

21. **KOCHIA** Roth, J. Bot. (Schrader) 1800(1): 307. 1801.

地肤属 di fu shu

Herbs annual, less often subshrubs, villous or pubescent, rarely glabrous. Stem erect or oblique, usually much branched. Leaves alternate, sessile or subsessile, terete, semiterete, or narrowly complanate, margin entire. Flowers axillary, sessile, usually 1-3-glomerulate, bisexual, sometimes some female, without bractlets. Perianth subglobose, 5-parted, herbaceous, usually hairy; segments incurved, abaxially with transverse, winglike, membranous, veined appendages in fruit. Disk absent. Stamens 5, inserted at base of perianth; filaments flattened; anthers broadly oblong, exserted. Ovary broadly ovoid; ovule subsessile; style obscure; stigmas 2 or 3, filiform, papillose. Utricle depressed globose; pericarp membranous, not adnate to seed. Seed horizontal, globose or ovoid, depressed, slightly emarginate near hilum; testa membranous, glabrous; embryo slender, annular; perisperm not copious.

Between ten and fifteen species: temperate zones of N Africa, Asia, Europe, and SW North America; seven species in China.

Scott (Feddes Repert. 89: 101-119. 1978) proposed to submerge *Kochia* and several other related genera into *Bassia*. A traditional circumscription of *Kochia* is accepted here.

- 1a. Subshrubs ..... 1. *K. prostrata*
- 1b. Herbs annual.
  - 2a. Leaves terete or semiterete.
    - 3a. Winglike appendages of perianth segments unequal; leaves blue-green ..... 7. *K. melanoptera*
    - 3b. Winglike appendages of perianth segments equal; leaves green.
      - 4a. Plants crowded branched; perianth glabrous, margin of winglike appendage entire ..... 5. *K. krylovii*
      - 4b. Plants sparsely branched; perianth densely pilose, margin of winglike appendage not entire ..... 6. *K. laniflora*
  - 2b. Leaves narrowly complanate.
    - 5a. Winglike appendage of perianth segments elongate, narrow, margin lacerate, apex long acuminate to caudate ..... 2. *K. odontoptera*
    - 5b. Winglike appendage of perianth segments not shaped as above.
      - 6a. Plants densely gray-white pilose throughout; branches irregularly spreading, rigid; margin of winglike appendages of perianth segments erose ..... 3. *K. stellaris*
      - 6b. Plants subglabrous or only inflorescences ferruginous villous; branches ascending, slender; margin of winglike appendages of perianth segments repand or incised ..... 4. *K. scoparia*

**1. *Kochia prostrata*** (Linnaeus) Schrader, Neues J. Bot. 3: 85. 1809.

本地肤 mu di fu

Subshrubs 20-80 cm tall. Woody stem usually less than 10 cm; annual branches simple or branched, not striate, slightly ribbed, densely light yellow-brown, light reddish, or gray-white pilose, densely white crisped pilose, or subglabrous. Leaves alternate, usually clustered on dwarf, axillary branchlets, sessile, linear, semiterete, 0.8-2 cm x 1-1.5 mm, spreading sericeous or densely appressed sericeous on both surfaces, base shortly attenuate, apex obtuse or acute; veins obscure. Flowers bisexual and female, usually 2 or 3 per glomerule, these arranged in spikes on upper part of annual branches. Perianth globose, densely sericeous; segments ovate or oblong, incurved, apex obtuse; winglike appendages with purple-red or black-brown veins, flabellate or obovate, membranous, margin irregularly crenate or erose. Filaments filiform, slightly exserted. Stigmas 2, purple-brown, filiform. Utricle depressed globose; pericarp gray-brown, thickly membranous. Seed black-brown, subglobose, ca. 1.5 mm in diam. Fl. Jul-Aug, fr. Aug-Sep.

Slopes, sandy places, valleys, Gobi desert, deserts. W Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang, Xizang [C and SW Asia, S Europe].

*Kochia prostrata* is a very variable species. Several infraspecific taxa have been described, differing mostly in pubescence and some other minor characters, probably environmentally affected, but partly

also dependent on geographic and karyological races. No consensus of infraspecific taxonomy is currently available for this species. The following varieties have been reported from China.

The species provides good fodder for animals.

- 1a. Leaves appressed sericeous ..... 1b. var. *canescens*
- 1b. Leaves spreading sericeous.
  - 2a. Annual branches densely light yellow-brown or light reddish pilose, or subglabrous ..... 1a. var. *prostrata*
  - 2b. Annual branches densely white crisped pilose ..... 1c. var. *villosissima*

**1a. *Kochia prostrata* var. *prostrata***

本地肤(原变种) mu di fu (yuan bian zhong)

*Salsola prostrata* Linnaeus, Sp. Pl. 1: 222. 1753; *Kochia suffruticosa* Lessing.

Annual branches densely light yellow-brown or light reddish pilose, or subglabrous. Leaves spreading sericeous.

Slopes, sandy places, valleys, deserts. W Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang, Xizang [C and SW Asia, S Europe].

**1b. *Kochia prostrata* var. *canescens*** Moquin-Tandon, Chenop. Monogr. Enum. 93. 1840.

灰毛本地肤 hui mao mu di fu

Annual branches densely gray-white pilose. Leaves densely appressed sericeous.

• Slopes, sandy places. W Gansu, Nei Mongol, Ningxia, Xinjiang.

**1c. *Kochia prostrata* var. *villosissima*** Bongard & C. A. Meyer, Verz. Saisang-nor Pfl. 67. 1841.

密毛木地肤 mi mao mu di fu

Annual branches densely white crisped pilose. Leaves spreading sericeous.

• Gobi desert, sandy places, arid slopes. N Xinjiang.

**2. *Kochia odontoptera*** Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg, sér. 2, 1: 361. 1843.

尖翅地肤 jian chi di fu

*Kochia odontoptera* var. *schrenkiana* Moquin-Tandon; *K. schrenkiana* (Moquin-Tandon) Iljin.

Herbs annual, 15–30 cm tall. Stem erect, not striate, ribbed, gray-white cottony pubescent; branches sparse, ascending or oblique, slender, usually slightly curved. Leaves linear, complanate, 0.5–1.2 cm × 1–2.5 mm, densely sericeous on both surfaces, base attenuate, apex shortly acute. Flowers bisexual, usually 2 or 3 per axillary glomerule. Perianth greenish, subglobose, semiappressed light yellowish pilose; segments broadly ovate, apex acute; winglike appendages usually spreading, light brownish yellow, sublanceolate, 2–3.5 mm, membranous, margin lacerate, apex caudate-acuminate. Stamens 5; filaments exerted; anthers oblong, ca. 0.4 mm. Style very short; stigmas 2, light brown, filiform. Utricle obovoid; pericarp slightly whitish, membranous, glabrous. Seed horizontal, dark red-brown, ca. 0.8 mm; perisperm coherent, brown. Fl. and fr. May–Jul.

Dunes, terraces. N Xinjiang [C Asia].

**3. *Kochia stellaris*** Moquin-Tandon, Chenop. Monogr. Enum. 93. 1840.

伊朗地肤 yi lang di fu

*Bassia iranica* (Litvinov ex Bornmüller) Bornmüller; *Kochia iranica* Litvinov ex Bornmüller; *K. odontoptera* Schrenk var. *altera* Schrenk.

Herbs annual, to 50 cm tall, densely gray-white cottony pubescent. Stem erect, woody below, usually with crowded branches; branches irregularly spreading, whitish yellow or reddish purple, rigid. Leaves sessile, semiappressed villous, base attenuate, apex acute or shortly acuminate; lower leaves linear to oblong-lanceolate, to 1.8 cm; upper leaves ovate to oblong, 1.5–3 × 1–2 mm. Flowers bisexual, usually 2 or 3 per axillary glomerule. Perianth green, densely pilose; winglike appendages rhombic to fan-shaped, membranous, brownish yellow veined, apical margin erose. Stigmas 2, exerted, filiform. Style very short, ca. 1/4 as long as stigma. Utricle ovoid; pericarp thinly membranous. Seed dark brown, not lustrous, ca. 1 mm in diam., glabrous; perisperm coherent, brown. Fl. and fr. Jul–Oct.

Gobi desert. W Gansu, Xinjiang [Afghanistan, Pakistan; C Asia, SW Asia (Iran)].

Plants with perianth segments rhombic, narrowed at base, and not erose at margin correspond to *Kochia stellaris* s.str., whereas plants with perianth segments orbicular, erose at margin, have been segregated as *K. iranica*. The difference between these two entities is problematic.

**4. *Kochia scoparia*** (Linnaeus) Schrader, Neues J. Bot. 3: 85. 1809.

地肤 di fu

*Chenopodium scoparium* Linnaeus, Sp. Pl. 1: 221. 1753.

Herbs annual, 50–100 cm tall. Root fusiform. Stem erect, terete, light green or reddish purple, ribbed, slightly pubescent or subglabrous below; branches sparse, oblique. Leaves lanceolate or linear-lanceolate, complanate, 2–5 cm × 3–7 mm, usually with 3 distinct main veins, glabrous or slightly hairy, base attenuate into petiole, margin sparsely ferruginous ciliate, apex shortly acuminate; upper leaves sessile, smaller, 1-veined. Flowers bisexual or female, usually 1–3 per glomerule in axils of upper leaves and forming sparse, spikelike panicles; rachis beneath flowers sometimes ferruginous pilose. Perianth light green, subglobose; segments subtriangular, glabrous or apex slightly hairy, rarely wholly pubescent; winglike appendages triangular to obovate, sometimes subflabellate, membranous, obscurely veined, margin repand or incised. Filaments filiform. Style very short; stigmas 2, usually brownish purple. Utricle depressed globose; pericarp membranous, free from seed. Seed black-brown, sublustrous, ovoid, 1.5–2 mm; perisperm coherent. Fl. Jun–Sep, fr. Jul–Oct.

Valleys, river banks, beaches, wastelands, field margins, roadsides; also cultivated. Throughout China [Asia, Europe; widely naturalized in Africa, Australia, and North and South America].

*Kochia scoparia* is an extremely variable species. Several forms, varieties, and subspecies have been described. Of these taxa, the most widespread in China is probably var. (or subsp.) *scoparia*, whereas plants with lower branches arcuate, axis of inflorescence distinctly pubescent, and flowers surrounded by a dense tuft of long hairs exceeding the perianth segments have been called var. *subvillosa* Moquin-Tandon (in Candolle, Prodr. 13(2): 131. 1849). The nomenclature of this latter variety is extremely confused; in particular, it has been called *K. densiflora* Turczaninow ex B. D. Jackson (*K. scoparia* subsp. *densiflora* (Turczaninow ex B. D. Jackson) M. Velayos & S. Cirujano; *K. scoparia* var. *albovillosa* Kitagawa), and the names *K. sieversiana* (Pallas) C. A. Meyer and *K. scoparia* var. *sieversiana* (Pallas) Ulbrich ex Ascherson & Graebner have been misapplied to this entity.

This species also has a horticultural form, f. *trichophylla* (A. Voss) Stapf ex Schinz & Thellung, which is characterized by plants appearing ovoid or obovoid (“cypresslike”), with crowded branches, and leaves narrower. It is cultivated in the countryside for brooms. In late autumn, the branches and leaves become red or orange and can be used ornamentally.

The young plants are eaten as a vegetable, and the utricles are used medicinally.

**5. *Kochia krylovii*** Litvinov in Krylov, Fl. Altai Government Tomsk 5: 1121. 1909.

全翅地肤 quan chi di fu

Herbs annual, 10–20 cm tall, densely villous throughout except perianth. Stem much branched; branches crowded, green

striate, ribbed. Leaves terete, 0.3–1.5 cm × 0.5–1 mm, base attenuate, apex acute or obtuse. Flowers bisexual, usually 1–3 per glomerule, these borne throughout branches in leaf axils. Perianth discoid, 5-lobed, glabrous; winglike appendages obovate to linear, membranous, usually with purple-red veins, margin entire. Filaments slightly exserted; anthers 0.3–0.4 mm. Style very short; stigmas 2, exserted, recurved, plumose. Utricle broadly ovoid, ca. 1.5 mm; pericarp membranous. Seed black-brown; embryo dark green; perisperm coherent. Fl. Aug, fr. Sep–Oct.

Riversides, wastelands. NE Xinjiang [W Mongolia, Russia (SW Siberia)].

**6. *Kochia laniflora*** (S. G. Gmelin) Borbás, *Balaton Fl.* 340. 1900.

毛花地肤 mao hua di fu

*Salsola laniflora* S. G. Gmelin, *Reise Russland* 1: 160. 1770–1774; *Kochia arenaria* (Maerklin) Roth; *Salsola arenaria* Maerklin; *S. dasyphylla* Pallas.

Herbs annual, 20–50 cm tall. Stem erect, simple or sparsely branched, usually reddish purple, not striate, slightly ribbed, slightly cottony pilose; branches obliquely spreading, slender; basal branches suberect. Leaves subsessile, spreading or slightly incurved, semiterete, apex acuminate. Flowers usually 2 or 3 per axillary glomerulate, these forming interrupted spikes on upper branches. Perianth densely long sericeous; segments green, slightly fleshy above winglike appendages; winglike appendages rhombic-ovate to linear, membranous, brown veined, margin erose. Stamens 5; filaments black-brown; anthers exserted, oblong, ca. 1 mm. Style very short; stigmas 2 or 3. Utricle depressed globose; pericarp whitish, membranous, free from seed. Seed black-brown or black, sublustrous, broadly ovoid, 1.5–2 mm; embryo greenish. Fl. and fr. Jul–Sep.

Sunny slopes, riversides, sandy places. N Xinjiang [N Africa, C and SW Asia, Europe].

This species provides good fodder and is enjoyed by camels and sheep.

**7. *Kochia melanoptera*** Bunge, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 6: 417. 1880.

黑翅地肤 hei chi di fu

Herbs annual, 15–40 cm tall. Stem erect, much branched, obscurely striate, ribbed; branches oblique, pilose. Leaves shortly petiolate; leaf blade bluish green, terete or clavate, 0.4–2 cm × 0.5–0.8 mm, pubescent or becoming glabrous at maturity, base attenuate, apex obtuse or acute. Flowers bisexual, usually 1–3 per glomerule in almost all leaf axils. Perianth greenish, pubescent or occasionally subglabrous; 3 larger appendages spreading, black-brown, purple-red, or brown veined, winglike, lanceolate to narrowly ovate; 2 other appendages usually erect, subulate or tuberculate; sometimes all 5 appendages winglike but then 2 wings small. Stamens 5; filaments slightly exserted; anthers oblong. Style very short; stigmas 2, light yellow. Pericarp thickly membranous. Seed ovoid; perisperm white, farinose. Fl. and fr. Aug–Sep.

Slopes, sandy places, valley terraces, old river bottoms, waste places. W Gansu, Ningxia, N Qinghai, Xinjiang [Kazakhstan, Mongolia].

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