Parapholis and a few other genera of mostly annual grasses adapted to saline conditions are sometimes placed in the tribe Haiwandae. They are distinguished from typical Poeae by the distinctive rat-tail inflorescence and glumes placed side-by-side. However, they are clearly related to other less specialized annual members of Poeae, and recent molecular evidence places them within this tribe.

12. Tribe AVENEAE

燕麦族 yan mai zu

Wu Zhenlan (吴珍兰), Lu Shenglian (卢生莲), Chen Shouliang (陈守良), Chen Wenli (陈文利); Sylvia M. Phillips

Annual or perennial. Leaf blades linear to setaceous; ligule membranous. Inflorescence an open, contracted, or spikelike panicle. Spikelets all alike, somewhat laterally compressed, with 1 to several fertile florets; rachilla usually disarticulating below each floret, occasionally strictly 3 florets with lower 2 stamine or barren and of different appearance from upper fertile floret, then disarticulating above glumes and florets falling together; glumes persistent, often equal to spikelet or at least longer than first floret, commonly membranous with broad, shining, hyaline margins; rachilla usually geniculate; lemma hyaline to leathery, 3- to several-veined (Coleanthus 1-veined), apex entire or denticulate, awned from back, rarely awnless; awn usually geniculate with twisted column; palea hyaline, subequaling or much shorter than lemma. Lodicles 2, rarely absent. Stamens (2 or)3, rarely 1 (Cinna). Caryopsis mostly ellipsoid; hilum round or oval, endosperm sometimes soft or liquid. Starch-grains compound. Chromosomes large; basic number 7 (5 in Anthoxanthum). Leaf anatomy: non-Kranz, microhairs absent, silica-bodies oblong.

About 60 genera: temperate and cold regions of the world, extending to mountains in the tropics; 20 genera, one hybrid genus, and 144 species (40 endemic, 11 or 12 introduced) in China.

Recent molecular studies show the tribes Poeae and Avenae to be closely related and to some extent interleaved, with certain genera traditionally placed in one tribe ordered at a molecular level within the other. On this account the tribes are sometimes united into a broadly defined Poeae. However, most genera can be easily assigned to one or other tribe on morphological characteristics, and therefore the traditional treatment is maintained here.

1a. Spikelets with 2 or more fertile florets.
2a. Ovary hairy; spikelets large, 7–45 mm.
3a. Perennial; glumes unequal, 1–7-veined ................................................................. 75. Helictotrichon
3b. Annual; glumes subequal, 7–11-veined ........................................................................ 77. Avena
2b. Ovary glabrous or almost so; spikelets small, 2.5–10 mm.
4a. Lemmas keeled.
5a. Lemmas awned from back ................................................................. 78. Trisetum
5b. Lemmas awnless or with a subapical awn-point ........................................ 79. Koeleria
4b. Lemmas rounded on back.
6a. Annual; florets arising at about same level; rachilla extension absent ................................................................. 82. Aira
6b. Perennial; florets separated by an internode; rachilla extension present.
7a. Panicle glistening; lemma apex erose ................................................................. 80. Deschampsia
7b. Panicle not glistening; lemma apex 4-toothed ........................................ 87. Deyeuxia
1b. Spikelets with 1 fertile floret.
8a. Inflorescence of several racemes along a central axis ........................................ 92. Beckmannia
8b. Inflorescence a panicule, sometimes spikelike.
9a. Fertile floret accompanied by staminate or sterile florets.
10a. Spikelets with 2 florets.
11a. Spikelet disarticulating above glumes; lower floret stamine ........................................ 76. Arrhenatherum
11b. Spikelet disarticulating below glumes; upper floret stamine ................................. 81. Holcus
10b. Spikelets with 3 florets, the 2 lower staminate or barren (reduced to small scales in Phalaris).
12a. Lower lemmas rudimentary; plants without coumarin ........................................ 83. Phalaris
12b. Lower lemmas well developed; plants scented with coumarin ............................. 84. Anthoxanthum
9b. Fertile floret solitary, with or without a rachilla extension.
13a. Spikelets in compact umbellate clusters; glumes absent ...................................... 85. Coleanthus
13b. Spikelets in an open, contracted or spikelike panicle; glumes present.
14a. Spikelets falling entire.
15a. Spikelets shed with a basal stipe ................................................................. 89. Polypogon
15b. Spikelets shed without a basal stipe.
16a. Panicle open.
17a. Glumes indistinctly 3-veined; lemma with awnlet; stamen 1 ................................. 90. Cinna
17b. Glumes prominently 3-veined; lemma awnless; stamens 3 .............................. 91. Cyathopus
16b. Panicle spikelike or capitulate; stamens usually 3.
18a. Lemma awned from back ................................................................. 93. Alopecurus
18b. Lemma awnless ................................................................. 94. *Phleum*

14b. Spikelets disarticulating above glumes.

19a. Glumes slightly shorter than floret ........................................ 87. *Deyeuxia*

19b. Glumes equaling or longer than floret.

20a. Glumes mucronate ............................................................. 86a. *Agropogon*

20b. Glumes acute to acuminate.

21a. Spikelets usually less than 5 mm; callus glabrous or shortly hairy; lemma hyaline ................................................................. 86. *Agrostis*

21b. Spikelets often more than 5 mm; callus bearded, hairs 1/3 as long as to longer than floret (if shorter, penicillate rachilla extension present); lemma membranous to firm.

22a. Lemma at least 3/4 as long as glumes, usually firm; callus hairs almost as long as to clearly shorter than floret; rachilla extension present, penicillate ................................................. 87. *Deyeuxia*

22b. Lemma 1/2–2/3 as long as glumes, membranous; callus hairs often much exceeding floret; rachilla extension absent, or if present glabrous or shortly hairy ............................................. 88. *Calamagrostis*

### 75. HELICTOTRICHON


异燕麦属 *yi yan mai shu*

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

*Avenastrum* Opiz; *Avenula* (Dumortier) Dumortier; *Trisetum* sect. *Avenula* Dumortier.

Perennials, tussocky, often rhizomatous. Leaf blades linear to setaceous, flat, folded or rolled; ligule membranous. Inflorescence a panicle, open or often contracted, sometimes without secondary branching. Spikelets with 2 to several fertile florets and 1 or 2 reduced sterile florets above; rachilla pilose, disarticulating below each floret; glumes lanceolate, slightly unequal, usually shorter than spikelet and often shorter than lemmas, hyaline to membranous, lower glume 1–3-veined, upper glume 3–5-veined, keel scaberulous, apex acute; floret callus shortly bearded; lemmas lanceolate, firmly membranous to leathery, rounded or weakly keeled, 5–7(–9)-veined, glabrous, awned from middle of back or slightly above, apex minutely to deeply 2–4-toothed; palea slightly shorter than lemma and enclosed within lemma margins, keels scabrid-ciliolate to ciliate. Ovary densely hairy toward apex. Caryopsis with linear hilum; endosperm sometimes liquid.

About 100 species: Europe eastward to Japan, North America, also on tropical mountains; 14 species (seven endemic) in China.

Most species provide good forage.

1a. Palea keels smooth, glabrous, back deeply sulcate; hairs at apex of each rachilla internode 4–6 mm .................. 1. *H. pubescens*

1b. Palea keels scabrid to ciliate, back flat at maturity; hairs at apex of each rachilla internode 1–3 mm.

2a. Leaf blades flat or folded, keeled, margins and abaxial midrib prominently white-thickened, adaxial surface not ribbed; leaf sheath margins connate for part of length; floret callus bearded on sides only.

3a. Rhizomes present, plant forming loose turf; leaf sheaths closed for more than 1/2 of length; leaf blades 5–12 mm wide; spikelets 2–2.5 cm ................................................................. 2. *H. dahuricum*

3b. Rhizomes absent, plant forming dense turf; leaf sheaths closed for less than 1/4 of length; leaf blades 2–5 mm wide; spikelets 1–1.8 cm ................................................................. 3. *H. hookeri*

2b. Leaf blades flat or rolled, margins and midrib not thickened, adaxial surface closely ribbed with deep grooves between; leaf sheath margins free to base; floret callus evenly bearded.

4a. Panicle open, sometimes nodding; branches ascending or spreading, up to 10 cm.

5a. Lemma apex subentire or minutely denticulate.

6a. Culms 20–45 cm; ligules to 0.5 mm; rachilla internodes hairy throughout length .................. 4. *H. abietetorum*

6b. Culms up to 80 cm tall; ligules ca. 1 mm; rachilla internodes hairy only in upper part .......... 5. *H. leianthum*

5b. Lemma apex 2-toothed.

7a. Panicle branches in whorls of up to 8, with branchlets almost to base; lower culm internodes and sheaths villous ................................................................. 6. *H. yunnanense*

7b. Panicle branches 2–4 per node (up to 6 in *H. altius*), bare in lower part; lower culm internodes glabrous (sheaths sometimes pilose).

8a. Nodes of culm pubescent .......................................................... 7. *H. altius*

8b. Nodes of culm glabrous.
Avena pubescens Hudson, Fl. Angl. 42. 1762; Avenastrum pubescens (Hudson) Opiz; Avenula pubescens (Hudson) Dumortier.

Perennial, shortly rhizomatous. Culms solitary or few, erect, 30–120 cm tall, 3–4-noded. Leaf sheaths of lower leaves pubescent, upper and infrequently also lower glabrous, closed to above middle; leaf blades linear-lanceolate, flat, 10–30 cm, 4–10 mm wide, usually pubescent on both surfaces, abaxial surface with thin midrib, margins only slightly thickened, apex subacute; ligule lanceolate, 3–6 mm. Panicle lax, oblong in outline, 8–15 cm or more; branches 4–6 per node, up to 5 cm, fine, scaberulous. Spikelets 1.2–1.7 cm, pale green or variegated purple, florets 2–4; rachilla hairs 4–6 mm; glumes hyaline, lower glume 10–11 mm, 1–3-veined, upper glume 13–17 mm, 3-veined; lemmas firmly herbaceous, hyaline above awn insertion, lowest 9–11 mm, scabrid, apex irregularly 2-denticulate; awn 1.5–2 cm, geniculate, column twisted, terete; palea subequal to lemma, keels close together, smooth, glabrous, hyaline between keels. Anthers 5–7 mm. Fl. and fr. Jul–Sep.

Grassy mountain slopes, forest margins, among shrubs; 1000–2600 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia (Caucasus, Turkey), Europe; introduced in North America].

This is a widespread, polymorphic species, varying especially in the degree of hairiness of the leaves and the width of the blades. The Chinese population probably corresponds to a broad-leaved, rather sparsely hairy form found in neighboring parts of Russia and C Asia, Helictotrichon pubescens var. latifolium (Printz) Tzvelev. No specimens from China have been seen. The typical variety has hairy leaves usually up to 5 mm wide.

Helictotrichon pubescens is distinguished from all other species in the genus by its palea with close, smooth keels. Molecular studies place it close to the group of species including H. dahuricum (see the comment under that species). However, it differs morphologically from those species in several characters besides the palea, including unthickened leaf blade margins, an evenly bearded (vs. laterally bearded) calyx, and a hilum as long as or longer than the caryopsis (vs. half as long).

9a. Leaf blades 10–25 cm, 3–5 mm wide; spikelets 1–1.4 cm ........................................ 8. H. junghuhnii
9b. Leaf blades 6–11 cm, ca. 2 mm wide; spikelets 0.8–1 cm ........................................ 9. H. delavayi

4b. Panicle laxly to densely contracted; branches erect or narrowly ascending, usually less than 4 cm.
10a. Panicle 10–17 cm; lemmas densely scabrid; awn arising from upper 1/3 of lemma, recurved, scarcely twisted ................................................................. 10. H. schmidii
10b. Panicle 2–9(–14) cm; lemmas smooth, scaberulous or puberulous; awn arising near middle of lemma, geniculate with twisted column.

11a. Spikelets reddish violet; anthers 1–1.6 mm .................................................................. 11. H. potaninii
11b. Spikelets brown or tinged violet; anthers 3–4.2 mm.

12a. Panicle densely contracted; axis and branches densely pubescent; culm pubescent below panicle; spikelets golden brown ...................................................... 12. H. tibeticum
12b. Panicle laxly contracted; axis and branches scabrid or puberulent only in upper part; culm glabrous below panicle; spikelets pale yellowish brown tinged violet.

13a. Plant densely tufted; sheaths of culm leaves usually pilose; leaf blades scabrid on adaxial surface; anthers ca. 3 mm ...................................................... 13. H. tianschanicum
13b. Plant loosely tufted; sheaths of culm leaves usually glabrous; leaf blades densely puberulous on adaxial surface; anthers ca. 4 mm ................................. 14. H. mongolicum


14. H. mongolicum


大穗异燕麦 da sui yi yan mai

Avena planiculmis Schrader subsp. dahurica Komarov, Fl. Kamtschatka 1: 159. 1927; Avenastrum dahuricum (Komarov) Roshevitz; Avenula dahurica (Komarov) W. Sauer & H. Chmelistschek.

Perennial, rhizomatous, forming loose turf. Culms solitary or few, erect from decumbent base, 50–100 cm tall, 2–3-noded. Leaf sheaths of cauline leaves closed for 1/2 or more of length; leaf blades linear-lanceolate, flat, 8–25 cm, 5–12 mm wide, abaxial surface smooth with thick white midrib, adaxial surface scaberulous, margins thick, white, scaberulous, base rounded, apex abruptly acute; ligule lanceolate, 5–7(–10) mm. Panicle loosely contracted, 7–15 cm; branches usually paired, ascending, scabrid or almost smooth. Spikelets 1.7–2.5 cm, golden brown and purple, florets 5–6; rachilla hairs 1.5–2.5 mm; glumes membranous, 3-veined, lower glume 9.5–11 mm, upper glume 12–15 mm; lemmas leathery, hyaline above awn insertion, lowest 11–14 mm, asperulous, apex irregularly 2-denticulate; awn 1.5–1.7 cm, geniculate, column twisted, flat; palea keels ciliolate. Anthers 6.5–7 mm. Fl. and fr. Jul–Sep.

Open forests, grassy places, among shrubs; 700–1000 m. Heilongjiang, Nei Mongol [Mongolia, E Russia].

Helictotrichon dahuricum and H. hookeri belong to a group of species that have been shown by molecular studies to be only distantly related to Helictotrichon s.s. This group is sometimes separated as the genus Avenula. Some of the most obvious morphological distinctions are given in key couplet 2. Unfortunately the type species of Avenula is H. pubescens, which shows major morphological differences from the other species placed in Avenula, as noted above. For this reason Helictotrichon is maintained here in the traditional sense. Further morphological and molecular studies are required to clarify relationships within the group.

3. Helictotrichon hookeri (Scrubner) Henrard, Blumea 3: 429. 1940.

异燕麦 yi yan mai

Perennial, rhizomes very short or absent, forming mats.
Culms tufted, erect, 20–70 cm tall, usually 2-noded. Leaf sheaths of cauline leaves closed for less than 1/4 of length; leaf blades flat or folded, 10–25 cm, 2–5 mm wide, smooth or scabrid, margins thick, white, base straight, apex acute; ligule lanceolate, 3–6 mm. Panicle contracted, sometimes dense, 4–15 cm; branches usually paired, erect or ascending, scabrid, bearing 1–4 spikelets. Spikelets 1.1–1.7 cm, green or brown, florets 3–6; rachilla hairs 1–2 mm; glumes membranous, 3–(5)-veined, lower glume 9–12 mm, upper glume 10–13 mm; lemmas linear, hyaline above awn insertion, lowest 10–13 mm, asperulous, apex 2-toothed; awn 1.2–1.5 cm, geniculate, column twisted, flat; palea keels minutely ciliolate. Anthers ca. 4 mm. Fl. and fr. Jun–Sep.

Hill slopes in steppe, forest margins, moist meadows in high mountains; 100–3500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Yunnan [Kazakhstan, Kyrgyzstan, Mongolia, Russia; North America].

This is a variable species with higher-altitude forms distinguishable at subspecific rank. These forms correspond to plants from uplands in W North America, from where the species was first described.

1a. Panicle 4–8 cm, dense; spikelets golden brown .......................................................... 3a. Helictotrichon hookeri subsp. hookeri

1b. Panicle 5–15 cm, contracted; spikelets greenish ........................................ 3b. Helictotrichon hookeri subsp. schellianum

3a. Helictotrichon hookeri subsp. hookeri

异燕麦 (原亚种) yi yan mai (yu yan zhong)

Avena hookeri Scribner, True Grasses 123. 1890; A. tentoensis Honda; Avenuastrum asiaticum Roshevitz; A. tentoense (Honda) Kitagawa; Helictotrichon asiaticum (Roshevitz) Grossheim.

Plant 20–50 cm tall. Panicle 4–8 cm, dense, branches usually bearing a single spikelet. Spikelets golden brown.

Mountain meadows and rocky mountain slopes; below 3500 m. Qinghai, Sichuan, Xinjiang, Yunnan [Mongolia, Russia; North America].


奢异燕麦 she yi yan mai


Plant 30–80 cm tall. Panicle 5–15 cm, contracted, branches bearing up to 4 spikelets. Spikelets silvery green, sometimes tinged brownish or violet.

Hill slopes in steppe, rocky slopes, forest margins. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia].


冷杉异燕麦 leng shan yi yan mai


Perennial. Culms tufted, erect, 20–45 cm tall, 1–3-noded. Leaf sheaths often longer than internodes, glabrous; leaf blades linear, flat or rolled, 10–30 cm, 2–4 mm wide, abaxial surface smooth, glabrous, adaxial surface densely puberulous; ligule ca. 0.5 mm or absent, margin ciliolate. Panicle loose, narrowly lanceolate in outline, 10–15 cm; branches 2–4 per node, ascending, 4–5 cm, scabrid, bare in lower part, each bearing 1 or 2 spikelets. Spikelets ca. 1 cm, yellowish green or purplish, florets usually 3; rachilla hairs 2–2.5 mm; lower glume narrow, 4.2–7 mm, 1–(2)-veined, upper glume 6.3–8.3 mm, 3-veined; lemmas herbaceous with membranous apex, 7-veined, first lemma 7.5–9 mm, smooth, apex usually subentire, occasionally splitting into 2 teeth; awn arising at upper 2/5 of lemma, 1.2–1.6 cm, geniculate, column loosely twisted, terete; palea keels ciliolate. Anthers 2.5–3 mm.

● High mountain peaks; ca. 3000 m. Taiwan.


光花异燕麦 guang hua yi yan mai


Perennial. Culms tufted, erect, up to 80 cm tall, 2–3-noded, glabrous or sparsely retrorsely pubescent below nodes. Leaf sheaths lax, glabrous; leaf blades flat or involute when dry, 10–30 cm, 3–6 mm wide, abaxial surface glabrous, adaxial surface pubescent, apex acuminate; ligule truncate, ca. 1 mm. Panicle loose, 15–18 cm, nodding; branches in distant pairs, slender, often flexuous, scabrid, lower ca. 7 cm, bearing up to 4 spikelets in upper part. Spikelets 1–1.3 cm, pale green, florets 3–4; rachilla internodes glabrous toward base, hairs in upper part 1–2 mm; lower glume 4.6–5 mm, 1-veined, upper glume 5–7 mm, 3-veined; lemmas subleathery with hyaline apex, lower 9–10 mm, 7-veined, smooth, apex subentire, minutely denticate; awn 1.5–2 cm, weakly geniculate, column loosely twisted, terete; palea keels ciliolate, hairs ca. 0.3 mm. Anthers 3–3.5 mm. Fl. and fr. May–Jul.

● Under forests in high mountains, mountain valleys, shady mountain slopes, damp places; 700–3700 m. Anhui, Gansu, Guizhou, Hubei, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Lin'an].

This is an element of the Helictotrichon junguhnii complex with rather short rachilla hairs confined to the upper part of the rachilla internode, a more or less undivided lemma apex, and conspicuously ciliate palea keels. It is very similar to H. hideoi (Honda) Ohwi from Japan, which also has a subentire lemma apex, but differs by its pubescent leaf sheaths and awn arising slightly higher on the lemma back.


滇异燕麦 dian yi yan mai

Perennial, shortly rhizomatous. Culms loosely tufted, 60–70 cm tall, 3–4-noded, lower internodes villous, especially be-
low nodes. Leaf sheaths densely villous, usually longer than internodes; leaf blades broadly linear, flat, tough, 15–18 cm, 5–8 mm wide, abaxial surface asperulous, adaxial surface prominently ridged, hispid, apex subacute; ligule truncate, ca. 1 mm, back hairy, margin ciliate. Panicle loose, 20–30 cm, many spiculate; branches in whorls of up to 8, lower 8–10 cm, scabrid, with branchlets and spikelets throughout length. Spikelets 1.2–1.5 cm, green or tinged purplish, florets 3–5, spaced; rachilla filiform, hairs ca. 3.5 mm; glumes lightly keeled, keel scabrid, apex acuminate, lower glume ca. 5 mm, 1-veined, upper glume ca. 10 mm, 3-veined; lemmas papyry with membranous apex, lowest ca. 10 mm, 5-veined, smooth, apex acuminate or splitting into 2 acuminate-mucronate teeth; awn ca. 1.5 mm, gently curved or almost straight, slightly twisted in lower half, terete; palea keels scabrid-ciliolate. Anthers 3.2–3.5 mm. Fl. and fr. summer to autumn.

- Mountain slopes; ca. 3500 m. NW Yunnan (Zhongdian).

This distinctive species is easily recognizable by its densely villous leaf sheaths and lower culm internodes, many-spiculate panicle with whorled branches, slender, elongate rachilla internodes, and only slightly curved awn.


高异燕麦 gao yi yan mai


Perennial, shortly rhizomatous. Culms erect from shortly decumbent base, solitary or few, 1–1.2 m tall, 3–4-noded. Leaf sheaths densely pubescent. Leaf blades usually shorter than internodes, densely puberulous or basal sheaths glabrous; leaf blades broadly linear, flat, ca. 15 cm, 3–8 mm wide, abaxial surface pubescent, scabrid, adaxial surface pilose, or sometimes glabrous; ligule truncate or erosive, 1–2 mm, margin ciliolate. Panicle loose, lanceolate to oblong in outline, 10–20 cm; branches 4–6 per node, ascending, slender, often flexuous, up to 7 cm, scabrid, lower part bare, upper part bearing 1–3 spikelets. Spikelets 0.8–1.4 cm, yellowish green or purplish green, florets 3–4(–5); rachilla hairs 2–3 mm; glumes thinly membranous, lower glume 4–7 mm, 1-veined, upper glume 8–11 mm, 3-veined; lemmas leathery, lowest ca. 9 mm, 5–7-veined, smooth; awn 1–1.5 cm, geniculate, column twisted, terete; palea keels ciliolate. Anthers 4–5 mm. Fl. and fr. Jul.–Aug.


The publication of the name *Avena junghuhnii* in Buse’s preprint in February 1854 shortly predates the publication of *Trisetum virescens* by Steudel in April 1854.

This taxon lies at the center of a polymorphic complex extending from Pakistan and India to China and mountains in SE Asia. Variation within the complex is poorly understood and requires further investigation. Variable characters include lemma scabridity and apex, length and quantity of rachilla hairs, length of the cilia on the palea keels, and anther length. The midline of the lemma above the awn insertion is very fragile, frequently splitting into acuminate lobes, but sometimes remaining almost entire, even within the same panicle.

The name *Helictotrichon polyneurum* (J. D. Hooker) Henrard has been misapplied in China to specimens of *H. junghuhnii*. This member of the *H. junghuhnii* complex is known only from the Nilgiri Hills of S India. It is distinguished by its open, ovate panicle with smooth, widely spreading panicle branches and large, brownish spikelets with many prominent veins.


云南异燕麦 yun nan yi yan mai


Perennial. Culms erect, slender, 35–50 cm tall, 2–3-noded. Leaf sheaths tight, shorter than internodes, puberulous near margins, otherwise glabrous; leaf blades narrowly linear, flat or margins involute, stiff, 6–11 cm, 1.5–2 mm wide, abaxial surface of lower blades pubescent, both surfaces scabrid, apex acute; ligule truncate, 1.5–2 mm. Panicle ovate-oblong in outline, 5–10 cm, slightly nodding; branches usually paired, lower ca. 6 mm, scabrid, bearing 2–4 spikelets in distal part. Spikelets 0.8–1 cm, green variegated yellow and purple, florets 3–4; rachilla shortly bearded; lower glume 5.5–7 mm, 1-veined, upper glume 7–8 mm, 3-veined; lemmas firm with scarious apex, lowest 7.5–9 mm, 5-veined, scabrous, apex 2-toothed, teeth acuminate-mucronate; awn 1.3–1.5 cm, geniculate with twisted column, terete; palea keels slightly shorter than lemma, keels ciliolate. Anthers 2–2.5 mm. Fl. and fr. Jun.–Aug.
Helictotrichon schmidii

1a. Panicle densely spiculate; spikelets 0.8–1 cm, greenish or purplish, florets usually 3; rachilla hairs ca. 1 mm truncate, ca. 2 mm, usually lacerate. Panicle narrowly conical or sometimes scabrid; branches 2–3 per node. Spikelets 0.7–1 cm, greenish or purplish, florets usually 3; rachilla hairs ca. 1 mm; glumes membranous, lower glume (1.5–)4–6 mm, 1-veined, upper glume (3–)5.5–7 mm, 3-veined, apex acuminate-mucronate; lemma herbaceous with membranous apex, lowest 6–7 mm, 5–7-veined, densely scabrid, sometimes with a few scattered hairs, awned from upper 1/5–1/3, apex 2-toothed, teeth acuminate-aristulate; awn 0.5–1 cm, reflected from near base, scarcely twisted, terete; palea keels scabrid-ciliolate, hairs ca. 0.1 mm. Anthers 1.4–2 mm. Fl. and fr. Apr–Aug.

Grassy clearings in forests, riversides, ditches; 2000–3300 m. Guizhou, Sichuan, Yunnan [S India].

This species is otherwise known only from the hills of S India. The awn arises higher on the lemma back than usual and is outwardly curved rather than geniculate. The Indian population has longer lemmas (7–9 mm).

Trisetum lautum Chrtek (Folia Geobot. Phytotax. 25: 333. 1990), described from Yunnan, may be the same as this species. The type has not been seen.

1b. Panicle loose and delicate, branches spaced; spikelets with 2(–3) florets ..................... 12b. var. laxiflorum


小颖异燕麦 xiao ying yi yan mai

Culms slender, delicate. Panicle sparse; branches short, spaced, bearing 1–3 spikelets. Spikelets ca. 0.7 cm; lower glume 1.5–3.5 mm, upper glume 3–5.5 mm. Fl. and fr. Apr–Sep.

● Montane meadows, forests; 2100–3700 m. Shaanxi, Sichuan, Yunnan.

10a. Helictotrichon schmidii

This is a small, narrow-leaved variant from the Helictotrichon junghuhnii complex.

10a. var. schmidii

粗颖异燕麦 cu cao yi yan mai

Perennial. Culms tufted, 50–70 cm tall, 3-noded. Leaf sheaths densely pubescent; leaf blades flat, folded or rolled, mainly basal, 7–12 cm, 2–4 mm wide, scabrid or pubescent; ligule truncate, ca. 2 mm, usually lacerate. Panicle narrowly contracted, linear-oblong, 10–17 cm; branches 2 or 3 per node, lowest up to 3.5 cm, erect, scaberulous or pubescent, bearing branchlets and short-pedicelled spikelets to base. Spikelets 0.7–1 cm, greenish or purplish, florets usually 3; rachilla hairs usually 3; rachilla hairs ca. 1 mm; glumes membranous, lower glume (1.5–)4–6 mm, 1-veined, upper glume (3–)5.5–7 mm, 3-veined, apex acuminate-mucronate; lemma herbaceous with membranous apex, lowest 6–7 mm, 5–7-veined, densely scabrid, sometimes with a few scattered hairs, awned from upper 1/5–1/3, apex 2-toothed, teeth acuminate-aristulate; awn 0.5–1 cm, reflected from near base, scarcely twisted, terete; palea keels scabrid-ciliolate, hairs ca. 0.1 mm. Anthers 1.4–2 mm. Fl. and fr. Apr–Aug.

Grassy clearings in forests, riversides, ditches; 2000–3300 m. Guizhou, Sichuan, Yunnan [S India].

This species is otherwise known only from the hills of S India. The awn arises higher on the lemma back than usual and is outwardly curved rather than geniculate. The Indian population has longer lemmas (7–9 mm).


短药异燕麦 duan yao yi yan mai

Perennial, loosely tufted. Culms erect from ascending base, 25–50 cm tall, 2–3-noded. Leaf sheaths smooth, glabrous; leaf blades narrowly linear, flat, 5–20 cm, 2–4 mm wide, adaxial surface slightly scabrid or sparsely pilose, abaxial surface almost smooth; ligule 1.5–3.5 mm, margin lacerate. Panicle dense, spike-like, narrowly oblong in outline, 5–9 cm, often interrupted, slightly nodding; branches very short, scabrid. Spikelets 0.7–0.9 cm, reddish violet, florets 3–4; rachilla hairs 2–4 mm; glumes unequal, lower glume ca. 5 mm, 1-veined, upper glume ca. 7 mm, 3-veined; lemmas firm with membranous apex, 6–9.5 mm, scaberulous, apex finely 2-toothed; awn 1–1.4 cm, geniculate, column twisted, terete; palea keels ciliolate. Anthers 1–1.6 mm. Fl. Jun–Jul.

● High mountain forests; 3900–4200 m. Sichuan.


藏异燕麦 zang yi yan mai

Perennial, densely tufted. Culms erect, 15–100 cm tall, 2–3-noded, pubescent below panicle. Leaf sheaths densely pubescent or sometimes glabrous; leaf blades filiform, often rolled, 15–30 cm, 1–2 mm wide, densely pubescent on both surfaces, or sometimes scabrid; ligule 0.3–0.5 mm, margin ciliate. Panicle contracted, often dense and spike-like, ovate to oblong in outline, 2–6(–14) cm, rachis, branches, and pedicels all densely pubescent; branches suberect, 0.5–5 cm, lower with 4–7 spikelets. Spikelets 0.7–1.2 cm, golden brown or dark brown, florets 2–4; rachilla hairs 1.5–2 mm; glumes membranous, lower glume 7–9 mm, 1-veined, upper glume 8–11 mm, 3-veined; lemmas firm, lower 6–8.5 mm, 5–7-veined, scaberulous or puberulous, apex minutely 2-toothed or entire; awn 1–1.5 cm, weakly geniculate, column loosely twisted, terete; palea keels ciliolate. Anthers 3–4.2 mm. Fl. and fr. Jun–Sep.

● Rocky mountain slopes, alpine steppe, among shrubs; 2600–4600 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang (Tian Shan), Xizang, Yunnan.

This is a handsome species with contracted, golden brown panicles.

1a. Panicle densely contracted, 2–6 cm; spikelets with 2(–3) florets ................. 12a. var. tibeticum

1b. Panicle laxly contracted, 6–14 cm; spikelets with 3–4 florets ..................... 12b. var. laxiflorum

12a. Helictotrichon tibeticum var. tibeticum

藏异燕麦(原变种) zang yi yan mai (yuan bian zhong)
76. ARRHENATHERUM P. Beauvois, Ess. Agrostogr. 55. 1812.

燕麦草属 yan mai cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Perennial. Culms tall, basal internodes often swollen into globose corms. Leaf blades linear, flat. Inflorescence a moderately dense panicle. Spikelets weakly laterally compressed, 2 dimorphic, sometimes with an additional rudiment, lower floret staminate and strongly awned, upper floret bisexual and weakly awned or awnless; rachilla disarticulating above glumes but not between florets, extended beyond terminal floret; glumes unequal, thin, lower glume 1/2 spikelet length or more, 1-awned, upper glume as long as spikelet, 3-awned; lemmas firmly membranous to subleathery, rounded on back, 5-9-awned, 2-denticulate; lower lemma awned from near base, awn with twisted column, exserted from spikelet; upper lemma with a short straight awn or awnless; palea keels scabrid. Anthers ca. 4 mm. Fl. and fr. Jun–Sep.

Seven species: SW Asia, Europe, Mediterranean region; one species (introduced) in China.


燕麦 yan mai cao

Culms erect or geniculate at base, rather stout, 4–5-noded. Leaf blades loose, glabrous; leaf blades 14–30 cm, 3–9 mm wide, scabrid or abaxial surface smooth, apex acuminate; ligule 1–3 mm, obtuse or truncate. Panicle lanceolate to oblanceolate in outline, loose to rather dense, 10–25 cm, greenish or purplish, shining; branches clustered, scabrid. Spikelets oblanceolate, 7–9 mm, florets separated by short rachilla...
node not more than 0.6 mm; glumes lanceolate, apex acute; lower glume 4–6 mm, upper glume equal to spikelet, punctiform scabrid; lemma oblong-lanceolate, 7–9 mm, sparsely pubescent in lower 1/3 or glabrous, scabrid in upper 1/3; awn of lower lemma 1–2 cm, arising from lower 1/3 of lemma back; awn of upper lemma 1–2 mm, arising above middle or near apex. Anthers 4–5 mm. 2n = 28.

Introduced to China as an ornamental garden plant and for forage [native to Russia; N Africa, SW Asia, Europe; introduced to Australia and North America].

1a. Basal internodes of culm not swollen into globose corms

1b. Basal internodes of culm swollen into globose corms ........................................ 1a. var. elatius
1b. Basal internodes of culm swollen into globose corms ............................................. 1b. var. bulbosum

1a. Arrhenatherum elatius var. elatius

燕麦草（原变种） yan mai cao (yuán biàn zhòng)


Basal internodes of culm not swollen into globose corms; nodes usually glabrous.

77. AVENA Linnaeus, Sp. Pl. 1: 79. 1753.

燕麦属 yan mai shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annuals. Culms erect, fairly robust. Leaf blades linear, flat; ligule membranous. Inflorescence a large loose panicle. Spikelets large, pendulous, oblong to gaping, florets 2 to several, the uppermost reduced; rachilla pilose or glabrous, disarticulating below each floret or only below the lowest, or not disarticulating (cultivated species); glumes lanceolate to elliptic, usually subequal and as long as spikelet, rarely strongly unequal or shorter than spikelet, herbaceous to membranous, 7–11-veined, back rounded, smooth, apex acuminate; floret callus acute to pungent, bearded; lemmas lanceolate-oblong, usually leathery, occasionally papery, back rounded, 5–9-veined, glabrous to hirsute, awned usually from near middle of back, apex papery, 2-toothed to 2-fid, lobes sometimes extended into fine bristles, awn geniculate with twisted column, sometimes reduced or absent (cultivated species); palea usually shorter than lemma, keels ciliate. Ovary densely hairy. Caryopsis with long linear hilum.

About 25 species: centered on the Mediterranean region and SW Asia, extending to N Europe and N Asia, widely introduced to other temperate and cold regions; five species (all introduced) in China.

Avena includes several species cultivated as cereal crops (oats) and is also used for fodder and fiber production. A few species have become widespread as weeds of crops in temperate regions.

Avena barbata Pott ex Link and A. eriantha Durieu, native from the Mediterranean to C Asia, are mentioned (FRPS 9(3): 168. 1987) as cultivated in China.

1a. Rachilla tough, spikelets not regularly disarticulating; cultivated plants.

2a. Glumes as long as spikelet; lemmas leathery, distinctly veined in upper half; rachilla internodes short, straight; grains not free threshing ................................................................. 1. A. sativa
2b. Glumes conspicuously shorter than spikelet; lemmas papery, distinctly veined throughout; rachilla internodes elongate, sometimes sinuous; grains free threshing.

3a. Spikelets 2.5–3.5(–4.5) cm, florets 3–7; lemma apex shortly and obtusely 2–4-toothed; grain ca. 8 mm .... 2. A. chinensis
3b. Spikelets 2–2.5(–3.5) cm, florets 2–4; lemma apex with 2 slenderly acuminate teeth; grain ca. 6 mm ........... 3. A. nuda

1b. Rachilla disarticulating below each floret, or at least below lowest; wild plants.

4a. Rachilla disarticulating only below lowest floret, only lowest floret with a basal callus.

5a. Lower glume ± equal to upper glume .............................................................................. 4. A. sterilis
5b. Lower glume much shorter than upper glume ...................................................................... A. eriantha (see note above)

4b. Rachilla disarticulating below each floret, each floret with a basal callus.

6a. Lemma apex 2-toothed or 2-fid, but lacking apical bristles ................................................. 5. A. fatua
6b. Lemma apex 2-fid, each lobe with a fine apical bristle ...................................................... A. barbata (see note above)

燕麦 yan mai

Annual. Culms solitary or tufted, erect, 40–180 cm tall, unbranched. Leaf sheaths usually glabrous; leaf blades 15–30 cm, 4–10 mm wide, glabrous, margins sometimes scaberulous; ligule 3–6 mm. Panicle loose and open or contracted, 20–40 cm, nodding; branches spreading or contracted. Spikelets 2–3 cm, florets 2(or 3); rachilla ± glabrous, straight, not disarticulating or fracturing irregularly at maturity, florets lacking a basal bearded callus, internodes short, less than 0.5 mm; glumes lanceolate, subequal, as long as spikelet, 7–9-veined; lemmas 1.2–2.5 cm, leathery in lower half, herbaceous and distinctly veined above, glabrous or nearly so, apex minutely and irregularly 2–4-denticulate; awn 2.5–3.5 cm, weakly geniculate or rudimentary or absent; Grain adherent to lemma and palea at maturity. 2n = 42.

Widely cultivated in China [of cultivated origin].

This species is cultivated as a cereal crop (oats) in north-temperate regions of the world, and also as a green fodder crop. Genetic evidence points to *Avena sterilis* as the wild ancestor of *A. sativa*, and *A. fatua* as a weedy derivative. Hybrids between *A. sativa* and *A. fatua* with hairy florets or well-developed awns may occur where the two species grow together.

2. **Avena chinensis** (Fischer ex Roemer & Schultes) Metzger, Eur. Cereal. 53. 1824. 中国燕麦 ye yan mai

Annual. Culms 60–100 cm tall. Leaf blades 8–40 cm, 3–16 mm wide, scabrid. Panicle open, 12–20 cm; branches scabrid. Spikelets 2.5–3.5(–4.5) cm, florets 3–7; rachilla glabrous, not disarticulating at maturity, florets lacking a basal bearded callus, internodes elongate, simuous, uppermost leaves strongly curled; glumes broadly lanceolate, subequal, conspicuously shorter than spikelet, 1.5–2.5 cm, 7–11-veined; lemmas 2–2.5 cm, papery, distinctly veined throughout, glabrous, awned from upper 1/4 of lemma, apex with 2–4 small obtuse teeth; awn 1–2 cm, straight or bent, rarely awnless. Grain ca. 8 mm, free from lemma and palea at maturity (free threshing). Fl. and fr. Jun–Aug.

Cultivated, or naturalized along roadsides and on arable land; 1000–3200 m. Hebei, Henan, Hubei, Xinjiang, Yunnan [Russia; Europe].

More work is needed on *Avena chinensis*. It is very close to *A. nuda*, and may not be distinct from it. These naked wheats may be no more than free-threshing forms of *A. sativa*, caused by occasional mutations, and are perhaps better placed at infraspecific rank within *A. sativa*.

The name *Avena gracillima* Keng (Bull. Fan Mem. Inst. Biol., Bot. 7: 36. 1936), described from Hebei, is based on a very depauperate specimen with a panicle of only 1 or 2 spikelets. The spikelets are 1.4–1.8 mm long with herbaceous, glabrous lemmas and rudimentary awns. It is clearly a cultivated species, growing as a weed on grassy slopes, most likely referable to *A. chinensis*. The type has not been seen.

3. **Avena nuda** Linnaeus, Demonstr. Pl. 3. 1753.

裸燕麦 luo yan mai

*Avena sativa* Linnaeus var. *nuda* (Linnaeus) Koernicke.

Annual. Culms 45–90 cm tall. Leaf blades up to 20 cm, 3–7 mm wide, scaberulous. Panicle somewhat contracted, up to 25 cm. Spikelets 1.8–2.5(–3.5) cm, florets 2–4, lower 1 or 2 florets awned, upper florets awnless; rachilla glabrous, not disarticulating at maturity, florets lacking a basal bearded callus; glumes lanceolate, subequal, conspicuously shorter than spikelet, 7–9-veined; lemmas 1.5–2 cm, papery, distinctly veined throughout, glabrous, awned from ca. upper 1/3, apex 2-toothed, teeth slenderly acuminate, up to 4 mm; awn 1.5–2 cm, bent but not twisted. Grain ca. 6 mm, free from lemma and palea at maturity (free threshing). 2n = 42.

Cultivated; 2300–3300 m. Hubei, C and N Yunnan [Russia; Europe].

This is a minor crop, seldom cultivated nowadays. It is used for flour and also for animal fodder. It is a European species, but has been recently recorded as cultivated in Yunnan.

The place of publication of this species is sometimes cited as Amon. Acad. 3: 401. 1756. The *Amenitates Academicae* are a collection of reissued Linnaean dissertations. *Avena nuda* was validly published in the original dissertation in 1753.


长颖燕麦 chang ying yan mai


Annual. Culms solitary or tufted, erect or ascending, 50–120 cm tall, unbranched, 2–4-noded. Leaf sheaths glabrous or basal sheaths puberulous; leaf blades up to 60 cm, 4–13 mm wide, scaberulous, glabrous; ligule 3–4 mm. Panicle loose, open, pyramidal, 13–30 cm, nodding; branches coarsely scabrid. Spikelets 2–3 cm, florets 2 or 3, 2-awned; rachilla disarticulating only below lowest floret, florets falling together at maturity, only lowest floret with a bearded callus, internodes glabrous; glumes narrowly elliptic-oblong, subequal, as long as spikelet, 7–9-veined, apex finely acuminate; callus hairs up to 5 mm; lemmas 1.8–2.5 cm, leathery, hispid, finally brown in lower half, green and scabrid above, awned at about lower 1/3, apex finely 2-fid; awn 3–6 cm, fairly slender, strongly geniculate, column dark brown, pubescent. 2n = 42.

Arable weed, adventive. Yunnan [native to SW Asia and Europe].

This is a noxious weed of arable land, especially fields of cereals, native to the Mediterranean region and SW Asia, but now widespread in warm-temperate regions of the world. It has been recorded in China only from Yunnan.

The typical subspecies, *Avena sterilis* subsp. *sterilis*, is distinguished by its larger, 3–5 cm spikelets with 3–5 florets, 9–11-veined glumes, and stouter, 6–9 cm awns. Both subspecies occur over the whole range of the species.


野燕麦 ye yan mai
Annual. Culms erect or geniculate at base, 50–150 cm tall, unbranched, 2–4-noded. Leaf sheaths glabrous or basal sheaths puberulous; leaf blades 10–30 cm, 4–12 mm wide, scabrid or adaxial surface and margins pilose; ligule 1–5 mm. Panicle narrowly to broadly pyramidal, 10–40 cm, nodding; branches scabrid. Spikelets 1.7–2.5 cm, florets 2 or 3, all florets awned; rachilla easily disarticulating below each floret at maturity, each floret with a bearded callus, internodes hisrate or glabrous; glumes lanceolate, subequall, herbaceous, 9–11-veined, apex finely acute; callus hairs up to 4 mm; lemmas 1.5–2 cm, leathery, glabrous to densely hispid in lower half, green and scaberulous above, awned from near middle, apex shortly 2–4-toothed; awn 2–4 cm, geniculate, column twisted, blackish brown. Fl. and fr. Apr–Sep. 2n = 42.

Weed of cultivated fields, grassy mountain slopes, roadsides and other disturbed places; below 4300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India (Sikkim), Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

This is a noxious weed, especially in fields of cultivated oats, native to Europe and C and SW Asia, but now spread throughout temperate regions of the world.

1a. Lemmas hispid in lower half, dark brown at maturity ......... 5a. var. fatua

5a. Avena fatua var. fatua

野燕麦(原变种) ye yan mai (yuan bian zhong)

Avena fatua subsp. meridionalis Malzey; A. meridionalis (Malzey) Roshevitz.

Lemmas densely to sparsely hispid below middle with white or brownish hairs, becoming dark brown at maturity. Fl. and fr. Apr–Sep.

Disturbed places and as an arable weed; below 4300 m. Distribution as for the species.


光稃野燕麦 guang fu ye yan mai

Avena fatua var. mollis Keng.

Lemmas glabrous (callous often bearded), yellowish at maturity.

Grassy mountain slopes, roadsides, farmlands; below 4300 m. Distribution as for the species.

Glabrous forms may be found growing with hairy forms, and are of little taxonomic importance.

78. TRISETUM Persoon, Syn. Pl. 1: 97. 1805.

三毛草属 san mao cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Perennials, tufted, sometimes shortly rhizomatous. Leaf blades narrowly to broadly linear, usually flat; ligule membranous. Inflorescence a moderately lax to spikelike panicle, shining. Spikelets with 2 or 3 florets, disarticulating below each floret; rachilla shortly bearded, extended beyond uppermost floret, tipped by a reduced or vestigial floret; glumes lanceolate, unequal or subequal, shorter than spikelet, keeled, herbaceous or membranous, margins broad, hyaline, lower glume 1(–3)-veined, upper glume 3-veined, apex acute or acuminate; callus hairs up to 4 mm; lemmas lanceolate or merely outwardly curved; palea hyaline, slightly to distinctly shorter than lemma, gaping free from lemma margins. Caryopsis with punctiform hilum; endosperm sometimes liquid.

About 70 species: temperate regions of the world except Africa, also on tropical mountains; 12 species (five endemic) in China.

1a. Culm below panicle and panicle branches pubescent to tomentose (except T. altaicum); panicle contracted to dense and spikelike; plants often less than 50 cm tall.

2a. Culm glabrous; panicle branches smooth, glabrous .......................................................... 1. T. altaicum

2b. Culm pubescent to tomentose; panicle branches pubescent.

3a. Plant rhizomatous; culms stout, 2–3 mm thick; panicle scarcely exserted from uppermost leaf sheath

3b. Plant tufted; culms slender, 0.5–2 mm thick; panicle clearly exserted from uppermost leaf sheath.

4a. Palea keels densely ciliate; ovary pilose ................................................................. 5. T. debile

4b. Palea keels scabrid; ovary glabrous.

5a. Panicle dense, spikelike, cylindrical to ovoid, 1.5–11 cm; branches erect, appressed; glumes and lemmas lanceolate; anthers 0.7–1.3 mm .................................................... 3. T. spicatum

5b. Panicle contracted but not dense and spikelike, lanceolate to subcylindrical, 5–18 cm; branches usually obvious, slightly spreading; glumes and lemmas narrowly lanceolate; anthers 1.3–1.6 mm ... 4. T. clarkei

1b. Culm and panicle branches glabrous; panicle lax; plants often more than 40 cm tall.

6a. Floret callus hairy.

7a. Lemmas conspicuously punctate-scabrid; palea 1/2–2/3 lemma length .............................................. 6. T. bifidum

7b. Lemmas smooth; palea subequal to lemma ..................................................................................... 7. T. yunnanense
6b. Floret callus glabrous.

8a. Panicle branches single or paired; awns 9–14 mm, geniculate with twisted column; anthers 1–1.5 mm ....... 8. T. scitulum
8b. Panicle branches in whorls of 3–8; awns 4.5–9 mm, recurved or basally slightly twisted; anthers 2–3 mm.

9a. Culm stout, 4–5 mm in diam.; lemmas pale yellowish green, herbaceous with broad hyaline margins ....... 9. T. henryi
9b. Culm slender, 1.5–3 mm in diam.; lemmas brown at maturity, firm with narrow margins.

10a. Flores 2–4; lemmas 5–7 mm; awns up to 9 mm, strongly recurved ........................................ 10. T. sibiricum
10b. Flores 1 or 2; lemmas 4.5–5.5 mm; awns up to 6.5 mm, recurved or straight.

11a. Margins of leaf sheaths joined below middle; awns almost straight ........................................ 11. T. umbratile
11b. Margins of leaf sheaths joined to middle or above; awns recurved ........................................ 12. T. pauciflorum


高山三毛草 gao shan san mao cao

Perennial, loosely tufted, shortly rhizomatous. Culms erect from ascending base, 15–45 cm tall, glabrous, 2–3-noded. Leaf sheaths pilose; leaf blades flat, 10–15 cm, 2–4 mm wide, pilose on both surfaces or only on margins; ligule 2–3 mm. Panicle contracted, fairly dense, linear to narrowly lanceolate-oblong in outline, 4–9 cm, greenish brown tinged violet; branches erect, up to 2.5 cm, smooth or rarely scaberulous. Spikelets 5–7 mm, florets 2 or 3; rachilla hairs 0.5–1 mm; glumes unequal, lower glume 3–4 mm, upper glume 4–5 mm, apex acuminate; lemmas ca. 5 mm, punctately scabrid; awned from slightly above middle to upper 1/3; apex 2-denticulate, teeth mucronate; awn 4–8 mm, recurved, lower part slightly twisted; palea keels scabrid. Anthers 0.8–1.2 mm. Fl. Jun–Sep. 2n = 14.

Alpine meadows, among rocks in coniferous forests, grassy mountain slopes; 1900–2800 m. Xinjiang [E Kazakhstan, Mongolia, Russia (Siberia)]


康定三毛草 kang ding san mao cao


Perennial with slender rhizomes. Culms usually solitary, erect from ascending base, 40–50 cm tall, 2–3 mm in diam., pubescent below panicle, 2–3-noded. Leaf sheaths longer than internodes, loose, lower sheaths pilose; leaf blades broadly linear, flat, 7–10 cm, 4–5 mm wide, scaberulous on both surfaces and margins; ligule 1.5–3 mm, truncate, margin ciliolate. Panicle scarcely exserted from uppermost leaf sheath, dense, elliptic in outline, lobed, 12–15 cm, pale yellowish; branches erect or slightly spreading, pubescent, densely clothed in branchlets and spikelets, lowest 6–8 cm. Spikelets 5.5–6 mm, florets 3; rachilla hairs ca. 1 mm; glumes slightly unequal, acuminate, lower glume narrowly lanceolate, ca. 5 mm, upper glume narrowly elliptic-oblong, 5.7–5.9 mm; lemma narrowly lanceolate-oblong, 5–5.3 mm, scabrid, awned from upper 1/4, apex entire; awn 3.2–3.4 mm, almost straight, slightly recurved at base, not twisted; palea keels scabrid. Anthers 1–1.1 mm. Fl. Aug.

- Damp ground near water; 3000–3700 m. Qinghai, Sichuan.

The spikelets of this species are the same as those of some forms of Trisetum spicatum, but it is excluded from both T. spicatum and T. clarkei by its strikingly more robust rhizomatous habit and large, dense, scarcely exserted panicles.


穗三毛 sui san mao

Perennial, densely tufted. Culms erect, 3–60 cm tall, 1–2 mm in diam., pubescent to tomentose especially below panicle, 1–3-noded. Leaf sheaths pubescent; leaf blades flat or rolled, 2–15 cm, 2–4 mm wide, densely to sparsely hairy on both surfaces or only abaxial surface, or glabrous, margins often setose; ligule 1–2 mm. Panicle spikelike, dense, linear to ovate or oblong in outline, lower part sometimes interrupted, 1.5–11 cm; branches short, appressed, pubescent to tomentose. Spikelets 4–9 mm, florets 2 (or 3); rachilla hairs 1–1.5 mm; glumes subequal or slightly unequal, lower glume 4–8 mm, upper glume 5–9 mm, apex acuminate, occasionally briefly aristulate; lemmas lanceolate, 4–7 mm, scaberulous to pubescent, awned from upper 1/4–1/3, apex usually 2-denticulate, teeth often mucronate, occasionally subentire; awn 2–7 mm, weakly geniculate with loosely twisted column, or recurved at base, or almost straight; palea keels scaberulous. Anthers 0.7–1.3 mm. Fl. and fr. Jun–Sep.

Grassy mountain slopes, alpine meadows, on glacial moraine, among bushes, montane forests; 1900–5600 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Japan, Kazakhstan, Kyrgyzstan, Korea, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Caucasus), Australia, Europe, North and South America].

This extremely polymorphic species is one of the most widespread of all flowering plants, being present in arctic and alpine parts of all continents except Africa. A large number of subspecies and varieties has been described, and these are only weakly correlated with geography. In spite of difficulties in applying infraspecific names, it seems unacceptable to include the very large range of forms present in China without subdivision under a single species name. Therefore subspecific names that have previously been applied are maintained here to indicate the main nodes of variation. However, variation is still very imperfectly understood, especially in the Himalayas, and it is not possible to place all specimens within the given subspecies descriptions.

1a. Plant up to 50 cm tall; panicle 5–11 cm, linear to narrowly elliptic or oblong, often interrupted below, pointed at apex, usually greenish or brownish.

2a. Lowest lemma 4–5.5 mm, awn 3–5 mm; spikelets usually with 2 florets ......................... 3d. subsp. virescens
2b. Lowest lemma 5–7 mm, awn 5–7 mm; spikelets with 2 or 3 florets .............................. 3e. subsp. alaskanum
1b. Plant up to 30 cm tall; panicle 1.5–5 cm, oblong to ovate, dense, not interrupted, rounded at apex, usually purple or grayish.

3a. Lemmas densely pubescent; plant 3–12 cm tall; leaf blades tomentose. Panicle narrowly oblong–ovate, 4.6–6.3 mm; lowest lemma 5–6 mm, scabrous to shortly pubescent, apex entire or 2-denticulate-aristulate; awn 2–4 mm, straight or outwardly curved at base, not twisted. Fl. and fr. Jun–Sep.

Grassy mountain slopes, alpine meadows, among shrubs; 2000–5200 m. Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang [Bhutan, India (Sikkim), Kyrgyzstan, Mongolia, Russia (Siberia)].

This is a less hairy form than subsp. tibeticum, distinguished also by its relatively short, almost straight awns. Some specimens from above 5000 m in Xizang match subsp. mongolicum except for their longer (5–6 mm), twisted awns.

“Trisetum spicatum var. mongolicum (Hultén) P. C. Kuo & Z. L. Wu,” as given in FRPS (9(3): 140, 1987), was not validly published because “T. spicatum subsp. mongolicum Hultén” (Svensk Bot. Tidskr. 53: 214. 1959), on which it was based, was also not validly published because no type was indicated.


Plant (20–)30–60 cm. Culms pubescent, leaf blades and sheaths densely pubescent to glabrous. Panicle linear to narrowly oblong, often interrupted below, 5–7(–11) cm, green or brownish. Spikelets with 2(–3) florets; lower glume 3.5–4.8 mm, upper glume 4.3–5.6 mm; lowest lemma 4.5–5.5 mm, scabrous, apex entire or 2-denticulate; awn 3–5 mm, outwardly curved near base, not twisted.

Alpine grasslands, meadows, often on damp sand or gravel; 3200–5000 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, N India, Kazakhstan, Kyrgyzstan, Nepal, N Pakistan, Tajikistan].

“Trisetum spicatum var. himalaicum (Hultén) P. C. Kuo & Z. L. Wu,” as given in FRPS (9(3): 141. 1987), was not validly published because “T. spicatum subsp. himalaicum Hultén” (Svensk Bot. Tidskr. 53: 213. 1959), on which it was based, was also not validly published because no type was indicated.


Plant up to 60 cm tall. Culms pubescent, leaf blades and sheaths glabrous or pilose. Panicle linear-elliptic, dense, 1.5–2.5 cm, greenish or brownish, rarely purple. Spikelets with 2 florets, lower glume 4.5–5.5 mm, upper glume 4.6–6.3 mm; lowest lemma 5–6 mm, scabrous to shortly pubescent, apex entire or 2-denticulate-aristulate; awn 2–4 mm, straight or outwardly curved at base, not twisted. Fl. and fr. Jun–Sep.

Grassy mountain slopes, alpine meadows, among shrubs; 2000–5200 m. Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang [Bhutan, India (Sikkim), Kyrgyzstan, Mongolia, Russia (Siberia)].

This is a less hairy form than subsp. tibeticum, distinguished also by its relatively short, almost straight awns. Some specimens from above 5000 m in Xizang match subsp. mongolicum except for their longer (5–6 mm), twisted awns.

“Trisetum spicatum var. mongolicum (Hultén) P. C. Kuo & Z. L. Wu,” as given in FRPS (9(3): 140, 1987), was not validly published because “T. spicatum subsp. mongolicum Hultén” (Svensk Bot. Tidskr. 53: 214. 1959), on which it was based, was also not validly published because no type was indicated.

3a. Trisetum spicatum subsp. spicatum

This is a less hairy form than subsp. tibeticum, distinguished also by its relatively short, almost straight awns. Some specimens from above 5000 m in Xizang match subsp. mongolicum except for their longer (5–6 mm), twisted awns.

“Trisetum spicatum var. mongolicum (Hultén) P. C. Kuo & Z. L. Wu,” as given in FRPS (9(3): 141. 1987), was not validly published because “T. spicatum subsp. mongolicum Hultén” (Svensk Bot. Tidskr. 53: 213. 1959), on which it was based, was also not validly published because no type was indicated.


Grassy mountain slopes, alpine meadows; above 1900 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liao ning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Russia; Europe, North America].

This is a panarctic taxon, extending southward into the mountains of C Asia and W North America. It is not known from the Himalayas.


Grassy mountain slopes, alpine meadows; above 1900 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liao ning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [Russia; Europe, North America].

This is a panarctic taxon, extending southward into the mountains of C Asia and W North America. It is not known from the Himalayas.

Gravel slopes, alpine meadows; 3800–5600 m. Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India (Sikkim), Japan, Korea, Russia (Far East); North America (Canada, United States)].

This is the most robust member of the complex in China and has the largest spikelets. It has a general distribution along the mountain chains on both sides of the N Pacific, but specimens with these dimensions also occur in the Himalayas, where it intergrades with subsp. virescens. Conversely, specimens with the slightly smaller spikelet dimensions of subsp. virescens are known from Tianjin.

A robust form from Kashmir with pubescent lemmas has been named Trisetum spicatum var. pubiflorum (Hackel) L. Liu (T. pubiflorum Hackel). This has also been reported from the Hengduan Shan.


long-tussock. Culms erect, 20–30 cm tall, 0.5–1 mm in diam., pubescent especially below panicle, 1–3-noded. Leaf sheaths pubescent; leaf blades flat, 5–20 cm, 1.5–2(–4) mm wide, pubescent or scabrous; ligule 1–2 mm. Panicule contracted, linear to lanceolate in outline, usually slightly loose, at least lower branches obvious, 5–18 cm, brown, green, or yellowish green; branches slender, erect or slightly spreading, pubescent. Spikelets 4–8.5 mm, florets 2 or 3; rachilla hairs ca. 1.5 mm; glumes unequal, narrowly lanceolate, lower glume 4–6 mm, upper glume 5–7.5 mm, apex sharply acute; lemmas narrowly lanceolate, 3.5–7 mm, scabrid, awned from near upper 1/3, apex usually 2-denticulate, teeth mucronate, occasionally subentire; awn strongly recurved at base, 4–8 mm, fine, not twisted; palea keels scabrid. Anthers 1.3–1.6 mm. Fl. Jul–Sep.

Montane forests, among bushes, moist grassy mountainsides; 1900–4300 m. Gansu, Hubei, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [E Afghanistan, NW India, Kashmir, Pakistan].

The boundary between Trisetum spicatum and T. clarkei is obscured by intermediates, which are probably the result of introgression between the two species. Trisetum clarkei tends to be a taller, more slender grass, with a slightly looser panicle of narrower spikelets with well-exserted awns.


Perennial. Culms slender, base ascending, ca. 25 cm tall, ca. 0.8 mm in diam., glabrous or appressed-pubescent, densely appressed-pilose with longer spreading hairs below panicle, 3-noded. Leaf blades narrowly linear, ca. 4 cm, 1–1.2 mm wide, both surfaces pubescent with scattered longer hairs, convolute toward acuminate apex; ligule ca. 0.7 mm. Panicle lanceolate in outline, dense, ca. 4 cm, with few spikelets; branches short, densely pubescent with scattered longer spreading hairs; pedicels ca. 2 mm. Spikelets 5–6 mm, florets 2, green or straw-colored; rachilla pilose; glumes lanceolate, unequal, scabrid on keel, apex aristulate, lower glume 3–4 mm, 3-veined, upper glume 4–4.5 mm, 5-veined; lemmas 4–4.5 mm, inconspicuously 5-veined, keel scaberulous, awned from upper 1/3, apex 2-toothed; awn 5–7 mm, geniculate or recurved; palea subequal to lemma, keels densely ciliate. Ovary thinly pilose in upper part. Fl. Aug.

Habitat unknown; ca. 3400 m. NW Yunnan.

This species is known only from the type gathering, which has not been seen.


Bromus bifidus Thunberg in Murray, Syst. Veg., ed. 14, 119. 1784; Avena bifida (Thunberg) P. Beauvois; Trisetum flavescens (Linnaeus) P. Beauvois var. bifidum (Thunberg) Mackino; T. flavescens var. macranthum Hackel; T. flavescens var. papillosum Hackel.

Perennial, tussocky. Culms erect, 30–100 cm tall, glabrous, 2–5-noded. Leaf sheaths usually shorter than internodes, glabrous or pilose, margins joined in lower part; leaf blades flat, soft, up to 20 cm, 3–6 mm wide, glabrous or occasionally pilose; ligule 0.5–2 mm. Panicle lax, oblong to lanceolate-oblong in outline, 10–25 cm, often nodding, yellow-green or brown green; branches 2 or 3 at basal node, scaberulous, lowest up to 10 cm. Spikelets 6–8 mm, florets 2 or 3; rachilla hairs 0.2–0.5 mm; glumes unequal, lower glume 2–3.5 mm, upper glume 4–7 mm, apex acuminate; callus pubescent; lemmas 5–7 mm, firm, golden brown, punctate-scapoid, awned from upper 1/4, apex 2-toothed, teeth 1–2 mm, aristulate; awn 7–10 mm, fine, strongly recurved near base, not twisted; palea 1/2(–2/3) length of lemma, keels conspicuously convex, ciliate. Anthers 0.5–1 mm. Fl. Apr–Jun.

Forests, roadsides, moist grassy ditches banks; 500–2000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, New Guinea].


Bromus flavescens Thunberg in Murray, Syst. Veg., ed. 14, 119. 1784; Avena bifida (Thunberg) P. Beauvois; Trisetum flavescens (Linnaeus) P. Beauvois var. pubiflorum Hackel; T. flavescens var. macranthum Hackel; T. flavescens var. papillosum Hackel.

Perennial, tufted, shortly stoloniferous. Culms 26–35 cm tall, ca. 1.5 mm in diam., glabrous, 2–3-noded. Leaf sheaths scabrid, pubescent with longer hairs toward blade; leaf blades linear, gray-green, 4–10 cm, 2–3 mm wide, abaxial surface prominently veined, both surfaces scaberulous, often pilose, margins long ciliate, apex acuminate; ligule 1.5–3 mm, margin ciliate. Panicle lanceolate in outline, fairly dense, 7–9 cm, spikelets many; branches scabrid; pedicels 2–6 mm, scabrid. Spikelets 6.5–9 mm, florets 3, uppermost reduced, green or violet tinged; rachilla densely pilose; glumes unequal, keel scabrid, margins narrowly hyaline, apex acuminate-aristulate, lower glume lanceolate, 4–5 mm, 1-veined, upper glume elliptic, 5–6.5 mm, 3-veined; callus hairs ca. 0.8 mm; lowest lemma 6.5–7 mm, upper part often violet-colored, keel scabrid, apex 2-toothed; awn 12–16 mm, geniculate or rarely recurved; palea subequal to lemma. Anthers 1.8–2.2 mm. Ovary long-pilose in upper part.
POACEAE


优雅三毛草 you ya san mao cao

Avena flavescent J.D. Hooker (1896), not Linnaeus (1753).

Perennial, loosely tufted. Culms erect from geniculate base, 12–80 cm tall, 1.5–2 mm in diam., glabrous, 2–3-noded. Leaf sheaths usually shorter than internodes, glabrous, margins joined near base; leaf blades flat, soft, 10–20 cm, 2–8 mm wide, adaxial surface scattered pilose; ligule 1–4 mm. Panicle lax, lanceolate in outline, 7–15 cm, gray-green, brown or purplish; branches 1–3 at basal node, capillary, flexuous, smooth, glabrous, up to 5 cm. Spikelets 6.5–9 mm, florets 1–3; rachilla filiform, villous; glumes unequal, narrowly lanceolate, lower glume 4.5–5.3 mm, upper glume 6–7.2 mm, apex finely acuminate; callus glabrous; lemmas 6.5–8 mm, firm, golden brown, scabrous around keel, otherwise smooth, awned from upper 1/4–1/3, apex 2-toothed, teeth 2.5–3 mm, slenderly acuminate-aristulate; awn 19–14 mm, weakly geniculate, column twisted; palea 1/2–2/3 length of lemma, keels slightly convex, scabrid. Anthers 1–1.5 mm. Fl. Jul–Sep.

Alpine scrub, meadows, gravel river banks; 4000–5000 m. Si- chuan, Xizang, Yunnan [Bhutan, India (Sikkim), E Nepal].

This is a locally distributed, high-altitude species with a slender habit and large, brown, long-awned spikelets.


湖北三毛草 hu bei san mao cao

Perennial, shortly rhizomatous; roots thick, villous. Culms stout, rooting at lower nodes, ascending, 80–140 cm tall, 4–5 mm in diam., glabrous, 5–9-noded. Leaf sheaths longer than internodes, lower pubescent, usually closed to middle, upper glabrous, outer margin ciliate; leaf blades broadly linear, 15–35 cm, 5–15 mm wide, scabrid or adaxial surface puberulent, margins stiffly ciliate toward ligule; ligule brown, thick, 1–2 mm. Panicle lax, elliptic to narrowly elliptic-oblong in outline, 10–22 cm, much branched, densely spicate, silvery yellow-green; branches 4–6 or more at lowest node, smooth, longest 6–8 cm. Spikelets 5–7 mm, florets 2 or 3; rachilla hairs 1–1.2 mm; glumes unequal, lower glume 3–4 mm, upper glume 4–6 mm; callus glabrous; lemmas thinly herbaceous with broad hyaline margins, 5–6 mm, finely scabrid, awned from middle to upper 1/3, apex subentire, 2-mucronate; awn 4.5–6 mm, recurved or with short twisted column; palea 3/4 lemma length, keels scabrous. Anthers 2.5–3 mm. Fl. and fr. Jun–Sep.

Grassy roadsides, damp places in forests; below 2400 m. Anhui, Henan, Hubei, Jiangsu, Jiangxi, Shannxi, Shanxi (Ruicheng, Yuenqu), SE Sichuan, Zhejiang (Lin’an).

This is the most robust species in China, remarkable for its thick, hairy roots, stout culms, large panicle of pale spikelets, and thin-textured spikelets.


西伯利亚三毛草 xi bo li ya san mao cao

Trisetum flavescens (Linnaeus) P. Beauvios subsp. sibiricum (Ruprecht) T. Koyama; T. flavescens var. sibiricum (Ruprecht) Ohwi.

Perennial, loosely tufted, shortly rhizomatous. Culms solitary or few, 50–120 cm tall, 1.5–3 mm in diam., glabrous, 3–4-noded. Leaf sheaths mostly shorter than internodes, glabrous or lower shortly pubescent, margins joined near base; leaf blades broadly linear, 6–20 cm, 4–9 mm wide, glabrous or adaxial surface scattered pilose, ligule 1–2 mm. Panicle lax, narrowly oblong to lanceolate in outline, 10–20 cm, much branched, yellowish brown; branches 3–8 at lowest node, slightly scabrid, up to 6 cm. Spikelets 5–10 mm, florets 2–4; rachilla hairs ca. 1 mm; glumes unequal, lower glume 4–6 mm, upper glume 5–8 mm, apex acuminate; callus glabrous or with few very short hairs; lemmas 5–7 mm, firm, golden brown, finely but densely scabrid, awned from upper 1/3, apex 2-toothed, teeth triangular; awn 5–9 mm, strongly recurved, lower part straight or slightly twisted; palea 3/4 lemma length or longer, keels indistinctly scabrous. Anthers 2–3 mm. Fl. and fr. Jun–Aug.

Grassy mountain slopes, open forest, marshy places among shrubs, 700–4200 m. Gansu, Hebei, Heilongjiang, Henan, Hubei (Shennongjia), Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shanxi, Shannxi, Shannxi, Xian, Xian, Xizang [Japan, Kazakhstan, Korea, Mongolia, Russia; SW Asia (Caucasus), E Europe, North America (Alaska)].

This species is a good forage grass, closely related to Trisetum flavescens (Linnaeus) P. Beauvios from Europe. Trisetum flavescens has been introduced into many temperate countries for forage. It can be distinguished from T. sibiricum by its pale yellow leaf sheaths, geniculate awn with twisted column, and bearded callus.


绿穗三毛草 lü sui san mao cao


Culms erect, slender, 70–90 cm tall, glabrous. Leaf sheaths equaling or shorter than internodes, glabrous, outer margin ciliate at mouth, margins closed near base; leaf blades linear, 8–30 cm, 2–7 mm wide, scabrid; ligule 1–2 mm. Panicle lax, broadly lanceolate in outline, up to 22 cm, green; branches capillary, smooth in lower part, upper part scabrid. Spikelets 4–5(–6) mm, florets 1 or 2; rachilla hairs ca. 1.4 mm; glumes unequal, lower glume oblong-lanceolate, 2.5–4 mm, upper glume oblong, 4–5 mm; lemmas 4.5–5.5 mm, scabrid-papillose, awned from above middle, apex 2-toothed, teeth ca. 1.5 mm, acute; awn up to 6.5 mm, straight or almost so, not twisted; palea keels indistinctly scabrous. Anthers ca. 2 mm. Fl. and fr. Jul–Sep.

Marshy meadows and in forest. Heilongjiang, Jilin, Liaoning, Nei Mongol (Yakeshi) [Korea, Russia (Ussuri)].

This is a locally distributed variant of Trisetum sibiricum with small spikelets and almost straight awns.

Perennial, shortly rhizomatous. Culms erect from ascending base, 50–100 cm tall, 2–2.5 mm in diam., glabrous, 4–7-noded. Leaf sheaths closed up to middle or more, basal sheaths longer than internodes, upper shorter, glabrous, sometimes ciliate at margin and mouth; leaf blades soft, 15–30 cm, 5–8 mm wide, smooth or scabrid; ligule brown, ca. 1 mm. Panicle lax, lanceolate-oblong in outline, ca. 15 cm, much branched with many spikelets, silvery brown or purplish; branches whorled, smooth, up to 5 cm. Spikelets 4.5–5.5 mm, florets 1 or 2; glumes unequal, lower glume 2.5–3 mm, upper glume 4–4.5 mm; rachilla hairs ca. 1.5 mm; lemma 4.5–5 mm, scabrid-papillose, awned from upper 1/3, apex subentire; awn 3–4 mm, recurved and slightly twisted near base; palea keels scabrous. Anthers ca. 2.5 mm. Fl. and fr. Jul.–Aug.

- Moist shady places in valleys, woodland margins on mountainsides; 1600–2100 m. Henan, Shanxi, Sichuan.

This is a little-known variant close to *Trisetum sibiricum* and perhaps does not merit specific rank. It has small spikelets like those of *T. umbratile*, but with recurved awns, and occurs outside the known distribution of that taxon.

### 79. KOELERIA Persoon, Syn. Pl. 1: 97. 1805.

**qia cao shu**

Wu Zhenlan; Sylvia M. Phillips

Perennials, tufted, sometimes shortly rhizomatous. Culms unbranched. Leaf sheaths of tillering leaves usually closed; leaf blades mainly basal, narrow, flat, or inrolled and filiform to setaceous; ligule membranous. Inflorescence a dense spike-like panicle, shining; branches short, erect, hispidulous to woolly. Spikelets with 2 to several florets; rachilla pubescent or glabrous, disarticulating below each floret; glumes narrow, unequal or subequal, equaling or shorter than florets, strongly keeled, thinly herbaceous, 1–3(–5)-veined, margins broad, hyaline, shining; floret callus small, glabrous or very shortly hairy; lemmas membranous or papery, strongly compressed, sharply keeled, 3–5-veined, margins hyaline, shining, apex obtuse to acuminate, awnless or with a subapical mucro; palea subequaling lemma, hyaline, gaping free from lemma margins. Stamens 3. Ovary glabrous. Endosperm sometimes liquid.

About 35 species: temperate regions throughout the world, also on tropical mountains; four species in China.

This is a genus of narrowly defined, closely related species. They provide good forage in mountain steppe.

- Lemmas shortly awned, awns 0.5–2.5 mm; rachilla with 0.3–1 mm hairs ................................................................. 1. *K. litvinowii*
  - Glumes and lemmas glabrous, smooth or scabrid.  
    - Plant densely tufted; culms hairy mainly below panicle; spikelets punctate scabrid .................................. 3. *K. macrantha*
    - Plant with short rhizomes, forming loose mats; culms hairy throughout; spikelets smooth ............................. 4. *K. atroviolacea*


**mang qia cao**

Perennial, loosely to densely tufted. Culms up to 50 cm tall, thinly pubescent to tomentose below panicle, 1- or 2-noded, or node basal and obscured. Leaf sheaths glabrous or pubescent; leaf blades flat, 4–15 cm, 1–4 mm wide, pubescent or glabrous, margins sometimes setose near ligule; ligule 1–2 mm. Panicle elliptic-oblong to narrowly oblong in outline, 1.5–12 cm, sometimes interrupted, silky green, grayish or purplish; axis and branches densely pubescent. Spikelets 4.7–6 mm, florets 2 or 3; rachilla hairs 0.3–0.5(–1) mm; glumes slightly unequal, lower glume narrowly lanceolate, 3.5–5 mm, keel scabrid, upper glume elliptic-oblong, 4.3–5.8 mm, keel scabrid or ciliate, margins broadly membranous; lemmas lanceolate, 3.7–5.5 mm, finely scabrid to shortly pubescent, shortly awned from upper 1/4 or above, apex acute or 2-mucronate; awn 0.5–2.5 mm, straight; palea keels scabrid to ciliolate. Anthers 0.6–1.5 mm. Fl. and fr. Jun.–Sep.

Grassy or stony mountain slopes, alpine meadows; 3000–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kashmir, E Kazakhstan, Kyrgyzstan, Tajikistan (Pamirs)].

This species is intermediate between the closely related genera *Trisetum* and *Koeleria*, especially in the possession of a short, straight awn. A hybrid origin has been postulated (*T. spicatum × *K. macrantha*). Variation in the high mountains of W China and neighboring regions is poorly understood. In particular, the boundary with short-awned forms of *T. spicatum* is obscured by intermediates. Forms with a very short, straight awn are all included in *K. litvinowii*.

1a. Leaf sheaths densely pubescent; panicle
  - graysish violet .................................................. 1a. subsp. *litvinowii*
1b. Leaf sheaths glabrous or thinly pilose;
  - panicle silvery green ........................................ 1b. subsp. argentea

1a. *Koeleria litvinowii* subsp. *litvinowii*

**mang qia cao (yuan ya zhong)**

*Koeleria enodis* Keng; *K. hosseana* Domin; *K. hosseana* var. *tafelii* Domin; *K. litvinowii* var. *tafelii* (Domin) P. C. Kuo & Z. L. Wu; *Trisetum litvinowii* (Domin) Nevski.


Grassy or stony mountain slopes, alpine meadows; 3000–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [E Kazakhstan, Kyrgyzstan, Tajikistan (Pamirs)].
This subspecies tends to have a more northwestern distribution than subsp. argentea.

1b. Koeleria litvinowii subsp. argentea (Grisebach) S. M. Phillips & Z. L. Wu, comb. nov.

Perennial, loosely tufted. Culms green, pubescent or subglabrous below panicle. Leaf sheaths usually glabrous. Panicle pale silvery green. Lemma apex minutely 2-mucronate.

Damp meadows, alluvial gravel by rivers and mountain streams; ca. 4000 m. Qinghai, Xizang [Afghanistan, Kashmir].


Perennial, densely tufted or shortly rhizomatous; old basal sheaths encircling 2 or 3 culms together into bunches, finally splitting into fibers. Culms slender, 13–50 cm tall, pubescent below panicle, otherwise glabrous. Leaf sheaths densely pubescent at base, upper culm sheaths subglabrous; leaf blades usually rolled, hard, recurved, 2–13 cm, 0.5–2.5 mm wide, hirsute or sometimes glabrous; ligule 1–2 mm. Panicle 2–3 cm, very dense, lower part interrupted, yellowish green or tinged grayish violet. Spikelets 3.5–5 mm, florets 2(–3); glumes unequal, lanceolate, 2.6–5.5 mm, punctate-scabrous, apex acute, cuspidate, or rarely keel extended up to 0.3 mm into apical mucro; palea keels ciliolate. Anthers 1.2–2.3 mm. Fl. and fr. May–Sep.

Mountain slopes, grassland, roadsides; sea level to 3900 m. Anhui, Fujian, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Sichuan, Xinjiang, Xizang, Zhejiang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Japan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; North America, SW Asia, Europe; introduced to Australia and elsewhere].

This species has usually been known in the past as Koeleria cristata Persoon, an illegitimate, superfluous name that included the types of two earlier names in its circumscription. It is a highly polymorphic species, widespread in temperate parts of the N hemisphere, to which many infraspecific names have been applied. Variable characters include hairiness, stiffness, rolling and color of the leaf blades, panicle color, and spikelet size and hairiness. These variants are mostly ill-defined, interfading, and of negligible practical value.


Koeleria asiatica Domin subsp. atroviolacea (Domin) Tzvelev; K. asiatica subsp. ledebourii (Domin) Tzvelev; K. atroviolacea var. tsinghaica Tzvelev; K. geniculata Domin; K. ledebourii Domin.

Perennial, shortly rhizomatous, forming loose mats; old basal sheaths papery, persistent. Culms erect or geniculate at base, 10–50 cm tall, pilose throughout length, 2–3-noded. Leaf sheaths of cauline leaves inflated; leaf blades green, flat or rolled, 5–15 cm, 1–2 mm wide, smooth or scabrid, occasionally pilose; ligule ca. 0.2 mm. Panicle rather lax, pyramidal to oblong in outline, 2.5–8 cm, lower part often interrupted, yellowish green or tinged grayish violet. Spikelets 4–6 mm, florets 2 or 3; glumes usually glabrous, occasionally shortly ciliate on keel, lower glume narrowly lanceolate, 3.5–4 mm, upper glume broadly lanceolate, 4.5–5 mm; lemma narrowly ovate, ca. 5 mm, smooth, glabrous, awnless, apex acuminate; palea keels scabrid. Anthers ca. 2 mm. Fl. Jun–Aug.

Grassy places on dry mountain slopes; 2900–4600 m. Qinghai, Xizang [Mongolia, Russia (Altai and Sayan Mountains of S Siberia)].

This species is closely related to, and is sometimes regarded as a subspecies of Koeleria asiatica Domin. That species, in the strict sense, is confined to arctic regions of E Europe, Russia, and W North America, and usually has densely hairy spikelets.

It is uncertain whether this grass does in fact occur in China, as was reported in FRPS (9(3): 134, fig. 33. 1987, as Koeleria asiatica), or whether that record relates to an unusually loosely tufted form of K. macrantha. No specimens have been seen.
80. **Deschampsia** P. Beauvois, Ess. Agrostogr. 91. 1812.

发草属 fa cao shu

_Wu Zhenlan (吴珍兰); Sylvia M. Phillips_


Perennials, densely tufted. Leaf blades mainly basal, linear to setaceous, flat, folded or rolled; ligule membranous. Inflorescence usually an open panicle, infrequently contracted or spike-like; branches and pedicels usually filiform. Spikelets oblong to gaping, shining, laterally compressed, florets 2–3(–5), disarticulating below each floret; rachilla pilose, extended beyond uppermost floret; glumes lanceolate to oblong, subequal, 1–7 mm, florets 2, rachilla in ternode short; glumes thinly broad, 4-toothed or denticulately truncate; awn straight or weakly geniculate, usually not exserted from spikelet; palea hyaline, sub-rounded, finely 4-veined (5th midvein extended into awn), glabrous, awned from near base or in lower half, apex membranous, broad, 4-toothed or denticulately truncate; awn straight or weakly geniculate, usually not exserted from spikelet; palea hyaline, sub-equal to lemma. Ovary glabrous. Caryopsis with solid endosperm.

About 40 species: temperate and cold regions of the world; three species in China.

1a. Awns geniculate, clearly exserted from spikelet; leaf blades setaceous, smooth ......................................................... 1. *D. flexuosa*

1b. Awns straight or almost so, included in spikelet or only shortly exserted; leaf blades linear, usually adaxially scabrid.

2a. Panicle dense, spike-like, 80 cm, 0.3–0.5 mm wide, abaxial (outer) surface smooth; ligule brown, twisted. Anthers 1.5–2.5 mm. Fl. and fr. Jul–Sep. 2

2b. Panicle lax and open, or contracted but not spike-like, 6–30 cm, narrowly oblong to ovate ................................ 3. *D. cesitosa*


曲芒发草 qu mang fa cao

*Aira flexuosa* Linnaeus, Sp. Pl. 1: 65. 1753; *A. kawakamii* Hayata; *Avenella flexuosa* (Linnaeus) Drejer; *Deschampsia kawakamii* (Hayata) Honda; *Lerchenfeldia flexuosa* (Linnaeus) Schur.

Perennial, tufted, sometimes rhizomatous; old basal sheaths tightly overlapping. Culms slender, erect, 15–60 cm tall, 2- or 3-noded. Leaf blades longer than internodes, smooth or scaberulous upward; leaf blades setaceous, rather stiff, 3–15 cm, 0.3–0.5 mm wide, abaxial (outer) surface smooth; ligule lanceolate, 2–4 mm. Panicle open, ovate in outline, 5–10 cm, silvery with purple or brown tinge; branches usually paired, capillary, flexuous, bearing spikelets on distal part. Spikelets 4–6(–8) mm, florets 2, rachilla internode short; glumes thinly membranous, 1-veined, lower shorter than upper, apex acute; callus hairs ca. 1 mm; lemmas 3.5–5.6 mm, asperulous, awned from near base, apex denticulate or erose; awn 5–8 mm, exserted from spikelet, geniculate in middle, column dark brown, twisted. Anthers 1.5–2.5 mm. Fl. and fr. Jul–Sep. 2n = 28.

Exposed mountain peaks, on stony soil and rocky slopes. Taiwan [Japan, Philippines (Luzon), Russia; Africa (high mountains), SW Asia (Caucasus), Europe, North America, South America (S Argentina, S Chile)].

A variant of this widespread species found on Yu Shan (Mt. Morrisson) in Taiwan has larger spikelets than usual (6–8 mm), since the glumes are drawn out into long caudate tips, with the upper glume 1–2 mm longer than the lower. This variant is the basis of *Deschampsia kawakamii*. Typical *D. flexuosa* also occurs in Taiwan.


发草 fa cao


Perennial, densely tufted. Culms erect, slender to stout, 5–40 cm tall, 1–1.7 mm in diam., 1(or 2)-noded. Leaf sheaths loose, glabrous; leaf blades linear, flat or rolled, up to 20 cm, 1–3 mm wide, abaxial surface smooth, adaxial surface with coarse sharp ridges, smooth or scaberulous; ligule acuminate, up to 8 mm. Panicle densely contracted to spike-like, ovoid to oblong, 1–7 cm, brownish purple with golden sheen; branches very short, visible or not. Spikelets 4–6 mm, florets 2, rachilla internode ca. 1 mm; glumes subequal to spikelet, lower glume slightly shorter than or equaling upper glume, 1-veined, upper glume 3-veined, apex acute or obtuse, often lacerate; callus hairs ca. 1/3 lemma length; lemmas 3–4 mm, awned from near lower 1/4, apex broadly 2-toothed, teeth irregularly lacerate; awn straight or slightly bent, equaling or slightly longer than lemma. Anthers 1.5–2.2 mm. Fl. Jul–Aug.

Damp alpine meadows, wet places near rivers and stream banks; 3500–5100 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [E Afghanistan, Kashmir, Kazakhstan (Tarbagatai Mountains), Kyrgyzstan, Mongolia, N Pakistan, Russia (S Siberia), Tajikistan (Pamirs), Uzbekistan].

This is a distinctive, high-altitude variant from the *Deschampsia cesitosa* complex, distinguished by its short, spike-like, purple-brown panicles.

A specimen collected in S Xizang (N of Kumaon, N India) has been assigned to *Deschampsia cesitosa* subsp. *sikkimensis* Noltie, which is otherwise known only from India (Sikkim). It is a small plant with compact panicles, close to *D. koelerioides*, but differing in its pyramidal panicle with the spikelets aggregated into fascicles.

3. **Deschampsia cesitosa** (Linnaeus) P. Beauvois, Ess. Agrostogr. 91. 1812.

发草 fa cao

*Aira cesitosa* Linnaeus, Sp. Pl. 1: 64. 1753.

Perennial, densely tufted. Culms erect, slender to stout,
Deschampsia cespitosa is an extremely polymorphic, widely distributed grass. Many regional and local variants have been accorded separate status, either at specific or infraspecific rank. Variation is complex due to polyploidy and introgression, and morphological and cytological variation often do not coincide. There is extensive overlapping of diagnostic characters leading to a lack of clear boundaries between taxa. Variation is nowadays usually consigned to subspecies, mostly strongly linked to geographic distribution. The main variants reported in China are given below.

The position of the awn on the lemma back refers to the lowest lemma. In general the awn arises higher up on the second lemma, and short awns arise higher on the lemma back than do longer awns. A lemma. In general the awn arises higher up on the second lemma, and specimen collected at 2800 m on a grassy spur in Shennongjia, Hubei, strongly linked to geographic distribution. The main variants reported in plex due to polyploidy and introgression, and morphological and cyto-


In this plant the lower lemma length; lemmas 2.5–3.5 mm, awned from near base to near middle, rarely aawnless, apex broad, toothed or erose; awn straight or slightly bent, slightly shorter to longer than lemma. Anthers 1.2–2 mm. Fl. and fr. Jul–Sep.

Culms 30–150 cm tall; 1–3 mm in diam., 1–3-noded. Leaf sheaths loose, glabrous; leaf blades linear, flat or folded, up to 30 cm, 1–5 mm wide, abaxial surface smooth, adaxial surface with coarse sharp ridges, densely scabrid; ligule obtuse to acumin ate, 2–7(–12) mm. Panicle usually open, often nodding, infrequently loosely contracted, ovate to narrowly oblong in outline, up to 30 cm or more, greenish or purplish sometimes with gold-en sheen; branches slender, bearing spikelets on distal part. Spikelets 2.5–7 mm, florets (1–2)–3, rachilla internode ca. 1 mm; glumes slightly longer to slightly shorter than florets, lower glume slightly shorter than or equaling upper glume, 1-veined, upper glume 3-veined, apex acute; callus hairs ca. 1/3 lemma length; lemmas 2.5–3.5 mm, awned from near base to near middle, rarely aawnless, apex broad, toothed or erose; awn straight or slightly bent, slightly shorter to longer than lemma. Anthers 1.2–2 mm. Fl. and fr. Jul–Sep.

Wet meadows, river sand and gravel, among bushes, wet places; 1500–4500 m. Gansu, Heil ongjiang, Nei Mongol, Qinghai, Taiwan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe, North America; introduced elsewhere].

This is the most widely distributed subspecies, either native or introduced in most cold-temperate regions of the world.


Aira sukatschewii Poplavskaja; Deschampsia cespitosa var. festucifolia Honda; D. cespitosa var. microstachya Roshevitz; D. cespitosa subsp. sukatschewii (Poplavskaja) Chiapella & Probatova; D. orientalis (Hultén) B. S. Sun; D. sukatschewii (Poplavskaja) Roshevitz; D. sukatschewii subsp. orientalis (Hultén) Tzvelev.

Culms 10–70 cm tall. Leaf blades 1–2 mm wide. Panicle open, 6–18 cm; branches flexuous, smooth or scabrous. Spikelets 2.5–5 mm; glumes subequaling spikelet; lemmas awned between lower 1/3–1/2; awn usually longer than lemma.

Flood plains, river sand and gravel, wet meadows; below 3800 m. Heilongjiang, Nei Mongol, Qinghai, Taiwan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia (Far East, Siberia); North America].

Deschampsia cespitosa subsp. orientalis is the most common subspecies in E Asia, where it is a vicariant of subsp. cespitosa, which is native in Europe and western parts of Asia and introduced in E Asia.


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Aira sukatschewii Poplavskaja; Deschampsia cespitosa var. festucifolia Honda; D. cespitosa var. microstachya Roshevitz; D. cespitosa subsp. sukatschewii (Poplavskaja) Chiapella & Probatova; D. orientalis (Hultén) B. S. Sun; D. sukatschewii (Poplavskaja) Roshevitz; D. sukatschewii subsp. orientalis (Hultén) Tzvelev.

Culms 10–70 cm tall. Leaf blades 1–2 mm wide. Panicle open, 6–18 cm; branches flexuous, smooth or scabrous. Spikelets 2.5–5 mm; glumes subequaling spikelet; lemmas awned between lower 1/3–1/2; awn usually longer than lemma.

Flood plains, river sand and gravel, wet meadows; below 3800 m. Heilongjiang, Nei Mongol, Qinghai, Taiwan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia (Far East, Siberia); North America].

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Culms 10–70 cm tall. Leaf blades 1–2 mm wide. Panicle open, 6–18 cm; branches flexuous, smooth or scabrous. Spikelets 2.5–5 mm; glumes subequaling spikelet; lemmas awned between lower 1/3–1/2; awn usually longer than lemma.

Flood plains, river sand and gravel, wet meadows; below 3800 m. Heilongjiang, Nei Mongol, Qinghai, Taiwan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia (Far East, Siberia); North America].

Deschampsia cespitosa subsp. orientalis is the most common subspecies in E Asia, where it is a vicariant of subsp. cespitosa, which is native in Europe and western parts of Asia and introduced in E Asia.


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Aira sukatschewii Poplavskaja; Deschampsia cespitosa var. festucifolia Honda; D. cespitosa var. microstachya Roshevitz; D. cespitosa subsp. sukatschewii (Poplavskaja) Chiapella & Probatova; D. orientalis (Hultén) B. S. Sun; D. sukatschewii (Poplavskaja) Roshevitz; D. sukatschewii subsp. orientalis (Hultén) Tzvelev.

Culms 10–70 cm tall. Leaf blades 1–2 mm wide. Panicle open, 6–18 cm; branches flexuous, smooth or scabrous. Spikelets 2.5–5 mm; glumes subequaling spikelet; lemmas awned between lower 1/3–1/2; awn usually longer than lemma.

Flood plains, river sand and gravel, wet meadows; below 3800 m. Heilongjiang, Nei Mongol, Qinghai, Taiwan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia (Far East, Siberia); North America].

Deschampsia cespitosa subsp. orientalis is the most common subspecies in E Asia, where it is a vicariant of subsp. cespitosa, which is native in Europe and western parts of Asia and introduced in E Asia.

Culms 30–70 cm. Leaf blades 1–3 mm wide. Panicle usually loosely contracted, often nodding, 5–15 cm, purplish brown tinged golden; branches flexuous, smooth or scaberulous, lowest up to 7 cm. Spikelets 4.5–8 mm; glumes much longer than adjoining lemmas, apex acuminate; lemmas awned from near base or near middle; awn not or only slightly longer than lemma. Fl. and fr. Jul–Sep.

- Alpine meadows, pebbly river beds, roadsides, damp places; 3200–5100 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan.

*Deschampsia cespitosa* subsp. *ivanovae* is distinguished mainly by its long-acuminate glumes. The name *D. littoralis* (Gaudin) Reuter has been misapplied to this taxon in Chinese literature. Genuine *D. littoralis* refers to a variant from Switzerland with short ligules and proliferating spikelets.

*Deschampsia multiflora* appears to be based on an aberrant gathering from Qinghai with 3–5 florets per spikelet. The type has been lost.

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绒毛草属 rong mao cao shu

*Wu Zhenlan* (吴珍兰); *Sylvia M. Phillips*

*Sorgum* Adanson (1763), not *Sorghum* Moench (1794).

Annuals or perennials. Leaf blades flat. Inflorescence a moderately to densely contracted panicle. Spikelets laterally compressed, disarticulating below glumes, florets 2, lower floret bisexual, upper floret staminate; rachilla usually curved and hooked below bisexual floret, often shortly extended above stamine floret; glumes subequal, papery, enclosing florets, strongly keeled, lower glume 1-veined, upper glume 3-veined; lemmas cartilaginous, shiny, rounded on back, veins indistinct, apex obtuse or 2-toothed, upper lemma or both awned; awn arising from upper 1/3 of lemma back, geniculate, hooked or straight; palea slightly shorter than lemma, membranous.

Eight species: N Africa, SW Asia, Europe; one species (introduced) in China.


绒毛草 rong mao cao

*Avena lanata* (Linnaeus) Koeler; *Notholcus lanatus* (Linnaeus) Nash ex Hitchcock.

Perennial, softly hairy. Culms tufted, erect or geniculate at base, 30–80 cm tall, pubescent, 4–5-noded. Leaf sheaths loose, tomentose with reflexed hairs; leaf blades flat, 6–18 cm, 3–9 mm wide, soft, both surfaces pubescent, apex acute; ligule 2–3 mm, truncate or toothed. Panicle lanceolate to oblong or ovate in outline, rather loose to very dense, 3–12 cm; branches narrowly ascending, pubescent. Spikelets oblong or gaping, 3.5–6 mm, pale grayish green or purplish; glumes lanceolate, keel and veins hispidulous, surface scabrid or puberulent to villous, lower glume apex acute, upper glume wider and sometimes slightly longer than lower glume, apex mucronate; florets subequal, 2–2.5 mm; rachilla ca. 0.5 mm; lower lemma awnless, anthers 1.8–2 mm; upper lemma with hooked 1–2 mmawn, anthers ca. 1.5 mm. Fl. and fr. May–Oct.

Open ground, meadows, moist places; an adventive occasionally cultivated as a meadow grass. Jiangxi, Taiwan, Yunnan [native to Europe].

This European grass is now introduced as a weed in most temperate parts of the world.

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82. **AIRA** Linnaeus, Sp. Pl. 1: 63. 1753.

银须草属 yin xu cao shu

*Wu Zhenlan* (吴珍兰); *Sylvia M. Phillips*

Annuals, small. Leaf blades rolled. Inflorescence an open or contracted panicle. Spikelets small, laterally compressed, florets 2, both alike, bisexual, separated by very short internode, disarticulating below each floret; rachilla not extended beyond upper floret; glumes persistent, equal, enclosing florets, ovate, membranous, shining, 1(–3)-veined, apex acute; floret callus small, usually shortly bearded laterally, rarely glabrous; lemmas ovate, rounded on back, membranous becoming firm at maturity, indistinctly 5-veined, glabrous, upper part scaberulous to scabrid, awned from lower back or lower floret awnless, apex 2-toothed; awn geniculate with twisted column; palea slightly shorter than lemma. Anthers small. Caryopsis fusiform. 2n = 14, 28.

Eight species: centered on the Mediterranean region, extending northward to Scandinavia and eastward to Iran and Afghanistan; introduced in other temperate regions; one species in China.


银须草 yin xu cao

Culms solitary or tufted, erect or slightly geniculate, very slender, 5–30 cm tall, scabrid. Leaf sheaths scaberulous; leaf blades narrowly linear to filiform, 1–5 cm, 2–3 mm wide; ligule lanceolate, 1–4 mm, acute becoming lacerate. Panicle open, ovate in outline, up to 10 cm; branches 2–5 cm, capillary, scabrid, bearing spikelets in clusters toward tips; pedicels 2–4 mm, up to twice spikelet length, a pear-shaped swelling below spike-

Annual or perennial, tufted or rhizomatous. Leaf blades linear, flat; ligule membranous. Inflorescence a contracted or spike-like panicle. Spikelets strongly laterally compressed, florets 3 with lower 2 usually reduced to sterile lemmas and uppermost floret bisexual, disarticulating above glumes, rachilla not or very rarely extended beyond uppermost floret; glumes subequal, boat-shaped, as lemmas up to 1/2 as long as sterile lemma, narrow, often hairy, or one or both reduced to a vestigial fleshy scale at base of sterile floret; fertile floret shorter than glumes, leathery often becoming cartilaginous and shiny, rounded on back, obscurely 5-veined, awnless; palea resembling lemma, 2-veined. Caryopsis tightly enclosed by lemma and palea; embryo small; hilum linear.


Annual or perennial, tufted or rhizomatous. Leaf blades linear, flat; ligule membranous. Inflorescence a contracted or spike-like panicle. Spikelets all alike, not in clusters, disarticulating above the persistent glumes.

83. PHALARIS

This pioneer of dry, open places is now widespread in temperate regions.

Eleven species: mainly in the Mediterranean region and warm-temperate parts of the New World, one species circumboreal; several species widely distributed as adventives; five species (four introduced) in China.

1a. Spikelets falling in clusters of 7, a single fertile spikelet encircled by 6 reduced sterile spikelets............................. 5. P. paradoxa
1b. Spikelets all alike, not in clusters, disarticulating above the persistent glumes.

2a. Glumes not or very narrowly winged; perennial with spreading rhizomes ........................................................................ 1. P. arundinacea
2b. Glumes winged; annual or tufted perennial.

3a. Perennial, culm bases often bulbously thickened ............................................................................................. 2. P. aquatica
3b. Annuals, culm bases not thickened.

4a. Sterile lemmas 2, equal; anthers ca. 3 mm ............................................................................................................ 3. P. canariensis
4b. Sterile lemma 1; anthers 1.5–1.8 mm .................................................................................................................. 4. P. minor


Annual, rhizomatous; rhizomes extensively spreading. Culms reed-like, erect, leafy, 0.6–1.5 m tall, 6–8-noded. Leaf sheaths glabrous, not inflated; leaf blades 10–35 cm × 10–18 mm, tapering to a fine apex; ligule 2–3 mm. Panicle contracted, linear-oblong in outline, lobed, interrupted, 8–15 cm; branches short, erect, densely spicate. Spikelets oblong, laterally compressed, 4–6 mm; glumes narrowly lanceolate, glabrous or puberulous, pale green streaked darker green or purplish, keel scabrid, wingless or very narrowly winged upward, apex sharply acute; sterile lemmas equal, subulate, 1.5–1.8 mm, villous; fertile lemma broadly lanceolate, 3–4 mm, appressed-pubescent upward, shiny; palea boat-shaped, keels ciliolate. Anthers 2.5–3 mm. Fl. and fr. Jun–Aug. 2n = 28.

Marshy grassland, river and lake margins, forming colonies; 100–3200 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang (Lin’an) [widely distributed in temperate parts of the N hemisphere].

An ornamental form of this species with green- and cream-striped leaf blades, Phalaris arundinacea var. picta Linnaeus (丝带草 si dai cao), is sometimes cultivated in gardens.


Annual, loosely tufted. Culms 30–60(–100) cm tall. Uppermost leaf sheaths inflated with short blade; leaf blades 3–10 mm wide; ligule 3–5 mm. Panicle spike-like, very dense, ovate to oblong-ovate in outline, 1.5–4 cm. Spikelets obovate, strongly flattened, 7–10 mm; glumes oblanceolate, glabrous or puberulent, whitish with green veins, keel broadly winged above middle, wing margin entire, apex acute; sterile lemmas 2, equal, narrowly elliptic, chaffy, 2.5–4 mm, appressed-pilose; fertile

Roadsides and other disturbed places, introduced; below 3000 m. Hebei, Shanghai, Taiwan [W Mediterranean region, SW Asia (Caucasus)].

This species is widely cultivated for bird seed (Canary Grass) and is adventive in most warm-temperate countries.


細齒茅 xi gè cao

Annual, tufted. Culms 20–100 cm tall. Uppermost leaf sheaths not inflated; leaf blades 3–9 mm wide; ligule 4–6 mm. Panicle dense, ovate to oblong, 1–6 cm. Spikelets elliptic, 4.5–5.5 mm; glumes winged on upper part of keel, wing margin erose-denticulate; sterile lemma 1, ca. 1 mm, appressed-pilose; fertile lemma lanceolate-ovate, 2.7–4 mm, pubescent, becoming cartilaginous and shiny. Anthers 1.5–1.8 mm. 2n = 28.

Wheat fields, introduced. Yunnan [Bhutan, N India, Pakistan; N Africa, SW Asia, S Europe].

This annual weed, native in the Mediterranean region, is now widely distributed in many parts of the world. It was introduced to China accidentally in wheat seed imported from Mexico about 1974 and is becoming naturalized in parts of Yunnan.


奇異茅 qi ge cao

Annual, tufted. Culms 15–100 cm tall. Uppermost leaf sheath inflated; leaf blades 2–9 mm wide; ligule 2–8 mm. Panicle dense, narrowly oblong, 4–10 cm, base enclosed in uppermost leaf sheath. Spikelets arranged in clusters composed of 1 fertile spikelet encircled by 6 sterile spikelets, clusters falling entire, sterile spikelets sometimes reduced to club-shaped clusters of glumes. Fertile spikelet: glumes 4.5–6 mm, prominently 7–9-veined, narrowly winged, wing expanded near middle into large tooth, pale green or straw-colored with dark green stripe above tooth, apex attenuate; sterile lemmas abortive, represented by 2 minute fleshy scales at base of fertile lemma; fertile lemma elliptic, 2.8–3.2 mm, cartilaginous, shiny, sparsely pillose toward apex. Anthers 1–1.8 mm. 2n = 14.

Wheat fields, introduced. Yunnan [N Africa, SW Asia, S Europe].

Like the previous species, this widespread annual weed was introduced to China accidentally in wheat seed imported from Mexico about 1974.


黃花茅 hua huang mao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Hierochloë R. Brown.

Perennial, fragrant herbs. Inflorescence an open or contracted panicle. Spikelets lanceolate to plumply elliptic or oblong, weakly laterally compressed, florets 3, brown, lower 2 florets staminate or sterile, terminal floret bisexual; rachilla disarticulating above glumes but not between florets. Glumes persistent, unequal to subequal, lanceolate to ovate, lower glume shorter, 1(–3)-veined, upper glume 3(–5)-veined, about as long as spikelet, apex acute. Lower 2 florets subequal, with a palea and 3 stamens, or sterile and eplantate, or a combination of both; lemmas equal to or shorter than upper glume, firmly membranous to leathery, often brown-pilose on back and ciliate along margins, apex emarginate to deeply 2-lobed, awnless, with a short straight awn from above middle, or geniculately awned from near base. Bisexual floret equaling or shorter than 2 lower florets; lemma cartilaginous, glossy, 3–5-veined, margins convolute and covering palea, apex awnless, rarely mucronate; palea 1–3-veined, without keels; lodicules absent or 2; stamens 2; stigmas plumose. x = 5, 7.

About 50 species: temperate and cold regions of both hemispheres, also on tropical mountains; ten species (three endemic) in China.

All species are scented with coumarin (C₉H₆O₂), and some are used medicinally for their coumarin content.

Hierochloë has traditionally been recognized on the basis of the two lower florets being staminate, paleate, and awnless or only shortly awned, in contrast to the sterile, eplantate, geniculately awned lower florets in typical Anthoxanthum. Lodicules are also absent in typical Anthoxanthum. However, it is now known that a considerable number of species is intermediate in these characters, including some in China, and also some (e.g., A. hookeri) where the sex of the lower florets is variable within the species. There is no justification for continuing to recognize two separate genera. The species are all clearly related by their unusual spikelet structure and by the presence of coumarin.

1a. Lemma of both lower florets awnless or mucronate.

2a. Spikelets 3.5–6 mm; lower florets slightly shorter than glumes; plants up to 60 cm tall; panicle 4–10 cm .......... 1. A. nitens

2b. Spikelets 2.5–4 mm; lower florets equal to or longer than glumes; plants up to 30 cm tall; panicle 3–6 cm ...... 2. A. glabrum

1b. Lemma of both lower florets awned, or at least lemma of second floret.

3a. Lower florets both stamine, with a palea and stamens, or second floret sterile.

4a. Culms 50–120 cm tall; leaf blades 6–15 mm wide; panicle 10–22 cm; 2 lower lemmas scabrid ................. 3. A. potaninii

4b. Culms 10–50 cm tall; leaf blades 2–8(–10) mm wide; panicle 1.5–10 cm; 2 lower lemmas pubescent.

5a. Panicle 1.5–5 cm; awn of second lemma arising near middle, 3–7 mm, straight or weakly geniculate; bisexual floret hairy toward apex.

6a. Lemma of second floret with straight ca. 3 mm awn ................................................ 4. A. tibeticum

6b. Lemma of second floret with weakly geniculate 4–7 mm awn .................................................. 5. A. monticola
5b. Panicle 6–10 cm; awn of second lemma arising near base, 6–11 mm, clearly geniculate; bisexual floret glabrous ................................................................. 6. A. hookeri
3b. Lower florets both sterile, without a palea or stamens.

7a. Spikelets ca. 3 mm, obovate ......................................................................................................................... 7. A. pallidum
7b. Spikelets more than 3 mm, lanceolate to obleng.

8a. Leaf blades up to 3 mm wide; spikelets 3–5 mm; glumes ovate ....................................................................... 8. A. sikkimense
8b. Leaf blades up to 7 mm wide; spikelets 4.3–9 mm; glumes lanceolate.

9a. Spikelets 4.3–5.5 mm; lower glume 3/4 length of the upper glume; sterile lemmas ca. 4/5 length of spikelet ................................................................. 9. A. hordfieldii
9b. Spikelets 6–9 mm; lower glume 1/2 length of upper glume; sterile lemmas 1/2–2/3 length of spikelet ................................................................. 10. A. odoratum


光稃香草 guang fu xiang cao

Hierochloë bungeana Trinius; H. glabra Trinius subsp. bungeana (Trin.) Peschkova; H. odorata (Linnaeus) P. Beauvois; H. odorata f. pubescens Krylov; H. odorata subsp. pubescens (Krylov) H. Har & T. Koyama; Holcus odoratus Linnaeus.

Plant with slender creeping rhizomes. Culms 10–30 cm tall, 2–3-noded. Leaf sheaths glabrous or ± pubescent, longer than internodes; basal leaf blades up to 30 cm, 3–10 mm wide, culm leaves much shorter, glabrous or adaxial surface puberulous, margins scabrid, apex acuminate; ligule 2–5 mm, obtuse. Panicle pyramidal, loose, 4–10 cm; branches spreading, smooth, bare in lower half. Spikelets plumply elliptic, 3.5–6 mm, light brown, shining; glumes subequal, slightly shorter than spikelet, 3-veined; lower florets staminate, lemmas equal to or longer than glumes, subglabrous or minutely puberulous on back near apex, margins ciliate, apex obtuse or emarginate and mucronate, macro up to 0.5 mm; bisexual floret 2–2.5 mm, pubescent toward apex; palea 1-veined; anthers 1.7–2 mm. Fl. and fr. Jun–Sep.

Mountain slopes, floodplains, wet grasslands; 500–3000 m. Anhui, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shandong, Xinjiang, Yunnan, Zhejiang (Lin'an) [Kazakhstan, Mongolia, Russia].

This species is very close to Anthoxanthum nitens and is not clearly separable from the Asian forms of that species that have a glabrous callus. There is a tendency in A. glabrum to smaller panicles and spikelets and relatively shorter glumes, thereby imparting a slightly different habit.


松序光稃香草 song xu mao xiang cao


Plant loosely tufted, shortly rhizomatous, brown scales at base. Culms 50–120 cm tall, 4-noded, nodes black-brown. Leaf sheaths glabrous, smooth or scaberulous, shorter than internodes below and longer above; leaf blades broadly linear, 15–25 cm, 6–15 mm wide, both surfaces scabrid; ligule up to 1 cm, lanceolate. Panicle fairly loose, 10–22 × 2–6 cm; branches smooth. Spikelets 3.5–6 mm; glumes unequal, lower glume about half spikelet length, 1-veined, upper glume a little shorter than spikelet, 3-veined; lower florets staminate, lemmas ca. 5 mm, scabrid on back, margins ciliate, apex emarginate; first lemma awnless or mucronate; second lemma with subapical awn up to 4 mm; bisexual floret similar to staminate but smooth on back, scabrid near apex; palea 1(–2)-veined; anthers 2–3.5 mm. Fl. Jun.

- Grassy places in mountain valleys, forest margins and among shrubs; 2500–3000 m. S Gansu, W Sichuan.
**Anthoxanthum laxum** (R. Brown ex J. D. Hooker) Veldkamp (Hierochloë laxa R. Brown ex J. D. Hooker) has been confused with this species. *Anthoxanthum laxum* occurs on high-mountain ledges and in alpine pastures above 3000 m in E Afghanistan, Kashmir, Nepal, and N Pakistan. It can be distinguished by its smooth leaf blades, subequal glumes, and pilose or hirsute apex of the bisexual floret.


高山茅香 zang mao xiang


*Hierochloë tibetica* has been confused with *A. alpinum* because the heterotypic name *A. alpinum* Á. Löve & D. Löve already exists.


高山茅香 gao shan mao xiang


*Plant forming loose mats, shortly rhizomatous. Culms 20–35 cm tall, 2-noded. Leaf sheaths smooth, glabrous; leaf blades flat or involute, basal 2–5 cm, 2–3 mm wide, culm blades shorter and broader, both surfaces smooth and glabrous, margins scabrid; ligule 2–2.5 mm. Panicle loose or contracted, 2.5–5 × 1–3 cm, with ca. 10 spikelets; branches capillary, smooth, flexuose, pubescent. Spikelets obovate, 5–6 mm, purplish; glumes subequal, as long as spikelet, broadly ovate-oblong, 3-veined, apex hyaline, otherwise purple, back glabrous or a few scattered hairs; lower florets staminate, lemmas densely pubescent; first lemma bilobed, awnless; second lemma 2-cleft to about middle, short-awned from sinus, awn straight, 2–3 mm; bisexual floret ca. 2.5 mm, pubescent above middle; palea 2-veined; anthers 1.2–1.5 mm.● Exposed mountain ridges and slopes; ca. 5000 m. Xizang.


藏黄花茅 zang huang hua mao


*Plant loosely tufted, shortly rhizomatous. Culms 20–50 cm tall, 3–4-noded. Leaf sheaths glabrous or puberulous; leaf blades linear or broadly linear, 5–25 cm, 3–8 mm wide, pubescent or abaxial surface glabrous, apex acuminate; ligule 1.5–5 mm, truncate-lacerate. Panicle rather loose or contracted, lanceolate or lanceolate-oblong in outline, 6–10 cm. Spikelets lanceolate-oblong, 5.5–8 mm, green when young, maturing purplish brown; glumes unequal, lanceolate, lower glume 3–5–(6) mm, 1–(3)-veined, upper glume equal to spikelet, 3–(5)-veined; lower florets pubescent on back, apex 2-lobed, lobes acute; first floret usually staminate with palea (rarely stamens abortive), lemma 5–6 mm, lobed in upper 1/3, awned from sinus, awn fine, straight, 1–4 mm; second staminate often sterile and ephalate (but sometimes staminate with palea), lemma awned from lower 1/4, apical lobes short or back splitting to awn insertion, awn geniculate, 6–11 mm; bisexual floret 2.5–3.2 mm, smooth, shiny, (3–)5-veined; palea veinless; anthers 2.5–3.5 mm. Fl. and fr. May–Dec.

Open grassy mountainsides, dry rocky ridges, forests; 2100–4000 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, NE India, N Myanmar, Nepal].

The sexuality of the 2 lower florets is very variable in this species. *Anthoxanthum latifolium* is based on a particularly broad-leaved form from Yunnan.


淡黄色茅花 dan se huang hua mao


*Culms geniculate at base, shortly stoloniferous, 7–16 cm tall. Leaf sheaths glabrous; leaf blades flat, lanceolate, 5–12 cm, 2–4 mm wide; ligule 1–2.5 mm. Panicle contracted, 2.5–4 × 0.4–0.5 cm; branches single or in pairs; pedicels very short, setulose-pilosely. Spikelets obovate, ca. 3 mm; glumes subequal, ovate, pale with green keel, 3-veined, sparsely setose, apex acute; lower florets as long as glumes, sterile, composed only of lemmas, densely appressed-pilosely on back, apex 2-lobed; first lemma with awn arising from middle, awn straight, equaling lemma body; second lemma deeply bifid, awned from sinus, awn straight; bisexual floret less than 1/2 length of glumes, smooth, shiny; anthers ca. 3 mm. Fl. and fr. spring to summer.

● Mountain slopes, damp meadows, ca. 2700 m. Sichuan, NE Yunnan.

Anthoxanthum sikkimense is a variable species of mountains in SE Asia, extending into India. There are small differences between the populations from different islands or mountain areas, and these populations are sometimes recognized at varietal rank. However, this approach has led to a proliferation of varieties based on overlapping, only partially segregating characters and is not followed here.

Both lower florets appear to be sterile and epaleate in Taiwan, but in SE Asia the first floret may sometimes be staminate with a palea.

Anthoxanthum horsfieldii is in fact very close to A. hookeri from the Himalayas, which differs in little more than its rather looser panicle and acute lemma lobes.


Anthoxanthum odoratum subsp. odoratum

Plant loosely tufted, sometimes rhizomatous. Culms 15–60(–100) cm tall, 1–3-noded. Leaf sheaths glabrous or loosely pilose, mouth glabrous or bearded; leaf blades flat, up to 12 cm, 2–7 mm wide, glabrous or loosely pilose, smooth or scabrid, apex acuminate; ligule 1–3 mm, obtuse. Panicle dense, spike-like, lanceolate to narrowly oblanceolate in outline, 2–7(–10) × 0.4–1 cm; branches short; pedicels pubescent or glabrous. Spikelets lanceolate, 6–9 mm; glumes unequal, pubescent, punctiform-scabrid, margins sometimes ciliate, lower glume ca. 1/2 length of upper glume, 1-veined, upper glume subequal to spikelet, 3-veined; lower florets sterile, composed only of lemmas, 2.5–3.5 mm, pilose on back, apex 2-lobed, lobes obtuse; first lemma awned near base, awn geniculate, 7–9 mm; second lemma 3.9–4 mm, smooth, shiny; palea 1-veined; anthers 3–4.5 mm. Fl. and fr. May–Aug.

Meadows, alpine steppe; 1400–2900 m. Jiangxi, Taiwan (introduced), Xinjiang, NE China [Japan, Korea, Mongolia, Russia; Europe].

1a. Pedicels and glumes pubescent ........ 10a. subsp. odoratum

1b. Pedicels and glumes glabrous ............ 10b. subsp. alpinum

10a. Anthoxanthum odoratum subsp. odoratum

Anthoxanthum odoratum subsp. odoratum

Plant loosely tufted, sometimes rhizomatous. Culms 15–60(–100) cm tall, 1–3-noded. Leaf sheaths glabrous or loosely pilose, mouth glabrous or bearded; leaf blades flat, up to 12 cm, 2–7 mm wide, glabrous or loosely pilose, smooth or scabrid, apex acuminate; ligule 1–3 mm, obtuse. Panicle dense, spike-like, lanceolate to narrowly oblanceolate in outline, 2–7(–10) × 0.4–1 cm; branches short; pedicels pubescent or glabrous. Spikelets lanceolate, 6–9 mm; glumes unequal, pubescent, punctiform-scabrid, margins sometimes ciliate, lower glume ca. 1/2 length of upper glume, 1-veined, upper glume subequal to spikelet, 3-veined; lower florets sterile, composed only of lemmas, 2.5–3.5 mm, pilose on back, apex 2-lobed, lobes short, obtuse; first lemma awned from near middle, awn straight, 2–4 mm; second lemma awned near base, awn geniculate, 7–9 mm; bisexual floret 2–3 mm, smooth, shiny; palea 1-veined; anthers 3–4.5 mm. Fl. and fr. May–Aug.

Meadows, alpine steppe; 1400–2900 m. Jiangxi, Taiwan (introduced), Xinjiang, NE China [Japan, Korea, Mongolia, Russia; Europe].

1a. Pedicels and glumes pubescent ........ 10a. subsp. odoratum

1b. Pedicels and glumes glabrous ............ 10b. subsp. alpinum

10b. Anthoxanthum odoratum subsp. alpinum

Anthoxanthum odoratum subsp. alpinum

Plant loosely tufted, sometimes rhizomatous. Culms 15–60(–100) cm tall, 1–3-noded. Leaf sheaths glabrous or loosely pilose, mouth glabrous or bearded; leaf blades flat, up to 12 cm, 2–7 mm wide, glabrous or loosely pilose, smooth or scabrid, apex acuminate; ligule 1–3 mm, obtuse. Panicle dense, spike-like, lanceolate to narrowly oblanceolate in outline, 2–7(–10) × 0.4–1 cm; branches short; pedicels pubescent or glabrous. Spikelets lanceolate, 6–9 mm; glumes unequal, pubescent, punctiform-scabrid, margins sometimes ciliate, lower glume ca. 1/2 length of upper glume, 1-veined, upper glume subequal to spikelet, 3-veined; lower florets sterile, composed only of lemmas, 2.5–3.5 mm, pilose on back, apex 2-lobed, lobes short, obtuse; first lemma awned from near middle, awn straight, 2–4 mm; second lemma awned near base, awn geniculate, 7–9 mm; bisexual floret 2–3 mm, smooth, shiny; palea 1-veined; anthers 3–4.5 mm. Fl. and fr. May–Aug.

Meadows, alpine steppe; 1400–2900 m. Jiangxi, Taiwan (introduced), Xinjiang, NE China [Japan, Korea, Mongolia, Russia; Europe].

This is a polymorphic grass, introduced in grass seed or adventive in many temperate countries.
85. **COLEANTHUS** Seidel in Roemer & Schultes, Syst. Veg. 2: 11. 1817, nom. cons.

**Suo he shu**

Chen Shouliang (陈守良); Sylvia M. Phillips

Dwarf ephemeral. Leaf blades broadly linear, flat or folded, falcate. Inflorescence a sparsely branched panicle, spikelets arranged in distant, compact, umbellate clusters, base enclosed in inflated, funnel-like uppermost leaf sheath. Spikelets laterally compressed, floret 1, rachilla extension absent; glumes absent; lemma ovate, hyaline, 1-veined, keeled, apex extended into a subulate cusplike awn; palea variable in size, frequently about 2/3 lemma length, broad, 2-toothed, keels extended into mucros. Lodicules absent. Stamens 2. Caryopsis elliptic-oblong, protruding from floret and shed from it at maturity; hilum oval.

One species: C and N Europe to NE Asia; probably introduced in North America.

This is a widely distributed, but rather rare little grass, occurring sporadically in scattered localities.


**Suo he**


Culms spreading, forming small mat, branching at lower nodes, ascending up to 5(–10) cm. Leaf sheaths inflated; leaf blades ca. 1 cm × 1–4 mm, smooth, glabrous; ligule 0.5–3 mm. Panicle 0.5–3 cm; pedicels verticillate, 1–2 mm, setulose. Spikelets lanceolate; lemma 0.8–1.3 mm, vein scabrid; awn ca. 1 mm; palea 0.5–1 mm, keels scabrid or almost smooth. Anthers 0.3–0.4 mm. Caryopsis 1.7–2.1 mm, dark brown. Fl. and fr. spring to summer. 2n = 14.

Muddy streamsides, lake margins, other wet places, forming colonies. NE China, Jiangxi [Russia; Europe; probably introduced in North America (NW United States)].

86. **AGROSTIS** Linnaeus, Sp. Pl. 1: 61. 1753.

**Jian gu ying shu**

Lu Shenglian (卢生莲); Sylvia M. Phillips

*Pentatherum* Nábelek.

Annuals or perennials, tufted or sometimes with rhizomes or stolons. Leaf blades linear to filiform or setaceous, flat or rolled; ligule membranous. Inflorescence a panicle, open to contracted or spike-like. Spikelets with 1 floret, small, often gaping, without rachilla extension; rachilla disarticulating above glumes; glumes persistent, longer than floret, subequal or lower a little longer, membranous, 1-veined, apex subacute to acuminate; floret callus glabrous or shortly pilose; lemma oblong to elliptic, thinner than glumes, often hyaline, 5-veined, rounded on back, glabrous or hairy, lateral veins sometimes excurrent, awnless or awned from back, apex truncate or toothed; awn usually geniculate, sometimes weakly so or straight when short; palea shorter than lemma, sometimes very small. Stamens 3. Caryopsis oblong, sulcate on ventral side.

About 200 species: temperate and cold regions of the N hemisphere, also on tropical mountains; 25 species (eight endemic) in China. The genus includes some good fodder and lawn plants.

Some species are superficially very similar, and correct identification depends on careful observation of spikelet details. It is also important to collect the basal parts to show the presence or absence of rhizomes and stolons. When the palea is long it is normally obvious, but small paleas usually adhere to the mature caryopsis and may appear to be absent. The presence or absence of awns is useful for identification, but awned species may have awnless variants, and vice versa, and the position of the awn on the lemma back can also be rather variable.

1a. Lemma hairy.

2a. Spikelets 1.5–3 mm; palea almost equaling lemma ................................................................. 1. *A. munroana*

2b. Spikelets 3–4 mm; palea clearly shorter than lemma.

3a. Palea ca. 1/3 length of lemma; ligule 2.5–6 mm ........................................................................ 2. *A. pilosula*

3b. Palea ca. 2/3 length of lemma; ligule 1.5–2.5 mm ................................................................. 3. *A. dshungarica*

1b. Lemma glabrous.

4a. Palea well developed, more than 1/3 lemma length.

5a. Culms up to 20 cm tall; alpine grass in Taiwan ................................................................. 17. *A. fukayamae*

5b. Culms up to 130 cm tall; not alpine grasses.

6a. Anthers 0.5–0.8 mm; palea slightly under 1/2 lemma length .............................................. 16. *A. arisan-montana*

6b. Anthers 0.8–1.5 mm; palea 1/2–3/4 lemma length.

7a. Plant stoloniferous, rhizomes absent; panicle contracted after anthesis ............................... 4. *A. stolonifera*

7b. Plant tufted or rhizomatous, stolons absent; panicle open after anthesis.

8a. Ligule on non-flowering shoots shorter than wide; panicle branches almost smooth; plants up to 70 cm .................................................................................................................. 5. *A. capillaris*
8b. Ligule on non-flowering shoots as long as or longer than wide; panicle branches scabrid; plants up to 150 cm.
9a. Panicle green or violet tinged, branches moderately slender, branched from near base; floret callus shortly bearded, hairs 0.2–0.5 mm ........................................................................... 6. A. gigantea
9b. Panicle dark purple tinged brown, branches very fine, bare in lower 1/3; floret callus subglabrous ................................................................................................................. 7. A. divaricatissima
4b. Palea small, 1/3 length of lemma or less, often tiny.
10a. Palea awnless (occasionally a short awnlet present, included within the spikelet).
11a. Panicle dense, spike-like, linear or linear-oblung; culms less than 30 cm.
12a. Leaf blades filiform, 0.4–0.8 mm wide; spikelets ca. 2.5 mm; callus subglabrous .............. 8. A. mackliniae
12b. Leaf blades linear, 1–3 mm wide; spikelets 2.8–4 mm; callus hairs ca. 0.2 mm ............... 9. A. hugoniana
11b. Panicle open to laxly contracted, not spike-like; culms 20–100 cm.
13a. Culms weak, scrambling, 100–130 cm long; panicle ovate, ca. 30 cm, very delicate, branches and pedicels divaricate ................................................................. 10. A. brachiata
13b. Culms erect, tufted, usually less than 100 cm; panicle narrowly oblong to ovate, 3–25 cm, branches and pedicels not divaricate.
14a. Spikelets usually dark purple; glumes unequal; plant often less than 30 cm tall .......... 11. A. nervosa
14b. Spikelets usually green or greyish green, occasionally violet tinged; glumes subequal; plant (20–)40–100 cm tall.
15a. Anthers 0.3–0.5(–0.7) mm; spikelets 1.3–1.8 mm (if longer, anthers small).
16a. Leaf blades (2.5–)4–11 mm wide; glumes subacute; lemma 3/4–9/10 spikelet length; palea 0.3–0.6 mm .................................................................................. 12. A. micrantha
16b. Leaf blades 1–5 mm wide; glumes acuminate; lemma 2/3–3/4 spikelet length; palea less than 0.25 mm .................................................................................. 13. A. clavata
15b. Anthers 0.5–1.5 mm; spikelets 1.8–3.2 mm.
17a. Spikelets 2.5–3.2 mm; anthers 1–1.5 mm ........................................................................ 14. A. kunmingensis
17b. Spikelets 1.9–2.8 mm; anthers 0.5–1 mm.
18a. Panicle open, elliptic to narrowly ovate; branches bare in lower part; palea less than 0.2 lemma length .................................................................................. 15. A. infirma
18b. Panicle usually contracted, lanceolate-oblung; branches often bearing spikelets from base; palea 0.2–0.4 lemma length ...... 16. A. arisan-montana
10b. Palea awned, awn flexuous or geniculate, exerted from spikelet.
19a. Awn usually arising from middle of lemma back or above; anthers 0.5–1.2 mm.
20a. Panicle open, ovate to broadly elliptic; branches widely spreading to divaricate, up to 10 cm, bare in lower part.
21a. Leaf blades 2–5 mm wide; panicle elliptic, branches ascending; spikelets 1.8–2.7 mm ................................................................................................. 18. A. sozanensis
21b. Leaf blades 0.5–2 mm wide; panicle ovate, branches divaricate; spikelets 2.6–3.5 mm ................................................................................................. 19. A. hookeriana
20b. Panicle laxly contracted, lanceolate; branches ascending, up to 3.5 cm, with spikelets from near base.
22a. Culms 12–20 cm tall; cauline leaf blades 1–2 mm wide; spikelets dark purple; awn arising from middle of lemma ......................................................... 20. A. sinorupestris
22b. Culms 30–50 cm tall; cauline leaf blades 3–5 mm wide; spikelets greenish gray; awn arising from upper 1/4–1/3 of lemma ......................................................... 21. A. sinocontracta
19b. Awn usually arising from below middle of lemma back; anthers 1–1.6 mm.
23a. Plant with creeping surface stolons ................................................................................ 22. A. canina
23b. Plant with subterranean rhizomes or tufted.
24a. Leaf blades smooth on abaxial surface; panicle branches smooth .................................. 23. A. flaccida
24b. Leaf blades scabrid on abaxial surface; panicle branches smooth or scabrid.
25a. Rhizomes present, plant loosely tufted; panicle open, at least at anthesis; callus subglabrous, hairs 0.1–0.3 mm ............................................................................ 24. A. vinealis
25b. Rhizomes absent, plant densely tufted; panicle contracted; callus bearded, hairs 0.3–0.4 mm .................................................................................. 25. A. turkestanica


Calamagrostis munroana (Aitchison & Hemsley) Boissier.

Annual. Culms solitary or in small tufts, erect or geniculate at base, 10–45(–70) cm high, 3–5-noded. Leaves all cau-
line; leaf sheaths loose, smooth; leaf blades linear, flat, 3–15 cm × 1.5–5 mm, abaxial surface sub-smooth, adaxial surface scaberulous; ligule 1.5–2.5 mm. Panicle contracted, linear, 5–10 cm; branches short, erect, almost smooth, bearing spikelets to base; pedicels usually pubescent. Spikelets 3–4 mm, purple; glumes oblong-lanceolate, lower glume slightly longer than upper glume, keel scaberulous; callus hairs ca. 1 mm; lemma 1/2–2/3 spikelet length, back villous except below apex, awned from lower 1/3, apex irregularly toothed; awn weakly geniculate, 3–4.3 mm; palea ca. 2/3 length of lemma. Anthers 0.7–0.9 mm. Fl. and fr. Aug–Sep.

- Mountain slopes. Xinjiang.

This is a local variant of the variable species Agrostis pilosula, distinguished mainly by its longer palea in combination with a narrow, purple panicle. It is also geographically disjunct.


Perennial, tufted, stoloniferous; stolons slender, leafy, widely spreading, developing after anthesis. Culms erect or geniculate and rooting at base, 30–50(–100) cm tall. Leaf sheaths smooth; leaf blades linear, flat or rolled, 4–10 cm × 2–5 mm, scaberulous, apex acute to acuminate; ligule on non-flowering shoots 2–3.5 mm, rounded to truncate, often lacerate. Panicle narrow, linear to lanceolate in outline, 5–20 cm, open only at anthesis, otherwise contracted, often dense; branches several per node, closely divided, ascending, scabrous, main branch at a node often bare in lower 1/3, but accompanied by shorter branches bearing spikelets to base. Spikelets 1.8–3 mm, yellowish green; glumes lanceolate, subequal or lower glume slightly longer, lower glume scabrous along keel distally, upper glume often smooth, apex acute; callus minutely hairy; lemma 3/4 as long to subequaling spikelet, usually awnless, apex rounded; palea 1/2–3/4 length of lemma. Anthers 0.8–1.5 mm. Fl. Aug.

Moist places along roadsides. Anhui, Gansu, Guizhou, Heilongjiang, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Mongolia, Nepal, Russia; C and SW Asia, Europe].

This is a widespread and polymorphic species, adventive in many temperate countries.


Perennial, tufted, rhizomatous; rhizomes scaly, short. Culms tufted, geniculate or decumbent and rooting at base, 20–70 cm tall. Leaf sheaths smooth; leaf blades linear, flat, 4–10 cm × 1–3 mm, abaxial surface sub-smooth, adaxial surface scaberulous; ligule 1.5–2.5 mm. Panicle contracted, linear, 5–10 cm; branches short, erect, almost smooth, bearing spikelets to base; pedicels usually pubescent. Spikelets 3–4 mm, purple; glumes oblong-lanceolate, lower glume slightly longer than upper glume, keel scaberulous; callus hairs ca. 1 mm; lemma 1/2–2/3 spikelet length, back villous except below apex, awned from lower 1/3, apex irregularly toothed; awn weakly geniculate, 3–4.3 mm; palea ca. 2/3 length of lemma. Anthers 0.7–0.9 mm. Fl. and fr. Aug–Sep.

- Mountain slopes. Xinjiang.

This is a local variant of the variable species Agrostis pilosula, distinguished mainly by its longer palea in combination with a narrow, purple panicle. It is also geographically disjunct.

Perennial, rhizomatous; rhizomes tough, scaly, spreading. Culms loosely tufted, ascending to prostrate at base, rooting and branching from lower nodes, up to 130 cm tall. Leaf sheaths smooth or scaberulous; leaf blades linear, 5–30 cm × 3–10 mm, scabrid, apex acuminate; ligule on tillers 1.5–6 mm, as long as or longer than wide, toothed. Panicle oblong or conical in outline, 8–25 cm, contracted at first, open after anthesis; branches 5 or more per node, spreading, very scabrous, bearing branchlets nearly to base, spikelets clustered at the branch apices. Spikelets 2–3 mm, yellowish green or purplish; glumes elliptic-lanceolate, subequal or lower glume slightly longer, scabrid or pilosulous along upper keel and margins, apex acute; callus hairs 0.2–0.4 mm; lemma 2/3–3/4 spikelet length, glabrous, usually awnless, apex obtuse; palea 1/2–3/4 length of lemma. Anthers 0.8–1.5 mm. Fl. and fr. Jul–Aug.

Moist grassy places, probably introduced; 1000–1500 m. Hebei, Heilongjiang, Ningxia, Shanxi, Xinjiang [Afghanistan, W Russia; N Africa, SW Asia (Caucasus, Turkey), Europe; introduced in North America and other temperate countries].

6. Agrostis stolonifera Linnaeus var. gigantea (Roth) Koch; A. stolonifera subsp. gigantea (Roth) Maire & Weiler; A. stolonifera var. ramosa (S. F. Gray) Veldkamp; Fifa alba (Linnaeus) P. Beauvois var. ramosa S. F. Gray.

Perennial, rhizomatous; rhizomes tough, scaly, spreading. Culms loosely tufted, ascending to prostrate at base, rooting and branching from lower nodes, up to 130 cm tall. Leaf sheaths smooth or scaberulous; leaf blades linear, 5–30 cm × 3–10 mm, scabrid, apex acuminate; ligule on tillers 1.5–6 mm, as long as or longer than wide, toothed. Panicle oblong or conical in outline, 8–25 cm, contracted at first, open after anthesis; branches 5 or more per node, spreading, very scabrous, bearing branchlets nearly to base, spikelets clustered at the branch apices. Spikelets 2–3 mm, yellowish green or purplish; glumes elliptic-lanceolate, subequal or lower glume slightly longer, scabrid or pilosulous along upper keel and margins, apex acute; callus hairs 0.2–0.4 mm; lemma 2/3–3/4 spikelet length, glabrous, usually awnless, apex obtuse; palea 1/2–3/4 length of lemma. Anthers 1–1.5 mm. Fl. and fr. summer and autumn.

Moist grassy places, probably introduced; 1000–1500 m. Hebei, Heilongjiang, Ningxia, Shanxi, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, NW India, Japan, Korea, Mongolia, Nepal, Pakistan, Russia; N Africa, SW Asia, Europe].

This is a widespread and polymorphic species, introduced for pasture or adventure in Australia, North America, and elsewhere. The name Agrostis alba Linnaeus has sometimes been used for this species, but the correct application of that name is uncertain.

Agrostis gigantea, A. capillaris, and A. stolonifera are closely related, widespread weeds, which sometimes hybridize. While the lemma is usually awnless, a small awnlet from at or near the apex may be present in some spikelets.


8. Agrostis amethystina Mez.

Perennial, densely tufted; old basal sheaths fibrous. Culms erect or geniculate at base, 8–30 cm tall, 1–2 mm in diam., 2-noded. Leaf sheaths lax, overlapping; leaf blades linear, 2–8 cm × 1–3 mm, scabrid on both surfaces; ligule ca. 2 mm, back scabrid, apex rounded. Panicle linear, dense, spike-like, 5–8 cm; branches short, erect, bearing spikelets from base; pedicels scabrid. Spikelets ca. 2.5 mm, green tinged pale purple; glumes narrowly oblong-lanceolate, slightly unequal with lower keel, keel scabrid, apex acuminate; callus subglabrous; lemma 2/3 spikelet length, smooth, usually awnless, apex acute; palea to 0.25 mm. Anthers ca. 1 mm. Fl. and fr. Jul–Aug.

Alpine grassy slopes; 3000–4000 m. SE Xizang, NW Yunnan [N Myanmar].

Agrostis amethystina usually has awnless lemmas, but rarely a few lemmas have a short, straight awn from above the middle. Agrostis inaequiglumis Grisebach is a similar, small species, occurring in Bhutan, India (Sikkim), and Nepal. It also has a narrow, spike-like panicle and awnless spikelets, but is distinguished by its delicate, annual habit.


甘青剪股颖 gan qing jian gu ying

Agrostis shensiensis Mez.

Perennial, densely tufted; old basal sheaths fibrous. Culms erect or geniculate at base, 8–30 cm tall, 1–2 mm in diam., 2-noded. Leaf sheaths lax, overlapping; leaf blades linear, 2–8 cm × 1–3 mm, scabrid on both surfaces; ligule ca. 2 mm, back scabrid, apex rounded. Panicle dense, spike-like, linear-oblong in outline, 3–9 cm; branches 3–6 at each node, short, erect, up to 4 cm, smooth or scabrid, bearing spikelets from base; pedicels 0.7–2 mm, scabrid. Spikelets 2.8–4 mm, green flushed dark purple; glumes lanceolate, unequal, lower glume ca. 0.2 mm longer than upper glume, keel scabrid, upper back and margins puberulous, apex acuminate; callus hairs ca. 0.2 mm; lemma ca. 2/3 spikelet length, awnless or with short awnlet below apex, apex obtuse or slightly toothed; palea 0.45–0.5 mm. Anthers 0.7–1 mm. Fl. and fr. Aug–Sep.
The distinctive species is readily recognizable by its scrambling habit, very large, delicate panicle with divaricate branches, and thin-textured spikelets with deciduous glumes. The panicle is remarkably reminiscent of Sporobolus.


This variable species is the most common Agrostis in the Himalayas. It is a lush, leafy species, with a green panicle of small, awnless spikelets with subulate glumes, a relatively long floret, and short anthers. Habit is greatly influenced by environmental factors, from compact tufts to much laxer, almost stoloniferous growth in moister situations. Forms with short, lanceolate leaf blades differ in appearance from those with longer, narrower leaf blades, but the variation is continuous.
5 mm, both surfaces scabrid; ligule 1.5–3 mm, back scabrid, apex obtuse or lacerate. Panicle lax, lanceolate to narrowly oblong in outline, 8–25 cm; branches 2–7 at each node, ascending, capillary, 8–15 cm, scabrid, bare in lower 1/3–1/2 or sometimes with spikelets from base. Spikelets 1.5–2.5 mm, yellowish green; glumes lanceolate, subequal, lower slightly longer, keeled, keels acute-scabrid, apex acuminate; callus glabrous or nearly so; lemma 2/3–3/4 spikelet length, awnless, apex obtuse; palea to 0.25 mm. Anthers 0.3–0.5 mm. Fl. and fr. summer and autumn.

Roadsides, riversides, forest margins, disturbed grassy places, often in moist situations; below 4000 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Henan, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan [Japan, Korea, Mongolia, Russia; SW Asia (Caucasus), N Europe, North America (Alaska)].

*Agrostis clavata* is distinguished by the combination of scabrid leaves and panicle branches, small, pale green spikelets, acuminate glumes, an awnless lemma, and very small palea and anthers.

*Agrostis clavata* subsp. *matsumurae* (A. clavata var. *nukabo*) is often recognized, mainly on the basis of a dense, narrow panicle bearing spikelets from the base of the primary branches. In contrast, subsp. *clavata* has panicle branches divergent at flowering and bare in the lower 1/3–1/2. However, short, densely spicate branches are often present at the panicle nodes among the longer, bare-based branches in subsp. *clavata*, contributing to a denser panicle appearance when frequent. All the panicle branches become erect in the fruiting stage, further blurring the boundary with subsp. *matsumurae*. It has not been possible to distinguish two subspecies satisfactorily in herbarium material.


昆明剪股颖 kun ming jian gu ying


Perennial, rhizomatous. Culms erect from geniculate base, up to 70–100 cm tall, 1–2.5 mm in diam., 3–7-noded. Leaf sheaths smooth; leaf blades linear, flat or rolled when dry, 10–16 cm × 2.5–4 mm, both surfaces scabrid, apex acuminate; ligule 2–4.5 mm, back scabrid, apex obtuse. Panicle open or laxly contracted, narrowly lanceolate to narrowly ovate in outline, 15–20(–25) cm; branches 2–6 per node in well-spaced whorls, ascending to laxly spreading, slender, 7–12 cm, scabrid, bare below middle. Spikelets 2.5–3.2 mm, green tinged purplish gray or purple; glumes narrowly lanceolate, subequal, keel scabrid, upper indistinctly keeled, almost smooth, acute; callus hairs ca. 0.3 mm; lemma ca. 2/3 spikelet length, awnless or with up to 1 mm awnlet from middle or above, lateral veins slightly keeled and scaberulous above middle, apex truncate; palea 0.2–0.5 mm, 0.15–0.3 lemma length. Anthers 1–1.5 mm. Fl. and fr. Jun–Aug.

- Moist grassy slopes, riversides; 2000–3600 m. Sichuan, Yunnan.

*Agrostis kunmingensis* closely resembles awnless forms of *A. caudata* in spikelet size and anther length, but appears to lack the spreading stolons typical of that species. It is also close to *A. infirma*, a predominantly SE Asian species.


玉山剪股颖 yu shan jian gu ying

*Agrostis flaccida* Hackel var. *morrisonensis* (Hayata) Honda; *A. macilenta* Keng; *A. morrisonensis* Hayata; *A. rigida* Steudel; *A. shandongensis* F. Z. Li; *A. sozanensis* Hayata var. *exaristata* Handel-Mazzetti; *A. waltingensis* Honda.

Perennial, densely tufted. Culms slender, erect or geniculate at base, 20–100 cm tall, 0.5–2.5 mm in diam., 2–3-noded. Leaves mainly basal, leaf sheaths smooth; leaf blades often involute and acicular or narrowly linear and flat, 4–14 cm × 0.3–5 mm, smooth or slightly scaberulous; ligule of culm blades 2.25–2.75 mm, apex rounded. Panicle open or slightly contracted, elliptic in outline, 8–14(–25) cm; branches 4–6 per node, laxly ascending, 3–8(–10) cm, smooth, lower part bare. Spikelets 2–2.8 mm, purplish green; glumes lanceolate, unequal with lower longer, keel scabrid, apex acute; callus glabrous or almost so; lemma 3/4 spikelet length, awnless or rarely mucronate above middle, apex obtuse; palea 0.15–0.35 mm, less than 0.2 lemma length. Anthers 0.5–1 mm. Fl. Nov.

Mountains; 2600–4000 m. Heilongjiang, Hunan, Shandong, Taiwan, Yunnan [Indonesia, New Guinea, Philippines].

*Agrostis infirma* is a variable species widespread in SE Asia. *Agrostis sozanensis* is very similar, but has awned spikelets.


阿里山剪股颖 a li shan jian gu ying

*Agrostis arisan-montana* var. *megalandra* Y. C. Yang; *A. mealyhyra* Keng ex P. C. Keng var. *angustispicata* D. Z. Ma & J. N. Li; *A. perarta* Keng.

Perennial, loosely tufted. Culms geniculate at base, rooting at lower nodes, 40–100 cm tall, 1–1.7 mm in diam., 3–6-noded. Leaf sheaths smooth; leaf blades linear, soft, 5–14 cm × 2–4 mm, both surfaces scabrid, abaxial surface densely so, apex acuminate; ligule 2–3.5 mm, back scabrid, apex obtuse. Panicle contracted, narrowly lanceolate-oblong in outline, 10–20 cm, much branched; branches 3 per node or rebranched at base, narrowly ascending, longest 5–8 cm, scabrid, bearing spikelets from base. Spikelets 1.9–2.3 mm, yellowish green often with purplish tinge; glumes narrowly ovate-oblong, subequal, keel scabrid, apex subacute or acute; callus glabrous; lemma ca. 3/4 spikelet length, midvein terminating from slightly below middle to apex, awnless, apex broadly rounded, minutely denticulate; palea 0.35–0.75 mm, 0.2–0.4 lemma length. Anthers 0.5–0.8 mm. Fr. Jul.

- Grassy mountain slopes; 900–3200 m. Guangxi, Henan, Ningxia, Shaanxi, Sichuan, Taiwan, Yunnan.

In this species the lemma is awnless, with the midvein terminating anywhere from slightly below the middle up to the apex, varying even within the same panicle. The length of the palea is also rather variable, sometimes almost reaching the middle of the lemma.

*Agrostis arisan-montana* is close to *A. micrantha*, but tends to have a narrower panicle and more sharply acute glumes. It is also close to *A. infirma*, but with a more open panicle. The relationship between

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**Shu hua jian gu ying**

*Agrostis fukuyamae* Buse var. *fukuyamae* (Ohwi) Veldkamp; *A. rigidula* Steudel subsp. *fukuyamae* (Ohwi) T. Koyama; *A. rigidula* var. *fukuyamae* (Ohwi) Veldkamp.

Perennial, tufted. Culms erect, 15–20 cm tall, 0.5–1 mm in diam., 2-noded. Leaf sheaths longer than internodes, smooth; leaf blades narrowly linear to setaceous, folded, 5–10 cm × 0.6–1 mm (when folded), abaxial surface smooth or scabrous, adaxial surface scabrid; ligule 0.8–1.5 mm, apex obtuse or truncate. Panicle contracted when young, later open, narrowly ovate in outline, 7–10 cm; branches 3–4 per node, ascending to spreading, longest 3.5–6 cm, almost smooth, bearing spikelets from near base. Spikelets 1.5–2 mm, purplish green; glumes lanceolate-oblong, equal, keel scaberulous toward apex, apex acute; callus hairs 0.2–0.3 mm; lemma more than 3/4 spikelet length, awnless, midvein terminating near middle of back, apex broadly obtuse; palea 0.6–0.8 mm, slightly less to slightly more than 1/2 lemma length. Anthers 0.7–1 mm. Fl. Jul.

- Exposed rocks near mountain summits. Taiwan.

This species is perhaps no more than a local, high-altitude variant of *Agrostis infirma*, differing by its smaller spikelets with a relatively longer lemma and longer palea.

18. **Agrostis sozanensis** Hayata, Icon. Pl. Formosan. 7: 85. 1918.

**Shu hua jian gu ying**

*Agrostis sozanensis* var. *formosana* Hackel; *A. transmorrisonensis* Hayata; *A. transmorrisonensis* var. *opienensis* Keng ex Y. C. Yang.

Perennial, loosely tufted, shortly rhizomatous. Culms erect or ascending, up to 90 cm tall, 1–1.2(–2.5) mm in diam., 3–5-noded. Leaf sheaths smooth; leaf blades narrowly linear, flat or weakly involute toward apex, 7–20 cm × 2–5 mm, both surfaces scabrid; ligule 2–6 mm, apex obtuse or truncate. Panicle open, lax, broadly elliptic to narrowly ovate in outline, 15–30 cm; branches 2–4(–10) per node, capillary, widely ascending, flexuous, up to 10 cm, scabrid, lower 1/2–2/3 bare. Spikelets 1.8–2.7(–3) mm, green or tinged purplish red; glumes subequal or lower glume slightly longer than upper glume, keel scabrid, apex acute or acuminate; callus hairs 0.1–0.2 mm; lemma 2/3–3/4 spikelet length, awned from middle or above, apex obtuse or truncate; awn variable, up to 2–(3) mm, straight or slightly bent; palea 0.25–0.5 mm, 1/4–1/3 lemma length. Anthers 0.7–1.2 mm. Fl. and fr. summer and autumn.

- Moist ground, near roads, on slopes; below 2700 m. Anhui, Fujian, Guangdong, Guizhou, Henan, Hebei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

The development and position of the awn are variable in this species. It is usually bent and exserted from the spikelet, but may be shorter and straight. It may arise from the middle to the upper quarter of the lemma back. Occasionally, aawnless spikelets may occur in a panicle where most spikelets are awned. The distinction from *Agrostis infirma* is based mainly on the presence of awns, coupled with slightly longer paleas and anthers.

*Agrostis sozanensis* is very close to *A. canina* Linnaeus. *Agrostis canina* is distinguished by the presence of creeping surface stolons, an awn arising from the lower part of the lemma back, and anthers 1–1.5 mm.

The name *Agrostis perennans* (Walter) Tuckerman has been misapplied to *A. sozanensis*. *Agrostis sozanensis* and *A. transmorrisonensis* were published simultaneously, but *A. sozanensis* has priority when they are regarded as synonyms, since *A. sozanensis* was chosen first, by Ko- yama (Grasses Japan Neighboring Regions, 485. 1987). The identity of the taxon named *A. transmorrisonensis* var. *kunyushanensis* F. Z. Li (Bull. Bot. Res., Harbin 11(2): 28. 1991), described from Shandong (Kunyu Shan), is uncertain. The type has not been seen.


**Shu hua jian gu ying**

*Agrostis peraxa* Pilger; *A. poluninii* Bor; *A. pubicallis* Keng ex Y. C. Yang.

Perennial, tufted. Culms erect or slightly geniculate at base, up to 50 cm tall, 0.5–1.2 mm in diam., 2–4-noded. Leaf sheaths smooth; leaf blades very narrowly linear, flat, 5–10 cm × 0.5–2 mm, smooth except toward apex; ligule 2–3 mm, apex lacerate. Panicle very lax, ovate in outline, 7–20 cm, open at and after anthesis; branches 2–3 per node, whorls distant, widely ascending to divaricate, capillary, slightly flexuous, longest up to 9 cm, smooth or slightly scabrid, lower half bare. Spikelets 2.6–3.5 mm, usually violet tinged; glumes unequal, lower glume narrowly lanceolate, longer than upper, upper glume oblong-lanceolate, keel scabrid, apex acuminate; callus hairs ca. 0.2 mm; lemma 2/3 spikelet length, back smooth or scaberulous, awned from just above middle, apex truncate-denticate; awn weakly geniculate, 2–4 mm; palea ca. 0.3 mm. Anthers 0.6–1 mm. Fl. and fr. Aug–Sep.

Montane forests, among bushes, ditches, damp places; 1900–3600 m. Qinghai, W Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

The spikelets of *Agrostis hookeriana* are similar to those of *A. sozanensis*, but in the former species the panicle is very open and broad, with divaricate branches, and the geographic distribution is more west-ly.


**Yan sheng jian gu ying**

*Agrostis sinorupestris* L. Liu ex S. M. Phillips & S. L. Lu, sp. nov.


Haece species A. rupestris Allioni affinis, sed ab ea arista ex medio (non prope basis) lemmatis exorienti atque antheris brevioribus (0.6–0.8 mm, non 1–2 mm) differt.

Perennial, densely tufted. Culms erect, slender, 12–20(–30) cm tall, ca. 0.5 mm in diam., 2–3-noded. Leaf sheaths longer or shorter than internodes; leaf blades linear, flat or involute, 3–15 cm × 1–2 mm, scabrid; ligule very short, apex round or truncate. Panicle slightly contracted, lanceolate in outline, 3–8 cm; branches 2–6 per node, up to 4 cm, smooth or sparsely scabrid. Spikelets 2.8–3.5 mm, dark purple; glumes lanceolate, unequal, lower glume ca. 0.3 mm longer than upper glume, keel scabrid, apex acute; callus hairs ca. 0.2 mm; lemma ca. 2 mm, awned from middle of back, apex slightly toothed; awn weakly geniculate, 3.5–5 mm; palea 0.4–0.6 mm. Anthers 0.6–0.8 mm. Fl. and fr. summer and autumn.

- Stony mountain slopes; 3500–4000 m. Sichuan, Xizang, Yunnan.

There is a good illustration of Agrostis sinorupestris in Keng (Fl. Ill. Pl. Prim. Sin. Gram. 545. 1959, as "Agrostis rupestris"). The species is very similar to delicate forms of A. nervosa, but differs by the presence of awns.

The name "Agrostis sinorupestris" L. Liou (Vasc. Pl. Hengduan Mts. 2: 2252. 1994) belongs here, but was not validly published because no Latin description was provided. The name Agrostis rupestris Allioni has been misapplied to this species in the Chinese literature. It is distinguished from other members of the A. nervosa complex mainly by its smooth leaf blades and panicle branches.


紧序剪股颖 jin xu jian gu ying


Perennial, tufted. Culms erect, 30–50 cm tall, 1–2 mm in diam., 3–4-noded. Leaf sheaths loose, smooth; leaf blades linear, soft, culm blades 10–14 cm × 3–5 mm, blades of tillers ca. 1 mm wide, abaxial surface scabrid or almost smooth, adaxial surface scabrid; ligule 1–2.5 mm, apex truncate. Panicle laxly contracted, lanceolate in outline, 10–15 cm; branches 1–3 at each node or sometimes secondary branching from base, narrowly ascending, 2.5–3.5 cm, almost smooth, a few widely scattered scabridities, bearing spikelets for most of length. Spikelets 2.5–3 mm, green tinged purplish gray; glumes lanceolate, slightly more than upper glume, keel scabrid, apex acuminate; callus hairs 0.1–0.2 mm; lemma ca. 1/2 spikelet length, awned from upper 1/4–1/3, apex emarginate-paniculate; awn recurved in right angle from lower 1/3, slightly twisted below bend, 3–3.3 mm; palea ca. 0.25 mm. Anthers 0.5–0.7 mm. Fl. and fr. Aug–Oct.

- Alpine meadows; ca. 4000 m. NW Yunnan (Bijiang, Gongshan).

Agrostis filipes J. D. Hooker, from Kashmir and the Khasi Hills of NE India, also has awns arising from above the middle of the lemma back and a small palea. It differs in having narrower culm leaf blades 1–2.5 mm wide, a densely contracted panicle, and a fine awn 1–2 mm.


普通剪股颖 pu tong jian gu ying

Perennial, loosely tufted, stoloniferous, turf-forming. Culms erect or geniculate at base, 20–60 cm tall, 1–1.2 mm in diam., 3–5-noded. Leaf sheaths smooth; leaf blades linear, flat or involute toward apex, 3–20 cm × 1–3 mm, scabrous; ligule 1.5–4 mm, back scabrous, apex obtuse or acute. Panicle lax, lanceolate to ovate in outline, 5–12(–20) cm; branches 3–6 per node, spreading at anthesis, usually erect in fruit, capillary, up to 8 cm, scabrid, bare in lower half. Spikelets 1.5–3 mm, purplish brown; glumes lanceolate, subequal, keel scabrid, apex acute; callus hairs ca. 0.2 mm; lemma 2/3 spikelet length, awned from near base to slightly below middle of back, lateral veins minutely exserted, apex obtuse-paniculate; awn weakly geniculate, up to 4.5 mm; palea ca. 0.5 mm. Anthers 1–1.5 mm. Fl. Jul.

Damp grasslands; 1400–3800 m. Xinjiang, Xizang, Yunnan [Japan, Kashmir, Mongolia, Russia; Europe, NE America].

This is a European species, introduced as a lawn grass or adventive in some other temperate countries. Some variants are awnless or have poorly developed awns. It is distinguished from Agrostis vinealis and other awned species with short paleas by the combination of leafy stolons and long anthers.


柔软剪股颖 rou ruan jian gu ying

Perennial, tufted, shortly rhizomatous. Culms erect or geniculate at base, slender, 15–30(–50) cm tall, ca. 1 mm in diam., 3-noded. Leaf sheaths smooth; leaf blades narrowly linear, weakly rolled or infrequently flat, soft, 5–10 cm × 0.5–2 mm, smooth, uppermost culm blade elongate, widely divergent from culm; ligule 1–2 mm, apex obtuse. Panicle open, diffuse, narrowly ovate in outline, 4–8 cm; branches 2–5 per node, spreading, capillary, 5–7 cm, smooth or almost so, bare in lower half. Spikelets 2.5–3 mm, purple or purplish green; glumes lanceolate, slightly unequal, keel scabrid, apex acuminate; callus hairs 0.2–0.5 mm; lemma 2/3–3/4 spikelet length, indistinctly granular-scabrous, awned from lower 1/4–1/3 of back, lateral veins sometimes minutely exserted, apex truncate-paniculate; awn weakly geniculate, 3–5 mm; palea ca. 0.25 mm. Anthers 1–1.6 mm. Fl. and fr. Jul–Aug. 2n = 14.

Rocky slopes, open forest; 1500–2300 m. E Jilin, Liaoning [Japan, Korea, Russia (Kamchatka, Kuril Islands, Sakhalin)].

Agrostis flaccida is distinguished from other members of the A. vinealis complex mainly by its smooth leaf blades and panicle branches (see the comment under the next species).


芒剪股颖 mang jian gu ying

Agrostis canina subsp. montana (Hartman) Hartman; A. canina subsp. trinii (Turczaninow) Hultén; A. canina var. montana Hartman; A. coarctata subsp. trinii (Turczaninow) H. Scholz; A. flaccida subsp. trinii (Turczaninow) T. Koyama; A. flaccida var. trinii (Turczaninow) Ohwi; A. trinii Turczaninow; A. vinealis subsp. trinii (Turczaninow) Tzvelev.
Perennial, tufted, shortly rhizomatous. Culms erect from a geniculate base, 30–60 cm tall, ca. 1 mm in diam., 3-noded. Leaf sheaths smooth; leaf blades narrowly linear, flat or weakly rolled, grayish green, 5–8 cm × 0.5–2 mm, scabrid; ligule 1.5–3 mm, apex obtuse. Panicle lanceolate to narrowly ovate, 7–12 cm; branches 2–5 per node, laxly ascending, slender, moderately scabrid. Spikelets 2–2.5 mm, purple; glumes oblong-lanceolate, subequal, lower slightly longer, keel scabrid or almost smooth on upper glume, apex acuminate; callus hairs ca. 0.2 mm; lemma 2/3 spikelet length, awned from slightly below middle to lower 1/3, or awnless, apex obtuse; awn geniculate, 3–3.5 mm; palea very small. Anthers 1–1.5 mm. Fl. and fr. summer and autumn.

Damp grassy places; 1500–1700 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Pakistan, Russia; America, Europe].

*Agrostis vinalis* lies at the center of a complex of closely related taxa, including in China *A. flavicada* and *A. turkestanica*. Characters separating the taxa are very slight, which has led to differences in opinion as to their taxonomic status. *Agrostis vinalis* itself is widespread in Eurasia, but other members are usually of more restricted distribution. *Agrostis trinii*, based on an E Asian element with very scabrid leaf blades, has been reported from NE China. Other characters used to distinguish it are conflicting in the literature, and it seems impossible to maintain it as distinct.


*Agrostis vinalis* subsp. *turkestanica* (Drobow) Tzvelev.

Perennial, densely tufted. Culms slender, slightly geniculate at base, 20–35 cm tall, ca. 1 mm in diam., 2-noded. Leaves mainly crowded in basal tuft; leaf sheaths lax, smooth, longer than internodes; leaf blades setaceous, involute or flat, 3–4 cm × 0.8–1 mm; ligule 1.5–3 mm, apex rounded. Panicle contracted, linear-oblong, 4–9 cm; branches 1–3 per node, ca. 2 cm, smooth or scabrid. Spikelets 2–2.2 mm, dull purple; glumes lanceolate, subequal or lower glume slightly longer, lower glume aculeolate along keel, apex acute; lemma ca. 1.9 mm, distinctly 5-veined, awned from upper 2/3–3/5, apex obtuse or sub-rounded; awn weakly geniculate, 2.5–3 mm; palea ca. 0.2 mm. Anthers ca. 1.2 mm. Fl. and fr. Aug–Sep.

River valleys, roadsides; 2300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; SW Asia (NE Iran)].

This is a regional variant from the *Agrostis vinalis* complex, with a densely tufted habit, fine leaf blades, and a contracted panicle.

### 86a. ×**AGROPOGON** P. Fournier, Quatre Fl. France 50. 1934.

剪棒草属 *jian bang cao shu*

Lu Shenglian (卢生莲), Sylvia M. Phillips

*Agrostis* Linnaeus × *Polypogon* Desfontaines.

1. ×**Agropogon lutosus** (Poiret) P. Fournier, Quatre Fl. France 50. 1934.

野青茅属 *ye qing mao shu*

Lu Shenglian (卢生莲); Sylvia M. Phillips


Perennial, often shortly stoloniferous. Culms solitary or loosely tufted, ascending or decumbent and rooting at lower nodes, up to 80 cm tall. Leaf sheaths loose, glabrous; leaf blades linear, 9–20 cm, 2–10 mm wide, scabrid along margins and veins, apex acute or acuminate; ligule 5–8 mm, scariosus, scabrid on back, lacerate at apex. Panicle densely contracted, lanceolate to oblanceolate in outline, lobed, 2–18 cm; branches subverticillate; pedicels pubescent. Spikelets 2–3 mm, disarticulating above glumes; glumes persistent, subequal or upper glume slightly shorter than lower, elliptic, hispidulous, apex acute or emarginate with awn to 0.5(–3) mm; callus glabrous; lemma oblong, 1.4–1.6 mm, firmly hyaline, glossy, 5-veined, apex truncate-denticulate, awnless or with subapical awn up to 3 mm; palea 2/3 length of lemma. Anthers 0.5–1 mm, indehiscent. Fl. Jun–Jul.

Moist and saline ground; 1000–3000 m. S Gansu, Sichuan, Xizang, Yunnan [Afghanistan, NW India, Pakistan; NE Africa, Europe].

This is the name given to hybrids between *Agrostis stolonifera* and *Polypogon monspeliensis*. The spikelets resemble *Polypogon* in their scabrid, often shortly awned glumes, but these lack clearly 2-lobed tips, whereas spikelet disarticulation is usually like *Agrostis*. The plants are infertile, producing neither good pollen nor ripe seed.

The name ×*Agropogon littoralis*, based on *Polypogon littoralis* (1816), in turn a *nomen novum* for *Agrostis littoralis* Withering, has frequently been used in the literature. However, *A. lutosus* (1810), also a *nomen novum* for *A. littoralis*, is the earliest legitimate name and provides the correct specific epithet. Therefore both *P. littoralis* and ×*A. littoralis* were nomenclaturally superfluous when published and are consequently illegitimate.

### 87. DEYEUXIA Clarion ex P. Beauvois, Ess. Agrostogr. 43. 1812.

野青茅属 *ye qing mao shu*

Lu Shenglian (卢生莲), Chen Wenli (陈文俐); Sylvia M. Phillips

*Anisachne* Keng.
Perennials, tufted or also rhizomatous. Leaf blades linear, usually flat, sometimes involuted; ligule membranous. Inflorescence a panicle, loosely contracted to spikelike, rarely open. Spikelets with 1 floret (very rarely 2), rachilla disarticulating above glumes, with penicillate extension lying against the palea; glumes subequal, usually slightly longer than the floret, rarely slightly shorter, membranous, 1–3-veined, apex acute or acuminate; floret callus bearded, hairs usually 1/3 as long up to about equalling floret; lemma thinly to firmly membranous, (3–)5-veined, dorsally awned or awnless, apex erose, dentilicate or 2–4-toothed; awn geniculate or straight, its position varying from near base to near apex, usually inconspicuous, up to twice length of lemma but occasionally reduced to a subapical mucro or absent; palea 2/3 as long as subequalling lemma. Stamens usually 3, rarely 2 or 1.

About 200 species: temperate regions throughout the world, also on tropical mountains; 34 species (15 endemic) in China.

The genera Agrostis, Calamagrostis, and Deyeuxia form an intergrading complex of three incompletely separated entities. The majority of species can be placed without difficulty, but there is a number of troublesome intermediates, and no character combinations provide a definitive way of distinguishing the genera. Agrostis, with small spikelets and short callus hairs, has always been maintained separately, while Deyeuxia is sometimes maintained and sometimes sunk into Calamagrostis. However, the boundary between Agrostis and Calamagrostis is just as ill-defined as that between Calamagrostis and Deyeuxia. For this reason, three separate genera are maintained here, which complies with the usual practice in Chinese florists and avoids the need for many new combinations.

The taxonomy of this group is complicated by the presence of a number of apomictic complexes and frequent hybridization. Many infraspecific taxa have been described in an attempt to order this variation. However, intermediates are to be expected in an actively evolving group such as this, and most of these infraspecific taxa have not been enumerated separately here.

1a. Lemma awnless; panicle open.
   2a. Spikelets 2/3 as long as lemma or more; culms up to 120 cm; panicle 15–30 cm.
      3a. Spikelets 2–3 mm; lemma 1.5–2.5 mm; callus hairs equaling or subequaling lemma ........................................ 1. D. diffusa
      3b. Spikelets 3–4.2 mm; lemma 3–4 mm; callus hairs 2/3–4/5 as long as lemma ........................................ 2. D. flaccida
   2b. Callus hairs not more than 1/2 as long as lemma; culms up to 60 cm; panicle 6–12 cm.
      4a. Spikelets 2.5–3 mm; lemma 3–3.5 mm; callus hairs equaling or longer than floret; lemma 1.5–2.5 mm; callus hairs equaling or subequaling lemma ........................................ 3. D. yanyuanensis
      4b. Callus hairs 1/2 as long as lemma or longer.

1b. Lemma awned; panicle open or contracted.
   6a. Callus hairs less than 1/2 as long as lemma.
      7a. Awn arising near or above middle of lemma.
         8a. Spikelets with 2 florets ........................................ 6. D. himalaica
         8b. Spikelets with 1 floret.
            9a. Plant with slender, elongate, creeping rhizomes.
               10a. Awn 1–2.5(–6) mm, arising from upper 1/3 of lemma or above; glumes scabrid ............ 7. D. pulchella
               10b. Awn 5–6 mm, arising from middle of lemma; glumes smooth or scabrid only on keel ............ 8. D. rosea
            9b. Plant tufted or shortly rhizomatous.
               11a. Panicle contracted, branches straight, scabrid; lower glume ciliolate on margins; anthers 2–3 mm ................................................................. 9. D. scabrescens
               11b. Panicle open, branches capillary, curving, smooth; lower glume not ciliolate on margins;
                   anthers ca. 1 mm ................................................ 10. D. nyungchiensis
   7b. Awn arising from below middle of lemma.
      12a. Panicle loosely contracted to dense, sometimes spikelike.
         13a. Anthers 0.5–1.2 mm; culms 1–2-noded ........................................ 11. D. nivicola
         13b. Anthers 2–3 mm; culms 2–3–5-noded.
            14a. Glumes membranous, shining ................................................ 25. D. anthoxanthoides
            14b. Glumes not shining.
               15a. Leaf blades involute, filiform; spikelets 4–5.5 mm ................................................ 12. D. mazzetti
               15b. Leaf blades flat, stiff; spikelets 5–7 mm ................................................ 14. D. korotkyi
      12b. Panicle open with spreading branches, (5–)15–35 cm wide.
         16a. Callus hairs less than 1/5 length of lemma; ligule 0.5–2(–4) mm.
            17a. Plant ca. 65 cm tall; panicel 5–9(–16) cm; spikelets with 1(–2) florets ............ 15. D. suizanensis
            17b. Plant 80–120 cm tall; panicle 20–35 cm; spikelets with 1 floret .................... 16. D. effusiflora
            16b. Callus hairs 1/5–2/5 length of lemma; ligule 2.5–20 mm.
               18a. Lemma apex erose; anthers (1.3–)2–3 mm ................................................ 17. D. pyramidalis
               18b. Lemma apex with 0.5–1.5 mm mucros; anthers 0.5–1.2 mm .................... 13. D. flavens
      6b. Callus hairs 1/2 as long as lemma or longer.
         19a. Panicle open or slightly contracted.
20a. Panicle branches usually paired; glumes smooth, scabrid on keel only; ligule 1–1.5 mm ......... 18. *D. hakonensis*
20b. Panicle branches fasciicled; glumes scabrid; ligule 3–20 mm.

21a. Awn sub-basal .......................................................................................................................... 19. *D. sinelator*
21b. Awn arising near or above middle of lemma.

22a. Culms (4–)6–8-noded, usually branched ............................................................................ 20. *D. purpurea*
22b. Culms 2–4-noded, unbranched.

23a. Lemma awned from near middle; awn ca. 1.2 mm, not exserted from spikelets ................................. 21. *D. sichuanensis*
23b. Lemma awned from near apex; awn 3–6 mm, exserted from spikelet .......................... 22. *D. nepalensis*

19b. Panicle dense, often spikelike.

24a. Awn geniculate with twisted column, conspicuously exceeding glumes.

25a. Culm densely pubescent below panicle; panicle branches pubescent ........................................ 26. *D. tibetica*
25b. Culms scabrid below panicle; panicle branches scabrid.

26a. Anthers 1.5–2 mm; spikelets 4–6 mm, purple ......................................................................... 27. *D. tianschanica*
26b. Anthers 2–4 mm; spikelets 5–9 mm, yellowish brown, purplish at base .......................... 28. *D. holciformis*

24b. Awn slender, straight, slightly curved or indistinctly twisted in lower part, indistinctly within glumes (exserted in *D. moupinensis*).

27a. Lemma apex deeply 2-lobed; awn arising from between lobes; ligule ca. 0.5 mm ........ 29. *D. moupinensis*
27b. Lemma apex denticulate or minutely 4-toothed; ligule 1.5–7 mm.

28a. Anthers ca. 0.5 mm; culms 15–45 cm tall ........................................................................ 30. *D. debilis*
28b. Anthers 1.5–2.2 mm.

29a. Awn arising from lower 1/3 of lemma or slightly above.

30a. Awn poorly developed, 1–2 mm; spikelets 3–4 mm .......................................................... 23. *D. neglecta*
30b. Awn 3–6 mm; spikelets 4–7 mm.

31a. Panicle 10–25 cm; glumes subequal ........................................................................ 24. *D. lapponica*
31b. Panicle 5–8 cm; glumes unequal ................................................................................... 31. *D. zangxiensis*

29b. Awn sub-basal.

32a. Callus hairs equal to or slightly longer than lemma ......................................................... 32. *D. conferta*
32b. Callus hairs 1/2–4/5 as long as lemma.

33a. Leaf sheaths scabrid; spikelets purple with bronze at apex ........................................ 33. *D. kokonorica*
33b. Leaf sheaths smooth; spikelets yellowish green or pinkish .............................. 34. *D. macilenta*


Perennial, very loosely tufted, stoloniferous; stolons long, slender. Culms slender, decumbent, 30–80 cm tall, 1–2 mm in diam., 4–6-noded. Leaf blades flat or inrolled, 10–20 cm, 1–3 mm wide; ligule 1.5–3 mm, toothed. Panicle loose, open, 15–30 × 5–15 cm; branches paired or in whorls, up to 15 cm, very slender, flexuous, bare below middle, di- or trichotomously branched above, smooth, branchlets and pedicels capillary, drooping. Spikelets 2–3 mm, brownish purple; glumes unequal, lower glume narrowly lanceolate, 2–2.5 mm, apex acuminate, upper glume broadly lanceolate, 1.5–2.5 mm, apex obtuse; callus hairs equal to or slightly shorter than lemma; lemma 1.5–2.5 mm, apex obtuse or emarginate, awnless; palea 1/2–2/3 as long as lemma; rachilla ca. 0.5 mm, including hairs up to 1–1.5 mm. Anthers ca. 0.5 mm. Caryopsis brown, fusiform, ca. 1.5 mm. Fl. and fr. summer and autumn. 2n = 28*.

● Grassly slopes, among shrubs, on wasteland; 1900–3800 m. Guizhou, Sichuan, Yunnan.

The name “*Deyeuxia agrostioides* L. Liu” (Vasc. Pl. Hengduan Mts. 2; 2240. 1994) belongs here, but was not validly published because no Latin description was provided.


Perennial, very loosely tufted. Culms slender, weakly ascending, 60–120 cm tall, 1–2 mm in diam., 4–6-noded. Leaf sheaths scabrid; leaf blades flat, thin, 5–20 cm, 1–4 mm wide, glabrous, apex acuminate; ligule 1–4 mm, usually tattered. Panicle loose, open, soft, 15–20 × 8–14 cm; branches in whorls of 2–5, up to 10 cm, slender, flexuous, bare below middle, di- or trichotomously branched above, smooth, branchlets and pedicels capillary, drooping. Spikelets 3–4.2 mm, gray-green or purplish at apex; glumes lanceolate, lower glume 3–4 mm, 1-veined, scabrid along vein, apex acute, upper glume 2.5–3.5 mm, 3-veined with lateral veins obsolete, midvein smooth, apex obtuse; callus hairs 2/3–3/4 length of lemma; lemma 3–4 mm, awnless; palea 1/2–2/3 as long as lemma; rachilla ca. 0.8 mm, including hairs up to 1.5–2 mm. Anthers 0.5–0.7 mm. Caryopsis brown, fusiform, ca. 2 mm. Fl. and fr. Jul.–Aug.

● Bamboo forests, roadsides on moist ground; 2000–2600 m. Sichuan, Yunnan.


Perennial, loosely tufted. Culms slender, erect, 40–60 cm, ca. 1 mm in diam., 2- or 3-noded. Leaf sheaths scabrid; leaf blades involute, 5–9.5 cm, ca. 1.5 mm wide, scabrid; ligule oblong, ca. 3 mm. Panicle lanceolate, rather loose, 6–11 × 2–3 cm; branches ascending, lowest 1/7–1/5 length of lemma; lemma 2.7–3.5 mm, apex obtuse, awnless or with a very small apical mucro; palea 2/3–3/4 as long as lemma; rachilla 1.5–2.5 mm, including hairs 2–3 mm. Anthers ca. 2 mm.

- Woodlands; 2600 m. Sichuan.

This species is known only from the type.


Aulacolepis petelotii Hitchcock, J. Wash. Acad. Sci. 24: 291. 1934, Agrostis continentalis Handel-Mazzetti; A. petelotii (Hitchcock) Noltie; Anisachne gracilis Keng; A. gracilis var. multinosidis Y. Y. Qian; Aniselytron gracilis (Keng) N. X. Zhao; A. petelotii (Hitchcock) Sojak; Calamagrostis petelotii (Hitchcock) Govaerts; Deyeuxia continentalis (Handel-Mazzetti) L. Liu; Neoaulacolepis petelotii (Hitchcock) Rauschert.

Perennial, densely tufted, old basal sheaths fibrous. Culms slender, erect or geniculate at base, 11–25 cm tall, 2–4-noded. Leaf sheaths smooth; leaf blades linear to filiform, flat or involute, 2–10 cm, 0.5–4 mm wide, scabrid, apex acute; ligule 0.5–2 mm, truncate to lacerate. Panicle narrowly pyramidal, 3.5 mm, upper glume lanceolate, apex acuminate; callus hairs 1/4–1/3 length of lemma; lower lemma 2.5–3.1 mm, keel scabrid above middle, apex acuminatum; callus hairs 1/3–1/2 length of lemma; lemma slightly shorter than or subequaling glumes, apex narrowly obtuse, awnless; palea 2/3 as long as lemma; rachilla penicillate, including hairs 1.8–2.6 mm. Anthers ca. 0.5 mm. Fl. and fr. Nov.

Grassy and stony places in uplands; ca. 1900 m. Yunnan [Bhutan, NE India].

This grass lies on the boundary between Agrostis and Deyeuxia. It has an open panicle of small spikelets as in Agrostis, but a bearded callus and rachilla extension as in Deyeuxia. It is sometimes known as A. zenkeri Trinius (Calamagrostis zenkeri (Trinius) Davidev; D. zenkeri (Trinius) Veldkamp), a name which probably applies only to a grass from S India. Deyeuxia abnormis is very similar to D. petelotii, with which it is often confused, but is more robust with a laxer, spreading habit and a larger, more branched panicle. Other differences are given in the key.


不育野青茅 yan yuan ye qing mao

Agrostis nagenensis Bor; Calamagrostis abnormis (J. D. Hooker) U. Shukla; Deyeuxia nagenensis (Bor) Veldkamp.

Perennial, loosely tufted. Culms laxly ascending from a decumbent base, often scrambling, 30–90 cm tall, 4–10-noded, sometimes branched. Leaf sheaths scabrid; leaf blades linear, flat, 9–12 cm, 2–5 mm wide, apex acute; ligule 1–2 mm, truncate. Panicle effuse, 8–30 cm; branches loosely spreading, secondary and tertiary branches well developed. Spikelets 2.5–3.5 mm, green or purplish; glumes lanceolate, equaling or slightly exceeding floret, lower glume 2.6–3.4 mm, upper glume 2.5–3.1 mm, keel scabrid above middle, apex acuminate; callus hairs 1 3/5 length of lemma; lemma slightly shorter than or subequaling glumes, apex narrowly obtuse, awnless; palea 2/3 as long as lemma; rachilla penicillate, including hairs 1.8–2.6 mm. Anthers ca. 0.5 mm. Fl. and fr. Nov.

Grassy places on sandy acid soils; 1400–3000 m. Guizhou, Yunnan [Bhutan, NE India].

This species is unusual in Deyeuxia in that most spikelets have 2 florets. However, spikelets with 2 florets do occur sporadically in other normally 1-flowered species. The rachilla is also well developed, so possibly this species represents a primitive state within the genus. The spikelets are otherwise typical of Deyeuxia.


喜马拉雅野青茅 xi ma la ya ye qing mao

Perennial, subdensely tufted, rhizomatous; rhizomes elongate, slender. Culms erect, 15–60 cm tall, 2–3 mm in diam., smooth, (2–)3–4-noded. Leaf sheaths smooth or slightly scabrid; leaf blades flat or involute, 9–20 cm, 2–5 mm wide, slightly scabrid, apex long-acuminate; ligule 2–4 mm, toothed. Panicle loosely contracted, lanceolate-oblong in outline, 6–17 × 3–6 cm; branches in whorls of 3–5, ascending, 3.5–8 cm, slightly scabrid. Spikelets 5–6.5 mm, dark purple, florets (1–)2, upper floret slightly smaller; glumes subequal, 1-veined, slightly scabrid, lower glume broadly lanceolate, apex acute or slightly obtuse, upper glume lanceolate, apex acuminate; callus hairs 1 4/5 length of lemma; lower lemma 4–5 mm, upper lemma 3–3.5 mm, upper part purplish and scabrid, margins white, membranous, apex 4-toothed; awn arising from upper 1 5/2–5/5 of lemma, 8–10 mm, geniculate; palea 2/3 as long as lemma; rachilla internode between florets and extension above upper floret ca. 1 mm, pilose with hairs 0.8–1.5 mm. Anthers 2–2.5 mm. Fl. Sep.

- Alpine meadows, under alpine shrubs; 3900–4000 m. Xizang.

This species is unusual in Deyeuxia in that most spikelets have 2 florets. However, spikelets with 2 florets do occur sporadically in other normally 1-flowered species. The rachilla is also well developed, so possibly this species represents a primitive state within the genus. The spikelets are otherwise typical of Deyeuxia.
Perennial, densely tufted, rhizomatous; rhizomes elongate, slender. Culms erect, 10–40 cm tall, 1–1.5 mm in diam., scabrid below panicle, 2–3-noded. Leaf sheaths scabrid; leaf blades flat or involute when dry, 2–13 cm, 1–4 mm wide, scabrid, apex acute; ligule 2–4 mm, lacerate. Panicle dense, spike-like, lanceolate-oblong in outline, or sometimes laxer, 3–7(–13) × 0.8–1.5(–5) cm; branches 1–5 cm, scabrid. Spikelets 3–5(–6) mm, dark purple; glumes lanceolate, subequal or lower glume slightly shorter than upper, lower glume 1-veined, upper glume 3-veined, scabrid, apex acuminate; callus hairs ca. 1/3 length of lemma; lemma 3–4.5 mm, membranous, upper part scabrid; apex slightly 4-toothed; awn arising from upper part of lemma back; rachilla conspicuously penicillate, 1.5–2 mm, including hairs up to 5 mm.

Anthers 1.4–2.3 mm. Fl. Jul–Aug.

Alpine meadows, in woodlands, among bushes; 2700–5200 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Nepal].

This is a polymorphic species, varying especially in the compactness of the panicle and the length and position of the awn on the lemma back. Looser-panicked forms (var. laxa) are somewhat intermediate with Deyeuxia scabrescens. These two species are closely related, and hybridization is possibly occurring.

The spikelets in the type of Deyeuxia megalantha are enlarged due to nematode infection.


Calamagrostis borii Tzvelev.

Perennial, tufted, rhizomatous; rhizomes elongate, slender. Culms erect, 25–35 cm tall, smooth, 2–3-noded. Leaf sheaths smooth or scabrid at base; leaf blades flat, 4–8 cm, 3–4.5 mm wide, scabrid; ligule 3–7 mm. Panicle dense, spike-like, narrowly oblong in outline, 6–9 × 1.5–2 cm; branches erect, appressed, scabrid. Spikelets 4.5–6(–7) mm, rose or purplish red; glumes lanceolate, subequal or lower glume slightly longer than upper, densely scabrid, lower glume ciliolate along margin, 1-veined, upper glume 3-veined at base, apex sharply acuminate; callus hairs ca. 1/3 lemma length; lemma 3.5–5 mm, scabrid, apex denticulate; awn arising from or above middle of lemma, 5–9 mm, weakly geniculate; palea 2/3–3/4 as long as lemma; rachilla conspicuously penicillate, 1.5–2 mm, including hairs 3–4 mm. Anthers 2–3 mm. Fl. and fr. Jul–Oct.

Grassy slopes, among shrubs, in woods; 2000–4600 m. Gansu, Hubei, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

This is one of the more common species of Deyeuxia in China, occurring mainly at higher altitudes in the southwest. Deyeuxia pyramidalis is a closely related species with a similarly robust habit, but this occurs mainly at lower altitudes in eastern and northern areas. Deyeuxia scabrescens is very variable, but recognizable by its very scabrid panicle and spikelets, conspicuously penicillate rachilla, but short callus hairs, and awn arising from the upper part of the lemma back.

Deyeuxia scabrescens intergrades with D. pulchella, and intermediates occur causing problems for identification. Deyeuxia scabrescens var. humilis is based on a short plant with an almost straight awn, which is probably an introgression product of these two species.

The name "Deyeuxia dispar L. Liu" (Vasc. Pl. Hengduan Mts. 2: 2237. 1994) belongs here, but was not validly published because no Latin description was provided. The specimen indicated as the holotype has some enlarged spikelets, typical of nematode infection.


林芝野青茅 lin zhi ye qing mao

Perennial, tufted. Culms erect, 50–80 cm tall, 2–3-noded. Leaf sheaths smooth or scabrid; leaf blades flat or involute, 10–15 cm, 1–3 mm wide, scabrid; ligule 4–5 mm. Panicle open, ovate in outline, 7–12 × 5–8 cm; branches in whorls of 3–6, curving, spreading or ascending, 2–8 cm, smooth or scabrid, lower 1/2–2/3 bare; pedicles curved, slightly scabrid. Spikelets 5–7 mm, purple; glumes narrowly lanceolate, subequal or lower glume slightly longer than upper, lower glume 1-veined, upper glume 3-veined, scabrid, apex acuminate; callus hairs ca. 1/3 length of lemma; lemma ca. 3 mm, apex 4-toothed; awn arising from upper part of lemma, 2–3 mm; palea ca. 2/3 as long as lemma; rachilla 1–1.5 mm, including hairs 3.5–4 mm. Anthers ca. 1 mm. Fl. Aug.

Grassy mountainsides, among alpine shrubs; 3500–4700 m. Sichuan, Xizang.

Specimens from Xizang are sometimes confused with Deyeuxia
### 11. Deyeuxia nivicola

J. D. Hooker, Fl. Brit. India 7: 267. 1896 ["1897"].

微雪野青茅 weiyao yeqingmao

*Calamagrostis nivicola* (J. D. Hooker) Handel-Mazzetti;
*Deyeuxia levipes* Keng.

Perennial, tufted, rhizomatous; rhizomes slender, spreading. Culms erect or ascending, very slender, up to 20 cm tall, 0.5–1 mm in diam., smooth, 1–2-noded. Leaf sheaths tight, smooth; leaf blades flat or involute, 1–10 cm, 1–3 mm wide, adaxial surface scabrid, apex acute; ligule 1–3 mm, entire or irregularly denticulate. Panicle contracted, spike-like, linear to narrowly oblong in outline, 1.5–8 × 0.3–1 cm; branches 1–2 cm, erect, smooth. Spikelets 4–7 mm, purple or green tinged purple; glumes narrowly lanceolate, lower glume slightly longer than upper, both 1-veined, smooth or slightly scabrid along vein, apex acuminate; callus hairs 1/5–1/4 length of lemma; lemma 3–4.5 mm, herbaceous, scabrid above middle, apex distinctly 4-toothed, lateral veins shortly excurrent; awn sub-basal, 5–7 mm, geniculate; palea 2/3–3/4 as long as lemma; rachilla 2–3.5 mm, including hairs 3–4 mm. Anthers 0.5–1.2 mm. Fl. and fr. Aug–Sep. 2n = 28.

Grassy and stony mountain slopes; 3000–5000 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

See the comment on dimorphic anthers under *Deyeuxia flavens* (species no. 13).

### 12. Deyeuxia mazzettii


会理野青茅 huili yeqingmao


Perennial, tufted. Culms erect, 20–60 cm tall, ca. 1 mm in diam., 3–5–noded. Leaf sheaths smooth; leaf blades filiform, involute, 10–20 cm, ca. 0.5 mm wide, both surfaces smooth, margins scabrid, apex subacute; ligule 1–3 mm, truncate or lacerate. Panicle loosely contracted, broadly lanceolate, 6–14 × 2–5 cm; branches in whorls of 3–4, distant, ascending or widely spreading, scabrid, lower 1/2 bare. Spikelets 3–7 mm, yellowish brown or purple; glumes ovate-lanceolate, lower glume slightly longer than upper, 1-veined or obscurely 3-veined, scabrid, apex acuminate; callus hairs 1/4–1/3 length of lemma; lemma 3.5–5 mm, equaling or slightly shorter or longer than glumes, lateral and intermediate veins prolonged into 0.5–1.5 mm mucros with the outermost mucros longest; awn sub-basal, 5–6 mm, geniculate with twisted column; palea ca. 2/3 as long as lemma; rachilla 0.5–1 mm, including hairs up to ca. 2.5 mm. Anthers dimorphic, 0.5–0.6 mm when ovary sterile, 1–1.2 mm when ovary fertile. Fl. and fr. Aug–Sep. 2n = 28.

● Alpine meadows, grassy slopes, open woodlands or shrublands, especially along river banks; 2700–4500 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

*Deyeuxia flavens* is close to *Agrostis triaristata* (J. D. Hooker) Bor (D. triaristata J. D. Hooker; *Calamagrostis triaristata* J. D. Hooker) from Bhutan and India (Sikkim), but that species has smooth panicle branches, a smaller floret, more pronounced mucros at the lemma apex, and a minute rachilla extension. *Deyeuxia flavens* lies on the boundary between *Agrostis* and *Deyeuxia* because of the short callus hairs but penicillate rachilla extension. Dimorphic anthers are also known in other species from the Himalayas, e.g., *D. mazzettii*, *D. nivicola*, and *D. nyingchiensis*.

### 13. Deyeuxia flavens

Keng, Sunyatsenia 6: 67. 1941.

*Calamagrostis flavens* Keng (Calamagrostis flavens (Keng) P. C. Kuo & S. L. Lu ex J. L. Yang) may be based on a hybrid between *D. mazzettii* and *D. flavens*.

Perennial, loosely tufted. Culms erect or geniculate at base, slender, (12–)30–60 cm tall, 1–2 mm in diam., glabrous, 2–3-noded. Leaf sheaths smooth; leaf blades flat, 3–12 cm, 2–5 mm wide, scabrid; ligule 2.5–6 mm, toothed. Panicle open, very loose, 4–15 × 2–12 cm; branches usually paired, rarely in whors of 3–4, distant, ascending or widely spreading, scabrid, lower 1/2 bare. Spikelets 3–7 mm, yellowish brown or purple; glumes ovate-lanceolate, lower glume slightly longer than upper, 1-veined or obscurely 3-veined, scabrid, apex acuminate; callus hairs 1/4–1/3 length of lemma; lemma 3.5–5 mm, equaling or slightly shorter or longer than glumes, lateral and intermediate veins prolonged into 0.5–1.5 mm mucros with the outermost mucros longest; awn sub-basal, 5–6 mm, geniculate with twisted column; palea ca. 2/3 as long as lemma; rachilla 0.5–1 mm, including hairs up to ca. 2.5 mm. Anthers dimorphic, 0.5–0.6 mm when ovary sterile, 1–1.2 mm when ovary fertile. Fl. and fr. Aug–Sep. 2n = 28.

● Alpine meadows, grassy slopes, open woodlands or shrublands, especially along river banks; 2700–4500 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

### 14. Deyeuxia korotkyi


兴安野青茅 xinganyeqingmao

*Calamagrostis korotkyi* Litvinov, Schedae Herb. Fl. Ross. 55: no. 2750. 1918; C. korotkyi subspp. *turchaninowii* (Litvinov) Tzvelev; C. *turchaninowii* Litvinov; *Deyeuxia turchaninowii* (Litvinov) Y. L. Chang ex S. L. Lu.

Perennial, tufted. Culms erect, 30–80 cm tall, 1.5–3 mm in diam., 2–3-noded. Leaf sheaths smooth, rarely puberulous; leaf blades grayish green, flat, stiff, (4–)10–20 cm, 4–11 mm wide, both surfaces smooth, margins scabrid, apex finely acuminate; ligule 3–5 mm, truncate. Panicle dense, spike-like, 3–15 × 1–1.5 cm; branches in whors of 3–5, appressed to rachis, 1–2 cm, scabrid. Spikelets 5–7 mm, yellowish green or purplish; glumes...
lanceolate, subequal or lower glume ca. 1 mm longer than upper, lower glume 1–veined, upper glume 3–veined, smooth or scabrid only along midvein, apex acuminate; callus hairs ca. 1.3 length of lemma, sparse, unequal; lemma 4–5 mm, firmly membranous, apex denticulate; awn sub-basal, 7–11 mm, well exserted from spikelet, geniculate with twisted column; palea subequal to or slightly shorter than lemma; rachilla 1.5–2 mm, including hairs 2.5–4 mm. Anthers ca. 3 mm. Fl. Aug.

Grassy slopes, dry woodlands; 300–2500 m. N Heilongjiang, N Nei Mongol, NW Xinjiang [Mongolia, E Russia].

_Deyeuxia turczaninowii_ var. _nenjiangensis_ S. L. Lu (Acta Biol. Plateau Sin. 2: 19. 1984) has been described from N Heilongjiang and Nei Mongol. It may be the hybrid _D. korotkyi × Calamagrostis epigeios_. It differs from typical _D. korotkyi_ by its looser panicle, narrower glumes, and longer callus hairs ca. 3/4 as long as the lemma. It is intermediate between the putative parents in these characters.


水山野青茅 _shui shan ye qing mao_

_Agrostis suizanensis_ Hayata, Icon. Pl. Formosan. 7: 83. 1918; _Calamagrostis filifolia_ Merrill; _C. suizanensis_ (Hayata) Honda; _Deyeuxia biflora_ Keng; _D. chaseana_ Bor; _D. stenophylla_ Jansen (1952), not (Handel-Mazzetti) P. C. Kuo & S. L. Lu (1987).

Perennial, densely tufted. Culms slender, erect, up to 65 cm tall, 2–3-noded, retrorsely puberulent below nodes. Leaf sheaths glabrous or retrorsely puberulent toward base; leaf blades filiform, stiff, strongly involute, 6–8(–15) cm, 3–5 mm wide, apex acute; ligule 0.75–2.5 mm, minutely erose. Panicle contracted, narrowly oblong in outline, 5–16 × 0.6–1 cm, axis scaberulous; lowest branches in groups of 2–3(–4), 2.5–5 cm.

Spikelets 4.5–5.5(–6) mm, florets (1–)2, upper floret slightly scaberulous; lowest branches in groups of 2–3(–4), 2.5–5 cm. Spikelets 4.5–5.5(–6) mm, florets (1–)2, upper floret slightly smaller and bisexual or sometimes rudimentary; glumes lanceolate, slightly unequal with upper glume as long as spikelet, lower glume 1–veined, upper glume 1–3–veined, midvein scabrid, apex acuminate; callus hairs 1/8–1/5 length of lemma; lower part bare. Spikelets 3–4.5 mm, grayish green or purple at base; glumes lanceolate, equal, lower glume 1–veined, upper glume 3–veined, scabrid; callus hairs 1/7–1/5 length of lemma; lemma slightly shorter than glumes, apex 4-toothed; awn sub-basal, 4–5.5 mm, weakly geniculate, column slightly twisted; palea subequial to lemma; rachilla 0.5–0.7 mm, including hairs 2–3 mm. Anthers 1.5–2 mm. Fl. and fr. Jul–Oct.

- Wet places, especially river banks; 600–2900 m. Gansu, Guizhou, Henan, Ningxia, Shaanxi, Sichuan, Yunnan, Zhejiang.

_Deyeuxia arundinacea_ var. _laxiflora_ is not taxonomically a variety of _D. arundinacea_, which is a different grass; see the comment under _D. pyramidalis_ below.


野青茅 _ye qing mao_

_Calamagrostis pyramidalis_ Host, Icon. Descr. Gram. Austriac. 4: 28, 1809; _Agrostis arundinacea_ Linnaeus; _Arundo sylvatica_ Schrader, nom. illeg. superfl.; _C. arisanensis_ Honda; _C. arundinacea_ (Linnaeus) Roth; _C. arundinacea_ var. _brachytricha_ (Steudel) Hackel; _C. arundinacea_ var. _ciliata_ Honda; _C. arundinacea_ var. _hirsuta_ Hackel; _C. arundinacea_ var. _latifolia_ (Rendle) Kitagawa; _C. arundinacea_ var. _robusta_ (Franchet & Savatier) Honda; _C. arundinacea_ var. _sciroides_ (Franchet & Savatier) Hackel; _C. astrochelohensis_ Honda; _C. brachytricha_ Steudel; _C. brachytricha_ var. _ciliata_ (Honda) Y. Ibaragi & H. Ohashi; _C. collina_ Franchet; _C. formosana_ Hayata; _C. matsuiana_ Honda; _C. morrisonensis_ Hayata; _C. niitakayamensis_ Honda; _C. nipponica_ Franchet & Savatier; _C. robusta_ Franchet & Savatier; _C. sciroides_ Franchet & Savatier, nom. hom. illeg.; _Deyeuxia ampla_ Keng; _D. brachytricha_ (Steudel) Chang; _D. collina_ (Franchet) Pilger; _D. formosana_ (Hayata) C. C. Hsu; _D. henryi_ Rendle; _D. hupeshensis_ Rendle; _D. matsuana_ (Honda) Keng; _D. sylvatica_ Kunth, nom. illeg. superfl.

Perennial, tufted, sometimes shortly rhizomatous. Culms erect, slender or robust, (40–)100–150 cm tall, 2.5–5 mm in diam., 2–3-noded. Leaf sheaths glabrous to densely pubescent, or sheath-collar pilose; leaf blades flat or involute, 5–60 cm, 2–12 mm wide, smooth, scabrid or pubescent; ligule 4–13 mm, obtuse or lacerate. Panicle contracted to slightly open, lanceolate-ovate in outline, 6–35 × 1–10 cm; branches in whorls, ascending, erect or appressed, 1–2 cm; pedicels scabrid. Spikelets 3–5(–6.5) mm, yellowish green or purplish green; glumes lanceolate, subequal or lower glume slightly longer than upper, 1–3–veined, scabrid, apex acute; callus hairs 1/5–2/5 length of lemma; lemma 3.8–6.5 mm, subequal to glumes, scabrid, apex erose; awn arising from ca. lower 1/5 of lemma, 7–12 mm, geniculate with twisted column; palea as long as or slightly

(Reende) P. C. Kuo & S. L. Lu; _D. sylvatica_ (Schrader) Kunth var. _laxiflora_ Rendle.

Perennial, densely tufted. Culms erect, 80–120 cm tall, 3–5 mm in diam., pubescent just below panicle and on nodes, 2–4-noded. Leaf sheaths with minute retrorse hairs between veins; leaf blades flat or slightly involute, 30–70 cm, 5–10 mm wide, adaxial surface densely pubescent, abaxial surface scabrid; ligule 1–2(–4) mm, truncate or obtuse. Panicle large, open, 20–35 × 15–23 cm; branches in whorls of 3–5, spreading, scabrid, lower part bare. Spikelets 3–4.5 mm, grayish green or purple at base; glumes lanceolate, equal, lower glume 1–veined, upper glume 3–veined, scabrid; callus hairs 1/7–1/5 length of lemma; lemma slightly shorter than glumes, apex 4-toothed; awn sub-basal, 4–5.5 mm, weakly geniculate, column slightly twisted; palea subequial to lemma; rachilla 0.5–0.7 mm, including hairs 2–3 mm. Anthers 1.5–2 mm. Fl. and fr. Jul–Oct.

Specimens from Malesia tend to have longer leaf blades and ligules and a shorter rachilla extension. They have been referred to different varieties from the typical variety in Taiwan: _var. stenophylla_ (Jansen) Veldkamp in the Philippines and _var. chasenana_ (Bor) Veldkamp in New Guinea. Cleistogamous forms with anthers ca. 0.5 mm are known from the Philippines. The name _Deyeuxia biflora_ applies to an aberrant form with a well-developed second floret.


疏穗野青茅 _shu sui ye qing mao_

_Calamagrostis effusiflora_ (Rendle) P. C. Kuo & S. L. Lu ex J. L. Yang; _Deyeuxia arundinacea_ P. Beauv. var. _laxiflora_ (Rendle) P. C. Kuo & S. L. Lu; _D. sylvatica_ (Schrader) Kunth var. _laxiflora_ Rendle.
shorter than lemma; rachilla (0.5–)1.5–2 mm, including hairs 2.5–4 mm. Anthers (1.3–)2–3 mm. Fl. and fr. Jun–Oct.

Grassy slopes, open woods; 100–4200 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Henan, Heilongjiang, Hubei, Hunan, Jilin, Jiangsu, Jiangxi, Liaoiong, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Russia, Europe; Japan, Korea, Mongolia, Russia, China, Korea, North America].

This is a highly polymorphic complex, with many local variants.

The name Deyeuxia sylvatica Kuntb., based on Arundo sylvatica Schrader (1806), is illegitimate because Schrader cited Agrostis arundinacea Linnaeus (1753) in synonymy. Varietal combinations under D. sylvatica should be transferred to D. pyramidalis if it is wished to maintain them (D. sylvatica var. borealis Rendle, var. brachytricha (Steudel) Rendle, var. hirsuta (Hackel) Rendle, var. latifolia Rendle, var. ligulata Rendle, and var. sciuroides (Franchet & Savatier) Rendle).

The name Deyeuxia arundinacea P. Beauvois is often presumed to be based on Agrostis arundinacea Linnaeus, but this is not the case. In fact, D. arundinacea is a synonym of the Mediterranean grass Amphilodesmos mauritanicus (Poiret) T. Durand & Schinz. Varietal combinations under D. arundinacea should be transferred to D. pyramidalis if it is wished to maintain them (D. arundinacea var. borealis (Rendle) P. C. Kuo & S. L. Lu, var. brachytricha (Steudel) P. C. Kuo & S. L. Lu, var. ciliata (Honda) P. C. Kuo & S. L. Lu, var. hirsuta (Hackel) P. C. Kuo & S. L. Lu, var. latifolia (Rendle) P. C. Kuo & S. L. Lu, var. ligulata (Rendle) P. C. Kuo & S. L. Lu, var. robusta (Franchet & Savatier) P. C. Kuo & S. L. Lu, and var. sciuroides (Franchet & Savatier) P. C. Kuo & S. L. Lu).

The name Calamagrostis zhongdianensis L. Liou” (Vasc. Pl. Hengduan Mts: 2: 2235. 1994) belongs here, but was not validly published because no Latin description was provided.


箱根野青茅 xiang gen ye qing mao


Perennial, subloosely tufted from a short, knotty rhizome. Culms slender, erect or base geniculate, 30–70 cm tall, 0.5–1 mm in diam., 2–4-noded. Leaf sheaths smooth or rarely scabrid; leaf blades linear, 10–60 cm, 8–12 mm wide, adaxial surface puberulous, abaxial surface scabrid; ligule oblong-elliptic, 4–20 mm, apex lacerate. Panicle open, 22–35 × 6–18 cm; branches in whorls of 3–5, spreading or ascending, scabrid, lower 1/4–1/2 bare. Spikelets 4–6 mm, yellowish or purplish green; glumes subequal or upper glume shorter than lower, lower glume 1-veined, scabrid along vein, apex acuminate, upper glume 3-veined, scabrid along upper part of veins, apex obtuse; callus hairs 2/3–3/4 length of lemma; lemma 3.5–4 mm, apex obtuse, denticulate; awn sub-basal, ca. 5 mm, geniculate with twisted column; palea subequal to or slightly shorter than lemma; rachilla ca. 1 mm, including hairs up to 4 mm. Anthers ca. 2 mm. Fl. Aug–Sep.

● Forests, forest margins; 1000–3200 m. Henan, Shanxi, Sichuan.


华高野青茅 hua gao ye qing mao

Calamagrostis sylvatica (Keng) P. C. Kuo & S. L. Lu ex J. L. Yang.

Perennial, densely tufted. Culms erect, 1.3–1.8 m tall, 2–5 mm in diam., scabrid below panicle, otherwise smooth, 3–5-noded. Leaf sheaths smooth or rarely scabrid; leaf blades linear, 10–60 cm wide, adaxial surface puberulous, abaxial surface scabrid; ligule oblong-elliptic, 4–20 mm, apex lacerate. Panicle open, 22–35 × 6–18 cm; branches in whorls of 3–5, spreading or ascending, scabrid, lower 1/4–1/2 bare. Spikelets 4–6 mm, yellowish or purplish green; glumes subequal or upper glume shorter than lower, lower glume 1-veined, scabrid along vein, apex acuminate, upper glume 3-veined, scabrid along upper part of veins, apex obtuse; callus hairs 2/3–3/4 length of lemma; lemma 3.5–4 mm, apex obtuse, denticulate; awn sub-basal, ca. 5 mm, geniculate with twisted column; palea subequal to or slightly shorter than lemma; rachilla ca. 1 mm, including hairs up to 4 mm. Anthers ca. 2 mm. Fl. Aug–Sep.

Perennial, tussocky, rhizomatous; rhizomes short or elongate. Culms erect, slender to stout, up to 1.5 m tall, 1–4 mm in diam., usually branched, (4–)6–8-noded. Leaf sheaths smooth, glabrous; leaf blades linear, flat, 10–30 cm, 4–20 (–40) mm wide, scabrid; ligule oblong-elliptic, 3–10 mm, obtuse or lacerate. Panicle loosely contracted, narrowly elliptic in outline, 5–20 × 2.5–8 cm; branches slender, ascending or spreading, 2–8 cm, scabrid, bare below middle. Spikelets 3.5–5 mm, yellowish green, purplish, or yellowish brown; glumes lanceolate, subequal, lower glume 1-veined, upper glume 3-veined, flanks smooth, slightly glossy, midvein scabrid, apex abscuate; callus hairs 3/4–4/5 length of lemma; lemma 3–4 mm, conspicuously scabrid-hirtellous, apex obtuse or denticulate; awn sub-basal, 2–4 mm, straight, included within spikelet; palea subequal to lemma; rachilla 1–1.5 mm, including hairs 2.5–3 mm. Anthers 1.5–2 mm. Fl. Jul–Aug.

Forests, streamsides, shady valleys; 600–2500 m. Anhui, Guangdong, Guizhou, Hebei, Hubei, Jiangxi, Sichuan, Zhejiang [Japan, Russia (Kamchatka, Kuril Islands, Sakhalin)].

**Deyeuxia purpurea** encompasses a widespread, apomictic complex of morphologically very variable and intergrading forms. These have been treated by different authors either as separate species, or at subspecific or varietal rank within *D. purpurea*. Most are based on types from outside China, and no attempt is made here to relate these names to variation in the complex within China.

The name *Calamagrostis angustifolia* refers to a particularly narrow-leaved form (blades 1.5–3.5 mm wide) from NE China.


**四川野青茅** si chuan ye ping mao


Perennial, rhizomatous; rhizomes slender. Culms up to 80 cm tall, 2–3 mm in diam., unbranched, 2–3-noded. Leaf sheaths smooth; leaf blades flat, 11–25 cm, 4–5 mm wide, adaxial surface smooth, abaxial surface scabrid; ligule 3–4 mm, truncate. Panicle open or lightly contracted, 11–22 × 1–6 cm; branches in whorls of 3–4, slender, flexuous, almost smooth, often bare below middle; pedicels scabrid. Spikelets 3.5–4 mm, yellowish green, tinged purple; glumes lanceolate, the upper slightly shorter than the lower, scabrid, apex acute; callus hairs about as long as lemma; lemma 2.5–2.8 mm, scabrid, apex 2-denticulate; awn arising near or below middle of lemma, poorly developed, 1–2 mm, straight; palea 2/3 as long as lemma; rachilla ca. 2 mm, including hairs up to 3.5 mm. Anthers ca. 2 mm. Fl. and fr. Aug–Sep. 2n = 42*.

Grassy places in forests, damp ground near ditches; 1200–4300 m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shansi, Sichuan, Xinjiang [Japan, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe, North America].

This is a widespread, highly polymorphic species, to which the name *Deyeuxia kashmeriana* Bor has been misapplied (by Liou, Vasc. Pl. Hengduan Mts. 2: 2241. 1994). *Deyeuxia kashmeriana* is a synonym of *Calamagrostis decora* J. D. Hooker from Kashmir, which has slightly larger spikelets and a longer, sub-basal awn.


**顶芒野青茅** ding mang ye ping mao

*Calamagrostis staintonii* G. Singh.

Perennial, loosely tufted, shortly rhizomatous. Culms 50–90 cm tall, 2–3 mm in diam., smooth, unbranched, 3–4-noded. Leaf sheaths smooth; leaf blades usually involute, ca. 25 cm, 2–5 mm wide, both surfaces glabrous, smooth or sometimes scabrid on margin; ligule 3–5(–7) mm, obtuse or subacute. Panicle open, 10–18 × ca. 12 cm; branches ascending or spreading, lowermost whorled, 4–8 cm, smooth, bare below middle. Spikelets 3.5–4.5 mm, greenish or yellowish green tipped with purple; glumes lanceolate, lower glume 1-veined, upper glume 3-veined, scabrid, apex acute or abruptly acuminate; callus hairs about as long as lemma; lemma 2.5–3.5 mm, scabrid, apex 4-toothed; awn arising from upper 1/5–1/4 of lemma, well exserted from spikelet, 3–6 mm, very slightly bent; palea ca. 2/3 as long as lemma; rachilla 1–1.5 mm, including hairs 2.5–3 mm. Anthers ca. 2 mm. Fl. Jul–Aug.

Dry slopes; 3100–3500 m. Sichuan, Yunnan [Nepal].

*Calamagrostis staintonii* is the correct name for this species in *Calamagrostis* because the heterotypic name *C. nepalensis* Nees ex Steudel already exists.


**小花野青茅** xiao hua ye ping mao

*Arundo neglecta* Ehrhart, Beitr. Naturk. 6: 137. 1791; *Calamagrostis micrantha* Kearney; *C. neglecta* (Ehrhart) Gaertner; *Deyeuxia micrantha* (Kearney) L. Liu.

Perennial, tufted. Culms erect, 60–100 cm tall, 1–3 mm in diam., smooth or slightly scabrid below panicle, usually 2–3-noded. Leaf sheaths smooth, glabrous; leaf blades flat or involute, 10–30(–60) cm, 1–5 mm wide, adaxial surface scabrid with obvious veins, abaxial surface smooth; ligule 1.5–4 mm, obtuse or truncate, denticulate. Panicle dense, interrupted, lanceolate to narrowly ovate in outline, 5–20 × 2–4 cm, axis smooth or scabrid; branches short, fascicled, scabrid. Spikelets 3–4(–4.5) mm, pale green to purplish brown; glumes narrowly ovate, subequal, lower glume 1-veined, upper glume 3-veined, prominently scabrid throughout, apex acute; callus hairs 2/3–3/4 length of lemma; lemma 2.5–3.5 mm, apex obtuse, denticulate; awn arising near or below middle of lemma, poorly developed, 1–2 mm, straight; palea 2/3 as long as lemma; rachilla ca. 2 mm, including hairs up to 3.5 mm. Anthers ca. 2 mm. Fl. and fr. Aug–Sep. 2n = 42*.

Grassy places in forests, damp ground near ditches; 1200–4300 m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shansi, Sichuan, Xinjiang [Japan, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe, North America].

This is a widespread, highly polymorphic species, to which the name *Deyeuxia kashmeriana* Bor has been misapplied (by Liou, Vasc. Pl. Hengduan Mts. 2: 2241. 1994). *Deyeuxia kashmeriana* is a synonym of *Calamagrostis decora* J. D. Hooker from Kashmir, which has slightly larger spikelets and a longer, sub-basal awn.


**欧野青茅** ou ye ping mao

*Arundo lapponica* Wahlenberg, Fl. Lapp. 27. 1812; *Calamagrostis lapponica* (Wahlenberg) Hartman.

Perennial, loosely tufted, shortly rhizomatous. Culms erect from a geniculate base, 60–130 cm tall, 2–3 mm in diam., smooth, 3-noded. Leaf sheaths smooth; leaf blades flat or involute, 10–30 cm, 2–6 mm wide, adaxial surface loosely pubescent, abaxial surface scabrid; ligule 2–4(–6) mm, lacerate. Panicle loosely contracted, (5–)10–25 × 2–3(–8) cm; branches erect or ascending, 1–3(–4) cm, scabrid, lower 1/3 bare. Spikelets 4–6 mm, purplish brown or yellowish green; glumes ovate-lanceolate, subequal, 4–5 mm, lower glume 1-veined, upper glume 3-veined, scabrid on upper back and veins, apex acuminate; callus hairs 3/4–4/5 length of lemma; lemma 2.5–3.5 mm, apex denticulate; awn arising from lower 1/3 of lemma, ca. 3 mm, weakly geniculate, slightly twisted; palea 2/3 as long as lemma; rachilla 1–1.5 mm, including hairs 3–4 mm. Anthers ca. 2 mm. Fl. Jul–Aug.

Grassy slopes, forests, among shrubs, especially along river banks; 400–4100 m. Gansu, Heilongjiang, Nei Mongol, Sichuan, Xinjiang [Mongolia, Korea, Russia; Europe, North America].


**短毛野青茅** duan mao ye ping mao

This species is close to the variable *Deyeuxia holciformis*, but the different upper leaf surface provides a definite distinguishing character.


**Calamagrostis tianschanica** Ruprecht, Sert. Tianschan. 34. 1869.

Perennial, loosely tufted, rhizomatous; rhizomes slender, spreading. Culms erect, 15–50 cm tall, 1–2 mm in diam., scabrid below panicle, 2–3-noded. Leaf sheaths scabrid or scabrid-hirtellous to subglabrous, slightly inflated; leaf blades flat with involute margins, 4–10 cm, 2–3 mm wide, adaxial surface scabrid with numerous short spinules, apex acute; ligule 3–4 mm, lacerate. Panicle contracted, spikelet-like, dense or branches distinct, 3–8 ×1–1.5 cm; branches 1–2 cm, scabrid. Spikelets 4–6 mm, purple; callus hairs 3/4 length of lemma; glumes narrowly lanceolate, subequal, lower glume 1-veined, upper glume 3-veined, scabrid, apex acuminate; lemma 3–4.5 mm, apex 4-denticulate; awn arising from lower 1/4 of lemma, 5–6 mm, geniculate with twisted column; palea slightly shorter than lemma; rachilla ca. 2 mm, including hairs up to 3.5 mm. Anthers 1.5–2 mm. Fl. Jul–Sep.

Stony mountain slopes and alpine meadows, especially along rivers; 1000–5200 m. Gansu, Qinghai, Xinjiang [Kyrgyzstan, Tajikistan (Pamirs)].

This species occurs at higher altitudes than any other species of *Deyeuxia* in China.
veined, upper glume 3-veined, scaberulous, apex acute to acuminate; callus hairs ca. 1/2 length of lemma; lemma 4–6 mm, scabrid, apex 4-denticate; awn sub-basal, 5–7 mm, weakly geniculate, lower part slightly twisted; palea 2/3 as long to equaling lemma; rachilla 1.5–2.5 mm, including hairs 3–4.5 mm. Anthers 2–4 mm. Fl. and fr. Aug–Sep.

Grassy slopes and wet sandy places in montane regions; 3800–4500 m. Gansu, Qinghai (Yushu), Xizang [Kashmir, Kyrgyzstan (W Tien Shan), Tajikistan (Panirs)].

Deyeuxia compacta, with a small panicle and unusually broad glumes, represents an extreme form of this variable species.


細弱野青茅 bao xing ye qing mao


Perennial, loosely tufted, short rhizomatous. Culms erect, 40–70 cm tall, 2–3 mm in diam., 3–4-noded. Leaf sheaths retrorsely pubescent or glabrous; leaf blades flat or involute, 10–25 cm, 2–6 mm wide, both surfaces scabrid; ligule ca. 0.5 mm, truncate. Panicle contracted or slightly loose, base usually 10–25 cm, 2–6 mm wide, both surfaces scabrid; ligule ca. 0.5 mm, lanceolate, acute or narrowly lanceolate. Spikelets 3.5–4 mm, yellowish green or purplish; glumes narrowly lanceolate, subequal, lower glume 1-veined, upper glume 3-veined, scabrid, apex acute; callus hairs as long as lemma; rachilla ca. 3 mm, apex bidentate or 2-lobed to awn insertion; awn arising below apex or between lobes, 5–6 mm, slender, almost straight, much exceeding spikelet; palea 2/3 as long as lemma; rachilla ca. 0.5 mm, sparsely penicillate, 2.5–3.5 mm including hairs. Anthers ca. 1.2 mm. Fl. Jul–Aug.

● Light shade in woodlands, forming colonies, wet sandy places along rivers; 3200–4600 m. Gansu, W Xizang.

32. Deyeuxia conferta Keng, Sunyatsenia 6: 68. 1941.

密穗野青茅 mi sui ye qing mao

Calamagrostis conferta (Keng) P. C. Kuo & S. L. Lu.

Perennial, loosely tufted. Culms erect, 60–120 cm tall, 2–3 mm in diam., 2–3-noded. Leaf sheaths smooth or scabrid at base; leaf blades involute or flat, 10–45 cm, 3–6 mm wide, both surfaces scabrid or abaxial surface smooth; ligule 4–6 mm, lacerate. Panicle dense, spikelike, rarely interrupted at base, 9–20 × 1–3 cm; branches 1–3 cm, scabrid. Spikelets 4–6(–7) mm, yellowish green or purplish; glumes narrowly lanceolate, subequal or upper glume slightly shorter than lower, lower glume 1-veined, upper glume 3-veined, scabrid along veins, apex acuminate; callus hairs equal to or slightly longer than lemma; lemma 3.5–4(–5) mm, apex 2-lobed or denticulate; awn sub-basal, 2.5–4 mm, straight; palea ca. 2/3 as long as lemma; rachilla ca. 0.5 mm, including hairs up to 3 mm. Anthers 1.5–2.2 mm. Fl. and fr. Jul–Sep.

● Light shade in woodlands, forming colonies, wet sandy places along rivers; 3000–3500 m. Gansu, Nei Mongol, Qinghai, Shaanxi.

Deyeuxia conferta var. guoxuniana N. X. Zhao & M. F. Li (Acta Bot. Yunnan. 16: 230. 1994), described from Xizang, does not agree well with this species, and is perhaps of hybrid origin. It has not been possible to see the type specimen.


青海野青茅 _qing hai ye qing mao_

Perennial, loosely tufted. Culms erect, 10–40 cm tall, 1–1.5 mm in diam., usually 2–3-noded. Leaf sheaths scabrid; leaf blades flat or involute, 3–10(–12) cm, (0.5–)1.5–4 mm wide, adaxial surface and margins scabrid, abaxial surface smooth; ligule 1–3 mm, obtuse, denticulate. Panicle contracted, spike-like, narrowly oblong in outline, 2–6.5 × 0.6–1 cm; branches short, erect, scabrid. Spikelets 3–5 mm, purple, bronze at apex; glumes broadly lanceolate, subequal, lower glume 1-veined, upper glume 3-veined, scabrid or minutely hispid, apex acute; calyx hairs laterally 2/3–4/5 length of lemma, much shorter at lemma back; lemma 2.5–3.5 mm, scabrid or minutely hispid above middle, apex denticulate; awn sub-basal, 2–3 mm, erect or slightly curved, lower part slightly twisted; palea slightly shorter than lemma, purple along keels; rachilla ca. 1.5 mm, including hairs 2.5–3.5 mm. Anthers ca. 2 mm. Fl. Aug.–Sep.

- Alpine meadows, especially lakeside banks; 3000–4500 m. Gansu, Qinghai.


瘦野青茅 _shou ye qing mao_

_Calamagrostis varia_ P. Beauvois var. _macilenta_ Grisebach in Ledebour, Fl. Ross. 4: 427. 1852; _C. macilenta_ (Grisebach) Litvinov.

Perennial, shortly rhizomatous, mat-forming. Culms erect, 15–60 cm tall, ca. 1.5 mm in diam., usually 3-noded. Leaf sheaths smooth, usually purplish at base; leaf blades flat or involute, stiff, 5–15 cm, 2–4(–7) mm wide, adaxial surface slightly scabrid; ligule 1.5–3 mm, triangular or irregularly dentate. Panicle narrowly spikelike, dense, 6–9 × 0.8–1.5 cm; branches short, 2-fascicled, scabrid. Spikelets 4–5 mm, usually yellowish green or pinkish; glumes lanceolate, subequal, scabrid, lower glume 1-veined, upper glume 3-veined, apex acute; callus hairs 1/2 length of lemma; lemma 3–4 mm, upper part scabrid, apex obtuse or denticulate; awn sub-basal, about as long as lemma, 2.5–3 mm, weakly geniculate; palea slightly shorter than lemma; rachilla 1.5–2.2 mm, including hairs 3.5–4 mm. Anthers 2–2.2 mm. Fl. summer.

Meadows, damp sand-pebble ground; 2700–3400 m. Nei Mongol, Qinghai, Xinjiang [Mongolia, E Russia].
or slightly scabrid below panicle. Leaf sheaths with auricle on one side; leaf blades broadly linear, flat, 25–45 cm, 5–20 mm wide, adaxial surface scabrid, abaxial surface smooth, apex finely acuminate; ligule 0.5–3 mm, truncate. Panicle loosely contracted, lanceolate in outline, 15–25 cm, nodding, plumose; branches in whorls, bare at base, slightly scabrid. Spikelets silvery-green or tinged pale purple, 5.5–8 mm; glumes linear-lanceolate, subequal or lower glume slightly longer, keel scabrid, apex subulate; callus hairs 2–3 times length of lemma; lemma 3–5 mm, apex lacerate. Panicle dense, cylindric, 4–13 cm, slightly lobed but primary branches congested; branches scabrid. Spikelets 4.5–6.5 mm, grayish brown or purplish; glumes narrowly lanceolate, unequal, upper glume 2/3–7/8 length of lower glume, keel scabrid, apex acuminate-subulate; callus hairs equaling or longer than lemma; lemma about 1/2 as long as glumes, 2–4 mm, apex slightly denticulate; awn arising from apex, 0.5–1(–2) mm, straight, not projecting from glumes; palea 1/2 as long as lemma; rachilla not extended. Stamens 3, anthers 2 mm. Fl. and fr. Aug–Sep.

Damp sandy or stony places; 700–3000 m. Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, Kashmir, Kyrgyzstan, Pakistan, Tajikistan].

This taxon represents a small form of Calamagrostis pseudophragmites with a congested, usually purple panicle. It is often recognized at infraspecific rank (C. pseudophragmites subsp. tartarica), but at the specific rank the epithet “hedinii” has priority.


Damp grassy slopes in montane regions; 1900–5000 m. Shaanxi, Sichuan, Tibet, Xizang, Yunnan [Bhutan, Kashmir, Kyrgyzstan, Pakistan, Tajikistan].

This taxon represents a small form of Calamagrostis pseudoephagmites with a congested, usually purple panicle. It is often recognized at infraspecific rank (C. pseudophragmites subsp. tartarica), but at the specific rank the epithet “hedinii” has priority.

5. Calamagrostis epigeios (Linnaeus) Roth subsp. macrolepis (Litvinov) Tzvelev; C. macrolepis var. rigidula T. F. Wang.

Perennial, densely tufted, rhizomatous; rhizomes spreading. Culms erect, 90–120 cm tall, 3–4 mm in diam., 4–5-noded, scabrid below panicle. Leaf sheaths smooth; leaf blades flat or margins involute, grayish green, 15–40 cm, 5–10 mm wide, scabrid; ligule 5–12 mm, apex tattered. Panicle fairly dense, lobed, 15–25 × 3–4.5 cm; branches erect, 1–3 cm, scabrid. Spikelets 7–11 mm, greenish, purplish or yellowish green; glumes lanceolate-subulate, unequal, lower glume 7–11 mm, upper glume 1–1.5 mm shorter, keel scabrid; callus hairs 1.5 times length of lemma; lemma 3–5 mm, 3-veined, smooth or scabrid, apex slightly 2-lobed; awn arising near middle of lemma back, 3–4 mm, straight or slightly curved; palea 2/3 as long as lemma. Rachilla extension usually absent. Stamens 3, anthers 2.5–3 mm. Fl. and fr. Jul–Sep.

Grassy slopes in montane regions, sandy places near rivers, on waste ground; 100–3200 m. Hebei, Heilongjiang, Jilin, Neimongol, Qinghai, Shanxi, Xinjiang [SW Asia (Caucasus), Japan, Mongolia, Russia, Tajikistan].

This is an element from the Calamagrostis epigeios complex and is often included within that species.

3. Calamagrostis hedini Tzvelev

Grassy slopes in montane regions; 90–3000 m. Hebei, Heilongjiang, Jilin, Neimongol, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].


Damp grassy slopes, near riversides; 300–2500 m. Gansu, Gui- zhou, Hebei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan and NE China [Bhutan, India (Darjeeling), Japan, Kazakhstan, Korea, Pakistan, Turkestan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].

POACEAE

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89. POLYPOGON Desfontaines, Fl. Atlant. 1: 66. 1798.

棒头草属 bang tou cao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Annual or perennial. Leaf blades linear, flat; ligule membranous. Panicle contracted to dense and spike-like, often bristly with numerous small deciduous spikelets. Spikelets with 1 floret, laterally compressed, without rachilla extension, falling entire, pedicel or upper part of it articulated and remaining attached to spikelet as a stipe; glumes equal, longer than floret, papery, scabrid, 1-veined, apex entire to 2-lobed, often with slender awn from apex; lemma about 1/2 as long as glumes, rounded, thin, smooth, shiny, obtuse 5-veined, veins usually shortly excurrent from truncate apex, awnless or with fine subapical awnlet or geniculate dorsal awn; palea 1/2 as long as glume body. Twenty-five species: warm-temperate regions of the world and on tropical mountains, especially in damp places; six species (one endemic) in China.

Polygon is closely related to Agrostis, with which it hybridizes. It is distinguished mainly by its deciduous spikelets falling with a slender, basal stipe attached.

1a. Glumes awnless.

2a. Spikelets 1.5–2.5 mm; palea almost as long as lemma; anthers 0.5–0.7 mm .................................................. 1. P. viridis

2b. Spikelets 3–4 mm; palea 2/3 lemma length; anthers 1–1.5 mm ................................................................. 2. P. hissaricus

1b. Glumes awned.

3a. Awn of glumes shorter than or up to 1.5 times as long as glume body.

Damp places, especially riversides; 100–3900 m. Common in China. This is a polymorphic, polyploid complex, in which some forms have been given separate infraspecific names. However, intermediates are common and such names are of very limited use.

This species provides forage and has soil-holding qualities.

1a. Spikelets 5–7 mm; lemmas 3–3.5 mm; awn 2–3 mm .............................................................. 5a. var. epigeios

1b. Spikelets 4–4.5 mm; lemmas ca. 2.5 mm; awn ca. 1.5 mm ......................................................... 5b. var. parviflora

5a. Calamagrostis epigeios var. epigeios

拂子茅 (原变种) fu zi mao (yuan bian zhong)

Arundo epigeios Linnaeus, Sp. Pl. 1: 81. 1753; Calamagrostis epigeios var. densiflora Grisebach; Calamagrostis epigeios var. sylvatica T. F. Wang.

Panicle dense, interrupted, 10–30 cm. Spikelets 5–7 mm; lemma 3–3.5 mm; awn 2–3 mm; rachilla extension absent or rudimentary.

Moist ground near ditches and along riversides; 100–3900 m. Common in China. This is a polymorphic, polyploid complex, in which some forms have been given separate infraspecific names. However, intermediates are common and such names are of very limited use.

1a. Spikelets 5–7 mm; lemmas 3–3.5 mm; awn 2–3 mm .............................................................. 5a. var. epigeios

1b. Spikelets 4–4.5 mm; lemmas ca. 2.5 mm; awn ca. 1.5 mm ......................................................... 5b. var. parviflora


小花拂子茅 xiao hua fu zi mao

Plants dwarfish. Panicle spike-like, 6–9 cm. Spikelets 4–4.5 mm, lemma ca. 2.5 mm; awn ca. 1.5 mm.

Moist ground near ditches and along riversides. Heilongjiang, W Sichuan (alpine regions) [E Russia].

Calamagrostis extremiorientalis (Tzvelev) Probatova (C. epigeios subsp. extremiorientalis Tzvelev; C. epigeios var. extremiorientalis (Tzvelev) Kitagawa), from the Russian Far East and NE China, has similar dimensions to this variety, but the awn arises further up the lemma back. It has not been possible to see any authentic material.


东北拂子草 dong bei fu zi cao

Perennial, densely tufted. Culms 90–135 cm tall. Leaf sheaths glabrous; leaf blades linear, involute when dry, 25–35 cm, ca. 5 mm wide, adaxial surface very scabrid, abaxial surface smooth, margin scabrid; ligule 3–4(–7) mm, truncate or lacerate. Panicle lanceolate in outline, often lobed in lower half, 12–17(–22) × 1.2–1.5 cm. Spikelets 6–7 mm; glumes lanceolate-subulate, subequal, scabrid along keel, apex long acuminate; callus hairs 5.5–6.8 mm; lemma 4–5 mm, 3-veined, apex 2-toothed; awn arising from upper 1/3 of lemma back, 2.5–3 mm; straight; palea 3/4 as long as lemma; rachilla 0.5–0.8 mm, upper part or apex penicillate with a few or many long silky hairs. Fl. and fr. Jul.–Aug.

- Forests, forest margins, moist places, waste ground. Heilongjiang, Jilin.

- Forests, forest margins, moist places, waste ground. Heilongjiang, Jilin.
POACEAE

A. phylolepis, A. tenuis, A. variegata, A. viridis, A. wightii

Annual, tufted. Culms geniculate, sometimes trailing and rooting at lower nodes, 10–75 cm tall. Leaf blades linear or broadly linear, 2.5–15 cm, 3–10 mm wide, scabrid or adaxial surface smooth, apex acute; ligule 3–8 mm. Panicle densely cylindrical, slightly lobed, or looser and narrowly ovate, 4–15 cm, pale green or flushed purple; branches narrowly ascending, up to 4 cm, bearing densely clustered spikelets. Spikelets narrowly oblong, 2–2.5 mm; glumes narrowly oblong, puberulous, vein scabrid-aculeate, margins slightly ciliate in lower half, apex emarginate, awned from sinus; awn shorter or up to 1.5 times as long as glume body; lemma elliptic, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, ca. 2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.7 mm. Caryopsis elliptic, ca. 1 mm. Fl. and fr. Apr–Sep.

Annual, tufted. Culms geniculate, sometimes trailing and rooting at lower nodes, 10–75 cm tall. Leaf blades linear or broadly linear, 2.5–15 cm, 3–10 mm wide, scabrid or adaxial surface smooth, apex acute; ligule 3–8 mm. Panicle densely cylindrical, slightly lobed, or looser and narrowly ovate, 4–15 cm, pale green or flushed purple; branches narrowly ascending, up to 4 cm, bearing densely clustered spikelets. Spikelets narrowly oblong, 2–2.5 mm; glumes narrowly oblong, puberulous, vein scabrid-aculeate, margins slightly ciliate in lower half, apex emarginate, awned from sinus; awn shorter or up to 1.5 times as long as glume body; lemma elliptic, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, ca. 2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.7 mm. Caryopsis elliptic, ca. 1 mm. Fl. and fr. Apr–Sep.

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Annual, tufted. Culms geniculate, sometimes trailing and rooting at lower nodes, 10–75 cm tall. Leaf blades linear or broadly linear, 2.5–15 cm, 3–10 mm wide, scabrid or adaxial surface smooth, apex acute; ligule 3–8 mm. Panicle densely cylindrical, slightly lobed, or looser and narrowly ovate, 4–15 cm, pale green or flushed purple; branches narrowly ascending, up to 4 cm, bearing densely clustered spikelets. Spikelets narrowly oblong, 2–2.5 mm; glumes narrowly oblong, puberulous, vein scabrid-aculeate, margins slightly ciliate in lower half, apex emarginate, awned from sinus; awn shorter or up to 1.5 times as long as glume body; lemma elliptic, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, ca. 2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.7 mm. Caryopsis elliptic, ca. 1 mm. Fl. and fr. Apr–Sep.

Annual, tufted. Culms geniculate, sometimes trailing and rooting at lower nodes, 10–75 cm tall. Leaf blades linear or broadly linear, 2.5–15 cm, 3–10 mm wide, scabrid or adaxial surface smooth, apex acute; ligule 3–8 mm. Panicle densely cylindrical, slightly lobed, or looser and narrowly ovate, 4–15 cm, pale green or flushed purple; branches narrowly ascending, up to 4 cm, bearing densely clustered spikelets. Spikelets narrowly oblong, 2–2.5 mm; glumes narrowly oblong, puberulous, vein scabrid-aculeate, margins slightly ciliate in lower half, apex emarginate, awned from sinus; awn shorter or up to 1.5 times as long as glume body; lemma elliptic, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, ca. 2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.7 mm. Caryopsis elliptic, ca. 1 mm. Fl. and fr. Apr–Sep.

Annual, tufted. Culms geniculate, sometimes trailing and rooting at lower nodes, 10–75 cm tall. Leaf blades linear or broadly linear, 2.5–15 cm, 3–10 mm wide, scabrid or adaxial surface smooth, apex acute; ligule 3–8 mm. Panicle densely cylindrical, slightly lobed, or looser and narrowly ovate, 4–15 cm, pale green or flushed purple; branches narrowly ascending, up to 4 cm, bearing densely clustered spikelets. Spikelets narrowly oblong, 2–2.5 mm; glumes narrowly oblong, puberulous, vein scabrid-aculeate, margins slightly ciliate in lower half, apex emarginate, awned from sinus; awn shorter or up to 1.5 times as long as glume body; lemma elliptic, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, ca. 2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.7 mm. Caryopsis elliptic, ca. 1 mm. Fl. and fr. Apr–Sep.
thickly clothed in yellow bristles. Spikelets narrowly oblong, 1.5–2.5 mm; glumes narrowly obovate-oblong, puberulous, vein scabrid-acute, margins ciliate, apex emarginate, apex of lobes slightly acute, awned from sinus; awn 2.5–4 times as long as glume body; lemma obovate, 1–1.2 mm, apex slightly 4-toothed, midvein extended into a fine, straight, readily deciduous, 1.5–2 mm awn; palea as long as lemma. Stamens 3, anthers ca. 0.8 mm. Caryopsis obovate-oblong, ca. 1 mm. Fl. and fr. May–Oct.

Moist places, stream sides; below 3000 m. Anhui, Fujian, Gansu, Guangdong, Hebei, Henan, Jiangsu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N and S Africa, SW Asia (Caucasus), Europe].

This is a widely introduced weed naturalized in most warm-temperate regions.


裂颖棒头草 lie ying bang tou cao

Annual, tufted. Culms erect or geniculate, up to 35 cm tall. Leaf sheaths scabrid, uppermost slightly inflated; ligule 1–6 mm, apex irregularly toothed; leaf blades linear, 5–10 cm, 1–5 mm wide, both surfaces scabrid, apex acuminate. Panicle dense, spike-like, sometimes lobed, 5–7 cm, often purple tinged. Spikelets 2–3 mm, yellowish green; glumes obovate-oblong, hispid, margins ciliate, apex deeply 2-lobed, lobes obtuse, awned from sinus; awn 6–7 mm; lemma 1–1.2 mm, awnless; palea as long as lemma. Stamens 3, anthers 0.3–0.4 mm. Caryopsis obovate-oblong, 0.7–0.9 mm. Fl. and fr. Jun–Aug.

Moist grassland on mountain slopes, marshy meadows; 400–3300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in North America].

90. CINNA Linnaeus, Sp. Pl. 1: 5. 1753.

单蕊草属 dan rui cao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Perennials. Leaf blades flat; ligule membranous. Inflorescence an open panicle. Spikelets laterally compressed, floret 1, rachilla extension usually present, varying from minute stub to slender bristle, disarticulating below glumes; glumes equal or lower somewhat shorter, lanceolate, membranous with broad hyaline margins, 1–3-veined, apex acute; lemma herbaceous with hyaline margins, equal to or slightly shorter than glumes, keeled, 3–5-veined, awnless or with mucro or short straight awn arising below apex, apex subacute; palea as long as or slightly shorter than lemma, 1-keeled, 1-veined or 2-veined with veins very close together, keel scabrid. Stamens 1(or 2). Ovary oblong, styles united at base. Endosperm liquid.

Four species: temperate regions of the N hemisphere, Mexico to Peru; one species in China.


单蕊草 dan rui cao


Culms solitary or loosely tufted, 0.6–1.6 m tall, 2–3 mm in diam., smooth or scabrid below nodes, 7–9-noded. Leaf sheaths scabrid; leaf blades broadly linear, 15–30 cm, 10–15 mm wide, both surfaces and margin scabrid; ligule 3–6 mm. Panicle drooping, 15–40 cm; branches slender, 3–6 per node, up to 10 cm, ascending or spreading with spikelets in clusters along branchlets, scabrid. Spikelets 2.5–4 mm, green; glumes subequal, narrowly lanceolate, lower glume 1-veined, upper glume 1–3-veined; floret raised on 0.1–0.5 mm stipe; lemma oblong-lanceolate, 2.5–3.8 mm, (3–)5-veined, scabrid, awnlet 0.2–1(–2) mm. Anthers 0.6–0.8 mm. Caryopsis ca. 2 mm. Fl. and fr. Jul–Sep. 2n = 28.

Damp places in woodlands, thickets, along riversides. Heilongjiang, Jilin [Japan, Korea, Mongolia, Russia; N Europe, North America].

91. CYATHOPUS Stapf, Hooker’s Icon. Pl. 24: t. 2395. 1895.

杯禾属 bei he shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Perennial, tufted, scabrid throughout. Culms ascending, moderately stout, unbranched. Leaf blades linear, flat; ligule membranous. Inflorescence an open panicle; branches whorled, distant, bare in lower part; pedicels densely scabrid, apices pale, shallowly cuplike. Spikelets laterally compressed, floret 1, rachilla extension absent or almost so, disarticulating below glumes; glumes equal, lanceolate, papery, prominently 3-veined, apex cuspidate; lemma membranous, slightly shorter than glumes, weakly keeled, 5-veined, apex subacute, awnless; palea as long as lemma, 2-keeled. Stamens 3.

One species: Bhutan, China, India (Sikkim).
1. **Cyathopus sikkimensis** Stapf, Hooker’s Icon. Pl. 24: t. 2395. 1895.

锡金杯禾 xi jin bei he

Culms ca. 80 cm tall, 3–4 mm in diam., scabrid, 4–5-noded, nodes dark. Leaf sheaths subequaling internodes, papery, scaberulous; leaf blades 20–35 cm, 7–7.5 mm wide, scabrid, apex acute; ligule 6–9 mm, lacerate. Panicle 23–27 cm; branches 3–5 per node, up to 10 cm, laxly ascending, densely scabrid. Spikelets lanceolate, 2–3 mm, green; glumes as long as spikelet, scabrid on back and veins, apices exceeding floret; lemma lanceolate, 1.7–2.5 mm, pallid, scaberulous near apex, glabrous below. Anthers ca. 0.9 mm. Fl. Sep.

Conifer forests (*Abies*-*Tsuga*) and bamboo thickets (*Fargesia*) on steep slopes; 2900–3200 m. W Yunnan [Bhutan, India (Sikkim)].

This apparently rare grass is known from only a few gatherings.


蕉草属 wang cao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Annual or perennial. Leaf blades linear, flat; ligule membranous. Inflorescence composed of many unilateral racemes along a central axis; racemes dense, the lower often branched; spikelets subsessile, closely imbricate, biseriate. Spikelets orbicular, disarticulating below glumes, bisexual floret 1, with or without a second staminate floret above it; rachilla extension absent; glumes equal, gibbously inflated, enclosing all but apex of floret, not or weakly keeled, herbaceous with thinner white margins, 3-veined, apex obtuse or acute; floret callus short, glabrous; lemma lanceolate, cartilaginous, rounded on back, 5-veined, apex acute or tapering to a cusplike awn-point; palea somewhat shorter than lemma. Caryopsis terete.

Two species: temperate regions of the N hemisphere; one species in China.

The second species in the genus, *Beckmannia eruciformis* (Linnaeus) Host, occurs from Europe and the Mediterranean region to C Asia and E Russia. It is a perennial with short, creeping rhizomes, sometimes with tuberous basal internodes, spikelets usually with 2 florets, globose, inflated glumes, and longer anthers 1.2–1.8 mm.

1. **Beckmannia syzigachne** (Steudel) Fernald, Rhodora 30: 27. 1928.

蕉草 wāng cáo

Annual. Culms tufted, erect, soft, 15–90 cm tall, 2–4-noded. Leaf sheaths glabrous, usually longer than internodes; leaf blades 5–20 cm, 3–10 mm wide, grayish green, scabrid or abaxial surface smooth, apex acute; ligule 3–8 mm. Inflorescence 10–30 cm; racemes erect or narrowly ascending, 1–4 cm. Spikelets orbicular-cuneate in outline, flattened, 2.5–3 mm, gray-green, floret 1(–2); glumes glabrous or hispid, slightly inflated, laterally compressed, veins prominent, linked by oblique transverse veinlets; lemma scaberulous, apex cuspidate-aristate. Anthers 0.4–0.6 mm. Caryopsis oblong, ca. 1.5 mm, with a tuft of hairs at apex. Fl. and fr. Apr–Oct. 2n = 14.

Riversides, swampy meadows, damp places; below 3700 m. Anhui, Fujian, Gansu, Hebei, Heilongjiang, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shandong, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe, North America].

1a. Glumes glabrous, or almost so; anthers usually 0.6–1 mm;................................. 1a. var. *syzigachne*

1b. Glumes densely hispid throughout;
anthers usually 0.4–0.6 mm; .................. 1b. var. *hirsutiflora*

1a. **Beckmannia syzigachne** var. *syzigachne*

蕉草(原变种) wāng cáo (yuán biàn zhòng)

Glumes glabrous or with a few short stiff hairs at base; anthers usually 0.6–1 mm.

Riversides, swampy meadows, damp places; below 3700 m. Gansu, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe, North America].

1b. **Beckmannia syzigachne** var. *hirsutiflora* Roshevitz in Komarov, Fl. URSS 2: 291. 1934.

毛颖蕉草 mào yǐng wāng cáo

*Beckmannia hirsutiflora* (Roshevitz) Probatova; *B. syzigachne* subsp. *hirsutiflora* (Roshevitz) Tzvelev.

Glumes hispid; anthers usually 0.4–0.6 mm.

Streamsides, moist meadows; below 3000 m. NE China [E Russia].

93. **ALOPECURUS** Linnaeus, Sp. Pl. 1: 60. 1753.

看麦娘属 kān mài niáng shū

Lu Shenglian (卢生莲); Sylvia M. Phillips

Annual or perennial. Leaf blades linear, flat; ligule membranous. Inflorescence a spikelike panicle, densely cylindrical, spikelets
numerous, closely packed; pedicels very short, apices cuplike. Spikelets protogynous, strongly laterally compressed, floret 1, falling entire from pedicel; rachilla extension absent; glumes equal, + equaling and enclosing floret, broadly lanceolate to oblong, membranous to thinly leathery, prominently 3-veined, strongly keeled, keel usually ciliate, infrequently winged, lower margins almost free or connate for up to half their length, apex obtuse, acute or shortly awned; lemma broadly lanceolate to ovate, usually thinly membranous, keeled, obscurely 5-veined, smooth, glabrous, lower margins often connate, awned from lower back, apex truncate to acute; awn straight when short or geniculate when longer, column smooth, usually twisted at maturity, bristle scabrid; palea absent or very small. Lodicules absent; ovary glabrous. Caryopsis obliquely obovate in side view; endosperm sometimes liquid.

Between 40 and 50 species: temperate and cold regions of the N hemisphere, South America; eight species in China.

1a. Perennial; short or long creeping rhizomes present.

1b. Annual; rhizomes absent.

1b. Annual; rhizomes absent.

2a. Perennial, loosely tufted or culms solitary, rhizomatous. Culms erect, 15–50 cm tall, 3-noded. Leaf sheaths smooth, upper sheaths inflated; leaf blades 5–12 cm, 3–7 mm wide, abaxial surface smooth, adaxial surface scabrid; ligule 2–3 mm. Panicle ovoid to shortly and broadly cylindrical, densely hairy, 1.5–3 cm, gray-green or tinged light purple. Spikelets narrowly ovate-oblong, slightly urn-shaped, 4–6 mm; glumes submembranous, densely villous on keel, lateral veins and near margins, hairs soft, spreading, 2–3 mm, margins connate at base, apices sharply acuminate to mucronate, slightly divergent; lemma shorter than glumes, margins connate in lower 1/3–1/2, upper margins slightly pubescent, awned from lower 1/5–1/4, apex broadly acute; awn exerted 4–8 mm from spikelet, geniculate. Anthers yellow, 2–2.5 mm. Fl. and fr. Jul–Sep.

Damp montane grasslands, alpine meadows, other wet places; below 3800 m. Hebei, Heilongjiang, Nei Mongol, Qinghai [Mongolia, Russia (Far East, Siberia)].


喜马拉雅看麦娘 xi ma la ya kan mai niang

Perennial, loosely tufted, with long, slender rhizomes. Culms sometimes solitary, erect, up to 100 cm tall, 3–5-noded. Leaf sheaths loose, smooth, upper sheaths slightly inflated; leaf blades gray-green, 5–20 cm, 3–8 mm wide, abaxial surface smooth, adaxial surface scabrid; ligule 2–5 mm. Panicle broadly cylindrical, 4–8 cm, gray-green, blackish at maturity. Spikelets narrowly oblong, slightly urn-shaped, 4–6 mm; glumes herbaceous, upper part scabrid, keels densely pilose, glabrous or thinly pilose near margins or more generally on flanks, margins connate in lower 1/5, apices acute, slightly divergent (keel shallowly concave below apex); lemma slightly shorter than glumes, margins connate in lower 1/3–1/2, awned from slightly below middle, apex puberulous, obliquely truncate; awn usually included in spikelet, sometimes exerted up to 2.5 mm, usually straight, weakly geniculate with twisted column when longer. Anthers yellow, 2–3 mm. Fl. and fr. Jul–Sep. 2n = 28.

Damp grasslands; 600–3300 m. Gansu, Heilongjiang, Nei Mongolia, Ningxia, Qinghai, Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, N Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia; Europe; introduced in North America].


大看麦娘 da kan mai niang

Perennial, with long slender rhizomes. Culms solitary, erect, 15–80 cm tall, 3–5–noded. Leaf sheaths smooth, uppermost sheath inflated; leaf blades gray-green, 3–15 cm, 2–6 mm wide, abaxial surface smooth, adaxial surface scabrid; ligule 1–4 mm. Panicle shortly and broadly cylindrical to ovoid, 1.5–4 cm, yellow-green tinged violet. Spikelets ovate-elliptic, 3.5–5 mm; glumes thinly herbaceous, keels ciliate with 1.5–2 mm silky hairs, lateral veins and flanks silky pilose, margins connate near base, apices subacute, straight or indistinctly divergent; lemma subequaling or slightly shorter than glumes, margins connate in lower 2/5, awned from lower 1/4–1/3, apex puberulous, obliquely truncate; awn exerted 4–8 mm from spikelet, geniculate. Anthers yellow, 2–2.5 mm. Fl. and fr. Jun–Sep.

Damp montane grasslands, alpine meadows, other wet places; below 3800 m. Hebei, Heilongjiang, Nei Mongol, Qinghai [Mongolia, Russia (Far East, Siberia)].

1a. Perennial; short or long creeping rhizomes present.

1b. Annual; rhizomes absent.

1b. Annual; rhizomes absent.

2a. Perennial, loosely tufted or culms solitary, rhizomatous. Culms erect, 15–50 cm tall, 3-noded. Leaf sheaths smooth, upper sheaths inflated; leaf blades 5–12 cm, 3–7 mm wide, abaxial surface smooth, adaxial surface scabrid; ligule 2–3 mm. Panicle ovoid to shortly and broadly cylindrical, densely hairy, 1.5–3 cm, gray-green or tinged light purple. Spikelets narrowly ovate-oblong, slightly urn-shaped, 4–6 mm; glumes submembranous, densely villous on keel, lateral veins and near margins, hairs soft, spreading, 2–3 mm, margins connate at base, apices sharply acuminate to mucronate, slightly divergent; lemma shorter than glumes, margins connate in lower 1/3–1/2, upper margins slightly pubescent, awned from lower 1/5–1/4, apex broadly acute; awn exerted 4–8 mm from spikelet, geniculate. Anthers yellow, 2–2.5 mm. Fl. Jun. 2n = 56.

Damp alpine grasslands, wet places on rocky slopes; 3000–4100 m. SW Xinjiang (Taxkorgan) [NE Afghanistan, Kashmir, Kyrgyzstan, N Pakistan, Tajikistan].
Alopecurus alpinus Smith var. songaricus Schrenk ex Fischer & Meyen; A. songaricus (Schrenk ex Fischer & Meyen) V. Petrov.

Perennial, loosely tufted, shortly rhizomatous. Culms erect, slightly geniculate at base, up to 100 cm tall, 3–5-noded. Leaf sheaths loose, smooth, slightly inflated; leaf blades 5–25 cm, 3–10 mm wide, abaxial surface smooth, adaxial surface scaberulous; ligule 2–4 mm. Panicle cylindrical, 3–8 cm, gray-green. Spikelets elliptic, 4–6 mm; glumes herbaceous, smooth, keels stiffly ciliate, lateral veins shortly pilose, margins connate in lower 1/3, apices acute, slightly convergent; lemma equaling or slightly longer than glumes, margins connate below middle, awned from lower 1/4, apex puberulous, subacute; awn exserted 3–6 mm from spikelet, weakly geniculate, column not twisted. Anthers yellow, 2–3.5 mm. Fl. and fr. Apr–Aug. 2n = 28.

Montane meadows, forest margins, river valleys; 1500–2500 m. Heilongjiang, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; introduced elsewhere].

This species has been introduced to Japan, North America, and some other temperate countries as a pasture and forage grass.


看麦娘 kannai nang

Alopecurus aequalis subsp. amurensis (Komarov) Hultén; A. aequalis var. amurensis (Komarov) Ohwi; A. aequalis subsp. aristulatus (Michaux) Tzvelev; A. aequalis var. aristulatus (Michaux) Tzvelev; A. amurensis var. aristulatus (Michaux) Tzvelev; A. geniculatus var. aequalis (Sobolewski) Paunero.

Annual, loosely tufted. Culms weak, geniculately ascending, occasionally rooting and branching from lower nodes, 15–40 cm tall. Leaf sheaths smooth, glabrous, slightly inflated; leaf blades light green, soft, 3–10 cm, 2–6 mm wide, abaxial surface smooth, glabrous, adaxial surface closely ribbed, scaberulous; ligule 2–5 mm. Panicle narrowly cylindrical, 2–7 cm, pale green. Spikelets elliptic or oblong, 2–3 mm; glumes membranous, smooth, keels ciliate-hispid, lateral veins hispid on lower part, margins connate at base, apices obtuse; lemma equaling or slightly longer than glumes, margins connate below middle, awned from lower 1/4–1/3, apex obtuse; awn included within spikelet or exserted up to 1.2 mm, straight. Anthers orange, 0.5–0.8 mm. Fl. and fr. Apr–Aug. 2n = 14.

Irrigation ditches, rice fields, damp grasslands, other wet weedy places; below 3500 m. Anhui, Fujian, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Nei Mongol, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Zhejiang [Bhutan, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe, North America].

This is a widespread, semi-aquatic weed of N temperate regions of the world, now introduced to Australia and elsewhere.

East Asian forms tend to have more obvious awns than usual, perhaps due to introgression from Alopecurus longearistatus. Alopecurus amurensis and A. aristulatus are both based on such forms. A form from South America with glabrous glumes has been separated as A. hitchcockii Parodi. A specimen of this species has been found on waste ground in Chengdu, Sichuan.


长芒看麦娘 chang mang kan mai nang

Alopecurus mandshuricus Litvinov.

Annual, loosely tufted. Culms geniculately ascending, 15–30 cm tall. Leaf sheaths lax, smooth, glabrous, upper sheaths sometimes inflated; leaf blades soft, 3–9 cm, 1–3.5 mm wide, abaxial surface smooth, glabrous, adaxial surface closely ribbed, scaberulous; ligule 2–4 mm. Panicle narrowly cylindrical, 4–7 cm, pale green, appearing villous from long slender awns, base often included in uppermost leaf sheath. Spikelets narrowly oblong, 2.5–3 mm; glumes membranous, smooth, keels and lateral veins ciliate, margins connate at base, apices obtuse; lemma equaling or slightly longer than glumes, margins connate below middle, awned from lower 1/4–1/3, apex obtuse; awn exserted 3 mm or more from spikelet, straight. Anthers orange, 0.4–0.8 mm. Fl. and fr. May–Jun. 2n = 14.

Damp sandy or muddy river banks and lake shores. Heilongjiang [Russia (Far East)].


大穗看麦娘 da sui kan mai nang

Alopecurus agrestis Linnaeus.

Annual, tufted. Culms erect or geniculately ascending, up to 80 cm tall. Leaf sheaths smooth, glabrous, upper sheaths slightly inflated; leaf blades 3–16 cm, 2–9 mm wide, glabrous, abaxial surface smooth or scabrid, adaxial surface scabrid; ligule 2–5 mm. Panicle narrowly cylindrical, up to 10 cm, tapering toward apex, yellow-green, pale green, or purplish. Spikelets narrowly oblong, 4.5–7.5 mm; glumes leathery, punctate-scabrid, keels narrowly winged, wings shortly pilose below, scabrid above, lateral veins very shortly pilose near base, margins connate in lower 1/3–1/2, apices acute; lemma slightly longer than glumes, margins connate in lower 1/3–1/2, awned from near base, apex acute; awn exserted 4–8 mm from spikelet, geniculate. Anthers pale yellow, 2.5–4 mm. 2n = 14.

Fields, introduced. Taiwan (Taipei) [Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

This species is adventive or introduced as a fodder grass in North America, Australia, and other temperate regions.


日本看麦娘 ri ben kan mai nang

Annual, tufted, often forming large clump. Culms erect or geniculately ascending, sometimes branching from lower nodes, 25–50 cm tall, 3–4-noded. Leaf sheaths lax, smooth, glabrous, upper sheaths inflated; leaf blades soft, glaucous, 3–12 cm, 3–7 mm wide, abaxial surface smooth, adaxial surface scaberulous; ligule 2–5 mm. Panicle cylindrical, 3–10 cm, yellow-green.
Spikelets ovate-oblong, 4.8–7 mm; glumes herbaceous, smooth, keels wingless, stiffly ciliate, lateral veins pubescent near base or glabrous, margins connate only at extreme base, apices subacute; lemma slightly longer than glumes, herbaceous, margins connate in lower 2/5, awned from near base, apex subacute; awn exserted 5–8 mm from spikelet, weakly geniculate, column not twisted. Anthers white, ca. 1 mm. Fl. and fr. Feb–May.

Wet places; below 2000 m. Anhui, Fujian, Guangdong, Guizhou, Henan, Hubei, Jiangsu, Shaanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].


梯牧草属  tī mù cao shù
Lu Shenglian (吕生莲); Sylvia M. Phillips

Annual or perennial, often shortly rhizomatous. Leaf blades linear, flat. Inflorescence a spikelike, cylindrical panicle, elongate to ovoid or capitate; branches short, sometimes adnate to axis, spikelets densely crowded, sub sessile. Spikelets strongly laterally compressed, floret 1, disarticulating above glumes; rachilla extension present or absent; glumes equal, oblong or obovate in side view, longer than and enclosing floret, herbaceous, 3-veined, strongly keeled, keel often pectinate-ciliate, margins overlapping but not connate, apex truncate to acute, with stout mucro or short stiff awn; lemma broadly oblong or ovate, thinly membranous, dorsally convex, 3–7-veined, apex truncate to subacute, awnless or mucronate; palea slightly shorter than lemma, ciliate along keels; lodicules 2; stamens 3. Caryopsis ellipsoid to ovoid.

Sixteen species: temperate and cold regions of the N hemisphere, extending southward in America along mountain chains into Chile; four species in China.

1a. Annual, lacking non-flowering shoots at anthesis; spikelets obovate-cuneate; glumes firm, inflated ................. 1. P. paniculatum
1b. Perennial, with non-flowering shoots at anthesis; spikelets oblong; glumes membranous, not inflated.

2a. Panicle broadly cylindrical or ovoid; glumes with 1.5–3 mm awns; spikelets purplish ......................................... 2. P. alpinum
2b. Panicle narrowly cylindrical; glumes with 0.3–1.5 mm awns; spikelets gray-green.

3a. Glumes pectinate-ciliate along keel; culms swollen at base ................................................................. 3. P. pratense
3b. Glumes scabrid along keel; culms not swollen at base ................................................................. 4. P. phleoides


鬼蜡烛  gui la zhu

Chilochoa paniculata (Hudson) P. Beauvois; Phleum asperum Jacquin; P. japonicum Franchet & Savatier.

Annual, tufted. Culms erect or geniculate at base, slender, 3–45 cm tall, 3–5-noded. Leaf sheaths glabrous, upper slightly inflated; leaf blades soft, 1.5–15 cm, 2–6 mm wide, glabrous, margins scabrid, apex acute; ligule 2–4 mm, obtuse. Panicle narrowly cylindrical, 1–10 × 0.4–0.8 cm, yellowish green; branches free from central axis. Spikelets obovate-cuneate, 2–3 mm; rachilla extension present; glumes inflated toward apex, narrowed toward base, deeply channeled between veins, scabrid, keel glabrous or shortly pectinate, apex truncate, cuspidate into a hard 0.3–0.6 mm mucro; lemma 1.3–2 mm, 5-veined, sparsely appressed-pubescent, apex subobtuse; anthers 0.4–0.8 mm. Caryopsis ca. 1 mm. Fl. and fr. Apr–Aug. 2n = 28.

Mountain slopes, riversides, field margins, roadsides; ca. 1800 m. Anhui, Gansu, Henan, Hubei, Jiangsu, Shaanxi, Sichuan, Xinjiang, Zhejiang [Lin’an] [Afghanistan, NW India, Japan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].


高山梯牧草  gāo shān ti mù cao
Phleum commutatum Gaudin.

Annual, tufted. Culms erect or decumbent at base, 50–120 cm tall, 3–5-noded. Leaf sheaths glabrous, upper slightly inflated; leaf blades broadly linear, 2–13 cm, 2–9 mm wide, the upper shorter than the lower. Anthers white, 1 mm. Fl. and fr. Jun–Oct. 2n = 14, 28.

Wet alpine meadows, damp soil around bushes, riversides; 2500–3000 m. Gansu, Heilongjiang, Henan, Hubei, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India (Sikkim), Japan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; SW Asia, N Europe, North America, South America (Andes)].

This is a species of arctic and alpine regions of the N hemisphere, extending down the Andes in South America as far as Chile.


梯牧草  tī mù cao
Phleum pratense Jacquin.

Perennial forming loose or dense tussocks. Culms erect or geniculately ascending, 40–120 cm tall, 6–10-noded, lowest nodes usually swollen and cornlike. Leaf sheaths glabrous, loose; leaf blades 10–50 cm, 3–8 mm wide, glabrous, both surfaces and margins scabrid, apex acuminate; ligule 2–5 mm, rounded. Panicle narrowly cylindrical, 4–15 × 0.5–1 cm, gray-green; branches adnate to central axis. Spikelets obovate-oblong, 3–5 mm; rachilla extension absent; glumes oblong, membranous, scabrous, lower softly hairy on margins, keel conspicuously pectinate-ciliate, apex truncate with stout, 0.5–
1.5 mm, scabrid awn; lemma ca. 2 mm, 7-veined, puberulent, especially along veins, apex obtuse; anthers 1.5–2 mm. Caryopsis ca. 1 mm. Fl. and fr. Jun–Aug. 2n = 28, 42.

Grasslands, steppe, forest margins; ca. 1800 m. Anhui, Hebei, Heilongjiang, Henan, Shaanxi, Shandong, Xinjiang (Zhaosu), Yunnan [Russia; Europe].

This is a native of Europe and Russia, now widely introduced in temperate regions of the world as a pasture grass (Timothy Grass).


假梯牧草 jia ti mu cao


Perennial, densely tufted. Culms erect or often geniculate at base, 15–75 cm tall, 2–4-noded. Leaf sheaths smooth, loose; leaf blades 2–20 cm, 1–5 mm wide, the upper shorter than the lower, adaxial surface and margins scabrid, apex acuminate; ligule 1–3 mm, obtuse. Panicle narrowly cylindrical, gradually tapering to apex, 2.5–10 × 0.4–0.7 cm, gray-green; branches free from central axis. Spikelets oblong, 2–3 mm; rachilla extension present; glumes oblong, membranous, keel scabrid, apex obtuse, abruptly narrowed into a stout, 0.3–0.7 mm, scabrid mucro; lemma 1.5–2 mm, 5-veined, glabrous or puberulent, apex obtuse; anthers 1–1.5 mm. Caryopsis 1.3–1.5 mm. Fl. and fr. Jun–Sep. 2n = 14.

Grassy mountain slopes, among shrubs, forest margins; 800–2600 m. Heilongjiang, Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan; NW Africa, SW Asia (Caucasus), Europe].

13. Tribe BRACHYPODIEAE

短柄草族 duan bing cao zu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials, or rarely annual. Leaf blades linear or convolute; ligule membranous. Inflorescence a loose raceme; spikelets (rarely only 1 spikelet) alternating on opposite sides of, and lying broadside to the rachis; rachis tough; pedicels very short. Spikelets elongate, with 5–20 florets, subterete to lightly laterally compressed, rarely strongly laterally compressed, disarticulating above glumes and between florets; glumes unequal, lanceolate, shorter than lowest lemma, herbaceous to membranous, rounded on back, distinctly 3–9-veined, apex obtuse to shortly awned; lemmas lanceolate, herbaceous to firmly membranous, sometimes becoming leathery at maturity, rounded on back, 7–9-veined, awned from entire acuminate apex; awn straight; palea subequal to lemma, ciliate on keels. Lodicles ciliate. Stamens 3. Ovary with hairy apical appendage. Caryopsis tightly enclosed by lemma and palea, ventrally furrowed, apex hairy, embryo small, hilum elongate, linear. x = 5, 7, 9.

One genus and ca. 16 species: temperate Asia and Europe, mountains in Africa, America from Mexico to Bolivia; five species (two endemic) in China.

95. BRACHYPodium P. Beauvois, Ess. Agrostogr. 100. 1812.

短柄草属 duan bing cao shu

Description and distribution as for tribe.

1a. Annual; spikelets laterally compressed; anthers 0.5–1 mm ................................................................. 1. B. distachyon
1b. Perennial; spikelets subterete; anthers 3–5 mm.

2a. Raceme with 1–3 spikelets; culms 10–30 cm tall; leaf blades needle-like ............................................. 2. B. kawakamii
2b. Raceme with 3–6(–15) spikelets; culms usually more than 30 cm tall; leaf blades linear.

3a. Lemmas of all florets with 1–6 mm awn; plant with spreading rhizomes ............................................. 3. B. pinnatum
3b. Lemmas of upper florets with 5–14 mm awn; plant without rhizomes.

4a. Pedicels of spikelets less than 2 mm ..................................................................................................... 4. B. sylvaticum
4b. Pedicels of spikelets 2–5.5 mm ........................................................................................................... 5. B. pratense


二穗短柄草 er sui duan bing cao

Bromus distachyos Linnaeus, Cent. Pl. 2: 8. 1756; Agropyron distachyon (Linnaeus) Chevallier; Festuca distachya (Linnaeus) Roth; Trachymyia distachya (Linnaeus) Link; Zerna distachya (Linnaeus) Panzer ex B. D. Jackson.

Annual. Culms tufted, usually ascending, infrequently erect, up to 15(–40) cm tall. Leaf sheaths smooth to densely pilose; leaf blades lanceolate, flat, rather stiff, glaucous, 1–12 cm, 3–4 mm wide, loosely pilose, margins scabrous-pectinate, apex acuminate; ligule ca. 1 mm. Raceme 2–4 cm, spikelets 1–3 crowded at apex of peduncle. Spikelets 2–3 cm., laterally compressed, florets 10–16; glumes pilose or glabrous, apex acute, lower glume lanceolate, 5–6 mm, 5-veined, upper glume lanceolate-oblong, 7–8 mm, 7-veined; lemma 7.5–10 mm, glabrous, thinly setose or pubescent; awn 7–15 mm. Anthers 0.5–1 mm.

Dry stony places. Xizang (Mainling) [Afghanistan, Pakistan, Tajikistan, Turkmenistan; N Africa, SW Asia, S Europe; introduced elsewhere].