58. DIARRHENA P. Beauvois, Ess. Agrostogr. 142. 1812, nom. cons.

龙常草属 long chang cao shu

Neomolinia Honda.

Description and distribution as for tribe.

1a. Keels of palea smooth; anthers 0.7–1.2 mm; panicle open, branches spreading ..... 1. *D. japonica*
1b. Keels of palea ciliate; anthers 1.5–2 mm; panicle ± contracted, branches erect to ascending.
2a. Panicle contracted at first, becoming somewhat lax at maturity, primary branches often further divided; lemmas smooth on veins; lowest lemma 3.5–4 mm ..... 2. *D. fauriei*
2b. Panicle always contracted, primary branches erect, simple; lemmas scabrid on veins near apex; lowest lemma 4.5–5 mm ..... 3. *D. mandshurica*

1. Diarrhena japonica Franchet & Savatier, Enum. Pl. Jap. 2: 603. 1879.

日本龙常草 ri ben long chang cao

Neomolinia japonica (Franchet & Savatier) Probatova.

Culms tufted, erect, 50–80 cm tall, 1–1.5 mm in diam., 4–5-noded, glabrous below nodes. Leaf sheaths mostly shorter than internodes, glabrous; leaf blades flat, 20–30 × 0.8–1.5 cm, glabrous or adaxial surface sparsely pilose, apex gradually acuminate; ligule 0.5–1 mm. Panicle open, ovate in outline, 10–20 × 8–20 cm; primary branches 1 or 2 per node, widely spreading, filiform, scabrid, sparingly branched, bearing up to 6 spikelets. Spikelets obovate at maturity, 3–5 mm, florets 1–3; glumes membranous, 1-veined, lower glume lanceolate, 0.8–1 mm, upper glume broadly lanceolate, ca. 1.5 mm, acute; lemmas lanceolate-ovate, lowest 2.7–3 mm, 3-veined, veins smooth, apex obtuse; palea keels smooth. Anthers 0.7–1.2 mm. Caryopsis 2.5–3 mm. Fl. and fr. Aug–Sep. 2*n* = 38.

Mountain slopes in forests. NE China [Korea (Cheju Island), Japan, Russia (Kunashir Island in S Kuril Islands)].

2. Diarrhena fauriei (Hackel) Ohwi, Acta Phytotax. Geobot. 10: 135. 1941.

法利龙常草 fa li long chang cao

Molinia fauriei Hackel, Bull. Herb. Boissier, ser. 2, 3: 504. 1903; *Diarrhena koryoensis* Honda; *D. nekkamontana* Honda; *D. yabeana* Kitagawa; *Neomolinia fauriei* (Hackel) Honda; *N. koryoensis* (Honda) Nakai.

Culms solitary or in small tufts, erect, 80–100 cm tall, 2–3 mm in diam., 5–7-noded, puberulous below nodes. Leaf sheaths shorter than internodes, glabrous, rarely upper puberulous; leaf blades flat, thin, 20–30 × 1–2 cm, adaxial surface glabrous or puberulous, abaxial surface scabrid or nearly smooth, apex gradually long-acuminate; ligule ca. 0.5 mm. Panicle laxly contracted, narrowly lanceolate at first, later slightly more spreading, 12–15 × 2–3 cm; primary branches in clusters of 2–5, erect to ascending, scabrid, each branch with branchlets, loosely bearing 4–13 spikelets. Spikelets obovate at maturity, 4–7 mm, florets 2; glumes lanceolate, usually 1-veined, acute, lower glume 1–1.5 mm, upper glume ca. 2 mm; lemmas 3.5–4 mm, 3-veined, veins smooth, apex subacute; palea keels ciliolate. Anthers 1.5–2 mm. Caryopsis ca. 2.5 mm. Fl. and fr. Jul–Sep. 2*n* = 38.

Montane forests. Shandong, NE China [Japan, Korea, Russia (Far East)].

3. Diarrhena mandshurica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 628. 1888.

龙常草 long chang cao

Neomolinia mandshurica (Maximowicz) Honda.

Culms solitary or in small tufts, erect, 70–120 cm tall, 2–3 mm in diam., 5–6-noded, scabrid or puberulous below nodes. Leaf sheaths shorter than internodes, pubescent; leaf blades flat, thin, 15–30 × 0.6–2 cm, adaxial surface pubescent, abaxial surface scabrid, apex gradually long-acuminate; ligule ca. 1 mm. Panicle densely contracted, 12–20 × ca. 1 cm; primary branches solitary or paired at base, erect, each branch simple, bearing 2–7 spikelets. Spikelets obovoid at maturity, 4.5–7 mm, florets 2–3; glumes lanceolate, acute, lower glume 1.5–2 mm, 1-veined, upper glume 2–3 mm, 1–3-veined, the lateral veins obscure; lemmas 4.5–5 mm, 3–5-veined, veins scabrid near apex, apex subacute; palea keels ciliate. Caryopsis ca. 4 mm. Fl. and fr. Jun–Sep. 2*n* = 38.

Forests, grassy hillsides. NE China [Korea, Russia (Far East)].

11. Tribe POEAE

早熟禾族 zao shu he zu

Wu Zhenlan (吴珍兰), Lu Shenglian (卢生莲), Liu Liang (刘亮),
Zhu Guanghua (朱光华), Chen Shouliang (陈守良), Chen Xiang (陈翔);
Sylvia M. Phillips, Robert J. Soreng, Susan G. Aiken, Nikolai N. Tzvelev, Marina V. Olonova

Annual or perennial. Leaf blades linear to filiform; ligule membranous. Inflorescence usually an open or contracted panicle, rarely spikelike or a single raceme with tough rachis (fragile in *Parapholis*). Spikelets all alike or rarely dimorphic with mixed fertile and sterile spikelets, florets (1 or)2 to many with uppermost reduced, usually laterally compressed, disarticulating below each floret;

glumes persistent, usually shorter than lemmas, membranous or rarely leathery; floret callus glabrous or with woolly hairs; lemmas membranous to leathery, (3–)5–7(–13)-veined, glabrous or infrequently hairy, apex entire or denticulate, awnless or with a straight or curved awn from apex; palea subequaling lemma. Lodicules 2, hyaline. Stamens (1–)3. Ovary sometimes hairy. Caryopsis mostly ellipsoid; hilum linear or round. Leaf anatomy: non-Kranz; microhairs absent. Chromosomes large. $x = 7$.

About 50 genera and 1200 species: temperate and cold regions of the world, also on tropical mountains; 16 genera and 212 species (54 endemic, at least nine introduced) in China.

This is a large tribe of predominantly temperate grasses, usually with a paniculate inflorescence, simple, several-flowered spikelets with the florets exserted from the glumes, and 5- or more veined lemmas.

1a. Inflorescence a single terminal spikelike raceme; spikelets sessile.
2a. Spikelets with several florets; rachis tough ..... 61. *Lolium*
2b. Spikelets with one floret; rachis fracturing below each spikelet ..... 74. *Parapholis*
1b. Inflorescence an open, contracted or dense panicle, occasionally sparse and subracemose; spikelets pedicellate.
3a. Fertile spikelets accompanied by pectinate sterile spikelets ..... 63. *Cynosurus*
3b. Fertile spikelets not accompanied by sterile spikelets.
4a. Plants annual.
5a. Lemmas awned ..... 60. *Vulpia*
5b. Lemmas awnless.
6a. Pedicels stout; panicle 1-sided, with short branches or reduced to a compact raceme; lowest rachilla internode enlarged.
7a. Panicle with very short, simple branches; glumes 3–9-veined; lemmas keeled throughout .... 72. *Sclerochloa*
7b. Panicle with short, often branched branches; glumes 1–3-veined; lemmas keeled in upper half ..... 73. *Pseudosclerochloa*
6b. Pedicels slender; panicle not as above; lowest rachilla internode not enlarged.
8a. Spikelets plumply ovate to rotund; pedicels filiform; lemmas orbicular to oblate ..... 65. *Briza*
8b. Spikelets elliptic to ovate; pedicels slender; lemmas lanceolate to ovate ..... 66. *Poa*
4b. Plants perennial.
9a. Lemmas rounded on back, at least toward base.
10a. Spikelets with 1 floret; floret indurated and glossy at maturity ..... 69. *Milium*
10b. Spikelets with more than 1 floret; florets herbaceous or leathery.
11a. Plant a robust aquatic with long spongy rhizomes; floret callus stiffly bearded ..... 62. *Scolochloa*
11b. Plant not as above; floret callus glabrous (lemma base sometimes pubescent).
12a. Lemma apex firm, acute or awned; hilum linear ..... 59. *Festuca*
12b. Lemma apex thinly scarious to hyaline, ± obtuse, awnless; hilum round to oval ..... 64. *Puccinellia*
9b. Lemmas keeled throughout.
13a. Lemmas orbicular to oblate, margins broad, membranous, appressed to lemma above ..... 65. *Briza*
13b. Lemmas narrower, margins less distinct, often inrolled.
14a. Palea keels smooth.
15a. Lemmas indistinctly 3–5-veined below, almost veinless in upper half, apex obtuse to acute ..... 70. *Colpodium*
15b. Lemmas prominently 3-veined, apex broadly obtuse to truncate, erose ..... 71. *Catabrosa*
14b. Palea keels scabrid to ciliolate.
16a. Lemmas herbaceous or membranous with hyaline margins, apex awnless ..... 66. *Poa*
16b. Lemmas thinly leathery, apex acute to briefly awned.
17a. Spikelets in dense 1-sided fascicles at the ends of the panicle branches; florets 2–5 ..... 67. *Dactylis*
17b. Spikelets evenly dispersed; floret 1 ..... 68. *Aniselytron*

59. FESTUCA Linnaeus, Sp. Pl. 1: 73. 1753.

羊茅属 yang mao shu

Lu Shenglian (卢生莲), Chen Xiang (陈翔); Susan G. Aiken

Perennials, tufted, shoots extra- or intra-vaginal. Leaf sheath margins usually free, rarely connate, sometimes with auricles; leaf blades folded to conduplicate and filiform, sometimes flat; ligule membranous. Inflorescence an open, contracted or spikelike panicle. Spikelets with 2 to several florets, uppermost floret usually reduced; rachilla usually scabrid, rarely smooth or pubescent; disarticulating above glumes and between florets; glumes usually unequal, herbaceous to scarious, rarely subleathery, lower glume often small, 1-veined, upper glume usually shorter than lowest lemma, 3(–5)-veined; lemmas usually similar in texture to glumes, often

subleathery at least with age, usually ± laterally compressed but not keeled, rounded on back at least toward base, usually 5-veined, veins sometimes prominent, apex acuminate, entire or notched, awned or awnless; palea subequal to lemma, keels scabrid, rarely smooth. Stamens 3. Ovary glabrous or hairy on top. Caryopsis oblong or linear, usually ventrally sulcate, usually free from lemma and palea, hilum long-linear. $x = 7$.

About 450 species: temperate regions throughout the world, extending into the tropics on mountain tops; 55 species (25 endemic) in China.

Many of the species are superficially very similar, particularly among the fine-leaved species. In these, the position of sclerenchyma tissue, as seen in a cross section of the leaf blade, is an important aid to identification. The type of branching of the basal vegetative shoots (tillers) is also important. If the shoot breaks through the base of the subtending leaf sheath a loose tuft results (extravaginal branching), but if it grows up inside the leaf sheath a denser tuft results (intravaginal branching).

The fine-leaved species include a number of species aggregates. The aggregate name has been used in the main key, as this will be sufficient for most users. Within the aggregates individual taxa are recognized either at specific or infraspecific rank, but the differences between the taxa are slight and often overlapping.

This large genus is divided into subgenera, which are indicated in the key. Recent molecular work is indicating that the larger broad-leaved species are not closely related to the fine-leaved species.

Most of the species provide good grazing, and some are important constituents of fine lawns.

1a. Leaf blades flat or loosely involute; panicle usually loose, open, more than 10 cm (infrequently contracted or shorter).
2a. Lemmas awnless or mucronate, mucro less than 2 mm (except *F. altaica* with membranous glumes) (species nos. 1–8: *F.* subg. *Drymanthele* V. I. Kreczetowicz & Bobrov; species nos. 9–13: *F.* subg. *Leucopoa* (Grisebach) Hackel).
3a. Ligule 1.5–5 mm; lemmas awnless.
4a. Panicle 7–9 cm; spikelets 17–18 mm; florets 9–10 ..... 1. *F. sinomutica*
4b. Panicle more than 15 cm; spikelets less than 15 mm; florets 3–5.
5a. Spikelets 6–7 mm; first lemma ca. 5 mm; anthers 1.5–2 mm ..... 4. *F. changduensis*
5b. Spikelets 7–15 mm; first lemma 7–11 mm; anthers 2.5–4 mm.
6a. Leaf sheaths smooth, glabrous or scabrid; anthers 3–4 mm; ovary apex glabrous ..... 5. *F. dolichantha*
6b. Leaf sheaths with retrorse hairs at base; anthers 2.5–3.2(–3.5) mm, ovary apex hairy.
7a. Lemma punctiform or scabrid, veins 5; ovary usually densely hairy ..... 2. *F. modesta*
7b. Lemma smooth, veins 3; ovary sparsely hairy ..... 3. *F. handelii*
3b. Ligule 0.1–1(–1.5) mm; lemmas awnless or mucronate.
8a. Spikelets 4–5.5 mm; glumes ovate; first lemma 3.5–4 mm ..... 6. *F. japonica*
8b. Spikelets more than 6 mm; glumes lanceolate; first lemma more than 6 mm.
9a. Leaf sheaths not conspicuous at base; anthers less than 2 mm.
10a. Lower glume 5–6 mm, upper glume 7–8 mm; anthers 1.2–1.8 mm ..... 7. *F. sinensis*
10b. Lower glume 2–3.5(–4.5) mm, upper glume 3.5–4.5(–6) mm; anthers 1–1.2 mm ..... 8. *F. undata*
9b. Leaf sheaths conspicuous at base, persistent; anthers more than 2 mm (*F.* subg. *Leucopoa* (Grisebach) Hackel).
11a. Plants usually dioecious; ovary apex densely hairy.
12a. Basal sheaths glossy straw-colored, not becoming fibrous; shoots intravaginal ..... 9. *F. olgae*
12b. Basal sheaths light gray or brownish, becoming fibrous; some shoots extravaginal ..... 10. *F. sibirica*
11b. Plants bisexual; ovary apex thinly hairy.
13a. Adaxial to abaxial sclerenchyma strands absent in leaf blade cross section ..... 11. *F. tristis*
13b. Adaxial to abaxial sclerenchyma strands present in leaf blade cross section.
14a. First lemma 7–9 mm; lemmas scabrid, veins prominent; leaf blades pubescent on adaxial surface ..... 12. *F. altaica*
14b. First lemma 6–6.5 mm; lemmas smooth or only upper part scabrid, veins weak; leaf blades scaberulous on adaxial surface ..... 13. *F. alatavica*
2b. Lemmas awned, awn more than 2 mm (if awnless, falcate auricles present).
15a. Auricles usually absent, if present small (*F.* subg. *Subulatae* (Tzvelev) E. B. Alexeev).
16a. Ovary apex glabrous or rarely sparsely hairy; leaf blades sometimes involute.
17a. Awns ca. 5 mm or less; anthers more than 2.5 mm.
18a. Lower glume 5–6 mm, upper glume 6–7 mm; anthers 3.5–4 mm; ovary apex glabrous ..... 14. *F. pubiglumis*
18b. Lower glume 3.8–4.2 mm, upper glume 5.3–5.7 mm; anthers 2.5–3.5 mm; ovary apex sparsely hairy ..... 15. *F. yunnanensis*
17b. Awns usually more than 5 mm; anthers less than 2.2 mm.
19a. Panicle branches usually paired; anthers 1.2–2 mm; adaxial to abaxial sclerenchyma strands absent in leaf blade cross section ..... 16. *F. fascinata*

19b. Panicle branches usually single; anthers 1.8–2.2 mm; adaxial to abaxial sclerenchyma strands present in leaf blade cross section.
20a. Lower glume 6–6.5 mm, upper glume 8.5–9 mm ..... 17. *F. longiglumis*
20b. Lower glume 3–4.5 mm, upper glume 5–6 mm ..... 18. *F. vierhapperi*
16b. Ovary apex densely hairy; leaf blades always flat.
21a. Lower glume ovate, 1–1.8 mm; upper glume ovate, 2.2–3 mm ..... 19. *F. parvigluma*
21b. Lower glume lanceolate, 1.5–4.5 mm; upper glume broadly lanceolate, 2.5–6 mm.
22a. Lemma apex entire or slightly notched; awn 4–8 mm ..... 20. *F. extremiorientalis*
22b. Lemma apex distinctly notched; awn usually more than 8 mm.
23a. Florets 2–3; anthers 1–1.2(–1.6) mm ..... 21. *F. leptopogon*
23b. Florets 4–6; anthers 1.7–2 mm ..... 22. *F. elata*
15b. Auricles present, lanceolate, falcately curved or erect (*F.* subg. *Schedonorus* (P. Beauvois) Petermann).
24a. Auricles erect; anthers 1.5–2.2 mm.
25a. Panicle 15–25 cm; lemma apex 2-lobed; awn 6–8 mm; ovary apex hairy ..... 23. *F. scabriflora*
25b. Panicle 5–7 cm; lemma apex entire; awn 2–3 mm; ovary apex glabrous ..... 24. *F. chayuensis*
24b. Auricles falcately curved; anthers 2.5–4 mm.
26a. Lemma awnless or awn 0.7–3(–5) mm.
27a. Ligule 1.8–2 mm ..... 25. *F. formosana*
27b. Ligule 0.3–1 mm.
28a. Auricle margins ciliate ..... 26. *F. arundinacea*
28b. Auricle margins glabrous ..... 27. *F. pratensis*
26b. Lemma awned, awn more than 5 mm.
29a. Panicle loose, open; branches flexuous.
30a. Leaf blades 4–18 mm wide; rachilla scabrid; anthers 2–3 mm ..... 28. *F. gigantea*
30b. Leaf blades 2.5–4 mm wide; rachilla smooth; anthers 3.6–4 mm ..... 29. *F. liangshanica*
29b. Panicle narrow, spikelike; branches stiff.
31a. Culms with 2 nodes ..... 30. *F. durata*
31b. Culms with 3–4 nodes ..... 31. *F. mazzettiana*

1b. Leaf blades folded or tightly involute; panicle usually contracted, narrow or spikelike (*F.* subg. *Festuca*).
32a. Plants usually loosely tufted with extravaginal shoots; leaf blade cross section with five or more well-defined ribs; sclerenchyma strands five or more; panicle rather loose.
33a. Lemma awnless ..... 32. *F. jacutica*
33b. Lemma awned.
34a. Awn 5–8 mm ..... 33. *F. stapfii*
34b. Awn 0.5–5(–6) mm.
35a. Rachilla internodes ca. 2 mm; ovary apex densely hairy ..... 34. *F. kashmiriana*
35b. Rachilla internodes ca. 1 mm; ovary apex sparsely hairy or glabrous.
36a. Ovary apex sparsely hairy; awns 0.5–2 mm.
37a. Anthers 2.7–3.7 mm ..... 35. *F. georgii*
37b. Anthers less than 2.5 mm.
38a. Anthers 0.5–1 mm ..... 36. *F. nitidula*
38b. Anthers 1.8–2.4 mm ..... 37. *F. amblyodes*
36b. Ovary apex glabrous; awns 1–5 mm (if less, lemmas densely pubescent).
39a. Panicle compact, narrow; culms 18–30 cm tall.
40a. Spikelets 8–10 mm; lemmas smooth ..... 38. *F. yulungschanica*
40b. Spikelets 5–8 mm; lemmas scabrid.
41a. Plants with intravaginal shoots; leaf sheaths 0.4–0.6 mm; spikelets 7–8 mm ..... 39. *F. kansuensis*
41b. Plants with extravaginal shoots; leaf sheaths 0.1–0.3 mm; spikelets 5–6 mm ..... 40. *F. subalpina*
39b. Panicle open, ± loose; culms 30–100 cm tall.
42a. Basal vegetative shoots short and dense; leaf blades always folded; awn 3–7 mm ..... 41. *F. forrestii*
42b. Basal vegetative shoots long and loose; leaf blades somewhat flat or folded; awn 1–3 mm ..... 42. *F. rubra*
32b. Plants usually densely tufted with intravaginal shoots; leaf blade cross section with only midrib or also two lateral ribs well defined; sclerenchyma strands three (if 5–7, lateral strands small) or a continuous subepidermal layer; panicle contracted or spikelike.
43a. Lemmas awnless.

44a. Glumes pubescent; anthers ca. 1.5 mm ..... 43. *F. chelungkiangnica*
44b. Glumes glabrous; anthers 2–3 mm ..... 44. *F. dahurica*
43b. Lemmas awned.
45a. Sclerenchyma in leaf blade cross section in a continuous layer.
46a. Anthers 2–3.4 mm; leaf blade cross section with 3–5 well-defined ribs ..... 45. *F. trachyphylla*
46b. Anthers 1.5–2.2 mm; leaf blade cross section with only midrib well defined.
47a. Spikelets 8–9 mm; lemmas 5.5–5.7 mm ..... 46. *F. hondae*
47b. Spikelets 4–6 mm; lemmas 3–4(–5) mm ..... 47. *F. ovina*
45b. Sclerenchyma in leaf blade cross section in discrete strands.
48a. Leaf blades with 5–7 sclerenchyma strands, including 2–4 small lateral strands.
49a. Plant densely tufted; glume margins glabrous; anthers 0.7–1.1 mm ..... 48. *F. brachyphylla*
49b. Plant loosely tufted; glume margins ciliate; anthers 1.1–1.5 mm ..... 49. *F. chumbiensis*
48b. Leaf blades with three sclerenchyma strands (one at midrib, two at ends of leaf).
50a. Leaf sheaths of vegetative shoots usually closed for more than half their length ..... 50. *F. cumminsii*
50b. Leaf sheaths of vegetative shoots usually open for more than half their length.
51a. Leaf cross section with 3 well-developed sclerenchyma strands ..... 51. *F. kryloviana*
51b. Leaf cross section with 3 small sclerenchyma strands.
52a. Anthers more than 1.5 mm.
53a. Spikelets 4.5–6 mm; glume margins ciliolate or glabrous; palea 2.5–4 mm ..... 52. *F. valesiaca*
53b. Spikelets 6–8 mm; glume margins ciliate; palea 4.5–5.5 mm ..... 53. *F. litvinovii*
52b. Anthers less than 1.5 mm.
54a. Old basal leaf sheaths present; leaf sheaths glabrous; leaf blades smooth on abaxial surface ..... 54. *F. tibetica*
54b. Old basal leaf sheaths absent; leaf sheaths pubescent; leaf blades scabrid on abaxial surface ..... 55. *F. wallichiana*

1. Festuca sinomutica X. Chen & S. M. Phillips, Novon 15: 69. 2005.

贫芒羊茅 pin mang yang mao

Festuca mutica S. L. Lu, Acta Phytotax. Sin. 30: 534. 1992, not Chevallier (1827).

Plant loosely tufted. Culms 68–75 cm tall. Leaf sheaths glabrous; auricles absent; leaf blades flat or involute, (7–)13–20(–32) cm × 1–3 mm, veins 7, pubescent along veins, adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 1.5–2 mm (ca. 0.5 mm in tillers). Panicle loose, open, 7–9 cm; branches 2.5–5 cm, 1–2 at lowest node, upper few-spiculate, lower 1/2 naked. Spikelets 17–18 mm; florets 8–10; glumes smooth, margins narrowly membranous; lower glume linear or lanceolate, 2.5–3 mm, apex acute; upper glume lanceolate or broadly lanceolate, 3.5–4 mm, apex acute; rachilla internodes 0.9–1.1 mm long, smooth; lemmas 6.5–7 mm; awns absent; palea keels smooth. Anthers 2.8–3.2 mm. Ovary apex hairy. Fl. and fr. Jul.

● Meadows; ca. 2900 m. Yunnan (Eryuan).

2. Festuca modesta Nees ex Steudel, Syn. Pl. Glumac. 1: 316. 1854.

素羊茅 su yang mao

Plant loosely tufted or single-stemmed; shoots extravaginal. Culms 80–100 cm tall, nodes 2–3. Leaf sheaths scabrid, basal sheaths with retrorse hairs; auricles absent; leaf blades flat, (10–)15–30(–60) cm × 5–12(–15) mm, margins scabrid, veins 14–36; adaxial to abaxial sclerenchyma strands present; ligule 1.5–3(–5) mm, margin ciliolate. Panicle loose, open, erect or nodding, 18–22 cm; branches 4–11 cm, (1–)2(–3) at lowest node, lower 1/2–2/3 naked. Spikelets (7–)9–11 mm; florets (1–)3–4; glumes glabrous or hairy; lower glume narrowly lanceolate, 2.5–3(–4) mm, apex acuminate; upper glume broadly lanceolate, 3.5–4(–5) mm, apex acute to obtuse; rachilla internodes 1.2–1.8 mm; lemmas 6.5–8.5 mm, punctiform or scabrid, 5-veined; awns absent; palea keels scaberulous. Anthers 2.5–3.5 mm. Ovary apex moderately to densely hairy. Fl. and fr. Apr–Sep.

Forests, grassy mountain slopes, valleys; 1000–3600 mm. Gansu, Qinghai, Shaanxi, Sichuan, Yunnan [NW India, Nepal].

3. Festuca handelii (St.-Yves) E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 82(3): 95. 1977.

哈达羊茅 ha da yang mao

Festuca modesta Steudel subsp. *handelii* St.-Yves in Handel-Mazzetti, Symb. Sin. 7: 1289. 1936.

Plant loosely tufted or single-stemmed; shoots extravaginal. Culms 60–85 cm tall, nodes 2–3. Leaf sheaths with trichomes; auricles absent; leaf blades flat or loosely convolute, 3–4(–6) mm wide; adaxial to abaxial sclerenchyma strands present; ligule 2.5–3.5 mm. Panicle loose, open, 15–20 cm. Spikelets 9–10 mm, florets 3–4; glumes with trichomes; lower glume narrowly lanceolate, 2.5–3 mm; upper glume broadly lanceolate, 4–4.5 mm; rachilla internodes 1–1.5 mm; lemmas 6.4–8 mm, smooth, veins 3; awns absent; palea keels scabrid. Anthers 2.8–3.2 mm. Ovary apex sparsely to moderately hairy. Fl. and fr. Jul.

● 3600–3700 m. Sichuan, Yunnan.

4. Festuca changduensis L. Liu, Fl. Xizang. 5: 85. 1987.

昌都羊茅 chang du yang mao

Culms 60–100 cm tall, nodes 3–4. Leaf sheaths glabrous; auricles absent; leaf blades flat, 10–20 cm × 3–5 mm, both surfaces scabrid; ligule 3–5 mm. Panicle very loose, open, 18–22 cm; branches horizontal, 9–11 cm, 3–4 per node. Spikelets 6–7 mm; florets 3–5; glumes with trichomes; lower glume narrowly lanceolate, 2.8–3.2 mm, scabrid along keel; upper glume narrowly oblong, 3.8–4.2 mm, scabrid; rachilla internodes 0.9–1.1 mm, scabrid; lemmas 4.8–5.2 mm, puncti-scabrid or pubescent, apex acute; awns absent; palea keels scabrid toward apex. Anthers 1.5–2 mm. Ovary apex glabrous.

● Grassy mountain slopes; 3200–3800 m. Sichuan, Xizang.

This species has a unique combination of flat leaf blades, awnless lemmas, and a glabrous ovary.

5. Festuca dolichantha Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 274. 1982.

长花羊茅 chang hua yang mao

Plant solitary or loosely tufted; shoots extravaginal. Culms 50–110 cm tall, nodes 2–3. Leaf sheaths glabrescent; auricles absent; leaf blades flat or involute, (10–)25–40 cm × 1–4(–6) mm, margins scaberulous or scabrid; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 1.1–2.5(–5) mm, margin ciliolate. Panicle loose, open but narrow, 15–20(–25) cm; branches 5–10(–14) cm, 2 at lowest node, lower 1/3–1/2 naked. Spikelets 11–15 mm; florets (2–)3–5; glumes smooth or veins spinescent, margins membranous; lower glume narrowly lanceolate, (3.5–)4–5 mm; upper glume lanceolate or broadly lanceolate, 5.5–7 mm; rachilla internodes (1–)1.5–2 mm; lemmas (7–)8–9(–11) mm, scabrid, apex mucronate to awned; awns 0.1–2 mm; palea keels smooth. Anthers 3–4 mm. Ovary apex glabrous. Fl. and fr. Jul–Sep.

● Forests, grasslands; 3800–4000 m. Sichuan, Yunnan.

The subgeneric placement of this species is uncertain. It differs from species of *Festuca* subg. *Drymanthele* by its glabrous ovary and may be nearer to species of *F.* subg. *Subulatae*.

6. Festuca japonica Makino, Bot. Mag. (Tokyo) 20: 83. 1906.

日本羊茅 ri ben yang mao

Festuca fauriei Hackel.

Plant loosely tufted or turf-forming, shortly rhizomatous; shoots extravaginal. Culms 30–75 cm tall, nodes 1–2(–3). Leaf sheaths smooth, loose; auricles absent; leaf blades flat or involute, 5–20 cm × 1–2.5 mm, veins 5, adaxial surface scabrid, abaxial surface smooth; adaxial to abaxial sclerenchyma strands absent; abaxial sclerenchyma in narrow discrete strands; ligule 0.2–0.5(–1) mm, margin ciliolate or not. Panicle loose, open, pyramidal, (7–)10–20 cm; branches horizontal or pendulous, (2–)4.5–9 cm, (1–)2 at lowest node, lower 2/3–3/4 naked. Spikelets 4–6 mm; florets 2–3(–4); glumes glabrous, margins membranous; lower glume lanceolate, 1–1.5 mm; upper glume ovate, 1.5–2 mm; rachilla internodes 0.4–0.8 mm; lemmas 3.5–4 mm, smooth; awns absent; palea keels scaberulous to ciliolate toward apex. Anthers 1.2–1.6(–2) mm. Ovary apex moderately hairy. Fl. and fr. May–Aug.

Forests, grasslands, roadsides, streamsides; 1300–3100 m. Anhui, Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

The relationships of this species are uncertain, although it has been placed in *Festuca* subg. *Drymanthele*.

7. Festuca sinensis Keng ex E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 93(1): 112. 1988.

中华羊茅 zhong hua yang mao

Plants loosely tufted; shoots extravaginal. Culms 60–75 cm tall, nodes 3–4, dark purple. Leaf sheaths glabrous, uppermost 16–22 cm, much longer than its blade; auricles present as erect swellings or absent; leaf blades flat or involute, erect, rigid, 6–16 cm × 1.5–3.5 mm, uppermost much shorter, veins 7–13; adaxial to abaxial sclerenchyma strands present; ligule 0.3–1.5 mm, margin ciliolate. Panicle loose, open, 11–18 cm; branches ascending, 6–11 cm, 2 at lowest node, lower 1/2 naked. Spikelets 8–9 mm; florets 3–4; lower glume glabrous, 5–6 mm, apex acuminate; upper glume, 7–8 mm, scabrid on upper keel, apex acuminate; rachilla internodes 0.9–1.1 mm, hispidulous; lemmas 6.5–7.5 mm, pubescent; awns (absent to) 0.8–2 mm; palea keels ciliolate. Anthers 1.2–1.8 mm. Ovary apex glabrous or sparsely hairy. Fl. and fr. Jul–Sep.

● Alpine meadows, grassy mountain slopes, forests; 2600–4800 m. Gansu, Qinghai, Sichuan.

The relationships of this species are uncertain, although it has been placed in *Festuca* subg. *Drymanthele*.

8. Festuca undata Stapf in J. D. Hooker, Fl. Brit. India 7: 350. 1896 [“1897”].

曲枝羊茅 qu zhi yang mao

Plants loosely tufted; shoots extravaginal. Culms (25–)30–65 cm tall, nodes 2–3. Leaf sheaths smooth; auricles present as erect swellings; leaf blades flat or involute, 3–10(–15) cm × 1.5–2.9 mm, veins (7–)12–14; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.4(–0.5) mm, truncate, margin sometimes ciliolate. Panicle loose, nodding, 5–12(–16) cm; branches erect or slightly curved, 4–9 cm, 1(–2) at lowest node. Spikelets 6–8.5 mm; florets (2–)3–4(–5); glumes glabrous or punctate, margins broadly membranous, apex acuminate; lower glume narrowly lanceolate or lanceolate, (2.1–)2.8–4.5 mm; upper glume broadly lanceolate or oblong, 3.8–6 mm; rachilla internodes 0.7–1 mm; lemmas 5.5–7 mm, scabrid; awns 0.5–2 mm; palea keels scabrid. Anthers 1–1.2 mm. Ovary apex moderately hairy. Fl. and fr. Jun.

Grassy mountain slopes, forest margins; 4100–4800 m. Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].

This taxon has been placed in *Festuca* subg. *Drymanthele*, but is probably closer to taxa in *F.* subg. *Subulatae*.

9. Festuca olgae (Regel) Krivotulenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 56. 1960.

西山羊茅 xi shan yang mao

Molinia olgae Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 625. 1881; *Festuca deasyi* Rendle; *F. olgae* var. *deasyi* (Rendle) Tzelev; *F. sibirica* subsp. *deasyi* (Rendle) Tzvelev; *Leucopoa olgae* (Regel) V. I. Kreczetowicz & Bobrov.

Plant dioecious, densely tufted; shoots intravaginal, basal sheaths straw-colored, glossy, not splitting into fibers. Culms 25–85 cm tall, nodes 1–3. Leaf sheaths glabrous; leaf blades usually flat, occasionally involute, 8–25(–40) cm × 2–3(–4.5) mm; ligule 0.1–0.3 mm. Panicle loose, lanceolate to ovate in outline, 6–14 cm; branches 3–7 cm, smooth, usually solitary, naked below middle. Spikelets 7–11 mm, purplish; florets 2–6; glumes entirely membranous except for narrow thicker band along vein; lower glume 3–4.5 mm; upper glume 4–6 mm; lemmas 6–8 mm, back asperulous, margins broadly membranous, apex obtuse to lacerate; awns absent or with 0.1–2 mm mucro. Anthers 2.7–4 mm in male florets. Ovary apex densely hairy in female florets. 2*n* = 28.

Grassy and stony mountain slopes, screes; 3500–4000 m. Xinjiang, Xizang, Yunnan [Afghanistan, India, Kashmir, Kyrgysytan, Pakistan, Tajikistan; SW Asia (NE Iran)].

10. Festuca sibirica Hackel ex Boissier, Fl. Orient. 5: 626. 1884.

西伯利亚羊茅 xi bo li ya yang mao

Festuca albida (Turczaninow ex Trinius) Malyschev (1965), not Lowe (1831); *Poa albida* Turczaninow ex Trinius; *Leucopoa albida* (Turczaninow ex Trinius) V. I. Kreczetowicz & Bobrov; *L. sibirica* Grisebach, nom. illeg. superfl.

Plant dioecious, densely tufted; shoots extravaginal and intravaginal; basal sheaths light gray or brownish, becoming fibrous. Culms 22–40 cm tall, nodes 1(–2). Leaf sheaths glabrous; leaf blades flat or involute, 8–30 cm × 1.5–3 mm, margins smooth or scaberulous; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.4–0.7 mm, margin ciliate. Panicle weakly spreading, 5–7 cm; branches 1–1.5 cm, scabrid, 2 at lowest node (the short branch with only one spikelet). Spikelets 6–8 mm, greenish or yellowish; florets 2–3; glumes membranous; lower glume lanceolate or broadly lanceolate, 3.5–4.8 mm; upper glume broadly lanceolate or ovate, 4–5.3 mm; rachilla internodes 0.5–0.7 mm; lemmas 5.8–6.5 mm, back asperulous; awns absent; palea keels scabrid. Anthers 3–3.5 mm long in male florets. Ovary apex densely hairy in female florets. 2*n* = 28. Fl. and fr. Jun.

Stony slopes, screes, among rocks, sometimes in sand. Nei Mongol, NE China [Mongolia, Russia].

11. Festuca tristis Krylov & Ivanitzkaja, Sist. Zametki Mater. Gerb. Tomsk. Univ. 1928(1): 1. 1928.

黑穗羊茅 hei sui yang mao

Plant densely tufted; shoots intravaginal. Culms 30–50 cm tall. Leaf sheaths glabrous or lower sparsely pubescent; leaf blades usually involute, occasionally flat, stiff, 4–25 cm × 0.5–0.8 mm, veins 5–7, outer surface scabrid; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.1–0.3 mm, margin ciliate. Panicle loose, open, 7–13 cm; branches 2–5 cm, upper single, lower paired, naked below middle. Spikelets 8–12 mm, purplish or brown, shiny; florets 3–4; glumes smooth, margins membranous, rarely ciliolate; lower glume narrowly lanceolate, 4.5–5.5 mm; upper glume broadly lanceolate, 5.7–6.7 mm; rachilla internodes 1.2–1.5 mm; lemmas 6–7 mm, punctiform or scabrid except toward base, conspicuously veined, margins broad, hyaline, apex entire; awns (0.3–)1–2 mm; palea keels scaberulous. Anthers 3–3.6 mm. Ovary apex moderately hairy. Fl. and fr. Jul–Sep.

Alpine grasslands, rocky slopes; 2800–4600 m. Xinjiang [E Kazakhstan (Tarbagatai Mountains), Mongolia, Russia (W Siberia)].

12. Festuca altaica Trinius in Ledebour, Fl. Altaic. 1: 109. 1829.

阿尔泰羊茅 a er tai yang mao

Festuca scabrella Torrey; *F. altaica* subsp. *scabrella* (Torrey) Hultén; *F. altaica* var. *scabrella* (Torrey) Breitung.

Plant densely tufted, base with brown scabrid old sheaths, shortly rhizomatous between tufts; shoots usually intravaginal. Culms (25–)30–90(–120) cm tall. Leaf sheaths glabrous; leaf blades involute or culm blades occasionally flat, (4–)10–30(–45) cm × 0.5–1.4 mm (to 4 mm when flat), adaxial surface densely pubescent, margins scaberulous, veins 5–17; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.1–0.6 mm, margin ciliate. Panicle loose, open, (5–)7–16 cm; branches 3–10(–13) cm, scabrid, 1–2(–3) at lowest node. Spikelets 8–14 mm, purplish or brown; florets 3–6; glumes broadly lanceolate, margins broadly membranous; lower glume 4–6.8(–8.3) mm; upper glume 5–7.5(–10) mm; rachilla internodes 1.2–1.8 mm; lemmas (6–)7–9(–12) mm, scabrid, veins prominent; awns 0.2–0.7 mm; palea keels scaberulous. Anthers 2.5–4.5(–5.5) mm. Ovary apex moderately hairy. 2*n* = 28. Fl. and fr. Jun–Sep.

Stony mountain slopes, meadows; 2400–3800 m. Xinjiang [E Kazakhstan (Tarbagatai Mountains), Mongolia, Russia; North America].

13. Festuca alatavica (Hackel ex St.-Yves) Roshevitz in Komarov, Fl. URSS 2: 528. 1934.

阿拉套羊茅 a la tao yang mao

Festuca rubra Linnaeus subsp. *alatavica* Hackel ex St.-Yves, Candollea 3: 393. 1928; *F. tianschanica* Roshevitz.

Plant densely tufted, shortly rhizomatous. Culms 30–80 cm tall. Leaf sheaths smooth or scabrid; leaf blades flat or involute, stem blades 2–4 cm, basal blades up to 20 cm, adaxial surface scaberulous; ligule 0.1–0.3 mm, ciliolate. Panicle broadly ovate in outline, very loose, 7–16 cm; branches 3–6 cm, widely spreading, scabrid, few-spiculate, 2 at lowest node. Spikelets 10–12 mm; florets 4–6; glumes smooth, almost entirely hyaline, thickened around veins; lower glume narrowly lanceolate, 4–4.5 mm; upper glume broadly lanceolate, 5–5.5 mm; lemmas narrowly oblong, (5–)6–6.5 mm, smooth or scabrid upward, apex acuminate or with awn-point; awns 1–1.5

mm; palea keels scabrid. Anthers 2.5–4 mm. Ovary apex sparsely hairy. Fl. and fr. Aug–Sep.

Stony slopes, wet places; 2600–4000 m. Xinjiang [Kashmir, E Kazakhstan, Kyrgyzstan, N Pakistan, Tajikistan].

14. Festuca pubiglumis S. L. Lu, Acta Phytotax. Sin. 30: 531. 1992.

毛颖羊茅 mao ying yang mao

Plant loosely tufted, shortly rhizomatous, old basal sheaths stramineous; shoots extravaginal. Culms 40–50 cm tall; nodes 1–2. Leaf sheaths glabrous; auricles present as erect swellings or absent; leaf blades flat or involute, gray-green 10–25 cm × 3–4 mm, margins smooth or scabrid, veins 13–15; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.4–0.7 mm, margin ciliate. Panicle loose, open, 11–15 cm, base included in uppermost leaf sheath, uppermost blade exceeding panicle; branches (2–)4–8 cm, 2 at lowest node, lower 1/2 naked. Spikelets 10–13 mm; florets 4–6(–8), closely overlapping; glumes pubescent, apex acuminate; lower glume narrowly lanceolate, 5–6 mm; upper glume lanceolate, 6–7 mm; rachilla internodes 1.2–1.5 mm, scabrid; lemmas 7–8 mm, densely pubescent; awns (2–)4–7 mm; palea keels scabrid. Anthers 3.5–4 mm. Ovary apex glabrous. Fl. and fr. Jun–Jul.

● Alpine meadows; 3600–3800 m. Yunnan (Eryuan).

This species was placed in *Festuca* subg. *Subulatae* by S. L. Lu, but it is not closely related to other species in this subgenus.

15. Festuca yunnanensis St.-Yves, Rev. Bretonne Bot. Pure Appl. 2: 72. 1927.

滇羊茅 dian yang mao

Plant loosely tufted; shoots extravaginal. Culms rigid, 65–90 cm tall, glabrous or villous. Leaf sheaths glabrous or pubescent on innovation shoots; auricles present as erect swellings or absent; leaf blades usually folded, occasionally flat, 25–35 cm × 3–5 mm. Panicle loose, erect, 12–15(–19) cm; branches 3–10 cm, 2 at lower nodes, lower 1/3 naked. Spikelets 9–10 mm; florets 4–5; glumes glabrous or pubescent; lower glume lanceolate, 3.8–4.2 mm; upper glume lanceolate, 5.3–5.7 mm; rachilla internodes scabrid or pubescent; lemmas 6.8–7.2 mm, scabrid or villous; awns (0.5–)1–2(–5) mm; palea keels ciliolate to long-ciliate. Anthers 2.5–3.5 mm. Ovary apex glabrous or sparsely hairy. Fl. and fr. Jun–Aug.

● Subalpine meadows, *Pinus* forests; 2900–4800 m. Sichuan, Yunnan.

1a. Glumes smooth, glabrous; lemmas scabrid on upper back, margins glabrous; palea keels ciliolate along upper 1/3 ..... 15a. var. *yunnanensis*

1b. Glumes pubescent; lemmas long villous on back, margins ciliate; palea keels long ciliate ..... 15b. var. *villosa*

15a. Festuca yunnanensis var. **yunnanensis**

滇羊茅(原变种) dian yang mao (yuan bian zhong)

Culms glabrous. Leaf sheaths smooth. Rachilla scabrid; glumes glabrous; lemmas scabrid on upper back; palea keels ciliolate along upper 1/3.

● Subalpine meadows, *Pinus* forests; 2900–3800 m. Sichuan, Yunnan.

15b. Festuca yunnanensis var. **villosa** St.-Yves in Handel-Mazzetti, Symb. Sin. 7: 1287. 1936.

毛羊茅 mao yang mao

Culms long villous. Leaf sheaths of innovations smooth or pubescent. Rachilla densely pubescent; glumes pubescent, midrib long villous; lemmas long villous on back; palea keels long-ciliate.

● Subalpine meadows; 3700–4800 m. Sichuan (Muli), Yunnan (Lijiang).

16. Festuca fascinata Keng ex S. L. Lu, Acta Phytotax. Sin. 30: 533. 1992.

蛊羊茅 gu yang mao

Plant loosely or densely tufted; shoots extravaginal. Culms 60–90 cm tall, nodes 2–3. Leaf sheaths glabrous; auricles absent; leaf blades flat (at culm) or involute (at base), (7–)14–25(–27) cm × 1.5–2.6 mm, margins scaberulous, veins 5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.6(–0.8) mm, margin sometimes ciliate. Panicle loose, nodding, 10–20 cm, base enclosed by uppermost leaf sheath; branches erect or ascending, (3–)9–12 cm, (1–)2 at lower nodes. Spikelets 7–10 (–12) mm; florets 3–5(–7); glumes glabrous or sparsely hairy; lower glume narrowly lanceolate, 2.1–3(–5) mm; upper glume lanceolate, occasionally broadly lanceolate, 3.8–6 mm; rachilla internodes 1–1.5(–2) mm, scabrid; lemmas 4.8–7 mm, scabrid upward; awns (4–)5–9 mm; palea 5–6 mm, keels scabrid. Anthers 1.2–2 mm. Ovary apex glabrous, or rarely sparsely hairy. Fl. and fr. Jun–Sep.

● Forests, mountain slopes, meadows; 2500–4100 m. Gansu, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

17. Festuca longiglumis S. L. Lu, Acta Phytotax. Sin. 30: 531. 1992.

长颖羊茅 chang ying yang mao

Plant loosely tufted or turf-forming; shoots extravaginal. Culms 40–65 cm tall, nodes 3–4. Leaf sheaths glabrous; auricles absent; leaf blades flat or involute, soft, (16–)20–35 cm × 2.5–3.5(–4) mm, smooth, veins 7–12; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.2–0.4 mm, margin ciliate. Panicle loose, open, 10–22 cm, base enclosed by uppermost leaf sheath; branches ascending or spreading, 3–8(–10) cm, smooth, inserted singly, naked below middle. Spikelets 10–12 mm; florets 5–6; glumes glabrous, long acuminate; lower glume narrowly lanceolate, 5–6.5 mm; upper glume lanceolate, 8–9 mm; rachilla internodes 1.3–1.5 mm; lemmas 7–8.5(–10) mm, smooth; awns 7–10 mm; palea keels scabrid. Anthers 1.8–2 mm. Ovary apex glabrous. Fl. and fr. Aug.

● Mountain slopes, near forests; ca. 2900 m. Yunnan (Binchuan).

18. Festuca vierhapperi Handel-Mazzetti, Akad. Wiss. Wien, Math.-Naturwiss. Kl., Anz. 57: 176. 1920.

藏滇羊茅 zang dian yang mao

Plants loosely to densely tufted; shoots extravaginal. Culms 60–90(–120) cm tall, nodes 2–3(–4). Leaf sheaths glabrous or basal sheaths hairy, uppermost 15–25 cm, longer than blade; auricles usually absent; leaf blades flat or involute, rigid, (3–)10–26(–30) cm × 3–5.5 mm, margins scabrid, veins 7–13; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.4–0.6 mm, margin ciliolate. Panicle loose, erect or nodding, 8–20(–30) cm; branches 8–12 cm, 1–2 at lowest node. Spikelets 7–15 mm; florets 3–5(–7); glumes long acuminate; lower glume narrowly lanceolate, 2–3.5(–4.5) mm; upper glume narrowly lanceolate, 5–6 mm; rachilla internodes 1.2–1.4 mm, scabrid; lemmas (6–)6.5–8 mm, smooth or scabrid upward; awns 4–8(–10) mm; palea keels scabrid. Anthers 1.8–2.2 mm. Ovary apex glabrous. Fl. and fr. Jun–Sep.

● Grassy mountain slopes, forests, along forest margins; 2900–4100 m. Sichuan, Xizang, Yunnan.

19. Festuca parvigluma Steudel, Syn. Pl. Glumac. 1: 305. 1854.

小颖羊茅 xiao ying yang mao

Plant loosely tufted or turf-forming; shoots extravaginal. Culms (30–)40–80 cm tall, nodes 2–3. Leaf sheaths glabrous or basal leaf sheath hairy; auricles absent; leaf blades flat, 7–20(–36) cm × 2.5–3.8(–5) mm, veins 13–17; adaxial to abaxial sclerenchyma strands present; ligule 0.2–0.5 mm, margin ciliolate. Panicle loose, nodding, (10–)15–20 cm; branches 4–13 cm, 1(or 2) at lowest node. Spikelets 7–9 mm; florets 3 or 4(or 5); glumes smooth, apex obtuse to acute; lower glume ovate, 1–1.8 mm; upper glume ovate, 2.2–3(–4) mm; rachilla internodes 0.9–1.1 mm; lemmas 4.8–7 mm, smooth, apex subobtuse, rarely slightly notched; awns 5–10(–12) mm; palea keels smooth. Anthers 0.7–1.1(–1.5) mm. Ovary apex densely hairy. Fl. and fr. Apr–Jul.

Grassy slopes, forests, roadsides, river banks; (200–)1000–3700 m. Guizhou, Hunan, Jiangxi, Shaanxi, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea].

Records of this species from NE India and Nepal are based on misidentifications.

20. Festuca extremiorientalis Ohwi, Bot. Mag. (Tokyo) 45: 194. 1931.

远东羊茅 yuan dong yang mao

Festuca subulata Trinius var. *japonica* Hackel; *F. subulata* subsp. *japonica* (Hackel) Koyama & Kawano.

Plant loosely tufted; shoots extravaginal. Culms 60–100 cm tall, nodes (2–)3(–4). Leaf sheaths glabrous; auricles absent; leaf blades flat, soft, 10–30 cm × 4–10(–13) mm, glabrous, margins smooth or scaberulous; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 1.1–2.5(–3.5) mm. Panicle loose, nodding, (8–)12–30 cm; branches (3–)7–15 cm, scabrid, (1–)2 per node. Spikelets 5–8(–9.5) mm; florets 3–4(–5); glumes smooth or scaberulous on midvein; lower glume narrowly lanceolate to lanceolate, 2.5–3.5(–4.5) mm; upper glume lanceolate to broadly lanceolate, 3.5–6 mm; rachilla internodes 0.8–1.1 mm, pubescent; lemmas 5–6(–7) mm, strongly 5-veined, scabrid, apex entire or slightly notched; awns 4–8 mm; palea 5–6(–7) mm, keels smooth. Anthers 1–1.5(–2) mm. Ovary apex moderately or densely hairy. $2n = 28$. Fl. and fr. Jun–Aug.

Forests, valleys, grasslands, riversides; 900–2800 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan [Japan, Korea, E Russia].

This taxon is sometimes treated as an Asian subspecies of the North American *Festuca subulata*. However, *F. subulata* is considered here to be a different species, separable by its shorter ligule 0.2–1 mm, weakly 3-veined lemmas, longer awns 5–17 mm, and scabrid palea keels.

21. Festuca leptopogon Stapf in J. D. Hooker, Fl. Brit. India 7: 354. 1896 [“1897”].

弱序羊茅 ruo xu yang mao

Festuca subulata Trinius var. *leptopogon* (Stapf) St.-Yves; *F. takasagoensis* Ohwi.

Plant loosely tufted, shortly rhizomatous; shoots extravaginal. Culms (30–)60–120 cm tall, nodes 3–5. Leaf sheaths glabrous, old basal sheaths reddish brown, becoming fibrous; auricles absent; leaf blades flat, soft, 8–15(–30) cm × 3–8 mm, glabrous, margins smooth or scabrid, veins 12–22; adaxial to abaxial sclerenchyma strands present; ligule (0.5–)1–2 mm, truncate. Panicle loose, nodding, (10–)15–30 cm; branches flexuously ascending, 6–15 cm, 1(–2) at lower nodes. Spikelets 7–8 mm; florets 2–3; glumes smooth; lower glume lanceolate, 1.5–3.2 mm; upper glume broadly lanceolate, 2.5–4(–5.5) mm; rachilla internodes 1–1.5 mm, scabrid; lemmas 6.5–7.5(–8) mm, smooth, apex distinctly notched; awns 6–10(–15) mm; palea keels smooth or occasionally scaberulous. Anthers 1–1.2(–1.6) mm. Ovary apex moderately or densely hairy. Fl. and fr. May–Jul.

Forests on mountain slopes, grasslands, streamsides; 2300–3900 m. Guizhou, Qinghai, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, NE India, Malaysia, Nepal].

22. Festuca elata Keng ex E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 82(3): 97. 1977.

高羊茅 gao yang mao

Plant loosely tufted or shortly rhizomatous; shoots extravaginal. Culms 70–100 cm tall; nodes 3–4. Leaf sheaths glabrous; auricles absent; leaf blades flat, 10–20 cm × 4–9 mm wide, glabrous, margins scabrid; ligule 1.5–3.5 mm. Panicle loose, open, 20–26 cm; branches ca. 15 cm, inserted singly, scabrid, with branchlets and spikelets to base. Spikelets 8–9 mm; florets 4–6; lower glume lanceolate, 2.5–3.2 mm; upper glume broadly lanceolate, 4–5 mm; lemmas lanceolate-elliptic, 7.5–8.2 mm, smooth, apex distinctly notched, awns 8–13 mm; palea keels scaberulous. Anthers 1.7–2 mm. Ovary apex densely hairy.

● Mountain slopes, forests, roadsides. Guangxi, Guizhou, Sichuan.

23. Festuca scabriflora L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 387. 2002.

糙花羊茅 cao hua yang mao

Plant loosely tufted. Culms 60–80 cm tall, nodes 3–4. Leaf sheaths glabrous; auricles lanceolate, straight; leaf blades flat, 10–15 cm × 4–6 mm, margins scabrid; ligule 0.4–0.6 mm. Panicle loose, 15–25 cm; branches 5–8(–15) cm, paired, lower 1/3 naked. Spikelets 16–18 mm; florets 4–5; lower glume narrowly lanceolate, 1.5–2.5 mm, apex acute; upper glume narrowly lanceolate, 3–3.5 mm, apex acuminate; lemmas 6–7 mm, densely scabrid, apex notched; awns 6–8 mm; palea keels ciliolate. Anthers 1.3–1.7 mm. Ovary apex hairy. Fl. and fr. Jul–Aug.

● Alpine *Quercus* forests, streamsides, grassy mountainsides; 2700–3600 m. Sichuan, Xizang, Yunnan.

This species is apparently close to *Festuca gigantea*, but specimens have not been seen.

24. Festuca chayuensis L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 387. 2002.

察隅羊茅 cha yu yang mao

Plant densely tufted. Culms 15–20 cm tall, node 1. Leaf sheaths smooth; auricles lanceolate, straight; leaf blades flat to involute, 5–8 cm × ca. 1 mm, margins scaberulous; ligule 0.4–0.6 mm, truncate, margin ciliolate. Panicle loose, open, 5–7 cm; branches 2–3 cm, inserted singly. Spikelets 8–10 mm, dark purple; florets 4–5; glumes smooth; lower glume narrowly lanceolate, 2–3 mm; upper glume narrowly lanceolate, 3–4 mm; lemmas 5–6 mm, scabrid or pubescent, apex entire; awns 2–3 mm; palea keels scabrid. Anthers 2–2.2 mm. Ovary apex glabrous.

● Grassy mountainsides; ca. 3900 m. Xizang.

25. Festuca formosana Honda, Bot. Mag. (Tokyo) 42: 134. 1928.

台湾羊茅 tai wan yang mao

Culms robust, (40–)150–200 cm tall. Leaf sheaths glabrous; auricles falcate; leaf blades flat, stiff, (15–)30–60 cm × 5–20 mm, margins scaberulous, finely acuminate; ligule 1.8–2.2 mm, truncate. Panicle large, effuse, 30–40 cm; branches ascending, paired, scabrid. Spikelets 8–10 mm; florets 1–2(–3), 3rd floret reduced; glumes glabrous; lower glume narrowly lanceolate, 2.2–2.8(–3.2) mm; upper glume broadly lanceolate, 3.5–4.5 mm; lemmas 8–9 mm, puberulent, awnless; palea keels ciliolate. Anthers 2.6–3 mm.

● Limestone areas. Taiwan.

This species appears to be close to *Festuca arundinacea*. Specimens have not been seen.

26. Festuca arundinacea Schreber, Spic. Fl. Lips. 57. 1771.

苇状羊茅 wei zhuang yang mao

Plant tussock forming; shoots intravaginal. Culms robust, 30–100 cm tall, nodes 1–2(–5). Leaf sheaths usually smooth, occasionally scabrid at base; auricles falcate, ciliolate; leaf blades flat, tough, 4–35 cm × 1.5–7 mm, margins scabrid, veins 18, tapering to a fine point; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.5–1 mm, truncate. Panicle loose or contracted, 5–25 cm, many-spiculate; branches 2–10 cm, 1–2 at lower nodes. Spikelets 8–15 mm; florets (2–)3–7; glumes glabrous; lower glume narrowly lanceolate, 3–6 mm; upper glume lanceolate, 4.5–7 mm; rachilla internodes 1.2–1.5 mm; lemmas 6–9 mm, firm except for narrow scarious scabrid margins, apex notched; awns 0.3–0.8(–5) mm; palea keels scaberulous. Anthers 2.7–3.7 mm. Ovary apex glabrous. Fl. and fr. Jun–Sep.

Valleys, under shrubs, along forest margins; 700–1200 m. Xinjiang; cultivated and adventive in Gansu, Hubei, Jiangxi, Nei Mongol, Qinghai, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang, NE China [Russia; Europe, North America].

This species is a native of C and N Asia and Europe, widely introduced as a pasture grass and naturalized in other temperate countries. The ciliate auricles are characteristic, but the hairs become worn off with age.

The earlier name *Festuca elatior* Linnaeus (1753) has been formally rejected.

1a. Lemmas awnless or mucronate, mucro ca. 0.5 mm; leaf sheaths scabrid at base ..... 26a. subsp. *arundinacea*
1b. Lemmas awned, awn 0.7–2.5(–5) mm; leaf sheaths smooth throughout ..... 26b. subsp. *orientalis*

26a. Festuca arundinacea subsp. **arundinacea**

苇状羊茅(原亚种) wei zhuang yang mao (yuan ya zhong)

Bromus arundinaceus (Schreber) Roth; *Festuca elatior* Linnaeus, nom. utique rej.; *F. elatior* subsp. *arundinacea* (Schreber) Celak; *F. elatior* var. *arundinacea* (Schreber) Wimmer; *Lolium arundinaceum* (Schreber) Darbyshire; *Schedonorus elatior* (Linnaeus) P. Beauvois, nom. rej.

Leaf sheaths usually scabrid at base. Lemmas awnless or mucronate; mucro up to 0.5 mm.

Valleys, under shrubs, along forest margins; 700–1200 m. Xinjiang, cultivated in Gansu, Hebei, Hubei, Jiangxi, Nei Mongol, Qinghai, Shaanxi, Sichuan, Yunnan, Zhejiang, NE China [Russia; Europe].

26b. Festuca arundinacea subsp. **orientalis** (Hackel) Tzvelev, Fl. URSS 18: 17. 1970.

东方羊茅 dong fang yang mao

Festuca elatior Linnaeus subvar. *orientalis* Hackel, Monogr. Fest. Eur. 154. 1882; *F. arundinacea* var. *aristata* Regel; *F. orientalis* (Hackel) V. I. Kreczetowicz & Bobrov; *F. regeliana* Pavlov.

Leaf sheaths usually smooth throughout. Lemmas awned; awn 0.7–2.5(–5) mm.

Forest margins, wetlands. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

27. Festuca pratensis Hudson, Fl. Angl. 37. 1762.

草甸羊茅 cao dian yang mao

Festuca elatior Linnaeus subsp. *pratensis* (Hudson) Hackel; *F. elatior* var. *pratensis* (Hudson) A. Gray; *F. fluitans* Linnaeus var. *pratensis* (Hudson) Hudson; *Lolium pratense* (Hudson) Darbyshire; *Schedonorus pratensis* (Hudson) P. Beauvois.

Plant loosely tufted; shoots extravaginal. Culms 30–130 cm tall, nodes 2–4. Leaf sheaths glabrous; auricles falcate, glabrous; leaf blades flat or loosely rolled, 10–25 cm × 2–7 mm, glabrous, veins 18–25; adaxial to abaxial sclerenchyma strands present; ligule 0.2–0.5 mm, margin ciliate. Panicle compact except at anthesis, (6–)10–25 cm; branches usually paired, (3.5–)4–6.5 cm, unequal, longer branch with 4–6 spikelets, shorter branch with 1–3 spikelets. Spikelets 8.5–17 mm; florets (2–)4–12; glumes glabrous or scabrid; lower glume (2–)2.6–4(–4.5) mm; upper glume (3–)3.5–5 mm; rachilla internodes scabrid; lemmas (5–)6–8 mm, smooth or scabrid, apex hyaline, acute, rarely awn–tipped; awns 0–2 mm; palea keels scabrid. Anthers (0.5–)2–4.6 mm. Ovary apex glabrous. 2*n* = 14, 28, 42, 70.

Cultivated. Guizhou, Jiangsu, Jilin, Qinghai, Sichuan, Xinjiang, Yunnan [SW Asia, Europe; cultivated North America].

This grass (Meadow Fescue) was widely cultivated as a pasture grass in the late 1800s and early 1900s and is now found in most temperate parts of the world. It may have been introduced to China at that time.

28. Festuca gigantea (Linnaeus) Villars, Hist. Pl. Dauphiné 2: 110. 1787.

大羊茅 da yang mao

Bromus giganteus Linnaeus, Sp. Pl. 1: 77. 1753; *Lolium giganteum* (Linnaeus) Darbyshire.

Plant loosely tufted, usually with old brownish sheaths at base; shoots extravaginal. Culms 45–150 cm tall, nodes (1–)2–3. Leaf sheaths glabrous or scabrid; auricles falcate; leaf blades dark green, flat, (10–)15–35(–50) cm × 6–18 mm, midrib conspicuous, margins scabrid, veins 26–36; adaxial to abaxial sclerenchyma strands present; ligule (0.5–)1–1.5(–2.5) mm, margin glabrous. Panicle loose, open, 15–25(–50) cm; branches flexuous, 5–10(–15) cm, paired, unequal, shorter with 3–6 spikelets, longer with 6–9 spikelets, lower 1/3 naked. Spikelets 8–13(–20) mm; florets 3–10; glumes smooth or scabrid; lower glume lanceolate, (3.5–)4–7 mm; upper glume broadly lanceolate, 5–8 mm; rachilla internodes 1.3–1.8 mm, scabrid; lemmas 6–7.5(–9) mm, scabrid, apex entire or slightly notched; awns (6–)10–15(–18) mm; palea keels scaberulous. Anthers 2.5–3 mm. Ovary apex glabrous. Fl. and fr. Jul–Aug. 2*n* = 42.

Damp shady places along forest margins, grasslands, under shrubs; 1000–3800 m. Sichuan, Xinjiang (Tian Shan), Yunnan [Bhutan, NW India, Kazakhstan, Pakistan, Russia, Tajikistan; SW Asia, Europe; cultivated North America].

29. Festuca liangshanica L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 387. 2002.

凉山羊茅 liang shan yang mao

Plant loosely tufted with short slender rhizomes. Culms 60–80 cm tall, nodes 1–2. Leaf sheaths glabrous; auricles falcate; leaf blades flat, 6–13 cm × 2.5–4 mm, margins smooth, veins 15–17; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.5 mm, margin glabrous. Panicle loose, open, 8–20 cm; branches flexuous, 3–9 cm, 2 at lowest node, one long and the other short, smooth. Spikelets 10–20 mm; florets 3–8; glumes smooth, apex obtuse; lower glume narrowly lanceolate, 4–6 mm; upper glume lanceolate, 6–7 mm; rachilla internodes 1.8–2.2 mm, smooth; lemmas 7.5–9 mm, punctiform or scaberulous, apex entire or slightly notched; awns 4.5–13 mm; palea keels scaberulous. Anthers 3.6–4 mm. Ovary apex glabrous. Fl. and fr. Jul.

● Grassy mountain slopes; ca. 1200 m. Sichuan (Liang Shan, Xichang).

This species resembles *Festuca gigantea* in its falcate auricles, long awns, and glabrous ovary apex.

30. Festuca durata B. S. Sun & H. Peng, Guihaia 13: 223. 1993.

硬序羊茅 ying xu yang mao

Plant loosely tufted or single-stemmed; shoots intravaginal. Culms (30–)50–80(–110) cm tall, nodes 2. Leaf sheaths glabrous; auricles falcate; leaf blades flat, usually erect, 5–15(–25) cm × 2–6 mm, veins 10–14, glabrous; adaxial to abaxial sclerenchyma strands present, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.5 mm. Panicle narrow, spikelike, 10–25 cm; branches stiff, erect, 1.2–3(–9) cm, 1(–2) at lowest node, bearing 2–4 spikelets from base. Spikelets 10–17 mm; florets (3–)4–6; glumes glabrous, apex acuminate; lower glume narrowly lanceolate, 5–7 mm; upper glume narrowly lanceolate, 6–8 mm; rachilla internodes 1.6–2.5(–3) mm; lemmas 6.5–9.5 mm, apex slightly notched; awns 6–13 mm; palea keels scabrid. Anthers 2.5–3.5 mm. Ovary apex glabrous. Fl. and fr. Jun–Oct.

● Roadsides, ditches; 1400–2600 m. Guizhou, Yunnan.

This species resembles *Festuca gigantea* in its falcate auricles, long awns, and glabrous ovary apex.

31. Festuca mazzettiana E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 82(3): 99. 1977.

昆明羊茅 kun ming yang mao

Festuca mairei Hackel ex Handel-Mazzetti, Symb. Sin. 7: 1288. 1936, not St.-Yves (1922); *F. kunmingensis* B. S. Sun; *Lolium mazzettianum* (E. B. Alexeev) Darbyshire.

Plant solitary or loosely tufted; shoots intravaginal. Culms (40–)60–80 cm tall; nodes (3 or)4. Leaf sheaths glabrous; auricles falcate; leaf blades flat or involute, (2.5–)6–10(–30) cm × 1.5–2.5(–4) mm, veins 10–14; ligule 0.3–0.6(–1) mm, margins ciliolate or without cilia. Panicle spikelike, 13–17(–26) cm; branches 2–5 cm, 2 or 1 at lowest node. Spikelets 12–16 mm, purplish or brown (tinged greenish); florets 3–4; glumes glabrous; lower glume narrowly lanceolate, 4–5(–7) mm; upper glume lanceolate, 5.2–6.7 mm; rachilla internodes 1.8–2.2 mm; lemmas 7.5–9(–10) mm, scabrid, apex slightly notched; awns 7–15 mm; palea 7.5–8.5 mm, keels scaberulous. Anthers 2.5–3 mm. Ovary apex glabrous (immature). Fl. and fr. Jul.

● Grassy places, forest margins; 2600–2800 m. Sichuan, Yunnan.

32. Festuca jacutica Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 14: 163. 1915.

雅库羊茅 ya ku yang mao

Plant tufted, turf-forming, base clothed in old sheaths. Culms 50–80 cm tall, nodes 2–3. Leaf sheaths glabrous; auricles present as erect swellings or absent; leaf blades conduplicate, filiform, stem blades 4–8 cm × ca. 0.3 mm, basal blades up to 30 cm, veins 5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in broad bands or continuous; ligule 0.1–0.3 mm, margin ciliolate. Panicle loosely contracted, 5–10 cm; branches 2–3 cm. Spikelets 5–7.5 mm, usually purplish, occasionally greenish, tawny at maturity; florets 4–7; glumes smooth, margins and apex broadly membranous; lower glume narrowly lanceolate, 1.8–2.2 mm; upper glume broadly lanceolate, 2.8–3.2 mm; lemmas 3–4 mm, punctiform, apex acute or obtuse; awns absent; palea keels scabrid or ciliolate. Anthers 1.5–2 mm. Ovary apex glabrous. Fl. and fr. Jun–Aug.

Hill slopes, meadows, open forests. 700–1800 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [E Russia].

33. Festuca stapfii E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(4): 115. 1978.

细芒羊茅 xi mang yang mao

Festuca undata Stapf var. *aristata* Stapf.

Plant tufted; shoots extravaginal. Culms 20–70 cm tall, nodes 2, dark brown. Leaf sheaths smooth or basal sheaths pubescent; auricles present as erect swellings; leaf blades conduplicate, flaccid, 3–10 cm × 0.8–1 mm, veins 7–9; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.5 mm, margin ciliate. Panicle loose, open, 6–23 cm; branches 3–6 cm, filiform, scabrid, 1(–2) at lowest node. Spikelets 6–8.5(–9.5) mm, greenish or purplish; florets 3–4(–7); glumes smooth, margins broadly membranous; lower glume narrowly lanceolate, 2–2.5(–3.8) mm; upper glume lanceolate, 3–4.5(–6.5) mm; rachilla internodes 1–1.5 mm; lemmas 5–6.5 mm, smooth, acuminate; awns (3–)5–8 mm; palea keels scabrid. Anthers 1–1.8 mm. Ovary apex glabrous when young, later sparsely hairy. Fl. and fr. Jul–Sep.

Grassy mountainsides, chalky meadows, forest margins; 3000–3200 m. Sichuan, Xizang, Yunnan (E Lijiang mountains) [Bhutan, India (Darjeeling, Sikkim), Nepal].

Festuca undata Stapf, from India (Sikkim), differs by its extravaginal shoots, shorter awns 0.7–1.4 mm, and smaller anthers 0.5–0.7 mm.

34. Festuca kashmiriana Stapf in J. D. Hooker, Fl. Brit. India 7: 351. 1896 [“1897”].

克什米尔羊茅 ke shi mi er yang mao

Festuca rubra Linnaeus subsp. *kashmiriana* (Stapf) St.-Yves.

Plant densely tufted; shoots intravaginal or extravaginal. Culms 15–60 cm tall, nodes 1–2. Leaf sheaths smooth, glabrous, margins membranous; auricles present as erect swellings or absent; leaf blades conduplicate, 10–20 cm × ca. 0.5 mm, both surfaces scabrid. Panicle loose, open at flowering, 6–10 cm; branches 2–5 cm, inserted singly. Spikelets 8.5–11 mm, greenish or purplish brown; florets 3–6; glumes smooth or scabrid, margins thinly membranous or ciliolate, apex acute; lower glume lanceolate, 2–2.5 mm; upper glume lanceolate-ovate, 3–4.5 mm; rachilla internodes 1.8–2.2 mm, pubescent; lemmas 5.1–6.5 mm, scabrid on upper back, rarely pubescent laterally at base; awns 2–3.5 mm; palea keels scabrid, pubescent between keels. Anthers 1.5–2.5 mm. Ovary apex densely hairy. Fl. and fr. Jul.

Grassy places on sunny slopes; ca. 4600 m. Xizang [NW India, Kashmir].

35. Festuca georgii E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(5): 94. 1978.

滇西北羊茅 dian xi bei yang mao

Plant loosely tufted; shoots extravaginal. Culms 60–80 cm tall, nodes 2–3. Leaf sheaths glabrous; auricles absent; leaf blades conduplicate, 7–22 cm × 0.8–1.5 mm, veins 7–9(–13); adaxial to abaxial sclerenchyma strands absent, adaxial sclerenchyma present on tops of ribs, abaxial sclerenchyma in broad bands, some reaching vascular bundles, or continuous beneath epidermis; ligule 0.2–0.4 mm, margin ciliate. Panicle loose, open, 15–20 cm; branches 4–8 cm, 2 at lowest node. Spikelets 8–10 mm, greenish or purplish; florets 3(–4); glumes glabrous; lower glume narrowly lanceolate, 3.5–4 mm; upper glume broadly lanceolate, 4.5–5 mm; rachilla internodes 1.3–1.5 mm; lemmas 6–7 mm, scabrid; awns (0.5–)0.8–1.5 mm; palea keels scabrid. Anthers 3–3.3 mm. Ovary apex sparsely hairy. Fl. and fr. Aug.

● Moist shady situations at *Pinus* forest margins; 3000–3400 m. Yunnan (E Lijiang mountains).

36. Festuca nitidula Stapf in J. D. Hooker, Fl. Brit. India 7: 350. 1896 [“1897”].

微药羊茅 wei yao yang mao

Plant loosely tufted or turf-forming; shoots intravaginal or extravaginal. Culms (10–)18–60 cm tall; nodes usually 1(–2). Leaf sheaths glabrous; auricles usually absent; leaf blades setaceous, conduplicate or sometimes flat, 2–15 cm × 1–2 mm, veins 7–12; adaxial to abaxial sclerenchyma strands present or absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.2–0.5(–1) mm, margin ciliolate. Panicle loose, open, usually drooping, 4–10 cm; branches 3–5(–7) cm, flexuous, 1 at lowest node. Spikelets 5–6(–7) mm, purplish or sometimes brown; florets 2–5; glumes smooth, margins membranous, apex subobtuse; lower glume lanceolate, 1.5–3 mm; upper glume broadly lanceolate to oblong, 3–4 mm; rachilla internodes 0.8–1 mm; lemmas 4–5 mm, scabrid; awns (0.5–)1–2(–4) mm; palea keels scabrid. Anthers 0.5–1 mm. Ovary apex sparsely hairy. Fl. and fr. Jun–Sep.

Wet places in alpine meadows, grassy mountain slopes, floodlands, swamp meadows; 2500–5300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [NW India, Kashmir, Nepal].

This species has unusually small anthers.

37. Festuca amblyodes V. I. Kreczetowicz & Bobrov in Komarov, Fl. URSS 2: 771. 1934.

葱岭羊茅 cong ling yang mao

Festuca amblyodes subsp. *erectiflora* (Pavlov) Tzvelev; *F. erectiflora* Pavlov.

Plant loosely tufted or turf-forming. Culms 15–30 cm tall, nodes 1–2. Leaf sheaths smooth; auricles present as erect swellings; leaf blades conduplicate, 5–15 cm × 0.3–0.5 mm, 1/3–1/2 length of culms, veins 5; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule (0.2–)0.4–0.6 mm, margin ciliolate. Panicle loose, open, 3–5 cm; branches 1–2(–4) cm, inserted singly. Spikelets 6–11 mm, greenish, purplish or brown; florets 3–5; glumes smooth, margins narrowly membranous; lower glume narrowly lanceolate, 2–2.8 mm; upper glume lanceolate, 3.4–4.1 mm; rachilla internodes 1.2–1.6 mm, scabrid or pubescent; lemmas 4.5–6.2 mm, punctiform toward apex, smooth below; awns 1–1.5 mm; palea keels scabrid. Anthers 1.8–2.4 mm. Ovary apex sparsely hairy. Fl. and fr. Jun–Aug.

Meadow steppes, alpine meadows, mountain valleys; 2200–3700 m. Qinghai, Xinjiang, Yunnan [E Kazakhstan, Kyrgyzstan, Tajikistan].

38. Festuca yulungschanica E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(4): 116. 1978.

丽江羊茅 li jiang yang mao

Plant densely tufted; shoots intravaginal. Culms 18–26 cm tall. Leaf sheaths smooth, closed below middle when young; auricles present as erect swellings or absent; leaf blades conduplicate, 0.4–0.6 mm wide, veins 5; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands. Panicle contracted, narrow, 4.5–6 cm. Spikelets ovate, 8–10 mm, greenish; lemmas 5–5.5 mm, smooth; awns (1.5–)2.5–5.5 mm; palea keels scabrid. Anthers 2.3–2.8 mm. Ovary apex glabrous.

● Subalpine grassy places, mountain slopes; 3300–3700 m. Yunnan.

39. Festuca kansuensis Markgraf–Dannenberg, Acta Bot. Acad. Sci. Hung. 19: 207. 1973.

甘肃羊茅 gan su yang mao

Plant densely tufted; shoots intravaginal. Culms 20–30(–50) cm tall, nodes 2. Leaf sheaths smooth, glabrous or rarely pubescent; auricles present as erect swellings; leaf blades conduplicate, filiform, 10–15(–25) cm × (0.25–)0.3–0.5 mm, veins 5, abaxial surface scabrid; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in broad bands; ligule 0.4–0.6 mm, margin ciliate. Panicle loose, narrow; branches 1–3 cm, scabrid, 1 or 2 at lowest node. Spikelets 7–8 mm, yellowish green or purplish; florets 3–4; lower glume glabrous, linear or narrowly lanceolate, 3–3.5 mm; upper glume narrowly lanceolate, 4.2–4.8 mm, margins minutely ciliolate, scaberulous near apex; lemmas 5.3–5.7 mm, scabrid; awns 1.5–2.7 mm; palea keels and back scabrid. Anthers (2.1–)2.5–3 mm. Ovary apex glabrous or sparsely hairy. Fl. and fr. Jun–Aug.

● Mountain slopes, meadow steppe; 3200–3700 m. Gansu, Qinghai.

40. Festuca subalpina Y. L. Chang & Skvortsov, Acta Soc. Harbin. Investig. Nat. Ethnogr., Bot. 12: 29. 1954.

长白山羊茅 chang bai shan yang mao

Plant densely tufted; shoots extravaginal. Culms 15–25 cm tall, nodes 1. Leaf sheaths smooth, glabrous or basal leaf sheaths pubescent; auricles present as erect swellings; leaf blades conduplicate, flaccid, 7–13 cm × 0.3–0.8 mm, veins (5–)7–9; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 3 strands at midrib and margins; ligule 0.1–0.3 mm, margin ciliate. Panicle contracted, narrow, 3–6 cm; branches 0.5–2 cm, 1 at lowest node. Spikelets 5–6 mm, purplish or greenish brown; florets 3–5; glumes glabrous or pubescent; lower glume lanceolate, 2–2.5 mm; upper glume oblong or broadly lanceolate, 2.8–3.2 mm; rachilla internodes 1–1.2 mm; lemmas 3.5–4 mm, smooth in lower part, scabrid or pubescent toward apex; awns 1–2.5(–3) mm; palea keels scabrid. Anthers 1.5–2.1(–2.5) mm. Ovary apex glabrous. Fl. and fr. Jul–Sep.

● Mountain slopes; 2500–2600 m. Jilin (Changbai Shan).

41. Festuca forrestii St.-Yves, Rev. Bretonne Bot. Pure Appl. 2: 72. 1927.

玉龙羊茅 yu long yang mao

Festuca forrestii var. *kozlovii* Tzvelev.

Plant loosely tufted or turf-forming; shoots intravaginal or extravaginal. Culms stiff, (18–)30–60 cm tall, 1-noded. Leaf sheaths smooth; auricles present as erect swellings; leaf blades conduplicate, 6–20 cm × 0.3–0.5 mm, both surfaces smooth or abaxial surface scabrid, margins scaberulous, veins 5; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule ca. 0.1 mm. Panicle loose, open, 4–7 cm; branches 1.5–4 cm, inserted singly. Spikelets 8–10 mm, purplish or rarely greenish; florets 3–5(–7); glumes smooth or upper scabrid, margin ciliolate; lower glume narrowly lanceolate, 2.5–3.5 mm; upper glume lanceolate, 4–5 mm; rachilla internodes 1.1–1.4 mm, scabrid; lemmas 5–6 mm, punctiform or scabrid; awns 2–6 mm; palea keels and back scabrid. Anthers 1.8–2.5(–3) mm. Ovary apex glabrous or sparsely hairy. Fl. and fr. Jul–Sep.

● Wet alpine meadows; 2500–4400 m. Qinghai, Sichuan, Xizang, Yunnan.

42. Festuca rubra Linnaeus, Sp. Pl. 1: 74. 1753.

紫羊茅 zi yang mao

Plants loosely tufted, shortly rhizomatous; shoots extravaginal; basal sheaths reddish brown. Culms 15–60(–100) cm tall, nodes 1–3. Leaf sheaths glabrous or with retrose hairs, occasionally reddish; auricles present as erect swellings or absent; leaf blades setaceous, conduplicate or culm blades flat, 6–30 cm × 0.4–1 mm (to 4 mm when flat), veins 5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.1–0.5 mm, margin without cilia. Panicle fairly loose, 5–14(–20) cm; branches 1.5–8 cm, scabrid

or hairy, 1–4 at lowest node. Spikelets 6–13 mm, green or purple; florets 2–6(–10); glumes smooth or slightly scabrid; lower glume narrowly lanceolate, 2–3.5(–4.5) mm; upper glume broadly lanceolate, 3.5–5.5(–6) mm; rachilla internodes ca. 0.8 mm, pubescent; lemmas smooth, scabrid or pubescent, (4–)5–7(–8) mm; awns (0.3–)1–3.5(–5) mm, rarely awnless; palea keels scabrid toward apex. Anthers (1–)2–3.7 mm. Ovary apex glabrous. 2*n* = 14, 21, 28, 42, 49, 53, 56, 64, 70.

Grassy slopes, roadsides, alpine meadows, other grassy places, in sun or shade; 600–4500 m. Widespread and common in China [temperate regions of N hemisphere].

Festuca rubra is a very polymorphic species, widespread in temperate and cold regions of the N hemisphere, and useful for pastures and lawns. Members of the complex (nos. 35–42) may be identified by the presence of young tiller leaf sheaths that are fused in a tube almost to the top. Look for this character if the leaf sheaths are reddish brown with retrorse hairs and the older leaf sheaths are fibrous. Leaf cross sections of the *F. rubra* complex are characteristic, with small patches of sclerenchyma under the lower epidermis, but no strands running across the leaf.

There are numerous variants, and many infraspecific taxa have been described. The following subspecies can be recognized in China.

1a. Lemmas densely pubescent; awn 0–1.5 mm ..... 42c. subsp. *arctica*
1b. Lemmas smooth or scabrid; awn 1–5 mm.
  2a. Lemmas 4–6 mm; awn 1–3.5 mm; anthers 2–3.5 mm ..... 42a. subsp. *rubra*
  2b. Lemmas 6–8 mm; awn 3–5.5 mm; anthers 1–2 mm ..... 42b. subsp. *clarkei*

42a. Festuca rubra subsp. **rubra**

紫羊茅(原亚种) zi yang mao (yuan ya zhong)

Festuca rubra var. *nankataizanensis* Ohwi; *F. rubra* var. *niitakensis* Ohwi.

Panicle branches scabrid. Spikelets with 3–6 florets; lemmas smooth or scabrid, 4–6 mm. Anthers 2–3.5 mm.

Grassy slopes, roadsides, alpine meadows, other grassy places, in sun or shade. Common in China except in the S [Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe, North America].

This is a very widely distributed grass, adventive or introduced for pasture and lawns in many cool-temperate countries.

Festuca rubra var. *nankataizanensis*, described from Taiwan, differs from this subspecies in its densely hirsute lemmas and small anthers 1–1.5 mm.

42b. Festuca rubra subsp. **clarkei** (Stapf) St.-Yves, Rev. Bretonne Bot. Pure Appl. 2: 62. 1927.

克西羊茅 ke xi yang mao

Festuca rubra var. *clarkei* Stapf in J. D. Hooker, Fl. Brit. India 7: 353. 1896 [“1897”]; *F. clarkei* (Stapf) B. S. Sun.

Panicle branches scabrid. Spikelets with 3–5 florets; lemmas glabrous or with very short hairs, 6–8 mm; awn 3–5.5 mm. Anthers 1–2 mm.

Mountain slopes; 2000–3600 m. Yunnan [Bhutan, N India, Kashmir, Pakistan].

42c. Festuca rubra subsp. **arctica** (Hackel) Govoruchin, Fl. Urala 127. 1937.

毛稃羊茅 mao fu yang mao

Festuca rubra Linnaeus f. *arctica* Hackel, Monogr. Festuc. Eur. 140. 1882; *F. kirelowii* Steudel; *F. cryophila* V. I. Kreczetowicz & Bobrov; *F. rubra* subsp. *kirelowii* (Steudel) Tzvelev; *F. rubra* subsp. *pluriflora* (D. M. Chang) N. R. Cui.

Panicle branches hairy. Spikelets with 2–7(–10) florets; lemmas densely pubescent, 5–6.5 mm; awn up to 1.5 mm or awnless. Anthers 2.7–3.7 mm. 2*n* = 42.

Among shrubs, grassy mountain slopes, valleys, floodlands; 2100–4300 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Kashmir, Kazakhstan (Tarbagatai Mountains), Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; N Europe, North America].

Festuca rubra subsp. *pluriflora* is based on a variant from Xinjiang (S Tian Shan) with 8 or more florets in the spikelet and glabrous leaf sheaths.

43. Festuca chelungkiangnica Y. L. Chang & Skvortsov ex S. L. Lu, Acta Phytotax. Sin. 30: 539. 1992 [*“chelungkingnica”*].

草原羊茅 cao yuan yang mao

Plant densely tufted. Culms 15–30 cm tall. Leaf sheaths glabrous; auricles present as erect swellings or absent; leaf blades filiform, conduplicate, 7–15 cm × 0.4–0.6 mm, cauline leaves 1.5–3 cm, veins 5; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 3 broad bands at midrib and margins; ligule 0.9–1.1 mm, margin ciliolate. Panicle narrow, 3.5–4.5 cm × 0.3–0.5 cm; branches 0.5–1 cm, inserted singly, rarely paired at lowest node, upper part of panicle racemose. Spikelets 5–6 mm, yellowish green; florets 4; glumes pubescent, margins ciliolate; lower glume narrowly lanceolate, ca. 3 mm; upper glume broadly lanceolate, ca. 4 mm; lemmas 4–5 mm, pubescent, awnless or mucronate. Anthers ca. 1.5 mm. Ovary apex glabrous. Fl. and fr. Sep–Nov.

● Grassland steppes. Heilongjiang.

44. Festuca dahurica (St.-Yves) V. I. Kreczetowicz & Bobrov in Komarov, Fl. URSS 2: 517. 1934.

达乌里羊茅 da wu li yang mao

Plants densely tufted, base clothed in old sheaths; shoots intravaginal. Culms (20–)30–60 cm tall; nodes 1–2. Leaf sheaths glabrous; auricles present as erect swellings; leaf blades conduplicate, 4–15 cm × 0.5–1 mm, veins 5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 3 broad bands; ligule 0.2–0.3 mm, margin ciliolate. Panicle narrow, contracted, (3–)6–8 cm; branches 1–3 cm, pubescent, 1–2 at lowest node. Spikelets 6–8.5 mm, greenish or purplish, brownish at maturity; florets 4–6; glumes glabrous, apex acute; lower glume lanceolate, 3–4 mm; upper glume lanceolate or elliptic, 3.5–5 mm; rachilla internodes 1–1.5 mm; lemmas 4.5–6.5 mm, scabrid or pubescent, awnless; palea keels glabrous. Anthers (2–)2.5–3 mm. Ovary apex glabrous. Fl. and fr. Jun.

Hill slopes; 600–3200 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Qinghai [Mongolia, E Russia].

1a. Panicle 6–8 cm; leaf blades 0.8–1 mm wide; anthers 2.5–3 mm ..... 44a. subsp. *dahurica*
1b. Panicle 3–5 cm; leaf blades ca. 0.6 mm wide; anthers ca. 2 mm ..... 44b. subsp. *mongolica*

44a. Festuca dahurica subsp. **dahurica**

达乌里羊茅(原亚种) da wu li yang mao (yuan ya zhong)

Festuca ovina Linnaeus var. *dahurica* St.-Yves, Bull. Soc. Bot. France 71: 40. 1924.

Culms 30–60 cm tall. Leaf blades 0.8–1 mm wide. Panicle 6–8 cm. Lemmas 4.5–5.5 mm. Anthers 2.5–3 mm.

Hill slopes; 600–1400 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol [Russia].

44b. Festuca dahurica subsp. **mongolica** S. R. Liou & Ma in Ma et al., Fl. Intramongol. 7: 261. 1983.

蒙古羊茅 meng gu yang mao

Plants dwarf. Leaf blades narrow, less than 0.6 mm wide. Panicle 3–5 cm. Lemmas 4–5 mm. Anthers ca. 2 mm.

● Grassy mountainsides; 1200–3200 m. Gansu, Hebei, Heilongjiang (Sunwu), Nei Mongol, Qinghai.

45. Festuca trachyphylla (Hackel) Krajina, Acta Bot. Bohem. 9: 190. 1930.

草秆羊茅 cao fu yang mao

Festuca ovina Linnaeus subvar. *trachyphylla* Hackel, Monogr. Festuc. Eur. 91. 1882.

Plant densely tufted; shoots intravaginal. Culms 20–75 cm tall, nodes 1–2. Leaf sheaths glabrous or hairy; auricles present as erect swellings; leaf blades involute, 8–30 cm × 0.4–0.6 mm, veins (5–)7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma usually forming an interrupted or almost continuous, unevenly thickened ring, occasionally in 3 strands; ligule 0.1–0.3 mm, margin ciliate. Panicle 3–13 cm, branches 1.2–3.5 cm, 1 at lowest node. Spikelets 5.5–10 mm; florets 4–8; glumes pubescent; lower glume 2–4 mm; upper glume 3–5.5 mm; lemmas 3.8–5.5 mm, scabrid or pubescent; awns 0.5–2.5 mm; palea keels scabrid. Anthers 2–3.4 mm. Ovary apex glabrous. $2n = 42$.

Perhaps introduced in China [Russia (European part); Europe; introduced in North America].

This commercially available species (Hard Fescue or Sheep Fescue) is widely used in North America and Europe for land stabilization on pipelines, mine tailings, and roadside plantings. It may have been introduced to China for similar purposes, but this has not been confirmed.

46. Festuca hondae E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 86(1): 70. 1981.

光秆羊茅 guang fu yang mao

Festuca formosana E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(5): 98. 1978, not Honda (1928); *F. taiwanensis* S. L. Lu, nom. illeg. superfl.

Plant densely tufted; shoots intravaginal. Culms 15–30 cm tall. Leaf blades conduplicate, 5–12 cm × 0.6–0.8 mm, veins 5 or 7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in a continuous ring. Panicle contracted, 2.5–4.5 cm; branches scabrid. Spikelets ovate, 8–9 mm, greenish; florets 4–6; lemmas 5.5–5.7 mm, smooth; awns 2–2.5 mm; palea keels smooth or scaberulous. Anthers 1.8–2 mm. Ovary apex glabrous.

● Among rocks, open mountain ridges; ca. 4300 m. Taiwan.

This species is known only from the type and is perhaps no more than an extreme variant of *Festuca ovina*.

47. Festuca ovina Linnaeus, Sp. Pl. 1: 73. 1753.

羊茅 yang mao

Plant densely tufted; shoots intravaginal. Culms 10–60 cm tall; node 1. Leaf sheaths glabrous or basal leaf sheaths occasionally with trichomes; auricles present as erect swellings or absent; leaf blades filiform, conduplicate, (3–)8–25 cm × 0.3–0.6 mm, margins usually scabrid, veins 5(–7); adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in a continuous ring; ligule (0.1–)0.2–0.5 mm, margin ciliate. Panicle contracted, narrow, 2–8 cm; branches (0.5–)1–2 cm, 1 at lowest node. Spikelets 4–6 mm, greenish, purplish or brown; florets 3–6; glumes glabrous or scabrid below apex; lower glume narrowly lanceolate to lanceolate, 1.8–2.8 mm; upper glume lanceolate or broadly lanceolate, 2.8–3.5 mm; rachilla internodes 0.8–1 mm; lemmas 3–4(–5) mm, punctiform or scabrid; awns 0.5–2 mm; palea keels scabrid. Anthers 1.5–2.2 mm. Ovary apex glabrous. Fl. and fr. Jun–Sep.

Alpine meadows, steppe, grassy places in forests; 1600–4400 m. Anhui, Gansu, Guizhou, Jiangsu (cultivated), Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia; SW Asia (Caucasus), Europe, North America].

This is an extremely polymorphic species with a natural distribution throughout temperate and cold parts of the N hemisphere. It provides good forage on poor upland soils. Numerous variants have been recognized at infraspecific rank, often from different habitats and based on small differences in pubescence, size, proportion of vegetative and floral parts, and other characters. The name *Festuca airoides* Lamarck, a European segregate, has been applied to plants from the *F. ovina* complex in China.

Festuca ovina and related species (nos. 43–47) can be distinguished from members of the *F. rubra* complex as follows: plants densely tufted, without rhizomes; young leaf sheaths with free, overlapping margins; shoots intravaginal; leaf blades with only midrib or also two lateral ribs well defined; leaf sclerenchyma a continuous or broken subepidermal band, or 3 broad strands at midrib and margins.

48. Festuca brachyphylla Schultes & J. H. Schultes, Mant. 3(Add. 1): 646. 1827.

短叶羊茅 duan ye yang mao

Festuca brevifolia R. Brown, Chloris Melvilliana 31. 1823, not Muhlenberg (1817); *F. jouldosensis* D. M. Chang; *F. ovina* subsp. *brachyphylla* (Schultes & J. H. Schultes) Piper; *F. ovina* var. *brachyphylla* (Schultes & J. H. Schultes) Hitchcock.

Plant usually densely tufted; shoots intravaginal. Culms (5–)8–30(–55) cm tall; node 1. Leaf sheaths glabrous; auricles

present as erect swellings; leaf blades conduplicate, (1.5–)2–10(–20) cm × 0.5–0.8 mm, veins (3–)5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 5–7 narrow discrete strands; ligule ca. 0.2 mm, margin ciliate. Panicle contracted, spikelike, 1.5–4(–5.5) cm; branches 0.2–1.5 cm, scabrid, 1–2 at lowest node. Spikelets 4–8 mm, usually brown or brownish purple, occasionally greenish; florets 2–6; glumes smooth, margins glabrous, apex acute or subobtuse; lower glume narrowly lanceolate, (1.2–)1.5–2.5(–3.3) mm; upper glume oblong, (2.4–)3–4.5 mm; rachilla internodes 0.8–1 mm; lemmas 3–4.5(–5.2) mm, scabrid; awns 0.8–1.5 mm; palea keels smooth or minutely scaberulous. Anthers (0.5–)0.7–1.1(–1.3) mm. Ovary apex glabrous. Fl. and fr. Jul–Sep. $2n = 42$.

Alpine meadows, mountain slopes, forests, among shrubs, gravelly places; 3500–4800 m. Gansu, Qinghai, Xinjiang, Xizang (Amdo) [E Kazakhstan (Tarbagatai Mountains.), Kyrgyzstan, Mongolia, Russia, Tajikistan; N Europe, North America].

This is a panarctic tundra species, extending southward into C Asia on high mountains.

49. Festuca chumbiensis E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(4): 118. 1978.

春丕谷羊茅 chun pi gu yang mao

Plant turf-forming; shoots intravaginal. Culms 20–50 cm tall, nodes 1–2. Leaf sheaths glabrous; auricles present as erect swellings; leaf blades conduplicate, 4–7 cm × 0.7–0.8 mm, veins 7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 5–7 narrow discrete strands; ligule 0.3–0.4 mm, margin ciliolate. Panicle contracted, 3–5(–7) cm; branches 0.5–1.5 cm, scabrid, 1–2 at lowest node. Spikelets ovate, 5–5.5 mm, greenish or brown; florets 4–5; glumes with ciliate margins; lower glume lanceolate, 1.6–2 mm; upper glume ovate, 3–3.5 mm; rachilla internodes 0.6–1 mm; lemmas broadly lanceolate, 3–3.5 mm, scabrid; awns 0.8–1.8 mm; palea keels scabrid. Anthers 1.1–1.5 mm. Ovary apex glabrous. Fl. and fr. Jun.

● Wet places; 3300–5000 m. Xizang.

50. Festuca cumminsii Stapf in J. D. Hooker, Fl. Brit. India 7: 349. 1896 [“1897”], aggregate.

纤毛羊茅 xian mao yang mao

Plant loosely or densely tufted; shoots intravaginal. Culms 4–45 cm tall, nodes 1–3. Leaf sheaths glabrous or pubescent; auricles acute erect swellings or absent; leaf blades conduplicate, (1.5–)5–10(–14) × 0.2–0.4 mm, 0.5–0.8 mm deep, veins 5–7(–9); adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 3 narrow discrete strands; ligule 0.1–0.4 mm, margin ciliolate. Panicle contracted to spikelike, 2–10 cm; branches stiffly ascending to erect, 1 at lowest node. Spikelets 5–10 mm, greenish, brownish or purplish; florets 2–6; glumes often ciliolate on margins; lower glume narrowly lanceolate; upper glume lanceolate to broadly lanceolate; lemmas 3.2–6 mm, scabrid; awns 0.8–3 mm; palea keels scaberulous or scabrid. Anthers (0.8–)1–3 mm. Ovary apex glabrous. Fl. and fr. May–Sep.

Forest margins, under shrubs, grassy or stony mountain slopes, alpine meadows, among pebbles in mountains, floodlands; 2500–5300 m. Gansu, Hubei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India (Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, N Pakistan, Russia (Altai), Tajikistan; SW Asia (N Iran)].

The name *Festuca cumminsii* is used here in a broad sense to include a number of segregate taxa that can be grouped together as the *F. cumminsii* aggregate. The aggregate is characterized by intravaginal branching, leaf sheaths closed for more than half their length, and leaf sclerenchyma in 3 small strands. *Festuca cumminsii* s.s. is known only from Bhutan and India (Sikkim). Taxa in the aggregate that occur in or very near China are as follows.

1a. Anthers 1.7–3 mm.
  2a. Spikelets brownish green.
    3a. Leaf blades with 7 vascular bundles, abaxial surface smooth ..... 50a. *F. borissii*
    3b. Leaf blades with 5 vascular bundles, abaxial surface somewhat scabrid ..... 50b. *F. kurtschumica*
  2b. Spikelets often with a violet tinge; leaf blades with 5–7 vascular bundles ..... 50c. *F. alaica*
1b. Anthers 1–1.6 mm.
  4a. Lemmas pale green, usually violet-tinged, dull; sheaths on tillers closed for 1/2 their length or less.
    5a. Leaf blades with 5 vascular bundles ..... 50d. *F. coelestis*
    5b. Leaf blades almost always with 7(–9) vascular bundles ..... 50e. *F. tschatkalica*
  4b. Lemmas brownish green, slightly glossy; sheaths on tillers closed for 1/2 their length or more.
    6a. Lemmas 4.5–6 mm, broadly lanceolate ..... 50f. *F. pamirica*
    6b. Lemmas 3.2–4.3 mm, lanceolate-ovate ..... 50g. *F. goloskokovii*

50a. Festuca borissii Reverdatto, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 83: 8. 1965.

博日羊茅 bo ri yang mao

Leaf blades with 7 vascular bundles, abaxial surface smooth. Spikelets brownish green.

Stony mountain slopes. Not yet recorded from China [Kazakhstan (Tarbagatai Mountains), Kyrgyzstan, Russia (Altai)].

50b. Festuca kurtschumica E. B. Alexeev, Novosti Sist. Vyssh. Rast. 13: 24. 1976.

三界羊茅 san jie yang mao

Culms ca. 35 cm tall, nodes 1–2. Leaf sheaths smooth or pubescent between veins; leaf blades 5–12 cm, adaxial surface scabrid or pubescent. Panicle 2–3(–5) cm. Spikelets 5.5–6.5(–7) mm, brownish; florets 3–5; lower glume narrowly lanceolate; upper glume broadly lanceolate, ciliolate along margins; lemmas 3.5–4.5 mm, scabrid on upper back; awns (0.2–)0.8–1.5 mm. Anthers 1.5–2 mm. Fl. Jul.

Alpine meadows; ca. 2700 m. Xinjiang (Altay Shan) [E Kazakhstan, Mongolia].

50c. Festuca alaica Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 134. 1916.

翼羊茅 yi yang mao

Leaf blades with 5–7 vascular bundles. Spikelets tinged violet.

Stony slopes, among pebbles in mountains. Not yet recorded from China [Kyrgyzstan, Tajikistan; SW Asia (N Iran)].

50d. Festuca coelestis (St.-Yves) V. I. Kreczetowicz & Bobrov in Komarov, Fl. URSS 2: 514. 1934.

矮羊茅 ai yang mao

Festuca ovina Linnaeus subsp. *coelestis* St.-Yves, Candollea 3: 376. 1928.

Culms 4–10(–12) cm tall. Leaf sheaths smooth; leaf blades rigid, 1.5–6(–10) cm, smooth, glabrous; vascular bundles 5. Panicle 1–5 cm. Spikelets 5–6 mm, green tinged purple or brownish purple; florets 3–6; glumes with margins usually ciliolate or lower glume only ciliolate on abaxial margin; lower glume narrowly lanceolate; upper glume broadly lanceolate or obovate; lemmas 3.2–4 mm, usually scabrid on upper back; awns 1–2 mm. Anthers 1–1.4 mm. Fl. and fr. May–Sep.

Forest margins, under shrubs, grassy mountain slopes, alpine meadows, floodlands; 2500–5300 m. Gansu, Hubei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Kashmir, E Kazakhstan (Tarbagatai Mountains), Kyrgyzstan, N Pakistan, Tajikistan].

50e. Festuca tschatkalica E. B. Alexeev, Novosti Sist. Vyssh. Rast. 13: 27. 1976.

沙卡羊茅 sha ka yang mao

Leaf blades almost always with 7(–9) vascular bundles. Spikelets pale green tinged violet.

Stony slopes in high mountains. Not yet recorded from China [Kyrgyzstan (Tien Shan)].

50f. Festuca pamirica Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 422. 1960.

帕米尔羊茅 pa mi er yang mao

Festuca alaica Drobow subsp. *pamirica* (Tzvelev) Tzvelev.

Plant densely tufted, base with brown old sheaths. Culms 10–20(–34) cm. Leaf sheaths smooth; leaf blades 6–14 × ca. 0.1 cm, scabrid. Panicle 3–5 cm; branches 0.5–1 cm, scabrid. Spikelets (6.5–)8.7–10 mm, brown; florets 3–5(–7); glumes smooth, usually ciliolate along margins, apex mucronate; lower glume lanceolate; upper glume lanceolate-ovate; lemmas 4–5 mm, scabrid on upper back; awns 0.6–1 mm. Anthers 1.8–2 mm. Fl. and fr. Jun–Sep.

Alpine grassy slopes; ca. 3200 m. Xinjiang, NW Yunnan [Tajikistan (Pamirs)].

50g. Festuca goloskokovii E. B. Alexeev, Novosti Sist. Vyssh. Rast. 13: 25. 1976.

宫咯什羊茅 gong ka shi yang mao

Spikelets brownish green; lemmas lanceolate-ovate, 3.2–4.3 mm.

High mountain slopes. Not yet recorded from China [E Kazakhstan (Alatau Mountains)].

51. Festuca kryloviana Reverdatto, Sist. Zametki Mater. Gerb. Tomsk. Univ. 1927(2): 3. 1927.

寒生羊茅 han sheng yang mao

Plant turf-forming or densely tufted; shoots intravaginal. Culms (15–)20–55 cm tall, node 1. Leaf sheaths glabrous or with trichomes; auricles present as erect swellings; leaf blades conduplicate, 8–18 cm × 0.3–0.4 mm, veins (5–)7, margins scaberulous; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma usually in 3 broad bands; ligule 0.2–0.6 mm, margin ciliate. Panicle usually contracted, occasionally loose, open, (1.5–)3–7 cm; branches 1–2.5 cm, with spikelets from base, inserted singly. Spikelets 6–8 mm, greenish or rarely brown; florets 4–6; glumes glabrous or upper ciliolate along margins; lower glume narrowly lanceolate or lanceolate, 2.5–4 mm; upper glume lanceolate or broadly lanceolate, 3.7–5 mm; rachilla internodes 0.8–1 mm; lemmas 4.5–5.5(–6) mm, scabrid above middle; awns (1.5–)2–3(–4) mm; palea keels scabrid. Anthers 1.6–2.6 mm. Ovary apex glabrous. Fl. and fr. Jun–Aug.

Alpine meadows, semi-desert steppe, grassy mountain slopes; 1300–2600 m. Hebei, Xinjiang [E Kazakhstan (Tarbagatai Mountains), Kyrgyzstan (Tien Shan), Mongolia (Altai), Russia (Altai)].

52. Festuca valesiaca Schleicher ex Gaudin, Agrost. Helv. 1: 242. 1811.

瑞士羊茅 rui shi yang mao

Plant densely tufted; shoots intravaginal. Culms 20–35(–50) cm tall, nodes 1(–2). Leaf sheaths glabrous or basal leaf sheaths occasionally with trichomes; auricles present as erect swellings; leaf blades filiform, green or bluish, conduplicate, (2–)6–15(–20) cm × 0.3–1.1 mm, veins (3–)5(–7); adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in 3(–5) discrete strands; ligule 0.1–0.3 mm, margin ciliate. Panicle spikelike, 3–7 cm; branches 1–2.5 cm, scabrid, 1 at lowest node. Spikelets 4.5–6 mm, greenish brown or purplish; florets (2–)3–5; glumes sometimes with ciliolate margins; lower glume lanceolate, 2–2.6(–3.5) mm; upper glume broadly lanceolate, 3–4.2 mm; rachilla internodes 0.4–0.8(–1.2) mm; lemmas 3.8–5 mm, scabrid; awns 0.7–2.2 mm; palea keels scabrid. Anthers (1–)1.6–2.4 mm. Ovary apex glabrous. Fl. and fr. May–Aug.

Grassy mountain slopes, subalpine meadows, grasslands, roadsides; 1000–3700 m. Guizhou, Jilin, Qinghai, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan; SW Asia, Europe].

The name *Festuca valesiaca* is used here in a broad sense, distinguished from the *F. rubra* complex by its intravaginal shoots and weakly defined ribs; from the *F. ovina* complex by its discrete sclerenchyma strands; and from the *F. cumminsii* complex by its leaf sheaths open for more than half their length. Subspecies that have been recognized within this complex occurring in or near China are distinguished as follows.

1a. Leaf blades bluish green.
2a. Spikelets 4–6(–7.5) mm; lemmas 2.8–4.2(–4.7) mm ..... 52a. subsp. *valesiaca*
2b. Spikelets (5.4–)6–9 mm; lemmas (4.3–)4.5–5.2 mm ..... 52b. subsp. *pseudodalmatica*
1b. Leaf blades green.
3a. Spikelets green, often tinged violet; leaf sheaths on tillers closed up to 1/6 their length.
4a. Spikelets 4–6 mm; lemmas 2.5–4 mm; leaf blades 0.3–0.6(–0.7) mm wide ..... 52c. subsp. *pseudovina*
4b. Spikelets (5.5–)6.5–10 mm; lemmas (4.5–)4.8–6 mm; leaf blades (0.4–)0.5–1.1 wide ... 52d. subsp. *sulcata*
3b. Spikelets brownish green; leaf sheaths on tillers closed 1/6–1/3 their length.
5a. Spikelets 4–6(–7) mm; lemmas 3.2–4.2(–4.6) mm; leaf blades 0.3–0.6(–0.7) mm wide ..... 52e. subsp. *hypsophila*
5b. Spikelets (7–)8–14 mm; lemmas 4.8–6.5 mm; leaf blades (0.5–)0.6–0.9 mm wide ..... 52f. subsp. *kirghisorum*

52a. Festuca valesiaca subsp. **valesiaca**

瑞士羊茅(原亚种) rui shi yang mao (yuan ya zhong)

Leaf blades bluish green. Spikelets 4–6(–7.5) mm; lemmas 2.8–4.2(–4.7) mm.

Grassy mountain slopes, subalpine meadows, grasslands, roadsides; 1000–3700 m. N Sichuan, Xinjiang, Xizang, Yunnan [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan; SW Asia, Europe].

52b. Festuca valesiaca subsp. **pseudodalmatica** (Krajina ex Domin) Soó, Acta Biol. (Szeged 1955+) 17(1–2): 117. 1972 ["1971"].

假达羊茅 jia da yang mao

Festuca pseudodalmatica Krajina ex Domin, Acta Bot. Bohem. 8: 61. 1929.

Leaf blades bluish green. Spikelets (5.4–)6–9 mm long; lemmas (4.3–)4.5–5.2 mm long.

Steppe, stony slopes, among rocks. ?China [Kazakhstan, Russia, Tajikistan, Turkmenistan; SW Asia, Europe].

52c. Festuca valesiaca subsp. **pseudovina** (Hackel ex Wiesbaur) Hegi, Ill. Fl. Mitt.-Eur. 1: 334. 1908.

假羊茅 jia yang mao

Festuca pseudovina Hackel ex Wiesbaur, Oesterr. Bot. Z. 30: 126. 1880; *F. valesiaca* var. *pseudovina* (Hackel ex Wiesbaur) Schinz & R. Keller.

Leaf blades green. Spikelets greenish purple or purplish red, 4–6 mm; lemmas 2.5–4 mm, smooth or upper back pubescent; awn 1–1.5 mm. Fl. and fr. Jun–Sep.

Open grassy hill tops, alluvial fans; 1200–1700 m. NW Sichuan, Xinjiang, Xizang; NE China [Kazakhstan, Russia, Turkmenistan; SW Asia (Caucasus), Europe].

52d. Festuca valesiaca subsp. **sulcata** (Hackel) Schinz & R. Keller, Fl. Schweiz, ed. 2, 26. 1905.

沟叶羊茅 gou ye yang mao

Festuca ovina Linnaeus var. *sulcata* Hackel, Bot. Centralbl. 8: 405. 1881; *F. ovina* subsp. *sulcata* (Hackel) Hackel; *F. sulcata* (Hackel) Beck; *F. rupicola* Heuffel.

Leaf blades green. Spikelets greenish purple or rarely tawny, 5.5–10 mm; lemmas 4.5–6 mm, smooth or upper back slightly scabrid; awn 2–3 mm. Fl. and fr. Jun–Sep.

Grassy mountain slopes, alpine meadows, rock fissures, alpine steppe; 1800–4500 m. Jilin, Nei Mongol, Shaanxi, Shanxi, NW Sichuan, Xinjiang, Yunnan [Kazakhstan, Russia, Turkmenistan; Europe].

52e. Festuca valesiaca subsp. **hypsophila** (St.-Yves) Tzvelev, Bot. Zhurn. (Kiev) 56: 1255. 1971.

松菲羊茅 song fei yang mao

Festuca ovina Linnaeus var. *hypsophila* St.-Yves, Candollea 5: 111. 1932.

Leaf sheaths on tillers closed 1/6–1/3 their length; leaf blades 0.3–0.6(–0.7) mm wide. Spikelets 4–6(–7) mm, brownish green; lemmas 3.2–4.2(–4.6) mm.

Stony slopes, among rocks, hill steppe. ?China [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia].

52f. Festuca valesiaca subsp. **kirghisorum** (Kashina ex Tzvelev) Tzvelev, Zlaki SSSR, 410. 1976.

克松羊茅 ke song yang mao

Festuca rupicola Heuffel subsp. *kirghisorum* Kashina ex Tzvelev, Bot. Zhurn. 56: 1255. 1971.

Leaf sheaths on tillers closed 1/6–1/3 their length; leaf blades (0.5–)0.6–0.9 mm wide. Spikelets (7–)8–14 mm, brownish green; lemmas 4.8–6.5 mm.

Stony hillsides, *Juniperus* forests. ?China [Kyrgyzstan (Tien Shan)].

53. Festuca litvinovii (Tzvelev) E. B. Alexeev, Novosti Sist. Vyssh. Rast. 13: 31. 1976.

东亚羊茅 dong ya yang mao

Festuca pseudosulcata Drobow var. *litvinovii* Tzvelev, Rast. Tsentr. Azii 4: 170. 1968.

Plant loosely or densely tufted or turf-forming; shoots intravaginal. Culms 20–50 cm tall, nodes 1–2. Leaf sheaths glabrous; auricles absent; leaf blades conduplicate, rigid, 5–20 cm × 0.5–0.8 mm, smooth, veins 5–7; adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands or rarely in broad bands; ligule 0.2–0.4 mm, margin ciliolate. Panicle spikelike, 3–6 cm; branches 1–2 cm, pubescent, 1(–2) at lowest node. Spikelets 6–8 mm, yellowish green or brown; florets 3–5; glumes with ciliate margins; lower

glume lanceolate, glabrous, 2.8–3.5(–4.2) mm; upper glume lanceolate or oblong, (3–)4–5 mm, pubescent; rachilla internodes 0.8–1.2(–1.9) mm; lemmas 4–5.5 mm, pubescent; awns 0.8–3 mm; palea keels scabrid, pubescent between keels. Anthers 2–2.8 mm. Ovary apex glabrous. Fl. and fr. Jun–Aug.

Grassy mountain slopes, meadow steppe, roadsides; 2100–4200 m. Hebei, Heilongjiang, Liaoning, Nei Mongol, Qinghai, Shanxi, Xinjiang [Mongolia, Russia].

54. Festuca tibetica (Stapf) E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(4): 118. 1978.

西藏羊茅 xi zang yang mao

Festuca valesiaca var. *tibetica* Stapf in J. D. Hooker, Fl. Brit. India 7: 349. 1896 [“1897”].

Plants densely tufted, old basal sheaths present; shoots intravaginal. Culms 4–17 cm tall, node 1. Leaf sheaths glabrous; auricles present as erect swellings or absent; leaf blades conduplicate, 1.5–10.5 cm × 0.6–0.8 mm, abaxial surface smooth, veins 7; adaxial to abaxial sclerenchyma strands absent; abaxial sclerenchyma in narrow discrete strands; ligule 0.1–0.4 mm, margin ciliolate. Panicle contracted, 1.5–3 cm; branches 0.5–1 cm, 1–2 at lowest node. Spikelets 4–6 mm, greenish; florets 3–4; glumes glabrous; lower glume lanceolate, 2.3–2.8 mm; upper glume lanceolate, 3.8–4.2 mm; rachilla internodes 0.6–0.8 mm; lemmas 3.3–3.7 mm, scabrid or pubescent; awns 1–1.8 mm; palea keels scabrid. Anthers 0.8–1.2(–1.4) mm. Ovary apex glabrous. Fl. and fr. Jul–Sep.

Grassy mountain slopes; 2700–4000 m. Xizang, Yunnan [Bhutan, India (Sikkim)].

This taxon is composed of short plants from high altitudes in Xizang. It is sometimes considered conspecific with *Festuca coelestis* in the *F. cumminsii* complex.

55. Festuca wallichiana E. B. Alexeev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 83(4): 120. 1978.

藏羊茅 zang yang mao

Plant densely tufted; shoots intravaginal. Culms (7–)15–35 cm tall, nodes 1–2. Leaf sheaths pubescent; auricles present as erect swellings; leaf blades conduplicate, 2.5–11 cm × 0.35–0.45 mm, abaxial surface scabrid, veins 5(–7); adaxial to abaxial sclerenchyma strands absent, abaxial sclerenchyma in narrow discrete strands; ligule 0.3–0.5 mm, margin ciliolate. Panicle contracted, (1.5–)2.5–6 cm; branches 1.5–2.5 cm, 1 at lowest node. Spikelets 5–5.5 mm, greenish or purplish; florets 4–5; glumes glabrous; lower glume narrowly lanceolate, 2–2.5 mm; upper glume narrowly lanceolate, 3.8–4.2 mm; rachilla internodes 0.7–0.9 mm; lemmas 3.2–3.8 mm, scabrid; awns (0.6–)0.8–1.8 mm; palea keels scaberulous. Anthers 1.1–1.5 mm. Ovary apex glabrous.

Steppe, dry slopes; 3300 m. Xizang [Bhutan, India, Nepal].

60. VULPIA C. C. Gmelin, Fl. Bad. 1: 8. 1805 [“1806”].

鼠茅属 shu mao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Annuals. Culms tufted, slender. Leaf blades linear, usually involute; ligule membranous. Inflorescence a contracted, narrow, somewhat 1-sided panicle. Spikelets laterally compressed, florets several to many with the uppermost reduced, widely spaced; rachilla scabrid or pubescent, disarticulating below each floret; glumes narrow, very unequal, persistent; lower glume small, sometimes minute, 0–1-veined; upper glume much longer, 1–3-veined; lemmas narrowly lanceolate, membranous becoming firm at maturity, rounded or occasionally keeled, faintly 3–5-veined, back smooth, scabrid or pubescent, margins inrolled over palea, apex narrowed into an awn; awn straight or curved, usually longer than lemma; callus short, glabrous or bearded; palea slightly shorter than lemma, keels ciliolate. Stamens 1–3. Ovary glabrous. Caryopsis narrow, tightly enclosed by lemma and palea; hilum linear.

Twenty-six species: mainly temperate regions of the N hemisphere, extending into tropical uplands, also a few species in South America; a few species widely adventive; one species in China.

Vulpia is closely related to *Festuca* and is distinguished mainly by the annual habit.

1. Vulpia myuros (Linnaeus) C. C. Gmelin, Fl. Bad. 1: 8. 1805 [“1806”].

鼠茅 shu mao

Festuca myuros Linnaeus, Sp. Pl. 1: 74. 1753.

Culms erect or geniculately ascending, 20–70 cm tall, 3–4-noded, smooth. Leaf sheaths loosely overlapping, shorter or lower longer than internodes, smooth, glabrous; leaf blades involute, 7–11 cm × 1–2 mm, adaxial surface pubescent, abaxial surface smooth; ligule 0.2–0.5 mm, truncate. Panicle linear, 10–20 × 0.5–1 cm, loose to somewhat dense, mostly curved or nodding, base enclosed by uppermost leaf sheath or just exserted from it. Spikelets oblong or wedge-shaped, 8–10 mm (excluding awns), florets 4–7; lower glume minute, 1–3 mm, upper glume linear-lanceolate, 3–8 mm, apex acute; lemmas 5–7 mm, back scabrid, 5-veined, margins scabrid or ciliolate, apex acuminate; awn 1.3–1.8 cm. Stamen 1; anther 0.4–1 mm. Caryopsis reddish brown, ca. 4 mm. Fl. and fr. Apr–Jul. $2n = 42$.

Mountain slopes, roadsides, especially in sandy places. Anhui, Fujian, Jiangsu, Jiangxi, Taiwan, Xizang, Zhejiang [Afghanistan, Bhutan, Kyrgyzstan, Pakistan, S Russia, Tajikistan, Turkestan, Uzbekistan; Africa (N and on mountains), SW Asia, Europe].

This species is adventive in most temperate parts of the world. *Vulpia alpina* L. Liu (Fl. Reipubl. Popularis Sin. 9(2): 405. 2002), based on a single specimen from Xizang (Lhasa), may be simply a depauperate form of this species. The type has not been seen.

61. LOLIUM Linnaeus, Sp. Pl. 1: 83. 1753.

黑麦草属 hei mai cao shu

Liu Liang (刘亮); Sylvia M. Phillips

Annual or perennial. Leaf blades linear, flat or rolled, often auriculate; ligule membranous. Inflorescence a single, stiff, 2-sided raceme, spikelets arranged edgeways on, alternate in 2 opposite rows, their inner edges sunk in hollows of the tough rachis. Spikelets laterally compressed, florets several to many, uppermost florets reduced, disarticulating below each floret; glumes leathery; lower glume suppressed except in terminal spikelet and there similar to upper; upper glume abaxial, narrow, persistent, shorter than lemmas to as long as spikelet; lemmas membranous to leathery, rounded on back, 5–9-veined, with or without a subterminal awn; palea usually equal to lemma. Caryopsis tightly enclosed by hardened lemma and palea; hilum linear.

About eight species: temperate N Africa, Asia, and Europe, especially the Mediterranean region; now widely introduced or adventive elsewhere; six species (at least four introduced) in China.

Most species are good forage grasses. *Lolium* is a difficult genus taxonomically as all the species are more or less interfertile and consequently intergrade. The individual species are also very variable. Most will hybridize with *Festuca arundinacea* and its allies, and the resulting hybrids have the nothogeneric name ×*Festulolium* Ascherson & Graebner.

1a. Lemmas elliptic to ovate, turgid at maturity; mature caryopsis not more than 3 times as long as wide.
2a. Lemmas of lower florets 5.2–8.5 mm, usually awned; caryopsis 4–7 mm ..... 1. *L. temulentum*
2b. Lemmas of lower florets 3.5–5.4 mm, usually awnless; caryopsis 3.2–4.5 mm ..... 2. *L. remotum*
1b. Lemmas oblong, not turgid at maturity; mature caryopsis more than 3 times as long as wide.
3a. Perennial with non-flowering shoots at anthesis; young leaf blades folded; lemmas awnless ..... 3. *L. perenne*
3b. Annual (or short-lived perennial); young leaf blades rolled; lemmas awned or awnless.
4a. Spikelets with 8–22 florets; glume less than half spikelet length ..... 4. *L. multiflorum*
4b. Spikelets with 3–10 florets; glume half spikelet length or more.
5a. Rachis 2–3 mm thick; spikelets partly sunken in rachis; lemmas 5–8 mm; awns absent or up to 3(–8) mm, present on upper florets only ..... 5. *L. rigidum*
5b. Rachis 0.4–1.5 mm thick; spikelets not sunken in rachis; lemmas 9–15 mm; awns 5–20 mm, present on all florets ..... 6. *L. persicum*

1. Lolium temulentum Linnaeus, Sp. Pl. 1: 83. 1753.

毒麦 du mai

Annual. Culms tufted, erect or decumbent, slender to moderately robust, 20–120 cm tall, 3–5-noded. Leaf blades flat, thin, 10–25 cm × 4–10 mm, smooth or scabridulous on abaxial surface, margins scabrid, young blades rolled; auricles present or absent; ligule 0.5–2.5 mm, obtuse to truncate. Raceme stiff, straight, 10–30 cm; rachis thick, smooth or scabridulous, spikelets about their own length apart. Spikelets turgid, 0.8–2.5 cm, florets 4–10, rachilla internodes 1–1.5 mm, smooth, glabrous; glume linear-oblong, rigid, as long as spikelet, often exceeding florets, 5–9-veined, margins narrowly membranous, apex obtuse; lemmas elliptic to ovate, turgid at maturity, 5.2–8.5 mm, apex obtuse; awn usually present, stiff, scabrid; palea ciliolate along keels. Caryopsis very plump, length 2–3 times width, 4–7 mm. Fl. and fr. May–Aug. 2*n* = 14.

Fields of cereals, introduced. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hunan, Qinghai, Shaanxi, Shanghai, Xinjiang, Zhejiang [N Africa, SW Asia, S Europe].

This is a noxious arable weed, widespread and naturalized in warm-temperate parts of the world (Darnel). The grains are often infected by a fungus (ergot) which produces the alkaloid temulin, causing poisoning when grazed by cattle or when present as a contaminant of flour.

Awnless or weakly awned variants can be distinguished at varietal rank.

1a. Lemmas strongly awned; awn 10–20 mm ..... 1a. var. *temulentum*
1b. Lemmas awnless or weakly awned; awn 0–3 mm ..... 1b. var. *arvense*

1a. Lolium temulentum var. **temulentum**

毒麦(原变种) du mai (yuan bian zhong)

Lemmas strongly awned; awn 10–20 mm. Fl. and fr. Jun–Jul.

Fields of cereals, introduced. Anhui, Gansu, Hebei, Heilongjiang, Henan, Qinghai, Shaanxi, Xinjiang, Zhejiang [Europe].

1b. Lolium temulentum var. **arvense** (Withering) Liljeblad, Svensk. Fl. 80. 1816.

田野黑麦草 tian ye hei mai cao

Lolium arvense Withering, Arr. Brit. Pl., ed. 3, 2: 168. 1796; *L. temulentum* subsp. *arvense* (Withering) Tzvelev.

Lemmas awnless or weakly awned; awn 0–3 mm.

Fields of cereals, introduced. Hunan (Xiangtan), Shanghai, Zhejiang (Dai Shan) [Russia; Europe].

2. Lolium remotum Schrank, Baier. Fl. 1: 382. 1789.

疏花黑麦草 shu hua hei mai cao

Annual. Culms erect, slender, 30–100 cm tall, 3–4-noded, smooth or scaberulous below inflorescence. Leaf blades linear, up to 25 cm × 1–6 mm, adaxial surface smooth or scabrid, abaxial surface smooth, margins scaberulous near apex, young blades rolled; auricles to 2 mm or absent; ligule to 2.5 mm,

truncate. Raceme straight, 6–20 cm, slender; rachis smooth, spikelets their own length or more apart. Spikelets 0.8–1.6 cm, florets 5–10; glume linear-lanceolate, 1/2–2/3 as long as spikelet, 3–7-veined, apex obtuse or acute; lemmas elliptic, plump, 3.5–5.4 mm, apex rounded, erose, usually awnless; palea spinulose along upper keels. Caryopsis length 2–3 times width. Fl. and fr. Jul–Aug. 2*n* = 14.

Fields, roadsides, introduced. Heilongjiang, Xinjiang [Afghanistan, W Russia; Europe].

This species is a weed of *Linum* fields.

3. Lolium perenne Linnaeus, Sp. Pl. 1: 83. 1753.

黑麦草 hei mai cao

Perennial, turf-forming. Culms tufted, erect or spreading, sometimes prostrate and rooting from lower nodes, 30–90 cm tall, 3–4-noded. Leaf blades soft, 5–20 cm × 3–6 mm, glabrous, young blades folded; auricles to 3 mm; ligule 2–2.5 mm. Raceme stiffly erect, or rarely slightly curved, 10–30 cm; rachis glabrous, smooth, spikelets usually less than their own length apart. Spikelets 0.8–2 cm, florets 5–10, rachilla internodes ca. 1 mm, smooth, glabrous; glume lanceolate, 1/3 as long to subequaling spikelet, 3–9-veined, margins narrowly membranous, apex acute or obtuse; lemmas oblong, herbaceous, 5–9 mm, 5-veined, smooth, apex obtuse to subacute, awnless; palea ciliolate along keels. Caryopsis length more than 3 times width. Fl. and fr. May–Jul. 2*n* = 14, 28.

Meadows, grassy places, moist roadsides. Commonly cultivated in China [Russia; N Africa, Europe].

This species is extensively cultivated in temperate regions of the world as an excellent forage and lawn grass. It is a variable species, with many cultivars (Perennial Rye Grass).

4. Lolium multiflorum Lamarck, Fl. Franç. 3: 621. 1779 [“1778”].

多花黑麦草 duo hua hei mai cao

Annual, biennial, or short-lived perennial. Culms tufted, erect or decumbent at base, 0.5–1.3 m tall, 4–5-noded. Leaf blades flat, 10–20 cm × 3–8 mm, glabrous, adaxial surface scabrid, young blades rolled; auricles usually present, 1–4 mm; ligule up to 4 mm. Raceme erect or nodding, 10–30 cm; rachis scabridulous, spikelets overlapping or up to their own length apart. Spikelets 0.8–3 cm, florets 8–22; glume lanceolate, much shorter than spikelet, scarcely exceeding lowest floret, 5–7-veined, margin narrowly membranous, apex obtuse, acute or slightly erose; lemmas oblong-lanceolate, 5–8 mm, 5-veined, apex acute, obtuse or erose; awn up to 5(–15) mm, fine, straight, or upper lemmas awnless; palea equal to lemma, ciliolate along keels. Caryopsis length 3 times width. Fl. and fr. Jul–Aug. 2*n* = 14.

Grasslands, introduced. Anhui, Fujian, Guizhou, Hebei, Henan, Hunan, Jiangxi, Nei Mongol, Shaanxi, Sichuan, Taiwan, Xinjiang, Yunnan [N Africa, SW Asia, C and S Europe].

This species is widely grown in temperate regions of the world for pasture and forage (Italian Rye Grass).

Lolium multiflorum hybridizes with *Festuca pratensis* to form the hybrid ×*Festulolium braunii* (K. Richter) A. Camus. *Lolium grandispicum* Y. J. Fei (Guihaia 19: 205. 1999), described from Hubei (Jingzhou) is probably based on a specimen of this hybrid. The type (*Y. J. Fei 98088*, HBAC) has not been seen.

5. Lolium rigidum Gaudin, Agrost. Helv. 1: 334. 1811.

硬直黑麦草 ying zhi hei mai cao

Annual. Culms tufted, erect or geniculate at base, 20–80 cm tall, 2–4-noded, smooth or scabrid below inflorescence. Leaf blades 5–20 cm × 3–6 mm, adaxial surface and margins smooth or scabrid, abaxial surface smooth; auricles up to 3 mm or absent; ligule 0.5–2.5 mm, rounded or truncate. Raceme stiff, straight or curved, 5–20 cm; rachis slender to fairly stout, smooth or scabrid, 1–3 mm thick, spikelets appressed to partly sunken, overlapping by half their length or up to their own length apart. Spikelets 1–2 cm, florets 5–10; glume lanceolate to oblong, as long as spikelet, 5–7(–9)-veined; lemmas oblong or oblong-lanceolate, 5–8 mm, 3–5-veined, scabrid, apex obtuse or erose; awn absent or 3(–8) mm on upper fertile florets only. Caryopsis length 3 times width or more.

Fields; 200–1800 m. Gansu (Tianshui), Henan [Afghanistan, Pakistan, Turkmenistan; N Africa, SW Asia, Europe].

This taxon comprises a polymorphic species complex. It is a good fodder grass, introduced in temperate parts of the world.

6. Lolium persicum Boissier & Hohenacker in Boissier, Diagn. Pl. Orient., ser. 1, 13: 66. 1854 [“1853”].

欧黑麦草 ou hei mai cao

Annual. Culms tufted, erect or decumbent, 20–70 cm tall, 3–4-noded, scabrid below inflorescence. Leaf blades flat, 6–15 cm × 2–8 mm, adaxial surface scabrid; auricles up to 2 mm or absent; ligule 0.5–2 mm. Raceme straight, 10–20 cm; rachis scabrid, 0.4–1.5 mm thick, spikelets about their own length apart. Spikelets 1–2 cm, florets 5–9; rachilla internodes ca. 0.5 mm, slightly spinescent; glume narrowly lanceolate, 2/3 as long to subequaling spikelet, 5-veined, apex obtuse or acute; lemmas lanceolate, 6.5–11 mm, 5-veined, apex attenuate into awn; awn 5–20 mm, slightly curved; palea equal to or slightly shorter than lemma, ciliate along keels. Caryopsis length 3.5–5 times width. Fl. and fr. Jun–Jul. 2*n* = 14.

Streamsides, roadsides, mountain slopes; 1400–2300 m. Gansu, Hebei, Qinghai, Shaanxi, Xinjiang [Afghanistan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

62. SCOLOCHLOA Link, Hort. Berol. 1: 136. 1827, nom. cons., not Mertens & W. D. J. Koch (1823).

水茅属 shui mao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Fluminia Fries.

Perennial, rhizomatous. Leaf blades linear, flat. Inflorescence an open panicle. Spikelets laterally compressed, lanceolate-

oblong, florets several, contiguous; rachilla scaberulous, disarticulating above glumes and between florets; glumes slightly unequal, upper nearly as long as spikelet, firmly membranous, keel scaberulous, apex abruptly acuminate, lower glume 1–3-veined, upper glume 3–5-veined; lemmas broadly lanceolate, thinly leathery, rounded on back, 5–7-veined, veins smooth, not raised, scabrid above middle, apex scarious, usually 3-denticulate, sometimes mucronate; floret callus subacute, bearded laterally with stiff hairs; palea subequal to lemma, narrow, flat, apex sharply 2-denticulate. Ovary densely hairy at apex; hilum linear.

Two species: N temperate regions, one species widespread, including China.

1. Scolochloa festucacea (Willdenow) Link, Enum. Pl. 1: 137. 1827.

水茅 shui mao

Arundo festucacea Willdenow, Enum. Pl. 1: 126. 1809; *Donax borealis* Trinius; *Festuca borealis* (Trinius) Mertens & Koch ex Röhling; *Fluminia arundinacea* (Roemer & Schultes) Fries; *F. festucacea* (Willdenow) Hitchcock; *Graphephorum arundinaceum* (Roemer & Schultes) Ascherson; *Schedonorus arundinaceus* Roemer & Schultes (1817), not (Schreber) Dumortier (1824), nom. cons.

Plant with spreading spongy rhizomes. Culms robust, erect from a decumbent base, rooting at lower nodes, 0.7–2 m tall. Leaf sheaths smooth, glabrous; leaf blades 15–40 cm × 4–10 mm, smooth, margins sharply scabrid, apex finely acuminate; ligule 3–8 mm, truncate. Panicle loose, elliptic to ovate in outline, 15–30 cm; branches 2–4 at each node, erect at first, spreading after anthesis, naked in lower half, scabrid. Spikelets 7–10 mm, florets (2–)3–4(–5); glumes broadly lanceolate, lower glume 6.5–8 mm, upper glume 7.3–10 mm; lemmas 6–8 mm; palea lanceolate, ca. 6 mm. Anthers 2.5–3.4 mm. Fl. Jun–Aug. $2n = 28$.

Shallow, slow-flowing water, swamps; below 1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Kazakhstan, Mongolia, Russia; SW Asia (Caucasus), NE Europe, North America].

This is a forage grass, providing hay from swampy areas.

63. CYNOSURUS Linnaeus, Sp. Pl. 1: 72. 1753.

洋狗尾草属 yang gou wei cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Leaf blades linear, flat; ligule membranous. Inflorescence condensed, a narrowly spikelike or capitate panicle, ± 1-sided, bearing paired dimorphic spikelets, the outer of each pair sterile and covering a fertile spikelet. Fertile spikelet with (1–)2–5 florets, laterally compressed, disarticulating above glumes and between florets; glumes subequal, narrow, thin, acute; lemmas leathery, rounded on back, 5-veined, scabrid upward, apex acute, narrowly obtuse or bidenticulate, mucronate or awned. Sterile spikelet flattened, reduced to distichously pectinate glumes and sterile empty lemmas, persistent on panicle. Caryopsis elliptic or oblong, adherent to palea. $x = 7$.

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

1. Cynosurus cristatus Linnaeus, Sp. Pl. 1: 72. 1753.

洋狗尾草 yang gou wei cao

Perennial, compactly tufted. Culms wiry, erect or decumbent at base, 20–70 cm tall, 1–2 mm in diam., unbranched, 3–4-noded. Leaf sheaths smooth, glabrous; leaf blades up to 15 cm × 1–4 mm, soft, smooth, glabrous, apex finely acute; ligule 0.5–1.5 mm, rounded. Panicle linear-oblong, spikelike, 5–10 × 0.5–0.7 cm, erect or slightly curved; branches very short. Fertile spikelet oblong or wedge-shaped, 3–6 mm, florets 2–5; glumes lanceolate, shorter than florets, 3–4.5 mm, margins membranous, back keeled, keel scabrid, apex acuminate or mucronate; lemmas narrowly ovate-oblong, lowest ca. 4 mm, spinescent, apex mucronate; palea slightly shorter than lemma, keels scabrid. Anthers ca. 2 mm. Caryopsis oblong, ca. 2 mm, apex glabrous. Sterile spikelet ovate, composed of up to 18 stiff, narrowly linear, shortly awned empty lemmas with green ciliate keel. Fl. and fr. Jun–Aug. $2n = 14$.

Roadsides, forest margins, fields, adventive. Jiangxi (Lu Shan) [N Africa, SW Asia, Europe; introduced in North America and Australia].

This species is introduced in some temperate countries as a pasture and lawn grass and is adventive elsewhere.

64. PUCCINELLIA Parlatore, Fl. Ital. 1: 366. 1848, nom. cons.

碱茅属 jian mao shu

Liu Liang (刘亮), Zhu Guanghua (朱光华); Nikolai N. Tzvelev

Atropis (Trinius) Ruprecht ex Grisebach, nom. rej.; *Poa* sect. *Atropis* Trinius.

Perennial herbs, tufted. Culms erect. Leaf sheaths spread along culms or clustered at base, glabrous; leaf blades linear, often convolute or conduplicate, scabrid or smooth; ligule membranous. Inflorescence a spreading or contracted panicle. Spikelets slightly compressed or cylindrical, disarticulating above glumes and between florets; florets 2–8, imbricate; glumes lanceolate to broadly ovate, unequal, shorter than first floret, papery, apex often scarious, obtuse or acuminate; lower glume small, 1(–3)-veined, upper glume 3-veined; lemmas oblong, lanceolate or ovate, papery, 5-veined, back rounded or slightly keeled, glabrous or pubescent on

lower veins, intervein spaces, and base, apex obtuse or slightly acuminate, membranous, ciliate or irregularly finely toothed; palea as long as or slightly shorter than lemma; lodicules 2, often 2-lobed; stamens 3, small. Caryopsis small, narrowly ellipsoid, not sulcate, free from palea and lemma. $x = 7$.

About 200 species: temperate and arctic regions of both hemispheres, usually along shores of saline lakes, also on mountains in the tropics; 50 species (14 endemic) in China.

1a. Base of plant with a few very short budlike extravaginal shoots, covered with scales.
2a. Anthers 1.5–2.4 mm; lemmas 2.7–3.5 mm.
3a. Lemma glabrous, rarely base minute pubescent; panicle narrow, branches appressed, sometimes slightly spreading ..... 21. *P. przewalskii*
3b. Lemma base pubescent; panicle more lax; branches spreading after anthesis ..... 22. *P. roshevitsiana*
2b. Anthers 0.7–1.5 mm; lemmas 1.5–3.2 mm.
4a. Lemmas 1.5–2 mm, base minutely hairy; anthers 1–1.2 mm; branches of panicle scabrid ..... 24. *P. koeieana*
4b. Lemmas 2.2–3.2 mm.
5a. Palea keels smooth or with a few spinules on upper part; spikelets usually tinged with purple; panicle spreading after anthesis ..... 23. *P. altaica*
5b. Palea keels scabrid; spikelets usually pale green; panicle very narrow, contracted.
6a. Lemma base shortly hairy; panicle branches scabrid ..... 19. *P. schischkinii*
6b. Lemma base glabrous or subglabrous; panicle branches smooth at least on lower parts ..... 20. *P. kuenlunica*
1b. Base of plant without extravaginal shoots.
7a. Lemmas 1.3–2.4(–2.8) mm.
8a. Anthers 0.3–0.5 mm.
9a. Branches of panicle smooth ..... 48. *P. micrandra*
9b. Branches of panicle scabrid.
10a. Lemma base pubescent ..... 46. *P. hauptiana*
10b. Lemma base glabrous ..... 47. *P. iliensis*
8b. Anthers 0.5–1.7 mm.
11a. Lemma glabrous, rarely with a few hair on callus.
12a. Anthers 0.5–0.8 mm.
13a. Branches of panicle scabrid or smooth only near base.
14a. Ligule 2–3 mm, acuminate; panicle 8–12 cm ..... 44. *P. florida*
14b. Ligule 1–2 mm, obtuse; panicle 5–9 cm ..... 45. *P. leiolepis*
13b. Branches of panicle smooth or only in upper part slightly scabrid.
15a. Lemmas 2.2–2.4 mm; panicle contracted, 1.5–2.5 × ca. 0.5 cm; culms 5–10 mm tall ..... 49. *P. minuta*
15b. Lemmas 1.5–2.1 mm; panicle at first contracted but open at maturity, 3–9 × 1–4 cm; culms 5–20 cm tall ..... 50. *P. himalaica*
12b. Anthers 0.8–1.7 mm.
16a. Panicle 3–5 cm, contracted.
17a. Culms 10–25 cm tall, not rooting from lower nodes; panicle branches 2–4 per node; anthers 1.2–1.5 mm; apex of palea mucronulate ..... 15. *P. degeensis*
17b. Culms 5–10 cm tall, rooting from lower nodes; panicle branches single; anthers 0.8–1.2 mm; apex of palea not mucronulate ..... 16. *P. strictura*
16b. Panicle 4–15 cm, open.
18a. Plants densely tufted, 20–40 cm tall; basal leaves very numerous, conduplicate, 0.3–0.7 mm wide; plants of sandy habitats ..... 13. *P. filifolia*
18b. Plants more laxly tufted, 4–15 cm tall; basal leaves less numerous, conduplicate or flat, 1–4 mm wide; plants of non-sandy habitats.
19a. Panicle broadly diffuse, 6–15 cm; branches 2–5 per node, scabrid at least in upper part ..... 12. *P. tenuiflora*
19b. Panicle less diffuse, 4–10 cm; branches (1 or)2(or 3) per node, smooth.
20a. Lemmas 1.5–2.2 mm, usually violaceous ..... 14. *P. tianschanica*
20b. Lemmas 2.2–2.5 mm, usually pale pink ..... 29. *P. vachanica*
11b. Lemmas somewhat pubescent at base.
21a. Lowermost internodes of culms thickened, tuberlike; panicle broad and open ..... 4. *P. diffusa*
21b. Lowermost internodes of culms not tuberlike.
22a. Anthers 0.5–0.9 mm; branches of panicle scabrid, usually reflexed after anthesis.
23a. Spikelets in panicle branches very numerous, usually pale green; mostly ruderal plants, rarely found at up to middle montane zone ..... 42. *P. distans*

23b. Spikelets in panicle branches less numerous, usually grayish or pinkish violet tinge; montane plants ..... 43. *P. glauca*

22b. Anthers 0.8–2 mm; branches of panicle scabrid or smooth.

24a. Plants with numerous thin, erect flowering culms, shorter vegetative shoots absent; ligule of upper cauline leaf 2–3.5 mm, gradually narrowed upward ..... 3. *P. tenuissima*

24b. Flowering culms less numerous, thicker, often geniculate; vegetative shoots usually present; ligule of upper cauline leaf 0.7–2 mm, usually rounded.

25a. Panicle branches scabrid throughout; spikelets usually grayish violet tinge; culms usually geniculate ..... 2. *P. gigantea*

25b. Panicle branches smooth at least near their base; spikelets pale green or purple-tinged.

26a. Lemmas 2–2.5 mm; anthers 1.2–1.6 mm; spikelets usually pale green; panicle usually hardly exserted from upper sheath ..... 9. *P. coreensis*

26b. Lemmas 1.5–2.2 mm; anthers 0.9–1.3 mm; spikelets usually purple-tinged; panicle usually broadly open and far exserted from upper sheath.

27a. Plant of high mountains, 10–30 cm tall; panicle branches 1–2 per node; spikelets intense purple ..... 11. *P. qinghaica*

27b. Plant of lower altitudes, 20–50(–60) cm tall; panicle branches 2–5 per node; spikelets usually less intensely purple.

28a. Lemma densely pubescent near base; palea keels ciliate on lower part, scabrid on upper part; anthers 1.2–1.5 mm ..... 8. *P. chinampoensis*

28b. Lemma glabrous or slightly pubescent near base; palea keels smooth throughout or scaberulous on upper part; anthers 0.8–1.2 mm.

29a. Lemmas pubescent near base; palea keels scabrid on upper part ..... 10. *P. manchuriensis*

29b. Lemmas glabrous or subglabrous near base; palea keels usually smooth, rarely with 1–3 small teeth ..... 12. *P. tenuiflora*

7b. Lemmas 2.5–4 mm.

30a. Lemmas glabrous, rarely with a few hairs on the callus.

31a. Branches of panicle scabrid or smooth only near base.

32a. Anthers 0.3–0.5 mm ..... 39. *P. micranthera*

32b. Anthers 1.2–3 mm.

33a. Spikelets with 6–9 florets; culms 30–50 cm tall; anthers 1.2–1.7 mm ..... 25. *P. multiflora*

33b. Spikelets with 2–5 florets; culms stout, 20–40 cm tall; anthers 1.5–3 mm.

34a. Panicle open, 10–20 cm; anthers 2.3–3 mm; lemmas 3.4–4 mm ..... 26. *P. thomsonii*

34b. Panicle narrow, 5–10 cm; anthers 1.5–2.2 mm; lemmas 3–3.5 mm ..... 27. *P. stapfiana*

31b. Branches of panicle smooth or slightly scabrid only on upper part.

35a. Anthers 0.5–1.3 mm.

36a. Panicle spreading.

37a. Culms erect, 20–40 cm tall, very thin; panicle 8–13 cm; branches very thin; lemmas 2.2–2.8 mm ..... 29. *P. vachanica*

37b. Culms usually geniculately ascending, 10–25 cm tall, rather thick; panicle 5–10 cm; lemmas 2.7–3.5 mm ..... 34. *P. pauciramea*

36b. Panicle contracted and dense.

38a. Lemmas 3.2–3.5 mm, palea keels smooth; culms scabrid below inflorescence ..... 32. *P. kashmiriana*

38b. Lemmas 2.5–3.2 mm; palea keels with a few teeth; culms smooth throughout .... 33. *P. nudiflora*

35b. Anthers 1.3–2.5 mm.

39a. Panicle spreading; branches (1 or)2 per node; leaf blades soft, 1–2 mm wide ..... 35. *P. ladyginii*

39b. Panicle contracted and dense.

40a. Palea keels ciliate or scabrid; leaf blade soft, smooth, 1.5–2.5 mm wide ..... 36. *P. subspicata*

40b. Palea keels glabrous and smooth, rarely with a few teeth; leaf blade 0.2–1.5 mm wide.

41a. Culms 5–8 cm tall, 1-noded; panicle 1–2 cm, branches 1 per node ... 28. *P. shuanghuensis*

41b. Culms 8–40 cm tall, 2–3-noded; panicle 5–10 cm, branches 1–3 per node.

42a. Culms usually erect, 15–30(–40) cm tall; leaf blade 0.5–1.5 mm broad; spikelets 4–5 mm ..... 30. *P. pamirica*
42b. Culms geniculate ascending, 8–20 cm tall; leaf blade 0.2–0.5 mm broad; spikelets 5–6 mm ..... 31. *P. ladakhensis*

30b. Lemmas somewhat pubescent at base.
43a. Panicle branches smooth or in upper part some scabrid.
44a. Panicle 1.5–5 cm, contracted and dense; culms 4–15 cm ..... 41. *P. humilis*
44b. Panicle 5–10 cm, contracted or open; culms 15–40 cm.
45a. Plants of coastal shoals and rocks, marshy meadows; lemma sparsely pubescent along lower part of veins; anthers 0.7–1.2 mm ..... 38. *P. kurilensis*
45b. Plants of high mountains (3000 m or higher); lemma densely pubescent near base or anthers 1–1.3 mm.
46a. Lemma 2.8–3.5 mm, slightly pubescent near base; anthers 1–1.3 mm ..... 17. *P. roborovskyi*
46b. Lemma 3.5–4 mm, densely pubescent near base; anthers 0.8–1.2 mm ..... 18. *P. arjinshanensis*
43b. Panicle branches scabrid, rarely almost smooth along lower 1/3.
47a. Anthers 0.5–0.9(–1) mm.
48a. Culms straight, 30–80(–100) cm tall; panicle 10–20(–30) cm, branches directed obliquely upward; plants of lowlying, usually seaside, habitats, saltmarshes ..... 37. *P. nipponica*
48b. Culms usually geniculate, 15–40 cm tall; panicle 5–12(–15) cm, branches usually spreading; plants of montane habitats ..... 40. *P. hackeliana*
47b. Anthers 1–1.5(–1.8) mm.
49a. Ligule of upper cauline leaf 0.7–1.5(–2) mm, apex rounded; culms 30–50 cm tall, rather thick; leaf blades 1.5–3(–4) mm wide.
50a. Lemmas 3–3.5 mm, acuminate ..... 6. *P. jeholensis*
50b. Lemmas 2.4–3 mm, obtuse ..... 7. *P. macranthera*
49b. Ligule of the upper cauline leaf 1.7–3.5(–4) mm, gradually narrowed upward.
51a. Leaf blade 0.5–1.2 mm wide, convolute; plants usually without short vegetative shoots; culms thin and straight ..... 5. *P. dolicholepis*
51b. Leaf blade 1.5–4 mm wide, laxly convolute or flat; plants usually with a few short vegetative shoots; culms thick and geniculate ..... 1. *P. poecilantha*

1. Puccinellia poecilantha (K. Koch) V. I. Kreczetowicz in Komarov, Fl. URSS 2: 472. 1934.

斑稃碱茅 ban fu jian mao

Festuca poecilantha K. Koch, Linnaea 21: 411. 1848; *Atropis poecilantha* (K. Koch) V. I. Kreczetowicz; *A. chilochloa* V. I. Kreczetowicz.

Perennial, tufted, grayish green. Culms 30–50 cm tall, usually geniculate, thick. Ligule 2–3.5 mm; leaf blades subinrolled or conduplicate, 3–6 cm, 1.5–4 mm wide, adaxial surface and margins scabrid. Panicle contracted, but later spreading, 6–12 cm; branches 2–7 cm, scabrid. Spikelets 5–8 mm, florets 5–9; lower glume ca. 1.5 mm, 1-veined, upper glume 1.5–2 mm, inconspicuously 3-veined, apex obtuse and margins ciliate; lemmas 2.5–3.5(–4) mm, usually tinged with purple, veins pubescent on lower part, apex acuminate or obtuse; palea keels scabrid; anthers 1.2–2 mm. Fl. May–Jul. $2n = 28$.

Dry grasslands, saline places, saline lake shores; 100–2000 m. Qinghai, Xinjiang [Afghanistan, Kazakhstan, Russia, Turkmenistan, Uzbekistan; SW Asia (Iran)].

Material of this species has been incorrectly named as *Puccinellia festuciformis* (Host) Parlatore.

2. Puccinellia gigantea (Grossheim) Grossheim, Fl. Kavkaza 1: 114. 1928.

大碱茅 da jian mao

Atropis gigantea Grossheim, Vestn. Tiflissk. Bot. Sada 46: 35. 1919; *A. anisoclada* V. I. Kreczetowicz; *A. sclerodes* V. I. Kreczetowicz; *Puccinellia anisoclada* (V. I. Kreczetowicz) Parsa; *P. sclerodes* (V. I. Kreczetowicz) V. I. Kreczetowicz ex Drobow.

Perennial, loosely tufted, grayish green. Culms erect or geniculately ascending, 50–80(–100) cm tall. Ligule 1–3.5 mm, abaxial surface scabrid; leaf blades flat or inrolled, 5–15 cm, 1.5–4 mm wide, adaxial surface scabrous. Panicle 6–20 cm, contracted, but later spreading; branches 2–6 per node, basal primary branch 4–10 cm, scabrous. Spikelets 4–6 mm, usually purple, florets 3–7; glumes obtuse, lower glume 1.5–2 mm, 1-veined, upper glume 2–2.5 mm, 1–3-veined; lemmas 1.7–2.3(–2.5) mm, veins ± pubescent below, apex triangular-rounded; palea keels scabrid on upper part; anthers 1–1.4 mm. Fl. Jun–Jul. $2n = 14$.

Saline moist meadows, lake banks; 100–2000 m. Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, E Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Caucasus, Iran), SE Europe].

3. Puccinellia tenuissima (Litvinov ex V. I. Kreczetowicz) Litvinov ex Pavlov, Fl. Kazakhst. 1: 242. 1956.

纤细碱茅 xian xi jian mao

Atropis tenuissima Litvinov ex V. I. Kreczetowicz in Komarov, Fl. URSS 2: 765. 1934.

Perennial, densely tufted. Culms slender, 20–50 cm tall, ca. 0.5 mm in diam. Ligule 1.5–3 mm; leaf blades 4–10 cm,

0.3–1.5 mm wide, narrowly linear, usually convolute, adaxial surface slightly scabrid. Panicle straight or slightly spreading, loose, 5–1.2 cm; branches slender, smooth or slightly scabrid. Spikelets 3–4 mm, florets 3–5; glumes obtuse, lower glume ca. 0.7 mm, upper glume ca. 1.5 mm; lemmas 1.7–2.3 mm, usually purple, pubescent near base, apex obtuse; palea keels ciliate on lower part, scabrid in upper part; anthers 1–1.5 mm. Fl. May–Jul. 2*n* = 14.

Low wet places, saline meadows; 100–1500 m. Qinghai, Xinjiang [Kazakhstan, Russia].

4. Puccinellia diffusa (V. I. Kreczetowicz) V. I. Kreczetowicz ex Drobow, Fl. Uzbekistan. 1: 253. 1941.

展穗碱茅 zhan sui jian mao

Atropis diffusa V. I. Kreczetowicz in Komarov, Fl. URSS 2: 760. 1934.

Perennial, tufted. Culms 30–50 cm tall, base thickened and tuberlike. Ligule ca. 1.5 mm; leaf blades flat or subinrolled, 4–10 cm, 0.6–1.3 mm wide, adaxial surface scabrous. Panicle effuse, 8–12 cm, branches 2–4 per node, 2–4 cm, slender, lower part smooth and naked, scabrous near spikelets. Spikelets 5–6 mm, florets 3–6; glumes obtuse, lower glume ca. 1.2 mm, upper glume ca. 2 mm; lemmas 2–2.7 mm, purple with yellow margins, base pubescent, apex obtuse; palea keels pubescent near base, scabrid on upper part; anthers 1.2–1.6 mm. Fl. May–Jul.

Dry river banks, sandy gravel, saline grassy places; 100–2000 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

5. Puccinellia dolicholepis (V. I. Kreczetowicz) Pavlov, Fl. Kazakhst. 1: 242. 1956.

毛稃碱茅 mao fu jian mao

Atropis dolicholepis V. I. Kreczetowicz in Komarov, Fl. URSS 2: 764. 1934.

Perennial, densely tufted. Culms erect, 20–40(–50) cm tall, slender, 1–1.5 mm in diam. Ligule 1.7–3.5 mm; leaf blades usually inrolled, 3–5 cm, 0.3–1.2 mm wide. Panicle loose, 5–12 cm; branches 1–2 cm, ascending and then spreading, scabrid. Spikelets 4–7 mm, usually tinged with purple, florets 2–6; lower glume 1.3–1.6 mm, upper glume 2–2.8 mm, apex subacute; lemmas 2.5–3.5(–4) mm, shortly hairy on lower part of veins, apex acute to acuminate; palea keels pubescent on lower part, scabrid on upper part; anthers 1.4–2.3 mm. Fl. Jun–Jul.

Dry grasslands, sandy saline lake shores and meadows, sandstone slopes; 100–1500 m. Qinghai, Xinjiang [Kazakhstan. Kyrgyzstan, Russia (SW Siberia); SW Asia (Caucasus), SE Europe].

6. Puccinellia jeholensis Kitagawa, Rep. First Sci. Exped. Manchoukuo, Sect. IV, 4: 102. 1936.

热河碱茅 re he jian mao

Puccinellia palustris (Seenus) Grossheim subsp. *jeholensis* (Kitagawa) Norlindh.

Perennial, tufted, grayish green. Culms erect or geniculately ascending, 30–60 cm tall, 1–2 mm in diam. Leaf sheaths smooth; ligule 0.5–1.3 mm; leaf blades flat, 6–10 cm, 2–3 mm wide, abaxial surface glabrous, adaxial surface and margins scabrous. Panicle usually spreading, 8–20 × 5–10 cm; branches 2–4 per node, basal primary branch 4–8 cm, upper part scabrid. Spikelets 5–6 mm, florets 4 or 5; rachilla internodes scabrid; lower glume ca. 1.2 mm, 1-veined, apex acuminate, upper glume ca. 1.8 mm, 3-veined, apex obtuse; lemmas 3–3.5 mm, purple, lower 1/4 pubescent, margins membranous, yellow, apex obtuse; palea as long as lemma, keels hairy in lower part, scabrid in upper part; anthers 1.2–2 mm. Fl. Jun–Jul.

Lake shores, shallow sandy slopes, low saline meadows. Hebei, Heilongjiang, Jiangsu, Nei Mongol [Mongolia].

7. Puccinellia macranthera (V. I. Kreczetowicz) Norlindh, Fl. Mongol. Steppe 1: 102. 1949.

大药碱茅 da yao jian mao

Atropis macranthera V. I. Kreczetowicz in Komarov, Fl. URSS 2: 759. 1934; *Puccinellia poaeoides* Keng.

Perennial, tufted, grayish green. Culms 30–50 cm tall, 1–2.5 mm in diam. Leaf sheaths smooth or scabrid; ligule 0.5–1.2 mm, truncate or obtuse; leaf blade flat or inrolled, 3–8 cm, 2–4 mm wide, margins and adaxial surface scabrous. Panicle laxly spreading, 8–20 × 6–12 cm; branches 2–4 per node, basal primary branch 4–8 cm, horizontally spreading or reflexed after anthesis, axis and branches scaberulous, lower part naked. Spikelets 5–6 mm, florets 4–6; rachilla internodes smooth; glumes obtuse, lower glume 1–1.5 mm, upper glume ca. 2 mm; lemmas 2.4–3 mm, base pubescent, margins yellow, apex truncate-triangular; palea keels ciliate; anthers 1.5–2 mm. Fl. Jun–Jul.

Moist saline places; 100–2000 m. Gansu, Jilin, Liaoning, Nei Mongol, NE Xinjiang [Mongolia, Russia (Siberia)].

8. Puccinellia chinampoensis Ohwi, Acta Phytotax. Geobot. 4: 31. 1935.

朝鲜碱茅 chao xian jian mao

Perennial, tufted, grayish green. Culms erect, 30–80 cm tall, ca. 1.5 mm in diam. Leaf sheaths smooth; ligule 1–1.7 mm; leaf blade flat or inrolled, 4–9 cm, 1.5–3 mm wide, adaxial surface scabrid. Panicle loose, 7–15 × 4–8 cm; branches 3–5 per node, 6–8 cm, ascending, spreading or slightly nodding after anthesis, scabrid, lower 1/2 naked. Spikelets 4–6 mm, florets 4–7; lower glume 0.7–1.3 mm, 1-veined, upper glume 1–1.7 mm, 3-veined; lemmas 1.8–2.2 mm, later tinged with purple, hairy near base, apex truncate; palea as long as or slightly longer than lemma, keels sparsely pubescent on lower part, scabrid on upper part; anthers 1.2–1.5 mm. Fl. Jun–Jul.

Saline meadows, sandy seashores. Hebei, Liaoning [Korea].

9. Puccinellia coreensis Hackel ex Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 57. 1930.

高丽碱茅 gao li jian mao

?*Puccinellia coreensis* var. *asperifolia* Kitagawa.

Perennial, loosely tufted. Culms 20–60 cm tall, 1.3–2 mm in diam., nodes geniculate. Leaf sheaths loose, uppermost sheath ca. 10 cm, reaching base of inflorescence; ligule 1–2

mm; leaf blades flat or conduplicate, 8–20 cm, 1–3 mm wide, margins and adaxial surface scabrous. Panicle 8–20 × 3–5 cm; branches 2–5 per node, 3–8 cm, smooth, lower part naked, upper part densely spiculate. Spikelets 5–7 mm, florets 5–7; lower glume 1–1.2 mm, upper glume 1.5–2 mm; lemmas 2–2.5 mm, base slightly pubescent, apex obtuse, dentate-ciliate; palea keels scabrous on upper part; anthers 1.1–1.3 mm. Fl. Jun–Aug.

Hills, slopes, wet places along field margins. Jilin, Liaoning [Korea].

This taxon was first described as *"Agrostis distans* var. *coreensis* Hackel ex T. Mori" (Enum. Pl. Corea, 36. 1922), which is a *nomen nudum* and, therefore, was not validly published.

10. Puccinellia manchuriensis Ohwi, Acta Phytotax. Geobot. 4: 31. 1935.

柔枝碱茅 rou zhi jian mao

Perennial, tufted. Culms 30–60 cm tall. Leaf sheaths smooth; ligule 1–2 mm; leaf blade inrolled or flat, 10–15 cm, 1.5–3 mm wide, adaxial surface densely scabrous along veins. Panicle 7–15 cm; branches 3–5 per node, 2–4 cm, smooth or scabrous, spikelets many. Spikelets 3–4 mm, florets 3–5; lower glume ca. 0.8 mm, upper glume ca. 1.2 mm; lemmas 1.6–2.2 mm, base pubescent, apex obtuse; palea keels scabrid on upper part; anthers 0.8–1.3 mm. Fl. May–Jul. 2*n* = 28.

Riversides, saline meadows, sandy seashores. Beijing, Gansu, Heilongjiang, N Jiangsu, Nei Mongol, Shanxi, Tianjin [Japan, Mongolia, Russia (Far East)].

11. Puccinellia qinghaica Tzvelev, Bot. Zhurn. (St. Petersburg) 89: 842. 2004.

青海碱茅 qing hai jian mao

Perennial, tufted. Culms erect, 10–30 cm tall. Ligule 0.5–1.5 mm; leaf blades 2–6 cm, 0.5–1.5 mm wide. Panicle usually spreading, 3–8 cm; branches (1 or)2(or 3) per node, 2–5 cm, thin, smooth, lower part naked. Spikelets 3–4 mm, tinged with purple, florets 2–4; glumes obtuse, lower glume 0.5–1 mm, upper glume 1–1.5 mm; lemmas 1.6–2.2 mm, pubescent at base; palea keels scabrid on upper part; anthers 0.8–1.3 mm. Fl. Jun–Jul.

● Alpine riversides, meadows; 2000–3500 m. Qinghai.

12. Puccinellia tenuiflora (Grisebach) Scribner & Merrill, Contr. U. S. Natl. Herb. 13: 78. 1910.

星星草 xing xing cao

Atropis tenuiflora Grisebach in Ledebour, Fl. Ross. 4: 389. 1852; *Puccinellia mongolica* (Norlindh) Bubnova; *P. tenuiflora* var. *mongolica* Norlindh.

Perennial, tufted. Culms erect, often geniculate, 30–70 cm tall, 1–2 mm in diam., terminal node in lower 1/3. Leaf sheaths glabrous; ligule 0.7–1.5 mm, obtuse; leaf blade conduplicate or slightly inrolled, 2–8 cm, 1–3 mm wide, adaxial surface scabrid. Panicle loose, 6–15 cm; branches 2–5 per node, slender, horizontally spreading, scabrid or smooth, lower part naked. Spikelets 2.5–3.5 mm, usually tinged purple, florets 2–4; lower glume ca. 0.6 mm, 1-veined, upper glume ca. 1.2 mm, 3-veined, apex subobtuse; lemmas 1.5–2.2 mm, glabrous or subglabrous, apex obtuse; palea keels smooth or with a few small teeth; anthers 0.8–1.4 mm. Fl. Jun–Jul. 2*n* = 14, 56.

Saline wet grasslands, stable sandy beaches, saline meadows; 500–4000 m. Anhui, Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shanxi, Xinjiang [Japan, Kazakhstan, Mongolia, Russia (Siberia); SW Asia (Iran)].

13. Puccinellia filifolia (Trinius) Tzvelev, Novosti Sist. Vyssh. Rast. 1964: 18.1964.

线叶碱茅 xian ye jian mao

Colpodium filifolium Trinius, Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4, 2(1): 70. 1836.

Perennial, densely tufted, tillers very numerous. Culms erect, 20–30 cm tall, 0.7–1.5 mm in diam. Ligule 0.6–2 mm; leaf blades conduplicate, setaceous, 2–5 cm, 0.3–1 mm wide. Panicle spreading, 3–8 cm; branches 2 or 3 per node, 2–6 cm, thin, smooth. Spikelets 2.5–4 mm, usually tinged with purple; florets 2–4; glumes obtuse, lower glume 0.5–1 mm, upper glume 1–1.5 mm; lemmas 1.6–2 mm, glabrous or subglabrous; palea keels smooth; anthers 0.9–1.1 mm. Fl. May–Jun.

Sandy saline places; near sea level to 500 m. Nei Mongol (near Chailar) [Mongolia].

14. Puccinellia tianschanica (Tzvelev) Ikonnikov, Opred. Viss. Rast. Baskirsk. ASSR 80. 1979.

天山碱茅 tian shan jian mao

Puccinellia tenuiflora (Grisebach) Scribner & Merrill subsp. *tianschanica* Tzvelev, Novosti Syst. Vyssh. Rast. 8: 79. 1971; *P. gyirongensis* L. Liu.

Perennial, tufted. Culms erect, 10–30 cm tall, 1–1.6 mm in diam., nodes slightly geniculate. Ligule 0.7–1.5 mm; leaf blade 2–6 cm, 0.5–2 mm wide. Panicle 3–10 × 1.5–3 cm; branches mostly 1–3 per node, 3–5 cm, thin, smooth, lower part naked, upper part with a few spikelets. Spikelets 2.5–4 mm, usually tinged with purple, rarely yellowish brown, florets 2–4; lower glume 0.5–1 mm, upper glume 1.3–1.8 mm; lemmas 1.5–2.3 mm, glabrous, apex obtuse-truncate; palea keels smooth; anthers 0.8–1.2 mm. Fl. Jun–Aug.

Dry grasslands, dampish grassy places; 1500–3500 m. Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

15. Puccinellia degeensis L. Liu, Vasc. Pl. Hengduan Mts. 2: 2199. 1994.

德格碱茅 de ge jian mao

Perennial, densely tufted. Culms obliquely ascending, 15–20 cm tall, 1–1.5 mm in diam. Leaf sheaths glabrous, uppermost enclosing base of panicle; ligule ca. 1 mm, truncate; leaf blades flat or conduplicate, 3–5 cm, (1–)2–3 mm wide, margins scabrid. Panicle narrow, 3–4 × ca. 3 cm; branches 2–4 per node, 1–2 cm, smooth. Spikelets 3–4 mm, florets 2 or 3; lower glume 0.6–1 mm, veinless or sometimes 1-veined, upper glume 1–1.5 mm, 1–3-veined; lemmas 2–2.5 mm, glabrous, margins ca. 0.3 mm wide, yellow, membranous, apex obtuse; palea keels smooth, apex 2-toothed and mucronate, mucros ca. 0.2 mm; anthers 1.2–1.5 mm. Fl. Jun–Jul.

● Alpine riversides, marshes, meadows; ca. 3600 m. NW Sichuan.

16. Puccinellia strictura L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 405. 2002.

竖碱茅 shu jian mao

Perennial, tufted. Culms many, rooting from lower nodes, 5–10 cm tall. Leaf sheaths smooth, uppermost reaching lower part of panicle; ligule 1–1.5 mm; leaf blade convolute, 2–3 cm, 1–2 mm wide. Panicle dense, spikelike, 3–5 × ca. 0.5 cm, green; branches single, ca. 1 cm, smooth, spikelets 4 or 5. Spikelets 4–4.5 mm, florets 4; lower glume 1.2–1.5 mm, apex acuminate, upper glume ca. 2 mm, apex acuminate; lemmas 2–2.2 mm, glabrous, apex acuminate; palea keels smooth; anthers 0.8–1.2 mm. Fl. Jul–Aug.

● Moist places in alpine ravines; ca. 3900 m. Xizang.

17. Puccinellia roborovskyi Tzvelev, Rast. Tsentr. Azii 4: 157. 1968.

疏穗碱茅 shu sui jian mao

Perennial, tufted. Culms 20–40 cm tall. Leaf sheaths smooth; ligule 1–2.5 mm; leaf blade inrolled, 3–8 cm, 1–2 mm wide. Panicle 5–10 cm; branches paired, 3–5 cm, with axillary pad, spreading after anthesis, smooth or slightly scabrid, lower part naked, upper part with 1–3 spikelets. Spikelets 6–7 mm, tinged with purple, florets 3–5; glumes acuminate, lower glume ca. 1.5 mm, upper glume ca. 2 mm; lemmas lanceolate, 2.8–3.5 mm, base pubescent along veins, margins membranous, yellow, apex acuminate; palea keels scabrid; anthers 0.7–1.3 mm. Fl. Jul–Aug.

● Sandy lake shores, river valleys, moist saline grassy places; 3000–4600 m. Qinghai, Xizang.

18. Puccinellia arjinshanensis D. F. Cui, Fl. Xinjiang. 6: 119. 1996.

阿尔金山碱茅 a er jin shan jian mao

Perennial, tufted. Culms erect, 20–30 cm tall, ca. 1 mm in diam. Leaf sheaths smooth; ligule ca. 2 mm, semi-rounded; leaf blade conduplicate or inrolled, hard, 3–7 cm, 1–1.5 mm wide, margins scabrous, adaxial surface scabrous along veins. Panicle 5–10 × ca. 4 cm; branches 1 or 2 per node, smooth, apex sparsely scabrous. Spikelets 4–7 mm, florets 3–5; lower glume 2–2.5 mm, 1-veined, upper glume ca. 3 mm; lemmas 3.5–4 mm, veins inconspicuous, base and between veins densely pubescent, margins broadly membranous; palea keels ciliate on lower half, scabrous on upper half; anthers 0.8–1.2 mm. Fl. Jul–Aug.

● Gully banks on slopes; 3000–3500 m. Xinjiang.

19. Puccinellia schischkinii Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 57. 1955.

斯碱茅 si jian mao

Perennial, tufted, intravaginal and a few short extravaginal shoots present. Culms erect or ascending, 20–40 cm tall, 1–2 mm in diam., soft. Ligule 1–2 mm, rounded or acuminate; leaf blades inrolled or flat, hard, 4–5 cm, 1–2 mm in diam., abaxial surface glabrous, grayish green, adaxial surface scabrid. Panicle very narrow, 10–20 cm, pale green; branches 1–3 cm, straight, scabrid, spiculate to base. Spikelets 5–7 mm, florets 5–7; glumes lanceolate, slightly keeled, upper keel scabrous, apex acuminate, lower glume 1.5–1.8 mm, 1-veined, upper glume 2–2.5 mm, 3-veined; lemmas 2.2–3.2 mm, base sparsely shortly hairy, midvein scabrid toward apex, apex acute; palea keels ciliate on lower part, scabrous on upper part; anthers 0.7–1.2 mm. Fl. Jun–Jul.

Mountain saline meadows, marshes, lowland gravel beaches, grassy places along saline lake shores; (600–)3000–4300 m. Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan].

Some authors have incorrectly named material of this species as *Puccinellia roshevitsiana*.

20. Puccinellia kuenlunica Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 62. 1955.

昆仑碱茅 kun lun jian mao

Perennial, densely tufted, intravaginal and extravaginal tillering shoots present. Culms erect, 20–30 cm tall. Uppermost leaf sheath very long; ligule ca. 2 mm; leaf blade 3–8 cm, 1–2.5 mm wide, margins and adaxial surface scabrid. Panicle very narrow, 8–18 cm; branches short, appressed or slightly spreading after anthesis, smooth or sparsely scabrous along upper part. Spikelets ca. 4–6 mm, florets 3–5; glumes ovate-lanceolate, lower glume 1–1.5 mm, 1-veined, upper glume 1.5–2 mm, 3-veined; lemmas ovate-lanceolate, 2.5–3.2 mm, base glabrous or subglabrous, apex acuminate; palea keels smooth on lower part, scabrous on upper part; anthers 0.7–1.2 mm. Fl. Jun–Jul.

● Deserts, dry grasslands; 2000–3000 m. Gansu, Qinghai, SE Xinjiang, Xizang.

21. Puccinellia przewalskii Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 63. 1955.

勃氏碱茅 bo shi jian mao

Perennial, loosely tufted, intravaginal and a few short extravaginal shoots present. Culms erect or ascending from a geniculate base, 25–40 cm tall. Leaf sheaths smooth; ligule 2–3 mm; leaf blade flat or inrolled, hard, grayish green, 5–10 cm, 2–3 mm wide, adaxial surface scabrid. Panicle narrow, 8–15 cm; branches ca. 5 cm, appressed or sometimes spreading, scabrid or smooth in lower part. Spikelets 5–7 mm, slightly tinged with purple, florets 5–7; glumes obtuse or subacuminate, lower glume ca. 1.5 mm, upper glume 2–2.5 mm; lemmas 3.2–3.5 mm, lower part glabrous, rarely base minutely pubescent, apex acuminate or narrowly rounded; palea keels smooth in lower part, shortly ciliate in upper part; anthers 1.5–2.4 mm. Fl. Jun–Jul.

● Moist saline places on sandstone, river banks. Gansu, Qinghai.

22. Puccinellia roshevitsiana (Schischkin) V. I. Kreczetowicz ex Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 60. 1955.

西域碱茅 xi yu jian mao

Atropis roshevitsiana Schischkin, Sist. Zametki Mater. Gerb. Tomsk. Univ. 1929(3): 1. 1929.

Perennial, tufted, grayish green. Culms erect, 30–60 cm

tall, hard, grayish green. Ligule ca. 1.5 mm; leaf blades recurved, straight, 5–10 cm, 2–4 mm wide, margins scabrid. Panicle 8–15 cm; branches 3–5 per node, 2–6 cm, scabrid, spreading after anthesis. Spikelets linear-lanceolate, 5–8 mm, florets 5–6; glumes obtuse, lower glume ca. 1.5 mm, upper glume ca. 2.5 mm; lemmas 2.7–3.5 mm, marginal veins pubescent at base, apex scarious; palea keels scabrid in upper half; anthers 1.5–2 mm. Fl. Jun–Jul.

Low saline deserts, gravel flats in river valleys; ca. 500 m. Xinjiang [Kazakhstan].

23. Puccinellia altaica Tzvelev, Rast. Tsentr. Azii 4: 152. 1968.

阿尔泰碱茅 a er tai jian mao

Puccinellia dolicholepis var. *paradoxa* Sergievskaja.

Perennial, loosely or densely tufted, intravaginal and a few extravaginal shoots present. Culms erect, 20–30 cm tall. Ligule ca. 1 mm; leaf blades 3–8 cm, ca. 1 mm wide. Panicle contracted or slightly loose, 5–14 × 2–4 cm; branches paired, lower part naked, smooth. Spikelets 3.5–4.5 mm, florets 3–5; lower glume 1–1.2 mm, apex acuminate, upper glume 1.5–2 mm, apex acuminate; lemmas 2.3–2.8(–3) mm, violet, glabrous or slightly hairy near base, apex acuminate; palea keels smooth or with a few spinules in upper 1/3; anthers 1.2–1.5 mm. Fl. Jul–Aug. 2*n* = 14.

Flat sandy river banks, saline meadows, grassland on slopes; 1000–2500 m. NE Xinjiang [Mongolia, Russia (Siberia)].

24. Puccinellia koeieana Melderis, Biol. Skr. 14(4): 72. 1965.

科氏碱茅 ke shi jian mao

Perennial, loosely or densely tufted; intravaginal and extravaginal shoots present. Culms erect or geniculately ascending, 15–30 cm tall. Leaf blades flat or ± inrolled, 2–5 cm, ca. 2 mm wide, grayish green, adaxial surface scabrid along veins. Panicle contracted, later spreading, 7–8 × ca. 5 cm; branches paired at lower nodes, 2–3 cm, slender, scabrid, reflexed after anthesis. Spikelets 4.5–5 mm, often tinged with purple, florets 4–7; glumes broadly lanceolate or ovate, lower glume ca. 1 mm, 1-veined, upper glume ca. 1.5 mm, 1–3-veined, apex acute or subobtuse; lemmas 1.5–2 mm, purple, glabrous or base minutely hairy, apex obtuse, mucronate; anthers 1–1.2 mm. Fl. May–Jul.

Alpine moist saline places; 2000–3000 m. Xizang [Afghanistan; SW Asia (Iran)].

25. Puccinellia multiflora L. Liu, Fl. Xizang. 5: 123. 1987.

多花碱茅 duo hua jian mao

Perennial, loosely tufted. Culms geniculate at base, 30–50 cm tall, soft. Terminal sheath enclosing lower part of inflorescence; ligule 1–2.5 mm; leaf blade soft, 5–10 × 0.2–0.3 cm, margins and adaxial surface scabrid. Panicle spreading, ca. 15 × 4 cm; branches 2 or 3 per node, basal primary branch 5–8 cm, scabrid, lower 1/2 naked, upper 1/2 with 2–4 spikelets. Spikelets 8–11 mm, tinged purplish brown, florets 6–9; glumes obtuse; lower glume ca. 1.5 mm, upper glume 2–2.5 mm; lemmas 2.8–3.5 mm; palea scabrid on upper part of keels; anthers 1.2–1.5 mm. Fl. Jun–Jul.

● Sandy saline lake shores, alluvial fans; 2900–4200 m. Qinghai, W Xizang.

26. Puccinellia thomsonii (Stapf) R. R. Stewart, Brittonia 5: 418. 1945.

长穗碱茅 chang sui jian mao

Glyceria thomsonii Stapf in J. D. Hooker, Fl. Brit. India 7: 347. 1896 [“1897”]; *Atropis thomsonii* (Stapf) Pampanini.

Perennial, densely tufted. Culms stout, 20–40 cm tall, 1.5–3 mm in diam., 3–5-noded, nodes often geniculate. Leaf sheaths loose, terminal sheath ca. 10 cm, often enclosing base of inflorescence; ligule ca. 3 mm, broadly ovate; leaf blade flat or conduplicate or inrolled, 6–18 cm, 1–3 mm wide, margins and adaxial surface scabrid. Panicle spreading, 12–20 × 2–3 cm; branches paired, 3–5 cm, obliquely ascending, scabrid, lower part naked. Spikelets 5–9 mm, florets 3–5; glumes oblong, apex acuminate, lower glume 1.8–2.5(–3) mm, upper glume 2.2–3.2 mm; lemma 3.5–4(–4.5) mm, glabrous, keeled toward apex, apex acuminate; palea keels smooth on lower part, scabrid upward; anthers 2–2.6 mm. Fl. Jun–Jul.

Open basins; 4000–5200 m. Xizang [Pakistan].

27. Puccinellia stapfiana R. R. Stewart, Brittonia 5: 418. 1945.

藏北碱茅 zang bei jian mao

Glyceria poaeoides Stapf in J. D. Hooker, Fl. Brit. India 7: 348. 1896 [“1897”], not *Puccinellia poaeoides* Keng (1938).

Perennial, tufted. Culms erect or obliquely ascending, 20–40 cm tall. Leaf sheaths dense at culm base, terminal sheath reaching panicle; ligule ca. 1 mm; leaf blades conduplicate, 3–10 cm, 1–2.5 mm wide, margins and adaxial surface scabrid. Panicle narrow, 5–10 × ca. 1.5 cm; branches 2 or 3 per node, obliquely ascending, scabrid, 2–3 cm, lower part naked, upper part with 2–4 spikelets. Spikelets 5–6 mm, tinged with purple at maturity, florets 2–4; glume apex obtuse or acuminate, lower glume 2–2.2 mm, upper glume 2.5–2.8 mm; lemmas 3–3.5(–4) mm, glabrous, margins ciliate, finely toothed, apex obtuse; palea keels smooth or upper part scabrid, anthers 1.5–2.2 mm. Fl. Jun–Jul.

Alpine grassy places, saline sandy lake shores, marshy meadows; 4000–4800 m. NW Xizang [India, Pakistan].

28. Puccinellia shuanghuensis L. Liu, Fl. Xizang. 5: 125. 1987.

双湖碱茅 shuang hu jian mao

Perennial, densely tufted. Culms slender, 5–8 cm tall, 1-noded at base. Leaf sheaths clustered at culm base; ligule ca. 1 mm, triangular; leaf blades soft, 2–3 cm, ca. 1 mm wide, adaxial surface scabrid. Panicle 1–2 × ca. 1 cm, with ca. 10 spikelets; branches 1 per node, 0.7–1 cm, spreading, smooth, spikelets 1–3; pedicels thickened at apex. Spikelets ca. 4 mm, florets 2 or 3; glumes narrowly acuminate, lower glume 1.2–1.5 mm, upper glume ca. 2 mm; lemmas 2.8–3 mm, glabrous, apex acuminate; palea shorter than lemma, keels smooth; anthers ca. 1.5 mm. Fl. Jun–Jul.

● Saline grassland on mountain slopes; 4500–5100 m. Xizang.

29. Puccinellia vachanica Ovczinnikov & Czukavina, Fl. Tadziksk. SSR 1: 505. 1957.

文昌碱茅 wen chang jian mao

Puccinellia pamirica (Roshevitz) V. I. Kreczetowicz ex Ovczinnikov & Czukavina subsp. *vachanica* (Ovczinnikov & Czukavina) Tzvelev.

Perennial, tufted. Culms erect, 20–40 cm tall, slender. Ligule 1–2 mm; leaf blade conduplicate or inrolled 3–5 cm, 0.5–1.5 mm wide. Panicle usually spreading, 5–10 cm; branches 1–3 per node, slender, smooth or upper parts sparsely scabrid. Spikelets 3–5 mm, usually slightly purple tinged, florets 3 or 4; lower glume 1–1.5 mm, upper glume 2–2.5 mm; lemmas 2.2–2.8 mm, glabrous; palea keels smooth or sparsely scabrid on upper part; anthers 0.9–1.1 mm. Fl. Jun–Aug. 2*n* = 28.

Lake shores, saline meadows; 2500–3500 m. Qinghai, S Xinjiang, W Xizang [Tajikistan].

30. Puccinellia pamirica (Roshevitz) V. I. Kreczetowicz ex Ovczinnikov & Czukavina, Fl. Tadziksk. SSR 1: 224. 1957.

帕米尔碱茅 pa mi er jian mao

Atropis distans (Jacquin) Grisebach f. *pamirica* Roshevitz, Trudy Glavn. Bot. Sada 38: 121. 1924; *A. pamirica* V. I. Kreczetovicz.

Perennial, tufted. Culms usually erect, rarely geniculately ascending, 15–40 cm tall. Leaf sheaths mostly clustered at plant base; ligule ca. 1 mm; leaf blades conduplicate or inrolled, 3–4 cm, 0.5–1.5 mm wide, margins and adaxial surface scabrid. Panicle mostly contracted, or spreading after anthesis, 5–10 cm; branches 2–4 cm, ascending, smooth. Spikelets 4–5 mm, purple tinged, florets 3 or 4; lower glume 1.5–1.8 mm, apex shortly acuminate, upper glume 2–2.5 mm, inconspicuously 3-veined, apex shortly acuminate; lemmas 2.5–3.5 mm, glabrous, with a raised keel, margins membranous, apex acute or acuminate, finely toothed; palea keels smooth or sparsely scabrid; anthers 1.3–1.8 mm. Fl. and fr. Jul. 2*n* = 14, 28.

Lake shores, stony depressions; 3200–4800 m. Qinghai, Xinjiang, NW Xizang [Afghanistan, Kyrgyzstan, Tajikistan, Uzbekistan].

31. Puccinellia ladakhensis (H. Hartmann) Dickoré, Stapfia 39: 182. 1995.

拉达克碱茅 la da ke jian mao

Poa ladakhensis H. Hartmann, Candollea 39: 510. 1984.

Perennial, loosely tufted, old basal sheaths lacerate to fibrous. Culms geniculately ascending, 8–20 cm tall, 3- or 4-noded. Ligule ca. 1 mm; leaf blades 2–5 cm, 0.2–0.5 mm wide. Panicle contracted, 5–10 × 1–2 cm; branches 2–3(–5) cm, lower 1/2 naked, smooth. Spikelets 5–6 mm, purple tinged, florets 3 or 4; lower glume 1.5–1.8 mm, upper glume ca. 2.5 mm; lemmas 3.2–3.5 mm, glabrous, keeled toward apex, apex acuminate; palea keels glabrous, apex mucronate; anthers 1.2–1.6 mm. Fl. May–Jul.

Saline shores of rivers and lakes. Xizang [Kashmir, Nepal].

32. Puccinellia kashmiriana Bor, Kew Bull. [8] 1953: 270. 1953.

克什米尔碱茅 ke shi mi er jian mao

Perennial, densely tufted. Culms 10–15 cm tall, scabrid below inflorescence. Leaf sheaths clustered at plant base; ligule ca. 1.5 mm; leaf blades short, linear, basal blades flat, soft, ca. 5 cm, upper blades conduplicate, ca. 2 cm, 1–1.5 mm wide, adaxial surface and margins scabrid. Panicle very narrow, 3–4 × ca. 0.5 cm; branches 2 per node, ca. 1.5 cm, ascending, smooth, lower part naked, upper part with 1 or 2 spikelets. Spikelets ca. 5 mm, tinged with purple, florets 3–5; lower glume 1.2–1.5 mm, 1-veined, upper glume 2–2.5 mm, 3-veined; lemmas 3–3.5 mm, glabrous, apex acute or mucronate; palea keels smooth; anthers 0.6–0.8 mm. Fl. Jul–Aug.

Gravelly places in open alpine valleys; 4000–5100 m. Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Pakistan].

33. Puccinellia nudiflora (Hackel) Tzvelev, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 17: 75. 1962.

裸花碱茅 luo hua jian mao

Poa nudiflora Hackel, Oesterr. Bot. Z. 52: 453. 1902.

Perennial, tufted. Culms geniculate at base, 7–20 cm tall. Leaf sheaths smooth, uppermost often reaching inflorescence base; ligule ca. 1 mm; leaf blade conduplicate or inrolled, 1–4 cm, 1–2 mm wide, adaxial surface scabrid. Panicle dense, 4–6 cm; branches 2–4 cm, smooth, upper part with 2–4 spikelets. Spikelets 4–5.5 mm, florets 3 or 4; lower glume 1–1.2 mm, upper glume ca. 1.5 mm; lemmas 2.5–3 mm, glabrous, upper part keeled, apex obtuse; palea keels with a few teeth; anthers 0.6–0.8 mm. Fl. Jun–Jul.

Meadows on gravelly lake shores, saline beaches, alpine marshes, along ravine edges, valleys; 2400–4900 m. Qinghai, Xinjiang, Xizang [Kyrgyzstan, Tajikistan].

34. Puccinellia pauciramea (Hackel) V. I. Kreczetowicz ex Ovczinnikov & Czukavina, Fl. Tadziksk. SSR 1: 227. 1957.

少枝碱茅 shao zhi jian mao

Atropis distans (Jacquin) Grisebach f. *pauciramea* Hackel, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 442. 1903; *A. pauciramea* (Hackel) V. I. Kreczetowicz.

Perennial, tufted. Culms geniculately ascending, 15–30 cm tall, with many tillering shoots, 5–10 cm tall. Ligule 1–3 mm; leaf blades conduplicate or inrolled, 4–10 cm, 1–2 mm wide, margins and adaxial surface scabrid. Panicle broadly open, 4–7 cm; branches 2 per node, smooth, spikelets 1–3 at branch tips. Spikelets 5–6 mm, florets 2–4; glumes with apex obtuse or acuminate, lower glume 1.2–1.5 mm, upper glume 1.8–2 mm; lemmas 2.5–3.5 mm, purple with golden yellow membranous margins, glabrous, keeled, apex obtusely triangular; palea keels smooth or with 1–2 teeth; anthers 0.6–1.3 mm. Fl. Jun–Jul. 2*n* = 28.

Lake banks, sand dunes, gravel of river valleys, alluvial fans, saline soils in mountainous areas; 3000–5000 m. Qinghai, Xinjiang, Xizang [Afghanistan, Kyrgyzstan, Mongolia, Tajikistan, Uzbekistan].

35. Puccinellia ladyginii Ivanova ex Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 65. 1955.

布达尔碱茅 bu da er jian mao

Perennial, loosely tufted. Culms erect, 20–30 cm tall, 2- or 3-noded. Leaf sheaths smooth; ligule 1–2 mm; leaf blade flat, 5–8 cm, 1.5–2.2 mm wide, smooth or adaxial surface scabrid. Panicle open, 5–8 × 3–5 cm; branches 2 per node, 3–4 cm, lower part naked, branchlets and spikelets in upper half, smooth or rarely slightly scabrid. Spikelets ca. 6 mm, tinged purplish red, florets 4–6; glumes ovate-lanceolate, lower glume 1.5–2 mm, 1-veined, upper glume 2–2.5 mm, 3-veined, apex obtuse or slightly acuminate; lemmas 2.5–3.4 mm, glabrous, apex obtuse; palea keels smooth or sparsely scabrid in upper part; anthers 1.3–2 mm. Fl. Jun–Aug.

● Alpine sandy river beaches; 3500–4500(–5000) m. Qinghai.

36. Puccinellia subspicata V. I. Kreczetowicz ex Ovczinnikov & Czukavina, Fl. Tadziksk. SSR 1: 226. 1957.

穗序碱茅 sui xu jian mao

Atropis subspicata V. I. Kreczetowicz in Komarov, Fl. URSS 2: 760. 1934; *Poa gorbunovii* Ovczinnikov.

Perennial, loosely tufted. Culms 5–25(–30) cm tall, soft. Leaf blades flat or conduplicate, soft, 3–10 cm, 1.5–2.5 mm wide, smooth. Panicle cylindrical, contracted or spreading, 2–5 cm; branches 1–2 cm, smooth, lower part naked, spikelets 1–3 at branch tips. Spikelets 5–8 mm, usually purply tinged, florets 3–7; glumes ovate, apex subobtuse, lower glume 1–1.5 mm, upper glume 2–2.5 mm; lemmas elliptic, 2.7–4.5 mm, usually purple tinged, glabrous, keeled, apex acute; palea keels scabrid; anthers 1.5–2.5 mm. Fl. Jun–Jul. 2*n* = 14.

Wet alpine meadows. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

37. Puccinellia nipponica Ohwi, Bot. Mag. (Tokyo) 45: 379. 1931.

日本碱茅 ri ben jian mao

Perennial, tufted. Culms erect, 30–100 cm tall. Uppermost leaf sheath long, usually enclosing base of inflorescence; ligule 2–3 mm; leaf blades soft, 10–20 cm, 1–3 mm wide. Panicle 10–20(–30) cm; branches 3–5 per node, erect and appressed to axis, spiculate to base, scabrid. Spikelets 4–6 mm, pale green, florets 3 or 4; glumes lanceolate, lower glume 2–2.5 mm, 1-veined, upper glume ca. 3 mm, 3-veined; lemmas 2.5–3.5 mm, base pubescent, apex acuminate; anthers 0.7–0.8 mm. Fl. Jun–Jul. 2*n* = 28.

Sandstone seashores, saline grassy places. Liaoning, Nei Mongol [Japan, Korea, Russia (Far East)].

38. Puccinellia kurilensis (Takeda) Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 59. 1930.

千岛碱茅 qian dao jian mao

Atropis kurilensis Takeda, J. Linn. Soc., Bot. 42: 497. 1914; *Puccinellia kamtschatica* Holmberg var. *sublaevis* Holmberg; ?*P. pumila* (Vasey) Hitchcock; ?*P. adpressa* Ohwi.

Perennial, loosely tufted. Culms erect, 10–40 cm tall, uppermost node at about middle of culm. Ligule 1.5–3 mm; leaf blade flat, thin, 6–10 cm, 2–3 mm wide, adaxial surface scabrid. Panicle contracted, 5–15 cm, lower part often enclosed in uppermost leaf sheath; branches 2–6 cm, spreading at maturity, smooth or upper part slightly scabrid. Spikelets 6–8 mm, florets 4–7(–9); lower glume 1.5–3 mm, upper glume 2–3.5 mm; lemmas 2.7–3.5(–4) mm, green, margins later golden, veins conspicuously raised, sparsely pubescent along lower part of veins, apex acuminate; palea keels scabrid upward; anthers 0.7–1.2 mm. 2*n* = 42, 56.

Seashores, gravel meadows. Heilongjiang, Liaoning [Japan, Korea, Russia (Far East); North America].

39. Puccinellia micranthera D. F. Cui, Fl. Xinjiang. 6: 600. 1996 [*"microanthera"*].

小药碱茅 xiao yao jian mao

Perennial, tufted. Culms erect, 25–40 cm tall, 2–3-noded, terminal node at lower 1/3. Leaf sheaths smooth; ligule 1.5–2 mm, obtuse; leaf blades flat, 3–8 cm, 1.5–3 mm wide, scabrid. Panicle large, effuse, 12–20 × 5–7 cm; branches many per node, 5–10 cm, scabrid; pedicels 5–8 mm, scabrid. Spikelets 4–7 mm, florets 3–6; glumes with broadly membranous margins, lower glume 1–1.5 mm, 1-veined, upper glume ca. 2 mm; lemmas 3–4 mm, glabrous, apex acuminate; palea keels scabrid on upper part; anthers 0.3–0.5 mm. Fl. Jun–Jul.

● Gully slopes, marshy meadows; 1300–2000 m. Xinjiang, Xizang.

40. Puccinellia hackeliana (V. I. Kreczetowicz) V. I. Kreczetowicz ex Drobow, Fl. Uzbekistan. 1: 250. 1941.

高山碱茅 gao shan jian mao

Atropis hackeliana V. I. Kreczetowicz in Komarov, Fl. URSS 2: 762. 1934.

Perennial, densely tufted, grayish green. Culms 15–45 cm tall, nodes geniculate. Ligule 1–2.5 mm; leaf blades conduplicate or flat, 1–3 cm, 1–1.5 mm wide, adaxial surface and margin scabrid. Panicle 5–15 cm; branches 2–5 per node, scabrid. Spikelets 4–6(–8) mm, florets 3–6, purple; glumes ovate, apex obtuse, lower glume 1.5–2 mm, upper glume 2–2.5 mm; lemmas 2.5–3 mm, base pubescent, apex triangular-rounded; palea keels pubescent in lower part, scabrid in upper part; anthers 0.7–1 mm. Fl. 7–8. 2*n* = 28, 42.

Alpine desert grasslands, saline meadows, gravel slopes, field borders, lake banks; 1600–4000 m. Qinghai, Xinjiang, Xizang, [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan].

41. Puccinellia humilis (Litvinov ex V. I. Kreczetowicz) Bor, Nytt Mag. Bot. 1: 19. 1952.

矮碱茅 ai jian mao

Atropis humilis Litvinov ex V. I. Kreczetowicz in Komarov, Fl. URSS 2: 759. 1932; *Puccinellia hackeliana* subsp. *humilis* (Litvinov ex V. I. Kreczetowicz) Tzvelev.

Perennial, densely tufted, grayish green. Culms erect, 4–15 cm tall. Leaf blades conduplicate or inrolled, 1–3 cm, ca. 1 mm

wide, smooth. Panicle dense, spikelike, 2–5 × 0.5–1 cm; branches smooth, spikelets 1–3. Spikelets 6–7 mm, florets 3–6; lower glume ca. 2.2 mm, upper glume 2.5–3 mm; lemmas 2.5–3.5 mm, violet, base shortly hairy, apex subobtuse; palea keels scabrid on upper part; anthers 0.7–1.2 mm. Fl. Jun–Jul.

Alpine grassy slopes; 3000–4200 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

42. Puccinellia distans (Jacquin) Parlatore, Fl. Ital. 1: 367. 1848.

碱茅 jian mao

Poa distans Jacquin, Observ. Bot 1: 42. 1764; *Atropis distans* (Jacquin) Grisebach; *Puccinellia filiformis* Keng.

Perennial, tufted, pale green. Culms erect or geniculate, 20–40(–60) cm tall, ca. 1–2 mm in diam. Ligule 1–2 mm, truncate or toothed; leaf blade flat or conduplicate, 2–10 cm, 1–2 mm wide, abaxial surface scabrid. Panicle open, 5–15 × 5–6 cm; branches 2–6 per node, horizontally spreading or reflexed, lower part naked, scabrid. Spikelets 4–6 mm, florets 3–7; glumes obtuse, lower glume 1–1.5 mm, 1-veined, upper glume 1.5–2 mm, 3-veined; lemmas 1.8–2.2 mm, base pubescent, apex truncate or rounded; palea keels scabrid; anthers 0.5–0.8 mm. Fl. May–Jul. 2*n* = 28, 42.

Saline moist grassy places, field banks, river valleys, lowland saline abandoned meadows; 100–2000 m. Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; NW Africa, SW Asia, Europe, North America].

43. Puccinellia glauca (Regel) V. I. Kreczetowicz in Komarov, Fl. URSS 2: 484. 1934.

灰绿碱茅 hui lü jian mao

Atropis distans (Jacquin) Grisebach var. *glauca* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 623. 1881; *A. glauca* (Regel) V. I. Kreczetowicz.

Perennial, tufted, grayish green. Culms 20–50 cm tall. Leaf blades flat or conduplicate, 5–15 cm, 1.5–2.5 mm wide. Panicle open, 6–15 cm; branches 2 or 3 per node, 3–8 cm, scabrid, tips with a few spikelets, nodding at maturity. Spikelets 5–6 mm, florets 3–5; lower glume ca. 1.5 mm, upper glume 1.8–2 mm, apex obtuse; lemmas obovate, 1.8–2.4 mm, base pubescent, veins inconspicuous, apex rounded; palea keels scabrid-ciliolate; anthers 0.5–0.8 mm. Fl. Jun–Aug. 2*n* = 42.

Mountainous areas, river valleys, sandy places, fields. Qinghai, Sichuan, Xinjiang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

44. Puccinellia florida D. F. Cui, Fl. Xinjiang. 6: 600. 1996.

玖花碱茅 jiu hua jian mao

Perennials, tufted. Culms erect, 15–40 cm tall. Leaf sheaths smooth, uppermost sheath reaching lower part of panicle; ligule 2–3 mm, acuminate; leaf blades flat or conduplicate, 3–6 cm, 1.2–3 mm wide, margins and adaxial surface scabrid. Panicle contracted, 8–12 × 2–3 cm, branches 2–5 per node, axis and branches scaberulous. Spikelets 6–7 mm, green or slightly tinged with purple, florets 6–9; lower glume 1–1.5 mm, 1-veined, upper glume 1.5–2 mm, 3-veined; lemma 2–2.2 mm, glabrous or subglabrous, upper keel spinulose, margins broadly membranous, apex obtuse or almost truncate; palea keels conspicuously spinulose on upper half; anthers 0.5–0.7 mm. Fl. May–Jul.

● River beaches; ca. 1100 m. Xinjiang.

45. Puccinellia leiolepis L. Liu, Fl. Xizang. 5: 126. 1987.

光稃碱茅 guang fu jian mao

Perennial. Culms erect or base creeping, 15–20 cm tall, much branched. Leaf sheaths broad, loose, uppermost sheath enclosing panicle base; ligule 1–1.5 mm, obtuse; leaf blades flat or conduplicate, 2–5 cm, 1–2 mm wide. Panicle 5–8 × ca. 1 cm; branches 2–4 per node, scabrid, base naked. Spikelets 4–6 mm, florets 5–7; lower glume ca. 1 mm, 1-veined, apex obtuse, upper glume ca. 1.5 mm, 3-veined; lemmas 2–2.3 mm, glabrous, apex obtuse; palea keels scabrid, anthers 0.6–0.8 mm. Fl. Jun–Jul.

● Wet ravines, saline places, alpine meadows; 3000–4500 m. Xizang, Qinghai, Sichuan.

46. Puccinellia hauptiana (Trinius ex V. I. Kreczetowicz) Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 1: 255. 1937.

鹤甫碱茅 he fu jian mao

Atropis hauptiana Trinius ex V. I. Kreczetowicz in Komarov, Fl. URSS 2: 763. 1934; *Puccinellia kobayashii* Ohwi.

Perennial, loosely tufted, grayish green. Culms 15–60 cm tall, 1–2 mm in diam. Ligule 1–1.5 mm; leaf blades flat or conduplicate, 2–6 cm, 1–2 mm wide, margins and adaxial surface scabrid. Panicle open, 6–20 cm; branches 3–8 cm, horizontally spreading or reflexed, scabrid. Spikelets 4–5 mm, florets 5–8; glumes ovate, lower glume 0.7–1 mm, upper glume 1.2–1.5 mm; lemmas 1.6–1.8 mm, green, rarely purply tinged, base pubescent, apex broadly obtuse; palea keels ciliate-scabrid; anthers 0.3–0.5 mm, Fl. Jun–Jul. 2*n* = 28.

River banks, marshy lake shores, ditch banks in fields, low wet saline flats and sandy places in river valleys; 100–3000 m. Anhui, Gansu, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; E Europe, North America].

47. Puccinellia iliensis (V. I. Kreczetowicz) Sergievskaja in Krylov, Fl. Zapadnoi Sibiri 12: 3116. 1961.

伊犁碱茅 yi li jian mao

Atropis iliensis V. I. Kreczetowicz in Komarov, Fl. URSS 2: 763. 1934.

Perennial, densely tufted, grayish green. Culms (5–)10–25(–30) cm tall. Ligule ca. 1 mm; leaf blades thin, 1–6 cm, 0.5–2 mm wide. Panicle open or contracted, 5–8 cm; branches 2–4 per node, slender, scabrid, spikelets 3–5 on upper part. Spikelets 2.5–3 mm, green, later tinged purplish red, florets 2–4(–5); glumes obtuse, lower glume ca. 0.5 mm, upper glume ca. 1 mm; lemmas 1.4–1.6 mm, glabrous, apex rounded; palea keels thinly scabrid on upper part; anthers 0.3–0.5 mm. Fl. Jun–Jul.

Sandy beaches in river valleys, damp grassy places; 600–2000 m. Xinjiang [Kazakhstan, Kyrghyzstan, Uzbekistan].

Tzvelev initially treated this species as a synonym of *Puccinellia hauptiana*, but he now believes that it is best treated as a distinct species.

48. Puccinellia micrandra (Keng) Keng & S. L. Chen, Bull. Bot. Res., Harbin 14(2): 140. 1994.

微药碱茅 wei yao jian mao

Puccinellia distans (L.) Parl. var. *micrandra* Keng, Sunyatsenia 6: 58. 1941.

Perennial, loosely tufted, grayish green. Culms geniculately ascending, 10–20 cm tall, ca. 1 mm in diam. Ligule ca. 1 mm, truncate or triangular; leaf blades short, 2–4 cm, 1–2 mm wide, margins and adaxial surface scabrid. Panicle open, 5–8 × up to 5 cm wide; branches 2 per node, 2–4 cm, lower part naked, smooth; pedicels ca. 0.5 mm, scabrid. Spikelets ca. 2.5 mm, pale yellow, later tinged with purple, florets 2 or 3; lower glume 0.6–1 mm, upper glume ca. 1.2 mm, 3-veined; lemmas ca. 1.5 mm, callus shortly hairy, apex truncate; palea keels smooth; anthers 0.3–0.5 mm. Fl. Jun–Jul.

● Watersides, meadows; 1000–3100 m. Gansu, Hebei, Heilongjiang, N Jiangsu, Nei Mongol, Shanxi.

Tzvelev initially treated this species as a synonym of *Puccinellia hauptiana*, but he now believes that it is best treated as a distinct species.

49. Puccinellia minuta Bor, Nytt Mag. Bot. 1: 19. 1952.

侏碱茅 zhu jian mao

?*Puccinellia platyglumis* L. Liu.

Perennial, small, densely tufted. Culms 3–8 cm tall, glabrous. Leaf sheaths clustered at base; ligule ca. 1 mm; leaf blades conduplicate or inrolled, 1–2 cm, 0.6–1.2 mm wide, margins scabrid. Panicle contracted to spikelike, erect, ca. 2 × 0.5 cm; branches 2 or 3 per node, ca. 0.5 cm, ascending, smooth; spikelets ca. 3.5 mm, purple tinged, florets 2 or 3; glumes keeled, shortly acuminate, lower glume ca. 0.8 mm, upper glume ca. 1.2 mm, 1-veined; lemmas lanceolate, 2.2–2.3(–2.4) mm, glabrous, apex slightly acuminate; anthers 0.6–0.8 mm. Fl. Jun–Jul.

Alpine sandy lake shores, saline meadows; 4000–5100 m. Qinghai, Xizang [Pakistan].

50. Puccinellia himalaica Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17: 66. 1955.

喜马拉雅碱茅 xi ma la ya jian mao

Perennial, tufted. Culms 5–20 cm tall. Leaf sheaths smooth; ligule 0.7–1.8 mm; leaf blade conduplicate or inrolled, 3–4 cm, 0.7–2 mm wide, glabrous or adaxial surface scabrid. Panicle contracted at first, open at maturity, 3–9 × 1–4 cm; branches 2–5 per node, 1–6 cm, slender, ascending, smooth. Spikelets 2.4–3.5 mm, pale green, becoming purple, florets 2–4; glumes with conspicuous midrib, apex acuminate, lower glume 0.9–1.5 mm, 1-veined, upper glume 1.2–1.9 mm, 3-veined; lemmas 1.5–2.1 mm, glabrous, apex obtusely acuminate, sometimes midrib extended into mucro; palea keels smooth or scabrid toward apex; anthers 0.5–0.7 mm. Fl. Jun–Jul.

Open grassy places, marshy sandy places on lake and river shores, meadows, along ditches, moist lake ravines; 3000–5000 m. Xinjiang, W Xizang [Afghanistan, India, Pakistan; SW Asia (Iran)].

65. BRIZA Linnaeus, Sp. Pl. 1: 70. 1753.

凌风草属 ling feng cao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Annual or perennial, slender. Leaf blades linear or broadly linear, flat. Inflorescence an open panicle; pedicels filiform. Spikelets ovate to rotund, laterally compressed or globose, florets several to many, glumes and florets horizontally spreading, disarticulating above glumes and between florets; glumes subequal, shorter than florets, narrowly ovate to orbicular, 3–5-veined, margins broad, scarious, apex hooded; lemmas tightly overlapping, orbicular to oblate, deeply concave, papery to leathery, 5–11-veined, back gibbous, usually slightly keeled, margins broad, membranous, appressed to floret above, base cordate, apex obtuse, cuspidate or 2-lobed; palea slightly or much shorter than lemma, lanceolate to orbicular, keels narrowly winged. Stamens 1–3. Caryopsis plumply elliptic; hilum round to elliptic, or linear.

Twenty-one species: temperate Asia, Europe, and South America; three species (two introduced) in China.

The delicate panicles of plump spikelets on fine trembling pedicels are very ornamental and are used in dried flower arrangements (Quaking Grass).

1a. Panicle drooping, with few spikelets; spikelets ca. 12 × 10 mm; florets 10–12 ..... 3. *B. maxima*
1b. Panicle erect, with numerous spikelets; spikelets 3–6 × 4–7 mm; florets 3–8.
2a. Perennial; ligule 0.5–1.5 mm; spikelets 4–6 mm; anthers 1.5–2 mm ..... 1. *B. media*
2b. Annual; ligule 3–6 mm; spikelets 3–5 mm; anthers ca. 0.4 mm ..... 2. *B. minor*

1. Briza media Linnaeus, Sp. Pl. 1: 70. 1753.

凌风草 ling feng cao

Perennial, shortly rhizomatous. Culms loosely tufted, erect, 40–60 cm tall. Leaf sheaths smooth; leaf blades 4–15 cm × 4–5 mm, margins scabrid, otherwise smooth, apex subacute; ligule 0.5–1.5 mm, truncate. Panicle open, erect, ovate or pyramidal in outline, 4–18 cm, with many pendant spikelets; branches paired, obliquely ascending, sparingly branched; pedicels hairlike, longer than spikelets, flexuous. Spikelets broadly ovate, 4–6 × 5–7 mm, shining, purplish, florets 4–8; lower glume 2.5–3 mm, 1-veined, upper glume 3–3.5 mm, 3–5-

veined; lemmas orbicular, lowest 3–4 mm, 7–9-veined; palea obovate, slightly shorter than lemma, keels glabrous. Anthers 1.5–2 mm. Fl. and fr. Jul–Sep. 2*n* = 14, 28.

Meadow slopes, grassy clearings in forests; 3600–3800 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Nepal; SW Asia, Europe].

2. Briza minor Linnaeus, Sp. Pl. 1: 70. 1753.

银鳞茅 yin lin mao

Annual. Culms usually solitary, erect, slender, 20–60 cm tall. Leaf sheaths thin, soft, smooth, loosely overlapping; leaf blades thin, 4–12 cm × 4–10 mm, adaxial surface and margins scabridulous, apex acute; ligule 3–6 mm, subacute. Panicle open, erect, broadly ovate in outline, 5–10 cm, with many pendant spikelets; branches mostly paired, very slender, obliquely spreading, scabrid; pedicels hairlike, mostly longer than spikelets, flexuous. Spikelets broadly ovate, 3–5 × ca. 4 mm, pale green, florets 3–8; glumes broad, 2–2.5 mm, 3–5-veined, apex rounded; lemmas very broadly ovate, wider than long, lowest 1.5–2 mm, 7–9-veined, back smooth and glossy or pubescent, membranous margins very broad; palea ovate, slightly shorter than lemma, back appressed pubescent or marginal hairs spreading and fringing keels, keels almost wingless, glabrous. Anthers ca. 0.4 mm. 2*n* = 10.

Gardens, cultivated. Fujian, Guizhou, Jiangsu, Taiwan, Zhejiang (Hangzhou Shi) [N Africa, SW Asia, S Europe].

This is a ornamental grass with a delicate panicle of many small, rounded spikelets.

3. Briza maxima Linnaeus, Sp. Pl. 1: 70. 1753.

大凌风草 da ling feng cao

Annual. Culms solitary or loosely tufted, erect or geniculate at base, 20–60 cm tall. Leaf sheaths smooth, glabrous; leaf blades thin, 4–20 cm × 3–8 mm, margins scabrid, otherwise smooth, apex acute; ligule 2–5 mm, obtuse. Panicle loose, nodding, 7–10 cm, sparingly branched with few pendant spikelets; branches inserted singly, scaberulous, sometimes with only 1 spikelet; pedicels hairlike, shorter or longer than spikelet, drooping. Spikelets ovate, ca. 1.2 × 1 cm, tinged reddish brown, florets 7–20; lower glume 5–6 mm, 5-veined, upper glume 6–7 mm, 7–9-veined, margins purple or tawny, apex broadly rounded; lemmas very broadly ovate, wider than long, lowest 7–8 mm, 7–9-veined, glabrous or appressed-pubescent; palea obovate, 1/2–2/3 length of lemma, back glabrous, keels pubescent. Anthers ca. 2 mm. 2*n* = 14.

Gardens. Frequently cultivated in China [N Africa, S Europe].

This is a very attractive ornamental grass with a panicle of relatively few large spikelets. It is widely cultivated and an established introduction in many warm-temperate countries.

66. POA Linnaeus, Sp. Pl. 1: 67. 1753.

早熟禾属 zao shu he shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng, Marina V. Olonova

Annuals or perennials. Culm bases infrequently swollen, or with bulbous sheath bases; new shoots intravaginal or extravaginal, rarely (in China) pseudointravaginal, intravaginal but with reduced or rudimentary lower leaf blades and weakly differentiated prophyl. Uppermost culm leaf sheath closed from 1/20th to entire length; ligule hyaline, membranous or infrequently papery; blade flat, folded, or involute, abaxially keeled, adaxially with 1 groove on either side of the midvein, apex prow-tipped. Inflorescence a terminal panicle; branches 1–9 per node; flowers all bisexual, or mixed bisexual and female (rarely male), with distal female flowers within spikelets, or with partially to wholly female spikelets or inflorescences. Spikelets laterally compressed, florets (1–)2–8(–10), rachilla disarticulating above glumes and between florets, uppermost floret vestigial; vivipary sometimes present; glumes mostly strongly keeled, unequal, or subequal, lower glume 1- or 3-veined, upper glume 3(or 5)-veined; lemmas laterally compressed, usually distinctly keeled, 5(–7)-veined, distal margins and apex membranous, apex awnless, rarely minutely mucronate; floret callus short, truncate, blunt, glabrous or webbed (with a dorsal tuft of woolly hairs), rarely with a line of hairs around base of lemma; palea subequal or infrequently to 2/3 as long as lemma, not gaping, keels green, distinctly separated, usually scabrid, smooth in *Poa* sect. *Micrantherae*, sometimes pilulose to villous, margins usually smooth, glabrous. Lodicules 2. Stamens 3, anthers sometimes vestigial. Ovary glabrous. Caryopsis oblong to fusiform, triangular to oval in cross section, sometimes grooved, free or adhering to the palea. 2*n* = 14–266. *x* = 7.

More than 500 species: throughout Arctic and N and S temperate regions and extending to most subtropical and tropical mountains, in habitats such as temperate forests, mountain slopes, grasslands, wetlands, steppes, alpine areas and tundra, deserts, and around human habitation, on acidic to sub-basic or subsaline, dry to wet soils, from sea level to the upper limits of vegetation; 81 species (14 endemic, at least one introduced) in China.

Poa includes many species useful and important for forage, soil stabilization, and lawns, and several widespread weeds. Five of six recognized subgenera are present in China. (1) *Poa* subg. *Arctopoa*: stout plants with thick rhizomes, scabrid to ciliate lemma margins, and glabrous calluses, found in subsaline to subalkaline wetlands. (2) *Poa* subg. *Ochlopoa*: plants with bulbous sheathed culm bases (spikelets then often viviparous), or if not bulbous then commonly quite smooth throughout, with shortly villous palea keels and no callus hairs, sometimes annuals. (3) *Poa* subg. *Pseudopoa*: slender annuals with scabrid-angled panicle branches, shortish glumes, uppermost culm sheaths closed for 1/15–1/10 their length, glabrous calluses, and scabrid rachillas. (4) *Poa* subg. *Poa*: the largest and most diverse subgenus, including annuals and perennials, with or without rhizomes, but generally with the uppermost culm sheaths closed for over 1/4 their length. (5) *Poa* subg. *Stenopoa*: commonly tufted perennials generally with the uppermost culm sheaths closed for only 1/15–1/5(–1/4) their length, with mainly extravaginal shoots, mostly without rhizomes, mostly with panicle branches that are scabrid angled from the base, and with 3-veined first glumes.

Some species have races with florets that develop into bulbils that can readily send down roots as soon as they drop from the inflorescence (i.e., they are viviparous). Viviparous spikelets often have fairly normal-looking proximal florets. Pubescence on the lemmas and calluses of such florets is often poorly developed relative to that in normal spikelets, or absent. Identification is easiest with plants having normal spikelets.

Hybridization and facultative apomixis are common in some subgenera, especially *Poa* subg. *Poa* and *P.* subg. *Stenopoa*, and the vast majority of species studied are polyploid.

1a. Lemma margins scabrid to long ciliate, or at least between lower margin and marginal vein; glumes often ciliolate on lower margins; plants robust with long thick rhizomes; butts of some old basal sheaths retrorsely strigose, hairs 0.1–0.2 mm ..... 1. *P.* subg. *Arctopoa* (species nos. 1–3)

1b. Lemma margins smooth or sparsely scabrid; glumes never ciliolate on margins; rhizomes present or absent; butts of old basal sheaths glabrous, infrequently finely strigose in *P.* subg. *Stenopoa*, hairs to 0.05 mm.

2a. Culms with bulbous bases due to basally swollen sheaths; spikelets frequently viviparous ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Arenariae*: species nos. 5–7)

2b. Culms without basally swollen sheaths (rarely culm base swollen); spikelets infrequently viviparous.

3a. Palea keels smooth, pubescent; panicle branches smooth ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Micrantherae*: species nos. 8–11)

3b. Palea keels usually scabrid, glabrous or pubescent, if smooth then panicle branches scabrid; if pubescent then with 1 or more hooks near apex.

4a. Panicle branches in distinct whorls; annuals; lower glume 1-veined, much shorter than adjacent lemma ..... 3. *P.* subg. *Pseudopoa* (species no. 12)

4b. Panicle branches not clearly whorled; perennials or infrequently annual; lower glume 1- or 3-veined, subequal to or longer than adjacent lemma.

5a. Uppermost culm sheath closed for less than 1/4 of length; shoots extravaginal; rhizomes usually absent; panicle branches scabrid; lower glume 3-veined ..... 5. *P.* subg. *Stenopoa* (species nos. 64, 66–81)

5b. Uppermost culm sheath closed for ca. 1/4 of length to near top; shoots intravaginal and/or extravaginal; rhizomes sometimes present; panicle branches smooth or scabrid; lower glume 1- or 3-veined.

6a. Leaf blades 1–4 mm wide, mostly shorter than 10 cm; lemmas densely villous on keel and marginal veins, appressed short villous between veins; palea keels shortly villous; plant less than 40 cm, forming dense tufts; callus web absent in Chinese species ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Alpinae*: species no. 4)

6b. Leaf blades 1–10 mm wide, some often over 10 cm; lemmas glabrous or pubescent; palea keels glabrous or pubescent; plant up to 120 cm, forming loose or dense tufts; callus web present or absent.

7a. Palea keels with minute, smooth to apiculate bumps, without distinctly hooked prickle hairs, glabrous; lemmas pubescent on keel, otherwise glabrous; callus long webbed; ligule acuminate; lower glume 1-veined, often sickle-shaped ..... 5. *P.* subg. *Stenopoa* (*P.* sect. *Pandemos*: species no. 65)

7b. Palea keels with hooked prickle hairs, glabrous or pubescent between keels; lemmas glabrous or variously pubescent; callus webbed or not; ligule truncate to acuminate; lower glume 1- or 3-veined, usually not sickle-shaped ..... 4. *P.* subg. *Poa* (species nos. 13–63)

1. *Poa* subg. *Arctopoa* (Grisebach) Probatova, Novosti Sist. Vyssh. Rast. 8: 34. 1971.

类早熟禾亚属 lei zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Glyceria sect. *Arctopoa* Grisebach in Ledebour, Fl. Ross. 4: 392. 1852; *Arctopoa* (Grisebach) Probatova.

Perennials, stoutly rhizomatous; shoots mostly extravaginal. Culms stout, mostly 2–4 mm in diam., smooth. Lowermost leaf sheath retrorsely strigose at base, uppermost sheaths closed 1/6–1/3 of length; blade grayish green, flat, folded, or involute, papery, 2–8 mm wide, abaxially smooth, adaxially nearly smooth to densely scabrid along prominent veins, apex slender prow-tipped; ligule white or off white to brownish or yellowish, membranous-papery. Panicle contracted or open; branches stout; vivipary absent; rachilla smooth or scabrid. Glume veins prominent, margins smooth or scabrid to ciliate or villous, elsewhere smooth, lower glume 1- or 3-veined; lemmas 5–7-veined, veins faint, abaxial surface smooth or scabrid, glabrous or keel and marginal veins villous, outer margins scabrid to ciliate in part; callus obliquely angled, obtuse or pointed, glabrous or nearly so, or with sinuous hairs around the base of the lemma (*P. eminens*); palea scabrid, keels medially hairy, distally scabrid. Anthers 1.6–3.1 mm.

Four or five species: C to E Asia and North America, in high alpine areas to steppes and taiga, and on subarctic sea coasts, generally on subsaline, subalkaline, or saline moist to wet ground; three species in China.

The Chinese species all belong to *Poa* sect. *Aphydris* (Grisebach) Tzvelev. *Poa eminens* C. Presl, the only member of *P.* sect. *Arctopoa* (Grisebach) Tzvelev, was reported for Heilongjiang and Nei Mongol in FRPS (9(2): 93. 2002). We have seen no vouchers from China, and the distribution seems improbable given its otherwise strictly coastal and generally more northern distribution. However, it might yet be found in the upper Tumen River delta.

The lower and middle margins of the lemma are distinctly scabrid to long ciliate, unlike other *Poa* species. DNA data suggest the subgenus arose from hybridization between an ancient lineage of *Poa* and an ancient lineage outside the genus that today includes *Arctophila* (Ruprecht) Andersson and *Dupontia* R. Brown, and it could alternatively be recognized as a separate genus, *Arctopoa*.

1a. Callus usually with a crown of sinuous hairs to 2 mm long, slightly pointed; lemmas membranous-papery, glumes subequal to lowest lemma, lateral veins prominent; plants of coastal habitats (*P.* sect. *Arctopoa*) ..... *P. eminens* (see note above)

1b. Callus glabrous, blunt; lemmas ± papery; glumes generally distinctly shorter than lowest lemma, lateral veins indistinct at least on lower glumes; plants of inland habitats (*P.* sect. *Aphydris*).

2a. Panicle branches smooth; panicle contracted, branches erect ..... 2. *P. tibetica*

2b. Panicle branches scabrid angled; panicle open or only slightly contracted.

3a. Lemma keels glabrous or sparsely pilulose near base; panicle open ..... 1. *P. subfastigiata*

3b. Lemma keels villous; panicle slightly contracted or open ..... 3. *P.* ×*schischkinii*

1. Poa subfastigiata Trinius in Ledebour, Fl. Altaic. 1: 96. 1829.

散穗早熟禾 san sui zao shu he

Arctopoa subfastigiata (Trinius) Probatova; *Glyceria subfastigiata* (Trinius) Grisebach.

Perennials, rhizome stout, 2–3 mm in diam.; shoots mainly extravaginal. Culms erect, (30–)50–115 cm tall, 2–4 mm in diam., smooth, nodes 2 or 3, none or 1 exserted, base enclosed by withered fibrous sheaths. Leaf sheaths loose, smooth, 6–20 cm, several × as long as blade, uppermost closed for 1/6–1/4 of length; blade grayish green, flat or folded, papery, 4–20(–50) cm, 2–8 mm wide, abaxially smooth, adaxially scabrid along the prominent veins, apex slender prow-tipped; ligule white or off-white, 1.5–4 mm, abaxially scabrid, apex truncate, ciliolate, collar margins ciliolate or glabrous. Panicle open, well exserted, (6.5–)10–35 × 10–32 cm; branches widely spreading, strict, 2–5 per node, stout, scabrid angled, longest (5–)10–20 cm, divaricately branching in distal 1/2, with spikelets in distal 1/4. Spikelets ovate to lanceolate, purple or tawny, (5–)6–10 mm, florets 3–5; glumes narrowly to broadly lanceolate, keel scabrid, lower glume 3–4 mm, 1- or 3-veined, upper glume 4–5 mm, 3-veined, margins smooth or proximally sparsely scabrid to ciliate; lemmas broadly lanceolate, 4–5.5(–6) mm, glabrous throughout or base minutely hairy, intermediate veins indistinct, margins sometimes sparsely scabrid or ciliate; callus glabrous; palea proximally scabrid to pilulose between keels, keels distally scabrid, medially ciliate, pilulose or villous. Anthers 1.6–2.6(–3) mm. Fl. and fr. Jun–Jul. 2*n* = 28, 42, 91, 97.

Desert lake-basins, steppe wetlands, moist grassy places on river shores, saline sandy places, meadows. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai [Mongolia, Russia (Far East, Siberia)].

This species has spikelets up to 1 cm long, effuse panicles up to 32 cm wide, glabrous lemmas, a glabrous callus, and a thick and well-developed rhizome. It is a forage species used for soil stabilization in arid regions.

2. Poa tibetica Munro ex Stapf in J. D. Hooker, Fl. Brit. India 7: 339. 1896 [“1897”].

西藏早熟禾 xi zang zao shu he

Poa chushualana Rajeshwari et al.; *P. spiciformis* D. F. Cui (2001), not (Steudel) Hauman & Parodi (1929).

Perennials, stoutly rhizomatous or stoloniferous; shoots mainly extravaginal. Culms erect or obliquely ascending (or geniculate), (15–)20–60(–90) cm tall, 2–3 mm in diam., smooth, glabrous, nodes 1 or 2 in lower part, sometimes 1 exserted, base enclosed in withered fibrous sheaths. Leaf sheaths of culm smooth, uppermost closed for 1/4–1/3 of length, of tillers smooth and glabrous or infrequently densely retrorsely scabrid to hispidulous; blade grayish green, flat, folded, or involute, papery, 3.5–12.5 cm, (1–)2–5 mm wide, abaxial surface smooth, adaxial surface with scabrid margins and veins, apex slender prow-tipped, somewhat pungent, blades of tillers 12–18(–35) cm, surfaces glabrous (or pubescent); ligule white or off-white, brownish to yellowish, firmly membranous, 1–2(–5.5) mm, abaxially scabrid, apex rounded, ciliolate, sometimes irregularly dentate. Panicle contracted to spikelike, often interrupted, 5–13 × 1–2(–3) cm; branches erect or steeply ascending, strict, (1–)2–4(–5) per node, rounded, smooth, longest 1–5 cm with spikelets from base or in distal 1/2–3/4. Spikelets pale green, sometimes purple, (4–)5–8(–9) mm, florets 3–6(–8); vivipary absent; rachilla internodes 0.5–1.5 mm, smooth or scabrid; glumes smooth except for a few hooks on the upper part of keel, margins smooth or faintly to prominently scabrid, proximally ciliate or villous, lower glume 2.5–4.6 mm, narrow, 1- or 3-veined, upper glume 3.5–6 mm, 3-veined; lemmas broadly lanceolate, 3.8–5.7 mm, apex and margins ± membranous, sometimes minutely mucronate, lower half of keel and marginal veins villous, upper part nearly smooth to closely scabrid, intermediate veins indistinct; callus glabrous or with 1 to several hairs, these straight, to 1.5 mm; palea smooth or scabrid between keels, keels ciliate, medially pilulose or villous, distally scabrid. Anthers 2–3.1 mm. Fl. and fr. Jul–Sep.

Marshy meadows, riversides, lake banks, grassy places, ditch banks, saline meadows, saline moist places; 3000–4500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; SW Asia (Iran)].

This is a stout species with well-developed, thick rhizomes, contracted to spikelike panicles, sparsely long villous lemma keel and margins, and usually a glabrous callus. The types of *Poa chushualana*, *P. stenostachya*, and *P. spiciformis* have not been seen, but their descriptions fit within the variation of this species, though they cannot all be placed to variety reliably. *Poa chushualana*, from Kashmir, just W of the Xizang border, is said to differ by its stoloniferous form, geniculate culm bases, and leaf blades 1–3 mm wide with pubescent surfaces. *Poa tibetica* s.l. needs detailed study. Some gatherings from China might be *P. tianschanica*. The exact identity of *P. tianschanica* is problematic and the Chinese material could prove to be a robust form of *P. pratensis* or the product of past hybridization with that species.

1a. Spikelets narrowly elliptical, 6.6–8.2 mm; lemmas 5.3–5.7 mm ..... 2a. var. *aristulata*
1b. Spikelets ovate to elliptical, 5–5.5 mm; lemmas 4–4.5 mm ..... 2b. var. *tibetica*

2a. Poa tibetica var. **aristulata** Stapf in J. D. Hooker, Fl. Brit. India 7: 339. 1896 [“1897”].

芒柱早熟禾 mang zhu zao shu he

Poa pseudotibetica Noltie.

Culms stout, to 45 cm tall, smooth, leafy in lower 1/2–2/3. Blade 4–16 cm; ligule 1.5–5.5 mm, apex subacute, irregularly dentate. Panicle contracted, up to 9 cm. Spikelets narrowly elliptical, 6.6–8.2 mm, florets 3 or 4; vivipary absent; lower glume 4–4.6 × 1.5–1.7 mm, upper glume 4.8–6 × 2–2.4 mm; lemmas 5.3–5.7 mm, firmer, long acute. Anthers 2.2–3.1 mm.

Marshy meadows at high elevations. Xinjiang, Xizang [India (Sikkim)].

Plants of the S Xizang-Qinghai Plateau have been treated as a separate species, *Poa pseudotibetica*, but no clean break was noticed between this and more northern material.

2b. Poa tibetica var. **tibetica**

西藏早熟禾(原变种) xi zang zao shu he (yuan bian zhong)

Poa ciliatiflora Roshevitz; *P. stenostachya* S. L. Lu & X. F. Lu (2001), not R. Brown (1810); *P. stenostachya* var. *kokonorica* S. L. Lu & X. F. Lu.

Culms erect or obliquely ascending, 20–60 cm tall. Leaf blade 4–7 cm, of tillers 12–18 cm; ligule membranous, 1–2 (–3.5) mm, apex rounded. Panicle contracted to spikelike, 5–10 cm. Spikelets ovate to elliptical, 5–5.5 mm, florets 3–5; lower glume 2.5–3.5 mm, narrow, upper glume 3.5–5 mm; lemmas 4–4.5 mm, a little thinner and subacute. Anthers ca. 2 mm. Fl. and fr. Jul–Sep. 2*n* = 42.

Marshy meadows, riversides, lake banks, grassy places, ditch banks, saline meadows, saline moist places; 3000–4500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, W Xizang [NW India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; SW Asia (Iran)].

Poa stenostachya seems to differ from *P. tibetica* var. *tibetica* only in its longer ligules, 3–3.5 mm.

3. Poa ×schischkinii Tzvelev, Novosti Sist. Vyssh. Rast. 11: 32. 1974, pro sp.

希斯肯早熟禾 xi si ken zao shu he

Arctopoa ×schischkinii (Tzvelev) Probatova.

Perennials, stoutly rhizomatous; shoots extravaginal. Culms stout, erect, simple, 25–40(–60) cm tall, 2–3 mm in diam., smooth, nodes 2 or 3, sometimes 1 exserted, base enclosed by withered fibrous sheaths. Leaf sheaths loose, smooth, 6–20 cm, several × longer than its blade, basal ones strigose near the nodes only, uppermost closed for 1/6–1/4 length; blade grayish green, flat or folded, papery, 4–20(–50) cm, 2–8 mm wide, abaxially smooth, adaxially scabrid along the prominent veins, apex slender prow-tipped; ligule white or off-white, 1.5–3 mm, abaxially scabrid, apex truncate, ciliolate, collar margins ciliolate or glabrous. Panicle open, diffuse, 10–20 × 10–15 cm; branches spreading widely, strict, 2–5 per node, stout, angular, scabrid, longest (5–)10–20 cm, branching divaricately in distal 1/2, with spikelets in distal 1/4. Spikelets oblong to lanceolate, 5–7 mm; vivipary absent; glumes narrowly to broadly lanceolate, 3–4 mm, keel scabrid, surface smooth, lower glume slightly shorter, 1(or 3)-veined, proximally ciliate or villous, distally smooth or margins scabrid; lemmas ca. 5 mm, keel and marginal veins proximally densely villous; callus glabrous; palea proximally scabrid to pilulose between keels, keels medially ciliate, pilulose or villous. Anthers ca. 2.2 mm. Fl. and fr. Jul–Aug.

Sporadic in steppe grasslands on middle to high mountains, saline wet meadows. Nei Mongol, Qinghai, Xinjiang (Altay) [Mongolia, Russia (Siberia)].

Tzvelev (Zlaki SSSR, 1976) suggested that *Poa ×schischkinii* is a hybrid between *P. tibetica* and *P. subfastigiata*. The sporadic occurrence of intermediate forms suggests that these may represent remnants of a series of hybrids or introgressed plants between parents that are no longer or only sporadically in contact.

2. Poa subg. **Ochlopoa** (Ascherson & Graebner) Hylander, Bot. Not. 1953: 354. 1953.

黄褐早熟禾亚属 huang he zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Poa sect. *Ochlopoa* Ascherson & Graebner, Syn. Mitteleur. Fl. 2: 387. 1900; *Ochlopoa* (Ascherson & Graebner) H. Scholz.

Annuals or perennials, tufted, not rhizomatous, sometimes stoloniferous in *Poa* sect. *Micrantherae*; shoots with or without bulbous bases. Culm bases bulbous or not. Uppermost leaf sheaths smooth, closed for ca. 1/4 length; blade flat or folded, papery to thickly papery; ligule membranous. Panicle open or somewhat contracted; branches smooth or scabrid; spikelets compact; vivipary present (frequent in *P.* sect. *Arenariae*) or absent; glumes usually 3-veined. Anthers 0.2–2 mm.

Thirty species: worldwide, mostly in N Africa, C and SW Asia, and Europe, in habitats such as temperate forests, steppes, alpine areas, and disturbed places, on moist to dry ground; eight species in China.

The Chinese species belong to three sections: *Poa* sect. *Alpinae* (Hegetschweiler ex Nyman) Stapf (species no. 4); *P.* sect. *Arenariae* (Hegetschweiler ex Nyman) Stapf (species nos. 5–7); and *P.* sect. *Micrantherae* Stapf (*Poa* sect. *Ochlopoa*; species nos. 8–11).

1a. Culms with bulbous bases due to basally swollen sheaths; spikelets frequently viviparous *(P.* sect. *Arenariae*).
2a. Lemma entirely glabrous; plants of mountain slopes and meadows ..... 5. *P. bactriana*
2b. Lemma somewhat pilulose to villous in lower part of the veins (if spikelets viviparous, the pubescence is retained only on a few of the least modified lemmas or is absent); plants from lower (hilly steppe) regions and plains.
3a. Plants usually over 15 cm tall; ligules of tillers usually hyaline or slightly milky-white, 1/15–1/7(–1/5) as long as blade; panicle 2–8 cm ..... 6. *P. bulbosa*
3b. Plants (3–)5–15(–20) cm tall; ligules of tillers white, 2–5 mm long, usually 1/5–1/2 as long as blade; panicle 0.8–2.3 cm ..... 7. *P. timoleontis*
1b. Culms without basally swollen sheaths (rarely culm base swollen); spikelets infrequently viviparous.
4a. Palea keels usually scabrid; panicle branches smooth or distally sparsely scabrid (*P.* sect. *Alpinae*) ..... 4. *P. alpina*
4b. Palea keels smooth; panicle branches smooth (*P.* sect. *Micrantherae*).
5a. Anthers 0.2–1 mm; annuals; lemma with intermediate veins pubescent (rarely the whole lemma glabrous), area between veins glabrous.
6a. Anthers 0.6–1 mm, more than 1.5 × longer than wide; panicle branches ascending to widely spreading or reflexed ..... 8. *P. annua*
6b. Anthers 0.2–0.5 mm, not more than 1.5 × longer than wide; panicle branches ascending ..... 9. *P. infirma*
5b. Anthers 1.2–3.5 mm; perennials; lemma with intermediate veins glabrous or pubescent, area between veins glabrous or pubescent.
7a. Palea keels shortly villous, smooth; lemmas glabrous between veins; anthers (1.2–)1.5–1.8(–2.5) mm ..... 10. *P. supina*
7b. Palea keels glabrous, scabrid; lemmas sparsely pubescent or glabrous between veins; anthers 1.7–3.25 mm ..... 11. *P. veresczaginii*

4. Poa alpina Linnaeus, Sp. Pl. 1: 67. 1753.

高山早熟禾 gao shan zao shu he

Perennials, densely tufted; shoots intravaginal. Culms erect or obliquely ascending, (5–)10–30(–45) cm tall, usually several per tuft, smooth, nodes often 2, 1 exserted. Leaf sheath smooth, glabrous, 2 or more × as long as blade, basal ones persistent, investing culm bases, uppermost closed for 1/4 length; ligule white, 2–4(–5) mm, abaxially smooth, of tillers 1–2 cm long; blade grayish green, flat or folded, thickly papery, withering, 3–10(–16) cm, 2–6 mm wide, surfaces glabrous, margins smooth or sparsely scabrid, apex prow-tipped. Panicle loosely contracted to open, ovoid to oblong (pyramidal at anthesis), 2–7 × 2–3 cm, purple tinged; branches ascending to spreading, 2 per node, rounded, smooth or distally sparsely scabrid, longest 2(–3) cm, divaricately rebranched with moderately crowded spikelets in distal 1/2. Spikelets broadly ovate, 4–8 mm, florets 3–5(–7); vivipary absent in China; rachilla internodes ca. 0.5 mm, smooth, glabrous (rarely slightly pilulose); glumes broadly ovate, membranous-papery, subequal, faintly 3-veined, keel arched, scabrid, surfaces smooth, margins membranous, smooth, apex acute, lower glume 2.5–3(–4) mm, upper glume 3.4–4.5 mm; lemmas broadly ovate, membranous-papery, apex and margins broadly membranous, keel arched, keel villous for 2/3 of length, marginal veins for 1/2 length, intermediate veins indistinct, area between veins pilulose to short villous; callus glabrous; palea glabrous or proximally infrequently pilulose between keels, keels scabrid, often medially pilulose to shortly villous. Anthers 1.2–2 mm. Fl. and fr. Jul–Sep. 2*n* = 22, 28, 32, 33, 34, 35, 42, 44, 58.

Low arctic to subalpine meadows, sporadic in taiga, slopes, crevices along ditch banks, sandy places; 2400–3800 m. Qinghai, Xinjiang, Xizang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan; SW Asia (Iran), Europe, North America].

This species has spikelets broadly ovate, lower glumes 3-veined, lemma proximally pubescent between veins, callus glabrous, old sheaths persistent and closely overlapping, anthers more than 1.2 mm, and palea keels shortly villous, together making it quite distinct from other species. Gatherings from arctic regions and European mountains are often viviparous, but such plants have not been recorded from China.

5. Poa bactriana Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 4: 93. 1923.

荒漠早熟禾 huang mo zao shu he

Perennials, densely tufted; shoots with bulbous bases. Culms (2–)8–60 cm tall, erect, base with swollen, withered leaf sheaths. Leaf sheath smooth, glabrous, uppermost culm sheath closed for 1/4 length; blade flat or folded, thin, 2–15 cm, 1–3 mm wide, surfaces and margins scabrid, apex slender prow-tipped; ligules 1.5–3 mm, apex obtuse, rounded, of tillers 0.7–1.5 mm. Panicle loosely contracted to open, oblong to pyramidal, well exserted, 2–10 cm; branches obliquely ascending or spreading, 2–3(–4) per node, smooth, longest with sparse to moderately crowded spikelets. Spikelets green or apices purple, ovate to elliptic, (3–)4–7 mm, florets 2–4(–6); vivipary present or absent; glumes unequal, lower glume 2–3 mm, 1-veined, upper glume wider, 3–3.5 mm, 3-veined; lemmas elliptic to lanceolate, 2–3.5(–4) mm, veins glabrous throughout, keel and marginal veins scabrid; callus glabrous; palea keels scabrid. Anthers (0.6–)1.2–2 mm. Fl. and fr. Apr–May.

Juniperus forests, among shrubs, mountainous areas, dry grassy places on slopes, stony and silty slopes, desert grasslands; 400–4000 m. Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

This species is uncommon or rare in the mountains of far W and NW China.

1a. Panicle loosely contracted; normal lemmas 2.7–3.2 mm; spikelets viviparous in China ..... 5a. subsp. *bactriana*
1b. Panicle fairly diffuse; lemmas 2–2.7 mm; spikelets normal flowered in China ..... 5b. subsp. *glabriflora*

5a. Poa bactriana subsp. **bactriana**

荒漠早熟禾(原亚种) huang mo zao shu he (yuan ya zhong)

Culms 20–60 cm. Leaf blade 2–15 cm × 1–3.5 mm, surfaces and margins scabrid. Panicle loosely contracted, oblong, sometimes lobed, usually well exserted, 3–10 cm. Spikelets green or tips purple, (3–)4–7 mm, florets 2–4(–6); vivipary present in most spikelets; glumes unequal, lower glume 2–3 mm, 1-veined, upper glume wider, 3–3.5 mm, 3-veined; lemmas elliptic to lanceolate, 2.7–3.2 mm, abaxial surface glabrous, keel and marginal veins scabrid. Anthers 1.2–1.8 mm. Fl. and fr. Apr–May.

Mountainous areas, desert grasslands; 400–2700 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

The Chinese material all belongs to var. *vivipara* Tzvelev (Novosti Sist. Vyssh. Rast. 10: 96. 1973).

5b. Poa bactriana subsp. **glabriflora** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 96. 1973.

光滑早熟禾 guang hua zao shu he

Poa bulbosa Linnaeus var. *glabriflora* Roshevitz, Fl. Turkmen. 1: 143. 1932; *P. bactriana* subsp. *zaprjagajevii* (Ovczinnikov) Tzvelev; *P. glabriflora* (Roshevitz) Roshevitz ex Ovczinnikov; *P. scitula* Bor; *P. zaprjagajevii* Ovczinnikov.

Culms (2–)8–40 cm. Leaf blade ca. 2 cm × 0.5–2 mm, surfaces scabrid, in tillers flat or folded with margins inrolled or not, elongated, narrower. Panicle oblong to lanceolate, fairly diffuse, 2.5–10 × 1–2 cm. Spikelets tawny, purple tinged, ca. 4 mm; vivipary commonly present, or absent (in Chinese material); glumes, lower glume ca. 1.5 mm, upper glume ca. 2 mm; lemmas 2–2.7 mm, keel and veins only slightly scabrid, otherwise glabrous. Anthers 0.6–1.2(–1.5) mm. Fl. and fr. May–Jul.

Middle and upper mountain zones, dry grassy places on slopes, stony and silty slopes; 2400–4000 m. ?Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

The distinction between subsp. *zaprjagajevii* and subsp. *glabriflora* is between plants from alpine habitats with distinctly purple, open panicles, sparsely scabrid branches with only a few spikelets (subsp. *zaprjagajevii*), and plants from middle mountains with pale green or pinkish violet tinged, loosely contracted panicles with several (often viviparous) spikelets (subsp. *glabriflora*). From the limited material seen we doubt the value of keeping them apart. *Poa scitula* Bor is an excellent match for subsp. *zaprjagajevii*.

Poa (sect. *Arenariae*) *vvedenskyi* Drobow was reported in FRPS (9(2): 224. 2002) from alpine grassy places at ca. 3000 m in Xinjiang, but no voucher has been seen by us and it is probably not present in China. Tzvelev (Zlaki SSSR, 451. 1976) wrote that *P. vvedenskyi* is endemic to the Uzbekistan Chulbair Range of the Gissar Mountains and adjacent Afghanistan as reported by Bor (in Rechinger, Fl. Iran. 70: 28. 1970). The report in FRPS from Xinjiang more likely represents *P. bactriana* subsp. *glabriflora* or (if separated) subsp. *zaprjagajevii*. *Poa vvedenskyi* can be distinguished from normal-flowered plants of *P. bactriana* by the pubescent lemmas, and from normal-flowered plants of *P. bulbosa* by having panicles sparse, with almost smooth branches, bearing 1–3 spikelets each; lemmas lanceolate, 3–5 mm, pinkish violet, apex gradually tapering, slightly pilose along veins proximally; spikelets always normal-flowered; alpine plants, 10–15 cm tall.

6. Poa bulbosa Linnaeus, Sp. Pl. 1: 70. 1753.

鳞茎早熟禾 lin jing zao shu he

Perennials, densely tufted; shoots with bulbous bases. Culms erect or geniculately ascending, (9–)15–55 cm tall, base with bulbous withered leaf sheaths, nodes 2 or 3, exserted. Leaf sheath smooth, uppermost culm sheath closed for 1/4 of length, tiller sheaths usually less than 1/15–1/7(–1/5) length of blades; blades flat or folded, thin, soon withering, mostly basal, 2–10 cm, 0.5–2(–2.5) mm wide, surfaces smooth, margins scabrid, not cartilaginous; ligule hyaline or milky-white, 1–2(–3.5) mm, apex acuminate. Panicle contracted (looser in viviparous inflorescences), oblong to ovate, 2–8 cm; branches obliquely ascending, 2–4 per node, scabrid, longest to 2 cm. Spikelets purple tinged, 3.5–5(–7.5) mm, florets 2–6 (when normal); vivipary commonly present; rachilla smooth, glabrous; glumes subequal, ovate, 3-veined, 2–3 mm, keel sparsely scabrid; lemmas normal or viviparous, lower 1 or 2 normal, (2.5–)3–3.5 mm, apex acute, keel villous to 2/3 of length, marginal veins to 1/2, area between veins glabrous, often glabrous throughout in viviparous spikelets; callus webbed, hairs moderately dense, commonly glabrous in viviparous spikelets; palea keels scabrid. Anthers (1–)1.4–1.6 mm, usually abortive in viviparous spikelets. Fl. and fr. May–Jul. 2*n* = 14, 28, 39, 42, 45.

Plains, sandstone slopes, desert grasslands, river shores, wastelands near fruit gardens; 700–4700 m. Xinjiang, Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe; introduced in Australia, New Zealand, North and South America, and Pacific Islands].

This widespread and weedy species is probably introduced in China. It is a useful spring forage. It is readily recognizable by the bulbous sheathed bases of the shoots and common occurrence of vivipary. FRPS (9(2): 212. 2002) reported viviparous material of *Poa sinaica* Steudel from Qinghai and Xinjiang, but this normally non-viviparous species is unlikly to be present in China. It occurs from SW Asia to Afghanistan and W Pakistan. Normal-flowered material is needed to see the key distinctions of lemma length (3.5–4.5 mm) and glabrous calluses. The Chinese material seems a better match for *P. bulbosa*, and we conclude that *P. sinaica* does not occur in China.

1a. Viviparous spikelets present ..... 6c. subsp. *vivipara*
1b. Viviparous spikelets absent.
  2a. Callus with a tuft of long sinuate hair on dorsal surface ..... 6a. subsp. *bulbosa*
  2b. Callus glabrous; pubescence of lemma less dense, sometimes almost glabrous ..... 6b. subsp. *nevskii*

6a. Poa bulbosa subsp. **bulbosa**

鳞茎早熟禾(原亚种) lin jing zao shu he (yuan ya zhong)

Poa psammophila Schur.

Culms (9–)15–40 cm tall. Spikelets normal flowered, vivipary absent; lemmas 3–3.5 mm, apex acuminate, lower keel and marginal veins villous; callus webbed. Anthers (1–)1.4–1.6 mm. $2n = 42$.

Plains, sandstone slopes, desert grasslands; 700–4700 m. Xinjiang [Afghanistan, Pakistan (rare), Russia (European part), Turkmenistan (rare); SW Asia, Europe; introduced in North America].

This subspecies was reported from China in FRPS (9(2): 223. 2002, as var. *bulbosa*) and Fl. Xinjiang. (6: 84. 1996), but these records have not yet been confirmed by us.

6b. Poa bulbosa subsp. **nevskii** (Roshevitz ex Ovczinnikov) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 95. 1973.

尼氏早熟禾 ni shi zao shu he

Poa nevskii Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 10. 1933.

Culms 35–60 cm tall. Leaf blade 2–2.5 mm wide, narrower in tillers. Vivipary absent; lemmas 2.5–3.5 mm, keel and marginal veins sparsely shortly villous or glabrous throughout; callus glabrous. Anthers ca. 2 mm. Fl. and fr. May–Jun.

Grassy places on slopes; 3000–4000 m. Xinjiang [Tajikistan, Turkmenistan, Uzbekistan].

This subspecies was reported from Xinjiang in FRPS (9(2): 224. 2002, as *P. nevskii*), but not in Fl. Xinjiang. (6, 1996). The presence of this taxon in China has not been confirmed by us.

6c. Poa bulbosa subsp. **vivipara** (Koeler) Arcangeli, Comp. Fl. Ital. 785. 1882.

胎生鳞茎早熟禾 tai sheng lin jing zao shu he

Poa bulbosa var. *vivipara* Koeler, Descr. Gram. 189. 1802; *P. desertorum* Trinius; *P. crispa* Thuillier.

Culms 15–55 cm tall. All or most spikelets viviparous; lemmas 3–4 mm, glabrous or basal 1 or 2 pubescent; distal florets viviparous, forming bulbils, bulbil lemmas becoming swollen and purple at base, apex elongated and developing a blade; callus glabrous or webbed. Anthers occasionally well developed in proximal floret. $2n = 21, 28, 39, 42$.

River shores, wastelands near fruit gardens, desert grasslands; 700–4300 m. Xinjiang, Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe; introduced in Australia, North and South America, and Pacific Islands].

Pubescence is often poorly developed or absent in proximal florets of viviparous spikelets.

7. Poa timoleontis Heldrich ex Boissier var. **dshilgensis** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 94. 1973.

季莨早熟禾 ji gen zao shu he

Poa dshilgensis Roshevitz in Komarov, Fl. URSS 2: 377. 1934.

Perennials, densely tufted; shoots with bulbous bases. Culms 2–10(–19) cm tall, densely tufted, smooth. Leaf sheath margins hyaline, basal culm sheaths persistent, uppermost closed for 1/4 of length; blades folded, thin, 1–2 cm × 0.5–1 (–2.5) mm, surfaces scabrid, margins scabrid; ligules of tillers white, (2–)3–6 mm, 1/5–1/2 as long as blade. Panicle loosely contracted, oblong, compact, 0.8–2.3 cm; branches purplish violet, 1–3 per node, longest 0.5–1.5 cm. Spikelets 4–10 mm (2.5–4 mm in normal spikelets), florets 3–7; vivipary present in all or most spikelets; rachilla smooth, glabrous; glumes subequal, lower glume ca. 2 mm, upper glume ca. 2.5 mm; lemmas 1.8–2.5 mm, margins membranous, veins indistinct, keel and marginal veins proximally sparsely villous or more commonly glabrous throughout in viviparous spikelets; callus glabrous; palea keels scabrid. Anthers 1–1.5 mm (rarely developed in viviparous spikelets). Fl. and fr. Jun–Aug.

Mountain slopes, grasslands; ca. 2500 m. Xinjiang (Artux) [Afghanistan, Kazakhstan; SW Asia, S Europe].

Normal-flowered *Poa timoleontis* var. *timoleontis* occurs only in the Mediterranean region. The viviparous var. *dshilgensis* is known only from a few C Asian countries and one gathering from China, but we have expanded the circumscription to include taller viviparous plants from SW Asia and Europe; the long, white ligule and dwarf, bulbous-based habit make it readily recognizable. FRPS (9(2): 224–225. 2002) additionally reported viviparous *P. timoleontis* s.s. from China. Bor (in Rechinger, Fl. Iran. 70: 26. 1970) and Tzvelev (Zlaki SSSR, 449. 1976) gave the range of *P. timoleontis* var. *timoleontis* as Greece and SW Asia to Iran. No material from China seen by us matches the taller viviparous form, and it is possible that the material reported in FRPS belongs to *P. bulbosa*. In the former USSR, the viviparous var. *dshilgensis* is known only from the type, from Kazakhstan. Bor gave the range of *P. dshilgensis* as Afghanistan and Tajikistan, but no Russian or Tajikistani Flora has reported it from Tajikistan.

8. Poa annua Linnaeus, Sp. Pl. 1: 68. 1753.

早熟禾 zao shu he

Poa annua f. *reptans* (Haussknecht) T. Koyama; *P. annua* var. *reptans* Haussknecht; *P. crassinervis* Honda.

Annuals, sometimes over wintering, infrequently stoloniferous. Culms loosely tufted, erect or oblique, often decumbent, often geniculate, soft, 6–30(–45) cm tall, smooth, nodes 1 or 2(or 3), 1(or 2) exserted. Leaf sheath slightly compressed, thin, smooth, uppermost closed for ca. 1/3 of length; blade light to dark green, flat or folded, thin, 2–12 cm × (0.8–)1–3.5 mm, margins slightly scabrid, apex acutely prow-tipped; ligules 0.6–3 mm, abaxially smooth, glabrous, apex obtuse, margin irregularly dentate, smooth. Panicle open, moderately congested, broadly ovoid to pyramidal, (1–)3–10 cm, as long as wide; branches ascending, spreading, or a few reflexed, 1 or 2(–3) per node, smooth, longest with usually 3–5 spikelets in distal 1/2. Spikelets ovate to oblong, dark to light green, (3–)4–5.5 mm, florets 3–5, distal fertile florets often female; vivipary absent; rachilla internodes 0.5–1.5 mm, smooth, glabrous, hidden or exposed; glumes unequal, smooth or rarely keeled with hooks, lower glume lanceolate and acute to subflabellate and obtuse, 1.5–2(–3) mm, 1-veined, upper glume elliptic, 2–3(–4) mm, 3-veined, the margin angled; lemmas ovate, 2.2–3.5 mm, apex and margins broadly membranous, intermediate veins prominent, keel and marginal, and usually intermediate, veins villous in the lower 1/2, rarely glabrous throughout; callus glabrous; palea keels smooth, densely pilulose to short villous. Anthers 0.6–1 mm, usually at least 2 × as long as wide, or vestigial. Fl. Apr–May, fr. Apr–Jul. $2n = 28$.

Weed of disturbed, often moist and shady ground; near sea level to 4800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Europe, North and South America, Pacific Islands].

Poa annua is easily distinguished from other short-anthered *Poa*, other than *P. infirma*, by the annual habit, absence of a web on the callus, and the near absence of hooks on the panicle branches and spikelet bracts, in combination with densely pubescent palea keels that lack hooked prickle hairs at the apex. Plants with glabrous florets are sporadically encountered.

Plants perennating by short stolons rooting at the nodes appear to develop repeatedly but sporadically at various elevations with prolonged, cool, mesic growing conditions, possibly in response to trampling. These are sometimes placed in var. *reptans*. Such plants have been recorded from Yunnan.

9. Poa infirma Kunth in Humboldt et al., Nov. Gen. Sp. 1: 158. 1816 [“1815”].

低矮早熟禾 di ai zao shu he

Poa annua Linnaeus subsp. *exilis* (Tommasini ex Freyn) Ascherson & Graebner; *P. annua* var. *exilis* Tommasini ex Freyn; *P. exilis* (Tommasini ex Freyn) Murbeck.

Annuals. Culms loosely tufted, erect or oblique, often decumbent, often geniculate, soft, 5–25 cm tall, smooth, nodes 1 or 2(–3), 1(or 2) exserted. Leaf sheaths, thin, smooth, uppermost closed for ca. 1/3 of length; blade light green, flat or folded, thin, 2–8 cm × 1–3 mm, margins smooth or sparsely scabrid, apex acutely prow-tipped; ligule membranous, 1–3 mm, abaxially smooth, glabrous. Panicle open, ovoid-oblong, 2–10 cm, 1–2 × as long as wide; branches ascending, 1–3 per node, smooth, longest usually with 5–9 moderately crowded spikelets in distal 1/2. Spikelets ovate to oblong, light green, 3–4 mm, florets 4–6, distal fertile florets often female; vivipary absent; rachilla internodes 1–1.5 mm, smooth, glabrous, often exposed; glumes unequal, margins broadly membranous, smooth, lower glume lanceolate and acute to subflabellate and obtuse, 1–1.5 mm, 1-veined, upper glume elliptic, margin angled, 1.8–2.5 mm, 3-veined; lemmas ovate, membranous-papery, 2–2.5 mm, keel densely villous, marginal and lateral veins densely villous; callus glabrous; palea keels without hooks, densely pilulose to short-villous. Anthers 0.2–0.5 mm, round to short elliptical, less than 1.5 × as long as wide, or vestigial. Fl. and fr. May–Aug. 2*n* = 14.

Sporadic in moist meadows, gardens, sandy places, shady disturbed ground; 1000–2000 m. Fujian, Shanxi, Sichuan, Zhejiang [India, Pakistan, Tajikistan; Africa, SW Asia, Australia, Europe, Japan, New Zealand, North America, Pacific Islands, South America].

Poa infirma differs from *P. annua* in its shorter, more spherical or slightly lozenge-shaped anthers, and diploid chromosome number. It also has more ascending branches with more crowded spikelets.

10. Poa supina Schrader, Fl. Germ. 1: 289. 1806.

仰卧早熟禾 yang wo zao shu he

Poa variegata A. Haller, Cat. Pl. Helv. 38. 1800, not Lamarck (1791); *P. annua* Linnaeus var. *supina* (Schrader) Link; *P. supina* subsp. *ustulata* (S. E. Fröhner) Á. Löve & D. Löve; *P. ustulata* S. E. Fröhner.

Perennials, sometimes stoloniferous; shoots mostly extravaginal. Culms tufted or isolated, oblique, decumbent at base, frequently geniculate above, soft, (4–)8–20(–30) cm tall, 0.5–0.7 mm in diam., smooth, nodes 1 or 2(–3), 1(or 2) exserted. Leaf sheaths thin, smooth, basal ones drying pale brown and soon withering, enclosing culm bases, uppermost closed for 1/4–1/3 of length, 1.5–5 × longer than blade; blade light green, flat or folded, thin, 2–6 cm × 2–3 mm, surfaces smooth, margins smooth or sparsely scabrid, apex acutely prow-tipped; ligule 0.6–1.5 mm, abaxially smooth, glabrous, apex obtuse. Panicle open to loosely contracted, compactly pyramidal to ovoid, diffuse to moderately congested, (1.5–)2–5 cm, 1–2 × as long as wide; branches ascending to spreading, 1 or 2 per node, rounded, smooth, longest to 2 cm with 2–8 spikelets in distal 1/2. Spikelets ovate to oblong, light green, frequently purple tinged, 3.5–5(–6) mm, florets 3–6, distal fertile florets often female; vivipary absent; rachilla internodes 0.5–0.8 mm, smooth, glabrous; glumes unequal, smooth or sparsely scabrid, membranous-papery, lower glume lanceolate and acute to subflabellate and obtuse, ca. 1.5 mm, 1-veined, upper glume elliptic, 2–2.5 mm, margin angled, 3-veined; lemmas elliptic or oblong to ovate, membranous-papery, 1.4–3.5(–4) mm, keel and marginal veins sparsely villous or glabrous, smooth, intermediate veins distinct, margins smooth, apex obtuse; callus glabrous; palea keels smooth, hooks absent, shortly villous for most of length. Anthers (1.2–)1.5–1.8(–2.5) mm, or vestigial. Fl. and fr. Jun–Aug. 2*n* = 14, 28.

Alpine and subalpine meadows on slopes, moist places; 1000–3100 m. Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kashmir, Mongolia, Nepal, Pakistan, Russia (Far East, Siberia), Tajikistan; SW Asia, Europe, North America].

Poa supina has been divided into two taxa since the plants from C Asia, the Himalayas, and Xizang, including some but not all of the material from China, are more densely tufted and less stoloniferous than material from elsewhere. In addition, the branches are reduced to 1 per node, often rebranched near the base, and the palea looks minutely bumpy because of the globose, short cells between the veins. This material could be distinguished as *P. supina* subsp. *ustulata*. However, aside from the habit, the differences cited do not seem constant in the material from China, and material from NW China matches *P. supina* s.s.

11. Poa veresczaginii Tzvelev, Novosti Sist. Vyssh. Rast. 11: 34. 1974.

薇早熟禾 wei zao shu he

Perennials, loosely tufted or weakly stoloniferous; shoots extravaginal and intravaginal. Culms erect, sometimes decumbent at base, few per tuft, 17–60 cm tall, 0.8–1.3 mm thick, smooth, nodes 2 or 3, 1 or 2 exserted, uppermost to 1/4–1/2 way up culm. Leaf sheaths mostly 1.5–2.5 mm wide, ribs not distinctly raised, smooth, glabrous, lower leaves bladeless or with short blades, uppermost closed for 1/2–3/4 of length, 5–8 cm, 1.5–5 × as long as blade; blade green, flat, thin, 2–5 cm × 1.5–3.5 mm, surfaces smooth and glabrous, margins scabrid, longer upward along culm; ligule 2.5–4 mm, abaxially smooth,

of tillers 0.5–1.5 mm, collars smooth, glabrous. Panicle open, lax, 3.5–12 × 3–8 cm; branches spreading, 1 or 2 per node, capillary, rounded, smooth, longest 2.5–5 cm with 1–3(or 4) spikelets in distal 1/4. Spikelets rosy-violet tinged and a little grayish, 4.5–7 mm, florets usually 3–5, mostly perfect, infrequently female; vivipary absent; rachilla internodes to 1–1.5 mm, smooth, glabrous; glumes unequal, submembranous-papery, smooth or upper keel with a few hooks, lower glume 2.7–4.1 mm, 1- or 3-veined, upper glume 3.7–4.7 mm, 3-veined; lemmas oblong, membranous-papery, 3.5–4.5 mm, margins broadly membranous, apex obtuse, blunt, intermediate veins moderately distinct, keel loosely villous for up to 2/3 of length, marginal veins to 1/2, surfaces smooth, abaxially glabrous or loosely pilulose; callus glabrous or sparsely webbed, usually on proximal florets, hairs less than 1/2 as long as lemma; palea smooth and glabrous between keels, keels scabrid. Anthers 1.7–3.25 mm, vestigial or later aborted (up to 1.5 mm). Fl. and fr. Aug.

Alpine swales, stony slopes, glacial outwash; 2800–3600 m. Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Russia (Altai)].

The paratype cited from Mongolia is now within Xinjiang, in the Altay Shan very close to the new Mongolia-Russia border. Tzvelev (Zlaki SSSR, 460. 1976) placed this species in *Poa* sect. *Nivicolae*, based on the membranous-papery spikelet bracts and nearly smooth palea keels, to which features we would add the presence of female flowers in some spikelets. However, chloroplast and nuclear DNA markers place it in *P.* sect. *Micrantherae*.

3. Poa subg. **Pseudopoa** (K. Koch) Stapf in J. D. Hooker, Fl. Brit. India 7: 337. 1896 [“1897”].

假早熟禾亚属 jia zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Festuca [unranked] *Pseudopoa* K. Koch, Linnaea 21: 409. 1848; *Eremopoa* Roshevitz.

Slender annuals or ephemerals, shoots intravaginal. Culms erect. Inflorescence an open panicle; branches whorled, scabrid angled. Spikelets slightly compressed, elliptic, florets (1 or)2 to many, distant or only slightly overlapping; rachilla filiform, scabrid; glumes unequal, shorter than floret, lower glume 1-veined, upper glume 3-veined; lemmas lanceolate to narrowly oblong in side view, rounded on back or slightly keeled at base, herbaceous, 5-veined, apex obtuse to acuminate or mucronate, glabrous or keel and marginal veins pilulose to short villous, intermediate veins faint; palea equaling or shorter than lemma, keels scabrid; callus glabrous. Stamens (2–)3. Caryopsis partly adherent to lemma and palea, faintly grooved; hilum oval.

About five species: NE Africa, C and SW Asia, Europe; one species in China.

Species of *Poa* subg. *Pseudopoa* have a delicate, annual habit and whorled, scabrid-angled panicle branches. The subgenus comprises two widespread, variable species, which are sometimes subdivided, and a few local species in SW Asia. Since 1934, they have usually been recognized as a separate genus, *Eremopoa*, but molecular data place them in the middle of *Poa*. *Poa persica* Trinius occurs from Turkey to Afghanistan and Pakistan, but has not yet been found in China. It can be recognized by its lemmas with broad, membranous margins and obliquely truncate tips in side view, and by having anthers 1.4–2.5 mm.

12. Poa diaphora Trinius, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 1: 69. 1836.

阿尔泰早禾 a er tai han he

Annual. Culms 5–45 cm tall, solitary or tufted, slender. Leaf blade 2–10 cm × 1–4 mm, flat or folded, abaxial surface scabrid or smooth, adaxial surface scabrid, apex acuminate; ligule 1–3 mm. Panicle delicate, narrowly to broadly ovate in outline, 2–20 cm; branches 3–10 per node, subcapillary, scabrid. Spikelets elliptic, 4–6.5 mm, florets 2–6, green or purple tinged; lower glume lanceolate, 1–2 mm, apex acute, up to 1/2 as long as lowest lemma; upper glume narrowly ovate, 1.5–2.5 mm, apex acute or subacute; lemmas 2–4 mm, glabrous or scantily hairy to densely appressed-pubescent along lower part of veins, margins narrowly membranous, apex acuminate or often with a mucro to 0.5 mm; palea a little shorter than lemma. Anthers 0.4–1 mm. Fl. and fr. May–Aug. 2*n* = 28, 42.

Borders of streams and drying ponds, dry stony or sandy places; 1300–4000 m. Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Poa diaphora is a widespread and variable species and is sometimes divided into infraspecific taxa. The most distinct is subsp. *oxyglumis*, with hairy lemma veins appearing as silky-white stripes, although intermediates do occur. Small plants (up to 15 cm) with relatively long lemmas (over 3.5 mm) are sometimes distinguished, as subsp. *diaphora*, from the bulk of the species, which would then be placed in a “subsp. *songarica*,” but this distinction is much less clear-cut and is not followed here.

1a. Lemmas glabrous or scantily hairy along proximal part of veins ..... 12a. subsp. *diaphora*
1b. Lemmas densely pubescent along proximal part of veins ..... 12b. subsp. *oxyglumis*

12a. Poa diaphora subsp. **diaphora**

阿尔泰早禾(原亚种) a er tai han he (yuan ya zhong)

Aira altaica Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 526. 1835; *Catabrosella songarica* (Schrenk) Czerepanov; *Eremopoa altaica* (Trinius) Roshevitz; *E. altaica* subsp. *songarica* (Schrenk) Tzvelev; *E. persica* (Trinius) Roshevitz var. *songarica* (Schrenk) Bor; *E. songarica* (Schrenk) Roshevitz; *Glyceria songarica* Schrenk; *Nephelochloa altaica* (Trinius) Grisebach; *N. songarica* (Schrenk) Grisebach; *Poa persica* Trinius var. *songarica* (Schrenk) Stapf; *P. songarica* (Schrenk) Boissier.

Lemmas glabrous or scantily hairy near base of veins. Anthers 0.4–0.6 mm.

Borders of streams and drying ponds, stony slopes; 1300–4000 m. Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

12b. Poa diaphora subsp. **oxyglumis** (Boissier) Soreng & G. Zhu, **comb. nov.**

旱禾 han he

Basionym: *Poa persica* Trinius var. *oxyglumis* Boissier, Fl. Orient. 5: 610. 1884; *Eremopoa altaica* subsp. *oxyglumis* (Boissier) Tzvelev; *E. oxyglumis* (Boissier) Roshevitz; *E. persica* var. *oxyglumis* (Boissier) Grossheim.

Lemmas densely pubescent along lower parts of keel and marginal veins. Anthers 0.6–1 mm.

Dry stony or sandy places; 1900–2300 m. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia].

4. Poa subg. Poa

早熟禾亚属 zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Annuals or perennials, with or without rhizomes, without bulbs; shoots extravaginal and intravaginal. Sheaths sometimes strongly keeled, uppermost closed for more than (1/5–)1/4 of length; ligules membranous, milky-white or hyaline. Panicle with or without unisexual flowers, loosely contracted to open; branches smooth or scabrid, round or angled; lower glumes 1- or 3-veined; lemmas distinctly keeled, glabrous or pubescent, outer margin smooth or sparsely scabrid, glabrous, intermediate veins faint or more commonly conspicuous; callus glabrous or mostly dorsally webbed, rarely diffusely villous; palea keels glabrous or pubescent, usually scabrid at least distally. Anthers 0.2–4 mm.

About 400 species: distribution as for genus; 51 species (13 endemic) in China.

The Chinese species belong to three sections: *Poa* sect. *Macropoa* F. Hermann ex Tzvelev (species nos. 13–16); *P.* sect. *Poa* (species nos. 17–29), which is further subdivided into *P.* subsect. *Nivicolae* (Roshevitz) Tzvelev (species nos. 17–19), *P.* subsect. *Poa* (species nos. 20–22), and *P.* subsect. *Cenisiae* (Ascherson & Graebner) V. Jirásek (species nos. 23–29); and *P.* sect. *Homalopoa* Dumortier (species nos. 30–63).

Poa raduliformis (species no. 22) could not be included in Key 2 below because the taxon is insufficiently known to the authors. No specimens definitely referable to *P. raduliformis* were seen for this treatment.

1a. Anthers 0.2–1 mm ..... *Key 1*
1b. Anthers more than 1 mm ..... *Key 2*

Key 1 (species with anthers up to 1 mm long: *Poa* sect. *Homalopoa* in part, species nos. 43–63).

1a. Palea keels pubescent at least medially.
2a. Palea keels without apical hooks; ligule abaxially pilulose; panicle branches proximally scabrid angled.
3a. Panicle branches erect to steeply ascending, 2–6 cm; lemmas glabrous or sparsely pilulose between veins .... 46. *P. hisauchii*
3b. Panicle branches spreading, 3–11 cm; lemmas usually sparsely to densely pilulose between veins ..... 47. *P. acroleuca*
2b. Palea keels scabrid at least at the apex (if without hooks then upper culm ligule smooth and glabrous, or at most sparsely scabrid or pilulose); ligule abaxially smooth or scabrid, glabrous or sparsely pilulose; panicle branches proximally smooth or scabrid angled.
4a. Callus glabrous; glumes distinctly shorter than lowest lemma; lemma surface and intermediate veins glabrous.
5a. Lemmas 4–5 mm; panicle 18–22 cm ..... 49. *P. imperialis*
5b. Lemmas 2.5–3.5 mm; panicle 3–15(–19.5) cm ..... 50. *P. sikkimensis*
4b. Callus webbed or if glabrous, then lower glume as long as to longer than lowest lemma; lemma surfaces and/or intermediate veins glabrous or pubescent.
6a. Ligule 2–6 mm, apex obtuse to acute; collar glabrous; lower glume only slightly narrower than upper glume, 1- or 3-veined.
7a. Annuals or short-lived perennials; leaf sheath ca. 2 × as long as blade; upper glume as long as or longer than lowest lemma ..... 60. *P. hirtiglumis*
7b. Perennials; leaf sheath slightly shorter than blade; upper glume shorter than lowest lemma ..... 51. *P. stapfiana*
6b. Ligule 0.8–1.5(–2.5) mm, apex truncate to obtuse; collar usually ciliate; lower glume distinctly narrower than upper glume, 1-veined.
8a. Palea keels densely pilulose to villous to near apex; lemma ca. 4 × as long as wide, apex obtuse to acute; roots commonly 0.2–0.3 mm in diam. ..... 48. *P. nepalensis*
8b. Palea keels pilulose only around middle, sometimes obscurely so; lemma ca. 5 × as long as wide, apex acute to acuminate; most roots ca. 0.1 mm in diam.
9a. Lemma surfaces pubescent ..... 52. *P. burmanica*
9b. Lemma surfaces glabrous.
10a. Lemma surface smooth or minutely bumpy near the base at most; ligule abaxially smooth ..... 53. *P. himalayana*
10b. Lemmas surface minutely bumpy over much of length; ligule abaxially scabrid or pilulose ..... 56. *P. khasiana*
1b. Palea keels scabrid only, not pubescent.
11a. Lower glume mostly 3-veined.

12a. Plants 4–8 cm tall; panicle 1–2.5 cm, branches 0.5–1.5 cm; lemmas and callus glabrous ..... 44. *P. pseudamoena*
12b. Plants 30–51 cm tall; panicle 8–25 cm, branches 2–7 cm; lemma and callus pubescent ..... 43. *P. eleanorae*
11b. Lower glume 1-veined, or if sometimes 3-veined then lemmas glabrous and panicle over 5 cm long.
13a. Lemmas 1.5–2.6 mm, surface finely scabrid, keel glabrous or pilulose to short villous; anthers 0.2–0.5 mm ..... 63. *P. szechuensis*
13b. Lemmas 2.7–6 mm, surface smooth or finely scabrid, keel glabrous to villous, if glabrous then lemma 3–4.5 mm; anthers 0.5–1 mm (sometimes longer).
14a. Callus glabrous; lemmas glabrous or with a few short hairs at base of keel.
15a. Ligule 0.7–1.2; lower glume 1.5–2.2 mm, upper glume 2.1–2.6 mm; lemmas 2.7–3.3 mm; larger roots mostly ca. 0.1 mm in diam. ..... 55. *P. wardiana*
15b. Ligule 2.5–6.5; lower glume 2.2–4 mm, upper glume 2.8–4.5 mm; lemmas 3.1–4.4 mm; larger roots mostly 0.2–0.3 mm in diam. ..... 62. *P. dzongicola*
14b. Callus webbed; lemmas glabrous or pubescent.
16a. Lemma glabrous.
17a. Lemma densely scabrid, 3.7–5.2 mm, papery; palea subequal to lemma ..... 61. *P. sunbisinii*
17b. Lemma smooth, 3–4 mm, membranous-papery; palea distinctly shorter than lemma ..... 58. *P. takasagomontana*
16b. Lemma pubescent at least on the keel.
18a. Glumes subequal, lower glume not more than 0.5 mm shorter than lowest lemma; ligule abaxially smooth or sparsely scabrid.
19a. Lemmas green, 4–5 mm, papery, surface minutely bumpy, otherwise glabrous ..... 57. *P. nankoensis*
19b. Lemmas usually purple tinged, 2–4(–5) mm, membranous to membranous-papery, surface smooth to sparsely scabrid, glabrous or pilulose ..... 60. *P. hirtiglumis*
18b. Glumes unequal, lower glume usually more than 0.5 mm shorter than lowest lemma; ligule abaxially smooth to densely scabrid.
20a. Lemma surface pubescent ..... 52. *P. burmanica*
20b. Lemma surface glabrous.
21a. Leaf sheaths very compressed with a winged keel, uppermost closed for 2/3–3/4 of length; collar glabrous; panicle broad, branches scabrid angled from base, longest to 12 cm ..... 45. *P. ussuriensis*
21b. Leaf sheaths somewhat compressed, with or without a slightly winged keel, uppermost closed for 1/2–2/3 of length; collar often ciliate; panicle narrow, branches smooth or sparsely scabrid angled from base; longest to 7 cm.
22a. Lower glume subulate to wedge-shaped, less than 1/2 as long as lower lemma ..... 54. *P. rajbhandarii*
22b. Lower glume narrowly lanceolate, slightly arched to sickle-shaped, more than 1/2 as long as lower lemma ..... 56. *P. khasiana*

Key 2 (species with anthers more than 1 mm long: *Poa* sect. *Macropoa*, species nos. 13–16; *P.* sect. *Poa*, species nos. 17–29; *P.* sect. *Homalopoa* in part, species nos. 30–42).

1a. Lemma and callus totally glabrous and ligule less than 3(–4) mm (if plants tufted, ligules 2.5–6 mm, and anthers 1.1–1.5 mm, see 62. *P. dzongicola*).
2a. Plants densely tufted, all or most shoots flowering, extravaginal, rhizomes absent; leaf blade thin, 1–2 mm wide, scabrid; lemma thinly finely scabrid or minutely bumpy throughout; branches distally moderately scabrid ..... 32. *P. perennis*
2b. Plants densely or loosely tufted, sterile shoots usually present, intra- and extravaginal, rhizomes present or absent, if all shoots extravaginal then rhizomes well developed; leaf blade thick or thin, usually 1.5–4 mm wide; lemmas smooth or variously scabrid; panicle branches distally smooth or scabrid.
3a. Flowering shoots fewer than sterile shoots, rhizomes absent or poorly developed; panicle branches rounded, smooth or sparsely scabrid.
4a. Lemma surfaces smooth; paleas smooth between the keels ..... 24. *P. hissarica*
4b. Lemma surfaces scabrid; paleas scabrid between the keels ..... 26. *P. qinghaiensis*
3b. Flowering shoots as many or more than sterile shoots, rhizomes well developed or not; panicle branches smooth or more commonly scabrid at least distally (*Poa* sect. *Macropoa*).
5a. Major roots ca. 0.1 mm in diam.; plants (apparently) without rhizomes; uppermost leaf sheath shorter than blade ..... 13. *P. bomiensis*
5b. Major roots 0.2–1 mm in diam.; plants with rhizomes; uppermost leaf sheath 1–4 × as long as blade.
6a. Major roots to 1 mm in diam.; sheaths of tillers retrorsely hispidulous to pilulose near collar; uppermost culm leaf sheath 3–4 × as long as blade ..... 14. *P. binodis*
6b. Major roots 0.2–0.4 mm in diam.; sheaths of tillers smooth or scabrid near the collars; uppermost culm leaf sheath ca. 1–4 × as long as blade.
7a. Palea keels scabrid for 1/3–1/2 of length, smooth or minutely bumpy between keels; plants almost always pinkish violet; panicle branches smooth or scabrid; alpine plants from C Asia ..... 15. *P. bucharica*
7b. Palea keels scabrid for 2/3–3/4 of length, with sparse slender spinules between keels; plants with or without pinkish violet coloration; panicle branches scabrid; plants widespread ..... 16. *P. sibirica*

1b. Lemma or callus pubescent with at least a few short hairs; ligule 0.2–10 mm.
8a. Culms with 5–12 nodes, mostly 50–150 cm; longest panicle internodes usually more than 4 cm; leaf blade commonly over 4 mm wide; sheaths prominently compressed-keeled.
9a. Branches moderately to densely scabrid distally ..... 30. *P. remota*
9b. Branches smooth or very sparsely scabrid.
10a. Longest branches with 2–5 spikelets; culms glabrous below all nodes, not rebranched except at base ..... 41. *P. gammieana*
10b. Longest branches with 7–26 spikelets; culms strigose below lowest nodes, frequently rebranched above .... 42. *P. grandis*
8b. Culms with 1–4 nodes, mostly 10–80 cm; longest panicle internodes usually less than 4 cm; leaf blade usually less than 4 mm wide; sheaths indistinctly to prominently compressed-keeled.
11a. Collars of at least the lower leaves with a distinct wedge-shaped area on either side, usually densely scabrid to strigose or villous on wedge but not above or below it; blade margins not abruptly flared; ligule truncate, 0.5–1.5 mm ..... 34. *P. mairei*
11b. Collars usually with an indistinct narrow junction, rarely pubescent much back from margin but then hairs not confined to junction; blade margins abruptly flared or not; ligule truncate to acuminate, 0.4–10 mm.
12a. Callus glabrous.
13a. Palea keels medially pilulose to villous; panicle open.
14a. Culm blades 3 or 4, flat, middle culm ones medially smooth on the margins and surfaces, 4–5 mm wide, apex abruptly prow-tipped; glumes distinctly punctate-papillate; lemmas conspicuously 5–7-veined, pubescent between the veins ..... 40. *P. polyneuron*
14b. Culm blades 2 or 3, flat, folded or involute, middle culm ones scabrid at least on the margins, 1–3 mm wide, apex gradually prow-tipped; glumes not or indistinctly punctate-papillate; lemmas 5-veined, lateral veins faint to moderately conspicuous, glabrous or pubescent between the veins.
15a. Lemmas moderately densely scabrid to crisply pilulose between veins near base; plants loosely tufted ..... 39. *P. nitidespiculata*
15b. Lemmas smooth or sparsely scabrid, sometimes loosely soft pilulose, between veins near base; plants densely to loosely tufted ..... 25. *P. lipskyi*
13b. Palea keels scabrid throughout; panicle open or contracted.
16a. Longest ligules to 1(–1.5) mm, truncate; panicle branches moderately to densely scabrid.
17a. Plants densely tufted, without rhizomes, tillers all or most intravaginal with blades firm involute, abaxially scabrid, ribs indistinct; lemmas glabrous between veins ..... 34. *P. mairei*
17b. Plants densely to loosely tufted, with or without rhizomes, tillers intra- and extravaginal with blades thin involute, abaxially smooth or scabrid, ribs distinct; lemmas glabrous or pilulose between veins ..... 18. *P. polycolea*
16b. Longest ligules 1.5–8 mm, truncate to acuminate; panicle branches smooth to densely scabrid.
18a. Panicle branches distally rounded or faintly angled, smooth or very sparsely scabrid.
19a. Glumes membranous, surfaces minutely punctate with purple pigment in papillate cells, not shiny, otherwise smooth or with sparsely scabrid keels ..... 37. *P. pagophila*
19b. Glumes membranous to sub-papery, surfaces not evidently minutely punctate, or only near apex, shiny or not, keels smooth or scabrid.
20a. Uppermost sheaths closed for 1/2–3/4 of length; palea keels sparsely scabrid (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*
20b. Uppermost sheaths closed for 1/3–1/2 of length; palea keels moderately to densely scabrid ..... 25. *P. lipskyi*
18b. Panicle branches distally angled, sparsely to densely scabrid.
21a. Lower culm leaf ligule less than 0.8(–1) mm, truncate, to 1.5(–2.2) mm for upper culm leaves.
22a. Sterile tiller shoots common, intra- and extravaginal, laterally pointing shoots commonly present; basal sheaths persistent, straw colored, shiny; spikelet bracts acute, rachilla internodes mostly less than 1 mm ..... 18. *P. polycolea*
22b. Sterile tiller shoots infrequent, mostly extravaginal, laterally pointing shoots absent; basal sheaths not persisting, not shiny; spikelet bracts sharply acute to acuminate, rachilla internodes often reaching 1.2 mm ..... 32. *P. perennis*
21b. Lower culm leaf ligule more than 1 mm, truncate to acute, to 2–8 mm for upper culm leaves.
23a. Panicle branches usually 3–5 per node, moderately to densely scabrid angled in distal 1/2, longest with 6–26 moderately crowded spikelets; uppermost ligules 3–8 mm, often lacerate ..... 31. *P. asperifolia*
23b. Panicle branches usually 1–2 per node, sparsely to moderately scabrid in distal 1/2, longest with 1–8 loosely arranged spikelets; uppermost ligules (1–)2–6 mm, generally entire.
24a. Culm leaf blades reaching the panicle, uppermost node above the middle; glumes distinctly covered by papillate cells; plants not glaucous ..... 38. *P. falconeri*

24b. Culm leaf blades not reaching the panicle, uppermost node in the lower 1/3; glumes with a few indistinct papillate cells; plants distinctly glaucous ..... 39. *P. nitidespiculata*

12b. Callus pubescent.

25a. Panicle narrowly pyramidal with 5 densely scabrid branches per node, the longest to 3 cm with 6–9 spikelets from near the base; palea hyaline, distinctly shorter than lemma ..... 29. *P. xingkaiensis*

25b. Panicle not narrowly pyramidal with 5 densely scabrid branches per node, or if so then longest branch more than 3 cm with florets in the distal 1/2; paleas distinctly colored in part, not mostly hyaline, distinctly shorter to as long as lemma.

26a. Plants less than 25 cm tall.

27a. Ligule 0.1–1.2 mm, truncate.

28a. Lower culm sheaths thin with prominent ribs; blade thin, with distinct abaxial ribs; lower glume subulate ..... 18. *P. polycolea*

28b. Lower culm sheaths without distinct abaxial ribs; lower glume broader ..... 35. *P. langtangensis*

27b. Ligule of upper leaves more than 1.5 mm, truncate to acuminate.

29a. Glumes membranous-papery, weakly keeled, covered by punctate-papillate cells, keel smooth or with sparse hooks, apex obtuse or acute, often blunt, lower glume 1(or 3)-veined.

30a. Plants with slender rhizomes and isolated shoots; glumes green, upper one to 2–2.7 mm; lowest lemmas 2.5–3.3 mm ..... 35. *P. langtangensis*

30b. Plants loosely to moderately densely tufted, not rhizomatous or infrequently with some isolated shoots; glumes usually purple, upper one 3–3.5 mm; lowest lemmas 3.2–4.8(–5) mm ..... 37. *P. pagophila*

29b. Glumes very thinly to thickly papery, not or only sparsely covered by punctate papillae (or if so then strongly keeled, and upper with prominent lateral veins, and sharply acuminate; *P. tenuicula*), keels smooth or densely scabrid.

31a. Plants densely tufted, without rhizomes; glumes sharply acute to acuminate, the upper one prominently 3-veined; lemmas pubescent between the veins; rachilla densely pilulose to short villous ..... 59. *P. tenuicula*

31b. Plants with distinct lateral tending shoots, rhizomatous to weakly stooling, with isolated flowering shoots, or with few shoots per tuft; glumes acute or acuminate, apex generally not so sharply pointed; lemmas glabrous or pilose between the veins; rachillas glabrous or pilulose.

32a. Palea keels with 2–6 hooks per keel; lemmas in the upper 1/4–1/2 membranous, turning golden-brown; panicle branches round, smooth to sparsely scabrid, to 2.5 cm with 2–12 spikelets clustered distally ..... 17. *P. calliopsis*

32b. Palea keels with more than 6 hooks per keel, lemmas distally thicker, membranous only in the upper 1/5 or less, with at most a narrow golden-brown band; branches smooth or scabrid, round or angled in part, usually without spikelets distinctly clustered distally.

33a. Uppermost sheaths closed 1/4–2/5; lemmas glabrous between the veins; paleas glabrous between the keels; plants with well-developed branching rhizome systems; panicle branches sometimes scabrid, longest branch with (3–)7–18, small to moderate-sized spikelets ..... 21. *P. pratensis*

33b. Uppermost sheaths closed over 1/2; lemmas usually pubescent between the veins; plants loosely tufted, with short, unbranched rhizomes or stooling; panicle always smooth or nearly so, longest branch with 1–3(–7) large spikelets.

34a. Palea keels sparsely scabrid, glabrous, between keels glabrous; callus hairs sparse, dorsal or diffuse; viviparous spikelets unknown (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*

34b. Palea keels distinctly scabrid and usually often pilulose to short-villous medially, between keels usually pilulose; callus hairs dorsal, well developed; spikelets infrequently viviparous ..... 27. *P. smirnowii*

26b. Plants more than 25 cm tall.

35a. Lemmas glabrous, but densely scabrid over most of surface; paleas densely scabrid between keels ..... 61. *P. sunbisinii*

35b. Lemmas pilulose to villous at least on the keel, between veins smooth, minutely bumpy, scabrid, glabrous or pubescent; paleas smooth or scabrid, glabrous or pubescent between keels.

36a. Lower glume subulate, keel straight or slightly arched, usually 1-veined, less than 1/2 the width of upper glume, both glumes smooth throughout or sparsely to moderately scabrid on the keel only, not punctate-papillate on the sides, generally shiny; shoots intra- and extravaginal, some lateral tending shoots usually present; rachillas well exposed mostly with upper internodes exceeding 1.2 mm; female flowers common; normal anthers 2.3–3 mm; lemma sides glabrous or pilulose in the basal part, with conspicuous intermediate veins; ligule of lower culm and tiller leaves less than 0.5 mm, of upper culm leaves to 1(–2.2) mm, truncate to obtuse; lower culms covered by closely overlapping, long, narrow sheaths ..... 18. *P. polycolea*

36b. Lower glume subulate or broader, keel slightly to distinctly arched, 1–3-veined, often more than 1/2 as wide as upper glume, glume texture as above or scabrid or punctate-papillate, shiny or not; shoots sometimes all intra- or all extravaginal, lateral tending shoots present or absent; rachillas hidden to well exposed, often with most internodes less than 1.2 mm; female flowers common or absent; normal anthers 1.2–3.5 mm; ligule of lower shoots often longer than 0.5 mm, those of the upper leaves often more than 2 mm, truncate to acuminate; lower culms mostly not covered in closely overlapping, long, narrow sheaths; in any case not with the above combination of characters.
37a. Lower lemmas pubescent between veins.
38a. Plants definitely not rhizomatous; lower glume 1(–3)-veined; glume surfaces distinctly covered with punctate-papillate cells; culms to 40 cm.
39a. Anthers 1.2–1.5 mm; flowers all perfect; glumes papery, strongly keeled, green, and a bit glaucous; panicle loosely contracted, branches ascending, moderately scabrid on angled branches distally (if in the Himalayas see *P. stapfiana*, a species with anthers to 1.2 mm and glumes membranous) ..... 59. *P. tenuicula*
39b. Anthers 2–3.5 mm; flowers sometimes female; glumes membranous to membranous-papery, often weakly keeled, usually purple; panicle open, branches spreading, smooth and round throughout, or sparsely scabrid angled distally.
40a. Lemmas subpapery, minutely bumpy, not or sparsely scabrid above; all shoots intravaginal ..... 36. *P. nubigena*
40b. Lemmas membranous-papery, not minutely bumpy, moderately to densely scabrid above; some shoots extravaginal ..... 37. *P. pagophila*
38b. Plants with at least some distinct laterally tending shoots to clearly rhizomatous, or lower glume distinctly 3-veined; glume surfaces not or only slightly punctate-papillate in the margins; culms 25–120 cm.
41a. Panicle branches moderately to densely scabrid angled (distally at least); basal sheaths becoming fibrous; uppermost ligules 3–8 cm, entire to long lacerate; lower glumes 1(–3)-veined; web usually absent, when present, always dorsal, usually scanty ..... 31. *P. asperifolia*
41b. Panicle branches smooth or sparsely scabrid, round or weakly angled; basal sheaths becoming papery or soon withering; ligules 1–4(–6) cm, entire; lower glumes commonly 3-veined in most spikelets (1-veined in *P. tangii*); callus hairs usually present, dorsal or diffuse.
42a. Ligules ca. 1 mm long; hairs diffuse or dorsal on the callus; lower glumes 1-veined ..... 19. *P. tangii*
42b. Ligules 2–6 cm; hairs of the callus all dorsal, or some diffuse; lower glumes 1- or 3-veined.
43a. Leaf sheaths of upper culm leaves closed 1/4 to 1/3 of length ..... 23. *P. arctica*
43b. Leaf sheaths of upper culm leaves closed over (2/5–)1/2 of length.
44a. Plants glaucous throughout, with at most a scant dorsal web of 1 to few hairs; panicle branches distally sparsely scabrid; sheaths closed 2/5–1/2 of length ..... 39. *P. nitidespiculata*
44b. Plants not or little glaucous, with a well-developed dorsal or diffuse web; panicle branches smooth, or sparsely scabrid; sheaths closed over 1/2–3/4 of length.
45a. Palea keels sparsely to moderately scabrid, glabrous, between keels glabrous; callus hairs scant, dorsal or diffuse; panicle branches totally smooth; plants without distinct rhizomes, sometimes weakly stoloniferous (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*
45b. Palea keels scabrid and usually medially pilulose to short villous, between keels usually pilulose; callus hairs dorsal, well developed; panicle branches smooth or sparsely (moderately) scabrid; plants with distinct rhizomes ..... 27. *P. smirnowii*
37b. Lemmas between veins glabrous throughout (intermediate veins infrequently pubescent).
46a. Glume surfaces distinctly covered with punctate-papillate cells; anthers 2–3.5 mm; lower glume 1(–3)-veined, often weakly keeled; plants definitely not rhizomatous (infrequently with short delicate rhizomes in *P. pagophila*); flowers sometimes female; panicle open, branches spreading, smooth and round throughout, or sparsely scabrid angled distally.
47a. Lemmas almost papery, minutely bumpy, not or sparsely scabrid above; all shoots intravaginal ..... 36. *P. nubigena*
47b. Lemmas membranous-papery, not minutely bumpy, moderately to densely scabrid above; some shoots extravaginal ..... 37. *P. pagophila*
46b. Glume surfaces not or only slightly punctate-papillate in the margins; or anthers shorter than 2 mm, or branches distinctly scabrid distally, or glumes 3-veined, or plants strongly rhizomatous.
48a. Plants tufted, without rhizomes; sheaths smooth, glabrous; panicle branches scabrid angled; ligules (1–)1.5–3 mm, obtuse; blades flat, smooth on both surfaces, 1–3 mm wide; lower glumes 3-veined; lemmas 4–5.5 mm, villous along keel and marginal veins, between veins glabrous; palea keels pilulose; anthers 2.5–3 mm ..... 28. *P. macroanthera*

48b. Plants tufted or not, with or without rhizomes, sheaths smooth or scabrid, sometimes pubescent; panicle branches smooth or sparsely to densely scabrid; ligules 1–8 mm, truncate to acuminate; blades flat, folded or involute, surfaces smooth or scabrid, 1–5 mm wide; lower glumes 1- or 3-veined; lemmas 2.5–6 mm, pilulose to villous along keel at least; palea keels scabrid only or medially pilulose to villous; anthers 1.2–3.5 mm; in any case not with the above combination of characteristics.
49a. Sheaths closed 2/5–3/4 of length; panicle branches smooth; anthers 2.5–3.5 mm, or sometimes vestigial; lemmas 4–5.5 mm long; uppermost ligules ca. 1 mm; callus hairs dorsal or diffuse, loose; lemma keel hairs sparse, long and soft ..... 19. *P. tangii*
49b. Sheaths closed (1/5–)1/4–3/5 of length; panicle branches smooth or scabrid; anthers 1.2–2.5(–3) mm, sometimes vestigial or not; uppermost ligules mostly 1–8 mm; callus hairs dorsal only; lemma keel hairs not sparse, long and soft.
50a. Lemma keel short villous or pilulose in lower 1/3; callus web scanty; palea keels glabrous.
51a. Ligules of upper culm leaves (2–)3–8 mm, of lower culm more than ca. 1 mm ..... 31. *P. asperifolia*
51b. Ligules of upper culm leaves to 2.2 mm, of lower culm less than ca. 1 mm.
52a. Plants densely tufted, without lateral tending shoots ..... 32. *P. perennis*
52b. Plants loosely tufted, subrhizomatous ..... 33. *P. zhongdianensis*
50b. Lemma keel villous to lanate in 1/2–3/4 of length; callus web dense; palea keels glabrous or pilulose-villous medially.
53a. Uppermost culm leaf blades 0.6–0.9 × as long as their sheaths; panicle branches proximally sparsely to moderately scabrid, distally densely scabrid angled ..... 20. *P. lhasaensis*
53b. Uppermost culm leaf blades 0.1–0.7 × as long as their sheaths; panicle branches smooth or variously scabrid.
54a. Uppermost culm sheaths closed over (1/2–)2/3 of length; culm blades 1–5 cm × 2–4 mm, flat or folded, not much different from tillers; panicle branches smooth or nearly so, longest with 1–3(–7) large spikelets; palea keels with a few soft hairs medially and between keels of some lemmas; anthers 2–2.5 mm ..... 27. *P. smirnowii*
54b. Uppermost culm sheaths closed 1/4–2/5 of length; culm blades various in length and width, but generally not consistently short and broad, or if so, the tillers commonly involute; panicle branches smooth to densely scabrid angled, longest usually with 7 or more spikelets; palea keels glabrous or rarely pilulose; anthers mostly (1.2–)1.4–2.5(–2.8) mm ..... 21. *P. pratensis*

13. Poa bomiensis C. Ling, Acta Phytotax. Sin. 17(1): 101. 1979.

波密早熟禾 bo mi zao shu he

Annuals (?or perennials), tufted, not rhizomatous; shoots extravaginal. Culms erect, solitary or few per sparse tuft, 20–35(–55) cm tall, 0.8–1.5 mm in diam., compressed, scabrid below nodes, nodes 2 or 3, 0–3 exserted. Leaf sheaths longer to slightly shorter than internodes 8–12 cm, slightly shorter than blade, uppermost closed for 3/7–1/2 of length, finely retrorsely scabrid, glabrous, keel slightly raised; blade flat, thin, 6–11 cm (uppermost often longest), 2–5 mm wide, adaxially smooth or scabrid on keel and veins, adaxially scabrid on and between veins, margins smooth to finely scabrid; ligule 1–2.5 mm, abaxially smooth, apex truncate, obtuse or acute. Panicle open, narrow, slightly lax, 7–14 × 1–3 cm, longest internodes 2–2.5 cm; branches ascending to spreading, 2 per node, slender, flexuous, proximally smooth or scabrid, distally scabrid on and sometimes between angles, longest 3–5 cm with 1–4 spikelets in distal 1/3. Spikelets elliptic, green or slightly purple tinged, 5–6 mm, florets 2 or 3; vivipary absent; rachilla scabrid, glabrous; glumes unequal, apex acuminate, upper keel and surface scabrid, lower glume subulate to narrowly lanceolate, 2.3–3.5 mm, 1- or 3-veined, upper glume lanceolate, 3.3–4.5 mm, 3-veined; lemmas ovate to oblong to lanceolate, 3.2–5 mm, apex acuminate, intermediate veins 5(–7), prominent, surfaces minutely scabrid; callus glabrous; palea finely scabrid, keels scabrid 2/3–3/4 of length. Anthers (1–)1.2–1.7 mm. Fl. and fr. Jun–Sep.

● Mountain meadows among thickets; 4000–4200 m. SE Xizang (Bomi).

Though originally described as a perennial, the two specimens seen appear to be slender-rooted annuals.

14. Poa binodis Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 388. 2002.

双节早熟禾 shuang jie zao shu he

Perennials, rhizomatous; shoots extra- and intravaginal. Plants grayish green. Culms erect, decumbent at base, loosely tufted, 40–80 cm tall, 1–2 mm in diam., smooth, nodes 2, 1 exserted. Leaf sheath pale, prominently keeled with a short ± leathery wing, smooth, lower ones hispidulous to pilulose, to 16 cm, 3–4 × as long as blade, uppermost closed for 2/3 of length, smooth, glabrous; blade folded with slightly inrolled margins, or involute, leathery, 4–10 cm × ca. 3 mm, surfaces smooth to sparsely scabrid, of tillers to 15 cm, abaxially somewhat reflexed hispid; ligule 1–2 mm, collar smooth, scabrid or hispidulous or ciliate. Panicle loosely contracted, 12–20 × 3–5 cm; branches ascending to spreading, 2 or 3 per node, slender, proximally smooth or scabrid along angles throughout, longest 3–9 cm with 10–17 moderately crowded spikelets in distal 1/2, pedicels 0.5–1 mm, terminal one ca. 2 mm. Spikelets pale,

sometimes purplish near apex, (3.5–)4–7 mm, florets 3 or 4(–6); vivipary absent; rachilla internodes 0.5–1.5 mm, scabrid; glumes unequal, apex acute, keel scabrid, area between veins sparsely, minutely scabrid, lower glume 2–2.5 mm, 1-veined, upper glume 2.8–3.5 mm, 3-veined; lemmas (3–)3.5–4 mm, minutely bumpy and moderately scabrid from base, glabrous throughout, keel finely scabrid for most of length, prominently 5(–7)-veined, margins smooth, apex acute; callus glabrous; palea minutely bumpy between keels, hooks sparse or absent, keels scabrid in distal 1/3–1/2 (30–50 hooks per keel). Anthers ca. 2 mm. Fl. and fr. Jul–Aug.

● Ditch banks, grassy places on slopes; ca. 3800 m. W Sichuan.

This species is similar to *Poa sibirica*, but differs in its grayish green coloration, stout roots (to 1.2 mm thick), 2-noded culms, and hispid leaves. It is known from only two gatherings.

15. Poa bucharica Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 4: 94. 1923.

布查早熟禾 bu cha zao shu he

Perennials, loosely tufted, rhizomatous; shoots extravaginal. Culms erect, decumbent at base, 50–80 cm tall, 1–2 mm in diam., nodes 2 or 3, 1 or 2 exserted, lower internodes smooth or scabrid. Leaf sheaths pale green, compressed, moderately keeled, smooth or scabrid, glabrous, 2–4 × as long as blade, uppermost closed for 1/3–2/5 of length; blade flat or folded with margins slightly inrolled, thin to moderately thin, 5–20 cm × 1–3 mm, abaxially smooth or sparsely to densely scabrid, margins scabrid, of tillers and lower culm to 30 cm; ligule 0.5–1(–2.7) mm, abaxially smooth or scabrid, glabrous, apex truncate or infrequently obtuse, collar margins scabrid, glabrous. Panicle loosely contracted to open, (3–)5–15 × 1–9 cm; branches contracted to spreading, 2–5 per node, slender, proximally round and smooth, distally scabrid angled, longest 0.5–7 cm with 2–10 spikelets in distal 1/3–1/2. Spikelets pale green and rosy to dark purple, 4–6 mm, florets 3–4(–6); vivipary absent; rachilla internodes 0.5–1.5 mm, smooth or sparsely scabrid; glumes subequal, keel sparsely scabrid, apex acuminate, lower glume 2–3 mm, 1- or 3-veined, upper glume 3–3.5(–4.5) mm, 3-veined; lemmas pale green and violet to dark purple above, papery-membranous to papery, 4–5 mm, abaxially smooth or minutely bumpy, adaxially smooth or sparsely scabrid, glabrous throughout, keel distally scabrid, intermediate veins prominent, margins smooth, apex acute; callus glabrous; palea smooth or minutely bumpy between keels, keels scabrid in distal 1/2, 5–40 hooks per keel. Anthers 1.5–3 mm. Fl. and fr. Jun–Jul.

Alpine grassy places on slopes, swales and stony slopes; 2800–3500 m. Xinjiang [Afghanistan (rare), Kashmir, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Poa koksuensis Goloskokov is expected from the Jungarian Alatau border of China. It can be distinguished from *P. bucharica* by the totally smooth panicle branches and palea keels with only 1–6 short spinules or entirely smooth.

1a. Culms 50–80 cm tall; panicle loosely contracted, branches scabrid over most or all of length, longest with 3–10 spikelets; palea with 5–40 hooks per keel ..... 15a. subsp. *bucharica*

1b. Culms 20–65(–70) cm tall; panicle open, pyramidal, diffuse, branches smooth or distally sparsely scabrid, longest with 2–5 spikelets; palea with 5–15 hooks per keel ..... 15b. subsp. *karateginensis*

15a. Poa bucharica subsp. **bucharica**

布查早熟禾(原亚种) bu cha zao shu he (yuan ya zhong)

Culms 50–80 cm tall, lower internodes scabrid. Uppermost leaf sheaths 2–3 × as long as blade; ligule 0.5–1 mm; uppermost blades 4–9 cm. Panicle loosely contracted, ovoid to lanceolate, interrupted or not, 5–10 × 1–3 cm; branches contracted to steeply ascending, 3–5 per node, sparsely to moderately scabrid over most or all of length, longest 0.5–4 cm with 3–10 moderately crowded spikelets in distal 1/2. Spikelets 4–6 mm, florets 3–4(–6); rachilla internodes 0.5–1.5 mm, smooth or sparsely scabrid; lower glume 2–3 mm, upper glume 3–3.5 mm; lemmas thinly papery to papery, ca. 4 mm, intermediate veins prominent; palea with 5–40 hooks per keel. Anthers 1.5–2.8 mm. Fl. and fr. Jun–Jul. 2*n* = 14.

Alpine grassy places on slopes; 2800–3500 m. Xinjiang [Afghanistan (rare), Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

15b. Poa bucharica subsp. **karateginensis** (Roshevitz ex Ovczinnikov) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 28. 1974.

卡拉蒂早熟禾 ka la di zao shu he

Poa karateginensis Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 12. 1933; *P. suruana* H. Hartmann.

Culms 20–65(–70) cm tall, lower internodes smooth. Leaf sheaths, uppermost 3–4 × as long as blade; ligules 0.3–2.7 mm; uppermost blades 1–4 cm. Panicle open, pyramidal, diffuse, (3–)6–15 × 3–9 cm; branches ascending to spreading, 2 or 3(or 4) per node, smooth or distally sparsely scabrid, longest 2–7 cm with 2–5 spikelets in distal 1/2. Spikelets 6–7 mm, florets 3 or 4(–5); rachilla internodes 1–1.5 mm, smooth; lower glume 3–3.5 mm, upper glume 3.5–4 mm; lemmas thinly papery, 4–5 mm, intermediate veins moderately distinct; palea with 5–15 hooks per keel. Anthers 2–3 mm. Fl. and fr. Jul–Aug.

Alpine grassy slopes; ca. 3000 m. Xinjiang [Kashmir, W Tajikistan (Karataginsky Range)].

The type of *Poa suruana*, from Kashmir (Karakorum Mountains), resembles subsp. *karateginensis* in its open panicle with fairly smooth branches, but seems intermediate to subsp. *bucharica* in its more typical glumes and longer panicle with a few more spikelets per branch, distinct ligules to ca. 2 mm long, and height of 65–70 cm. *Poa bucharica* subsp. *aksuensis* Roshevitz ex Tzvelev keys out to subsp. *karateginensis* but has palea keels each with 15–40 spinules. It comprises plants from the Tien Shan on or near the Kyrgyzstan-China border and potentially occurs in China.

16. Poa sibirica Roshevitz, Izv. Imp. S.-Peterburgsk. Bot. Sada 12: 121. 1912.

西伯利亚早熟禾 xi bo li ya zao shu he

Perennials, rhizomatous; shoots extravaginal and a few

intravaginal. Culms erect, decumbent at base, (20–)40–120 cm tall, 1–4 mm in diam., loosely tufted, shiny, smooth or sparsely short scabrid below panicle, nodes 3 or 4, 1 or 2 exserted, with a few persistent whitish sheaths. Leaf sheaths green, compressed, with keel up to 0.4 mm deep, smooth or finely scabrid, glabrous, 8–20 cm, 1–2 or more × as long as blade, uppermost closed for 1/2–2/3 of length; blade flat or folded, thin, 4–25 cm × (1.5–)2–6(–8) mm, abaxially smooth, adaxially smooth to scabrid, margins scabrid, apex prow-tipped, of tillers often folded, abaxially smooth; ligule (0.5–)1–2.7 mm, abaxially smooth or scabrid, glabrous or puberulent, apex truncate to obtuse, irregularly dentate, collar margins smooth or coarsely scabrid, glabrous. Panicle loosely contracted to wide open, exserted, (4–)6–15(–18) cm, longest internodes 1–4 cm; branches ascending to spreading, 2–5 per node, slender, round to weakly angled, proximally smooth or scabrid along angles throughout, longest 3–9 cm with 3–17 moderately crowded spikelets in distal 1/2. Spikelets pale green to dark purple, (3.5–)4–5.5(–6.5) mm, florets 2–5; vivipary absent; rachilla internodes 0.5–1 mm, smooth or scabrid; glumes lanceolate, acute, upper keel and veins scabrid, lower glume (1.2–)2–2.5(–3.5) mm, 1(or 3)-veined, upper glume 2.5–3(–4.5) mm, 3-veined; lemmas pale green or sometimes violet to dark purple above, 2.5–4(–5.5) mm, proximally minutely bumpy to scabrid, distally scabrid, glabrous throughout (sometimes obscurely strigulose on keel base), keel scabrid, intermediate veins prominent, apex and margins narrowly membranous, apex acute; callus glabrous; palea minutely bumpy and with slender hooks between keels, keels finely and densely scabrid to subciliate for (1/2–)2/3–3/4 of length, 40–60 hooks per keel. Anthers 1.5–2.5 mm. Fl. and fr. Jun–Jul.

Forest margins, meadows among thickets, grassy places on slopes in river valleys, subalpine meadows; 1700–2800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan, NW Xinjiang, Yunnan [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe (Russia to W of Ural Mountains)].

1a. Lower lemmas within spikelets 2.8–3.8 mm; panicle branches spreading; leaf blade 1.5–4 mm wide; culm 1–2 mm in diam. at lower nodes ..... 16a. subsp. *sibirica*

1b. Lower lemmas within spikelets (3.5–)3.8–5.2 mm; panicle branches erect to ascending; blade 2–8 mm wide; culm 2–4 mm in diam. at lower nodes ..... 16b. subsp. *uralensis*

16a. Poa sibirica subsp. **sibirica**

西伯利亚早熟禾(原亚种) xi bo li ya zao shu he (yuan ya zhong)

Culms 50–100 cm tall, 1–2 mm in diam. at lower nodes. Leaf sheaths shorter than internodes, uppermost 8–18 cm, 1.5–4 × longer than blade; ligule (0.5–)1–2.7 mm, abaxially scabrid; blade 1.5–4(–5) mm wide, uppermost to 10 cm. Panicle loosely contracted to open, ovoid to pyramidal, 4–15 cm, longest internodes 1–2.5(–3) cm. Spikelets 2–5-flowered; lower glume 2–2.5 mm, upper glume 2.5–3 mm; lemmas 2.5–3.8 mm. Anthers 1.5–2.5 mm. Fl. and fr. Jun–Jul. 2*n* = 14.

Forest margins, meadows among thickets, grassy places on slopes in river valleys, subalpine meadows; 1700–2800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan, NW Xinjiang, Yunnan [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe (Russia to W of Ural Mountains)].

This subspecies is quite variable, but is readily distinguishable from other species over most of its range. Material from Sichuan, however, looks somewhat different and needs further study.

16b. Poa sibirica subsp. **uralensis** Tzvelev, Novosti Sist. Vyssh. Rast. 9: 50. 1972.

显稃早熟禾 xian fu zao shu he

Poa insignis Litvinov; *P. sibirica* subsp. *insignis* (Litvinov) Olonova; *P. sibirica* var. *insignis* (Litvinov) Sergievskaja.

Culms up to 120 cm tall, 2–4 mm in diam. at lower nodes. Leaf sheaths longer than their internodes, nearly equaling its blade; ligules ca. 1.5 mm, abaxially sparsely scabrid to pilulose; blades moderately thin, 2–8 mm wide, uppermost to 20 cm. Panicle loosely contracted, ovoid to cylindrical, 10–20 cm, longest internodes 2.5–4 cm. Spikelets (1–)2(–3)-flowered; lower glume 2.5–3.5 mm, upper glume 3–4.5 mm; lemmas (3.5–)3.8–5.2(–5.5) mm. Anthers 2–2.5 mm. Fl. and fr. Jun–Aug. 2*n* = 28.

Grasslands on slopes, meadows along forest margins; 2000–2800 m. NW Xinjiang (Toli) [Kazakhstan, Korea, Russia (Siberia); Europe (Russia: Ural Mountains)].

17. Poa calliopsis Litvinov ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 11. 1933.

花丽早熟禾 hua li zao shu he

Poa phariana Bor.

Perennials, with small tufts or isolated shoots, with slender rhizomes; shoots extravaginal. Culms erect, mostly solitary, 3–15(–25) cm tall, 0.5–1 mm in diam., smooth, nodes 1 or 2(–3), none or 1 exserted, uppermost 1/5–1/3 way up. Leaf sheaths smooth, ribs indistinct, lower ones 1.5–2 mm wide, 1.5–6.5 cm, 1–4 × as long as blade, uppermost closed for 1/3 of length, basal ones soon becoming fibrous, not persisting; blade flat or folded, moderately thin, 0.3–4 cm × 1–3 mm, abaxially smooth, adaxially smooth or finely scabrid, glabrous, margins scabrid, apex prow-tipped, of tillers and lower culm frequently curved, 1–4(–7) cm; ligule 0.5–2(–3) mm, abaxially smooth, apex truncate to obtuse, collars smooth, glabrous, uppermost erect or slightly divergent. Panicle initially contracted, ovoid, later open and pyramidal, 1.2–5 × 1.5–4 cm, longest internodes 0.25–1.3 cm; branches (1 or)2 per node, eventually spreading to reflexed, flexuous, rounded, smooth or distally scabrid, longest 0.7–2.5 cm, with 2–12 spikelets clustered distally; flowers perfect or female, sometimes whole inflorescence female. Spikelets broadly elliptic or ovate, golden tawny or purple, 3.5–4.5 mm, florets (1–)2 or 3; vivipary usually absent; rachilla internodes 0.3–0.6 mm, smooth, glabrous; glumes elliptic or ovate or subflabellate, subequal, smooth or keel with a few hooks, lower glume (2–)2.25–3.3 mm, 1- or 3-veined, upper glume (2.2–)2.5–3.8 mm, 3-veined; lemmas broadly oblong, slightly arched along keel, 2.75–4.2(–4.7) mm, upper 1/4–1/2 membranous, turning gold-

en-brownish, apex obtuse to acute, keel villous for 1/2 of length, marginal veins villous for 1/4 of length, area between veins smooth, glabrous or infrequently proximally pilulose; callus webbed, hairs dense, 1/2 as long as lemma; palea glabrous or proximally pilulose between keels, keels sparsely scabrid, 2–6 hooks per keel. Anthers 1.5–2 mm, or vestigial, ca. 0.1 mm. Fl. and fr. Jul–Aug. 2*n* = 28.

Alpine areas, meadows, waterside grassy places; 3000–3700 (–5400) m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

Most material placed here is of low-growing plants with long, slender rhizomes and delicate panicles with pendent spikelet clusters. Hybrids with *Poa qinghaiensis* are occasionally found in the NE Xizang-Qinghai Plateau. Intermediates are stouter and have larger spikelets and more scabrid lemma and palea keels than are typical for *P. calliopsis*, but the lemmas are strongly pubescent on the keel and marginal veins. Such plants are difficult to separate from *P. lipskyi*, except that they have the more pendent spikelet clusters typical of *P. calliopsis* and *P. qinghaiensis*, and often a trace of webbing on the callus, and might be referred to *P. pratensis* subsp. *staintonii*.

18. Poa polycolea Stapf in J. D. Hooker, Fl. Brit. India 7: 342. 1896 [“1897”].

多鞘早熟禾 duo qiao zao shu he

Poa chalarantha Keng ex L. Liu; *P. gilgitica* Dickoré; *P. lithophila* Keng ex L. Liu; *P. maerkangica* L. Liu; *P. triglumis* Keng ex L. Liu.

Perennials, loosely to densely tufted, often shortly stoloniferous or rhizomatous; shoots extra- and intravaginal. Culms erect, decumbent, or ascending, usually several per tuft, 10–60(–75) cm tall, 0.5–1 mm in diam., smooth, nodes 1–3, 1 or 2 exserted, uppermost usually 1/4–1/3 way up. Lowermost leaf sheaths closely overlapping, straw colored, often somewhat thickly papery and persistent, not or only slightly fibrous, lower and middle sheaths 1–1.3(–1.5) mm wide distally, with distinct closely spaced ribs, membranous between ribs, smooth or scabrid, sometimes retrorsely hispidulous, uppermost smooth, glabrous, 4–20 cm, 1/2–4 × as long as blade, closed for ca. 1/2 of length; blade flat or folded with inrolled margins, thin, 2–10(–20) cm × 0.8–1.5(–2.5) mm, abaxially often shiny, smooth, ribs distinct, margins finely scabrid, adaxially smooth or sparsely scabrid, glabrous or strigose, of tillers with margins inrolled, to 20(–30) cm, adaxially smooth or scabrid, glabrous or pilulose to strigose, visible veins 5–9 including keel; lower ligules 0.1–0.5 mm, adaxially smooth or scabrid, apex truncate, glabrous or ciliolate, upper to 0.5–1(–2.2) mm, apex truncate to obtuse, collar margins abruptly flared, smooth or scabrid, glabrous or lower ones ciliate to strigose. Panicle open, erect or diffuse, 5–15(–20) × 2–9 cm, longest internodes 1–3(–3.5) cm; branches spreading to reflexed, 2–5 per node, capillary, usually angled, scabrid, longest 3–9 cm with 2–9 spikelets in distal 1/3–1/2. Spikelets lanceolate, green or purple tinged, 4–7 mm, florets 2–4(–5), commonly female, sometimes whole inflorescence female; vivipary absent; rachilla internodes 0.7–1.6 mm, smooth or slightly bumpy, or scabrid, usually visible laterally; glumes membranous-papery, generally shiny, keel and veins scabrid, surface smooth (rarely slightly scabrid distally), apex acute to acuminate, lower glume subulate, 1.5–3(–4) mm, 1/3–1/2 as wide as upper, 1(or 3)-veined, upper glume elliptic, 3–4(–5) mm, 3-veined; lemmas lanceolate, very thinly papery, 3–5(–5.5) mm, keel straight, 5(or 7)-veined, margins membranous, apex acute to acuminate, glabrous, or keel sparsely pilulose to shortly villous for 2/3 of length, marginal veins for 1/2 of length, intermediate veins conspicuous, area between them smooth or sparsely scabrid, glabrous or basally pilulose; callus usually sparsely webbed, hairs less than 1/2 as long as lemma; paleas smooth, minutely bumpy, or scabrid, glabrous or pilulose between keels, keels scabrid, sometimes medially pilulose. Anthers (2–)2.3–3 mm, or vestigial. Fl. and fr. Jun–Aug.

Common in alpine rocky slopes, mountain slopes, meadows among thickets, coniferous, *Quercus*, and *Larix* forests on slopes; 3000–5000 m. Qinghai, W Sichuan, SW Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Nepal, Pakistan].

Poa polycolea is a distinctive and common species of the upper mountains from west to east along the Himalayas, extending northward through Hengduan Shan. It has slender culms and blades, short ligules, and long anthers, or florets, spikelets, or inflorescences that are female. It is quite variable in floret vestiture, and in the east it grades toward *P. asperifolia*, which has stouter culms with more raised nodes and longer leaf blades and ligules, and *P. tangii*, which has softer leaves and smooth branches, broader first glumes, and more often blunt lemmas. Infrequently some spikelets have an additional sterile bract above the 2 normal glumes as in the type of *P. triglumis*.

19. Poa tangii Hitchcock, Proc. Biol. Soc. Washington 43: 94. 1930.

唐氏早熟禾 tang shi zao shu he

Poa shansiensis Hitchcock.

Perennials, loosely tufted, sometimes short rhizomatous; shoots mainly extravaginal. Culms erect, sometimes abruptly decumbent at base, few per tuft, 25–50 cm tall, 0.5–1 mm in diam., smooth, nodes 2 or 3, 1 or 2 exserted, uppermost usually 1/3–1/2 way up. Lower leaf sheaths mostly 1.2–1.5 mm wide, with well-spaced moderately raised ribs, thin between the ribs, smooth or scabrid, sometimes hispidulous, lowermost ones not closely overlapping, papery, withering, longest 4–10 cm, smooth, glabrous, 2–4 × as long as blade, uppermost closed for 2/5–3/4 of length; blade flat, papery to thickly papery, 2–4(–10) cm × 1–2(–3) mm, abaxially smooth, adaxially smooth or scabrid, glabrous, margins finely scabrid, of tillers flat or folded, 5–20 cm, generally with only primary veins expressed abaxially (3–5 veins visible including keel); ligule 0.5–1 mm, apex truncate, errose to fimbriate, adaxially smooth or scabrid, collar margins not or weakly flared, smooth or scabrid, glabrous or the lower ones sometimes ciliate. Panicle open, erect or lax, diffuse, exserted, 2–8 × 2–4 cm, longest internodes 1.2–3.5 cm; branches spreading, 2 per node, slender, rounded, smooth, longest 1.5–4 cm with 1–3 spikelets in distal 1/3; flowers female or perfect, sometimes whole inflorescences female. Spikelets ovate, grayish green, 5–8 mm, florets 3–6; vivipary absent; rachilla internodes 0.7–2.5 mm, smooth or sparsely scabrid, glabrous or sparsely pilulose; glumes very thinly papery, surface smooth, keel smooth or sparsely scabrid, apex obtuse to acute, blunt or pointed, lower glume lanceolate, 2.5–3.5 mm, 1/2–3/4 as wide as upper, 1-veined, upper glume 3–5.5 mm, 3-veined; lemmas oblong, very thinly papery, 4–5.5 mm, apex

obtuse, veins glabrous or keel loosely villous for 1/2 of length, marginal veins to 1/3, area between veins smooth or distally scabrid, proximally glabrous or laxly pilulose; callus webbed or diffusely hairy, hairs less than 1/2 as long as lemma; palea, smooth or minutely bumpy (or with sparse minute hooks), glabrous between keels, keels sparsely scabrid, sometimes medially pilulose. Anthers 2.5–3.5 mm, or vestigial. Fl. and fr. May–Jul.

● Wet grassy places along forest margins; 1500–3600 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi.

Poa tangii is variable in spikelet pubescence, but the variation is not geographically correlated. The species becomes especially difficult to distinguish from *P. polycolea* in Gansu and Qinghai, except by its smooth, rounded branches and sparsely scabrid palea keels. Compare *P. tangii* also with *P. veresczaginii* in *P.* subg. *Ochlopoa*.

20. Poa lhasaensis Bor, Bull. Bot. Surv. India 7: 132. 1965.

江萨早熟禾 jiang sa zao shu he

Poa jaunsarensis Bor.

Plants grayish to tawny grayish, perennials, rhizomatous. Culms 40–80 cm tall, 1.5–2 mm in diam., nodes 3 or 4. Lower leaf sheaths retrorsely scabrid, 14–19 cm, 1.1–1.6 × as long as blade, uppermost closed for (1/5–)1/4 of length; blades flat or folded, moderately thin, 8.5–19 cm × 2.5–4 mm, uppermost 8.5–13 cm, surfaces and margins scabrid, apex slender prow-tipped; ligule 2.5–5 mm, apex entire to lacerate, abaxially scabrid. Panicle loosely contracted or somewhat open, oblong to pyramidal, 10–19 × 2–5 cm; branches loosely ascending, 3–5 per node, proximally rounded, sparsely scabrid, distally densely scabrid on and between angles, longest 4–8 cm with spikelets moderately crowded in distal 1/2. Spikelets elliptic, 4–5 mm, florets 2–4; vivipary absent; rachilla glabrous; glumes thinly papery, scabrid on keels and marginal veins, lower glume lanceolate to oblong, 2.3–3.5 mm, 1- or 3-veined, apex acuminate, upper glume elliptic to oblong, 3.5–3.8 mm; lemmas 3.5–4 mm, keel villous for 1/2 of length, marginal veins to 1/3; callus webbed; palea keels scabrid, glabrous. Anthers 1.4–2 mm. Fl. and fr. Jun–Aug.

High-elevation grassy places on slopes; 3300–4500 m. Sichuan, Xizang [India, Kashmir, Nepal].

Poa lhasaensis needs further study. The types of *P. jaunsarensis* and *P. lhasaensis* are large plants with long upper culm leaves (10–13 cm), upper sheaths closed for only 1/4 their length, and the lowest sheaths moderately to densely retrorsely scabrid; *P. jaunsarensis* has the uppermost ligule to 5 mm long and lacerate. The few specimens referable to *P. jaunsarensis* could be accommodated in *P. pratensis* except for the several long, relatively scabrid leaf blades along the culms, their unusually open sheaths, long ligules, and the thin glumes, which in combination suggest the specimens might be something else, perhaps intermediates between *P. pratensis* and *P. asperifolia*. The anthers are longer and the panicle branches more numerous in the type specimens than in the original descriptions of both *P. lhasaensis* and *P. jaunsarensis*.

21. Poa pratensis Linnaeus, Sp. Pl. 1: 67. 1753, nom. cons.

草地早熟禾 cao di zao shu he

Poa florida N. R. Cui.

Perennials, loosely tufted or with isolated shoots, strongly rhizomatous, often forming turf; shoots extra- and often intravaginal. Plants green to pale or yellowish green, or purplish to strongly grayish glaucous. Culms 10–120 cm, 1–2.5 mm in diam., erect or decumbent, 1 to several per tuft, smooth, nodes (1–)2–4, 1 or 2 exserted. Leaf sheaths moderately compressed and keeled, uppermost closed for (1/4–)1/3–2/5 of length, smooth or infrequently retrorsely scabrid or pilulose; blades flat or folded, papery to thickly papery, 1–5 mm wide, surfaces smooth or sparsely scabrid, margins scabrid, adaxially glabrous or frequently sparsely hispidulous to strigulose, of tillers, flat or folded with margins inrolled, intravaginal ones when present often folded, 0.5–2 mm wide, extravaginal ones flat or folded (1–)1.5–5 mm wide; ligule whitish, 0.5–4(–5) mm, abaxially nearly smooth to densely scabrid, apex truncate to rounded, often finely scabrid to ciliolate or pilulose. Panicle loosely contracted to open, oblong to broadly pyramidal, erect or slightly lax, (2–)5–20(–25) cm, longest internodes 1–4.2 cm; branches steeply ascending to widely spreading, (2–)3–5(–9) per node, rounded or distally angled, nearly smooth to distally scabrid with hooks on and between angles, longest branch 1.5–5(–10) cm with (3–)7–18 spikelets in distal 1/3–2/3, sometimes clustered distally. Spikelets ovate, green or grayish, frequently purple tinged, 3–7(–9) mm, florets 2–5(–9); vivipary absent in China; rachilla internodes 0.5–1(–1.2) mm, smooth, glabrous (rarely sparsely pilulose); glumes subequal, strongly keeled, keels and sometimes lateral veins dorsally scabrid, first glume 1.5–3(–4) mm. 1–3-veined, upper glume 2–4 mm, 3(or 5)-veined; lemmas ovate to lanceolate (or narrowly lanceolate), 2.5–4(–5) mm, apex slightly obtuse to acuminate, keel villous for 3/4 of length, marginal veins to 1/2 length, intermediate veins prominent, glabrous (rarely sparsely pilulose), glabrous between veins, minutely bumpy, sparsely scabrid distally; callus webbed, hairs as long as lemma, frequently with less well-developed tufts from below marginal veins; palea usually narrow, glabrous or with sparse hooks, usually minutely bumpy, glabrous between keels, keels scabrid, infrequently medially pilulose in subsp. *pruinosa*. Anthers (1.2–)1.4–2.5(–2.8) mm, infrequently poorly formed, but not vestigial. Fl. and fr. Jun–Sep. $2n = 28–144$.

Temperate to arctic, moderately moist to wet conditions, from coastal meadows to forest shade, to alpine and tundra, often in disturbed sites; 500–4400 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Australia, Europe, North America, Pacific Islands, South America].

Poa pratensis is a valuable species for soil stabilization and forage. Its taxonomy is complicated by the occurrence of facultative apomixis and an extensive polyploid series. It comprises many local and variable, widespread races. It is possible to recognize the widespread forms as subspecies, but there are many intermediates between them that do not fit well and we can only treat them as *P. pratensis* s.l. The type of *P. florida* appears to belong to this species, but has many more florets per spikelet (6–9) than is usual.

1a. Blades somewhat tough and slightly fleshy, folded, not setiform, 2–5 mm wide, grayish green, sterile shoot leaves usually curved outward; panicle somewhat lax, branches ± smooth; plants from somewhat saline habitats in mountains and steppe basins of C Asia ..... 21d. subsp. *pruinosa*

1b. Blades flat or folded, sometimes setiform, not fleshy, 0.5–4(–5) mm wide, sometimes with a bluish tinge, but not grayish green; sterile shoot leaves mostly straight (sometimes curved in subsp. *alpigena*).

2a. Lemmas 4–4.5 mm, lower glume 3–4 mm.

3a. Panicle 4–8 cm; branches 2 per node, distally sparsely scabrid, spikelets clustered in distal 1/3, clusters somewhat pendent ..... 21f. subsp. *staintonii*

3b. Panicle 10–15 cm; branches 3–5 per node, distally moderately scabrid, spikelets loosely arranged in distal 1/2, not pendant ..... 21g. subsp. *stenachyra*

2b. Lemmas 2.5–3.5(–5) mm, lower glume 2–3.5(–4) mm.

4a. Innovations and flowering shoots in small clusters, usually enclosed by dead leaf sheaths; shoots connected by long rhizomes; blades of the innovation leaves usually setiform, convolute, 0.4–1 mm in diam.; plants 20–100 cm tall; panicle usually slightly lax, compressed after anthesis; branches slightly scabrid; lemmas 2.5–3.5 mm; ligule glabrous ..... 21b. subsp. *angustifolia*

4b. Innovation shoots usually solitary, rarely somewhat appressed, but not forming dense clusters.

5a. Sheaths of lower leaves somewhat scabrid due to very short hairs; innovation leaf blades usually convolute, moderately firm, 0.4–0.7 mm in diam.; panicle lax, branches scabrid; lemmas 2.8–3.5 mm; culms 30–80 cm tall; forest plants of Heilongjiang basin ..... 21e. subsp. *sergievskajae*

5b. Sheaths of lower leaves glabrous and smooth (rarely pilulose, but then blades broader and flat); panicle branches usually slightly scabrid or smooth; lemmas 2.5–4(–5) mm.

6a. Plants 8–30(–50) cm tall, with bluish coating, especially prominent on glumes; blades 1.3–4 mm wide, flat; panicle broad, lax; branches slightly scabrid, 1 or 2(or 3) per node; ligule abaxially pilulose ..... subsp. *irrigata* .(see note under 21c. subsp. *pratensis*)

6b. Plants usually larger, usually without bluish coating; panicle branches usually 3–5 per node at lowest nodes.

7a. Panicle branches with scattered spinules, sometimes nearly smooth; leaf blade usually flat; plants often with compact aerial shoots; widespread ..... 21c. subsp. *pratensis*

7b. Panicle branches smooth or nearly so; leaf blade often convolute; plants almost always with solitary shoots; arctic and alpine ..... 21a. subsp. *alpigena*

21a. Poa pratensis subsp. **alpigena** (Lindman) Hiitonen, Suom. Kasvio. 205. 1933.

高原早熟禾 gao yuan zao shu he

Poa alpigena Lindman, Sv. Fanerogamfl. 91. 1918; *P. pratensis* var. *alpigena* Blytt, nom. illeg. superfl.; *P. pratensis* var. *contracta* Keng; *P. pratensis* var. *iantha* Laestadius.

Plants green or more often purplish, with slender rhizomes; shoots extravaginal. Culms 10–70 cm tall, 0.7–1 mm in diam., mostly solitary, nodes 1 or 2. Leaf sheaths smooth, glabrous; blades flat or more often folded, 2–5 cm × 0.6–2(–3) mm, surfaces and margins slightly scabrid or smooth, adaxially frequently sparsely hairy, of tillers often curved upward, to 12 cm; ligules 0.8–2.5 mm, abaxially smooth or sparsely scabrid. Panicle loosely contracted or eventually open, erect, 5–10(–20) × 1–3.5(–5) cm; branches spreading at anthesis, slightly flexuous, 2–4 per node, slender, smooth or sparsely scabrid, longest 1.5–4 cm, with 9–15 spikelets in distal 1/2. Spikelets purple-violet, 3–5 mm, florets 2 or 3; glumes subequal, lower glume 2–3.5 mm, upper glume 2.5–4 mm; lemmas ovate, 3.3–4.3 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins glabrous or sparsely pilulose to short villous; palea smooth or proximally with sparse hooks between keels, keels scabrid, sometimes medially pilulose. Anthers (1.2–)1.3–1.8 mm. Fl. and fr. Jul–Aug. 2*n* = 28, 35, 42, 56, 63, 70, 74–78, 84.

Mountain meadows, alpine cold grasslands, riverside sandy places; 700–1000 m. Hebei, Heilongjiang, Nei Mongol [Russia; Europe, North and South America].

Only a few specimens from NE China seem to be of this race. Records from western provinces cited in FRPS (9(2): 101–102. 2002, as *P. alpigena*) seem to be based on material better placed in subsp. *pruinosa* or subsp. *staintonii*.

21b. Poa pratensis subsp. **angustifolia** (Linnaeus) Lejeun, Comp. Fl. Belg. 82. 1828.

细叶早熟禾 xi ye zao shu he

Poa angustifolia Linnaeus, Sp. Pl 1: 67. 1753; *P. pratensis* var. *angustifolia* (Linnaeus) Smith.

Plants pale green, sometimes purplish, forming tufts, not turf; shoots extra- and intravaginal, with fascicles of slender intravaginal shoots. Culms (15–)20–80 cm tall, several per tuft. Leaf sheaths longer than basal internodes, shorter than upper internodes, several times as long as blades; blades flat or folded with margins inrolled, thin to moderately thin, 3–9 cm × 1–2 mm, of tillers intravaginal ones setiform, folded with inrolled margins, papery to thickly papery, to 45 cm × 0.5–1 mm, surfaces smooth, often adaxially pubescent; ligule 0.5–2 mm, apex truncate, abaxially scabrid. Panicle open, oblong to narrowly pyramidal, 5–10(–15) × 2–4(–5) cm; branches ascending or spreading, 3–5 per node, scabrid, longest 2–5 cm with 6–18 spikelets in distal 1/2–2/3. Spikelets ovate, frequently purple tinged, 4–5 mm, florets 2–5; glumes subequal, apex acuminate, keel scabrid, lower glume 2.2–3 mm, 1-veined, upper glume 2.5–3.2 mm, 3-veined; lemmas 2.5–3.5(–4) mm, apex acute, narrowly membranous, keel villous for 2/3 of length, marginal veins for 1/2 length, intermediate veins glabrous; palea smooth to minutely bumpy between keels, keels scabrid. Anthers 1.3–2 mm. Fl. and fr. Jun–Jul, fr. Jul–Sep. 2*n* = 28, 46, 51, 56, 63, 66, 72.

Coniferous and *Quercus* forest margins, grasslands on slopes; 500–4400 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; introduced in North America].

This subspecies is probably introduced, at least in part, in China. It grades into subsp. *pratensis*.

21c. Poa pratensis subsp. **pratensis**

草地早熟禾(原亚种) cao di zao shu he (yuan ya zhong)

Poa angustiglumis Roshevitz; *P. pratensis* [unranked] *anceps* Gaudin; *P. pratensis* var. *anceps* (Gaudin) Grisebach; *P. viridula* Palibin.

Plants green or pale green, often forming turf, strongly rhizomatous; shoots extra- and intravaginal. Culms (15–)20–80(–120) cm, few to several per tuft, erect, nodes 2–4. Leaf sheaths smooth or retrorsely scabrid, lower ones longer than internodes, usually distinctly longer than blade, uppermost to 20 cm; blades flat, moderately papery to thickly papery, 2–10 cm × 2–4(–5) mm, surfaces smooth or adaxial surface and margins sparsely scabrid, abaxially glabrous or less often sparsely pubescent, of tillers flat and folded or all flat with margins inrolled or not, papery to thickly papery, to 45 cm × 1–4(–5) mm; ligules 1–4(–5) mm, abaxially scabrid. Panicle loosely contracted to open, oblong to broadly pyramidal, 5–20(–25) × 3–5(–10) cm; branches spreading, straight or flexuous and slightly lax, 3–7(–9) per node, smooth or scabrid, longest 5–10 cm with 3–10(–18) spikelets in distal 1/2. Spikelets ovate, frequently purple tinged, 4–7(–9) mm, florets 3–5(–8); glumes ovate to lanceolate (narrowly lanceolate), apex acute to acuminate, keel distally scabrid, lower glume 1.5–3(–4) mm, 1- or 3-veined, upper glume 2–3(–5) mm, 3-veined; lemmas ovate to lanceolate 2.5–4(–5) mm, apex slightly obtuse to acute, keel villous for 3/4 of length, marginal veins for 1/2 length, intermediate veins glabrous; palea smooth or minutely bumpy, rarely with a few hooks between keels, keels scabrid. Anthers (1.2–)1.5–2.2(–2.8) mm. Fl. May–Jun, fr. Jul–Sep. 2*n* = 28, 35, 42, 49, 50, 52, 56, 58, 63, 64, 66, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140.

Moist meadows, sandy places, grassy slopes; 500–4000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia (Far East, Siberia), Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Australia, Europe, North America, Pacific Islands, South America].

The race is widely cultivated for forage, soil stabilization, and lawns. It is probably also native to China. Cultivated, soft-leaved plants are sometimes called subsp. *irrigata* (Lindman) H. Lindberg, but such cultivated plants are not readily classified. *Poa pratensis* subsp. *irrigata* was reported from Xinjiang in FRPS (9(2): 194. 2002, as *P. irrigata* Lindman), but, while it is potentially present there, no authentic material has been seen by us. It was mapped for the Russian Far East only from the Commander Isles by Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 279. 1985).

21d. Poa pratensis subsp. **pruinosa** (Korotky) Dickoré, Stapfia 39: 173. 1995.

粉绿早熟禾 fen lü zao shu he

Poa pruinosa Korotky, Repert. Spec. Nov. Regni Veg. 13: 291. 1914; *P. grisea* Korotky; *P. macrocalyx* var. *tianschanica* Regel; *P. markgrafii* H. Hartmann; *P. pachyantha* Keng ex Shan Chen; *P. pamirica* Roshevitz ex Ovczinnikov; *P. tianschanica* (Regel) Hackel ex O. Fedtschenko.

Plants grayish green, loosely tufted, not forming turf; shoots mainly extravaginal, often curved upward. Culms often decumbent, 15–70 cm tall, solitary or infrequently few per tuft, 1–2 mm in diam., nodes 2 or 3, uppermost node less than 1/3 way up. Blades flat or usually folded with margins inrolled, moderately papery to thickly papery, 2–5 mm wide, of tillers folded, thickly papery and firm, usually distinctly curved, 3–10(–18) cm × (1–)2–5 mm, often adaxially sparsely pubescent; ligule 0.5–4 mm, abaxially scabrid (rarely smooth). Panicle usually loosely contracted, oblong to pyramidal, somewhat lax, 4–10(–15) cm; branches ascending to spreading, (1–)2–5(–7) per node, smooth or distally scabrid, longest with spikelets in distal 1/3–1/2. Spikelets usually grayish and purple tinged, 3–6(–7) mm, florets 2–5(–7); lower glume 2.5–3.5 mm, 1- or 3-veined, upper glume 3–4 mm, 3-veined; lemmas ovate to lanceolate, 3–4.5 mm, apex acute, keel villous for 2/3 of length, marginal veins for 1/2; palea keels scabrid, glabrous or infrequently medially pilulose. Anthers 2–2.5 mm. Fl. and fr. Jun–Sep. 2*n* = 42.

Mountains, moist weakly saline or alkaline grassy places, alpine river banks, marshy grasslands in the north. Gansu, Heilongjiang, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

This race is native to China. The inclusion of *Poa tianschanica* s.s. needs further study. *Poa pruinosa* s.s. (including *P. grisea*) includes plants from E Siberia with a profuse, waxy bloom and culms strongly flattened at the base. The types of *P. markgrafii* and *P. pamirica* seem typical of the subspecies. Plants without a waxy bloom, with stiff culms that are weakly flattened at base, occurring from the Altai, Khakass, and

Tuva in Siberia southward through C Asia, are sometimes distinguished as *P. tianschanica* s.s. Tzvelev (Zlaki SSSR, 459. 1976) treated these as one species, possibly derived from hybridization between *P. pratensis* and *P. tibetica*. *Poa pachyantha* seems to fit within *P. pratensis* subsp. *pruinosa*; although the culms are not flattened, the lower sheaths are flattened and somewhat keeled, and the plants are gray with anthocyanic spikelets that are somewhat clustered. *Poa sabulosa* (Turczaninow ex Roshevitz) Turczaninow ex Roshevitz was reported in FRPS (9(2): 102. 2002) from Heilongjiang, in low, wet, sandy places by river banks, lake shores, seashores, and saline meadows. No voucher was seen, and it is doubtfully present in China. In Russia it is considered a narrow endemic of subsaline meadows in the Baikal region of Siberia and N Mongolia, and is treated as a low-growing (10–30 cm), small-spikeleted (lemmas 2.3–2.8 mm) race, as *P. pratensis* subsp. *sabulosa* (Turczaninow ex Roshevitz) Tzvelev, or lumped within *P. pratensis* subsp. *pruinosa* s.l.

21e. Poa pratensis subsp. **sergievskajae** (Probatova) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 27. 1974.

色早熟禾 se zao shu he

Poa sergievskajae Probatova, Novosti Sist. Vyssh. Rast. 8: 28. 1971.

Plants loosely tufted, not forming a turf, slender rhizomatous, shoots mainly extravaginal. Culms solitary, erect, slender, 20–80 cm tall. Leaf sheaths of lower leaves retrorsely hispidulous, blades flat with slightly inrolled margins, 1–3 mm wide, adaxially sparsely pubescent, of tillers folded, to 25 cm × 0.8–1.4 mm. Panicle open, pyramidal, 5–15 cm; branches slightly flexuous, slender, nearly smooth to moderately scabrid, longest with 3–10 spikelets. Spikelets pale green, 3–5 mm; glumes unequal, lower glume 1-veined; lemmas 2.5–3.5 mm, keel and marginal veins loosely villous; palea glabrous between keels, keels scabrid. Anthers 1.3–1.8 mm. Fl. and fr. Jul.

Betula and *Picea* forests, shade of shrubs, moist ground. ?Heilongjiang, ?Jilin, ?Xizang [Russia (Far East, Siberia)].

A number of gatherings from China fits this taxon, which may merely represent a minor variation within *Poa pratensis*, possibly from low nutrient (acidic), shady, moist habitats.

21f. Poa pratensis subsp. **staintonii** (Melderis) Dickoré, Stapfia 39: 174. 1995.

长秆早熟禾 chang fu zao shu he

Poa alpigena subsp. *staintonii* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 142. 1978; *P. dolichachyra* Keng ex P. C. Keng & G. Q. Song.

Plants green or purplish, not forming a turf. Culms 30–40 cm tall, nodes 2, uppermost node to 1/3 of way up. Leaf sheaths smooth, weakly keeled, uppermost 9–11 cm, several times longer than blade; blades folded, moderately papery to thickly papery, 3–7 cm × 2–3 mm, abaxially smooth, adaxially sparsely pubescent, of tillers 20–25 cm × 1–2 mm; ligules 1.5–3 mm, apex obtuse, abaxially smooth. Panicle open, 4–8 cm; branches spreading, 2 per node, proximally smooth, distally sparsely scabrid, longest 3–5 cm with spikelets clustered in distal 1/3, clusters somewhat pendent. Spikelets ovate, purple tinged, 4.5–6 mm, florets 2–4; glumes sparsely scabrid on keels, smooth or very sparsely scabrid on lateral veins, smooth between veins, lower glume ca. 3 mm, 1-veined, upper glume ca. 4 mm, 3-veined; lemmas 4–4.5 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins glabrous; palea keels medially scabrid or pilulose. Anthers ca. 2 mm. Fl. and fr. Jul–Aug.

River banks in high mountain areas, waterside grassy slopes; 3400–3800 m. Qinghai, N Sichuan, Xizang, Yunnan [Nepal].

This race is native to the Xizang-Qinghai Plateau. It has larger spikelets than *Poa calliopsis*, but seems intermediate to it in the possession of spikelets crowded near the somewhat pendent branch tips.

21g. Poa pratensis subsp. **stenachyra** (Keng ex P. C. Keng & G. Q. Song) Soreng & G. Zhu, **comb. et stat. nov.**

窄颖早熟禾 zhai ying zao shu he

Basionym: *Poa stenachyra* Keng ex P. C. Keng & G. Q. Song, Acta Biol. Plateau Sin. 12: 10. 1994.

Plants green or pale green, loosely tufted, not forming a turf, shoots mainly extravaginal. Culms erect, solitary or few per tuft, 80–110 cm tall, smooth, rounded or slightly compressed, nodes 2–4, 1 or 2 exserted, uppermost node 1/5–1/4 way up. Leaf sheaths smooth, somewhat keeled, uppermost to 19 cm, ca. 2 × as long as blade; blades flat with margins slightly inrolled, leathery, 10–16 cm × 3–4 mm, adaxially sparsely scabrid; ligule 1–2 mm, abaxially scabrid, margin erose, apex obtuse. Panicle open, 10–15 × 4–8 cm, longest internode 3.7–4.2 cm; branches widely spreading to nodding, 3–5 per node, proximally rounded and smooth, distally moderately scabrid, longest 6–8 cm with 8–13 spikelets in distal 1/2. Spikelets 5–6 mm, florets 3; glumes subequal, keel moderately scabrid, surfaces sparsely scabrid, lower glume 3.5–4 mm, 1- or 3-veined, upper glume 4–5 mm, 3-veined, as long or slightly longer than first lemma; lemma narrowly lanceolate, 4–4.5 mm, apex acuminate, yellow bronze, intermediate veins prominent, keel villous for 1/2 length, marginal veins to 1/3, surfaces indistinctly minutely bumpy, sparsely scabrid; palea glabrous between keels, keels finely scabrid. Anthers ca. 2.3 mm. Fl. and fr. Jun–Aug.

● Forest margins on slopes, grassy places among thickets; 3700–4300 m. Qinghai, NW Sichuan.

This rare race differs from the others by having glumes and lemmas narrowly acuminate, the glumes subequal to the lowest lemma.

22. Poa raduliformis Probatova, Novosti Sist. Vyssh. Rast. 8: 25. 1971.

糙早熟禾 cao zao shu he

Poa remota Forselles subsp. *raduliformis* (Probatova) Voroschilov.

Perennials, shortly rhizomatous, rhizomes yellowish orange to reddish brown, slender. Plants yellowish green. Culms 35–90 cm tall, 3–4 mm in diam., nodes 2 or 3, uppermost node ca. 1/2 way up, often slightly scabrid below the panicle and nodes. Leaf sheaths compressed, keeled, 10–20 cm, lower ones distinctly retrorsely hispidulous, uppermost closed for 1/3 of length; blade flat or infrequently folded, moderately thin, 8–15 cm × (1.5–)3–5 mm, adaxial surface of basal blades sparsely pilulose; ligules 2–3.5 mm, apex ciliolate, abaxially sparsely puberulent. Panicle open, oblong, 8–20 cm; branches ascending, spreading in anthesis, scabrid throughout, longest 3–

5 cm with 3–10 spikelets in distal 1/2. Spikelets green, 3.5–6 mm, florets 2–4; vivipary absent; glumes strongly keeled, keel almost straight, keel and lateral veins moderately densely scabrid, surface sometimes moderately scabrid above, 3-veined, apex acuminate, lower glume 2–3 mm, upper glume 2.5–3.5 mm; lemmas lanceolate, 3.3–4.5 mm, keel and marginal veins with lower part sparsely pilulose, surfaces glabrous, finely minutely bumpy; callus webbed; palea glabrous between keels, keels scabrid. Anthers 1.8–2.4 mm. Fl. and fr. Jun–Jul. 2*n* = 70.

Forest margins, roadside thickets; ca. 2600 m. ?Shanxi [Japan, Mongolia, Russia (Far East, E Siberia)].

Tzvelev (Zlaki SSSR, 451. 1976) considered *Poa raduliformis* as probably "a result of hybridization of *P. pratensis* with *P. remota*, *P. radula*, or *P. sibirica*." It seems few gatherings from China might be called *P. raduliformis*, and the report from Shanxi in FRPS (9(2): 130–131. 2002) is doubtful. The species should be looked for in Heilongjiang.

23. Poa arctica R. Brown subsp. **caespitans** Simmons ex Nannfeldt, Symb. Bot. Upsal. 4: 71. 1940.

极地早熟禾 ji di zao shu he

Poa tolmatchewii Roshevitz.

Perennials, densely tufted, short rhizomatous or not (Chinese plants); shoots extravaginal and some intravaginal. Culms solitary to several (rarely up to 20, Chinese plants), 7.5–60 cm tall, 0.5–2 mm in diam., smooth, glabrous, nodes 1 or 2, none or 1 exserted, uppermost to 1/3 way up, base of culms with sheaths soon withering (in Chinese plants). Leaf sheaths weakly keeled, smooth, glabrous, 2–15 cm, 1.5–5 × as long as blade, uppermost closed for 1/4–1/3 of length; blades flat or folded, papery to thickly papery, 1–6 mm wide, surfaces smooth or sparsely scabrid, of tillers folded, 2–15 cm; ligule 2–4 mm, abaxially smooth or sparsely scabrid, apex obtuse to acute. Panicle open, ovoid to pyramidal, well exserted, 3–10 (–15) × 2–6 cm, internodes 0.8–1.5(–3) cm; branches spreading early, sinuous and flexuous to strict, (1–)2–5 per node, slender to moderately stout, rounded, smooth or distally scabrid, longest 1.5–5 cm with 2–7 spikelets in distal 1/3. Spikelets ovate, strongly purple tinged, 4–5(–5.5) mm, florets (2–)3–4 (–6); vivipary absent (within China); rachilla internodes 0.8–1.2 mm, smooth, glabrous, or short villous (within China); glumes subequal, lanceolate, very thinly papery, 3-veined, weakly keeled, smooth or sparsely scabrid, lower glume (2–)2.5–4.5 mm, upper glume (2.5–)3–5 mm; lemmas lanceolate to broadly lanceolate, 3.5–4.5 mm, margins broadly membranous, apex acute, keel densely long-villous for 3/4 of length, marginal veins to 2/3, intermediate veins prominent, area between veins smooth to moderately bumpy, distally smooth or sparsely scabrid, proximally (sparsely to) densely shortly villous; callus webbed, hairs usually dense, to 1/2 as long as lemma; palea sparsely to moderately pilulose between keels, keels scabrid, medially pilulose. Anthers 1.4–2.5 mm. Fl. and fr. Jul–Aug. 2*n* = 77.

Wet places along glacial rivers or lakes, alpine meadows, grassy places on rocky slopes; ca. 2100 m. Heilongjiang, Jilin [Russia; Europe (Scandinavia), North America].

The only Chinese material seen by the authors is from Jilin (Changbai Shan), and this is tentatively placed within subsp. *caespitans*. The specimens have no evident rhizomes, like subsp. *caespitans*. The rachillas are strongly pilose as in subsp. *lanata* (Scribner & Merrill) Soreng (incl. *Poa malacantha* Komarov), but the leaf blades are too thin and the spikelets too small for that taxon. *Poa arctica* subsp. *arctica* is distinguished by its loose, rhizomatous habit, mostly solitary culms, and generally glabrous rachillas. These gatherings had been identified as *P. shinoana* Ohwi (*P. malacantha* subsp. *shinoana* (Ohwi) T. Koyama; *P. malacantha* var. *shinoana* (Ohwi) Ohwi). FRPS (9(2): 132. 2002) reported *P. tolmatchewii* from Heilongjiang, but we have not seen a voucher specimen. Specimens named as *P. arctica* subsp. *arctica* from Gansu, Hebei, Nei Mongol, Qinghai, and Xinjiang have been redetermined as other species, mostly *P. tangii*. *Poa arctica* subsp. *arctica* is a circumboreal arctic and alpine species, and is known as far south as ca. 50°N in the mountains S of Lake Baikal (but not from Mongolia) and from northernmost Korea (*P. deschampsioides* Ohwi), but there seems to be little or no suitable habitat in adjacent parts of China.

24. Poa hissarica Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 12. 1933.

希萨尔早熟禾 xi sa er zao shu he

Poa laudanensis Roshevitz ex Ovczinnikov.

Perennials, densely tufted, with or without short lateral shoots; shoots extravaginal and intravaginal. Culms few to several per tuft, erect or obliquely ascending, (10–)15–40 cm tall, 0.5–0.8 mm in diam., smooth, nodes 2 or 3, 1 or 2 exserted, uppermost to 1/4 way up, base enclosed by persistent pale brown leaf sheaths. Leaf sheaths smooth, glabrous, 3–9 cm, 4–5 × as long as blade, uppermost closed for 1/3–2/3 of length; blades folded with margins inrolled or not, moderately papery to thickly papery, ca. 2 mm wide, abaxially smooth, adaxially smooth or sparsely scabrid, margins scabrid, longest intravaginal ones to 3–8 cm; ligule 1–2 mm, abaxially smooth or sparsely scabrid, margin dentate to lacerate, sometimes ciliolate, apex truncate to obtusely rounded, collars smooth, glabrous. Panicle loosely contracted or open, erect, exserted, (3–)4–10 × 3–7 cm; branches spreading, straight or slightly flexuous, 2 per node, slender, rounded and smooth throughout or distally slightly angled and pedicels sparsely scabrid, longest (1.2–)2–5 cm with 1–5 spikelets in distal (1/3–)1/2. Spikelets ovate, tinged pale purple, (4–)5–8(–10) mm, florets (2–)3–6; vivipary absent; rachilla internodes 0.8–1.2 mm, smooth, glabrous; glumes unequal to subequal, very thinly papery, shiny, smooth or keel sparsely scabrid distally, lower glume (2–)2.5–3.5 mm, 1- or 3-veined, upper glume 3–4 mm, 3-veined; lemmas ovoid to broadly lanceolate, 3–4.8 mm, intermediate veins indistinct, smooth throughout to sparsely and finely scabrid on and along margins, glabrous throughout, margins broadly membranous, apex obtuse to acute; callus glabrous; palea smooth, glabrous between keels, keels medially scabrid to ciliate, distally scabrid. Anthers ca. 2 mm. Fl. and fr. Jun–Jul.

Alpine moist rocky grassy slopes; (2800–)3700–4000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Poa hissarica is possibly endemic to the W slope of the C Asian Republics, but one specimen from Xinjiang (Tian Shan, 2800 m), with very sparse callus web and very sparsely hispid between the lemma veins, is close to this species. Perhaps *P. hissarica* would be better treated as a subspecies of *P. lipskyi*.

25. Poa lipskyi Roshevitz, Izv. Bot. Sada Akad. Nauk SSSR 30: 303. 1932.

疏穗早熟禾 shu sui zao shu he

Perennials, densely tufted, with or without short lateral shoots; shoots extra- and intravaginal. Culms several per tuft, erect or obliquely ascending, (5–)10–55 cm tall, 1–2 mm in diam., smooth, nodes (1–)2 or 3, none or 1 exserted, uppermost to 1/4–1/2 way up, base enclosed in layers of old, pale brown sheaths. Leaf sheaths smooth or the lower ones scabrid, glabrous, 4–10 cm, 1.5–4 × as long as blade, uppermost closed for 1/3–1/2 of length; blades flat or folded, thickly papery, 2–10 cm × 1–3(–4) mm, abaxially smooth, adaxially densely scabrid, less often nearly smooth, glabrous, margins scabrid, apex prow-tipped, of tillers 3–12 cm; ligule 1.6–4 mm, abaxially scabrid, apex truncate to obtuse, dentate to lacerate, sometimes ciliolate, collar usually smooth, glabrous. Panicle open or loosely contracted, erect or somewhat lax, exserted, 4–10(–15) × 3–8 cm; branches ascending to spreading, straight or slightly flexuous, 1 or 2(–5) per node, slender, rounded and smooth throughout or distally slightly angled and very sparsely scabrid, longest 2–7 cm with 2–4(–8) spikelets in distal 1/4–1/3. Spikelets ovate, 6–9 mm, florets 3–5(–6), purple tinged; vivipary present or commonly absent; rachilla internodes 0.8–1.2 mm, smooth, glabrous; glumes unequal to subequal, very thinly papery, shiny, smooth or keel sparsely scabrid distally, lower glume 3.5–4 (–5.2) mm, 1- or 3-veined, upper glume 3.5–5(–6) mm, 3-veined; lemmas broadly lanceolate, 4.5–6.2 mm, acute, intermediate veins indistinct, keel villous for 1/2 of length, marginal veins for 1/3, intermediate veins and surfaces proximally smooth, glabrous or loosely pilulose to short villous, keel and surfaces sparsely scabrid distally, apex acute; callus glabrous (rarely with a few hairs less than 1 mm); palea smooth, glabrous or sparsely pilulose between keels, keels scabrid, some medially pilulose to short villous. Anthers 2–2.8 mm. Fl. and fr. Jun–Aug.

Alpine meadows, swales, moist gravel slopes; 2200–3600 m. Qinghai, Xinjiang, Xizang [?Kashmir, Kazakhstan, Kyrgyzstan, NW Mongolia, Tajikistan, Uzbekistan].

Poa lipskyi is fairly common at high altitudes in C Asian mountains bordering W China and in the Kunlun Shan. Two geographically overlapping subspecies are commonly recognized.

1a. Lemma glabrous between veins ..... 25a. subsp. *dschungarica*

1b. Lemma loosely pilulose to short villous between veins ..... 25b. subsp. *lipskyi*

25a. Poa lipskyi subsp. **dschungarica** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 26. 1974.

准噶尔早熟禾 zhun ga er zao shu he

Poa dschungarica Roshevitz, Izv. Bot. Sada Akad. Nauk SSSR 30: 778. 1932.

Leaf blade papery to thickly papery, 2–3(–5) mm wide. Panicle open, 6–12 × 6–8 cm; lemmas glabrous between veins; palea keels scabrid, sometimes medially sparsely pilulose. Fl. and fr. Jun–Jul.

Alpine grassy places; ca. 3000 m. Xinjiang [Kazakhstan, Kyrgyzstan, NW Mongolia, Tajikistan, Uzbekistan].

25b. Poa lipskyi subsp. **lipskyi**

疏穗早熟禾(原亚种) shu sui zao shu he (yuan ya zhong)

Poa bedeliensis Litvinov; *P. contracta* Ovczinnikov & Czukavina (1957), not Retzius (1783); *P. kungeica* Goloskokov; *P. lipskyi* var. *contracta* Tzvelev; *P. macroanthera* D. F. Cui subsp. *meilitzyka* D. F. Cui; *P. ovczinnikovii* Ikonnikov; *P. pseudodisiecta* Ovczinnikov.

Blades thickly papery, 1–3(–4) mm wide. Panicle open or loosely contracted, 5–15 × 3–8 cm; lemmas loosely pilulose to short villous between veins; palea keels medially pilulose. Fl. and fr. Jun–Aug. 2*n* = 70.

Alpine meadows, gravel slopes; 2200–3600 m. Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan].

Poa macroanthera subsp. *meilitzyka* would seem to fall here, although we have not seen the type.

26. Poa qinghaiensis Soreng & G. Zhu, **sp. nov.**

青海早熟禾 qing hai zao shu he

Type: China. Qinghai: Dulan Xian, Ngola Shan, 36°28'N, 98°14'E, steep S-facing slope, in duff in open *Picea* stand, ca. 3900 m, 22 Sep 1997, *R. J. Soreng, P. M. Peterson & Sun Hang 5461* (holotype, US; isotypes, KUN, PE, others to be distributed).

Haec species a P. hissarica Roshevitz ex Ovczinnikov *et* P. lipskyi Roshevitz *lemmate glabris vel carina ad basim paulo pilosula abaxialiter modice ad dense scabro nervis intermediis prominentibus praedito atque palea inter carinas scabra ad carinas dense scabra; a* P. pagophila Bor *spiculis plerumque longioribus, 5–9(–10) mm, glumis non papillatis differt.*

Perennials, tufted, with or without short rhizomes; shoots extravaginal and intravaginal. Culms few to several, erect (5–)15–55, nodes 1–3, 0–2 exserted, uppermost to 1/4–1/2 way up, base enclosed in few to many layers of old pale brown sheaths. Leaf sheaths smooth or the lower ones coarsely scabrid, glabrous, 2–15 cm, 1.5–3 × as long as blade, uppermost closed for 1/2 of length; blades flat or folded, moderately thin, 2–10 cm × 2–3(–5) mm, abaxially smooth or scabrid, adaxially scabrid, of tillers to 20 cm; ligules 2–4 mm, abaxially smooth. Panicle open or loosely contracted, 2–10 × 1.5–6 cm, longest internodes 0.4–2.1 cm; branches spreading to reflexed, sinuously flexuous or arched, (1 or)2(–4) per node, rounded and smooth or distally sparsely scabrid and slightly angled, longest 1–6 cm with 2–6 spikelets clustered in distal 1/3, clusters frequently pendent; flowers female or perfect, sometimes whole inflorescences female. Spikelets ovate, purple tinged, 5–9(–10) mm, florets 2–4; vivipary present or commonly absent; rachilla internodes 0.5–1(–1.2) mm, smooth, glabrous; glumes subequal, smooth or keel sparsely scabrid, lower glume 3.5–6 mm, 1- to faintly 3-veined, upper glume 4–7 mm, 3-veined; lemmas (4–)4.5–7.5 mm, veins 5(–9), intermediate veins distinct, apex acute, keel and veins scabrid, hooks fine to coarse, sometimes elongated, occasionally developed into short villous hairs in the lower 1/3,

surfaces proximally moderately to densely scabrid, distally moderately to sparsely scabrid or minutely bumpy; callus glabrous; palea scabrid between keels, keels densely scabrid. Anthers 2–3 mm, or vestigial. Fl. and fr. Jul–Aug.

● Arid subalpine forests, alpine meadows, gravel slopes; 3500–5100 m. Gansu, Qinghai, SE Xinjiang, NE Xizang.

Poa qinghaiensis differs from other species in *P.* subsect. *Cenisiae* by the combination of the lemmas lacking villous hairs, being scabrid on the lower sides, and in having pronounced intermediate veins. Specimens were previously treated under the name *P. lipskyi* or remained unidentified. Although not well studied in *P. hissarica* or *P. lipskyi*, vestigial anthers are common in the new species and have not been found in other species in *P.* subsect. *Cenisiae*. In many respects, *P. qinghaiensis* approaches *P. pagophila*, but that species generally has smaller spikelets and the glumes are strongly papillate. Intermediates between *P. qinghaiensis* and *P. calliopsis* have been found at the Kunlun Pass and presumably represent hybridization between them.

27. Poa smirnowii Roshevitz, Izv. Glavn. Bot. Sada SSSR 28: 381. 1929.

史米诺早熟禾 shi mi nuo zao shu he

Perennials, loosely tufted, shortly rhizomatous; shoots all extravaginal, or a few intravaginal. Culms 1–5 per clump, 5–40 cm tall, nodes 1–3. Leaf sheaths smooth, glabrous, 4–8 cm, 1.5–3 × as long as upper blade, uppermost closed for over (1/2–)2/3 of length; blade flat or folded, moderately thin, 1–5 cm × 2–4 mm, surfaces smooth or adaxially sparsely scabrid, margins scabrid, apex prow-tipped, of tillers 2–15 cm; ligule 2–4 mm, abaxially smooth, collars smooth, glabrous. Panicle loosely contracted to open, slightly lax, exserted, 2–8 × 1.2–5 cm, longest internodes 1–2.5 cm; branches rounded, ascending or spreading, 2(–5) per node, smooth or sparsely (rarely moderately) scabrid, longest 1.5–4.5 cm with 1–3(–7) spikelets in distal 1/3. Spikelets ovate, usually purple tinged, 5–8 mm, florets 2–4(–5); vivipary present or absent; rachilla glabrous or sparsely pilulose to short villous; glumes subequal or equal, lower glume 3.5–4 mm, (1 or) faintly 3-veined, upper glume ca. 4 mm, 3-veined; lemmas 4.5–5 mm, mostly purple, margins membranous, keel villous for 3/4 of length, marginal veins for 2/3, area between veins proximally loosely pilulose or infrequently glabrous, distally smooth to sparsely scabrid; callus webbed, hairs long, dense; palea glabrous or pilulose between keels, keels scabrid, usually medially pilulose to short-villous. Anthers 2–2.5 mm. Fl. and fr. Jul–Aug.

Alpine shady grassy areas, open moist gravelly slopes, riversides; 2000–3300 m. Xinjiang [N Mongolia, Russia (C and E Siberia)].

Three subspecies are recognized, all of which appear to be rare in China.

1a. Spikelets viviparous ..... 27c. subsp. *polozhiae*
1b. Spikelets not viviparous.
2a. Plants (5–)10–25(–33) cm tall, culms usually solitary or sometimes forming small tufts; panicle 1.2–3 cm wide ..... 27a. subsp. *mariae*
2b. Plants (15–)24–40(–55) cm tall, culms usually several in loose tufts; panicle 3.5–5 cm wide ... 27b. subsp. *smirnowii*

27a. Poa smirnowii subsp. **mariae** (Reverdatto) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 26. 1974.

美丽早熟禾 mei li zao shu he

Poa mariae Reverdatto, Sist. Zametki Mater. Gerb. Tomsk. Univ. 1933(3–4): 2. 1933; *P. alpina* Linnaeus var. *saposhnikovii* Sergievskaja.

Culms 1(–3) per clump, (5–)10–25(–33) cm tall. Leaf blade 1–5 cm × 2–4 mm, of tillers 2–11 cm. Panicle loosely contracted to slightly open, slightly lax, 2–6(–8) × 1.2–3 cm; branches ascending to weakly spreading, longest 1.2–2.5(–4.5) cm. Callus hairs moderately dense. Fl. and fr. Jul–Aug.

Alpine shady grassy areas, open gravelly slopes, riversides; ca. 3300 m. Xinjiang (Altay Shan, Tian Shan) [Russia (Siberia)].

27b. Poa smirnowii subsp. **smirnowii**

史米诺早熟禾(原亚种) shi mi nuo zao shu he (yuan ya zhong)

Poa arctica R. Brown subsp. *smirnowii* (Roshevitz) Malyschev.

Culms (1–)2–5 per clump, (15–)24–40(–55) cm tall. Leaf blade 3–5 cm × 3–4 mm, of tillers 5–15 cm. Panicle open, lax, 5–8 × 3.5–5 cm; branches spreading, longest 2.5–4.5 cm. Callus hairs dense. Fl. and fr. Jul–Aug. $2n = 42, 70$.

Alpine shady grassy areas, open gravelly slopes, riversides; 2000–2600 m. Xinjiang (Altay Shan, Tian Shan) [N Mongolia, Russia (C and E Siberia)].

This subspecies differs from subsp. *mariae* mainly by its more tufted habit, greater height, and broader panicles.

27c. Poa smirnowii subsp. **polozhiae** (Revjankina) Olonova, Turczaninowia 1(4): 7. 1998.

朴咯早熟禾 po ka zao shu he

Poa polozhiae Revjankina, Fl. Rastitel'n. Altaya 1996: 102. 1996.

Culms several (ca. 5) per tuft, ca. 20 cm tall. Spikelets viviparous. Fl. and fr. Aug.

Alpine screes; ca. 3700 m. Xinjiang [Russia (Siberia)].

This taxon was described from Russia (Altai). One gathering is known from China.

28. Poa macroanthera D. F. Cui, Acta Bot. Boreal.-Occid. Sin. 7: 97. 1987.

大药早熟禾 da yao zao shu he

Perennials, loosely to densely tufted, without rhizomes; shoots extra- and intravaginal. Culms 40–55 cm tall, rounded, smooth, glabrous, nodes 2–4, 1 or 2 exserted, uppermost at mid-culm. Leaf sheath shorter than internode, smooth, glabrous, 10–11 cm, slightly compressed, uppermost closed for over 1/5–1/4 of length, old basal sheaths persisting, becoming fibrous, overlapping; blade flat or folded, moderately thin, 3–15 cm, uppermost shortest, 1–3 mm wide, surfaces smooth or sparsely scabrid, glabrous; ligule (1–)1.5–3 mm, abaxially smooth or sparsely scabrid, apex obtuse. Panicle open, diffuse, 8–15 cm;

branches ascending to spreading, 2–3 per node, slender, smooth throughout or distally scabrid angled, longest to 5 cm with 8 spikelets in distal 1/2; flowers female or perfect. Spikelets elliptic to lanceolate, green or purple, 5.6–7 mm, florets 3 or 4; vivipary absent; rachilla internodes to 2 mm, smooth, glabrous, exposed; glumes lanceolate, smooth or sparsely scabrid on keel, lower glume 3–4 mm, 3-veined, upper glume 3.5–5 mm, 3-veined; lemmas lanceolate, very thinly papery, 4–5.5 mm, purple above veins, apex acuminate, keel villous for 1/2 length, marginal veins to 1/3, intermediate veins prominent, area between them glabrous, above sparsely scabrid; callus weakly webbed, hairs sparse, short; palea keels scabrid, medially pilulose to shortly villous. Anthers 2.5–3 mm. Fl. and fr. Jun–Jul.

● Riversides in ravines, subalpine meadows along forest margins; 2500–3300 m. Xinjiang (Kunlun Shan, Tian Shan).

The placement of this species near *Poa smirnowii* is controversial. The type, examined by M. V. Olonova, has sheaths open for 1/5–1/4 their length and scabrid-angled panicle branches. This argues against any relationship to *P. smirnowii* and inclines us to think it might be better placed in *P.* subg. *Stenopoa*.

29. Poa xingkaiensis Y. X. Ma, Bull. Bot. Res., Harbin 22: 387. 2002.

星早熟禾 xing zao shu he

Perennial, rhizomatous; shoots extravaginal. Culms erect, 40–50 cm, 1–2 mm in diam., nearly smooth, nodes 3 or 4. Leaf sheaths smooth, usually longer than internodes, uppermost ca. 11 cm, ca. 3/4 as long as blade; blades flat, thin, 5–20 cm × 2–3 mm, distinctly longer upward along culm, apex slender prow-tipped; ligules 2.5–3 mm, abaxially puberulent, apex truncate. Panicle open, narrowly pyramidal, 10–15 × 2–3 cm, longest internodes ca. 2 cm; branches ascending, usually 5 per node, capillary, scabrid, longest ca. 3 cm with 6–9 moderately crowded spikelets in distal 4/5. Spikelets narrowly lanceolate, 3.5–4 mm, florets 2; vivipary absent; glumes narrowly lanceolate, equal, as long as spikelet, apex acuminate, keels scabrid from near base, lower glume 3.8–4 mm, 3-veined, upper glume 4.1–4.5 mm, 3-veined; lemmas narrowly lanceolate, 3–3.3 mm, keel shortly villous for 1/2 of length, marginal veins for 1/4, area between veins glabrous; callus webbed, hairs short; palea “hyaline,” distinctly shorter than lemma. Anthers 0.7–0.8 mm (doubtfully mature, presumably over 1.2 mm at maturity). Fl. and fr. Aug.

● About 400 m. Heilongjiang.

Except for its rhizomatous habit, this species seems different from other members of *Poa* subg. *Poa* and is only tentatively placed here. It is known only from the type, which we have not seen, but the description and illustration suggest the plant may be immature. The illustration looks somewhat like immature specimens of *P. compressa*, with a *Koeleria*-like inflorescence at anthesis. We wonder if it could be a species of *P.* subg. *Stenopoa*, perhaps *P. sphondylodes* or *P. versicolor* subsp. *ochotensis* with an odd habit.

30. Poa remota Forselles, Linn. Inst. Skrift. 1: 6. 1807.

疏序早熟禾 shu xu zao shu he

Poa quadripedalis Ehrhart ex Koeler; *P. sudetica* Haenke var. *remota* (Forselles) Fries.

Perennials, loosely tufted, shortly rhizomatous; shoots mainly extravaginal. Culms erect, 50–150 cm tall, 1–3 mm in diam., compressed, smooth or sparsely scabrid, nodes 3–5, 1 or 2 exserted. Leaf sheath with keel winged, 0.4–0.8 mm deep, scabrid, 10–20 cm, about as long as blade, uppermost closed for (1/2–)2/3–9/10 of length; blade light green, flat, moderately thin, 3–11 mm, surfaces smooth or sparsely scabrid, margins densely scabrid, apex slender prow-tipped; ligule 2–3(–3.5) mm, abaxially smooth or sparsely scabrid, apex obtuse, collar margins abruptly flared, scabrid, glabrous or rarely pilulose. Panicle open, 15–30 × 7–20 cm, longest internodes 4–7 cm; branches spreading, 3–7 per node, slender, proximally scabrid angled, distally scabrid all around on angles, longest 7–15 cm with 12–40 spikelets in distal 1/2. Spikelets lanceolate, green, rarely purple tinged, 4.5–6 mm, florets 3–5; vivipary absent; rachilla internodes 0.7–1 mm, densely minutely bumpy; glumes narrowly lanceolate, keel and lateral veins prominently scabrid, area between veins sparsely scabrid, lower glume 2–3 mm, 1(or 3)-veined, upper glume 2.5–3.5 mm, 3-veined; lemmas lanceolate, 3–4.5 mm, veins prominent, edge finely scabrid, apex acute, keel pilulose for 1/3 of length, marginal veins for 1/4, area between veins minutely bumpy to sparsely scabrid, glabrous; callus sometimes webbed, hairs sparse, to 2 mm; palea minutely bumpy to sparsely scabrid, keels densely scabrid. Anthers 1.1–1.6 mm. Fl. and fr. Jun–Jul. 2*n* = 14.

Moist to wet ground, *Picea* and *Larix* forest openings. Xinjiang [Kazakhstan, Russia; Europe].

The occurrence of this species in China is based on a gathering by Regel, determined by Tzvelev. The only voucher so determined seen by us we placed in *Poa pratensis*.

31. Poa asperifolia Bor, Kew Bull. [7] 1952: 130. 1952.

糙叶早熟禾 cao ye zao shu he

Poa megalothyrsa Keng ex Tzvelev.

Perennials, green or grayish green, tufted, rhizomatous, rhizomes fairly stout, short; shoots extra- and intravaginal. Culms erect or decumbent, (35–)40–120 cm tall, 1–2(–2.5) mm in diam., usually several per tuft, nodes (2–)3 or 4, 1 or 2 exserted, smooth, commonly enveloped by fibrous lower sheaths. Leaf sheaths distinctly keeled, smooth or retrorsely scabrid, glabrous, 7–20 cm, 3/4–2 × as long as blade, uppermost closed for 1/4–2/5 of length; blade flat or folded, thin to moderately thin, 7–22 cm (longest at mid-culm), (1.5–)2–5 mm, surfaces scabrid along veins only, margins whitish, densely scabrid, apex slender prow-tipped; ligule hyaline, (2–)3–8 mm, abaxially smooth or sparsely scabrid, apex obtuse, entire or long-lacerate, those of lower culm usually ca. 1 mm or longer, collar margins scabrid, abruptly flared. Panicle open, erect to slightly lax, (9–)13–35 × 4–15 cm, longest internode 2–6 cm; branches ascending to widely spreading, somewhat flexuous, (2–)3–5 per node, fairly slender, proximally rounded to slightly angled, smooth or sparsely scabrid, distally slightly angled, scabrid on and between angles, longest (3–)4–15 cm with (3–)6–26 spikelets in distal 1/2. Spikelets narrowly lanceolate to lanceolate, green, or purple tinged, 4.5–6(–8.5) mm, florets 2–4(–6); vivipary absent; rachilla internodes 0.7–1.5 mm, minutely bumpy, scabrid, or infrequently smooth; glumes unequal, apex acute to acuminate, keel and veins scabrid, area between veins sparsely

scabrid, lower glume 2.5–3.5(–4) mm, 1(or 3)-veined, upper glume 3–4.5(–5.4) mm, 3-veined; lemmas lanceolate, elliptic to oblong or obovate, 3.5–4.5(–5.6) mm, apex acuminate, intermediate veins prominent, keel sparsely shortly villous for 1/3 (–1/2) of length, infrequently densely villous or glabrous, marginal veins villous for 1/5(–1/4), proximally densely scabrid to minutely bumpy, glabrous or sparsely pilulose, distally scabrid and minutely bumpy; callus glabrous or occasionally webbed, hairs few and usually short, or infrequently several to 1/2 as long as lemma; palea glabrous, area with slender hooks or crisply pilulose between keels, keels scabrid. Anthers 1.5–3 mm. Fl. and fr. May–Jul.

Fairly common, low alpine to upper forests, openings and thickets on granite, shale, limestone, or sandstone slopes; 3300–4500 m. Gansu, Qinghai, Sichuan, E Xizang, Yunnan [Bhutan].

Poa asperifolia is easily distinguished by the combination of large panicles, long, hyaline, and lacerate ligules, fairly stout, short rhizomes, and fibrous basal sheaths, but its lemma vestiture is highly variable. It approaches *P. pratensis* through *P. lhasaensis* (*P. jaunsarensis*), but differs in having leaf blades very scabrid and often thin, ligules long and lacerate, lemmas minutely hairy or densely scabrid proximally between the veins, and callus glabrous or nearly so. It appears to hybridize with species of *P.* subg. *Stenopoa*, but those species lack rhizomes and have more crowded and narrower culms in the regions where they overlap. Tzvelev reported it from SW Xinjiang (Pamirs), but all material seen by us is from the eastern Himalayas and Hengduan Shan, where it is fairly common.

32. Poa perennis Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 276. 1982.

宿生早熟禾 su sheng zao shu he

Perennials, densely tufted; shoots all or mostly extravaginal, all or most shoots flowering. Culms erect to ascending, 20–60 cm tall, 0.5–1.5 mm in diam., rounded, smooth, not or only slightly ridged, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths moderately firm, not persisting, not shiny, 4–10 cm, 1/2–2/3 as long as blade, lower sheaths glabrous or scabrid to retrorsely strigose near collars, uppermost closed for 1/4–1/2 of length; blade flat or folded with margins slightly inrolled, thin, 5–10 cm × 1–2 mm, surfaces smooth or scabrid, adaxially glabrous or retrorsely strigulose near base, margins scabrid; ligule 0.5–2 mm, apex dentate, collar margins glabrous or with some cilia. Panicle open, 6–13 × 2–7 cm, longest internodes 1.4–3.5 cm; branches flexuous, 2 or 3 per node, slender, proximally rounded and smooth, distally scabrid and weakly angled, longest 2–8 cm with 3–10 spikelets in distal 1/2. Spikelets green or purple tinged, 4–7 mm, florets 2–4; vivipary absent; rachilla internodes to 1.2 mm, smooth or scabrid; glumes unequal, lanceolate, usually purple, apex acuminate, lower glume 2–2.5 mm, 1-veined, upper glume 2.7–3.5 mm, keel scabrid to coarsely ciliate near apex, smooth elsewhere, distinctly shorter than first lemma; lemmas 3.3–4.8 mm, apex sharply acute to acuminate, intermediate veins faint to moderately distinct, keel lower part and marginal veins scabrid, glabrous or for 1/3 of length sparsely pilulose, area between veins scabrid to minutely bumpy throughout; callus glabrous, or infrequently with a few hairs to 2 mm; palea smooth or scabrid, glabrous between keels, keels scabrid. Anthers 1.5–2.3 mm. Fl. and fr. Jun–Aug.

● Grassy places on gravel slopes; 2500–3500 m. ?SE Xizang, NW Yunnan.

Poa perennis in its typical form is distinct from all other *Poa* species. The circumscription is challenging because many specimens do not agree in detail with the type, but are not readily assignable to other species. We have not seen any material from Xizang, but it is expected to occur there.

33. Poa zhongdianensis L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 405. 2002.

中甸早熟禾 zhong dian zao shu he

Perennials, loosely tufted, subrhizomatous; shoots extravaginal, tillers few. Culms 40–70 cm tall, nodes 3 or 4, 2 exserted, 1–1.5 mm in diam., smooth. Lower leaf sheaths somewhat keeled, moderately compressed, proximally retrorsely scabrid to distally hispidulous to strigulose, 4.5–7.5 cm, 5/9–5/6 as long as blade, uppermost closed for ca. 3/5 of length, sometimes united further by a hyaline membrane; blades flat or folded with inrolled margins, moderately thin, 5–20 cm, uppermost 5–12 cm × 2–3 mm, abaxially smooth or sparsely scabrid, shiny, adaxially and margins scabrid, apex slender prow-tipped; ligule 1.7–2.2 mm, abaxially scabrid, apex truncate to obtuse, lower ligules 0.3–0.5 mm, scabrid margined, collar margins strigose to ciliate. Panicle open, well exserted, 10–18 × up to 10 cm, longest internodes 2–3.5 cm; branches spreading, 2(–4) per node, slender, proximally rounded, smooth or sparsely scabrid, distally scabrid angled, longest 4–7 cm with 4–12 spikelets in distal 1/2; flowers female or perfect. Spikelets 4–5.5 mm, florets 2(or 3); vivipary absent; rachilla internodes to 1(–1.2) mm, smooth, minutely bumpy, or scabrid; glumes unequal sublustrous, keel scabrid distally, lower glume 1.5–2.3 mm, to 1/2 as long as first lemma, to 1/2 as wide as upper glume, 1-veined, upper glume 2.5–3 mm, 3-veined; lemmas thinly papery, 3.5–4 mm, proximally moderately scabrid to minutely bumpy, distally minutely bumpy, apex acute, keel villous or short villous to 1/3 of length, marginal veins to 1/5, intermediate veins moderately prominent; callus webbed, hairs sparse, to 1/3 the lemma; palea minutely bumpy to densely scabrid between keels, keels scabrid, glabrous. Anthers 1.8–2 mm, vestigial in unisexual flowers. Fl. and fr. Jun–Jul.

● Open places, *Picea* and *Quercus* forests; 3400–3600 m. NW Yunnan.

This species differs from other species in *Poa* sect. *Homalopoa* in having leaf sheath sparsely and retrorsely strigose, sheath collar margins strigose to ciliate, leaf blade adaxial surface or both surfaces scabrid, spikelets 4–5.5 mm, with 2(or 3) florets, and lower glume short, 1.5–2.3 mm.

34. Poa mairei Hackel, Repert. Spec. Nov. Regni Veg. 12: 387. 1913.

毛稃早熟禾 mao fu zao shu he

Poa ludens R. R. Stewart; *P. patens* Keng ex P. C. Keng; *P. pseudopratensis* J. D. Hooker (1896), not Beyer (1891).

Perennials, densely tufted, not rhizomatous; shoots all intravaginal. Culms (10–)20–85 cm tall, 1–2 mm in diam., smooth, nodes 2 or 3, 1–3 exserted, uppermost node to 1/3–1/2 way up. Leaf sheaths keeled, smooth or infrequently sparsely

scabrid, glabrous, lowermost loose, short, firm, becoming papery, 7–15 cm, 1.5–5 × as long as blade, uppermost closed for 1/3 of length; blade usually folded with slightly inrolled margins, thickly papery, 3–9 cm × 1–2(–3) mm, abaxially smooth or infrequently sparsely scabrid, shiny, ribs indistinct, margins scabrid, adaxially often pale, scabrid, of tillers to 4–30 cm; ligule 0.5–1.2(–1.5) mm, apex truncate to obtuse, ciliolate, abaxially scabrid or with coarse short hairs, collars of lower and tiller leaves with a distinctly wedge-shaped zone of dense, short, stiff strigose to subvillous hairs, margins sometimes with a few ciliate hairs. Panicle open, broadly triangular, well exserted, (4–)6–15(–20) × 3–10(–15) cm, longest internodes 1–3.5 cm; branches spreading, flexuous, (1–)2 or 3(–5) per node, proximally rounded or weakly angled, smooth or sparsely scabrid, distally smooth and rounded to densely scabrid on and between angles, longest 2.5–8 cm with 3–15 spikelets in distal 1/3–1/2; flowers rarely female. Spikelets elliptic to oblong, (3.7–)4–8 mm, florets 2–4(–6); vivipary absent; rachilla internodes to 1.2 mm, smooth or scabrid, glabrous or hispidulous to pilulose; glumes ovate to oblong, purplish, unequal to subequal, firm, surfaces minutely punctate with purple papillae, apex acute to acuminate, keel nearly smooth to quite scabrid, lower glume (2.1–)2.5–4 mm, 1- or 3-veined, upper glume (3–)3.5–5 mm, 3(–5)-veined, apex acuminate; lemmas proximally light green, becoming purplish distally, firm, (3.9–)4.2–5(–6) mm, 5–7-veined, apex acute to acuminate, keel villous to pilulose for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, sometimes shortly villous to pilulose, proximally scabrid, or minutely bumpy throughout, glabrous or sparsely pilulose to shortly villous between veins; callus webbed or infrequently glabrous; palea scabrid or pilulose between keels, keels scabrid, sometimes medially pilulose. Anthers 1.8–2.5 mm, or vestigial. Fl. and fr. Jun–Sep.

Subalpine and alpine slopes, fairly common in grassy places among thickets, meadows; 2500–4100 m. SW Sichuan, SE Xizang, N Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa mairei is marked by the absence of extravaginal shoots, the short, firm, folded, lower culm leaf blades, the abaxially glabrous and smooth leaf sheaths and blades with triangular, lateral patches on the sides of the collar region that are strigose with upward or marginally directed hairs, and short truncate ligules. *Poa ludens* and *P. patens* do not differ substantially from the type of *P. mairei*.

35. Poa langtangensis Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 143. 1978.

朗坦早熟禾 lang tan zao shu he

Perennials, with isolated shoots, rhizomes present, slender. Culms isolated or few together, 9–25 cm tall, 0.6–0.8 mm in diam., erect, smooth, with 2 or 3 nodes above base, none or 1 exserted, and several short leaves at the base. Leaf sheaths smooth, glabrous, 3.5–5 cm, 1.5–2 × as long as blade, uppermost closed for just over 1/2 of length, lowermost soon withering, becoming fibrous, not persisting; blades flat or folded, thin, 1.5–5 cm × 1–1.5(–2) mm, surfaces and margins smooth, of tillers few, short; ligule 0.5–1 mm, abaxially smooth, glabrous, apex truncate to obtuse, smooth, collars smooth, glabrous. Panicle open, 3–5 × to 3 cm, longest internodes 1–2 cm; branches spreading, flexuous, (1 or)2 per node, capillary, smooth (hooks very rare), longest 1.5–2.5(–3) cm with 3–4 spikelets in distal 1/2. Spikelets narrowly lanceolate, green or purple tinged, 3–3.5 mm, 2–3 × longer than broad, florets 2; vivipary absent; rachilla smooth, glabrous; glumes green, narrow, keel weak, veins inconspicuous, surfaces smooth, very thinly papery, minutely punctate-papillate, lower glume 1.5–2.2 mm, 1(or 3)-veined, keel smooth or sparsely scabrid, upper glume 2–2.7 mm, broader (to 0.6 mm), 3-veined, keel minutely scabrid; lemmas oblong, slightly arched along the keel, very thinly papery, 2.5–3.3 mm, apex acute, with a narrow bronze band below the narrow whitish tip, keel and marginal veins proximally pilulose to short villous, intermediate veins faint, area between veins glabrous (not minutely bumpy), distally smooth to sparsely scabrid; callus webbed with hairs to 1/2 as long as lemma on the lowest floret; palea smooth, glabrous between keels, keels finely scabrid, 3–16 hooks per keel. Anthers ca. 1.5 mm. Fl. and fr. Jun–Jul.

Grassy places in alpine river valleys; ca. 4000 m. ?Xizang [Nepal].

Poa langtangensis could be a weak form of *P. pagophila* from a cold, shady habitat. Unlike *P. calliopsis*, it has narrow spikelets that are not so clustered and deflexed. Although we have not found a voucher specimen for the record from Xizang, the type, from Nepal, is from within 10 km of the Xizang border.

36. Poa nubigena Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 400. 2002.

云生早熟禾 yun sheng zao shu he

Perennials, densely tufted, not rhizomatous; shoots intravaginal. Culms 30–65 cm tall, ca. 1 mm in diam., smooth, nodes 2 or 3, 1–3 exserted, uppermost node to 1/3–1/2 way up culm. Leaf sheaths narrowly keeled, smooth or sparsely scabrid, glabrous, lowermost loose, short, moderately firm, becoming papery, 4.5–12 cm, 1.3–1.8 × as long as blade, uppermost closed for 3/7–4/7 of length; blades flat or folded with margins inrolled or not, thin to moderately thin, 3–11 cm × 1–2 mm wide, uppermost 3–7 cm, abaxially smooth except the upper keel scabrid, adaxial surface and margins scabrid, of tillers 4–20 cm, adaxially strigose in some; ligules 2–4.1 mm, abaxially smooth, apex obtuse to acute, of tillers ca. 0.5 mm, abaxially scabrid, apex truncate, scabrid, collars of lower and tiller leaves smooth, glabrous, or margins with a few ciliate hairs. Panicle open, lax, narrowly triangular, well exserted, diffuse, 5.5–14 × 3–8 cm, longest internodes 2–3.5 cm; branches spreading, flexuous, 2 per node, slender, round, smooth (or with a few hooks), longest 3–7.5 cm with 3–11 spikelets in distal 1/3; flowers female, perfect, or male. Spikelets elliptic, 3.5–6 mm, florets 2(or 3); vivipary absent; rachilla internodes to 1.2 mm, scabrid or densely hispidulous; glumes unequal, ovate to oblong, surfaces minutely punctate with purple papillae, membranous to very thinly papery, keels scabrid above, lower glume 2.3–3.5 mm, 1- to faintly 3-veined, upper glume 2.7–4.5 mm, faintly 3-veined, broadest above middle, 1.5–2 × broader than lower one, shorter than 1st lemma by 1–2 mm; lemmas thinly papery, 3.5–5.2 mm, apex narrowly membranous, acute, keel villous for 1/2 of length, marginal veins to 1/4, intermediate veins moderately prominent, area between veins proximally minutely bumpy, scabrid or crisply pilulose, distally smooth or sparsely scabrid,

minutely bumpy; callus webbed; palea proximally densely scabrid to hispidulous between keel, keels scabrid. Anthers ca. 2 mm or vestigial. Fl. and fr. Jun–Aug.

● Meadows on slopes, river bank rocky grassy places, ravines; 2200–3700 m. W Sichuan, E Xizang, NW Yunnan.

The type of *Poa nubigena* differs from *P. mairei* in its longer ligules, smooth, glabrous collars, presence of numerous female flowers, and slightly thinner leaf blades, branches, and glumes. The species approaches *P. pagophila*, but is generally taller and occurs at lower elevations.

37. Poa pagophila Bor in K. H. Rechinger, Fl. Iran. 70: 38. 1970.

曲枝早熟禾 qu zhi zao shu he

Poa levipes Keng ex L. Liu; *P. nigropurpurea* C. Ling.

Perennials, loosely to moderately densely tufted, usually not rhizomatous, infrequently with short delicate rhizomes; shoots extravaginal and pseudointravaginal. Culms erect or decumbent, often geniculate, 5–30(–40) cm tall, 0.5–1 mm in diam., round, smooth, nodes 2 or 3, none or 1(–2) exserted, nodes distinctly constricted and translucent, basal sheaths soon withering. Leaf sheaths smooth or finely scabrid, glabrous, loose, 2–10 cm, 1.25–5 × as long as blade, uppermost closed for 1/3–2/3 of length; blade flat, thin, 2–9 cm × 1.5–2.5 mm, surfaces and margins nearly smooth to scabrid, apex slender prow-tipped, uppermost erect or slightly divergent, 1–4.5 cm, of tillers 2–8 cm; ligule 1.5–4.3(–6) mm, abaxially smooth or sparsely scabrid, apex acute, sometimes blunt, collars smooth, glabrous. Panicle open, lax, exserted, 3–10 × 2–5 cm, longest internodes 1–3 cm; branches spreading to reflexed, flexuous, often arched upward, sometimes looping back, rounded, 1 or 2 per node, smooth or slightly scabrid distally on pedicels, longest 2–4 cm, with 2–6 spikelets in distal 1/2; flowers female or perfect. Spikelets elliptic, (4–)4.3–5.5(–5.8) mm, florets (1 or)2 or 3(or 4); vivipary absent; rachilla internodes 0.5–3 mm, smooth, bumpy, glabrous or rarely pilulose; glumes unequal to subequal, narrow, surfaces minutely punctate with purple papillae, keels weak, keels and veins sometimes sparsely scabrid distally, lower glume 2.5–3.5(–4) mm, 1-veined, often blunt, upper glume 3–3.5(–4.9) mm, 3-veined; lemmas very thinly papery, 3.2–4.8(–5) mm, intermediate veins faint to moderately prominent, keel and marginal veins proximally villous, area between veins proximally scabrid or pilulose, distally scabrid; callus glabrous or webbed, hairs sparse; palea smooth or scabrid, glabrous between keels, keels finely scabrid for over 3/4 of length. Anthers 2–3.5 mm or vestigial. Fl. and fr. Jun–Aug.

Alpine to subalpine grassy places on riversides, slopes, thickets; (3200–)3600–5200 m. ?Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

Poa pagophila is difficult to separate from *P. lipskyi* and *P. qinghaiensis*. It has shorter spikelets, glumes that are more evidently papillate-punctate, and less well-developed, dense basal tufts of leaves. Although it was reported in Fl. Qinghai. (4: 46. 1999), we have seen no authentic material from Qinghai. When *P. pagophila* was first described by Bor (Kew Bull. [4] 1949: 239. 1949), the name was not validly published.

38. Poa falconeri J. D. Hooker, Fl. Brit. India 7: 342. 1896 [“1897”].

福克纳早熟禾 fu ke na zao shu he

Perennials, not glaucous, loosely tufted, not rhizomatous; shoots extravaginal. Culms erect or decumbent at base, 10–80 cm tall, 1–2.5 mm in diam., smooth or finely scabrid, nodes 3 or 4, 2 or 3 exserted, uppermost more than 1/2 way up. Leaf sheaths smooth or scabrid, glabrous, lowermost becoming papery, 6–13 cm, 2/3–1.5 × as long as blade, uppermost closed for 1/2–3/5 of length; blades flat, thin, 4.5–20 cm × 1–4 mm, abaxially dull, surfaces and margins scabrid, uppermost reaching into the panicle; ligule milky-membranous, (1–)2–4 mm, abaxially smooth or scabrid, apex obtuse to acute, collar smooth or scabrid. Panicle open, lax, 6–20 × 1–5 cm, longest internode 2–5 cm; branches ascending, spreading or reflexed, flexuous, 1 or 2 per node, slender, proximally rounded and smooth, distally scabrid on and sparsely between angles, longest 3.5–9 cm with 1–7 well-spaced spikelets in distal 1/2. Spikelets elliptic-oblong, 5–7.5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.7–1.8(–2.5) mm, smooth, minutely bumpy, or pilulose; glumes unequal to subequal, narrowly lanceolate to lanceolate, apex acuminate, surfaces minutely punctate with purple papillae, smooth or sparsely scabrid, keel and sometimes lateral veins scabrid, lower glume (2.7–)3–5 mm, 1(or 3)-veined, upper glume (3.4–)4–6.3 mm, 3-veined; lemmas 4–6.3 mm, intermediate veins faint to moderately prominent, keel shortly villous or pilulose for 1/3 of length, marginal veins to 1/4, surfaces proximally densely crisply pilulose to finely scabrid or minutely bumpy, distally minutely bumpy to sparsely scabrid; callus glabrous; palea scabrid or pilulose between keels, keels scabrid. Anthers 1.6–2.8 mm. Fl. and fr. Jun–Aug. $2n = 42$.

Alpine meadows; 3700–4000 m. Xizang [India (Himachal Pradesh, Uttar Pradesh), Kashmir, Nepal].

Poa falconeri, *P. nitidespiculata*, and *P. pagophila* represent extremes that seem to grade toward one another. There are few plants from China that can be called *P. falconeri* with certainty.

39. Poa nitidespiculata Bor, Kew Bull. [3] 1948: 139. 1948 [*“nitide-spiculata”*].

闪穗早熟禾 shan sui zao shu he

Perennials, glaucous throughout, loosely tufted, subrhizomatous; shoots extra- and intravaginal. Culms erect or ascending, 30–60 cm, ca. 1 mm in diam., nodes 2, none or 1 exserted, smooth or sparsely scabrid below, uppermost less than 1/3 way up. Leaf sheaths glabrous or lowermost scabrid to covered with minute hairs, 8–11 cm, 1–1.5 × as long as blade, uppermost closed for 2/5–1/2 of length; blades flat or folded with margins inrolled, thickly papery, 4–12 cm × (1–)2–3.1 mm, abaxially smooth, adaxially sparsely scabrid, margins scabrid, apex slender prow-tipped, of tillers short; ligule milky-membranous, 2.7–6 mm, abaxially smooth, lower ones scabrid, of tillers 0.7–1 mm, abaxially scabrid, collar margins rounded, glabrous or sparsely ciliate. Panicle open, well exserted, 11–16 × 6–10 cm, longest internodes 3–3.5 cm; branches spreading, flexuous, 2 per node, proximally smooth, distally sparsely sca-

brid, longest 4–7 cm with 4–8 spikelets in distal 1/2; flowers female or perfect. Spikelets ovate to oblong, glaucous, 6.2–6.7 mm, florets 2 or 3; vivipary absent; rachilla internodes up to 1 mm, scabrid or pilulose; glumes unequal to subequal, lanceolate or oblong, keel distally scabrid, surfaces smooth or faintly punctate-papillate, lower glume 3.1–4.5 mm, 1- or 3-veined, upper glume 4.1–5 mm, 3-veined; lemmas oblong, 6–6.5 mm, apex obtuse, keel crisply pilulose to short villous for 2/5 of length, marginal veins to 1/3, intermediate veins moderately raised, area between veins proximally densely scabrid to crisply pilulose, distally smooth or sparsely scabrid; callus glabrous or sparsely webbed; palea scabrid or pilulose between keels, keels scabrid. Anthers 2.5–3 mm, or vestigial. Fl. and fr. Jun–Aug.

Alpine sunny slopes, grassy places in river valleys; 4400–4700 m. Xizang [India (Sikkim), Nepal].

The lemmas have a shortly pubescent abaxial surface and a broad, membranous margin, and the callus is glabrous. The species is similar to *Poa polyneuron*, but differs in having long leaf blades and ligules, larger spikelets up to 7 mm, long glumes and lemmas, and the lemma only 5-veined.

40. Poa polyneuron Bor, Kew Bull. [7] 1952: 223. 1952.

多脉早熟禾 duo mai zao shu he

Perennials, loosely tufted, rhizomatous; shoots extravaginal. Culm base slightly decumbent, 30–55 cm × 1–2.5 mm, nodes 3 or 4, 1 or 2 exserted. Leaf sheaths strongly keeled with a narrow wing, basal ones finely retrorse strigose, becoming fibrous, middle and upper ones smooth, 11–15 cm, ca. 3 × as long as blade, uppermost closed for 1/2–2/3 of length; blade flat or folded, moderately thin, 3–8 cm × (1.5–)4–5 mm, surfaces smooth, or adaxially sparsely scabrid, margins and keel smooth or scabrid, apex abruptly prow-tipped, tillers to 15 cm × 2 mm; ligules brown, membranous, ca. 2 mm, abaxially smooth, apex acuminate. Panicle open, lax, 10–17 × 2–6 cm, longest internode 3–4 cm; branches spreading, 2 per node, smooth throughout or with infrequent hooks, longest 3–8 cm with 3–6 well-spaced spikelets in distal 1/3. Spikelets elliptic, 5.5–7 mm, florets 3 or 4; vivipary absent; rachilla internodes to 1.2 mm, smooth, glabrous; glumes broadly lanceolate, keel scabrid above, surfaces minutely punctate with or without purple papillae, lower glume 4.5–5 mm, 3-veined, upper glume ca. 5 mm, 3(or 5)-veined, smooth or sparsely scabrid; lemmas broadly elliptic, ca. 5 mm, 5–7-veined, keel slightly arched, keel shortly villous for 2/3 of length, marginal veins for 1/2, intermediate veins prominent, surfaces proximally densely pilulose, distally sparsely scabrid; callus glabrous or scantily webbed with a few hairs to 1/2 as long as lemma; palea with slender hooks to proximally pilulose between keels, keels medially pilulose, distally scabrid. Anthers 1.6–2.2 mm. Fl. and fr. Jun–Aug.

High mountains, grassy slopes; ca. 4000 m. Xizang [India (Sikkim)].

The type of *Poa polyneuron* is from the India-Xizang border. Rajbhandari (Bull. Univ. Mus. Univ. Tokyo 34: 203. 1991) discussed it under *P. gammieana*. It also approaches *P. grandis*. The flowers examined were perfect, but if it were related to *P. grandis* it would be expected also to have female florets.

41. Poa gammieana J. D. Hooker, Fl. Brit. India 7: 345. 1896 [“1897”].

茛密早熟禾 gen mi zao shu he

Perennials, loosely tufted, not rhizomatous; shoots extravaginal. Culms decumbent, sometimes geniculate, (40–)50–85 cm tall, 1.5–3 mm in diam., smooth, glabrous, nodes 5–7, 1 or 2 exserted. Leaf sheaths keeled, 8–15 cm, 1–1.3 × as long as blade, uppermost closed for 2/3–5/7 of length, lower sheaths scabrid, upper sheaths smooth; blade flat, moderately thin, 8–12 cm × 2–7 mm, distinctly keeled, surfaces smooth, keel and margins smooth or scabrid, apex abruptly slender prow-tipped; ligule 3–6.5 mm, abaxially scabrid, apex obtuse to acute, basal and tiller ligules shorter, collars smooth to long scabrid on margins. Panicle open, lax, 10–20 × 1–6 cm, longest internodes 3–5 cm; branches ascending to spreading, 1 or 2 per node, proximally rounded, distally slightly angled, smooth, longest 3–9 cm with 2–5 well-spaced spikelets in distal 1/3. Spikelets green, sometimes glaucous, 5.5–9.2 mm, florets 3–5; vivipary absent; rachilla internodes 0.8–2.3 mm, smooth or minutely bumpy, glabrous or hispidulous; glumes surfaces minutely papillate-punctate, apex acuminate, keel distally scabrid, lower glume 3.3–4 mm, (1 or)3-veined, upper glume 4–4.7 mm, 3-veined; lemmas 4.5–5.2 mm, apex narrowly membranous, keels shortly villous for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, glabrous or sparsely pilulose, area between veins finely scabrid throughout; callus webbed; palea scabrid between keels, keels scabrid, medially pilulose. Anthers 1.1–1.6(–2) mm. Fl. and fr. Jun–Aug.

Alpine grassy slopes; 4000–4300 m. Xizang [Bhutan, India (Assam, Sikkim)].

Poa gammieana is known in China from one gathering. It has fewer spikelets per branch and shorter glumes than *P. grandis*.

42. Poa grandis Handel-Mazzetti, Symb. Sin. 7: 1284. 1936.

阔叶早熟禾 kuo ye zao shu he

Poa spontanea Bor.

Perennials, loosely tufted, from a tough, shortly rhizomatous crown, tillers sometimes clambering; shoots extravaginal. Culms erect, 1 to several, somewhat compressed, (50–)70–120 cm tall, 2–5 mm in diam., smooth, nodes 5–12, several exserted, slightly swollen, usually with leafy lateral shoots from mid to upper nodes (these infrequently flowering), lowest to mid-culm nodes strigose above and below. Leaf sheaths strongly compressed, prominently keeled above, glabrous, or sometimes strigose near the base, ?pilulose also, 6–9 cm, ca. 1/2 as long as blade, uppermost closed from 3/4 of length to near the top; blade absent or nearly so on lowermost sheaths, flat, moderately thin, 7–25 cm, uppermost often longest, (2–)4–12 mm wide, distinctly keeled, surfaces smooth, margins smooth or scabrid, adaxially often pilulose, apex prow-tipped; ligule membranous, 2–6 mm, abaxially smooth or scabrid, apex truncate or rounded, collar margins often prominently flared. Panicle open, erect, diffuse, 15–35 × 10–20 cm, longest internodes (3–)4–5(–8) cm; branches eventually spreading to reflexed, strict, (2–)3–7(–9) per node, fairly stout, smooth throughout or distally very sparsely scabrid, longest 6–12 cm with 7–26 spikelets in distal 1/2; flowers female or perfect, some inflorescences entirely female. Spikelets elliptic, 5–7 mm, florets 2 or 3(–5); vivipary absent; rachilla internodes 0.3–1 mm, densely scabrid or smooth, glabrous, or pilulose to hispidulous; glumes lanceo-

late to ovate, surface minutely papillate-punctate, apex acuminate, keel and upper surface smooth or scabrid, lower glume 2.3–4 mm, 1(or 3)-veined, upper glume 3.5–5 mm, 3-veined; lemmas elliptic to lanceolate, 3.5–5 mm, keel sparsely shortly villous for 1/3 of length, marginal veins for 1/4, intermediate veins faint to prominent, area between veins proximally scabrid to crisply pilulose, distally scabrid; callus sparsely webbed or glabrous; palea densely scabrid or with slender hooks between keels, keels scabrid, sometimes medially pilulose. Anthers 1.8–2.8 mm, or vestigial. Fl. and fr. Jun–Aug.

High-elevation meadows and *Fargesia* thickets along streams in mountainous areas, alpine slopes and river valleys; 2700–4500 m. SW Sichuan, SE Xizang (Mêdog), NW Yunnan [Myanmar].

Poa grandis is unusual in its multinoded culms with branching shoots from the upper nodes, and dense, thick, shortly rhizomatous crowns. Keng (Fl. Ill. Pl. Prim. Sin. Gram. 163. 1959, as *"P. plurinodis"*) reported it as dioecious, but from population samples and additional gatherings it appears to be sequentially gynomonoecious. The types of *P. spontanea*, from adjacent Myanmar, and *"P. plurinodis*," from NW Yunnan, are not significantly different. *"Poa plurinodis* Keng" (Claves Gen. Sp. Gram. Prim. Sin. 165. 1957 and loc. cit. 1959) was not validly published because no Latin description was provided. *"Poa plurinodis* Keng ex P. C. Keng" (Acta Bot. Yunnan. 4: 275. 1982) was not validly published because two types were indicated.

43. Poa eleanorae Bor, Kew Bull. [3] 1948: 142. 1948.

易乐早熟禾 yi le zao shu he

Perennials, loosely tufted, rhizomes not recorded; shoots extravaginal. Culms ascending, sometimes geniculate, 30–50 cm tall, 1–2 mm in diam., smooth, nodes 2 or 3, none or 1 exserted. Leaf sheaths loose, smooth, glabrous, lowermost scabrid, becoming fibrous, 8–13 cm, 3/5–1 × as long as blade, uppermost closed for ca. 1/9 of length; blade folded with margins inrolled, thin, 7–22 cm × 1–3 mm, abaxially shiny, smooth, adaxially scabrid, margins smooth; ligule 0.5–2(–2.5) mm, abaxially scabrid, apex truncate to obtuse, collar smooth, glabrous, or lowermost sparsely scabrid. Panicle open, 8–24 × 3–12 cm, longest internodes 2–7 cm; branches spreading to reflexed, flexuose, sometimes arched upward, 2 per node, proximally smooth to sparsely scabrid, distally scabrid on and between angles, longest with 5–15 well-spaced spikelets in distal 1/2, pedicel mostly shorter than spikelet. Spikelets cuneate, 5–7 mm, florets 2 or 3; vivipary absent; rachilla internodes 1.5–1.7 mm, smooth or scabrid, glabrous or pilulose; glumes subequal, surfaces minutely punctate with purple papillae, smooth or sparsely scabrid, keels straight, or slightly curved, finely scabrid, 3-veined, apex acuminate, lower glume 5.6–6.5 mm, upper glume 5.7–7 mm, as long as or slightly longer than first lemma; lemmas elliptic, 4.2–6.5 mm, apex acute, scabrid throughout, intermediate veins prominent, keel shortly villous for 1/3 of length, marginal veins sometimes near base; callus glabrous or sparsely webbed; palea scabrid throughout. Anthers (0.4–)0.6–1 mm. Fl. and fr. Jul–Aug.

Alpine grassy places; 3800–4000 m. ?Sichuan, ?Xizang, ?Yunnan [India (Sikkim), Nepal].

Poa eleanorae is unlike other species in the short-anthered group in having long, open sheaths and large spikelets with glumes as long as or longer than the first lemma. Specimens with well-preserved bases have not been seen, and it is possible that short rhizomes might be produced. The species was reported from Sichuan, Xizang, and Yunnan in FRPS (9(2): 170. 2002), but not in the provincial Chinese Floras. No authentic material from China has been seen by us.

44. Poa pseudamoena Bor, Kew Bull. [8] 1953: 276. 1953.

拟早熟禾 ni zao shu he

Poa amoena Bor, Kew Bull. [3] 1948: 140. 1948, not (J. Presl) Kunth, 1833; *P. platyglumis* (L. Liu) L. Liu; *Puccinellia platyglumis* L. Liu.

Annuals or short-lived perennials, densely tufted. Culms included in the basal tufts or slightly exserted, erect or decumbent, 4–8 cm tall, smooth, nodes 1 or 2, hidden. Leaf sheaths smooth, glabrous, 1–3 cm, subequal to shorter than blade, uppermost closed for ca. 1/4 of length; blade flat or folded, thin, 1–4 cm × 1–1.6 mm, abaxially smooth, adaxially smooth or sparsely scabrid, margins smooth to scabrid; ligules 0.5–2.2 mm, abaxially smooth, apex acute, lacerate to dentate, collars smooth. Panicle contracted to subspiciform, or open at anthesis, ovoid to cylindrical, erect, 1–2.5 × 0.6–1 cm, longest internodes 0.4–0.8 cm; branches erect to ascending, 1 or 2 per node, proximally smooth, distally sparsely to moderately scabrid on weak angles, longest 0.5–1.5 cm with 1–3(–8) spikelets distally. Spikelets elliptic, pale green to purple tinged 3.2–6 mm, florets 2–4; vivipary absent; rachilla internodes 0.4–1 mm, smooth, glabrous; glumes subequal, keels smooth or sparsely scabrid, lower glume 1.8–4 mm, (1 or)3-veined, upper glume 2.4–4.6 mm, oblong, 3-veined; lemmas broadly elliptic, 2.5–4 mm, glabrous throughout, apex acute, occasionally mucronulate, keel sparsely scabrid, intermediate veins faint to moderately prominent, area between veins smooth; callus glabrous; palea smooth between veins, keels scabrid. Anthers 0.6–1 mm. Fl. and fr. Aug–Sep.

Xizang-Qinghai Plateau: grassy frost-heaved slopes, glacial outwash, lake shores; 2800–5600 m. Qinghai, S Xinjiang, Xizang [India (Uttar Pradesh)].

Poa pseudamoena is infrequently collected. It looks much like a form of *Poa annua* with glabrous lemmas, but with more congested panicles. The type of *Puccinellia platyglumis*, from SW Xizang, has smaller spikelets and a more open panicle, at least at anthesis. We have seen authentic *Poa pseudamoena* from S Xinjiang on mixed sheets with *Puccinellia*.

45. Poa ussuriensis Roshevitz in Komarov, Fl. URSS 2: 754. 1934.

乌苏早熟禾 wu su zao shu he

Poa ussuriensis f. *angustifolia* I. C. Chung; *P. ussuriensis* f. *scabra* I. C. Chung.

Weakly perennial, loosely tufted. Culms erect, 30–80 cm tall, ca. 0.8 mm in diam., scabrid below nodes, nodes 3 or 4(–5), 2 or 3 exposed. Leaf sheaths very compressed with a winged keel, 4–13 cm, 1/2–1 × as long as blade, uppermost closed for 2/3–3/4 of length; blade flat or weakly folded, thin, deeply keeled, 2–15 cm × (1.5–)2–3(–4.5) mm, adaxially scabrid, margins densely scabrid; ligule (0.5–)1–2(–2.5) mm, abaxially scabrid, apex truncate to obtuse, collars scabrid, margins glabrous. Panicle open, lax, diffuse, 7–20 cm, broad, longest internodes 3–5 cm; branches eventually spreading, lax, 2–5 per node, slender, scabrid on and between angles throughout, long-

est to 12 cm with 3–13 loosely arranged spikelets in distal 1/3. Spikelets oblong-lanceolate, light green, (3–)4–6 mm, florets 3–5(–6); vivipary absent; rachilla internodes ca. 1 mm, smooth, glabrous; glumes unequal, acute, keels sparsely scabrid, lower glume 1.5–2 mm, 1-veined, upper glume 2.5–3 mm, 3-veined; lemmas 3–4 mm, apex acuminate, keel villous for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, area between veins minutely bumpy, glabrous; callus sparsely webbed; palea smooth or minutely bumpy between keels, keels scabrid. Anthers 0.4–1 mm. Fl. and fr. Jun. $2n = 28, 42$.

Deciduous forests, mixed forests, glades, riparian gravels. Heilongjiang, ?Jilin (expected) [Korea, Russia (Far East)].

Poa ussuriensis is common on the Russian side of the Chinese border east and west of Vladivostok. *Poa radula* Franchet & Savatier was reported in FRPS (9(2): 113–114. 2002) from Jilin, but it is doubtfully present in China. According to Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 283. 1985), *P. radula* is a species of Sakhalin, the Kuril Islands, and S Kamchatka, but is not found elsewhere in the Russian Far East, China, or Japan. Chung (Korean Grass. 72. 1965) reported it from S Korea, but not N Korea or China; Japanese authors have not mentioned it for Korea or China; and Kitagawa (Neo-Lineam. Fl. Manshur. 102–105. 1979) did not list it for Manchuria. *Poa radula* can be difficult to distinguish from *P. ussuriensis*: it has a broader leaf blade, (3–)4.5–10 mm wide, longer ligule, (1.5–)2.5–4 mm, larger spikelets (5–)6–8(–10) mm, and hexaploid chromosome number.

46. Poa hisauchii Honda, Bot. Mag. (Tokyo) 42: 132. 1928.

久内早熟禾 jiu nei zao shu he

Annuals or short-lived perennials. Culms ascending to erect, 20–60 cm tall, nodes 3 or 4. Leaf sheaths shorter than internodes, smooth or scabrid; blade flat, grayish green, 4–8 cm × 1–3 mm, surfaces and margins scabrid; ligule 0.5–1.5 mm, abaxially pilulose, apex truncate to rounded, collar margin ciliate. Panicle narrowly oblong, 8–15 cm, longest internodes 3–5 cm; branches erect or curved ascending (sometimes spreading in fruit), 2 or 3(–5) per node, slender, scabrid angled from base, longest 2–6 cm with 5–15 spikelets in distal 1/2. Spikelets oblong to ovate, green, 4–5 mm, florets 3 or 4; vivipary absent; rachilla internodes 0.6–0.9 mm, glabrous; glumes slightly unequal, lanceolate, keel and veins distally scabrid, lower glume 2–2.4 mm, 1-veined, apex acuminate, upper glume oblong to lanceolate, 2.2–2.8 mm long, 3-veined, apex acuminate; lemmas 2.8–3.2 mm, keel villous for 3/4 of length, marginal veins to 1/2, area between veins glabrous or sparsely pilulose near keel; callus webbed; paleas distinctly shorter than the lemma, keels pilulose. Anthers (0.3–)0.4–0.7 mm. Fl. Jun–Jul. $2n = 28$.

Shady and moist forest openings, grassy places. Hebei, Zhejiang [Japan, Korea].

Records from Sichuan and Yunnan in FRPS (9(2): 155. 2002) were based on misidentifications. This species has the pilulose ligules and branches scabrid from the base characteristic of *Poa acroleuca*, but the branches are shorter and erect to steeply ascending, and the lemmas are somewhat longer and usually glabrous or with a few hairs between the veins.

47. Poa acroleuca Steudel, Syn. Pl. Glumac. 1: 256. 1854.

白顶早熟禾 bai ding zao shu he

Annuals or short-lived perennials. Culms ascending to erect, sometimes slightly swollen at the base, sometimes with moniliform swelling, 30–85 cm tall, 0.6–1 mm in diam., smooth, glabrous to retrorsely strigulose, nodes 3 or 4, 2 exserted. Leaf sheaths weakly keeled, smooth or sparsely scabrid, glabrous or retrorsely strigulose, 8–13 cm, slightly shorter or longer than blade, uppermost closed for over 2/3 of length, lowermost becoming fibrous in age; blades flat, thin, 7–20 cm × (1–)1.5–5(–11) mm, surfaces smooth to moderately scabrid, margins moderately to densely scabrid; ligule 0.5–1.5(–2) mm, abaxially pilulose, apex truncate to rounded, collar margins ciliate. Panicle open, elliptic, narrowly ovate, or pyramidal, exserted, 10–21 × 3–10 cm, longest internodes 3–5.5 cm; branches ascending to widely spreading, or reflexed, 2–5 per node, slender, angular, scabrid from base, longest 3–11 cm with 9–40 spikelets in distal 1/2. Spikelets ovate, green, 2.5–5 mm, florets (2–)3–5; vivipary absent; rachilla internodes 0.5–0.8 mm, smooth to sparsely scabrid, glabrous or pilulose; glumes slightly unequal, lanceolate, keel and veins distally scabrid, lower glume 1.5–2.4 mm, 1-veined, upper glume 2–2.8 mm, 3-veined, often as long or slightly longer than lowest lemma; lemmas oblong, 1.6–2.6(–3) mm, apex obtuse to acute, keel shortly villous for 5/6 of length, marginal veins to 3/4, intermediate veins moderately prominent, area between veins pilulose for 4/5 of length, rarely glabrous; callus sparsely webbed; palea pilulose between keels, keels smooth, rarely with a few apical hooks, pilulose to shortly villous to apex. Anthers (0.4–)0.5–1 (–1.3) mm. Fl. and fr. Apr–Jun. $2n = 28$.

Moist and shady grassy places, ditch banks, parks, disturbed ground; 500–1500(–2400) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Korea, Japan].

Poa acroleuca is usually well marked by the pilulose lemma surfaces and palea keels, callus web presence, and scabrid branches. It appears to intergrade with *P. nepalensis*, but that species normally has glabrous lemma surfaces, shorter, more contracted panicles, upper glume shorter than the first lemma, smooth, glabrous ligules (at least on the upper culm leaves), and tends to be paler overall.

1a. Lemma surfaces and intermediate veins moderately to densely pubescent ..... 47a. var. *acroleuca*
1b. Lemma surfaces and intermediate veins glabrous or sparsely pubescent ..... 47b. var. *ryukyuensis*

47a. Poa acroleuca var. **acroleuca**

白顶早熟禾(原变种) bai ding zao shu he (yuan bian zhong)

Lemma surfaces and intermdiate veins moderately to densely pubescent.

Moist and shady grassy places, ditch banks, parks, disturbed ground; 500–1500(–2400) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Korea, Japan].

47b. Poa acroleuca var. **ryukyuensis** Koba & Tateoka, J. Jap. Bot. 67: 205. 1992.

如昆早熟禾 ru kun zao shu he

Lemma surfaces and intermediate veins glabrous or sparsely pubescent.

Sporadic at low elevations. Guangdong, Shandong, Zhejiang [Japan (Okinawa)].

It is not uncommon to find plants of *Poa acroleuca* in China with glabrous or nearly glabrous lemmas. The range of such plants, recently named from Okinawa as var. *ryukyuensis*, has not yet been fully documented. These can be confused with *P. hisauchii*, except that in that species the panicles are narrow with short, erect or ascending branches, and the anther to lemma length ratio is less than 1:5 (vs. 1:5–2:5); or with *P. nepalensis*, except that in that species all ligules are pilulose and the paleas are pilulose to the apex.

48. Poa nepalensis (G. C. Wallich ex Grisebach) Duthie, List Grasses N. W. India 40. 1883.

尼泊尔早熟禾 ni bo er zao shu he

Poa annua Linnaeus var. *nepalensis* G. C. Wallich ex Grisebach, Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 3: 75. 1868.

Annuals to short-lived perennials, tufted or weakly stoloniferous. Culms erect, geniculate, or obliquely ascending, 15–50(–80) cm tall, 0.5–2 mm in diam., smooth, nodes 2–4, 0–2 exposed. Leaf sheaths loose, keeled, smooth, glabrous, 5–11 cm, about as long as blade, uppermost closed for 1/2(–3/4) of length; blades flat, thin to moderately thin, 4–20 cm × (1.5–)2–7(–11) mm, uppermost 3–10 cm, surfaces smooth to sparsely scabrid, margins scabrid, apex acutely to acuminately prow-tipped; ligule 0.5–1.5(–2) mm, abaxially smooth or scabrid, glabrous or rarely pilulose, apex truncate to obtuse, collar margins usually ciliate. Panicle open or loosely contracted, ovate or elliptic, exserted, 5–15(–22) × 3–10 cm, longest internodes 1–3 cm; branches ascending to reflexed, 2(–4) per node, proximally smooth or sparsely scabrid angled, distally nearly smooth to densely scabrid angled, longest 3–9 cm with 10–35 spikelets in distal 1/2. Spikelets elliptic, light green, 3.5–5(–7) mm, florets 3–6(–7); vivipary absent; rachilla internodes 0.5–0.8 mm, smooth, glabrous; glumes subequal to equal, keel and sometimes veins scabrid, lower glume narrow, 1.3–3.3 mm, 1-veined, upper glume broader, 1.5–3.4 mm, 3-veined; lemmas oblong to elliptic, 2.4–4(–5) mm, apex obtuse, rarely acute, keel villous to near apex, marginal veins for 3/4 of length, intermediate veins prominent, glabrous, rarely pilulose, areas between veins minutely bumpy, glabrous or infrequently pilulose proximally between keel and intermediate veins; callus webbed; palea smooth, glabrous, rarely sparsely pilulose, between keels, keels pilulose to short villous for most of length, distally pilulose or with a few hooks. Anthers (0.4–)0.6–1 mm. Fl. and fr. Apr–Jun.

Meadows on slopes, roadsides, disturbed ground, at lower elevations in E China; 1900–4000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Liaoning, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Japan, Kashmir, Korea, Myanmar, Nepal, Pakistan].

1a. Panicle branches proximally smooth or sparsely scabrid angled ..... 48a. var. *nepalensis*
1b. Panicle branches sparsely to moderately scabrid from the base ..... 48b. var. *nipponica*

48a. Poa nepalensis var. **nepalensis**

尼泊尔早熟禾(原变种) ni bo er zao shu he (yuan bian zhong)

Poa mariesii Rendle; *P. micrandra* Keng; *P. nephelophila* Bor.

Culms 15–50(–80) cm tall, 0.5–2 mm in diam. Uppermost leaf sheath subequal to blade, closed for 1/2(–3/4) of length; ligule 0.5–1.5(–2) mm. Panicle branches proximally smooth or sparsely scabrid angled, distally nearly smooth to shortly scabrid angled; lower glume 1.3–3.3 mm, upper glume 1.5–3.4 mm; lemmas with intermediate veins glabrous, infrequently pilulose, areas between veins minutely bumpy; palea keels distally pilulose or scabrid with few to several hooks. Fl. and fr. Apr–Jun. 2*n* = 42.

Meadows on slopes, roadsides, disturbed ground, at lower elevations in E China; 1900–4000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Kashmir, Myanmar, Nepal, Pakistan].

Poa nepalensis var. *nepalensis* is very variable, and more sensitive analyses might reveal additional taxa, but we were unable to divide the specimens in any meaningful way. This subspecies is much more widespread than was previously understood. The types of *Poa mariesii*, from Jiangsu, and *P. nephelophila*, from Myanmar (with branches nearly smooth throughout), are robust forms.

48b. Poa nepalensis var. **nipponica** (Koidzumi) Soreng & G. Zhu, **comb. et stat. nov.**

日本早熟禾 ri ben zao shu he

Basionym: *Poa nipponica* Koidzumi, Bot. Mag. (Tokyo) 31: 256. 1917.

Culms 20–40 cm tall, 1–2 mm in diam. Uppermost leaf sheaths slightly longer than blade, closed for ca. 1/2 of length; ligule 1–1.6(–2) mm. Panicle branches proximally sparsely to moderately scabrid angled from base, distally sparsely to moderately densely long scabrid angled; lower glume 2.5–3.3 mm, upper glume 2.5–3.4 mm; lemmas with intermediate veins glabrous or proximally pilulose to short villous, smooth between veins; palea keels pilulose only. Fl. and fr. May–Jul. 2*n* = 42, 56.

Thickets, moist meadows on sunny slopes. Liaoning [Korea, Japan].

Poa nepalensis var. *nipponica* is generally more robust than var. *nepalensis*, and the lower glume to lower lemma length ratio is slightly greater. It is common in Japan, but seems to be absent from most of China.

49. Poa imperialis Bor, Kew Bull. [12] 1957: 414. 1958.

茁壮早熟禾 zhuo zhuang zao shu he

Annuals or short-lived perennials, stoloniferous. Culms decumbent ascending, 70–85 cm tall, 2–3 mm in diam., smooth, nodes 3–6, none or 1 exserted. Leaf sheaths loose, keeled, smooth, glabrous, 14–17 cm, slightly longer than blade, uppermost closed for ca. 3/4 of length; blade flat, thin, base abruptly narrowed, surfaces smooth, margins scabrid, apex long slender prow-tipped; ligule 3–6 mm, abaxially smooth, apex obtuse, collars smooth, glabrous. Panicle open, 18–22 cm, longest internodes 3.5–4 cm; branches spreading to reflexed, 2 per node, proximally smooth, angled, distally scabrid angled, longest 8–11 cm with 20–40 spikelets in distal 2/3. Spikelets up to 6–7 mm, florets 5 or 6; vivipary absent; glumes purple tinged, keel

and sometimes veins sparsely scabrid, lower glume elliptic, 3–3.5 mm, 1-veined, back convex, upper glume 3.7–4 mm, oblong, 3-veined; lemmas 4–5 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins moderately prominent, areas between veins smooth, glabrous; callus glabrous; palea smooth, glabrous between keels, keels scabrid, medially pilulose. Anthers 0.6–0.9 mm. Fl. and fr. May–Jul.

Grassy places on slopes along *Abies* forest margins; 3700–4500 m. ?Sichuan [Nepal].

Poa imperialis could be simply a large form *P. sikkimensis*.

50. Poa sikkimensis (Stapf) Bor, Kew Bull. [7] 1952: 130. 1952.

锡金早熟禾 xi jin zao shu he

Poa annua var. *sikkimensis* Stapf in J. D. Hooker, Fl. Brit. India 7: 346. 1896 [“1897”]; *P. eragrostioides* L. Liu; *P. tunicata* Keng ex C. Ling.

Annuals or short-lived perennials, tufted to weakly stoloniferous. Culms erect or arching, or geniculate ascending, 4–42 cm tall, 0.5–2 mm in diam., smooth, nodes 1–3(–4), none or 1 exserted, uppermost to 1/3 way up culm. Leaf sheaths loose, smooth, glabrous, 2–8 cm, 1–3 × as long as blade, uppermost closed for 1/3–1/2 of length; blade flat, thin, 3–10 cm × (1.5–) 2–5 mm, surfaces smooth or sparsely scabrid, margins scabrid, apex acutely prow-tipped, of tillers 1–10 cm; ligule 1.5–4(–6) mm, abaxially smooth or sparsely scabrid, apex obtuse to acute, collars glabrous. Panicle loosely contracted to open, oblong to pyramidal, 3–15(–19.5) × 1.5–5 cm, longest internodes 0.5–3 cm; branches obliquely ascending, spreading, or reflexed, flexuous, 2 per node, proximally smooth, distally scabrid, longest to 1–7 cm with 4–30 spikelets in distal 2/3. Spikelets ovate, usually purple tinged, 3.8–5(–6) mm, florets 3–5; vivipary absent; rachilla internodes 0.4–0.9 mm, smooth, glabrous; glumes usually purple, subequal to unequal, broad, keels smooth or sparsely scabrid, lower glume 1.5–2.7 mm, 1-veined, upper glume 2–3.1 mm, 3-veined; lemmas broadly elliptic, 2.5–3.3 mm, apex obtuse to acute, keel pilulose to shortly villous, rarely glabrous, for 1/2 length, marginal veins to 1/3, intermediate veins prominent, areas between veins smooth, glabrous; callus glabrous; palea glabrous between keels, keels sparsely scabrid, some smooth, medially sparsely pilulose. Anthers 0.5–0.9 mm. Fl. and fr. Jul–Sep. 2*n* = 28, 42.

Grassy slopes, meadows, marshy ground, sandy bottoms, roadsides, disturbed ground; 3000–4700 m. SW Gansu, S Qinghai, W Sichuan, E Xizang (Yadong, Zayü), NW Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa sikkimensis lacks a webbed callus and has ligules 2–6 mm. It is most difficult to distinguish from *P. annua*, but has sparsely scabrid palea keels and branches and no pubescence on the intermediate veins of the lemmas.

51. Poa stapfiana Bor, Kew Bull. [4] 1949: 239. 1949.

斯塔夫早熟禾 si ta fu zao shu he

Poa tremula Stapf in J. D. Hooker, Fl. Brit. India 7: 344. 1896 [“1897”], not Lamarck (1791); *P. tremula* var. *micranthera* Stapf.

Perennials, loosely tufted, weakly stoloniferous; shoots extra- and intravaginal. Culms 20–60 cm tall, 0.6–1.4 mm in diam., erect or obliquely ascending, smooth, glabrous, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths loose, smooth, glabrous, 5–10 cm, slightly shorter than blade, uppermost closed for 1/4–1/3 of length; blade flat or folded, thin, 5–14 cm × 1–5 mm, adaxially sometimes scabrid, margins scabrid, apex slender prow-tipped or mucronate; ligule 2.5–5 mm, abaxially smooth, apex obtuse. Panicle open, lax, 8–25 cm, longest internodes 2.2–4 cm; branches widely spreading, flexuous, 2 per node, slender, proximally smooth, distally scabrid angled, longest 3.5–7 cm with 9–20 spikelets in distal 1/2. Spikelets elliptic to oblong, green or grayish, 4–6 mm, florets 3–6; vivipary absent; rachilla smooth, glabrous or pilulose; glumes subequal or lower to 1.5 mm shorter, scabrid only on keel, apex acuminate, faintly or not evidently punctate-papillate, lower glume lanceolate to elliptic, 2.7–3.9 mm, 1(or 3)-veined, upper glume oblong, 3–4.5 mm, faintly 3-veined; lemmas oblong, very thinly papery, 3–4.5 mm, apex acute, keel villous for 3/4 of length, marginal veins to 1/2, intermediate veins prominent, areas between softly pilulose; callus webbed; paleas shorter than the lemma, keels scabrid, medially pilulose. Anthers 0.7–1.2 mm. Fl. and fr. Jul–Sep.

Alpine meadows; 2500–4300 m. ?Xizang [N India, Kashmir, Nepal, Pakistan; SW Asia (Iran)].

This species approaches *Poa himalayana* on one end of its range of variation and *P. hirtiglumis* on the other, but it has longer lemmas and generally longer anthers than either of those species. The occurrence of this species in China requires confirmation.

52. Poa burmanica Bor, Kew Bull. [3] 1948: 141. 1948.

缅甸早熟禾 mian dian zao shu he

Annuals or short-lived perennials, weakly stoloniferous; shoots extra- and intravaginal. Culms loosely tufted, mostly flowering, 10–60 cm tall, 0.5–0.8 mm in diam., smooth or sparsely retrorse scabrid below lower nodes, glabrous, nodes 3–5, 3 or 4 exserted. Leaf sheaths smooth, glabrous or sparsely retrorsely strigulose, 7–12 cm, 1–2 × as long as blade, uppermost closed for 1/4–1/3 of length; blade flat, thin, 2–6 cm × 1.5–2.5 mm, adaxial surface and margins scabrid, apex slender prow-tipped; ligule 0.8–1.3 mm, abaxially smooth or scabrid, apex truncate to obtuse, collars smooth or slightly scabrid, margins glabrous or ciliate. Panicle open, lax, slightly exserted, 8–13 × 3–5 cm, longest internodes 2–3.5 cm; branches spreading, flexuous, 2 per node, capillary, scabrid throughout, distally angled, longest 2–5 cm with 2–5 spikelets, Spikelets 5–5.5 mm, florets 2 or 3; vivipary absent; rachilla internodes to 1 mm, smooth, glabrous; glumes lanceolate, unequal, lower glume subulate, 1.6–3 mm, distinctly shorter than the upper, keel nearly smooth, 1-veined, upper glume 3.2–4.1 mm, strongly 3-veined, keel scabrid; lemmas oblong, 3.7–4.6 mm, ca. 5 × as long as wide, 5(–7)-veined, apex slightly acuminate, keel shortly villous for 4/5 of length, marginal veins for 2/3, intermediate veins prominent, areas between veins basally pilulose, apically scabrid; callus densely webbed; palea distinctly shorter than lemma, sparsely pilulose between veins, keels scabrid, sometimes medially pilulose. Anthers 0.6–1 mm. Fl. and fr. May–Jun.

Alpine meadows; ca. 3700 m. SW Sichuan, SE Xizang, NW Yunnan [Myanmar].

Poa burmanica is distinguished from *P. himalayana*, *P. khasiana*, and *P. rajbhandarii* by the pubescent sides of the lemmas and by little else.

53. Poa himalayana Nees ex Steudel, Syn. Pl. Glumac. 1: 256. 1854.

史蒂瓦早熟禾 shi di wa zao shu he

Poa gracilior Keng ex L. Liu; *P. stewartiana* Bor.

Annuals or short-lived perennials. Culms 1 to several, erect or geniculately ascending, (12–)20–50(–70) cm tall, 0.5–0.8 mm in diam., smooth or scabrid below the lower nodes, glabrous, nodes 2–5, 1 or 2 exserted. Leaf sheaths smooth or scabrid or glabrous to strigulose near the collars, 5–15 cm, 1–3 × as long as blade, uppermost closed for 2/5–1/2 of length; blade flat, thin, 3–15 cm × (0.5–)1–2.5 mm, abaxially smooth or scabrid, adaxially and margins densely scabrid, glabrous, apex slender prow-tipped, of tillers up to 10 cm; ligule 0.8–2.5 mm, abaxially smooth, glabrous, apex truncate to obtuse, collar margins sparsely shortly ciliate or glabrous. Panicle open, ovoid, lax, (6–)9–20 × 3–8 cm, longest internodes 3–5 cm; branches ascending, spreading to reflexed, 2 per node, slender, proximally smooth or sparsely scabrid, distally scabrid angled, longest 4–9 cm with (3–)5–10 spikelets in distal 1/3. Spikelets narrowly elliptic, 3–5 mm, florets 2–4; vivipary absent; rachilla internodes to 1 mm, smooth, glabrous; glumes unequal, slender, acuminate, keels slightly convex, sparsely scabrid, surfaces apically smooth or sparsely scabrid, lower glume (2–)3–3.7 mm, 1-veined, upper glume (3–)3.5–4.5 mm, prominently 3-veined; lemmas oblong to elliptic, very thinly papery, 2.5–4.3 mm, ca. 5 × as long as wide, apex slightly acuminate, keel of at least some lemmas pilulose to short villous for 1/3(–1/2) of length, marginal veins for 1/4(–1/3), intermediate veins faint to prominent, areas between veins smooth or minutely bumpy only near base, glabrous; callus sparsely webbed; paleas distinctly shorter than the lemma, smooth, glabrous between keels, keels scabrid, medially sparsely pilulose, area margins narrowly hyaline. Anthers 0.6–1 mm. Fl. and fr. May–Jul.

Grassy places on slopes; 1900–3500 m. W Sichuan, ?Xizang, Yunnan [India (Himachal Pradesh, Uttar Pradesh), Kashmir, Pakistan].

Poa himalayana is the correct name for *P. stewartiana* Bor, and differs from *P. rajbhandarii* (*P. himalayana sensu* Bor and Rajbhandari) by the pilulose palea keels and relatively long glumes, especially the lower ones. It is common in the W Himalayas, but seems to be rare in China. However, as the two species are quite similar and some specimens seem intermediate, they might be better treated as subspecies. It was reported from Yunnan in FRPS (9(2): 145, 153, 154. 2002) under *P. himalayana*, *P. gracilior*, and *P. stewartiana*, but the voucher specimens from Yunnan belong to other species, mainly *P. khasiana*.

54. Poa rajbhandarii Noltie, Edinburgh J. Bot. 57: 288. 2000.

喜马拉雅早熟禾 xi ma la ya zao shu he

Annuals or short-lived perennials, loosely tufted, weakly stoloniferous. Culms 1 to several, erect or geniculate ascending, 16–45 cm tall, 0.5–1 mm in diam., smooth or sparsely retrorse scabrid below lower nodes, glabrous, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths smooth or sparsely scabrid near the collars, glabrous, 6–13 cm, slightly longer than blade, uppermost closed for 3/5 of length; blades flat, thin, 5–18 cm × 1–2.5 mm, abaxially nearly smooth to scabrid, adaxially and margins densely scabrid, apex slender prow-tipped; ligule 0.4–1.5(–2.3) mm, abaxially scabrid or puberulent, truncate to obtuse, collar margins often ciliate. Panicle open, lax, 8–18 × 3–8 cm, longest internodes 2.5–4 cm; branches ascending to spreading, flexuous, 1–4 per node, slender, scabrid throughout, longest 3–7 cm with 3–8 spikelets in distal 1/3. Spikelets narrowly elliptic, 3.7–5.2 mm, florets (1–)2–3(–4); vivipary absent; rachilla internodes to 1–1.5 mm, smooth, glabrous; glumes distinctly unequal, slender, acuminate, distinctly shorter than first lemma, keels scabrid, upper surface and edges smooth or scabrid, lower glume, subulate to wedge-shaped, 1.5–2.4 mm, straight or only slightly convexed, 1-veined, upper glume 2.2–3.3 mm, 3-veined; lemmas oblong to elliptic, very thinly to thinly papery, (2.8–)3.3–4.2 mm, ca. 5 × as long as wide, apex slightly acuminate, margins finely scabrid along edge, keel pilulose to shortly villous for 1/3–1/2 of length, marginal veins to 1/3, intermediate veins faint to prominent, areas between veins smooth or minutely bumpy over some or most of length, glabrous; callus webbed; palea distinctly shorter than lemma, smooth, glabrous between keels, keels scabrid, glabrous. Anthers 0.6–1 mm. Fl. and fr. May–Jul.

Alpine grassy places; 2700–4000 m. SC and SE Xizang, NW Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa rajbhandarii includes *P. himalayana sensu* Bor. *Poa himalayana* s.s. has panicles more lax and palea keels medially pilulose. *Poa rajbhandarii* is similar to *P. khasiana*, but differs in the lower glume being straighter and shorter, less than half the length of the first lemma.

55. Poa wardiana Bor, Kew Bull. [3] 1948: 143. 1948.

瓦迪早熟禾 wa di zao shu he

Annuals or short-lived perennials. Culms several, 28–35 cm tall, 0.6–0.8 mm in diam. base obliquely ascending, nodes 3 or 4, 1 or 2 exserted, scabrid below nodes. Leaf sheaths sparsely scabrid, 4.5–9 cm, 1.2–2 × as long as blade, uppermost closed for 1/2 of length; blades flat, thin, 2.5–8 cm × 1.5–2 mm, abaxially smooth to scabrid, adaxially and margins scabrid, slender prow-tipped; ligule 0.7–1.2 mm, abaxially scabrid, apex truncate to obtuse, erose, collars glabrous. Panicle open, 8–15 × 2–4 cm, longest internodes 2–3.5 cm; branches ascending to spreading, flexuous, 2 per node, capillary to slender, proximally smooth to scabrid, distally scabrid along weak angles, longest 3–7 cm with 5–13 spikelets in distal 1/3. Spikelets oblong to lanceolate, 4.5–5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.5–1 mm, smooth, glabrous; glumes subequal to slightly unequal, 2–2.5 mm, keel scabrid, apex acuminate, purplish violet, lower glume broadly subulate, 1.5–2.2 mm, 1-veined, upper glume 2.1–2.6 mm, 3-veined; lemmas oblong, 2.7–3.3 mm, apex acute, keel basally sparsely pilulose, area between veins scabrid, glabrous, intermediate veins moderately prominent; callus glabrous; palea shorter than lemma, scabrid on and between keels. Anthers 0.7–0.8 mm. Fl. and fr. Jul.

Grassy places among *Rhododendron* thickets on slopes; 3300–4000 m. Xizang, Yunnan [India (Assam)].

Poa wardiana is perhaps only a depauperate form of *P. rajbhandarii* with subglabrous lemmas, in which case the name *P. wardiana* has priority, but its lemmas are somewhat scabrid on the sides. The similar *P. lachenensis* Noltie, from India (Sikkim), differs as follows: lower glume 2.2–3 mm; lemma sides scabrid to minutely bumpy near base, keel glabrous; lower part of culms smooth, shiny, ligule margins smooth; palea smooth between keels, keels medially pilulose.

56. Poa khasiana Stapf in J. D. Hooker, Fl. Brit. India 7: 343. 1896 ["1897"].

喀斯早熟禾 ka si zao shu he

Poa formosae Ohwi.

Annuals or short-lived perennials, loosely tufted, weakly stoloniferous. Culms 1 to several, clambering to erect with base geniculate, 30–70 cm tall, 0.5–1.5 mm in diam., smooth to retrorsely scabrid or hispidulous below nodes, nodes 3 or 4, 1–3 exserted. Leaf sheaths finely retrorsely scabrid to strigulose near the collars, lower ones often tinged with purple, 6–15 cm, 1.4–4 × as long as blade, uppermost closed for 2/5–1/2 of length; blades flat, thin, 3–10 cm × 1.5–3 mm, abaxially smooth, margins smooth or finely scabrid, adaxially scabrid, apex slender prow-tipped; ligule 0.8–1(–1.5) mm, abaxially scabrid or pilulose, apex truncate or obtuse, rounded, collar margins usually shortly ciliate or strigulose. Panicle open, narrow, 7–21 × 2–5 cm, longest internodes 3–6 cm; branches ascending to spreading or reflexed, flexuous, 2–4 per node, slender, proximally smooth to scabrid, distally scabrid, angled, longest 3–6 cm with 2–8 spikelets in distal 1/3–1/2. Spikelets ovate to oblong, pale green, 4–6 mm, florets 3–4(–5); vivipary absent; rachilla internodes 0.7–1.2 mm, smooth, glabrous; glumes unequal, slender, apex acuminate, upper keel scabrid, upper surfaces and edges smooth to scabrid, lower glume 1.8–3.2 mm, narrowly lanceolate, slightly convex to often sickle-shaped, 1-veined, upper glume 2.7–3.7 mm, 3-veined; lemmas lanceolate to oblong, thinly papery to papery, 3.2–4.4 mm, ca. 5 × as long as wide, apex acute to acuminate, sparsely scabrid along edge, keel shortly villous to pilulose for 2/3 of length, marginal veins to 1/2, intermediate veins prominent, areas between veins minutely bumpy, glabrous; callus densely webbed; palea distinctly shorter than lemma, smooth, glabrous, or pilulose between keels, keels scabrid throughout or infrequently medially shortly ciliate to pilulose, margins minutely bumpy and then membranous-papery. Anthers 0.6–1 mm. Fl. and fr. Jul–Sep. $2n = 28$.

Alpine scattered forests, grassy places among thickets on slopes, roadsides, *Fargesia* thickets; 300–4000 m. Guizhou, W Sichuan, Taiwan, SE Xizang, NW Yunnan [India (Khasi Hills), Myanmar].

Poa khasiana has firmer lemmas than most other taxa in the complex except *P. rajbhandarii*, but the lower glumes are relatively long in comparison to the first lemma, and are more sickle-shaped than in that species. A report from India (Sikkim) by Rajbhandari (Bull. Univ. Mus. Univ. Tokyo 34: 214. 1991) was rejected by Noltie (Fl. Bhutan 3(2): 572. 2000).

57. Poa nankoensis Ohwi, Acta Phytotax. Geobot. 2: 165. 1933.

南湖大山早熟禾 nan hu da shan zao shu he

Perennials, tufted. Culms ascending, 10–20(–40) cm tall, 0.8–1 mm in diam., smooth, nodes 3–5, none exserted. Leaf sheaths smooth, glabrous, several times longer than internodes, 5–8 cm, 1–3 × as long as blade, uppermost closed for 3/10–1/3 of length; blade flat or folded, thickly papery, 2–8 cm × 1.5–3 (–4) mm, abaxially smooth, adaxially and margins smooth to sparsely scabrid, apex acute to acuminately prow-tipped, of tillers to 16 cm; ligule 1–2(–3) mm, abaxially smooth or sparsely scabrid, apex obtuse to acute, collar glabrous. Panicle open, slightly included to exserted, 5–13 cm, longest internodes 2–3 cm; branches ascending to spreading, 1 per node, rounded, distally sparsely scabrid, longest 3–4 cm with 10–16 spikelets in distal 2/3. Spikelets green, (4–)5–6 mm, florets 2–3(–4); vivipary absent; rachilla internodes ca. 0.5 mm long, smooth, glabrous; glumes subequal, smooth, lower glume 3.5–4 mm, 1-veined, upper glume 3.5–5 mm, 3-veined; lemmas lanceolate, firm, 4–5 mm, apex acuminate, keel villous for 3/4 of length, marginal veins for 1/2, intermediate veins faint to moderately prominent, areas between veins minutely bumpy; callus densely webbed; palea distinctly shorter than lemma, minutely bumpy between keels, keels scabrid. Anthers 0.8–1 mm. Fl. and fr. Jun–Aug.

● Alpine grassy places. Taiwan.

58. Poa takasagomontana Ohwi, Repert. Spec. Nov. Regni Veg. 36: 41. 1934.

高砂早熟禾 gao sha zao shu he

Annuals or short-lived perennials, weakly stoloniferous. Culms ascending, loosely tufted, 40–50 cm tall, 0.4–1 mm in diam., sparsely scabrid below the nodes, nodes 4 or 5, none or 1 exserted. Leaf sheaths sparsely scabrid, 9–12 cm, 5/7–1 × as long as blade, uppermost closed for ca. 3/5 of length; blade flat, thin, 10–15 cm × 1.5–3 mm, abaxially sparsely scabrid, adaxially and margins scabrid, apex slender prow-tipped; ligules 1–1.5(–2) mm, abaxially scabrid, apex obtuse, collars ciliate margined. Panicle open, lax, 10–15 cm, barely exserted, longest internodes 2.5–3 cm; branches spreading, 2 per node, densely scabrid angled throughout, longest 2–4 cm with 5–8 spikelets in distal 1/2. Spikelets 3.5–5 mm, florets (1 or)2; vivipary absent; rachilla to 1.2 mm, smooth, glabrous; glumes unequal, very thinly papery, keels scabrid, lower glume narrowly lanceolate, 1.5–3 mm, 1-veined, upper glume 3–4 mm, 3-veined; lemmas 3–4 mm, very thinly papery, glabrous, keel faintly scabrid toward the apex, intermediate veins moderately prominent, areas between veins smooth, minutely bumpy, apex sharply acute to acuminate; callus webbed; palea shorter than lemma, smooth between keels, keels scabrid. Anthers 0.7–1 mm. Fl. and fr. Jul–Aug.

● Alpine wet places along forest margins. Taiwan.

With its thin, smooth, glabrous lemmas and webbed callus, *Poa takasagomontana* stands out, but seems closely related to *P. khasiana*. However, it has longer anthers than most species in this group.

59. Poa tenuicula Ohwi, Repert. Spec. Nov. Regni Veg. 36: 42. 1934.

细杆早熟禾 xi gan zao shu he

Perennials, densely tufted; shoots extra- and intravaginal. Culms ascending to erect, 19–40 cm tall, ca. 1 mm in diam., smooth, nodes 2–4, none or 1 exserted, uppermost node to 1/3–

1/2 way up culm. Leaf sheaths weakly keeled, smooth, 5–8 cm, 2–4 × as long as blade, uppermost closed for 2/5–3/5 of length; blade flat or folded, thin, 1.5–8 cm × 2–2.8 mm, apex prow-tipped, abaxially smooth, often ribbed, adaxially finely scabrid, margins smooth or scabrid, of tillers 1–3.5 cm; ligule 1–3 mm, abaxially smooth, apex obtuse to acute, of tiller and lower leaves 0.2–0.5 mm, abaxially scabrid, collar smooth. Panicle loosely contracted, 5–8 cm, longest internodes 1.5–2 cm; branches ascending, 1 or 2 per node, proximally rounded, smooth, distally scabrid angled, longest 2.5–4 cm with 6–12 spikelets in distal 1/2. Spikelets lanceolate, slightly purple tinged, 4–6.5 mm, florets 2–4; vivipary absent; rachilla internodes to 1 mm, pilulose to short villous or sparsely scabrid; glumes papery, strongly keeled, keel apically sparsely scabrid, sides punctate-papillate, somewhat glaucous, apex sharply acute to acuminate, lower glume 3–4.1 mm, 1(–3)-veined, upper glume 4–4.7 mm, prominently 3-veined, lateral veins to 2/3 as long; lemmas 3.5–4.7 mm, apex acute to acuminate, margins purple, keel villous for 3/4 of length, marginal veins for 2/3, and sometimes intermediate veins to 1/2 length, areas between veins proximally densely pilulose to shortly villous, distally minutely bumpy; callus densely webbed; palea densely pilulose to villous between keels, keels scabrid, medially densely pilulose to villous. Anthers (1–)1.2–1.5 mm. Fl. and fr. Jun–Aug.

● Alpine grassy slopes. Taiwan.

Poa tenuicula differs from *P. nankoensis* in being taller and having panicles longer, spikelets pubescent between lemma veins and on rachilla, and anthers longer.

60. Poa hirtiglumis J. D. Hooker, Fl. Brit. India 7: 343. 1896 [“1897”].

毛花早熟禾 mao hua zao shu he

Annuals or short-lived perennials, shoots extra- and intravaginal. Culms tufted, several, slightly arching, erect or geniculate at base, 4–35(–44) cm, 1–1.6 mm in diam., smooth, glabrous, nodes 1–3, none or 1 exserted, uppermost to 1/4 way up culm. Leaf sheaths thin, loose, soon withering, smooth, glabrous, 3–9 cm, ca. 2 × as long as blade, uppermost closed for 1/5–1/4 of length; blade flat or folded, thin, 2–8 cm × 1.5–3(–4) mm, surfaces smooth, margins and keel smooth to scabrid, apex acutely prow-tipped; ligules milky, ovate, 2–5 mm, abaxially smooth, glabrous, apex obtuse, entire to lacerate, collar smooth, glabrous. Panicle open, exserted, 3–7(–9) × 1.5–4 cm, longest internode 1–2 cm; branches spreading to reflexed, flexuous, often arched, 1 or 2(–3) per node, proximally sparsely scabrid, distally scabrid on and between angles, longest 1.5–4.5 cm with 9–25 spikelets in distal 1/2. Spikelets obovate, usually purple tinged, 2.5–4.5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.5–0.7(–1) mm, smooth or sparsely scabrid or pilulose; glumes lanceolate, subequal, upper often as long as or slightly longer than lower lemma, keel scabrid, surface smooth to distally sparsely scabrid, lower glume (1.5–)2.2–4 mm, 1- or 3-veined, upper glume (2–)2.3–5(–6) mm, 3-veined; lemmas broadly oblong, 2–4(–5) mm, intermediate veins distinct, keel shortly villous for 1/2–4/5 of length, marginal veins for 1/3–2/3, surfaces pilulose, sparsely scabrid near obtuse apex; callus glabrous or sparsely webbed; palea pilulose or minutely bumpy between keels, keels distally scabrid, pilulose for most of length. Anthers 0.6–1 mm. Fl. and fr. May–Aug.

Subalpine and alpine meadows; 2700–4900(–5500) m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Assam, Sikkim), Nepal].

This species appears to be a derivative of *Poa stapfiana*, which is taller with longer lemmas and relatively shorter glumes.

1a. Lemmas between veins pilulose; palea keels pilulose over most of the length ..... 60a. var. *hirtiglumis*

1b. Lemmas between veins glabrous or sparsely pilulose only near the base; palea keels scabrid only ..... 60b. var. *nimuana*

60a. Poa hirtiglumis var. **hirtiglumis**

毛花早熟禾(原变种) mao hua zao shu he (yuan bian zhong)

Culms 1–1.6 mm in diam., nodes 1–2. Leaf sheaths smooth, glabrous, uppermost closed for 1/5–1/4 of length; ligule abaxially smooth, glabrous. Longest panicle branches 1.5–4.5 cm with 9–25 spikelets in distal 1/2. Spikelets 2.5–4.5 mm; rachilla internodes smooth, pilulose; upper glume 2.3–4 mm; lemmas 2–3.3 mm, keel densely villous for 4/5 of length, marginal veins for 2/3, surfaces pilulose, sparsely scabrid near obtuse apex; palea pilulose between keels, keels pilulose for most of length, distally scabrid. Fl. and fr. May–Aug.

Subalpine and alpine meadows; 2700–4900(–5500) m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Assam, Sikkim), Nepal].

Poa hirtiglumis var. *hirtiglumis* is usually well marked by the possession of spikelets with glumes subequal to each other and subequal to or slightly longer than the first lemmas, the lemmas commonly pilose between the veins, and the paleas pilose for much of their length. Plants from the E Xizang-Qinghai Plateau sometimes lack the hairs between the lemma veins and on the palea keels.

60b. Poa hirtiglumis var. **nimuana** (C. Ling) Soreng & G. Zhu, **comb. et stat. nov.**

尼木早熟禾 ni mu zao shu he

Basionym: *Poa nimuana* C. Ling, Acta Phytotax. Sin. 17(1): 103. 1979; *P. macrolepis* Keng ex C. Ling; *P. zhongbaensis* C. Ling.

Culms 0.6–1.5 mm in diam., 1–3 nodes. Lower leaf sheaths finely scabrid, uppermost closed for 1/4–2/5 of length; ligule smooth to sparsely scabrid. Longest panicle branches 2–7 cm with up to 5–11 spikelets in distal 1/2–2/3. Spikelets 3–5(–6) mm; rachilla internodes smooth or sparsely scabrid; upper glume (2–)3–5(–6) mm; lemmas (2.5–)3–4(–5) mm, keel villous for 1/2 of length, marginal veins to 1/3, surfaces scabrid or sparsely pilulose near base; palea minutely bumpy between keels, keels scabrid for 1/4–2/3 of length, glabrous. Fl. and fr. Jun–Aug.

● Grassy places on mountain tops, riverside fields, roadsides, frigid alpine crevices, frost scars, marshy ground; 3000–5500 m. Gansu, Qinghai, Sichuan, Xizang.

Poa hirtiglumis var. *nimuana* differs from var. *hirtiglumis* in the scabrid palea keels and glabrous and more scabrid lemma sides. *Poa macrolepis* is a taller form with larger spikelets, but there is nothing else

to distinguish it from *P. hirtiglumis*. *Poa zhongbaensis* is a shorter, smaller-spikeleted form that may be better placed in *P. szechuensis* var. *rossbergiana*.

61. Poa sunbisinii Soreng & G. Zhu, **sp. nov.**

孙必兴早熟禾 sun bi xing zao shu he

Type: China. Yunnan: Fugong Xian, above Bijiang ca. 9 km by road, W slope of Bilou Mts. (divide between Nu Jiang and Lancang Jiang drainages), 26°35'N, 98°59'E, opening in *Abies-Tsuga* forest–*Fargesia* thicket contact zone, 2900 m, 8 Sep 1997, *R. J. Soreng, P. M. Peterson & Sun Hang 5222* (holotype, US; isotypes, KUN, PE, others to be distributed).

Haec species a P. eleanorae Bor *foliorum superiorum vaginarum marginibus per dimididum longitudinis connatis, lemmate glabro atque glumis 1.5 mm brevioribus quam lemmatibus; a* P. gammieana J. D. Hooker *inflorescentiae ramis scabris, lemmatis paleaeque carinis glabris atque ligula plerumque breviore, 1–2(–5) mm; a* P. dzongicola Noltie *callo dorso lanuginoso atque ligula breviore differt*.

Annuals or short-lived perennials. Major roots capillary to slender, 0.1–0.2 mm. Culms tufted, erect or slightly decumbent at base, 25–80 cm tall, 1–3.5 mm in diam., smooth or sparsely scabrid below nodes, nodes 2–4, 1 or 2 exserted, uppermost ca. 1/2 way up culm. Leaf sheaths smooth, glabrous, 6–15 cm, 0.5–1 × as long as blade, uppermost closed for ca. 1/2 of length; blades flat or folded, moderately thin, uppermost 8–30 cm × 1.5–5 mm, abaxial surface and margins smooth or sparsely scabrid, adaxially scabrid, keel and 4–10 primary veins abaxially pronounced, apex slender prow-tipped; ligule 1–2(–5) mm, apex obtuse, abaxially scabrid, collar glabrous. Panicle open, eventually exserted, 8–25 cm, longest internode ca. 4 cm; branches initially ascending and flexuous, eventually spreading or reflexed and lax, mostly 2 per node, scabrid all round, angled in part, longest 8–11 cm with 5–13 spikelets loosely arranged in distal 1/2. Spikelets lanceolate, purple tinged, (4–)5–7 mm, florets 2 or 3; vivipary absent; rachilla internodes ca. 1 mm, usually densely slender-scabrid to hispidulous; glumes thinner-textured than the lemmas, frequently purple on margins or all over, keel scabrid, surface uniformly minutely punctate, apex sharply acute, lower glume narrowly lanceolate, 3.3–4.6 mm, 1- or 3-veined, upper glume lanceolate 3.8–5 mm, 3-veined; lemmas 3.7–5.2 mm, moderately firm, apex sharply acute, margins very narrowly membranous, with a narrow purple band, keel and marginal veins scabrid, intermediate veins faint to moderately prominent, areas between veins usually densely scabrid over most of the surface; callus of proximal florets sparsely webbed, hairs short, callus of distal florets glabrous; palea scabrid throughout. Anthers 0.7–1.6 mm. Fl. and fr. Aug.

● Openings in upper forested and subalpine slopes, 2900–3900. NW Yunnan.

Poa sunbisinii differs from *P. eleanorae* by having more closed leaf sheaths, a lack of hairs on the lemma keels, and shorter spikelets with glumes shorter than the lemmas by (on average) ca. 1.5 mm. It has a long palea as in *P. gammieana*, but that species has smooth inflorescence branches, pilose lemma and palea keels, and longer ligules. *Poa dzongicola* has glabrous calluses and longer ligules.

62. Poa dzongicola Noltie, Edinburgh J. Bot. 57: 283. 2000.

雅江早熟禾 ya jiang zao shu he

Poa yakiangensis L. Liu.

Annuals or short-lived perennials, tufted to loosely tufted. Culms ascending to erect, (13–)25–76 cm, smooth or sparsely scabrid below nodes, nodes 3 or 4, 0–2 exserted. Leaf sheaths scabrid, 6–14 cm, slightly shorter than to 2 × as long as blade, uppermost closed for 1/4–1/2 of length; blade flat, thin to moderately thin, 5–22 cm × 2–4(–5) mm, surfaces and margins smooth to sparsely scabrid; ligules 2.5–6.5 mm, abaxially smooth or sparsely scabrid, apex truncate to acute, collars, smooth to scabrid, glabrous. Panicle open, narrowly pyramidal, 6.5–18 × 3–6 cm, longest internodes 2–6 cm; branches spreading to reflexed, flexuose, sinuous to twisted to arched, 1–3 per node, scabrid throughout, distally angled, longest 2–8 cm with 5–15(–28) spikelets in distal 1/2–2/3. Spikelets lanceolate, purple tinged, 4–7 mm, florets 2–4(–6); vivipary absent; rachilla internodes 0.8–0.9 mm, smooth to densely scabrid; glumes subequal to unequal, narrow, keel, veins and distal surface sparsely scabrid, lower glume 2.2–4 mm, 1- or 3-veined, upper glume 2.8–4.5 mm; lemmas lanceolate, 3.1–4.4 mm, glabrous throughout, apex acute to acuminate, keel and veins scabrid, intermediate veins prominent, areas between veins scabrid throughout, or partly minutely bumpy; callus glabrous; palea minutely bumpy, sometimes scabrid between keels, keels scabrid. Anthers 0.5–0.9(–1.5) mm. Fl. and fr. Jul–Sep.

Coniferous forests openings, low alpine moist sometimes rocky thickets, disturbed ground; 3700–4600 m. SW Sichuan, SE Xizang [Bhutan, India (Sikkim)].

Poa dzongicola differs from *P. szechuensis* s.l. by the longer ligules, longer, acute glumes and lemmas, and longer anthers. The type of *P. dzongicola* differs from *P. yakiangensis* only by the scabrid sheaths and slightly longer glumes.

63. Poa szechuensis Rendle, J. Bot. 46: 173. 1908.

四川早熟禾 si chuan zao shu he

Annuals or short-lived perennials, tufted. Culms 1–60 cm tall, 0.2–1.5 mm in diam., smooth or scabrid below nodes, glabrous, nodes 1–5, 0–3 exserted. Leaf sheaths smooth or scabrid, glabrous, 1–15 cm, slightly shorter than to 2 × as long as blade, uppermost closed for 1/3–1/2 of length; blade flat or infrequently folded, thin, 1–8 cm × 0.5–3(–4) mm, scabrid throughout, apex slender prow-tipped, of tillers 1–15 cm; ligule 0.5–6 mm, abaxially smooth or scabrid, apex truncate to acute, sometimes minutely dentate, collar glabrous. Panicle open, lax, ovoid to pyramidal, included to slightly exserted, (1–)2–20 cm, longest internode (0.5–)1–5 cm; branches ascending to spreading or reflexed, flexuous, 1 or 2(–3) per node, capillary, proximally smooth or scabrid angled, distally scabrid, longest 1–8 cm with 2–20 spikelets in distal 1/4–1/2. Spikelets ovate, green or purple tinged, 2.3–4 mm, florets 2–4(–5); vivipary absent; rachilla internodes 0.5–0.7 mm, smooth or scabrid, glabrous; glumes unequal to subequal, keel scabrid, surface distally scabrid, lower glume 1–2(–2.5) mm, 1(or 3)-veined, upper glume 1.5–2.5(–3) mm; lemmas elliptic, 1.5–2.6(–3.5) mm, apex obtuse to acute, keel scabrid only or pilulose to shortly villous for 1/2 of length, marginal veins for 1/4, veins distally scabrid, in-

termediate veins prominent, areas between veins minutely bumpy for most of length, sparsely scabrid at least near apex, glabrous; callus glabrous or scantily webbed; palea smooth or minutely bumpy, and sometimes scabrid between keels, keels densely scabrid. Anthers 0.2–0.5 mm. Fl. and fr. May–Sep.

Grassy places among thickets, along forest margins on slopes, natural and disturbed places; (2000–)4700 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].

Poa szechuensis, as treated here, includes a highly variable (phenotypically plastic) and strongly inbreeding complex of three varieties. The lemmas of the types of *P. szechuensis*, *P. chumbiensis*, and *P. tibeticola* are glabrous, but there are many similar specimens with 1 to several hairs on some lemmas in some spikelets, and we therefore feel justified in applying a broader species concept. All have lemmas mostly 2–2.6 mm and anthers 0.2–0.5 mm.

1a. Lemmas glabrous throughout; callus glabrous ..... 63c. var. *szechuensis*
1b. Lemmas pilulose to shortly villous on keel; callus glabrous or with a few dorsal hairs.
2a. Culms not arching, 10–30 cm tall; callus of lowest florets with or without a few short hairs; plants of mid elevations ..... 63a. var. *debilior*
2b. Culms arching, 1.5–10 cm tall; callus glabrous; alpine plants ..... 63b. var. *rossbergiana*

63a. Poa szechuensis var. **debilior** (Hitchcock) Soreng & G. Zhu, **comb. et stat. nov.**

垂枝早熟禾 chui zhi zao shu he

Basionym: *Poa debilior* Hitchcock, Proc. Biol. Soc. Washington 43: 93. 1930; *P. declinata* Keng ex L. Liu.

Annuals or short-lived perennials, slender tufted. Culms 20–60 cm tall, nodes 3–5. Leaf sheaths smooth or scabrid, uppermost 4–15 cm; ligule (0.5–)1.4–5 mm. Panicle 7–20 cm, longest internode 2–5 cm; longest branches 2–8 cm. Florets 2–3(–5); lemma keel and marginal veins usually partly hairy (at least in lower florets), apex acute; callus glabrous or scantily webbed (at least in basal florets). Fl. and fr. Jun–Aug.

● Shady moist places in ravines, streamsides on mountain slopes, thickets, subalpine meadows, grassy slopes; (2000–)4500 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, NW Sichuan, Yunnan.

Plants included here have at least some hairs on the lemma keels and are generally spindly in habit. The type of *Poa declinata* is tentatively placed here. It has somewhat longer-than-average lemmas with denser pubescence on the keels, more crowded spikelets, slightly thicker roots, and longer anthers. It seems to be transitional between *P. szechuensis* and *P. nepalensis* or *P. khasiana*.

63b. Poa szechuensis var. **rossbergiana** (K. S. Hao) Soreng & G. Zhu, **comb. et stat. nov.**

罗氏早熟禾 luo shi zao shu he

Basionym: *Poa rossbergiana* K. S. Hao, Bot. Jahrb. Syst. 68: 581. 1938; *P. rohmooana* Noltie.

Annuals, densely tufted. Culms 1–10 cm tall, nodes 1 or 2. Leaf sheaths smooth, uppermost 1–3 cm; ligule 1–2 mm. Panicle (1–)2–4 cm, longest internodes 0.5–1.5 cm; longest branches 1–2 cm. Florets 3 or 4; glumes ovate to lanceolate; lemma keel and marginal veins partly hairy; callus glabrous. Fl. and fr. Jun–Sep.

Alpine grassy slopes, in and around *Kobresia* mats, moraine gravels, silts; 4200–4700 m. Qinghai, Xizang [India (Sikkim)].

Included here are densely tufted, dwarf, high-alpine forms with sparsely pubescent lemmas. This race is similar in form to *Poa pseudoabbreviata* Roshevitz, but that species is perennial and occurs in arctic Russia and North America. The other varieties comprise lower-elevation and some subalpine plants that are taller, with leafy culms.

63c. Poa szechuensis var. **szechuensis**

四川早熟禾(原变种) si chuan zao shu he (yuan bian zhong)

Poa gracillima Rendle, J. Linn. Soc., Bot. 36: 424. 1904, not Vasey (1893); *P. chumbiensis* Noltie; *P. omeiensis* Rendle, nom. illeg. superfl.; *P. tibeticola* Bor.

Annuals. Culms 10–40 cm tall, nodes 2–4. Leaf sheaths smooth or scabrid, uppermost 2–15 cm; ligule (0.7–)1–4.3(–6) mm. Panicle 3.5–20 cm, longest internodes 1–5 cm. Florets 2 or 3; glumes lanceolate or elliptic to lanceolate; lemmas glabrous throughout; callus glabrous. Fl. and fr. May–Aug.

Mountainous areas, sparse forests, thickets, alpine grassy places; (3000–)4600–4700 m. Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].

In var. *szechuensis* the lemmas are completely glabrous. There is a continuum of specimens between *Poa chumbiensis*, a tall and broad-leaved form, *P. tibeticola*, an intermediate form, and the type of *P. szechuensis*, a spindly little plant.

5. Poa subg. Stenopoa (Dumortier) Soreng & L. J. Gillespie, Aliso, in press, 2006.

林地亚属 lin di ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Marina V. Olonova

Poa sect. *Stenopoa* Dumortier.

Perennials, tufted, some with thin, short rhizomes, sometimes stoloniferous (*P.* sect. *Pandemos*) or strongly rhizomatous (*P.* sect. *Tichopoa*). Shoots extra- and intravaginal. Culms usually rounded, sometimes strongly compressed (*P.* sect. *Tichopoa*), smooth or scabrid. Leaf sheaths mostly closed for 1/20–1/6(–1/4 in *P.* sect. *Pandemos*) of length; leaf blades flat, thin, soft to folded or inrolled, firm and hard. Panicle lax to very dense, and spiciform, branches with dense short prickles on angles. Spikelets 3–5(–8) mm, florets 1–3(–8); vivipary absent; rachilla smooth, warty or pubescent; both glumes 3-veined; lemma soft, usually pubescent at least on keel and marginal veins, sometimes also lower part between veins, rarely entirely glabrous; veins slightly raised; callus webbed to glabrous or with a short crown of hairs; palea usually smooth, sometimes pubescent between keels, keels with short prickles, very rarely proximally ciliate. Anthers (1–)1.2–2 mm.

About 40 species: Asia, Europe, North America, a few species in South America; 18 species (one endemic, at least one introduced) in China.

The Chinese species belong to four sections: *Poa* sect. *Secundae* V. L. Marsh ex Soreng (species no. 64); *P.* sect. *Pandemos* Ascherson & Graebner (species no. 65); *P.* sect. *Tichopoa* Ascherson & Graebner (species no. 66); and *P.* sect. *Stenopoa* Dumortier (species nos. 67–81). The other two sections in the subgenus, namely *P.* sect. *Abbreviatae* Nannfeldt ex Tzvelev and *P.* sect. *Oreinos* Ascherson & Graebner, do not occur in China.

Many species in *Poa* sect. *Stenopoa* hybridize easily, and have formed a series of morphologically and genetically distinct populations. These are supposed to have been stabilized by apomixis. The situation is made more complex by *P. glauca*, *P. nemoralis*, and *P. palustris*, which are represented by many cytological races of vague taxonomic status. These have hybridized with other species of *P.* sect. *Stenopoa* to form agamic complexes, which are supposed to have arisen quite long ago, perhaps during the Pleistocene (Tzvelev, Fl. European Part USSR 1: 117–368. 1974). Four of these have differentiated sufficiently to be treated as the distinct hybridogenous species *P. albertii*, *P. araratica*, *P. lapponica*, and *P. urssulensis*. Some polytypic species are also accepted. Their subspecies are geographically separated; some may be of hybrid origin, but are close to one parent as result of introgression.

1a. Sheaths of upper culm leaves closed for 1/4(–1/3) of length; lower glume 1-veined, often sickle-shaped; lemma with or without a bronze-yellowish band below apex, lateral veins faint to prominent; vegetative shoots extravaginal and/or intravaginal; plants loosely tufted, stoloniferous (sometimes with short lateral shoots with small beadlike swellings); sheaths compressed, usually densely retrorsely scabrid, collars not ciliate; blade papery, flat, apex simple acuminate (*P.* sect. *Pandemos*) ..... 65. *P. trivialis*

1b. Sheaths of upper culm leaves closed for 1/20–1/5(–1/4) of length; lower glumes (1 or)3-veined; lemma commonly with a bronze-yellowish band below apex, lateral veins mostly faint; vegetative shoots all or mostly extravaginal (rarely mostly intravaginal); plants rarely with well-developed rhizomes (but if rhizomatous then culms and nodes strongly compressed: *P.* sect. *Tichopoa*).

2a. Plants with well-developed rhizomes; culms isolated, nodes and internodes strongly compressed; callus usually webbed (*P.* sect. *Tichopoa*) ..... 66. *P. compressa*

2b. Plants without rhizomes (or at most with poorly developed lateral shoots, or short upward-directed bladeless shoots, or somewhat stoloniferous in riparian forms of *Poa palustris*); culms usually closely clustered, nodes and internodes not or only slightly compressed, but if compressed then plants not rhizomatous; callus webbed or not.

3a. Lemmas weakly keeled, glabrous; spikelets 2.5 or more × as long as wide; callus glabrous; panicle contracted, linear; spikelets not viviparous (*P.* sect. *Secundae*) ..... 64. *P. secunda*

3b. Lemmas strongly keeled, pubescent (infrequently glabrous); spikelets commonly 1.5–2 × as long as wide; callus with a dorsal web or glabrous; panicle open or contracted, linear to pyramidal; spikelets sometimes viviparous (*P.* sect. *Stenopoa*).

4a. Panicle with viviparous spikelets ..... 80. *P. albertii*

4b. Panicle without viviparous spikelets.

5a. Plants up to 25(–40) cm of alpine and subalpine belt (if from lower elevation steppe see 77. *P. versicolor*); upper node usually not exposed.

6a. Plants 20–30 cm, subalpine (to low alpine).

7a. Ligule 3–8 mm, 2–4 × as long as blade width, lemma glabrous between veins ..... 76. *P. hylobates*

7b. Ligule 0.7–3 mm (if longer, lemma pubescent between veins), usually equal to blade width ..... 78. *P. araratica*

6b. Plants 5–15(–25) cm, alpine, if taller, then spikelets 5–8 mm, leaf blade green, soft.

8a. Panicle contracted, densely ovoid to spiciform, longest branches 1(–1.5) cm, spikelets crowded, 3–4(–5) mm; uppermost internode not more than 1 mm wide; leaf blade firm in age, narrow, folded or inrolled; plant pale or grayish yellow, glumes sometimes with purplish bands.

9a. Densely tufted, shoots mostly intravaginal; leaf blades inrolled, 0.5–1 mm wide ..... 79. *P. attenuata*

9b. Moderately tufted, shoots mostly extravaginal; leaf blades folded, 1–1.5 mm wide ..... 80. *P. albertii*

8b. Panicle elongated, sometimes quite open, longest branches 1.5–2 cm, spikelets moderately crowded to sparse, (3.8–)4–5.5(–6) mm; uppermost internode frequently up to 1.5–2 mm wide; leaf blade withering, folded or flat; plant glaucous, glumes and vegetative parts frequently strongly purplish.

10a. Callus glabrous (rarely with a few short hairs) ..... 80. *P. albertii*

10b. Callus webbed ..... 81. *P. glauca*

5b. Plants (25–)30–100 cm, sometimes alpine; uppermost node usually exposed.

11a. Mesomorphic plants; culm with uppermost node more than 1/3(–1/2) way up, leaf blade soft, flat, 1–5 mm wide, usually longer than sheath; ligule up to 1.5 × blade width; panicle open.

12a. Ligule 2–3 mm, callus of lemma webbed ..... 70. *P. palustris*

12b. Ligule of uppermost leaves 0.2–1.5 mm, usually less than blade width (if C Asia, see also 75. *P. nemoraliformis*).

13a. Spikelets 4–8 mm, blades (2–)3–8 mm, plants with bluish bloom, scabrid near nodes ..... 69. *P. sichotensis*
13b. Spikelets up to 4 mm; blades 1–3 mm, plants green, smooth near nodes.
14a. Rachilla pubescent.
15a. Ligule up to 1 mm; palea with prickles on keels and glabrous between them ..... 67. *P. nemoralis*
15b. Ligule 1–2 mm; if less than 1 mm, then palea with short hairs on the lower part of keels and pubescent between them ..... 68. *P. lapponica*
14b. Rachilla glabrous.
16a. Culm with uppermost node usually at or above middle, culm usually smooth; rachilla warty, never pilose (infrequently sparsely hispidulous) ..... 68. *P. lapponica*
16b. Culm with uppermost node 1/3–1/2 way up; culm usually scabrid; rachilla warty or pilose.
17a. Plants firm and robust; leaf blade 1.5–2.5(–3) mm, firm; leaf sheath usually longer than blade; low-elevation grasslands of central and eastern provinces ..... 72. *P. sphondylodes*
17b. Plants soft and slender; leaf blade 1–1.5(–2) mm, thin; leaf sheath usually shorter than blade; mountain forest margins and high-elevation grass slopes of central and western provinces ..... 73. *P. faberi*

11b. Xeromorphic plants; culm with uppermost node up to 1/3 way up, if up to 1/2 way up and/or plant mesomorphic, then ligule more than 1.5 × blade width; leaf blade firm or soft, folded or flat, 0.5–2.5(–3.5) mm broad, much shorter to infrequently longer than sheath.
18a. Plants with 2(or 3) nodes above 1 cm at the base; leaf blade firm or soft and withering in age; uppermost blade usually very narrow and folded, short, usually less than 1/2 as long as sheath to subequal; panicle open to densely spiciform.
19a. Panicle dense, contracted to spiciform, branches erect, the longest ones 1/5–1/3(–2/5) as long as panicle; uppermost node usually below 1/6 way up culm ..... 77. *P. versicolor*
19b. Panicle usually open, especially while flowering, longest branches 1/3–1/2 as long as panicle; uppermost node usually ca. 1/6 way up culm.
20a. Plants robust, up to 100(–120) cm; uppermost internode 30–80 cm, up to 2.5 mm in diam. in fruiting material; plants of E and NE China ..... 71. *P. alta*
20b. Plants slender, 30–45(–55) cm, uppermost internode up to 35 cm long, up to 1.5 mm in diam.
21a. Densely to sparsely tufted plants with few leaves; spikelets up to 5 mm; ligule (1–)2–7 mm; plants widespread ..... 77. *P. versicolor*
21b. Loosely tufted, leafy plants; spikelets up to 6(–6.5) mm; ligule up to 1(–1.5) mm; plants of NW mountains ..... 75. *P. nemoraliformis*
18b. Plants with 3–5 nodes above 1 cm at the base (if 2, then leaves long, soft, and flat), leaf blade soft and withering with age, never firm, uppermost blades frequently flat, usually more than 1/2 as long as sheath; panicle open or contracted (if contracted, then with blades soft and withering in age), with long erect branches, 1/2 as long as panicle, never dense and spiciform.
22a. Plants with 2 nodes; panicle with scattered spikelets; spikelets 4.5–5.5(–8) mm; uppermost internode frequently thick, up to 1.5–2 mm, but not elongated; plant glaucous, frequently dark purple; plants of alpine and subalpine belts ..... go to lead 7
22b. Plants with 3–5 nodes; panicle usually with crowded spikelets; spikelets 3–5.5(–6) mm; uppermost internode usually 1–1.5 mm (if 1.5–2.5(–3) mm then very elongated); plants green or tinged purple, of hills to lower alpine belt.
23a. Ligule up to 2 mm.
24a. Ligule up to 1(–1.5) mm ..... 71. *P. alta*
24b. Ligule 1–2 mm.
25a. Panicle elongated-pyramidal with quite dense to scattered spikelets 3–4 mm; plants of lower mountain belt in N China ..... 74. *P. urssulensis*
25b. Panicle with long erect branches and scattered spikelets (3.5–)5–7 mm; plants of high mountain belt in W and NW China ..... 75. *P. nemoraliformis*

23b. Ligule 2–8 mm.
26a. Callus glabrous (sometimes with a few short hairs), panicle usually open ..... 76. *P. hylobates*
26b. Callus usually webbed; panicle usually loosely contracted.
27a. Plants firm and robust; leaf blade 1.5–2.5(–3) mm, firm; leaf sheath usually longer than blade; low-elevation grasslands of C and E provinces ..... 72. *P. sphondylodes*
27b. Plants soft, slender; leaf blade 1–1.5(–2) mm, thin; leaf sheath usually shorter than blade; mountain forest margins and high-elevation grass slopes of C and W provinces ..... 73. *P. faberi*

64. Poa secunda J. Presl subsp. **juncifolia** (Scribner) Soreng, Phytologia 71: 401. 1992 [“1991”].

巨早熟禾 ju zao shu he

Poa juncifolia Scribner, Bull. Div. Agrostol., U.S.D.A. 11: 52. 1898; *P. ampla* Merrill.

Plants bluish. Perennials, densely tufted, sterile shoots intra- and extravaginal. Culms erect, 40–120 cm tall. Leaf sheath smooth or scabrid, uppermost closed for 1/15–1/5 of length; blade flat or folded, papery to thickly papery, up to 25 cm × 1–3(–4) mm, adaxially scabrid; ligule 0.5–3 mm, abaxially scabrid, truncate to acute, of tillers all truncate, collar glabrous. Panicle narrow, dense, 10–15 × 1–3 cm; branches steeply ascending, scabrid angled, with spikelets from the base. Spikelets narrowly lanceolate, weakly compressed, 8–10 mm, florets 4–7; vivipary absent; glumes broad, subequal, lower glume 3–3.5 mm, upper glume 4–4.5 mm, nearly as long as lower lemma; lemmas weakly keeled, 4–6 mm, apex obtuse to acute, glabrous, abaxially scabrid; callus glabrous; palea keels scabrid. Anthers 1.5–3 mm. Fl. and fr. May–Jul. 2*n* = 62, 63, 64, 65, 68, 70, 71, 97.

Introduced in China [India, Pakistan; SW Asia (Iran), Australia; native to North and South America].

Poa secunda subsp. *juncifolia* was introduced to China for forage and rangeland stabilization under the name *P. ampla*. A few vouchers exist from experimental stations, but whether or not it occurs outside of cultivation in China was not verified. *Poa secunda* subsp. *secunda* has acute to acuminate ligules, softer foliage, and crisply puberulent lemma surfaces.

65. Poa trivialis Linnaeus, Sp. Pl. 1: 67. 1753.

普通早熟禾 pu tong zao shu he

Perennials, tufted, stoloniferous, shoots with or without beadlike swellings. Culms decumbent to geniculate, 20–100 cm tall, 1–2 mm in diam., nodes 3 or 4, scabrid below panicle and nodes. Lower leaf sheaths usually densely retrorsely scabrid, 8–15 cm, subequal to blade, uppermost closed for ca. 1/4 of length; blade flat, papery, 8–20 cm × 2–5 mm, surfaces scabrid, apex acuminate; ligule 3.5–10 mm, abaxially scabrid, acute to acuminate, collar smooth or scabrid, glabrous. Panicle oblong to pyramidal, 9–20 × 2–4 cm; branches obliquely ascending to spreading, 4–5 per node, densely scabrid throughout, longest ca. 4 cm with many spikelets crowded in distal 1/2, pedicels very short. Spikelets 2.5–3.5(–4) mm, florets 2 or 3; vivipary absent; glumes scabrid on keel, lower glume narrow, often sickle-shaped, 1.5–2 mm, 1-veined, upper glume 2.2–3 mm, 3-veined; lemmas ca. 2.5 mm, abaxial surface slightly arched, keel shortly villous for ca. 1/2 of length, marginal veins glabrous or pilulose to short-villous in lower 1/3, intermediate veins prominent, areas between veins minutely bumpy, glabrous; callus webbed, hairs long; palea subequal to lemma, minutely bumpy between keels, glabrous, keels minutely scabrid or bumpy. Anthers ca. 1.5 mm. Fl. and fr. May–Jul.

Moist places, grassy places on slopes; 1000–3500 m. Hebei, Jiangsu, Jiangxi, Nei Mongol, N Sichuan, Xinjiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in Africa, Australia, New Zealand, and North and South America].

Poa trivialis is sometimes seeded as a pasture and lawn species. It establishes well in cool, moist, shady sites, including gardens, trails, adjacent woods, and disturbed ground. It is probably introduced in China. Two races (or species) are usually recognized, with subsp. *trivialis* far more widely dispersed beyond the native European–SW Asian range of the species.

1a. Lemma marginal veins glabrous or pilulose for up to 1/4 of length; stolons without beadlike swellings ..... 65a. subsp. *trivialis*
1b. Lemma marginal veins pilulose to shortly villous for up to 1/3 of length; stolons with beadlike swellings ..... 65b. subsp. *sylvicola*

65a. Poa trivialis subsp. **trivialis**

普通早熟禾(原亚种) pu tong zao shu he (yuan ya zhong)

Horizontal shoots without beadlike swellings. Lemma with marginal veins glabrous or pilulose for up to 1/4 of length. Fl. and fr. May–Jul. 2*n* = 14, 28.

Moist places, grassy places on slopes. Hebei, Jiangsu, Jiangxi, Nei Mongol, Xinjiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in Africa, Australia, New Zealand, and North and South America].

This subspecies is commonly confused with *Poa khasiana*, a species with shorter ligules, often hairy collar margins, and scabrid palea keels.

65b. Poa trivialis subsp. **sylvicola** (Gussoni) H. Lindberg, Öfvers. Finska Vetensk.-Soc. Förh. 48(13): 9. 1906.

欧早熟禾 ou zao shu he

Poa sylvicola Gussoni, Enum. Pl. Inarim. 371. 1854; *P. trivialis* var. *sylvicola* (Gussoni) Hackel.

Horizontal shoots with beadlike swellings. Lemma with marginal veins pilulose to short-villous for up to 1/3 of length. Fl. and fr. Jun–Jul. 2*n* = 14.

Meadows along forest margins on slopes, fields and grassy places in low mountainous areas; 1000–3500 m. N Sichuan, Xinjiang [Kyrgyzstan, W Russia, Tajikistan, Turkmenistan; N Africa, SW Asia, Europe].

This subspecies is native to W Eurasia. We have not seen vouchers from China.

66. Poa compressa Linnaeus, Sp. Pl. 1: 69. 1753.

加拿大早熟禾 jia na da zao shu he

Perennials, strongly rhizomatous, shoots extravaginal. Culms wiry, compressed, erect, often geniculate at base, simple or sparsely tufted, 15–50(–60) cm tall, 1.5–2 mm wide, nodes compressed, 3–6, 2–5 exserted. Leaf sheaths compressed to keeled, smooth, uppermost closed for 1/10–1/5 of length; blades flat, 5–12 cm × 1.4–4 mm, surfaces smooth or adaxially scabrid; ligule 1–3 mm, abaxially scabrid, truncate to obtuse. Panicle contracted or slightly open, erect, narrow, 4–11 × 0.5–1(–3) cm; branches erect or steeply ascending, or eventually spreading, 1–3 per node, densely scabrid angled from base, longest 2–4 cm with spikelets moderately crowded from the base or in distal 2/3. Spikelets ovate-lanceolate, 3.5–5 mm, florets 2–4; glumes lanceolate, nearly equal, 2–3 mm, 3-veined, apex acute or thinly mucronate, keel scabrid, rachilla smooth or minutely bumpy; lemmas oblong, 2.3–3.5 mm, apex obtuse, keel shortly villous for 2/3 of length, marginal veins to 1/3, intermediate veins faint, areas between veins glabrous; callus sparsely webbed or glabrous; palea keels scabrid. Anthers 1.3–1.8 mm. Fl. and fr. Jun–Aug. 2*n* = 14, 35, 42, 45, 49, 50, 56, 59.

Moist grassy places in forests. Hebei, Jiangxi, Qinghai, Shandong, Taiwan, Xinjiang, Yunnan [India (Himachal Pradesh), Japan, Kazakhstan, Russia (Far East, Siberia); Africa, SW Asia, Australia, Europe, North and South America, Pacific Islands].

Poa compressa is native to W Eurasia. It is infrequent in China and is perhaps present only as an introduction in C to E Russia and China. It is distinguishable by its strong rhizome system, long, open sheaths, compressed culms and nodes, and scabrid-angled panicle branches. It is a good soil binder in riparian habitats. It is expected in Heilongjiang because it is frequent on the Russian side of the Chinese border.

67. Poa nemoralis Linnaeus, Sp. Pl. 1: 69. 1753.

林地早熟禾 lin di zao shu he

Culms loosely tufted, 30–80(–100) cm tall, erect or lightly geniculate, nodes 3–5(–6), uppermost at or above 1/2 way up. Leaf sheaths smooth or scabrid, shorter than blade; blade flat, soft, 5–12 cm × 1–3 mm, margins and both surfaces scabrid; ligule 0.2–1(–1.5) mm, truncate to obtuse. Panicle slender, 5–15(–22) cm, branches spreading, 2–5 per node, basal primary branch 1/2–2/3 as long as panicle with spikelets in distal 1/2. Spikelets lanceolate, 3.5–5(–6) mm, florets mostly 3; rachilla pilose; glumes narrowly lanceolate, 2.5–3.7 mm; lemma oblong-lanceolate, 2.5–3.7(–4.2) mm, keel shortly villous for 1/2 of length, marginal veins to 1/3, apex membranous; callus sparsely webbed, rarely glabrous; palea smooth and glabrous between keels. Anthers 1.3–1.5 mm. Fl. May–Jun. 2*n* = 14, 35, 70.

Forested slopes, shady and moist places, forest margins, grassy places among thickets; 1000–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe, naturalized in North America].

Poa nemoralis is represented by many cytological races, which form a huge series of agamic complexes of very variable hybrid populations. Such a complex, arising from hybridization with *P. palustris*, is treated here as *P. lapponica* and is common in NE Europe, Siberia, and Mongolia. The many hybrids with *P. versicolor* subsp. *relaxa* and *P. nemoraliformis*, reported by Ovczinnikov (in Ovczinnikov & Chukavina, Fl. Tadzhiksk. SSR 1: 144. 1957), also seem to form agamic complexes. *Poa nemoralis* commonly hybridizes with *P. glauca* in Scandinavia, but obvious hybrids between these species have not yet been found in China. Pure populations of *P. nemoralis* usually occur in broad-leaved forests, quite far from *P. nemoraliformis*, *P. palustris*, and *P. versicolor* subsp. *relaxa*.

1a. Ligule of upper leaf 0.8–1 mm; rachilla pubescent; callus webbed ..... 67a. var. *nemoralis*
1b. Ligule of upper leaf 0.8–1.5 mm; rachilla smooth or scabrid; callus glabrous or very sparsely villous ..... 67b. var. *parca*

67a. Poa nemoralis var. **nemoralis**

林地早熟禾(原变种) lin di zao shu he (yuan bian zhong)

Ligule of upper leaf 0.8–1 mm. Panicle quite lax, 5–15(–22) cm. Spikelets 3.5–5(–6) mm; rachilla pubescent; callus webbed. 2*n* = 28, 33, 42, 56.

Forested slopes, shady and moist places, forest margins, grassy places among thickets; 1000–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; naturalized in North America].

67b. Poa nemoralis var. **parca** N. R. Cui, Acta Bot. Boreal.-Occid. Sin. 7(2): 103. 1987.

疏穗林地早熟禾 shu sui lin di zao shu he

Upper culm internode sometimes elongated, especially after flowering. Ligule of upper leaf 0.8–1.5 mm. Panicle effuse, 10–12 cm. Spikelets 3–5 mm; rachilla smooth or scabrid; callus glabrous or very sparsely villous.

● Meadows along forest margins; 1200–1600 m. Xinjiang.

In spite of the morphological resemblance to the hybrid complexes *Poa lapponica* and *P. urssulensis*, this variety seems to be closest to *P. nemoralis*. The glabrescence of the lemma callus and rachilla might be caused by mutation. Its status and relationship need to be defined more exactly.

Gatherings with a short ligule and unwebbed lemma callus, treated by Liu et al. (FRPS 9(2): 113. 2002) as *Poa rhomboidea* Roshevitz, might belong here. *Poa rhomboidea* is otherwise an endemic of limestone cliffs of the W Caucasus.

68. Poa lapponica Prokudin, Zhurn. Inst. Bot. Vseukraïns'k. Akad. Nauk 20: 198. 1939.

拉扒早熟禾 la ba zao shu he

Culms loosely tufted or with short rhizomes, 30–50(–75) cm tall, nodes 3–5, uppermost less than 1/2 way up. Leaf

sheaths smooth or slightly scabrid, subequal to blade; blade flat, quite soft, 7–15 cm × 1–3 mm, adaxial surface smooth or scabrid; ligule 0.5–1.5 mm, obtuse. Panicle effuse, 5–12(–18) cm, branches 2–5 per node, upper part with sparse spikelets. Spikelets 3.5–5(–8) mm, florets 2 or 3; glumes narrowly lanceolate, slightly unequal; rachilla glabrous or scabrid to densely hairy; lemma lanceolate, keel and marginal veins sparsely pubescent along proximal 1/3; callus sparsely villous or glabrous. Anthers 1.5–2 mm. Fl. Jun–Aug.

Open stony, rocky, and grassy slopes, alpine meadows; 300–4200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe].

Hybridization between *Poa nemoralis* and *P. palustris* is very common in the northern parts of Eurasia. Both species form numerous cytological races, and apomixis is common. Members of this agamic complex are here accepted as a separate, polytypic species of ancient origin and stabilized by apomixis and selection, which needs to be distinguished from the products of recent hybridization and for which the name *P.* ×*intricata* Wein can be used.

1a. Rachilla glabrous; panicle narrow ..... 68a. subsp. *acmocalyx*
1b. Rachilla pubescent; panicle effuse ..... 68b. subsp. *pilipes*

68a. Poa lapponica subsp. **acmocalyx** (Keng ex L. Liu) Olonova & G. Zhu, **comb. et stat. nov.**

尖颖早熟禾 jian ying zao shu he

Basionym: *Poa acmocalyx* Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 388. 2002.

Culms loosely tufted, ca. 45 cm, erect. Leaf sheaths glabrous, longer than internodes, uppermost 10–15 cm, almost reaching panicle, slightly longer than blade; blade 7–14 cm × 2–3 mm, adaxially scabrid; ligule 0.5–0.8 mm. Panicle effuse, 12–15 cm; primary branch 5–10 cm. Spikelets 5–6 mm, florets 2 or 3; rachilla glabrous; callus sparsely villous. Anthers ca. 1.5 mm. Fl. and fr. Jun–Aug.

● Grassy places on sunny slopes; 1000–3900 m. Jilin, N Sichuan.

This subspecies combines the characters of *Poa nemoralis* (ligule not exceeding ca. 1 mm) and *P. palustris* (rachilla glabrous). The type material of *P. acmocalyx* is quite mesomorphic, with the uppermost node at about the middle of the culm, although FRPS (loc. cit.) gives it as in the lower 1/4, which would be a better match for *P. faberi*.

68b. Poa lapponica subsp. **pilipes** (Keng ex Shan Chen) Olonova & G. Zhu, **comb. et stat. nov.**

毛轴早熟禾 mao zhou zao shu he

Basionym: *Poa pilipes* Keng ex Shan Chen in Ma et al., Fl. Intramongol., ed. 2, 5: 594. 1994.

Culms 30–70 cm tall, slender and soft, nodes 3 or 4, usually with many tillers. Leaf sheath smooth, glabrous, subequal to blade; blade very soft to quite firm, 5–15 cm; ligule of terminal leaf 0.5–1.5 mm. Panicle narrow, (7–)10–18 cm, basal primary branch 2–4 cm, erect. Spikelets 3.5–5 mm; rachilla pilulose; first lemma 3–5 mm; callus sparsely villose or glabrous; palea keels distally with prickles, proximally shortly hairy, middle and upper parts longer ciliate; shortly hairy between keels. Anthers 1.5–2 mm, yellow. Fl. Jun–Aug.

● Grassy places on slopes, alpine meadows; 2000–4200 m. Hebei, Nei Mongol, Sichuan.

Poa lapponica subsp. *pilipes* is very close to *P. nemoralis*, but differs in having a longer ligule, as in *P. palustris*. The type differs by its unusual palea, which is pubescent between the keels proximally and has short, soft hairs on the middle part of the keels. These characters of the palea do not appear to be constant among Chinese material and subsp. *pilipes* might be a modern hybrid. Its variation at population level needs more research.

69. Poa sichotensis Probatova, Novosti Sist. Vyssh. Rast. 10: 68. 1973.

西可早熟禾 xi ke zao shu he

Poa hengshanica Keng ex L. Liu.

Culms loosely tufted, 60–120 cm tall, erect, or slightly geniculate, with bluish bloom; uppermost node above middle of culm. Lower leaf sheaths scabrid; leaf blade flat or folded, uppermost 3 or more × as long as sheath, (2–)3–6(–8) mm wide; ligule 0.5–1.5 mm. Panicle narrow, 15–26 cm, branches erect; lower ones 1/3–1/2 as long as panicle, with 6–16 spikelets. Spikelets slightly silverish, 4–7 mm, florets 3–6; rachilla hairy; glumes 2.8–6 mm; lemma 2.5–5 mm, keel and marginal veins proximally sparsely pubescent for 1/3 of length, glabrous between veins; callus villose; palea keels ciliate, proximally shortly and densely pubescent between keels. Anthers ca. 1.2–2 mm. Fl. Jun–Aug. 2*n* = 42, 49–50, 56, 70.

Meadows among thickets in deciduous forests. Heilongjiang, Jilin [Russia (Far East)].

Poa sichotensis is closely allied to *P. alta*, but is less xeromorphic. The type of *P. hengshanica* and other material so named match *P. sichotensis*.

70. Poa palustris Linnaeus, Syst. Nat., ed. 10, 2: 874. 1759.

泽地早熟禾 ze di zao shu he

Culms loosely tufted, 40–80(–120) cm tall, erect or slightly geniculate, rarely branching near base; nodes 5 or 6, uppermost at or above middle of culm. Shoots extravaginal. Leaf sheath smooth or rarely scabrid; equal to or shorter than blade; blade flat, 8–20 cm × 2–3(–5) mm; ligule 2–3 mm. Panicle slightly contracted, 10–20(–30) cm; branches obliquely ascending, 3–8 per node, basal primary branch 1/2–2/3 as long as panicle with spikelets in distal 1/2. Spikelets ovate-oblong, yellowish green, 2.5–5(–7) mm, florets (2–)3–5(–7); rachilla scabrid or warty, rarely smooth; glumes almost equal, 2–3.5(–4) mm; lemma 3–3.5(–4) mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, apex golden or rarely silvery, membranous; callus webbed; palea keel scabrid, area between keels smooth and glabrous. Anthers 1.2–1.5(–2) mm. Fl. Jun–Jul. 2*n* = 28, 30, 32, 42.

Meadows among scattered thickets on slopes, marshy grasslands; 300–3500 m. Anhui, Hebei, Heilongjiang, Henan, Nei Mongol, Xinjiang [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; SW Asia, Europe, North America].

Poa palustris, like *P. nemoralis*, is one of the most complicated and polymorphic species. Hybridization with *P. nemoralis*, coupled with apomixis, has formed a series of morphologically and genetically distinct populations treated here as *P. lapponica*.

Despite its great polymorphism, *Poa palustris* has not been divided satisfactorily into stable taxa. Its distribution in China seems to be quite restricted, limited to the northern regions only. It is probably naturalized in central and southern areas. In the mountains of the south and southwest it is replaced by the allied species *P. faberi*. In E China, Japan, and Korea it is very close to, and probably replaced by, a third, related species, *P. sphondylodes*. Unusual plants in Anhui differ by the glumes and lemma being much narrower with a prominent vein. Some populations of *P. palustris* in N China and even in the Russian Far East differ from normal *P. palustris* by the appearance of characters of *P. sphondylodes*: ligule longer than 3–4 mm, upper node infrequently only to 1/3 way up culm, leaf blades soft and flat, panicle branches sometimes very short, spikelets crowded at very base of branches, and longest branches at 2nd node of panicle. Both Ohwi (Fl. Jap. 164. 1965) and Koyama (Grasses Japan Neighboring Regions, 96. 1987) reported *P. palustris* with a ligule to 5 mm from Japan; similarly Chung (Korean Grass. 71. 1965) and Lee (Man. Korean Grass. 154. 1966) from Korea. *Poa palustris* with such long ligules occurs in the Pacific area only, and these plants might be closer to *P. sphondylodes*. Such plants may also be found in coastal areas of China.

71. Poa alta Hitchcock, Proc. Biol. Soc. Washington 43: 93. 1930.

高株早熟禾 gao zhu zao shu he

Poa flavida Keng ex L. Liu; *P. mongolica* (Rendle) Keng ex Shan Chen; *P. nemoralis* Linnaeus var. *mongolica* Rendle; *P. pseudonemoralis* Skvortsov (1954), not Schur (1866); *P. pseudopalustris* Keng ex Shan Chen, nom. illeg. superfl.; *P. skvortzovii* Probatova; *P. vaginans* Keng.

Culms tufted, (40–)60–110(–120) cm tall, usually robust, erect, scabrid, nodes 3; upper internode elongated, to ca. 80 cm, ca. 2.5 mm thick. Leaf sheath scabrid, slightly longer than leaf blade; leaf blade flat, scabrid, 2–4 mm wide, ligule membranous, (0.2–)0.5–3.5 mm. Panicle narrow, 10–23 × (1–)2–4(–6) cm; branches straight, lower part naked, upper part with 4–6 spikelets. Spikelets 3.5–8 mm, florets 2–5(–6); rachilla pubescent, prickled, warty or glabrous; glumes subequal, lanceolate, apex slightly acuminate, 2.5–3.5(–5) mm; lemma broadly lanceolate, 3–4 mm; keel scabrid, lower half and lower 1/3 of marginal veins villous; callus sparsely villous; palea keels, scabrid or shortly pubescent, area between glabrous. Anthers 1.4–2 mm. Fl. Aug. $2n = 28, 35, 42$.

Mountain tops, open grassy slopes; ca. 2500 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Mongolia, Russia].

The types of *Poa flavida* and, probably, *P. nemoralis* var. *mongolica* show these taxa to be less robust forms of *P. alta*. The type of *P. skvortsovii* (*P. pseudonemoralis* Skvortsov, not Schur; *P. pseudopalustris*) looks like the most common form of *P. alta*. According to the protologue, *P. vaginans* differs from *P. flavida* in having culms with 4 or 5 nodes, in having a panicle with 2 or 3 branches at the lowest node, in spikelet size, and in the lemma being pubescent proximally between the veins; however, the type of *P. vaginans* has the lemma smooth between the veins and culms with only 2 or 3 nodes, and it does not differ in the number of panicle branches or in spikelet size. All the species of this group should be treated as *P. alta*.

72. Poa sphondylodes Trinius in Bunge, Enum. Pl. China Bor. 71. 1833.

硬质早熟禾 ying zhi zao shu he

Culms loosely tufted, (15–)30–50(–70) cm tall, erect or obliquely ascending, firm and robust, scabrid below inflorescence, rarely smooth, nodes (2or)3 or 4, uppermost up to 1/3(–1/2) way up. Shoots extravaginal. Leaf sheaths scabrid, much shorter than internodes, usually longer or equal to blade; blade flat and usually firm, (4–)6–12 × 0.15–0.25(–0.3) cm; ligule (2–)3–5(–10) mm. Panicle narrow and dense, (4–)6–10 cm, branches erect, 2–5 per node, basal ones 1/6–1/2 as long as panicle with spikelets crowded near branch base. Spikelets lanceolate, sometimes very narrow and elongated, green or grassy yellow, 3.5–5(–10) mm, florets 2–5(–11); rachilla glabrous or warty; glumes, narrowly lanceolate, unequal, 2.5–4(–4.5) mm; lemma lanceolate, 3–4 mm; callus webbed or glabrous.

Open sandy ground, frequently on river banks, meadows among scattered thickets on slopes, grassy places on sunny slopes; 100–3200 m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Russia (Far East), Japan, Korea].

Poa sphondylodes is treated here as a polymorphic species with a broad ecological amplitude and many ecotypes. Its appearance depends on the environment, varying from quite mesomorphic to almost xeromorphic.

Tzvelev (Zlaki SSSR, 472. 1976) and Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 283. 1985) considered this species to be synonymous with *Poa versicolor* subsp. *ochotensis*, but the type of *P. sphondylodes* and other gatherings so named differ from that subspecies in their broader leaf blades and quite soft habit. The most mesomorphic populations of *P. sphondylodes* seem to be confused with *P. palustris*, but the typical forms differ from the latter species as follows: uppermost node in lower part of culm; ligule of uppermost leaf much longer, 3–5(–8) mm; panicle usually with very short branches, longest branches at 2nd node of panicle; spikelets proximally crowded on branches. Specimens with rather more lax panicles and longer branches are common in C China.

1a. Spikelets 6–10 mm ..... 72d. var. *subtrivialis*
1b. Spikelets 3.5–5 mm.
  2a. Panicle branches with spikelets proximal ..... 72a. var. *sphondylodes*
  2b. Panicle branches with spikelets along distal half.
    3a. Ligule 2–3 mm, palea sometimes pubescent between keels ..... 72b. var. *erikssonii*
    3b. Ligule 3–5 mm, palea never pubescent between keels .... 72c. var. *macerrima*

72a. Poa sphondylodes var. **sphondylodes**

硬质早熟禾(原变种) ying zhi zao shu he (yuan bian zhong)

Poa kelungensis Ohwi, Acta Phytotax. Geobot. 4: 60. 1935; *P. palustris* Linnaeus var. *strictula* (Steudel) Hackel; *P. sphondylodes* var. *kelungensis* (Ohwi) Ohwi; *P. strictula* Steudel.

Panicle quite dense, branches short, erect, with spikelets crowded from base. Spikelets 3.5–5 mm.

Open sandy ground, frequently on river banks, meadows among scattered thickets on slopes, grassy places on sunny slopes; 100–2500 m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Sichuan, Taiwan [Japan, Korea, Russia (Far East)].

The type and other gatherings of *Poa kelungensis*, which are quite soft and with the uppermost internode almost equal to its blade, closely resemble the type of *P. sphondylodes*. Gatherings from sandy beaches

are quite different from typical *P. sphondylodes*, but those from shady forests are closely allied and form intermediate populations. The extreme form probably represents a discrete (maybe apomictic) population, which cannot be treated without more research. The type of *P. strictula* and most gatherings so named represent a mesomorphic form of *P. sphondylodes*.

72b. Poa sphondylodes var. **erikssonii** Melderis in Norlindh, Fl. Mongol. Steppe 1: 99. 1949.

多叶早熟禾 duo ye zao shu he

Poa longiglumis Keng ex L. Liu; *P. plurifolia* Keng.

Ligule 2–3 mm. Panicle branches with spikelets in distal 1/2. Spikelets 3.5–5(–5.5) mm; palea sometimes pubescent between keels.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes. Hebei, Henan, Nei Mongol, Shaanxi, Shanxi, Sichuan.

This variety is closer to *Poa palustris* in its shorter ligule than to typical *P. sphondylodes*, so it might be of hybrid origin. The variability of this variety depends very much on environment, and both the leaf characters and the panicle characters appear to vary. The panicles of the same clone may differ greatly in the shape, length, and width of their branches when grown in the wet seasons or when the habitat turns dry. The type of *P. longiglumis* is very close to this variety.

72c. Poa sphondylodes var. **macerrima** Keng, Sunyatsenia 6: 55. 1941.

瘦弱早熟禾 shou ruo zao shu he

Ligule 3–5 mm. Panicle branches with spikelets in distal 1/2. Spikelets 3.5–5(–6) mm.

Grassy places on sunny slopes; 1000–3200 m. Anhui, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

This variety is quite common to the east. It resembles *Poa palustris* in its more open panicle, with panicle branches longer and spikelets crowded distally, probably forming intermediate populations.

72d. Poa sphondylodes var. **subtrivialis** Ohwi, Acta Phytotax. Geobot. 10: 126. 1941.

大穗早熟禾 da sui zao shu he

Poa grandispica Keng ex L. Liu.

Ligule 3–5(–5.5) mm. Panicle branches with spikelets in distal 1/2 or crowded from base. Spikelets 6–10 mm.

● Grassy places on sunny slopes; 1000–3200 m. Hebei, Henan, Sichuan, Shanxi.

Among the varieties of *Poa sphondylodes* this variety most closely resembles var. *macerrima*, but differs from them all in being more robust and in its longer spikelets, to 10 mm. It is quite rare, with sporadic occurrence, and has probably arisen independently in different areas. The type of *P. grandispica* seems to belong here.

73. Poa faberi Rendle, J. Linn. Soc., Bot. 36: 423. 1904.

法氏早熟禾 fa shi zao shu he

Culms loosely tufted, (25–)30–50(–70) cm tall, erect or obliquely ascending, soft and slender, scabrid, rarely smooth below inflorescence, nodes (2–)3 or 4, uppermost up to 1/3(–1/2) way up culm. Shoots extravaginal. Leaf sheaths scabrid, long, the uppermost only 2–5 cm shorter than internode and usually shorter than blade; leaf blades flat, very thin and soft, (4–)6–12 × 0.1–0.15(–0.2) cm; ligule (2–)3–5(–8) mm. Panicle narrow, congested to loose, (4–)6–12 × 1–1.5(–2) cm, branches erect, 2–5 per node, basal ones 1/3–1/2 as long as panicle with spikelets distally crowded. Spikelets lanceolate, sometimes very narrow and elongated, green or bluish, 3.5–5(–8) mm long, florets 2–5; rachilla glabrous or pubescent; glumes narrowly lanceolate, unequal, 2.5–4(–4.5) mm; lemma lanceolate, sometimes very narrow, (2.5–)3–4 mm, rarely pubescent between veins, apex membranous; callus sparsely webbed (rarely glabrous).

● Mountain forest margins, meadows among scattered thickets on slopes, grassy places on sunny slopes; 200–1200(–4400) m. Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

Poa faberi resembles *P. sphondylodes* s.s. in the uppermost node position and long ligules, but differs from it in being softer and also in distribution and ecology, growing commonly at higher elevations in S and SW China. It is represented by many morphological types, some of them described as species, but material is lacking and further research is needed to confirm its taxonomic status. Some of these types have undeveloped spikelets and stamens and look like immature and sterile modern hybrids.

The highest concentration of different morphological variants of this species is in Sichuan and Xizang. These unusual and very soft plants with long leaf blades, very thin, almost smooth panicle branches, and abnormally narrow spikelets, glumes, and lemmas occur quite frequently in the highlands of Sichuan, Xizang, and Yunnan. They look like hybrids involving *Poa asperifolia* (*P.* sect. *Homalopoa*), which has a long ligule, thin panicle branches, elongated parts of the rachilla, and very narrow spikelets.

1a. Rachilla pubescent ..... 73c. var. *longifolia*
1b. Rachilla glabrous.
  2a. Ligule (2–)3–6(–8) mm ..... 73a. var. *faberi*
  2b. Ligule ca. 10 mm ..... 73b. var. *ligulata*

73a. Poa faberi var. **faberi**

法氏早熟禾(原变种) fa shi zao shu he (yuan bian zhong)

Poa linearis Trinius (1833), not Schumacher (1827); *P. paucifolia* Keng ex Shan Chen; *P. prolixior* Rendle.

Ligule (2–)3–6(–8) mm. Rachilla glabrous; lemma callus sometimes not webbed.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes; 200–1200(–3000) m. Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Sichuan, Xinjiang, Xizang, Yunnan.

Type material at BM and K is heterogeneous. Three of the syntypes differ clearly from *Poa sphondylodes* by the very thin, soft stems and leaves, the uppermost leaf sheaths almost reaching the panicle, and the rather long panicle branches. Although the fourth syntype has the uppermost node in the lower 1/3 of the culm, it matches *P. sphondylodes* in being robust with thick, dense culms and leaf blades and a narrow, dense panicle. Moreover, some of them have an unwebbed callus.

The type of *Poa paucifolia* looks like normal *P. faberi* var. *faberi*. The protologue and syntypes of *P. prolixior* do not differ significantly from *P. faberi*.

73b. Poa faberi var. **ligulata** Rendle, J. Linn. Soc., Bot. 36: 424. 1904.

尖舌早熟禾 jian she zao shu he

Ligule up to 10 mm. Rachilla glabrous, lemma callus sometimes not webbed.

● Meadows among scattered thickets on slopes. Sichuan.

This is a very rare plant that requires further study.

73c. Poa faberi var. **longifolia** (Keng) Olonova & G. Zhu, **comb. nov.**

毛颖早熟禾 mao ying zao shu he

Basionym: *Poa orinosa* Keng var. *longifolia* Keng, Fl. Tsinling. 1(1): 439. 1976; *P. fascinata* Keng ex L. Liu; *P. lepta* Keng ex L. Liu; *P. malaca* Keng; *P. pubicalyx* Keng ex L. Liu.

Rachilla pubescent, lemma callus usually webbed.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes; 2900–4400 m. Gansu, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

The type of *Poa orinosa* var. *longifolia*, which is mesomorphic with a long (ca. 3.5 mm) ligule, appears to be closer to *P. faberi* than to the quite xeromorphic *P. orinosa*, which is treated here as *P. versicolor* subsp. *orinosa*.

Poa malaca combines the characters of *P. nemoralis* and *P. palustris*, having a long ligule and pubescent rachilla. The type is very soft and thin. It seems to be much closer to the *P. faberi* complex, differing only by the shorter ligule, and occupies almost the same area.

Poa pubicalyx has lemmas not pubescent but sometimes with prickles, which is quite common with *P.* sect. *Stenopoa*. The types and all available gatherings of *P. lepta* and *P. fascinata* are poorly developed, feeble plants that look like unstabilized hybrids. Specimens with seeds or, at least, normally developed flowers are needed for confirmation of their status.

74. Poa urssulensis Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 527. 1835.

乌苏里早熟禾 wu su li zao shu he

Culms loosely tufted, 35–60 cm tall, obliquely ascending, nodes 3–5, uppermost 1/3–1/2 way up culm. Shoots extravaginal. Leaf sheaths scabrid, rarely almost glabrous, shorter than internode; blade usually shorter than sheath, flat, or folded, (1–)1.5–2 mm wide, both surfaces scabrid; ligule 0.2–1.5(–2) mm. Panicle effuse, 6–10 × 2.5–5 cm, branches spreading, 2–5 per node, basal primary branch 1/3–1/2 as long as panicle with spikelets in distal 1/2. Spikelets ovate-lanceolate, (3–)3.5–4(–5) mm, florets 2–4; rachilla glabrous or warty, rarely ciliata or pilosa; glumes narrowly lanceolate, lower glume 3–4 mm, upper glume 3.5–4.5 mm; lemma lanceolate, 3–4(–4.5) mm, keel shortly villous for 1/2 of length, marginal veins to 1/3, apex membranous; callus webbed to glabrous; palea smooth and glabrous between keels. Anthers ca. 1.2 mm. Fl. Jun–Aug.

Open grassy and rocky slopes, thickets; (300–)1000–3200(–4200) m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shandong, Xinjiang, Xizang [Kazakhstan, Korea, Mongolia, Russia; Europe].

This is a variable species of hybrid origin, close to *Poa lapponica*, that might represent a complex of independently arisen populations. The diagnostic characters, such as the pubescence of the lemma and rachilla, and the length of the ligule, vary greatly, both within populations and between populations. Some variants have been recognized as species but are here treated as varieties.

1a. Callus webbed (rarely almost glabrous) ..... 74a. var. *urssulensis*
1b. Callus glabrous.
  2a. Panicle quite spreading, ligule 0.5–1.5 mm, rachilla glabrous or pilose ..... 74b. var. *kanboensis*
  2b. Panicle narrow and dense, ligule 0.2–1 mm, rachilla pilose ..... 74c. var. *korshunensis*

74a. Poa urssulensis var. **urssulensis**

乌苏里早熟禾(原变种) wu su li zao shu he (yuan bian zhong)

Ligule 0.5–1.5(–2) mm. Panicle spreading to contracted; rachilla warty, ciliate, or pilose; lemma callus webbed to almost glabrous. 2*n* = 28, 42.

Open grassy and rocky slopes, thickets; (300–)1000–3200(–4200) m. Gansu, Heilongjiang, Nei Mongol, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia; Europe].

74b. Poa urssulensis var. **kanboensis** (Ohwi) Olonova & G. Zhu, **comb. et stat. nov.**

坎博早熟禾 kan bo zao shu he

Basionym: *Poa kanboensis* Ohwi, Acta Phytotax. Geobot. 10: 125. 1941; *P. krylovii* Reverdatto.

Ligule 0.5–1.5(–2) mm. Panicle spreading, with scattered spikelets; rachilla ciliate, pilose or glabrous; lemma callus glabrous.

Grassy places on slopes. Hebei, Liaoning, Shandong [Korea].

74c. Poa urssulensis var. **korshunensis** (Goloskokov) Olonova & G. Zhu, **comb. et stat. nov.**

柯顺早熟禾 ke shun zao shu he

Basionym: *Poa korshunensis* Goloskokov, Vestn. Akad. Nauk Kazakhsk. SSR 14: 72. 1955.

Ligule 0.2–1 mm. Panicle contracted and narrow; rachilla pilose; lemma callus glabrous.

Grassy places on slopes; 1300–3200 m. ?Xinjiang [Kazakhstan].

This variety differs from var. *kanboensis* in having a more narrow and contracted panicle, and geographically.

75. Poa nemoraliformis Roshevitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 11: 30. 1949.

林早熟禾 lin zao shu he

Poa major D. F. Cui.

Culms loosely to densely tufted, 30–50 cm tall, erect, usually hard, scabrid, nodes 2–5, uppermost in lower 1/3; base covered by withered leaf sheaths. Shoots extravaginal. Leaf sheath scabrid, longer than blade; blade usually flat, later folded or inrolled, 1.5–2.5 mm wide, scabrid; ligule (0.5–)1–1.5 mm.

Panicle oblong, conferted, 8–16(–20) cm, branches thin, 2–4.5 cm. Spikelets elliptic-lanceolate, green or tinged with purple, 4–6(–6.5) mm, florets 3 or 4, usually with upper floret rudimentary; rachilla usually glabrous; glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, margins dry membranous, keel scabrid; lemma oblong-lanceolate, 3.2–4 mm; margins membranous, keel and marginal veins usually short-villous to glabrous along lower 1/2; callus glabrous. Anthers ca. 2 mm. Fl. Jun–Aug.

Open grasslands on rocky slopes, meadows along forest margins, thickets; 1100–4300 m. Xinjiang, Xizang [India, Tajikistan].

Poa nemoraliformis differs from *P. nemoralis* in its longer ligule 1–1.5 mm (vs. 0.2–1 mm), glabrous rachilla, and unwebbed lemma callus, and differs from *P. versicolor* subsp. *relaxa* in never forming dense tufts. The syntypes represent a sequence of increasing xeromorphism (leaf blades more firm, position of uppermost node varying from 1/2 to 1/3 way up culm). The first two syntypes differ from the description in the protologue in having the rachilla shortly hairy; the second syntype differs in having a long ligule ca. 2.4 mm.

Records of *Poa sterilis* M. Bieberstein from China are probably based on this species. Examination of the type of *P. major* has shown that it was misplaced in *P.* subg. *Poa* and belongs here.

76. Poa hylobates Bor, Bull. Bot. Surv. India 7: 132. 1965.

喜巴早熟禾 xi ba zao shu he

Poa elanata Keng ex Tzvelev.

Culms tufted, 30–50 cm tall, erect, usually hard, scabrid, nodes 3 or 4, uppermost in lower 1/3; base covered by withered leaf sheaths. Shoots extravaginal. Leaf sheath scabrid, longer than blade; blade usually flat, later folded or inrolled, 1.5–2.5 mm wide, scabrid; ligule (2–)3–4.5(–6.5) mm. Panicle oblong, conferted, 7–15 cm, branches 2–3(–4.5) cm. Spikelets elliptic-lanceolate, green or tinged with purple, 4–6(–6.5) mm, florets 3–5(–7); rachilla glabrous; glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, margins dry membranous, keel scabrid; lemma oblong-lanceolate, 3.2–3.7(–4) mm; margins white or golden yellow membranous, keel and marginal veins usually shortly villous to glabrous along lower 1/2; callus glabrous. Anthers ca. 2 mm. Fl. Jun–Aug.

Grassy places along forest margins on slopes. 2900–4400 m. Qinghai, Sichuan, Xinjiang, Xizang [Nepal].

Poa hylobates is allied to *P. nemoraliformis* and quite frequently forms intermediate populations in Sichuan and Xizang. Quite common are specimens that combine a glabrous callus and rachilla with a ligule longer than ca. 5 mm or 1–3 mm, or a pubescent callus and rachilla with a ligule ca. 5 mm; these features exceed the bounds of known species, including *P. hylobates*.

The type of *Poa elanata* looks immature, but taking into account the length and panicle shape of dry culms from the preceding year, which are well represented, it may be attributed to *P. hylobates*.

77. Poa versicolor Besser, Enum. Pl. 41. 1821.

变色早熟禾 bian se zao shu he

Poa attenuata Trinius var. *versicolor* (Besser) Regel.

Culms erect, densely tufted, (25–)30–60(–75) cm tall, nodes 2–3(–5), uppermost to 1/3 way up culm. Shoots extravaginal. Leaf sheath scabrid, usually longer than blade; blade narrowly linear, flat or inrolled, 0.5–2.5(–3) mm wide, scabrid; ligules 1–3(–7) mm. Panicle contracted, narrow to spiciform, (4.5–)6–15(–17) × 1–3(–5) cm; branches erect, 1 or 2 per node, (1/5–)1/4–1/3(–1/2) × as long as panicle. Spikelets lanceolate, (3–)3.5–6(–7) mm, green or tinged with purple, apex yellow, ± violet; florets (2–)3–5(–7); rachilla warty, rarely pilose; glumes subequal, lanceolate to oblong-lanceolate, 3–4.2 mm; lemma oblong-lanceolate, 3.2–4 mm, keel usually shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous or pubescent; callus webbed to glabrous; palea glabrous or pubescent between keels. Anthers 1.3–2 mm. Fl. Jun–Aug.

Meadows along forest and thicket margins, grasslands on slopes, steppes; 200–4300 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

Poa versicolor is supposed to be a xeromorphic derivate of *P. palustris*. It is interpreted here as a widespread complex of feebly differentiated geographic races, and it is perplexingly polymorphic. *Poa versicolor* s.s. is distributed in S Europe and is absent from China. All subspecies in this complicated species seem to be close allies, differing from one another by complexes of characters only and connected by intermediate populations. This complex is also connected with other species in *P.* sect. *Stenopoa* through hybridization.

1a. Lemma pubescent between veins ..... 77d. subsp. *reverdattoi*
1b. Lemma glabrous between veins.
  2a. Panicle dense, contracted to spiciform, branches erect, the longest ones 1/5–1/3 (–2/5) as long as panicle; culm with uppermost node up to 1/6 way up culm.
    3a. Culm under panicle usually with dense prickles ..... 77c. subsp. *orinosa*
    3b. Culm under panicle usually with few or no prickles, usually warty ..... 77f. subsp. *ochotensis*
  2b. Panicle usually open, especially at anthesis, longest branches 1/3–1/2 as long as panicle; culm with upper node usually ca. 1/6 way up culm.
    4a. Ligule (3–)4–7 mm ..... 77e. subsp. *varia*
    4b. Ligule 1–3 mm.
      5a. Culm under the panicle usually with dense prickles; spikelets usually green; plants of lower and middle elevations ..... 77a. subsp. *stepposa*
      5b. Culm under the panicle usually with few or no prickles, usually warty; spikelets usually purplish; plants of middle and upper elevations ..... 77b. subsp. *relaxa*

77a. Poa versicolor subsp. **stepposa** (Krylov) Tzvelev, Novosti Sist. Vyssh. Rast. 9: 51. 1972.

低山早熟禾 di shan zao shu he

Poa attenuata Trinius var. *stepposa* Krylov, Fl. Altai Gov. Tomsk 7: 1856. 1914; *P. attenuata* subsp. *botryoides* Tzvelev; *P. botryoides* (Trinius ex Grisebach) Komarov; *P. serotina* Ehrhart ex Hoffmann var. *botryoides* Trinius ex Grisebach; *P. stepposa* (Krylov) Roshevitz; *P. transbaicalica* Roshevitz.

Culms (15–)25–50(–70) cm tall, erect, scabrid; leaf blades narrowly linear, flat or folded, 0.5–1.2 mm wide, ligule (1–)2–3 mm. Panicle contracted, narrow, (4.5–)6–10(–12) cm; branches scabrid, up to 4 cm, with few spikelets. Spikelets 3–5(–7) mm; lemma 3.5–4 mm, glabrous between veins; callus sparsely webbed. Anthers 1.2–1.5 mm. Fl. Jun–Aug. 2*n* = 28.

Grasslands on slopes, steppes; 200–1500 m. Heilongjiang, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia; Europe].

This subspecies is most polymorphic, and several of its populations were described as distinct species, but the characters on which these divisions were based are very unreliable and the entities cannot be recognized, even as subspecies.

Tzvelev (Novosti Sist. Vyssh. Rast. 11: 31. 1974) treated *Poa botryoides* as a lower-elevation subspecies of *P. attenuata*, the typical race of which he treated as alpine. Nevertheless, the type of *P. botryoides* appears to be closer to *P. versicolor* subsp. *stepposa*, being as tall as this taxon and with panicle branches as long. The type of *P. transbaicalica* looks like typical *P. versicolor* subsp. *stepposa*.

77b. Poa versicolor subsp. **relaxa** (Ovczinnikov) Tzvelev, Tadzhikist. Bazy Akad. Nauk 1: 20. 1933.

新疆早熟禾 xin jiang zao shu he

Poa relaxa Ovczinnikov, Izv. Tadzhikist. Bazy Ak. Nauk 1: 20. 1933; *P. acuminata* Ovczinnikov (1933), not Scribner (1896); *P. fragilis* Ovczinnikov.

Culms 30–50 cm tall, usually hard, scabrid, base covered by withered leaf sheaths slightly tinged with red. Leaf blade usually flat, later folded or inrolled, 1.5–2.5 mm wide; ligule 1–1.5(–6) mm. Panicle oblong, conferted, 7–15 cm, branches 1 or 2 per node, 2–3 cm. Spikelets elliptic-lanceolate, 4–6(–6.5) mm, green or tinged with purple, florets 3–5(–7); glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, keel scabrid; lemma 3.2–3.7(–4) mm; margins white or golden yellow membranous. Anthers ca. 2 mm. Fl. Jun–Aug. 2*n* = 42.

Meadows along forest and thicket margins, open grasslands on rocky slopes; 1100–4300 m. Gansu, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

This subspecies is probably of hybrid origin and forms numerous morphological variants. It appears to be intermediate between *Poa nemoralis* and *P. versicolor*, replacing the Siberian *P. urssulensis* and *P. versicolor* subsp. *stepposa* in C Asia. Pazij (Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 17: 18–42. 1962) has reported hybrids of subsp. *relaxa* with *P. attenuata*, *P. nemoralis*, and even *P. pratensis*. Ovczinnikov (in Ovczinnikov & Chukavina, Fl. Tadzhiksk. SSR 1: 149. 1957) has reported that the extreme forms make subsp. *relaxa* very difficult to identify. Typical *P. fragilis*, with entirely glabrous lemmas, is rather rare, but in spite of its differing clearly from the type of subsp. *relaxa*, numerous intermediate samples form a continuum. For this reason, *P. fragilis* does not seem to deserve even subspecific rank.

77c. Poa versicolor subsp. **orinosa** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

山地早熟禾 shan di zao shu he

Basionym: *Poa orinosa* Keng, Fl. Tsinling. 1(1): 439. 1976; *P. incerta* Keng ex L. Liu; *P. schoenites* Keng ex L. Liu; *P. stereophylla* Keng ex L. Liu.

Culms (25–)30–45(–70) cm tall. Leaf blades flat or folded; ligule 0.9–3 mm. Panicle contracted, narrow, 8–10 × (0.5–)1–1.5 cm, basal branches (1/4–)1/3–1/2 as long as panicle. Spikelets 3–4 mm, florets 2–3(–5); rachilla pubescent or rarely glabrous; callus of lemma glabrous or webbed.

● Grassy places on slopes; 2500–3600 m. Hebei, Henan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

This subspecies, described from C and S China, is quite close to *Poa versicolor* subsp. *stepposa*, and probably replaces it in this area. The types of *Poa incerta* and *P. schoenites* are allied to subsp. *orinosa*, and their populations appear to form a continuum with it. The type of *P. stereophylla* differs in its wiry culm, but this is not a constant feature and depends very much on the environment. *Poa versicolor* subsp. *orinosa* might be intermediate between *P. versicolor* and *P. alta*, but as the characters of *P. versicolor* are absolutely prevailing it is attributed here to that species.

77d. Poa versicolor subsp. **reverdattoi** (Roshevitz) Olonova & G. Zhu, **comb. et stat. nov.**

瑞沃达早熟禾 rui wo da zao shu he

Basionym: *Poa reverdattoi* Roshevitz in Komarov, Fl. URSS 2: 407. 1934; *P. argunensis* Roshevitz.

Culms densely tufted, (15–)35–45(–60) cm tall, erect, scabrid, sometimes tinged with grayish green, terminal node 1/6–1/3 way up culm. Leaf sheaths scabrid, shorter than internode, terminal sheath ca. 2 × as long as blade; blades folded or inrolled, hard, short, 0.5–1(–1.5) mm wide, abaxial surface and margin scabrid, adaxial surface minutely hairy; ligule (1–)2–2.5(–3) mm. Panicle contracted to spiciform, laxer at anthesis, 3–4 × (0.5–)1–5(–8) cm, branches 2 or 3 per node, with spikelets near base. Spikelets sometimes tinged with purple, 3–5(–6) mm, florets 2–4; rachilla glabrous or pilulose; glumes (2–)2.8–3(–3.5) mm; lemma keel shortly villous for 1/2 length, marginal veins for 1/3, area between veins minutely hairy for lower 1/3; callus usually moderately webbed to glabrous; palea minutely hairy in lower area between keels. Anthers ca. 2 mm. Fl. Jun. 2*n* = 28, 35, 42.

Dry grasslands on rocky slopes; 200–1000 m. Liaoning, Nei Mongol [Mongolia, Russia (S Siberia)].

This is a variable subspecies with a rather restricted distribution limited to low elevations of China, Mongolia, and S Siberia. Records of this subspecies from Xinjiang and the Altai region belong to *Poa albertii*.

Poa argunensis differs from subsp. *reverdattoi* only in variable and unreliable characters and forms many intermediate populations.

77e. Poa versicolor subsp. **varia** (Keng ex L. Liu) Olonova & G. Zhu, **comb. et stat. nov.**

多变早熟禾 duo bian zao shu he

Basionym: *Poa varia* Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 404. 2002.

Culms tufted, 30–40 cm tall, erect or geniculately ascending, scabrid, nodes 2–3(–4), uppermost to 1/6 way up culm.

Leaf sheath scabrid, longer than internode; blade narrow, 1–1.5 mm wide, both surfaces scabrid; ligule 4–7 mm. Panicle 5–10 × 2–5 cm, branches 2–5 per node, spikelets in distal 1/2, dense. Spikelets 4–5 mm; rachilla warty or glabrous; lemma 3–3.5 mm, slightly yellowish bronze below, keel shortly villous for 1/2 length, marginal veins for 1/3; callus sparsely villous; palea glabrous between keels. Anthers ca. 1.5 mm. Fl. and fr. Jun–Aug.

● Grassy places on slopes; 2500–3000 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xizang, Yunnan.

77f. Poa versicolor subsp. **ochotensis** (Trinius) Tzvelev, Zlaki SSSR, 472. 1976.

乌库早熟禾 wu ku zao shu he

Poa ochotensis Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 377. 1831; *P. nemoralis* Linnaeus subsp. *ochotensis* (Trinius) Tzelev; *P. subaphylla* Honda.

Culms 35–60 cm tall, slender, usually almost smooth under inflorescence, nodes 2–3(–4), uppermost node to 1/3 way up culm. Leaf sheaths longer than blade; blade narrowly linear, 1–1.5 mm wide, flat, scabrid; ligule (0.5–)1–2(–4) mm. Panicle narrow, sometimes almost spiciform, dense, 3–8 × 0.5–1.5 cm; basal branches 1/5–1/3 as long as panicle; rachilla warty, glabrous, rarely minutely pilose. Spikelets 3–5(–6) mm, florets 6 or 7; glumes narrowly lanceolate; lemma 3–3.5 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus nearly glabrous; palea sometimes pilulose between keels. 2*n* = 28, 42, 49.

Grassy places on slopes; 200–1000 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Japan, Korea, Mongolia, Russia (Far East)].

This taxon seems to be a stabilized hybrid between *Poa sphondylodes* and *P. versicolor*. It is treated here as a subspecies of *P. versicolor* because the characters of that species prevail. Material with a glabrous callus was described as *P. subaphylla*.

Most gatherings identified by Chinese, Japanese, and Korean botanists as *Poa viridula* Palibin seem to belong here. True *P. viridula* has not been recorded from China.

78. Poa araratica Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 486. 1875.

阿洼早熟禾 a wa zao shu he

Poa crymophila Keng ex C. Ling.

Culms tufted, 20–35(–45) cm tall, erect or slightly geniculate, scabrid or glabrous, nodes 2 or 3, at or above base, upper part often naked, uppermost internode frequently thick, up to 1–2 mm. Shoots extravaginal. Leaf sheath longer than blade; blade flat or folded, 3–8 cm × 1–2 mm, scabrid; ligule (0.5–)1.5–2.5(–7) mm. Panicle 3–5(–10) × 1–2 cm, branches 1–3(–5) per node, spikelets scattered. Spikelets 4.5–5.5(–8) mm, rachilla glabrous to pilose; glumes subequal, usually almost as long as spikelet; lemma 2.5–3.8 mm, keel, veins and area between veins hairy to entirely glabrous; callus webbed or glabrous; palea glabrous to pubescent between keels. Anthers 1.2–1.4 mm. Fl. Aug–Oct.

Open grassy slopes, subalpine forest margins; 2000–4200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia].

Poa araratica is treated here as a hybrid complex comprising many populations of different stages of stabilization and of obscure taxonomic status. It seems to have arisen through hybridization between *P. versicolor* and *P. glauca*.

1a. Lemma pubescent between veins.
  2a. Ligule 1–3 mm ..... 78c. subsp. *ianthina*
  2b. Ligule 3–7 mm ..... 78e. subsp. *altior*
1b. Lemma glabrous between veins.
  3a. Lemma keel and marginal veins almost entirely glabrous, sometimes with minute or single hairs ..... 78d. subsp. *psilolepis*
  3b. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3.
    4a. Ligule 1.5–2.5 mm ..... 78a. subsp. *araratica*
    4b. Ligule 0.5–1 mm ..... 78b. subsp. *oligophylla*

78a. Poa araratica subsp. **araratica**

阿洼早熟禾(原亚种) a wa zao shu he (yuan ya zhong)

Ligule 1.5–2.5(–3) mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous; callus glabrous or minutely webbed.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia].

78b. Poa araratica subsp. **oligophylla** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

贫叶早熟禾 pin ye zao shu he

Basionym: *Poa oligophylla* Keng, Fl. Tsinling. 1(1): 436. 1976; *P. arjinsanensis* D. F. Cui.

Ligule 0.5–1 mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous; callus webbed or glabrous.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang [Russia (Siberia)].

The type of *Poa arjinsanensis* looks like typical *P. araratica* s.l. but with a short ligule and lemmas glabrous between the veins.

78c. Poa araratica subsp. **ianthina** (Keng ex Shan Chen) Olonova & G. Zhu, **comb. et stat. nov.**

堇色早熟禾 jin se zao shu he

Basionym: *Poa ianthina* Keng ex Shan Chen in Ma et al., Fl. Intramongol. 7: 260. 1983; *P. sinoglauca* Ohwi.

Ligule 1–3 mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, areas between veins pubescent; callus webbed or glabrous.

● Open grassy slopes, subalpine forest margins; 3300–4200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan.

The protologue of *Poa sinoglauca* reported the lemma to be pubescent on the intermediate veins. The type proved to have the lemma quite frequently pubescent both on the intermediate veins and on the

area between the veins, and thus it is a better match with *P. araratica* subsp. *ianthina*.

78d. Poa araratica subsp. **psilolepis** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

光稃早熟禾 guang fu zao shu he

Basionym: *Poa psilolepis* Keng, Sunyatsenia, 6: 56. 1941.

Lemma almost entirely glabrous, sometimes with only minute or single hairs on keel and marginal veins. 2*n* = 28, 42.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Tajikistan].

The lemma indumentum is not consistent: spikelets with entirely glabrous lemmas and with obviously pubescent lemmas may be found on the same herbarium sheet.

78e. Poa araratica subsp. **altior** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

高阿洼早熟禾 gao a wa zao shu he

Basionym: *Poa attenuata* Trinius var. *altior* Keng, Sunyatsenia 6: 57. 1941.

Culms densely tufted, erect, 35–45(–50) cm tall, uppermost node in lower 1/6. Leaf sheath shorter than internode, scabrid; blade short, hard, folded, rarely flat, both surfaces and margin scabrid; ligule 4–6 mm. Panicle contracted, 4–6 × 1–4 cm, branches 2 or 3 per node. Spikelets 3–4(–5) mm, florets 2–4, tinged with purple; rachilla pubescent, glumes (2–)2.8–3(–3.5) mm; lemma keel shortly villous for 1/2 of length, marginal veins for 1/3 length, area between veins minutely hairy for lower 1/3; callus webbed; palea minutely hairy proximally between keels. Anthers 1.3–2 mm. Fl. Jun.

● Grassy places; 2000–3400 m. Gansu, Sichuan, Xizang.

The type of *Poa attenuata* var. *altior* has culms too tall to be *P. attenuata* and seems to have similarities to *P. glauca*.

79. Poa attenuata Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 527. 1835.

渐尖早熟禾 jian jian zao shu he

Culms densely tufted, 7–15(–25) cm tall, pale, glabrous or slightly scabrid under the panicle, nodes 2, both near culm base. Shoots usually intravaginal. Leaf sheath usually slightly scabrid, uppermost 1/2 as long as internode; blade folded or inrolled to needle-shape, firm, usually up to 1/2 as long as sheath, 0.3–0.8(–1.5) mm wide, scabrid; ligule 1.5–2.5 mm. Panicle dense, contracted to spiciform, a bit more open at anthesis, 1.5–4 × 0.4–1 cm; branches 2 or 3 per node, 1/5–1/3 as long as panicle. Spikelets lanceolate, (2.5–)3–4.5(–5) mm, florets 2 or 3(–5); rachilla warty; glumes shorter than spikelet, usually equal to first lemma, lemma (2.5–)3–3.5 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus webbed or glabrous; palea glabrous between veins. Anthers 1.2–1.5 mm. Fl. Jun–Aug.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan, Uzbekistan].

Most botanists recognize *Poa attenuata* as one of the most complicated and problematic complexes in the flora of C Asia. It has hybridized with *P. glauca* to form an apomictic complex, which is treated here as *P. albertii*, while *P. attenuata* is supposed to be a more or less pure group of xeromorphic alpine populations.

1a. Callus webbed ..... 79a. var. *attenuata*
1b. Callus glabrous ..... 79b. var. *dahurica*

79a. Poa attenuata var. **attenuata**

渐尖早熟禾(原变种) jian jian zao shu he (yuan bian zhong)

Poa tetrantha Keng ex L. Liu.

Lemma callus webbed. 2*n* = 28, 42.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang [Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan, Uzbekistan].

79b. Poa attenuata var. **dahurica** (Trinius) Grisebach, Fl. Ross. 4: 371. 1852.

达呼里早熟禾 da hu li zao shu he

Poa dahurica Trinius, Mém. Imp. Acad. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4(2): 63. 1836.

Lemma callus glabrous.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan].

The callus indumentum is known to be a rather unreliable character, varying not only in populations, but also in the same specimen and even the same panicle, so it cannot be the basis for species recognition.

80. Poa albertii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 611. 1881.

阿拉套早熟禾 a la tao zao shu he

Culms dense to loosely tufted, 7–15(–25) cm tall, scabrid (sometimes only slightly), nodes 1 or 2, usually near base. Shoots extravaginal, rarely some intravaginal, sometimes with ascending tillers. Leaf sheath scabrid; blade flat, folded or inrolled, (0.5–)1.5–2(–3) mm wide, scabrid; ligule 1–2.5(–3.5) mm. Panicle oblong, narrow, dense to quite loose, (2–)4–6 × 0.5–1.5 cm; branches 2–5 per node, primary basal branch 2/7–2/3 as long as panicle. Spikelets lanceolate, sometimes tinged with purple or variegated, 3–4(–6) mm, florets 2 or 3; sometimes upper floret viviparous; rachilla smooth, warty or papillose; lower glume 1.5–2 mm, upper glume 2–2.5 mm; lemma narrowly lanceolate, glabrous to uniformly pubescent, apex acuminate; callus webbed or glabrous; palea glabrous or smooth between keels. Anthers 1.2–1.5 mm. Fl. and fr. Jul–Aug. 2*n* = 28, 42.

Alpine grasslands; 2000–5600 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran)].

Poa albertii represents an apomictic hybrid complex combining the characters of the parent species *P. attenuata* s.l. and *P. glauca* s.l., and perhaps additionally *P. versicolor* subsp. *relaxa*.

1a. Panicle with viviparous spikelets ..... 80c. subsp. *arnoldii*
1b. Panicle without viviparous spikelets.
2a. Lemma glabrous between veins.
3a. Lemma distinctly pubescent on keel and marginal veins ..... 80a. subsp. *albertii*
3b. Lemma entirely glabrous (rarely with a few short hairs) ..... 80d. subsp. *poophagorum*
2b. Lemma pubescent between veins.
4a. Panicle contracted, densely ovoid to spiciform, branches up to 1(–1.5) cm, spikelets crowded, 3–4(–5) mm; uppermost internode not more than 1 mm wide; leaf blade firm, narrow, folded or inrolled; plant pale or grayish yellow, glumes sometimes with purplish bands ..... 80b. subsp. *kunlunensis*
4b. Panicle elongated, sometimes quite open, branches up to 1.5–2 cm, spikelets moderately crowded to sparse; (3.8–)4–5.5(–6) mm; uppermost internode frequently up to 1.5–2 mm wide; leaf blade withering, folded or flat; plant glaucous, frequently glumes and vegetative parts strongly purplish ..... 80e. subsp. *lahulensis*

80a. Poa albertii subsp. **albertii**

阿拉套早熟禾(原亚种) a la tao zao shu he (yuan ya zhong)

Poa breviligula Keng ex L. Liu; *P. densissima* Roshevitz ex Ovczinnikov; *P. juldusicola* Regel; *P. festucoides* N. R. Cui (1987), not Lamarck (1791); *P. litvinoviana* Ovczinnikov; *P. sinattenuata* Keng; *P. sinattenuata* var. *breviligula* Keng; *P. parafestuca* L. Liu; *P. poophagorum* Bor subsp. *hunczilapensis* Keng ex D. F. Cui.

Culms 6–20 cm tall, scabrid. Leaf blade folded or inrolled, 0.5–1 mm wide; ligule 1–2(–3.5) mm. Panicle oblong, narrow, dense to quite loose, 2–4 × 0.5–1.5 cm; branches 2 or 3 per node, basal primary branch 2/7–2/3 as long as panicle. Spikelets lanceolate, never viviparous; rachilla smooth or pilulose; lemma lanceolate to narrowly lanceolate, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus glabrous. $2n = 28$.

Alpine grassy places; 2000–5200 m. Gansu, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Altai), Tajikistan, Uzbekistan].

The types of both *Poa densissima* and *P. juldusicola* match *P. albertii* subsp. *albertii* well. The type of *P. litvinoviana* seems to be of hybrid origin and resembles both *P. attenuata* and *P. glauca*, so it should be assigned to *P. albertii*. The types of both *P. sinattenuata* and its var. *breviligula* differ from *P. albertii* subsp. *albertii* only by the pilulose rachilla, but rachilla indumentum is too variable within this hybrid complex to be a reliable basis for recognizing even subspecies. The type of *P. parafestuca* has not been seen, but descriptions and other gatherings show that it should be assigned to subsp. *albertii*.

80b. Poa albertii subsp. **kunlunensis** (N. R. Cui) Olonova & G. Zhu, **comb. nov.**

高寒早熟禾 gao han zao shu he

Basionym: *Poa festucoides* N. R. Cui subsp. *kunlunensis* N. R. Cui, Acta Bot. Boreal.-Occid. Sin. 7(2): 97. 1987; *P. indattenuata* Keng ex P. C. Keng & G. Q. Song; *P. koelzii* Bor; *P. rangkulensis* Ovczinnikov & Czukavina; *P. roemeri* Bor; *P. scabriculmis* N. R. Cui [*"scabristemmed"*].

Culms 4–10(–20) cm tall. Leaf blades folded, short, 0.7–1(–1.5) mm wide; ligule 1–3 mm. Panicle dense, contracted, 1–2.5(–3) × 0.5–2 cm, branches mostly paired. Spikelets purple when old, never viviparous; rachilla glabrous; lemma laterally elliptic-oblong, keel and marginal veins proximally villous, areas between veins proximally densely shortly pubescent, apex obtuse; callus sparsely webbed or sometimes glabrous. $2n = 28$.

Alpine grasslands; 4000–5200 m. Qinghai, Xinjiang, Xizang [Afghanistan, India, Pakistan, Russia (S Siberia), Tajikistan, Uzbekistan; SW Asia (Iran)].

The type of *Poa festucoides* subsp. *kunlunensis* has not been seen, but the protologue and illustration indicate that it belongs here and it therefore provides the earliest epithet at subspecific rank. *Poa roemeri* differs from *P. albertii* subsp. *kunlunensis* in having a loose panicle and thin, withering leaf blades. The two entities are connected by intermediate populations and differ in such negligible characters that *P. roemeri* cannot be recognized at any rank. The type of *P. scabriculmis* has also not been seen, but the protologue and illustration indicate that it cannot be separated from the other entities within this subspecies. The types of both *P. indattenuata* and *P. rangkulensis* look like type material of *P. festucoides* subsp. *kunlunensis* and do not differ from most gatherings so named.

80c. Poa albertii subsp. **arnoldii** (Melderis) Olonova & G. Zhu, **comb. et stat. nov.**

阿诺早熟禾 a nuo zao shu he

Basionym: *Poa arnoldii* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 142. 1978; *P. mustangensis* Rajbhandari.

Culms 5–15(–25) cm tall. Leaf sheath usually smooth; blade flat, 1–2 mm wide, abaxial surface glabrous, adaxial surface scabrid; ligules 2.3–3 mm. Panicle loosely spreading, 4–6 cm; branches paired, lowermost 1–2 cm. Spikelets 4–4.5 mm, florets 2, upper floret viviparous; lemma elliptic-oblong, keel and marginal veins proximally villous, areas between veins usually proximally shortly pubescent; callus glabrous.

Alpine grassy places; 4000–5600 m. Gansu, Qinghai, Xizang [Nepal].

Viviparous spikelets are very rare within *Poa* sect. *Stenopoa* and are restricted to taxa closely allied to *P. glauca* or which have originated through hybridization with that species. *Poa mustangensis*, which was described from neighboring Nepal, seems not to be separable from this subspecies.

80d. Poa albertii subsp. **poophagorum** (Bor) Olonova & G. Zhu, **comb. et stat. nov.**

波伐早熟禾 bo fa zao shu he

Basionym: *Poa poophagorum* Bor, Kew Bull. [3] 1948: 143. 1948 [*"poiphagorum"*].

Culms 5–10(–18) cm tall, smooth or scabrid. Leaf blade flat, folded or inrolled, 1–1.5 mm wide, ligule 2–3.5 mm. Panicle narrow, 2–5 × 0.5–1.5 cm; branches short, scabrid. Spikelets 3–4(–5) mm, tinged with purple, florets 2–4; rachilla glabrous

or scabrid, sometimes minutely hairy; glumes subequal; lemma glabrous throughout, rarely along keel and marginal veins proximally sparsely minutely hairy; callus glabrous.

Alpine grasslands; 3000–5500 m. Qinghai, Xinjiang, Xizang, Yunnan [Bhutan, India, Nepal].

80e. Poa albertii subsp. **lahulensis** (Bor) Olonova & G. Zhu, **comb. et stat. nov.**

拉哈尔早熟禾 la ha er zao shu he

Basionym: *Poa lahulensis* Bor, Kew Bull. [3] 1948: 138. 1948; *P. borealitibetica* C. Ling.

Culms 10–20 cm tall, nodes 1 or 2. Leaf blade flat or folded, quite soft, 3–5 cm × 1.5–2.5 mm, both surfaces scabrid, frequently withering; ligule 1–3 mm. Panicle elliptic, 4–6 × 1.5–3 cm, branches 2 or 3 per node. Spikelets obovate, green or slightly tinged with purple, 4.5–6 mm, florets 3–6; glumes broadly lanceolate; lemma oblong-lanceolate, slightly membranous, keel and marginal veins densely pubescent below middle, areas between veins proximally pubescent; callus glabrous or minutely hairy.

Alpine grasslands; 2000–5500 m. Xizang, Yunnan [India].

The types of both *Poa lahulensis* and *P. borealitibetica* differ from other members of this complex by being more mesomorphic and look like dwarf plants of *P. versicolor* subsp. *relaxa*, with leaf blades softer and withering with age, panicles lax, and spikelets larger. The pubescence between the veins can vary, as far as complete absence, but other characters are quite constant. This might be evidence of the contribution of *P. versicolor* subsp. *relaxa* to the genotype of *P. albertii* subsp. *lahulensis*. More research is needed to find out the relationships and parentage of the subspecies of *P. albertii*, since subsp. *lahulensis* might not be of hybrid orgin but instead a direct derivate of *P. versicolor* subsp. *relaxa*.

81. Poa glauca Vahl, Fl. Dan. 6(17): 3. 1790.

灰早熟禾 hui zao shu he

Culms erect, glaucous, sometimes strongly purplish, (5–)10–15(–35) cm tall, nodes 1 or 2, uppermost to 1/5 way up culm, covered by sheath; uppermost internode up to 1.5–2 mm wide. Shoots always extravaginal, even when densely tufted. Leaf sheath longer than blade, flat or folded, sometimes quite soft, withering, 1–2 mm wide, margins and both sides of veins scabrid; ligule 1–1.5(–2) mm. Panicle contracted, later quite open, 4–7 cm; branches 1 or 2 per node, 2–3 cm, with a few scattered spikelets. Spikelets oblong-ovate, (3.8–)4–5(–7) mm, tinged with purple, florets 2–4; glumes narrowly lanceolate, unequal, as long as lower lemma; lemma narrowly lanceolate, lower lemma ca. 4 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3; callus sparsely webbed or glabrous. Fl. Jun–Aug.

Dry gravel slopes, grassy places on river beaches; 2000–5200 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran), Europe, North America].

Poa glauca is probably one of the most polymorphic species in the genus. In C Asia it has probably been almost consumed by introgressive hybridization. Most gatherings seem to belong to the hybrid complexes *P. albertii* and *P. araratica* s.l. Pure populations of *P. glauca* are rather rare in China.

1a. Culms 5–15(–20) cm tall, usually glaucous or purplish; leaf blade usually folded; panicle branches quite thick, firm, obliquely ascending ..... 81a. subsp. *glauca*

1b. Culms (10–)20–35 cm tall, usually green; leaf blade usually flat and broad; panicle branches thin, frequently curved, erect ..... 81b. subsp. *altaica*

81a. Poa glauca subsp. **glauca**

灰早熟禾(原亚种) hui zao shu he (yuan ya zhong)

Deyeuxia hugoniana Rendle; *Poa taiwanicola* Ohwi.

Culms 5–15(–20) cm tall, usually glaucous or purplish. Leaf blade usually folded. Panicle branches quite thick, firm, obliquely ascending. Callus webbed. 2*n* = 42–49, 50, 56, 60, 63, 64, 65, 70, 72, 75, 78.

Dry gravel slopes, grassy places on river beaches; 2000–5200 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe, North America].

81b. Poa glauca subsp. **altaica** (Trinius) Olonova & G. Zhu, **comb. et stat. nov.**

阿尔泰早熟禾 a er tai zao shu he

Basionym: *Poa altaica* Trinius in Ledebour, Fl. Altaic. 1: 97. 1829; *P. tristis* Trinius ex Regel.

Culms (10–)20–35 cm tall, usually green. Leaf blade usually flat and broad, 1.5–2 mm wide. Panicle branches thin, frequently curved, erect. Callus webbed. 2*n* = 28, 42.

Alpine grassy places; 2300–3600 m. ?Xinjiang [Kazakhstan, Russia (Altai)].

Poa glauca subsp. *altaica* is currently known only from high elevations in Kazakhstan and the SW Altai region of Russia. Although no examples have been seen from China, the subspecies might be found in the neighboring province Xinjiang. The type of *P. tristis* looks like an immature specimen of subsp. *altaica*.

67. DACTYLIS Linnaeus, Sp. Pl. 1: 71. 1753.

鸭茅属 ya mao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Perennial. Leaf sheaths closed to middle; leaf blades linear, flat or folded. Inflorescence a lobed, 1-sided panicle, open or contracted; spikelets subsessile, densely clustered in compact fascicles on the panicle branches. Spikelets strongly laterally compressed, florets 2–5, disarticulating above glumes and between florets; glumes lanceolate, subequal, shorter than lemmas, strongly

keeled, 1–3-veined; lemmas lanceolate to oblong in side view, papery or thinly leathery, strongly keeled, 5-veined, scabrid or ciliate along keel, apex cuspidate to briefly awned; palea slightly shorter than lemma, narrow, ciliolate along keels. Caryopsis oblong or slightly triangular; hilum round; endosperm soft.

One species: N Africa, temperate Asia, Europe; widely introduced elsewhere as a pasture grass.

One widespread, variable species is recognized here. There are many different races and ecotypes throughout its range, the more widespread being generally tetraploid with local diploid races particularly in the Mediterranean region. These forms are seldom clear-cut, and intermediates are common.

1. Dactylis glomerata Linnaeus, Sp. Pl. 1: 71. 1753.

鸭茅 ya mao

Dactylis altaica Besser; *D. glomerata* subsp. *altaica* (Besser) Domin; *D. glomerata* var. *altaica* (Besser) Keng; *D. glomerata* subsp. *sinensis* A. Camus; *D. glomerata* subsp. *himalayensis* Domin.

Perennial, coarse. Culms solitary or tufted, erect or geniculate at base, 40–140 cm tall. Leaf sheaths strongly keeled; leaf blades flat, (6–)10–30 cm × 4–9 mm, abaxial surface scabrid along midrib and margin; ligule 4–8 mm. Panicle oblong to ovate in outline, 5–15 cm; branches single or rarely paired at base, (3–)5–15 cm, horizontal or ascending, lower part naked, upper part with dense fascicles of spikelets. Spikelets oblong to wedge-shaped, 5–9 mm, florets closely overlapping, green or purplish; glumes 4–5(–6.5) mm, scabrid or ciliolate along keel, margins membranous, apex acute to acuminate; lemmas 4–7 mm, lowest subequal to spikelet, scabrid or flanks short-pilose, apex with stout awn up to 1.5 mm. Anthers ca. 2.5 mm. Fl. and fr. May–Aug. $2n = 14, 28, 42$.

Mountain slopes, light forest shade, other grassy places; 1400–3600 m. Gansu, Guizhou, Hubei, Ningxia, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang; cultivated in Hebei, Henan, Jiangsu, Shandong [Bhutan, N India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan, Turkestan, Uzbekistan; N Africa, SW Asia, Europe].

This is an important pasture and forage grass that has been widely introduced into temperate and subtropical regions throughout the world (Cocksfoot, Orchard Grass).

The typical form, subsp. *glomerata* ($2n = 28$), has a relatively compact panicle, broad spikelet fascicles, and conspicuously ciliate lemma keels. Other forms, widespread in China and the Himalayas, have a looser panicle with long flexuose branches, narrower spikelet fascicles, and only minutely ciliolate lemma keels. The names subsp. *sinensis*, subsp. *himalayensis*, and the European name subsp. *slovenica* (Domin) Domin have been applied to these forms. A chromosome count of $2n = 14$ has been recorded for subsp. *himalayensis*. The basis of this variation, the correct application of these names, and their relationship to similar variants from outside China are not yet understood.

68. ANISELYTRON Merrill, Philipp. J. Sci. 5: 328. 1910.

沟稃草属 gou fu cao shu

Lu Shenglian (卢生莲); Sylvia M. Phillips

Aulacolepis Hackel (1907), not Ettingshausen (1893); *Neoaulacolepis* Rauschert.

Perennials, tufted. Leaf blades linear to broadly linear, flat, flaccid; ligule membranous. Inflorescence an open panicle; branches whorled. Spikelets with 1 floret, laterally compressed, disarticulating above glumes, rachilla shortly extended beyond floret, glabrous; glumes much shorter than floret, unequal, lower glume sometimes very small or vestigial, upper glume lanceolate, margins broadly hyaline, apex acuminate; callus of floret shortly and inconspicuously hairy, lateral hairs longest; lemma lanceolate in side view, keeled, leathery, scabrid, strongly 5-veined, acute or rarely mucronate; palea subequaling and almost enclosed by lemma, keels close together, prominent, scabrid, depressed between keels. Caryopsis ellipsoid. $x = 7$.

Two species: N India to Indonesia and Japan; two species in China.

The two species, and their infraspecific combinations, have usually been known in the past under the generic name *Aulacolepis* Hackel, but this is an illegitimate later homonym. The genus is usually placed in *Aveneae* close to, or included within, *Calamagrostis*, but molecular evidence shows it is more accurately placed in *Poeae*.

1a. Lower glume 0.5–2.5 mm, 1-veined; lateral pedicels variable in length, some filiform; leaf blades 5–15 mm wide ... 1. *A. treutleri*
1b. Lower glume up to 0.75 mm, veinless; lateral pedicels short, up to 1 mm; leaf blades 3–6 mm wide ..... 2. *A. agrostoides*

1. Aniselytron treutleri (Kuntze) Soják, Cas. Nar. Muz. Praze, Rada Prir. 148: 202. 1980 [“1979”].

沟稃草 gou fu cao

Milium treutleri Kuntze, Revis. Gen. Pl. 2: 780. 1891; *Aniselytron clemensiae* (Hitchcock) Soják; *A. japonica* (Hackel) Bennet & Raizada; *A. milioides* (Honda) Bennet & Raizada; *A. pseudopoa* (Jansen) Soják; *A. treutleri* var. *japonica* (Hackel) N. X. Zhao; *Aulacolepis clemensiae* Hitchcock; *A. japonica* Hackel; *A. milioides* (Honda) Ohwi; *A. pseudopoa* (Jansen) Ohwi; *A. treutleri* (Kuntze) Hackel; *A. treutleri* subsp. *japonica* (Hackel) T. Koyama; *A. treutleri* var. *japonica* (Hackel) Ohwi; *A. treutleri* var. *milioides* (Honda) Ohwi; *Calamagrostis japonica* (Hackel) Govaerts; *C. treutleri* (Kuntze) U. Shukla; *Deyeuxia pseudopoa* Jansen; *D. treutleri* (Kuntze) Stapf; *Neoaulacolepis clemensiae* (Hitchcock) Rauschert; *N. japonica* (Hackel) Rauschert; *N. treutleri* (Kuntze) Rauschert; *N. treutleri* var. *japonica* (Hackel) T. Osada; *Poa milioides* Honda.

Culms solitary or loosely tufted, erect or geniculate and rooting at lower nodes, 45–110 cm tall, leafy. Leaf sheaths smooth or scabrid; leaf blades linear-lanceolate, 8–25 cm × 5–15 mm, scabrid, apex acuminate; ligule 0.5–4 mm, truncate or rounded. Panicle open, ovate to pyramidal in outline, 10–25 cm; branches in distant whorls, slender, scabrid, bare in lower part, longest up to 13 cm; pedicels of lateral spikelets variable in length. Spikelets 2.5–5 mm, grayish green; glumes lanceolate, lower glume 0.5–2.5 mm, 1-veined, upper glume 2–3.5 mm, 1–3-veined, keel scabrid, apex acute; callus hairs 0.1–0.8 mm; lemma apex acute to acuminate, sometimes scarious and incurved, rarely mucronate; palea keels prominent, scabrid becoming ciliolate toward apex; rachilla 0.2–1.5 mm, glabrous. Anthers 0.7–1.5 mm. Fl. Jul.

Moist shady often rocky places; 1300–2000 m. Fujian, Guangxi, Guizhou, Hubei, Sichuan, Taiwan, Yunnan [Bhutan, India (Darjeeling, Sikkim), Indonesia (Sumatra), Japan, Malaysia (Sabah), N Myanmar, N Vietnam].

Populations of this grass from different parts of its geographic range have sometimes been separated at specific or varietal rank. However, variation is still little understood, so a broad species concept is followed here.

2. Aniselytron agrostoides Merrill, Philipp. J. Sci. 5: 329. 1910.

小颖沟稃草 xiao ying gou fu cao

Aniselytron agrostoides var. *formosana* (Ohwi) N. X. Zhao; *A. formosana* (Ohwi) L. Liu; *Aulacolepis agrostoides* (Merrill) Ohwi; *A. agrostoides* var. *formosana* Ohwi; *Calamagrostis aniselytron* Govaerts.

Culms slender, erect or geniculately ascending and rooting at lower nodes, 50–60 cm tall. Leaf sheaths smooth; leaf blades linear, 10–24 cm × 3–6 mm, scabrid, apex acuminate; ligule 0.3–1.5 mm, obtuse, erose or fimbriate. Panicle open with spreading branches, or somewhat contracted and narrower, 9–22 cm; branches whorled, smooth or scaberulous, bare in lower part, longest up to 7.5 cm; pedicels of lateral spikelets fairly uniform in length, up to 1 mm. Spikelets 2.5–4 mm, green; lower glume vestigial or very small, 0.2–0.7 mm, veinless, upper glume lanceolate, very variable, 1–2.7 mm, 1–3-veined, smooth, apex slenderly acuminate; callus hairs 0.05–0.2 mm; lemma as long as spikelet, attenuate upward, margins scarious, apex scarious, acute to acuminate, incurved; palea keels prominent, scabrid; rachilla 0.3–0.8 mm, glabrous. Anthers 1.2–1.5 mm. Fl. Jul.

Forests, grassy roadsides. Taiwan [Philippines].

69. MILIUM Linnaeus, Sp. Pl. 1: 61. 1753.

粟草属 su cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annual or perennial. Leaf blades flat; ligule membranous. Inflorescence a terminal open panicle. Spikelets elliptic or ovate, with 1 floret, bisexual, slightly dorsally compressed, disarticulating above glumes, rachilla extension absent; glumes subequal, as long as spikelet, herbaceous, persistent, 3-veined; callus very short, obtuse, glabrous; lemma elliptic, slightly shorter than glumes, leathery becoming indurated and glossy at maturity, smooth, glabrous, obscurely 5-veined, margins involute, apex acute, awnless; palea resembling lemma in texture, 2-veined, not keeled. Lodicules 2. Stamens 3.

Five species: Europe eastward to Japan, also in E North America; one species in China.

This genus has often been placed in *Stipeae*, but molecular evidence shows its relationship lies within *Poeae*.

1. Milium effusum Linnaeus, Sp. Pl. 1: 61. 1753.

粟草 su cao

Perennial, shortly rhizomatous. Culms loosely tufted, erect, slender, 0.9–1.5 m tall, smooth, glabrous, 3–5-noded. Leaf sheaths loose, slightly inflated, glabrous; leaf blades broadly linear to linear-lanceolate, thin, soft, 10–30 cm, 5–15 mm wide, glabrous, abaxial surface gray-green, adaxial surface green, margins scaberulous, apex acute; ligule lanceolate, 2–10 mm. Panicle ovate or pyramidal in outline, very lax, 10–30 cm; branches in clusters of up to 6, slender, flexuous, spreading or deflexed, smooth or scabrid, lower part bare. Spikelets 3–4 mm, gray-green or tinged with purple; glumes elliptic-ovate, scaberulous, margins white, apex acute; lemma glossy, milky-white when young, brown at maturity. Anthers 2–3 mm. Fl. and fr. May–Jul. 2*n* = 14, 28.

Forests, moist shady places; 700–3500 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Ningxia, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, Japan, E Kazakhstan, Korea, Kyrgyzstan, Pakistan, Russia, Tajikistan; SW Asia, Europe, North America].

This is a good forage grass. The culms are used for weaving.

70. COLPODIUM Trinius, Fund. Agrost. 119. 1822.

小沿沟草属 xiao yan gou cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Catabrosella (Tzvelev) Tzvelev; *Colpodium* subg. *Catabrosella* Tzvelev; *Colpodium* subg. *Paracolpodium* Tzvelev; *Paracolpodium* (Tzvelev) Tzvelev.

Small perennials, tufted or rhizomatous. Leaf sheaths with partially connate margins, rarely split to base; leaf blades linear, flat or folded, apex hooded; ligule membranous. Inflorescence an open or contracted panicle or reduced to a raceme. Spikelets with 1–4 florets, glistening; rachilla disarticulating below each floret, extension above floret(s) short or absent; glumes unequal to subequal, upper glume 1/2 as long as to equaling or exceeding florets, lower glume 1-veined, upper glume 3-veined; lemmas ovate or oblong, thinly membranous becoming hyaline at apex, keeled, 3–5-veined below middle, intermediate veins often obscure or absent, veinless toward apex, glabrous or hairy on lower veins or back, apex obtuse to acute; palea about equal to lemma, keels smooth, glabrous or often hairy. Stamens 2 or 3. Caryopsis free or lemma and palea partially adherent; hilum elliptic to oblong. $x = 2, 4, 5, 6, 7, 9$.

Twenty-two species: Turkey eastward through the Caucasus to the Himalayas and E Siberia, also on a few mountains in Africa; five species in China.

Colpodium species usually occur on high mountains. They often resemble *Poa* morphologically, but can be distinguished by the thinner lemmas with veinless tips and smooth palea keels. Species with long glumes, a single floret, and 3-veined lemmas are not easily recognizable as members of tribe *Poeae*.

1a. Spikelet with 2–4 florets; plant densely tufted; culms tuberously thickened at base ..... 1. *C. humile*
1b. Spikelet with 1 floret; plant shortly rhizomatous; culms not tuberously thickened.
2a. Glumes equaling or longer than floret, lanceolate.
3a. Leaf blades 3–4 mm wide; panicle branches bearing 3–4 clustered spikelets; lemma veins densely pilose below middle ..... 2. *C. tibeticum*
3b. Leaf blades 1–2 mm wide; panicle branches capillary, mostly with a single spikelet; lemma veins shortly pubescent below middle ..... 3. *C. wallichii*
2b. Glumes shorter than floret, at least the lower, oblong-lanceolate or ovate-lanceolate.
4a. Leaf blades green, 2–5 mm wide; panicle contracted, lower branches spreading; spikelets usually purple ..... 4. *C. altaicum*
4b. Leaf blades glaucous, 1–3 mm wide; panicle very narrow, branches suberect to appressed; spikelets usually whitish green ..... 5. *C. leucolepis*

1. Colpodium humile (M. Bieberstein) Grisebach in Ledebour, Fl. Ross. 4: 384. 1852 [“1853”].

矮小沿沟草 ai xiao yan gou cao

Aira humilis M. Bieberstein, Fl. Taur.-Caucas. 1: 57. 1808; *Catabrosa humilis* (M. Bieberstein) Trinius; *Catabrosella humilis* (M. Bieberstein) Tzvelev; *C. humilis* subsp. *songorica* Tzvelev; *C. songorica* (Tzvelev) Czerepanov.

Perennial, densely tufted; roots hairy. Culms tuberously thickened at base, clothed in fibrous sheath remnants, erect or geniculate at lowest node, 10–30 cm tall, 2–3-noded. Leaf sheaths closed in lower 1/6; leaf blades usually flat, 1–6 cm × 1–2 mm, glabrous; ligule 1–2 mm. Panicle pyramidal, open, 3.5–7 × 2–5 cm; branches 2–6 per node, ascending or spreading, smooth. Spikelets 3–5 mm, florets 2–3(–4), purplish brown or purplish green; glumes shorter than spikelet, unequal, lower glume ovate, 1.5–2 mm, upper glume broadly ovate, 2–2.3 mm, acute; lemmas ovate-oblong, 2.5–3 mm, keel and marginal veins densely silky villous below middle, intermediate veins inconspicuous or absent, apex truncate-erose; palea keels densely silky villous below middle; rachilla extension 0.3–0.8 mm. Stamens 3; anthers 1.5–1.8 mm. Fl. Apr–Jun. $2n = 10$.

Sandy steppe, mountain valleys, roadsides; 400–1700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, N Uzbekistan; SW Asia (Caucasus, N Iran)].

This is a rather widespread species showing variation over its range, especially in lemma hairiness and venation, and several subspecies have been described. The Chinese material, with mainly 3-veined lemmas, and any weak intermediate veins glabrous, corresponds to *Catabrosella humilis* subsp. *songorica*. Typical *Colpodium humile* has distinctly 5-veined lemmas densely pilose on the proximal part of all veins.

2. Colpodium tibeticum Bor, Kew Bull. [8] 1953: 270. 1953.

藏小沿沟草 zang xiao yan gou cao

Paracolpodium tibeticum (Bor) E. B. Alexeev.

Perennial, shortly rhizomatous. Culms erect, 12–21 cm tall, 2–3-noded. Leaf sheaths slightly inflated, longer than internodes, purple at blade junction, old basal sheaths becoming fibrous; leaf blades folded or lower flat, up to 7 cm × 3–4 mm, glabrous or puberulent; ligule 4–6 mm. Panicle oblong or pyramidal in outline, open, 3–7 × 1–3 cm, shortly exserted from uppermost leaf sheath; branches 2 per node, up to 1.5 cm, 3–4 spikelets clustered at tips with lateral pedicels much shorter than spikelet, reflexed at maturity. Spikelets 5–6 mm, floret 1, purple; glumes lanceolate, equal, equaling or longer than floret, glabrous, apex acuminate, sometimes slightly recurved; lemma ca. 4 mm, 3-veined, densely pilose along veins below middle, apex rounded; palea keels pilose; rachilla extension present, short. Stamens 2; anthers 2.7–3 mm. Fl. and fr. Jun–Aug.

Moist grassy or stony places in high mountains; 4500–5500 m. S Xizang (Cona) [Bhutan, Nepal].

When describing *Colpodium tibeticum*, Bor annotated the herbarium specimen *Ludlow, Sherriff & Hicks 20796* (BM) as the holotype, but in the protologue he indicated the specimen *Kingdon Ward 11688* (BM) as the holotype. The Kingdon Ward specimen must therefore be taken as the correct holotype of the name.

3. Colpodium wallichii (Stapf) Bor, Kew Bull. [8] 1953: 270. 1953.

瓦小沿沟草 wa xiao yan gou cao

Catabrosa wallichii Stapf in J. D. Hooker, Fl. Brit. India 7: 312. 1896 [“1897”]; *Paracolpodium wallichii* (Stapf) E. B. Alexeev.

Perennial, shortly rhizomatous. Culms erect, 7–25 cm tall, 2–3-noded. Leaf sheaths longer than internodes; leaf blades narrowly linear to filiform, up to 10 cm × 1–2 mm, glabrous; ligule 2–2.5 mm. Inflorescence delicate, open, few-spiculate, almost racemose, 2.5–5.5 cm; branches 1 or 2 per node, up to 1 cm, capillary, flexuous, mostly bearing only 1 spikelet, occasionally 2, equaling or longer than spikelet, gently reflexing at maturity. Spikelets 3.7–5.5 mm, floret 1, purple or less often greenish; glumes slightly shorter to slightly longer than floret, lower glume narrowly lanceolate, 3–5 mm, apex subacute, upper glume lanceolate-oblong, 3.5–5.5 mm, apex narrowly obtuse; lemma narrowly lanceolate-oblong, 3.2–4.3 mm, obscurely 3–5-veined, shortly pubescent along veins below middle, sometimes a few hairs on lower back, apex obtuse to truncate-denticulate; palea keels shortly pubescent; rachilla extension present, short. Stamens 2; anthers 2–2.5 mm.

Stony or sandy places in trickling water from snow melt; above 4000 m. ?Xizang [Bhutan, India (Sikkim), Nepal].

This species is very likely to occur in the mountains of S Xizang, but the illustration in Fl. Xizang. (5: 141. 1987, as *Catabrosa wallichii*) appears to be a form of *Catabrosa aquatica*.

4. Colpodium altaicum Trinius in Ledebour, Fl. Altaic. 1: 100. 1829.

柔毛小沿沟草 rou mao xiao yan gou cao

Catabrosa altaica (Trinius) Boisser; *Paracolpodium altaicum* (Trinius) Tzvelev.

Perennial, shortly rhizomatous, forming loose mats. Culms erect or ascending, 10–40 cm tall, 2–3-noded. Leaf sheaths closed up to middle, longer than internodes; leaf blades green, flat or sometimes folded, up to 8 cm × 2–5 mm, glabrous or rarely adaxial surface sparsely puberulous, apex obtuse or mucronate; ligule 2–4 mm. Panicle lanceolate to ovate in outline, 3–11 × 1–3 cm, fairly dense or lower branches spreading; branches paired. Spikelets 3.2–4.5 mm, floret 1(–2), usually purplish; glumes oblong-lanceolate or ovate-lanceolate, slightly shorter than or upper subequaling floret, lower glume 2.3–2.7 mm, upper glume 3.1–3.6 mm, apex subacute; lemma broadly oblong, as long as spikelet, 3-veined, lanate along lower veins, apex obtuse, irregularly toothed; palea as long as or longer than lemma, keels lanate; rachilla extension absent. Stamens 2; anthers 2–3 mm, dark purple. Fl. and fr. Jun–Aug. 2*n* = 42.

Stony or gravelly mountain slopes; 2500–4800 m. Xinjiang [NE Kazakhstan, Mongolia, Russia (Siberia)].

5. Colpodium leucolepis Nevski, Bull. Soc. Imp. Naturalistes Moscou 43: 224. 1934.

高山小沿沟草 gao shan xiao yan gou cao

Colpodium villosum Bor; *Paracolpodium altaicum* subsp. *leucolepis* (Nevski) Tzvelev; *P. leucolepis* (Nevski) Tzvelev.

Perennial, shortly rhizomatous, forming loose mats. Culms erect or ascending, 8–28 cm tall, 2-noded. Leaf sheaths closed up to middle, longer than internodes; leaf blades glaucous, folded, 2–12 cm × 1–3 mm, adaxial surface puberulous, abaxial surface usualy glabrous, apex acute; ligule 1–3 mm. Panicle very narrow, spikelike, almost racemose, 3–7 cm, branches spaced, erect or almost so. Spikelets 3.4–4.2 mm, floret 1, usually pale green; glumes unequal, slightly shorter than floret, lower glume elliptic, 2.1–3 mm, upper glume lanceolate-elliptic, 2.6–3.5 mm, apex acute; lemma oblong, as long as spikelet, 5-veined, villous on veins or generally in lower half, apex obtuse-denticulate; palea keels villous, rachilla extension absent. Stamens 2; anthers 2–3 mm, dark purple. Fl. and fr. Jun–Aug.

Alpine grasslands, gravelly slopes, rocky fissures; 3900–5000 m. Xinjiang [NE Afghanistan, Kashmir, E Kazakhstan, Kyrgyzstan, N Pakistan, Tajikistan (Pamirs)].

This species is confined to the high mountains of the W Himalayas.

Colpodium himalaicum (J. D. Hooker) Bor, from Kashmir and the W Himalayas, is similar, but has a more densely tufted habit and much shorter glumes not exceeding 1/2 the length of the floret.

71. CATABROSA P. Beauvois, Ess. Agrostogr. 97. 1812.

沿沟草属 yan gou cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Perennials, rhizomatous or stoloniferous. Leaf sheaths closed to middle or above; leaf blades linear, flat, glabrous; ligule membranous. Inflorescence an open or infrequently contracted panicle of many spikelets; branches minutely papillose; pedicels short. Spikelets with (1–)2(–3) florets, subterete, disarticulating below each floret; rachilla extended above floret, glabrous; glumes unequal, much shorter than florets, membranous, lower less than 1/2 spikelet length, 0–1-veined, upper up to 2/3 spikelet length, prominently 1–3-veined, apex truncate or broadly obtuse; lemmas broadly ovate to oblong, herbaceous or thinly membranous becoming hyaline toward apex, rounded on back, prominently 3-veined, lateral veins marginal, glabrous, apex broadly obtuse to truncate, erose, awnless; floret callus short, glabrous; palea subequal to lemma, keels smooth. Stamens 3. Caryopsis ellipsoid, hilum shortly oblong. *x* = 5.

Two to four species: temperate regions of both hemispheres, Chile; two species in China.

1a. Panicle narrow, dense, almost spikelike, branches short, adpressed or suberect ..... 1. *C. capusii*
1b. Panicle open or loosely contracted, branches loosely ascending to spreading ..... 2. *C. aquatica*

1. Catabrosa capusii Franchet, Ann. Sci. Nat., Bot., sér. 6, 18: 272. 1884.

长颖沿沟草 chang ying yan gou cao

Catabrosa aquatica subsp. *capusii* (Franchet) Tzvelev.

Perennial, rhizomatous. Culms decumbent at base, up to 30(–60) cm tall. Leaf sheaths closed up to middle, loose, longer

than internodes; leaf blades flat, soft, 3–8 cm × 2–4 mm, apex acute; ligule ca. 2 mm, obtuse. Panicle narrow, contracted, almost spikelike, interrupted below, 2–12 × 0.8–1.5 cm; branches less than 5 cm, adpressed or suberect, compactly spiculate to base. Spikelets with (1–)2 florets, 3–4 mm; glumes oblong, obscurely 1–3-veined, apex obtuse or erose, lower glume 0.5–2 mm, upper glume 1.5–2.3 mm; lemma 2–2.7 mm, brown flushed purple, smooth, apex truncate, denticulate. Anthers 1–1.5 mm. Fl. Jun–Aug.

Marshy ground and water meadows on high mountains; 3700–4900 m. Nei Mongol, Xizang [Kyrgyzstan, Tajikistan, Uzbekistan; SW Asia (N Iran, N Iraq, E Turkey)].

Young panicles of *Catabrosa aquatica* can resemble the narrow panicle of this species.

2. Catabrosa aquatica (Linnaeus) P. Beauvois, Ess. Agrostogr. 97. 1812.

沿沟草 yan gou cao

Perennial, rhizomatous; rhizome stout, creeping. Culms erect, succulent, 20–70 cm tall, unbranched. Leaf sheaths closed up to middle, upper shorter than internodes; leaf blades equally wide throughout, soft, 5–20 cm × 2–8 mm, apex boat-shaped; ligule 2–5 mm, obtuse. Panicle open or loosely contracted at anthesis, ovate to oblong in outline, 10–30 × 4–12 cm; branches whorled, slender, usually obliquely ascending, up to 10 cm, often bare of spikelets in lower part. Spikelets with (1–)2(–3) florets, 2–4(–5.8) mm; glumes obtuse or subtruncate; lower glume ovate to suborbicular, 0.5–1.2(–2) mm; upper glume broadly elliptic, 1–2(–3) mm; lemma 1.5–3 mm, green becoming brown at maturity, usually glabrous, apex truncate. Anthers 1–2 mm. Fl. and fr. Apr–Aug. $2n = 20$.

Slow-moving, shallow water of river and streamsides, muddy pond margins, ditches; 800–4000 m. Gansu, Guizhou, Hebei, Hubei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan; SW Asia, Europe, North America].

Catabrosa aquatica is a widespread, polymorphic species of aquatic and marshy habitats, and extreme forms are sometimes accorded separate status, either at specific or infraspecific rank.

This species provides good forage.

1a. Culms 20–70 cm tall; panicle loose, open, branches to 10 cm; lemma 2–3 mm ..... 2a. var. *aquatica*
1b. Culms up to 20 cm tall; panicle rather sparse, branches 1–2 cm; lemma 1.5–2.2 mm ..... 2b. var. *angusta*

2a. Catabrosa aquatica var. **aquatica**

沿沟草(原变种) yan gou cao (yuan bian zhong)

Aira aquatica Linnaeus, Sp. Pl. 1: 64. 1753; *Glyceria aquatica* (Linnaeus) J. Presl & C. Presl; *Poa airoides* Koeler.

Culms 20–70 cm tall, creeping and spreading. Leaf blades 5–20 cm × 4–8 mm. Panicle loose, open; branches slender, 2–6 cm, obliquely ascending or rarely horizontal. Lemma 2–3 mm. Fl. and fr. Apr–Aug.

Shallow water of river and streamsides, pond margins; 800–4000 m. Gansu, Guizhou, Hebei, Hubei, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan; SW Asia, Europe, North America].

2b. Catabrosa aquatica var. **angusta** Stapf, J. D. Hooker, Fl. Brit. India 7: 311. 1896 [“1897”].

窄沿沟草 zhai yan gou cao

Catabrosa angusta (Stapf) L. Liu.

Culms up to 20 cm tall, shortly creeping, forming loose tufts. Leaf blades up to 5 cm × 1–2 mm. Panicle narrow, open; branches 1–2 cm, suberect. Lemma 1.5–2.2 mm. Fl. and fr. Apr–Sep.

● Mountains, wet grassy places, streamsides, pond margins; near sea level to 4800 m. Nei Mongol, Qinghai, Sichuan, Xizang.

This variety may simply represent small, depauperate plants from high altitudes. The panicle is more open than in *Catabrosa capusii*. Other small forms from high altitudes in the Himalayas and Qinghai, with an open panicle and deep purple spikelets, have been described as *C. sikkimensis* J. D. Hooker. These also intergrade completely with the main body of the species.

72. SCLEROCHLOA P. Beauvois, Ess. Agrostogr. 97. 1812.

硬草属 ying cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals. Leaf sheaths closed for lower 1/4–1/2 of their length; leaf blades linear, flat or involute. Inflorescence a contracted or dense, 1-sided panicle, often subracemose; branches short, stout, smooth, often bearing only 1 subsessile spikelet. Spikelets linear to oblong, florets 3–8, usually lower bisexual, upper male or sterile, tardily disarticulating between florets and below pedicel, lowest rachilla internode enlarged, very stout and tough; glumes unequal, herbaceous with broad scarious margins, keeled, lower glume 3–5-veined, upper glume 5–9-veined, apex obtuse; lemmas narrowly oblong, leathery with scarious margins, keeled, prominently 5–7-veined, glabrous, apex obtuse to rounded. Caryopsis with an apical beak formed from persistent style base; hilum oval. $x = 7$.

Two species: C and S Europe eastward to C Asia; introduced elsewhere; one species in W China.

1. Sclerochloa dura (Linnaeus) P. Beauvois, Ess. Agrostogr. 98. 1812.

硬草 ying cao

Cynosurus durus Linnaeus, Sp. Pl. 1: 72. 1753.

Annual forming small dense tuft. Culms ascending or decumbent, 5–15 cm tall. Leaf sheaths smooth, glabrous, lower papery, whitish; leaf blades flat, 1.5–7 cm × 2–4 mm, glabrous, adaxial surface scabrid; ligule 1–3 mm, acute. Panicle elliptic-oblong in outline, dense, stiff, 1–5 cm, scarcely exserted from

uppermost leaf sheath; branches bearing a single spikelet or shortly racemose near middle. Spikelets narrowly oblong, 6–10 mm, florets 3–5, lower 2–3 fertile, upper male or sterile; glumes ovate-oblong, lower glume 2–3 mm, upper glume 3.5–5 mm; lemmas ovate-oblong, lowest 4.8–6 mm, the upper much shorter, all veins prominent, apex obtuse to emarginate. Anthers 0.8–1.3 mm. Caryopsis 2.5–3.5 mm, brown. 2*n* = 14.

Hill slopes; 500–1000 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, C and S Europe; introduced in Australia and the United States].

73. PSEUDOSCLEROCHLOA Tzvelev, Bot. Zhurn. 89: 840. 2004.

假硬草属 jia ying cao shu

Liu Liang (刘亮); Nikolai N. Tzvelev

Annual, rarely biennial, tufted. Culms short. Leaf sheaths split; leaf blades linear, flat or loosely folded; ligule membranous. Inflorescence a moderately dense, 1-sided panicle; branches stiff, bearing spikelets to base; pedicels short, thick. Spikelets with 2–7 florets; rachilla thick, disarticulating below each floret; glumes shorter than lemmas, 1–3-veined, cartilaginous in lower part, apex obtuse or acute; lemmas oblong to ovate, subcartilaginous, 3–5-veined, glabrous, strongly keeled above middle, apex obtuse; palea as long as lemma, scabrid along keel. Caryopsis with small round hilum.

Two species: one in W Europe, one endemic to China.

This is one of the small, satellite, annual genera close to *Poa*. It is excluded from *Puccinellia* by its keeled lemmas and stiff, 1-sided panicles, and from *Sclerochloa* by its regularly disarticulating spikelets, 3-veined upper glume, and lack of a beak on the caryopsis.

1. Pseudosclerochloa kengiana (Ohwi) Tzvelev, Bot. Zhurn. 89: 841. 2004.

耿氏假硬草 geng shi jia ying cao

Puccinellia kengiana Ohwi, J. Jap. Bot. 12: 654. 1936, based on *P. stricta* Keng, Sinensia 4: 321. 1934, not Blom (1930); *Sclerochloa kengiana* (Ohwi) Tzvelev.

Annual, loosely tufted. Culms ascending, 15–30 cm tall. Leaf sheaths smooth, glabrous; leaf blades 5–14 cm × 3–4 mm, glabrous, smooth or adaxial surface scabrid; ligule 2–3.5 mm, truncate or toothed. Panicle lanceolate to narrowly elliptic in outline, 8–12 × 1–3 cm, mostly shortly exserted from uppermost leaf sheath; branches stiffly ascending, usually paired, up to 2.5 cm, bearing several overlapping spikelets. Spikelets elliptic-oblong, 4–5.5 mm, florets 2–5(–7), all fertile; glumes ovate-oblong, lower glume 1.2–2 mm, 1-veined, upper glume 2–3 mm, 3-veined, apex obtuse or acute; lemmas broadly ovate, lowest ca. 3 mm, the upper decreasing gradually, midvein prominent, raised into keel in upper half, other veins inconspicuous, apex obtuse. Anthers ca. 1 mm. Caryopsis ca. 1.5 mm, dark gray. Fl. and fr. Apr–Jul.

● Fields, valleys, streamsides. Anhui, Henan, Jiangsu, Jiangxi.

74. PARAPHOLIS C. E. Hubbard, Blumea, Suppl. 3: 14. 1946.

假牛鞭草属 jia niu bian cao shu

Wu Zhenlan (吴珍兰); Sylvia M. Phillips

Annuals. Leaf blades narrowly linear to linear-lanceolate. Inflorescence a slender cylindrical raceme, spikelets sessile in 2 alternating rows sunk in hollows of the rachis; rachis fragile, fracturing horizontally beneath each spikelet at maturity. Spikelets with 1 floret; glumes leathery, placed side by side in front of spikelet and appressed to rachis, closing rachis cavity and covering floret, asymmetrical, appearing like halves of a single split glume, strongly 3–7-veined, outer margin inflexed, apex acute; lemma hyaline, 3-veined, its side toward the rachis, awnless; palea slightly shorter than lemma. Ovary with lobed apical appendage; styles nearly absent. Caryopsis narrowly oblong; hilum round to narrowly oblong. Endosperm liquid.

Six species: C and SW Asia, Mediterranean region, northward along Atlantic coast of Europe to the Baltic Sea; introduced to most other temperate regions; one species (introduced) in China.

1. Parapholis incurva (Linnaeus) C. E. Hubbard, Blumea, Suppl. 3: 14. 1946.

假牛鞭草 jia niu bian cao

Aegilops incurva Linnaeus, Sp. Pl. 2: 1051. 1753; *Lepidurus incurvus* (Linnaeus) Janchen; *Lepturus incurvus* (Linnaeus) Druce; *Pholiurus incurvus* (Linnaeus) Schinz & Thellung; *Rottboellia incurva* (Linnaeus) Roemer & Schultes.

Culms tufted, decumbent at base, 10–25 cm tall, much branched in lower part. Leaf sheaths rounded, smooth, glabrous; leaf blades linear, flat or folded, 2.5–8 cm × 1–2 mm, glabrous, abaxial surface smooth, adaxial surface and margins scabrid, finely acute; ligule 0.5–1 mm, truncate. Raceme slenderly cylindrical, 4–10 cm, falcately curved; rachis smooth, joints shorter than spikelets. Spikelets 6–8 mm; glumes as long as spikelet, narrowly oblong-subulate, 3–5-veined, glabrous, acute; lemma lanceolate, 4–5 mm, 3-veined, the laterals very short, glabrous. Anthers 0.5–1 mm. Caryopsis tawny, 3–3.5 mm. Fl. Apr–Jun. 2*n* = 38.

Seashores, coastal salt marshes, introduced. Fujian, Zhejiang (Putuo) [Turkmenistan; N Africa, SW Asia, Europe; introduced in S Africa, America, and Australia].

Parapholis and a few other genera of mostly annual grasses adapted to saline conditions are sometimes placed in the tribe *Hainardieae*. 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 (陈文俐); 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 staminate 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; floret callus bearded; lemmas 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. Lodicules 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 *Aveneae* 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 panicle, sometimes spikelike.
9a. Fertile floret accompanied by staminate or sterile florets.
10a. Spikelets with 2 florets.
11a. Spikelet disarticulating above glumes; lower floret staminate ..... 76. *Arrhenatherum*
11b. Spikelet disarticulating below glumes; upper floret staminate ..... 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 capitate; stamens usually 3.
18a. Lemma awned from back ..... 93. *Alopecurus*