

streams; 3000–4500 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Pakistan].

This is a very variable species, especially in spikelet size and lemma indumentum, but it is not easily divided into infraspecific taxa.

Small-spiculate forms with purple glumes and larger, pallid forms sometimes grow together.

This is an important component of alpine pasture, providing good forage for yaks.

## 120. SCHISMUS P. Beauvois, Ess. Agrostogr. 73. 1812.

齿稃草属 chi fu cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annuals or short-lived perennials, dwarf, densely tufted. Leaf blades linear, flat or involute; ligule a line of hairs. Inflorescence a contracted or spike-like panicle. Spikelets with several florets, laterally compressed, falling entire, or upper florets disarticulating separately and then lower florets, glumes, and pedicel falling tardily together; glumes as long as spikelet or almost so, subequal, membranous with hyaline margins, lanceolate, prominently 5–7-veined, acute to acuminate; lemmas ovate, rounded on back, membranous, 7–9-veined, pilose on back or margins, emarginate to 2-lobed, mucronate or not; palea equaling or subequaling lemma, hyaline. Lodicules 2, ciliate.

Five species: S Africa, C and SW Asia, Mediterranean region; introduced in America and Australia; two species in China.

- 1a. Apical lobes of lowest lemma narrowly triangular, clearly longer than wide; palea reaching slightly beyond base of lemma sinus, never exceeding middle of lobes ..... 1. *S. arabicus*  
 1b. Apical lobes of lowest lemma broadly triangular, not longer than wide; palea reaching at least middle of lobes, often as long as or longer than lemma ..... 2. *S. barbatus*

1. *Schismus arabicus* Nees, Fl. Afr. Austral. III. 422. 1841.

齿稃草 chi fu cao

*Schismus barbatus* (Linnaeus) Thellung subsp. *arabicus* (Nees) Maire & Weiller.

Annual. Culms tufted, 5–15 cm tall. Leaf sheaths glabrous; leaf blades up to 10 cm, glabrous or pilose on adaxial surface; ligule 0.5–1 mm. Inflorescence subspicate, 1–4 cm, 5–10 mm wide. Spikelets 5–7 mm, florets 5–8; glumes about as long as spikelet, lanceolate, acuminate, lower glume 4.5–6.5 mm, 5–7-veined, upper glume 5–7 mm, 3–5-veined; lemmas elliptic-ovate, 2.5–4 mm, 7–9-veined, pilose below middle with pointed hairs, deeply 2-lobed, lobes (of lowest lemma) 1–2 mm, narrowly triangular, clearly longer than wide, apex acuminate, with or without mucro from sinus; palea reaching only slightly beyond base of lemma sinus, never exceeding middle of apical lobes. Anthers 0.2–0.4 mm. Fl. and fr. Mar–Jul.  $2n = 12$ .

Arid open places. Xinjiang, W Xizang [Afghanistan, NW India, Mongolia, Pakistan, Russia (Altai)]; N Africa, C and SW Asia, SE Europe; introduced in America and Australia.

2. *Schismus barbatus* (Linnaeus) Thellung, Bull. Herb. Boissier, sér. 2, 7: 391. 1907.

髯毛齿稃草 ran mao chi fu cao

*Festuca barbata* Linnaeus, Demonstr. Pl. 3. 1753; *F. minuta* Hoffmann; *Schismus marginatus* J. D. Hooker; *S. minutus* (Hoffmann) Roemer & Schultes.

Annual. Culms tufted, 5–25 cm tall. Leaf sheaths loosely pilose toward ligule; leaf blades 1–5 cm, often pilose on adaxial surface near base; ligule ca. 0.5 mm. Inflorescence subspicate, 1–4 cm, 5–10 mm wide. Spikelets 5–6 mm, florets 5–10; glumes slightly shorter than spikelet, lanceolate, acute, lower glume 4–5 mm, 5–7-veined, upper glume 4–6 mm, 5-veined; lemmas broadly ovate, 1.8–2.5 mm, 9-veined, pilose below middle often with minutely clavate hairs, 2-lobed, lobes (of lowest lemma) 0.2–0.4 mm, broadly triangular, not longer than wide, apex acute, with or without mucro from sinus; palea reaching at least middle of apical lobes, often as long as or longer than lemma. Anthers 0.2–0.4 mm.  $2n = 12$ .

Dry open places. Xizang [Afghanistan, NW India, Turkmenistan]; N and S Africa, C and SW Asia, S Europe; introduced in America and Australia.

## 20. Tribe ARISTIDEAE

三芒草族 san mang cao zu

Chen Shouliang (陈守良), Lu Shenglian (卢生莲); Sylvia M. Phillips

Perennials, or occasionally annuals. Leaf blades narrow, often convolute; ligule a line of hairs. Inflorescence a contracted or open panicle. Spikelets all alike, with 1 floret, bisexual without rachilla extension, laterally compressed or terete, disarticulating above glumes; glumes usually longer than floret, persistent, membranous to scarios, 1–5-veined, apex acute to acuminate or mucronate; floret callus pungent to obtuse, bearded; lemma usually terete, cartilaginous becoming indurated at maturity, margins tightly convolute and enclosing the palea, 1–3-veined, veins converging at apex, extending directly into 3 awns, or more often combining into a single 3-branched awn raised upon a twisted column, laterals sometimes reduced or rarely suppressed, awn branches scabrid or all or only the central branch plumose; palea less than 1/2 length of lemma, often obscure, hyaline or membranous. Stamens 3, rarely 1. Caryopsis terete or fusiform, tightly enclosed within toughened lemma, embryo 1/3 its length; hilum linear. Leaf anatomy: either Kranz PS (*Stipagrostis*) or a form of Kranz unique to *Aristida*; microhairs absent or 1-celled, rarely 2-celled.  $x = 11, 12$ .

Three genera and ca. 350 species: tropical and subtropical regions of the world; two genera and 12 species (six endemic) in China.

This tribe is usually instantly recognizable on account of the 3-branched awn. *Stipagrostis* has sometimes been included in *Aristida*, but besides the obvious awn difference, separation of the two genera is supported by differences in leaf anatomy. In *Stipagrostis* the cells of the outer bundle sheath are larger than the inner, and only the inner contain chloroplasts, whereas in *Aristida* the cells of the outer bundle sheath are smaller, and both sheaths contain chloroplasts. There is also usually a difference in chromosome number:  $2n = 22$  in *Aristida* and  $2n = 44$  in *Stipagrostis*.

Species of *Aristideae* are mainly found on the poor, stony soils of dry plains and deserts.

- 1a. Branches of the awn scabrid ..... 121. *Aristida*  
 1b. Branches of the awn (or at least the central branch) plumose ..... 122. *Stipagrostis*

## 121. ARISTIDA Linnaeus, Sp. Pl. 1: 82. 1753.

三芒草属 san mang cao shu

Lu Shenglian (卢生莲), Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials, less often annuals or suffruticose. Culms tufted. Leaf blades usually basal, rolled or rarely flat. Inflorescence a narrow or open panicle. Spikelets with 1 floret; glumes scarious, narrow, unequal with the upper usually longer, 1(-3)-veined; floret callus bearded, obtuse to pungent or 2-toothed; lemma narrowly cylindrical or laterally compressed, convolute, glabrous or sparsely hairy; awn 3-branched, branches arising directly from lemma apex or seated on a straight or twisted column, persistent or disarticulating either at base or apex of column (always persistent in China), scabrid. Stamens 3.

About 300 species: widely distributed in tropical and warm-temperate regions of the world; ten species (six endemic) in China.

This genus is found on poor, dry soils in areas of low rainfall, but does not usually penetrate into true desert.

- 1a. Annuals; culms usually branched.  
 2a. Lemma 1.7–2 mm; central awn 0.5–0.8 cm ..... 1. *A. cumingiana*  
 2b. Lemma 5–11 mm; central awn 1–2.5 cm.  
 3a. Glumes subequal or lower glume slightly shorter; lemma distinctly longer than upper glume ..... 2. *A. adscensionis*  
 3b. Glumes unequal, lower glume 1/2–2/3 length of upper glume; lemma  $\pm$  equal to upper glume ..... 3. *A. depressa*  
 1b. Perennials; culms usually unbranched.  
 4a. Lower glume longer than upper glume; panicle open, branches divaricate, bearded in axils ..... 4. *A. chinensis*  
 4b. Lower glume shorter than upper glume or glumes subequal; panicle narrow, branches erect or ascending, glabrous in axils.  
 5a. Column of awn 1–3 mm, twisted; lateral awns 5–10 mm.  
 6a. Leaf sheaths and blades glabrous; glumes and lemma smooth (rarely scabrid); anthers 3.5–4 mm ..... 5. *A. tsangpoensis*  
 6b. Leaf sheaths and blades with silky hairs; glumes and lemma scabrid or lemma with long soft hairs; anthers 4–4.5 mm ..... 6. *A. scabrescens*  
 5b. Column of awn absent or very short and straight; lateral awns reduced, 0.1–3 mm, or up to 6 mm.  
 7a. Lateral awns 0.1–0.4 mm ..... 7. *A. brevissima*  
 7b. Lateral awns 1.1–6 mm.  
 8a. Glumes 7–10 mm, lemma 6.5–8 mm, central awn 4–8 mm.  
 9a. Lateral awns 1.1–3 mm; apex of glumes acute, upper mucronate; leaf sheaths smooth ..... 8. *A. trisetata*  
 9b. Lateral awns 5–6 mm; apex of glumes obtuse or emarginate; leaf sheaths scaberulous ..... 9. *A. batangensis*  
 8b. Glumes 12–13 mm; lemma ca. 9 mm, central awn 8–9 mm ..... 10. *A. alpina*

**1. *Aristida cumingiana*** Trinius & Ruprecht, Sp. Gram. Stipac. 141. 1842.

黄草毛 huang cao mao

Delicate annual. Culms solitary or tufted, capillary, erect or geniculate at base, 6–20 cm tall, branched. Leaf sheaths smooth, loose, shorter than internodes; leaf blades narrow, involute, 2.5–10 cm, abaxial surface glabrous, adaxial surface hairy, smooth; ligule ca. 0.2 mm. Panicle oblong to ovate in outline, loose, open, 5–10 cm; branches capillary, ascending, inserted 2–3 together along main axis. Spikelets green or purple; glumes unequal, 1-veined, scabrid on vein, apex acuminate-mucronate, lower glume lanceolate, 2–2.5 mm, upper

glume narrowly lanceolate-oblong, 2.8–3.5 mm; callus small, broadly obtuse; lemma 1.7–2 mm, upper part scabrid; awn arising directly from lemma apex, stiffly spreading, central branch 5–8 mm, laterals about half as long. Anthers 0.5–0.6 mm. Fl. and fr. summer and autumn.

Hill slopes, dry grasslands; 200–800 m. Fujian, Guangdong, Hunan, Jiangsu, Yunnan, Zhejiang [India, Indonesia (Celebes), Laos, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; Africa, N Australia].

This is much the smallest species in China, easily recognized by its delicate habit and very small, often purplish spikelets. It is one of the most widespread species in the genus.

**2. *Aristida adscensionis*** Linnaeus, Sp. Pl. 1: 82. 1753.

三芒草 san mang cao

*Aristida adscensionis* var. *vulpioides* (Hance) Hackel ex Henrad; *A. heymanii* Regel; *A. vulgaris* Trinius & Ruprecht; *A. vulpioides* Hance; *Chaetaria adscensionis* (Linnaeus) P. Beauvois.

Annual. Culms tufted, erect or geniculate at base, 15–55 cm tall, branched. Leaf sheaths smooth, glabrous, shorter than internodes, laxly overlapping; leaf blades involute, 3–20 cm, finely pointed; ligule ca. 0.5 mm. Panicle usually narrow, loosely contracted, 4–20 cm; branches short, ascending, inserted singly on main axis. Spikelets gray-green or purplish green; glumes subequal or unequal with upper longer, 1-veined, scabrid on vein, lower glume lanceolate-oblong, 4–6.8 mm, acute, upper glume linear, 5–8 mm, obtuse to emarginate or apiculate; callus ca. 0.5 mm, narrowly obtuse; lemma linear, distinctly longer than upper glume, 7–11 mm, laterally compressed, smooth or rarely scabrid in upper half, keel scabrid upward; awn branches arising directly from lemma apex, central branch 1–2.5 cm, laterals slightly shorter. Anthers 1.8–2 mm. Fl. and fr. Jun–Oct.

Dry mountain slopes, rocky fissures, and along river banks; 200–1800 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [tropical and warm-temperate regions of the world].

*Aristida adscensionis* is a widely distributed, variable, annual pioneer of dry, open places, recognized by its long, parallel-sided, flattened lemma often exerted from the glumes. It is used for forage.

**3. *Aristida depressa*** Retzius, Observ. Bot. 4: 22. 1786.

仪英三芒草 yi ying san mang cao

*Aristida vulgaris* var. *depressa* (Retzius) Trinius & Ruprecht; *Chaetaria depressa* (Retzius) P. Beauvois.

Annual. Culms slender, erect or geniculate at base, 30–50 cm tall, branched. Leaf sheaths glabrous, shorter than internodes, loose; leaf blades involute, 4–15 cm, abaxial surface smooth, adaxial surface pubescent, apex finely pointed; ligule ca. 0.5 mm. Panicle lax and open or loosely contracted, 7–18 cm; branches filiform, 2–5 cm, ascending or slightly flexuously spreading, inserted singly or in small groups along main axis. Spikelets greenish or stramineous; glumes clearly unequal with upper longer, narrowly lanceolate, 1-veined, lower glume 4–4.7 mm, scabrid on vein and back, acuminate, upper glume 7–8 mm, smooth, emarginate to acute; callus 0.3–0.5 mm, obtuse; lemma linear, about as long as upper glume, 6.5–8 mm, laterally compressed, smooth or punctately scabrid, keel spinulose; awn arising directly from lemma apex, branches subequal, central branch 1.2–1.5 cm, laterals ca. 1 cm. Anthers 1.5–2 mm. Fl. Jul–Sep.

Grassy mountain slopes, river banks and roadsides; 700–1600 m. Sichuan, Yunnan [India, Myanmar, Sri Lanka, Thailand].

This is a variant from the *Aristida adscensionis* gene pool, in which species it is often included.

**4. *Aristida chinensis*** Munro, Proc. Amer. Acad. Arts 4: 363. 1860.

华三芒草 hua san mang cao

*Aristida formosana* Honda.

Perennial. Culms densely tufted, erect, wiry, 30–60 cm tall, unbranched. Leaf sheaths smooth, longer than internodes, bearded at mouth; leaf blades involute, filiform, curling when dry, 10–20 cm, abaxial surface smooth, adaxial surface pubescent; ligule ca. 0.2 mm. Panicle ovate in outline, open, 1/2 length of plant or more, 20–30 cm; branches 3–15 cm, divaricate, solitary or in small widely spaced groups along central axis, bearded in axils, strongly scabrid, lower part naked, spikelets clustered distally. Spikelets gray-green or purple; glumes unequal with lower longer, linear-lanceolate, 1–3-veined, acuminate-mucronate, lower glume 8–14 mm, scabrid on vein, upper glume 1/2–2/3 length of lower, smooth; callus ca. 0.5 mm; lemma 5–8 mm, terete, smooth; awn branches arising directly from lemma apex, central branch 1–1.5 cm, laterals slightly shorter or subequal to central branch. Anthers 1–2 mm. Fl. and fr. Apr–Dec.

Grassy hill slopes. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Cambodia, Indonesia (Celebes), Philippines, Thailand, Vietnam].

This is a species of local distribution, easily distinguished by its large, open, scabrid panicle and spikelets with inverted glumes (lower glume longer).

**5. *Aristida tsangpoensis*** L. Liu, Fl. Xizang. 5: 82. 1987.

藏布三芒草 zang bu san mang cao

Perennial forming tough tussocks; roots sometimes coated in sand. Culms erect or slightly geniculate, 15–40 cm tall, unbranched. Leaf sheaths glabrous, rarely collar with short hairs or sometimes silky hairs at mouth; leaf blades flat or involute, 5–10 cm, abaxial surface smooth, adaxial surface scabrid. Panicle narrow, 5–11 cm; branches 1.5–4 cm, paired, appressed to axis; pedicels often villous below spikelet. Spikelets yellowish green or gray-purple; glumes slightly unequal with upper longer, 1-veined, lower glume narrowly lanceolate-oblong, (7–)9–11 mm, scabrid on vein, subacute, mucronate, upper glume linear-oblong, (9–)11–12 mm, smooth on vein, acute, mucronate; callus ca. 0.5 mm, obtuse; lemma 6–9 mm, streaked gray-purple, smooth or punctately scabrid; awn with 1–2 mm slightly twisted column, central branch 1–1.4 cm, laterals 7–9.7 mm. Anthers 3.5–4 mm. Fl. and fr. Jul–Sep.

• Mountain slope forests, under montane scrub, sandy riversides; 3000–3900 m. Xizang, Yunnan.

**6. *Aristida scabrescens*** L. Liu, Fl. Xizang. 5: 84. 1987.

糙三芒草 cao san mang cao

Perennial. Culms densely tufted, erect, 15–60 cm tall, unbranched. Leaf sheaths usually shorter than internodes, sparsely silky hairy along margins, sheath-collar ciliate, villous at mouth; leaf blades gray-green, involute, 5–20 cm, abaxial surface smooth, adaxial surface densely pilose with short hairs. Panicle narrowly contracted or lax, 4–16 cm; branches 1–7 cm, capillary, paired, appressed to axis or loosely ascending. Spikelets yellowish green to purplish green; glumes subequal with upper slightly longer, lanceolate, scabrid, apiculate, lower glume 10–

12 mm, upper glume 12–14 mm; callus obtuse; lemma 8–9 mm, punctately scabrid, also with some long soft hairs; awn with 2–3 mm twisted column, central branch ca. 1.5 cm, laterals ca. 1.2 cm. Anthers 4–4.5 mm. Fl. and fr. Jul–Sep.

• Grassy places on mountain slopes, river banks; 3100–4100 m. Xizang.

**7. *Aristida brevissima*** L. Liu, Fl. Xizang. 5: 80. 1987.

短三芒草 duan san mang cao

Perennial forming small tough tussocks. Culms erect, 15–30 cm tall, unbranched. Leaves mainly basal; leaf sheaths glabrous except for ca. 2 mm hairs at mouth, shorter than internodes, tightly overlapping; leaf blades involute, needle-like, 4–8 cm, abaxial surface smooth, adaxial surface scabrid. Panicle narrow, 7–13 cm; branches short, few-spiculate, paired. Spikelets yellowish green; glumes equal or upper slightly longer, 10–11 mm, narrowly lanceolate, smooth, glabrous, 1-veined; callus ca. 0.6 mm, obtuse; lemma 8–9 mm, streaked blackish, punctately scabrid, awns arising directly from lemma apex, very reduced; central awn ca. 2 mm, lateral awns vestigial, 0.1–0.4 mm. Anthers 3–4 mm. Fl. Aug.

• Mountain slopes; 3000–3100 m. Xizang, Yunnan.

**8. *Aristida trisetata*** Keng, Sunyatsenia 6: 102. 1941.

三刺草 san ci cao

Perennial forming small tough tussocks, base clothed in old leaf sheaths. Culms erect, 10–40 cm tall, unbranched. Leaves mainly basal; leaf sheaths glabrous, shorter than internodes, laxly overlapping in clusters; leaf blades usually involute, curved, 3.5–15 cm, acute; ligule ca. 2 mm. Panicle linear, 3.5–9 cm; branches short, stiff, few-spiculate, inserted singly, appressed to main axis. Spikelets purple or brown; glumes subequal or slightly unequal with upper longer, 7–10 mm, 1-veined, scabrid on vein, lower glume narrowly lanceolate, subacute, upper glume linear-oblong, acute and mucronate; callus 0.5–0.8 mm, obtuse; lemma 6.5–8 mm, streaked purple-brown, smooth or upper part scabrid, narrowly tapering into apex; awns arising directly from lemma apex; central awn 4–8 mm, lateral awns much reduced, 1.1–3 mm. Anthers 3–4 mm. Fl. and fr. Jul–Sep.

• Forests, under montane scrub, grasslands on steep dry mountainsides; 2400–4700 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

**9. *Aristida batangensis*** Z. X. Tang & H. X. Liu, J. Sichuan Univ., Nat. Sci. Ed. 29: 423. 1992.

巴塘三芒草 ba tang san mang cao

Perennial forming tough tussocks, old sheaths persistent. Culms erect or base geniculate, 50–70 cm tall, unbranched. Leaf sheaths scaberulous, lower purplish; leaf blades involute, often curved, tough, 3–15 cm, adaxial surface hispidulous; ligule 1–1.5 mm. Panicle linear, sparsely branched; branches short, appressed to main axis. Spikelets hoary green; glumes slightly unequal with upper longer, narrowly lanceolate, lower glume ca. 7 mm, upper glume 8.5–9 mm, 1-veined, smooth, obtuse or emarginate; callus ca. 0.5 mm, obtuse, bearded with 0.2–0.8 mm hairs; lemma cylindrical, awns arising directly from lemma apex; central awn 7–8 mm, lateral awns 5–6 mm. Anthers ca. 3 mm.

• Habitat unknown; 2600–2700 m. W Sichuan (Batang).

**10. *Aristida alpina*** L. Liu, Fl. Xizang. 5: 82. 1987.

高原三芒草 gao yuan san mang cao

Perennial forming small tough tussocks. Culms erect, 15–25 cm tall, unbranched, upper part dark-gray, terminal node usually included in uppermost leaf sheath. Leaf sheaths glabrous, pilose at mouth (hairs ca. 2 mm), tightly overlapping; leaf blades gray-green, involute or rarely flat, 4–18 cm, abaxial surface smooth, adaxial surface scabrid. Panicle narrow, 4–10 cm; branches 2–5 cm, appressed to main axis. Spikelets dark-purple or brown; glumes subequal with upper slightly longer, 1.2–1.3 cm, lanceolate, 1-veined, scabrid on upper part and vein, apiculate; callus ca. 0.5 mm, bearded with ca. 0.8 mm hairs, obtuse; lemma ca. 9 mm, dark purple, scabrid in upper part, awns arising directly from lemma apex; central awn 8–9 mm, lateral awns 4–6 mm. Anthers ca. 3 mm. Fl. and fr. summer and autumn.

• Dry mountain slopes; ca. 4500 m. Xizang.

This species is very similar to *Aristida trisetata*, but with somewhat larger spikelet parts.

**122. STIPAGROSTIS** Nees, Linnaea 7: 290. 1832.

针禾属 zhen he shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Aristida* sect. *Stipagrostis* (Nees) Bentham & J. D. Hooker.

Perennial, sometimes suffrutescent, or rarely annual. Culms tufted. Leaf blades mostly rolled, tough, sometimes deciduous from the sheaths. Inflorescence a narrow or open panicle. Spikelets with 1 floret; glumes scarious, unequal or subequal, 1–11-veined; floret callus laterally bearded, pungent; lemma narrowly cylindrical, indurated, glabrous or sparsely hairy; awn 3-branched, articulated at the lemma apex, a twisted column present or not, at least the central awn branch plumose, lateral branches shorter, often capillary. Stamens 3.

About 50 species: Africa to C Asia; two species in China.

This is a genus of grasses adapted to true desert conditions.

- 1a. Spikelets 1.3–1.7 cm; glumes subequal, lower slightly longer; lemma 5–7 mm, apex truncate, ciliolate ..... 1. *S. pennata*  
 1b. Spikelets 2.5–3 cm; glumes unequal, lower clearly longer; lemma 8–9 mm, apex slightly 2-lobed, glabrous .... 2. *S. grandiglumis*

**1. *Stipagrostis pennata*** (Trinius) De Winter, *Kirkia* 3: 135. 1963.

羽毛针禾 *yu mao zhen he*

*Aristida pennata* Trinius, *Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad.* 6: 488. 1815; *Aristida pungens* var. *pennata* (Trinius) Trautvetter; *Arthratherum pennatum* (Trinius) Tzvelev.

Perennial with slender rhizomes, roots tomentose. Culms tussocky, 20–60 cm tall, much branched at base. Leaf sheaths smooth or scabrid, longer than internodes; leaf blades involute, 10–30 cm, glaucous, abaxial surface scabrid, adaxial surface puberulent; ligule short, margin with 0.5–1 mm hairs. Panicle lax, open, base usually included in uppermost leaf sheath, 5–20 cm; branches paired, rarely solitary. Spikelets 1.3–1.7 cm, stramineous; glumes narrowly lanceolate, smooth or scabrid, pubescent within, subequal, lower slightly longer than upper, lower glume 3–5-veined, upper glume 3-veined, apex acuminate; callus ca. 1 mm; lemma 5–7 mm, smooth on back, apex truncate, ciliolate; awn with short 0.3–1 mm column, all 3 branches densely plumose throughout, hairs 2–4 mm, central branch 1–1.5 cm, lateral branches a little shorter. Fl. and fr. Jul–Sep.

Fixed dunes; 300–500 m. Xinjiang, Yunnan [Afghanistan, Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran)].

This species provides good fodder when young and is also good for binding sand.

**2. *Stipagrostis grandiglumis*** (Roshevitz) Tzvelev, *Zlaki SSSR*, 618. 1976.

大颖针禾 *da ying zhen he*

*Aristida grandiglumis* Roshevitz, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR* 11: 18. 1949.

Perennial, roots tomentose. Culms densely tufted, 30–65 cm tall, branched at base. Leaf sheaths smooth or scabrid, longer than internodes; leaf blades involute, 10–35 cm, abaxial surface smooth, adaxial surface pubescent; ligule short, ciliate. Panicle lax with few spikelets, 15–30 cm; branches capillary, solitary, 3–10 cm. Spikelets 2.5–3 cm, stramineous or yellowish white; glumes narrowly lanceolate, smooth or scabrid, densely pubescent within upward, unequal, lower glume 2.5–3 cm, 5–7-veined, marginal veins obscure, upper glume 2–2.3 cm, 3-veined, apex acuminate; callus 1–1.5 mm; lemma 8–9 mm, apex slightly 2-lobed, glabrous; awn with short ca. 1 mm column, all 3 branches densely plumose throughout, hairs 4–5 mm, central branch ca. 2.5 cm, lateral branches 2–2.2 cm. Fl. and fr. Jun–Sep.

Desert sands, banks of watercourses; 1100–1500 m. Gansu (Dunhuang), S Xinjiang [Mongolia].

## 21. Tribe PAPPOPHOREAE

冠芒草族 *guan mang cao zu*

Chen Shouliang (陈守良); Sylvia M. Phillips

Annual or perennial. Leaf blades linear, often convolute; ligule a line of hairs. Inflorescence a contracted, rather narrow panicle. Spikelets all alike, slightly laterally compressed, with (1 or) 2 to several florets, lower florets bisexual, the upper progressively reduced, disarticulating above glumes but not usually between florets; glumes persistent, membranous, usually enclosing the florets, obviously 1- to many-veined, entire; lemmas broad, rounded on back, 9–11-veined, veins extended into 5–19 awns, sometimes alternating with hyaline lobes; palea broad, subequaling lemma body, keels ciliate. Caryopsis with large embryo and punctiform hilum. Leaf anatomy: Kranz PS type; microhairs slender, bulbous-tipped.  $x = 9$  or 10.

Five genera and 41 species: tropics and subtropics extending to temperate E Asia, usually in dry places; one genus and two species in China.

*Pappophoreae* can be easily recognized by the many-veined, many-awned lemmas on a tough rachilla, with the florets all falling together from the glumes. Anatomically it is related to *Eragrostideae*, but its stalked microhairs, with bulbous glandular tips, are unique.

### 123. *ENNEAPOGON* Desvaux ex P. Beauvois, *Ess. Agrostogr.* 81. 1812.

九顶草属 *jiu ding cao shu*

Perennial or sometimes annual. Culms tufted. Leaf blades usually narrow, often convolute. Panicle contracted, sometimes spikelike or capitate. Spikelets with 2–3(–6) florets, lowermost floret bisexual, second floret smaller, usually staminate, remaining florets reduced to barren lemmas forming a brushlike apical clump; glumes lanceolate, unequal with the upper longer, 1- to several-veined; lemmas papery to leathery, smooth or ribbed, villous below middle, veins extended into 7–9 awns forming a circlet around top of lemma; awns stout and ciliate for much of their length, slender and scaberulous toward tips.

Twenty-eight species: tropics and subtropics, especially Africa and Australia, extending to temperate E Asia; two species in China.

1a. Third lemma vestigial, 0.5–3 mm including awns; basal sheaths enclosing cleistogamous spikelets ..... 1. *E. desvauxii*  
1b. Third lemma sterile but well developed, 4–10 mm including awns; basal sheaths lacking cleistogamous spikelets .. 2. *E. persicus*

**1. *Enneapogon desvauxii*** P. Beauvois, *Ess. Agrostogr.* 82. 1812.

九顶草 *jiu ding cao*

*Enneapogon borealis* (Grisebach) Honda; *E. brachysta-*

*chyus* (Jaubert & Spach) Stapf; *E. desvauxii* subsp. *borealis* (Grisebach) Tzvelev; *E. jinjiangensis* B. S. Sun & S. Wang; *Pappophorum boreale* Grisebach; *P. brachystachyum* Jaubert & Spach.

Perennial. Culms densely tufted, wiry, usually geniculate