

## 28. Tribe TRIFOLIEAE

车轴草族 che zhou cao zu

Wei Zhi (韦直); Michael A. Vincent

Herbs, rarely shrubs. Leaves pinnately or digitately 3-foliolate, rarely 1- or 5–7-foliolate; stipules mostly adnate to petiole, rarely nearly free (*Parochetus*); leaflets estipellate, veins mostly extended to teeth on margin. Inflorescences various, often capitate or spicate racemes, rarely flowers 1–3 axially; bracts present; bracteoles absent. Calyx campanulate, 5-lobed. Corolla papilionaceous. Stamens diadelphous (9+1) or monadelphous; free parts of filaments filiform or dilated upward; anthers dimorphic or monomorphic (*Ononis*). Ovary with 1 to numerous ovules; style glabrous. Legumes various: straight, falcate, spirally coiled, or ovate, included in or exerted from calyx, dehiscing by one or both sutures or indehiscent. Seeds estrophiolate.

Six genera and ca. 485 species: mainly distributed in the N temperate regions of the Old World; six genera and 45 species (one endemic, 19 introduced) in China.

- 1a. Anthers dimorphic, alternately dorsifixed or basifixed, either all equal or alternately longer and shorter; perennial herbs or shrubs, usually glandular and villous, sometimes spiny ..... 158. *Ononis*
- 1b. Anthers uniform in size and shape, not alternately basifixed and dorsifixed; annual or perennial herbs, not glandular, variably glabrous or hairy, not spiny.
  - 2a. Petals persisting after flowering; legume included in or slightly exerted from persistent corolla, inflorescence generally an umbel or dense raceme, sometimes headlike; filaments dilated upward ..... 159. *Trifolium*
  - 2b. Petals deciduous after flowering; legume as long as or longer than calyx; inflorescence various; filaments not dilated upward.
    - 3a. Keel petals acute; prostrate herbs rooting at the nodes; leaves palmately 3-foliolate; flowers 1–3 in long-pedunculate axillary umbels ..... 160. *Parochetus*
    - 3b. Keel petals obtuse; upright or sprawling herbs, not generally rooting at nodes; leaves pinnately trifoliolate; flowers in dense to lax terminal or axillary racemes, or in axillary sessile or shortly pedunculate heads, short racemes, umbels, or rarely solitary.
      - 4a. Flowers in slender racemes; ovules few; legumes indehiscent or tardily 2-valved, ovoid, straight, ca. same length as calyx ..... 161. *Melilotus*
      - 4b. Flowers in heads, short racemes, sessile umbels, rarely solitary; ovules mostly numerous; legumes indehiscent or dehiscent, linear or coiled, flattened or cylindric, longer than calyx.
        - 5a. Keel and wing petals possessing an explosive pollination mechanism, due to interlocking projections on adjoining faces of petals; legumes mostly spirally coiled, some flattened and curved, scarcely dehiscent, mostly prickly ..... 162. *Medicago*
        - 5b. Keel and wing petals lacking explosive pollination mechanism; legumes straight or curved, mostly linear, dehiscent or indehiscent, not prickly ..... 163. *Trigonella*

### 158. ONONIS Linnaeus, Sp. Pl. 2: 716. 1753.

芒柄花属 mang bing hua shu

Perennial herbs or shrubs, usually glandular and villous, sometimes spiny. Leaves pinnately 1–3(–5)-foliolate, lateral often reduced or absent; stipules herbaceous, usually adnate to petiole, cauline stipules basally connate, bifid; stipels absent; leaflets toothed, lateral veins extending into teeth. Flowers 1–3 in short axillary racemes; peduncle often bristlelike; floral leaves sometimes reduced to bracts with flowers crowded into a spike. Calyx campanulate or tubular; teeth ± equal. Petals free from staminal tube, claw short; keel ± beaked. Stamens monadelphous; filaments dilated at apex; anthers dimorphic, alternately basifixed and dorsifixed. Ovary shortly stipitate; ovules 2 to many. Legume linear-oblong or ovate. Seed reniform, smooth or punctate.

About 75 species: N Africa, SW Asia, Europe; four species (two introduced) in China.

- 1a. Flowers yellow; legume linear-oblong, 10–25 mm ..... 4. *O. natrix*
- 1b. Flowers pink, reddish purple, or purple; legume ovate to elliptic or rhomboid, more than 10 mm.
  - 2a. Plants without spines; flowers in pairs at nodes in dense leafy racemes ..... 2. *O. arvensis*
  - 2b. Plants with spines; flowers usually solitary at nodes in lax leafy racemes.
    - 3a. Corolla 6–10 mm, equal to or slightly longer than calyx ..... 1. *O. antiquorum*
    - 3b. Corolla 10–20 mm, 1.5–2 × as long as calyx ..... 3. *O. spinosa*

1. *Ononis antiquorum* Linnaeus, Sp. Pl., ed. 2, 2: 1006. 1763.

Greuter; *O. spinosa* Linnaeus subsp. *antiquorum* (Linnaeus) Briquet; *O. spinosa* var. *antiquorum* (Linnaeus) Arcangeli.

伊犁芒柄花 yi li mang bing hua

*Ononis repens* Linnaeus subsp. *antiquorum* (Linnaeus)

Perennial shrubs, erect, 50–80(–100) cm tall, with inter-

mixed long and short glandular hairs. Stem flexuous, terete, much branched, spiny. Leaves 1-foliolate, sometimes 3-foliolate at base of stem; stipules 6–8 mm; petiole 2–3 mm, slender; leaflets oblong or ovate, 6–12 × 2–5 mm, glandular on both surfaces, base rounded, margins irregularly serrulate, apex acute. Flowers in lax, leafy racemes, solitary at nodes; pedicel short. Calyx 5–8 mm; teeth ca. 2 × as long as tube. Corolla pink with purple stripes, 6–10 mm, not or slightly exceeding calyx. Legume ovoid, 5–6 mm, hidden in persistent calyx. Seeds 1 or 2 (or 3), tuberculate. Fl. May–Aug, fr. Jul–Sep.

Sandy meadows, margins of coniferous woodlands. Xinjiang [N Africa, C and SW Asia, S Europe].

**2. *Ononis arvensis*** Linnaeus, Syst. Nat., ed. 10, 2: 1159. 1759.

芒柄花 mang bing hua

*Ononis hircina* Jacquin; *O. repens* Linnaeus subsp. *arvensis* (Linnaeus) Greuter; *O. spinosa* Linnaeus subsp. *arvensis* (Linnaeus) Greuter & Burdet.

Perennial herbs, shrubby, 30–80 cm tall, with glandular and simple hairs. Stem straight, longitudinally ridged, much branched, unarmed. Leaves 3-foliolate, at apical part of stem 1-foliolate; stipules 6–10 mm, equal to petiole; terminal leaflet ovate to broadly oblong, 15–30 × 5–15 mm, sessile, base rounded to broadly cuneate, apex acute, lateral leaflets ca. 1/2 length of terminal one, glandular and villous on both surfaces, more dense abaxially. Flowers in dense, terminal, leafy racemes, (1 or) 2 at nodes; pedicel short. Calyx 8–12 mm; teeth 3–4 × as long as tube. Corolla red with purple stripes, rarely white, 10–20 mm. Legume broadly oblong or ovoid, ca. 7 × 5–6 mm, hidden in calyx, apex slightly reflexed. Seeds 2–4, tuberculate. Fl. and fr. Jun–Aug.

Moist sandy soil in meadows. Xinjiang, Xizang [Afghanistan, Kashmir; C and SW Asia, C and N Europe].

**3. *Ononis spinosa*** Linnaeus, Sp. Pl. 2: 716. 1753, nom. cons.

红芒柄花 hong mang bing hua

*Ononis campestris* W. D. J. Koch & Ziz; *O. repens* Linnaeus subsp. *spinosa* (Linnaeus) Greuter.

Perennial shrubs, 30–60 cm tall, with long and short glandular hairs, often arranged in 2 opposite lines. Stem erect, branched at base, spiny. Leaves 3-foliolate, sometimes 1-foliolate toward tip of stem; terminal leaflet oblong-elliptic, 5–10 × 3–5 mm, base rounded, margins irregularly serrulate, apex acute. Flowers in lax, leafy racemes, solitary at nodes, subsessile. Calyx 7–8 mm; teeth longer than tube. Corolla pale red to mauve, 10–20 mm. Legume oblong to rhomboid, 8–9 mm, equal to or slightly exserted from persistent calyx, apex beaked. Seeds 2 or 3, brown to black, tuberculate. Fl. and fr. Apr–Sep.

Cultivated as ornamentals [introduced from Europe].

**4. *Ononis natrix*** Linnaeus, Sp. Pl. 2: 717. 1753.

黄芒柄花 huang mang bing hua

Perennial subshrubs, 10–70 cm tall, densely glandular hairy. Stem erect, much branched, unarmed. Leaves 3-foliolate, lower rarely 5-foliolate, upper rarely 1-foliolate; leaflets oblong, obovate, to broadly linear, 1–3 cm, base cuneate, apex acute. Flowers in lax, leafy racemes or panicles, solitary at nodes, or at tips of lateral branchlets; pedicel 5–20 mm; bract aristate. Calyx 8–12 mm; teeth linear-lanceolate, 2.5–4 × length of tube. Corolla yellow, with veins scarlet or purple, 12–20 mm. Legume linear-elliptic, 10–25 × 3–4 mm, 2–3 × as long as persistent calyx, beaked. Seeds 6–9, globose, minutely tuberculate. Fl. May–Oct.

Cultivated as ornamentals [introduced from S and W Europe].

**159. TRIFOLIUM** Linnaeus, Sp. Pl. 2: 764. 1753.

车轴草属 che zhou cao shu

*Ursia* Vassilczenko.

Annual or perennial herbs, glabrous to pubescent. Stems erect to ascending or prostrate. Leaves pinnately 3-foliolate or palmately 3 (or 5–9)-foliolate; stipules entire or toothed, partly adnate to petiole; leaflets toothed or entire. Inflorescences axillary or terminal. Flowers sessile or shortly pedicellate, in heads, short racemes, umbels, or rarely solitary; bracts small or absent, often connate into a dentate and membranous involucre. Calyx 5–10[–30]-veined, regular or bilabiate, after flowering sometimes strongly inflated; teeth equal or unequal. Corolla persistent, white, pink, purple, or yellow, sometimes inflated in fruit. Filaments some or all dilated at apex; anthers uniform. Ovary with 1–12 ovules. Legume indehiscent, enclosed by marcescent calyx and petals. Seeds 1 or 2 (–9), ovoid to spherical or reniform.

About 250 species: temperate and subtropical Africa, America, Asia, and Europe; 13 species (nine introduced) in China.

- 1a. Stipules almost completely adnate to petiole.
  - 2a. Stem erect; leaflets (3–)5(–9); flowers 20–35, inflorescence capitate ..... 1. *T. lupinaster*
  - 2b. Stem prostrate or decumbent; leaflets 3; flowers 1–5, inflorescence umbellate.
    - 3a. Stem prostrate, thick and short; leaflets with 6 pairs of lateral veins ..... 2. *T. eximium*
    - 3b. Stem decumbent, thin and long; leaflets with 18–24 pairs of lateral veins ..... 3. *T. gordeievii*
- 1b. Stipules adnate to petiole for 1/2 its length or less.
  - 4a. Petioles slender, shorter than or equal to leaflets; flowers less than 8 mm; ovary stipitate.
    - 5a. Leaflets all ± sessile; stipules lanceolate, 1–1.5 cm, adnate to petiole for ca. 1/2 their length ..... 6. *T. aureum*
    - 5b. At least terminal leaflet stalked; stipules ovate to oblong, 4–8 mm, adnate to petiole for less than 1/2 their length.

- 6a. Flowers 5–15; pedicels larger than or equal to calyx tube; corolla 3–4 mm, standard boat-shaped, acute, smooth; leaflets 5–10 mm ..... 8. *T. dubium*
- 6b. Flowers 20–40; pedicels smaller than calyx tube; corolla (3–)5–6 mm, standard broadly flattened, emarginate, striate; leaflets 8–16 mm ..... 7. *T. campestre*
- 4b. Petioles, especially in lower leaves, much longer than leaflets; flowers more than 6 mm; ovary sessile.
- 7a. Calyx inflated in fruit, veins reticulate, 2 upper teeth longer than 3 lower teeth ..... 9. *T. fragiferum*
- 7b. Calyx not inflated in fruit, veins not reticulate, teeth subequal or lower longest.
- 8a. Flowers pedicellate, bracts present; calyx throat glabrous inside.
- 9a. Stem prostrate, stoloniferous, rooting at nodes; stipules thin and membranous; calyx teeth shorter than tube ..... 4. *T. repens*
- 9b. Stem erect-ascending; stipules herbaceous; calyx teeth longer than or equal to tube ..... 5. *T. hybridum*
- 8b. Flowers ± sessile, bracts absent; calyx throat with a thickened hairy ring inside.
- 10a. Floral heads sessile or very shortly pedunculate, ovoid to globose, involucre by stipules of upper leaves ..... 12. *T. pratense*
- 10b. Floral heads pedunculate, subglobose to elongate, involucre of small bracts or none.
- 11a. Plants perennial, rhizomatous; stems flexuous; leaf veins arcuate, running into small marginal teeth ..... 11. *T. medium*
- 11b. Plants annual, lacking rhizomes; stems upright, straight; leaf veins straight.
- 12a. Floral heads conic to cylindrical, 3–6 cm, involucre absent; calyx teeth ± equal; corolla red or pink, rarely white; stipules broad, apex blunt, dark green to purple ..... 10. *T. incarnatum*
- 12b. Floral heads ovoid or globose, 1.2–2.5 cm, involucre of small fused bracts; calyx teeth unequal, lower much longer than others; corolla creamy white; stipules narrow, apex attenuate, pale green ..... 13. *T. alexandrinum*

**1. *Trifolium lupinaster*** Linnaeus, Sp. Pl. 2: 766. 1753.

野火球 ye huo qiu

*Trifolium lupinaster* f. *albiflorum* (Seringe) P. Y. Fu & Y. A. Chen; *T. lupinaster* var. *albiflorum* Seringe.

Perennial herbs, glabrous to slightly pubescent. Stems erect, 30–60 cm, unbranched or branched above. Leaves palmately (3–)5(–9)-foliolate; stipules adnate to petiole for most of their length, membranous, apex long triangular; petiolule ca. 1 mm; leaflets lanceolate to linear-oblong, 25–50 × 5–16 mm, lateral veins 50 or more pairs, running to serrulate margin, base narrowly cuneate, apex acute or obtuse. Flowers 20–35, in terminal or axillary heads subtended by a membranous, caducous involucre; peduncle 1–3(–5) cm. Calyx 6–10 mm, sparsely pubescent, veins 10; teeth filiform, 1–2 × length of tube. Corolla purple or white, (10–)12–20 mm. Ovary stipitate, glabrous; ovules 5–9. Legume gray-brown, oblong, 6–10 × 2–3 mm; style persistent. Seeds (2 or)3–9, brown, ovoid, 1.5–2 mm, smooth. Fl. and fr. Jun–Oct.

Forest margins, hillsides, grasslands, moist lowlands. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Xinjiang [Japan, Korea, Mongolia, Russia; E Europe].

**2. *Trifolium eximium*** Stephan ex Seringe, Prodr. 2: 203. 1825.

大花车轴草 da hua che zhou cao

Perennial herbs, pubescent to glabrescent. Stems prostrate to ascending, 3–15 cm, branches 3–10, arising from a taproot, bases covered by persistent stipules and old leaves. Leaves palmately 3-foliolate, sessile to shortly petiolate; stipules ovate-oblong to lanceolate, membranous, connate for most of their length, apex acute; leaflets obovate-elliptic, 5–20 × 4–14 mm, lateral veins 6 pairs, forked and running to serrulate margin, base broadly cuneate, apex obtuse. Flowers 1–5, in axillary um-

bels subtended by scarious involucre; peduncle 5–40 mm; pedicels 1–4 mm, reflexed in fruit. Calyx 6–8 mm, pubescent to glabrescent, veins 10; teeth broadly triangular, 1–2 × length of tube. Corolla red, rarely white, 15–20 mm. Ovary sessile to shortly stipitate; ovules 6–8. Legume slightly falcate, 11–15 mm. Seeds 3–5, brown, ovoid, 1.8–2 mm, smooth. Fl. Jun–Jul, fr. Jul–Aug.

Moist belt along subalpine coniferous forests, rocky places in alpine valleys, glacial moraines; above 1500 m. N Xinjiang [Mongolia, Russia (Siberia)].

**3. *Trifolium gordeievii*** (Komarov) Z. Wei, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 1980(9): 82. 1980 [*“gordejevi”*].

延边车轴草 yan bian che zhou cao

*Medicago gordeievii* Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 133. 1921 [*“gordeievi”*]; *Trigonella gordeievii* (Komarov) Grossheim; *Ursia gordeievii* (Komarov) Vassilczenko.

Perennial herbs, villous to glabrescent. Stems 40–80 cm, decumbent-stoloniferous or procumbent-ascending, slender, branched. Leaves palmately 3-foliolate, very shortly petiolate to sessile; stipules lanceolate, membranous, entire, adnate to petiole for most of their length, base sheathing, apex subulate; leaflets obovate to elliptic, (5–)8–15(–18) × 4–8(–12) mm, finely pubescent abaxially, glabrous adaxially, lateral veins 18–24 pairs, prominent on both surfaces, extending into teeth, base broadly cuneate, apex rounded, retuse. Flowers 1(–3), in axillary umbel; involucre absent; peduncle shorter than or equal to leaves; bracts minute, caducous; pedicels (3–)5–7(–9) mm. Calyx 8–9 × ca. 2 mm, veins 10; teeth subulate, 2–3 × length of tube. Corolla white or pink, becoming red to purple, 14–16 mm; standard oblanceolate-elliptic, claw short; wings and keel slightly shorter, with long claw equal to limbs. Ovary shortly

stipitate. Legume ovate-oblong, 8–9 × ca. 3 mm, flat, apex with hooked beak. Seeds 1 or 2(–4), broadly ovoid. Fl. Jun–Sep.

Cold coniferous forests, rocky stream banks; 500–800 m. Heilongjiang, Jilin [Russia (Far East)].

**4. *Trifolium repens*** Linnaeus, Sp. Pl. 2: 767. 1753.

白车轴草 bai che zhou cao

Perennial herbs, stoloniferous, glabrous to glabrescent. Stems 10–30 cm, prostrate, rooting at nodes. Leaves long petiolate, palmately 3-foliolate; stipules ovate-lanceolate, membranous, with veins green or red, sheathing at base, apex subulate; petiolule 1–1.5 mm; leaflets obovate to ovate, 6–20(–40) × 8–16(–25) mm, lateral veins 13 pairs, prominent on both surfaces, base cuneate, apex emarginate to broadly rounded. Flowers 20–50(–80), in terminal, globose umbels, 1.5–4 cm; peduncle equal to or longer than petiole; involucre absent; bracts lanceolate-ovate, membranous; pedicels 2–5 mm, reflexed after anthesis. Calyx 3–5 mm, veins 6–10; teeth shorter than tube. Corolla white, rarely pink-tinged, 5–12 mm, fragrant; standard elliptic, ca. 2 × wings and keel. Ovary sessile; ovules 3 or 4. Legume linear-oblong. Seeds 2–4, ovoid to reniform. Fl. and fr. May–Oct.

Cultivated, escaped, and naturalized; grasslands, ravines, roadsides. Throughout China [native to N Africa, C and SW Asia, and Europe].

**5. *Trifolium hybridum*** Linnaeus, Sp. Pl. 2: 766. 1753.

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Perennial herbs, glabrous or glabrescent. Stems few to several from crown, erect or ascending, 15–60 cm, ridged vertically. Leaves palmately 3-foliolate; stipules ovate to ovate-lanceolate, base fused for ca. 1/3 of length, free blade long acuminate, tip subulate; petioles very long in lower leaves, gradually reduced in upper leaves; petiolule 1–1.5 mm; leaflets broadly elliptic to ovate-elliptic or obovate, 1–3 × 1–2 cm, lateral veins 15–20 pairs, base broadly cuneate, margins entire to serrulate, apex obtuse (rarely emarginate). Flowers 10–50, in axillary and terminal, globose umbels, 1–2.5 cm; peduncle longer than adjacent leaves; involucre absent; bracts lanceolate, 0.5–1 mm; pedicels 3–5 mm, reflexed after anthesis. Calyx with 5 major and 5 minor veins; teeth subulate, 1–2 × length of tube. Corolla pink to white, 7–10 mm; standard elliptic, longer than wings and keel. Ovary linear; ovules 2. Legume elliptic. Seeds 2, brown to reddish, ovoid, tuberculate. Fl. and fr. Jun–Oct.

Cultivated, escaped, and naturalized; forest margins, grasslands, roadsides. Gansu, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang [native to SW Asia and Europe; cultivated worldwide].

**6. *Trifolium aureum*** Pollich, Hist. Pl. Palat. 2: 344. 1777.

黄车轴草 huang che zhou cao

*Trifolium agrarium* Linnaeus, nom. utique rej.; *T. strepens* Crantz, nom. illeg. superfl.

Annual herbs, appressed puberulent. Stems erect or ascending, branched at middle, (10–)20–50 cm. Leaves palmately 3-foliolate; stipules lanceolate, 1–1.5 cm, veins prominent, adnate to petiole for ca. 1/2 their length, apex long acuminate;

petioles equal to leaflets in lower leaves, shorter in upper leaves; leaflets obovate-oblong to narrowly elliptic, ± sessile, 10–23 × 5–8 mm, papery, lateral veins 10–18 pairs, base cuneate, margins entire at base, serrate distally, apex obtuse (rarely emarginate). Flowers 25–40, imbricate in dense, globose to shortly cylindrical racemes, 1.5–2 cm, axillary and terminal; peduncle as long as or longer than racemes; involucre and bracts absent; pedicels ca. 1 mm, reflexed after anthesis. Calyx 2–2.5 mm, veins 5; tube short; lower 3 teeth 2–2.5 × length of upper 2. Corolla yellow, turning brown, 6–8 mm; standard elliptic. Ovary long stipitate, oblong; style longer than ovary. Legume narrowly ovoid, 2.5–3 mm, stipitate, apex with persistent style. Seed 1, yellow-brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun–Jul.

Cultivated, escaped, and naturalized; roadsides, weedy areas. Hebei, Jiangsu, Shaanxi [native to SW Asia and C and N Europe].

**7. *Trifolium campestre*** Schreber in Sturm, Deutschl. Fl., Abt. 1, Band 4, Heft 16. 1804.

草原车轴草 cao yuan che zhou cao

Annual herbs, pubescent to glabrescent. Stems erect, ascending, or prostrate. Leaves pinnately 3-foliolate; stipules ovate to oblong, 5–8 mm, adnate to petiole for 1/2 their length, apex acuminate; petioles shorter than or equal to leaflets; lateral leaflets sessile, terminal petiolule 3–7 mm; leaflets obovate to oblong-elliptic, 8–16 × 4–8 mm, lateral veins 5–8 pairs, base cuneate, margins entire proximally, serrate distally, apex rounded to emarginate. Flowers 20–40, imbricate in globose or cylindrical racemes, 8–13 × 7–10 mm; peduncle 1–3 cm; involucre and bracts absent; pedicels 1–1.8 mm, reflexed after anthesis. Calyx white, 2–2.8 mm, membranous, glabrous to sparsely pubescent, veins 5. Corolla yellow, turning brown, (3–)5–6 mm; standard broadly spatulate, striate, apex emarginate. Legume long ovoid, ca. 3 mm; stipe ca. 1 mm. Seed 1, brown, convex-ovoid, ca. 1 mm. Fl. and fr. Feb–Apr.

Cultivated, escaped, and naturalized; roadsides, grasslands, disturbed areas. Hebei, Jiangsu, Shaanxi [native to N Africa, SW Asia, and Europe].

**8. *Trifolium dubium*** Sibthorp, Fl. Oxon. 231. 1794.

钝叶车轴草 dun ye che zhou cao

Annual herbs, glabrous to sparsely pubescent. Stems erect to decumbent, (5–)10–30(–40) cm. Leaves pinnately 3-foliolate; stipules obliquely ovate, 4–8 mm, base rounded, margins finely dentate, apex acute; petiole shorter than or equal to leaflets; terminal petiolule longer than lateral petioles; leaflets obovate, 5–10(–12) × 3–8 mm, veins 6–8 pairs, base cuneate, margins entire proximally, obscurely serrulate distally, apex rounded or emarginate. Flowers 5–15, in axillary heads; peduncle 0.5–3(–4) cm, pubescent; pedicels less than 1 mm, after flowering pendulous. Calyx ca. 2 mm, veins 5. Corolla pale yellow, turning brown, 3–4 mm; standard narrowly boat-shaped, smooth, apex acute. Legume oblong, 1.5–2 mm, shortly beaked; stipe ca. 1 mm. Seed 1, pale brown, globose. Fl. and fr. Apr–Sep.

Cultivated, escaped, and naturalized. Jiangsu, Shaanxi, Taiwan [native to SW Asia and Europe].

**9. *Trifolium fragiferum*** Linnaeus, Sp. Pl. 2: 772. 1753.

草莓车轴草 cao mei che zhou cao

Perennial herbs, stoloniferous, glabrous or hairy. Stems prostrate or decumbent, 10–30(–50) cm, rooting at nodes. Leaves palmately 3-foliolate, long petiolate; stipules linear-lanceolate to lanceolate-ovate, 1–2 cm, membranous, base sheathing, tip acuminate to subulate; leaflets obovate to obovate-elliptic, ± sessile, (5–)10–25 × 5–15 mm, glabrous or sparsely pubescent on veins, lateral veins 10–15, base broadly cuneate, apex rounded, retuse. Flowers 10–30, in crowded hemispheric or ovoid heads, 0.8–2.5 cm; peduncle axillary, to 2 × petiole; involucre bracts fused, lobes lanceolate, entire or toothed. Calyx bilabiate, strongly inflated in fruit, veins reticulate; teeth filiform, 2 upper longer than 3 lower, 2 upper and distal 1/2 of tube densely sericeous. Corolla white or pink, 6–8 mm; standard oblong. Ovary linear. Legume ovate-oblong, enclosed in inflated calyx. Seeds 1 or 2, brown, reniform. Fl. and fr. May–Aug.

Alkaline soils, swamps, ditches, roadsides. Xinjiang [N Africa, C and SW Asia, Europe].

**10. *Trifolium incarnatum*** Linnaeus, Sp. Pl. 2: 769. 1753.

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Annual herbs, pubescent. Stems erect or ascending, 30–100 cm, simple to sparingly branched, striate. Leaves palmately 3-foliolate, long petiolate in lower leaves, shortly petiolate in upper leaves; stipules dark green to purple, elliptic, connate and adnate to petiole for ca. 3/4 their length, membranous, veins 3–5, base sheathing, apex broadly triangular or rounded; leaflets broadly obovate to suborbicular, 1.5–3.5 cm, lateral veins 5–10, base cuneate, margins irregularly crenate, apex retuse to obtuse. Flowers 50–80(–120), in dense, cylindric, terminal heads, 3–6 × 1–1.5 cm; peduncle 2.5–7 cm, stout. Calyx densely hirsute, veins 10; teeth subulate, longer than or equal to tube. Corolla red, pink, or white, 10–15 mm; standard narrowly elliptic, acute. Ovary oblate. Legume ovoid. Seed 1, greenish brown, ovoid. Fl. and fr. May–Jul.

Cultivated as an adaptable forage crop with hopeful prospects in China, escaped. Hebei, Jiangsu, Shaanxi, Shandong [native to Mediterranean region].

**11. *Trifolium medium*** Linnaeus, Amoen. Acad. 4: 105. 1759.

中间车轴草 zhong jian che zhou cao

Perennial herbs, rhizomatous, pubescent to glabrescent. Stems decumbent or ascending, 20–50 cm, branches flexuous. Leaves palmately 3-foliolate, lower long petiolate, upper shortly petiolate; stipules linear-lanceolate, adnate to petiole for ca. 1/2 their length, free blade acuminately lanceolate; leaflets elliptic to broadly lanceolate, 15–55 × 6–20 mm, lateral veins 10–12, arching, branched, running into small marginal teeth, base

rounded, margins entire to obscurely serrate, apex obtuse to acute. Flowers numerous, in globose to broadly ovate, terminal, solitary or paired, sessile or shortly pedunculate heads. Calyx 5–6 mm, veins 10; teeth subulate, unequal, lower tooth longest. Corolla purple, 15–18 mm; standard oblong-ovate. Legume ovoid. Seed 1, brown, angled. Fl. May–Jul, fr. Jun–Aug.

Cultivated, persisting after cultivation. Hebei, Shaanxi [native to SW Asia and Europe].

**12. *Trifolium pratense*** Linnaeus, Sp. Pl. 2: 768. 1753.

红车轴草 hong che zhou cao

Perennial herbs, sparsely villous or glabrescent. Stems numerous from crown, erect or ascending, 20–70 cm, stout, striate. Leaves palmately 3-foliolate, basal and cauline, long petiolate in lower leaves, shortly petiolate in upper leaves; stipules ovate-lanceolate, membranous, base adnate to petiole, apex acuminate-subulate; leaflets ovate-elliptic or obovate, rarely elliptic, 1.5–3.5(–5) × 1–2 cm, lateral veins 15, base broadly cuneate, margins obscurely serrulate, apex obtuse, rarely retuse. Flowers 30–70, in dense globose or ovoid, terminal, sessile to shortly pedunculate heads, subtended by involucre of stipules of reduced leaves. Calyx slightly pubescent or glabrous, veins 10; teeth subulate, unequal, lower tooth ca. 2 × others. Corolla purple, rarely pink or white, 12–14(–18) mm; standard spatulate, apex rounded, retuse. Ovary elliptic. Legume ovoid. Seed 1, yellow or brown, ovoid. Fl. and fr. May–Sep.

Cultivated and naturalized; woodland margins, wet meadows, roadsides. Anhui, Fujian, Guangdong, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Taiwan, Xinjiang, Yunnan [native to N Africa, SW Asia, and Europe].

**13. *Trifolium alexandrinum*** Linnaeus, Cent. Pl. I. 25. 1755.

埃及车轴草 ai ji che zhou cao

Annual herbs, sparsely pubescent to glabrescent. Stems erect or ascending, 20–60 cm, striate, branched at base. Leaves palmately 3-foliolate, alternate on lower part of stem, opposite on upper part; petioles equal to leaflets in lower leaves, shorter in upper leaves; stipules lanceolate, adnate to petiole for 1/2 their length, veins 4 or 5, pale green, margins sparsely ciliate, apex subulate; leaflets obovate or broadly elliptic to oblong-lanceolate, 15–30(–50) × 6–15 mm, lateral veins 6–10, base broadly cuneate to obtuse, margins of apical 1/2 serrate, apex obtuse, rarely retuse. Flowers numerous, in ovoid or conic, terminal or axillary heads, 12–25 × 10–15 mm; peduncles 1–2 × heads; involucre of short bracts, united at base. Calyx 3.5–4 mm, veins 10; teeth unequal, plumose, lower tooth equal to tube, others shorter. Corolla creamy white, 8–13 mm. Legume 22–25 mm. Seed 1, yellow, ovoid. Fl. Apr–May, fr. May–Jun.

Cultivated. Guangdong, Jiangsu, Taiwan [native range unknown; cultivated in N Africa and SW Asia].

**160. PAROCHETUS** Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 240. 1825.

紫雀花属 zi que hua shu

Perennial herbs, prostrate to ascending, rooting at nodes, sometimes with tubers. Leaves palmately 3-foliolate; stipules entire, free to basally adnate to petiole; petiole long; leaflets obcordate, base narrowly to broadly cuneate, margin entire or toothed. Inflo-

rescence umbellate; peduncle axillary, erect or deflexed in fruit; pedicel bases bracteate; flowers 1–3. Calyx teeth ± equal to tube, upper 2 connate for most of their length. Corolla not adnate to stamens; standard obovate, tapering into a claw; wings falcate-oblong, auriculate; keel broadly triangular-falcate, shorter than wings, apex straight or abruptly inflexed, acute. Stamens diadelphous; filaments capillary. Ovary sessile, glabrous; ovules numerous. Legume linear-ovate, longer than calyx, apex obliquely acute. Seeds numerous, brown, reniform, often spotted; hilum small, round and lateral.

Two species: E Africa, C and S Asia; one species in China.

**1. Parochetus communis** Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 240. 1825.

紫雀花 *zi que hua*

Stems prostrate to ascending, 10–20 cm, tubers lacking. Stipules 4–5 mm, membranous, entire, free; petiole 8–15 cm, slender, pubescent; petiolule less than 1 mm; leaflets 8–20 × 10–20 mm, lateral veins 4 or 5 pairs, base narrowly cuneate, margins entire or minutely serrate. Inflorescence umbellate; pe-

duncle longer than or equal to petiole; pedicels 5–10 mm; flowers 1–3. Calyx 6–9 mm, pubescent. Corolla blue or purple, rarely white or pink, ca. 20 mm; standard 1.4–2 cm, claw 3–5 mm; wings falcate-oblong, auricle 2–4 mm; keel abruptly inflexed, acute. Legume linear-ovate, 20–25 × 3–4 mm. Seeds 8–12, ca. 2 × 1 mm. Fl. and fr. Apr–Nov.

Thickets, woodland margins, grasslands, roadsides; 1800–3000 m. Sichuan, Xizang, Yunnan [Bhutan, India, Malaysia, Myanmar, Nepal, Sri Lanka, N Thailand, Vietnam].

## 161. MELILOTUS (Linnaeus) Miller, Gard. Dict. Abr., ed. 4. 1754.

草木犀属 *cao mu xi shu*

*Trifolium* [unranked] *Melilotus* Linnaeus, Sp. Pl. 2: 764. 1753 [“*Meliloti*”]; *Brachylobus* Dulac.

Annual or biennial herbs, taprooted, upright. Leaves pinnately 3-foliolate; stipules entire or nearly so, basally adnate to petiole; leaflets serrulate, lateral veins ending in teeth; stipels absent. Racemes axillary, slender, elongate; flowers numerous; bracts minute; bracteoles absent. Calyx teeth subequal. Corolla yellow or white, petals free from staminal tube, deciduous; standard ovate-oblong; wings narrowly oblong; keel broadly falcate. Stamens diadelphous; filaments capillary. Ovary sessile or shortly stipitate; ovules 2–8; style filiform, curved upward, often persistent. Legume obovoid or globose, slightly exerted from calyx, surface reticulate veined or wrinkled. Seeds 1 or 2, broadly ovoid, smooth or papillate.

About 20 species: temperate and subtropical N Africa, Asia, and Europe; four species in China.

These are fragrant herbs grown as green manure, forage crops, or bee plants.

- 1a. Flowers white ..... 1. *M. albus*  
 1b. Flowers yellow.  
 2a. Flowers up to 3 mm, pedicels less than 1 mm; legumes globose, ca. 2 mm ..... 4. *M. indicus*  
 2b. Flowers (3–)7 mm, pedicels 1.5 mm or more; legumes ovoid-elliptic, 3–5 mm.  
 3a. Stipules lanceolate, base hastate and split into several teeth or incised; leaflets serrate, teeth 15–20 on a side ..... 3. *M. dentatus*  
 3b. Stipules linear-falcate, base entire or with 1 minute tooth; leaflets obscurely to strongly serrate, teeth fewer than 15 on a side ..... 2. *M. officinalis*

**1. Melilotus albus** Medikus, Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 382. 1787.

白花草木犀 *bai hua cao mu xi*

Annual or biennial herbs, glabrescent. Stems erect, 70–200 cm, terete, hollow, much branched. Stipules subulate, 6–10 mm, entire; petiole slender, shorter than leaflet; leaflets lanceolate, oblong, or oblanceolate-oblong, 15–30 × (4–)6–12 mm, puberulent abaxially, glabrous adaxially, lateral veins running into teeth, 12–15 pairs, margins shallowly serrate. Racemes 8–20 cm; flowers 40–100; bracts 1.5–2 mm; pedicels 1–2 mm. Corolla white, 3.5–5 mm; standard larger than wings and keel. Ovary narrowly ovate; ovules 2–4. Legume elliptic to oblong, 3–3.5 mm, veins reticulate, thin, brown, dark when ripe, apex acute, beaked. Seeds 1 or 2, brown, ovoid, papillate. Fl. May–Jul, fr. Jul–Sep.

Moist soil in fields, roadsides, wastelands. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Liaoning, Nei

Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Asia, Europe].

**2. Melilotus officinalis** (Linnaeus) Lamarck, Fl. Franç. 2: 594. 1779.

草木犀 *cao mu xi*

*Trifolium officinale* Linnaeus, Sp. Pl. 2: 765. 1753 [T. “*M. officinalis*”]; *Brachylobus officinalis* (Linnaeus) Dulac; *Melilotus graveolens* Bunge; *M. officinalis* f. *suaveolens* (Ledebour) H. Ohashi & Tateishi; *M. suaveolens* Ledebour.

Biennial herbs, sparsely puberulent to glabrescent. Stems erect, 40–100(–250) cm, longitudinally ridged. Stipules linear-falcate, 3–5(–7) mm, entire or with 1 tooth at base; petiole slender; leaflets obovate, broadly ovate, oblanceolate, to linear, 15–25(–30) × 5–15 mm, lateral veins running into teeth, 8–12 pairs, margins shallowly serrate. Racemes 6–15(–20) mm, 30–70-flowered, dense at first, becoming lax in anthesis; bracts equal to pedicels, 1.5–2 mm. Corolla yellow, 4.5–7 mm; stan-

dard ± equal to wings and keel. Ovary narrowly ovate; ovules (4–)6(–8). Legume ovoid, 3–5 × ca. 2 mm, veins transversely reticulate, dark brown, apex with persistent style. Seeds 1 or 2, yellowish brown, ovoid, ca. 2.5 mm, smooth. Fl. May–Sep, fr. Jun–Oct.

Sandy grasslands, hillsides, ravine shores, margins of mixed woodlands. Throughout China [Asia, Europe].

**3. *Melilotus dentatus*** (Waldstein & Kitaibel) Persoon, Syn. Pl. 2: 348. 1807.

细齿草木犀 xi chi cao mu xi

*Trifolium dentatum* Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 1: 41. 1802; *Melilotus dentatus* prol. *sibiricus* O. E. Schulz; *M. dentatus* subsp. *sibiricus* (O. E. Schulz) Suvorov.

Biennial herbs, glabrous. Stems erect, 20–50(–80) cm, terete, longitudinally ridged. Stipules lanceolate to narrowly triangular, 6–12 mm, base hastate, with 2 or 3 teeth or incised; petiole slender, usually shorter than leaflets; leaflets oblong-lanceolate to suborbicular, 20–30 × 5–13 mm, lateral veins 15–20 pairs, parallel and branching into teeth, prominent on both surfaces, especially obvious near margins, base rounded or cuneate, apex rounded, apiculate. Racemes 3–5 cm, elongated to 8–10 cm when fruiting, scattered 20–50-flowered; pedicels ca. 1.5 mm. Corolla yellow, 3–4 mm; standard slightly longer than wings and keel. Ovary narrowly ovate; ovules 2. Legume globose to ovoid, 4–5 × 2–2.5 mm, veins reticulate, gibbous on ventral suture, brown. Seeds 1 or 2, olive-green, globose, ca. 1.5 mm. Fl. Jun–Sep, fr. Jul–Oct.

Woodland margins, alkaline meadows. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Xinjiang [C Asia, Europe].

**4. *Melilotus indicus*** (Linnaeus) Allioni, Fl. Pedem. 1: 308. 1785.

印度草木犀 yin du cao mu xi

*Trifolium indicum* Linnaeus, Sp. Pl. 2: 765. 1753 [*T. "M. indica"*]; *Melilotus parviflorus* Desfontaines.

Annual herbs, slightly pubescent to glabrescent. Stems erect or ascending, 20–50 cm, terete, simple or branching from base. Stipules lanceolate, 4–6 mm, base auriculate, with 2 or 3 tiny teeth, margin membranous; leaflets obovate-cuneate to narrowly oblong, 10–25(–30) × 8–10 mm, appressed hairy abaxially, glabrous adaxially, lateral veins 7–9 pairs, parallel running into teeth, base cuneate, margins serrulate toward apex, apex obtuse or truncate, sometimes retuse. Racemes slender, dense, 1.5–4 cm; peduncle long; flowers 15–25; bracts filiform; pedicels ca. 1 mm. Corolla yellow, 2.2–2.8 mm; standard broadly ovate, retuse, equal to wings and keel, or sometimes keel slightly longer. Ovary narrowly ovate; ovules 2. Legume olive-green, becoming red-brown when ripe, globose, ca. 2 mm, slightly exserted from calyx, glabrous, veins reticulate. Seed 1, dark brown, broadly ovoid, ca. 1.5 mm. Fl. Mar–May, fr. May–Jun.

Open places, alkaline soil in meadows, roadsides. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [S and C Asia, Europe].

## 162. **MEDICAGO** Linnaeus, Sp. Pl. 2: 778. 1753, nom. cons.

苜蓿属 mu xu shu

Annual or perennial herbs, rarely shrubs. Leaves pinnately 3-foliolate; stipules adnate to petiole at base; leaflets denticulate, lateral veins running out into teeth. Racemes axillary, flowers crowded into heads; bracts small and caducous. Calyx 5-toothed, subequal. Petals free from staminal tube; standard oblong to obovate, usually reflexed; wings and keel with hooked appendages involved in explosive tripping mechanism for pollination. Stamens diadelphous; filaments not dilated, apical portion of staminal column arched; anthers uniform. Ovary sessile or shortly stipitate; ovules numerous; style subulate; stigma subcapitate, oblique. Legume compressed, coiled, curved, or straight, surface reticulate, sometimes armed with spines. Seed small, reniform, smooth or rough.

About 85 species: Africa, C and SW Asia, Europe, Mediterranean region; 15 species (one endemic, six introduced) in China.

1a. Legume spirally coiled.

2a. Perennial herbs or shrubs; legume spineless.

3a. Shrubs ..... 9. *M. arborea*

3b. Herbs.

4a. Legume tightly coiled in 2–4(–6) spirals, center solid or nearly so; corolla variable in color, white, deep blue, to dark purple ..... 7. *M. sativa*

4b. Legume loosely coiled in 1–1.5 spirals, center hollow; corolla yellow to brownish purple ..... 8. *M. × varia*

2b. Annual or biennial herbs; legume with spines or tubercles.

5a. Leaflets obviously hairy; legume globose, less than 4.5 mm in diam.

6a. Petiole shorter than peduncle, stipule entire or obscurely serrate, leaflets densely hairy; inflorescence 2–10-flowered ..... 10. *M. minima*

6b. Petiole longer than peduncle, stipule small, incised, leaflets sparsely pilose; inflorescence 1- or 2-flowered ..... 11. *M. praecox*

5b. Leaflets glabrous or glabrescent; legume discoid, 4–10 mm in diam.

7a. Petiole not more than 2 × as long as peduncle, stipule lacinate or lacerate, leaflets without dark blotch ..... 12. *M. polymorpha*

7b. Petiole 2–5 × as long as peduncle, stipule triangular, incised to lacinate, leaflets with a dark central blotch ..... 13. *M. arabica*

- 1b. Legume not spirally coiled.
- 8a. Legume less than 3 mm ..... 1. *M. lupulina*
- 8b. Legume more than 8 mm.
- 9a. Legume falcate or linear, straight or curved to arcuate, less than 3 mm wide.
- 10a. Plants perennial; flowers in crowded pedunculate racemes ..... 6. *M. falcata*
- 10b. Plants annual; flowers solitary to few in sessile to shortly stalked clusters.
- 11a. Flowers 1 or 2(or 3), 6–8 mm, sessile; legume more than 40 mm ..... 14. *M. monantha*
- 11b. Flowers 2–5, 4–5 mm, shortly pedunculate; legume less than 30 mm ..... 15. *M. orthoceras*
- 9b. Legume oblong to semilunar, more than 4 mm wide.
- 12a. Plants densely pubescent; flowers yellow, ca. 5 mm ..... 5. *M. edgeworthii*
- 12b. Plants glabrous or slightly puberulent; flowers yellow with scarlet spot, more than 6 mm.
- 13a. Legume 5–9 mm wide; stems glabrous; leaflets rather larger ..... 2. *M. platycarpus*
- 13b. Legume less than 6 mm wide; stems ± puberulent; leaflets rather smaller.
- 14a. Flowers 4 or 5 in a scattered thyrese; leaflets ovate to orbicular; stipules hastate ..... 3. *M. archiducis-nicolaii*
- 14b. Flowers (4–)6–9(–15) in dense fascicles; leaflets cuneate-linear to oblanceolate; stipules lanceolate ..... 4. *M. ruthenica*

**1. *Medicago lupulina*** Linnaeus, Sp. Pl. 2: 779. 1753.

天蓝苜蓿 *tian lan mu xu*

Annual or short-lived perennial herbs, 15–60 cm, glabrescent to pubescent, sometimes glandular. Stems decumbent, prostrate or ascending, much branched. Stipules ovate-lanceolate, to 10 mm, entire or toothed, base rounded or hastate, apex acuminate; petiole 1–2 cm; leaflets elliptic, ovate, or obovate, 5–20 × 4–6 mm, papery, pubescent, lateral veins to 10 pairs, base cuneate, margin distally obscurely serrate, apex truncate or retuse, apiculate. Flowers 10–20 in small heads; peduncles slender, straight, longer than subtending leaves, glabrate to densely appressed pubescent; bracts bristlelike, minute; pedicel less than 1 mm. Calyx ca. 2 mm, glabrate to densely hairy. Corolla yellow, 2–2.2 mm; standard suborbicular, apex retuse, longer than wings and keel. Ovary broadly ovate; ovule 1. Legume reniform, ca. 3 × 2 mm, sculptured with concentric arcuate veins, sparsely hairy, black when ripe. Seed 1, brown, ovoid, smooth. Fl. Apr–Sep, fr. Jun–Oct.

Stream banks, roadsides, waste fields, woodland margins. Throughout China [Asia, Europe].

**2. *Medicago platycarpus*** (Linnaeus) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 271. 1841.

阔荚苜蓿 *kuo jia mu xu*

*Trigonella platycarpus* Linnaeus, Sp. Pl. 2: 776. 1753; *Melilotoides platycarpus* (Linnaeus) Soják; *Melissitus platycarpus* (Linnaeus) Goloskokov; *Trigonella karkarensis* Semenov ex Vassilczenko; *Turukhania platycarpus* (Linnaeus) Vassilczenko.

Perennial herbs, (25–)40–80(–100) cm. Stems erect, quadrangular, base often purplish, glabrous or puberulent. Stipules broadly triangular-lanceolate, 5–8 mm, shallowly serrate, base subhastate; petiole slender, 2.5–3.5(–5) cm, shorter above; leaflets broadly ovate, orbicular, to broadly elliptic, (15–)20–30 × (8–)15–25 mm, papery, sparsely hairy or glabrescent abaxially, glabrous adaxially, lateral veins ca. 10 pairs, inconspicuous, base rounded to broadly cuneate, margin irregularly dentate, apex rounded or truncate. Flowers (4 or)5–8(–15) in umbels;

peduncle shorter than or equal to subtending leaf, slender; bracts minute, ovate, apiculate, ca. 1 mm; pedicels 3–5 mm. Corolla yellow with purple stripes, bluish when dry, (7–)9–12(–14) mm; standard oblong-spatulate, slightly constricted at middle. Ovary linear; ovules 12–14. Legume oblong-falcate to semilunar, (10–)12–18(–24) × 5–9 mm, flat, veins crosswise long reticulate, black when ripe, dorsal suture straight, apex rounded, shortly beaked. Seeds (5–)8–12, brown, broadly ovoid, ca. 3 × 2 mm, smooth to rugose. Fl. Jun–Jul, fr. Jul–Aug.

Ravines, meadows by margins of coniferous forests; 1200–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia].

**3. *Medicago archiducis-nicolaii*** Širjaev, Bull. Misc. Inform. Kew 1928: 270. 1928 [“*archiducis-nicolaii*”].

青海苜蓿 *qing hai mu xu*

*Kamiella archiducis-nicolaii* (Širjaev) Vassilczenko; *Melilotoides archiducis-nicolaii* (Širjaev) Yakovlev.

Perennial herbs, 8–20 cm. Stems prostrate or ascending, slender, ridged, much branched, sparsely hairy. Stipules hastate, 4–7(–10) mm, veins obvious, margin dentate, apex narrowly triangular; petiole 4–12 mm; leaflets broadly ovate to orbicular, 6–18 × 6–12 mm, papery, puberulent abaxially, glabrescent adaxially, lateral veins 6–10 pairs, base rounded, margin obscurely irregularly denticulate, apex truncate or retuse, apical leaflet and petiolule longest. Flowers 4 or 5, scattered in axillary umbels; peduncle slightly longer than subtending leaf; bracts ca. 1 mm; pedicels slender, 2–5(–7) mm. Corolla yellow-orange, with central mauve spot, 7–9(–10) mm; standard obovate-elliptic, retuse. Ovary linear, glabrous; ovules 7–9(–13). Legume oblong-semilunar, 10–15(–18) × 4–6 mm, flat, veins crosswise reticulate, black when ripe, apex shortly beaked. Seeds 5–7, brown, broadly ovoid, ca. 2.5 × 1.5 mm, smooth. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine slopes, valleys, grasslands; (2500–)3000–4000 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, NE Xizang.

**4. *Medicago ruthenica*** (Linnaeus) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 271. 1841.

花苜蓿 *hua mu xu*

*Trigonella ruthenica* Linnaeus, Sp. Pl. 2: 776. 1753; *Medicago liaosiensis* (P. Y. Fu & Y. A. Chen) X. Y. Zhu & Y. F. Du; *M. ruthenica* var. *inschanica* (H. C. Fu & Y. Q. Jiang) X. Y. Zhu; *Melilotoides ruthenica* (Linnaeus) Soják; *M. ruthenica* var. *inschanica* (H. C. Fu & Y. Q. Jiang) H. C. Fu & Y. Q. Jiang; *M. ruthenica* var. *liaosiensis* (P. Y. Fu & Y. A. Chen) H. C. Fu & Y. Q. Jiang; *Melissitus liaosiensis* (P. Y. Fu & Y. A. Chen) Yakovlev; *M. ruthenicus* (Linnaeus) Peschkova; *M. ruthenicus* var. *inschanicus* (H. C. Fu & Y. Q. Jiang) H. C. Fu & Y. Q. Jiang; *M. ruthenicus* var. *liaosiensis* (P. Y. Fu & Y. A. Chen) H. C. Fu & Y. Q. Jiang; *Pocockia liaosiensis* P. Y. Fu & Y. A. Chen; *P. ruthenica* (Linnaeus) Boissier; *P. ruthenica* var. *inschanica* H. C. Fu & Y. Q. Jiang.

Perennial herbs, 20–70(–100) cm. Stems erect or ascending, branched at base, quadrangular. Stipules lanceolate, cuspidate, veins obvious, base rounded, auriculate, with 1–3 shallow denticles, apex slightly curved; petiole 2–7(–12) mm; leaflets varied in shape with different habitats, oblong, oblanceolate, cuneate, linear, and oblong-ovate, (6–)10–15(–25) × (1.5–)3–7(–12) mm, terminal largest, lateral veins 8–18 pairs, prominent on both surfaces, base cuneate, broadly cuneate, to rounded, margin entire below, slightly to irregularly serrulate in upper 3/4, apex truncate, obtuse, or retuse. Flowers (4–)6–9(–15) in umbels, sometimes to 2 cm; peduncles straight, usually longer than subtending leaf; bracts 1–2 mm; pedicels 1.5–4 mm. Corolla yellow-brown, with scarlet to purple stripes in center, (5–)6–9 mm; standard oblong-ovate, obcordate, or spatulate; wings oblong; keel shortest, ovate. Ovary linear; ovules 4–8. Legume oblong or oblong-ovate, 8–15(–20) × 3.5–5(–7) mm, flat, veins inclined transversely, black when ripe, base tapering and slightly curved, stipitate, apex obtuse, apiculate. Seeds 2–6, brown, elliptic-ovoid, ca. 2 × 1.5 mm, smooth. Fl. Jun–Sep, fr. Aug–Oct.

Sandy soil of stream banks, slopes, grasslands. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan [Mongolia, Russia (Far East, Siberia)].

**5. *Medicago edgeworthii*** Širjaev, Oesterr. Bot. Z. 87: 123. 1938.

毛茛苜蓿 *mao jia mu xu*

*Trigonella pubescens* Edgeworth ex Baker in J. D. Hooker, Fl. Brit. India 2: 88. 1876; *Medicago pubescens* (Edgeworth ex Baker) Širjaev (1928), not Candolle (1813); *Melilotoides pubescens* (Edgeworth ex Baker) Yakovlev.

Perennial herbs, 30–40 cm. Stems erect or ascending, branched at base, terete, densely hairy. Stipules ovate-lanceolate, 5–8(–10) mm, base rounded to hastate, margin entire, apex acuminate; petiole 2–6 mm; leaflets obovate to long obovate, (6–)10(–15) × (4–)7(–10) mm, scattered pubescent on both surfaces, especially dense on midrib abaxially, lateral veins 8–13 pairs, straightly running to teeth, base broadly cuneate, margin serrulate in upper 1/2, apex rounded, abruptly shortly acuminate. Flowers (1 or)2 or 3(–6) scattered in axillary heads; peduncles slightly longer than leaves; bracts ca. 1.5 mm; pedicels less than 2 mm. Corolla yellow, ca. 5 mm. Ovary oblong, densely tomentose; ovules 12–14. Legume oblong, 12–16 × 4–5 mm, flat, densely appressed pubescent, veins close, trans-

verse, base rounded, sessile, apex acute, shortly beaked, sutures obvious. Seeds 10–12, dark brown, ovate-elliptic, ca. 2 × 1 mm, smooth. Fl. Jun–Aug, fr. Jul–Sep.

Grasslands, open fields, roadsides; 2500–3500 m. Qinghai, Sichuan, Xizang, Yunnan [Afghanistan, India, Pakistan].

**6. *Medicago falcata*** Linnaeus, Sp. Pl. 2: 779. 1753.

野苜蓿 *ye mu xu*

Perennial herbs, (20–)40–100(–120) cm. Stems erect or ascending, terete, branchy. Stipules lanceolate to linear-lanceolate, base hastate, apex acuminate; leaflets obovate to linear, (5–)8–15(–20) × (1–)2–5(–10) mm, pubescent abaxially, glabrous or appressed puberulent adaxially, margin serrulate in apical 1/4 or margin 2- or 3-serrate, lateral veins 5–15 pairs, base cuneate, apex rounded, obtuse, or acute, mucronate. Racemes 10–20(–40) mm, with 6–20(–25) flowers, crowded; peduncles axillary, straight, equal to or slightly longer than leaves; bracts ca. 1 mm; pedicels 2–3 mm. Corolla yellow, 6–9(–11) mm; standard long obovate. Ovary linear; ovules 2–5. Legume falcate or straight, (8–)10–15 × 2.5–3.5(–4) mm, appressed puberulent, veins oblique and thin. Seeds 2–4, brown, ovate-elliptic, ca. 2 × 1.5 mm. Fl. Jun–Aug, fr. Jul–Sep.

Grassy places, slopes, ravines, dry sandy fields. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Asia, Europe].

- 1a. Stems ascending, appressed puberulent; leaflets obovate to linear-oblongate, margin serrulate in apical 1/4, apex obtuse, mucronulate, glabrous adaxially, appressed puberulent abaxially, lateral veins 12–15 pairs; legume falcate ..... 6a. subsp. *falcata*
- 1b. Stems erect, densely yellow tomentose; leaflets linear, margin 2- or 3-serrate, sparsely appressed puberulent adaxially, densely tomentose abaxially, lateral veins 5–7 pairs; legume straight ..... 6b. subsp. *romanica*

**6a. *Medicago falcata* subsp. *falcata***

野苜蓿(原亚种) *ye mu xu (yuan ya zhong)*

*Medicago sativa* Linnaeus subsp. *falcata* (Linnaeus) Arcangeli.

Stems ascending, appressed puberulent. Leaflets obovate to linear-oblongate, appressed puberulent abaxially, glabrous adaxially, lateral veins 12–15 pairs, margin serrulate in apical 1/4, apex obtuse, mucronulate. Legume falcate.

Grassy places, slopes, ravines, dry sandy fields. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Asia, Europe].

**6b. *Medicago falcata* subsp. *romanica*** (Prodan) O. Schwartz & Klinkowski, Verh. Bot. Vereins Prov. Brandenburg 74: 182. 1933.

草原苜蓿 *cao yuan mu xu*

*Medicago romanica* Prodan, Fl. Român. 1: 617. 1923; *M. falcata* var. *romanica* (Prodan) Hayek.

Stems erect, densely yellow tomentose. Leaflets linear, densely tomentose abaxially, sparsely appressed pubescent adaxially, lateral veins 5–7 pairs, margins 2- or 3-serrate. Legume straight.

Dry grasslands, slopes. Xinjiang [Russia (W Siberia); C Asia, E Europe].

**7. *Medicago sativa*** Linnaeus, Sp. Pl. 2: 778. 1753.

紫苜蓿 *zi mu xu*

*Medicago afghanica* Vassilczenko; *M. alaschanica* Vassilczenko; *M. asiatica* Sinskaya subsp. *sinensis* Sinskaya; *M. beipinensis* Vassilczenko; *M. pekinensis* Vassilczenko; *M. rivularis* Vassilczenko; *M. roborovskii* Vassilczenko; *M. sativa* var. *tibetana* Alefeld; *M. tibetana* (Alefeld) Vassilczenko.

Perennial herbs, 30–100 cm. Stems erect, ascending, rarely prostrate, quadrangular, glabrous or puberulent, much branched. Stipules ovate-lanceolate, base entire or with 1 or 2 denticles, apex acute; leaflets long ovate, obovate, to linear-ovate, (5–)10–25(–40) × 3–10 mm, papery, appressed pubescent abaxially, glabrous adaxially, lateral veins 8–10 pairs, base tapering, margin serrulate in upper 1/3, apex rounded, mucronate with a denticle from midrib. Heads or racemes with 5–30 flowers, 1–2.5 cm; peduncles straight, longer than leaves; bracts equal to pedicels, ca. 2 mm. Corolla variable in color, white, deep blue, to dark purple; standard oblong, retuse. Ovary linear; ovules numerous. Legume tightly coiled in 2–4(–6) spirals, 5–9 mm in diam., center solid or nearly so, brown when ripe, veins thin and inconspicuous. Seeds 10–20, yellow or brown, ovoid, 1–2.5 mm, smooth. Fl. May–Jul, fr. Jun–Oct.

Cultivated throughout China, often escaped to roadsides, fields, grasslands, and stream banks [native to N and SW Asia, probably also S Europe; now cosmopolitan].

**8. *Medicago* × *varia*** Martyn, Fl. Rust. 3: t. 87. 1793.

杂交苜蓿 *za jiao mu xu*

*Medicago sativa* Linnaeus subsp. *varia* (Martyn) Arcan-geli.

Perennial herbs, 60–80(–120) cm. Stems erect, prostrate, or ascending, quadrangular, much branched. Stipules lanceolate, base obscurely dentate, apex acuminate; leaflets oblong-obovate to elliptic, 10–20(–25) × (3–)5–10 mm, papery, sparsely appressed puberulent abaxially, glabrous adaxially, lateral veins 8 pairs, base rounded or broadly cuneate, margin shallowly serrate in upper 1/2. Flowers 8–15 in capitate racemes, crowded, becoming more widely spaced after anthesis; peduncles straight, longer than leaves; bracts shorter than pedicels. Corolla yellow, yellow-brown, to brownish purple, 9–10(–11) mm; standard oblong-ovate, usually with darker stripes, retuse. Ovules 6–8. Legume loosely coiled in (0.5–)1–1.5(–2) spirals, (4–)7–9(–12) mm in diam., center hollow, veins inconspicuous. Seeds 3–6, brown, ovoid. Fl. Jun–Aug, fr. Aug–Oct.

Cultivated throughout China, escaping to fields and roadsides [widely cultivated elsewhere].

This is a hybrid between *Medicago sativa* and *M. falcata*.

**9. *Medicago arborea*** Linnaeus, Sp. Pl. 2: 778. 1753.

木本苜蓿 *mu ben mu xu*

*Rhodusia arborea* (Linnaeus) Vassilczenko.

Shrubs, 1–2(–4) m, pale yellow sericeous; bark split longitudinally. Stems erect, terete. Stipules narrowly triangular, 5–8 mm, acute, entire; petioles 2–4 cm; leaflets obovate to obcordate, 10–18 × 8–14 mm, sericeous abaxially, glabrous adaxially, lateral veins 5–7 pairs, base broadly cuneate, margin entire, apex obtuse or retuse. Flowers 6–10 scattered in racemes, 2–2.5 cm; peduncles axillary, 3–5 cm, densely silky; bracts ca. 2 mm; pedicels ca. 5 mm. Corolla orange, 12–15 mm. Ovary stipitate; ovules 12–15. Legume loosely coiled in 0.5–1.5 spirals, 12–15 mm in diam., center hollow, appressed pubescent, veins radially reticulate, netted in external circle. Seed reniform, ca. 4 mm. Fl. May.

Cultivated as an ornamental. Hebei, Jiangsu [native to the Mediterranean region].

**10. *Medicago minima*** (Linnaeus) Bartalini, Cat. Piante Siena, 61. 1776.

小苜蓿 *xiao mu xu*

*Medicago polymorpha* Linnaeus var. *minima* Linnaeus, Sp. Pl. 2: 780. 1753.

Annual herbs, 5–30 cm, spreading hairy, sometimes with glandular hairs. Stems diffuse, prostrate or ascending, branched at base. Stipules ovate, base rounded, margin entire or obscurely shallowly serrate, apex acute; petioles slender, 5–10(–20) mm; leaflets obovate, 5–8(–12) × 3–7 mm, papery, villous on both surfaces, base cuneate, margin serrulate in apical 1/3, apex rounded or retuse, apiculate. Flowers 2–10 in capitate racemes; peduncles slender and straight; pedicels short or sessile. Corolla pale yellow, 3–4 mm; standard broadly ovate, longer than wings and keel. Legume globose, 2.5–4.5 mm, tightly coiled in 3–5 spirals; spines straight with hooked tip, equal to radius of legume. Seed long reniform, brown, 1.5–2 mm, smooth. Fl. Mar–Apr, fr. Apr–May.

Sandy slopes, waste fields, stream banks. Anhui, Gansu, Hebei, Henan, Hubei, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Africa, Asia, Europe].

**11. *Medicago praecox*** Candolle, Cat. Pl. Horti Monsp. 123. 1813.

早花苜蓿 *zao hua mu xu*

Annual herbs, (5–)10–20(–50) cm. Stems prostrate or ascending, quadrangular, branched at base, sparsely hairy. Stipules ovate, incised or lacerate; leaflets obovate or obcordate, (2–)4–8(–12) × (2–)5–9(–13) mm, papery, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin only obscurely serrate apically, apex truncate or emarginate. Flowers 1 or 2 in axillary umbel; peduncles shorter than petiole, bracts ca. 1.5 mm; pedicels less than 1 mm. Corolla yellow, 3–4 mm; standard broadly orbicular. Ovary linear. Legume usually only 1 per umbel, scarlet to dark brown, discoid, 3–4 mm, loosely coiled in 2–4(or 5) spirals, coil edge wide, deeply grooved, spines 10 in each row. Seed brown, reniform, 2–2.8 × 1–1.3 mm. Fl. Mar–Apr, fr. May–Jul.

Introduced and cultivated. Anhui, Fujian, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Sichuan [native to the N Mediterranean region].

**12. *Medicago polymorpha*** Linnaeus, Sp. Pl. 2: 779. 1753.

南苜蓿 *nan mu xu*

Annual or biennial herbs, 20–90 cm. Stems prostrate or ascending, branched at base, subquadrangular, glabrescent. Stipules ovate-oblong, 4–7 mm, base auriculate, margin irregularly lacinate or deeply incised, apex acuminate; petioles long and thin, 1–5 cm; leaflets obovate or triangular-obovate, 7–20 × 5–15 mm, papery, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin shallowly serrate in apical 1/3, apex obtuse, truncate, or emarginate, apiculate. Flowers (1 or) 2–10 in axillary racemes; peduncles slender, 3–15 mm, usually longer than leaves; pedicel less than 1 mm. Corolla yellow, 3–4 mm; standard obovate, emarginate. Legume ash-green to greenish brown, discoid, 4–6(–10) mm, tightly coiled in 1.5–2.5(–6) spirals, turning clockwise, radial veins connected near edge on coil face, spines or tubercles 15 in each row. Seed brown, reniform, ca. 2.5 × 1.25 mm, smooth. Fl. Mar–May, fr. May–Oct.

Cultivated or escaped to fields, hillsides, and roadsides. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [native at least to N Africa, SW Asia, and S Europe; widely introduced elsewhere].

**13. *Medicago arabica*** (Linnaeus) Hudson, Fl. Angl. 288. 1762.

褐斑苜蓿 *he ban mu xu*

*Medicago polymorpha* Linnaeus var. *arabica* Linnaeus, Sp. Pl. 2: 780. 1753; *M. maculata* Willdenow; *M. oxalioides* Schur.

Annual herbs, 40–65 cm. Stems decumbent or spreading, longitudinally ridged, sparsely hairy, hairs simple and multicellular-glandular. Stipules ovate-lanceolate, 5–12 mm, incised, with 6–8 deep lobes; petioles slender, 2–8(–12) cm, 2–5 × as long as peduncle; leaflets usually with a dark colored patch at center, obcordate to broadly obovate, 7–25(–30) × 14–32 mm, sparsely hairy abaxially, glabrous adaxially, base broadly cuneate, margin subentire or shallowly serrate, apex rounded or emarginate. Flowers (1 or) 2–5(or 6) in axillary racemes; peduncles with a terminal cusp; bracts ca. 1 mm; pedicels longer than or equal to bracts. Corolla yellow, 5–6.5 mm; standard broadly obovate, retuse. Legume cylindrical to globose, 5–7 mm, tightly coiled in 3–7 spirals, turning counterclockwise, 5–8 radial veins on coil face, spines 13–15 in each row. Seed yellowish brown,

oblong-elliptic, 2.5–3.5 × 1.2–1.5 mm, smooth. Fl. Mar–May, fr. May–Aug.

Cultivated, rather moist stream banks, grasslands. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangsu [native to the Mediterranean region].

**14. *Medicago monantha*** (C. A. Meyer) Trautvetter, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 8: 272. 1841.

单花胡卢巴 *dan hua hu lu ba*

*Trigonella monantha* C. A. Meyer, Verz. Pfl. Casp. Meer. 137. 1831; *T. geminiflora* Bunge.

Annual herbs, 20–40 cm. Stems prostrate or ascending, branched at base, ridged, pilose. Leaves 3-foliolate; stipules lanceolate-hastate, 5–7 mm; petioles 1–2.5 cm; leaflets oblong-obovate to obtriangular, (3–)5–12 × (3–)4–8 mm, pilose at least on midrib abaxially, subglabrous adaxially, lateral veins 5–8 pairs, base cuneate, margin denticulate in apical 2/3, apex truncate. Flower axillary, solitary at basal portion of stem, 2(or 3) in apical portion, sessile or peduncles developed, 6–8 mm, with straight dense hairs. Corolla yellow, 6–8 mm; standard evidently longer than wings and keel. Ovary linear; ovules 18–24; style short and flat. Legume straight, cylindrical, 40–50(–80) × 1–2 mm, appressed pubescent, veins reticulate, forming a pattern of squares or pentagons, apex hooked. Seeds numerous, brown, oblong-elliptic, ca. 2 mm. Fl. May–Jul, fr. Jun–Aug.

Clay soils in deserts, wilderness tracts, or roadsides. Xinjiang [Afghanistan, Mongolia, Pakistan; C and SW Asia].

**15. *Medicago orthoceras*** (Karelin & Kirilov) Trautvetter, Trudy Glavn. Bot. Sada 5: 421. 1877.

直果胡卢巴 *zhi guo hu lu ba*

*Trigonella orthoceras* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 399. 1841.

Annual herbs, 15–25(–40) cm. Stems prostrate or ascending, subquadrangular, sparsely pilose. Leaves 3-foliolate; stipules subhastate, 5–6 mm; leaflets obovate to obovate-triangular, 6–15 × 3–8 mm, pilose at least on midrib abaxially, glabrous adaxially, lateral veins 6–9 pairs, base cuneate, margin denticulate in upper 2/3, apex truncate. Flowers 2–5 in subumbellate heads; peduncles undeveloped, but sometimes to 3–5 mm. Corolla yellow, 4–5 mm; standard longer than wings and keel. Ovary linear; ovules numerous; style short and flat. Legume cylindrical, 20–30 × 1–1.5 mm, appressed pubescent, veins reticulate. Seeds numerous, brown, oblong to ovoid, ca. 2 × 1 mm, warty. Fl. Apr–Jun, fr. May–Jul.

Sandy slopes, grasslands; 1200–1900 m. W Xinjiang [Pakistan, Russia (W Siberia); C and SW Asia].

**163. TRIGONELLA** Linnaeus, Sp. Pl. 2: 776. 1753.

胡卢巴属 *hu lu ba shu*

Annual or perennial herbs. Stem erect, spreading or prostrate, much branched. Leaves pinnately 3-foliolate; stipules adnate to petiole, conspicuously veined; terminal leaflet usually larger, margin ± serrulate or incised, lateral veins running out into teeth. Inflorescence axillary, shortly racemose, capitate, subumbellate, or flower solitary; peduncles elongate in fruit. Pedicels short, often less than 5 mm, thickened after flowering; bracts minute; bracteoles absent. Calyx teeth ± equal. Petals yellow, blue, purple, or white, free from staminal tube; standard obovate or oblong, broad at base, sometimes broadly clawed; wings elliptical; keel obtuse, shorter than

wings. Stamens diadelphous or nearly monadelphous; filaments not dilated; anthers uniform. Legume straight, falcate, or arcuate, compressed or terete, tapering at both ends, with reticulate coat. Seeds 1 to many, scabrous, warty or pitted.

About 55 species: mostly in Africa, Asia, Europe, Mediterranean region, and Oceania; eight species (two introduced) in China.

1a. Perennial herbs; legume linear-oblong.

2a. Wings shorter than keel.

3a. Corolla 10–12 mm; branches erect, arising from subshrubby base ..... 3. *T. cachemiriana*

3b. Corolla 7–9(–10) mm; branches prostrate to ascending, arising from large woody base ..... 4. *T. pamirica*

2b. Wings longer than keel.

4a. Legume covered with oblique veins; standard suborbicular, equal to wings; leaflet margin sparsely serrate .... 1. *T. emodi*

4b. Legume covered with crosswise veins; standard long obovate, reflexed, slightly longer than wings; leaflet margin densely biserrate ..... 2. *T. fimbriata*

1b. Annual herbs; legume cylindrical or ovoid.

5a. Legume conical or ovoid, more than 2.5 mm wide; plants over 30 cm.

6a. Legume ovoid, 2.5–5 mm; inflorescence long pedunculate, capitate, with 10–25 flowers; petiole 10–40 mm ..... 7. *T. caerulea*

6b. Legume conical, 70–120 mm; inflorescence subsessile, flowers solitary or in pairs; petiole 6–15 mm ..... 8. *T. foenum-graecum*

5b. Legume linear-cylindrical, less than 2 mm wide; plants under 30 cm.

7a. Peduncles as long as leaves or longer, usually over 15 mm ..... 5. *T. cancellata*

7b. Peduncles shorter than leaves, usually under 10 mm ..... 6. *T. arcuata*

**1. *Trigonella emodi*** Benth in Royle, Ill. Bot. Himal. Mts. 197. 1835.

喜马拉雅胡卢巴 xi ma la ya hu lu ba

Perennial herbs, 20–60(–80) cm. Stem erect or ascending, terete, branching at base, yellow pubescent when young. Leaves 3-foliolate; stipules broadly lanceolate, incised; leaflets broadly obovate, (7–)10–25 × (4–)7–15 mm, sparsely pilose abaxially, glabrous adaxially, base cuneate, margin sparsely serrate, apex obtuse or truncate, apiculate. Flowers 5–8(–10) in short racemes; peduncle slender and axillary, 1–2 cm, after flowering prolonged to 2–3 cm, straight; bracts minute; pedicels 1.5–2.5 mm. Calyx 3–4 mm; teeth lanceolate, shorter than tube. Corolla yellow, 6–9 mm; standard suborbicular, equal to wings; keel ca. 1/2 length of wings. Ovary as long as style; ovules 8–10. Legume oblong, 14–20 × 4–5 mm, glabrous, veins prominent, oblique, base rounded, apex acute, with persistent style. Seeds 4–6, brown, ellipsoid, ca. 2.5 × 1.5 mm, smooth. Fl. and fr. Jun–Sep.

Ravine shores or meadows by woodlands of the Himalayan valleys; 2700–3800 m. Xizang [India, Kashmir, Nepal, Pakistan].

**2. *Trigonella fimbriata*** Royle ex Benth in Royle, Ill. Bot. Himal. Mts. 197. 1835.

重齿胡卢巴 chong chi hu lu ba

Perennial herbs, 25–30 cm. Stem erect, spreading branching, subquadrangular, sparsely pilose. Leaves 3-foliolate; stipules ovate-lanceolate, incised, 4–6 mm, pilose; petiole 3–5 mm; leaflets broadly obovate, 6–10(–12) × 3–6(–8) mm, pilose at least on midrib abaxially, glabrous adaxially, base cuneate, margin irregularly biserrate. Flowers (3–)6–8(–12) in subumbellate heads; peduncle 20–40 mm, pilose, straight; pedicels ca. 2 mm. Calyx ca. 3.5 mm; teeth subulate-lanceolate. Corolla yellow, (5–)6–7 mm. Ovary linear, sparsely pilose; ovules 7–9. Legume elliptic-oblong, 8–10 × ca. 4 mm, veins crosswise, thin and conspicuous, both ends rounded. Seeds 2–4. Fl. and fr. Jul–Aug.

Ravine shores or meadows by woodlands of the Himalayan valleys; 3800–4300 m. Xizang [India, Kashmir, Nepal].

**3. *Trigonella cachemiriana*** Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 36. 1835–1844.

克什米尔胡卢巴 ke shi mi er hu lu ba

Perennial herbs, 20–40 cm. Stems erect, terete, branching from base, leafy. Leaves 3-foliolate; stipules of lower part triangular-lanceolate, 3–5 mm; leaflets obovate, (5–)7–12 × (4–)6–8 mm, base broadly cuneate, margin serrulate. Flowers (5–)8–10, in subumbellate heads; peduncle slender, 20–35 mm, straight after flowering; pedicels 1–2.5 mm. Calyx 3–4 mm; teeth triangular. Corolla yellow, 10–12 mm; standard suborbicular, equal to keel; wings short and narrow. Ovary linear; ovules 10. Legume oblong, (10–)12–15(–18) × ca. 4 mm, veins prominent, oblique, base stipitate, apex rounded. Seeds 2–4, brown, reniform to ovoid, 2.5–3 mm, smooth. Fl. Jun–Aug, fr. Aug–Sep.

Sandy ravines, grasslands in valleys; 2400–3800 m. Xinjiang, Xizang [Afghanistan, India, Kashmir, Pakistan; SW Asia (Iran)].

**4. *Trigonella pamirica*** Borissova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 225. 1938.

帕米尔胡卢巴 pa mi er hu lu ba

*Melilotoides pamirica* (Borissova) Soják; *Melissitus pamiricus* (Borissova) Goloskokov.

Perennial herbs, (15–)30–40(–50) cm, from a woody caudex. Stem procumbent or ascending, terete, branching at base. Leaves 3-foliolate; leaflets obovate, 9–18 × 5–9 mm, glabrate to sparsely pubescent, base cuneate, margin sharply few toothed, apex truncate to broadly rounded, sometimes retuse or apiculate. Flowers (2–)5–8(–10) in umbels; peduncle axillary, longer than subtending leaf; pedicels 2–3 mm, recurving after anthesis. Calyx 4–5(–7) mm; teeth linear-lanceolate, as long as tube. Corolla yellow, 7–9(–10) mm; standard oblong to oblong-ovate, 7–10 × 4–5 mm, longer than keel. Ovary linear; ovules 3–5. Legume oblong-elliptic, (10–)11–13(–16) × (3–)4.5

mm, straight or slightly curved, flattened laterally, glabrous or rarely pubescent, veins prominent, oblique, base broadly cuneate, apex acute, with persistent style. Seeds 3 or 4, smooth. Fl. and fr. May–Sep.

Dry slopes and stony wastelands, middle and upper montane regions; below 4500 m. Xinjiang [C Asia, SW Asia (Iran)].

**5. *Trigonella cancellata*** Desfontaines, Tabl. École Bot. 3: 218. 1829.

网脉胡卢巴 wang mai hu lu ba

Annual herbs, 10–20(–40) cm. Stems prostrate or ascending, puberulent. Leaves 3-foliolate; stipules linear-lanceolate, dentate at base; leaflets obtriangular or obovate-triangular, (4–)7–10 × 4–7 mm, appressed pubescent abaxially, glabrous adaxially, lateral veins 5–8 pairs, base cuneate, margin dentate in upper 1/2, apex truncate. Flowers 4–7 in umbellate heads; peduncle axillary, 10–18 mm. Calyx 3–4 mm, veins 5, prominent. Corolla yellow, ca. 5 mm; standard ovate-oblong, longer than wings and keel. Ovary linear; ovules numerous. Legume cylindrical, 15–20 × ca. 1.5 mm, 4 or 5 in umbel, curved to semi-circular, white pubescent, veins reticulate, beak hooked. Seeds 6–8, brown, oblong, ca. 2.5 × 1 mm, papillose; papillae deep brown. Fl. May–Aug, fr. Jun–Sep.

Alkaline soils on sandy slopes or ravine edges. Xinjiang [Russia (W Siberia); C and SW Asia].

**6. *Trigonella arcuata*** C. A. Meyer, Verz. Pfl. Casp. Meer. 136. 1831.

弯果胡卢巴 wan guo hu lu ba

Annual herbs, 10–25 cm. Stems prostrate or ascending, terete, branching at base, scattered villous. Leaves 3-foliolate; stipules lanceolate, base subhastate; leaflets obtriangular or obovate, 5–10 × 3–7 mm, scattered villous abaxially, scabrous and glabrous adaxially, lateral veins 5–7 pairs, running out into teeth, parallel, base broadly cuneate, margin dentate above middle, apex truncate. Flowers 4–6(–8) in umbellate heads; peduncle less than 5 mm, thick, densely villous. Corolla yellow, 4–5 mm. Ovary linear villous; ovules numerous. Legume cylindrical, 15–20 × 1.25–1.5 mm, 4 or 5 in umbel, falcate, scattered villous, veins crosswise reticulate, beak pointed. Seeds 7 or 8, oblong, ca. 2.5 mm, brown warty. Fl. Mar–Jun, fr. May–Jul.

Alkaline soil on ravines or hillsides. Xinjiang [C and SW Asia].

**7. *Trigonella caerulea*** (Linnaeus) Seringe in Candolle, Prodr. 2: 181. 1825.

藍胡卢巴 lan hu lu ba

*Trifolium caeruleum* Linnaeus, Sp. Pl. 2: 764. 1753 [*T. "M. caerulea"*]; *Melilotus caeruleus* (Linnaeus) Desrousseau.

Annual herbs, 30–60(–80) cm. Stems straight, thick, terete, glabrescent, branched. Leaves pinnately 3-foliolate; stipules subulate-lanceolate; petioles 1–4 cm; leaflets ovate to broadly elliptic, 15–35 × 4–15 mm, sparsely pubescent on midrib abaxially, glabrous adaxially, lateral veins 8–10 pairs, base cuneate or rounded, margin serrate, apex obtuse or acute. Racemes capitate or ovoid, 10–25-flowered; peduncles axillary, ca. 6 cm, straight, glabrous; bracts bristlelike, ca. 1.5 mm; pedicel ca. 1 mm. Calyx ca. 3 mm, membranous, veins 5. Corolla blue, 5–6 mm; standard longest petal, keel shortest. Ovary ovate, glabrous; ovules 5–7. Legume ovoid, 2.5–5 × ca. 2.5 mm, apex tapering and beaked, longer than body. Seeds 1 or 2, brown, broadly ovoid, ca. 2 mm, tuberculate. Fl. Jun–Aug, fr. Jul–Sep.

Cultivated or escaped on wastelands. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi [widely cultivated in Asia and Europe; of cultivated origin].

*Trigonella caerulea* is apparently nowhere indigenous and was probably derived from *T. procumbens* (Besser) Reichenbach (Ivimey-Cook in Tutin et al., Fl. Eur. 2: 152. 1968).

**8. *Trigonella foenum-graecum*** Linnaeus, Sp. Pl. 2: 777. 1753.

胡卢巴 hu lu ba

Annual herbs, 30–80 cm. Taproot to 80 cm, fibrous roots lateral. Stem erect, terete, branched. Leaves 3-foliolate; stipules entire, membranous, base adnate to petiole, apex acute; petiole spreading, 6–15 mm; leaflets narrowly obovate, ovate, to oblong-elliptic, terminal equal to laterals, 15–40 × 4–15 mm, sparsely pubescent or glabrescent abaxially, glabrous adaxially, lateral veins 5 or 6 pairs, base cuneate, margin dentate in upper 1/2. Flowers sessile, axillary, solitary or in pairs. Calyx 7–8 mm, villous. Corolla creamy or pale yellow, base violet, 13–18 mm. Ovary puberulent; ovules numerous. Legume long conical, 7–12 × 0.4–0.5 cm, straight or slightly curved, glabrescent, veins longitudinally reticulate, apex with long beak to 2 cm, distal suture thickened. Seeds 10–20, brown, oblong-ovoid, 3–5 × 2–3 mm, surface uneven. Fl. Apr–Jul, fr. Jul–Sep.

Cultivated throughout China, escaped in fields as a semi-wild weed in Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Himalayan region; SW Asia].

The seeds are used medicinally. The tender leaves and stems are used as vegetables; and the dried stems, leaves, and seeds are used as flavoring for foods and in baking. The dried plant also is used as insect repellent.