
车轴草属 che zhou cao shu

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, involucrate by stipules of upper leaves .................................................................................. 12. T. pratense

10b. Floral heads pedunculate, subglobose to elongate, involucrate 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 cylindric, 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


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 pinnately (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
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 umbels subtended by scarious involucres; 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, 0.5–1 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.

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-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 umbels; involucre absent; peduncle shorter than or equal to 0.5–1 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.

Perennial herbs, pubescent 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-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 umbels; involucre absent; peduncle shorter than or equal to 0.5–1 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.

Annual herbs, pubescent to glabrescent. Stems erect or ascending, 30–100 cm, simple to sparingly branched, striate. Leaves palmately 3-foliolate; stipules linear-lanceolate, adnate to petiole for ca. 1/2 their length, apex acuminate to subulate; petioles shorter than or equal to leaflets; terminal petiolule 3–7 mm; leaflets oblong-elliptic, ± sessile, 5–15 × 3–6 mm; standard elliptic. Ovary linear. Legume obovate-oblong, 6–8 mm; standard oblong. Ovary linear. Legume obovate-oblong, 6–8 mm; standard oblong.

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


Annual herbs, glabrous to sparsely pubescent. Stems erect to decumbent, (5–)10–30–40 cm. Leaves palmately 3-foliolate; stipules obliquely ovate, 4–8 mm, base rounded, margins finely dentate, apex acute; petioles shorter than or equal to leaflets; terminal petiolule longer than lateral petioles; leaflets oblong-elliptic, 5–10–12 × 3–8 mm, veins 6–8 pairs, base cuneate, margins entire proximally, serrate distally, apex rounded or emarginate. Flowers 5–15, in globose heads; peduncle 1–3 cm; involucre 3–5–6 mm; standard broadly spatulate, striate, apex emarginate. Legume ovoid, ca. 3 mm; stipe ca. 1 mm. Seed 1, brown, convex-ovoid, ca. 1 mm. Fl. and fr. May–Jun.

Cultivated, escaped, and naturalized. Jiangsu, Shandong, Shandong [native to N Africa, SW Asia, and Europe].


Perennial herbs, stoloniferous, glabrous or hairy. Stems prostrate or decumbent, 10–30–50 cm, rooting at nodes. Leaves pinnately 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; involucral 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, and SW Asia, Europe].


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 obovate to suborbicular, 1.5–3.5 cm, lateral veins 5–10, base cuneate, margins irregularly crenate, apex obtuse 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].


Annual herbs, rhizomatous, pubescent to glabrescent. Stems decumbent or ascending, 20–50 cm, branches flexuous. Leaves palmately 3-foliolate, long petiolate, upper shortly petiolate; stipules linear-lanceolate, adnate to petiole for ca. 1/2 their length, free blade acuminate 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–Aug.

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


Annual herbs, pubescent. Stems erect or ascending, 20–50 cm, branches flexuous. 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, 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; involucral 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, and SW Asia, Europe].

Cultivated, escaped, and naturalized; roadsides, grasslands, disturbed areas. Hebei, Jiangsu, Shaanxi [native to SW Asia and Europe].
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, Hebei, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Taiwan, Xinjiang, Yunnan [native to N Africa, SW Asia, and Europe].


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].