Annuals or short-lived perennials, dwarf, densely tufted. Leaf blades linear, flat or involute; ligule a line of hairs. Inflorescence a contracted or spikelike 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, margined 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 or longer than lemma ........................................................................................................................... 2. *S. barbatus*


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.


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].
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 Linneaus, 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 suffrutescent. 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 as 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. triseta*
               9b. Lateral awns 5–6 mm; apex of glumes obtuse or emarginate; leaf sheaths scabrous .... 9. *A. batangensis*
            8b. Glumes 12–13 mm; lemma ca. 9 mm, central awn 8–9 mm .............................................................. 10. *A. alpina*


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.

三芒草 san mang cao

*Aristida adscensionis* var. *vulpioides* (Hance) Hackel ex Henrard; *A. heymannii* Regel; *A. vulgaris* Trinu & Ruprecht; *A. vulpioides* Hance; *Chaetaria adscensionis* (Linneaus) 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 exserted from the glumes. It is used for forage.


仪英三芒草 yi ying san mang cao

*Aristida vulgaris* var. *depressa* (Retzius) Trinu & 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, 1-veined, lower glume 1/2–2/3 length of lower, smooth; callus ca. 0.5 mm, narrowly obtuse; lemma 5–8 mm, terete, smooth on vein, acute, mucronate; callus ca. 0.5 mm, narrowly obtuse; lemma 6–9 mm, streaked gray-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 1.2–1.5 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).


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 collared 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.


糙三芒草 cao san mang cao

Perennial. Culms densely tufted, erect, 15–60 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 1.2–1.5 mm. Fl. and fr. Apr–Dec.
12. STIPAGROSTIS Nees, Linnaea 7: 290. 1832.

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

2. S. pennata

POACEAE


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 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.


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.

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

7. Aristida brevissima

山三芒草  san si san mang cao

Perennial forming small tough tussocks. Culms erect or base geniculate, 50–70 cm tall, unbranched. Leaf sheaths scabrid, pilose at mouth (hairs ca. 2 mm), tightly overlapping; leaf blades yellowish 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 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 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.

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


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).

This species is very similar to Aristida triseta, but with somewhat larger spikelet parts.
21. Tribe PAPPOPHOREAE

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 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.

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 spike-like 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 circle 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. brachystachyus (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