

11. Tribe CROTALARIEAE

猪屎豆族 zhu shi dou zu

Li Jianqiang (李建强), Sun Hang (孙航), Wei Zhi (韦直); Roger M. Polhill, Michael G. Gilbert

Shrubs or herbs. Leaves generally digitately 3(–7)-foliolate, sometimes 1-foliate or simple, usually pulvinate; stipels absent. Inflorescences terminal, ± leaf-opposed, or less often axillary, racemes or heads, sometimes flowers solitary or aggregated into leafy pseudoracemes. Calyx generally with 5 subequal lobes. Corolla papilionaceous; standard sometimes with basal calluslike appendages. Stamens all connate into a sheath split above; anthers generally dimorphic, alternately basifixed and dorsifixed. Ovary 2- to many ovuled; style bearded lengthwise or minutely ciliate on adaxial side. Legumes usually turgid or inflated, rarely compressed, 2-valved, continuous within. Seeds estrophiolate.

Eleven genera and slightly more than 1,200 species: most diverse in S Africa where all but one N African genus occur, two genera extending east to China and one pantropical (*Crotalaria*); three genera (one introduced) and 44 species (nine endemic, seven introduced) in China.

- 1a. Stamens all similar; legume compressed, narrowly oblong, 3.5–5.5 × ca. 0.2 cm 52. *Rothia*
1b. Stamens dimorphic, 5 shorter with oblong basifixed anthers alternating with 5 longer with ovoid dorsifixed anthers; legume usually conspicuously inflated, or if not then less than 1.5 cm and/or more than 0.4 cm wide.
2a. Calyx lobes distinct or sometimes 2 adaxial ones connate; legume usually conspicuously inflated (but flat in *C. psoraleoides*) 50. *Crotalaria*
2b. Calyx with 4 adaxial lobes connate in pairs; legume only slightly inflated 51. *Lotononis*

50. CROTALARIA Linnaeus, Sp. Pl. 2: 714. 1753, nom. cons.

猪屎豆属 zhu shi dou shu

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Goniogyna Candolle; *Heylandia* Candolle; *Priotropis* Wight & Arnott.

Herbs or shrubs, often short-lived, rarely small trees. Stems terete or angled. Stipules filiform to leaflike or lacking. Leaves simple or 3-foliate, usually petiolate. Inflorescences terminal, leaf-opposed, or occasionally axillary, racemose, occasionally condensed and headlike; bracts usually present. Flowers usually pedicellate; bracteoles 2, rarely lacking. Calyx subcampanulate, with 5 subequal lobes or 2-lipped with 3 narrow abaxial lobes and 2 broader adaxial lobes often connate or partly connate. Corolla usually yellow, less often white, purplish red, or dark purplish blue; standard usually orbicular or oblong, outside glabrous or with trichomes, basally almost always with 2 appendages inside; wings oblong or narrowly elliptic; keel rounded to angled, generally extended into a well-developed beak. Stamens monadelphous, dimorphic, 5 usually shorter with oblong and basifixed anthers alternating with 5 longer with ovoid and dorsifixed anthers. Ovary stipitate or sessile, with or without trichomes, with 2 to many ovules; style long, basally curved or geniculate, almost always with 1 or 2 lines of trichomes on apical part; stigma minute, oblique, rarely 2-lobed. Legume subsessile to long stipitate, oblong, cylindric, ovoid-globose, or rarely rhombic, usually conspicuously inflated, rarely compressed, 2- to many seeded, with or without a stipe. Seeds obliquely cordate to oblong-reniform, with a definite hilar sinus.

About 700 species: throughout tropics and extending into subtropics, most numerous in E and S tropical Africa; 42 species (nine endemic, six introduced) in China.

The indumentum of many species of *Crotalaria* darkens significantly in herbarium collections and is often variously described as yellow or brown, but in living material it may often be ± colorless rather than as indicated in many descriptions.

Some species of *Crotalaria* are grown as fiber crops, fodder, and green manure, while others are used medicinally and as ornamentals. Pyrrolizidine alkaloids are present in some species, which in livestock can cause acute or more often chronic poisoning known as “crotalism.”

- 1a. Leaves 3-foliate; calyx subcampanulate.
2a. Legume 0.3–0.5 cm, 2-seeded.
3a. Leaflet blades elliptic, 2–3 × 1–1.5 cm; legume ca. 5 mm in diam.; corolla keel without twisted beak 5. *C. uncinella*
3b. Leaflet blades obovate to oblanceolate, 1–2 × 0.3–0.8 cm; legume 3–4 mm in diam.; corolla keel with twisted beak 39. *C. medicaginea*
2b. Legume 2–4 cm, (4–)20–30-seeded.
4a. Legume densely pubescent, not glabrescent; corolla only slightly longer than calyx.
5a. Leaflet blades suborbicular to elliptic-obovate, 2–4 × 1–2 cm; stems spreading pilose 1. *C. incana*
5b. Leaflet blades elliptic to narrowly elliptic, 5–7 × 2–4 cm; stems appressed pilosulose.
6a. Corolla 10–15 mm; legume 2.5–4 × 1–1.5 cm 2. *C. micans*
6b. Corolla 5–9 mm; legume ca. 2 × 0.5–1 cm.
7a. Leaflet blades elliptic to oblong-elliptic, 3–5 × 2–2.5 cm, apex obtuse; legume stipe ca. 4 mm 3. *C. jianfengensis*
7b. Leaflet blades narrowly elliptic, 5–7 × 2.5–4 cm, apex acuminate; legume stipe absent 4. *C. bracteata*

- 4b. Legume thinly pubescent when young, later glabrous; corolla ca. 2 × as long as calyx.
- 8a. Calyx glabrous.
- 9a. Leaflet blades oblong to narrowly elliptic, 2–3 cm wide; corolla standard orbicular 9. *C. trichotoma*
- 9b. Leaflet blades linear to linear-lanceolate, 0.5–1 cm wide; corolla standard oblong 10. *C. ochroleuca*
- 8b. Calyx with trichomes.
- 10a. Legume compressed, 4–8-seeded 6. *C. psoraleoides*
- 10b. Legume inflated, 20- or more seeded.
- 11a. Leaflet blades oblong to elliptic, 3–6 × 1.5–3 cm 7. *C. pallida*
- 11b. Leaflet blades linear to linear-lanceolate, 5–9(–12) × 0.5–1 cm 8. *C. lanceolata*
- 1b. Leaves simple; calyx subcampanulate or 2-lipped.
- 12a. Stipules lanceolate-lunate; corolla pale yellow, white, or often tinged blue 11. *C. verrucosa*
- 12b. Stipules not lanceolate-lunate, sometimes absent; corolla red, purple, purplish blue, yellow, or rarely pale yellow or white.
- 13a. Corolla purplish red to purple or purplish blue.
- 14a. Flowers in a condensed headlike raceme; corolla deep purple or purplish blue 27. *C. mairei*
- 14b. Flowers in an elongated raceme or rarely solitary; corolla purplish red to purple.
- 15a. Plant prostrate; leaf blade obovate to obovate-elliptic, less than 2 × as long as wide; legume with trichomes 23. *C. hainanensis*
- 15b. Plant erect; leaf blade linear-lanceolate to elliptic-oblancheolate, more than 2.5 × as long as wide; legume glabrous.
- 16a. Leaf blade 2–4 × 0.6–0.8 cm, adaxially with trichomes; plants ca. 0.6 m tall 22. *C. chiayiana*
- 16b. Leaf blade 5–8 × ca. 2 cm, adaxially glabrous; plants 1–1.5 m tall 24. *C. occulta*
- 13b. Corolla usually yellow, rarely pale yellow or white.
- 17a. Stipules winglike, decurrent along stem 12. *C. alata*
- 17b. Stipules not winglike, sometimes absent.
- 18a. Plant ca. 9 cm tall, erect; leaf blade 0.5–1 cm.
- 19a. Calyx subcampanulate, 5–6 mm, lobes all similar; corolla standard without glandular trichomes ... 41. *C. tiantaiensis*
- 19b. Calyx 2-lipped, ca. 7 mm, adaxial 2 lobes distinctly wider than abaxial 3 lobes; corolla standard with glandular trichomes along margin near base 42. *C. anningensis*
- 18b. Plant 20–150 cm tall or prostrate; leaf blade 1.5–20(–25) cm.
- 20a. Legume ovoid-globose, 0.4–0.7 cm, 6–12-seeded.
- 21a. Bracts ovate-triangular, 6–7 mm; calyx 8–10 mm, divided for ca. 1/2 its length 35. *C. dubia*
- 21b. Bracts lanceolate or linear, 1.5–3(–4) mm; calyx 4–7 mm, deeply divided.
- 22a. Leaf blade broadly ovate-elliptic to suborbicular, apex not mucronate 36. *C. humifusa*
- 22b. Leaf blade narrowly linear, oblanceolate, or oblong, apex mucronate.
- 23a. Leaf blade oblanceolate to oblong; plants ascending to erect, 50–100 cm tall; inflorescences elongated, 10–20 cm 37. *C. linifolia*
- 23b. Leaf blade narrowly linear; plants prostrate to erect, to 30 cm tall; inflorescences very short and headlike 38. *C. nana*
- 20b. Legume cylindric, 1–4(–6) cm, 10–30-seeded.
- 24a. Legume 1–1.5 cm, 10–15(–30)-seeded; herbs.
- 25a. Stipules absent.
- 26a. Leaf blade 3–8 × 2–4 mm, elliptic to ovate, adaxially glabrous 34. *C. similis*
- 26b. Leaf blade 10–60 × 4–25 mm, elliptic to linear, adaxially usually with trichomes (sometimes glabrous in *C. chinensis*).
- 27a. Corolla standard 4–5 mm; calyx 3–4 mm 33. *C. prostrata*
- 27b. Corolla standard 6–11 mm; calyx 5–10 mm.
- 28a. Leaf blade oblong-linear to linear; racemes 1–5-flowered 29. *C. chinensis*
- 28b. Leaf blade narrowly elliptic to elliptic; racemes 5–30-flowered 32. *C. yunnanensis*
- 25b. Stipules present but sometimes caducous.
- 29a. Stipules needlelike, ca. 1 mm.
- 30a. Racemes terminal or axillary, 20–30-flowered 30. *C. albida*
- 30b. Racemes axillary, (1 or)2- or 3-flowered 31. *C. uliginosa*
- 29b. Stipules linear, 2–6 mm.
- 31a. Leaf blade orbicular to elliptic; corolla 4–6 mm 28. *C. acicularis*
- 31b. Leaf blade linear, linear-lanceolate, or elliptic-oblancheolate; corolla 8–12 mm.
- 32a. Leaf blade linear-elliptic to elliptic-oblancheolate, ca. 2 cm wide 24. *C. occulta*
- 32b. Leaf blade linear to linear-lanceolate, 0.5–1 cm wide 26. *C. sessiliflora*
- 24b. Legume 2–4(–6) cm, (10–)20–30-seeded; herbs or shrublets.

- 33a. Calyx 2–3 cm, black when mature 25. *C. calycina*
 33b. Calyx less than 1.5 cm, brownish yellow when mature.
 34a. Stems 3- or 4-angled.
 35a. Stems 4-angled; leaf blade 10–20(–25) cm; racemes 6–10-flowered; legume 4–5 cm 18. *C. tetragona*
 35b. Stems 3-angled; leaf blade 2–3 cm; racemes 1–3-flowered; legume ca. 2 cm 40. *C. triquetra*
 34b. Stems terete.
 36a. Stipules 5–30 mm.
 37a. Stipules leaflike, broadly lanceolate, 10–30 mm 13. *C. mysorensis*
 37b. Stipules ovate-triangular, lanceolate, or triangular-lanceolate, 5–10 mm.
 38a. Stems and leaf blade adaxially glabrous; leaf blade 7–15 cm; stipules ovate-triangular, ca. 10 mm 14. *C. spectabilis*
 38b. Stems and leaf blade adaxially pilose; leaf blade 2–6 cm; stipules lanceolate to triangular-lanceolate, 5–8 mm 21. *C. ferruginea*
 36b. Stipules 1–3 mm.
 39a. Leaf blade obovate to obovate-elliptic, 1–3 cm; corolla yellow or purplish red 23. *C. hainanensis*
 39b. Leaf blade narrowly elliptic, lanceolate, or linear, 5–12 cm; corolla always yellow.
 40a. Corolla 1–1.2(–1.5) cm, equal to or only slightly exerted beyond calyx.
 41a. Leaf blade linear to oblong-linear, 4–7 × 0.4–1 cm; legume 3–4 cm, densely brown silky pubescent 19. *C. yaihsienensis*
 41b. Leaf blade narrowly elliptic, 6–11 × 2–3 cm; legume 1–2.5 cm, glabrous 20. *C. kurzii*
 40b. Corolla 1.5–2.5 cm, clearly exerted beyond calyx.
 42a. Leaf blade linear-lanceolate to oblong-linear, 0.5–2 cm wide 17. *C. juncea*
 42b. Leaf blade oblanceolate or narrowly elliptic, 2–4 cm wide.
 43a. Leaf blade apex obtuse to acuminate, mucronate; legume 4–6 cm 15. *C. assamica*
 43b. Leaf blade apex emarginate, not mucronate; legume 2.5–3 cm 16. *C. retusa*

1. *Crotalaria incana* Linnaeus, Sp. Pl. 2: 716. 1753.

圆叶猪屎豆 *yuan ye zhu shi dou*

Crotalaria incana subsp. *purpurascens* (Lamarck) Milne-Redhead; *C. purpurascens* Lamarck; *C. schimperii* A. Richard.

Herbs or shrublets, to 1 m tall. Stems brownish yellow spreading pubescent. Stipules acicular, 2–3 mm, tardily caducous. Leaves 3-foliolate; petiole 3–5 cm; petiolules 1–3 mm; leaflet blades elliptic-obovate, obovate, or suborbicular, 2–4 × 1–2 cm, terminal one larger than lateral ones, thin, abaxially pubescent to nearly glabrous, adaxially glabrous, secondary veins 6–10 on each side of midvein, secondary and tertiary veins abaxially distinct and adaxially inconspicuous, base rounded to broadly cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, 10–20 cm, 5–15-flowered; bracts 1–10 mm, caducous. Pedicel 3–4 mm; bracteoles inserted at base of calyx tube, similar to bracts, 2–3 mm. Calyx subcampanulate, 6–8 mm, 5-lobed, pubescent; lobes lanceolate, longer than tube. Corolla yellow, exerted beyond calyx; standard elliptic, 8–10 mm, base with appendages, apically usually pilose; wings oblong, 8–10 mm; keel ± as long as wings, abruptly rounded below middle, beak well developed and incurved. Legume clavate, 2–3 × 0.7–1 cm, apically slightly oblique, 20–30-seeded, densely rusty pilose; stipe ca. 2 mm. Fl. Oct–Dec, fr. Jan–Feb.

Sparse grasslands, along trails; below 100–2000 m. Cultivated or naturalized in Anhui, Guangdong, Guangxi, Jiangsu, Taiwan, Yunnan, and Zhejiang [pantropical; origin obscure].

2. *Crotalaria micans* Link, Enum. Hort. Berol. Alt. 2: 228. 1822.

三尖叶猪屎豆 *san jian ye zhu shi dou*

Crotalaria anagyroides Kunth.

Herbs or shrublets, to 2 m tall. Stems terete, thick, densely rusty appressed pubescent. Stipules acicular, very minute, persistent or caducous. Leaves 3-foliolate; petiole 2–5 cm; petiolules ca. 2 mm; leaflet blades elliptic to narrowly elliptic, 4–7(–10) × 2–3 cm, terminal one larger than lateral ones, thin, veins distinct on both surfaces, midvein abaxially sparsely pilose and adaxially pilose, secondary veins 8–15 on each side of midvein, base cuneate, apex acuminate and mucronate. Racemes terminal, 10–30 cm, 20–30-flowered; bracts linear, 0.7–1.3 cm, caducous. Pedicel 5–7 mm; bracteoles similar to bracts but smaller. Calyx subcampanulate, 7–10 mm, 5-lobed, densely rusty silky pilose; lobes broadly lanceolate, ± as long as tube. Corolla yellow, exerted beyond calyx; standard orbicular, ca. 1.4 cm in diam., base with 2 appendages, apex obtuse to retuse; wings oblong, ca. 1.3 cm; keel ca. 1 cm, abruptly rounded slightly below middle, beak slightly incurved. Legume oblong, 2.5–4 × 1–1.5 cm, 20–30-seeded, densely pilose when young, glabrescent; stipe 2–4 mm. Seeds black when mature, obliquely cordate, nearly smooth. Fl. May–Sep, fr. Aug–Dec.

Grasslands, slopes, along trails; below 100–2400 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Hainan, Taiwan, and Yunnan [native to South America and Mexico].

3. *Crotalaria jianfengensis* C. Y. Yang, Acta Phytotax. Sin. 20: 478. 1982.

尖峰猪屎豆 *jian feng zhu shi dou*

Herbs or shrublets, 60–120 cm tall. Stems terete, ribbed, densely brownish yellow pubescent. Stipules acicular, ca. 2 mm, caducous. Leaves 3-foliolate; petiole 3–5 cm; petiolules ca. 1.5 mm; leaflet blades elliptic to oblong-elliptic, 3–5 × 2–2.5 cm, terminal one larger than lateral ones, thin, abaxially slightly pubescent to subglabrous, adaxially glabrous, veins dis-

tinged on both surfaces, secondary veins 8–10 on each side of midvein, base narrow, apex obtuse to retuse and mucronate. Racemes terminal or axillary, ca. 40 cm, 50–80-flowered; bracts linear, 3–5 mm, caducous. Pedicel 0.8–1.2 cm; bracteoles inserted at base of calyx tube, similar to bracts but shorter. Calyx subcampanulate, 8–10 mm, 5-lobed, brownish yellow appressed pubescent; lobes lanceolate, subequal in length. Corolla yellow, included in calyx; standard obovate, 5–8 mm; wings oblong, 4–6 mm; keel ovate, \pm as long as standard, narrowed apically from middle. Legume cylindrical, many seeded, densely appressed pubescent; stipe 3–4 mm. Fl. Feb.

- Sandy areas, grassy slopes along rivers; ca. 600 m. Hainan.

4. *Crotalaria bracteata* Roxburgh ex Candolle, Prodr. 2: 130. 1825.

毛果猪屎豆 mao guo zhu shi dou

Herbs or shrublets, 60–120 cm tall. Stems terete, appressed pubescent. Stipules acicular, 3–4 mm. Leaves 3-foliolate; petiole 3–5 cm; petiolules 1–1.5 mm; leaflet blades narrowly elliptic, 5–7(–9) \times 2.5–4 cm, terminal one larger than lateral ones, thin, abaxially sparsely pilose, adaxially glabrous, veins distinct on both surfaces, secondary veins 8–18 on each side of midvein, base attenuate, apex acuminate. Racemes leaf-opposed or rarely terminal, 10–15 cm, 10–30-flowered; bracts acicular, ca. 1 mm. Pedicel 3–7 mm; bracteoles inserted at base of calyx tube, ovate-lanceolate, ca. 3 mm. Calyx subcampanulate, 5–6 mm, 5-lobed, pilose; lobes lanceolate, \pm as long as tube. Corolla yellow, exerted from calyx; standard oblong, ca. 9 mm, base with 2 appendages; wings oblong, ca. 8 mm; keel \pm as long as wing, curved, beak narrow and slightly incurved. Ovary sessile. Legume ellipsoid-fusiform, ca. 2 \times 0.5–1 cm, 7- or 8-seeded, densely rusty pubescent; style persistent. Fl. Aug–Sep, fr. Oct–Dec.

Along trails, riverbanks, forests; 700–1000 m. Yunnan (Xishuangbanna) [Bangladesh, Bhutan, Cambodia, India, Laos, Myanmar, Philippines, Thailand, Vietnam].

5. *Crotalaria uncinella* Lamarck subsp. **elliptica** (Roxburgh) Polhill, Kew Bull. 25: 284. 1971.

球果猪屎豆 qiu guo zhu shi dou

Crotalaria elliptica Roxburgh, Fl. Ind., ed. 1832, 3: 279. 1832; *C. splendens* Vogel.

Herbs, to 2 m, sometimes trailing or scandent. Stems terete, glabrescent. Stipules ovate-triangular, 1–1.5 mm. Leaves 3-foliolate; petiolules ca. 1 mm; leaflet blades elliptic, 1–3 \times 0.8–1.5 cm, abaxially pubescent, adaxially glabrous, midvein abaxially raised, base cuneate, apex obtuse and mucronate or sometimes retuse. Racemes terminal or leaf-opposed, 10–30-flowered or more; bracts ovate-triangular, ca. 1 mm. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx subcampanulate, 3–4 mm, 5-lobed, densely pubescent; lobes broadly lanceolate, \pm as long as tube. Corolla yellow, exerted beyond calyx; standard suborbicular to elliptic, ca. 5 mm; wings oblong, \pm as long as standard; keel 5–6 mm, longer than standard, strongly rounded, apex with a short straight beak. Ovary sessile. Legume ovoid, 6–7 mm, 2-seeded, pubescent. Seeds brownish. Fl. Aug–Oct, fr. Nov–Dec.

Mountains, along trails; below 100–1100 m. Guangdong, Guangxi, Hainan [India, Malaysia, Thailand, Vietnam].

Crotalaria uncinella subsp. *uncinella* is found in Africa and the Mascarene Islands and has larger flowers (keel 0.9–1.1 cm) and legumes (8–11 mm).

6. *Crotalaria psoraleoides* D. Don, Prodr. Fl. Nepal. 242. 1825 [*“psoralioides”*].

黄雀儿 huang que er

Crotalaria cytisoides Roxburgh ex Candolle; *C. szemaensis* Gagnepain; *Priotropis cytisoides* (Roxburgh ex Candolle) Wight & Arnott.

Shrubs, 50–100 cm tall. Stems and branches terete, appressed brownish pubescent when young, glabrescent. Stipule subulate, often caducous. Leaves 3-foliolate; petiole 2–4 cm; petiolules less than 1 mm; leaflet blades elliptic to oblong, 5–7 \times 1.5–5 cm, with terminal one longer than lateral ones, thin, abaxially slightly appressed pubescent, adaxially glabrous, base tapered, apex acuminate and mucronate. Racemes terminal or leaf-opposed, 10–30-flowered; bracts linear, 2–4 mm. Pedicel 6–8 mm; bracteoles 2, basal to calyx tube and at middle or apical part of pedicel, lanceolate-triangular. Calyx subcampanulate, 5–7 mm, pubescent, 5-lobed; lobes lanceolate, \pm as long as calyx tube, apex acuminate. Corolla yellow, turning red when old, exerted from calyx; standard oblong, 7–10 mm; wings obovate-oblong, broader at base; keel strongly rounded around middle through almost 90°, beak not twisted. Legume ellipsoid, ca. 3 cm, compressed, with trichomes when young, glabrescent when mature; stipe 4–5 mm. Seeds 4–8, smooth. Fl. and fr. Apr–Dec.

Trailsides on mountain slopes; 800–1500 m. Xizang, Yunnan [Bangladesh, Bhutan, N India, N Myanmar, Nepal, N Thailand].

Crotalaria psoraleoides belongs to the same section as *C. bracteata* and *C. uncinella* but has been placed by some authors in the genus *Priotropis* on the basis of its compressed legumes. Such legumes are found in other, unrelated species of *Crotalaria* and do not justify the recognition of a distinct genus.

7. *Crotalaria pallida* Aiton, Hort. Kew. 3: 20. 1789.

猪屎豆 zhu shi dou

Crotalaria mucronata Desvaux; *C. obovata* G. Don; *C. pallida* var. *obovata* (G. Don) Polhill; *C. striata* Candolle.

Herbs, perennial. Branches terete, ribbed, densely appressed pubescent. Stipules acicular, very minute, caducous. Leaves 3-foliolate; petiole 2–4 cm; petiolules 1–2 mm; leaflet blades oblong to elliptic, 3–6 \times 1.5–3 cm, abaxially sparsely silky pubescent, adaxially glabrous, veins distinct on both surfaces, base broadly cuneate, apex obtuse to retuse. Racemes terminal, ca. 25 cm, 10–40-flowered; bracts linear, ca. 4 mm, caducous. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts, ca. 2 mm. Calyx subcampanulate, 4–6 mm, 5-lobed, densely pubescent; lobes triangular, \pm as long as tube. Corolla yellow, exerted beyond calyx; standard orbicular to elliptic, ca. 1 cm in diam., base with 2 appendages; wings oblong, ca. 8 mm, marginally pilose on basal part; keel ca. 1.2 cm, rather shallowly rounded, marginally pilose at base, beak

narrow and \pm projecting. Ovary subsessile. Legume oblong, 3–4 \times 0.5–0.8 cm, 20–30-seeded, pilose when young but glabrescent. Fl. Sep–Oct, fr. Nov–Dec.

Grasslands, disturbed sandy areas; 100–1100 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America].

Crotalaria pallida is a very weedy species that is adventive throughout the tropics. It is suspected of being poisonous to livestock.

8. *Crotalaria lanceolata* E. Meyer, Comm. Pl. Afr. Austr. 24. 1836.

长果猪屎豆 chang guo zhu shi dou

Herbs, 50–100 cm tall. Branches terete, pilose when young but glabrescent. Stipules absent. Leaves 3-foliolate; petiole 3–6 cm; petiolules 1–2 mm; leaflet blades linear to linear-lanceolate, 5–9(–12) \times 0.5–1 cm, both surfaces sparsely pilose or glabrous, base cuneate, apex acuminate and mucronate. Racemes terminal, to 20 cm, 10–40-flowered; bracts subulate to filiform, 0.5–3 mm, expanded at base. Pedicel 3–5 mm; bracteoles normally inserted at base of calyx or rarely on pedicel, narrow, 0.3–1 mm. Calyx subcampanulate, ca. 3 mm, 5-lobed, pubescent; lobes triangular, shorter than tube. Corolla yellow, exerted beyond calyx; standard broadly elliptic to orbicular, ca. 1 cm in diam., base with 2 appendages; wings oblong, ca. 1 cm, marginally pilose at base; keel \pm as long as wings, apical half rounded, marginally pubescent at base, beak long. Ovary subsessile. Legume oblong, 2–3 \times 0.5–1 cm, many seeded, glabrous. Seeds obliquely cordate. Fl. Jun–Aug, fr. Sep–Nov.

Grasslands, along trails; to ca. 900 m. Cultivated or naturalized in Fujian, Taiwan, and Yunnan [native to Africa and Madagascar].

This species is adventive in North and South America.

9. *Crotalaria trichotoma* Bojer, Ann. Sci. Nat., Bot., sér. 2, 4: 265. 1835.

光萼猪屎豆 guang e zhu shi dou

Crotalaria usaramoensis E. G. Baker; *C. zanzibarica* Benth.

Herbs or shrublets, to 2 m tall. Branches terete, ribbed, pubescent. Stipules subulate, ca. 1 mm. Leaves 3-foliolate; petiole 3–5 cm; petiolules ca. 2 mm; leaflet blades narrowly elliptic, 6–10 \times 1–2(–3) cm, abaxially pubescent, adaxially glabrous, base cuneate, apex acuminate and mucronate. Racemes terminal, ca. 20 cm, 10–20-flowered; bracts linear, 2–3 mm. Pedicel 3–6 mm; bracteoles inserted on apical half of pedicel, similar to bracts in shape but shorter. Calyx subcampanulate, 4–5 mm, 5-lobed; lobes triangular, \pm as long as tube, glabrous to sparsely pubescent. Corolla yellow, exerted beyond calyx; standard orbicular, ca. 1.2 cm in diam., base with 2 appendages, apex awned; wings oblong, \pm as long as standard; keel ca. 1.5 cm, slightly rounded, narrowed apically from middle, marginally pubescent at base, beak rather long. Ovary subsessile. Legume cylindrical, 3–4 \times 0.7–1.2 cm, 50–70-seeded, glabrescent; style and calyx persistent. Seeds orangish buff to terra-cotta-colored, reniform, smooth. Fl. Apr–Aug, fr. Sep–Dec.

Grasslands, along trails; 100–2000 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Hainan, Hunan, Sichuan, Taiwan, and Yunnan [native to E Africa; introduced in Australia, Indonesia, Malaysia, Philippines, Sri Lanka, and Vietnam].

10. *Crotalaria ochroleuca* G. Don, Gen. Hist. 2: 138. 1832.

狭叶猪屎豆 xia ye zhu shi dou

Herbs or shrublets, erect, to 1.5 m tall. Branches ribbed, pubescent when young but glabrescent. Stipules absent. Leaves 3-foliolate; petiole 1–3 cm; petiolules ca. 1 mm; leaflet blades linear to linear-lanceolate, 5–9(–12) \times 0.5–1 cm, abaxially sparsely pilose, adaxially glabrous, base broadly cuneate, apex acuminate and mucronate. Racemes terminal, 10–15 cm, 10–15-flowered, lax; bracts minute. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx subcampanulate, ca. 4 mm, 5-lobed, glabrous; lobes triangular. Corolla pale yellow or white, exerted far beyond calyx; standard oblong, 0.8–1.2 cm, base with 2 appendages; wings obovate, ca. 1.3 cm; keel 1.7–2.3 cm, longer than wings, shortly rounded, beak rather long and projecting. Ovary subsessile. Legume oblong, 4–7 \times 1.5–2 cm, 20–30[–100]-seeded, sparsely pubescent. Seeds pale yellow to orange, reniform, smooth. Fl. Aug–Oct, fr. Nov–Dec.

Shaded places with thin soil. Cultivated or naturalized in Guangdong, Guangxi, and Hainan [native to Africa; introduced in Australia, North America, Papua New Guinea, and South America (Brazil)].

11. *Crotalaria verrucosa* Linnaeus, Sp. Pl. 2: 715. 1753.

多疣猪屎豆 duo you zhu shi dou

Crotalaria acuminata G. Don; *C. angulosa* Lamarck; *C. mollis* Weinmann.

Herbs, erect, 50–100 cm tall. Branches 4-angled, glabrescent. Stipules leaflike, ovate-falcate, 5–8 mm. Leaves simple; petiole 3–5 mm; leaf blade ovate to elliptic, 10–15 \times 3–5 cm, thinly membranous, abaxially densely pubescent, adaxially glabrous, base broadly cuneate, apex acuminate. Racemes terminal, 10–20-flowered; bracts linear, ca. 1 mm. Pedicel 3–4 mm; bracteoles inserted apically from middle of pedicel. Calyx subcampanulate, 8–10 mm, 5-lobed; lobes lanceolate, slightly longer than tube. Corolla pale yellow, white, or often tinged blue; standard orbicular to obovate, 1–1.8 cm, base with 2 appendages; wings oblong, 1–1.6 cm; keel \pm as long as wings, exerted beyond calyx, rounded with an incurved, fairly shortly twisted beak. Ovary subsessile, pilose on apical part. Legume oblong, 2–4 cm, 10–12-seeded, pubescent. Seeds nearly smooth to papillose, shiny. Fl. Aug–Oct, fr. Nov–Dec.

Grasslands, sparse forests; 100–200 m. Guangdong, Hainan, Taiwan [Bangladesh, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Australasia, introduced in Africa and the Americas].

Crotalaria verrucosa is now quite a common weed throughout the tropics.

12. *Crotalaria alata* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 241. 1825.

翅托叶猪屎豆 chi tuo ye zhu shi dou

Crotalaria bialata Roxburgh (1832), not Schrank (1819); *C. bidiei* Gamble.

Herbs or shrublets, erect, 5–100 cm tall. Branches zigzag, silky pilose. Stipules decurrent on stem as a broad wing. Leaves simple, nearly sessile; leaf blade elliptic to obovate-elliptic, 3–8 × 1–5 cm, both surfaces with trichomes but abaxially slightly denser, base attenuate to cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, 2- or 3-flowered; bracts ovate-lanceolate, ca. 3 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 6–10 mm; lobes lanceolate, apex acuminate. Corolla yellow; standard obovate-orbicular, 5–8 mm, abaxially bearded at apex; wings oblong, shorter than standard; keel ovate, apically with a long twisted beak. Ovary glabrous. Legume oblong, 3–4 cm, 30–40-seeded, sparsely pubescent or glabrous, apex with a slightly curved beak; neck ca. 3 mm. Seeds obliquely cordate, smooth. Fl. Jun–Aug, fr. Sep–Dec.

Montane grasslands; 100–2000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; cultivated and naturalized in Africa and Madagascar].

Crotalaria alata has been used for erosion control and soil improvement.

13. *Crotalaria mysorensis* Roth, Nov. Pl. Sp. 338. 1821.

褐毛猪屎豆 he mao zhu shi dou

Crotalaria decasperma Naik; *C. stipulacea* Roxburgh.

Herbs, erect, 50–100 cm tall. Branches terete, densely rusty spreading pilose. Stipules broadly lanceolate, 1–3 × 0.3–0.5 cm. Leaves simple, nearly sessile; leaf blade lanceolate to broadly lanceolate, 5–7(–8) × 0.5–1.5 cm, both surfaces sparsely pilose, base cuneate, apex obtuse. Racemes terminal, 6–9-flowered; bracts lanceolate, 5–8 mm. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, similar to bracts, 6–10 mm. Calyx 2-lipped, 0.8–1.5 cm, parted to base. Corolla yellow; standard narrowly elliptic, 1.2–1.5 cm, base with 2 appendages, apical half pilose; wings lanceolate-oblong, 1.2–1.4 cm; keel slightly longer than wings, narrowed apically from middle and extended into a long suberect twisted beak. Legume broadly oblong, 2–3 × 1.2–1.5 cm, 20–30-seeded. Fl. Aug.

Near sea level. Guangdong (coastal islands) [Bangladesh, India, Indonesia, Malaysia, Nepal, Pakistan, ?Philippines, Sri Lanka].

14. *Crotalaria spectabilis* Roth, Nov. Pl. Sp. 341. 1821.

大托叶猪屎豆 da tuo ye zhu shi dou

Crotalaria leschenaultii Candolle; *C. sericea* Retzius (1788), not N. L. Burman (1768), nor Willdenow (1802).

Herbs, erect, 0.6–1.5 m tall. Branches terete, glabrous. Stipules ovate-triangular, ca. 1 cm. Leaves simple; petiole 2–8 mm; leaf blade oblanceolate to narrowly elliptic, 7–15 × 2–5 cm, thin, abaxially appressed silky pubescent, adaxially glabrous, base broadly cuneate, apex obtuse and mucronate. Racemes terminal, 20–30-flowered; bracts ovate-triangular, 7–10 mm. Pedicel 1–1.5 cm; bracteoles inserted at or apical to middle of pedicel, linear, ca. 1 mm. Calyx 2-lipped, 1.2–1.5 cm, glabrous; lobes broadly lanceolate-triangular, longer than tube. Corolla pale yellow; standard veined purplish red, suborbicular

to oblong, 1–2 cm, base with 2 appendages, apex obtuse to retuse; wings obovate, ca. 2 cm; keel rounded about middle, with a fairly short and slightly incurved twisted beak exerted beyond calyx. Legume broadly oblong, 2.5–3 × 1.5–2 cm, 20–30-seeded, shortly stipitate, glabrous. Seeds smooth. Fl. Aug–Oct, fr. Oct–Dec.

Montane grasslands, along trails; 100–1500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Bangladesh, India, Malaysia, Myanmar, Nepal, ?Philippines, Thailand; cultivated and naturalized in Africa and Madagascar].

15. *Crotalaria assamica* Benth, London J. Bot. 2: 481. 1843.

大猪屎豆 da zhu shi dou

Herbs, erect, to 1.5 m tall. Branches terete, sericeous. Stipules linear, minute. Leaves simple; petiole 2–3 mm; leaf blade oblanceolate to narrowly elliptic, 5–15 × 2–4 cm, thin, abaxially sericeous, adaxially glabrous, base cuneate, apex obtuse and mucronate. Racemes terminal or leaf-opposed, to 30 cm, 20–30-flowered; bracts linear, 1–2 mm. Bracteoles similar to bracts but shorter. Calyx 2-lipped, 1–1.5 cm, pubescent; lobes lanceolate-triangular, ± as long as tube. Corolla deep golden yellow; standard suborbicular to elliptic, 1.5–2 cm, base with 2 appendages, apex retuse; wings 1.5–1.8 cm; keel rounded through 90°, narrowed apically from middle and extended into a long twisted beak exerted beyond calyx. Ovary glabrous. Legume oblong, 4–6 × ca. 1.5 cm, 20–30-seeded; stipe ca. 5 mm. Fl. May–Sep, fr. Aug–Dec.

Montane grasslands, along trails; below 100–3000 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [India, Laos, Myanmar, Philippines, Thailand, Vietnam].

Baker (Fl. Brit. India 2: 75. 1876) suggested that *Crotalaria sericea* N. L. Burman (Fl. Indica, 156. 1768) might be conspecific with this species. If this was the case, then Burman's name would have priority, but there seems to be too much doubt as to the exact identity of Burman's species to justify displacing a well-established name. Some authors have cited Burman's name as a synonym of *C. assamica* in the apparent belief that *C. sericea* N. L. Burman was a later homonym of *C. sericea* Retzius (1788), following Candolle who published the replacement name *C. burmanii* Candolle, but this is not correct as Burman's name has priority.

16. *Crotalaria retusa* Linnaeus, Sp. Pl. 2: 715. 1753.

吊裙草 diao qun cao

Lupinus cochinchinensis Loureiro.

Herbs, erect, 60–120 cm tall. Branches terete, pubescent. Stipules subulate, ca. 1 mm. Leaves simple; petiole 2–4 mm; leaf blade oblong to oblanceolate, 3–8 × 1–3.5 cm, abaxially slightly pubescent, adaxially glabrous, veins distinct on both surfaces, base cuneate, apex retuse. Racemes terminal, 10–20-flowered; bracts lanceolate, 2–3 mm. Pedicel 3–5 mm; bracteoles inserted on apical part of pedicel, filiform, very minute. Calyx 2-lipped, 1–1.2 cm, sparsely pubescent; lobes broadly lanceolate. Corolla yellow; standard suborbicular to elliptic, 1–1.5 cm, base with 2 appendages; wings oblong, 1–1.5 cm; keel ± as long as wings, narrowed apically from middle and extended into a long twisted beak exerted beyond calyx. Legume

oblong, 3–4 × 1–1.8 cm, 10–20-seeded, glabrous; stipe ca. 2 mm. Fl. Oct–Dec, fr. Jan–Apr.

Montane grasslands, seashore sandy areas. Guangdong, Hainan [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, SW Asia, Pacific islands].

This species is cultivated in Hunan. It is toxic to livestock.

17. *Crotalaria juncea* Linnaeus, Sp. Pl. 2: 714. 1753.

菽麻 shu ma

Crotalaria benghalensis Lamarck; *C. sericea* Willdenow (1802), not N. L. Burman (1768), nor Retzius (1788); *C. tenuifolia* Roxburgh ex Hornemann.

Herbs, erect, 50–100 cm tall. Branches terete, ribbed, appressed silky pubescent. Stipules linear, ca. 2 mm, caducous. Leaves simple; petiole 3–5 mm; leaf blade oblong to linear-lanceolate, 6–12 × 0.5–2 cm, both surfaces pilose but abaxially more densely so, base attenuate, apex acuminate and mucronate. Racemes terminal, 10–20-flowered; bracts linear, 3–4 mm. Pedicel 5–8 mm; bracteoles inserted at base of calyx tube, shorter than bracts, densely pubescent. Calyx 2-lipped, 1–1.5 cm, parted almost to base, densely rusty pilose; lobes lanceolate, curved. Corolla yellow; standard oblong, 1.5–2.5 cm, base with 2 appendages; wings obovate-oblong, 1.5–2 cm; keel subangular, slightly longer than wings, apex with a long slightly incurved twisted beak exerted beyond calyx. Legume sessile, cylindrical, 2–4 × 1.2–1.7 cm, 10–15-seeded, rusty pubescent. Seeds smooth to papillose around hilum. Fl. Aug–Dec, fr. Jan–May.

Sparse forests, along trails; below 100–2000 m. Cultivated or naturalized in Fujian, Guangdong, Guangxi, Jiangsu, Shaanxi, Shandong Sichuan, Taiwan, Yunnan, and Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Crotalaria juncea is cultivated as a fiber crop (“Sunn Hemp”) and as a green manure. It is widely naturalized in Africa, tropical and subtropical America, Asia, Australia, and Papua New Guinea. Its original distribution is probably S Asia.

18. *Crotalaria tetragona* Roxburgh ex Andrews, Bot. Repos. 9: t. 593. 1812.

四棱猪屎豆 si leng zhu shi dou

Crotalaria esquirolii H. Léveillé.

Herbs, erect, to 2 m tall. Branches 4-angled, silky pubescent. Stipules linear to linear-lanceolate, 4–5 mm. Leaves simple; petiole ca. 4 mm; leaf blade oblong-elliptic to linear-lanceolate, 10–20(–25) × 1–2.5 cm, both surfaces finely appressed pubescent, midvein abaxially pale and prominent, base broadly cuneate to obtuse, apex acute to slightly acuminate. Racemes terminal or leaf-opposed, 6–10-flowered; bracts lanceolate, 4–6 mm. Pedicel 1–1.5 cm; bracteoles inserted at apex of pedicel, linear, 3–4 mm. Calyx 2-lipped, 1.5–2.5 cm, divided to near base, densely brown pilose; abaxial lobes narrowly triangular-lanceolate, connate for ca. 1/4 of length, 4–5 mm wide at base; adaxial lobes similar, divided to near base. Corolla yellow; standard suborbicular to oblong, ca. 2.5 cm, base with 2 appen-

dages; wings narrowly elliptic to lanceolate-elliptic, ca. 2 cm; keel ± as long as wings, broad and rounded, abaxial margin woolly, beak long, twisted, and exerted beyond calyx. Legume oblong, 4–5 cm, 10–20-seeded, [dark brown tomentose or] densely brownish yellow pubescent. Fl. Sep–Nov, fr. Dec–Feb.

Sparse forests, along trails; 500–1600 m. Guangdong, Guangxi, Sichuan, Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, ?Philippines, Thailand, Vietnam].

19. *Crotalaria yaihsienensis* T. C. Chen, Acta Phytotax. Sin. 8: 349. 1963.

崖州猪屎豆 ya zhou zhu shi dou

Herbs, to 1 m tall. Branches terete, ribbed, appressed silky pubescent. Stipules filiform, less than 1 mm, caducous. Leaves simple; petiole 2–3 mm; leaf blade linear, 4–7 × 0.4–1 cm, both surfaces silky pilose but abaxially more densely so, midvein abaxially prominent and adaxially sulcate, secondary veins 12–15 on each side of midvein, base slightly cuneate, apex obtuse. Racemes terminal or leaf-opposed, 10–20 cm, 8–12-flowered, lax; bracts ovate-triangular, ca. 1.5 mm. Bracteoles inserted at base of calyx tube. Calyx 2-lipped, ca. 1 cm; abaxial 3 lobes linear-lanceolate, ca. 1 cm; adaxial 2 lobes lanceolate, ca. 9 mm. Corolla yellow; standard suborbicular, ca. 7 mm; keel ± as long as standard, narrowed apically from middle and extended into a long beak included in calyx. Ovary sessile, with trichomes. Legume oblong, 2.5–3 cm, 10–20-seeded, densely brown silky pubescent. Fl. Sep–Nov, fr. Dec–Jan.

• Seashores, montane grasslands. S Hainan (Sanya).

20. *Crotalaria kurzii* Baker ex Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 229. 1874.

薄叶猪屎豆 bao ye zhu shi dou

Crotalaria peguana Benthham ex Baker; *C. peguana* var. *qiubeiensis* (C. Y. Yang) C. Chen & J. Q. Li; *C. qiubeiensis* C. Y. Yang.

Herbs or shrublets, erect, 0.6–1.5 m tall. Branches terete, appressed pubescent. Stipules acicular, very minute. Leaves simple; petiole 1–2 mm; leaf blade narrowly elliptic, 6–11 × 2–3 cm, thinly to thickly papery, abaxially silky pubescent, adaxially glabrous or pilose, veins abaxially raised, base attenuate to slightly cuneate, apex acuminate. Racemes terminal, to 20 cm, many flowered; bracts linear, 2–4 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube or on middle of pedicel, similar to bracts. Calyx 2-lipped, 0.8–1.2 cm, parted nearly to base, pubescent; lobes linear, linear-lanceolate, or broadly lanceolate, apex acuminate. Corolla yellow, included in or ± as long as calyx; standard oblong to ovate-oblong, 0.8–1.2 cm, base with 2 appendages, apically barbate; wings oblong, 8–10 mm, apex obtuse; keel ca. 9 mm, rounded, apex with a long twisted beak. Ovary sessile. Legume oblong, 1–2(–2.5) × 0.5–1 cm, 8–15-seeded, glabrous. Fl. Jun–Oct, fr. Sep–Dec.

Thickets, open woodlands; 800–1500 m. Guangxi, Yunnan [Bangladesh, India, Laos, Myanmar, Thailand, Vietnam].

Collections with more broadly lanceolate calyx lobes have been treated as *Crotalaria peguana* var. *qiubeiensis*.

21. *Crotalaria ferruginea* Graham ex Bentham, London J. Bot. 2: 476. 1843.

假地蓝 jia di lan

Crotalaria bodinieri H. Léveillé; *C. ferruginea* var. *pilosissima* Bentham ex Baker; *C. lonchophylla* Handel-Mazzetti; *C. pilosissima* Miquel; *C. rufescens* Franchet.

Herbs, erect to ascending, 20–60(–120) cm tall. Branches brownish yellow spreading pilose. Stipules lanceolate to triangular-lanceolate, 5–8 mm. Leaves simple; leaf blade elliptic, 2–6 × 1–3 cm, both surfaces pilose but abaxially more densely so, base slightly cuneate, apex obtuse to acuminate. Racemes terminal, 2–6-flowered; bracts lanceolate, 2–4 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube. Calyx 2-lipped, 1–1.2 cm, parted to base, densely pilose; lobes lanceolate. Corolla yellow; standard narrowly elliptic, 8–10 mm; wings oblong, ca. 8 mm; keel ± as long as wings, narrowed apically from middle and extended into a long twisted beak included in or exerted slightly beyond calyx. Ovary subsessile. Legume oblong, 2–3 cm, 20–30-seeded, glabrous. Fl. Jun–Oct, fr. Sep–Dec.

Open forests, montane grasslands; 400–2200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

22. *Crotalaria chiayiana* Y. C. Liu & F. Y. Lu, Quart. J. Chin. Forest. 12(4): 79. 1979.

红花假地蓝 hong hua jia di lan

Crotalaria ferruginea Graham ex Bentham var. *chiayiana* (Y. C. Liu & F. Y. Lu) S. S. Ying.

Herbs, erect, to 60 cm tall. Branches terete, densely pubescent. Stipules triangular-lanceolate, spreading, longer than petiole, persistent. Leaves simple; petiole very short; leaf blade linear-lanceolate, 2–4 × 0.6–0.8 cm, both surfaces hirsute, apex acuminate. Racemes terminal or leaf-opposed, 1–4-flowered. Calyx campanulate, sericeous; lobes linear-lanceolate, much longer than tube. Corolla purplish red or purple, ± as long as calyx. Legume ellipsoidal, glabrous.

- Wastelands, open roadsides; 1400–1600 m. Taiwan.

This species is known to us only from the protologue but seems to be easily identifiable by the unusual corolla color.

23. *Crotalaria hainanensis* C. C. Huang, Acta Phytotax. Sin. 6: 393. 1957.

海南猪屎豆 hai nan zhu shi dou

Herbs, prostrate. Branches sparsely hirsutulous. Stipules subulate to ovate-lanceolate, ca. 2 mm. Leaves simple; petiole short; leaf blade obovate to obovate-elliptic, 1–3 × 1–2 cm, both surfaces glabrescent, veins abaxially raised, base broadly cuneate, apex obtuse and mucronate. Racemes terminal, 1–3-flowered; bracts ovate-triangular, ca. 3 mm. Pedicel 2–6 mm; bracteoles inserted on pedicel at or below middle, linear, ca. 1 mm. Calyx 2-lipped, 8–10 mm, parted, pubescent; lobes lanceo-

late. Corolla yellow or purplish red; standard rhombic to suborbicular, 0.8–1.2 cm, glabrous, base with 2 appendages; wings oblong, 8–10 mm; keel ± as long as standard, narrowed basally from middle, apically extended into a long twisted beak. Ovary subsessile. Legume oblong, 2–3 cm, 10–15-seeded, densely rusty pilose. Seeds brown, reniform, glabrous. Fl. Aug–Oct, fr. Sep–Dec.

- Dry grasslands, open sands. Hainan (Changjiang).

24. *Crotalaria occulta* Graham ex Bentham, London J. Bot. 2: 565. 1843.

紫花猪屎豆 zi hua zhu shi dou

Herbs, 1–1.5 m tall. Branches terete, densely pilose. Stipules linear to filiform, 5–8 mm, persistent. Leaves simple; petiole very short; leaf blade linear-oblong to elliptic-oblong, 5–8 × ca. 2 cm, abaxially sparsely pilose, adaxially glabrous, base attenuate, apex acuminate. Racemes terminal or leaf-opposed, to 15 cm, 1–20-flowered; bracts linear, ca. 1 cm. Bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 1.5–1.8 cm, densely rusty pilose; abaxial lobes narrow, 2–3 mm wide; adaxial lobes 5–6 mm wide. Corolla yellow or purplish blue, included in calyx; standard obovate, 1–1.2 cm, base with 2 appendages; wings oblong, ± as long as standard; keel rounded with a long twisted beak. Legume cylindrical, ca. 1.5 cm, included in or ± as long as calyx, 10–15-seeded, glabrous. Fl. Aug–Oct, fr. Nov–Feb.

Sparse forests, along trails; 800–1000 m. Yunnan [Bangladesh, Bhutan, India, N Laos].

Indian collections note that the flowers open at dusk and have a sweet scent similar to that of *Viola odorata*.

25. *Crotalaria calycina* Schrank, Pl. Rar. Hort. Monac. t. 12. 1817.

长萼猪屎豆 chang e zhu shi dou

Crotalaria roxburghiana Candolle.

Herbs, annual or short-lived perennial, erect, 30–80 cm tall. Branches terete, densely coarsely pilose. Stipules filiform, ca. 1 mm, persistent or caducous. Leaves simple, subsessile; leaf blade oblong-linear to linear-lanceolate, 3–12 × 0.5–1.5 cm, abaxially densely brownish pilose, adaxially pilose on midvein, base narrow, apex acute. Racemes terminal, usually condensed or headlike, 3–12-flowered, often with solitary axillary flowers below; bracts lanceolate, slightly ovate-falcate, 1–2 cm. Pedicel 2–4 mm, thick; bracteoles inserted at base of calyx tube or on middle or apical part of pedicel, similar to bracts but shorter. Calyx 2-lipped, 2–3 cm, parted to base, abaxially brownish pilose; lobes lanceolate. Corolla yellow, included in calyx; standard obovate to suborbicular, 1.5–2.5 cm, base with 2 appendages, apically pubescent; wings narrowly elliptic, ± as long as standard; keel with a long straight shortly twisted beak. Legume black when mature, subcylindric, 2–2.5 cm, 20–30-seeded, glabrous. Fl. Jun–Sep, fr. Oct–Dec.

Open forests, along trails; below 100–2400 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Pakistan,

Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands].

26. *Crotalaria sessiliflora* Linnaeus, Sp. Pl., ed. 2, 2: 1004. 1763.

野百合 ye bai he

Crotalaria brevipes Champion ex Benth.

Herbs, annual or short-lived perennial, erect, 30–100 cm tall. Stems often branching from lower parts, terete, densely coarsely hirsute. Stipules linear, 2–3 mm, persistent or caducous. Leaves simple; petiole nearly absent; leaf blade variable in shape, usually linear to linear-lanceolate, 3–8 × 0.5–1 cm, abaxially densely silky pubescent, adaxially glabrous, base attenuate, apex acuminate. Racemes terminal or leaf-opposed or densely congested and headlike on branch apices, few to many flowered or flowers solitary in axils; bracts linear-lanceolate, 4–6 mm. Pedicel ca. 2 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 1–1.5 cm, conspicuously long brownish pilose; abaxial lobes lanceolate to triangular-lanceolate, to 2.5 mm wide, connate for ca. 1/4 of length; adaxial lobes ca. 4 mm wide, joined for ca. 1/3 length, apices long acuminate. Corolla blue to purplish blue or pale yellow, slightly shorter than calyx; standard oblong, 7–10 × 4–7 mm, abaxially sparsely strigose along midvein, base with 2 appendages, apex obtuse to retuse; wings oblong to linear-oblong, shorter than standard; keel ± as long as standard, bent sharply below middle, adaxial margin proximally woolly, apex extended into straight twisted beak. Ovary sessile. Legume dark with age, cylindrical, ca. 1 cm, ± included in calyx, 10–15-seeded, glabrous. Fl. May–Nov, fr. Oct–Feb.

Valley grasslands, along trails; below 100–1600 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam; Pacific islands].

27. *Crotalaria mairei* H. Léveillé, Bull. Acad. Int. Geogr. Bot. 25: 49. 1915.

头花猪屎豆 tou hua zhu shi dou

Herbs, perennial, ascending to erect, 10–60 cm tall. Stems many from base, terete, densely silky pilose. Stipules acicular, 1–2 mm, persistent or caducous. Leaves simple; petiole 1–4 mm; leaf blade lanceolate, oblong-lanceolate, or rarely oblanceolate, 1.5–3 × 0.5–1.5 cm, abaxially densely brown pilose, adaxially glabrous or very sparsely pilose, base cuneate, apex shortly acuminate to rounded and cuspidate. Racemes terminal, headlike, less than 5 cm, 10–20-flowered; bracts linear to linear-lanceolate, 4–8 mm. Pedicel ca. 2 mm or ca. 5 mm when flowers arranged laxly on branch tip and not headlike; bracteoles inserted at base of calyx, similar to bracts. Calyx 2-lipped, 1–1.3 cm, deeply divided, densely brown pilose or pubescent; lobe apices long acuminate; abaxial lobes lanceolate; adaxial lobes oblong-ovate, ca. 3 mm wide. Corolla deep purple or purplish blue, ± as long as calyx; standard ovate to suborbicular, 0.8–1.3 cm, abaxially pilose near tip, base with 2 appendages, apex obtuse to retuse; wings oblong, 0.8–1.3 cm; keel ovate, ±

sharply angled near base, margins proximally woolly, apex extended into a long straight twisted beak. Ovary sessile. Legume cylindrical, ca. 1 cm, included in or slightly exserted beyond calyx, 10–15-seeded, glabrous. Fl. Sep–Nov, fr. Dec–Feb.

Montane grasslands; 300–3000 m. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [India, Myanmar, Nepal, Sri Lanka].

- 1a. Calyx densely brown pilose; legume included within calyx 27a. var. *mairei*
 1b. Calyx pubescent; legume exserted slightly beyond calyx 27b. var. *pubescens*

27a. *Crotalaria mairei* var. *mairei*

头花猪屎豆(原变种) tou hua zhu shi dou (yuan bian zhong)

Crotalaria capitata Baker (1876), not Lamarck (1786).

Calyx densely brown pilose. Legume included within calyx.

Montane grasslands; 300–3000 m. Guangxi, Guizhou, Sichuan, Yunnan [India, Myanmar, Nepal, Sri Lanka].

27b. *Crotalaria mairei* var. *pubescens* C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 220. 1988.

短毛头花猪屎豆 duan mao tou hua zhu shi dou

Calyx pubescent. Legume exserted slightly beyond calyx.

• Montane grasslands; 1000–2400 m. Yunnan.

28. *Crotalaria acicularis* Buchanan-Hamilton ex Benth., London J. Bot. 2: 476. 1843.

针状猪屎豆 zhen zhuang zhu shi dou

Herbs, ascending, 20–80 cm tall. Branches densely brown spreading silky pilose. Stipules linear, 2–4 mm. Leaves simple; petiole short; leaf blade suborbicular to oblong, 1–2(–3) × 1–1.5 cm, membranous to papery, both surfaces sparsely white spreading silky pilose, base narrow to slightly cordate, apex obtuse to acuminate. Racemes terminal, 5–30-flowered; bracts lanceolate to acicular, 2–3 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube or on apical part of pedicel, acicular. Calyx 2-lipped, 4–6 mm, parted to base, densely brown silky pilose; lobes lanceolate. Corolla yellow; standard suborbicular to obovate, 4–5 mm; wings narrowly elliptic, slightly shorter than standard; keel suborbicular, apex with a long twisted beak. Ovary sessile. Legume cylindrical, ca. 1 cm, 10–12-seeded, glabrous. Fl. Aug–Nov, fr. Dec–Feb.

Along trails, thickets on slopes; 100–1700 m. Hainan, Taiwan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia].

29. *Crotalaria chinensis* Linnaeus, Syst. Nat., ed. 10, 2: 1158. 1759.

中国猪屎豆 zhong guo zhu shi dou

Crotalaria akoensis Hayata; *C. kawakamii* Hayata; *C. sinensis* J. F. Gmelin.

Herbs, 15–60 cm tall, brownish yellow pilose except for legumes. Stems terete, branched at base. Stipules absent. Leaves

simple, subsessile; leaf blade variable in shape, usually lanceolate, linear-lanceolate, linear, or oblong-linear, 2–3.5 × 0.4–1 cm, abaxially densely brown coarsely pilose but more densely so on veins and along margin, adaxially glabrous or sparsely pilose, base attenuate, apex acuminate. Racemes congested on branch apices, 1–5-flowered or with 1 or 2 flowers in axils; bracts lanceolate, 3–5 mm. Pedicel 2–4 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 8–10 mm, parted to base; abaxial 3 lobes linear to linear-lanceolate; adaxial 2 lobes broadly lanceolate. Corolla pale yellow, included in or ± as long as calyx; standard ovate to orbicular, 7–9 mm, base with 2 appendages; wings oblong, 7–9 mm; keel narrowed apically from middle and extended into a twisted beak. Ovary subsessile. Legume cylindrical, 0.8–1.2 cm, included in or exerted from calyx, 15–20-seeded. Seeds cordate, ca. 2.5 mm, smooth. Fl. Jun–Oct, fr. Sep–Dec.

Montane grasslands; below 100–1000 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam].

30. *Crotalaria albida* Heyne ex Roth, Nov. Pl. Sp. 333. 1821.

响铃豆 *xiang ling dou*

Herbs, short-lived or perennial, erect to ascending, 10–80 cm tall. Stems sometimes branched above base, occasionally branched only at base, appressed pubescent to spreading pilose. Stipules acicular, minute, caducous, sometimes apparently absent. Leaves simple, subsessile; leaf blade oblanceolate, elliptic, or obovate, 1–2.5 × 0.4–1.2 cm, abaxially strigose, adaxially glabrous, base cuneate, apex obtuse and mucronate. Racemes terminal, often on lateral branches, rarely leaf-opposed, to 20 cm, 20–30-flowered; bracts filiform, ca. 1 mm. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 4–8 mm, parted; abaxial 3 lobes lanceolate; adaxial 2 lobes broader, falcate, apices slightly obtuse to acuminate. Corolla pale yellow; standard elliptic, 5–8 mm, base with appendages, apex barbate; wings oblong, ± as long as standard; keel rounded, narrowed apically from middle and extended into a twisted beak. Ovary subsessile. Legume cylindrical, ca. 1 cm, slightly exerted beyond calyx, 6–12-seeded, glabrous. Fl. May–Sep, fr. Sep–Dec.

Open montane forests, grassy slopes, along trails; 200–2800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

- 1a. Leaf blade usually oblanceolate; adaxial calyx lobes slightly obtuse at apex 30a. var. *albida*
 1b. Leaf blade elliptic; adaxial calyx lobes acuminate at apex 30b. var. *gengmaensis*

30a. *Crotalaria albida* var. *albida*

响铃豆(原变种) *xiang ling dou* (yuan bian zhong)

Crotalaria formosana Itô & Matsumura.

Leaf blade usually oblanceolate. Calyx with adaxial lobes

slightly obtuse at apex. Legume 6–12-seeded.

Open montane forests, along trails; 200–2800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

Many collections are of relatively robust plants branching mainly well above the base and probably relatively short-lived. Some collections from Xizang are of much smaller plants, many branched from base, and probably longer lived.

30b. *Crotalaria albida* var. *gengmaensis* (Z. Wei & C. Y. Yang) C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 225. 1988.

耿马猪屎豆 *geng ma zhu shi dou*

Crotalaria gengmaensis Z. Wei & C. Y. Yang, Acta Phytotax. Sin. 20: 479. 1982.

Leaf blade elliptic. Calyx with adaxial lobes acuminate at apex. Legume 6–8-seeded.

- Grassy slopes; 1600–1700 m. Yunnan (Gengma).

31. *Crotalaria uliginosa* C. C. Huang, Acta Phytotax. Sin. 6: 396. 1957.

湿生猪屎豆 *shi sheng zhu shi dou*

Herbs, to 20 cm tall. Stems branched at base, glabrescent. Stipules acicular, ca. 1 mm. Leaves simple; petiole to ca. 0.5 mm; leaf blade on basal part of branches oblong-ob lanceolate to oblong-elliptic but linear-elliptic toward tips of branches, 7–15 × 3–5 mm, abaxially sparsely appressed pubescent, adaxially glabrous, midvein abaxially raised, base broadly cuneate to rounded, apex obtuse to rarely truncate and mucronate. Racemes leaf-opposed, (1 or)2- or 3-flowered. Pedicel 2–3 mm; bracteoles inserted at base of calyx tube, linear, ca. 0.5 mm. Calyx 2-lipped, 4–5 mm; lobes lanceolate, apex acuminate. Corolla yellow; standard broadly obovate, 4–5 × 3–4 mm, base with 2 appendages, apex obtuse; wings oblong, ca. 4 mm; keel slightly longer than wings, rounded to 90°, narrowed apically from middle and extended into a long twisted beak. Ovary subsessile; style ca. 2.5 mm. Legume cylindrical, 10–15 × ca. 5 mm, 7–15-seeded, glabrous, base with persistent calyx and filaments. Seeds brown, reniform, ca. 1 mm, shiny.

- By streams. Yunnan (Yanshan).

32. *Crotalaria yunnanensis* Franchet, Pl. Delavay. 151. 1889.

云南猪屎豆 *yun nan zhu shi dou*

Herbs, perennial, erect, 15–70 cm tall. Stems few branched, coarsely spreading pilose. Stipules absent. Leaves simple; petiole ca. 1.5 mm; leaf blade oblong to elliptic, 2–6 × 0.5–2.5 cm, both surfaces sparsely brown pilose but abaxially more densely so on midvein, veins abaxially raised, base slightly cuneate, apex obtuse to acuminate and mucronate. Racemes terminal, 5–20 cm, 5–30-flowered; bracts linear, 2–9 mm. Pedicel ± as long as or shorter than bract; bracteoles inserted at base of calyx tube, pilose. Calyx 2-lipped, 5–10 mm, densely brown pilose; lobes lanceolate. Corolla yellow; standard suborbicular, 0.9–1.1 cm in diam., base with 2 appen-

dages; wings obovate-oblong, 7–10 mm; keel \pm as long as wings, rounded, narrowed apically from middle and extended into a long twisted beak. Legume cylindric, ca. 1 cm, glabrous. Fl. May–Aug, fr. Aug–Oct.

• Open grasslands, thickets, *Pinus-Quercus* forests; 100–3000 m. Sichuan, Yunnan.

- 1a. Bracts 2–4 mm, \pm as long as pedicel
..... 32a. var. *yunnanensis*
1b. Bracts 6–9 mm, longer than pedicel
..... 32b. var. *heqingensis*

32a. *Crotalaria yunnanensis* var. *yunnanensis*

云南猪屎豆(原变种) yun nan zhu shi dou (yuan bian zhong)

Bracts 2–4 mm, \pm as long as pedicel.

• Open grasslands, thickets; 100–3000 m. Sichuan, Yunnan.

32b. *Crotalaria yunnanensis* var. *heqingensis* (C. Y. Yang) C. Chen & J. Q. Li, J. Wuhan Bot. Res. 6: 226. 1988.

鹤庆猪屎豆 he qing zhu shi dou

Crotalaria heqingensis C. Y. Yang, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(7): 112. 1980.

Bracts 6–9 mm, longer than pedicel.

• *Pinus-Quercus* forests; 1700–1900 m. Yunnan (Heqing).

33. *Crotalaria prostrata* Rottler ex Willdenow, Enum. Pl. 2: 747. 1809.

俯伏猪屎豆 fu fu zhu shi dou

Crotalaria jinpingensis C. Y. Yang; *C. prostrata* var. *jinpingensis* (C. Y. Yang) C. Y. Yang.

Herbs, prostrate. Branches slender, densely spreading pubescent to white appressed pilose. Stipules absent. Leaves simple; petiole very short; leaf blade elliptic to ovate-oblong, 1–3 \times 0.5–1 cm, both surfaces with trichomes, base oblique, apex obtuse. Racemes terminal or leaf-opposed, 2–8-flowered; bracts subulate. Pedicel 1–2 mm; bracteoles inserted at base of calyx tube, similar to bracts, densely brown pilose. Calyx 2-lipped, 3–4 mm, parted to base; lobes lanceolate. Corolla yellow; standard suborbicular to elliptic, 4–5 mm, apex obtuse to retuse; wings oblong, \pm as long as standard; keel narrowed apically from middle and extended into a long beak included in calyx. Ovary sessile. Legume cylindric, ca. 1 cm, 10–15-seeded. Fl. May–Aug, fr. Aug–Dec.

Montane grassy wetlands, grassy slopes; 100–1300 m. Yunnan [Bangladesh, Cambodia, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

34. *Crotalaria similis* Hemsley, Ann. Bot. (Oxford) 9: 152. 1895.

屏东猪屎豆 ping dong zhu shi dou

Herbs, prostrate, 5–20 cm, densely silky pilose. Stipules absent. Leaves simple; petiole very short; leaf blade ovate to elliptic, 3–8 \times 2–4 mm, abaxially densely pilose, adaxially glabrous, base obtuse, apex acute. Racemes terminal, short, (1–)3–

5-flowered; bracts lanceolate. Pedicel 3–5 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, ca. 6 mm, very densely silky pilose; abaxial 3 lobes lanceolate; adaxial 2 lobes broadly lanceolate. Corolla bright yellow; standard oblong to suborbicular, ca. 6 mm, apex barbate; wings oblong, \pm as long as standard; keel slightly longer than standard, upcurved, beak rather blunt. Ovary sessile. Legume cylindric, ca. 1 cm, 10–20-seeded. Fl. May.

• Sandy soils near coast; near sea level. Taiwan.

35. *Crotalaria dubia* Graham ex Bentham, London J. Bot. 2: 565. 1843.

卵苞猪屎豆 luan bao zhu shi dou

Herbs, annual, 1–1.5 m tall. Stems terete, densely pubescent. Stipules filiform, caducous. Leaves simple; petiole short; leaf blade obovate to ovate-oblong, 3–5 \times 1.5–3 cm, thickly papery, both surfaces densely rusty pilose, veins abaxially raised, base cuneate, apex obtuse to acuminate and mucronate. Racemes terminal, congested and headlike, many flowered; bracts ovate-triangular, 6–7 mm. Pedicel ca. 1 mm; bracteoles inserted at base of calyx tube, similar to bracts. Calyx 2-lipped, 8–10 mm, divided for ca. 1/2 its length; lobes lanceolate. Corolla yellow; standard oblong, ca. 5 mm, base with 2 appendages, apex obtuse to retuse; wings narrowly elliptic, \pm as long as standard; keel slightly rounded, narrowed apically from middle and extended into a long beak. Legume ovoid, 5–7 mm in diam., included in calyx, 6–8-seeded, glabrous. Fl. Oct–Nov, fr. Dec–Feb.

By streams, wetlands; ca. 1000 m. Yunnan [Bangladesh, India, Myanmar, N Thailand].

36. *Crotalaria humifusa* Graham ex Bentham, London J. Bot. 2: 476. 1843.

匍地猪屎豆 pu di zhu shi dou

Herbs, annual or short-lived perennial, prostrate, to 20 cm, most parts adpressed pilose. Stems terete, densely pubescent. Stipules linear, to 4 \times 1.8 mm, somewhat persistent. Leaves simple; petiole shorter than stipules, to 2 mm; leaf blade broadly elliptic-ovate, often slightly oblique, 1.2–3.6 \times 1–2.4 cm, both surfaces silky pilose but more densely so abaxially, abaxially grayish green, base broadly cuneate to rounded, apex rounded and not mucronate. Racemes leaf-opposed or terminal on short flowering branches, ascending, very lax, 2–8-flowered; bracts linear, ca. 1.5 mm. Pedicel to 4 mm; bracteoles inserted at base of calyx, similar to bracts. Calyx \pm 2-lipped, 4–6 mm, deeply divided; abaxial 3 lobes linear-lanceolate, falcate, 2–3.5 mm; adaxial lobes connate, slightly wider, apex attenuate. Corolla yellow; standard oblong-orbicular, 5.5–6.5 mm, midline abaxially with trichomes; keel slightly longer than standard, \pm sharply angled near base, apex extended into a straight slightly twisted beak. Legume cylindric-ovoid, 6–8 mm, ca. 12-seeded, glabrous. Seeds very pale brown, \pm D-shaped, ca. 1.3 mm, glossy.

Disturbed areas including sandy river margins; 1800–1900 m. Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand; Australia].

37. *Crotalaria linifolia* Linnaeus f., Suppl. Pl. 322. 1782.

线叶猪屎豆 xian ye zhu shi dou

Herbs, annual or short-lived perennial, erect to ascending, 0.5–1 m tall. Stems terete, densely silky pubescent. Stipules minute, caducous. Leaves simple; petiole short; leaf blade linear to oblong, 2–5 × 0.3–1.5 cm, both surfaces silky pilose, adaxially sometimes only along midvein, base cuneate to rounded, apex acuminate to obtuse and mucronate. Racemes terminal, lax, 10–20 cm, many flowered; bracts lanceolate, 2–3 mm. Pedicel to 2.5 mm; bracteoles inserted at base of calyx, similar to bracts. Calyx 2-lipped, 6–7 mm, deeply divided, densely rusty pilose; abaxial lobes lanceolate; adaxial lobes slightly longer and broader. Corolla yellow with darker veins; standard oblong to suborbicular, 5–7 mm, margin pilose at base and with 2 appendages, apex retuse; wings oblong, 6–7 mm; keel ca. 8 mm, ± sharply angled near base, margins minutely woolly, apex extended into a long straight twisted beak. Legume rhombic to ovoid, 5–6 mm, 8–10-seeded, glabrous; stipe almost absent. Fl. Aug–Oct, fr. Nov–Dec.

Slopes, seashore sandy areas, along trails; 400–2500 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Taiwan, Xizang, Yunnan [India, Japan (Ryukyu Islands), Myanmar, Sri Lanka].

- 1a. Leaf blade oblanceolate to oblong, 5–15 mm wide, base narrow, apex acuminate; legume rhombic 37a. var. *linifolia*
 1b. Leaf blade linear to linear-oblong, 3–4 mm wide, base rounded, apex obtuse; legume rhombic to ovoid 37b. var. *stenophylla*

37a. *Crotalaria linifolia* var. *linifolia*

线叶猪屎豆(原变种) xian ye zhu shi dou (yuan bian zhong)

Crotalaria linifolia var. *pygmaea* Yamamoto.

Leaf blade oblanceolate to oblong, 2–5 × 0.5–1.5 cm, base narrow, apex acuminate. Legume rhombic.

Slopes, along trails; 500–2500 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [India, Japan (Ryukyu Islands), Myanmar, Sri Lanka].

37b. *Crotalaria linifolia* var. *stenophylla* C. Y. Yang, Acta Phytotax. Sin. 20: 479. 1982.

窄叶猪屎豆 zhai ye zhu shi dou

Crotalaria stenophylla Vogel, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 7. 1843, not Ecklon & Zeyher (1836).

Leaf blade linear to linear-oblong, 2.5–3.5 × 0.3–0.4 cm, base rounded, apex obtuse. Legume rhombic to ovoid.

• Seashore sandy areas, along trails. Guangdong, Guangxi, Hunan, Taiwan.

38. *Crotalaria nana* N. L. Burman var. *patula* Baker in J. D. Hooker, Fl. Brit. India 2: 71. 1876.

座地猪屎豆 zuo di zhu shi dou

Herbs, annual, prostrate to erect. Stems terete, branched at

base, densely yellow silky pubescent. Stipules absent. Leaves simple, subsessile; leaf blade linear, 1.5–3 × 0.2–0.4 cm, both surfaces silky pilose but more densely so abaxially, base slightly cuneate, apex obtuse and mucronate. Racemes terminal, headlike, 2–6-flowered; bracts linear, 2–3 mm. Pedicel short; bracteoles inserted at base of calyx, subulate, ca. 3 mm, silky pilose. Calyx 2-lipped, 4–5 mm; abaxial 3 lobes lanceolate-triangular; adaxial 2 lobes connate, oblong, apex obtuse. Corolla yellow, slightly shorter than and included in calyx. Ovary sessile. Legume ovoid to globose, 4–5 mm, 6–12-seeded.

Sandy soils; below 100–1900 m. Hainan [India, Myanmar, Nepal].

Crotalaria nana var. *nana*, recorded from W India and Sri Lanka, has wider leaves and coarser trichomes on the calyx.

39. *Crotalaria medicaginea* Lamarck, Encycl. 2: 201. 1786.

假苜蓿 jia mu xu

Herbs, shrublets, or shrubs, prostrate to erect, to 1 m tall. Stems slender, branched, appressed silky pubescent. Stipules filiform, 2–3 mm. Leaves 3-foliolate; petiole 0.2–2 cm; petioles ca. 1 mm; leaflet blades oblanceolate, obovate-oblong, or ovate-oblong, (1–)2–3 × 0.3–1.2 cm, abaxially densely silky pubescent, adaxially glabrous, base cuneate, apex obtuse, truncate, or retuse. Racemes terminal or leaf-opposed, many flowered; bracts minute. Pedicel 2–3 mm. Calyx subcampanulate, 2–4 mm, 5-lobed; lobes broadly lanceolate. Corolla yellow; standard elliptic to ovate-oblong, 3–5 mm, base with 2 appendages, apex pilosulose; wings oblong to obovate, 3–4 mm; keel ± as long as wings, rounded and narrowed apically from middle, beak long and twisted. Ovary sessile. Legume globose, 3–5 mm in diam., included in or slightly exerted beyond calyx, pubescent, 2-seeded, apex shortly beaked. Fl. Aug–Oct, fr. Nov–Dec.

Seashore sandy areas, grassy slopes, along trails; below 100–2800 m. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan [Afghanistan, Bangladesh, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

- 1a. Petiole 0.2–1 cm; leaf blade oblanceolate to obovate, 3–8 mm wide 39a. var. *medicaginea*
 1b. Petiole 1–2 cm; leaf blade ovate-oblong, 10–12 mm wide 39b. var. *luxurians*

39a. *Crotalaria medicaginea* var. *medicaginea*

假苜蓿(原变种) jia mu xu (yuan bian zhong)

Crotalaria neglecta Wight & Arnott; *C. yuanjiangensis* C. Y. Yang.

Petiole 0.2–1 cm; leaf blade oblanceolate to obovate, 1–2 × 0.3–0.8 cm.

Seashore sandy areas, along trails; below 100–1400 m. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan (Yuanjiang) [Bangladesh, India, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

39b. *Crotalaria medicaginea* var. *luxurians* (Bentham) Baker in J. D. Hooker, Fl. Brit. India 2: 81. 1876.

大叶假苜蓿 da ye jia mu xu

Crotalaria luxurians Bentham, London J. Bot. 2: 578. 1843.

Petiole 1–2 cm; leaf blade ovate-oblong, 1–2.5 × 1–1.2 cm.

Grassy slopes; 700–900 m. Yunnan (Xishuangbanna) [Afghanistan, India, Nepal, Pakistan, Sri Lanka].

40. *Crotalaria triquetra* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 34. 1850.

砂地野百合 sha di ye bai he

Crotalaria triquetra var. *garambiensis* Y. C. Liu & F. Y. Lu.

Herbs, annual, erect to ascending, to 50 cm tall. Branches 3-angled, pubescent. Stipules linear-lanceolate, ca. 3 mm, caducous. Leaves simple; petiole ca. 1 mm; leaf blade elliptic-oblong, 2–3 × 0.7–1 cm, adaxial surface pellucid punctate, secondary veins 7 or 8 on each side of midvein, base rounded, apex obtuse. Racemes terminal or leaf-opposed, 1–3-flowered. Pedicel ± as long as calyx. Calyx ± 2-lipped, divided to ca. 1/2 its length, pubescent; lobes triangular-lanceolate. Corolla pale yellow, 1–1.2 cm, longer than calyx; standard ovate, base with 2 appendages; wings oblong, slightly shorter than standard; keel ± as long as wings, angled near base, beak straight and twisted. Legume cylindrical, ca. 2 cm, ca. 16-seeded, pubescent.

Open grasslands, wastelands; below 300 m. S Taiwan [India, Indonesia, Sri Lanka].

41. *Crotalaria tiantaiensis* Yan C. Jiang, X. Y. Zhu, Y. F. Du & H. Ohashi, J. Jap. Bot. 79: 373. 2004.

天台猪屎豆 tian tai zhu shi dou

Herbs, perennial, 6–12 cm tall, with appressed rubiginous trichomes. Stipules absent. Leaves simple; petiole ca. 1 mm; leaf blade narrowly oblong, 4–10 × 1–2 mm, with dense white papillae and appressed rubiginous trichomes. Racemes terminal, 1.5–3.5 cm, 3–7-flowered; bracts linear, ca. 1 mm. Pedicel 1.5–2 mm; bracteoles linear, ca. 1.5 mm. Calyx subcampanulate, 5–6 mm, deeply 5-lobed, with appressed trichomes

and ciliate margins; lobes narrowly lanceolate, 4–5 mm, all similar. Corolla pale yellow when dry, exerted from calyx; standard ovate, ca. 5 × 3 mm, midline abaxially with trichomes, base with claw ca. 0.5 mm, with 2 pulvinate callosities, apex rounded; wings oblong, ca. 4 × 1.5 mm; keel ± as long as standard, incurved above middle, beak not twisted. Ovary sessile, glabrous. Legume ellipsoidal, 6–8 × 4–4.5 mm, glabrous. Fl. and fr. Sep.

• Zhejiang.

Crotalaria tiantaiensis is known to us only from the protologue based on a single collection. Apparently, it is very similar vegetatively to the preceding species.

42. *Crotalaria anningensis* X. Y. Zhu & Y. F. Du in X. Y. Zhu et al., Legumes China, 631. 2007.

安宁猪屎豆 an ning zhu shi dou

Herbs, perennial, ca. 9 cm tall, with appressed ferruginous trichomes. Stipules absent. Leaves simple; petiole ca. 1 mm; leaf blade elliptic, 5–7 × 2–3 mm, abaxially with appressed trichomes, adaxially green, with dense white papillae, base cuneate, apex acute. Racemes terminal, 3–6 cm, 6–15-flowered; bracts linear, ca. 2 mm. Pedicel 2–4 mm; bracteoles similar to bracts, ca. 2 mm. Calyx 2-lipped, ca. 7 mm, deeply (4 or) 5-lobed, with appressed trichomes; abaxial 3 lobes linear 5–6 mm; adaxial 2 lobes ovate-lanceolate. Corolla yellow, exerted from calyx; standard suborbicular, ca. 6 × 5 mm, margins proximally with glandular trichomes, basal claw ca. 1 mm, with 2 pulvinate callosities, apex rounded; wings oblong, 4–6 × 2–3 mm; keel ± as long as standard, incurved above middle, beak not twisted. Ovary sessile, ?glabrous. Legume not seen. Fl. Mar.

• Yunnan (Anning).

Crotalaria anningensis is known to us only from the protologue. The presence of glandular trichomes on the margins of the standard are atypical for *Crotalaria* and, coupled with the absence of fruit, throws some doubt on the generic placement of this taxon. In the protologue, it states that the ovary is pilose, but in the illustration accompanying the protologue the ovary is shown as glabrous.

51. LOTONONIS (Candolle) Ecklon & Zeyher, Enum. Pl. Afric. Austral. 176. 1836, nom. cons.

罗顿豆属 luo dun dou shu

Wei Zhi (韦直); Roger M. Polhill, Michael G. Gilbert

Ononis sect. *Lotononis* Candolle, Prodr. 2: 166. 1825.

Herbs [or shrublets], annual or perennial. Stipules distinct. Leaves digitately 3-foliolate, usually petiolate. Inflorescences leaf-opposed, umbellate [or racemose], long pedunculate. Calyx cuplike, most abaxial tooth narrowly triangular and longest but other 4 teeth ± joined in pairs. Corolla standard ovate or obovate, glabrous, claw short; wings sometimes much shorter than standard; keel rounded at apex. Stamens 10, connate into a dorsally split sheath; anthers dimorphic, 4 longer and basifixed, 6 shorter and dorsifixed. Ovary sessile; ovules many; style incurved; stigma terminal. Legume subsessile, slightly inflated, usually many seeded. Seeds without an aril; funicle threadlike.

About 100 species: Africa, S Asia, S Europe; one species (introduced) in China.

1. *Lotononis bainesii* Baker, Fl. Trop. Afr. 2: 6. 1871.

罗顿豆 luo dun dou

Herbs, perennial, prostrate, mat-forming, 0.3–1.8 m wide. Stems slender, decumbent, branching and rooting at nodes, glabrous or sparsely puberulent. Stipules ovate, 4–10 mm, one

smaller than other, base auriculate, apex acute. Leaves 3-foliolate, apical one larger; petiole 6–7.5 mm; leaflet blades linear-elliptic to lanceolate, 1.5–4 × 0.6–1 cm, glabrous or sparsely puberulent, base cuneate, apex rounded and mucronate. Inflorescences umbellate heads, 8–12-flowered; bracts and bracteoles minute, inconspicuous; peduncle to 25 cm. Flowers sessile. Calyx 3–4 mm. Corolla bright yellow, ca. 1 cm; standard orbicular to oblong, long clawed; wings obliquely ovate to ob-

long; keel 8–9 mm, incurved and obtuse, longer than standard. Legume linear, 7–12 × 2–3 mm, white villous, with a curved beak. Seeds ca. 1 mm in diam.

Cultivated in Taiwan [native to S Africa].

Lotononis bainesii is widely grown as a fodder crop. It is particularly suitable for red lateritic soils.

52. ROTHIA Persoon, Syn. Pl. 2: 638, [659]. 1807, nom. cons., not Schreber (1791), nor Lamarck (1792), nor Borkhausen (1792).

落地豆属 *luo di dou shu*

Li Jianqiang (李建强); Roger M. Polhill, Michael G. Gilbert

Dillwynia Roth (1806), not Smith (1805); *Goetzea* Reichenbach; *Westonia* Sprengel.

Herbs, annual, ± prostrate. Stipules distinct, sometimes solitary. Leaves digitately 3-foliolate, usually petiolate. Inflorescences terminal or leaf-opposed but often appearing axillary, racemose, few flowered, shortly pedunculate to almost sessile; bracts and bracteoles inconspicuous. Calyx cuplike; tube membranous; lobes 5, subequal, with dorsal pair somewhat curved. Corolla shorter than calyx; standard ovate or oblong, with a linear claw; wings and keel ± as long as standard; keel rounded at apex. Stamens 10, connate into a dorsally split sheath; anthers uniform. Ovary sessile; ovules many; style straight. Legume subsessile, ± oblong or linear, ± inflated or slightly compressed, many seeded. Seeds strongly curved; funicle ± as long as seed.

Two species: one in Asia, one in the drier regions of Africa; one species in China.

1. Rothia indica (Linnaeus) Druce, Rep. Bot. Exch. Club Soc. Brit. Isles 3: 423. 1914.

落地豆 *luo di dou*

Trigonella indica Linnaeus, Sp. Pl. 2: 778. 1753; *Dillwynia trifoliata* Roth; *Rothia trifoliata* (Roth) Persoon; *Westonia humifusa* Sprengel, nom. illeg. superfl.; *W. indica* (Linnaeus) Kuntze.

Herbs, annual, ascending, to 25 cm. Stems adpressed-pilose. Stipules lanceolate, ca. 4 × 1.5 mm. Petiole ca. 7 mm; petiolules to 1 mm; leaflet blades oblanceolate, 1–2.2 × 0.4–0.8 cm, both surfaces adpressed pilose, base cuneate, apex rounded

to broadly acute. Inflorescences leaf-opposed or extra-axillary, 1–3-flowered, congested; bracts filiform, ca. 1.5 mm; peduncle 0–2.5 mm. Pedicel ca. 1.5 mm. Calyx obconical, 4–6 mm, divided to slightly below middle; lobes triangular, apex acuminate. Corolla yellow, exerted from calyx; standard oblong-orbicular, 5.5–6.5 mm, abaxially pilose along midline; wings oblong, slightly shorter than standard; keel ± as long as standard. Legume narrowly oblong, 3.5–5.5 × ca. 0.2 cm, straight, slightly compressed, more than 20-seeded, adpressed pubescent. Seeds brown, D-shaped, ca. 1.3 mm, smooth. Fl. and fr. Mar–Jun.

Sandy areas; near sea level. Guangdong, Hainan [India, Indonesia, Laos, Malaysia, Sri Lanka, Thailand, Vietnam; N Australia].