

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

羊茅属 yang mao shu

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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. alata*
- 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. chayuenensis*
- 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. yulungshanica*
- 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 ciliate 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 ciliate. 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 m. 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; ra-

chilla 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 ciliate. 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. $2n = 28$.

Grassy and stony mountain slopes, screes; 3500–4000 m. Xinjiang, Xizang, Yunnan [Afghanistan, Kyrgyzstan, India, Kashmir, 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) Malyshev (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. $2n = 28$. 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 ciliate; 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. *2n* = 28. Fl. and fr. Jun–Sep.

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

13. *Festuca alata*vica (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. *alata*vica 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, ciliate. 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 ciliate 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 ciliate 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 ciliate 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, mid-rib 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.

盖羊茅 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 as-

ending, (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 ciliate. 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 ciliate. 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 subobtusate, 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 ciliate. 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 chayensis* 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 ciliate. 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 ciliate. 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, ciliate; 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. $2n = 14, 28, 42, 70$.

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. $2n = 42$.

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, spike-like,

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. kunningensis* 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 ciliate or without cilia. Panicle spike-like, 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 ciliate. 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 ciliate. 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 ciliate, 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 sub-obtuse; 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 retrorse 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. $2n = 14, 21, 28, 42, 49, 53, 56, 64, 70$.

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.

毛稔羊茅 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. $2n = 42$.

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.

草稈羊茅 *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.

光稈羊茅 *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 Melvilliania 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. Obsch. 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 ciliate. 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 ciliate. 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 ciliate 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. kurtshumica*
 - 2b. Spikelets often with a violet tinge; leaf

- blades with 5–7 vascular bundles 50c. *F. alaiica*
- 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. Zаметki 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 alaiica* 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 alaiica 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.

宫喀什羊茅 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. Zаметki 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 spike-like, 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. *hypsochila*
- 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 Si-

chuan, Xinjiang, Yunnan [Kazakhstan, Russia, Turkmenistan; Europe].

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

松菲羊茅 song fei yang mao

Festuca ovina Linnaeus var. *hypsochila* 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].

