

39. SALSOLA Linnaeus, Sp. Pl. 1: 222. 1753.

猪毛菜属 zhu mao cai shu

Herbs annual, subshrubs, or shrubs, glabrous, pilose, hispid, or papillate. Leaves alternate, rarely opposite, sessile, terete or semiterete, rarely linear, base usually expanded, sometimes decurrent, apex obtuse or with an acicular awn. Flowers bisexual, solitary or glomerulate in bract axils, forming a spicate or paniculate inflorescence on upper part of branches; bracts ovate or broadly lanceolate; bractlets 2. Perianth 5-parted; segments ovate-lanceolate or oblong, adaxially concave, membranous, becoming hardened later, glabrous or pilose, with a transverse, winglike appendage near middle abaxially; distal portion of segments incurved, apices usually connivent, together embracing utricle and appearing conic; abaxial appendage spreading, membranous in fruit, sometimes undeveloped and appearing crestlike or tuberculate. Stamens 5; filaments subulate or narrowly linear, flattened; anthers oblong, apex appendaged, appendage apex acute or obtuse, variously shaped, or very small. Ovary broadly ovoid or globose, depressed; style long or very short; stigmas 2, erect or recurved, subulate or filiform, adaxially papillate. Fruit a utricle, globose; pericarp membranous or fleshy. Seed horizontal, vertical, or oblique; embryo spiral; perisperm absent.

About 130 species: Africa, Asia, Europe, a few species in North America; 36 species (three endemic) in China.

In its traditional circumscription, *Salsola* s.l. is a paraphyletic or probably even polyphyletic group of taxa rather than a phylogenetically justified genus. Recent studies indicate that several widely recognized genera of Salsoleae (e.g., *Girgensohnia*, *Halothamnus*, *Haloxylon*, and *Noaea* Moquin-Tandon) as well as many proposed segregate genera (e.g., *Caroxylon* Thunberg, *Climacoptera* Botschantzev, *Darniella* Maire & Weiller, *Hypocylix* Wołoszczak, *Neocaspiya* Tzvelev, *Nitrosalsola* Tzvelev, and *Xylosalsola* Tzvelev), are probably phylogenetically rooted in *Salsola sensu latissimo*. However, more research is needed for justification of any dramatic taxonomic changes in that group. Because of that, *Salsola* is accepted here in its traditional circumscription.

- 1a. Leaf apex acicular awned; herbs annual, papillate, hispid, or glabrous.
 - 2a. Leaves broadly linear, proximally 5–7(–10) mm wide; perianth segment above wing reflexed, not embracing utricle; anthers free from base to near apex 21. *S. aperta*
 - 2b. Leaves terete, semiterete, or narrowly lanceolate, proximally not more than 4 mm wide; perianth segments above wing embracing utricle; anthers free from base to middle.
 - 3a. Perianth segments abaxially wingless or with an irregular process in fruit.
 - 4a. Plants glabrous; leaves semiterete.
 - 5a. Stem and branches striate; leaves all alternate; utricle 2–2.5 mm in diam. 23. *S. komarovii*
 - 5b. Stem and branches not striate; lower leaves opposite, upper ones alternate; utricle 3–4 mm in diam. 22. *S. soda*
 - 4b. Plants papillate or hispid; leaves filiform-terete or narrowly lanceolate.
 - 6a. Leaves filiform-terete; flowers forming spikes on upper branches; bracts and bractlets tightly appressed to rachis; anthers 1–1.5 mm 24. *S. collina*
 - 6b. Leaves narrowly lanceolate; flowers distributed throughout plant; bracts and bractlets spreading; anthers ca. 0.5 mm 25. *S. zaidamica*
 - 3b. Perianth segments abaxially winged in fruit.
 - 7a. Perianth with only 1 segment abaxially winged in fruit; anthers ca. 0.3 mm 26. *S. monoptera*
 - 7b. Perianth with all segments abaxially winged in fruit; anthers 0.5–1 mm.
 - 8a. Perianth segments above wing abaxially green and fleshy keeled.
 - 9a. Perianth segment apex pungent, together connivent and forming a cone, perianth (including wings) 5–7 mm in diam. 27. *S. tamariscina*
 - 9b. Perianth segment apex obtuse, together embracing utricle and not forming a cone, perianth (including wings) 8–10 mm in diam. 28. *S. rosacea*
 - 8b. Perianth segments above wing abaxially neither green nor fleshy keeled.
 - 10a. Perianth segment apex acicular, together connivent and forming a cone, rarely apex membranous and thinly long aristate.
 - 11a. Wing margin irregularly dentate; perianth segments above wing hardened, together connivent and forming a cone; leaf base distinctly expanded 29. *S. chinghaiensis*
 - 11b. Wing margin subentire; perianth segments above wing together connivent and forming a cone, or apex membranous and thinly long aristate; leaf base slightly expanded.
 - 12a. Plants slender, not more than 30 cm tall, fr. May–Jun 30. *S. praecox*
 - 12b. Plants stout, to 50 cm tall, fr. Aug–Sep.
 - 13a. Stems light red-brown, yellow-brown after drying; perianth (including wings) 5–8 mm in diam. in fruit, apex of segments hardened, becoming

- obtuse; anther appendage apex obtuse 9. *S. arbusculiformis*
- 27b. Subshrubs or annual herbs, hairy; leaf base not constricted and petiole-like.
 - 32a. Subshrubs, densely covered with T-shaped hairs; globose, dwarf branches present 10. *S. passerina*
 - 32b. Subshrubs or annual herbs, pilose; globose, dwarf branches absent.
 - 33a. Subshrubs; leaves persistent.
 - 34a. Perianth segments densely pilose 1. *S. orientalis*
 - 34b. Perianth segments glabrous, except apex ciliate 2. *S. dshungarica*
 - 33b. Herbs annual; leaves usually deciduous in fruit.
 - 35a. Perianth segment margin ciliate; anthers ca. 0.5 mm; perianth (including wings) 5–7 mm in diam. in fruit 3. *S. micranthera*
 - 35b. Perianth segment margin not ciliate, or only apex ciliate; anthers ca. 1 mm; perianth (including wings) 7–9 mm in diam. in fruit 4. *S. nitraria*

1. *Salsola orientalis* S. G. Gmelin, Reise Russland 4: 47. 1784.

Bot. Akad. Nauk Uzbeksk. SSR 13: 5. 1952.

东方猪毛菜 *dong fang zhu mao cai*

小药猪毛菜 *xiao yao zhu mao cai*

Caroxylon orientale (S. G. Gmelin) Tzvelev; *Salsola rigida* Pallas.

Herbs annual, 20–80 cm tall. Stem erect, much branched; branches obliquely spreading, white, densely pilose, rarely villous. Leaves gray-green, semiterete, 1–1.5 cm × 1.5–2 mm, villous, often deciduous, base slightly expanded, not decurrent, apex obtuse. Inflorescence spicate-paniculate; bracts broadly ovate, margin membranous; bractlets suborbicular, shorter than perianth. Perianth (including wings) 5–7 mm in diam. in fruit; segments narrowly ovate, herbaceous, abaxially winged from distal middle part in fruit, margin membranous, sparsely ciliate; portion of segment above wing connivent with others, tightly appressed to utricle, margin membranous, ciliate; 3 wings reniform, membranous, with numerous fine veins; other 2 wings obovate, smaller. Anthers ca. 0.5 mm. Stigmas filiform, nearly equaling style. Seed horizontal. Fl. Jul–Sep, fr. Sep–Oct.

Subshrubs 20–50 cm tall. Stem branched from base; woody branches gray-brown, fissured; annual branches herbaceous, densely shortly sinuate pilose. Leaves semiterete, straight, 7–10 × 1–1.5 mm, densely pilose, base slightly expanded, apex obtuse. Inflorescence spicate-paniculate; bracts leaflike; bractlets broadly ovate, densely pilose, margin membranous, apex obtuse. Perianth (including wings) 7–10 mm in diam. in fruit; segments narrowly ovate, abaxially somewhat fleshy and winged from middle, densely pubescent, margin membranous; portion of segment above wing connivent with others, forming a short cone; 3 wings yellow-brown or dark brown, reniform, with numerous veins; other 2 wings smaller. Stigmas subulate, ca. 2 × as long as style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Deserts, sandy areas. S Xinjiang [C Asia].

Deserts, dunes, slopes. N Xinjiang [C and SW Asia].

Freitag and Rilke (in Fl. Iranica) considered this taxon to be conspecific with *Salsola nitraria*. They indicated that forms with smaller anthers and smaller utricles are common in Afghanistan, Pakistan, and S Iran, and plants with sparsely hairy perianth segments occur scattered all over the distributional area.

2. *Salsola dshungarica* Iljin, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 2: 129. 1936.

4. *Salsola nitraria* Pallas, Ill. Pl. 23. 1803.

准噶尔猪毛菜 *zhun ga er zhu mao cai*

钠猪毛菜 *na zhu mao cai*

Subshrubs 10–30 cm tall. Woody branches much branched, gray-brown, short, stout; annual branches borne at apex of woody branches, crowded, white, branched in middle and upper part, densely shortly sinuate pilose. Leaves alternate, sometimes fascicled, terete, 5–10 × 0.7–1 mm, sparsely villous, base expanded, not constricted, apex obtuse. Inflorescence usually spicate-paniculate; bracts broadly lanceolate or ovate, apex obtuse; bractlets broadly ovate, margin membranous. Perianth (including wings) 6–8 mm in diam. in fruit; segments green, narrowly ovate, abaxially somewhat fleshy and winged from distal middle part, glabrous except apex ciliate, margin membranous; portion of segment above wing connivent with others, enclosing utricle, forming a short cone; wings membranous, 3 yellow-brown or light purple-brown, reniform, with numerous fine veins; other 2 wings obovate, smaller. Anther appendage very small. Stigmas subulate, nearly equaling style. Seed horizontal. Fl. Aug–Sep, fr. Sep–Oct.

Nitrosalsola nitraria (Pallas) Tzvelev.

Herbs annual, 10–40 cm tall. Stem branched from base; lower branches subopposite, pubescent and sparsely villous. Leaves semiterete, 0.8–1.5 cm × 1–1.5 mm, sparsely villous, deciduous in fruit, base slightly expanded, apex obtuse. Inflorescence spicate-paniculate; bracts broadly ovate, margin membranous, nearly equaling bractlets; bractlets suborbicular, slightly shorter than perianth. Perianth (including wings) 7–9 mm in diam. in fruit; segments narrowly ovate or lanceolate, green, abaxially nearly fleshy and winged from distal middle part in fruit, margin membranous, not ciliate or only apex ciliate; portion of segment above wing connivent with others, tightly appressed to utricle, broadly triangular, glabrous; 3 wings yellow-brown or black-brown, broadly ovate or semi-orbicular, larger, membranous, with fine, dense veins, margin colorless; other 2 wings broadly linear, smaller. Anthers ca. 1 mm. Stigmas filiform, nearly equaling style. Seed horizontal or oblique. Fl. Jul–Aug, fr. Sep–Oct.

Gobi desert, arid slopes. N Xinjiang [C Asia].

3. *Salsola micranthera* Botschantzev, Bot. Mater. Gerb. Inst.

Gobi desert, dunes. N Xinjiang [Afghanistan, Pakistan; SW Asia, SE Europe (Lower Volga region of Russia)].

5. *Salsola arbuscula* Pallas, Reise Russ. Reich. 1: 487. 1771.

木本猪毛菜 mu ben zhu mao cai

Salsola arborescens Linnaeus f.; *Xylosalsola arbuscula* (Pallas) Tzvelev.

Shrubs 50–100 cm tall. Stem much branched; branches spreading, older ones light gray-brown, with longitudinal fissures; branchlets white, smooth. Leaves alternate, fascicled on dwarf branches, light green, semiterete, 1–3 cm × 1–2 mm, glabrous, base white, expanded and thickened, above base constricted and petiole-like, leaf often deciduous from this point, apex obtuse or acute. Inflorescence spikelike; bracts longer than bractlets; bractlets ovate, equaling or longer than perianth, margin membranous at base, apex pungent. Perianth (including wings) 8–12 mm in diam. in fruit; segments oblong, abaxially with distinct midvein and winged from proximal middle part in fruit; portion of segment above wing connivent with others, enclosing utricle, slightly reflexed and appearing rosettelike, apex mucronate; 3 wings semiorbicular; other 2 wings narrower. Anther appendages narrowly lanceolate, apex acute. Stigmas subulate, 2–4 × as long as style. Seed horizontal. Fl. Jul–Oct, fr. Sep–Oct.

Deserts, slopes. W Gansu, Nei Mongol, Ningxia, Xinjiang [Afghanistan, Mongolia, Pakistan; SW Asia (Iran), SE Europe (Lower Volga region of Russia)].

6. *Salsola abrotanoides* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 25: 366. 1879.

蒿叶猪毛菜 hao ye zhu mao cai

Subshrubs 15–40 cm tall. Woody branches gray-brown, longitudinally fissured; annual branches crowded, yellow-green, herbaceous, finely ribbed, papillate. Leaves alternate, fascicled on dwarf branches of older branches, semiterete, 1–2 cm × 1–2 mm, base expanded, above base constricted and petiole-like, leaf often deciduous from this point, apex obtuse or mucronate. Inflorescence spikelike, slender, loose; bracts longer than bractlets; bractlets narrowly ovate, shorter than perianth, margin membranous. Perianth (including wings) 5–7 mm in diam. in fruit; segments ovate, abaxially fleshy and winged from middle, margin membranous; portion of segment above wing tightly appressed to utricle, abaxially fleshy, margin membranous, apex obtuse; 3 wings yellow-brown, semiorbicular, larger; other 2 wings obovate, smaller. Anther appendages very small. Stigmas subulate, ca. 2 × as long as style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Arid slopes, alluvial fans, rocky riversides. W Gansu, Qinghai, Xinjiang [Mongolia].

7. *Salsola junatovii* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 22: 105. 1963.

天山猪毛菜 tian shan zhu mao cai

Subshrubs 20–50 cm tall. Stem much branched; woody branches gray-brown, longitudinally fissured; annual branches white below, green above, glabrous or papillate. Leaves alter-

nate, semiterete, slightly incurved, 1–2.5 cm × 1.5–2.5 mm, glabrous or papillate, base expanded, slightly decurrent, above base constricted and appearing petiole-like, leaf often deciduous from this point, apex slightly inflated, obtuse or mucronate. Inflorescence spicate-paniculate; bracts leaflike; bractlets broadly triangular, abaxially fleshy and slightly keeled, margin membranous, apex acute. Perianth (including wings) 8–9 mm in diam. in fruit; segments narrowly ovate, hardened in fruit, winged from proximal middle part abaxially; portion of segment above wing connivent with others, forming an obtuse cone, apex obtuse; 3 wings semiorbicular, larger; other 2 wings oblong, smaller. Anther appendage apex obtuse. Style slightly stout; stigmas subulate, 2–3 × as long as style. Seed horizontal. Fl. Aug–Sep, fr. Sep–Oct.

• Arid slopes, rocky deserts. S Xinjiang.

8. *Salsola laricifolia* Turczaninow ex Litvinov, Herb. Fl. Ross. 49: No. 2443. 1913.

松叶猪毛菜 song ye zhu mao cai

Shrubs small, 40–90 cm tall. Stem much branched; older branches black-brown or brown, slightly fissured; branchlets white, glabrous, sometimes papillate. Leaves alternate, fascicular on dwarf branches, yellow-green, semiterete, 1–2 cm × 1–2 mm, fleshy, base expanded and slightly thickened, not decurrent, above base constricted and appearing petiole-like, leaf deciduous from this point, apex obtuse or acute. Inflorescence spikelike; bracts leaflike, base decurrent; bractlets green, broadly ovate, abaxially fleshy, margin membranous, apex acute. Perianth (including wings) 8–11 mm in diam.; segments light green, narrowly ovate, abaxially slightly hardened and winged from proximal middle part, glabrous, margin membranous; portion of segment above wing connivent with others into a cone, apex obtuse; 3 wings reniform, larger; other 2 wings obovate or suborbicular, smaller. Anther appendage apex acute. Stigmas subulate, ca. 2 × as long as style. Seed horizontal. Fl. Jun–Aug, fr. Aug–Sep.

Slopes, dunes, rocky deserts; N Xinjiang [Mongolia; C Asia].

9. *Salsola arbusculiformis* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 142. 1916.

白枝猪毛菜 bai zhi zhu mao cai

Shrubs 40–100 cm tall. Stem much branched; older branches gray-brown or black-brown, longitudinally fissured; branchlets white, slightly sublustrous. Leaves alternate, fascicular on dwarf branches of older branches, gray-green, semiterete, 1–1.5 cm × 1–1.5 mm, slightly fleshy, base somewhat expanded, not decurrent, above base constricted and petiole-like, leaf deciduous from this point, apex obtuse. Inflorescence spikelike; bract base not decurrent; bractlets suborbicular, margin membranous, apex obtuse. Perianth (including wings) 8–14 mm in diam. in fruit; segments abaxially yellow-green, narrowly ovate, winged from proximal middle part in fruit, glabrous, margin membranous; portion of segment above wing connivent with others into a cone, apex obtuse; 3 wings yellow-brown or light purple-brown, reniform; other 2 wings smaller. Anther appendage apex obtuse. Stigmas subulate, equaling style. Seed

horizontal. Fl. Aug–Sep, fr. Sep–Oct.

Gobi desert, arid slopes. N Xinjiang [C Asia].

10. *Salsola passerina* Bunge, *Linnaea* 17: 4. 1843.

珍珠猪毛菜 zhen zhu zhu mao cai

Salsola gemmascens Pallas subsp. *passerina* (Bunge) Botschantzev.

Subshrubs 15–30 cm tall, densely covered with T-shaped hairs. Stem branched from base; woody branches spreading, gray-brown; annual branches yellow-green, with globose, dwarf branches. Leaves subulate or triangular, 2–3 × ca. 2 mm, abaxially slightly keeled, usually early deciduous, base expanded, apex acute. Inflorescence spikelike; bracts ovate; bractlets broadly ovate, margin membranous, apex acute. Perianth (including wings) 7–8 mm in diam. in fruit; segments narrowly ovate, abaxially slightly fleshy and winged from middle in fruit, margin membranous; portion of segment below wing glabrous; portion above wing connivent with others and forming a cone, T-shaped hairy; 3 wings yellow-brown or light purple-red, reniform; 2 other wings obovate, smaller. Anthers free from base to near apex, oblong; anther appendage lanceolate, apex acute. Stigmas filiform. Seed horizontal or vertical. Fl. Jul–Sep, fr. Aug–Sep.

Slopes, rocky alluvial fans. W Gansu, Nei Mongol, Ningxia, Qinghai [Mongolia].

11. *Salsola implicata* Botschantzev, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 13: 6. 1952.

密枝猪毛菜 mi zhi zhu mao cai

Herbs annual, 10–40 cm tall. Stem branching from base, densely furfuraceous hairy, sparsely sinuate pilose; branches dense, spreading or slightly flexuous, white, slender. Leaves terete, 5–10 × 1–1.5 mm, usually early deciduous, base slightly expanded and recurved, apex obtuse. Flowers solitary, borne throughout plant; bracts broadly lanceolate; bractlets broadly triangular, margin membranous, apex acute. Perianth (including wings) 8–10 mm in diam. in fruit; segments lanceolate, abaxially winged from middle in fruit, furfuraceous hairy and pilose; portion of segment above wing connivent with others, tightly appressed to utricle, lanceolate, subfleshy, hairy; wing with a space between wings of adjacent segments, yellow-brown, obovate or rhomboid, pellucid, subpapery, several veined. Anthers free from base to apex; anther appendage ovate. Stigmas linear, apex obtuse. Seed horizontal. Fl. Jul–Aug, fr. Sep–Oct.

Deserts, dunes. N Xinjiang [C Asia].

According to Freitag and Rilke (in Fl. Iranica), *Salsola implicata* differs from *S. sclerantha* C. A. Meyer only by such unstable characters as recurved leaves and yellow perianth wings, and thus it is better treated as a synonym of the latter species.

12. *Salsola foliosa* (Linnaeus) Schrader ex Roemer & Schultes, Syst. Veg. 6: 235. 1820.

浆果猪毛菜 jiang guo zhu mao cai

Anabasis foliosa Linnaeus, Sp. Pl. 1: 223. 1753; *Caspia foliosa* (Linnaeus) Galushko; *Neocaspia foliosa* (Linnaeus) Tzvelev; *Salsola clavifolia* Pallas.

Herbs annual, 20–40 cm tall. Stem erect, branched from base; branches gray-green, black-brown after drying, subfleshy, glabrous except slightly hairy in leaf axils. Leaves gray green, clavate, 1–2 cm × 1.5–2.5 mm, fleshy, glabrous, apex usually incurved, slightly inflated, obtuse. Flowers 3–5-glomerulate, borne throughout plant; bractlets broadly ovate, margin membranous, apex obtuse. Perianth (including wings) 5–7 mm in diam. in fruit; segments obovate or suborbicular, 0.8–1.1 mm, submembranous, abaxially with 1 protruding vein and winged from distal middle part; portion of segment above wing slightly curved, not enclosing utricle, broadly triangular, membranous, apex obtuse; wings yellow-brown, semiorbicular, subequal, margin entire. Anthers ca. 0.6 mm; appendage obscure. Style obscure; stigmas ca. 0.2 mm. Utricle berrylike, globose, juicy. Seed horizontal. Fl. Aug–Sep, fr. Sep–Oct.

Saline soils in deserts, semideserts. N Xinjiang [Mongolia, Russia (SW Siberia); C Asia, SW Asia (Caucasus), SE Europe].

13. *Salsola subcrassa* Popov ex Iljin in Shishkin, Fl. URSS 6: 875. 1936.

粗枝猪毛菜 cu zhi zhu mao cai

Climacoptera subcrassa (Popov ex Iljin) Botschantzev.

Herbs annual, 15–40 cm tall. Stem branched from base; lower branches elongate, stout, sparsely pilose below, pubescent or subglabrous above. Leaves yellow-green, semiterete, 1–2 cm × 1.5–2.5 mm, glabrous, margin membranous at base, decurrent, apex obtuse; lower leaves sometimes sparsely villous. Inflorescence spikelike; flowers solitary; bracts ovate, longer than bractlets; bractlets ovate, shorter than perianth, margin membranous. Perianth (including wings) 10–15 mm in diam. in fruit; segments lanceolate, membranous, abaxially winged from middle in fruit, glabrous; portion of segment above wing reflexed, with others appearing starlike, apex membranous; wings obovate. Anther appendage shortly stalked, white, shorter than anther. Stigmas subulate-filiform, 3–4 × as long as style. Seed horizontal. Fl. Aug–Sep, fr. Sep–Oct.

Gobi desert, saline lake shores. N Xinjiang [C Asia].

14. *Salsola heptapotamica* Iljin, Trudy Bot. Inst. Acad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 2: 127. 1936.

钝叶猪毛菜 dun ye zhu mao cai

Climacoptera obtusifolia (Schrenk) Botschantzev; *Halimocnemis obtusifolia* Schrenk.

Herbs annual, 15–40 cm tall. Stem erect, branched from base, sinuate-villous below, sparsely pubescent or subglabrous above. Leaves terete, 1–1.5 cm × 1–2 mm, lower leaves densely crisped villous, upper ones glabrous, base expanded, decurrent, apex obtuse. Inflorescence terminal, spikelike, loose; bracts narrowly ovate, equaling or slightly longer than bractlets, glabrous, apex acute; bractlets broadly lanceolate, shorter than perianth, with 1 prominent vein, apex acute. Perianth (including wings) 10–12 mm in diam. in fruit; segments lanceolate, membranous, glabrous, abaxially winged from proximal middle part in fruit; portion of segment above wing connivent with others into a cone, submembranous distally, glabrous, apex acuminate; 3 wings yellow-brown, semiorbicular; other 2 wings narrower.

Anther appendage yellow, vesicular, ovate, 1/3-1/2 as long as anther. Stigmas filiform-subulate, 2-3 × as long as style. Seed horizontal. Fl. Jul-Aug, fr. Aug-Sep.

Gobi desert, sandy areas, saline lake shores. N Xinjiang [E Kazakhstan].

15. *Salsola lanata* Pallas, Reise Russ. Reich. 2: 736. 1773.

短柱猪毛菜 duan zhu zhu mao cai

Climacoptera lanata (Pallas) Botschantzev.

Herbs annual, 15-40 cm tall. Stem erect, branched from base, gray-green, densely tomentose mixed with erect, long, jointed hairs. Leaves spreading, gray-green, semiterete, 1-1.5 cm × 1.5-2 mm, densely pubescent mixed with erect, long hairs, base decurrent, apex obtuse. Inflorescence spikelike; bracts narrowly ovate, apex acute; bractlets lanceolate, shorter than or equaling bracts, longer than perianth. Perianth (including wings) 14-16 mm in diam. in fruit; segments lanceolate, membranous, hardened in fruit, abaxially winged from proximal middle part, pubescent; portion of segment above wing connivent into a cone, pubescent, apex acuminate; 3 wings light red or dark brown, semiobicular or reniform, larger, membranous; other 2 wings narrower. Anther appendage shortly stalked, purple-red, vesicular, elliptic, subequaling anther. Stigmas subulate, very short, 1/7-1/6 as long as style. Seed horizontal. Fl. Jul-Aug, fr. Aug-Sep.

Saline lake shores, saline soils of Gobi desert. N Xinjiang [Pakistan, Russia; SW Asia (Iran)].

The Chinese plants belong to subsp. *lanata*.

16. *Salsola korshinskyi* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 142. 1916.

褐翅猪毛菜 he chi zhu mao cai

Climacoptera korshinskyi (Drobow) Botschantzev.

Herbs annual, 30-60 cm tall. Stem erect, much branched above; branchlets obliquely spreading, densely pubescent mixed with erect, long hairs when young. Leaves spreading, gray-green, semiterete, 1-1.5 cm × 1.5-2.5 mm, densely pubescent mixed with suberect, long hairs, base decurrent, apex obtuse. Inflorescence spicate; bracts narrowly ovate, subequaling bractlets; bractlets ovate, slightly shorter than or subequaling perianth. Perianth (including wings) 10-12 mm in diam. in fruit; segments lanceolate, membranous, abaxially winged from middle, pubescent; portion of segment above wing connivent with others into a cone; 3 wings yellow-brown or red-brown, reniform or obovate; other 2 wings smaller. Anther appendage shortly stalked, purple-red or white, narrowly ovate, 1/3-1/2 as long as anther. Stigmas subulate, subequaling style. Seed horizontal. Fl. Jul-Aug, fr. Aug-Sep.

Gobi desert, saline lake shores. N Xinjiang [C Asia].

17. *Salsola ferganica* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 141. 1916.

费尔干猪毛菜 fei er gan zhu mao cai

Climacoptera ferganica (Drobow) Botschantzev.

Herbs annual, globose, 10-30 cm tall. Stem branched from base; branches numerous, densely pubescent mixed with sinuate, long hairs. Leaves spreading, gray-green, semiterete, 1-1.5 cm × 1-2 mm, densely pubescent mixed with sinuate, long hairs, base decurrent, apex obtuse. Inflorescence spikelike; bracts narrowly ovate, longer than bractlets, densely pubescent, apex obtuse; bractlets ovate, subequaling perianth. Perianth (including wings) 10-15 mm in diam. in fruit; segments lanceolate, abaxially winged from proximal middle part in fruit, pubescent; portion of segment above wing connivent with others into a cone, lanceolate, pubescent, apex acuminate; wings purple-red or dark brown, 3 semiobicular and larger, 2 narrower. Anther appendage vesicular, minute, 1/10-1/8 as long as anther. Stigmas subulate, 3-4 × as long as style. Seed horizontal. Fl. Jul-Aug, fr. Aug-Sep.

N Xinjiang [C Asia].

This taxon was treated as *Salsola crassa* Marschall von Bieberstein subsp. *turcomanica* (Litvinov) Freitag by Freitag and Rilke (in Fl. Iranica), but, according to Grubov (Rast. Tsentral. Azii 2: 97. 1966), the name *S. turcomanica* Litvinov was misapplied to this taxon.

18. *Salsola sukaczewii* (Botschantzev) A. J. Li in H. W. Kung & C. P. Tsien, Fl. Reipubl. Popularis Sin. 25(2): 172. 1979.

长柱猪毛菜 chang zhu zhu mao cai

Climacoptera sukaczewii Botschantzev, Sborn. Rabot. Posvyaschch. Akad. Sukachevu, 112. 1956.

Herbs annual, globose, 15-30 cm tall. Stem much branched, gray-green, densely pubescent mixed with sinuate, long hairs when young. Leaves semiterete, 1-2 cm × 1.5-2 mm, base decurrent, apex obtuse. Inflorescence spikelike, loose; bracts broadly lanceolate, apex obtuse; bractlets long ovate, slightly shorter than or subequaling perianth, apex acute. Perianth (including wings) 15-18 mm in diam. in fruit; segments lanceolate, membranous, hardened in fruit, abaxially winged from proximal middle part, densely pubescent; portion of segment above wing connivent with others into a long, thin cone, narrowly lanceolate, densely pubescent; 3 wings light purple-red or yellow-brown, semiobicular, larger, submembranous; other 2 wings linear, smaller. Anther appendage shortly stalked, purple-red, vesicular, elliptic, slightly shorter than or subequaling anther. Style very short; stigmas subulate, 6-8 × as long as style. Seed horizontal. Fl. Jul-Aug, fr. Sep-Oct.

Sandy places, dunes. N Xinjiang [C Asia].

19. *Salsola brachiata* Pallas, Ill. Pl. 30. 1803.

散枝猪毛菜 san zhi zhu mao cai

Climacoptera brachiata (Pallas) Botschantzev.

Herbs annual, 10-30 cm tall. Stem erect, branched from base; branches opposite, sometimes upper ones alternate; branchlets spreading, thin, hard, densely pubescent mixed with sparse, long, jointed hairs. Leaves opposite, semiterete, 1.5-2 cm × 2-2.5 mm, densely pubescent mixed with sparse, long

hairs, base slightly expanded, not decurrent, apex mucronate. Inflorescence spikelike; bracts leaflike, longer than bractlets, base expanded; bractlets broadly lanceolate, densely pubescent mixed with sparse, long hairs, margin broadly membranous at base, apex acute. Perianth (including wings) 10–13 mm in diam. in fruit; segments narrowly lanceolate, hardened in fruit, abaxially winged from proximal middle part, densely pubescent, margin membranous; portion of segment above wing connivent with others into a long, thin cone, narrowly lanceolate, subleathery, densely pubescent; 3 wings yellow-brown or purple-brown, reniform; other 2 wings obovate, smaller. Anther appendage cochleate. Style very short; stigmas subulate, 7–8 × as long as style. Seed vertical. Fl. Jul–Aug, fr. Sep–Oct.

Gobi desert, slopes, ravines. N Xinjiang [Mongolia, Russia (SW Siberia); C Asia, SW Asia (Caucasus), SE Europe].

20. *Salsola affinis* C. A. Meyer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 1: 360. 1843.

紫翅猪毛菜 *zi chi zhu mao cai*

Climacoptera affinis (C. A. Meyer) Botschantzev; *C. roborowskii* (Iljin) Grubov; *Salsola roborowskii* Iljin.

Herbs annual, 10–30 cm tall. Stem branched from base; branches alternate or lower ones subopposite, ascending or decumbent, white, densely pilose. Leaves semiterete, alternate, 1–2.5 cm × 2–3 mm, densely pubescent, base slightly expanded, not decurrent, apex obtuse; lower leaves subopposite, usually curved. Inflorescence terminal, spikelike; bracts broadly ovate, shorter than bractlets, margin membranous, apex obtuse; bractlets ovate, shorter than perianth. Perianth (including wings) 5–10 mm in diam. in fruit; segments lanceolate, membranous, abaxially winged from proximal middle part, glabrous or sparsely villous; portion of segment above wing connivent with others into a cone, lanceolate, membranous, apex acute; 3 wings purple-red or dark brown, reniform; 2 other wings obovate, smaller. Anther appendage white, elliptic. Stigmas subequaling or slightly longer than style. Seed horizontal or sometimes vertical. Fl. Jul–Aug, fr. Aug–Sep.

Deserts, hills, dry clayey soils. Xinjiang [C Asia, SE Europe (Lower Volga region of Russia)].

21. *Salsola aperta* Paulsen, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 6(5): 197. 1903.

露果猪毛菜 *lu guo zhu mao cai*

Herbs annual, 10–30 cm tall. Stem branched from base; branches alternate or lower ones subopposite, white, sublustrous, ribbed, glabrous. Leaves light gray-green, broadly linear, 2–5 cm × 5–7 mm, fleshy, glabrous, base slightly decurrent, apex spinose mucronate; midvein distinct abaxially. Flowers solitary, borne throughout plant; bracts leaflike, longer than bractlets. Perianth (including wings) 5–8 mm in diam. in fruit; segments lanceolate, membranous, below middle hardened in fruit, abaxially winged from middle, glabrous; portion of segment above wing reflexed, with others appearing starlike, not enclosing utricle, lanceolate, membranous, apex abruptly acute; 3 wings semiorbicular, larger, with several sparse, stout veins; other 2 wings very small. Anthers free from base to near

apex, 1.5–2 mm; appendage ovate, apex obtuse. Stigmas 3–4 × as long as style. Seed horizontal. Fl. Jun–Jul, fr. Jul–Aug.

Dunes, sandy places. Xinjiang [Afghanistan, S Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

22. *Salsola soda* Linnaeus, Sp. Pl. 1: 223. 1753.

苏打猪毛菜 *su da zhu mao cai*

Herbs annual, 20–70 cm tall. Stem branched from base; branches alternate or lower ones opposite, spreading, light green, sometimes whitish, not straight, glabrous. Lower leaves opposite, upper ones alternate, all semiterete, 2–7 cm × 2–4 mm, glabrous, base expanded, slightly decurrent, margin membranous, apex minutely mucronate. Inflorescence spicate, loose; flowers usually solitary; bracts longer than bractlets; bractlets narrowly ovate, margin narrowly membranous near base, apex acute. Perianth segments ovate, membranous, hardened in fruit, abaxially with a triangular process on distal middle part, glabrous; portion of segment above process strongly inflexed, with others forming a truncate surface tightly appressed to utricle, apex obtuse. Anthers oblong, 1–1.5 mm; appendage minute. Stigmas filiform, 2–3 × as long as style. Utricle obovoid, 3–4 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Saline lake shores, meadows with saline soils. Xinjiang [N Africa, C and SW Asia, S Europe; locally naturalized in North America (California) and South America (Argentina)].

23. *Salsola komarovii* Iljin, Bot. Zhurn. SSSR 18: 276. 1933.

无翅猪毛菜 *wu chi zhu mao cai*

Herbs annual, 20–50 cm tall. Stem erect, branched from base; branches alternate, spreading, yellow-green, white or purple-red striate, glabrous. Leaves alternate, horizontally or slightly obliquely spreading, semiterete, 2–5 cm × 2–3 mm, base expanded, slightly decurrent, margin membranous at base, apex mucronate. Inflorescence terminal, spicate; bracts linear, longer than bractlets, apex mucronate; bractlets narrowly ovate, longer than perianth, thickened in fruit and tightly appressed to perianth, margin membranous at base, apex mucronate. Perianth segments ovate-oblong, membranous, hardened and leathery in fruit, abaxially with a pectinate process on distal middle part, glabrous; portion of segment above process inflexed, with others forming a truncate surface, apex connivent with others into a short cone, acute, membranous. Style very short; stigmas filiform, 3–4 × as long as style. Utricle obovoid, 2–2.5 in diam. Fl. Jul–Aug, fr. Aug–Sep.

Beaches, sandy soils on riversides. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, N Zhejiang [Japan, Korea, Russia (Far East)].

24. *Salsola collina* Pallas, Ill. Pl. 34. 1803.

猪毛菜 *zhu mao cai*

Salsola chinensis Gandoger.

Herbs annual, 20–100 cm tall. Stem branched from base; branches alternate, spreading, green, white or purple-red striate, hispid or subglabrous. Leaves spreading or slightly curved,

filiform-terete, 2–5 cm × 0.5–1.5 mm, hispid, base slightly expanded, decurrent, margin membranous, apex spinose mucronate. Inflorescence spikelike; bracts and bractlets tightly appressed to rachis; bracts ovate, abaxially longitudinally keeled, margin membranous, apex spinose mucronate; bractlets narrowly lanceolate, apex spinose mucronate. Perianth segments ovate-lanceolate, membranous, hardened in fruit, abaxially crested; portion of segment above crest inflexed, with others forming a plane surface tightly appressed to utricle or sometimes connivent distally into a small cone, subleathery, apex acute, membranous. Anthers 1–1.5 mm. Stigmas filiform, 1.5–2 × as long as style. Seed horizontal or oblique. Fl. Jul–Sep, fr. Sep–Oct.

Around farm houses, roadsides, waste places. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Korea, Mongolia, Pakistan, Russia; C Asia; naturalized in C and W Europe and North America].

This plant is used in Chinese medicine to reduce blood pressure.

25. *Salsola zaidamica* Iljin, Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 17: 122. 1955.

柴达木猪毛菜 *chai da mu zhu mao cai*

Herbs annual, 8–15 cm tall. Stem branched from base; basal branches subopposite, spreading, densely papillate. Leaves alternate, crowded, narrowly lanceolate, compressed, densely papillate, margin membranous and usually reflexed near base, apex spinose mucronate. Flowers solitary, borne nearly throughout plant; bracts longer than bractlets, apex spinose mucronate; bractlets ovate, densely papillate, margin membranous at base. Perianth segments narrowly ovate, submembranous, hardened in fruit and appearing leathery, abaxially with a thickened process at middle, glabrous; portion of segment above process inflexed, with others forming a truncate surface tightly appressed to utricle, apex membranous, usually caducous and forming a circular hole. Anthers oblong, ca. 0.5 mm. Style very short; stigmas filiform. Seed horizontal, ca. 1.5 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Saline areas in deserts. N Gansu, Qinghai, E Xinjiang [Mongolia].

The actual distribution of *Salsola zaidamica* requires additional studies.

26. *Salsola monoptera* Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 25: 364. 1879.

单翅猪毛菜 *dan chi zhu mao cai*

Herbs annual, 10–30 cm tall. Stem branched from base, densely hispid; branches alternate, horizontally spreading, lowest ones subopposite. Leaves yellow-green, filiform, semiterete, 1–1.5 cm × 0.5–1 mm, hispid, base slightly expanded, apex spinose mucronate. Inflorescence spikelike, or sometimes flowers borne throughout plant; bracts lanceolate, longer than bractlets. Perianth segments narrowly ovate, membranous, hardened and leathery in fruit, only 1 segment abaxially winged, others with a toothlike process, all glabrous; portion of segment above wing or process connivent with others and forming a plane surface, apex acute. Stamens longer than perianth; anthers ca. 0.3 mm; appendage very small. Style very short; stigmas

filiform, 4–6 × as long as style. Seed horizontal, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Riversides, sandy slopes. Nei Mongol, Qinghai, Xinjiang, Xizang [Mongolia, Russia (Altai)].

27. *Salsola tamariscina* Pallas, Reise Russ. Reich. 3: 604. 1776.

怪柳叶猪毛菜 *cheng liu ye zhu mao cai*

Herbs annual, 15–50 cm tall. Stem erect; branches usually gray-green, long, straight, and glabrous, sometimes white striate and rough. Leaves gray-green, semiterete, 0.5–1.5 cm × 1.5–2 mm, glabrous, base expanded, slightly decurrent, margin membranous, apex mucronate. Flowers solitary throughout plant; bracts narrowly ovate, subequaling or longer than bractlets, abaxially white keeled, margin membranous at base, apex extended, mucronate; bractlets ovate-lanceolate, subequaling perianth, apex mucronate. Perianth (including wings) 5–7 mm in diam. in fruit; segments narrowly ovate, submembranous, hardened in fruit, abaxially winged from middle, perianth segments above wing connivent with others and forming a cone, narrowly lanceolate, submembranous, abaxially green fleshy keeled, apex acute, long mucronate; 3 wings semi-orbicular or suborbicular; other 2 wings yellow-brown, obovate, with veins united at base. Style very short; stigmas filiform, 2–3 × as long as style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Saline-alkaline meadows, Gobi desert. N Xinjiang [Mongolia, Russia (Altai, N Caucasus, SE European part); C Asia, SE Europe (SE Ukraine)].

28. *Salsola rosacea* Linnaeus, Sp. Pl. 1: 222. 1753.

蔷薇猪毛菜 *qiang wei zhu mao cai*

Herbs annual, 15–40 cm tall. Stem erect, branched, rarely simple, gray-green, white striate, sometimes light red-brown below, glabrous. Leaves gray-green, semiterete, 1–3 cm × 1.5–2 mm, glabrous, base expanded with membranous margin, decurrent, apex mucronate. Flowers axillary, solitary, borne throughout plant; bracts narrowly lanceolate, sometimes slightly curved, longer than bractlets, apex pungent; bractlets ovate-lanceolate, longer than perianth, margin membranous at base, apex acute. Perianth (including wings) 8–10 mm in diam. in fruit; segments narrowly ovate, submembranous, abaxially winged from distal middle part, glabrous; portion of segment above wing tightly appressed to utricle, broadly lanceolate or triangular, abaxially green fleshy keeled, margin submembranous, apex obtuse; 3 wings reniform; other 2 wings purple-red or yellow-brown, obovate. Anthers oblong, 0.5–0.7 mm. Style very short; stigmas filiform, 2–3 × as long as style. Seed horizontal. Fl. Jul–Aug, fr. Sep–Oct.

Gobi desert, ravines, saline soils. N Xinjiang [W Mongolia, Russia (Altai); C Asia].

29. *Salsola chinghaiensis* A. J. Li, Acta Phytotax. Sin. 16(1): 122. 1978.

青海猪毛菜 *qing hai zhu mao cai*

Herbs annual, 40–50 cm tall. Stem branched from base, green, white striate, densely hispid. Leaves alternate, semi-

terete, 2–3 cm × 1.5–3 mm, fleshy, hispid, base expanded, apex hardened mucronate. Inflorescence terminal, spikelike; flowers solitary; bracts broadly lanceolate, longer than bractlets, apex elongate, spinose mucronate; bractlets spreading, lanceolate. Perianth (including wings) 10–12 mm in diam. in fruit; segments lanceolate, membranous, hardened in fruit, abaxially winged from proximal middle part; portion of segment above wing connivent with others into a long cone, subleathery, densely very shortly hispid, apex acute, thinly mucronate; 3 wings semiorbicular, with veins united at base, margin irregularly toothed; other 2 wings narrower. Anthers oblong, ca. 1 mm. Stigmas filiform, 2–3 × as long as style. Seed horizontal, ca. 2 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

- Saline soils in meadows. Qinghai (Qaidam Pendi).

Salsola chinghaiensis may be a synonym of *S. ikonnikovii* (see Rilke, Biblioth. Bot. 149: 152. 1999).

30. *Salsola praecox* (Litvinov) Iljin in Shishkin, Fl. URSS 6: 216. 1936.

早熟猪毛菜 zao shu zhu mao cai

Salsola kali Linnaeus var. *praecox* Litvinov, Sched. Herb. Fl. Ross. 4: 66. 1902; *S. paulsenii* Litvinov subsp. *praecox* (Litvinov) Rilke.

Herbs annual, 5–25 cm tall. Stem branched from base; branches green, white striate, slender, hispid or subglabrous; lowest branches elongate. Leaves spreading or curved, filiform, semiterete, 1.5–3.5 cm × 0.7–1.5 mm, hispid, base slightly expanded, apex spinose mucronate. Inflorescence spikelike, loose, or sometimes flowers borne throughout plant; bracts narrowly ovate, longer than bractlets, margin membranous at base, apex elongate, spinose mucronate; bractlets ovate, longer than perianth, apex spinose mucronate. Perianth (including wings) 6–8 mm in diam. in fruit; segments narrowly lanceolate, membranous, hardened in fruit, abaxially winged from proximal middle part, hispid; portion of segment above wing connivent with others into a long, thin cone, shortly bristly, apex long, hard, spinose mucronate; 3 wings reniform, larger; other 2 wings narrowly lanceolate, smaller, leathery. Anthers ca. 0.5 mm, apex spinose mucronate. Stigmas filiform, 2–3 × as long as style. Seed horizontal. Fl. Apr–May, fr. May–Jul.

Dunes, sandy places. N Xinjiang [Afghanistan, SW Pakistan; SC Asia, SW Asia (E Iran)].

Salsola praecox is very closely related to *S. paulsenii* and would perhaps be better treated as *S. paulsenii* subsp. *praecox*.

31. *Salsola paulsenii* Litvinov, Izv. Turkestansk. Otd. Russk. Geogr. Obsch. 4(5): 28. 1905.

长刺猪毛菜 chang ci zhu mao cai

Herbs annual, 15–40 cm tall. Stem branched from base, usually light red-brown, rigid, densely hispid. Leaves semiterete, straight, 1.5–3 cm × 1.5–2 mm, rigid, hispid, base slightly expanded, apex spinose mucronate. Inflorescence spikelike, loose; bracts narrowly ovate, apex elongate, spinose mucronate; bractlets slightly reflexed, broadly lanceolate, longer than perianth. Perianth (including wings) 6–8 mm in diam. in fruit;

segments broadly lanceolate, submembranous, hardened in fruit, abaxially winged from proximal middle part, hispid; portion of segment above wing connivent with others into a long, thin cone, densely hispid, apex long acuminate, rigidly spinose mucronate; 3 wings reniform or semiorbicular, larger; other 2 wings narrower. Stigmas filiform, longer than style. Seed horizontal. Fl. Jul–Aug, fr. Sep–Oct.

Gobi desert, saline sandy places. N Xinjiang [Afghanistan, W Mongolia; C and SW Asia, SE Europe; naturalized in SW North America].

Salsola ×gobicola Iljin (Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 17: 124. 1955) is a hybrid between *S. paulsenii* and *S. tragus* (see Rilke, Biblioth. Bot. 149: 164. 1999).

32. *Salsola pellucida* Litvinov, Sched. Herb. Fl. Ross. 8: 16. 1922.

薄翅猪毛菜 bao chi zhu mao cai

Herbs annual, 20–60 cm tall. Stem erect, much branched, green; branches white-striate, stout, densely hispid. Leaves semiterete, 1.5–2.5 cm × 1.5–2 mm, apex spinose mucronate. Inflorescence spikelike; bracts longer than bractlets. Perianth (including wings) 7–12 mm in diam. in fruit; segments hardened in fruit, abaxially winged from proximal middle part, glabrous or rough; portion of segment above wing connivent with others into a long, thin cone, apex subrigidly spinose mucronate or thinly membranous mucronate; 3 wings semiorbicular; 2 other wings narrower. Stigmas filiform, longer than style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Gobi desert, ravines, riversides. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [C Asia, SW Asia (E Caucasus)].

Most authors regard *Salsola pellucida* as a synonym of *S. paulsenii* s.str.

33. *Salsola sinkiangensis* A. J. Li, Acta Phytotax. Sin. 16(1): 122. 1978.

新疆猪毛菜 xin jiang zhu mao cai

Herbs annual, 15–30 cm tall. Stem branched from base; branches crowded, white striate, densely hispid. Leaves alternate, green, filiform, semiterete, 1–1.5 cm × 0.5–0.8 mm, fleshy, hispid, base slightly expanded, not decurrent, apex spinose mucronate. Flowers axillary, solitary, borne throughout plant; bracts broadly lanceolate, longer than bractlets, apex elongate, spinose mucronate; bractlets lanceolate. Perianth (including wings) 5–6 mm in diam. in fruit; segments ovate-lanceolate, membranous, hardened in fruit, abaxially winged from middle, glabrous; portion of segment above wing connivent with others into a short cone, apex acute; wings light purple-red or yellow-brown, 3 obovate, other 2 narrower. Filaments narrowly linear; anthers oblong, ca. 0.5 mm; appendage white, small. Stigmas filiform, ca. 2 × as long as style. Seed horizontal, 1.5–2 mm in diam. Fl. Jul–Aug, fr. Sep–Oct.

• Sandy and rocky deserts, valley terraces; 900–2500 m. Gansu, Xinjiang.

Salsola sinkiangensis may be a synonym of *S. Jacquemontii* Moquin-Tandon (see Rilke, Biblioth. Bot. 149: 139. 1999).

34. *Salsola ikonnikovii* Iljin, Izv. Bot. Sada Akad. Nauk SSSR 30: 748. 1932.

蒙古猪毛菜 meng gu zhu mao cai

Herbs annual, 30–40 cm tall. Stem branched from base, green; branches white striate, sparsely hispid along striae; basal branches ascending, elongate. Leaves semiterete, 2–3 cm × 1.5–2 mm, glabrous, base expanded, apex spinose mucronate. Inflorescence spicate; flowers axillary, solitary; bracts narrowly ovate, longer than bractlets, apex elongate, spinose mucronate; bractlets reflexed in fruit, narrowly ovate, abaxially with a white, stout vein, base expanded, margin membranous at base, apex elongate, spinose mucronate. Perianth (including wings) 7–10 mm in diam. in fruit; segments narrowly ovate, hardened and leathery in fruit, abaxially winged from middle, glabrous; portion of segment above wing connivent with others into a short cone, rigid; 3 wings reniform or obovate, larger, apex irregularly dentate; 2 other wings very narrow. Anthers ca. 1 mm; appendage extremely small. Stigmas equaling style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Dunes, sandy places. Nei Mongol [Mongolia].

35. *Salsola nepalensis* Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Acad. Nauk SSSR 21: 127. 1961.

尼泊尔猪毛菜 ni bo er zhu mao cai

Herbs annual, 20–40 cm tall. Stem branched from base, densely long hispid; basal branches subopposite, decumbent, elongate, upper branches alternate, all branches light purple-red or white-ribbed. Leaves sessile, terete, 1.5–4 cm × ca. 1 mm, hispid, apex spinose mucronate. Inflorescence spikelike; flowers solitary; bracts spreading, abaxially white veined, base expanded, margin ciliate near base. Perianth (including wings) ca. 5 mm in diam. in fruit; segments membranous, leathery in fruit, abaxially winged, glabrous; portion of segment above wing connivent with others into a cone, apex acute, membranous; wings with black-brown veins, margin slightly crenate. Anthers ca. 0.8 mm, without an appendage. Stigmas filiform, 3–4 × as long as style. Seed horizontal. Fl. Jul–Aug, fr. Aug–Sep.

Valleys, arid slopes, sandy or rocky places. Xizang [Nepal].

Salsola nepalensis may be a synonym of *S. jacquemontii* Moquin-Tandon (see Rilke, Biblioth. Bot. 149: 139. 1999).

36. *Salsola tragus* Linnaeus, Cent. Pl. 2: 13. 1756.

刺沙蓬 ci sha peng

Salsola australis R. Brown; *S. dichracantha* Kitagawa; *S. iberica* (Sennen & Pau) Botschantzev ex Czerepanov; *S. kali* Linnaeus var. *angustifolia* Fenzl; *S. kali* var. *pseudotragus* G. Beck; *S. kali* subsp. *ruthenica* Soó; *S. kali* var. *tenuifolia* Tausch; *S. kali* var. *tragus* (Linnaeus) Moquin-Tandon; *S. pestifer* A. Nelson; *S. ruthenica* Iljin, nom. illeg. superfl.; *S. ruthenica* var. *filifolia* A. J. Li; *S. tragus* subsp. *iberica* Sennen & Pau.

Herbs annual, 30–100 cm tall. Stem erect, branched from base, white, or purple-red striate, densely hispid or subglabrous. Leaves semiterete or terete, 1.5–4 cm × 0.5–1.5 mm, glabrous or hispid, base expanded, margin membranous at base, apex spinose mucronate. Inflorescence spikelike; bracts narrowly ovate, longer than bractlets, margin membranous at base, apex spinose mucronate; bractlets ovate, apex spinose mucronate. Perianth (including wings) 7–10 mm in diam. in fruit; segments narrowly ovate, membranous, hardened in fruit, abaxially 1-veined and winged from middle, glabrous; portion of segment above wing connivent with others and enclosing utricle, subleathery, apex membranous; 3 wings sometimes light purple-red, reniform or obovate, larger; other 2 wings narrower. Stigmas filiform, 3–4 × as long as style. Seed horizontal, ca. 2 mm in diam. Fl. Aug–Sep, fr. Sep–Oct.

Dunes, sandy places, rocky places in Gobi desert, valleys, seashores. N Gansu, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang, Xizang [native to C and SW Asia and SE Europe; now widely naturalized in S Africa, Asia, Australia, Europe, and North and South America].

In its present circumscription, *Salsola tragus* still remains an extremely polymorphic species probably consisting of several distinct races (subspecies or even segregate species). Studies of allozymes and DNA markers in some North American and Eurasian representatives of *S. tragus* also indicate that there are several cryptic, genetically divergent populations (Ryan & Ayres, Canad. J. Bot. 78: 59–67. 2000). Several varieties and forms have been recognized within *S. tragus*, but they are mostly morphological variants of little or no taxonomic value.

