

50. STIPA Linnaeus, Sp. Pl. 1: 78. 1753.

针茅属 zhen mao shu

Perennials, forming dense tussocks, old basal sheaths persistent. Leaf blades filiform to setaceous, convolute, abaxial surface smooth or scabrid, adaxial surface prominently ribbed. Inflorescence usually a contracted panicle, enclosed in uppermost leaf sheath or shortly exerted, spikelets few. Spikelets with one floret, bisexual; glumes subequal, hyaline or membranous, much longer than floret, 3–5-veined, long acuminate; callus pungent, shortly bearded; lemma narrowly lanceolate, terete, usually leathery, (3–)5-veined, hairy, margins overlapping, apex entire; awn articulated at lemma apex and deciduous at maturity, scabrid to plumose, 1–2-geniculate, column tightly twisted, bristle straight, flexuous or curling; palea subequaling lemma, hyaline, enclosed within lemma. Lodicules 2 or 3, lanceolate. Stamens 3, anthers glabrous or shortly hairy at apex. Stigmas 2.

About 100 species: temperate and warm-temperate regions of Asia and Europe, in dry, open habitats; 23 species (three endemic) in China.

- 1a. Awn scabrid or minutely hispidulous (hairs to 0.3 mm) throughout.
 - 2a. Cleistogamous spikelets present in basal leaf sheaths; lemma 0.5–0.6 cm 1. *S. bungeana*
 - 2b. Cleistogamous spikelets not present in basal leaf sheaths; lemma 0.8–1.7 cm.
 - 3a. Panicle branches not enclosed by uppermost leaf sheath, usually clearly exerted; awn minutely hispidulous, bristle straight or slightly flexuous.
 - 4a. Glumes 1.2–1.5 cm, apex finely acuminate; awns separate, bristle stiff 2. *S. przewalskyi*
 - 4b. Glumes 1.5–3 cm, apex filamentous; awns twisted together at top of panicle, bristle flexuous 3. *S. capillacea*
 - 3b. Panicle branches enclosed by expanded uppermost leaf sheath; awn scabrid, bristle curling.
 - 5a. Glumes 1.8–2.5 cm; awn column 1.5–2.5 cm to first bend 4. *S. sareptana*
 - 5b. Glumes 2.5–4.5 cm; awn column 3–10 cm to first bend.
 - 6a. Ligule of culm leaves 1.5–2 mm 5. *S. baicalensis*
 - 6b. Ligule of culm leaves 3–10 mm.
 - 7a. Lemma 1–1.2 cm; awn 13–18 cm 6. *S. capillata*
 - 7b. Lemma 1.5–1.7 cm; awn 20–28 cm 7. *S. grandis*
 - 1b. Awn plumose or at least shortly hairy along part or all of its length.
 - 8a. Awn plumose, or at least shortly hairy, throughout its length.
 - 9a. Awn 1-geniculate (sometimes weakly 2-geniculate in *S. consanguinea*).
 - 10a. Awn shortly pubescent, hairs on bristle 0.4–0.7 mm 9. *S. consanguinea*
 - 10b. Awn plumose, hairs on bristle 2–5 mm.
 - 11a. Panicle shortly exerted; lemma evenly hairy 10. *S. mongolorum*
 - 11b. Panicle branches enclosed by uppermost leaf sheath; lemma hairs in lines 11. *S. caucasica*
 - 9b. Awn 2-geniculate.
 - 12a. Lemma hairs in lines; glumes gray-green or pale brownish, narrowly lanceolate, long attenuate-filiform.
 - 13a. Glumes 1.8–3 cm; lemma smooth or scaberulous below apex; awn hairs 1–4 mm.
 - 14a. Culms 15–35 cm; awn 4–6 cm, hairs on bristle 3–4 mm 12. *S. orientalis*
 - 14b. Culms 40–80 cm; awn 9–20 cm, hairs on bristle 1–2.5 mm 13. *S. arabica*
 - 13b. Glumes 1.2–2 cm; lemma spinulose below apex; awn hairs 0.8–1.5 mm 14. *S. breviflora*
 - 12b. Lemma evenly hairy; glumes green or dark purple, lanceolate, acuminate into awn-point.
 - 15a. Panicle branches 3–6 cm, flexuous; glumes dark purple; awn 6.5–9 cm, hairs shorter below, 2–3 mm on bristle 15. *S. purpurea*
 - 15b. Panicle branches 2–4 cm, straight; glumes green or purplish; awn 3–6 cm, hairs longer below, 0.3–0.7 mm on bristle 16. *S. roborowskyi*
 - 8b. Awn plumose only on column or only on bristle.
 - 16a. Awn 1.5–3 cm; column plumose, bristle glabrous or minutely hairy (hairs 0.1–0.2 mm).
 - 17a. Panicle 1–2 cm wide; branches 1–3 cm, suberect.
 - 18a. Awn obscurely 2-geniculate, hairs on column up to 1 mm; spikelets 1.1–1.4 cm 17. *S. regeliana*
 - 18b. Awn distinctly 2-geniculate, hairs on column 2–3 mm; spikelets 0.6–1.1 cm 18. *S. subsessiliflora*
 - 17b. Panicle (2–)3–7 cm wide; branches 3–6 cm, spreading or obliquely ascending.
 - 19a. Leaf blades scabrid or hairy; panicle branches spreading, with cushion in axils; ligule 3–7 mm; column hairs 3–4 mm 19. *S. penicillata*
 - 19b. Leaf blades smooth, glabrous; panicle branches ascending, without cushion in axils; ligule 1–1.5 mm; column hairs 1–2 mm 20. *S. aliena*
- 16b. Awn 6–28 cm; column glabrous, bristle plumose, hairs 2–6 mm.
 - 20a. Awn 1-geniculate, 6–13 cm 8. *S. tianschanica*

- 20b. Awn 2-geniculate, 15–28 cm.
- 21a. Glumes 2–3 cm; lemma evenly hairy; awn hairs 2–3 mm 21. *S. lessingiana*
- 21b. Glumes 3–5.5 cm; lemma hairs in lines; awn hairs 3–6 mm.
- 22a. Column of awn 5–6 cm to first bend; ligule up to 4 mm 22. *S. kirghisorum*
- 22b. Column of awn 3.5–4.5 cm to first bend; ligule 4–12 mm 23. *S. macroglossa*

1. *Stipa bungeana* Trinius, Enum. Pl. China Bor. 70. 1833.

长芒草 chang mang cao

Perennial, densely tufted. Culms 20–60 cm tall, 2–5-noded. Basal leaf sheaths pubescent, slightly swollen, enclosing cleistogamous spikelets, culm sheaths glabrous or margin ciliate; leaf blades acicular, convolute, basal blades up to 17 cm, culm blades 3–15 cm; ligule of basal leaves rounded, 0.2–0.5 mm, ciliate, of culm leaves lanceolate, 3–5 mm, apex denticulate. Panicle 12–20 cm, base enclosed by uppermost leaf sheath, gradually exerted after maturity. Spikelets gray-green or purple; glumes narrowly lanceolate, 0.9–1.5 cm, apex extended into a slender awn-tipped cusp; callus pungent, 1–1.3 mm; lemma 5–6 mm, pilose in longitudinal lines, awn articulation with a ring of short hairs; awn deciduous, 4–7 cm, scabrid, 2-geniculate, column 1–1.5 cm to first bend, 0.5–1 cm to second bend, bristle 3–5 cm. Cleistogamous spikelets laterally compressed, awnless or shortly awned. Caryopses regularly produced in cleistogamous spikelets. Fl. and fr. May–Oct.

Rocky slopes, loess hills, river banks, roadsides; 500–4000 m. Anhui, Gansu, Hebei, Henan, Jiangsu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Sichuan, Xinjiang, Xizang [Kazakhstan (Tien Shan), Kyrgyzstan (Tien Shan), Mongolia].

This is a good forage grass for summer pasture, becoming green early in the season.

2. *Stipa przewalskyi* Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 1(6): 3. 1920.

甘青针茅 gan qing zhen mao

Perennial, loosely tufted. Culms 30–100 cm tall, 2–3-noded. Leaf sheaths glabrous, lower slightly longer than internodes; leaf blades filiform, convolute, basal blades up to 30 cm, culm blades 10–15 cm, outer surface scabrid; ligule of basal leaves rounded, 0.5–1 mm, of culm leaves lanceolate, 2–3 mm, decurrent and adnate to margins of leaf sheath. Panicle slightly spreading, 15–30 cm, exerted from uppermost leaf sheath at maturity. Spikelets gray-green becoming purple; glumes narrowly lanceolate, 1.2–1.5 cm, apex slenderly acuminate; callus pungent, ca. 2 mm; lemma 8–10 mm, densely hairy in a ventral longitudinal line, longitudinally pilose on back, hispidulous below apex, a ring of short hairs at awn articulation; awn deciduous, 4–6 cm, 2-geniculate, column 1.5–2.5 cm to first bend, setulose with ca. 0.3 mm spinules, ca. 1 cm to second bend, bristle scabrid, stiff, straight, 1.5–2.5 cm. Fl. and fr. May–Aug.

• Grassy rocky hillsides, roadsides; 800–3600 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang.

This is a forage grass of summer pasture in steppe and forest steppe regions.

3. *Stipa capillacea* Keng, Sunyatsenia 6(2): 100. 1941.

丝颖针茅 si ying zhen mao

Perennial, tufted. Culms 15–50 cm tall, 2–3-noded. Basal leaves 1/3–1/2 length of culms; leaf sheaths glabrous, longer than internodes; leaf blades acicular, convolute, up to 20 cm, outer surface smooth or scaberulous; ligule of basal and culm leaves ca. 0.6 mm, truncate, ciliolate. Panicle narrowly contracted, 14–18 cm, often exerted from uppermost leaf sheath at maturity; branches erect-ascending, awns of spikelets twisted together at panicle top to form a tail. Spikelets greenish or purplish; glumes narrowly lanceolate, body ca. 1.5 cm, apex long attenuate into capillary 1–1.5 cm filament, often breaking into fine threads; callus pungent, 2–2.5 mm; lemma 7–10 mm, pubescent in a ventral longitudinal line, shortly longitudinally pilose on back, hispidulous below apex, a ring of stiff hairs at awn articulation; awn deciduous, 7–10 cm, 2-geniculate, column glabrous or puberulous, sometimes with longer hairs to 0.8 mm, 1–2 cm to first bend, 0.6–1 cm to second bend, bristle setulose, flexuous, 5–7 cm, apex filamentous. Fl. and fr. Jul–Sep.

Alpine scrub, wet meadows, hills, montane plains, river banks; 2900–5000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Nepal].

This is an easily recognizable species because of its spirally coiling awns and filamentous glume tips.

- 1a. Glumes 2.5–3 cm; lemma ca. 10 mm ... 3a. var. *capillacea*
- 1b. Glumes 1.5–2(–2.2) cm; lemma (7–)8–9 mm 3b. var. *parviflora*

3a. *Stipa capillacea* var. *capillacea*

丝颖针茅(原变种) si ying zhen mao (yuan bian zhong)

Stipa koelzii R. R. Stewart.

Glumes 2.5–3 cm. Lemma ca. 10 mm. Anthers ca. 4 mm. Fl. and fr. Jul–Sep.

Alpine scrub, meadows, hills, montane plains, river banks; 2900–5000 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Nepal].

3b. *Stipa capillacea* var. *parviflora* N. X. Zhao & M. F. Li, Acta Bot. Yunnan. 16: 229. 1994.

小花丝颖针茅 xiao hua si ying zhen mao

Glumes 1.5–2(–2.2) cm. Lemma (7–)8–9 mm. Anthers ca. 2 mm. Fl. Aug.

• Meadows on lake margins, moist places, field margins; 4200–4400 m. Xizang (Langkazê, Tingri).

This variety is used for forage and fiber.

4. *Stipa sareptana* A. K. Becker, Bull. Soc. Imp. Naturalistes Moscou 57: 52. 1882.

新疆针茅 xin jiang zhen mao

Perennial, compactly tufted. Culms 30–80 cm tall, smooth or spinulose, 2–3-noded, nodes dark, exposed. Basal leaves 1/2 length of culms, leaf sheaths smooth or spinulose, shorter than internodes; leaf blades setaceous, convolute, outer surface smooth or scabrid to shortly spinulose; ligule 2–10 mm, of basal leaves rounded, of culm leaves lanceolate. Panicle narrow, 10–20 cm, base enclosed by expanded uppermost leaf sheath. Spikelets yellowish green; glumes narrowly lanceolate, 1.5–2.5 cm, apex filiform; callus pungent, 2.2–3 mm; lemma 9–11 mm, shortly hairy in longitudinal lines, an obscure ring of hairs at awn articulation; awn deciduous, 10–15(–20) cm, scabrid, 2-geniculate, column 1.5–2.5 cm to first bend, 1–1.5 cm to second bend, bristle 9–15 cm, curling. Fl. and fr. Jun–Aug.

Steppes, mountain slopes, floodlands, river banks; 400–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia, Tajikistan].

This species differs from others in the *Stipa capillata* group by its basal leaves, which are much shorter than the culms, exposed culm nodes, and rather small spikelets.

- 1a. Culms and outer surface of leaf blades scabrid or shortly spinulose 4a. var. *sareptana*
- 1b. Culms and outer surface of leaf blades smooth and glabrous 4b. var. *krylovii*

4a. *Stipa sareptana* var. *sareptana*

新疆针茅(原变种) xin jiang zhen mao (yuan bian zhong)

Stipa capillata Linnaeus var. *sareptana* (A. K. Becker) Schmalhaus.

Culms spinulose. Leaf sheaths smooth or spinulose; leaf blades spinulose on outer surface; ligule of culm leaves 5–7(–10) mm. Awn with column ca. 2.5 cm to first bend, 1–1.5 cm to second bend, bristle 10–15 cm. Fl. and fr. Jun–Aug.

Drought steppe, desert steppe, Gobi desert; 400–2700 m. Xinjiang [Kazakhstan, Mongolia, Russia, Tajikistan].

4b. *Stipa sareptana* var. *krylovii* (Roshevitz) P. C. Kuo & Y. H. Sun, Fl. Reipubl. Popularis Sin. 9(3): 275. 1987.

西北针茅 xi bei zhen mao

Stipa krylovii Roshevitz, Izv. Glavn. Bot. Sada SSSR 28: 379. 1929; *S. capillata* var. *coronata* Roshevitz; *S. sareptana* subsp. *krylovii* (Roshevitz) D. F. Cui.

Culms smooth. Leaf sheaths smooth; leaf blades smooth on outer surface; ligule of culm leaves 2–3 mm. Awn with column 1.5–2 cm to first bend, ca. 1 cm to second bend, bristle 7–10 cm. Fl. and fr. Jun–Sep.

Mountain slopes, floodlands, river banks; 400–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

This variety is used as a forage grass in steppe regions.

5. *Stipa baicalensis* Roshevitz, Izv. Glavn. Bot. Sada SSSR 28:

380. 1929.

狼针草 lang zhen cao

Perennial, tufted. Culms 50–80 cm tall, 3–4-noded, lower nodes concealed. Leaf sheaths smooth or scabrid, lower usually longer than internodes; leaf blades convolute, basal blades up to 40 cm, outer surface smooth; ligule truncate or 2-toothed, ciliate, of basal leaves 0.5–1 mm, of culm leaves 1.5–2 mm. Panicle narrow, 20–50 cm, base often enclosed by expanded uppermost leaf sheath. Spikelets gray-green or purplish brown; glumes narrowly lanceolate, 2.5–3.5 mm, apex filiform; callus pungent, ca. 4 mm; lemma 12–15 mm, shortly hairy in longitudinal lines, a ring of short hairs at awn articulation; awn deciduous, 14–17 cm, scabrid, 2-geniculate, column 3–5 cm to first bend, 1.5–2 cm to second bend, bristle curling, ca. 10 cm. Fl. and fr. Jun–Oct.

Mountain slopes, dry grassy places; 700–4000 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xizang [Kazakhstan, Mongolia, Russia].

This species is scarcely distinguishable from the widespread *Stipa capillata*. It has a short ligule and a definite ring of short hairs at the awn articulation. It provides forage in dry steppe and meadow steppe regions.

6. *Stipa capillata* Linnaeus, Sp. Pl., ed. 2, 1: 116. 1762.

针茅 zhen mao

Perennial, densely tufted. Culms 40–80 cm tall, often 4-noded, lower nodes concealed. Leaf sheaths smooth or slightly scabrid, lower longer than internodes; leaf blades convolute, basal blades up to 40 cm, outer surface smooth or scabrid; ligule lanceolate, of basal leaves 1–1.5 mm, of culm leaves 3–10 mm. Panicle narrow, 10–25 cm or more, base enclosed by expanded uppermost leaf sheath. Spikelets yellowish green or gray-white; glumes narrowly lanceolate, 2.5–3.5 cm, apex filiform; callus pungent, 2–3 mm; lemma 9–12 mm, shortly hairy in longitudinal lines, smooth and glabrous toward apex; awn deciduous, 11–19 cm, scabrid, 2-geniculate, column 3.5–5 cm to first bend, ca. 1.5 cm to second bend, bristle curling, ca. 10 cm. Fl. and fr. Jun–Aug.

Mountain valleys, plains, rocky slopes; 500–2300 m. N Gansu, Hebei, Shanxi, N Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

This is a widespread species yielding good forage in the steppe zone when young. After the fruiting heads appear the sharp calluses can cause damage to cattle.

7. *Stipa grandis* P. A. Smirnov, Repert. Spec. Nov. Regni Veg. 26: 267. 1929.

大针茅 da zhen mao

Perennial, densely tufted. Culms 50–100 cm tall, 3–4-noded, lower nodes concealed. Basal leaves often reaching to panicle, leaf sheaths smooth or scabrid, lower longer than internodes; leaf blades filiform, convolute, up to 50 cm, outer surface smooth; ligule of basal leaves rounded, 0.5–1 mm, ciliate, of culm leaves lanceolate, 2.5–10 mm. Panicle narrow, 20–50

cm, base enclosed by expanded uppermost leaf sheath. Spikelets greenish purple; glumes narrowly lanceolate, 3–4.5 cm, apex filiform; callus pungent, 4–4.5 mm; lemma 15–17 mm, shortly hairy in longitudinal lines, a ring of short hairs at awn articulation; awn deciduous, 20–28 cm, scabrid, 2-geniculate, column 7–10 cm to first bend, 2–2.5 cm to second bend, bristle curling, 11–18 cm. Fl. and fr. May–Aug.

Flat open steppes; 100–3400 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi [Mongolia, Russia].

This species is very close to *Stipa capillata*, but with larger spikelets and longer awns. It provides good forage for grazing and cutting in the steppe zone.

8. *Stipa tianschanica* Roshevitz in B. Fedtschenko, Fl. Aziatsk. Ross. 1(12): 149. 1916.

天山针茅 tian shan zhen mao

Culms 10–25 cm tall, 2–3-noded, glabrous or pubescent below nodes. Basal leaves equaling or overtopping culms; leaf sheaths glabrous, shorter than internodes; leaf blades convolute, acicular, outer surface smooth or scabrid; ligule ca. 1 mm, obtuse, densely pilose. Panicle contracted, 4–10 cm, branches usually enclosed by inflated uppermost leaf sheath. Spikelets pale greenish; glumes narrowly lanceolate, equal or lower glume slightly longer, 2–3.5 cm, apex hyaline, long attenuate-filiform; callus pungent, 1.5–2 mm; lemma 7–10 mm, pilose in longitudinal lines, apex with a ring of short hairs or glabrous; awn deciduous, 6–13 cm, 1-geniculate, column 1–2.5 cm, glabrous, bristle 4–14 cm, plumose, hairs 3–6 mm. Fl. and fr. Jun–Jul.

Dry mountain slopes, dry steppes, deserts; 300–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Uzbekistan].

This is the only species in China with a clearly 1-geniculate awn with glabrous column and feathery bristle. The twisted column is almost smooth, and the hairs of the feather begin just below the bend, splaying out around it. It is a good forage grass.

- 1a. Lemma apex scabrid, with a ring of short hairs 8a. var. *tianschanica*
- 1b. Lemma apex smooth, glabrous.
 - 2a. Glumes 2–2.5 cm; awn bristle 4–7 cm 8b. var. *gobica*
 - 2b. Glumes 3–3.5 cm; awn bristle 10–15 cm 8c. var. *klemenzi*

8a. *Stipa tianschanica* var. *tianschanica*

天山针茅(原变种) tian shan zhen mao (yuan bian zhong)

Stipa potaninii Roshevitz.

Culms 17–23 cm tall. Panicle ca. 5 cm. Glumes 2.7–3.3 cm; lemma 7–8 mm, apex scabrid, with a ring of short hairs; awn 7–9.5 cm, column 1.2–1.5 cm, bristle 6–7 cm, hairs to 6 mm. Fl. and fr. Jun–Jul.

Dry mountain slopes; 2100–2600 m. Gansu, Qinghai, Xinjiang, Xizang [Kazakhstan (Tien Shan), Kyrgyzstan, Uzbekistan].

This variety has the most westerly distribution within the species, being more or less confined to the Tien Shan range.

8b. *Stipa tianschanica* var. *gobica* (Roshevitz) P. C. Kuo & Y. H. Sun, Fl. Reipubl. Popularis Sin. 9(3): 277. 1987.

戈壁针茅 ge bi zhen mao

Stipa gobica Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 13. 1924; *S. gobica* var. *wulateica* Y. Z. Zhao; *S. sinomongolica* Ohwi; *S. tianschanica* subsp. *gobica* (Roshevitz) D. F. Cui; *S. wulateica* (Y. Z. Zhao) Y. Z. Zhao.

Culms 10–12 cm tall. Panicle 4–7 cm. Glumes 2–2.5 cm; lemma 7.5–8.5 mm, apex smooth, without a ring of short hairs; awn 6–8 cm, column 1–1.5 cm, bristle 4–6 cm, hairs 3–5 mm. Fl. and fr. Jun–Jul.

Gravelly slopes, stony plains, dry steppes, deserts; 300–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia].

8c. *Stipa tianschanica* var. *klemenzi* (Roshevitz) Norlindh, Fl. Mongol. Steppe 1: 66. 1949.

石生针茅 shi sheng zhen mao

Stipa klemenzi Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 12. 1924.

Culms 20–40 cm tall. Panicle 6–10 cm. Glumes 3–3.5 cm; lemma 9–11 mm, apex smooth, without a ring of short hairs; awn 9.5–13 cm, column 1.5–2.5 cm, bristle 10–15 cm, hairs up to 6.5 mm. Fl. and fr. Jun–Jul.

Gravelly slopes; ca. 1400 m. Nei Mongol [Mongolia, Russia (near Mongolian border)].

9. *Stipa consanguinea* Trinius & Ruprecht, Sp. Gram. Stipac. 78. 1842.

宜红针茅 yi hong zhen mao

Perennial, tufted. Culms erect or geniculate at base, 15–50 cm tall, 2-noded. Leaf sheaths shorter than internodes; leaf blades grayish green, setaceous, abaxial surface smooth, glabrous; ligule of basal leaves 0.1–0.4 mm, of culm leaves 1–1.5 mm. Panicle contracted, 6–8 cm, base enclosed in uppermost leaf sheath. Spikelets tinged purplish; glumes subequal, 2.2–2.6 cm, hyaline, apex long acuminate; callus short; lemma 8–10 mm, hairy in longitudinal lines, hairs denser in lower part, a ring of short hairs at awn articulation; awn deciduous, 8–11 cm, pubescent, 1(or 2)-geniculate, hairs on column 0.2–0.4 mm, bristle slightly flexuous, hairs 0.4–0.7 cm. Fl. and fr. May–Jul.

Open stony slopes; 1500–2500 m. Xinjiang [Mongolia (Altai), Russia (Altai)].

This species has sometimes been considered conspecific with *Stipa koelzii* (a synonym of *S. capillacea* in this treatment), but it has much larger glumes lacking filamentous tips and more clearly pubescent, non-spiralling awns. It also grows in drier habitats.

10. *Stipa mongolorum* Tzvelev, Rast. Tsentr. Azii 4: 57. 1968.

蒙古针茅 meng gu zhen mao

Perennial, densely tufted. Culms 15–40 cm tall, 1–2-

noded, pubescent below nodes. Basal leaves 1/2 length of culms; leaf sheaths glabrous or hairy on margin, shorter than internodes; leaf blades acicular, convolute, outer surface smooth or almost so; ligule 0.3–0.5 mm, densely hairy. Panicle open, lax, 8–20 cm, shortly exerted from uppermost leaf sheath. Spikelets pale greenish; glumes subequal or lower slightly longer, narrowly lanceolate, 1.4–1.9 cm, membranous, apex acuminate-filiform; callus pungent, 1.5–2 mm; lemma 6–7.5 mm, uniformly densely pilose; awn deciduous, 4.5–6.4 cm, plumose throughout, 1-geniculate, column 0.4–0.7 cm, hairs ca. 2 mm, bristle 4–6 cm, hairs 2–3.5 mm. Fl. and fr. Jun–Aug.

Rocky or stony slopes, dry steppes; ca. 1500 m. Nei Mongol, Ningxia (Helan Shan) [Mongolia].

The awn has a shorter column in proportion to the bristle than in *Stipa caucasica*.

11. *Stipa caucasica* Schmalhausen, Ber. Deutsch. Bot. Ges. 10: 293. 1892.

镰芒针茅 lian mang zhen mao

Densely tufted perennial, roots thick, tomentose, clothed in sand grains; old basal sheaths forming large clumps. Culms 15–30 cm tall, 2–3-noded, lower internodes pubescent. Basal leaves 2/3 length of culms; leaf sheaths shorter than internodes; leaf blades acicular, convolute, outer surface smooth or scabrid, ligule of basal leaves truncate, ca. 0.5 mm, of culm leaves rounded, 1–1.5 mm, ciliate. Panicle narrow, 5–10 cm, branches enclosed in inflated uppermost leaf sheath. Spikelets pale green-brown sometimes faintly purple-tinged; glumes equal or lower glume slightly longer, narrowly lanceolate, 1.5–4 cm, apex long attenuate-filiform; callus pungent, 1–2 mm; lemma 7–10 mm, pilose in longitudinal lines, a ring of soft hairs at apex; awn deciduous, 5–12 cm, hairy throughout, 1-geniculate, column 1.5–2.3 cm, hairs 1–2 mm, bristle 5–8 cm, falcately curved, plumose, hairs 3–5 mm. Fl. and fr. Apr–Jun.

Stony mountain slopes, sand dunes, gravel plains; 1400–5100 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Turkmenistan; SW Asia (Caucasus, N Iran)].

This is a widespread and highly polymorphic species. Variation in China is best accommodated within the following two subspecies. *Stipa caucasica* subsp. *glareosa* has a rather more easterly distribution, but smaller, scabrid-leaved forms occur sporadically throughout the range of the species in part related to increased altitude. The species is close to *S. orientalis*, the most obvious difference being the 1-geniculate awn. Hybrids between *S. caucasica* and *S. orientalis* have been reported.

- 1a. Leaf blades usually smooth on outer surface;
glumes 3.5–4 cm; awn 7–12 cm 11a. subsp. *caucasica*
- 1b. Leaf blades usually scabrid on outer surface;
glumes 1.5–3.5 cm; awn 4.5–7 cm 11b. subsp. *glareosa*

11a. *Stipa caucasica* subsp. *caucasica*

镰芒针茅(原亚种) lian mang zhen mao (yuan ya zhong)

Stipa orientalis Trinius var. *grandiflora* Ruprecht.

Plant coarse, at least 20 cm tall; leaf blades 0.5–1 mm in

diam., outer surface usually smooth; glumes 3.5–4 cm; awn 7–14 cm.

Stony slopes, landslips; 1400–4500 m. Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan; SW Asia (Caucasus, N Iran)].

This subspecies provides fodder in early spring in desert steppe.

11b. *Stipa caucasica* subsp. *glareosa* (P. A. Smirnov) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 20. 1974.

沙生针茅 sha sheng zhen mao

Stipa glareosa P. A. Smirnov, Bull. Soc. Imp. Naturalistes Moscou 38: 12. 1929; *S. caucasica* f. *desertorum* Roshevitz; *S. caucasica* subsp. *desertorum* (Roshevitz) Tzvelev; *S. caucasica* var. *desertorum* (Roshevitz) Tzvelev; *S. glareosa* var. *langshanica* Y. Z. Zhao; *S. langshanica* (Y. Z. Zhao) Y. Z. Zhao.

Plant delicate, up to 20 cm tall; leaf blades 0.25–0.5 mm in diam., outer surface usually scabrid; glumes 2–3.5 cm; awn 4.5–7 cm.

Stony mountain slopes, sand dunes, gravel plains; 600–5100 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan].

Stipa langshanica appears to represent a small, local variant from a mountain range in Nei Mongol. The type has not been seen.

12. *Stipa orientalis* Trinius in Ledebour, Fl. Altaic. 1: 83. 1829.

东方针茅 dong fang zhen mao

Perennial, densely tufted; old basal sheaths forming large clumps, yellowish, slightly glossy, margins ciliate. Culms 15–35 cm tall, 2–3-noded, nodes purple, internodes puberulous. Basal leaves 1/2–2/3 length of culms; leaf sheaths shorter than internodes; leaf blades filiform, convolute, 4–15 cm, abaxial surface scaberulous-puberulous; ligule lanceolate, 2–4 mm, ciliate. Panicle contracted, 4–8 cm, branches frequently enclosed by inflated uppermost leaf sheath. Spikelets green, or occasionally faintly purple-tinged, with silvery tips; glumes narrowly lanceolate, lower usually slightly longer, 1.8–2.2 cm, apex scarious, finely long-acuminate; callus pungent, ca. 2 mm; lemma 7–8 mm, pilose in ventral line and along midvein, intermediate veins pilose at least below middle, a ring of short soft hairs at awn articulation; awn deciduous, 4–6 cm, hairy throughout, 2-geniculate, column 0.7–1.2 cm to first bend, 0.5–0.8 cm to second bend, shortly hairy, hairs 0.5–1 mm, bristle 3–4 cm, plumose, hairs 3–4 mm at base reducing toward apex. Fl. and fr. May–Jul.

Rocky slopes, mountain valleys, desert steppes; 400–5100 m. Qinghai, Xinjiang, Xizang [Kashmir, Kyrgyzstan, W Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe (Ural)].

This is a good forage grass in desert steppe regions.

13. *Stipa arabica* Trinius & Ruprecht, Sp. Gram. Stipac. 77. 1842.

图尔盖针茅 tu er gai zhen mao

Stipa arabica subsp. *caspia* (K. Koch) Tzvelev; *S. arabica*

var. *szovitsiana* Trinius; *S. arabica* var. *turgaica* (Roshevitz) Tzvelev; *S. caspia* K. Koch; *S. szovitsiana* (Trinius) Grisebach; *S. turgaica* Roshevitz.

Perennial, tufted. Culms 40–80 cm tall, gray pubescent, 2–3-noded, nodes often dark-brown. Basal leaves 1/2 length of culms; leaf sheaths shorter than internodes, pubescent or lower part subglabrous; leaf blades filiform, convolute, outer surface glabrous to densely pilose; ligule lanceolate, 5–10 mm. Panicle contracted, 15–35 cm, base enclosed by slightly inflated uppermost leaf sheath. Spikelets pale green or greenish yellow; glumes narrowly lanceolate, 2–3 cm, membranous, apex long-acuminate; callus pungent, ca. 1 mm; lemma 9–12 mm, shortly hairy in longitudinal lines not reaching apex, a ring of hairs at awn articulation; awn 9–20 cm, deciduous, hairy throughout, 2-geniculate, column 1.5–1.8 cm to first bend, hairs ca. 1 mm, ca. 1.5 cm to second bend, bristle 6–7 cm, plumose on second column and bristle, hairs 1–2.5 mm. Fl. and fr. May–Jul.

Rocky slopes, Gobi desert; 500–3100 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

This is a widespread and variable species, reaching the eastern limit of its range in W China. It is sometimes subdivided into more narrowly defined species or infraspecific taxa based on variations in leaf indumentum and spikelet size. Chinese material is referable to subsp. *caspia*, or *Stipa caspia* at specific rank. *Stipa arabica* subsp. *arabica* from SW Asia has lemmas 7–9 mm and awns not exceeding 9 cm. *Stipa turgaica* is based on a form with densely pilose leaf blades. *Stipa arabica* is a good forage grass in desert steppe regions.

14. *Stipa breviflora* Grisebach, Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 3: 82. 1868.

短花针茅 duan hua zhen mao

Perennial, forming spreading tuft; old basal sheaths pubescent. Culms sometimes geniculate, 20–60 cm tall, 1–3-noded. Basal leaves 1/4–1/3 length of culms; leaf sheaths shorter than internodes; leaf blades acicular, convolute, 7–15 cm, outer surface glabrous; ligule of basal leaves 0.5–1.5 mm, rounded, ciliate, of culm leaves up to 2 mm. Panicle loosely contracted, 10–25 cm, base enclosed by uppermost leaf sheath. Spikelets pale gray-green or light brown with silvery tips; glumes narrowly lanceolate, lower often slightly longer, 1.2–2 cm, apex scarious, acuminate into fragile filiform extension; callus pungent, 1.2–1.5 mm; lemma 0.6–0.8 cm, pilose along veins in lower half, minutely asperulous above, scabrid-spinulose below apex, a ring of short stiff hairs at awn articulation; awn 5.5–8 cm, deciduous, hairy throughout, 2-geniculate, column 1–1.6 cm to first bend, 0.7–1 cm to second bend, hairs 0.8–1 mm, bristle 3–6 cm, hairs 1–1.5 mm. Fl. May–Jul.

Gravel and rocky slopes; 700–4700 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Kashmir, Kazakhstan (Tien Shan), Kyrgyzstan, Mongolia, Nepal, Tajikistan, Uzbekistan].

This species is easily recognized by its shortly plumose awn, spinulose lemma apex, and hairy basal sheaths. The long filiform glume tips are readily broken off, so that the spikelets appear to be much shorter. This is a spring forage grass in desert steppe regions.

15. *Stipa purpurea* Grisebach, Nachr. Königl. Ges. Wiss.

Georg-Augusts-Univ. 3: 82. 1868.

紫花针茅 zi hua zhen mao

Lasiagrostis tremula Ruprecht; *Ptilagrostis purpurea* (Grisebach) Roshevitz; *Stipa purpurea* subsp. *arenosa* (Tzvelev) D. F. Cui; *S. purpurea* var. *arenosa* Tzvelev; *S. pilgeriana* K. S. Hao.

Perennial, densely tufted. Culms 20–45 cm tall, 1–2-noded. Basal leaves 1/2 length of culms; leaf sheaths smooth, longer than internodes; leaf blades acicular, convolute, outer surface smooth or scabrid; ligule of basal leaves ca. 1 mm, obtuse, ciliate, of culm leaves lanceolate, 3–6 mm, decurrent and adnate to margins of leaf sheath. Panicle open, up to 15 cm, base enclosed in elongate purple uppermost leaf sheath, spikelets few; branches 3–6 cm, capillary, flexuous. Spikelets purple; glumes lanceolate, 1.3–2.5 cm, apex acuminate into 2–3 mm awn point; callus pungent, 1.5–2.2 mm; lemma 8–12 mm, back softly pubescent, apex without ring of hairs; awn deciduous, 6–9 cm, plumose throughout, hairs 2–3 mm, 2-geniculate, column 1.5–1.8 cm to first bend, 0.7–1 cm to second bend, bristle 4.5–7 cm. Fl. and fr. Jun–Oct.

Stony slopes, valley silt, sand or gravel flats; 1900–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Kashmir, Kyrgyzstan (Pamirs), Tajikistan (Tien Shan)].

This species provides forage in mountain areas. At high altitudes it often occurs in *Kobresia pygmaea* turf.

16. *Stipa roborowskyi* Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 1(6): 1. 1920.

昆仑针茅 kun lun zhen mao

Perennial, forming dense tussocks. Culms 30–75 cm tall, 2–3-noded. Basal leaves 1/2–2/3 length of culms; leaf sheaths longer than internodes; leaf blades acicular, convolute, 8–10 cm, outer surface sparsely pubescent; ligule of basal leaves lanceolate, 2–5 mm, of culm leaves 3–7(–12) mm. Panicle 15–30 cm, base included in uppermost leaf sheath; branches obliquely ascending, straight, 2–4 cm. Spikelets green or tinged pale purple; glumes narrowly lanceolate, 1.4–1.6 cm, apex finely acuminate; callus pungent, 1–3 mm; lemma 7–8 mm, back pubescent, a ring of hairs at awn articulation; awn deciduous, 4–6 cm, hairy throughout, 2-geniculate, column plumose with ca. 2 mm hairs, 0.6–0.7 cm to first bend, ca. 1 cm to second bend, bristle 3–4 cm, hairs 0.3–0.7 mm. Fl. and fr. Jul–Sep.

Grassy mountainsides, silt fans and gravelly places by lakes; 3500–5100 m. Qinghai, Xinjiang (Kunlun Shan, Pamirs), Xizang [India (Sikkim), Kashmir].

This is a good forage grass in steppe and meadow steppe regions.

17. *Stipa regeliana* Hackel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1: 130. 1884.

狭穗针茅 xia sui zhen mao

Stipa purpurascens Hitchcock.

Perennial, densely tufted. Culms 20–50 cm tall. Basal leaves 1/3–1/2 length of culms; leaf sheaths glabrous; leaf blades setaceous, convolute, outer surface smooth or slightly scaberulous, apex often with a tuft of ca. 0.2 mm spinules;

ligule lanceolate, 4–6 mm, puberulent. Panicle narrow, 3–10 cm, exerted from uppermost leaf sheath; branches suberect, spikelets few. Spikelets purple with pale tips; glumes subequal or lower glume slightly longer, narrowly oblong, 1.1–1.4 cm, membranous, apex acute to finely acuminate; callus pungent, 1–1.5 mm; lemma 7–8 mm, pubescent, hairs slightly longer below awn; awn stout, stiff, 1.5–2 cm, 1–2-geniculate, column weakly twisted, shortly plumose, 0.3–0.5 cm to first bend, ca. 0.5 cm to second bend, this sometimes obscure, hairs 0.7–1 mm decreasing toward bristle, bristle ca. 1 cm, setulose, hairs appressed, 0.1–0.2 mm. Fl. and fr. Jul–Sep.

Montane grasslands, alluvial flats in mountain valleys, floodplains; 1600–4600 m. Gansu, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Kashmir, E Kazakhstan, Kyrgyzstan (Tien Shan), Tajikistan (E Pamirs)].

The combination “*Achnatherum purpurascens* (Hitchcock) Keng” (Claves Gen. Sp. Gram. Prim. Sin. 106, 213. 1957) was not validly published because Keng did not cite the place and date of valid publication of the basionym.

This is a forage grass in montane regions.

18. *Stipa subsessiliflora* (Ruprecht) Roshevitz in B. Fedtschenko, Izv. Imp. Bot. Sada Petra Velikago 14 (Suppl. 2): 50. 1915.

座花针茅 zuo hua zhen mao

Lasiagrostis subsessiliflora Ruprecht in Osten-Sacken & Ruprecht, Sert. Tianschan. 35. 1869; *Ptilagrostis subsessiliflora* (Ruprecht) Roshevitz; *Stipa basiplumosa* Munro ex J. D. Hooker; *S. subsessiliflora* subsp. *basiplumosa* (Munro ex J. D. Hooker) D. F. Cui; *S. subsessiliflora* var. *basiplumosa* (Munro ex J. D. Hooker) P. C. Kuo & Y. H. Sun.

Perennial, densely tufted. Culms 10–45 cm tall, 2–3-noded. Basal leaves 1/3 length of culms; leaf sheaths glabrous, lower shorter than internodes, upper longer than internodes; leaf blades setaceous, convolute, basal blades up to 15 cm, outer surface scabrid; ligule lanceolate, 2–4 mm or slightly shorter at base. Panicle narrow, 7–14 × 1–2 cm, base enclosed by uppermost leaf sheath when young; branches suberect, 1–3 cm. Spikelets purple; glumes equal or lower longer, lanceolate-oblong, 0.6–1.1 cm, papery, apex scarious, acute to attenuate-mucronate; callus pungent, ca. 1 mm; lemma 4–6 mm, pubescent; awn deciduous, 1.5–2.7 cm, 2-geniculate, column plumose, hairs to first bend 2–3 mm, hairs to second bend 1–1.5 mm, bristle scabrid. Fl. and fr. Jul–Sep.

Stony slopes, alluvial plains, sandy river banks; 1900–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Kashmir, E Kazakhstan, Kyrgyzstan, Russia (Altai), Tajikistan, Uzbekistan].

This is a high mountain species, yielding good forage.

19. *Stipa penicillata* Handel-Mazzetti, Oesterr. Bot. Z. 85: 226. 1936.

疏花针茅 shu hua zhen mao

Perennial, tufted. Culms 25–70 cm tall, 1–2-noded. Basal leaves reaching to panicle; leaf sheaths scabrid to white-hirsute; leaf blades setaceous, convolute, basal blades up to 30 cm, outer surface densely scabrid with some longer spinules or hir-

sute; ligule lanceolate, 3–7 mm, acute. Panicle open, 15–25 cm, exerted from uppermost leaf sheath; branches with axillary cushions, capillary, flexuous, with 2–4 spikelets. Spikelets green or flushed purplish; glumes subequal or lower slightly longer, lanceolate-oblong, 0.8–1 cm, apex acuminate into a fine point; callus pungent, ca. 1 mm; lemma 5–8 mm, pilose; awn ca. 2 cm, deciduous, 1–2-geniculate, column plumose, hairs 3–4 mm, 0.3–0.7 cm to first bend, 0.4–0.5 cm to second bend, this sometimes obscure, bristle 0.7–1.8 cm, scabrid. Fl. and fr. Jun–Sep.

• Mountain slopes, sand and gravel of river and lake valleys; 1400–5200 m. Gansu, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

- 1a. Leaf sheaths and blades scabrid; ligule glabrous on back 19a. var. *penicillata*
- 1b. Leaf sheaths and blades densely hirsute; ligule hairy on back, ciliolate along margin 19b. var. *hirsuta*

19a. *Stipa penicillata* var. *penicillata*

疏花针茅(原变种) shu hua zhen mao (yuan bian zhong)

Stipa laxiflora Keng.

Leaf sheaths and blades scabrid; ligule glabrous on back. Fl. and fr. Jun–Sep.

• Mountain slopes, sand and gravel of river and lake valleys; 1400–5200 m. Gansu, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang.

This is a good forage grass when young.

19b. *Stipa penicillata* var. *hirsuta* P. C. Kuo & Y. H. Sun, Bull. Bot. Res., Harbin 4(4): 89. 1984.

毛疏花针茅 mao shu hua zhen mao

Leaf sheaths and blades densely hirsute with gray-white hairs; ligule hairy on back, ciliolate along margin. Awn distinctly 2-geniculate. Fl. and fr. Jul–Sep.

• Dry mountain slopes, ravine sides; 3400–4500 m. Qinghai.

20. *Stipa aliena* Keng, Sunyatsenia 6(1): 74. 1941.

异针茅 yi zhen mao

Perennial, tufted. Culms 20–40 cm tall, 1–2-noded. Basal leaves 1/2–2/3 length of culms; leaf sheaths smooth, glabrous, longer than internodes; leaf blades setaceous, convolute, basal blades up to 24 cm, outer surface smooth; ligule rounded, 1–1.5 mm, shorter in basal leaves, hairy on back. Panicle open, 10–15 cm; branches without axillary cushions, loosely ascending. Spikelets gray-purplish; glumes subequal, lanceolate, 1–1.3 cm, apex slenderly acuminate; callus pungent, ca. 1 mm; lemma 6.5–8 mm, pilose; awn persistent, 1.8–2.5 cm, 2-geniculate, column 0.4–0.5 cm to first bend, plumose, hairs 1–2 mm at base reducing toward first bend, 0.4–0.5 cm to second bend, puberulous, bristle 1–1.5 cm, appressed-puberulous. Fl. and fr. Jul–Sep.

• Damp grassy mountain slopes, silt fans, river banks; 2900–4600 m. Gansu, Qinghai, Sichuan, Xizang.

This is a good forage grass in steppe regions.

21. *Stipa lessingiana* Trinius & Ruprecht, Sp. Gram. Stipac. 79. 1842.

细叶针茅 xi ye zhen mao

Perennial, tufted. Culms 30–60 cm tall, 2–3-noded. Basal leaves 1/2–2/3 length of culms; leaf sheaths smooth or margins ciliate, longer than internodes; leaf blades setaceous, up to 35 cm, 0.3–0.5 mm in diam., outer surface scabrid at least in apical part; ligule of basal leaves 0.2–0.5 mm, rounded, ciliate, of culm leaves 1–2 mm. Panicle narrow, 10–20 cm, base enclosed by uppermost leaf sheath. Spikelets yellowish green; glumes subequal, linear-lanceolate, 2–3 cm, apex attenuate into hyaline filament; callus pungent, 1.5–2 mm; lemma 8–10 mm, pubescent, densely in lower part and sparsely in upper part, a ring of short hairs at apex; awn deciduous, 15–20 cm, 2-geniculate, column 2–3 cm to first bend, smooth, glossy, 1–1.5 cm to second bend, bristle 8–15 cm, plumose, hairs 2–3 mm. Fl. and fr. May–Jul. $2n = 44$.

Rocky hill slopes, piedmont regions; 800–1300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, S Russia, Tajikistan, Turkmenistan; SW Asia (Caucasus, Iran), E Europe].

Stipa hohenackeriana Trinius & Ruprecht has been reported from Xinjiang. It differs from *S. lessingiana* by the smooth outer surface of the leaf blades, longer ligules (1.5–5 mm), and scabrid awn column.

Stipa lessingiana is a good forage grass in steppe regions.

22. *Stipa kirghisorum* P. A. Smirnov, Repert. Spec. Nov. Regni Veg. 21: 232. 1925.

大羽针茅 da yu zhen mao

Stipa pennata Linnaeus subsp. *kirghisorum* (P. A. Smirnov) Freitag.

Perennial, tufted. Culms 35–60 cm tall, 4-noded. Basal leaves 2/3 to equaling length of culms; leaf sheaths longer than internodes, scabrid, lowermost with ciliate margins; leaf blades setaceous, convolute, 0.5–0.7 mm in diam., outer surface scabrid; ligule of basal leaves 1–1.5 mm, rounded, margin ciliate, of culm leaves up to 4 mm, acuminate. Panicle narrow, 10–15 cm, branches often enclosed by uppermost leaf sheath. Spikelets yellowish green; glumes subequal, lanceolate, 3.5–5 cm, apex acuminate into long fragile filiform tip; callus pungent, 2.5–4 mm; lemma 14–18 mm, hairs in longitudinal lines, marginal line terminating 1–2 mm below apex, dorsal lines separate to base, apex glabrous; awn deciduous, 16–26 cm, 2-geniculate, column smooth, glossy, 5–6 cm to first bend, 1–2 cm to second bend, bristle 12–18 cm, plumose, hairs 4–5 mm. Fl. and fr. May–Sep.

Rocky mountain slopes, alluvial fans, dry steppes; 300–2400 m. Xinjiang [Afghanistan (Hindu Kush), Kashmir, Kazakhstan, Kyrgyzstan, W Mongolia, N Pakistan, Tajikistan, Uzbekistan].

This is part of the widespread *Stipa pennata* complex, extending from W Europe to Siberia and the Himalayas, and including a number

of subsidiary taxa. *Stipa kirghisorum* is one of the more distinctive segregates, differing from *S. pennata* s.s. by the longer marginal lines of hairs on the lemma and dorsal lines separate to the base. It is a common forage grass in steppe regions.

23. *Stipa macroglossa* P. A. Smirnov, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 47. 1924.

长舌针茅 chang she zhen mao

Perennial. Culms 30–50 cm tall, 2–3-noded, pubescent below nodes. Basal leaves nearly equal to culms; leaf sheaths shorter than internodes, scabrid; leaf blades setaceous, convolute, ca. 0.5 mm in diam., outer surface strongly scabrid; ligule linear-lanceolate, 4–7(–12) mm, laterally decurrent and adnate to margins of leaf sheath. Panicle contracted, 10–15 cm, base enclosed by expanded uppermost leaf sheath. Spikelets yellowish green; glumes 4–5.5 cm, apex long acuminate-filiform; callus pungent, ca. 3 mm; lemma 12–16 mm, hairs in longitudinal lines, marginal line terminating 2.5–3.5 mm below apex, other lines shorter, apex glabrous; awn deciduous, 15–28 cm, 2-geniculate, column smooth, glossy, 3–4.5 cm to first bend, ca. 2 cm to second bend, bristle 15–20 cm, plumose, hairs 3–6 mm. Fl. and fr. Jun–Sep.

Dry steppes, rocky slopes; 800–1800 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan].

This is a member of the *Stipa pennata* complex, distinguished by an exceptionally long ligule. It provides good forage when young in steppe regions.

