

42. SOPHORA Linnaeus, Sp. Pl. 1: 373. 1753.

槐属 huai shu

Bao Bojian (包伯坚); Michael A. Vincent

Ammothamnus Bunge; *Cephalostigmaton* Yakovlev; *Edwardsia* Salisbury; *Goebelia* Bunge ex Boissier; *Keyserlingia* Bunge ex Boissier; *Styphnolobium* Schott; *Vexibia* Rafinesque.

Deciduous or evergreen trees, shrubs, subshrubs, or perennial herbs, rarely twining. Leaves imparipinnate; stipules present or absent; leaflets many, entire, rarely with stipels. Racemes terminal or axillary. Flowers white, yellow, or purple; bracts small and linear or absent. Calyx campanulate or cup-shaped, 5-lobed, equal, upper 2 lobes nearly bilabiate. Standard orbicular, oblong, elliptic, obovate, or oblanceolate; wings asymmetric or symmetric; keel similar to wings. Stamens 10, free or fused at base; anthers versatile. Ovary stalk short or absent; ovules several to many; stigma small, terminal, globose. Legumes cylindrical, moniliform, fleshy or leathery, sometimes winged, indehiscent or tardily dehiscent. Seeds 1 to many, ovate, elliptic, or subspheroidal, black, dark brown, or light red.

About 70 species: widespread in tropical and temperate zones; 21 species (nine endemic, one introduced) in China.

- 1a. Trees, rarely shrubs; petiole base inflated, covering caducous bud stipules; stipels present; inflorescence paniculate.
 - 2a. Ovary almost equal to stamens in length; legume linear, slightly constricted between seeds; seeds closely spaced 21. *S. brachygyna*
 - 2b. Ovary obviously shorter than stamens in length; legume thick, obviously constricted between seeds; seeds more distantly spaced 20. *S. japonica*
- 1b. Small trees, shrubs, subshrubs, or herbs; petioles not inflated at base, buds exposed; stipules present or absent; stipels absent; inflorescence racemose.
 - 3a. Herbs or subshrubs; flowers white to creamy white; raceme terminal.
 - 4a. Legume indehiscent, seeds 2 per loment section; leaflets small, (3.5–)15–20(–27) × (2–)3–7 mm 19. *S. pachycarpa*
 - 4b. Legume tardily dehiscent, seed 1 per loment section; leaflets large, 1.5–6 × 1–2 cm.
 - 5a. Branches and leaflets densely hairy; flowers in dense racemes; keel mucronate at apex 10. *S. alopecuroides*
 - 5b. Branches and leaflets glabrous or pilose when young; flowers in lax racemes; keel obtuse at apex 11. *S. flavescens*
 - 3b. Small trees, shrubs, or climbing shrubs; flowers white-yellow or purple, or, if herbs, flowers yellow; inflorescence terminal, opposite or alternate with leaves.
 - 6a. Plants spiny; stipules spinescent.
 - 7a. Stems villous; flower ca. 2 cm, blue-purple 8. *S. moorcroftiana*
 - 7b. Stems glabrous; flower ca. 1.5 cm, white or creamy white, rarely blue-purple 9. *S. davidii*
 - 6b. Plants without spines; stipules not spinescent.
 - 8a. Legume winged; plants flowering before leaves expand; some terminal leaflets changed to tendrils 12. *S. mollis*
 - 8b. Legume wingless; plants flowering after leaves expand; terminal leaflets normal.
 - 9a. Stipules absent or very small.
 - 10a. Legume slightly curved; leaflets obviously smaller toward base; stipules very small; standard shorter than other petals 7. *S. tonkinensis*
 - 10b. Legume straight; leaflets not obviously smaller toward base; stipules absent; standard equal to other petals.
 - 11a. Shrubs or small trees, 2–4 m tall; leaflets large, 2.5–5 × 2–3.5 cm; flowers large, ca. 15 mm, yellow or creamy white 13. *S. tomentosa*
 - 11b. Subshrubs, 0.2–1 m tall; leaflets small, 1–2.5 × 0.7–1.5 cm; flowers small, ca. 10 mm, purple 18. *S. praetorulosa*
 - 9b. Stipules subulate, 4–10 mm.
 - 12a. Legume dehiscent into 4 limbs; calyx compressed campanulate or cup-shaped, teeth small or not obvious.
 - 13a. Leaflet veins not obvious adaxially; seed 1 per legume, gray-brown.
 - 14a. Inflorescence terminal; leaflets oblong or ovate-oblong, reflexed at margin; corolla ca. 10 mm 14. *S. franchetiana*
 - 14b. Inflorescence alternate or opposite a leaf; leaflets ovate or ovate-elliptic, not reflexed at margin; corolla ca. 15 mm 15. *S. wilsonii*
 - 13b. Leaflet veins obvious adaxially; seeds 2–4 per legume, red.
 - 15a. Leaflets papery to nearly leathery, ovate-elliptic, ovate, or long elliptic, acute or shortly acuminate at apex 16. *S. prazeri*
 - 15b. Leaflets papery, ovate-oblong or ovate-lanceolate, long acuminate or caudate-

- acuminate at apex 17. *S. benthamii*
- 12b. Legume dehiscent into 2 limbs; calyx campanulate, teeth obvious, unequal.
- 16a. Leaflets small, less than 20 mm, ovate or elliptic-ovate, densely long hairy on both surfaces 4. *S. yunnanensis*
- 16b. Leaflets large, (15-)20-40(-50) mm, usually ovate-lanceolate, or other shapes except ovate and elliptic-ovate, pilose adaxially or glabrous.
- 17a. Inflorescence terminal, rarely opposite a leaf; flowers dense, yellow; seeds green 6. *S. xanthoantha*
- 17b. Inflorescence opposite a leaf, pseudo-terminal or axillary; flowers sparse, white or purple-red; seeds yellow, yellow-brown, or red-brown.
- 18a. Flowers white; seeds long ovoid, 7-8 mm 5. *S. albescens*
- 18b. Flowers purple-red; seeds oblong or long ovate, 5-9 mm.
- 19a. Fine veins on leaflets impressed adaxially; seeds long ovate, 5-6 mm ... 2. *S. dunnii*
- 19b. Fine veins on leaflets not impressed adaxially; seeds oblong, elliptic, or long ovate, 6-9 mm.
- 20a. Legume slender; seeds long ovate or elliptic, ends rounded, 6-7 mm 3. *S. microcarpa*
- 20b. Legume thick, slightly compressed; seeds oblong-reniform, ends acute to rounded, 7-9 mm, yellow or yellow-brown 1. *S. velutina*

1. *Sophora velutina* Lindley, Bot. Mag. 14: t. 1185. 1828.

短绒槐 duan rong huai

Shrubs, ca. 2 m high. Young branches, rachis, young branches of flower, and leaf densely velutinous. Leaves 15-20 cm; stipules linear, 6-7 mm, villous; leaflets 13-41, opposite or nearly opposite, ovate-lanceolate, elliptic, elliptic-lanceolate, oblong, or ovate-oblong, 1-4 × 0.5-2 cm, papery, hairy on both surfaces, glabrous, or glabrous adaxially, midvein raised, base rounded or obtuse, apex acuminate or acute with mucro. Racemes opposite with leaf or pseudo-opposite, 15-20(-30) cm. Flowers many, widely spaced; bracts similar to stipule, 6-8 mm, hairy; pedicel short, 2-3 mm. Calyx campanulate, ca. 13 mm; teeth 5, unequal, dark brown hairy. Standard reflexed, obovate-lanceolate or obovate-oblong, ca. 16 × 3-5 mm, apex retuse, narrowing to base; wings oblong, less than 15 mm, base auriculate; keel falcate, slightly shorter than wings. Stamens 10, free or slightly fused at base. Ovary terete, densely yellow pubescent, stalked; ovules 4-6; style straight, glabrous; stigma capitate, very small. Legumes moniliform, slightly compressed, 6-10 × 0.7-1 cm, hairy or nearly glabrous. Seeds 2-4, yellow or yellow-brown, oblong-reniform, ends acute to rounded. Fl. and fr. Apr-Aug.

Forests, mountain forests, valleys, riverbanks, rocky places; 500-2500 m. Guangxi, Guizhou, Sichuan, Yunnan [Bangladesh, Bhutan, India, Myanmar].

- 1a. Leaflets hairy on both surfaces; legumes densely hairy 1a. var. *velutina*
- 1b. Leaflets glabrous or nearly glabrous adaxially; legumes sparsely hairy or nearly glabrous.
- 2a. Inflorescence terminal; leaflets (19-)25-35(-41), small, 10-15 × 5-6 mm 1b. var. *multifoliolata*
- 2b. Inflorescence opposite with leaf; leaflets fewer than 21, large, 2-4 × 1.5-2 cm.
- 3a. Midvein of leaflets raised;

- fruit neck long, 2-4 cm 1c. var. *dolichopoda*
- 3b. Midvein of leaflets impressed; fruit neck short, less than 1.5 cm.
- 4a. Erect shrubs; legumes nearly glabrous 1d. var. *cavaleriei*
- 4b. Climbing shrubs or woody vines; legumes pilose 1e. var. *scandens*

1a. *Sophora velutina* var. *velutina*

短绒槐(原变种) duan rong huai (yuan bian zhong)

Sophora glauca Leschenault ex Candolle.

Shrubs, ca. 2 m high. Leaflets hairy on both surfaces. Legumes densely hairy.

Valleys, riverbanks; 1000-2500 m. Guizhou, Sichuan, Yunnan [Bangladesh, India, Myanmar].

1b. *Sophora velutina* var. *multifoliolata* C. Y. Ma, Acta Phytotax. Sin. 20: 466. 1982.

多叶槐 duo ye huai

Leaflets (19-)25-35(-41), elliptic or lanceolate-elliptic, 1-1.5(-2.5) cm × 5-6 mm, glabrous adaxially or pilose near midvein. Inflorescence terminal. Fruit neck 2-4 cm or more.

- Mountain forests; 1100-1600 m. Yunnan (Menghai).

1c. *Sophora velutina* var. *dolichopoda* C. Y. Ma, Acta Phytotax. Sin. 20: 465. 1982.

长颈槐 chang jing huai

Leaflets fewer than 21, 2-4 × 1.5-2 cm, glabrous adaxially. Inflorescence opposite with leaf. Fruit neck long, 2-4 cm.

- Forests, valleys; 500-2000 m. Guizhou, Yunnan.

1d. *Sophora velutina* var. *cavaleriei* (H. Léveillé) Brummitt & J. B. Gillett, Kirkia 5: 621. 1966.

光叶短绒槐 guang ye duan rong huai

Sophora cavaleriei H. Léveillé, Fl. Kouy-Tchéou, 242. 1914–1915; *S. velutina* subsp. *cavaleriei* (H. Léveillé) Yakovlev.

Leaflets glabrous. Legumes almost glabrous.

- Forests, valleys; 1000–2000 m. Guangxi, Guizhou, Yunnan.

1e. *Sophora velutina* var. *scandens* C. Y. Ma, Acta Phytotax. Sin. 20: 465. 1982.

攀援槐 pan yuan huai

Woody vines or climbing shrubs. Leaflets 13–17, rarely 21, retuse at midvein. Legumes pilose.

- Valleys, rocky places; 1500–2000 m. Sichuan, Yunnan.

2. *Sophora dunnii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 466. 1897.

柳叶槐 liu ye huai

Sophora dispar Craib.

Shrubs, ca. 2 m high. Branchlets dark yellow hairy. Leaves to 20 cm; stipules linear, ca. 10 mm, hairy; petiole hairy; leaflets 15–23, opposite, ovate-lanceolate or elliptic-lanceolate, 25–35(–50) × 10–15 mm, papery, veins obvious abaxially, base rounded or obtuse, apex mucronate. Racemes ca. 20 cm, opposite a leaf or appearing opposite. Flowers many; pedicel short, ca. 5 mm, hairy; bract similar to stipule, longer than pedicel. Calyx campanulate; teeth 5, orbicular or triangular, unequal, upper 2 nearly fused to bilabiate, brown hairy. Corolla purple-red; standard obovate-oblong or obovate-elliptic, ca. 15 mm, retuse at apex, 2-auriculate at middle, narrowing to a claw at base; wings slightly shorter than standard, falcate, unequally auriculate at base; keels ca. 13 mm, long ovate. Stamens 10, slightly fused at base. Ovary densely yellow-brown hairy; ovules 4–6. Legumes moniliform, 10–15 cm, darkly brown pilose, dehiscence along sutures. Seeds 2 or 3, long ovate, yellow-brown or brown. Fl. Mar–Jun, fr. May–Aug.

Valleys and forests on slopes; 1000–2000 m. Guizhou, Sichuan, Yunnan [Myanmar, Thailand].

3. *Sophora microcarpa* C. Y. Ma, Acta Phytotax. Sin. 20: 466. 1982.

细果槐 xi guo huai

Shrubs, 1–2 m high, few branched. Branches gray-white pubescent. Leaves 15–20 cm; stipules linear, ca. 10 mm; petiole gray-brown pubescent; leaflets 19–25, subopposite or nearly opposite, ovate-lanceolate or long elliptic, 30–35 × ca. 10 mm, papery, pubescent on both surfaces, base rounded, slightly oblique, apex acuminate, mucronate; petiolule less than 1 mm, hairy. Racemes terminal; rachis sulcate, gray-white pubescent. Flowers many, dense; pedicel 4–5 mm; bract linear, equal to pedicel in length, hairy. Calyx campanulate, ca. 6 mm; teeth 5, unequal. Corolla purple-red; standard oblong, ca. 6 × 4 mm, 2-auriculate at middle; wings hastate, slightly rugose; keel slightly shorter than standard, falcate, apex rounded, 1-auriculate at base. Stamens 10, 1 free and other 9 fused at base. Ovary terete, hairy; ovules many; stigma capitate, very small. Legumes moniliform, slender, 6–10 cm, gray-white pubescent, de-

hiscent along sutures. Seeds 3–6, brown-red, long ovate or elliptic. Fl. and fr. Feb–Aug.

- Mountain forests; 1000–1700 m. Guizhou, Yunnan.

4. *Sophora yunnanensis* C. Y. Ma, Acta Phytotax. Sin. 20: 467. 1982.

云南槐 yun nan huai

Shrubs or small trees. Stem gray-white pubescent when young; branches densely hairy. Leaves 10–15 cm; stipules subulate, ca. 3.5 mm, tomentose; leaflets 13–21, opposite, ovate or elliptic-ovate, 15–20 × 8–10 mm, papery, densely hairy on both surfaces, veinlets obscure, apex rounded; petiolule short, ca. 1 mm, hairy. Racemes opposite a leaf or appearing terminal. Flowers dense; bracts subulate, ca. 6 mm, hairy. Calyx campanulate, ca. 10 mm; teeth 5, subequal, triangular, hairy. Corolla white; standard oblong, retuse, obcordate, narrowing to a claw, 2-auriculate at middle; wings hastate; keel ovate-oblong, claw slender, equal to petal. Stamens 10, 1 free, others somewhat fused at base. Ovary gray-brown hairy, stalk short; ovules 4–6; style slender, ca. 2.5 mm, glabrous; stigma small, capitate, slightly hairy. Fl. Mar.

- Mountain scrub. Yunnan.

5. *Sophora albescens* (Rehder) C. Y. Ma, Acta Phytotax. Sin. 20: 468. 1982.

白花槐 bai hua huai

Sophora glauca Leschenault ex Candolle var. *albescens* Rehder in Sargent, Pl. Wilson. 3: 447. 1917; *S. velutina* Lindley var. *albescens* (Rehder) P. C. Tsoong.

Shrubs, 1–2 m. Branchlets gray-white pubescent. Leaves 15–20(–25) cm; stipules linear, 3–4 mm, caducous; leaflets 17–25, ovate-lanceolate or ovate-oblong, 2–3(–4) × 1–1.5 cm, papery, pubescent abaxially, glabrous adaxially, base rounded or obtuse, apex cuspidate. Racemes opposite a leaf or appearing terminal; bracts linear, 6–8 mm, hairy. Calyx campanulate, ca. 10 mm; teeth 5, short, hairy. Corolla white; standard reflexed, obovate-lanceolate, ca. 16 × 3–5 mm, 2-auriculate at middle, apex retuse; wings oblong or broadly linear, 13–14 mm, unequally 2-auriculate at base, claw slender, ca. 6 mm; keel obovate or falcate. Stamens 10, slightly fused and sparsely pubescent at base. Ovary gray-brown hairy, stalk short; style straight, glabrous. Legumes moniliform, 6–15 cm, constricted between seeds, beaked, gray-white pubescent or subglabrous. Seeds 2–4(–6), yellow-brown or red-brown, long ovoid. Fl. and fr. Mar–Aug.

- Shady damp places in valleys; 1100–2500 m. Sichuan, Yunnan.

The name “*Sophora albescens* J. St.-Hil. (1806) Duham. Arb. 3: 86,” as cited in Zhu et al. (Legumes China, 580. 2007), does not exist and is an error picked up from various indices.

6. *Sophora xanthoantha* C. Y. Ma, Acta Phytotax. Sin. 20: 468. 1982.

黄花槐 huang hua huai

Herbs or subshrubs, less than 1 m. Stem and branches

densely golden velutinous. Leaves 15–20 cm; stipules caducous; leaflets 17–25, opposite, oblong or long elliptic, 2.5–3.5 × 1–1.5 cm, papery, densely golden velutinous abaxially, especially on midrib and petiole, sparsely gray-white hairy adaxially, both ends obtuse; veinlets evident abaxially. Racemes terminal, 6–8 cm. Flowers dense; bracts subulate, equal to calyx. Calyx campanulate, ca. 7 mm; teeth 5, triangular, unequal, pilose. Corolla yellow; standard oblong or nearly oblong, ca. 11 mm, apex retuse, 2-auriculate at middle, narrowing to claw, ca. 3 mm; wings equal to standard, hastate, apex beaked; keel slightly shorter than wings, 1-auriculate. Stamens 10, slightly fused and sparsely very shortly hairy at base. Ovary densely brown hairy on both sides; ovules many; style straight, glabrous; stigma very small, capitate, sometimes shortly hairy. Legumes moniliform, 8–13 × 0.8–1 cm, villous, beak 1–2 cm, base with neck 1.5–4 cm, 2-dehiscent. Seeds 2–4, green, long elliptic, 9–10 × 4–5 mm, rounded at one end, acute at other end.

- Hill meadows; 500–1800 m. Yunnan.

7. *Sophora tonkinensis* Gagnepain, Notul. Syst. (Paris) 3: 18. 1914.

越南槐 yue nan huai

Shrubs to 1.3 m. Stems slender; branches green, glabrous, much branched; branchlets gray hairy. Leaves 10–15 cm; stipules very small or nearly absent; petiole 1–2 cm, inflated at base; leaflets 11–33(–39), opposite or nearly alternate; petiolule 1–2 mm, slightly inflated; blades oblong, elliptic, ovate-oblong, or lanceolate, 15–25 × 10–15 mm, leathery, terminal one largest, 30–40 × ca. 20 mm, gray-brown hairy abaxially, glabrous or sparsely pubescent adaxially, midrib obvious abaxially, base rounded or slightly cordate, apex cuspidate. Inflorescence a raceme or branched into a panicle from base, terminal, 10–30 cm; rachis and peduncle hairy; bracts small, subulate, hairy. Flowers 10–12 mm; pedicel ca. 5 mm. Calyx cup-shaped, ca. 2 × 3–4 mm; teeth small, gray-brown hairy. Corolla yellow or dark purple; standard orbicular, ca. 6 × 5 mm, shortly stipitate; wings slightly longer than standard, oblong or ovate-oblong, 1-auriculate at base; keel longer, obovate, ca. 9 × 4 mm, 1-auriculate at base. Stamens 10, slightly fused at base. Ovary hairy; ovules 4; style straight, glabrous; stigma hairy. Legumes moniliform, 3–5 cm, sparsely pubescent, dehiscent along both sutures. Seeds 1–3, ovoid, black. Fl. May–Jul, fr. Aug–Dec.

Forests on sunny slopes, scrub on stony mountains, calcareous or sandstone hill slopes; 1000–2000 m. Guangxi, Guizhou, Yunnan [Vietnam].

- 1a. Leaflets (25–)27–33(–39), lanceolate ... 7c. var. *polyphylla*
1b. Leaflets 11–19, elliptic, oblong, or ovate-oblong.
2a. Corolla yellow 7a. var. *tonkinensis*
2b. Corolla dark purple 7b. var. *purpurascens*

7a. *Sophora tonkinensis* var. *tonkinensis*

越南槐(原变种) yue nan huai (yuan bian zhong)

Cephalostigmaton tonkinense (Gagnepain) Yakovlev; *Sophora subprostrata* Chun & T. C. Chen.

Leaflets 11–19, elliptic, oblong, or ovate-oblong. Corolla yellow.

Scrub on stony mountains; 1000–2000 m. Guangxi, Guizhou, Yunnan [Vietnam].

7b. *Sophora tonkinensis* var. *purpurascens* C. Y. Ma, Acta Phytotax. Sin. 20: 469. 1982.

紫花越南槐 zi hua yue nan huai

Leaflets 11–19, elliptic, oblong, or ovate-oblong. Corolla dark purple.

- Forests on sunny slopes; 1100–1200 m. Guizhou.

7c. *Sophora tonkinensis* var. *polyphylla* S. Z. Huang & Z. C. Zhou, Acta Phytotax. Sin. 22: 487. 1984.

多叶越南槐 duo ye yue nan huai

Leaflets (25–)27–33(–39), lanceolate, pubescent abaxially.

- Calcareous or sandstone hill slopes. Guangxi.

8. *Sophora moorcroftiana* (Benth) Benth ex Baker in J. D. Hooker, Fl. Brit. India 2: 249. 1876.

砂生槐 sha sheng huai

Caragana moorcroftiana Benth in Royle, Ill. Bot. Himal. Mts. 198. 1835.

Shrubs, ca. 1 m high, densely branched. Branchlets densely hairy. Leaves 4–6 cm; stipules subulate, 4–7 mm, spinescent, persistent; leaflets 11–15, obovate, ca. 10 × 6 mm, hairy on both surfaces, base cuneate or rounded, apex obtuse or retuse, usually mucronate. Racemes terminal at branchlets, 3–5 cm. Flowers large. Calyx blue, shortly campanulate; teeth 5, ca. 7 × 3–5 mm, glabrous. Corolla blue-purple; standard ovate-oblong, ca. 9 × 5 mm, reflexed, apex retuse, narrowing to a claw, claw equal to blade; wings obovate-elliptic, ca. 16 mm, 1-auriculate at base, claw ca. 6 mm; keel ovate-falcate, auriculate on one side, claw slender, ca. 18 mm. Stamens 10, unequal, slightly fused at base. Ovary shorter than stamens, yellow-brown hairy; ovules many. Legumes not obviously moniliform, slightly compressed, ca. 6 × 0.7 cm, 2-valvate along sutures. Seeds 1–4(or 5), light yellow, ellipsoidal, ca. 4.5 mm. Fl. May–Jul, fr. Jul–Oct.

Valley forests; 3000–4500 m. Xizang [Bhutan, India, Myanmar].

9. *Sophora davidii* (Franchet) Skeels, U.S.D.A. Bur. Pl. Industr. Bull. 282: 68. 1913.

白刺槐 bai ci huai

Shrubs or small trees, 1–2 m high, rarely 3–4 m. Branches glabrous; sterile branches spiny at tip, some spines branched. Leaves 2–6.5(–8) cm; stipules subulate, some becoming spiny, sparsely pubescent, persistent; leaflets 11–19, usually elliptic-ovate or obovate-oblong, 5–20 mm, sparsely villous abaxially, glabrous adaxially, apex rounded or retuse, usually with mucro. Racemes terminal at branchlets. Flowers small, ca. 15 mm or less. Calyx campanulate, blue-purple, unequally 5-toothed, glabrous. Corolla white or light yellow, some red-purple on stan-

dard, rarely blue-purple; standard obovate-oblong, ca. 14 × 6 mm, rounded at apex, with slender claw at base, reflexed; wings equal to standard, obovate-oblong, ca. 3 mm wide, auriculate on one side; keel slightly shorter than wings, falcate-obovate, auriculate. Stamens 10, equal, slightly fused at base. Ovary longer than stamens, densely yellow-brown hairy, many ovuled; style curved, glabrous. Legumes slightly compressed, 6–8 × 0.6–0.7 cm, 2-valvate along sutures, sparsely hairy. Seeds 3–5, dark brown, ovoid, ca. 4 mm. Fl. Mar–Aug, fr. Jun–Oct.

• Valley scrub, hill slopes, sandy places in valleys; below 3400 m. Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

- 1a. Leaflets large, 15–20 mm, oblong, lateral veins obvious; legume long constricted between seeds 9c. var. *liangshanensis*
1b. Leaflets small, 5–15 mm, elliptic-ovate to broadly ovate, lateral veins not obvious; legume shortly or not obviously constricted between seeds.
2a. Corolla white or light yellow; leaflets 10–15 mm, elliptic-ovate or obovate-oblong 9a. var. *davidii*
2b. Corolla blue-purple; leaflets very small, 5–6 mm, usually broadly ovate 9b. var. *chuansiensis*

9a. *Sophora davidii* var. *davidii*

白刺槐(原变种) bai ci huai (yuan bian zhong)

Sophora moorcroftiana (Benth) Baker var. *davidii* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 5: 253; Pl. David. 1: 101. 1883; *Caragana chamlago* B. Meyer (1909), not *C. chamlago* Lamarck (1785); *S. moorcroftiana* subsp. *viciifolia* Yakovlev; *S. viciifolia* Hance (1881), not Salisbury (1796).

Leaflets 11–19, elliptic-ovate or obovate-oblong, 10–15 mm, lateral veins not obvious. Corolla white or creamy white. Legumes slightly compressed, not obviously constricted between seeds. Seeds 3–5.

• Valley scrub, hill slopes; below 2500 m. Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Yunnan, Zhejiang.

9b. *Sophora davidii* var. *chuansiensis* (C. Y. Ma) C. Y. Ma ex B. J. Bao & Vincent, **comb. nov.**

川西白刺槐 chuan xi bai ci huai

Basionym: *Sophora viciifolia* Hance var. *chuansiensis* C. Y. Ma, Acta Phytotax. Sin. 20: 469. 1982.

Leaflets very small, usually obovate, 5–6 × 2–4 mm, lateral veins not obvious. Corolla blue-purple. Legumes shortly constricted between seeds.

• Dry hill slopes, sandy places in valleys; 2500–3400 m. Sichuan, Xizang, Yunnan.

9c. *Sophora davidii* var. *liangshanensis* (C. Y. Ma) C. Y. Ma ex B. J. Bao & Vincent, **comb. nov.**

凉山白刺槐 liang shan bai ci huai

Basionym: *Sophora viciifolia* Hance var. *liangshanensis* C. Y. Ma, Acta Phytotax. Sin. 20: 470. 1982.

Leaflets large, oblong, 15–20 mm, lateral veins obvious, gray-white pilose. Legumes moniliform, long constricted between seeds. Seeds 2 or 3, rarely 5.

• 700–800 m. Sichuan.

10. *Sophora alopecuroides* Linnaeus, Sp. Pl. 1: 373. 1753.

苦豆子 ku dou zi

Herbs or subshrubs, ca. 1 m high, densely branched. Branches white villous or patulous-tomentose. Leaves 15–30 × 4–9 cm; stipules subulate, ca. 5 mm, caducous; petiole 1–2 cm; leaflets 11–27, lanceolate-oblong or elliptic-oblong, 15–40 × 5–14 mm, papery, densely hairy abaxially, pilose adaxially, lateral veins not obvious. Racemes terminal. Flowers many, dense; pedicel 3–5 mm; bracts subulate, caducous. Calyx compressed campanulate; teeth 5, unequally triangular-ovate. Corolla white or creamy white; standard varying in shape, usually oblong-obovate, 15–20 × 3–4 mm, apex rounded or obcordate, narrowing to claw; wings ca. 16 mm, ovate-oblong, 1-auriculate; keel similar to wings, claw slender, ca. 1/2 as long as blade. Stamens 10, slightly fused at base, shortly hairy where fused. Ovary densely white hairy; stigma very small, pilose. Legumes moniliform, straight, 8–13 cm. Seeds many, brown or light brown, ovoid. Fl. May–Jun, fr. Aug–Oct.

Grasslands, deserts. Gansu, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Afghanistan, India, Pakistan; C and SW Asia].

- 1a. Branches and leaflets appressed villous 10a. var. *alopecuroides*
1b. Branches and leaflets densely patulous-tomentose 10b. var. *tomentosa*

10a. *Sophora alopecuroides* var. *alopecuroides*

苦豆子(原变种) ku dou zi (yuan bian zhong)

Goebelia alopecuroides (Linnaeus) Bunge ex Boissier; *Pseudosophora alopecuroides* (Linnaeus) Sweet; *Sophora orientalis* Pallas; *S. pallida* Salisbury; *Vexibia alopecuroides* (Linnaeus) Yakovlev.

Branches white villous. Leaflets appressed villous, densely so abaxially.

Near grasslands, deserts. Gansu, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [India; C and SW Asia].

10b. *Sophora alopecuroides* var. *tomentosa* (Boissier) Bornmüller, Bot. Centralbl. Beih. 27: 347. 1910.

毛苦豆子 mao ku dou zi

Goebelia alopecuroides var. *tomentosa* Boissier, Fl. Orient. 2: 629. 1872; *Sophora alopecuroides* subsp. *tomentosa* (Boissier) Yakovlev; *Vexibia alopecuroides* var. *tomentosa* (Boissier) Yakovlev.

Branches and leaflets densely patulous-tomentose.

Xinjiang [Afghanistan, Pakistan; SW Asia (Iran)].

11. *Sophora flavescens* Aiton, Hort. Kew. 2: 43. 1789.

苦参 ku shen

Herbs or subshrubs, 1–2 m. Stem striped, pilose when young. Leaves 20–25(–30) cm; stipules lanceolate, 6–8 mm, acuminate; leaflets 13–25, elliptic, ovate, or lanceolate, 3–4(–6) × (0.5–)1.2–2 cm, papery, pilose or glabrescent abaxially, glabrous adaxially, base cuneate or slightly cordate, apex obtuse or acute. Racemes terminal, 15–25 cm. Flowers many, widely spaced; pedicel slender, ca. 7 mm; bracts linear, ca. 2.5 mm. Calyx campanulate, oblique; teeth not obvious, sparsely pubescent. Corolla white, pale yellow, purple-red, or red; standard obovate-spatulate, 14–15 × 6–7 mm, apex rounded or retuse, narrowing to a claw; wings rugose, claw equal to blade, ca. 13 mm; keel similar to wings, slightly broader, ca. 4 mm wide. Stamens 10, free or slightly fused at base. Ovary nearly sessile, hairy; ovules many; style slightly curved. Legumes 5–10 cm, slightly constricted between seeds, slightly quadrangular, sparsely or densely pubescent or glabrescent, 4-valvate. Seeds 1–5, red-brown or purple-brown, long ovoid, slightly compressed. Fl. Jun–Aug, fr. Jul–Oct.

Scrub, hill slopes, farm fields; below 1500 m. All provinces [India, Japan, Korea, Russia].

- 1a. Corolla purple-red or red 11c. var. *galegoides*
1b. Corolla white or pale yellow.
2a. Branchlets and leaflets pilose
or glabrescent; legume
sparsely hairy 11a. var. *flavescens*
2b. Branchlets and leaflets densely
brown villous; legume densely
hairy 11b. var. *kroni*

11a. *Sophora flavescens* var. *flavescens*

苦参(原变种) ku shen (yuan bian zhong)

Sophora angustifolia Siebold & Zuccarini; *S. flavescens* f. *angustifolia* (Siebold & Zuccarini) Yakovlev; *S. flavescens* var. *angustifolia* (Siebold & Zuccarini) Kitagawa; *S. flavescens* var. *stenophylla* Hayata.

Branchlets and leaflets pilose or glabrescent. Corolla white or pale yellow. Legume sparsely pubescent or glabrescent.

Scrub, hill slopes, farm fields; below 1500 m. All provinces [India, Japan, Korea, Russia].

11b. *Sophora flavescens* var. *kroni* (Hance) C. Y. Ma, Acta Phytotax. Sin. 20: 470. 1982.

毛苦参 mao ku shen

Sophora kroni Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 219. 1862.

Branchlets and leaflets densely brown villous. Legume densely hairy.

• Scrub, hill slopes, farm fields; below 1000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Shanxi.

11c. *Sophora flavescens* var. *galegoides* (Pallas) Candolle,

Prodr. 2: 96. 1825.

红花苦参 hong hua ku shen

Sophora galegoides Pallas, Sp. Astragal. 118. 1803.

Corolla purple-red or red.

• Anhui, Guizhou, Zhejiang.

This taxon is similar to *Sophora flavescens* var. *flavescens* but is distinguished by its purple-red corolla.

12. *Sophora mollis* (Royle) Baker in J. D. Hooker, Fl. Brit. India 2: 251. 1876.

翅果槐 chi guo huai

Edwardsia mollis Royle, Ill. Bot. Himal. Mts. 196. 1835; *E. hortensis* Boissier & Buhse; *Keyserlingia buxbaumii* Bunge ex Boissier; *K. hortensis* (Boissier & Buhse) Yakovlev.

Shrubs, ca. 1 m high. Branchlets gray-white hairy. Leaves 12–25 cm; petiole base slightly inflated; leaflets (11–)19–35, ovate, elliptic, oblong, or lanceolate, (10–)15–22(–27) × 5–9(–15) mm, leathery, sparsely hairy or glabrescent, base cuneate to rounded, apex rounded or retuse. Racemes 5–10 cm. Flowers 20–26 mm; pedicel 5–20 mm; bracts linear-lanceolate to ovate, 2–3(–3.5) mm. Calyx sparsely hairy; teeth short to absent. Standard rounded, claw equal to 1/2 of petal; wings oblong, rugose in upper part; keel similar to wings, 1-auriculate. Stamens 10, free. Legumes winged, obviously constricted, quadrangular. Seeds 1–7, red-brown, oblong, ca. 8 mm.

Yunnan [Afghanistan, India, Kashmir, Nepal, Pakistan; SW Asia (Iran)].

13. *Sophora tomentosa* Linnaeus, Sp. Pl. 1: 373. 1753.

绒毛槐 rong mao huai

Shrubs or small trees, 2–4 m high. Branches shortly tomentose. Leaves 12–18 cm; stipules absent; leaflets 11–15(–19), oval or rounded, rarely ovate, 2.5–5 × 2–3.5 cm, nearly leathery, densely gray-white tomentose abaxially, glabrous adaxially, lateral veins obscure, base rounded, apex rounded or retuse. Racemes terminal, 10–20 cm, gray-white tomentose. Flowers dense; pedicel equal to calyx, 15–17 mm; bracts linear. Calyx campanulate, 5–6 mm, shortly tomentose. Corolla yellow or creamy white; standard broadly ovate, ca. 17 × 10 mm, claw ca. 3 mm; wings long elliptic, 1-auriculate, claw slender, ca. 5 mm; keel similar to wings, slightly shorter. Stamens 10, free. Ovary densely pubescent; style short, less than 2 mm. Legumes moniliform, 7–10 × 0.9–1 cm, shortly hairy. Seeds many, brown, globose, lustrous. Fl. Aug–Oct, fr. Sep–Dec.

Sand dunes, seashores. Guangdong, Hainan, Taiwan [seashores throughout the tropics].

14. *Sophora franchetiana* Dunn, J. Linn. Soc., Bot. 38: 358. 1908.

闽槐 min huai

Shrubs or small trees, 1–3 m. Branchlets densely brown tomentose. Leaves 10–15 cm; stipules subulate, ca. 4 mm; petiole 1–2 cm; leaflets 11–15, elliptic-oblong or ovate-oblong, 3–4 × 1.5–2 cm, papery, tomentose abaxially, glabrous and light green adaxially, lateral veins obscure, base rounded or nar-

rowed, apex acute or acuminate. Racemes terminal, ca. 6 cm, densely tomentose; rachis ca. 2 cm. Flowers 12–15 mm. Calyx 2–3 × 4–5 mm, densely tomentose; teeth 5, equal, triangular. Corolla white; standard obovate-oblong or orbicular, ca. 10 × 6 mm, base abruptly clawed, apex retuse; wings oblong, petal ca. 7 × 3.5 mm, auricle nearly absent, claw slender; keel nearly falcate, obtuse at apex, petal ca. 6 × 4 mm, claw ca. 3 mm. Stamens 10, free or slightly fused at base. Ovary sparsely brown hairy; ovules 4. Legumes terete, 4–6 cm, brown hairy, slenderly beaked, constricted between seeds if more than 1. Seeds 1, rarely 2 or 3, yellow, ovoid, ca. 8 mm, lustrous. Fl. and fr. Apr–Sep.

Valley scrub; below 1000 m. Fujian, Guangdong, Hunan, Zhejiang [Japan].

15. *Sophora wilsonii* Craib in Sargent, Pl. Wilson. 2: 94. 1914.

瓦山槐 wa shan huai

Shrubs, 1–2 m high. Branches sparsely golden pubescent; branchlets densely hairy. Leaves 10–12 cm; stipules subulate, ca. 4.5 mm, persistent; leaflets 9–15; petiolule ca. 1 mm; blades elliptic, 15–25 × 7–12 mm, papery, densely brown hairy abaxially, glabrous adaxially, lateral veins obscure, base cuneate, apex obtuse, mucronate. Racemes alternate with leaves. Bracts subulate, 2–3 mm, caducous. Calyx campanulate, obviously oblique, 6–7 mm; teeth 5. Corolla white or pale yellow; standard linear-obovate, ca. 15 × 5 mm, apex retuse; wings oblong, equal to standard in length, claw ca. equal to petal; keel similar to wings, shorter, 1-auriculate. Stamens 10, slightly fused at base, sparsely hairy at fused parts. Ovary sparsely hairy; style and stigma glabrous. Legumes dark brown, terete, 7.5–8.5 × 1–1.2 cm, rigid, sparsely pubescent, base slender necked, apex beaked. Seed 1, dark brown, large, oblong, ca. 13 mm, obtuse at both ends. Fl. and fr. May–Oct.

• Valley scrub; 500–1700 m. Gansu, Guizhou, Sichuan, Yunnan.

16. *Sophora prazeri* Prain, J. Asiatic Soc. Bengal, Pt. 2, Nat. Hist. 66: 466. 1897.

锈毛槐 xiu mao huai

Millettia esquirolii H. Léveillé; *Sophora duclouxii* Gagnepain; *S. mairei* Pampanini; *S. prazeri* subsp. *mairei* (Pampanini) Yakovlev; *S. prazeri* var. *mairei* (Pampanini) P. C. Tsoong.

Shrubs, 1–3 m high. Branches brown; branchlets red-brown tomentose. Leaves 7–11 × 3–4 cm; stipules setaceous, hairy; petiole sulcate adaxially; leaflets 7–15, usually ovate-elliptic, ovate, or long elliptic, rigidly papery; terminal leaflet ca. 8 × 4 cm, base cuneate to broadly cuneate, apex acute to broadly acute; middle leaflets oblong-lanceolate or ovate, 3–5 × 2–3.5 cm; basal leaflets smaller, veinlets obvious on both surfaces, densely hairy abaxially, lustrous adaxially. Racemes lateral, alternate with leaves, 5–20 cm. Pedicel 3–6 mm; bracts setaceous, caducous. Calyx obliquely campanulate; teeth 5, 8–9 × 5–7.5 mm, hairy. Corolla white or pale yellow; standard obovate or oblong-obovate, 15–17 × ca. 5 mm, apex retuse, narrowing to claw from middle; wings oblong, equal to standard in length, 1-auriculate, claw slender; keel shorter, obovate-oblong, 1-auriculate. Stamens 10, slightly fused at base. Ovary densely

red-brown hairy. Legumes moniliform, 4–10 cm, apex beaked, neck densely hairy, constricted between seeds. Seeds 2–4, dark red or light red, ovoid or elliptic, ca. 8 mm, both ends acute. Fl. and fr. Apr–Sep.

Mountain forests, valleys, wet slopes; below 2000 m. Guangxi, Guizhou, Yunnan [Myanmar].

17. *Sophora benthamii* Steenis, Bull. Jard. Bot. Buitenzorg, sér. 3, 17: 428. 1948.

尾叶槐 wei ye huai

Sophora acuminata Benth. ex Baker.

Shrubs, 1–3 m high. Branches light brown pubescent, becoming glabrous. Leaves 15–25 cm; stipules setaceous, brown pubescent; leaflets 9–19; petiolules ca. 1 mm; blades papery, ovate-oblong or ovate-lanceolate, rarely obovate, terminal leaflet largest, to 10 cm, lateral leaflets smaller, veinlets obvious, base cuneate or rounded, apex acuminate, mucronate. Racemes slender, sometimes curved, 10–15 cm, opposite leaves. Bracts setaceous, gray-brown hairy. Calyx obliquely campanulate; teeth 5, obtuse. Corolla white or pale yellow; standard oblong or obovate-lanceolate, ca. 16 × 6 mm, apex retuse, narrowing to claw from middle; wings ovate-oblong, 1-auriculate, rugose; keel shorter than wings, 1-auriculate, claw equal to blade. Stamens 10, somewhat fused at base. Ovary stalked, gray-brown hairy; ovules many. Legumes moniliform, 12–16 × 1–1.2 cm, pubescent, densely so where constricted, beak long. Seeds (1 or)2–4(or 5), dark red or red, ca. 12 × 7 mm, acute at both ends. Fl. and fr. Apr–Sep.

Valleys; 1300–2500 m. Xizang, Yunnan [Bhutan, India, Myanmar].

18. *Sophora praetorulosa* Chun & T. C. Chen, Acta Phytotax. Sin. 7: 28. 1958.

疏节槐 shu jie huai

Subshrubs, 20–100 cm high. Stem yellow-brown, glabrous, much branched from base. Leaves many and dense, 10–15 cm; stipules absent; leaflets 11–17, opposite, variable in shape, elliptic, orbicular, ovate, or obovate-oblong, 10–25 × 7–15 mm, nearly leathery, hairy when young, becoming glabrous, usually glandular-punctate, base rounded, apex obtuse or mucronate. Racemes terminal, ca. 12 cm. Flowers widely spaced; bracts subulate, less than 1 mm, persistent; pedicel ca. 5 mm. Calyx obliquely campanulate, pilose; teeth 5, unequal. Corolla purple; standard obovate, 5–7 × 3–4 mm, apex retuse, narrowing to claw; wings linear-oblong, 2-auriculate, claw ca. 1.5 mm; keel falcate, incurved. Stamens 10, slightly fused at base. Ovary pilose, shortly stalked; ovules 6; style glabrous. Legumes moniliform, glabrescent, apex beaked. Seeds 2 or 3, dark brown, elliptic, ca. 6 mm, lustrous. Fl. Jul–Aug.

• Dry wastelands. Hainan.

19. *Sophora pachycarpa* Schrenk ex C. A. Meyer in Fischer & Avé-Lallemant, Index Sem. Hort. Petrop. 9: 89. 1843.

厚果槐 hou guo huai

Goebelia pachycarpa (Schrenk ex C. A. Meyer) Bunge ex Boissier; *Vexibia pachycarpa* (Schrenk ex C. A. Meyer) Yakov-

lev.

Herbs or subshrubs, 30–60 cm; plant gray hairy. Leaves (5–)9–15(–20) cm; leaflets 13–33, opposite, lanceolate to oblong-lanceolate, (3.5–)15–20(–27) × (2–)3–7 mm, papery. Racemes terminal, to 20 cm, narrow. Calyx obliquely campanulate, ca. 8 × 4.5 mm, 5-lobed, pubescent. Corolla white to creamy yellow; standard oblong-obovate, apex obcordate, narrowing to claw, claw equal to blade in length; wings unequal, auriculate, claw shorter than blade; keel falcate, auriculate. Stamens 10, fused at base. Ovary densely gray-brown pubescent; ovules many. Legumes indehiscent, 4–5 × 0.8–0.9 cm. Seeds red-brown, 5–6 × 4–4.5 mm, lustrous.

• Gansu.

20. *Sophora japonica* Linnaeus, Mant. Pl. 1: 68. 1767.

槐 huai

Anagyris chinensis Sprengel; *Macrotropis foetida* Candolle; *Ormosia esquirolii* H. Léveillé; *Pongamia chinensis* Candolle; *Robinia mitis* Loureiro (1790), not Linnaeus (1763); *Sophora angustifoliola* Q. Q. Liu & H. Y. Ye [“*angustifolia*”]; *S. japonica* f. *columnaris* Schwerin; *S. japonica* f. *hybrida* Carrière; *S. japonica* f. *oligophylla* Franchet; *S. japonica* f. *pendula* Loudon; *S. japonica* var. *praecox* Schwerin; *S. japonica* var. *pubescens* (Tausch) Bosse; *S. japonica* f. *variegata* Nichols; *S. japonica* var. *vestita* Rehder; *S. japonica* var. *violacea* Carrière; *S. mairei* H. Léveillé (1915), not Pampanini (1910); *S. pubescens* Tausch; *S. sinensis* Forrest; *S. vaniotii* H. Léveillé; *Styphnolobium japonicum* (Linnaeus) Schott.

Trees, to 25 m. Bark gray-brown, longitudinally striate; branches of current year green, glabrous. Leaves 15–25 cm; stipules ovate to linear, caducous; petiole inflated at base, bud hidden; leaflets 9–15; stipels subulate; blades ovate-lanceolate or ovate-oblong, 2.5–6 × 1.5–3 cm, papery, glaucous and sparsely to densely pubescent abaxially, usually becoming glabrate, base broadly cuneate or rounded, apex acuminate, mucronate. Panicles terminal, to 30 cm; bracteole subulate. Calyx shortly campanulate, 3.5–4.5 mm; teeth 5, obtuse, pubescent. Corolla white or creamy yellow, rarely purple-red; standard broadly ovate, claw short, base cordate, apex retuse; wings ovate-oblong, ca. 10 × 4 mm; keel similar to wings, but broader. Stamens 10, unequal, free, persistent. Ovary glabrescent. Legumes green, moniliform, 2.5–5 × ca. 1 cm, obviously constricted between seeds, indehiscent, fleshy. Seeds 1–6, yellow-green, black-brown when dry, ovoid. Fl. Jul–Aug, fr. Aug–Oct.

Cultivated throughout China [native to Japan and Korea; widely cultivated elsewhere].

Many intergrading varieties and horticultural forms exist that are not worthy of recognition at this level. *Sophora angustifoliola* appears to be merely a narrow-leaved form of this species.

21. *Sophora brachygyna* C. Y. Ma, Acta Phytotax. Sin. 20: 472. 1982.

短蕊槐 duan rui huai

Trees, to 20 m or more. Bark gray-brown; branches of cur-

rent year green. Leaves to 20 cm; stipules caducous; petiole obviously inflated at base, bud hidden; leaflets 9–15; stipels subulate; petiolule ca. 3 mm; blades gray-white abaxially, green adaxially, ovate-lanceolate or ovate-oblong, 2.5–4(–6) × 1.5–2(–2.5) cm, glabrescent on both surfaces, base obtuse, apex acuminate. Panicles large, to 25 cm. Bractlets caducous. Calyx shortly campanulate, ca. 4 × 4 mm; teeth absent or obscure, gray-white ciliate. Corolla white or pale yellow; standard ovate, ca. 13 × 11 mm, base cordate, apex retuse, claw ca. 3 mm; wings oblong, ca. 11 × 4 mm, 2-auriculate, claw slender, ca. 4 mm; keel similar to wings, broader, 2-auriculate. Stamens 10, nearly free. Ovary shorter than 1/2 of stamens, white pilose; style curved. Legumes moniliform, sturdy, 4–6 × ca. 1.5 cm, obviously constricted between seeds, apex beaked, neck 1–2 cm, glabrous, indehiscent. Seeds 1 or 2(–4), brown-black, ovoid, compressed, ca. 11 × 7 mm. Fl. Aug–Nov, fr. Oct–Jan.

• Hill slopes, roadsides; ca. 300 m. Guangxi, Hunan, Jiangxi, Zhejiang.

This species may prove to be synonymous with *Sophora japonica*.

