

Perennial. Culms tufted, ca. 50 cm tall, ca. 5 mm in diam. Leaf sheaths retrorsely pubescent; leaf blades 10–20 cm × 4–10 mm, pubescent. Panicle erect, rather narrow, 10–15 cm; primary branches 3–5 cm, lower branches erect or spreading, each bearing 1 or 2 spikelets. Spikelets 20–30 × 5–8 mm, florets 9–13, overlapping; rachilla internodes not visible; lower glume 6–7 mm, upper glume ca. 8 mm, apex acuminate; lemmas 10–20 × ca. 2.2 mm in side view, keeled, pubescent, margins membranous, awned from apex; awn 5–7 mm. Fl. May–Jun.  $2n = 28, 42, 56, 70$ .

Roadsides, forest margins, moist places, adventive. Hebei [native to North America].

**54. *Bromus catharticus*** Vahl, Symb. Bot. 2: 22. 1791.

扁穗雀麦 bian sui que mai

*Bromus unioloides* Kunth; *Schedonorus unioloides* (Kunth) Roemer & Schultes; *Serrafalcus unioloides* (Kunth) Sampaio; *Zerna unioloides* (Kunth) Lindman.

Annual. Culms erect or geniculately ascending, 60–100 cm tall, ca. 5 mm in diam. Leaf sheaths pubescent; leaf blades 30–40 cm × 4–6 mm, scattered pubescent; ligule ca. 2 mm. Panicle lax, oblong in outline, 10–40 cm; branches ca. 10 cm, scabrid, each bearing 1–3 spikelets. Spikelets ovate-oblong, laterally compressed, 15–30 × 8–10 mm, florets 6–11, overlapping; rachilla internodes not visible, ca. 2 mm, scabrid; glumes

narrowly lanceolate, lower glume 10–12 mm, upper glume slightly longer than lower glume; lemmas 15–20 mm, keeled, 11-veined, veins scabrid, apex mucronate; palea narrow, ca. 1/2 as long as lemma, keels ciliate. Anthers 0.3–0.6 mm. Fl. May, fr. Sep.  $2n = 28, 42, 58$ .

Shady ditch sides, introduced. Guizhou, Hebei, Jiangsu, Nei Mongol, Taiwan, Yunnan [native to South America].

This species is widely introduced as a winter forage (Rescue Grass) and is now adventive in most temperate countries.

**55. *Bromus carinatus*** Hooker & Arnott, Bot. Beechey Voy. 403. 1840.

显脊雀麦 xian ji que mai

*Ceratochloa carinata* (Hooker & Arnott) Tutin.

Annual. Culms erect, 40–50 cm tall or more, glabrous. Leaf sheaths glabrous or pubescent near mouth; leaf blades flat, 20–30 cm × 5–10 mm, apex acuminate. Panicle open, 15–30 cm; branches long, spreading or drooping. Spikelets linear-lanceolate, laterally compressed, 30–40 mm, florets 5–11, lax; glumes lanceolate, 3–5-veined, apex acuminate, upper glume shorter than lower lemma, 5–7-veined; lemma 15–17 mm, compressed to keel, back scabrid, awn apical, 4(–10) mm; palea subequal to lemma; anthers ca. 0.5 mm.  $2n = 56$ .

Cultivated. Beijing, Taiwan [native to NW Europe and North America].

## 15. Tribe TRITICEAE

小麦族 xiao mai zu

Chen Shouliang (陈守良); Zhu Guanghua (朱光华)

Herbs annual or perennial, with or without rhizomes. Culms tufted or solitary. Leaf anatomy non-Kranz, without microhairs; leaf sheath usually split to base, rarely closed; ligule leathery or membranous; leaf blade usually linear to lanceolate, flat or involute. Inflorescence a solitary, bilateral spike, linear to ovate; rachis flattened, tough, or fragile and disarticulating at base of internodes, side not facing spikelets ± convex (here referred to as “back”). Spikelets 1 per node or in groups of 2 or 3 (rarely more) per node, usually sessile, rarely with a short pedicel, with 1 to many florets and apical floret smaller or sterile, laterally or dorsiventrally compressed, usually disarticulating below each floret if rachis tough. Glumes membranous to leathery, usually persistent, sometimes awnlike or reduced. Lemma 5–11-veined, apically awned or awnless. Palea with 2 keels. Lodicules 2, free, entire or 2-lobed. Stamens 3. Ovary tipped by a small, fleshy, hairy appendage. Stigmas 2. Caryopsis ellipsoid or oblong, hollowed on hilum face, free or somewhat adherent to lemma and palea. Endosperm with starch grains simple, rounded. Chromosomes large,  $x = 7$ .

About 20 genera and 330 species: temperate and warm-temperate regions, mainly in the N hemisphere; 13 genera (one introduced) and 175 species (99 endemic, eight introduced) in China.

In this account, “first lemma” refers to the lemma of the basal floret in a spikelet.

Chinese genera of economic value include *Hordeum* and *Triticum* (staple foods) and *Agropyron*, *Elymus*, *Elytrigia*, and *Leymus* (fine forage).

1a. Spikelets in groups of 2 or more per node of rachis.

2a. Spikelets dorsiventrally compressed; spike with rachis disarticulating, or if not then plants cultivated.

3a. Spikelets all sessile and similar in groups of 2 or 3 in regular, longitudinal rows; spike with rachis disarticulating ..... 99. *Psathyrostachys*

3b. Spikelets in groups of 3 in regular rows: 2 lateral spikelets usually shortly pedicellate, 1 central spikelet sessile, or if 3 spikelets all sessile then spike with rachis not disarticulating ..... 100. *Hordeum*

2b. Spikelets laterally compressed; spike with rachis not disarticulating.

4a. Glumes 1-veined, or at least distal glume 3- or more veined, usually broad, with lateral veins ± riblike ..... 102. *Elymus*

4b. Glumes 1–3(–5)-veined, narrow with indistinct lateral vein, setiform, or reduced.

5a. Leaf blade stiff, harsh; glumes well developed, 1–3(–5)-veined, frequently keeled ..... 98. *Leymus*

5b. Leaf blade flexible, herbaceous; glumes usually weakly developed or sometimes absent, subulate or linear-setiform, usually not keeled ..... 101. *Hystrix*

- 1b. Spikelets 1 per node of rachis.
- 6a. Glumes 5–13-veined, veins parallel or divergent.
- 7a. Glumes 1- or 2-keeled, with 5–11 veins, lateral ones diverging into teeth, apex obtuse or bidentate ..... 109. *Triticum*
- 7b. Glumes rounded abaxially, with 7–13 parallel or divergent veins, apex truncate, dentate or with 1–5 awns  
..... 110. *Aegilops*
- 6b. Glumes 1–9(–11)-veined, veins converging toward apex.
- 8a. Rachis fragile or falling entire; plants usually annual; lemma keeled or sharply so, keel pectinate spinulose or not.
- 9a. Spike oblong to orbicular; spikelets with 3–10 florets; lemma keeled, keel not pectinate spinulose  
..... 107. *Eremopyrum*
- 9b. Spike linear to oblong; spikelets with 2 florets; lemma sharply keeled, keel pectinate spinulose ..... 108. *Secale*
- 8b. Rachis tough; plants perennial; lemma rounded abaxially or keeled only at apex with keel not pectinate spinulose.
- 10a. Spike broadly linear to narrowly oblong, with crowded spikelets, pectinately arranged on a tough rachis; glumes 1–5-veined, usually 1-keeled to base, or if not keeled then midvein prominent.
- 11a. Apical spikelet usually sterile; glumes 1-keeled to base ..... 106. *Agropyron*
- 11b. Apical spikelet usually well developed; glumes not keeled or keeled only at apex, rarely keeled throughout length ..... 105. *Kengyilia*
- 10b. Spike linear, usually with lax spikelets divergently arranged on a tough rachis; glumes 3–9(–11)-veined, veins parallel or convergent and often keeled only in distal half.
- 12a. Plants usually with long rhizomes; spikelets usually disarticulating below glumes; lemma usually without distinct callus at base ..... 104. *Elytrigia*
- 12b. Plants tufted or with short rhizomes; spikelets usually disarticulating above glumes; lemma with distinct or obscure callus at base.
- 13a. Lemma usually with distinct callus at base ..... 102. *Elymus*
- 13b. Lemma usually with obscure callus at base ..... 103. *Pseudoroegneria*

## 98. LEYMUS Hochstetter, Flora 31: 118. 1848.

赖草属 lai cao shu

*Aneurolepidium* Nevski.

Herbs perennial. Plants usually with rhizomes, rarely without. Culms usually erect. Leaf sheath split almost to base; ligule leathery-membranous; auricles lanceolate or crescent-shaped; leaf blade usually glaucous, usually rolled, rarely flat, stiff, harsh. Inflorescence spike-like, linear, rarely oblong-ovate; rachis tough. Spikelets in regular rows of (1 or) 2 or 3(–6) per node, sessile, all similar, with (1–) 3–7 florets; rachilla disarticulating above glumes and between florets. Glumes opposite or side-by-side, linear to lanceolate, 1–3(–5)-veined, veins not raised (except in *L. mollis*), not keeled or keeled almost to base, apex acute to shortly awned. Lemma 3–7-veined, abaxially not keeled or keeled only at apex, apex acute to shortly awned; callus obtuse, triangular or rounded. Lodicules lanceolate to ovate, usually entire. Caryopsis adherent to lemma.

About 50 species: temperate regions of the N hemisphere; 24 species (11 endemic) in China.

The authors have seen no specimens of *Leymus pubinodis* (Keng) Á. Löve (Repert. Spec. Nov. Regni Veg. 95: 481. 1984, “*pubinodes*”; *Elymus pubinodis* Keng, Sunyatsenia 6: 85. 1941), described from Xizang.

- 1a. Spikelets (3 or) 4–6 per node.
- 2a. Spikelets with 3–5 florets; first lemma 15–20 mm ..... 1. *L. racemosus*
- 2b. Spikelets with 5–10 florets; first lemma 8–13 mm.
- 3a. Leaf blade 5–15 × 0.5–0.8 cm; spike oblong-ovate, 5–9 cm ..... 4. *L. ovatus*
- 3b. Leaf blade 15–42 cm; spike linear, 12–25 cm.
- 4a. Glumes 3-veined, unequal, proximal one 10–12 mm, distal one 13–16 mm; spikelets 3–5 per node ..... 2. *L. pseudoracemosus*
- 4b. Glumes 1-veined, subequal, 10–13 mm; spikelets 4–6(–11) per node ..... 3. *L. crassiusculus*
- 1b. Spikelets 1–3(or 4) per node.
- 5a. Spikelets usually 1 per node, rarely 2 or 3 per node below middle of spike.
- 6a. Glumes lanceolate or linear-lanceolate, 3-veined.
- 7a. Palea much shorter than lemma, apex emarginate; spikelets with 2 or 3 florets ..... 18. *L. pishanicus*
- 7b. Palea slightly shorter than or equaling lemma; spikelets with 4–8 florets.
- 8a. Glumes 10–15 mm, margin membranous and ciliate ..... 19. *L. altus*
- 8b. Glumes 6–7.5 mm, margin membranous but not ciliate ..... 20. *L. obvipodus*

- 6b. Glumes subulate-linear or narrowly lanceolate, veinless or 1-veined.
- 9a. Lemma puberulent, or if smooth and glabrous then margin ciliate; leaf blade 0.1–0.3 cm wide ..... 21. *L. ruoqiangensis*
- 9b. Lemma smooth, glabrous; leaf blade 0.2–2.5 cm wide.
- 10a. Leaf blade to 2.5 cm wide; glumes subulate-linear ..... 23. *L. aemulans*
- 10b. Leaf blade 0.2–0.6 cm wide, glumes linear-lanceolate.
- 11a. Spikelets with 3 or 4 florets ..... 22. *L. arjinshanicus*
- 11b. Spikelets with 4–7 florets ..... 24. *L. ramosus*
- 5b. Spikelets 1–3(or 4) per node.
- 12a. Glumes equaling or slightly longer than spikelet.
- 13a. Glumes wholly covering lemma or covering only base of first lemma.
- 14a. Spikelets 2 per node; glumes wholly covering lemma ..... 10. *L. karelinii*
- 14b. Spikelets (1 or)2 or 3 per node; glumes covering only base of first lemma ..... 11. *L. mollis*
- 13b. Glumes not covering lemma.
- 15a. Ligule ca. 0.5 mm; rachis internodes 3–6 mm ..... 12. *L. paboanus*
- 15b. Ligule 2–3 mm; rachis internodes 6–20 mm ..... 13. *L. tianshanicus*
- 12b. Glumes shorter than spikelet.
- 16a. Glumes oblong-lanceolate, apex with awn 4–5 mm ..... 5. *L. aristiglumis*
- 16b. Glumes not as above.
- 17a. Glumes covering base of first lemma.
- 18a. First lemma 7–9 mm including apical point.
- 19a. Culms 14–35 cm tall; glumes narrowly lanceolate, 5–9 mm, margin not ciliate ... 7. *L. yuennensis*
- 19b. Culms 60–150 cm tall; glumes linear-lanceolate, 9–11 mm, distal margin sparsely ciliate ..... 8. *L. pendulus*
- 18b. First lemma 10–14 mm.
- 20a. Spikelets with 2 or 3 florets ..... 6. *L. angustus*
- 20b. Spikelets with 5–9 florets ..... 9. *L. shanxiensis*
- 17b. Glumes not covering base of first lemma.
- 21a. Glumes 3-veined; palea equaling lemma.
- 22a. Callus of lemma villous; glumes linear-lanceolate ..... 15. *L. secalinus*
- 22b. Callus of lemma smooth; glumes subulate ..... 16. *L. chinensis*
- 21b. Glumes 1-veined or nearly veinless; palea shorter than or subequaling lemma.
- 23a. Callus of lemma puberulent; palea shorter than lemma; first lemma 5–8 mm ..... 14. *L. multicaulis*
- 23b. Callus of lemma villous; palea subequaling lemma; first lemma 9–10 mm ..... 17. *L. flexus*

**1. *Leymus racemosus*** (Lamarck) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 429. 1960.

大赖草 da lai cao

*Elymus racemosus* Lamarck, Tabl. Encycl. 1: 207. 1792; *E. giganteus* Vahl; *Leymus giganteus* (Vahl) Pilger.

Culms to 100 cm tall, ca. 10 mm in diam., stout, scaberulous pubescent below raceme. Leaf sheath membranous at margin; ligule ca. 2 mm, membranous, apex truncate; leaf blade glaucous green, 20–40 × ca. 1.5 cm, abaxial surface smooth, adaxial surface and margin scabrous. Spike 15–30 × 1–2 cm; rachis stout, glabrous. Spikelets 4–6 per node, pale glaucous green, 1.5–2.2 cm, with 3–5 florets. Glumes linear-lanceolate, 12–20 mm, with robust midvein and 2 faint lateral veins, apex long acuminate. Lemma lanceolate, 7-veined, softly hairy proximally, awnless; first lemma 15–20 mm. Palea slightly shorter than lemma. Fl. and fr. Jun–Sep.  $2n = 28$ .

Sandy places. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

This species is used for forage.

**2. *Leymus pseudoracemosus*** C. Yen & J. L. Yang, Acta Bot. Yunnan. 5: 275. 1983.

柴达木赖草 chai da mu lai cao

Culms 60–90 cm tall, 2- or 3-noded, glabrous, but pubescent below inflorescence. Leaf sheath usually longer than internode, glabrous, margin membranous; ligule membranous, ca. 3 mm; leaf blade glaucous, flat or rolled, 15–34(–40) × (0.4–)0.5–0.7 cm, abaxial surface glabrous or scabrous, adaxial surface puberulent or villous. Inflorescence erect, linear, sometimes with short branches proximally, 12–25 × 2–3 cm; rachis densely pubescent, margin villous with internodes 1–3 cm. Spikelets 3–5 per node, 1.7–2.1 cm, with 5–10 florets; rachilla internodes 1–1.8 mm, pubescent. Glumes lanceolate or narrowly so, obscurely 3-veined, margin membranous, ciliate, apex with awn 1–1.7 mm; proximal glume 10–12 mm; distal glume 13–16 mm. Lemma lanceolate, 5–7(–10)-veined, densely villous, margin membranous, ciliate; first lemma 9.5–13 mm; callus villous; awn 0.2–1.5 mm. Palea slightly shorter than or equaling lemma, ciliate along keels, apex 2-cleft. Anthers yellowish, 3–5 mm. Caryopsis blackish brown, narrowly elliptic, 4.5–5 × ca. 2 mm, apex with white hairs. Fl. and fr. Jul–Aug.

• Sandy places. Qinghai.

**3. *Leymus crassiusculus*** L. B. Cai, Acta Phytotax. Sin. 33: 494. 1995.

粗穗赖草 cu sui lai cao

Culms erect, 70–110 cm tall, ca. 4 mm in diam., 2- or 3-noded. Leaf sheath glabrous or margin ciliate; ligule 1.5–2 mm, membranous, apex truncate; leaf blade usually rolled, 20–42 × 0.5–0.7 cm, both surfaces smooth, glabrous, or adaxial surface scabrous. Spike yellowish brown, dense, 16–22 × 1.5–2 cm, densely long soft hairy; rachis internodes 4–10 mm. Spikelets 4–6(–11) per node, 1.2–1.8 cm, with 4–7 florets; rachilla internodes 1–1.5 mm, densely pubescent. Glumes linear-lanceolate, subequal, 10–13 mm, shorter than spikelet, 1-veined, margin membranous, ciliate. Lemma lanceolate, obscurely 5-veined, densely pubescent; first lemma 8–10 mm, apex with awn less than 2 mm. Palea equaling lemma, laxly setose along keels, apex emarginate. Anthers yellow, ca. 5 mm. Fl. and fr. summer.

• Field margins; ca. 3000 m. Qinghai (Xinghai), Shanxi (Pian-guan, Taiyuan).

**4. *Leymus ovatus*** (Trinius) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 430. 1960.

宽穗赖草 kuan sui lai cao

*Elymus ovatus* Trinius in Ledebour, Fl. Altaic. 1: 121. 1829; *Aneurolepidium ovatum* (Trinius) Nevski; *Leymus secalinus* (Georgi) Tzvelev subsp. *ovatus* (Trinius) Tzvelev.

Culms usually solitary, 70–100 cm tall, 3- or 4-noded, smooth, glabrous, but densely puberulent below spike. Leaf sheath smooth, glabrous; ligule ca. 1 mm, membranous, puberulent, apex truncate; leaf blade flat or rolled, 5–15 × 0.5–0.8 cm, abaxial surface densely pubescent, adaxial surface densely villous. Spike erect, oblong-ovate, 5–9 × 1.5–2.5 cm; rachis densely pubescent, internodes 2–6(–10) mm. Spikelets 4 per node, sessile or very shortly pedicellate, 1–2 cm, with 5–7 florets. Glumes linear-lanceolate, subequal, 10–13 mm, obscurely 3-veined, apex mucronate to acuminate. Lemma lanceolate, obscurely 5–7-veined, abaxially hirsutulous, margin ciliate, apex acuminate or with awn 1–3 mm; first lemma 8–10 mm; callus hirsute. Palea slightly shorter than or equaling lemma. Anthers 3.5–4 mm. Fl. and fr. Jul–Aug.

Grassy places, river banks, roadsides. Nei Mongol, Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

**5. *Leymus aristiglumis*** L. B. Cai, Bull. Bot. Res., Harbin 17: 28. 1997 [“*aristiglumis*”].

芒颖赖草 mang ying lai cao

Culms erect, 30–50 cm tall, 1.5–2 mm in diam., ca. 3-noded. Leaf sheath usually fibrous at base, margin ciliate; ligule 1.2–2 mm, membranous; leaf blade conduplicate or involute at margin, 7–16 × 2.5–4 cm, both surfaces scabrous. Spike erect, green, dense, 7–10 × 0.6–0.9 cm; rachis puberulent. Spikelets 2 or 3 per node, 0.8–1.1 cm, with 3 or 4 florets; rachilla densely puberulent. Glumes oblong-lanceolate, subequal, 3.5–4.5 × ca. 2 mm, 1-veined, margin membranous, apex with awn 4–5 mm. Lemma lanceolate, 5-veined, abaxially glabrous, margin laxly

pubescent; first lemma 6–7 mm, apex with point ca. 1 mm. Palea equaling lemma, with lax, short, stiff hairs along keels, apex emarginate. Anthers yellow, ca. 4 mm. Fl. and fr. summer.

• Mountain slopes; ca. 2600 m. Qinghai (Xining).

See the comment under *Leymus shanxiensis* (species no. 9) concerning the spelling of the specific epithet.

**6. *Leymus angustus*** (Trinius) Pilger, Bot. Jahrb. Syst. 74: 6. 1947.

窄颖赖草 zhai ying lai cao

*Elymus angustus* Trinius in Ledebour, Fl. Altaic. 1: 119. 1829; *Aneurolepidium angustum* (Trinius) Nevski; *Leymus angustus* subsp. *macroantherus* D. F. Cui; *Triticum angustum* (Trinius) F. Hermann.

Culms solitary or tufted, 60–100 cm tall, 3- or 4-noded, glabrous, or pubescent below nodes and spike. Leaf sheath grayish green, usually shorter than internodes, smooth or slightly scabrous; ligule 0.5–1 mm, membranous, apex obtuse; leaf blade glaucous, rolled, 15–25 × 0.5–0.7 cm, stiff, abaxial surface subsmooth, adaxial surface smooth, apex acute. Spike erect, 15–20 × 0.7–1 cm; rachis pubescent. Spikelets 2(or 3) per node, 1–1.4 cm, with 2 or 3 florets; rachilla puberulent. Glumes covering base of first lemma, subequal or proximal glume slightly shorter, 10–13 mm, linear-lanceolate, 1-veined. Lemma lanceolate, obscurely 5–7-veined, densely puberulent, apex mucronate or acuminate; first lemma 10–14 mm including awn; callus pubescent. Palea slightly shorter than lemma, ciliate along keels. Anthers 2.5–3 mm. Fl. and fr. Jun–Aug.

Grassy places, meadows; 2000–2100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

This species is used for forage.

**7. *Leymus yiuensis*** N. R. Cui & D. F. Cui in N. R. Cui, Fl. Xinjiang. 6: 603. 1996.

伊吾赖草 yi wu lai cao

*Leymus yiwuensis* N. R. Cui ex L. B. Cai, nom. illeg. superfl.

Culms erect or geniculate, 14–35 cm tall, usually 1-noded, smooth, glabrous. Leaf sheath smooth, glabrous or margin ciliate; ligule 0.5–1 mm, membranous; leaf blade involute, 4–9 cm × 0.1–2.5 mm, abaxial surface glabrous, adaxial surface and margin scabrous. Spike erect, green, dense, (3–)5–11 × (0.35–)0.5–1 cm; rachis pubescent, usually with white, long, soft hairs on nodes. Spikelets 2 per node, 0.7–1.1 cm, with 3–5(–8) florets; rachilla densely pubescent. Glumes usually covering base of first lemma, narrowly lanceolate, subequal, 5–9 mm, 1-veined, proximally pubescent, distally scabrous, apex narrowed, awnlike. Lemma lanceolate, distinctly 5-veined, abaxially with dense, white, soft hairs, margin ciliate; first lemma 7–9 mm including point 1–1.5 mm; callus with soft hairs 0.5–1 mm. Palea subequaling lemma, ciliate along keels distally. Anthers yellow, 2–3 mm. Ovary elliptic, apex puberulent. Fl. and fr. Jun–Aug.

- Meadows; ca. 2400 m. Xinjiang (Burqin, Yecheng, Yiwu).

*Leymus yiwuensis* was described as a new species by Cai (Bull. Bot. Res., Harbin 17: 29. 1997) based on the same holotype specimen (N. R. Cui 820064, XJA) as *L. yiuensis*.

### 8. *Leymus pendulus* L. B. Cai, Novon 10: 7. 2000.

垂穗赖草 *chui sui lai cao*

Plants with extended rhizomes. Culms erect or slightly geniculate below, 60–150 cm tall, 2–3 mm in diam., 4–6-noded, smooth. Leaf sheath glabrous or scabrous, basal ones persistent, usually disintegrating into fibers; ligule 2–3.5 mm, membranous, apex obtuse; leaf blade green, flat or involute, 5–22(–53) × 0.2–0.7 cm, both surfaces scabrous, margin sparsely spinulose or ciliate. Spikes pendent, brownish, very lax, 23–32 cm; rachis internodes 15–30 mm below middle, 6–12 mm distally, densely pubescent. Spikelets 2 or 3 per node, 1.1–1.5 cm, with 5–9 florets; rachilla internodes 1–1.5 mm, densely puberulent. Glumes linear-lanceolate, subequal, 9–11 mm, herbaceous, 1-veined, scabrous abaxially, margin sparsely ciliate above middle. Lemma lanceolate, obscurely 5-veined, sparsely spinulose abaxially, pubescent along or near margin; first lemma 6–9 mm, with slender awn 2–3 mm. Palea equaling or slightly longer than lemma, sparsely spinulose along keels, scabrous between keels, apex pointed or bifid. Anthers yellow or purplish, 2.5–3.5 mm. Caryopsis brown, apex pubescent.

- Woodland margins, mountain valleys, bases of walls; 2300–2400 m. Qinghai (Xining).

### 9. *Leymus shanxiensis* G. Zhu & S. L. Chen, **nom. nov.**

阔颖赖草 *kuo ying lai cao*

Replaced synonym: *Leymus latiglumis* L. B. Cai, Acta Phytotax. Sin. 33: 493. 1995 [“*latiglumis*”], not *Leymus latiglumis* Tzvelev, Novosti Sist. Vyssh. Rast. 9: 62. 1972.

Culms erect, 70–110 cm tall, 2–3 mm in diam., 3- or 4-noded. Leaf sheath scabrous; ligule membranous, ca. 0.8 mm; leaf blade flat or rolled, 10–25 × 0.3–0.5 cm, abaxial surface smooth, glabrous, adaxial surface scabrous or densely pubescent. Spike erect, greenish, 8–15 × 1–1.3 cm; rachis internodes 6–11(–20) mm, densely puberulent. Spikelets usually 2 per node, 1.8–2.5 cm, with 5–9 florets; rachilla internodes 0.5–1.5 mm, densely puberulent. Glumes covering only base of lemma, lanceolate, subequal, 11–16 mm, 3–5(–7)-veined, margin membranous, ciliate, apex narrowed into awn. Lemma oblong-lanceolate, 5–7-veined, with dense, long, soft hairs; first lemma 10–12 mm; awn less than 2 mm. Palea slightly shorter than or equaling lemma, laxly setose along keels, apex emarginate. Anthers yellow, ca. 5 mm. Fl. and fr. summer.

- Grasslands; 1300–3700 m. Shanxi (Pinglu, Youyu).

*Leymus latiglumis* is the correct spelling of Cai’s name. The original spelling “*latiglumis*” implies the second part of this compound epithet was intended as an adjective (agreeing with the masculine gender of *Leymus*), rather than a noun in apposition (which would be “*latigluma*”).

### 10. *Leymus karelinii* (Turczaninow) Tzvelev, Novosti Sist. Vyssh. Rast. 9: 59. 1972.

大药赖草 *da yao lai cao*

*Elymus karelinii* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 29(1): 64. 1856 [“*karelinii*”].

Culms tufted, 50–110 cm tall, 2–5 mm in diam. Leaf blade linear, 10–14(–23) × 0.2–0.7 cm, stiff. Spike rather dense, 6–20 cm. Spikelets 2 per node, 1.1–1.5(–1.8) cm, with 3 or 4 florets. Glumes equaling spikelet, wholly covering lemma, margin broadly membranous. Lemma 10–15 mm including awn. Anthers yellow, 4–5 mm. Fl. and fr. Jul–Aug.  $2n = 56$ .

Grassy places on mountains; 1600–2100 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

This species is used for forage.

### 11. *Leymus mollis* (Trinius) Pilger, Bot. Jahrb. Syst. 74: 6. 1947.

滨草 *bin cao*

*Elymus mollis* Trinius in Sprengel, Neue Entdeck. Pflanzenk. 2: 72. 1821; *E. arenarius* Linnaeus var. *coreensis* Hackel; *E. arenarius* subsp. *mollis* (Trinius) Hultén; *E. arenarius* var. *mollis* (Trinius) Koidzumi; *E. mollis* var. *coreensis* (Hackel) Honda; *Leymus arenarius* (Linnaeus) Hochstetter subsp. *mollis* (Trinius) Tzvelev; *Triticum molle* (Trinius) F. Hermann.

Culms solitary or tufted, 30–80 cm tall, smooth, glabrous, but puberulent below spike. Leaf sheath longer or shorter than internode, glabrous; ligule 1–2 mm; leaf blade usually rolled, 10–15 × 0.4–0.7 cm, stiff, abaxial surface smooth, adaxial surface slightly scabrous. Spike 9–15 × 1–1.5 cm; rachis robust, puberulent; internodes 6–10 mm. Spikelets (1 or) 2 or 3 per node, 1.5–2 cm, with 2–5 florets; rachilla puberulent. Glumes covering only base of lemma, oblong-lanceolate, 12–20 × 2–2.5 mm, 3–5-veined with keel-like midvein, puberulent, margin membranous. Lemma lanceolate, 5-veined, puberulent, apex mucronate; first lemma 12–14 mm. Palea slightly shorter than lemma, ciliolate along keels. Anthers 5–6 mm. Fl. and fr. May–Aug.  $2n = 28$ .

Coastal pebbles and sands. Hebei, Liaoning, Shandong [Japan, Korea, Mongolia, Russia; N North America].

### 12. *Leymus paboanus* (Claus) Pilger, Bot. Jahrb. Syst. 74: 6. 1947.

毛穗赖草 *mao sui lai cao*

Culms solitary or tufted, 45–90 cm tall, 3- or 4-noded, smooth, glabrous. Leaf sheath dull yellow at base, smooth, glabrous; ligule ca. 0.5 mm; leaf blade flat or rolled, 10–30 × 0.4–0.7 cm, abaxial surface smooth, adaxial surface scabrous. Spike erect, 6–18 × 0.3–1.3 cm; rachis slender, puberulent or basally smooth, margin ciliate; internodes 3–6 mm. Spikelets 2 or 3 per node, 0.8–1.3 cm, with 3–5 florets, viviparous or not; rachilla ca. 1.5 mm, densely pubescent. Glumes not covering base of first lemma, subulate, 6–12 mm, equaling spikelet, slightly hirsutulous. Lemma lanceolate, obscurely 3–5-veined, puberulent, apex mucronate or acuminate; first lemma 6–10 mm. Palea equaling or slightly longer than lemma. Anthers ca. 0.3 mm. Fl. and fr. Jun–Jul.

Forest understories, grassy places, river banks; ca. 2900 m. Gansu, Ningxia, Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

- 1a. Spike 10–18 cm; spikelets  
never viviparous ..... 12a. var. *paboanus*  
1b. Spike 6–9 cm; spikelets usually  
viviparous ..... 12b. var. *viviparus*

**12a. *Leymus paboanus* var. *paboanus***

毛穗赖草(原变种) mao sui lai cao (yuan bian zhong)

*Elymus paboanus* Claus, Beitr. Pflanzen. Russ. Reich. 8: 170. 1851; *Aneurolepidium paboanum* (Claus) Nevski; *E. saluginosus* (Grisebach) Steudel var. *paboanus* (Claus) Roshevitz.

Spike 10–18 cm. Spikelets never viviparous.

Grassy places, river banks. Gansu, Ningxia, Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

This variety is used for forage.

**12b. *Leymus paboanus* var. *viviparus*** L. B. Cai, Acta Phytotax. Sin. 39: 77. 2001.

胎生赖草 tai sheng lai cao

Spike 6–9 cm. Spikelets usually viviparous.

- Forest understories; ca. 2900 m. Qinghai.

**13. *Leymus tianschanicus* (Drobow) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 429. 1960.**

天山赖草 tian shan lai cao

*Elymus tianschanicus* Drobow in Vvedensky et al., Key Fl. Tashkent 1: 44. 1923, not (Drobow) Nevski (1934); *Aneurolepidium tianschanicum* (Drobow) Nevski.

Culms solitary or tufted, 70–120 cm tall, 3–6 mm in diam., 3- or 4-noded, smooth, glabrous, or slightly scabrous only below raceme. Leaf sheath smooth, glabrous; ligule 2–3 mm, membranous, apex rounded; leaf blade flat or rolled, 20–40 × 0.5–0.9 cm, stiff, glabrous or margin scabrous. Spike erect, 20–35 × ca. 1 cm; rachis densely pubescent, margin ciliate; internodes 0.6–2 cm. Spikelets 2 or 3 per node, 1.5–1.9 cm, with 3–5 florets; rachilla densely puberulent; internodes ca. 3 mm. Glumes not covering base of lemma, linear-lanceolate, equaling or slightly longer than spikelet, margin narrowly membranous at base, apex mucronate to acuminate. Lemma oblong-lanceolate, 5-veined, pubescent, margin ciliate, apex mucronate; first lemma 10–12 mm; callus villous; awn 1–3 mm. Palea shorter than or equaling lemma, margin ciliate. Anthers ca. 5 mm. Ovary white puberulent at apex. Fl. and fr. Jun–Oct.

Mountain slopes. Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

This species is used for forage.

**14. *Leymus multicaulis* (Karelin & Kirilov) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 430. 1960.**

多枝赖草 duo zhi lai cao

*Elymus multicaulis* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 868. 1841; *Aneurolepidium multicaule* (Karelin & Kirilov) Nevski; *E. aralensis* Regel; *E. aralensis* var. *aristatus* Regel; *E. aralensis* var. *enervius* Regel; *E. aralensis* var. *glaucus* Regel; *Triticum aralense* (Regel) F. Hermann.

Culms solitary or tufted, erect, 50–80 cm tall, 1.5–3 mm in diam., 1–5-noded, glabrous, but scabrous or pubescent below spike. Leaf sheath usually brown or purplish at base, smooth to densely pubescent; ligule 1–2 mm, membranous; leaf blade glaucous, flat or involute, 10–30 × 0.3–0.8 cm, abaxial surface smooth to puberulent, adaxial surface scabrous, puberulent, or sometimes pilose. Spike 5–14 × 0.6–1 cm; rachis scabrous or pubescent, margin ciliate. Spikelets 2 or 3 per node, 0.8–1.5 cm, with 2–6 florets. Glumes not covering base of first lemma, subulate, 5–11 mm, 1-veined, hirsutulous. Lemma lanceolate or broadly so, obscurely 5-veined, smooth, glabrous, but callus puberulent; first lemma 5–9 mm. Palea shorter than lemma, ciliate along keels. Anthers 3–4 mm. Fl. and fr. May–Aug.  $2n = 42$ .

Alkaline meadows, fields, saline soils or pebbles, roadsides. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

Plants of this species with a pubescent leaf blade were described as "*Leymus bruneostachyus*" (N. R. Cui & D. F. Cui in N. R. Cui, Fl. Xinjiang. 6: 603. 1996), but that name was not validly published because no type was indicated (Saint Louis Code, Art. 37.1).

**15. *Leymus secalinus* (Georgi) Tzvelev, Rast. Tsentr. Azii 4: 209. 1968.**

赖草 lai cao

Culms solitary or tufted, 18–100 cm tall, 2–5-noded, smooth, glabrous, but densely puberulent below spike. Leaf sheath smooth, glabrous but margin ciliate when young; ligule 1–1.5 mm, membranous, apex truncate; leaf blade flat or rolled, 8–30 × 0.4–0.7 cm, abaxial surface scabrous or smooth, adaxial surface scabrous or pubescent, or both surfaces densely pubescent. Spike erect, grayish green, brown, or brownish, (6–)10–15(–24) × 0.1–1.7 cm; rachis pubescent; internodes 3–7(–20) mm. Spikelets (1 or)2 or 3(or 4) per node, 1–2.2 cm, with 2–7(–10) florets; rachilla pubescent; internodes 1–1.5 mm. Glumes not covering base of first lemma, narrowly lanceolate to nearly subulate, shorter than spikelet, obscurely 1–3-veined, scabrous, apex mucronate to acuminate. Lemma lanceolate, 5-veined, pubescent, or glabrous above middle, margin membranous, apex acuminate or with awn 1–3 mm; first lemma 8–10(–14) mm; callus villous. Palea shorter than or equaling lemma, apex slightly bifid. Anthers 2–4 mm. Fl. and fr. Jun–Oct.

Mountain slopes, stony and aleurite slopes, grassy places, lake banks, alkaline swales and pebbles; 2900–4200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [India, Japan, Korea, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

This species is used for forage.

- 1a. Leaf blade abaxial surface scabrous or smooth; palea equaling lemma.  
 2a. Spikelets 2 or 3 (or 4) per node, with 4–7(–10) florets; anthers 3.5–4 mm ..... 15a. var. *secalinus*  
 2b. Spikelets 1 or 2 per node, with 2 or 3 florets; anthers 2–3 mm ..... 15b. var. *tenuis*
- 1b. Leaf blade abaxial surface densely pubescent and then palea equaling lemma, or scabrous or smooth and then palea shorter than lemma.  
 3a. Culms 40–100 cm tall, 3–5-noded; spike grayish green, usually 10–15 cm; glumes 3-veined; palea equaling lemma ..... 15c. var. *pubescens*  
 3b. Culms 18–45 cm tall, 2- or 3-noded; spike brown or brownish, 6–10 cm; glumes usually 1-veined; palea shorter than lemma ..... 15d. var. *qinghaicus*

### 15a. *Leymus secalinus* var. *secalinus*

赖草(原变种) lai cao (yuan bian zhong)

*Triticum secalinum* Georgi, Bemerik. Reise Russ. Reich. 1: 198. 1775; *Agropyron chinorossicum* Ohwi; *Aneurolepidium dasystachys* (Trinius) Nevski; *A. secalinum* (Georgi) Kitagawa; *Elymus dasystachys* Trinius; *E. dasystachys* var. *ligulatus* Keng; *E. secalinus* (Georgi) Bobrov; *E. thomsonii* J. D. Hooker; *Leymus dasystachys* (Trinius) Pilger; *L. ligulatus* (Keng) Tzvelev; *L. secalinus* var. *laxinodis* L. B. Cai.

Culms 40–100 cm tall, 3–5-noded. Leaf blade abaxial surface scabrous or smooth, adaxial surface scabrous or pubescent. Spikelets 2 or 3 (or 4) per node, with 4–7(–10) florets. Glumes linear-lanceolate. Anthers 3.5–4 mm. Fl. and fr. Jun–Oct.  $2n = 28$ .

Grassy places, mountain slopes. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang [India, Japan, Korea, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

**15b. *Leymus secalinus* var. *tenuis*** L. B. Cai, Acta Phytotax. Sin. 33: 496. 1995.

纤细赖草 xian xi lai cao

Culms 40–100 cm tall, 3–5-noded. Leaf blade adaxial surface scabrous or smooth. Spikelets 1 or 2 per node, with 2 or 3 florets. Glumes nearly subulate. Palea equaling lemma. Anthers 2–3 mm.

• Lake banks; ca. 4200 m. Xizang (Gyirong, Rutog, Zanda, Zhongba).

**15c. *Leymus secalinus* var. *pubescens*** (O. Fedtschenko) Tzvelev, Rast. Tsent. Azii 4: 209. 1968.

短毛叶赖草 duan mao ye lai cao

*Elymus dasystachys* var. *pubescens* O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 435. 1903; *Leymus secalinus* subsp. *pubescens* (O. Fedtschenko) Tzvelev.

Culms 40–100 cm tall, 3–5-noded. Leaf blade abaxial surface densely pubescent. Spike erect, grayish green, (6–)10–15 (–24) × 0.1–1.7 cm. Glumes 3-veined. Palea equaling lemma.

Stony and aleurite slopes, alkaline swales and pebbles. Xinjiang, Xizang [Russia].

**15d. *Leymus secalinus* var. *qinghaicus*** (L. B. Cai) G. Zhu & S. L. Chen, **comb. et stat. nov.**

青海赖草 qing hai lai cao

Basionym: *Leymus qinghaicus* L. B. Cai, Acta Phytotax. Sin. 39: 75. 2001.

Culms 18–45 cm tall, 2- or 3-noded. Leaf blade abaxial surface scabrous or smooth, adaxial surface scabrous or pubescent. Spike brown or brownish, 6–10 cm. Glumes narrowly lanceolate, usually 1-veined. Palea shorter than lemma.

• Mountain slopes; 2900–3100 m. Qinghai.

**16. *Leymus chinensis*** (Trinius ex Bunge) Tzvelev, Rast. Tsent. Azii 4: 205. 1968.

羊草 yang cao

*Triticum chinense* Trinius ex Bunge, Enum. Pl. China Bor. 72. 1833; *Agropyron chinense* (Trinius ex Bunge) Ohwi; *A. uninerve* P. Candargy, nom. illeg. superfl.; *Aneurolepidium chinense* (Trinius ex Bunge) Kitagawa; *Elymus auritus* Keng; *E. chinensis* (Trinius ex Bunge) Keng; *Leymus auritus* (Keng) Å. Löve.

Culms laxly tufted, 40–90 cm tall, 4- or 5-noded. Leaf sheath dull yellow, smooth; ligule 0.5–1 mm, papery, apex truncate, dentate; leaf blade flat or rolled, 7–18 × 0.3–0.6 cm, abaxial surface smooth, adaxial surface scabrous. Spike erect, 7–15 × 1–1.5 cm; rachis ciliolate at margin; internodes 6–10(–16) mm. Spikelets usually 2 per node at middle of spike, 1 per node elsewhere, glaucous when young, 1–2.2 cm, with 5–10 florets; rachilla smooth; internodes 1–1.5 mm. Glumes not covering base of first lemma, subulate, shorter than or equaling first lemma, obscurely 3-veined, smooth below middle, adaxially glabrous, but margin ciliolate, apex scabrous. Lemma lanceolate or broadly so, obscurely 5-veined, margin narrowly membranous, apex gradually narrowed, acute or mucronate; first lemma 8–9 mm; callus smooth. Palea equaling lemma, apex slightly bifid. Anthers 3–4 mm. Fl. and fr. Jun–Aug.  $2n = 28^*$ .

Grassy places. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Korea, Mongolia, Russia].

This species is used for forage.

The C Asian, somewhat similar *Leymus divaricatus* (Drobov) Tzvelev (Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 430. 1960; *Elymus divaricatus* Drobov, Repert. Spec. Nov. Regni Veg. 21: 45. 1925; *E. regelii* Roshevitz; *L. regelii* (Roshevitz) Tzvelev) has been recorded from Xinjiang (the type of *E. regelii*). It differs from *L. chinensis* in having spikelets 3 (or 4) per node more or less throughout the spike; glumes adaxially very shortly hairy or bristly; and lemmas usually ovate-lanceolate, abruptly narrowed at the apex, and awnless or with awn to 3(–4) mm.

**17. *Leymus flexus*** L. B. Cai, Acta Phytotax. Sin. 33: 491. 1995.

弯曲赖草 wan qu lai cao

Culms erect, 60–100 cm tall, 2–3 mm in diam., 3–5-noded. Leaf sheath glabrous, or pubescent proximally; ligule ca.

1.5 mm, membranous; leaf blade usually rolled, 15–27 × 0.4–0.5 cm, abaxial surface glabrous, adaxial surface scabrous. Spike brownish, 15–25 × ca. 1 cm; rachis densely white puberulent; internodes 8–15 mm. Spikelets usually 3 per node, 1.3–1.7 cm, with 3–7 florets; rachilla internodes 0.5–1.5 mm. Glumes not covering base of first lemma, linear-lanceolate, subequal, 11–14 mm, 1- or 2-veined, margin membranous, ciliate, apex narrowed into awn. Lemma lanceolate, 5-veined, pilose or glabrous; first lemma 9–10 mm; callus villous; awn 2–3 mm. Palea equaling lemma, ciliate along keels distally. Anthers yellow, 3–4 mm. Fl. and fr. summer.

• Mountain slopes; ca. 3200 m. Gansu, Qinghai (Xinghai, Xining), Shanxi.

**18. *Leymus pishanicus*** S. L. Lu & Y. H. Wu, Bull. Bot. Res., Harbin 12: 344. 1992.

皮山赖草 pi shan lai cao

Plants with long rhizomes. Culms laxly tufted, 50–80 cm tall, 3–5-noded, glabrous. Leaf sheath glabrous; ligule very short; leaf blade flat or margin rolled, abaxial surface glabrous, adaxial surface and margin scabrous. Spike lax, slender, 8–13 cm; rachis margin scabrous or ciliate; internodes 8–12 mm. Spikelets usually 1 per node, with 2 or 3 florets. Glumes lanceolate, equal, 9–11 mm, 3-veined, smooth, glabrous, margin membranous, ciliate, apex acuminate. Lemma oblong-lanceolate, 5-veined, smooth, glabrous; first lemma 12–14 mm, awnless. Palea much shorter than lemma, puberulent, ciliate along keels, apex emarginate. Fl. summer.

• Alpine meadows; ca. 2600 m. Xinjiang.

**19. *Leymus altus*** D. F. Cui in N. R. Cui, Fl. Xinjiang, 6: 604. 1996.

分株赖草 fen zhu lai cao

Culms solitary or laxly tufted, erect, glaucous, 80–150 cm tall, ca. 2-noded, smooth, glabrous. Leaf sheath smooth, glabrous; ligule ca. 2 mm, membranous; leaf blade flat or involute, 0.4–0.5 cm wide, abaxial surface glabrous, adaxial surface scabrous. Spike erect, 8–15 × 0.7–0.9 cm, with long, soft hairs at nodes; rachis margin ciliate; internodes 5–7(–30) mm. Spikelets 2 or 3 per node below middle of spike, 1 per node above middle, glaucous, 1.5–1.8 cm, with 4–6 florets; rachilla puberulent; internodes 1.5–2 mm. Glumes linear-lanceolate, 10–15 mm with proximal one shorter than distal, 3-veined, margin membranous, ciliate, apex acuminate or awned; lateral veins obscure. Lemma lanceolate, 5-veined, puberulent, margin ciliate, apex with awn 1–3 mm; first lemma 10–14 mm; callus with soft hairs ca. 1 mm. Palea equaling lemma, ciliate along keels distally, apex slightly 2-lobed. Anthers yellow, 3–4 mm. Fl. and fr. Jul–Aug.

• Field margins, gardens; ca. 2200 m. Xinjiang (Yecheng).

**20. *Leymus obvipodus*** L. B. Cai, Novon 10: 9. 2000.

柄穗赖草 bing sui lai cao

Plants with extended rhizomes. Culms erect or slightly geniculate below, 40–75 cm tall, 2–3 mm in diam., 2- or 3-noded, densely pubescent just below spike. Leaf sheath per-

sistent at base and becoming fibrous, usually puberulent; ligule 1–2 mm, membranous, apex obtuse; leaf blade involute, 6–18 × 0.2–0.4 cm, both surfaces densely puberulent. Spike erect, lax, greenish, 8–18 × 0.6–0.8 cm; rachis densely pubescent; internodes 0.5–2(–5) cm. Spikelets 1 or 2 per node, all pedicellate, 1.1–1.8 cm, with 4–8 florets; pedicel 0.1–1.4 cm, densely pubescent; rachilla densely puberulent; internodes 0.5–2 mm. Glumes lanceolate or linear-lanceolate, 1–3-veined, glabrous or scabrous abaxially, margin membranous, apex with awn 2–4 mm; proximal glume 5–6.5 mm; distal glume 6–7.5 mm. Lemma lustrous, lanceolate, obscurely 5-veined, glabrous or scabrous abaxially, pubescent along or near margin; first lemma 7–10 mm with short awn 1–3 mm. Palea slightly shorter than lemma, sparsely spinulose along keels, glabrous between keels, apex bifid. Anthers yellow, ca. 4 mm. Caryopsis brown, ca. 4.9 × 1.1 mm, apex pubescent.

• Woodland margins, wastelands; ca. 2900 m. Qinghai.

**21. *Leymus ruoqianguensis*** S. L. Lu & Y. H. Wu, Bull. Bot. Res., Harbin 12: 343. 1992.

若羌赖草 ruo qiang lai cao

*Leymus arjinshanicus* D. F. Cui subsp. *ruoqianguensis* (S. L. Lu & Y. H. Wu) D. F. Cui.

Culms tufted, 30–70 cm tall, 3- or 4-noded, glabrous. Leaf sheath brown at base, glabrous, margin membranous, sometimes ciliate; ligule ca. 0.5 mm; leaf blade usually rolled, 6–15 × 0.1–0.3 cm, abaxial surface glabrous, adaxial surface scabrous or puberulent. Spike erect, 4.5–14 mm; rachis hairy at nodes, margin ciliate; internodes 6–15 mm. Spikelets purplish or glaucous, usually 1 per node, with 3–5 florets. Glumes subulate or narrowly lanceolate, subequal, 7–10 mm, veinless or 1-veined, glabrous or pilose, margin scabrous, apex acuminate. Lemma oblong-lanceolate, 5-veined, awnless or mucronate. Palea subequaling lemma, ciliate along keels or glabrous. Anthers purplish or yellowish, 3–4 mm. Fl. and fr. summer.

• Alkaline soils in high mountains; 3600–4100 m. Qinghai, Xinjiang.

**22. *Leymus arjinshanicus*** D. F. Cui in N. R. Cui, Fl. Xinjiang, 6: 602. 1996.

阿尔金山赖草 a er jin shan lai cao

Plants with extended rhizomes. Culms tufted, erect, 30–70 cm tall, 2- or 3(or 4)-noded. Leaf sheath brown at base, glabrous, margin membranous, sometimes ciliate; ligule ca. 0.5 mm, apex truncate; leaf blade 10–20 × ca. 0.3 cm, abaxial surface glabrous, adaxial surface puberulent. Spike erect or slightly curved, 4–10 × 0.6–0.8 cm; rachis internodes 5–7(–15) mm. Spikelets 1 per node; rachilla densely puberulent; internodes ca. 0.2 mm. Glumes linear-lanceolate, 1-veined, proximally glabrous or distally scabrous abaxially, margin shortly prickly, apex acuminate with point ca. 1 mm. Lemma broadly lanceolate, obscurely 5-veined, glabrous or margin ciliate; first lemma 10–12 mm, apex acuminate. Palea equaling lemma, distal half ciliate abaxially, apex slightly bifid. Anthers yellow, ca. 4 mm. Fl. and fr. Jul–Sep.

• Saline meadows; ca. 3100 m. Xinjiang (Altun Shan).



In the Chinese text of the protologue (p. 216) and in the illustration caption (p. 217), the specific epithet was spelled "*aerginshanicus*," whereas in the Latin text (p. 602) it was spelled "*arjinshanicus*." Under Art. 61.3 of the Saint Louis Code, we here explicitly adopt "*arjinshanicus*" and reject "*aerginshanicus*."

**23. *Leymus aemulans*** (Nevski) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 430. 1960.

阿英赖草 a ying lai cao

*Aneurolepidium aemulans* Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 1: 17. 1933; *Elymus aemulans* (Nevski) Nikiforova.

Culms densely tufted, slender, smooth, glabrous. Leaf blade glaucous green, linear, flat or subinvolute, to 2.5 cm wide, abaxial surface smooth, adaxial surface scabrous. Spike erect, lax, 5–10 cm. Spikelets 1 at each node, pale green, 1.5–2 cm, with 3–5 florets. Glumes subulate-linear, somewhat lanceolate and broadened at base, gradually tapering toward apex, 0.5–0.75 mm wide, veinless, glabrous; proximal glume 0.3–0.6 cm, apex acute or shortly aristate; distal glume 0.6–1.2 cm, apex with awn. Lemma broadly lanceolate, (0.9–)1–1.2 cm, obscurely 5-veined, smooth, glabrous; awn 2–5 mm, scabrous. Fl. and fr. May–Jun.  $2n = 28$ .

Stony slopes. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

**24. *Leymus ramosus*** Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 430. 1960.

单穗赖草 dan sui lai cao

*Triticum ramosum* Trininius in Ledebour, Fl. Altaic. 1: 114. 1829, not Weigel (1782); *Agropyron ramosum* K. Richter; *Aneurolepidium ramosum* Nevski; *Elymus trinii* Melderis.

Culms 30–50 cm tall, smooth, glabrous. Leaf sheath glabrous or puberulent proximally; ligule very short; leaf blade glaucous, flat, 0.2–0.6 cm wide, abaxial surface glabrous, adaxial surface and margin scabrous or puberulent. Spike erect, 4–8 × 0.6–1 cm; rachis margin hispid. Spikelets 1 at each node, glaucous or purplish glaucous, 1.1–1.7 cm, with 4–7 florets. Glumes linear-lanceolate, 5–9 mm, stiff, veinless or midvein obscure. Lemma broadly lanceolate, 6–8 mm, 5–9-veined, smooth, glabrous, awnless or with awn ca. 2 mm. Fl. and fr. Jun–Aug.

Valley grasslands. Xinjiang [Mongolia, Russia (W Siberia); Europe].

## 99. *PSATHYROSTACHYS* Nevski in Komarov, Fl. URSS 2: 712. 1934.

新麦草属 xin mai cao shu

Plants perennial, densely tufted, or laxly tufted with underground rhizomes. Culms usually erect. Leaf blade flat or rolled. Spike linear, oblong, or ovate; rachis fragile, readily disarticulating between spikelets. Spikelets in groups of 2 or 3, sessile, compressed, with 1 or 2 (or 3) florets, usually with rudimentary florets. Glumes subulate-setiform, awnlike, inconspicuously 1-veined, not keeled, margin entire. Lemma lanceolate, broadly rounded abaxially, not keeled, 5–7-veined, apex acuminate to awned. Palea equaling or slightly longer than lemma, 2-keeled. Caryopsis tightly enclosed in lemma and palea at maturity, oblong, apex hairy.  $x = 7$ .

Nine species: steppes and semidesert regions from W Russia and Turkey eastward to Afghanistan and Siberia; cultivated in North America; five species (two endemic) in China.

All species of this genus are good fodder plants.

1a. Plants laxly tufted, with underground rhizomes.

2a. Glumes scabrous; lemma glabrous to sparsely scabrous ..... 1. *P. huashanica*

2b. Glumes pilose in proximal half, scabrous in distal half; lemma sparsely pilose ..... 2. *P. stoloniformis*

1b. Plants usually densely tufted, without underground rhizomes.

3a. Anthers violet, 5–5.6 mm ..... 4. *P. kronenburgii*

3b. Anthers usually yellow, 3–5 mm.

4a. Glumes densely hirsute, hairs 0.5–1.3 mm ..... 3. *P. lanuginosa*

4b. Glumes scabrous or puberulent only proximally and distally ..... 5. *P. juncea*

**1. *Psathyrostachys huashanica*** Keng, Fl. Tsinling. 1(1): 440. 1976 [*"huachanica"*].

华山新麦草 hua shan xin mai cao

Plants laxly tufted, with long, underground rhizomes. Culms glabrous, 30–60 cm tall, 2–4-noded. Leaf sheath brown at base, longer than internode, glabrous; ligule ca. 0.5 mm, margin ciliate; leaf blade usually flat, 3–20 × 0.2–0.4 cm, abaxial surface and margin scabrous, adaxial surface puberulent and pilose. Spike greenish, 4–9 × 1–1.5 cm; rachis densely pubescent, margin hirsute. Spikelets 2 or 3 per node, with 1 or 2 (or 3) florets; rachilla internodes 2.1–3.5 mm. Glumes (9–)10–13 mm, scabrous. Lemma glabrous to sparsely scabrous; first lemma 8–

10 mm; awn (5–)7–9(–14) mm. Palea equaling lemma, ciliolate along keels. Anthers yellow, 4.5–6 mm. Caryopsis 4.5–6 mm. Fl. and fr. May–Aug.  $2n = 14^*$ .

• Stony and rocky slopes; 500–700 m. Henan, Shaanxi (Hua Shan).

In the protologue, the specific epithet was misspelled "*huachanica*" on p. 440, presumably as a typographical error. On pp. 98, 99, and 473 it was correctly spelled "*huashanica*."

**2. *Psathyrostachys stoloniformis*** C. Baden, Nordic J. Bot. 9: 449. 1990.

匍茎新麦草 pu jing xin mai cao

Plants laxly tufted, with underground rhizomes. Culms 40–60 cm tall, 2- or 3-noded, glabrous, but pubescent below spike. Leaf sheath brown at base, usually shorter than internode; ligule 0.4–0.6 mm; leaf blade involute at margin, (2–)8–17 × (0.2–)0.3–0.5 cm, both surfaces scabrous. Spike oblong, 7–9 × 0.8–1.2 cm; rachis margin hirsute. Spikelets usually 3 per node, narrowly elliptic, with 1 or 2 florets. Glumes (8–)10–12(–14) mm, pilose proximally, scabrous distally. Lemma (8–)9–12(–14) mm including awn, usually sparsely pilose. Palea (6.5–)7–10 mm, apex bifid. Lodicules 1.4–1.8 mm. Anthers yellow, 3.5–4.5(–5) mm. Caryopsis 4.5–4.6 × 1.2–1.4 mm. Fl. and fr. Jun–Jul.  $2n = 14^*$ .

• Dry steppes; 1600–2500 m. Gansu, Qinghai.

**3. *Psathyrostachys lanuginosa*** (Trinius) Nevski in Komarov, Fl. URSS 2: 714. 1934.

毛穗新麦草 mao sui xin mai cao

*Elymus lanuginosus* Trinius in Ledebour, Fl. Altaica. 1: 121. 1829; *Hordeum lanuginosum* (Trinius) Schenck.

Culms densely tufted, 15–40(–60) cm tall, 2- or 3-noded, glabrous, rarely hairy just below spike. Leaf sheath grayish brown at base when older, glabrous; ligule 0.2–0.6 mm; leaf blade flat to subinvolute, 1–13 × 0.1–0.3 cm, abaxial surface glabrous to scabrous, adaxial surface scabrous to pubescent. Spike ovate, 1–2 × 1–1.3 cm, villous; rachis brittle. Spikelets usually (2 or)3 per node, whitish green or grayish green, with 1(or 2) florets. Glumes setiform, (5–)6–8 mm, with dense, strongly patent, long hairs. Lemma densely patent villous, 7–9 mm including awn 1–2.5 mm. Palea 6–8(–9) mm, sparsely pilose, densely ciliate along keels, apex acute. Anthers yellowish, 3–4 mm. Caryopsis 3.5–4 mm. Fl. and fr. summer.  $2n = 28$ .

Stony or rocky slopes, screes; ca. 200 m. Gansu, Xinjiang [Russia (W Siberia); C Asia].

**4. *Psathyrostachys kronenburgii*** (Hackel) Nevski in Komarov, Fl. URSS 2: 713. 1934.

单花新麦草 dan hua xin mai cao

*Hordeum kronenburgii* Hackel, Allg. Bot. Z. Syst. 11: 133. 1905; *Elymus kronenburgii* (Hackel) Nikiforova.

Culms usually densely tufted, (50–)70–90 cm tall, 3–5-noded, glabrous, but pubescent just below spike. Leaf sheath grayish brown at base when older, ± separating into individual fibers; ligule 0.4–2 mm; leaf blade green or glaucous green, flat, 3–13 × 0.2–5 cm. Spike greenish, 5–7 × 0.9–1.2 cm; rachis pubescent, margin hirsute. Spikelets usually 3 per node, narrowly ovate, 0.8–1 cm, with 1(or 2) florets. Glumes violet tinged, (6.5–)8–10 mm, pilose. Lemma 6–12 mm, prominently 5-veined, pilose, tapering into a short awn (1.8–)2–3.5 mm. Palea equaling lemma, ciliate along keels. Lodicules 0.6–1.3 mm. Anthers violet, 5–6 mm. Caryopsis 4–4.5 mm. Fl. and fr. Jun–Aug.  $2n = 14$ .

Grassy places on mountain slopes or river banks. Gansu, Qinghai, Xinjiang [Russia; C Asia].

**5. *Psathyrostachys juncea*** (Fischer) Nevski in Komarov, Fl. URSS 2: 714. 1934.

新麦草 xin mai cao

Culms densely tufted, 50–80(–100) cm tall, 2–4-noded, smooth and glabrous, scabrous, or with dense, short, soft hairs below spike. Leaf sheath smooth, glabrous; ligule 0.3–1 mm; leaf blade glaucous to grayish green, flat or involute, 4–18 × 0.2–8 cm, glabrous to scabrous, margin scabrous. Spike (5–)9–12 × (0.5–)0.7–1.2 cm; rachis very brittle, puberulent, margin hirsute. Spikelets 2 or 3 per node, greenish, yellowish brown at maturity, narrowly elliptic, 0.8–1.1 cm, with 1 or 2(or 3) florets. Glumes (4–)5–8 mm, obscurely 1-veined, scabrous or puberulent only proximally and distally. Lemma lanceolate, (7–)8–11 mm including awn 1–2(–3) mm, usually with short, stiff hairs or long, soft hairs. Palea slightly shorter than lemma. Lodicules 1.3–1.5 mm. Anthers yellow or purple, 3.8–4.8 mm. Caryopsis 4.3–5 mm. Fl. and fr. May–Sep.

Grasslands on mountain slopes, stony or pebbly calcareous or schistose mountain slopes, steppes, roadsides, or as a field weed; 1500–2000(–5500) m. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Russia; cultivated in North America].

- 1a. Culms below spike smooth and glabrous, or scabrous; anthers yellow ..... 5a. var. *juncea*
- 1b. Culms with dense, short, soft hairs below spike; anthers purple ..... 5b. var. *hyalantha*

**5a. *Psathyrostachys juncea* var. *juncea***

新麦草(原变种) xin mai cao (yuan bian zhong)

*Elymus junceus* Fischer, Mém. Soc. Imp. Naturalistes Moscou 1: 25. 1811; *E. junceus* var. *villosus* Drobov.

Culms below spike smooth and glabrous, or scabrous. Anthers yellow. Fl. and fr. May–Sep.  $2n = 14$ .

Stony or pebbly calcareous or schistose mountain slopes, steppes, roadsides, or as a field weed; below 5500 m. Gansu, Nei Mongol, Xinjiang [Kazakhstan, Russia (Siberia); cultivated in North America].

**5b. *Psathyrostachys juncea* var. *hyalantha*** (Ruprecht) S. L. Chen, Novon 7: 229. 1997.

紫药新麦草 zi yao xin mai cao

*Elymus hyalanthus* Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14: 36. 1869; *Psathyrostachys hyalantha* (Ruprecht) Tzvelev; *P. juncea* subsp. *hyalantha* (Ruprecht) Tzvelev.

Culms with dense, short, soft hairs below spike. Anthers purple, 3–4 mm. Fl. and fr. late summer to autumn.

Grasslands on mountain slopes, steppes; 1500–2000 m. Xinjiang [Kyrgyzstan, Russia].

## 100. HORDEUM Linnaeus, Sp. Pl. 1: 84. 1753.

大麦属 da mai shu

*Critesion* Rafinesque.

Plants annual or perennial. Culms usually erect. Leaf sheath of cauline leaves split almost to base; ligule membranous or leathery-membranous; auricles present or absent; leaf blade usually flat. Spike dense, usually without a terminal spikelet; rachis short, brittle, rarely flexible. Spikelets usually 3 per node, in regular rows, with 1 (or 2) florets; lateral spikelets usually pedicellate, rarely sessile, often reduced and much smaller than central spikelet; central spikelet usually sessile, rarely pedicellate, perfect. Glumes narrow, subulate-setaceous, sometimes lanceolate dilated at base, inconspicuously 1–3-veined, not keeled. Lemma subrounded abaxially, leathery, rarely leathery-membranous, 5-veined, not keeled, awned or awnless. Palea almost equaling lemma, glabrous, scabrous, or ciliate along keels. Lodicules broadly lanceolate or lanceolate-ovate. Caryopsis usually adnate to lemma and palea, rarely free, oblong, concave furrowed on inner side, apex hairy.  $x = 7$ .

Between 30 and 40 species: temperate regions, also on subtropical mountains; ten species (one endemic, two introduced) in China.

In addition to the species treated below, *Hordeum bulbosum* Linnaeus has been recorded as cultivated in China (FRPS 9(3): 30. 1987).

All species when young are used for forage.

- 1a. Plants perennial; glumes subulate-setaceous, not lanceolate dilated at base.
- 2a. Glumes much (usually more than 10 ×) longer than floret ..... 5. *H. jubatum*
- 2b. Glumes shorter to slightly longer than floret.
- 3a. Nodes of culms glabrous.
- 4a. Central spikelet with 2 florets, distal floret usually sterile; anthers 2–2.3 mm ..... 1. *H. innermongolicum*
- 4b. Central spikelet usually with 1 floret; anthers 1–1.7 mm ..... 3. *H. roshevitzii*
- 3b. Nodes of culms pubescent.
- 5a. Central spikelet lemma apex acute, acuminate, or with short awn usually shorter than lemma body; anthers 2–4 mm ..... 2. *H. brevisubulatum*
- 5b. Central spikelet lemma apex with awn 5–10 mm and usually longer than lemma body; anthers 1.1–2 mm ..... 4. *H. bogdani*
- 1b. Plants annual; glumes lanceolate dilated at base.
- 6a. Spike distichous.
- 7a. Rachis of spike brittle ..... 6. *H. spontaneum*
- 7b. Rachis of spike flexible ..... 7. *H. distichon*
- 6b. Spike hexastichous.
- 8a. Rachis of spike flexible ..... 10. *H. vulgare*
- 8b. Rachis of spike brittle.
- 9a. Lateral spikelets shortly pedicellate ..... 8. *H. lagunculiforme*
- 9b. Lateral spikelets sessile ..... 9. *H. agriocrithon*

**1. *Hordeum innermongolicum*** P. C. Kuo & L. B. Cai, Acta Biol. Plateau Sin. 6: 223. 1987.

内蒙古大麦 nei meng gu da mai

Plants perennial, laxly tufted. Culms 80–140 cm tall, 3–5-noded, glabrous throughout. Leaf sheath glabrous; ligule 0.5–1 mm, membranous; leaf blade 6–15 × 0.4–0.6 cm, abaxial surface subglabrous, adaxial surface pubescent. Spike reddish brown, 7–16 × 0.5–0.7 cm; rachis slightly brittle. Lateral spikelets: pedicellate, usually sterile; pedicel 0.5–1 mm; glumes setaceous, 6–8 mm; lemma lanceolate, 5–7 mm, awn 3–4 mm. Central spikelet: sessile, usually with 2 florets; proximal floret fertile, distal one sterile; glumes lanceolate-setaceous, 6–9 mm, obscurely 2- or 3-veined; lemma lanceolate, 7–10 mm, pubescent, awn 6–8 mm. Anthers yellow, 2–2.3 mm. Caryopsis 2.5–3.5 × ca. 2 mm. Fl. and fr. Jul–Aug.

• Mountain slopes; ca. 1200 m. Nei Mongol, Qinghai.

**2. *Hordeum brevisubulatum*** (Trinius) Link, Linnaea 17: 391. 1844.

短芒大麦 duan mang da mai

Plants perennial, tufted or with short rhizomes. Culms usually erect, glabrous or densely pubescent at nodes. Leaf sheath

usually fibrous at base, sometimes membranous, ± pubescent; ligule 0.2–0.7 mm; auricles present or absent; leaf blade flat or sometimes involute, (3–)5–150(–175) × (0.2–)0.6–5(–7.1) cm, abaxial surface glabrous to scabrous or densely pilose, epidermis with straight or sinuous long cells, with or without silica cells, adaxial surface scabrous or densely pubescent or pilose. Spike pale glaucous to greenish or grayish violet, (2.3–)3–8.5(–9.6) × 0.4–0.8 cm; rachis brittle. Lateral spikelets: usually developed, sometimes rudimentary, pedicellate; pedicel 0.9–2.3 mm. Central spikelet: sessile or subsessile, lanceolate; glumes setaceous, equal, 5.5–6.5(–7) mm; lemma glabrous, subglabrous, pubescent, or densely pinkish violet pilose or long spinulose, apex acute-acuminate to shortly awned, awn usually shorter than lemma body; palea apex ± acute. Lodicules (0.6–)0.8–1.4(–1.6) mm, ± pubescent distally and at margin, apex acute to acuminate. Anthers yellow to violet, (2–)2.5–4 mm. Caryopsis yellow-brown to dark violet. Fl. and fr. summer.

Steppe valleys at timberline, wet meadows, saline meadows, stream banks, salt steppes, dry valleys, dry stony slopes and other dry habitats, rarely as a weed; 1400–5000 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang, Xizang [C and N Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Turkmenistan, Uzbekistan].

- 1a. Lemma of central spikelet glabrous or subglabrous; culms glabrous throughout;

leaf blade abaxial epidermis without silica cells ..... 2a. subsp. *brevisubulatum*

- 1b. Lemma of central spikelet pubescent, pilose or long spinulose; culms usually densely pubescent at nodes; leaf blade abaxial epidermis with or without silica cells.
- 2a. Lemma of central spikelet densely pinkish violet pilose or long spinulose; leaf blade abaxial epidermis without silica cells ..... 2c. subsp. *turkestanicum*
- 2b. Lemma of central spikelet pubescent, but hairs usually sparser and shorter; leaf blade abaxial epidermis with very dense silica cells ..... 2b. subsp. *nevskianum*

**2a. *Hordeum brevisubulatum* subsp. *brevisubulatum***

短芒大麦(原亚种) duan mang da mai (yuan ya zhong)

*Hordeum secalinum* Schreber var. *brevisubulatum* Trinius, Sp. Gram. 1: pl. 4. 1828; *Critesion brevisubulatum* (Trinius) Á. Löve; *H. macilentum* Steudel; *H. secalinum* subsp. *brevisubulatum* (Trinius) Krylov.

Culms glabrous throughout. Leaf blade abaxial epidermis with straight long cells, without silica cells. Lemma of central spikelet glabrous or subglabrous; awn less than 3 mm. Fl. and fr. summer.  $2n = 14^*$ ,  $28^*$ .

Steppe valleys at timberline, saline meadows, stream banks; 1400–3000 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang, Xizang [Mongolia, Pakistan, Russia (SE Siberia); C Asia].

**2b. *Hordeum brevisubulatum* subsp. *nevskianum* (Bowden) Tzvelev, Novosti Sist. Vyssh. Rast. 8: 66. 1971.**

拟短芒大麦草 ni duan mang da mai cao

*Hordeum nevskianum* Bowden, Canad. J. Genet. Cytol. 7: 396. 1965; *Critesion brevisubulatum* subsp. *nevskianum* (Bowden) Á. Löve; *C. nevskianum* (Bowden) Tzvelev; *H. brevisubulatum* var. *nevskianum* (Bowden) Tzvelev.

Culms densely pubescent at nodes. Leaf blade abaxial epidermis with sinuous long cells, silica cells very dense. Lemma of central spikelet pubescent, but hairs usually sparser and shorter than in subsp. *turkestanicum*. Fl. and fr. summer.  $2n = 14$ ,  $28^*$ .

Saline meadows, salt steppes, dry valleys, rarely as a weed; 1500–5000 m. Qinghai, Shaanxi, Xinjiang [N Afghanistan, Kashmir, Nepal, Russia (W Siberia)].

**2c. *Hordeum brevisubulatum* subsp. *turkestanicum* Tzvelev, Novosti Sist. Vyssh. Rast. 8: 66. 1971.**

糙稃大麦草 cao fu da mai cao

*Hordeum turkestanicum* Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 45. 1934, not R. E. Regel (1914); *Critesion brevisubulatum* subsp. *turkestanicum* Á. Löve; *C. turkestanicum* Tzvelev; *H. brevisubulatum* var. *turkestanicum* P. C. Kuo.

Culms to 50 cm tall, usually densely pubescent at nodes. Leaf blade 5–8 × 0.2–0.4 cm, both surfaces densely pilose or scabrous, abaxial epidermis with straight long cells, without silica cells. Spike dense, usually grayish violet. Lemma densely pinkish violet pilose or long spinulose, apex acuminate in lateral spikelets, awned in central spikelet. Fl. and fr. summer.  $2n = 28$ ,  $42$ .

Mainly dry stony slopes and other dry habitats, but also wet meadows and stream banks; 2000–4600 m. Xinjiang, Xizang [C and NE Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Russia, Turkmenistan, Uzbekistan].

**3. *Hordeum roshevitzii* Bowden, Canad. J. Genet. Cytol. 7: 395. 1965.**

紫大麦草 zi da mai cao

*Hordeum sibiricum* Roshevitz, Izv. Glavn. Bot. Sada SSSR 28: 385. 1929, not Link ex Steudel (1840), nor (Linnæus) Schenck (1907); *Critesion californicum* (Covas & Stebins) Á. Löve subsp. *sibiricum* Á. Löve; *C. roshevitzii* (Bowden) Tzvelev.

Plants perennial, usually laxly tufted. Culms erect, 40–70 cm tall, 3- or 4(–6)-noded, smooth, glabrous. Ligule membranous; auricles usually absent; leaf blade flat, 3.5–15 × 0.3–0.4 cm, both surfaces glabrous but scabrous, epidermis without silica cells. Spike green or purplish green to blackish purple, 5–8 × 0.3–0.6 cm; rachis slightly brittle near base, very brittle distally, margin scabrous to ciliate. Lateral spikelets rudimentary, rarely male; glumes setaceous, 0.5–0.9(–1) cm, scabrous; lemma and palea ca. 4.2 mm; lemma awn ca. 2.3 mm. Central spikelet usually with 1 floret; glumes setaceous, 6–8 mm; lemma lanceolate, 5–7 mm, glabrous, awn (2–)4–8 mm; palea slightly shorter than or equaling lemma. Anthers yellow, 1–1.7 mm. Fl. and fr. Jun–Aug.  $2n = 14^*$ ,  $28$ .

Alkaline or saline meadows, lake shores, river banks, streamsides, pebbles; 500–3500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang [Japan, Korea, Mongolia, Russia].

The record in FRPS (9(3): 28. 1987) of *Hordeum violaceum* Boissier & Hohenacker, native to SW Asia, is referable to *H. roshevitzii*.

**4. *Hordeum bogdanii* Wilensky, Trudy Glavn. Bot. Sada 40: 248. 1928 [“*bogdani*”].**

布顿大麦草 bu dun da mai cao

*Critesion bogdanii* (Wilensky) Á. Löve.

Plants perennial, tufted. Culms 40–80(–100) cm tall, ca. 2 mm in diam., (2 or)3–5(or 6)-noded, densely appressed hairy at nodes. Leaf sheath membranous or fibrous, smooth, but those of lower leaves sometimes hairy; ligule 0.2–0.6 mm, membranous; auricles usually absent; leaf blade glaucous green, flat, 6–15 × 0.3–0.8(–1) cm, stiff, both surfaces scabrous or adaxial surface pilose. Spike pale whitish glaucous or greenish violet to somewhat dark violet, 4–10 × (0.3–)0.5–0.7 cm; rachis usually tough except apically, margin scabrous hairy. Lateral spikelets: pedicellate, male or perfect and setting seeds; glumes setaceous, rarely somewhat flattened at base, equal or proximal one slightly shorter (6–10 mm); lemma 5–7 mm, pubescent, awn 4–9 mm; palea usually equaling lemma. Central spikelet: sessile,

lanceolate; glumes setaceous, 5–10 mm; lemma 5–7 mm, densely shortly hairy, awn 5–10 mm; palea subequalling lemma, apex truncate or acute. Anthers usually yellow, 1.1–2 mm. Fl. and fr. Jun–Sep.  $2n = 14$ .

Alkaline or saline moist meadows, riverside sands, pebbles; 1000–3800 m. Gansu, Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia (W Siberia), Turkmenistan, Uzbekistan].

**5. *Hordeum jubatum*** Linnaeus, Sp. Pl. 1: 85. 1753.

芒颖大麦 mang ying da mai

*Critesion geniculatum* Rafinesque, nom. illeg. superfl.; *C. jubatum* (Linnaeus) Nevski; *Elymus jubatus* (Linnaeus) Link.

Plants perennial, tufted, smooth and glabrous. Culms erect or decumbent at base, 30–60 cm tall, ca. 2 mm in diam., 3–5-noded. Leaf blade flat, 6–12 × 0.15–0.4 cm. Spike green or purplish green, nodding, 5–10 cm including awns, soft; rachis brittle. Lateral spikelets: reduced to 1–3 spreading awns, rarely male. Central spikelet: perfect; glumes spreading, awnlike, 2.5–6.5 cm, much longer than floret; lemma lanceolate 5–6(–8) mm, awn to 7 cm; palea equalling lemma. Fl. and fr. May–Aug.  $2n = 28^*$ .

Meadows, moist land. Heilongjiang, Liaoning [temperate regions of the world].

**6. *Hordeum spontaneum*** K. Koch, Linnaea 21: 430. 1848.

钝稃野大麦 dun fu ye da mai

Plants annual. Culms 40–50 cm tall, 5- or 6-noded, glabrous. Leaf sheath glabrous; ligule yellowish brown, ca. 1 mm, apex truncate; auricles present, 2–3 mm; leaf blade 5–10 × 0.4–0.6 cm. Spike distichous, greenish to dark brown, slightly compressed, 4–6 × ca. 1 cm; rachis ca. 3 mm, brittle, densely pubescent. Lateral spikelets: pedicellate, sterile; pedicel ca. 2 mm; lemma apex rounded-obtuse, cuspidate, very shortly awned, or with awn 6–10 mm. Central spikelets: sessile, 1–1.4 cm; glumes linear-lanceolate, densely hairy, apex tapering into slender, scabrous awn; lemma broadly elliptic, glabrous, apex prolonged into flat, very scabrous awn 5–17 cm. Fl. and fr. Apr–Jun.

Thickets, stony screes, pebbles, roadsides, waste places, often as a weed in cultivated fields of *Hordeum* and other crops; 3500–4000 m. Sichuan, Xizang, Yunnan [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; NE Africa, SW Asia].

- 1a. Apex of lemma of lateral spikelets rounded-obtuse ..... 6a. var. *spontaneum*  
 1b. Apex of lemma of lateral spikelets cuspidate or awned.  
 2a. Apex of lemma of lateral spikelets cuspidate or with very short awn ..... 6b. var. *proskowetzii*  
 2b. Apex of lemma of lateral spikelets with awn 6–10 mm ..... 6c. var. *ischnatherum*

**6a. *Hordeum spontaneum* var. *spontaneum***

钝稃野大麦(原变种) dun fu ye da mai (yuan bian zhong)

*Hordeum ithaburense* Boissier; *H. vulgare* Linnaeus subsp. *spontaneum* (K. Koch) Ascherson & Graebner.

Lateral spikelets: lemma apex rounded-obtuse. Fl. and fr. Apr–Jun.  $2n = 14$ .

Thickets, stony screes, pebbles, roadsides, waste places, often as a weed in cultivated fields of *Hordeum* and other crops; 3500–4000 m. Sichuan, Xizang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; NE Africa, SW Asia].

**6b. *Hordeum spontaneum* var. *proskowetzii*** Nábělek, Spisy Přír. Fak. Masarykovy Univ. 111: 32. 1929.

芒稃野大麦 mang fu ye da mai

Lateral spikelets: lemma apex cuspidate or with very short awn. Fl. and fr. Apr–Jun.

Roadsides, waste places, as a weed in cultivated fields of *Hordeum*. Sichuan, Xizang [C and SW Asia].

**6c. *Hordeum spontaneum* var. *ischnatherum*** (Cosson) Thellung, Fl. Adv. Montpellier, 161. 1912.

尖稃野大麦 jian fu ye da mai

*Hordeum ithaburense* var. *ischnatherum* Cosson, Bull. Soc. Bot. France 11: 163. 1864; *H. ischnatherum* (Cosson) Schweinfurth.

Lateral spikelets: lemma apex with awn 6–10 mm. Fl. and fr. Apr–Jun.

Roadsides, as a weed in cultivated fields of *Hordeum*. Sichuan, Xizang [C and SW Asia].

**7. *Hordeum distichon*** Linnaeus, Sp. Pl. 1: 85. 1753.

二棱大麦 er leng da mai

Plants annual. Culms erect, 60–80 cm tall, 5- or 6-noded, smooth, glabrous. Leaf sheath usually shorter than internode; ligule membranous; auricles present, surrounding culm; leaf blade 15–20 × 0.6–0.7 cm. Spike erect, distichous, 10–20 × 0.7–0.8 cm; rachis flexible, margin pubescent. Lateral spikelets: pedicellate, sterile; pedicel ca. 2 mm; glumes ca. 5 × 0.5 mm, awn slender, ca. 5 mm; lemma ca. 8 mm. Central spikelet: fertile; glumes ca. 5 mm, awn slender, ca. 5 mm; lemma ca. 10 mm, awn to 15 cm; caryopsis adherent to or free from lemma and palea. Fl. and fr. Jul–Aug.

Cultivated as a fodder plant, or a weed in fields of *Hordeum vulgare*. Anhui, Fujian, Hebei, Henan, Qinghai, Xizang; perhaps other provinces [widely cultivated in temperate regions].

- 1a. Caryopsis of central spikelet adherent to lemma and palea ..... 7a. var. *distichon*  
 1b. Caryopsis of central spikelet free from lemma and palea ..... 7b. var. *nudum*

**7a. *Hordeum distichon* var. *distichon***

二棱大麦(原变种) er leng da mai (yuan bian zhong)

*Hordeum vulgare* Linnaeus convar. *distichon* (Linnaeus) Alefeld; *H. vulgare* subsp. *distichon* (Linnaeus) Koernicke; *H. vulgare* var. *distichon* (Linnaeus) J. D. Hooker.

Central spikelet: caryopsis adherent to lemma and palea. Fl. and fr. Jul–Aug.  $2n = 14$ .

Cultivated as a fodder plant, or a weed in fields of *Hordeum vulgare*. Hebei, Qinghai, Xizang [widely cultivated in temperate regions].

**7b. *Hordeum distichon* var. *nudum*** Linnaeus, Sp. Pl. 1: 85. 1753.

裸麦 luo mai

*Hordeum distichon* convar. *nudum* (Linnaeus) Tzvelev; *H. distichon* subsp. *nudum* (Linnaeus) Rothmaler; *H. nudum* (Linnaeus) Arduino; *H. sativum* Jessen var. *nudum* (Linnaeus) Vil-morin; *H. vulgare* var. *nudum* (Linnaeus) J. D. Hooker.

Central spikelet: caryopsis free from lemma and palea. Fl. and fr. Jul–Aug.  $2n = 14$ .

Cultivated as a fodder plant, or a weed in fields of *Hordeum vulgare*. NW and SW China [widely cultivated in temperate regions].

**8. *Hordeum lagunculiforme*** Bachtcev, Kungl. Lantbrukshögskolans Ann. 23: 309. 1957.

瓶大麦 ping da mai

*Hordeum spontaneum* K. Koch var. *lagunculiforme* (Bachtcev) Bachtcev.

Plants annual. Culms erect, smooth, glabrous. Leaf sheath usually glabrous; ligule membranous; auricles present; leaf blade flat. Spike hexastichous; rachis brittle. Lateral spikelets: pedicellate, fertile; pedicel 1.5–2 mm. Central spikelet: sessile, fertile. Fl. and fr. Jun–Sep.  $2n = 14$ .

Field margins, roadsides. Qinghai, Sichuan, Xizang [Kashmir, Russia, Turkmenistan].

**9. *Hordeum agriocrithon*** A. E. Åberg, Lantbrukshögskolans Ann. 6: 160. 1938.

六棱大麦 liu leng da mai

*Hordeum vulgare* Linnaeus subsp. *agriocrithon* (A. E. Åberg) Å. Löve.

Plants annual. Culms erect, 60–90 cm, smooth, glabrous. Leaf sheath usually glabrous; ligule 1–2 mm, membranous; auricles present, lanceolate; leaf blade flat, 10–15(–20) × 1–1.5 cm. Spike hexastichous, dense; rachis brittle. Spikelets all sessile, fertile, and similar. Glumes 5–6 × ca. 1 mm, densely puberulent; awn slender, ca. 10 mm. Lemma to 14 mm; awn ca. 15 mm. Caryopsis oblong, ca. 12 mm. Fl. and fr. Jun–Sep.  $2n = 14$ .

Usually a weed in fields of *Hordeum vulgare*. Qinghai, Sichuan, Xizang [C and SW Asia, E Mediterranean region].

**10. *Hordeum vulgare*** Linnaeus, Sp. Pl. 1: 84. 1753.

大麦 da mai

Plants annual. Culms erect, 50–100 cm tall, smooth, glabrous. Leaf sheath usually glabrous; auricles present; ligule 1–2 mm, membranous; leaf blade 9–25 × 0.6–2 cm. Spike hexastichous, dense; rachis flexible. Spikelets all sessile, fertile, and

similar. Glumes linear-lanceolate at base, puberulent; awn 8–14 mm. Lemma apex with long awn 8–15 cm or 3-forked appendage. Palea equaling lemma. Caryopsis adherent to or free from lemma and palea. Fl. and fr. Jun–Aug.

Commonly cultivated as a food and fodder plant. Anhui, Fujian, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [cultivated worldwide in all non-tropical countries and in montane areas of tropics].

- 1a. Caryopsis adherent to lemma and palea ... 10a. var. *vulgare*  
 1b. Caryopsis free from lemma and palea.  
 2a. Apex of lemma with long awn  
 8–15 cm ..... 10b. var. *coeleste*  
 2b. Apex of lemma with 3-forked  
 appendage ..... 10c. var. *trifurcatum*

**10a. *Hordeum vulgare* var. *vulgare***

大麦(原变种) da mai (yuan bian zhong)

*Hordeum sativum* Jessen, nom. illeg. superfl.; *H. sativum* var. *vulgare* (Linnaeus) K. Richter; *Triticum vulgare* (Linnaeus) Salisbury (1796), not Villars (1787).

Lemma apex with long awn 8–15 cm. Caryopsis adherent to lemma and palea. Fl. and fr. Jun–Aug.  $2n = 14$ .

Commonly cultivated as a food and fodder plant in China [cultivated worldwide in all non-tropical countries and in montane areas of tropics].

**10b. *Hordeum vulgare* var. *coeleste*** Linnaeus, Sp. Pl. 1: 85. 1753.

青稞 qing ke

*Hordeum coeleste* (Linnaeus) P. Beauvois; *H. sativum* var. *coeleste* (Linnaeus) Vilmorin.

Lemma with long awn 8–15 cm. Caryopsis free from lemma and palea. Fl. and fr. Jun–Sep.  $2n = 14$ .

Sometimes cultivated in NW and SW China [cultivated in other non-tropical countries].

**10c. *Hordeum vulgare* var. *trifurcatum*** (Schlechtendal) Alefeld, Landw. Fl. 341. 1866.

藏青稞 zang qing ke

*Hordeum coeleste* var. *trifurcatum* Schlechtendal, Linnaea 11: 543. 1837; *H. aegiceras* Nees ex Royle; *H. sativum* var. *trifurcatum* Schlechtendal ex Orlov & A. E. Åberg; *H. trifurcatum* (Schlechtendal) Wender; *H. vulgare* subsp. *aegiceras* (Nees ex Royle) Å. Löve; *H. vulgare* var. *aegiceras* (Nees ex Royle) Aitchison.

Lemma apex with 3-forked appendage. Caryopsis free from lemma and palea. Fl. and fr. Jun–Jul.  $2n = 14$ .

Sometimes cultivated. Gansu, Qinghai, Sichuan, Xizang [cultivated in other non-tropical countries].

## 101. HYSTRIX Moench, Methodus, 294. 1794.

猓草属 wei cao shu

*Asprella* Humboldt (1790), not *Asprella* Schreber (1789).

Plants perennial, with short or creeping rhizomes. Culms usually erect. Leaf sheath of cauline leaves split almost to base; auricles crescent-shaped; ligule leathery-membranous. Spike erect or nodding, slender; rachis not disarticulating at nodes. Spikelets (1 or)2 per node, with 1–3 (4 in *H. coreana*) florets, distal floret usually sterile; rachilla disarticulating above glumes. Glumes usually weakly developed or sometimes absent (9–10 mm in *H. coreana*), subulate or linear-setiform, not keeled (keeled in *H. coreana*), scabrous. Lemma lanceolate, subleathery, 5–7-veined, without distinct keel, usually awned; callus subobtusate. Palea 2-keeled, ± ciliate along keels. Lodicules broadly lanceolate, margin ciliate. Caryopsis narrow, slightly furrowed, apex hairy.  $x = 7$ .

About ten species: mainly in warm-temperate regions of Asia and North America; four species (one endemic) in China.

- 1a. Glumes well developed, 9–10 mm including awns, keeled ..... 4. *H. coreana*  
 1b. Glumes absent or weakly developed, to 6 mm, not keeled.  
 2a. Culms 40–60 cm tall, 3- or 4-noded ..... 3. *H. kunlunensis*  
 2b. Culms 80–130 cm tall, 4–6-noded.  
 3a. Spikelets with 2 or 3 florets; glumes subulate, 3–6 mm ..... 1. *H. komarovii*  
 3b. Spikelets with 1 floret; glumes usually absent, especially in proximal spikelets ..... 2. *H. duthiei*

**1. *Hystrix komarovii*** (Roshevitz) Ohwi, Acta Phytotax. Geobot. 2: 31. 1933.

东北猬草 dong bei wei cao

*Asperella komarovii* Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 5: 152. 1924.

Culms 100–130 cm tall, 4–6-noded, glabrous or pubescent below spike. Leaf sheath glabrous or pubescent; ligule ca. 1.5 mm; leaf blade flat, 10–20 × 1–2 cm, abaxial surface scabrous, adaxial surface pubescent. Spike ± nodding, green, slender, 10–20 × 1–1.5 cm; rachis pubescent on back, margin ciliate. Spikelets 2 per node, or 1 per node proximally in spike, with 2 or 3 florets. Glumes subulate, 3–6 mm, pubescent. First lemma ca. 12 mm; callus densely pubescent; awn 1–1.5 cm. Palea linear-lanceolate, shorter than lemma, ciliate along keels, apex 2-lobed. Caryopsis linear, slightly concave on inner side. Fl. and fr. Jun–Jul.

Usually in forests; 1000–2000 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi [Japan, Korea, Mongolia, Russia].

**2. *Hystrix duthiei*** (Stapf ex J. D. Hooker) Bor, Indian Forester 66: 544. 1940.

猬草 wei cao

*Asperella duthiei* Stapf ex J. D. Hooker, Fl. Brit. India 7: 375. 1896 [“1897”].

Culms 80–100 cm tall, 4- or 5-noded. Leaf sheath glabrous or puberulent proximally; ligule ca. 1 mm, apex truncate; leaf blade 10–15 cm, glabrous or adaxial surface pilose; rachis pale puberulent. Spikelets 2 per node, 3–4 mm, with 1 floret. Glumes usually absent, especially in proximal spikelets. Lemma lanceolate, 9–11 mm, 5-veined, with prickly hairs abaxially; callus obtuse, pubescent; awn 1.5–2.5 cm. Palea slightly shorter than lemma, laxly ciliate along keels. Anthers yellow, ca. 5 mm. Fl. and fr. May–Aug.

Forest margins, thickets; ca. 2000 m. Anhui, Henan, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [N India, Nepal].

**3. *Hystrix kunlunensis*** K. S. Hao, Bot. Jahrb. Syst. 68: 580. 1938.

昆仑猬草 kun lun wei cao

Culms 40–60 cm tall, 3- or 4-noded, smooth, glabrous at nodes. Leaf sheath shorter than internode, glabrous; ligule very short to absent; leaf blade green, linear-lanceolate, 5–7 × 0.2–0.5 cm, abaxially glabrous to scabrous, adaxially glabrous, base subauriculate, apex acuminate; leaf blade of innovation shoot narrower, narrowly linear. Spike dense, to 5 cm; rachis glabrous. Spikelets 2 per node, distichous, fragile, with 2(or 3) florets; proximal florets bisexual, distal ones unisexual. Glumes subulate, unequal, 2–5 mm, scaberulose to minutely pubescent. Lemma separated from glume by a short internode, linear-lanceolate, 6–9 mm, eventually deciduous; awn subflexuose, 1–1.2 cm, scabrous, inconspicuously veined. Palea linear-oblong, 2-keeled, glabrous, ciliate along keels. Caryopsis elliptic-oblong, ca. 5 mm.

• Near lakes; ca. 4500 m. Qinghai (Qinghai Hu).

**4. *Hystrix coreana*** (Honda) Ohwi, J. Jap. Bot. 12: 653. 1936.

高丽猬草 gao li wei cao

*Elymus coreanus* Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3(1): 17. 1930; *Asperella coreana* (Honda) Nevski; *Clinelymus coreanus* (Honda) Honda; *E. dasystachys* Trinius var. *maximoviczii* Komarov.

Culms tufted, geniculate at base, 50–65 cm tall, 3- or 4-noded, villous below spike. Leaf sheath shorter than internode, villous; ligule ca. 0.3 mm, membranous; leaf blade flat, 0.5–0.9 cm wide, both surfaces pilose. Spike somewhat nodding, 8–10 cm; rachis villous. Spikelets with 3 or 4 florets. Glumes subulate, unequal, keeled, 3-veined, scabrous along veins, apex tapering into scabrous awn; proximal glume ca. 9 mm including awn; distal glume ca. 10 mm including awn. Lemma ca. 15 mm including awn, 5-veined, glabrous except near apex. Palea ca. 9 mm, ciliate along keels distally. Lodicules ca. 1.6 mm. Anthers ca. 5.5 mm.

Sandy places on river banks. Heilongjiang, Jilin, Liaoning [N Korea, Russia (Far East)].

## 102. ELYMUS Linnaeus, Sp. Pl. 1: 83. 1753.

披碱草属 pi jian cao shu

*Campeiostrachys* Drobow; *Clinelymus* (Grisebach) Nevski, nom. superfl.; *Elymus* sect. *Clinelymus* Grisebach; *Goulardia* Husnot; *Roegneria* K. Koch; *Semeiostrachys* Drobow; *Terrellia* Lunell, nom. illeg. superfl.

Plants perennial, usually tufted, usually without, rarely with, rhizomes. Culms usually erect. Leaf sheath of cauline leaves split almost to base; auricles present or absent; leaf blade flat or rolled. Spike erect to nodding. Spikelets 1 or 2(–4) per node, sessile, rarely very shortly pedicellate, appressed to rachis, clearly laterally compressed, usually all similar, with 2–10 or more florets; rachis tough. Glumes opposite or side-by-side, linear-lanceolate to lanceolate-ovate, firmly membranous to leathery, 1–9(–11)-veined, not keeled, apex obtuse to shortly awned; veins  $\pm$  raised. Lemma lanceolate-oblong, rounded abaxially, 5-veined,  $\pm$  pubescent, apex obtuse or acute to awned, rarely toothed; veins connivent at apex; awn erect or reflexed. Palea shorter than or equaling lemma, apex retuse, subrounded, or acute. Caryopsis usually adherent to lemma and palea.  $x = 7$ .

About 170 species: temperate regions of both hemispheres, mainly in Asia; 88 species (62 endemic) in China.

The genus *Roegneria* should be referred to *Elymus* because of their many common characters, e.g., plants usually tufted; spikelets usually all similar, 1 per node; lemma lanceolate-oblong, rounded abaxially, 5-veined, veins connivent at apex.

In addition, two North American species have been recorded as cultivated in China (FRPS 9(3): 10, 66. 1987): *Elymus canadensis* Linnaeus and *E. trachycaulus* (Link) Gould ex Shinnars (as *R. pauciflora* (Schweinitz) Hylander).

Löve (Feddes Repert. 95: 447–473. 1984) published several new combinations and *nomina nova* in *Elymus* based on names previously validly published in *Roegneria* by Keng and Chen (Acta Univ. Nankin. Sci. Nat. [J. Nanjing Univ. (Biol.)] 1963(1): 1–92. 1963). However, in all cases, Löve cited the place of publication of the basionym from a later publication by Keng (Fl. Ill. Pl. Prim. Sin. Gram., ed. 2, 1965). Under Art. 33.3 of the Saint Louis Code, Löve's combinations were not validly published. These errors in citation are not correctable under Art. 33.4 because they are omissions, nor are they correctable under Art. 33.6(a) because conditions for valid publication were not again fulfilled in the 1965 work.

All species of this genus are good forage plants.

- 1a. Spikelets 2 per node (at least at middle nodes), rarely 3 or 4 per node.
  - 2a. Glumes much shorter than lemma.
    - 3a. Lemma awn more than 10 mm.
      - 4a. Leaf blade flat, 10–15  $\times$  0.5–1 cm ..... 7. *E. sibiricus*
      - 4b. Leaf blade flat or  $\pm$  rolled, 3–10  $\times$  0.2–0.5 cm.
        - 5a. Leaf blade flat, 3–5 mm wide; glume apex with awn 1–4 mm ..... 8. *E. nutans*
        - 5b. Leaf blade  $\pm$  rolled, ca. 2 mm wide; glume apex mucronate or acuminate ..... 9. *E. atratus*
    - 3b. Lemma awn less than 7 mm.
      - 6a. Leaf blade 1.5–3 mm wide; glumes oblong, 2–3 mm, 3-veined ..... 12. *E. sinosubmuticus*
      - 6b. Leaf blade 3–5 mm wide; glumes ovate-lanceolate, oblong-lanceolate, or narrowly lanceolate, 3–4 mm, 1–3-veined.
        - 7a. Spikelets 13–15 mm, with 4–6 florets; glumes oblong-lanceolate or ovate-lanceolate ..... 10. *E. breviaristatus*
        - 7b. Spikelets 10–12 mm, with 3 or 4 florets; glumes narrowly lanceolate ..... 11. *E. alpinus*
  - 2b. Glumes slightly shorter than or equaling lemma.
    - 8a. Rachis densely hirsute, nodes swollen ..... 6. *E. villifer*
    - 8b. Rachis not densely hirsute, nodes not swollen.
      - 9a. Culms, leaf blade, and spike all farinaceous; glumes and lemma  $\pm$  purplish punctate; awn purple, pubescent ..... 5. *E. purpuraristatus*
      - 9b. Culms, leaf blade, and spike not farinaceous; glumes and lemma not purplish punctate; awn green, glabrous but scabrous.
        - 10a. Glumes hirsutulous along veins.
          - 11a. Leaf sheath glabrous; spike purplish; glume apex acuminate or with point ca. 1.5 mm ..... 2. *E. barystachyus*
          - 11b. Leaf sheath villous at base; spike green; glume apex usually with awn to 5 mm ..... 4. *E. dahuricus*
        - 10b. Glumes scabrous along veins.
          - 12a. Glume apex acuminate or with awn 1–4 mm; lemma with usually erect awn (3–)5–13 mm.
            - 13a. Culms to 120 cm tall, 4- or 5-noded; leaf blade 10–20  $\times$  0.6–1.4 cm; lemma glabrous, or hirsutulous in distal half ..... 1. *E. tangutorum*
            - 13b. Culms 40–80 cm tall, 2- or 3-noded; leaf blade 5–12  $\times$  ca. 0.5 cm; lemma puberulent throughout ... 4. *E. dahuricus*
          - 12b. Glume apex with awn 5–7 mm; lemma with usually reflexed awn 8–20(–40) mm.
            - 14a. Leaf blade 1–1.6 cm wide; spikelets 2 or 3(or 4) per node ..... 3. *E. excelsus*
            - 14b. Leaf blade 0.5–0.9(–1.2) cm wide; spikelets 2 per node, or 1 per node in proximal and distal parts of spike ..... 4. *E. dahuricus*
  - 1b. Spikelets 1 per node.
    - 15a. Lemma with long, strongly recurved awn at seed maturity; if lemma awn short or nearly absent, or only slightly curved, then palea shorter than lemma, ciliate along keels, and apex rounded or emarginate.
    - 16a. Glumes usually slightly shorter than or equaling first lemma, 5–7-veined.
      - 17a. Palea oblong-obovate, much shorter than lemma ..... 14. *E. ciliaris*



- 17b. Palea oblong, slightly shorter than or equaling lemma.
- 18a. Lemma glabrous throughout ..... 20. *E. tibeticus*
- 18b. Lemma scabrous, pubescent, or hispidulous throughout.
- 19a. Glumes with thin margin ..... 15. *E. canaliculatus*
- 19b. Glumes not with thin margin.
- 20a. Lemma abaxially hispidulous or laxly spinulose.
- 21a. Lemma abaxially laxly spinulose, awn 2–2.5 cm; culms 30–50 tall ..... 16. *E. sinoflexuosus*
- 21b. Lemma abaxially hispidulous, awn 2.5–4.5 cm, culms 60–100 cm tall ..... 17. *E. gmelinii*
- 20b. Lemma abaxially smooth and glabrous (at middle), scabrous, puberulent, or pubescent, sometimes spinulose along veins.
- 22a. Lemma abaxially scabrous, puberulent, or pubescent.
- 23a. Lemma abaxially puberulent; culms 25–30 cm tall ..... 18. *E. zhui*
- 23b. Lemma abaxially scabrous or pubescent, margin ciliolate; culms 30–90 cm tall ..... 19. *E. formosanus*
- 22b. Lemma abaxially smooth and glabrous at middle, otherwise spinulose along veins or ± puberulent.
- 24a. Leaf blade usually flat, thin; glume apex acuminate ..... 21. *E. nakaii*
- 24b. Leaf blade involute, stiff; glume apex acute or with point 1–5 mm ..... 22. *E. strictus*
- 16b. Glumes much shorter than first lemma, (1–)3–5-veined; if glumes only slightly shorter than first lemma then margin thin, scarious, membranous, or very narrowly hyaline.
- 25a. Glumes slightly shorter than first lemma, margin thin, scarious, membranous, or very narrowly hyaline.
- 26a. Glume margin scarious.
- 27a. Culms 80–150 cm tall ..... 23. *E. caninus*
- 27b. Culms 30–60 cm tall ..... 24. *E. caesifolius*
- 26b. Glume margin thin, membranous, or very narrowly hyaline.
- 28a. Glume margin thin; spikelets pedicellate, pedicel 0.8–9 mm.
- 29a. Spikelet pedicel 0.8–1.5(–2) mm ..... 25. *E. durus*
- 29a. Spikelet pedicel 5–9 mm ..... 13. *E. cacuminis*
- 28b. Glume margin membranous or very narrowly hyaline; spikelets sessile or subsessile.
- 30a. Glume margin very narrowly hyaline.
- 31a. Culms 50–100 cm tall, 3–5-noded; leaf blade flat, 2.5–8 mm wide ..... 26. *E. antiquus*
- 31b. Culms 10–60 cm tall, 2- or 3-noded; leaf blade tightly involute, 1–4 mm wide ..... 27. *E. burchan-buddae*
- 30b. Glume margin membranous.
- 32a. Lemma glabrous throughout.
- 33a. Glume apex with short awn; leaf blade adaxial surface villous ..... 28. *E. serpentinus*
- 33b. Glume apex awnless, usually acute; leaf blade adaxial surface usually scabrous ..... 29. *E. glaberrimus*
- 32b. Lemma puberulent or ± hispidulous.
- 34a. Spikelets with 3 or 4 florets; lemma puberulent ..... 30. *E. pseudocaninus*
- 34b. Spikelets with 4 or 5(or 6) florets; lemma hispidulous distally and near margin ..... 31. *E. sinkiangensis*
- 25b. Glumes much shorter than first lemma, margin herbaceous.
- 35a. Glume apex usually tapering into awn 2–7 mm; palea equaling lemma.
- 36a. Lemma glabrous throughout.
- 37a. Culms 15–20 cm tall; first lemma 7–9 mm; anthers yellow or purple, 1.2–2.5 mm ..... 32. *E. Jacquemontii*
- 37b. Culms (15–)40–50 cm tall; first lemma 10–12 mm; anthers black or brown, 2–5 mm.
- 38a. First lemma ca. 10 mm; anthers black, ca. 2 mm ..... 33. *E. aristiglumis*
- 38b. First lemma 11–12 mm; anthers brown, 4–5 mm ..... 34. *E. shouliangiae*
- 36b. Lemma hirsute or hirsutulous throughout, pubescent only at base and margin, or puberulent proximally and hispidulous distally.
- 39a. Lemma pubescent only at base and margin ..... 37. *E. altissimus*
- 39b. Lemma hirsute or hirsutulous throughout, or puberulent proximally and hispidulous distally.
- 40a. Lemma hirsutulous throughout.
- 41a. Culms 1- or 2-noded; spikelets with 2 or 3 florets ..... 33. *E. aristiglumis*
- 41b. Culms 3-noded; spikelets with 4 or 5 florets ..... 35. *E. confusus*
- 40b. Lemma hirsute throughout, or puberulent proximally and hispidulous distally.
- 42a. Lemma hirsute throughout; culms 60–75 cm tall; palea ciliolate along keels distally ..... 36. *E. anthosachnoides*
- 42b. Lemma puberulent proximally, hispidulous distally; culms 20–45 cm tall; palea puberulent between keels distally ..... 39. *E. serotinus*
- 35b. Glume apex acute, mucronate, or with awn less than 2 mm; palea slightly shorter to slightly longer than lemma.

- 43a. Palea equaling or slightly longer than lemma; anthers 2.5–3 mm; lemma awn (2.5–)3.5–5.5 cm.
- 44a. Leaf blade 1–2 mm wide; palea ciliate along keels ..... 40. *E. retroflexus*
- 44b. Leaf blade 2–4 mm wide; palea glabrous along keels ..... 41. *E. leiotropis*
- 43b. Palea slightly shorter than lemma; anthers 1–2 mm; lemma awn 1–3 cm.
- 45a. Spike somewhat nitid; lemma glabrous or sparsely puberulent abaxially ..... 42. *E. brevipes*
- 45b. Spike not nitid; lemma pubescent, hirsutulous, or scabrous abaxially.
- 46a. Spikelets sessile or very shortly pedicellate, with 1–4(or 5) florets.
- 47a. Spikelets usually very shortly pedicellate, with 3 or 4(or 5) florets ..... 43. *E. schrenkianus*
- 47b. Spikelets sessile; with 1–3(–5) florets.
- 48a. Spikelets with 1–3 florets; culms 70–150 cm tall, 5–7-noded ..... 37. *E. altissimus*
- 48b. Spikelets with 2–5 florets; culms 40–80 cm tall, 3- or 4-noded ..... 38. *E. laxinodis*
- 46b. Spikelets usually sessile, with 4–9 florets.
- 49a. Lemma hirsute throughout, especially distally and near margin, first lemma  
13–14 mm ..... 36. *E. anthosachnoides*
- 49b. Lemma ± hirsutulous or scabrous abaxially, first lemma 9–11 mm.
- 50a. Lemma ± hirsutulous abaxially, first lemma ca. 11 mm, awn 3–4 cm; spikelets with  
7–9 florets ..... 44. *E. pulanensis*
- 50b. Lemma scabrous abaxially, rarely hirsutulous, first lemma 9–11 mm, awn 1.8–3 cm;  
spikelets with 4–7 florets.
- 51a. Spike ± purplish, nodding, 13–15 cm; glumes oblong-lanceolate, apex acute; lemma  
scabrous or hirsutulous abaxially ..... 45. *E. purpurascens*
- 51b. Spike usually glaucous green, slender and flexuose, 7–9 cm; glumes linear-lanceolate,  
apex usually acuminate; lemma scabrous abaxially ..... 46. *E. tschimganicus*
- 15b. Lemma with straight awn or awnless; palea slightly shorter to slightly longer than lemma.
- 52a. Lemma awn shorter than 7 mm or absent.
- 53a. Lemma apex truncate, with 3 teeth ..... 51. *E. tridentatus*
- 53b. Lemma ± narrowed toward apex, without teeth.
- 54a. Palea equaling or slightly longer than lemma, apex narrowly truncate.
- 55a. Lemma ± pilose ..... 47. *E. mutabilis*
- 55b. Lemma smooth, glabrous.
- 56a. Plants without rhizomes ..... 48. *E. magnicaespes*
- 56b. Plants ± with rhizomes.
- 57a. First lemma ca. 10 mm, callus smooth, glabrous; anthers ca. 3 mm ..... 49. *E. alashanicus*
- 57b. First lemma 7.8–9 mm, callus puberulent; anthers 4.5–5 mm ..... 52. *E. elytrigioides*
- 54b. Palea slightly shorter to longer than lemma, apex emarginate, rounded, or subrounded.
- 58a. Glumes densely pubescent adaxially ..... 50. *E. jufinshanicus*
- 58b. Glumes not as above.
- 59a. Palea 2/3–3/4 as long as lemma, subsmooth along keels ..... 53. *E. grandis*
- 59b. Palea equaling, subequaling, or longer than lemma, ± ciliate along keels.
- 60a. Glumes 4–9-veined; palea slightly shorter to slightly longer than lemma.
- 61a. Culms 30–80 cm tall; leaf blade 2–4 mm wide.
- 62a. Spikelets 1.4–1.8 cm, with 5 or 6 florets; lemma margin broadly membranous ..... 59. *E. viridulus*
- 62b. Spikelets 1–1.4 cm, with 2–4 florets; lemma margin not membranous ..... 60. *E. cheniae*
- 61b. Culms usually more than 100 cm tall; leaf blade 5–11 mm wide.
- 63a. Spikelets with 3–5 florets; glumes 5–7-veined; culms 100–160 cm tall ..... 61. *E. intramongolicus*
- 63b. Spikelets with 5–9 florets; glumes 7–9-veined; culms 50–120 cm tall ..... 62. *E. nevskii*
- 60b. Glumes 3–5-veined; palea equaling lemma.
- 64a. Spikelets with 2 or 3 florets ..... 55. *E. kronokensis*
- 64b. Spikelets with 3–6 florets.
- 65a. Culms ca. 100 cm tall, 4- or 5-noded ..... 54. *E. sylvaticus*
- 65b. Culms 20–60 cm tall, 2–4-noded.
- 66a. Culms 45–60 cm tall, 2- or 3-noded ..... 56. *E. yushuensis*
- 66b. Culms 20–45 cm tall, 2–4-noded.
- 67a. Culms ca. 45 cm tall, usually 4-noded, palea keels wingless and ciliate ..... 57. *E. leianthus*
- 67b. Culms 20–25 cm tall, usually 2-noded; palea keels winged and ciliate ..... 58. *E. humilis*
- 52b. Lemma awn more than 7 mm (but 1–35 mm *E. abolinii*).
- 68a. Glumes 5–7(–9)-veined, slightly shorter or longer than lemma.
- 69a. Glumes (especially distal one) longer than lemma.

- 70a. Spike somewhat lax; palea shorter than lemma; anthers 3–7 mm ..... 81. *E. abolinii*  
 70b. Spike dense, secund; palea subequalling lemma; anthers 2.5–3 mm.  
 71a. Glume margin membranous; lemma scabrous or appressed setose ..... 82. *E. fedtschenkoi*  
 71b. Glume margin not membranous; lemma pubescent ..... 83. *E. platyphyllus*  
 69b. Glumes (especially proximal one) slightly shorter than lemma.  
 72a. Spikelets pedicellate, pedicel 1–2.5 mm ..... 85. *E. magnipodus*  
 72b. Spikelets sessile.  
 73a. Lemma ± glabrous abaxially, margin narrowly membranous ..... 84. *E. shandongensis*  
 73b. Lemma puberulent, pilose, or ± hirsutulous abaxially, margin not membranous.  
 74a. Lemma margin ciliate ..... 86. *E. pendulinus*  
 74b. Lemma margin not ciliate.  
 75a. Glume margin scarios; leaf blade abaxial surface glabrous or scabrous, adaxial surface  
 scabrous or pubescent ..... 87. *E. komarovii*  
 75b. Glume margin not scarios; leaf blade both surfaces pilose or scabrous ..... 88. *E. tianschanigenus*  
 68b. Glumes (2 or) 3–5-veined, at least proximal glume 3-veined, usually much shorter than lemma,  
 or if subequalling lemma then apex shortly awned.  
 76a. Glumes always and lemma sometimes with membranous or scarios margin.  
 77a. Glumes and lemma with membranous or scarios margin.  
 78a. Lemma glabrous to hispidulous, margin membranous ..... 63. *E. kamoji*  
 78b. Lemma hirsutulous proximally and distally, subglabrous at middle, long ciliate near margin,  
 margin broadly scarios ..... 64. *E. hybridus*  
 77b. Glumes with membranous margin; lemma without such margin.  
 79a. Culms 50–60 cm tall, 2- or 3-noded.  
 80a. Glumes 5–6 mm; lemma awn 5–10 mm; anthers black ..... 65. *E. curtiaaristatus*  
 80b. Glumes 9–12 mm; lemma awn 12–15 mm; anthers yellow ..... 66. *E. scabridulus*  
 79b. Culms 60–100 cm tall, 4–7-noded.  
 81a. Spikelets 3.5–4.5 cm, with 5–10 florets ..... 67. *E. yangiae*  
 81b. Spikelets to 2 cm, with 3–9 florets.  
 82a. Spikelets ± pedicellate; glumes oblong-lanceolate; palea scabrous along keels distally ..... 68. *E. dolichatherus*  
 82b. Spikelets sessile; glumes narrowly lanceolate; palea ± ciliate along keels.  
 83a. Glumes and lemma usually smooth, glabrous, rarely scabrous along veins ..... 70. *E. calcicola*  
 83b. Glumes and lemma hirsute or villous.  
 84a. Glumes lanceolate, subequal, 5–6 mm, 2-veined, hispidulous along veins; lemma  
 densely villous abaxially ..... 71. *E. trichospiculus*  
 84b. Glumes oblong-lanceolate, hirsute, proximal one 5–6.5 mm, 3- or 4-veined, distal  
 one 6.5–7.5 mm, 4- or 5-veined; lemma usually densely pubescent proximally,  
 scabrous-ciliate distally ..... 69. *E. tenuispicus*  
 76b. Glumes and lemma without membranous or scarios margin.  
 85a. Lemma ± puberulent abaxially.  
 86a. Spikelets 12–16 mm, with 3–5 florets.  
 87a. Glumes oblong-lanceolate, 7–10 mm; lemma awn 10–18 mm ..... 72. *E. sinicus*  
 87b. Glumes lanceolate, 2–5 mm; lemma awn 6–8 mm ..... 74. *E. caianus*  
 86b. Spikelets 9–12 mm, with 2 or 3 florets.  
 88a. Culms usually 2-noded; glume apex acuminate ..... 76. *E. hongyuanensis*  
 88b. Culms 5–7-noded; glume apex with awn 1.5–3 mm ..... 75. *E. debilis*  
 85b. Lemma smooth or scabrous abaxially.  
 89a. Lemma callus glabrous or subglabrous ..... 78. *E. angustispiculatus*  
 89b. Lemma callus distinctly hirsute.  
 90a. Spikelets with 2 or 3 florets; lemma callus hairs 1–3 mm ..... 73. *E. puberulus*  
 90b. Spikelets with 4–8 florets; lemma callus hairs 4–10 mm.  
 91a. Lemma callus hairs 6–10 mm ..... 77. *E. barbicallus*  
 91b. Lemma callus hairs 4–6 mm.  
 92a. Leaf blade adaxial surface scabrous; lemma scabrous abaxially ..... 79. *E. hondae*  
 92b. Leaf blade adaxial surface pubescent; lemma smooth and glabrous abaxially ..... 80. *E. alienus*

**1. *Elymus tangutorum*** (Nevski) Handel-Mazzetti, Symb. Sin.  
 7: 1292. 1936.

*Clinelymus tangutorum* Nevski, Bull. Jard. Bot. Acad. Sci.  
 URSS 30: 647. 1932; *Elymus molliusculus* L. B. Cai.

麦宾草 mai bin cao

Culms erect or geniculate at base, to 120 cm tall, 4- or 5-  
 noded. Leaf sheath smooth; leaf blade flat, 10–20 × 0.6–1.4 cm,

both surfaces scabrous or abaxial surface smooth and adaxial surface pilose. Spike erect, usually dense, 8–15 × 0.8–1 cm; rachis margin ciliolate. Spikelets usually 2 per node, green or slightly purplish, 9–15 mm, with 3 or 4 florets. Glumes lanceolate or linear-lanceolate, 7–10 mm, obscurely 5-veined, scabrous or hirsutulous along veins, apex acuminate or with awn 1–3 mm. Lemma lanceolate, glabrous, or hirsutulous distally; first lemma 8–12 mm; awn erect, (3–)5–11 mm. Palea equaling lemma, ciliate along keels, apex narrowly obtuse. Fl. and fr. late summer.  $2n = 42$ .

Mountain slopes, steppes. Gansu, Guizhou, Hubei, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, ?Nepal].

*Elymus molliusculus* is very similar to *E. tangutorum* in culm height and features of leaf blade, spike, spikelets, and lemma. It is therefore treated here in synonymy.

**2. *Elymus barystachyus*** L. B. Cai, Acta Bot. Boreal.-Occid. Sin. 13: 70. 1993.

硬穗披碱草 ying sui pi jian cao

Culms laxly tufted or solitary, usually geniculate at base, 50–80 cm tall, 2.5–4.5 mm in diam., 3–5-noded. Leaf sheath glabrous; ligule ca. 1 mm, membranous; leaf blade 7–22 × 0.4–0.8 cm, both surfaces glabrous. Spike 8–18 × 0.5–0.9 cm; rachis margin ciliate. Spikelets usually 2 per node, or 1 per node proximally and distally in spike, purplish, 10–18 mm, with 4–6 florets. Glumes linear-lanceolate, 7–10 mm, 4–7-veined, hirsutulous along veins, apex acuminate or with point ca. 1.5 mm. Lemma oblong-lanceolate, scabrous proximally, densely pubescent distally and at margin, apex acute or with short awn 1–2 mm; first lemma 7–8 mm. Palea equaling lemma, ciliate along keels, otherwise glabrous. Anthers black or tinged yellowish, ca. 2 mm. Fl. and fr. Jun–Aug.

- Forests; 2700–3200 m. Qinghai, Sichuan, Xizang.

**3. *Elymus excelsus*** Turczaninow ex Grisebach in Ledebour, Fl. Ross. 4: 331. 1852.

肥披碱草 fei pi jian cao

*Clinelymus excelsus* (Turczaninow ex Grisebach) Nevski; *Elymus dahuricus* Turczaninow ex Grisebach subsp. *excelsus* (Turczaninow ex Grisebach) Tzvelev; *E. dahuricus* var. *excelsus* (Turczaninow ex Grisebach) Roshevitz.

Culms robust, ca. 140 cm tall, ca. 6 mm in diam. Leaf sheath glabrous or pubescent at base; leaf blade usually glaucous, flat, 20–30 × 1–1.6 cm, both surfaces scabrous or abaxial surface smooth. Spike erect, robust, 15–22 cm; rachis margin ciliolate. Spikelets 2 or 3 (or 4) per node, 2–15(–25) mm excluding awns, with 4 or 5 florets. Glumes narrowly lanceolate, 10–13 mm, 5–7-veined, scabrous along veins, apex with awn ca. 7 mm. Lemma scabrous, glabrous or pubescent distally and at margin; first lemma 8–12 mm; awn reflexed, 15–20(–40) mm, scabrous. Palea slightly shorter than lemma, ciliate along keels, slightly pubescent between keels. Fl. and fr. Jul–Aug.  $2n = 42^*$ .

Scrub, meadows, riverside sands, pebbles and rocks up to lower mountain slopes. Gansu, Hebei, Heilongjiang, Henan, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Korea, Mongolia, Russia].

**4. *Elymus dahuricus*** Turczaninow ex Grisebach in Ledebour, Fl. Ross. 4: 331. 1852.

披碱草 pi jian cao

Culms erect or geniculate at base, 40–140 cm tall, 2–4-noded. Leaf sheath glabrous, or densely pilose at base; leaf blade ± glaucous, flat, rarely rolled, 5–25 × 0.5–1(–1.2) cm, abaxial surface smooth, adaxial surface smooth or scabrous. Spike erect, somewhat dense, 14–18 × 0.5–1 cm; rachis margin ciliolate. Spikelets green or purplish green, usually stramineous at maturity, (1 or)2 per node, 9–15 mm, with 2–5 florets. Glumes lanceolate or linear-lanceolate, 7–10 mm, 3–5-veined, scabrous or scabrous-hirsutulous along veins, apex acuminate or with awn to 5 mm. Lemma lanceolate, puberulent, pubescent, or densely hirsutulous throughout; first lemma 7–9 mm; awn straight or recurved, 2–20 mm. Palea equaling lemma, ciliate along keels, ± pubescent between keels, apex narrowly truncate. Fl. and fr. Jun–Aug.

Forest glades, scrub, mountain slopes, valleys, meadows, pebbles, sometimes roadsides and field margins; ca. 2600 m. Hebei, Heilongjiang, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Turkmenistan, Uzbekistan; SW Asia].

Four varieties occur in China. In addition, *Elymus dahuricus* var. *brevisetus* Ohwi (J. Jap. Bot. 19: 168. 1943) was described from N Shanxi (Ningwu), but no specimens have been seen by the authors.

- 1a. Culms slender, 40–80 cm tall; first lemma 7–8 mm ..... 4c. var. *cylindricus*
- 1b. Culms more robust, 80–140 cm tall; first lemma 8–9 mm.
  - 2a. Lemma awn 2–5 mm ..... 4d. var. *xiningensis*
  - 2b. Lemma awn 10–20 mm.
    - 3a. Leaf sheath glabrous; glumes scabrous along veins ..... 4a. var. *dahuricus*
    - 3b. Leaf sheath densely pilose at base; glumes usually scabrous-hirsutulous along veins ..... 4b. var. *violeus*

**4a. *Elymus dahuricus* var. *dahuricus***

披碱草(原变种) pi jian cao (yuan bian zhong)

*Clinelymus dahuricus* (Turczaninow ex Grisebach) Nevski.

Culms more robust, 80–140 cm tall. Leaf sheath glabrous. Glumes scabrous along veins. First lemma ca. 9 mm; awn 10–20 mm. Fl. and fr. Jun–Aug.  $2n = 28, 42^*$ .

Forest glades, scrub, meadows, pebbles, sometimes roadsides and field margins. Hebei, Henan, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Turkmenistan, Uzbekistan; SW Asia].

**4b. *Elymus dahuricus* var. *violeus*** C. P. Wang & H. L. Yang, Bull. Bot. Res., Harbin 4(4): 86. 1984.

青紫披碱草 qing zi pi jian cao

Culms more robust, 80–140 cm tall. Leaf sheath densely

pilose at base. Glumes usually scabrous-hirsutulous along veins. First lemma 8–9 mm; awn 10–18 mm.

- Mountain slopes, valleys. Nei Mongol, Qinghai.

**4c. *Elymus dahuricus* var. *cylindricus*** Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 7: 152. 1884.

圆柱披碱草 *yuan zhu pi jian cao*

*Clinelymus cylindricus* (Franchet) Honda; *Elymus beijingensis* B. S. Sun, nom. illeg. superfl.; *E. cylindricus* (Franchet) Honda (1930), not Pohl (1809); *E. dahuricus* subsp. *cylindricus* (Franchet) N. R. Cui; *E. franchetii* Kitagawa.

Culms slender, 40–80 cm tall. Leaf sheath glabrous. Glumes scabrous along veins. First lemma 7–8 mm; awn 6–13 mm. Fl. and fr. later summer.  $2n = 42^*$ .

- Mountain slopes, roadsides. Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Yunnan.

**4d. *Elymus dahuricus* var. *xiningensis*** (L. B. Cai) S. L. Chen, *Novon* 7: 228. 1997.

西宁披碱草 *xi ning pi jian cao*

*Elymus xiningensis* L. B. Cai, *Acta Bot. Boreal.-Occid. Sin.* 13: 71. 1993.

Culms more robust, 80–110 cm tall. Leaf sheath glabrous. Glumes scabrous along veins. First lemma ca. 8 mm; awn 2–5 mm. Fl. and fr. late summer.

- Mountain slopes; ca. 2600 m. Qinghai.

**5. *Elymus purpuraristatus*** C. P. Wang & H. L. Yang, *Bull. Bot. Res.*, Harbin 4(4): 83. 1984.

紫芒披碱草 *zi mang pi jian cao*

Culms robust, to 160 cm tall, together with leaf blade and spike usually farinaceous throughout. Leaf sheath glabrous; leaf blade usually rolled,  $15\text{--}25 \times 0.25\text{--}0.4$  cm, abaxial surface smooth, adaxial surface scabrous. Spike erect or slightly curved, slender, usually dense, 8–15 cm; rachis margin ciliolate. Spikelets 2 per node, purplish green, 10–12 mm, with 2 or 3 florets. Glumes lanceolate or linear-lanceolate, 7–10 mm, 3-veined,  $\pm$  purplish punctate, scabrous, hispidulous along veins, apex mucronate. Lemma oblong-lanceolate, purplish punctate throughout, pubescent; first lemma 6–9 mm; awn purple, 7–15 mm, pubescent. Palea equaling or subequaling lemma, ciliolate along keels. Fl. and fr. late summer.

- Mountain slopes, valleys. Nei Mongol.

In the protologue, the specific epithet was misspelled “*purpuraristus*” on p. 83, presumably as a typographical error. In the illustration caption on p. 90 it was correctly spelled “*purpuraristatus*.”

**6. *Elymus villifer*** C. P. Wang & H. L. Yang, *Bull. Bot. Res.*, Harbin 4(4): 84. 1984.

毛披碱草 *mao pi jian cao*

Culms erect, 60–75 cm tall. Leaf sheath densely villous; leaf blade flat or slightly rolled,  $9\text{--}15 \times 0.3\text{--}0.6$  cm, villous

throughout. Spike slightly curved, 9–12 cm; rachis with swollen nodes, densely hirsute throughout, margin narrowly winged. Spikelets usually 2 per node, or 1 per node at apex and base of spike, 6–10 mm, with 2 or 3 florets. Glumes narrowly lanceolate, 4.5–7.5 mm, 3- or 4-veined, hirsutulous along veins, margin narrowly membranous, apex acuminate or with awn 1.5–2.5 mm. Lemma oblong-lanceolate, scabrous or hispidulous distally; first lemma 7–11 mm. Palea equaling lemma, ciliolate along keels, pubescent between keels. Fl. and fr. late summer.

- Swales of mountain valleys. Nei Mongol.

**7. *Elymus sibiricus*** Linnaeus, *Sp. Pl.* 1: 83. 1753.

老芒麦 *lao mang mai*

*Clinelymus sibiricus* (Linnaeus) Nevski; *C. yubaridakensis* Honda; *Elymus sibiricus* var. *brachstachys* Keng; *E. sibiricus* var. *gracilis* L. B. Cai; *E. sibiricus* var. *erectiusculus* L. B. Cai; *E. yubaridakensis* (Honda) Ohwi; *Hordeum sibiricum* (Linnaeus) Schenck (1907), not Link ex Steudel (1840), nor Roshevitz (1929); *Triticum arktasianum* F. Hermann.

Culms usually erect, sometimes slightly decumbent at base, 60–90 cm tall. Leaf sheath glabrous; leaf blade flat,  $10\text{--}15 \times 0.5\text{--}1$  cm, glabrous or adaxial surface slightly pubescent. Spike pendulous, lax, 15–20 cm; rachis margin scabrous, ciliolate. Spikelets glaucous or purplish glaucous, usually 2 per node, with (3 or)4 or 5 florets. Glumes narrowly lanceolate, 4–5 mm, 3–5-veined, glabrous, scabrous along veins, apex acuminate or with awn ca. 4 mm. Lemma lanceolate, 5-veined, obscurely so at base, scabrous or puberulent; first lemma 8–11 mm; awn 15–20 mm. Palea equaling lemma, ciliolate along keels, puberulent between keels. Fl. and fr. Jun–Aug.  $2n = 28^*$ ,  $42^*$ .

Forest glades, scrub, swales, sands and pebbles in river valleys; 1500–4900 m. Gansu, Hebei, Heilongjiang, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Japan, Korea, Mongolia, Nepal, Russia].

**8. *Elymus nutans*** Grisebach, *Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ.* 3: 72. 1868.

重穗披碱草 *chong sui pi jian cao*

Culms erect or geniculate at base, (13–)50–70 cm tall. Leaf sheath puberulent at base; leaf blade flat,  $6\text{--}8 \times 0.3\text{--}0.5$  cm, abaxial surface scabrous or smooth, adaxial surface pilose. Spike pendulous, flexuose, somewhat dense, 5–12 cm; rachis margin scabrous, ciliolate. Spikelets usually 2 per node (at least at middle nodes), sessile or very shortly pedicellate, green, purplish when mature, 9–15 mm, with 2(or 3) glumes and 2–4 florets. Glumes oblong, subequal, 4–5 mm, 3- or 4(or 5)-veined, scabrous along veins, apex with awn 1–4 mm. Lemma narrowly lanceolate, puberulent; first lemma (6–)10 mm; awn (3–)12–20 mm, divergently scabrous. Palea equaling lemma, ciliate along keels, puberulent between keels. Fl. and fr. Jul–Aug.

Mountain slopes, grasslands, riverside sands and pebbles; 2800–3400 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Mongolia, Nepal; C and SW Asia].

- 1a. Culms 50–70 cm tall; spikelets with 2 glumes; glumes 3- or 4-veined; first lemma awn 12–20 mm ..... 8a. var. *nutans*  
 1b. Culms 13–20 cm tall; spikelets often with 3 glumes; glumes 5-veined; first lemma awn 3–9 mm ..... 8b. var. *triglumis*

**8a. *Elymus nutans* var. *nutans***

重穗披碱草(原变种) chong sui pi jian cao (yuan bian zhong)

*Clinelymus nutans* (Grisebach) Nevski.

Culms 50–70 cm tall. Spikelets with 2 glumes. Glumes 3- or 4-veined. First lemma ca. 10 mm; awn 12–20 mm. Fl. and fr. Jul–Aug.  $2n = 42^*$ .

Mountain slopes, grasslands, riverside sands and pebbles. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Mongolia, Nepal; C and SW Asia].

This variety is a good forage grass.

**8b. *Elymus nutans* var. *triglumis* (Q. B. Zhang) G. Zhu & S. L. Chen, **comb. et stat. nov.****

三颖披碱草 san ying pi jian cao

Basionym: *Elymus triglumis* Q. B. Zhang, Acta Bot. Yunnan. 13: 21. 1991.

Culms 13–20 cm tall. Spikelets often with 3 glumes. Glumes 5-veined. First lemma 6–9 mm; awn 3–9 mm. Fl. Jul–Aug.

• Mountain grasslands; 2800–3400 m. Xinjiang (Tian Shan).

**9. *Elymus atratus* (Nevski) Handel-Mazzetti, Symb. Sin. 7: 1922. 1936.**

黑紫披碱草 hei zi pi jian cao

*Clinelymus atratus* Nevski, Bull. Jard. Bot. Acad. Sci. URSS 30: 644. 1932.

Culms erect or geniculate at base, somewhat slender, 40–60 cm tall. Leaf sheath smooth, glabrous; leaf blade  $\pm$  rolled, 3–10(–19)  $\times$  ca. 0.2 cm, both surfaces glabrous, or pubescent at base. Spikelets usually 2 per node, purplish black when mature, 8–10 mm, with 2 or 3 florets, usually 1 or 2 florets fertile. Glumes narrowly oblong or lanceolate, subequal, 2–4 mm, 1–3-veined, scabrous along midvein, apex mucronate or acuminate; lateral veins obscure. Lemma lanceolate, hirsutulous throughout; first lemma 7–8 mm; awn usually reflexed, 10–17 mm, scabrous. Palea equaling lemma, ciliolate along keels. Fl. and fr. late summer.  $2n = 42^*$ .

• Steppes. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

**10. *Elymus breviaristatus* Keng ex P. C. Keng, Bull. Bot. Res., Harbin 4(3): 191. 1984.**

短芒披碱草 duan mang pi jian cao

*Elymus yilianus* S. L. Chen, nom. illeg. superfl.

Culms laxly tufted, erect or geniculate at base, ca. 70 cm tall. Leaf sheath smooth; leaf blade flat, 4–12  $\times$  0.3–0.5 cm,

scabrous or abaxial surface smooth. Spike pendulous, lax, slender, 10–15 cm; rachis margin scabrous or ciliolate. Spikelets 2 per node, glaucous or purplish glaucous, 13–15 mm, with 4–6 florets. Glumes oblong-lanceolate or ovate-lanceolate, 3–4 mm, 1–3-veined, scabrous along veins, apex usually pointed. Lemma lanceolate, puberulent throughout or glabrous at middle part; first lemma 8–9 mm, apex with awn (1–)2–5 mm. Palea equaling lemma, ciliolate along keels, puberulent between keels, apex narrowed. Fl. and fr. summer.  $2n = 42^*$ .

• Mountain slopes. Ningxia, Qinghai, Sichuan, Xinjiang.

“*Elymus brachyaristatus*” (Löve, Feddes Repert. 95: 449. 1984) was not validly published because it was given as a *nomen novum* based on “*Clinelymus breviaristatus*” (Keng, Fl. Ill. Pl. Prim. Sin. Gram. 423. 1959), which was itself not validly published because no Latin description was provided (Saint Louis Code, Art. 36.1). Moreover, Löve’s supposed blocking name, *E. breviaristatus* (Hitchcock) Á. Löve (loc. cit. 471. Oct 1984), is in fact an illegitimate later homonym (Art. 53.1) because *E. breviaristatus* Keng ex P. C. Keng had already been validly published in July 1984.

**11. *Elymus alpinus* L. B. Cai, Acta Biol. Plateau Sin. 14: 8. 1999.**

高原披碱草 gao yuan pi jian cao

Culms erect, 25–35 cm tall, usually 5-noded. Leaf sheath usually longer than internode, glabrous; ligule ca. 0.3 mm, apex usually truncate; leaf blade flat or slightly involute, 6–10  $\times$  0.3–0.5 cm, both surfaces glabrous, margin ciliate. Spike erect or slightly flexuose, 4–6  $\times$  ca. 0.9 cm; rachis glabrous, but margin ciliolate; internodes 2–3 mm. Spikelets (1 or)2 per node, green, 10–12 mm, with 3 or 4 florets; rachilla densely puberulent. Glumes narrowly lanceolate, subequal, 3–4 mm, 1–3-veined, scabrous along midvein, apex acuminate. Lemma lanceolate, abaxially pubescent; first lemma 7–8 mm; awn slender, 3–7 mm. Palea slightly longer than lemma, ciliolate along keels distally, puberulent between keels. Anthers blackish, ca. 1.5 mm. Ovary pubescent at apex. Fl. Jul.

• Meadows; ca. 3200 m. Qinghai (Gonghe, Ulan).

**12. *Elymus sinosubmuticus* S. L. Chen, **nom. nov.****

无芒披碱草 wu mang pi jian cao

Replaced synonym: *Elymus submuticus* Keng ex P. C. Keng, Bull. Bot. Res., Harbin 4(3): 192. 1984, not *Elymus submuticus* (Hooker) Smyth, Trans. Kansas Acad. Sci. 25: 99. 1913.

Culms erect or geniculate at base, slender, 25–45 cm tall, 2-noded, smooth. Leaf sheath shorter than internode, smooth; ligule very short; leaf blade flat or rolled, 3–6  $\times$  0.15–0.3 cm, abaxial surface smooth, adaxial surface scabrous. Spike lax, curved, 3.5–7.5 cm. Spikelets 2 per node, or 1 per node distally in spike, sessile or with pedicel ca. 1 mm, purplish, (7–)9–13 mm, with (1 or)2 or 3(or 4) florets, densely puberulent. Glumes oblong, subequal, 2–3 mm, 3-veined, scabrous along raised midvein, apex acute or acuminate. Lemma lanceolate,  $\pm$  puberulent; first lemma 7–8 mm; awn less than 2 mm. Palea equaling lemma, ciliolate along keels, apex narrowly obtuse. Anthers ca. 1.7 mm. Fl. and fr. late summer.  $2n = 42^*$ .

- Mountain slopes. Sichuan.

**13. *Elymus cacuminis*** B. Rong Lu & B. Salomon, *Nordic J. Bot.* 13: 355. 1993 [*"cacuminus"*].

峰峦披碱草 feng luan pi jian cao

*Roegneria cacuminis* (B. Rong Lu & B. Salomon) L. B. Cai.

Culms tufted at base, erect or geniculately ascending, 25–57 cm tall, (2 or)3(or 4)-noded, glabrous, or sparsely scabrous below spike. Leaf sheath grayish or purplish, usually hairy at base, smooth distally; ligule to 0.5 mm; auricles pale green, brown, or purple; leaf blade light green to purplish, linear, tightly involute or with involute margin, rarely flat, 2–15 × 0.1–0.6 cm, abaxial surface scabrous, adaxial surface ± pubescent. Spike strongly nodding at flowering, secund or distichous, dense or lax, 4–13 × 0.8–1.2 cm; rachis scabrous on back and margin. Spikelets 1 per node, green or purple, 25–40 × 2.5–4.5 mm, with 3–6 florets; pedicel 5–9 mm. Glumes ovate or narrowly lanceolate, glabrous abaxially, scabrous along veins, margin thin, apex mucronate; proximal glume 2–6 × 0.5–1.4 mm, (1 or)2–5-veined; distal glume (2.5–)3–9 × 0.8–1.5 mm, 3–5(–7)-veined. Lemma narrowly lanceolate-elliptic, 8–11 × 1.2–2 mm, scabrous to sparsely pubescent abaxially; callus narrow ± setulose; awn strongly curved at maturity, 1.5–3 cm. Palea slightly shorter than lemma, glabrous to sparsely pubescent adaxially, ciliate along keels. Anthers yellow or purple, 1.3–2 mm. Fl. and fr. Jul–Sep.  $2n = 28^*$ .

Dry scrub, stony mountain slopes, rocky river banks, streams in valleys; 4300–5000 m. Sichuan, Xizang [India (Sikkim), Nepal].

**14. *Elymus ciliaris*** (Trinius ex Bunge) Tzvelev, *Novosti Sist. Vyssh. Rast.* 9: 61. 1972.

纤毛披碱草 xian mao pi jian cao

Culms solitary or tufted, usually geniculate at base, sometimes erect, 40–130 cm tall, 1–5 mm in diam. Leaf sheath glabrous, or pilose at base; leaf blade flat, 9–25 × 0.3–1 cm, glabrous to scabrous, pilose or pubescent, or densely so. Spike erect or nodding, 10–22 cm; rachis scabrous, margin hispid. Spikelets 1(or 2) per node, green, 10–22 mm excluding awns, with 5–12 florets. Glumes oblong-lanceolate or elliptic-lanceolate, proximal one 6–11 mm, distal one 7–13 mm, 5–7-veined, scabrous, ciliate, or white hirsute along veins and margin, apex acute, acuminate, or pointed. Lemma oblong-lanceolate or oblong, scabrous to hispid or both, margin shortly ciliate to long ciliate, apex pointed or awned; first lemma 7–12 mm; awn often reflexed, 1–30 mm. Palea oblong-ovate, much shorter than lemma, scabrous or ciliate along keels distally, apex truncate. Fl. and fr. May–Jul.

Mountain slopes, moist meadows, roadsides; 1200–1600 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia].

1a. Leaf blade glabrous to scabrous.

2a. Lemma scabrous abaxially, margin ciliate; palea scabrous along

keels distally ..... 14c. var. *hackelianus*

2b. Lemma hispid abaxially, margin long ciliate; palea ciliate along keels distally.

3a. Lemma apex with awn 10–30

mm ..... 14a. var. *ciliaris*

3b. Lemma apex pointed or with

awn 1–3(–7) mm ..... 14b. var. *submuticus*

1b. Leaf blade pubescent or pilose to densely so.

4a. Glumes elliptic-lanceolate, ciliate along veins and margin, apex pointed; leaf blade densely pilose on both surfaces ..... 14f. var. *lasiophyllus*

4b. Glumes oblong-lanceolate, scabrous or white hirsute along veins and margin, apex acute or acuminate; leaf blade densely pubescent on both surfaces and margin, or pubescent on both surfaces and white pilose along veins and margin.

5a. Glumes scabrous along veins and margin; lemma scabrous or hispidulous abaxially, margin shortly ciliate, first lemma 9–12 mm; culms 4–5 mm in diam.; leaf blade densely pubescent on both surfaces

and margin ..... 14d. var. *amurensis*

5b. Glumes white hirsute along veins and margin; lemma punctate-scabrous and densely hispid throughout, first lemma 7–9.5 mm; culms

1–2 mm in diam.; leaf blade

pubescent on both surfaces,

white pilose along veins

and margin ..... 14e. var. *hirtiflorus*

#### **14a. *Elymus ciliaris* var. *ciliaris***

纤毛披碱草(原变种) xian mao pi jian cao (yuan bian zhong)

*Triticum ciliare* Trinius ex Bunge, *Enum. Pl. China Bor.* 72. 1833; *Agropyron ciliare* (Trinius ex Bunge) Franchet; *A. ciliare* var. *integrum* Keng; *A. integrum* (Keng) Keng; *A. semicostatum* (Nees ex Steudel) Nees ex Boissier var. *ciliare* (Trinius ex Bunge) Hackel; *Brachypodium ciliare* (Trinius ex Bunge) Maximowicz; *Roegneria ciliaris* (Trinius ex Bunge) Nevski; *R. ciliaris* f. *ericaulis* Kitagawa.

Leaf blade glabrous but margin scabrous. Glumes elliptic-lanceolate, apex pointed, usually with teeth below point. Lemma hispid abaxially, margin long ciliate; first lemma 8–9 mm; awn 10–30 mm. Palea ciliate along keels distally. Fl. and fr. May–Jul.  $2n = 28^*$ .

Mountain slopes, moist meadows, roadsides. Almost throughout China [Japan, Korea, Mongolia, Russia].

**14b. *Elymus ciliaris* var. *submuticus*** (Honda) S. L. Chen, *Novon* 7: 228. 1997.

短芒纤毛草 duan mang xian mao cao

*Agropyron ciliare* var. *submuticum* Honda, *J. Fac. Sci.*

Univ. Tokyo, Sect. 3, Bot. 3(1): 27. 1930; *A. ciliare* f. *submuticum* (Honda) Ohwi; *Roegneria ciliaris* var. *submutica* (Honda) Keng.

Leaf blade usually glabrous. Lemma hispid abaxially, margin long ciliate, apex pointed or with awn 1–3(–7) mm. Palea ciliolate along keels distally. Fl. and fr. May–Jul.  $2n = 28$ .

Mountain slopes, moist meadows, roadsides. Anhui, Hebei, Shaanxi, Shandong, Zhejiang [Japan].

**14c. *Elymus ciliaris* var. *hackelianus*** (Honda) G. Zhu & S. L. Chen, **comb. nov.**

日本纤毛草 ri ben xian mao cao

Basionym: *Agropyron japonicum* Honda var. *hackelianum* Honda, Bot. Mag. (Tokyo) 41: 385. 1927; *A. ciliare* var. *hackelianum* (Honda) Ohwi; *A. ciliare* f. *japonense* (Honda) Ohwi; *A. ciliare* var. *hondae* Keng, nom. illeg. superfl.; *A. ciliare* var. *pauperum* Keng; *A. hackelianum* (Honda) Beetle; *A. hackelianum* var. *japonicum* Beetle, nom. illeg. superfl.; *A. japonense* Honda; *A. japonense* var. *hackelianum* (Honda) Honda; *A. japonicum* Honda (1927), not (Miquel) P. Candargy (1901); *Elymus ciliaris* var. *japonensis* (Honda) S. L. Chen; *E. ciliaris* subsp. *japonicus* Á. Löve; *E. racemifer* var. *japonensis* (Honda) Osada; *Roegneria ciliaris* var. *hackeliana* (Honda) L. B. Cai; *R. ciliaris* var. *japonensis* (Honda) C. Yen et al.; *R. hackeliana* (Honda) Nakai; *R. japonensis* (Honda) Keng; *R. japonensis* var. *hackeliana* (Honda) Keng; *R. japonica* B. S. Sun, nom. illeg. superfl.

Leaf blade abaxial surface glabrous, adaxial surface and margin scabrous. Glumes elliptic-lanceolate, apex acute or pointed. Lemma scabrous abaxially, margin ciliolate; first lemma 8–8.5 mm; awn 5–25 mm. Palea scabrous along keels distally. Fl. and fr. May–Jul.  $2n = 28^*$ .

Mountain slopes, roadsides. Anhui, Beijing, Fujian, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

When *Agropyron japonicum* and *A. japonicum* var. *hackelianum* are regarded as taxonomic synonyms and treated at varietal rank under *Elymus ciliaris*, the correct name under Art. 11.4 of the Saint Louis Code is the new combination *E. ciliaris* var. *hackelianus*. The earliest legitimate name at varietal rank is *A. japonicum* var. *hackelianum*, not the autonym, "*A. japonicum* var. *japonicum*," which was not validly published under Art. 27.2. Even though *A. japonicum* Honda is a later homonym and therefore illegitimate, *A. japonicum* var. *hackelianum* is legitimate under Art. 55.2.

**14d. *Elymus ciliaris* var. *amurensis*** (Drobow) S. L. Chen, Novon 7: 228. 1997.

阿麦纤毛草 a mai xian mao cao

*Agropyron amurense* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 12: 50. 1914; *A. ciliare* subsp. *amurense* (Drobow) T. Koyama; *A. ciliare* var. *pilosum* (Korshinsky) Honda; *Elymus ciliaris* subsp. *amurensis* (Drobow) Tzvelev; *Roegneria amurensis* (Drobow) Nevski; *R. ciliaris* var. *pilosa* (Korshinsky) Ohwi; *Triticum ciliare* f. *pilosum* Korshinsky.

Culms 4–5 mm in diam. Leaf blade both surfaces and margin densely pubescent. Glumes oblong-lanceolate, scabrous

along veins and margin, apex acute or acuminate. Lemma scabrous or hispidulous abaxially, margin shortly ciliolate; first lemma 9–12 mm; awn 20–25 mm. Fl. and fr. Jun–Jul.

Mountain slopes. Heilongjiang, Nei Mongol [Japan, Korea, Mongolia, Russia].

**14e. *Elymus ciliaris* var. *hirtiflorus*** (C. P. Wang & H. L. Yang) S. L. Chen, Novon 7: 228. 1997.

毛花纤毛草 mao hua xian mao cao

*Roegneria hirtiflora* C. P. Wang & H. L. Yang, Bull. Bot. Res., Harbin 4(4): 86. 1984; *Elymus sinohirtiflorus* S. L. Chen; *R. amurensis* var. *hirtiflora* (C. P. Wang & H. L. Yang) L. B. Cai.

Culms 1–2 mm in diam. Leaf blade both surfaces pubescent, white pilose along veins and margin. Glumes oblong-lanceolate, white hirsute along veins and margin, apex acuminate. Lemma punctate-scabrous and densely hispid throughout; first lemma 7–9.5 mm; awn 16–25 mm. Palea laxly ciliolate along keels. Fl. and fr. Jun–Jul.

• Mountain slopes; ca. 1200 m. Nei Mongol.

**14f. *Elymus ciliaris* var. *lasiophyllus*** (Kitagawa) S. L. Chen, **comb. nov.**

毛叶纤毛草 mao ye xian mao cao

Basionym: *Agropyron ciliare* var. *lasiophyllum* Kitagawa in Nakai et al., Rep. First Sci. Exped. Manchoukuo, Sect. IV, 4: 60, 98. 1936; *Roegneria ciliaris* var. *lasiophylla* (Kitagawa) Kitagawa.

Leaf blade both surfaces densely pilose. Glumes elliptic-lanceolate, ciliate along veins and margin, apex pointed. Lemma hispid abaxially, margin long ciliate; awn 10–25 mm. Fl. and fr. May–Jul.

• Mountain slopes, moist meadows, roadsides; 1500–1600 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi.

**15. *Elymus canaliculatus*** (Nevski) Tzvelev, Rast. Tsentr. Azii 4: 220. 1968.

沟槽披碱草 gou cao pi jian cao

*Agropyron canaliculatum* Nevski, Izv. Bot. Sada Akad. Nauk SSSR 30: 509. 1932; *Elymus longearistatus* (Boissier) Tzvelev subsp. *canaliculatus* (Nevski) Tzvelev; *Roegneria canaliculata* (Nevski) Ohwi; *R. longearistata* (Boissier) Drobow var. *canaliculata* (Nevski) L. B. Cai.

Culms erect or geniculately ascending, slender to stout, 30–70 cm tall, 3- or 4(or 5)-noded, glabrous. Leaf sheath glabrous, or sparsely scabrous or grayish purplish hairy at base; ligule 0.2–0.6 mm; auricles pale green or purple, 0.4–0.7 mm; leaf blade green to dark green, involute, 6–20 × 0.1–0.4 cm, abaxial surface glabrous but margin scabrous, adaxial surface scabrous to pilose. Spike strongly nodding at flowering, distichous, lax, 6–20 × 0.6–1.5 cm; rachis scabrous. Spikelets 1 per node, light green to purple, 40–70 × 4–7 mm, with 4–7(–9) developed florets. Glumes narrowly lanceolate-elliptic, proximal one 3–9 × 0.7–1.8 mm excluding awn, distal one 4–10 × 1–



2 mm excluding awn, 5–7-veined, scabrous abaxially, margin thin or hyaline, apex mucronate or tapering into a short awn to 5 mm. Lemma narrowly lanceolate-elliptic, 8–12 × 1–2 mm, pubescent abaxially; callus narrow, pointed, setulose or densely so; awn strongly curved, stout, 2.5–5 cm at maturity. Palea narrowly lanceolate-elliptic, slightly shorter than or equaling body of lemma, glabrous adaxially, ciliate along keels. Anthers yellow or purple, 4–5 mm. Fl. and fr. summer.  $2n = 28^*$ .

Mountain slopes, rocks, valleys; middle to upper mountain belts. Xizang [Pakistan, Russia (Alai, Pamirs), Tajikistan].

**16. *Elymus sinoflexuosus*** (L. B. Cai) S. L. Chen & G. Zhu, *Novon* 12: 428. 2002.

弯曲披碱草 wan qu pi jian cao

*Roegneria flexuosa* L. B. Cai, *Acta Phytotax. Sin.* 34: 330. 1996, not *Elymus flexuosus* Tausch (1837).

Plants with short rhizomes. Culms erect, 30–50 cm tall, 1.5–2.5 mm in diam., 3- or 4-noded, glabrous. Leaf sheath glabrous; ligule ca. 1 mm, membranous, apex truncate; leaf blade involute, 4–14 × 0.2–0.3 cm, adaxial surface scabrous or pubescent. Spike slightly nodding, lax, 10–16 cm; rachis flexuose, margin spinose; internodes 12–16 mm. Spikelets 1 per node, 15–20 mm excluding awns, with 6 or 7 florets; rachilla usually puberulent. Glumes oblong-lanceolate, proximal one 5–6 mm, distal one 7–8 mm, 5–7-veined, glabrous, apex acute or pungent. Lemma lanceolate, abaxially laxly spinulose; first lemma 9–10 mm; awn curved, 20–25 mm, scabrous. Palea slightly shorter than or equaling lemma, spinose along keels, glabrous between keels, apex truncate. Anthers yellow, 1.5–2 mm. Fl. and fr. Jul–Aug.

• Mountain slopes; 1700–3500 m. Gansu (Zhangye), Xinjiang (Taxkorgan).

**17. *Elymus gmelinii*** (Ledebour) Tzvelev, *Rast. Tsentr. Azii* 4: 216. 1968.

真穗披碱草 zhen sui pi jian cao

Culms laxly tufted, slender, 60–100 cm tall, 1.5–3 mm in diam. at base. Leaf sheath smooth, glabrous, but retrorsely pubescent at base; leaf blade flat or involute, 9–20(–26) × 0.2–0.8 cm, abaxial surface glabrous, adaxial surface scabrous or puberulent. Spike erect or nodding, usually secund, 9–15 cm. Spikelets 1 per node, yellowish green or tinged purplish, 15–25 mm, with (3–)5–7 florets. Glumes oblong-lanceolate or lanceolate, subequal and 10–15 mm or proximal one 6–11 mm and distal one 9–12 mm, 5–7-veined, scabrous along veins, apex acute or acuminate. Lemma lanceolate, hispidulous throughout; first lemma 10–12 mm; awn divaricate, 2.5–4.5 cm. Palea equaling or subequaling lemma, hispid along keels, apex subobtuse or emarginate. Anthers 2.5–3.5 mm. Fl. and fr. Jun–Aug.

Forest margins, mountain slopes, roadsides; 600–2600 m. Gansu, Hebei, Heilongjiang, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

1a. Culms 60–80 cm tall, 1.5–2 mm in diam. at base; glumes unequal: proximal one 6–11 mm, distal one 9–12 mm ..... 17a. var. *gmelinii*

1b. Culms 75–100 cm tall, up to 3 mm in diam. at base; glumes subequal, 10–15 mm ..... 17b. var. *macratherus*

**17a. *Elymus gmelinii* var. *gmelinii***

真穗披碱草(原变种) zhen sui pi jian cao (yuan bian zhong)

*Triticum caninum* Linnaeus var. *gmelinii* Ledebour, *Fl. Altaic*. 1: 118. 1829 [“*gmelini*”]; *Agropyron caninum* (Linnaeus) P. Beauvois var. *gmelinii* (Ledebour) Pease & A. H. Moore; *A. gmelinii* (Ledebour) Scribner & J. G. Smith (1897), not (Trinius) P. Candargy (1901); *A. turczaninowii* Drobow; *A. turczaninowii* var. *tenuisetum* Ohwi; *Elymus gmelinii* subsp. *tenuisetus* (Ohwi) Á. Löve; *Roegneria gmelinii* (Ledebour) Kitagawa; *R. turczaninowii* (Drobow) Nevski; *R. turczaninowii* var. *pohuashanensis* Keng; *R. turczaninowii* var. *tenuiseta* (Ohwi) H. L. Yang & C. P. Wang; *Semeiostachys turczaninowii* (Drobow) Drobow.

Culms 60–80 cm tall, 1.5–2 mm in diam. at base. Glumes unequal: proximal one 6–11 mm, distal one 9–12 mm. Lemma awn 2–4 cm. Fl. and fr. Jun–Jul.  $2n = 28$ .

Forest margins, mountain slopes, roadsides; 1300–2300 m. Gansu, Hebei, Heilongjiang, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

**17b. *Elymus gmelinii* var. *macratherus*** (Ohwi) S. L. Chen & G. Zhu, *Novon* 12: 426. 2002.

大芒披碱草 da mang pi jian cao

*Agropyron turczaninowii* var. *macratherum* Ohwi, *Acta Phytotax. Geobot.* 10: 98. 1941; *Roegneria gmelinii* var. *macrathera* (Ohwi) Kitagawa; *R. macrathera* (Ohwi) L. B. Cai; *R. turczaninowii* var. *macrathera* (Ohwi) H. L. Yang & C. P. Wang.

Culms 75–100 cm tall, ca. 3 mm in diam. at base. Glumes subequal, 10–15 mm. Lemma awn 3–4.5 cm. Fl. and fr. Jul–Aug.

• Mountain slopes, roadsides; 600–2600 m. Nei Mongol, Xinjiang.

**18. *Elymus zhui*** S. L. Chen, *nom. nov.*

小株披碱草 xiao zhu pi jian cao

Replaced synonym: *Roegneria minor* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 71. 1963, not *Elymus minor* (J. G. Smith) M. E. Jones, *Contr. W. Bot.* 14: 20. 1912.

Culms erect or slightly procumbent at base, 25–30 cm tall, ca. 4-noded. Leaf sheath glabrous, or pubescent at base; ligule ca. 0.5 mm or obsolete; leaf blade green, involute or flat, 8–10(–15) × 0.2–0.4 cm, abaxial surface pilose, adaxial surface densely pilose. Spike erect, 8–9 cm. Spikelets 1 per node, green, with (2 or)3–5 florets. Glumes oblong-lanceolate, proximal one 5–7 mm, distal one 6–8 mm, 5- or 6-veined, scabrous along veins, apex acute, sometimes with a tooth just below apex. Lemma lanceolate, puberulent throughout; first lemma ca. 8.5 mm; awn reflexed, ca. 1.2 cm. Palea subequaling lemma, rigidly ciliolate along keels, puberulent between keels distally, apex subrounded. Fl. and fr. Jul–Aug.

• Mountain slopes; ca. 1600 m. Guizhou, Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi.

The epithet of this *nomen novum* honors the late Dr. Guanghua Zhu, co-author of the present account of *Triticeae*.

Löve (Feddes Repert. 95: 458. 1984) did not validly publish the combination "*Elymus minor*," which would have been a later homonym; see the note following the genus description above.

**19. *Elymus formosanus*** (Honda) Á. Löve, Feddes Repert. 95: 449. 1984.

台湾披碱草 tai wan pi jian cao

Culms erect, 30–90 cm tall. Leaf sheath glabrous, or pubescent at base; leaf blade ca. 20 × 0.2–0.6 cm, both surfaces glabrous or scabrous. Spike slightly nodding, 10–20 cm. Spikelets 1 per node, lax, ca. 20 mm, with 5–7 florets. Glumes lanceolate, proximal one ca. 5 mm, distal one 7–9 mm, 5–7-veined, apex acute; veins robust, scabrous. Lemma oblong-lanceolate, ca. 8 mm, abaxially rounded and scabrous or pubescent, margin ciliolate; callus broad, rounded; awn recurved, 1–3.5 cm, rigid. Palea subequaling lemma, ciliate along keels, apex subrounded or slightly emarginate. Caryopsis ca. 3 mm. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

• Mountain slopes. Taiwan.

- 1a. Culms 60–90 cm tall; leaf sheath glabrous, leaf blade 0.4–0.6 cm wide; spike 15–20 cm; lemma awn 2–3.5 cm ..... 19a. var. *formosanus*  
 1b. Culms 30–50 cm tall; leaf sheath usually pubescent at base; leaf blade 0.2–0.4 cm wide; spike 10–12 cm; lemma awn 1–2 cm ..... 19b. var. *pubigerus*

**19a. *Elymus formosanus* var. *formosanus***

台湾披碱草(原变种) tai wan pi jian cao (yuan bian zhong)

*Agropyron formosanum* Honda, Bot. Mag. (Tokyo) 41: 385. 1927; *Roegneria formosana* (Honda) Ohwi; *R. formosana* var. *longearistata* Keng.

Culms 60–90 cm tall. Leaf sheath glabrous; leaf blade 0.4–0.6 cm. Spike 15–20 cm. Lemma awn 2–3.5 cm. Fl. and fr. Jun–Jul.

• Mountain slopes. Taiwan.

**19b. *Elymus formosanus* var. *pubigerus*** (Keng) S. L. Chen, Novon 7: 228. 1997.

毛鞘台湾草 mao qiao tai wan cao

*Roegneria formosana* var. *pubigera* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 60. 1963.

Culms 30–50 cm tall. Leaf sheath usually pubescent at base; leaf blade 0.2–0.4 cm wide. Spike 10–12 cm. Lemma with awn 1–2 cm. Fl. and fr. Jun–Jul.

• Mountain slopes. Taiwan.

**20. *Elymus tibeticus*** (Melderis) G. Singh, Taxon 32: 640. 1983.

西藏披碱草 xi zang pi jian cao

*Agropyron tibeticum* Melderis in Bor, Grasses Burma,

Ceylon, India, Pakistan, 696. 1960; *Roegneria tibetica* (Melderis) H. L. Yang.

Culms laxly tufted, 70–100 cm tall, 3- or 4-noded, smooth and glabrous, or nodes pubescent. Leaf sheath densely hispidulous proximally, glabrous distally; leaf blade green, flat, 12–16 × 0.3–0.6 cm, abaxial surface and near margin scabrous, adaxial surface pilose. Spike suberect or ± nodding, usually dense, or lax proximally, 10–16 cm. Spikelets 1 per node, green, 10–16 mm excluding awns, with (3 or)4 or 5 florets. Glumes oblong-lanceolate, proximal one 7–8.5 mm, distal one 8.5–10 mm, 5–7-veined, scabrous along veins, margin narrowly hyaline-membranous, apex acuminate or with awn to 6 mm. Lemma narrowly lanceolate, 8–10 mm, glabrous abaxially, apex hispidulous; awn straight or slightly curved, 1–1.7 cm. Palea narrowly lanceolate, subequaling lemma, hispidulous distally abaxially, ciliolate along keels, apex emarginate or truncate-obtuse. Anthers yellow, 2–2.3 mm. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

Forests, mountain slopes, valleys, roadsides; ca. 2500 m. Xizang, Yunnan [Bhutan].

**21. *Elymus nakaii*** (Kitagawa) S. L. Chen, **comb. nov.**

吉林披碱草 ji lin pi jian cao

Basionym: *Roegneria nakaii* Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 5(5): 151. 1941.

Culms erect, slightly decumbent at base, ca. 100 cm tall, ± puberulent at nodes. Leaf sheath glabrous, or retrorsely pubescent proximally; leaf blade flat, 11–20 × 0.4–0.7 cm, thin, abaxial surface glabrous, adaxial surface pilose. Spike erect, 10–13 cm. Spikelets 1 per node, ± secund, dense, with ca. 5 florets. Glumes lanceolate, proximal one 9–10 mm including point, distal one 9.5–11.5 mm including point, (3–)5(–7)-veined, scabrous along veins, margin glabrous, apex acuminate. Lemma hirsutulous near base and margin and along veins, otherwise glabrous; first lemma ca. 10 mm; awn reflexed, 18–22 mm. Palea subequaling lemma, rigidly ciliate along keels, between keels glabrous proximally and puberulent distally, apex emarginate, truncate, or subrounded. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

Meadows, mountain slopes. Hebei, Jilin, Nei Mongol, Ningxia [N Korea].

Löve (Feddes Repert. 95: 454. 1984) did not previously validly publish the combination *Elymus nakaii* because the place of valid publication of the basionym was not cited (Saint Louis Code, Art. 33.3). Instead, *Roegneria nakaii* was cited from Kitagawa (J. Jap. Bot. 17: 236. 1941), where the name was not validly published because no Latin description was provided (Art. 36.1).

**22. *Elymus strictus*** (Keng) S. L. Chen, **comb. nov.**

肃草 su cao

Basionym: *Roegneria stricta* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 68. 1963.

Culms erect or slightly geniculate at base, 50–100 cm tall, glabrous throughout. Leaf sheath glabrous; leaf blade glaucous or farinose, involute, (3.5–)8–16 × (0.1–)0.4–0.8 cm, stiff, abaxial surface glabrous, adaxial surface pubescent. Spike erect, (3.5–)10–18(–26) cm. Spikelets 1 per node, glaucous, or pur-

plish at maturity, (8–)15–20 mm, with (3–)5–8(–14) florets. Glumes: proximal one 5–8(–11) mm, distal one 6–13 mm, (3–)5–7-veined, apex acute or with mucro 1–5 mm; veins usually robust, scabrous. Lemma smooth and glabrous abaxially, or only so at middle and then otherwise ± puberulent, or hirsute along veins and on callus; first lemma (7–)9–10 mm; awn sub-erect, slightly recurved, (7–)14–22 mm, scabrous. Palea equaling lemma, ciliolate along keels distally, between keels puberulent distally or glabrous, apex emarginate or truncate. Anthers usually yellow, 1–2 mm. Fl. and fr. Jul–Oct.  $2n = 28^*$ .

- Mountain slopes, valleys, meadows, roadsides; 1300–4000 m. Gansu, Guizhou, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

Löve (Feddes Repert. 95: 458. 1984) did not previously validly publish the combination *Elymus strictus*; see the note following the genus description above. Because of this, Chen and Zhu (Novon 12: 428. 2002) did not previously validly publish *E. strictus* var. *crassus* (Saint Louis Code, Art. 43.1).

- 1a. Palea between keels puberulent distally ..... 22a. var. *strictus*  
 1b. Palea between keels glabrous ..... 22b. var. *crassus*

### 22a. *Elymus strictus* var. *strictus*

肃草(原变种) su cao (yuan bian zhong)

*Elymus gmelinii* (Ledebour) Tzvelev subsp. *strictus* (Keng) K. B. Jensen; *Roegneria stricta* Keng; *R. stricta* f. *major* Keng; *R. varia* Keng.

Lemma glabrous at middle abaxially, otherwise ± puberulent. Palea between keels puberulent distally.

- Mountain slopes, valleys, meadows, roadsides; 1300–2200 m. Gansu, Guizhou, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

### 22b. *Elymus strictus* var. *crassus* (L. B. Cai) S. L. Chen, **comb. et stat. nov.**

粗壮肃草 cu zhuang su cao

Basionym: *Roegneria crassa* L. B. Cai, Acta Phytotax. Sin. 34: 332. 1996.

Lemma glabrous abaxially or hirsute along veins and on callus. Palea between keels glabrous. Fl. and fr. Jul–Aug.

- Mountain slopes; 1800–4000 m. Ningxia, Qinghai.

### 23. *Elymus caninus* (Linnaeus) Linnaeus, Fl. Suec., ed. 2, 39. 1755.

犬草 quan cao

*Triticum caninum* Linnaeus, Sp. Pl. 1: 86. 1753; *Agrropyron caninum* (Linnaeus) P. Beauvois; *Braconotia canina* (Linnaeus) Fourreau; *B. elymoides* Godron, nom. illeg. superfl.; *Elytrigia canina* (Linnaeus) Drobow; *Gouldardia canina* (Linnaeus) Husnot; *Roegneria canina* (Linnaeus) Nevski; *Zeia canina* (Linnaeus) Lunell.

Culms laxly tufted, 80–150 cm tall, smooth. Leaf sheath glabrous; leaf blade green or glaucous green, broadly linear, flat, 12–20 × 0.5–1.1 cm, thin, glabrous or adaxial surface scabrous to scattered pilose. Spike nodding, somewhat dense, 10–20

cm. Spikelets 1 per node, green, rarely greenish purple, 10–15 mm excluding awns, with 2–5 florets. Glumes lanceolate, abruptly narrowed distally, 3–5-veined with broad secondary veins, scabrous, margin scarios; proximal glume 0.6–1 cm, awn ca. 2 mm; distal glume 0.7–1.1 cm, awn 2–4 mm. Lemma smooth, 0.9–1.1 cm; awn divergent, 1.5–1.8 cm. Palea apex truncate. Anthers 2.5–2.8 cm. Fl. and fr. Jun–Aug.  $2n = 28$ .

Forests, forest glades, scrub, mountain slopes; 1300–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

### 24. *Elymus caesifolius* Á. Löve ex S. L. Chen, **nom. nov.**

马格草 ma ge cao

Replaced synonym: *Roegneria glaucifolia* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 57. 1963, not *Elymus glaucifolius* Willdenow, Enum. Pl. 131. 1809.

Culms tufted, erect, 30–60 cm tall, 2- or 3-noded, glabrous. Leaf sheath glabrous or pilose at base; leaf blade glaucous, involute, (2–)6–16 × (0.1–)0.3–0.5 cm, stiff, abaxial surface smooth, glabrous, adaxial surface and margin scabrous. Spike erect, 6–15 cm. Spikelets 1 per node, 13–15 mm excluding awns, with 3–5 florets. Glumes oblong-lanceolate, proximal one 4–7 mm, distal one 6–8 mm, both 3-veined or distal one 5-veined, margin scarios, apex acute or acuminate. Lemma oblong-lanceolate, scabrous abaxially, scabrous or hirsutulous along veins; first lemma 9–11 mm; awn reflexed, 15–30 mm, scabrous. Palea slightly shorter than or subequaling lemma, abaxially hirsutulous in distal half, ciliolate along keels, apex truncate. Fl. and fr. late summer.  $2n = 42^*$ .

- Mountain slopes. Xizang.

Löve (Feddes Repert. 95: 448. 1984) did not previously validly publish the name *Elymus caesifolius*; see the note following the genus description above.

### 25. *Elymus durus* (Keng) S. L. Chen, **comb. nov.**

岷山披碱草 min shan pi jian cao

Basionym: *Brachypodium durum* Keng, Sunyatsenia 6: 54. 1941; *Elymus sclerus* Á. Löve, nom. illeg. superfl.; *Roegneria dura* (Keng) Keng; *R. dura* var. *variiglumis* Keng; *R. tschimganica* (Drobow) Nevski var. *variiglumis* (Keng) L. B. Cai.

Culms solitary or tufted, usually geniculate or with swollen nodes at base, 55–80 cm tall; nodes glaucous or purplish green, glabrous. Leaf sheath sometimes retrorsely pubescent; leaf blade flat or involute, 6–20(–25) × 0.1–0.45 cm, stiff, abaxial surface smooth or puberulent, adaxial surface scabrous or laxly puberulent. Spike nodding, 5–11 cm. Spikelets 1 per node, green or purplish green, 1.6–2.2 cm, with (3 or)4–7 florets; pedicel 0.8–1.5(–2) mm, glabrous or puberulent. Glumes lanceolate, scabrous along veins, margin thin, apex acute, acuminate, or pointed; proximal glume 3–4(–7) mm, 1–5-veined; distal glume 5–9 mm, 3–5-veined. Lemma lanceolate, hispidulous or scabrous; first lemma ca. 11 mm; awn reflexed, 1.5–2.8 cm, scabrous. Palea subequaling lemma, ciliate along keels, puberulent between keels. Anthers black, ca. 1.5 mm. Fl. and fr. late summer.  $2n = 28^*$ .

• Mountain meadows; 3700–4200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan.

Löve (Feddes Rept. 95: 448. 1984) published *Elymus scleris* as a *nomen novum* for *Brachypodium durum*, but the supposed blocking name, "*Elymus durus* Hedw. ex Steud., 1854" (Steudel, Nomencl. Bot., ed. 2, 1: 550, 551. 1840), was merely cited as a synonym by Steudel and was therefore not validly published under Art. 34.1(c) of the Saint Louis Code. Under Art. 11.4, the correct name in *Elymus* at specific rank is *E. durus*. Löve's name was therefore nomenclaturally superfluous when published and is illegitimate under Art. 52.1.

**26. *Elymus antiquus*** (Nevski) Tzvelev, Rast. Tsent. Azii 4: 220. 1968.

小颖披碱草 xiao ying pi jian cao

*Agropyron antiquum* Nevski, Izv. Bot. Sada Akad. Nauk SSSR 30: 515. 1932; *A. microlepis* Melderis; *Elymus microlepis* (Melderis) Melderis; *Roegneria antiqua* (Nevski) B. S. Sun; *R. parvigluma* Keng.

Culms tufted at base, slender, 50–100 cm tall, 3–5-noded, glabrous or scabrous below spike. Leaf sheath smooth or scabrous to sparsely hairy, margin sometimes ciliate; ligule 0.2–0.5 mm; leaf blade flat, 6–15 × 0.25–0.8 cm, both surfaces scabrous or pubescent. Spike ± nodding at flowering, distichous, 7.5–21 cm; rachis glabrous or ± scabrous on back and margin. Spikelets 1 per node, subsessile, green or purplish, 20–40 × 2–6 mm, with 3–7(–9) developed florets. Glumes oblong, lanceolate, or subovate, scabrous abaxially or only along veins, margin narrowly hyaline, apex mucronate; proximal glume 1.5–3 × 0.5–1.2 mm, 2- or 3-veined; distal glume 3–5.5 × 0.6–1.5 mm, 3–5-veined. Lemma lanceolate, 8–11.5 × 1.2–1.8 mm, glabrous, pubescent, or densely so abaxially; awn straight or slightly curved, 1–2 mm at maturity; callus setulose to densely so. Palea slightly shorter than lemma, scabrous-pubescent to pubescent adaxially, ciliate along keels distally, apex obtuse. Anthers yellow or purple, 2–3 mm. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

Mountain slopes and valleys, river banks; 2300–3800 m. Qinghai, Sichuan, Xizang, Yunnan [Nepal].

**27. *Elymus burchan-buddae*** (Nevski) Tzvelev, Rast. Tsent. Azii 4: 220. 1968.

短颖披碱草 duan ying pi jian cao

*Agropyron burchan-buddae* Nevski, Izv. Bot. Sada Akad. Nauk SSSR 30: 514. 1932; *A. nutans* Keng; *Elymus breviglumis* (Keng) Á. Löve ex D. F. Cui; *E. pseudonutans* Á. Löve; *Roegneria breviglumis* Keng; *R. burchan-buddae* (Nevski) B. S. Sun; *R. nutans* (Keng) Keng.

Culms tufted at base, erect or geniculately ascending, 10–60 cm tall, 2- or 3-noded, glabrous or sparsely scabrous below spike. Leaf sheath smooth or sparsely scabrous; ligule 0.2–0.3 (–0.5) mm; leaf blade light green to green, sometimes glaucous, tightly involute or with involute margin, 2–10(–18) × 0.1–0.4 cm, both surfaces glabrous, scabrous, or nearly hairy. Spike slightly distichous, rarely secund, 4–11 × 1–1.5 cm; rachis scabrous on back and margin. Spikelets 1 per node, sessile or subsessile, glaucous, (10–)14–35 × 3–6 mm, with 2–5(–7) florets. Glumes lanceolate or lanceolate-ovate, scabrous along veins and sometimes abaxially, margin sometimes very nar-

rowly hyaline, apex acute or mucronate; proximal glume 1.5–5 × 0.5–2 mm, (2 or)3(or 4)-veined; distal glume 3–5(–7.5) × 0.6–2 mm, 3–5-veined. Lemma narrowly lanceolate-elliptic, 7–10 × 1.3–2 mm, scabrous to pubescent abaxially; callus narrow, pointed, setulose or densely so; awn strongly curved at maturity, 1–3 cm. Palea shorter than or equaling body of lemma, glabrous to scabrous adaxially, ciliate along keels distally, apex rounded or obtuse. Anthers yellow to dark purple or black, 1–2 mm. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

Forest margins, mountain slopes, lands along rivers, river banks; 3000–5500 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [N India, ?Nepal].

**28. *Elymus serpentinus*** (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 427. 2002.

蜿轴披碱草 wan zhou pi jian cao

*Roegneria serpentina* L. B. Cai, Acta Phytotax. Sin. 35: 167. 1997.

Culms erect, 40–60 cm tall, 1–2 mm in diam., usually 4-noded, glabrous. Leaf sheath shorter than internode, glabrous; ligule ca. 0.4 mm, membranous, apex truncate; leaf blade flat, 4–15 × 0.3–0.4 cm, abaxial surface glabrous, adaxial surface villous. Spike pendulous, lax, 7–11 cm; rachis flexuose, slender, scabrous on back, margin ciliate; internodes 7–12 mm. Spikelets 1 per node, green, 13–16 mm excluding awns, with 4–6 florets; rachilla puberulent. Glumes oblong-lanceolate, 4- or 5-veined, scabrous along veins, margin narrowly membranous, apex dentate on one or both sides; proximal glume 5–6 mm, awn 3–4 mm; distal glume 6–7 mm, awn 4–6 mm. Lemma lanceolate, smooth and glabrous abaxially, scabrous along veins; first lemma 9–10 mm; awn distinctly recurved, 14–18 mm. Palea distinctly shorter than lemma, softly ciliate along keels, puberulent between keels, apex emarginate. Anthers yellow, ca. 3 mm. Ovary puberulent at apex. Fl. and fr. Jul.

• River banks; ca. 2000 m. Hebei (Yuxian).

**29. *Elymus glaberrimus*** (Keng & S. L. Chen) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.

光穗披碱草 guang sui pi jian cao

Plants without rhizome, when culms tufted, or with short rhizome. Culms erect, glaucous, ca. 80 cm tall. Leaf sheath smooth and glabrous, or puberulent at base; leaf blade glaucous, flat, or involute when dry, 8–15 × (0.1–)0.3–0.4 cm, stiff, abaxial surface smooth, glabrous, adaxial surface scabrous. Spike erect, 5–12 cm, with 6–11 spikelets. Spikelets 1 per node, greenish, stramineous when old; rachilla smooth and glabrous, or puberulent. Glumes lucid, oblong-lanceolate, glabrous, margin membranous, apex acute with a tooth on one side; proximal glume 4–6 mm, 3-veined; distal glume 5.5–7.5 mm, 3–5-veined. Lemma oblong-lanceolate, smooth and glabrous throughout; first lemma ca. 9 mm; awn recurved, 3–20 mm, scabrous. Palea equaling lemma, smooth and glabrous abaxially distally or scabrous proximally, ciliate along keels, apex emarginate or truncate. Fl. and fr. Aug–Sep.  $2n = 28^*$ .

• Meadows, mountain steppes, rocky slopes; 1400–2300 m. Qinghai, Xinjiang.

- 1a. Lemma awn 10–20 mm; plants without rhizome ..... 29a. var. *glaberrimus*  
 1b. Lemma awn 3–5 mm; plants usually with short rhizome ..... 29b. var. *breviaristus*

**29a. *Elymus glaberrimus* var. *glaberrimus***

光穗披碱草(原变种) *guang sui pi jian cao* (yuan bian zhong)

*Roegneria glaberrima* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 72. 1963.

Plants without rhizome. Lemma awn 10–20 mm. Fl. and fr. Aug–Sep.

- Rocky slopes; 1400–2300 m. Qinghai, Xinjiang.

**29b. *Elymus glaberrimus* var. *breviaristus* S. L. Chen ex D. F. Cui, Bull. Bot. Res., Harbin 10(3): 29. 1990.**

短芒光穗披碱草 *duan mang guang sui pi jian cao*

*Roegneria breviarista* (S. L. Chen ex D. F. Cui) L. B. Cai; *R. glaberrima* var. *breviarista* (S. L. Chen ex D. F. Cui) L. B. Cai.

Plants usually with short rhizome. Lemma awn 3–5 mm. Fl. and fr. late summer.

- Meadows, mountain steppes; 1600–1700 m. Xinjiang.

**30. *Elymus pseudocanicus* G. Zhu & S. L. Chen, nom. nov.**

阿尔泰披碱草 *a er tai pi jian cao*

Replaced synonym: *Elymus altaicus* D. F. Cui, Bull. Bot. Res., Harbin 10(3): 28. 1990, not *Elymus altaicus* A. Sprengel, Tent. Suppl. 5. 1828; *Roegneria altaica* L. B. Cai.

Culms erect, 50–75 cm tall, 3-noded, glabrous; nodes ± purplish. Leaf sheath purplish when young, yellowish brown when older, smooth, glabrous; ligule ca. 1 mm, membranous; leaf blade usually involute, 10–18 × 0.2–0.35 cm, abaxial surface smooth, adaxial surface scabrous. Spike dense, 8–9 cm; rachis smooth, margin ciliolate; internodes 7–9 mm. Spikelets 1 per node, purplish, subunilateral, 13–15 mm, with 3 or 4 florets; rachilla puberulent; internodes 2–3 mm. Glumes broadly lanceolate, subequal, 9–11 mm, 5-veined, margin broadly membranous, apex awnless. Lemma purplish, lanceolate, puberulent; first lemma 10–12 mm; callus puberulent; awn purplish, recurved, robust, 14–18 mm. Palea slightly shorter than or subequaling lemma, ciliolate along keels distally. Anthers yellow, ca. 2.5 mm. Fl. and fr. Jun–Aug.

- Forest understories along river valleys, mountain slopes. Xinjiang.

**31. *Elymus sinkiangensis* D. F. Cui, Bull. Bot. Res., Harbin 10(3): 26. 1990.**

新疆披碱草 *xin jiang pi jian cao*

*Roegneria sinkiangensis* (D. F. Cui) L. B. Cai.

Culms 60–80 cm tall, 2- or 3-noded. Leaf sheath smooth, glabrous, but retrorsely pubescent at base; ligule ca. 0.3 mm; leaf blade flat, 5–30 × 0.3–0.5 cm, abaxial surface smooth, glabrous, adaxial surface long pilose, margin ciliate. Spike erect,

dense, 7–10 cm; rachis subglabrous, margin ciliate; internodes 4–7 mm. Spikelets 1 per node, 13–15(–18) mm, with 4 or 5( or 6) florets. Glumes lanceolate, 3–5-veined, hispidulous along veins, margin membranous, apex acuminate or with awn ca. 2 mm; proximal glume 9–10 mm including awn; distal glume 10–12 mm including awn. Lemma lanceolate, hispidulous distally and near margin; first lemma 10–12 mm; awn recurved, 20–35 mm, scabrous. Palea equaling lemma, ciliate along keels. Anthers yellow, 1.5–2 mm. Fl. and fr. Jul–Sep.

- Forest margins, mountain steppes; 1800–2100 m. Xinjiang.

**32. *Elymus jacquemontii* (J. D. Hooker) Tzvelev, Rast. Tsentr. Azii 4: 221. 1968.**

低株披碱草 *di zhu pi jian cao*

*Agropyron jacquemontii* J. D. Hooker, Fl. Brit. India 7: 369. 1896 [“1897”]; *Anthosachne jacquemontii* (J. D. Hooker) Nevski; *Roegneria jacquemontii* (J. D. Hooker) Nevski.

Culms slender, 15–20 cm tall, 2- or 3(or 4)-noded. Leaf blade green or light green, glaucous, involute, 2–4(–7) × 0.1–0.2 cm, abaxial surface glabrous, adaxial surface scabrous or ± pubescent. Spike 4–11 × 0.8–2 cm, with 4 or 5 spikelets; rachis slender, 8–15 mm, glabrous. Spikelets 1 per node, sessile, 12–18 mm, with 4–7 florets. Glumes 4.5–7 mm, 5-veined, glabrous, margin hyaline, apex with short awn 1–3(–5) mm. Lemma lanceolate, glabrous throughout; first lemma 7–9 mm; awn strongly curved, 20–50(–60) mm. Palea equaling lemma, ciliate along keels, apex obtuse. Anthers yellow or purple, 1.2–2.5 mm. Fl. and fr. late summer.  $2n = 28^*$ .

- Stony mountain slopes, alluvial soils, between rocks, usually growing together with *Elymus burchan-buddae* and *E. nutans*; ca. 3900 m. Xinjiang, Xizang.

**33. *Elymus aristiglumis* (Keng & S. L. Chen) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.**

芒颖披碱草 *mang ying pi jian cao*

Culms solitary or tufted, erect, (15–)40–50 cm tall, 1- or 2-noded, glabrous. Leaf sheath glabrous; leaf blade flat, ± so, or involute, 6–8(–11) × to 0.5 cm, glabrous, scabrous, or densely hispidulous. Spike nodding, 6–8 cm excluding awns; rachis margin scabrous; internodes 3–10 mm. Spikelets 1 per node, purple, 12–15 mm excluding awns, with 2 or 3 florets; pedicel 0.5–1 mm, scabrous. Glumes narrowly lanceolate, subsymmetric, 1–3-veined, scabrous or smooth, apex with awn 3–7 mm; proximal glume 3–4 mm; distal glume 3–5 mm. Lemma oblong, smooth and glabrous or hirsutulous; first lemma ca. 10 mm; awn reflexed, 20–40 mm. Palea equaling lemma, hirsutulous throughout, ciliolate along keels. Anthers black, ca. 2 mm. Fl. and fr. late summer.  $2n = 28^*$ ,  $42^*$ .

- Mountain slopes, river banks; 1500–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

- 1a. Leaf blade involute, less than 0.2 cm wide, both surfaces densely hispidulous ..... 33b. var. *hirsutus*  
 1b. Leaf blade flat or ± so, 0.4–0.5 cm wide, glabrous or scabrous.  
 2a. Lemma ± hirsutulous throughout

- except callus glabrous, awn  
20–30 mm ..... 33a. var. *aristiglumis*  
2b. Lemma smooth, glabrous, awn  
to 40 mm ..... 33c. var. *leianthus*

**33a. *Elymus aristiglumis* var. *aristiglumis***

芒颖披碱草(原变种) mang ying pi jian cao (yuan bian zhong)

*Roegneria aristiglumis* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 55. 1963.

Leaf blade flat, 0.4–0.5 cm wide, glabrous or scabrous. Lemma ± hirsutulous throughout except callus glabrous; awn 20–30 mm. Fl. and fr. late summer.

• Mountain slopes; 1500–3000 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

**33b. *Elymus aristiglumis* var. *hirsutus* (H. L. Yang) S. L. Chen, Novon 7: 227. 1997.**

毛芒颖草 mao mang ying cao

*Roegneria aristiglumis* var. *hirsuta* H. L. Yang, Acta Phytotax. Sin. 18: 253. 1980.

Leaf blade involute, less than 0.2 cm wide, both surfaces densely hispidulous. Lemma hirsutulous throughout; awn 20–30 mm. Fl. and fr. late summer.

• Mountain slopes; 4400–4500 m. Xizang.

**33c. *Elymus aristiglumis* var. *leianthus* (H. L. Yang) S. L. Chen, Novon 7: 227. 1997.**

平滑披碱草 ping hua pi jian cao

*Roegneria aristiglumis* var. *leiantha* H. L. Yang, Acta Phytotax. Sin. 18: 253. 1980.

Leaf blade ± flat, 0.4–0.5 cm wide, glabrous or scabrous. Lemma smooth, glabrous; awn to 40 mm. Fl. and fr. late summer.

• Mountain slopes, river banks; 4900–5200 m. Xizang.

**34. *Elymus shouliangiae* (L. B. Cai) G. Zhu, Novon 12: 427. 2002.**

守良披碱草 shou liang pi jian cao

*Roegneria shouliangiae* L. B. Cai, Acta Phytotax. Sin. 35: 161. 1997.

Culms erect, 60–70 cm tall, 2–3 mm in diam., ca. 4-noded. Leaf sheath glabrous; ligule ca. 0.3 mm, apex truncate; leaf blade flat, 9–17 × 0.3–0.6 cm, rigid, both surfaces glabrous or adaxial surface scabrous. Spike lax, 16–19 cm; rachis glabrous, but margin scabrous; internodes 15–23 mm. Spikelets 1 per node, 2.6–3.2 cm excluding awns, with 8–10 florets; rachilla internodes puberulent. Glumes lanceolate, glabrous; proximal glume 7–8 mm, 3- or 4-veined, apex acuminate; distal glume 8–9 mm, 5–7-veined, apex with awn 2–5 mm. Lemma lanceolate, smooth, glabrous; first lemma 11–12 mm; awn recurved, robust, 3.5–4 cm. Palea subequaling lemma, scabrous or spinescent along keels, glabrous between keels, apex truncate. An-

thers brown, 4–5 mm. Ovary obovate, apex pubescent. Fl. and fr. Jul.

• River banks; ca. 2800 m. Xizang (Gyirong)

**35. *Elymus confusus* (Roshevitz) Tzvelev var. *breviaristatus* (Keng) S. L. Chen, Novon 7: 228. 1997.**

紊草 wen cao

*Roegneria confusa* (Roshevitz) Nevski var. *breviaristata* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 52. 1963; *R. confusa* subsp. *breviaristata* (Keng) N. R. Cui.

Culms 30–70 cm tall, 3-noded. Leaf sheath glabrous, but retrorsely pilose at base; leaf blade green, usually involute, 3–7.4 × ca. 0.4 cm, abaxial surface glabrous, adaxial surface scabrous. Spike erect, ca. 10 cm. Spikelets yellowish, green, or purplish green, 10–15 mm excluding awns, with 4 or 5 florets. Glumes narrowly lanceolate, 3-veined or distal glume 5-veined, scabrous along veins, apex long acuminate or distal glume with short awn; proximal glume 4–6 mm; distal glume 6–8 mm. Lemma laxly hirsutulous abaxially; first lemma 9–11 mm; awn reflexed, 13–15 mm, scabrous. Palea equaling lemma, ciliolate along keels distally, apex usually truncate. Fl. and fr. Jul–Aug.  $2n = 42^*$ .

• Meadows. Ningxia, Xinjiang.

*Elymus confusus* var. *confusus* is distributed in Mongolia and Russia, but has not yet been recorded from China. It differs from var. *breviaristatus* in having the awn of the first lemma about twice as long as the lemma body and in its chromosome number of  $2n = 28$ .

**36. *Elymus anthosachnoides* (Keng) Á. Löve ex B. Rong Lu, Nordic J. Bot. 15: 24. 1995.**

假花鳞草 jia hua lin cao

Culms solitary or tufted, 60–75 cm tall, 1.5–2.5 mm in diam., 4–6-noded. Leaf sheath glabrous; leaf blade flat, 11–25 × 0.35–0.7 cm, both surfaces villous or adaxial surface pilose or glabrous. Spike pendulous, 8–16 cm. Spikelets 1 per node, yellowish green or tinged purplish, 24–30 mm excluding awns, with 5–7 florets; rachilla villous; internodes ca. 3 mm. Glumes lanceolate, 3–5(–7)-veined, scabrous along veins, apex acute; proximal glume 5–7.5 mm; distal glume 7–9 mm. Lemma lanceolate, hirsute throughout, especially distally and near margin, or glabrous or scabrous; first lemma 13–14 mm; awn reflexed, robust, 20–35 mm. Palea slightly shorter than or equaling lemma, ciliolate along keels distally. Anthers reddish brown, 1–2 mm. Fl. and fr. Jul–Aug.

• Mountain slopes; 2700–4000 m. Qinghai, Sichuan, Xizang, Yunnan.

Löve (Feddes Repert. 95: 459. 1984) did not previously validly publish the combination *Elymus anthosachnoides*; see the note following the genus description above.

- 1a. Spike 8–9 cm; lemma hirsute  
throughout ..... 36a. var. *anthosachnoides*  
1b. Spike 10–16 cm; lemma glabrous  
or scabrous ..... 36b. var. *scabrilemmatus*

**36a. *Elymus anthosachnoides* var. *anthosachnoides***

假花鳞草(原变种) jia hua lin cao (yuan bian zhong)

*Roegneria anthosachnoides* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 65. 1963.Spike 8–9 cm. Lemma hirsute throughout. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

- Mountain slopes; ca. 4000 m. Sichuan, Yunnan.

**36b. *Elymus anthosachnoides* var. *scabrilemmatus* (L. B. Cai) S. L. Chen, **comb. nov.****

糙稃花鳞草 cao fu hua lin cao

Basionym: *Roegneria anthosachnoides* var. *scabrilemmata* L. B. Cai, Acta Phytotax. Sin. 35: 165. 1997.

Spike 10–16 cm. Lemma glabrous or scabrous. Fl. and fr. Jul–Aug.

- Mountain slopes; 2700–3600 m. Qinghai, Sichuan.

**37. *Elymus altissimus* (Keng) Á. Löve ex B. Rong Lu, Nordic J. Bot. 15: 24. 1995.**

高株披碱草 gao zhu pi jian cao

*Roegneria altissima* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 53. 1963.

Culms tufted, erect, slightly geniculate, 70–150 cm, rigid, 5–7-noded. Leaf blade glaucous green, 7–25(–40) × 0.6–1 cm, abaxial surface glabrous, adaxial surface laxly puberulent, margin scabrous. Spike erect or slightly curved, 15–18 cm. Spikelets 1 per node, ca. 11 mm, with 1–3 florets. Glumes greenish or slightly purplish, oblong, 5–6 mm, thick, 5–7-veined or proximal glume 3-veined, apex acuminate. Lemma yellowish green or slightly purplish, oblong-lanceolate, pubescent only at base and at margin; first lemma ca. 10 mm; awn slightly reflexed, robust, 10–20 mm. Palea slightly shorter than lemma, apex emarginate or subrounded. Fl. and fr. Jun–Sep.  $2n = 28^*$ .

- Forests, meadows; 1700–3400 m. Qinghai, Sichuan, Xinjiang, Yunnan.

Löve (Feddes Repert. 95: 448. 1984) did not previously validly publish the combination *Elymus altissimus*; see the note following the genus description above.

**38. *Elymus laxinodis* (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 427. 2002.**

稀节披碱草 xi jie pi jian cao

*Roegneria laxinodis* L. B. Cai, Guihaia 16: 199. 1996.

Culms erect or geniculate at base, 40–80 cm tall, 1–1.5 mm in diam., 3- or 4-noded, pubescent below spike and at nodes. Leaf sheath puberulent or scabrous; ligule ca. 0.5 mm, membranous, apex truncate; leaf blade flat, 10–16 × 0.4–0.6 cm, abaxial surface scabrous or ciliate along veins, adaxial surface villous. Spike erect or slightly curved, lax, 8–11 cm; rachis slender, puberulent; internodes 13–20(–28) mm. Spikelets narrow, 15–18 mm, with 2–5 florets. Glumes lanceolate, 3–5-

veined, sparsely spinose along veins and at margin, apex pungent; proximal glume 3–4 mm; distal glume 4–5 mm. Lemma narrowly lanceolate, abaxially puberulent; first lemma 9–10 mm; awn curved, 1.2–1.6 cm. Palea slightly shorter than lemma, scabrous along keels, puberulent between keels, apex truncate or obtuse. Anthers yellow, 2–2.5 mm. Caryopsis lanceolate, 6–7 mm. Fl. and fr. Aug–Sep.

- Mountain slopes; 3500–4000 m. Qinghai (Yushu), Sichuan (Kangding).

**39. *Elymus serotinus* (Keng) Á. Löve ex B. Rong Lu, Nordic J. Bot. 15: 21. 1995.**

秋披碱草 qiu pi jian cao

*Roegneria serotina* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 50. 1963.

Culms laxly tufted, erect, or decumbent or geniculate at base, 20–45 cm tall. Leaf sheath puberulent or margin ciliate at base; leaf blade involute, 9–11(–20) × 0.1–0.2 cm, both surfaces smooth and glabrous or adaxial surface scabrous. Spike curved and nodding, 6–10 cm, with 5–11 spikelets. Spikelets 1 per node, yellowish brown or purplish green, 12–13(–22) mm excluding awns, with 3–6(or 7) florets. Glumes oblong-lanceolate, 3–5-veined, laxly puberulent, scabrous along veins, apex acute or acuminate; proximal glume 5–6 mm; distal glume 7–8 mm; awn usually 2–5 mm. Lemma oblong-lanceolate, puberulent proximally, hispidulous distally; first lemma ca. 10 mm; awn reflexed, 2.5–3 cm, scabrous. Palea equaling lemma, puberulent between keels distally. Fl. and fr. late summer.  $2n = 28^*$ .

- Mountain slopes. Henan, Qinghai, Shaanxi.

Löve (Feddes Repert. 95: 467. 1984) did not previously validly publish the combination *Elymus serotinus*; see the note following the genus description above.

**40. *Elymus retroflexus* B. Rong Lu & B. Salomon, Nordic J. Bot. 13: 355. 1993.**

反折披碱草 fan zhe pi jian cao

*Roegneria retroflexa* (B. Rong Lu & B. Salomon) L. B. Cai.

Culms 55–75 cm tall, 3- or 4-noded, glabrous. Leaf sheath smooth; ligule 0.4–0.5 mm, apex lacerate; auricles 1–1.2 × 0.1–0.2 mm; leaf blade narrowly linear, 4–10 × 0.1–0.2 cm, scabrous. Spike nodding, lax, 6.5–12 × 0.5–1 cm; rachis smooth. Spikelets 1 per node, 4–6.5 × 2–5 mm, with 3–5 florets; rachilla pilose, 2.5–3 mm. Glumes narrowly elliptic, subequal, small, scabrous along veins, margin membranous, apex acute or mucronate; proximal glume (1.5–)2–5 × 0.5–1 mm, (2 or)3-veined; distal glume (3–)5–7.5 × 0.8–1.3 mm, 3–5-veined. Lemma narrowly lanceolate, 9–12 × 1–1.5 mm excluding awn; awn bent when mature, 3.5–5.5 cm. Palea narrowly lanceolate, 8–9 × 0.9–1.2 mm, ciliate along keels, apex truncate, hairy. Anthers yellow, 2.5–3 mm. Fl. and fr. Jul–Sep.  $2n = 28^*$ .

- Dry to moist mountain slopes and meadows usually with shrubs and *Betula* trees; 3900–4300 m. Xizang.

**41. *Elymus leiotropis* (Keng) S. L. Chen, comb. nov.**光脊披碱草 *guang ji pi jian cao*

Basionym: *Roegneria leiotropis* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 58. 1963.

Culms tufted, erect but geniculate at base, 60–90 cm tall, 3-noded. Leaf sheath glabrous; ligule ca. 0.2 mm, apex truncate; leaf blade flat or slightly involute, 7–17 × 0.2–0.4 cm, abaxial surface smooth, adaxial surface scabrous. Spike curved or nodding, 10–15 cm. Spikelets 1 per node, purplish green, 15–20 mm, with 4 or 5 florets. Glumes oblong-lanceolate, 3–5-veined, apex acute or acuminate; proximal glume 5–7 mm; distal glume 6–8 mm. Lemma lanceolate, hirsutulous throughout; first lemma 10–13 mm; awn reflexed, robust, 25–40 mm. Palea slightly shorter than lemma, distally scabrous, smooth along keels, apex truncate or emarginate. Fl. and fr. late summer.

- Mountain slopes. Yunnan.

Löve (Feddes Repert. 95: 449. 1984) did not previously validly publish the combination *Elymus leiotropis*; see the note following the genus description above.

**42. *Elymus brevipes* (Keng) S. L. Chen, comb. nov.**短柄披碱草 *duan bing pi jian cao*

Basionym: *Roegneria brevipes* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 49. 1963; *R. breviglumis* Keng var. *brevipes* (Keng) L. B. Cai.

Culms solitary or tufted, erect, 30–60 cm tall. Leaf blade involute when dry, rigid, abaxial surface smooth, adaxial surface scabrous. Spike curved or nodding, branched at base, 7–11 cm excluding awns; rachis slender. Spikelets 1 per node, purplish green, ± nitid, 14–22 × 4–7 mm; pedicel 0.5–2 mm. Glumes lanceolate, distinctly 3-veined or distal glume 4-veined, scabrous, apex acute or acuminate; proximal glume 1.5–3 mm; distal glume 3–4.5 mm. Lemma lanceolate, scabrous or subglabrous; first lemma 9–10 mm; awn reflexed, 2.5–3 cm, scabrous. Palea 8–9 mm, puberulent abaxially, ciliate along distal 1/3 of keels, apex truncate. Anthers yellow, 1.5–2.5 mm. Fl. and fr. late summer.  $2n = 28^*$ .

- Open rocky mountains. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, ?Yunnan.

Löve (Feddes Repert. 95: 467. 1984) did not previously validly publish the combination *Elymus brevipes*; see the note following the genus description above.

A record of the C Asian and W Himalayan *Elymus schugnanicus* (Nevski) Tzvelev (Novosti Sist. Vyssh. Rast. 9: 62. 1972; *Agropyron schugnanicum* Nevski, Bull. Jard. Bot. Acad. Sci. URSS 30: 512. 1932) from Yunnan (Fl. Yunnan. 9: 419–420. 2003, as *Roegneria schugnanica* (Nevski) Nevski) may be referable to *E. brevipes*. Lu (Nordic J. Bot. 15: 13–15. 1995) treated the two taxa as conspecific. Alternatively, it may be referable to *E. tschimganicus*.

**43. *Elymus schrenkianus* (Fischer & C. A. Meyer) Tzvelev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 20: 428. 1960.**

扭轴披碱草 *niu zhou pi jian cao*

*Triticum schrenkianum* Fischer & C. A. Meyer, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg 3: 305. 1845; *Agropyron schrenkianum* (Fischer & C. A. Meyer) P. Candargy; *Campeiostrachys schrenkiana* (Fischer & C. A. Meyer) Drobow; *Roegneria schrenkiana* (Fischer & C. A. Meyer) Nevski.

Culms robust, 30–90 cm tall. Sheath of lower leaves retrorsely pubescent; leaf blade flat, 5–8 × 0.3–0.6 cm, scabrous or sometimes pubescent. Spike nodding, ± secund, dense, 5–11 cm; internodes 3–8 mm. Spikelets 1 per node, usually very shortly pedicellate, purplish green, with 3 or 4 (or 5) florets. Glumes linear-lanceolate, 3-veined; proximal glume 4–4.5 mm, awn 2–3.5 mm; distal glume 4.5–5.5 mm, awn ca. 5 mm. Lemma lanceolate, very scabrous; first lemma ca. 11 mm; awn divaricate, 15–22 mm. Palea subequaling or equaling lemma, hispid along keels, apex subobtus. Anthers 1.5–1.8 mm. Fl. and fr. Jun–Jul.  $2n = 42^*$ .

Glades, mountain slopes, dry river meadows. Qinghai, Xinjiang, Xizang [Bhutan, India (Sikkim), Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Russia, Turkmenistan, Uzbekistan].

**44. *Elymus pulanensis* (H. L. Yang) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988 [“*pulancensis*”].**

普兰披碱草 *pu lan pi jian cao*

*Roegneria pulanensis* H. L. Yang, Acta Phytotax. Sin. 18: 253. 1980; *R. jacquemontii* (J. D. Hooker) Nevski var. *pulanensis* (H. L. Yang) L. B. Cai.

Culms laxly tufted, 30–50 cm tall, 3- or 4-noded. Leaf blade flat or involute, 7–10 × 0.15–0.3 cm, both surfaces glabrous or laxly villous. Spike curved, 8–10 cm, with 5–8 spikelets; rachis smooth, glabrous; internodes 14–20 mm. Spikelets 1 per node, 22–26 mm, with 7–9 florets. Glumes oblong-lanceolate, 3–5-veined, smooth, glabrous, margin membranous; proximal glume 4.5–5 mm, awn (1–)1.5–5 mm; distal glume 5–7 mm, awn to 7 mm. Lemma lanceolate, ± laxly hirsutulous abaxially; first lemma ca. 11 mm; awn reflexed, 30–40 mm. Palea equaling lemma, shortly ciliate along keels distally. Fl. and fr. late summer.

- River banks; ca. 3600 m. Xizang, Yunnan.

**45. *Elymus purpurascens* (Keng) S. L. Chen, comb. nov.**紫穗披碱草 *zi sui pi jian cao*

Basionym: *Roegneria purpurascens* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 56. 1963.

Culms laxly tufted, erect or slightly decumbent at base, 60–90 cm tall, rigid. Leaf sheath smooth, glabrous; leaf blade involute, 11–22 × 0.3–0.6 cm, stiff, abaxial surface glabrous, adaxial surface scabrous or pubescent, margin scabrous. Spike nodding, 13–15 cm, with 8–13 spikelets. Spikelets 1 per node, purplish in part, 1.5–2.3 cm excluding awns, with 4–7 florets. Glumes oblong-lanceolate, 5–8 mm, 5-veined, scabrous, apex acute; proximal glume sometimes shorter and 3-veined. Lemma lanceolate, scabrous or hirsutulous abaxially; first lemma 9–11 mm; awn reflexed, purplish, robust, 18–28 mm, scabrous. Palea



subequaling lemma, shortly ciliate along keels distally, puberulent between keels. Fl. and fr. Jun–Jul.  $2n = 28^*$ ,  $42^*$ .

• Mountain slopes. Gansu, Nei Mongol, Ningxia, Qinghai, Yunnan.

Löve (Feddes Repert. 95: 448. 1984) did not previously validly publish the combination *Elymus purpurascens*; see the note following the genus description above.

**46. *Elymus tschimganicus*** (Drobow) Tzvelev, Rast. Tsentr. Azii 4: 221. 1968 [*“czimganicus”*].

云山披碱草 yun shan pi jian cao

Culms erect, usually geniculate at base, 25–60 cm tall, smooth, glabrous. Leaf sheath glabrous throughout, or pubescent proximally; leaf blade glaucous green, subinvolute, 0.15–0.3 cm wide, both surfaces glabrous or adaxial surface slightly hairy. Spike flexuose, slender, 7–9 cm. Spikelets 1 per node, pale glaucous green, rarely very slightly tinged purple, with 5–7 florets. Glumes linear-lanceolate, 4–8 mm, 1/4–1/2 as long as basal florets in spikelet, (3–)5-veined, scabrous along veins, apex usually acuminate, occasionally shortly awned. Lemma lanceolate, 9–10 mm, scabrous; callus shortly setose on sides, or smooth and glabrous; awn reflexed, 20–30 mm. Palea subequaling lemma, apex slightly emarginate or obtuse. Anthers 2–2.5 mm. Fl. and fr. Jun–Jul.

Mountain slopes, high mountain meadows; ca. 3500 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

See the comment under *Elymus brevipes* (species no. 42).

- 1a. Lemma callus shortly setose on sides; leaf sheath glabrous, or pubescent proximally ..... 46a. var. *tschimganicus*  
 1b. Lemma callus smooth, glabrous; leaf sheath glabrous throughout .... 46b. var. *glabrispiculus*

**46a. *Elymus tschimganicus* var. *tschimganicus***

云山披碱草(原变种) yun shan pi jian cao (yuan bian zhong)

*Agropyron tschimganicum* Drobow in Vvedensky et al., Key Fl. Tashkent 1: 40. 1923; *Roegneria tschimganica* (Drobow) Nevski.

Leaf sheath glabrous, or pubescent proximally. Lemma callus shortly setose on sides. Fl. and fr. Jun–Jul.  $2n = 42^*$ .

High mountain meadows. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

*“Agropyron czimganicum,” “Elymus czimganicus,”* and *“Roegneria czimganica”* are merely orthographical variants.

**46b. *Elymus tschimganicus* var. *glabrispiculus*** D. F. Cui, Bull. Bot. Res., Harbin 10(3): 30. 1990.

光稃披碱草 guang fu pi jian cao

*Roegneria glabrispicula* (D. F. Cui) L. B. Cai; *R. tschimganica* var. *glabrispicula* (D. F. Cui) L. B. Cai.

Leaf sheath glabrous throughout. Lemma callus smooth, glabrous. Fl. and fr. summer.

• Mountain slopes; ca. 3500 m. Xinjiang.

**47. *Elymus mutabilis*** (Drobow) Tzvelev, Rast. Tsentr. Azii 4: 217. 1968.

狭颖披碱草 xia ying pi jian cao

Plants ± with rhizome, or if without rhizome then culms tufted. Culms erect, 60–120 cm tall. Leaf blade flat, 10–20 × 0.4–0.7 cm, glabrous. Spike usually dense, 6–20 × 0.4–0.7 cm; rachis margin ciliate; internodes 9–15 mm. Spikelets 1 per node, green, purple, glaucous, or purplish glaucous, 10–20 mm, with 2–5 florets; very shortly pedicellate. Glumes lanceolate or broadly so, 7–13 × 1.5–2 mm, 5-veined, scabrous or hispid, margin sometimes broadly membranous, apex acuminate to awned; awn (when present) 1–2 mm. Lemma narrowly elliptic, 8–9 mm, scabrous, ± pilose, or pubescent throughout; awn 1–7 mm. Palea equaling or subequaling lemma, margin ciliate, apex emarginate, truncate, or obtuse. Anthers 2–3 mm. Fl. and fr. Jun–Sep.  $2n = 28^*$ .

Sparse forests, forest margins and glades, among shrubs, mountain slopes, meadows, pebbles; 1200–2400 m. Xinjiang [Mongolia, Russia; C and SW Asia, Europe].

This species is a good forage grass.

- 1a. Plants without rhizome (culms tufted); spikelets usually glaucous or purplish glaucous ..... 47c. var. *praecaespitosus*  
 1b. Plants ± with rhizome; spikelets purple or green.  
 2a. Spikelets usually purple; glumes lanceolate; lemma ± pilose, awn 2–5 mm ..... 47a. var. *mutabilis*  
 2b. Spikelets usually green; glumes broadly lanceolate; lemma pubescent throughout, awn 1–2 mm ..... 47b. var. *nemoralis*

**47a. *Elymus mutabilis* var. *mutabilis***

狭颖披碱草(原变种) xia ying pi jian cao (yuan bian zhong)

*Agropyron mutabile* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 88. 1916; *A. angustiglume* Nevski; *Gouardia mutabilis* (Drobow) Ikonnikov; *Roegneria angustiglumis* (Nevski) Nevski; *R. mutabilis* (Drobow) Hylander.

Plants ± with rhizome. Spikelets usually purple. Glumes lanceolate. Lemma ± pilose; awn 2–5 mm. Fl. and fr. Jul–Aug.

Sparse forests, forest glades, among shrubs, mountain slopes, meadows, pebbles; 1300–2400 m. Xinjiang [Mongolia, Russia; SW Asia, Europe].

**47b. *Elymus mutabilis* var. *nemoralis*** S. L. Chen ex D. F. Cui, Bull. Bot. Res., Harbin 10(3): 29. 1990.

林缘披碱草 lin yuan pi jian cao

*Roegneria mutabilis* var. *nemoralis* (D. F. Cui) L. B. Cai.

Plants with rhizome. Spikelets usually green. Glumes broadly lanceolate. Lemma pubescent throughout; awn 1–2 mm.

• Forest glades, mountain slopes; 1800–1900 m. Xinjiang.

**47c. *Elymus mutabilis* var. *praecaespitosus*** (Nevski) S. L. Chen, *Novon* 7: 229. 1997.

密丛披碱草 mi cong pi jian cao

*Agropyron praecaespitosum* Nevski, *Izv. Glavn. Bot. Sada SSSR* 29: 541. 1930; *Elymus praecaespitosus* (Nevski) Tzvelev; *E. mutabilis* subsp. *praecaespitosus* (Nevski) Tzvelev; *Gouardia praecaespitosa* (Nevski) Ikonnikov; *Roegneria praecaespitosa* (Nevski) Nevski.

Plants without rhizome. Culms tufted. Spikelets usually glaucous or purplish glaucous. Fl. and fr. Jun–Sep.

Forest margins, mountain slopes; 1200–2400 m. Xinjiang [Mongolia, Russia].

**48. *Elymus magnicaespes*** D. F. Cui, *Bull. Bot. Res.*, Harbin 10(3): 25. 1990.

大丛披碱草 da cong pi jian cao

*Roegneria magnicaespes* (D. F. Cui) L. B. Cai.

Plants without rhizome. Culms tufted, erect, 50–70 cm tall, 2-noded. Leaf sheath glabrous, usually fibrous and broken at base; ligule ca. 5 mm, membranous, apex truncate; leaf blade setaceous, involute, 6–15 × 0.15–0.25 cm, stiff, abaxial surface glabrous, adaxial surface scabrous. Spike erect, slender, 8–12 cm; rachis scabrous, margin ciliolate; internodes ca. 10 mm. Spikelets 1 per node, 11–18 × 2–3 mm, with 4–6 florets; rachilla densely puberulent; internodes ca. 1.5 mm. Glumes oblong-lanceolate, 4- or 5-veined, margin membranous, apex acuminate or pointed; proximal glume 3–6 mm, distal glume 6–9 mm. Lemma oblong-lanceolate, smooth, glabrous, apex acuminate; first lemma ca. 10 mm. Palea equaling lemma, narrowed toward subtruncate apex, ciliolate along keels. Anthers ca. 3 mm. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Steppes; ca. 2100 m. Xinjiang.

**49. *Elymus alashanicus*** (Keng) S. L. Chen, *Bull. Bot. Res.*, Harbin 14: 142. 1994.

阿拉善披碱草 a la shan pi jian cao

*Roegneria alashanica* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 73. 1963.

Plants ± with rhizome. Culms laxly tufted, 40–60 cm tall, rigid, 3-noded. Leaf sheath usually fibrous and broken at base; leaf blade setaceous, involute, 5–8(–12) × 0.2–0.3 cm, stiff, both surfaces pubescent or abaxial surface smooth and glabrous. Spike erect, slender, 5–10 cm. Spikelets 1 per node, yellowish, 12–15 × 2–3 mm, with 3–6 florets, glabrous; rachilla glabrous. Glumes oblong-lanceolate, 3-veined, margin membranous, apex acute, rarely obtuse; proximal glume 5–6 mm; distal glume 7–9 mm. Lemma lanceolate, smooth, obscurely 5-veined, margin narrowly membranous, apex acute to pointed; callus smooth, glabrous; first lemma ca. 10 mm. Palea subequaling or slightly longer than lemma, apex truncate. Anthers ca. 3 mm. Fl. and fr. late summer.

• Mountain slopes; ca. 1800 m. Gansu, Nei Mongol, Ningxia, Xinjiang.

**50. *Elymus jufinshanicus*** (C. P. Wang & H. L. Yang) S. L. Chen, *Novon* 7: 228. 1997.

九峰山披碱草 jiu feng shan pi jian cao

*Roegneria alashanica* Keng var. *jufinshanica* C. P. Wang & H. L. Yang, *Bull. Bot. Res.*, Harbin 4(4): 87. 1984; *R. jufinshanica* (C. P. Wang & H. L. Yang) L. B. Cai.

Culms laxly tufted, usually geniculate at base, 70–90 cm tall. Leaf sheath usually longer than internode, glabrous; ligule 0.5–1 mm, apex truncate; leaf blade linear, usually involute, 8–18 × 0.1–0.15 cm, abaxial surface usually glabrous, adaxial surface usually villous. Spike erect, 12–15 cm; rachis subglabrous on back, margin ciliate. Spikelets 1 per node, yellowish, 13–18 × 2–3 mm, with 3 or 4 florets; rachilla densely pubescent. Glumes oblong-lanceolate, 3–5-veined, densely pubescent adaxially, apex acuminate; proximal glume 9–11 mm; distal glume 11–12 mm. Lemma lanceolate, subglabrous; first lemma ca. 11 mm; awn ca. 5 mm. Palea shorter than lemma. Anthers yellow, 1.5–2 mm. Fl. and fr. late summer.

• Mountain slopes; ca. 2200 m. Nei Mongol.

**51. *Elymus tridentatus*** (C. Yen & J. L. Yang) S. L. Chen, *Novon* 7: 229. 1997.

三齿披碱草 san chi pi jian cao

*Roegneria tridentata* C. Yen & J. L. Yang, *Novon* 4: 310. 1994.

Culms tufted, erect or slightly procumbent geniculate at base, 40–65 cm tall, 1.5–2 mm in diam., 2- or 3-noded, smooth, glabrous. Leaf sheath glabrous; ligule ca. 0.5 mm, scarious, apex truncate; leaf blade involute or subinvolute, 5–7 × ca. 0.2 cm, abaxial surface glabrous, adaxial surface pubescent. Spike erect, 5–11.5 × ca. 0.5 cm, with 6–14 spikelets; rachis usually glabrous. Spikelets 1 per node, purple or greenish purple, 10–13 × ca. 2 mm, with 4 or 5 florets; rachilla internodes 1.5–2 mm, appressed puberulent. Glumes oblong or oblong-elliptic, slightly oblique, unequal, prominently 3(–5)-veined, glabrous, sometimes sparsely shortly spinulose along veins, apex rounded-obtuse, rarely acute; proximal glume 4–5 mm; distal glume 5–6.5 mm. Lemma oblong-lanceolate, (7–)8–9 mm, appressed white pubescent proximally and laterally, apex truncate and 3-toothed, teeth 0.5–1 mm; callus obtuse, puberulent along sides. Palea shorter to longer than lemma, scabrous between keels, setulose-ciliate on distal 1/3–1/2 of keels, apex truncate. Anthers black, ca. 2 mm.  $2n = 42^*$ .

• Rocky slopes, roadsides; ca. 3700–3800 m. Qinghai.

**52. *Elymus elytrigoides*** (C. Yen & J. L. Yang) S. L. Chen, **comb. nov.**

昌都披碱草 chang du pi jian cao

Basionym: *Roegneria elytrigoides* C. Yen & J. L. Yang, *Acta Bot. Yunnan.* 6: 75. 1984; *Pseudoroegneria elytrigoides* (C. Yen & J. L. Yang) B. Rong Lu; *R. alashanica* Keng var. *elytrigoides* (C. Yen & J. L. Yang) L. B. Cai.

Plants with rhizome. Culms laxly tufted, erect, 60–75 cm tall, 1–1.2 mm in diam., 2–4(–6)-noded, glabrous. Leaf sheath

shorter than internode, glabrous, fibrous and broken at base; ligule ca. 0.5 mm, membranous, apex truncate; leaf blade green, flat or involute, (7–)10–15 × 0.15–0.33 cm, stiff. Spike linear, straight, (5–)8–16 cm, with 5–12 spikelets; rachis glabrous; internodes 8–15 mm, or to 20 mm at base of spike. Spikelets 1 per node, 12–15 mm, with 5 or 6 florets; rachilla glabrous or puberulent; internodes 1.5–1.8 mm. Glumes oblong-lanceolate, herbaceous, glabrous, margin membranous, apex obtuse or acute, unilaterally dentate; proximal glume 3.5–6.5 mm, 3- or 4-veined; distal glume 5–8.5 mm, 4- or 5-veined. Lemma oblong-lanceolate, 5-veined, glabrous, apex obtuse or with point ca. 0.5 mm; first lemma 7.8–9 mm; callus obtuse, puberulent. Palea equaling or slightly longer than lemma, abaxially glabrous, ciliolate along keels distally, apex truncate. Anthers yellow or pale brown, 4.5–5 mm. Caryopsis dark purple, oblong, ca. 5.5 × 1.5 mm, apex densely white hispidulous. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Mountain rocks among *Caragana*, river banks; ca. 3200 m. Xizang (Qamdo).

**53. *Elymus grandis* (Keng) S. L. Chen, comb. nov.**

大披碱草 da pi jian cao

Basionym: *Roegneria grandis* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 45. 1963.

Plants with short, underground rhizomes. Culms solitary or tufted, 80–100 cm tall, stiff, 5- or 6-noded. Leaf blade 20–30 × ca. 1 cm, subleathery, both surfaces smooth or adaxial surface scabrous. Spike erect, slender, lax, 20–25 cm; rachis scabrous. Spikelets 1 per node, 20–30 mm, with ca. 12 florets. Glumes oblong-lanceolate, 10–15 mm, 5–7-veined, smooth or scabrous, margin ± membranous. Lemma white pilose, apex pointed; first lemma ca. 15 mm including apical point ca. 1 mm. Palea 2/3–3/4 as long as lemma, subsmooth along keels, apex truncate or subrounded. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Mountain slopes. Henan, Shaanxi.

Löve (Feddes Repert. 95: 458. 1984) did not previously validly publish the combination *Elymus grandis*; see the note following the genus description above.

**54. *Elymus sylvaticus* (Keng & S. L. Chen) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.**

林地披碱草 lin di pi jian cao

*Roegneria sylvatica* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 36. 1963.

Culms laxly tufted, erect or slightly decumbent at base, ca. 100 cm tall. 4- or 5-noded. Leaf sheath smooth, glabrous; leaf blade flat, 13–25 × 0.6–0.9 cm, soft, glabrous. Spike rather dense, 7.5–8.5 cm. Spikelets 1 per node, 12–14 mm, with 3 florets. Glumes lanceolate, 8–10 mm, 3–5-veined, scabrous, margin narrowly membranous, apex acute, pointed, or with awn 1–2 mm. Lemma hirsutulous, margin narrowly membranous, apex narrowed with short awn 1–3 mm, sometimes with a tooth below apex; first lemma 9–11 mm. Palea subequaling lemma, densely ciliolate along keels distally, puberulent between keels, apex emarginate. Fl. and fr. summer.

• Forests; 1800–3300 m. Qinghai, Xinjiang.

**55. *Elymus kronokensis* (Komarov) Tzvelev, Rast. Tsentr. Azii 4: 216. 1968.**

少花披碱草 shao hua pi jian cao

*Agropyron kronokense* Komarov, Repert. Spec. Nov. Regni Veg. 13: 87. 1914; *A. boreale* (Turczaninow) Drobos; *Elymus borealis* (Turczaninow) D. F. Cui (1996, “*borealus*”), not Scribner (1900); *E. kronokensis* subsp. *borealis* (Turczaninow) Tzvelev; *Roegneria borealis* (Turczaninow) Nevski; *R. kronokensis* (Komarov) Tzvelev; *Triticum boreale* Turczaninow.

Culms erect, slender, (20–)30–60 cm tall, smooth, glabrous. Leaf blade flat, 5–9 × 0.15–0.25 cm, abaxial surface glabrous but scabrous, adaxial surface pilose. Spike erect, dense, 4–12 cm; rachis densely hirsute; Spikelets 1 per node, purple or purplish green, 9–10 mm, with 2(or 3) florets. Glumes lanceolate or broadly so, 4–6(–7) × 1.5–2.5 mm, 3–5-veined, glabrous, or scabrous along veins, margin purple or purplish membranous, apex obtusely dentate or with awn 1(–3) mm. Lemma lanceolate, 7–8(–9) mm, smooth, glabrous; awn 2–4 (–5) mm. Palea equaling lemma, ciliate along keels, apex emarginate. Fl. and fr. Jun–Aug.  $2n = 28$ .

Meadows in alpine zones and river valleys; 1600–1800 m. Xinjiang [Mongolia, Russia].

**56. *Elymus yushuensis* (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 428. 2002.**

玉树披碱草 yu shu pi jian cao

*Roegneria yushuensis* L. B. Cai, Bull. Bot. Res., Harbin 14: 338. 1994.

Culms erect, 45–60 cm tall, 1–2 mm in diam., 2- or 3-noded, glabrous. Leaf sheath glabrous; ligule very short, apex truncate; leaf blade usually involute, 5–9 cm, abaxial surface glabrous, adaxial surface and margin pilose. Spike lax, 6–11 cm; rachis slender, glabrous; internodes 7–18 mm, or to 30 mm at base of spike. Spikelets 1 per node, usually purplish, 12–20 mm, with 4–6 florets; rachilla pubescent. Glumes lanceolate, 3–5-veined, glabrous, apex pungent; proximal glume 4–5 mm; distal glume 6–7 mm. Lemma oblong-lanceolate, abaxially spinescent; first lemma 8–9 mm; awn 2–4 mm. Palea slightly shorter than or equaling lemma, ciliolate along keels distally, apex truncate. Caryopsis yellowish, apex pubescent. Fl. and fr. Aug–Sep.

• Roadsides; 3500–4000 m. S Qinghai.

**57. *Elymus leianthus* (Keng) S. L. Chen, Novon 7: 229. 1997.**

光花披碱草 guang hua pi jian cao

*Roegneria leiantha* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 42. 1963; *Kengyilia leiantha* (Keng) L. B. Cai.

Culms usually geniculate at base, ca. 45 cm tall, usually 4-noded. Leaf sheath smooth, glabrous; leaf blade flat or inflexed, 6–11 × 0.2–0.4 cm, smooth and glabrous or adaxial surface scabrous. Spike ± curved, ca. 12 cm; rachis margin ciliolate. Spikelets 1 per node, 12–14 mm excluding awns, with 3 or 4

florets. Glumes narrowly oblong, subequal, 5–8 mm including awn, 3–5-veined, scabrous along veins, apex acuminate or with awn 1–2 mm. Lemma oblong-lanceolate, 5-veined, glabrous but scabrous along veins, margin membranous; first lemma 9–10 mm; callus subglabrous; awn 4–5 mm. Palea equaling lemma, wingless and ciliolate along keels, apex obtuse or emarginate. Anthers yellow, 2–3 mm. Fl. and fr. late summer.

- Mountain slopes; 2300–2400 m. Qinghai, Yunnan.

**58. *Elymus humilis*** (Keng & S. L. Chen) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.

矮披碱草 ai pi jian cao

*Roegneria humilis* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 40. 1963.

Culms laxly tufted, 20–25 cm tall, usually 2-noded, smooth, glabrous. Leaf sheath smooth, glabrous, brown and fibrous at base when old; leaf blade usually involute, 2.5–5.5 (–10.5) × 0.1–0.4 cm, abaxial surface puberulent, adaxial surface pubescent. Spike slightly secund, 4.5–7 cm; rachis glabrous or puberulent, margin ciliate. Spikelets 1 (or 2) per node, 8–13 mm excluding awns, with 3–5 florets; rachilla densely strigose. Glumes lanceolate, asymmetric, 2–5-veined, margin purplish membranous, apex acuminate to purplish pointed; proximal glume 7–10 mm including awn 1–3 mm; distal glume 8–11 mm including awn ca. 3 mm. Lemma lanceolate, distally scabrous, especially along veins, margin purplish membranous; first lemma 8–9 mm; callus with hairs 0.2–0.5 mm; awn erect, purplish, 2–5 mm. Palea equaling lemma, winged along keels, ciliate along wings, puberulent between keels, apex emarginate. Anthers purplish when young, ca. 2 mm. Fl. and fr. late summer.

- Roadsides. Qinghai, Xinjiang.

**59. *Elymus viridulus*** (Keng & S. L. Chen) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.

绿穗披碱草 lü sui pi jian cao

*Roegneria viridula* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 39. 1963.

Culms erect, ca. 80 cm tall, rigid, 4-noded, smooth, glabrous. Leaf sheath retrorsely pubescent proximally, glabrous distally; leaf blade linear, flat or involute, 10–15 × 0.2–0.4 cm, abaxial surface smooth, glabrous, adaxial surface scabrous and pilose at base. Spike ± nodding, 7.5–9.5 cm; rachis glabrous but margin ciliate. Spikelets 1 per node, 14–18 mm, with 5 or 6 florets. Glumes green, lucid, broadly lanceolate, suboblique, subequal, 8–12 mm including awn 1–2 mm, 4–6(–7)-veined, nearly keeled along midvein, glabrous, margin broadly membranous. Lemma greenish, oblong-lanceolate, glabrous but scabrous distally and near margin, margin broadly membranous; first lemma ca. 10 mm; awn 2–6 mm. Palea slightly shorter than or subequaling lemma, both surfaces puberulent, hispid-ciliolate along keels distally, apex slightly emarginate or truncate. Anthers yellow, ca. 4 mm. Fl. and fr. late summer.  $2n = 28^*$ .

- Mountain slopes. Xinjiang.

**60. *Elymus cheniae*** (L. B. Cai) G. Zhu, Novon 12: 426. 2002.

陈氏披碱草 chen shi pi jian cao

*Roegneria cheniae* L. B. Cai, Acta Phytotax. Sin. 34: 333. 1996.

Culms erect or geniculate at base, 30–60 cm tall, 1.5–2.5 mm in diam., 3- or 4-noded, glabrous. Leaf sheath glabrous; ligule ca. 0.5 mm, membranous, apex truncate; leaf blade flat or involute at margin, 3–10 × 0.2–0.4 cm, both surfaces usually glabrous. Spike erect, 5–13 × ca. 0.4 cm; rachis glabrous, but margin ciliolate; internodes 5–7 mm. Spikelets green or purplish green, 10–14 mm, with 2–4 florets; rachilla puberulent. Glumes lanceolate or oblong-lanceolate, usually subequal, 7–11 mm, 4–6-veined, glabrous, margin membranous, apex pungent or mucronate. Lemma lanceolate, abaxially spinose; first lemma 8–10 mm; awn 1–3 mm. Palea slightly shorter or longer than lemma, ciliolate along keels, glabrous between keels. Anthers yellow, 1.5–2 mm. Caryopsis oblong, ca. 6 mm. Fl. and fr. Aug.

- Thickets; 2300–2600 m. Xinjiang (Xinyuan, Zhaosu).

**61. *Elymus intramongolicus*** (Shan Chen & W. Gao) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.

内蒙披碱草 nei meng pi jian cao

*Roegneria intramongolica* Shan Chen & W. Gao, Acta Phytotax. Sin. 17(4): 93. 1979.

Culms laxly tufted, erect, 100–160 cm tall, ca. 5 mm in diam., 4- or 5-noded, smooth, glabrous. Leaf sheath glabrous; ligule lacerate, apex obtuse; leaf blade flat, 15–25 × 0.5–1 cm, abaxial surface hirsutulous along veins, adaxial surface pubescent. Spike erect, 9–15 cm; rachis margin shortly ciliate; internodes 5–10 mm. Spikelets 1 per node, green or purplish green, 11–13.5(–18.5) mm, with 3–5 florets. Glumes linear-lanceolate, 5–7-veined, densely hirsutulous abaxially, margin submembranous, apex acuminate or with awn 1–1.5 mm; proximal glume 9–10 mm; distal glume 10–11 mm. Lemma lanceolate, puberulent abaxially, apex unequally 1-toothed on each side; first lemma 11–12.5 mm; awn 1–2.5 mm. Palea shorter than lemma, puberulent abaxially, ciliolate along keels. Fl. and fr. Jul–Aug.

- Forest margins, meadows. Nei Mongol.

**62. *Elymus nevskii*** Tzvelev, Spisok Rast. Gerb. Fl. SSSR Bot. Inst. Vsesoyuzn. Akad. Nauk 18: 29. 1970.

齿披碱草 chi pi jian cao

*Agropyron ugamicum* Drobow in Vvedensky et al., Key Fl. Tashkent 1: 40. 1923, not *Elymus ugamicus* Drobow (loc. cit. 44. 1923); *E. dentatus* (J. D. Hooker) Tzvelev subsp. *ugamicus* (Drobow) Tzvelev; *E. gmelinii* (Ledebour) Tzvelev subsp. *ugamicus* (Drobow) Á. Löve; *Gouardia ugamica* (Drobow) Ikonnikov; *Roegneria ugamica* (Drobow) Nevski; *Semeiostachys ugamica* (Drobow) Drobow.

Culms geniculate at base, robust, 50–120 cm tall. Leaf sheath glabrous or proximally pilose; leaf blade flat, 0.7–1.1 cm wide, both surfaces pilose and scabrous or abaxial surface glabrous. Spike erect, secund, dense; rachis margin scabrous.

Spikelets 1 per node, greenish or tinged purplish, 20–30 mm, with 5–9 florets. Glumes broadly lanceolate, subequal, 12–15 × 2.5–4 mm, prominently (5–)7–9-veined, scabrous, margin hyaline, apex acuminate, often 1-toothed. Lemma lanceolate, 11–13 mm, hirsute, scabrous; awn moderately stout, 1–5(–7) mm. Palea subequaling lemma, 10–12 mm, hispid along keels, apex rounded-obtuse. Anthers 2.5–3 mm. Fl. and fr. Jul–Aug.  $2n = 28$ .

Mountain slopes, valleys. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

This species has been treated as conspecific with *Elymus dentatus* (J. D. Hooker) Tzvelev (Spisok Rast. Gerb. Fl. SSSR Bot. Inst. Vsesoyuzn. Akad. Nauk 18: 29. 1970; *Agropyron dentatum* J. D. Hooker, Fl. Brit. India 7: 370. 1896 [“1897”]; *Roegneria dentata* (J. D. Hooker) Nevski; *Semeiostachys dentata* (J. D. Hooker) Drobow), which is regarded here as endemic to Kashmir and Pakistan. If the two species are united then the name *E. dentatus* has priority.

**63. *Elymus kamoji*** (Ohwi) S. L. Chen, Bull. Nanjing Bot. Gard. 1987: 9. 1988.

柯孟披碱草 ke meng pi jian cao

Culms laxly tufted, erect or geniculate at base, (30–)50–100 cm tall. Leaf sheath usually glabrous but margin usually ciliate; ligule ca. 0.5 mm, apex truncate; leaf blade flat or involute, 5–40 × (0.1–)0.3–1.3 cm, glabrous, scabrous. Spike nodding, rarely erect, (2.5–)7–20 cm; rachis internodes 8–16(–25) mm. Spikelets 1 per node, green or purplish green, (10–)13–25 mm excluding awns, with (3–)5–8 florets; rachilla puberulent; internodes (1.5–)2–2.5 mm. Glumes ovate-lanceolate to oblong-lanceolate, 3–5(–7)-veined, margin broadly scarious, apex with awn 2–7 mm, more rarely acute and awnless; proximal glume 4–8 mm; distal glume 5–9 mm. Lemma lanceolate, glabrous to hispidulous, margin membranous; first lemma 8–11 mm; callus puberulent to hispidulous; awn erect or slightly reflexed, 18–40 mm. Palea slightly shorter than or equaling lemma, margin distinctly winged, apex subrounded or obtuse. Fl. and fr. May–Jul.

Forest margins, mountain slopes, roadsides; 100–2300 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Qinghai, Shaanxi, Shandong, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Russia (Far East)].

Some authors consider *Elymus tsukushiensis* Honda (Bot. Mag. (Tokyo) 1: 391. 1936), described from Japan, to be conspecific with *E. kamoji*, described from China, in which case the name *E. tsukushiensis* would have priority.

Two varieties occur in China. In addition, *Elymus kamoji* var. *intermedius* S. L. Chen & Y. X. Jin (Bull. Nanjing Bot. Gard. 1987: 10. 1988) perhaps also merits recognition. It is characterized by having different leaf epidermis, glumes with an awn ca. 4 mm, and lemmas with a robust, straight, rough awn.

- 1a. Culms 50–100 cm tall; spikelets 13–25 mm, with 5–8 florets; glume apex usually awned ..... 63a. var. *kamoji*  
 1b. Culms 30–45 cm tall; spikelets 10–13 mm, with 3–5 florets; glume apex usually acute ..... 63b. var. *macerrimus*

**63a. *Elymus kamoji* var. *kamoji***

柯孟披碱草(原变种) ke meng pi jian cao (yuan bian zhong)

*Agropyron kamoji* Ohwi, Acta Phytotax. Geobot. 11: 179. 1942; *A. semicostatum* (Nees ex Steudel) Nees ex Boissier var. *transiens* Hackel; *A. tsukushiense* (Honda) Ohwi var. *transiens* (Hackel) Ohwi; *Elymus tsukushiensis* Honda var. *transiens* (Hackel) Osada; *Roegneria kamoji* (Ohwi) Keng & S. L. Chen; *R. tsukushiensis* (Honda) B. Rong Lu et al. var. *transiens* (Hackel) B. Rong Lu et al.

Culms 50–100 cm tall. Spikelets 13–25 mm, with 5–8 florets. Glume apex usually awned. Fl. and fr. May–Jul.  $2n = 42$ .

Forest margins, mountain slopes, roadsides; 100–2300 m. Anhui, Fujian, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Qinghai, Shaanxi, Shandong, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Russia (Far East)].

**63b. *Elymus kamoji* var. *macerrimus*** (Keng) G. Zhu, Novon 12: 426. 2002.

细瘦披碱草 xi shou pi jian cao

*Roegneria kamoji* var. *macerrima* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 17. 1963; *R. kamoji* subsp. *macerrima* (Keng) N. R. Cui; *R. macerrima* (Keng) L. B. Cai.

Culms 30–45 cm tall. Spikelets 10–13 mm, with 3–5 florets. Glume apex usually acute. Fl. and fr. May–Jul.

- Roadsides. Guangxi, Sichuan.

**64. *Elymus hybridus*** (Keng) S. L. Chen, **comb. nov.**

杂交披碱草 za jiao pi jian cao

Basionym: *Roegneria hybrida* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 18. 1963; *R. tsukushiensis* (Honda) B. Rong Lu et al. var. *hybrida* (Keng) L. B. Cai.

Culms erect or decumbent at base, ca. 90 cm tall. Leaf sheath brown or purplish; leaf blade flat, 15–25 × (0.25–)0.5–0.8 cm. Spike nodding, ca. 27 cm. Spikelets 1 per node, green, 17–20 mm excluding awns, with 6–8 florets. Glumes oblong-lanceolate, scabrous along veins, margin membranous, apex acuminate or with awn 1–2.5 mm; proximal glume 6–8 mm, 3–5-veined; distal glume 8–9 mm, 5–7-veined. Lemma oblong-lanceolate, proximal and distal parts hirsutulous but middle part subsmooth, long ciliate near margin, margin broadly scarious; awn erect or reflexed, 20–30 mm, scabrous. Palea slightly shorter than or equaling lemma, winged along keels, ciliolate along distal 3/4 of wings, apex obtuse. Ovary apex with yellowish, hard hairs. Fl. and fr. May–Jul.

- Mountain slopes. Jiangsu (Nanjing).

Chen (Bull. Nanjing Bot. Gard. 1987: 9. 1988) did not previously validly publish the combination *Elymus hybridus* because the place of valid publication of the basionym was not cited (Saint Louis Code, Art. 33.3). Instead, *Roegneria hybrida* was cited from Keng (Fl. Ill. Pl. Prim. Sin. Gram. 352. 1959), where the name was not validly published because no Latin description was provided (Art. 36.1).

**65. *Elymus curtisaristatus*** (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 426. 2002.

缩芒披碱草 suo mang pi jian cao

*Roegneria curtisaristata* L. B. Cai, Guihaia 16: 200. 1996.

Culms erect, 40–65 cm tall, 1–2 mm in diam., usually 3-noded, scabrous. Leaf sheath usually glabrous but retrorsely villous on basal leaves; ligule very short, apex truncate; leaf blade involute, 4–10 × 0.2–0.3 cm, both surfaces glabrous or adaxial surface sparsely villous. Spike erect or slightly curved, 9–12 cm; rachis glabrous, but margin spinose; internodes 7–12 mm. Spikelets purplish, narrow, 13–19 mm excluding awns, with 5–7 florets; rachilla puberulent. Glumes lanceolate or oblong-lanceolate, subequal, 5–6 mm, 3–5-veined, scabrous along veins, margin narrowly membranous. Lemma lanceolate, abaxially glabrous but scabrous distally and at margin; first lemma 9–10 mm; callus pubescent; awn straight, 5–10 mm. Palea slightly longer than lemma, ciliate along keels distally, scabrous between keels, apex truncate or obtuse. Anthers black, 2.3–3.2 mm. Fl. and fr. Aug.

- Mountain slopes; ca. 3400 m. Xizang (Qamdo).

**66. *Elymus scabridulus*** (Ohwi) Tzvelev, Rast. Tsentr. Azii 4: 218. 1968.

粗糙披碱草 cu cao pi jian cao

*Agropyron scabridulum* Ohwi, J. Jap. Bot. 19: 166. 1943; *Elymus semicostatus* (Nees ex Steudel) Melderis subsp. *scabridulus* (Ohwi) Å. Löve; *Roegneria scabridula* (Ohwi) Melderis.

Culms 50–60 cm tall, 2- or 3-noded, pubescent at nodes. Leaf sheath glabrous or retrorsely puberulent in innovation shoot; leaf blade involute, 7–15(–20) × ca. 0.3 cm, both surfaces ± scabrous. Spike erect, 8–10 cm; rachis compressed, margin with setiform hairs. Spikelets 1 per node, usually secund, dense, ca. 12 mm, with 5 or 6 florets. Glumes lanceolate, 3–5-veined, scabrous along veins, margin membranous, apex acuminate or pointed, usually with a tooth on one side; proximal glume 9–10 mm; distal glume 11–12 mm. Lemma lanceolate, scabrous; first lemma 7–8 mm; awn erect or slightly reflexed, purplish, slender, 12–15 mm. Palea linear-oblong, equaling lemma, setiform ciliate along keels, apex obtuse. Anthers yellow, oblong, ca. 1.5 mm. Fl. and fr. late summer.

- Forest margins, mountain slopes. Nei Mongol.

**67. *Elymus yangiae*** B. Rong Lu, Willdenowia 22: 129. 1992 [“*yangii*”].

杨氏披碱草 yang shi pi jian cao

*Roegneria yangiae* (B. Rong Lu) L. B. Cai, Acta Phytotax. Sin. 35: 158. 1997.

Culms erect or nodding at apex, 60–100(–110) cm tall, 4–7-noded, uppermost internode 23–35 cm. Leaf sheath scabrous; ligule 0.3–0.6 mm, apex lacerate; auricles 1.2–2 × 0.5–0.8 mm; leaf blade narrowly linear, 5–25 × 0.3–0.4 cm, both surfaces scabrous, margin ciliate. Spike nodding, 10–15 × 0.5–0.8 cm; rachis margin scabrous. Spikelets 1 per node, 35–45 mm including awns, with 5–10 florets; rachilla pilose, 1.7–2.1 mm. Glumes lanceolate, scabrous along veins, margin membranous, apex mucronate or acute; proximal glume 2–4.5 × 0.2–0.7 mm, (1 or) 2- or 3-veined; distal glume 3–3.5 × 0.4–0.9 mm, 2- or 3(–5)-veined. Lemma narrowly lanceolate, 7–10 mm, sparsely

pubescent to densely pilose; awn usually straight, 12–32 mm. Palea narrowly lanceolate, 8–10 mm, pubescent, ciliate along keels, apex pointed, 2-cleft. Anthers yellow, 3.5–4.2 mm. Fl. and fr. summer.  $2n = 28^*$ .

- Among bushes, stony mountain slopes; 3000–4200 m. Xizang.

**68. *Elymus dolichatherus*** (Keng) S. L. Chen, **comb. nov.**

长芒披碱草 chang mang pi jian cao

Basionym: *Roegneria dolichathera* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 19. 1963; *R. dolichathera* var. *glabrifolia* Keng.

Culms erect, usually glaucous, 60–90 cm tall, 4- or 5-noded. Leaf blade flat or involute, 10–20 × 0.3–0.7 cm, abaxial surface smooth, glabrous, adaxial surface scabrous or densely pubescent. Spike erect, ± curved, or nodding, 10–15 (–17) cm; rachis ± puberulent. Spikelets 1 per node, ± pedicellate, green or purplish green, 12–20 mm excluding awns, with 3–6 florets. Glumes oblong-lanceolate, subequal, 6–8 mm excluding awn, 3–5-veined, scabrous along veins, margin membranous, apex acuminate or awned. Lemma with teeth just below apex; awn erect or slightly reflexed, slender, (10–)15–30 mm. Palea slightly shorter than lemma, scabrous along keels distally. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

- Forests, mountain slopes; 2300–3700 m. Ningxia, Qinghai, Sichuan, Yunnan.

Löve (Feddes Repert. 95: 453. 1984) did not previously validly publish the combination *Elymus dolichatherus*; see the note following the genus description above.

**69. *Elymus tenuispicus*** (J. L. Yang & Y. H. Zhou) S. L. Chen, Novon 7: 229. 1997.

柔穗披碱草 rou sui pi jian cao

*Roegneria tenuispica* J. L. Yang & Y. H. Zhou, Novon 4: 307. 1994.

Culms laxly tufted, erect, 35–75 cm tall, 0.5–1 mm in diam., 4- or 5-noded, glabrous but puberulent at nodes. Leaf sheath equaling or longer than internode, villous, persistent basal part often lacerate, fibrous; ligule ca. 0.5 mm, hyaline-membranous, apex truncate; leaf blade green, flat or involute, 15–20 × 0.3–0.4 cm, abaxial surface scabrous, adaxial surface villous. Spike erect or slightly nodding, 9.2–10.5 cm excluding awns; rachis glabrous, but margin hispid-ciliate; nodes densely pubescent. Spikelets 1 per node, 13–16 mm, with 4–9 florets; rachilla puberulent. Glumes oblong-lanceolate, herbaceous, hirsute, margin membranous, apex acuminate with mucro 0.5–1 mm; proximal glume 5–6.5 mm, 3- or 4-veined; distal glume 6.5–7.5 mm, 4- or 5-veined. Lemma oblong-lanceolate, proximally densely pubescent, distally scabrous-ciliate; first lemma 7.5–8 mm; callus obtuse, densely puberulent, laterally with hairs 0.6–0.8 mm; awn erect, 10–20 mm. Palea shorter than or subequaling lemma, ciliate along distal 1/2–3/4 of keels, pubescent between keels, apex rounded-obtuse. Anthers yellow, 2–2.5 mm. Caryopsis brown, oblong, ca. 5.5 × 1.5 mm, densely white hispidulous. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

- Roadsides; ca. 3600 m. Xizang.

**70. *Elymus calcicola* (Keng) S. L. Chen, *comb. nov.***钙生披碱草 *gai sheng pi jian cao*

Basionym: *Roegneria calcicola* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 21. 1963.

Culms slender, ca. 100 cm tall, ca. 5-noded. Leaf blade glaucous green, flat, 10–20 × 0.4–0.5 cm, thick, abaxial surface glabrous, or puberulent along veins, adaxial surface pubescent. Spike ± curved, 12–20 cm. Spikelets 1 per node, 12–17 mm excluding awns, with 3–6 florets. Glumes narrowly lanceolate, usually asymmetric, smooth, or scabrous along veins, margin membranous, apex acuminate; proximal glume 5–8 mm; distal glume 6–10 mm. Lemma glabrous, scabrous, or hirsutulous; first lemma 9–11 mm; awn erect, slender, 15–25 mm, scabrous. Palea equaling or slightly longer than lemma, abaxially puberulent, ciliate throughout length of keels, apex narrowed, obtuse, usually slightly 2-lobed. Fl. and fr. Jun–Jul.

• Steep slopes by rivers, moist and calcareous soils; 1600–2000 m. Guizhou, Sichuan, Yunnan.

Löve (Feddes Repert. 95: 453. 1984) did not previously validly publish the combination *Elymus calcicola*; see the note following the genus description above.

**71. *Elymus trichospiculus* (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 428. 2002 [*“trichospicula”*].**毛穗披碱草 *mao sui pi jian cao*

*Roegneria trichospicula* L. B. Cai, Bull. Bot. Res., Harbin 14: 340. 1994.

Culms erect or slightly geniculate at base, 90–110 cm tall, 1.5–2.5 mm in diam., 4- or 5-noded, usually glabrous but puberulent below spike. Leaf sheath usually villous proximally; ligule ca. 0.5 mm; leaf blade 6–16 × 0.2–0.45 cm, both (especially adaxial) surfaces pilose. Spike lax, 8–12 cm; rachis puberulent on back, margin spinescent. Spikelets 1 per node, 12–18 mm, with 3–5 florets; rachilla hispidulous; internodes 1.5–2.5 mm. Glumes lanceolate, subequal, 5–6 mm, 3-veined, hispidulous along veins, apex acuminate or pointed; point less than 2 mm. Lemma oblong-lanceolate, 5-veined, abaxially densely villous, apex with straight awn 6–12 mm; first lemma 9–10 mm. Palea equaling lemma, ciliolate along keels distally, glabrous between keels, apex truncate. Anthers yellow, ca. 2 mm. Fl. and fr. Aug.

• Forest margins; 3500–4400 m. S Qinghai.

**72. *Elymus sinicus* (Keng) S. L. Chen, Novon 7: 229. 1997.**中华披碱草 *zhong hua pi jian cao*

Plants laxly tufted or with very short rhizome. Culms erect or geniculate at base, 60–90 cm tall, glabrous throughout. Leaf sheath glabrous; leaf blade involute, 6–22 × (0.1–)0.3–0.7 cm, stiff, abaxial surface glabrous, adaxial surface pilose. Spike erect, 8–13 cm. Spikelets 1 per node, 13–15 mm, with 4 or 5 florets. Glumes oblong-lanceolate, usually oblique, 3–5-veined, apex acute or with awn 1–3 mm; proximal glume 7–8 mm; distal glume 8–10 mm. Lemma oblong-lanceolate, laxly puberulent abaxially; first lemma ca. 9 mm; callus with hairs 0.1–0.4 mm; awn erect or slightly recurved, 10–18 mm. Palea equaling lemma, apex emarginate or truncate, setiform ciliate along keels

distally, puberulent between keels distally. Fl. and fr. Jul–Aug.

• Forest margins, mountain slopes, valleys, roadsides; 800–3800 m. Gansu, Henan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Yunnan.

1a. Leaf blade (0.1–)0.3–0.4 cm wide; spike 8–10 cm; glume apex acute, awnless ..... 72a. var. *sinicus*

1b. Leaf blade ca. 0.7 cm wide; spike 12–13 cm; glume apex with awn 1–3 mm ..... 72b. var. *medius*

**72a. *Elymus sinicus* var. *sinicus***中华披碱草(原变种) *zhong hua pi jian cao (yuan bian zhong)*

*Roegneria sinica* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 33. 1963; *R. sinica* var. *angustifolia* C. P. Wang & H. L. Yang.

Leaf blade 6–12 × (0.1–)0.3–0.4 cm. Spike 8–10 cm. Spikelets 13–14 mm, with 4 or 5 florets. Glume apex acute, awnless. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Forest margins, mountain slopes, valleys, roadsides; 2100–3000 m. Gansu, Nei Mongol, Qinghai, Shanxi, Sichuan.

**72b. *Elymus sinicus* var. *medius* (Keng) S. L. Chen & G. Zhu, Novon 12: 427. 2002.**中间披碱草 *zhong jian pi jian cao*

*Roegneria sinica* var. *media* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 35. 1963; *R. media* (Keng) L. B. Cai.

Leaf blade 7–22 × ca. 0.7 cm. Spike 12–13 cm. Spikelets ca. 15 mm, with 5 florets. Glume apex with awn 1–3 mm. Fl. Jul.

• Mountain slopes, roadsides; 800–3800 m. Gansu, Henan, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang.

**73. *Elymus puberulus* (Keng) S. L. Chen, *comb. nov.***微毛披碱草 *wei mao pi jian cao*

Basionym: *Roegneria puberula* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 20. 1963.

Culms laxly tufted, erect or geniculate at base, ca. 60 cm tall. Leaf sheath glabrous but pilose or pubescent at base; leaf blade flat, dark green abaxially, glaucous adaxially, 15–22 × 0.5–0.7 cm, abaxial surface glabrous, adaxial surface pubescent. Spike nodding or curved, 8–11 cm. Spikelets 1 per node, green, ca. 12 mm excluding awns, with 2 or 3 florets; pedicel absent or 0.5–0.7 mm, puberulent. Glumes oblong-lanceolate, 3–5-veined, apex acute or acuminate; proximal glume 4.5–6 mm; distal glume 5.5–7 mm. Lemma lanceolate, scabrous or smooth and glabrous; first lemma 8.5–9 mm; callus with hairs 1–3 mm; awn erect, slender, 17–23 mm. Palea slightly shorter than lemma, along keels subsmooth or ciliolate only near apex, apex emarginate or subrounded. Anthers yellowish brown, ca. 1.4 mm. Ovary apex hirsute. Fl. and fr. summer.

• Mountain slopes. Chongqing (Nanchuan).

Löve (Feddes Repert. 95: 453. 1984) did not previously validly publish the combination *Elymus puberulus*; see the note following the genus description above.

**74. *Elymus caianus*** S. L. Chen & G. Zhu, *Novon* 12: 425. 2002.

纤瘦披碱草 xian shou pi jian cao

*Roegneria gracilis* L. B. Cai, *Acta Phytotax. Sin.* 34: 328. 1996, not *Elymus gracilis* Philippi (1864).

Plants with short rhizome. Culms erect, ca. 70 cm tall, 1.2–2 mm in diam., 3- or 4-noded. Leaf sheath usually shorter than internode, glabrous; ligule very short, apex truncate; leaf blade flat or margin involute, 2–6 × 0.2–0.3 cm, abaxial surface often glabrous, adaxial surface scabrous or also sparsely pubescent. Spike slightly nodding, lax, 10–12 cm; rachis slender, margin spinose; internodes 5–12 mm. Spikelets purplish, 12–16 mm excluding awns, with 3 or 4 florets; rachilla puberulent; internodes 2–2.5 mm. Glumes lanceolate, 3-veined, scabrous along veins, apex acuminate; proximal glume 2–3 mm; distal glume 4–5 mm. Lemma narrowly lanceolate, usually spinose above middle and near margin; first lemma 8–10 mm; awn 6–8 mm. Palea slightly shorter than or equaling lemma, spinose along keels, glabrous between keels, apex truncate or obtuse. Anthers yellow, ca. 1 mm. Ovary obovate, apex pubescent. Fl. and fr. autumn.  $2n = 28^*$ .

• Stream banks; ca. 4000 m. Xizang (Gongbo'gyamda).

**75. *Elymus debilis*** (L. B. Cai) S. L. Chen & G. Zhu, *Novon* 12: 426. 2002.

柔弱披碱草 rou ruo pi jian cao

*Roegneria debilis* L. B. Cai, *Acta Phytotax. Sin.* 34: 327. 1996.

Culms slender, 50–60 cm tall, 1–2 mm in diam., 5–7-noded, scabrous; nodes with short, soft hairs. Leaf sheath glabrous; ligule ca. 0.3 mm, apex truncate; leaf blade flat, 7–15 × 0.3–0.5 cm, abaxial surface usually glabrous, adaxial surface scabrous or laxly villous. Spike usually nodding, 6–11 × 0.5–0.7 cm; rachis margin spinose; internodes 4–5 mm. Spikelets green, ca. 9 mm excluding awns, with 2 or 3 florets. Glumes narrowly lanceolate, 2.5–4 mm, subequal or proximal one shorter, 2- or 3-veined, scabrous, or spinose along veins, apex awned; awn 1.5–3 mm. Lemma lanceolate, 5-veined, abaxially scabrous or spinose, apex awned; first lemma 7–8 mm; awn flexuose, slender, 7–10 mm. Palea slightly longer than lemma, spinose along keels, scabrous between keels, apex truncate. Anthers yellow, ca. 1 mm. Caryopsis oblong. Fl. and fr. Jul–Aug.

• Forests; 2300–3400 m. Gansu (Sunan), Qinghai (Tongde).

**76. *Elymus hongyuanensis*** (L. B. Cai) S. L. Chen & G. Zhu, *Novon* 12: 426. 2002.

红原披碱草 hong yuan pi jian cao

*Roegneria hongyuanensis* L. B. Cai, *Acta Phytotax. Sin.* 35: 157. 1997.

Culms erect or geniculate below, 50–70 cm tall, 1.3–2.5 mm in diam., usually 2-noded. Leaf sheath glabrous; ligule very short, apex truncate; leaf blade flat or margin involute, 7–10 × 0.15–0.3 cm, abaxial surface subglabrous, adaxial surface laxly

villous. Spike pendulous, lax, 7–10 cm; rachis glabrous but margin scabrous; internodes 5–12 mm. Spikelets 1 per node, green, 10–12 mm excluding awns, with 2 or 3 florets. Glumes lanceolate, ca. 3-veined, glabrous or scabrous along veins, apex acute; proximal glume 3–4 mm; distal glume 4–6 mm. Lemma lanceolate, abaxially sparsely setose; first lemma 8–9 mm; awn straight, 6–11 mm. Palea subequaling lemma, ciliolate along keels, sparsely setose between keels, apex subtruncate to sub-rounded. Anthers black, ca. 2 mm. Caryopsis oblong, 4–5 mm, apex pubescent. Fl. and fr. summer.

• Meadows; ca. 3400 m. Sichuan (Hongyuan).

**77. *Elymus barbicallus*** (Ohwi) S. L. Chen, *Bull. Nanjing Bot. Gard.* 1987: 9. 1988.

毛盘草 mao pan cao

Culms laxly tufted, 40–100 cm tall, 4- or 5-noded, glabrous, or puberulent below nodes; nodes glabrous or white pilose. Leaf sheath glabrous or outer margin ciliate; leaf blade 15–30 × 0.3–0.8 cm, both surfaces glabrous or scabrous, or abaxial surface scabrous and adaxial surface pilose. Spike erect or slightly nodding, 18–22 cm. Spikelets 1 per node, green, 15–25 mm excluding awns, with 5–8 florets. Glumes lanceolate or oblong-lanceolate, apex acute or acuminate; proximal glume 7–14 mm, 3–5-veined; distal glume 8–14.5 mm, 5–7-veined. Lemma 8–13 mm, glabrous only abaxially, but scabrous near base, margin, and along veins; callus with hairs 6–10 mm; awn straight, 20–30 mm. Palea slightly shorter than to equaling lemma, ciliolate along keels distally, hispidulous between keels distally, apex emarginate or rounded. Anthers yellowish. Ovary hirsute. Fl. and fr. May–Jul.  $2n = 28^*$ .

• Forest margins, mountain slopes, valleys, river banks; 1300–1700 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shanxi.

- 1a. Culms puberulent below nodes, nodes white pilose; leaf sheath outer margin ciliate; glumes 10–14.5 mm; lemma 12–13 mm ..... 77c. var. *pubinodis*
- 1b. Culms, nodes, and leaf sheaths glabrous; glumes 7–12 mm; lemma 8–10 mm.
  - 2a. Leaf blade 0.6–0.8 cm wide, both surfaces glabrous or scabrous; palea equaling lemma ..... 77a. var. *barbicallus*
  - 2b. Leaf blade 0.3–0.7 cm wide, abaxial surface scabrous, adaxial surface pilose; palea slightly shorter than lemma ..... 77b. var. *pubifolius*

**77a. *Elymus barbicallus* var. *barbicallus***

毛盘草(原变种) mao pan cao (yuan bian zhong)

*Agropyron barbicalum* Ohwi, *Acta Phytotax. Geobot.* 11: 257. 1942; *Roegneria barbicalla* (Ohwi) Keng & S. L. Chen; *R. barbicalla* var. *brevisetata* Keng.

Culms 70–100 cm tall, glabrous; nodes glabrous. Leaf sheath glabrous; leaf blade 15–20 × 0.6–0.8 cm, both surfaces glabrous or scabrous. Proximal glume 7–8 mm; distal glume 8–9 mm. Lemma 8–10 mm. Palea equaling lemma. Fl. and fr. Jun–Jul.



• Forest margins, mountain slopes, river banks. Hebei, Nei Mongol.

**77b. *Elymus barbicallus* var. *pubifolius*** (Keng) S. L. Chen, *Novon* 7: 227. 1997.

毛叶毛盘草 mao ye mao pan cao

*Roegneria barbicalla* var. *pubifolia* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 25. 1963.

Culms ca. 50 cm tall, glabrous; nodes glabrous. Leaf sheath glabrous; leaf blade 15–20 × 0.3–0.7 cm, abaxial surface scabrous, adaxial surface pilose. Glumes 7–12 mm. Lemma ca. 10 mm. Palea slightly shorter than lemma. Fl. and fr. May–Jul.

• Mountain slopes; 1300–1700 m. Hebei, Shanxi.

**77c. *Elymus barbicallus* var. *pubinodis*** (Keng) S. L. Chen, *Novon* 7: 227. 1997.

毛节毛盘草 mao jie mao pan cao

*Roegneria barbicalla* var. *pubinodis* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 24. 1963.

Culms 40–50 cm tall, puberulent below nodes; nodes white pilose. Leaf sheath outer margin ciliate; leaf blade 16–30 × 0.4–0.7 cm, both surfaces glabrous or adaxial surface scabrous. Proximal glume 10–14 mm; distal glume 12–14.5 mm. Lemma 12–13 mm. Fl. and fr. May–Jul.

• Mountain slopes, valleys. Hebei, Nei Mongol.

**78. *Elymus angustispiculatus*** S. L. Chen & G. Zhu, *Novon* 12: 425. 2002.

狭穗披碱草 xia sui pi jian cao

*Roegneria angusta* L. B. Cai, *Acta Phytotax. Sin.* 34: 332. 1996, not *Elymus angustus* Trinius (1829).

Culms erect or slightly geniculate at base, 80–100 cm tall, 2–2.5 mm in diam., ca. 4-noded. Leaf sheath margin ciliate; ligule ca. 0.6 mm, papery, apex truncate; leaf blade flat, 8–15 × 0.4–0.6 cm, both surfaces glabrous or adaxial surface scabrous. Spike erect or slightly curved, 16–20 × ca. 0.6 cm; rachis scabrous on back, margin ciliolate. Spikelets 1 per node, narrow, 16–26 mm, with 4–6 florets. Glumes lanceolate, subequal, 8–10 mm, 3-veined, scabrous along veins, apex with mucro 1–2 mm. Lemma narrowly lanceolate, abaxially glabrous; first lemma 10–12 mm; callus glabrous or slightly pilose; awn straight, 20–25 mm, scabrous. Palea subequaling lemma, ciliolate along keels distally, glabrous between keels. Anthers yellow, 2–2.7 mm. Fl. and fr. Jul–Aug.

• Mountain slopes; ca. 2500 m. Qinghai (Xunhua).

**79. *Elymus hondae*** (Kitagawa) S. L. Chen, *Bull. Nanjing Bot. Gard.* 1987: 9. 1988 [*“hondai”*].

本田披碱草 ben tian pi jian cao

*Roegneria hondae* Kitagawa, *Rep. Inst. Sci. Res. Manchoukuo* 6(4): 118. 1942 [*“hondai”*]; *R. hondae* var. *fascinata* Keng.

Culms 70–100 cm tall, glabrous. Leaf sheath glabrous, or

retroscarsely pilose at base of innovation shoot; leaf blade 13–20 × 0.3–0.9 cm, abaxial surface smooth, subglabrous, adaxial surface scabrous, hispid along veins. Spike lax, 15–20 cm. Spikelets 1 per node, purplish green, ca. 16 mm excluding awns, with ca. 5 florets. Glumes lanceolate, scabrous along veins, apex acuminate or pointed; proximal glume 7–10 mm, 3–5-veined; distal glume 8.5–11 mm, 4–6-veined. Lemma scabrous, with a tooth below apex on one or both sides; first lemma ca. 10 mm; callus with hairs ca. 5 mm; awn straight, 15–25 mm. Palea slightly shorter than lemma, ciliate along keels distally, puberulent between keels distally, apex obtuse or emarginate. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Mountain slopes. Hebei, Henan, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi.

**80. *Elymus alienus*** (Keng) S. L. Chen, *Novon* 7: 227. 1997 [*“aliena”*].

涑源披碱草 lai yuan pi jian cao

*Roegneria aliena* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 31. 1963; *R. barbicalla* (Ohwi) Keng & S. L. Chen var. *foliosa* (Keng) L. B. Cai; *R. foliosa* Keng.

Plants usually with short, underground rhizomes. Culms laxly tufted, (30–)60–90 cm tall, 3- or 4(–6)-noded. Leaf sheath glabrous or retroscarsely pubescent; leaf blade flat, 12–20 × 0.4–0.9 cm, abaxial surface glabrous, adaxial surface pubescent. Spike erect or slightly curved, 7–15 cm. Spikelets 1 per node, green or purplish green, 14–17 mm excluding awns, with 4–6 florets; rachilla puberulent; internodes 1–2.5 mm. Glumes oblong-lanceolate, 3–5(or 6)-veined, smooth or scabrous along veins, apex acute or acuminate; proximal glume 7–8 mm; distal glume 8–10 mm. Lemma lanceolate, smooth and glabrous abaxially, but scabrous or puberulent along veins and near margin; first lemma 9–10 mm; callus with hairs 0.4–0.6 mm; awn straight or slightly reflexed, 10–25 mm. Palea slightly shorter than lemma, ciliate along keels distally, apex obtuse. Anthers ca. 2.5 mm. Fl. and fr. Jun–Aug.

• Moist valleys, roadsides; ca. 1100 m. Hebei, Henan, Nei Mongol, Shanxi.

The names *Roegneria aliena* and *R. foliosa* have equal priority, but in *Elymus* only *E. alienus* is validly published. Chen (*Bull. Nanjing Bot. Gard.* 1987: 9. 1988) did not validly publish the combination “*E. foliosus*” because the place of valid publication of the basionym was not cited (Saint Louis Code, Art. 33.3). Instead, *R. foliosa* was cited from Keng (*Fl. Ill. Pl. Prim. Sin. Gram.* 366. 1959), where the name was not validly published because no Latin description was provided (Art. 36.1).

**81. *Elymus abolinii*** (Drobow) Tzvelev, *Rast. Tsentr. Azii* 4: 214. 1968.

异芒披碱草 yi mang pi jian cao

Culms erect, 80–115 cm tall. Leaf blade flat, 0.4–0.7 cm wide, glabrous, scabrous, or adaxial surface pilose along veins. Spike erect or nodding, 10–20 cm; rachis with short bristles. Spikelets 1 per node, somewhat remote, green or slightly tinged, 15–30 mm, with 4–11 florets; rachilla appressed pilose. Glumes lustrous green, lanceolate or linear-lanceolate, subequal, 11–16 × 2–3 mm, 5–9-veined, very scabrous,

margin scarious, apex acuminate, often asymmetric and 1-toothed. Lemma lanceolate, 9–13 mm, scabrous-hairy, apex 1-toothed; awn sometimes recurved, 3–35 mm or reduced to a cusp ca. 1 mm. Palea shorter than lemma, apex truncate or subobtusate. Anthers 3–7 mm. Fl. and fr. Jun–Sep.  $2n = 28$ .

Mountain slopes, river banks; ca. 1300–2700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

- 1a. Lemma awn 3–8 mm or reduced to a cusp ca. 1 mm.  
 2a. Spikelets with 5–7 florets; glumes lanceolate, 5–7-veined; palea apex subobtusate ..... 81a. var. *abolinii*  
 2b. Spikelets with 4 or 5 florets; glumes linear-lanceolate, 6–9-veined; palea apex truncate ..... 81b. var. *nudiusculus*  
 1b. Lemma awn 15–35 mm.  
 3a. Spikelets 15–25 mm, with 5–7 florets ..... 81c. var. *divaricans*  
 3b. Spikelets 25–30 mm, with 7–11 florets ..... 81d. var. *pluriflorus*

**81a. Elymus abolinii** var. *abolinii*

异芒披碱草(原变种) yi mang pi jian cao (yuan bian zhong)

*Agropyron abolinii* Drobow, Repert. Spec. Nov. Regni Veg. 21: 42. 1925 [“*abolini*”]; *Gouardia abolinii* (Drobow) Ikonnikov; *Roegneria abolinii* (Drobow) Nevski.

Spikelets 15–25 mm, with 5–7 florets. Glumes lanceolate, 5–7-veined. Lemma awn 3–5 mm or reduced to a cusp ca. 1 mm. Palea apex subobtusate.

Mountain slopes; ca. 2700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan].

**81b. Elymus abolinii** var. *nudiusculus* (L. B. Cai) S. L. Chen & G. Zhu, Novon 12: 425. 2002.

裸穗异芒草 luo sui yi mang cao

*Roegneria nudiuscula* L. B. Cai, Acta Phytotax. Sin. 35: 171. 1997.

Spikelets 15–20 mm, with 4 or 5 florets. Glumes linear-lanceolate, 6–9-veined. Lemma awn 3–8 mm. Palea apex truncate.

- River banks; 1500–2000 m. Xinjiang.

**81c. Elymus abolinii** var. *divaricans* (Nevski) Tzvelev, Rast. Tsent. Azii 4: 214. 1968.

曲芒异芒草 qu mang yi mang cao

*Roegneria abolinii* var. *divaricans* Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 68. 1934.

Spikelets 15–25 mm, with 5–7 florets. Lemma awn 15–35 mm. Fl. and fr. Jun–Sep.

Grassy mountain slopes; 1300–1900 m. Xinjiang [Mongolia, Russia].

**81d. Elymus abolinii** var. *pluriflorus* D. F. Cui, Bull. Bot. Res., Harbin 10(3): 30. 1990.

多花异芒草 duo hua yi mang cao

*Roegneria abolinii* var. *pluriflora* (D. F. Cui) L. B. Cai.

Spikelets 25–30 mm, with 7–11 florets. Lemma awn 15–22 mm. Fl. and fr. Jun–Sep.

- Grassy mountain slopes. Xinjiang.

**82. Elymus fedtschenkoi** Tzvelev, Novosti Sist. Vyssh. Rast. 10: 21. 1973.

光鞘披碱草 guang qiao pi jian cao

*Agropyron curvatum* Nevski, Izv. Bot. Sada Akad. Nauk SSSR 30: 629. 1932; *Elymus curvatus* (Nevski) D. F. Cui (1996), not Piper (1903); *Roegneria curvata* (Nevski) Nevski; *R. fedtschenkoi* (Tzvelev) N. R. Cui, nom. superfl.

Culms erect or slightly geniculate at base, robust, 50–100 cm tall. Leaf sheath smooth, glabrous, rarely pilose at base; leaf blade 0.5–1.2 cm wide, glabrous, scabrous, or adaxial surface laxly pilose. Spike erect or slightly curved, often somewhat secund, dense, 7–16 cm. Spikelets 1 per node, subsessile, green or greenish tawny-purple, 15.5–25 mm excluding awns, with 5 or 6 florets. Glumes broadly lanceolate, 11–18 × 2.3–3.5 mm, 5–7-veined, margin membranous, apex acuminate, pointed, sometimes with a tooth. Lemma lanceolate, 10–14 mm, scabrous or appressed setose; awn reflexed, 25–37 mm. Palea lanceolate, 9–13 mm, hispid along keels, apex subobtusate. Anthers 2.5–3 mm. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

Mountain meadows. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan].

**83. Elymus platyphyllus** (Keng) Á. Löve ex D. F. Cui in N. R. Cui, Fl. Xinjiang. 6: 192. 1996.

宽叶披碱草 kuan ye pi jian cao

*Roegneria platyphylla* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 35. 1963.

Culms erect, 60–100 cm tall. Leaf sheath smooth, glabrous; leaf blade flat, 5–18 × 0.5–1.2 cm, rigid, abaxial surface glabrous, but scabrous along veins, adaxial surface pilose. Spike erect, usually secund, dense, 8–13 cm. Spikelets 1 per node, greenish, 18–24 mm excluding awns, with 6 or 7 florets. Glumes lanceolate, 5–7(–9)-veined, scabrous or hispidulous along veins, apex pointed; proximal glume 10–12 mm; distal glume 11–15 mm. Lemma lanceolate, pubescent throughout; first lemma 10–12 mm; awn erect, 7–14 mm. Palea subequaling lemma, puberulent abaxially, setiform ciliate along keels distally, apex emarginate or truncate. Anthers ca. 3 mm. Ovary hirsute. Fl. and fr. late summer.

- Meadows. Xinjiang.

Löve (Feddes Repert. 95: 456. 1984) did not previously validly publish the combination *Elymus platyphyllus*; see the note following the genus description above.

**84. Elymus shandongensis** B. Salomon, Willdenowia 19: 449. 1990.

山东披碱草 shan dong pi jian cao

*Roegneria shandongensis* (B. Salomon) J. L. Yang et al.

Culms laxly tufted, erect or slightly decumbent at base, 60–90 cm tall. Leaf sheath usually glabrous; ligule ca. 6.5 mm; leaf blade flat or involute at margin, 10–25 × 0.4–0.8 cm, both surfaces scabrous or adaxial surface smooth. Spike erect or slightly curved, 8–20 cm. Spikelets 1 per node, 13–19 mm excluding awns, with 5–8 florets. Glumes oblong-lanceolate, 5–7-veined, apex acute or pointed; veins robust, scabrous; proximal glume 5–7 mm; distal glume 7–9 mm. Lemma oblong-lanceolate, subglabrous abaxially, margin membranous; first lemma 9–10 mm; callus pubescent along lateral side; awn erect, (12–) 20–30 mm, scabrous. Palea subequaling lemma, wingless and shortly setiform ciliate along keels. Fl. and fr. Jul–Aug.  $2n = 28^*$ .

• Mountain slopes, roadsides. Anhui, Guizhou, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Taiwan, Zhejiang.

This species has long been misclassified by some taxonomists in China as *Elymus ×mayebaranus* (Honda) S. L. Chen (*Agropyron ×mayebaranum* Honda; *Roegneria ×mayebarana* (Honda) Ohwi ex Keng & S. L. Chen). The true *E. ×mayebaranus* is found only in Japan; it is a highly sterile natural hybrid between the hexaploid ( $2n = 42$ ) parents *E. humidus* (Ohwi & Sakamoto) Á. Löve (*A. humidum* Ohwi & Sakamoto) and *E. tsukushiensis* Honda.

**85. *Elymus magnipodus*** (L. B. Cai) S. L. Chen & G. Zhu, *Novon* 12: 427. 2002.

大柄披碱草 da bing pi jian cao

*Roegneria magnipoda* L. B. Cai, *Acta Phytotax. Sin.* 35: 164. 1997.

Culms erect, 20–35 cm tall, 1–2.5 mm in diam., 2-noded, smooth, glabrous. Leaf sheath usually longer than internode except on upper leaves, glabrous; ligule very short, papery; leaf blade involute, 4–7 × 0.15–0.25 cm, both surfaces glabrous or adaxial surface scabrous. Spike erect, lax, 6–9 cm; rachis glabrous; internodes 10–20(–28) mm. Spikelets 1 per node, yellowish green, 15–25 mm excluding awns, with 6–8 florets; pedicel 1–2.5 mm. Glumes subequal, 4.5–7 mm, 4–7-veined, abaxially glabrous, apex acute. Lemma lanceolate, abaxially smooth, glabrous; first lemma 9–10 mm; awn erect or slightly recurved, 9–15 mm. Palea slightly shorter than or equaling lemma, ciliolate along keels, apex truncate or subrounded. Anthers black, 2–3 mm. Ovary obovate, apex pubescent. Fl. and fr. Jun–Jul.

• River banks; ca. 3100 m. Qinghai (Golmud).

**86. *Elymus pendulinus*** (Nevski) Tzvelev, *Rast. Tsentr. Azii* 4: 218. 1968.

缘毛披碱草 yuan mao pi jian cao

Culms 60–110 cm tall, glabrous throughout, or puberulent or pubescent at nodes, sometimes also densely retrorsely pubescent in upper part (exserted from leaf sheath). Leaf sheath glabrous, or retrorsely pubescent at least at base; leaf blade flat, 10–25 × 0.3–0.9 cm, glabrous, scabrous, or adaxial surface pilose. Spike slightly nodding, 12–25 cm. Spikelets 1 per node, green or purplish at base, 15–25 mm excluding awns, with 4–9 florets. Glumes lanceolate or oblong-lanceolate, 3–7-veined, sometimes scabrous along veins, margin sometimes laxly cilio-

late, apex acute or pointed; proximal glume 7–9 mm; distal glume 7–10 mm. Lemma lanceolate or oblong-lanceolate, scabrous abaxially, pilose distally, laxly hirsutulous near apex, or hirsutulous throughout, margin ciliate distally; first lemma 8–11 mm; awn erect or slightly reflexed, slender, 15–30 mm. Palea slightly shorter than or subequaling lemma, ciliolate along keels distally, pubescent between keels. Anthers ca. 2 mm. Fl. and fr. May–Jul.  $2n = 28^*$ .

Forests, mountain slopes, valleys, meadows, along rivers; 100–2400 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Japan, Korea, Mongolia, Russia].

- 1a. Culms glabrous throughout (rarely pubescent at nodes) ..... 86a. subsp. *pendulinus*
- 1b. Culms puberulent or densely pubescent, at least at nodes.
  - 2a. Culms puberulent at nodes; leaf sheath glabrous; spikelets with 6–9 florets ..... 86b. subsp. *multiculmis*
  - 2b. Culms densely retrorsely pubescent in upper part (exserted from leaf sheath) and at nodes; leaf sheath retrorsely pubescent, especially proximally; spikelets with 4 or 5 florets ..... 86c. subsp. *pubicaulis*

**86a. *Elymus pendulinus* subsp. *pendulinus***

缘毛披碱草(原亚种) yuan mao pi jian cao (yuan ya zhong)

*Roegneria pendulina* Nevski in Komarov, *Fl. URSS* 2: 616. 1934; *Agropyron caninum* (Linnaeus) P. Beauvois var. *amurense* (Korshinsky) Korshinsky; *Triticum caninum* Linnæus f. *amurense* Korshinsky.

Culms glabrous throughout, rarely pubescent at nodes. Leaf sheath usually retrorsely pubescent at base. Spikelets with 4–8 florets. Fl. and fr. May–Jul.  $2n = 28^*$ .

Forests, mountain slopes, valleys, along rivers. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia].

**86b. *Elymus pendulinus* subsp. *multiculmis*** (Kitagawa) Á. Löve, *Feddes Repert.* 95: 459. 1984.

多秆缘毛草 duo gan yuan mao cao

*Roegneria multiculmis* Kitagawa, *J. Jap. Bot.* 17: 235. 1941; *R. multiculmis* var. *pubiflora* Keng.

Culms puberulent at nodes. Leaf sheath glabrous. Spikelets with 6–9 florets. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

• Mountain slopes; 1100–1200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Nei Mongol, Qinghai, Shaanxi, Shanxi.

**86c. *Elymus pendulinus* subsp. *pubicaulis*** (Keng) S. L. Chen, **comb. et stat. nov.**

毛秆披碱草 mao gan pi jian cao

Basionym: *Roegneria pubicaulis* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 30. 1963; *R. pendulina* f. *pubinodis* (Keng) Kitagawa; *R. pendulina* var. *pubinodis* Keng.

Culms densely retrorsely pubescent in upper part (exserted from leaf sheath) and at nodes. Leaf sheath retrorsely pubescent, especially proximally. Spikelets with 4 or 5 florets. Fl. and fr. Jun–Jul.  $2n = 28^*$ .

• Meadows, damp places; 100–2400 m. Gansu, Liaoning, Nei Mongol, Shaanxi, Yunnan.

Löve (Feddes Repert. 95: 459. 1984) did not previously validly publish the combination *Elymus pendulinus* subsp. *pubicaulis*; see the note following the genus description above.

**87. *Elymus komarovii*** (Nevski) Tzvelev, Rast. Tsentr. Azii 4: 216. 1968.

偏穗披碱草 *pian sui pi jian cao*

*Agropyron komarovii* Nevski, Izv. Bot. Sada Akad. Nauk SSSR 30: 620. 1932 [“*komarovi*”]; *Elymus uralensis* (Nevski) Tzvelev subsp. *komarovii* (Nevski) Tzvelev; *Roegneria komarovii* (Nevski) Nevski.

Culms erect or geniculate at base, 50–75 cm tall. Leaf sheath smooth and glabrous, or pubescent at base; leaf blade flat, 8–21 × 0.4–0.8 cm, abaxial surface glabrous but scabrous, adaxial surface scabrous or pubescent. Spike erect, usually secund, dense, 8.5–15 cm; rachis margin scabrous. Spikelets 1 per node, green or purplish green, 13–25 mm excluding awns, with 3–5 florets. Glumes lanceolate, subequal, 8–10 mm, 5–7-veined, margin scarious, apex asymmetric, awned; awn 2–7 mm, scabrous. Lemma lanceolate, 10–12 mm, puberulent; awn erect, 8–15 mm, scabrous. Palea subequaling lemma,

ciliate along keels, apex emarginate or obtuse. Anthers ca. 2 mm. Fl. and fr. summer.  $2n = 28^*$ .

Steppes, near villages; 1800–2900 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan].

**88. *Elymus tianschanigenus*** Czerepanov, Sosud. Rast. SSSR, 351. 1981.

天山披碱草 *tian shan pi jian cao*

*Agropyron tianschanicum* Drobow in Vvedensky et al., Key Fl. Tashkent 1: 40. 1923; *Elymus tianschanicus* (Drobow) Nevski (1934), not Drobow (1923); *E. uralensis* (Nevski) Tzvelev subsp. *tianschanicus* (Drobow) Tzvelev; *Roegneria tianschanica* (Drobow) Nevski; *Semeiostachys tianschanica* (Drobow) Drobow.

Culms erect, 50–100 cm tall, smooth, glabrous. Leaf sheath smooth, glabrous; leaf blade flat, 10–18 × 0.5–1 cm, both surfaces scabrous and pilose or abaxial surface scattered pilose. Spike erect or slightly nodding, subsecund, dense, 7–17.5 cm. Spikelets 1 per node, purplish green, 2–3 mm excluding awns, with 3–5(–7) florets. Glumes broadly lanceolate, slightly asymmetric, subequal, 9–12 mm, 5–7-veined, scabrous, apex acute or mucronate, sometimes with a tooth. Lemma lanceolate, 9–12 mm, pilose; awn straight, (4–)7–16 mm. Palea equaling or slightly longer than lemma, ciliate along keels, apex slightly emarginate or subobtuse. Anthers ca. 2.5 mm. Fl. and fr. summer.  $2n = 28$ .

Slopes in river valleys, meadows; 2700–3000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan].

### 103. PSEUDOROEGNERIA (Nevski) Á. Löve, Taxon 29: 168. 1980.

假鹅观草属 *jia e guan cao shu*

*Elytrigia* sect. *Pseudoroegneria* Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 60. 1934.

Plants perennial, densely tufted. Culms usually erect. Leaf blade flat or involute. Spike rather lax; rachis tough, glabrous or margin scaberulous. Spikelets 1 per node, with 3–6 florets; rachilla glabrous. Glumes lanceolate, 5–7-veined, glabrous or only midvein sometimes with a few spinules toward apex, apex truncate or obtuse to pointed. Lemma linear-lanceolate, usually 5-veined, glabrous but scabrous, awned or awnless; callus usually obscure; awn divergent at nearly 90° at maturity. Palea usually equaling lemma.  $x = 7$ .

About 15 species: N hemisphere; one species in China.

**1. *Pseudoroegneria cognata*** (Hackel) Á. Löve, Feddes Repert. 95: 446. 1984.

假鹅观草 *jia e guan cao*

*Agropyron cognatum* Hackel, Allg. Bot. Z. Syst. 11: 22. 1905; *A. dschungaricum* (Nevski) Nevski; *A. ferganense* Drobow; *Elymus cognatus* (Hackel) T. A. Cope; *Elytrigia cognata* (Hackel) O. Anders & D. Podlech; *E. dschungarica* Nevski; *E. ferganensis* (Drobow) Nevski; *E. geniculata* (Trinius) Nevski subsp. *ferganensis* (Drobow) Tzvelev.

Culms erect, 60–100 cm tall, smooth, glabrous. Leaf

sheath smooth, glabrous; leaf blade glaucous green, 12–18 × (0.1–)0.2–0.7 cm, abaxial surface smooth, glabrous, adaxial surface pubescent. Spike erect, 7–19 cm; rachis smooth. Spikelets usually glaucous green, 10–18 × 3–6 mm, with (3 or)4–6 florets. Glumes 5-veined, apex acute to acuminate; proximal glume 5–10 mm; distal glume 6–12 mm. Lemma 8–11 mm, 5-veined, apex obtuse or subacute; intermediate veins connivent with midvein slightly lower than marginal veins. Palea equaling lemma, shortly ciliate along keels distally, apex subobtuse. Anthers ca. 3.5 mm. Fl. and fr. Jun–Jul.  $2n = 14$ .

Stony slopes. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

### 104. ELYTRIGIA Desvaux, Nouv. Bull. Sci. Soc. Philom. Paris 2: 190. 1810.

偃麦草属 *yan mai cao shu*

*Braconotia* Godron, nom. illeg. superfl.

Plants perennial, with or without rhizomes. Leaf sheath of cauline leaves split almost to base. Spike erect or nodding, linear; rachis usually not disarticulating. Spikelets 1 per node, sessile, clearly laterally compressed, with 3–10 florets; rachilla disarticulating below glumes. Glumes oblong, ovate, or lanceolate, unequal, usually asymmetric, distinctly (3–)5–7-veined, with transverse scar at base. Lemma lanceolate, 5–7-veined, rounded abaxially or keeled only at apex; callus usually glabrous. Palea slightly shorter than lemma, ciliate along keels. Caryopsis usually adherent to lemma and palea, oblong, with longitudinal groove adaxially.  $x = 7$ .

About 40 species: subtropical and warm-temperate regions; two species in China.

In addition, the following five species have been recorded as cultivated in China (FRPS 9(3): 105–109. 1987): the mainly European *Elytrigia elongata* (Host) Nevski, *E. intermedia* (Host) Nevski, *E. juncea* (Linnaeus) Nevski, and *E. trichophora* (Link) Nevski, and the North American *E. smithii* (Rydberg) Nevski.

These species are very valuable hay and pasture plants.

- 1a. Plants with long rhizomes; culms not tufted; leaf blade 0.5–1 cm wide; spike 10–18 cm; lemma apex acuminate or with awn to 8 mm ..... 1. *E. repens*  
 1b. Plants with short rhizomes; culms usually densely tufted; leaf blade to 0.3 cm wide; spike 7–11 cm; lemma apex with awn 15–23 mm ..... 2. *E. gmelinii*

**1. *Elytrigia repens*** (Linnaeus) Desvaux ex B. D. Jackson, Index Kew. 1: 836. 1893.

偃麦草 yan mai cao

Plants with long rhizomes. Culms not tufted, green, glaucous, or purplish green, 40–80 cm tall, 3–5-noded, smooth. Leaf sheath smooth, glabrous but pilose at base; ligule ca. 0.5 mm; leaf blade flat, 10–20 × 0.5–1 cm, abaxial surface smooth, adaxial surface scabrous or pilose. Spike erect, 10–18 × 0.8–1.5 cm; rachis smooth but margin hispidulous; internodes 10–15 (–30) mm. Spikelets 10–18 × 6–10 mm, with 5–7(–10) florets, glabrous. Glumes subequal, 4–15 mm, 5–7-veined, smooth, glabrous, margin membranous, apex with point 1–2 mm or awn 4–8 mm. Lemma oblong-lanceolate, 6–12 mm, apex acuminate or with awn to 2 mm or 4–8 mm. Palea slightly shorter than lemma, ciliate along keels. Anthers yellow, ca. 5 mm. Fl. and fr. Jun–Sep.

Valleys, grasslands, pastures, meadows, field margins, waste places; 500–1900 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shandong, Sichuan, Xinjiang, Xizang, Yunnan [India, Japan, Korea, Mongolia, Russia; C and SW Asia, Europe; introduced in North America].

This species is one of the world's most valuable range grasses.

- 1a. Glumes 4–8 mm; lemma 6–10 mm ..... 1c. subsp. *elongatiformis*  
 1b. Glumes 10–15 mm; lemma ca. 12 mm.  
 2a. Glume and lemma apex both with awn 4–8 mm ..... 1b. subsp. *longearistata*  
 2b. Glume apex usually with point 1–2 mm; lemma apex acuminate or with awn to 2 mm ..... 1a. subsp. *repens*

**1a. *Elytrigia repens* subsp. *repens***

偃麦草(原亚种) yan mai cao (yuan ya zhong)

*Triticum repens* Linnaeus, Sp. Pl. 1: 86. 1753; *Agropyron junceum* (Linnaeus) P. Beauvois var. *repens* (Linnaeus) M. Marsson; *A. repens* (Linnaeus) P. Beauvois; *Braconotia officinarum* Godron, nom. illeg. superfl.; *Elymus repens* (Linnaeus) Gould; *T. infestum* Salisbury, nom. illeg. superfl.; *Zeia repens* (Linnaeus) Lunell.

Glumes 10–15 mm, apex usually with point 1–2 mm. Lemma ca. 12 mm, apex acuminate or with awn to 2 mm. Fl. and fr. Jul–Aug.  $2n = 42^*$ .

Pastures, meadows, waste places. Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shandong, Sichuan, Xinjiang, Xizang, Yunnan [India, Japan, Korea, Mongolia, Russia; C and SW Asia, Europe; introduced in North America].

**1b. *Elytrigia repens* subsp. *longearistata*** N. R. Cui, Fl. Xinjiang. 6: 602. 1996.

芒偃麦草 mang yan mai cao

Glumes 10–15 mm, apex with awn 4–8 mm. Lemma ca. 12 mm, apex with awn 4–8 mm. Fl. and fr. Jun–Aug.

- Valleys, field margins; 500–1900 m. Xinjiang.

**1c. *Elytrigia repens* subsp. *elongatiformis*** (Drobow) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 31. 1973.

多花偃麦草 duo hua yan mai cao

*Agropyron elongatiforme* Drobow in Vvedensky et al., Key Fl. Tashkent 1: 40. 1923; *A. repens* subsp. *elongatiforme* (Drobow) D. R. Dewey; *Elymus elongatiformis* (Drobow) As-sadi; *E. repens* subsp. *elongatiformis* (Drobow) Melderis; *Elytrigia elongatiformis* (Drobow) Nevski.

Glumes 4–8 mm. Lemma 6–10 mm. Fl. and fr. Jun–Sep.

Valleys, grasslands. Xinjiang [Mongolia, Russia].

**2. *Elytrigia gmelinii*** (Trinius) Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 2: 78. 1936.

曲芒偃麦草 qu mang yan mai cao

*Triticum gmelinii* Trinius, Linnaea 12: 467. 1838 [“*gmelinii*”]; *Agropyron aegilopoides* Drobow; *A. gmelinii* (Trinius) P. Candargy (1901), not (Ledebour) Scribner & J. G. Smith (1897); *A. strigosum* (M. Bieberstein) Boissier subsp. *aegilopoides* (Drobow) Tzvelev; *A. propinquum* Nevski; *Elymus aegilopoides* (Drobow) Voroschilov; *Elytrigia aegilopoides* (Drobow) Peshkova; *E. propinqua* (Nevski) Nevski; *E. strigosa* (M. Bieberstein) Nevski subsp. *aegilopoides* (Drobow) Tzvelev; *Pseudoroegneria strigosa* (M. Bieberstein) Á. Löve subsp. *aegilopoides* (Drobow) Á. Löve.

Plants with short rhizomes. Culms usually densely tufted, geniculate at base, 35–65 cm tall, smooth, glabrous. Leaf sheath smooth, glabrous; ligule short; leaf blade glaucous, flat or margin involute, to 0.3 cm wide, abaxial surface smooth, glabrous, adaxial surface puberulent. Spike erect, secund, 7–11 cm; rachis margin scabrous. Spikelets glaucous or purplish, 13–18 mm excluding awns, with 5–7 florets. Glumes narrowly lanceolate, 5-

or 6-veined, glabrous, apex acuminate or with awn to 4 mm; proximal glume 6–9 mm; distal glume 7–10 mm. Lemma narrowly lanceolate, 10–11 mm, hispid; awn curved, 15–23 mm. Fl. and fr. Jun–Aug.  $2n = 14$ .

Forest grasslands; ca. 2000 m. Xinjiang [Mongolia, Russia (Siberia)].

### 105. KENGYILIA C. Yen & J. L. Yang, *Canad. J. Bot.* 68: 1897. 1990.

以礼草属 *yi li cao shu*

Plants perennial, with creeping, underground rhizomes. Culms densely tufted, rarely laxly so. Leaf blade flat, rolled. Spike dense, rarely lax, usually with terminal spikelet. Spikelets 1(or 2) per node, sessile, with (5–)7 or 8 florets; rachilla disarticulating above glumes. Glumes rounded abaxially or keeled only at apex, rarely keeled throughout length. Lemma rounded abaxially, rarely keeled, usually 5-veined, densely pilose or hirsute, awnless or shortly awned. Palea apex retuse, obtuse, or 2-lobed. Caryopsis oblong, apex usually hairy.  $x = 7$ .

About 30 species: mountains of C Asia and the Xizang-Qinghai Plateau; 24 species (21 endemic) in China.

#### 1a. Plants laxly tufted.

2a. Spikelets usually 2 per node in proximal part of spike, 1 per node in distal part ..... 1. *K. geminata*

2b. Spikelets 1 per node throughout spike.

3a. Glumes slightly asymmetric, midvein raised, forming keel from base to apex, often ciliate ..... 6. *K. habahenensis*

3b. Glumes ovate, ovate-lanceolate, or oblong-lanceolate, midvein slightly raised, not forming keel.

4a. Glumes equaling first lemma or distal glume slightly longer ..... 2. *K. grandiglumis*

4b. Glumes shorter than first lemma.

5a. Glumes oblong-lanceolate; lemma densely pubescent ..... 5. *K. melanthera*

5b. Glumes ovate or ovate-lanceolate; lemma laxly puberulent or densely hirsute.

6a. Palea equaling or slightly longer than lemma; lemma laxly puberulent ..... 3. *K. rigidula*

6b. Palea shorter than lemma; lemma densely hirsute ..... 4. *K. eremopyroides*

#### 1b. Plants ± densely tufted.

7a. Spike lax, rachis internodes (4–)5–10(–15) mm.

8a. Spike rachis densely pubescent.

9a. Glumes oblong, subequal, 6.7–7.5 mm, hirsute along veins ..... 7. *K. gobicola*

9b. Glumes lanceolate, unequal, proximal one 4.5–6 mm, distal one 5.5–7 mm, both scabrous along veins ..... 8. *K. pendula*

8b. Spike rachis glabrous, scabrous, or sparsely puberulent.

10a. Rachis puberulent throughout, pilosulose only distally, or puberulent.

11a. Rachis puberulent throughout; glumes white pilose; lemma awn 10–15 mm ..... 11. *K. tahelacana*

11b. Rachis pilosulose only distally or puberulent; glumes glabrous; lemma awn 1–3 mm.

12a. Spikelets 16–22 mm, with 6–9 florets ..... 9. *K. laxiflora*

12b. Spikelets 10–12 mm, with 3–5 florets ..... 10. *K. laxistachya*

10b. Rachis glabrous or margin ciliate.

13a. Glumes oblong-lanceolate, 1–3(–5)-veined, anthers yellow or nearly black.

14a. Lemma laxly or distally densely hirsute; anthers nearly black ..... 14. *K. stenachyra*

14b. Lemma densely pubescent; anthers yellow ..... 15. *K. shawanensis*

13b. Glumes oblong or ovate-lanceolate, 4–6-veined, anthers yellow.

15a. Lemma densely villous; anthers 3.5–4 mm ..... 12. *K. zhaosuensis*

15b. Lemma scabrous or sparsely spinose; anthers 1.4–1.8 mm ..... 13. *K. hejingensis*

7b. Spike dense, rachis internodes 1–5(–7) mm.

16a. Glumes glabrous, puberulent, or only scabrous or ciliate along midvein.

17a. Lemma awnless; palea usually slightly longer than lemma ..... 16. *K. mutica*

17b. Lemma awn 2–11 mm; palea usually shorter than lemma.

18a. Lemma awn usually recurved, 7–11 mm ..... 19. *K. kaschgarica*

18b. Lemma awn usually straight or slightly reflexed, 2–6 mm.

19a. Glumes ovate-oblong, 3- or 4-veined ..... 17. *K. hirsuta*

19b. Glumes lanceolate, 5-veined ..... 18. *K. alata*

16b. Glumes densely hirsute, villous, or hirsutulous, rarely scabrous and then lemma awn 5–7 mm.

20a. Spike rachis glabrous, if puberulent or villous then culms less than 50 cm tall.

21a. Anthers black; lemma awn 1–7 mm; glumes oblong-lanceolate ..... 20. *K. thoroldiana*

- 21b. Anthers yellow or purple; lemma awn 10–13 mm; glumes oblong-ovate or ovate-lanceolate ..... 21. *K. batalinii*  
 20b. Spike rachis densely hairy.  
 22a. Culms 60–70 cm tall; spike slightly secund ..... 24. *K. pamirica*  
 22b. Culms 12–50 cm tall; spike clearly distichous.  
 23a. Lemma densely white hairy (hairs ca. 1 mm), awn 1.5–4 mm; anthers yellow, ca. 3 mm ..... 22. *K. guidenensis*  
 23b. Lemma densely hirsute, awn 4–6 mm; anthers yellowish black, 2–2.2 mm ..... 23. *K. kokonorica*

**1. *Kengyilia geminata*** (Keng & S. L. Chen) S. L. Chen, Bull. Bot. Res., Harbin 14: 141. 1994.

孪生以礼草 luan sheng yi li cao

*Roegneria geminata* Keng & S. L. Chen, Acta Univ. Nankin. Sci. Nat. 1963(1): 80. 1963; *Elymus geminatus* (Keng & S. L. Chen) S. L. Chen.

Plants usually with short rhizomes. Culms laxly tufted, 75–100 cm tall, glabrous or puberulent below spike. Leaf sheath glabrous; leaf blade flat, 7.5–27 × 0.3–0.5 cm, abaxial surface glabrous, adaxial surface puberulent or scabrous, margin ciliate. Spike usually curved, 8–15 cm. Spikelets usually 2 per node in proximal part of spike or with short branch at basal node, 1 per node in distal part of spike, greenish or tinged purplish, 16–20 mm, with 5–7 florets. Glumes lanceolate, laxly villos, apex acuminate or pointed; proximal glume 5–8 mm; distal glume 6–8 mm. Lemma oblong-lanceolate, densely villos; first lemma 9.5–10.5 mm; awn purple, 5–11 mm. Palea equaling lemma, abaxially laxly puberulent, margin ciliate (hairs hyaline, 0.6–1.2 mm), apex narrowly truncate. Fl. and fr. late summer.

- River banks; ca. 3000 m. Qinghai.

**2. *Kengyilia grandiglumis*** (Keng) J. L. Yang et al., Hereditas (Lund) 116: 28. 1992.

大颖以礼草 da ying yi li cao

*Roegneria grandiglumis* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 82. 1963.

Culms laxly tufted, geniculate at base, 40–70 cm tall, smooth, glabrous. Leaf sheath smooth, glabrous; leaf blade glaucescent green, involute or plicate, 6.5–17(–25) × 0.1–0.4 cm, abaxial surface smooth, glabrous, adaxial surface scabrous, apex acuminate. Spike 7–8 cm; rachis glabrous. Spikelets 10–13 mm, with 3–5 florets. Glumes pale green, tinged purplish, oblong-lanceolate, oblique distally, equal, 8–10 mm, or proximal glume slightly shorter, usually 3-veined, or 4- or 5-veined in distal glume, glabrous or pilose, margin submembranous, apex acuminate or shortly pointed. Lemma glabrous in proximal and middle parts, smooth but densely hispid in distal and lateral parts; first lemma ca. 9 mm, apex with point 1–3 mm. Palea slightly shorter than lemma, puberulent proximally, ciliate along keels distally, apex emarginate. Anthers black or dark green. Fl. and fr. late summer.  $2n = 42^*$ .

- Sandy river banks. Qinghai.

This species is used for forage.

**3. *Kengyilia rigidula*** (Keng) J. L. Yang et al., Hereditas (Lund) 116: 27. 1992.

硬秆以礼草 ying gan yi li cao

*Roegneria rigidula* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 77. 1963; *Kengyilia rigidula* var. *intermedia* (Keng) S. L. Chen; *K. rigidula* var. *trichocolea* L. B. Cai; *R. rigidula* var. *intermedia* Keng.

Culms laxly tufted, erect or geniculate at base, (40–)50–75 cm tall, rigid, 3- or 4-noded, glabrous. Leaf sheath glabrous or retrorsely puberulent; leaf blade involute, 3–10(–25) × (0.1–)0.2–0.4 cm, both surfaces puberulent, margin ciliate. Spike curved, 7.5–8 cm. Spikelets 10–15 mm, with 4–6 florets. Glumes ovate-lanceolate, 3- or 4-veined, glabrous but scabrous along midvein distally, apex acute; proximal glume 2–4 mm, sometimes 1- or 2-veined; distal glume 3–5 mm. Lemma oblong-lanceolate, 5-veined, laxly puberulent; first lemma 7–8 mm; awn 1–3 mm. Palea equaling or slightly longer than lemma, pubescent abaxially, ciliate along keels distally. Anthers yellow or nearly black. Fl. and fr. late summer.  $2n = 42^*$ .

- Dry mountain slopes; ca. 3300 m. Gansu, Qinghai, Xizang.

**4. *Kengyilia eremopyroides*** Nevski ex C. Yen et al., Novon 8: 96. 1998.

卵颖以礼草 luan ying yi li cao

Plants with short rhizomes. Culms densely tufted, erect, 31–37 cm tall, 1.5–2 mm in diam., 2-noded, glabrous but upper internodes pubescent. Leaf sheath glabrous; ligule ca. 0.5 mm, scarious-membranous, apex truncate; leaf blade flat, (1.5–)2–5.5 × 0.25–0.3 cm, abaxial surface densely pilose, adaxial surface pilose. Spikes erect, slightly secund, (3.5–)4–4.5 × 0.8–1 cm; rachis densely pilose; proximal internodes 5–7 mm, distal ones 1.5–2 mm. Spikelets stramineous or purple, ovate, 10–11 mm, with 4–6 florets; rachilla densely puberulent; internodes 0.8–1.2 mm. Glumes ovate, 3–5-veined, glabrous, apex acute or mucronate; proximal glume 4–4.5 mm; distal glume 4.5–5 mm. Lemma ovate-oblong, 7–8 mm, densely hirsute; awn 3–4 mm, scabrous. Palea shorter than lemma, sparsely ciliolate along keels distally, apex emarginate. Anthers black, ca. 2 mm. Fl. Jul.

- Clayey-sandy ground; ca. 4000 m. Qinghai (Ngoring Hu).

This species is known only from the type, *N. M. Przewalski 339* (LE), collected in July 1884 at “Lacus Orin-Nor” (Ngoring Hu, located W of Madoi in Qinghai).

**5. *Kengyilia melanthera*** (Keng) J. L. Yang et al., Hereditas (Lund) 116: 28. 1992.

黑药以礼草 hei yao yi li cao

Plants with underground rhizome. Culms laxly tufted, erect, lucid, 15–60 cm tall, 2- or 3-noded. Leaf blade 2.5–8

(–12) × 0.2–0.4 cm. Spike erect or curved, 4–7 × 1–1.5 cm. Spikelets crowded, 10–14 mm, with 3–5 florets. Glumes oblong-lanceolate, 3–5-veined, glabrous, puberulent, or densely pubescent; proximal glume 4–6 mm; distal glume 5–7 mm. Lemma densely pubescent, apex awnless, pointed, or with awn 2–4 mm; first lemma ca. 8 mm. Palea slightly shorter than or equaling lemma, puberulent abaxially, ciliate along keels, apex retuse or truncate. Anthers black. Fl. and fr. late summer.  $2n = 42^*$ .

• Mountain slopes, sandy grassy slopes, lake and river banks. Qinghai.

- 1a. Culms 15–25 cm tall; glumes glabrous or puberulent; lemma apex with awn 2–4 mm ..... 5a. var. *melanthera*  
 1b. Culms 40–60 cm tall; glumes densely pubescent; lemma apex awnless or pointed ..... 5b. var. *tahopaica*

**5a. *Kengyilia melanthera* var. *melanthera***

黑药以礼草(原变种) *hei yao yi li cao* (yuan bian zhong)

*Agropyron melantherum* Keng, Sunyatsenia 6: 62. 1941; *Elymus melantherus* (Keng) Á. Löve; *Kengyilia thoroldiana* (Oliver) J. L. Yang et al. var. *melanthera* (Keng) L. B. Cai; *Roegneria melanthera* (Keng) Keng.

Culms 15–25 cm tall. Glumes glabrous or puberulent. Lemma apex with awn 2–4 mm. Fl. and fr. late summer.

• Mountain slopes, sandy grassy slopes, lake banks. Qinghai.

**5b. *Kengyilia melanthera* var. *tahopaica* (Keng) S. L. Chen, Bull. Bot. Res., Harbin 14: 141. 1994.**

大黑药以礼草 *da hei yao yi li cao*

*Roegneria melanthera* var. *tahopaica* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 78. 1963; *Kengyilia hirsuta* (Keng) J. L. Yang et al. var. *tahopaica* (Keng) L. B. Cai.

Culms 40–60 cm tall. Glumes densely pubescent. Lemma apex awnless or pointed. Fl. and fr. late summer.

• River banks. Qinghai.

**6. *Kengyilia habahenensis* B. R. Baum et al., Pl. Syst. Evol. 174: 103, 106. 1991.**

哈巴河以礼草 *ha ba he yi li cao*

Plants with short rhizomes. Culms laxly tufted, 80–120 cm tall. Leaf sheath long pilose proximally, glabrous or sparsely pilose distally; ligule fringed; leaf blade linear, flat or margin involute, margin ciliate. Spike dense with pectinate appearance, (3–)4–7(–8) × 0.5–1 cm; rachis sparsely hirsutulous. Spikelets linear-oblong, ca. 15 × 2 mm, with 3–11 florets. Glumes slightly asymmetric, 3–5(–7) mm, connately 3–5-veined, apex acute or mucronate to pointed; midvein raised, forming keel from base to apex, often ciliate; proximal glume slightly shorter than distal one. Lemma connately veined, softly hairy, apex pointed or with awn ca. 3 mm; first lemma ca. 7 mm. Palea equaling lemma. Lodicules ciliate at margin. Anthers ca. 2 mm. Fl. and fr. late summer.  $2n = 42^*$ .

• Slopes in sparse *Larix* forests, scrub, dense vegetation; ca. 1100 m. Xinjiang.

**7. *Kengyilia gobicola* C. Yen & J. L. Yang, Canad. J. Bot. 68: 1897. 1990.**

戈壁以礼草 *ge bi yi li cao*

Culms densely tufted, ca. 60 cm tall, 1.5–2 mm in diam., 2- or 3-noded, glabrous but pubescent below spike. Leaf sheath lacerate-fibrous at base, glabrous; ligule ca. 0.5 mm, scarious-membranous; leaf blade flat or rolled, (6–)7–8 × ca. 0.3 cm, abaxial surface glabrous, adaxial surface villous. Spike erect, 8–12 × 0.4–0.6 cm; rachis densely pubescent; internodes 5–10 mm. Spikelets ovate, 15–20 mm, with (5–)7 or 8 florets; rachis pubescent; internodes 1–1.8 mm. Glumes oblong, sometimes oblique, subequal, 6.7–7.5 mm, herbaceous, 3–5-veined, glabrous but hirsute along veins, apex pointed or with a tooth on one side. Lemma 7–9 mm, villous; awn 1–4 mm. Palea slightly shorter than or equaling lemma, pubescent, ciliolate along keels, apex truncate. Anthers yellow or purple, 2–3 mm. Caryopsis dark brown, ca. 7 mm. Fl. and fr. late summer.  $2n = 42^*$ .

• Stony mountain deserts, roadsides; 2700–3700 m. Xinjiang.

**8. *Kengyilia pendula* L. B. Cai, Acta Phytotax. Sin. 37: 460. 1999.**

弯垂以礼草 *wan chui yi li cao*

Culms erect, 20–85 cm tall, 1.8–2.5 mm in diam., 3- or 4-noded, puberulent below spike. Leaf sheath usually shorter than internode, glabrous, or hispidulous at base; ligule ca. 0.5 mm, apex truncate; leaf blade flat or margin involute, 5–10 × 0.3–0.5 cm, abaxial surface glabrous, adaxial surface villous. Spike nodding, purple, 9–13 × 0.9–1.5 cm; rachis densely pubescent; internodes 4–6 mm, or to 24 mm at base of spike. Spikelets 14–18 mm excluding awns, with 5–8 florets; rachilla puberulent. Glumes lanceolate, 3–5-veined, scabrous along veins, apex usually mucronate; proximal glume 4.5–6 mm; distal glume 5.5–7 mm. Lemma lanceolate, distinctly 5-veined distally, abaxially pilose, margin densely villous; first lemma 8–9 mm; awn 5–6 mm. Palea slightly longer than lemma, spinose along keels, glabrous between keels, apex truncate. Anthers blackened, ca. 2.5 mm. Caryopsis apex puberulent. Fl. and fr. Aug.

• Sunny hillsides; ca. 3600 m. Qinghai (Baima).

**9. *Kengyilia laxiflora* (Keng) J. L. Yang et al., Hereditas (Lund) 116: 27. 1992.**

疏花以礼草 *shu hua yi li cao*

*Roegneria laxiflora* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 75. 1963.

Culms densely tufted, erect or geniculate at base, 50–70 cm tall. Leaf blade usually involute, ca. 10 × 0.3 cm. Spike curved, slender, rather lax, 10–15(–20) cm; rachis pilosulose only distally. Spikelets 16–22 mm, with 6–9 florets. Glumes soft, herbaceous, glabrous, margin membranous; proximal glume ca. 4 mm, 3-veined; distal glume 6–7 mm, 5-veined. Lemma lanceolate, 5-veined, hirsutulous, apex acute, acuminate, or with awn 1–2 mm; first lemma to 11 mm including awn. Palea slightly longer than lemma, ciliolate along keels. Fl. and fr. late summer.  $2n = 42^*$ .



- Mountain slopes. Gansu, Qinghai, W Sichuan.

**10. *Kengyilia laxistachya*** L. B. Cai & D. F. Cui, Bull. Bot. Res., Harbin 15: 424. 1995.

稀穗以礼草 xi sui yi li cao

Culms densely tufted, 25–55 cm tall, 2- or 3-noded. Leaf sheath glabrous; ligule ca. 0.3 mm, apex truncate; leaf blade usually involute, 5–8 cm, glabrous or adaxial surface puberulent. Spike erect or slightly curved, 5–7 × ca. 0.5 cm; rachis slender, puberulent on back; internodes 6–9 mm. Spikelets 10–12 mm, with 3–5 florets. Glumes broadly lanceolate or oblong, 2–4-veined, glabrous, margin membranous, apex pungent or mucronate; proximal glume 5–7 mm; distal glume 6–8 mm. Lemma oblong-lanceolate, abaxially densely villous; first lemma 7–8 mm; awn 2–3 mm. Palea slightly shorter than lemma, spinescent along keels distally, glabrous between keels, apex truncate. Anthers 2–2.5 mm. Fl. and fr. autumn.

- River banks; 2100–2700 m. Xinjiang (Heshuo, Shache).

**11. *Kengyilia tahelacana*** J. L. Yang et al., Canad. J. Bot. 71: 339. 1993.

黄药以礼草 huang yao yi li cao

Culms densely tufted, sometimes geniculate at base, 90–110 cm tall, 4- or 5-noded, glabrous but pubescent below spike. Leaf sheath glabrous; ligule ca. 0.4 mm, scarious-membranous, apex truncate; leaf blade flat, 15–32 × 0.5–0.8 cm, abaxial surface glabrous, adaxial surface scabrous. Spike slightly curved, 8–10 × ca. 1.5 cm; rachis puberulent throughout; internodes 4–9 mm. Spikelets green, lanceolate, 15–16 mm excluding awns, with ca. 7 florets; rachilla puberulent; internodes 1.5–2 mm. Glumes oblong, slightly oblique, subequal, 7–8 mm, herbaceous, (3–)5(or 6)-veined, white pilose, margin membranous, apex acuminate, mucronate, or with awn 1–2 mm. Lemma oblong-lanceolate, 6–9 mm, pubescent and hairy distally; callus glabrous but hairy on both sides; awn straight, 10–15 mm. Palea equaling or slightly longer than lemma, ciliolate along keels distally, puberulent between keels, apex emarginate. Anthers yellow, 2.5–3 mm. Caryopsis brown, ca. 6 mm. Fl. and fr. late summer.  $2n = 42^*$ .

- Rocky mountains; 2400–2500 m. Xinjiang.

**12. *Kengyilia zhaosuensis*** J. L. Yang et al., Canad. J. Bot. 71: 341. 1993.

昭苏以礼草 zhao su yi li cao

Culms densely tufted, 60–90 cm tall, ca. 2 mm in diam., 3- or 4-noded, glabrous but nodes pubescent. Leaf sheath glabrous; ligule ca. 0.5 mm, scarious-membranous, apex truncate; leaf blade flat or slightly involute, 18–20 × 0.5–0.7 cm, abaxial surface glabrous, adaxial surface scabrous. Spike erect or slightly curved, 14–20 × ca. 1 cm; rachis scabrous or hirsute; internodes 7–10 mm. Spikelets green, lanceolate, 15–17 mm excluding awns, with 6 or 7 florets; rachilla pubescent; internodes 1.5–2 mm. Glumes oblong, nearly oblique, 5-veined, glabrous, margin broadly membranous, apex acuminate, mucronate, or with awn 1–2 mm; proximal glume 9–11 mm; distal glume 10–12 mm. Lemma narrowly lanceolate, 8–10 mm excluding awn,

herbaceous, densely villous, margin membranous; callus hairy; awn 2–6 mm. Palea shorter than lemma, ciliate along keels distally, apex truncate. Anthers yellowish, 3.5–4 mm. Caryopsis brown. Fl. and fr. late summer.  $2n = 42^*$ .

- Rocky mountain ravines; ca. 1800 m. Xinjiang.

**13. *Kengyilia hejingensis*** L. B. Cai & D. F. Cui, Bull. Bot. Res., Harbin 15: 426. 1995 [*“hejingensi”*].

和静以礼草 he jing yi li cao

Culms erect or slightly geniculate, 60–80 cm tall, 2.5–3.5 mm in diam., 3- or 4-noded. Leaf sheath glabrous; ligule ca. 5 mm, membranous, apex truncate; leaf blade flat, 7–14 × 0.4–0.8 cm, abaxial surface glabrous or scabrous, adaxial surface white villous. Spike erect, green, dense, 8–11 × 0.6–0.8 cm; rachis margin ciliate; internodes ca. 5 mm. Spikelets 15–18 mm, with 4–6 florets. Glumes ovate-lanceolate, subequal, 8–9 mm, 4–6-veined, glabrous, margin membranous; awn 2–5 mm. Lemma lanceolate, 5–7-veined, abaxially scabrous or sparsely spinescent; first lemma 10–11 mm; awn 7–12 mm. Palea slightly shorter than lemma, ciliolate along keels, scabrous between keels. Anthers yellow, 1.4–1.8 mm. Ovary apex hirsute. Fl. and fr. autumn.

- Sloping meadows; 2200–2600 m. Xinjiang (Hejing).

**14. *Kengyilia stenachyra*** (Keng) J. L. Yang et al., Hereditas (Lund) 116: 27. 1992.

窄颖以礼草 zhai ying yi li cao

*Roegneria stenachyra* Keng, Acta Univ. Nankin. Sci. Nat. 1963(1): 79. 1963.

Culms erect, 60–90 cm tall, 3-noded, glabrous. Leaf sheath glabrous; leaf blade flat when fresh, soon involute on drying, 5–15 × 0.3–0.5 cm, stiff, abaxial surface glabrous, adaxial surface puberulent. Spike ca. 10 × 1 cm. Spikelets purplish stramineous, 12–15 mm excluding awns, with 4 or 5 florets. Glumes lanceolate-oblong, 4–5 mm or distal glume slightly longer, 1–3-veined, hirsutulous along veins, apex acute. Lemma laxly or distally densely hirsute; first lemma ca. 10 mm; awn 5–10 mm, scabrous. Palea shorter than lemma, ciliate along keels distally, apex emarginate or truncate. Anthers nearly black. Fl. and fr. late summer.  $2n = 42^*$ .

- Mountain slopes; ca. 3200 m. Gansu, Qinghai.

**15. *Kengyilia shawanensis*** L. B. Cai, Guihaia 16: 202. 1996.

沙湾以礼草 sha wan yi li cao

Culms laxly tufted, erect or slightly geniculate at base, 20–30 cm tall, 1.5–2.5 mm in diam., 3- or 4-noded. Leaf sheath glabrous; ligule very short, papery, apex truncate; leaf blade flat, 5–10 × 0.25–0.5 cm, both surfaces glabrous or adaxial surface sparsely villous, margin ciliate. Spike erect, 5–10 × 0.3–0.5 cm; rachis scabrous on back, margin spinose; internodes 6–9 mm. Spikelets green, 10–16 mm excluding awns, with 3–5 florets; rachilla puberulent. Glumes broadly lanceolate or oblong, 3–5-veined, glabrous, margin broadly membranous, apex acute or pungent; proximal glume 5.5–7.5 mm; distal glume 7–8.5 mm. Lemma lanceolate, abaxially densely pubescent; first lem-

ma 8–9 mm; awn straight, 2–7 mm. Palea subequaling lemma, spinose along keels distally, glabrous between keels. Anthers yellow, ca. 3 mm. Fl. and fr. Jun–Jul.

- Arid mountain slopes; ca. 3000 m. Xinjiang (Shawan).

**16. *Kengyilia mutica*** (Keng) J. L. Yang et al., *Hereditas* (Lund) 116: 28. 1992.

无芒以礼草 wu mang yi li cao

*Roegneria mutica* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 87. 1963.

Culms usually geniculate at base, 60–70 cm tall, 3-noded, puberulent below spike. Leaf sheath glabrous; leaf blade 12–19 × 0.4–0.6 cm, stiff, glabrous. Spike erect, 5–7 × ca. 0.8 cm. Spikelets greenish, ca. 12 mm, with 4 or 5 florets. Glumes oblong-ovate, 5–6 mm, 3-veined, glabrous or puberulent, apex acute; midvein prominent. Lemma densely villous, apex acute or pointed; first lemma ca. 9.5 mm. Palea equaling or slightly longer than lemma, ciliate along keels distally, apex emarginate or obtuse. Fl. and fr. late summer.  $2n = 42^*$ .

- Grasslands. Qinghai.

**17. *Kengyilia hirsuta*** (Keng) J. L. Yang et al., *Hereditas* (Lund) 116: 28. 1992.

糙毛以礼草 cao mao yi li cao

*Roegneria hirsuta* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 84. 1963; *Agropyron kengii* Tzvelev; *Elymus kengii* (Tzvelev) Á. Löve; *Kengyilia hirsuta* var. *obviaristata* L. B. Cai; *K. hirsuta* var. *variabilis* (Keng) L. B. Cai; *K. obviaristata* (L. B. Cai) L. B. Cai; *R. hirsuta* var. *leiophylla* Keng & S. L. Chen; *R. hirsuta* var. *variabilis* Keng.

Culms densely tufted, erect or decumbent, 40–70(–150) cm tall, rigid, 2- or 3-noded, pubescent only below spike. Leaf sheath glabrous or villous at base; leaf blade flat or margin involute, stiff, usually both surfaces glabrous or adaxial surface pilose or abaxial surface densely puberulent, margin ciliate. Spike (3–)6–8 × 0.7–1 cm. Spikelets densely imbricate, greenish or purplish, 10–15 mm excluding awns, with 3–7 florets. Glumes greenish, ovate-oblong, 3- or 4-veined, glabrous, or scabrous along midvein distally, apex acuminate or pointed; proximal glume 4.5–6 mm; distal glume 5–7 mm. Lemma yellowish brown, hirsute; first lemma 8–10 mm; awn erect or slightly reflexed, (1–)2–6 mm. Palea slightly shorter than or equaling lemma, hirsute-ciliate along keels, apex emarginate or 2-lobed. Anthers dark green. Fl. and fr. Aug–Sep.  $2n = 42^*$ .

- Mountain steppes, river banks. Gansu, Qinghai, Xinjiang.

**18. *Kengyilia alatavica*** (Drobow) J. L. Yang et al., *Canad. J. Bot.* 71: 343. 1993.

毛稈以礼草 mao fu yi li cao

Culms densely tufted, erect or geniculate at base, 25–70 cm tall, smooth and glabrous, puberulent at nodes, or densely retrorsely hairy throughout. Leaf sheath smooth and glabrous or densely pubescent; leaf blade glaucous, 5–10 × 0.3–0.5 cm, abaxial surface smooth and glabrous or pubescent, adaxial surface scabrous (together with margin) or puberulent. Spike erect,

dense, 5–8 × 0.8–1.1 cm; rachis puberulent to densely pubescent, margin scabrous or hispidulous. Spikelets green or purplish green, 10–16 × 5–7 mm, with 3–6 florets. Glumes lanceolate, 7–11 × ca. 2.5 mm, 5-veined, glabrous, or scabrous distally, margin broadly membranous. Lemma lanceolate, 8–9 mm, densely hispidulous or pubescent; awn 2–5 mm. Palea equaling or slightly longer than lemma, ciliate along keels distally. Lodicules shortly broadly triangular or long narrowly triangular. Anthers yellow, 2–3 mm. Fl. and fr. Jun–Sep.

Meadows on mountain slopes, dry steppes; 1500–3000 m. Gansu, Xinjiang, Xizang [Mongolia, Russia].

- 1a. Culms smooth and glabrous or nodes puberulent; leaf sheath smooth, glabrous, leaf blade abaxial surface smooth, glabrous; lodicules shortly broadly triangular ..... 18a. var. *alatavica*
- 1b. Culms densely retrorsely hairy throughout; leaf sheath densely pubescent, leaf blade abaxial surface pubescent; lodicules long narrowly triangular ..... 18b. var. *longiglumis*

**18a. *Kengyilia alatavica* var. *alatavica***

毛稈以礼草(原变种) mao fu yi li cao (yuan bian zhong)

*Agropyron alatavicum* Drobow, *Repert. Spec. Nov. Regni Veg.* 21: 43. 1925; *Elymus alatavicus* (Drobow) Á. Löve; *Elytrigia alatavica* (Drobow) Nevski.

Culms smooth and glabrous or nodes puberulent. Leaf sheath smooth, glabrous; leaf blade abaxial surface smooth, glabrous, adaxial surface and margin scabrous. Lodicules shortly broadly triangular.

Meadows on mountain slopes; 1500–3000 m. Xinjiang, Xizang [Mongolia, Russia].

**18b. *Kengyilia alatavica* var. *longiglumis*** (Keng) C. Yen et al., *Novon* 8: 94. 1998.

长颖以礼草 chang ying yi li cao

*Roegneria longiglumis* Keng, *Acta Univ. Nankin. Sci. Nat.* 1963(1): 83. 1963; *Kengyilia longiglumis* (Keng) J. L. Yang et al.

Culms densely retrorsely hairy throughout. Leaf sheath densely pubescent; leaf blade abaxial surface pubescent, adaxial surface puberulent. Lodicules long narrowly triangular.  $2n = 42^*$ .

- Dry steppes; ca. 2500 m. Gansu.

**19. *Kengyilia kaschgarica*** (D. F. Cui) L. B. Cai, *Novon* 6: 142. 1996.

喀什以礼草 ka shi yi li cao

*Elymus kaschgaricus* D. F. Cui, *Bull. Bot. Res.*, Harbin 10(3): 27. 1990; *Roegneria kaschgarica* (D. F. Cui) Y. H. Wu.

Culms densely tufted, 25–35 cm tall, ca. 2 mm in diam., 2- or 3-noded, glabrous but puberulent below spike. Leaf sheath of lower leaves usually densely retrorsely pubescent, of upper

leaves glabrous; leaf blade usually involute, 6–15 × 0.15–0.2 cm, abaxial surface glabrous, smooth or scabrous, adaxial surface villous and scabrous; ligule ca. 0.5 mm, membranous, apex truncate. Spike erect, dense, 3–8 × 0.5–0.7 cm; rachis densely pubescent; internodes 4–5 mm or ca. 8 mm at base of spike. Spikelets 9–11 mm, with 3–5 florets; rachilla densely pubescent; internodes 1–1.5 mm. Glumes ovate-oblong, 3–5-veined, strongly ciliate along veins, margin broadly membranous; proximal glume 5–7 mm excluding awn; distal glume 6–8 mm excluding awn. Lemma oblong, densely pubescent; first lemma 7–9 mm; callus pilose on both sides; awn recurved, 7–11 mm. Palea slightly shorter than lemma, ciliate along keels. Anthers ca. 1.5 mm. Fl. and fr. Jul–Sep.

- Cold alpine meadows; 2800–3800 m. Xinjiang.

**20. *Kengyilia thoroldiana*** (Oliver) J. L. Yang et al., *Hereditas* (Lund) 116: 27. 1992.

梭罗以礼草 suo luo yi li cao

Culms densely tufted, 12–15 cm tall, 1- or 2-noded, glabrous. Leaf sheath glabrous; leaf blade involute, 2–5(–8) × 0.2–0.35 cm, abaxial surface glabrous, adaxial surface and margin scabrous. Spike ovate or oblong-ovate, dense or moderately lax, 3–7.5 × 1–1.5 cm excluding awns; rachis glabrous. Spikelets 10–13 mm, with 4–6 florets. Glumes oblong-lanceolate, villous or only scabrous along midvein, apex acute, acuminate, or pointed; proximal glume 5–6 mm, 3(or 4)-veined; distal glume 6–7 mm, 5-veined. Lemma 5-veined, densely pubescent; first lemma 7–8 mm; awn 1–7 mm. Palea slightly shorter than lemma, long ciliate along keels distally, apex emarginate or 2-lobed. Anthers black. Fl. and fr. late summer.

Mountain slopes, valleys, river and lake banks; 4700–5100 m. Gansu, Qinghai, Xinjiang, Xizang [India (Sikkim)].

- 1a. Glumes villous; lemma awn 1–2.5 mm; spike dense, 3–4 cm excluding awns ..... 20a. var. *thoroldiana*
- 1b. Glumes only scabrous along midvein; lemma awn 5–7 mm; spike moderately lax, 5–7.5 cm excluding awns ..... 20b. var. *laxiuscula*

**20a. *Kengyilia thoroldiana* var. *thoroldiana***

梭罗以礼草(原变种) suo luo yi li cao (yuan bian zhong)

*Agropyron thoroldianum* Oliver in Hooker's Icon. Pl. 23: t. 2262. 1893; *Elymus thoroldianus* (Oliver) G. Singh; *Roegneria thoroldiana* (Oliver) Keng.

Spike 3–4 cm excluding awns. Glumes villous. Lemma awn 1–2.5 mm. Fl. and fr. late summer.

Mountain slopes, valleys, river banks; 4700–5100 m. Gansu, Qinghai, Xizang [India (Sikkim)].

**20b. *Kengyilia thoroldiana* var. *laxiuscula*** (Melderis) S. L. Chen, *Novon* 7: 229. 1997.

疏穗梭罗以礼草 shu sui suo luo yi li cao

*Agropyron thoroldianum* var. *laxiusculum* Melderis in Bor, Grasses Burma, Ceylon, India, Pakistan, 696. 1960; *Ely-*

*mus thoroldianus* subsp. *laxiusculus* (Melderis) Á. Löve; *E. thoroldianus* var. *laxiusculus* (Melderis) G. Singh; *Kengyilia grandiglumis* (Keng) J. L. Yang et al. var. *laxiuscula* (Melderis) L. B. Cai; *K. laxiuscula* (Melderis) Tzvelev; *Roegneria thoroldiana* var. *laxiuscula* (Melderis) H. L. Yang.

Spike 5–7.5 cm excluding awns. Glumes only scabrous along midvein. Lemma awn 5–7 mm. Fl. and fr. late summer.

- Lake banks; ca. 4700 m. Xizang.

**21. *Kengyilia batalinii*** (Krasnov) J. L. Yang et al., *Canad. J. Bot.* 71: 343. 1993.

巴塔以礼草 ba ta yi li cao

Culms densely tufted, erect or geniculate at base, 12–40 cm tall, glabrous or puberulent below spike. Leaf sheath glabrous, pubescent or densely so, or ciliate at margin; ligule short; leaf blade flat or involute, ca. 0.4 cm wide, abaxial surface glabrous or pubescent, adaxial surface softly hairy. Spike dense, 2.5–7 × 0.6–1 cm; rachis glabrous, puberulent, or densely villous; internodes 2–5 mm. Spikelets green or purplish green, 8–14 mm, with 3–6 florets, softly pale hairy. Glumes oblong-ovate or ovate-lanceolate, 4–7 mm, herbaceous, 3–5-veined, white hirsute or softly hairy, ciliate along veins, margin broadly membranous, apex acute or with awn 2–4 mm. Lemma ovate or broadly lanceolate, 6–8 mm, densely hirsute or softly long hairy; awn slightly curved, 8.5–13 mm. Palea lanceolate, subequaling lemma, ciliolate along keels distally, apex truncate or emarginate. Anthers yellow or purple, 2.5–4 mm. Fl. and fr. Jun–Sep.

Mountain slope grasslands, alpine steppes; 2100–4200 m. Xinjiang, Xizang [Mongolia, Russia].

- 1a. Culms 20–40 cm tall; leaf sheath glabrous, rarely pubescent or margin ciliate; spike rachis glabrous or puberulent; anthers yellow, ca. 4 mm ..... 21a. var. *batalinii*
- 1b. Culms 12–25(–35) cm tall; leaf sheath densely pubescent; spike rachis densely villous; anthers purple, 2.5–2.7 mm ..... 21b. var. *nana*

**21a. *Kengyilia batalinii* var. *batalinii***

巴塔以礼草(原变种) ba ta yi li cao (yuan bian zhong)

*Triticum batalinii* Krasnov, *Bot. Zap.* 2: 21. 1887–1888 [“*batalini*”]; *Agropyron argenteum* (Nevski) Pavlov; *A. batalinii* (Krasnov) Roshevitz; *Elymus batalinii* (Krasnov) Á. Löve; *Elytrigia argentea* Nevski; *E. batalinii* (Krasnov) Nevski.

Culms 20–40 cm tall. Leaf sheath glabrous, rarely pubescent or margin ciliate. Spike rachis glabrous or puberulent. Anthers yellow, ca. 4 mm. Fl. and fr. Jun–Sep. 2n = 42.

Mountain slope grasslands; 2100–3500 m. Xinjiang (Kunlun Shan, Tian Shan), Xizang [Mongolia, Russia].

**21b. *Kengyilia batalinii* var. *nana*** (J. L. Yang et al.) C. Yen et al., *Novon* 8: 95. 1998.

矮生以礼草 ai sheng yi li cao

*Kengyilia nana* J. L. Yang et al., *Canad. J. Bot.* 71: 341. 1993.

Culms 12–25(–35) cm tall. Leaf sheath densely pubescent. Spike rachis densely villous. Anthers purple, 2.5–2.7 mm. Fl. and fr. late summer.  $2n = 42^*$ .

- Alpine steppes; ca. 4200 m. Xinjiang.

**22. *Kengyilia guidenensis*** C. Yen et al., *Novon* 5: 395. 1995.

贵德以礼草 *gui de yi li cao*

Culms densely tufted, erect, 35–50 cm tall, ca. 1.5 mm in diam., 2- or 3-noded, pubescent just below spike. Leaf sheath glabrous, rarely pubescent on lowermost leaves; ligule ca. 0.5 mm, scarious-membranous, apex truncate; leaf blade narrowly lanceolate, flat or slightly involute, 8.5–9 × ca. 0.3 cm, abaxial surface glabrous, adaxial surface densely white hairy, hairs ca. 1 mm. Spike erect, ovate, 3–3.5 × ca. 0.5 cm; rachis densely white pilose; internodes 1.5–2 mm. Spikelets greenish purple, oblong-ovate, ca. 7 mm excluding awns, with 5–7 florets; rachilla densely hirsutulous; internodes 1–1.2 mm. Glumes broadly lanceolate, unequal, 1(–3)-veined, densely white hirsute, margin herbaceous-membranous, apex acuminate or mucronate; proximal glume 3–5 mm; distal glume 4–7 mm. Lemma ovate, 7–9 mm excluding awn, densely white hairy, hairs ca. 1 mm; first lemma ca. 7 mm; callus with hairs ca. 0.8 mm; awn 1.5–4 mm. Palea equaling lemma, ciliate along keels, densely hirsute between keels, apex emarginate. Lodicules triangular. Anthers yellow, ca. 3 mm. Caryopsis brown, ca. 5 mm. Fl. and fr. autumn.

- Stony slopes, between broken granite rocks; ca. 3100 m. Qinghai (Guide).

**23. *Kengyilia kokonorica*** (Keng) J. L. Yang et al., *Hereditas* (Lund) 116: 27. 1992.

青海以礼草 *qing hai yi li cao*

*Roegneria kokonorica* Keng, *Acta Univ. Nankin. Sci. Nat.*

1963(1): 88. 1963; *Elymus kokonoricus* (Keng) Á. Löve ex D. F. Cui.

Culms solitary or tufted, 30–50 cm tall, 2- or 3-noded, puberulent below spike. Leaf sheath glabrous; leaf blade rolled, 2–15(–18) × 0.2–0.5 cm, glabrous. Spike dense, 3–6 × 0.7–0.8 cm. Spikelets green or tinged purplish, 8–10 mm, with 3 or 4(–6) florets. Glumes green abaxially, lanceolate-ovate, 3–4 mm excluding awn, 1–3-veined, densely hirsute, margin membranous; midvein somewhat prominent; awn 2–3 mm. Lemma densely hirsute; first lemma ca. 6 mm; awn 4–6 mm, scabrous. Palea equaling lemma, ciliate along keels. Anthers yellowish black, 2–2.2 mm. Ovary apex puberulent. Fl. and fr. late summer.  $2n = 42^*$ .

- Dry steppes. Gansu, Ningxia, Qinghai, Xinjiang, Xizang.

**24. *Kengyilia pamirica*** J. L. Yang & C. Yen, *J. Sichuan Agric. Univ.* 10: 566. 1992.

帕米尔以礼草 *pa mi er yi li cao*

Culms densely tufted, 60–70 cm tall, 1.2–2 mm in diam., 2- or 3-noded, glabrous but pubescent just below spike. Leaf sheath glabrous; ligule ca. 0.5 mm, hyaline-membranous, apex truncate; leaf blade involute, 9–10(–15) × 0.2–0.7 cm, abaxial surface glabrous, adaxial surface densely villous along lateral veins, or both surfaces villous on surculose leaves. Spike lanceolate to obovate, 8–10 × 0.8–1.2 cm; rachis densely villous; internodes 2–7 mm. Spikelets purple, 12–16 mm excluding awns, with 5–8 florets; rachilla densely pubescent; internodes 0.5–2 mm. Glumes oblong, equal or subequal, 6–7(–9) mm, 3–5-veined, densely hirsute, apex acute, mucronate, or with awn 1–2 mm. Lemma ovate, 7–9 mm, densely villous; callus with hairs ca. 0.8 mm laterally, 0.2–0.5 mm elsewhere; awn erect, 10–15 mm, scabrous. Palea subequaling lemma, sparsely ciliate along keels distally, puberulent or scabrous between keels, apex emarginate or truncate. Anthers yellow to purple, ca. 3 mm. Caryopsis brown, ca. 6 mm. Fl. and fr. late summer.  $2n = 42^*$ .

- Steppes; ca. 2800 m. Xinjiang.

**106. AGROPYRON** Gaertner, *Novi Comment. Acad. Sci. Imp. Petrop.* 14: 539. 1770.

冰草属 *bing cao shu*

*Costia* Willkomm (1858), nom. illeg. superfl., not Willkomm (1860).

Plants perennial, with creeping rhizomes or culms tufted. Culms erect or geniculate at base. Sheaths of vegetative shoots often closed almost throughout their length, usually with lanceolate auricles; leaf blade flat or involute. Spike linear-oblong or ovoid; rachis tough, pubescent. Spikelets 1 per node, divergently or pectinately arranged, sessile, laterally compressed, with 3–10 florets; rachilla disarticulating above glumes and between florets. Glumes linear to narrowly ovate, hardened, 1–5-veined, 1-keeled to base, tapering to an acuminate or shortly awned tip in which veins converge. Lemma lanceolate-oblong, leathery, 5–7-veined, glabrous or pilose, apex acute or with straight awn; midvein slightly keeled; callus very short. Palea ± equaling lemma, pilose along keels, rarely smooth and glabrous, apex usually 2-toothed. Lodicules ciliate at margin. Caryopsis somewhat adherent to lemma and palea.  $x = 7$ .

About 15 species; mainly in Asia and Europe; introduced and widely cultivated in North America; five species (one endemic) in China.

The authors have seen no specimens of *Agropyron kanashiroi* Ohwi (*J. Jap. Bot.* 19: 167. 1943; *Elytrigia kanashiroi* (Ohwi) Melderis; *Pseudo-roegneria strigosa* (M. Bieberstein) Á. Löve subsp. *kanashiroi* (Ohwi) Á. Löve; *Roegneria kanashiroi* (Ohwi) K. L. Chang), described from “*Mongholia interior*” and also recorded from Ningxia (in *Fl. Ningxia.* 2: 359. 1988).

- 1a. Plants with long-creeping, branching rhizomes; culms not tufted ..... 1. *A. michnoi*  
 1b. Plants without such rhizomes; culms tufted.  
 2a. Spike rather lax, rachis internodes 3–5(–10) mm.

- 3a. Spike 1–1.5(–2) cm wide; spikelets 15–20 mm, with 9–11 florets ..... 2. *A. sibiricum*  
 3b. Spike 0.4–0.6 cm wide; spikelets 8–14(–19) mm, with (2 or)3–8 florets ..... 3. *A. mongolicum*  
 2b. Spike dense, rachis internodes 1–2 mm.  
 4a. Culms densely tufted; spikelets imbricate, not pectinately arranged ..... 4. *A. desertorum*  
 4b. Culms laxly tufted; spikelets pectinately arranged, diverging at wide angle from rachis ..... 5. *A. cristatum*

**1. *Agropyron michnoi*** Roshevitz, Izv. Glavn. Bot. Sada SSSR 28: 384. 1929.

根茎冰草 gen jing bing cao

*Agropyron cristatum* (Linnaeus) Gaertner subsp. *michnoi* (Roshevitz) Á. Löve.

Plants with long-creeping, branching rhizomes. Culms not tufted, erect, 42–68 cm tall, glabrous. Leaf sheath glabrous; ligule ca. 1 mm, scarious, apex truncate; leaf blade flat or margin inrolled, 3–9 × 0.2–0.4 cm, abaxial surface glabrous, adaxial surface puberulent and laxly villous together. Spike elliptic or elliptic-lanceolate, dense, 5–10 × 0.9–1.4 cm; rachis pubescent. Spikelets pale glaucous green, 5–10 mm, with 5–7(–10) florets. Glumes boat-shaped, glabrous but ciliate along keel; awn 1–3 mm; proximal glume 2.5–3.5 mm; distal glume 3–4 mm. Lemma lanceolate, ± woolly and bristly together; first lemma 5–8 mm; awn ca. 2 mm. Palea equaling lemma, ciliate along keels, apex acuminate. Fl. and fr. Jul–Sep.

Sandy banks. Nei Mongol [Mongolia, Russia].

This species is used for forage.

**2. *Agropyron sibiricum*** (Willdenow) P. Beauvois, Ess. Agrostogr. 102, 142, 146, 181. 1812.

西伯利亚冰草 xi bo li ya bing cao

*Triticum sibiricum* Willdenow, Enum. Pl. 1: 135. 1809; *Agropyron cristatum* (Linnaeus) Gaertner subsp. *sibiricum* (Willdenow) Á. Löve; *A. fragile* (Roth) P. Candargy subsp. *sibiricum* (Willdenow) Melderis; *A. fragile* var. *sibiricum* (Willdenow) Tzvelev; *Eremopyrum sibiricum* (Willdenow) P. Candargy.

Roots coated with grains of sand affixed by secretions of root hairs. Culms tufted, erect or geniculate at base, 50–80 cm tall, glabrous, or scabrous below spike. Leaf sheath glabrous, smooth or scabrous; leaf blade flat or involute, 10–20 × 0.4–0.6 cm, abaxial surface smooth, adaxial surface scabrous or puberulent. Spike slightly curved, 7–12 × 1–1.5(–2) cm; rachis internodes 4–5(–7) mm. Spikelets pale green, 15–20 × 4–6 mm, with 9–11 florets. Glumes ovate-lanceolate, oblique, glabrous, smooth or scabrous along keel, apex pointed; proximal glume 5–6.5 mm, 3–5-veined; distal glume 6–7 mm, 5-veined. Lemma glabrous or scabrous, apex pointed; first lemma ca. 8 mm. Palea slightly shorter than or equaling lemma, ciliate along keels. Anthers 3.5–4 mm. Fl. and fr. Jun–Jul.  $2n = 14, 28$ .

Sandy steppes, semideserts, sands. Hebei, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; Europe; introduced in North America].

Plants with villous lemmas have been named *Agropyron sibiricum* f. *pubiflorum* Roshevitz (in B. Fedtschenko, Fl. Iugo-Vostoka Evropeiskoi Chasti SSSR 2: 156. 1928). In China they are usually found in the steppes of Nei Mongol.

**3. *Agropyron mongolicum*** Keng, J. Wash. Acad. Sci. 28: 305. 1938.

沙芦草 sha lu cao

Culms tufted, erect or geniculate at base, 20–60 cm tall, 2- or 3(–6)-noded. Leaf sheath glabrous; ligule apex truncate; leaf blade involute, 5–15 × 0.2–0.3 cm, glabrous or prickly hairy along veins. Spike linear, moderately lax, 3–9(–12) × 0.4–0.6 cm; rachis glabrous or puberulent; internodes 3–5(–10) mm. Spikelets 8–14(–19) × 3–5 mm, with (2 or)3–8 florets; rachilla glabrous or puberulent; internodes 3–5(–10) mm. Glumes oblique, 3–5-veined, apex with point ca. 1 mm or awn ca. 2 mm; proximal glume 3–6 mm; distal glume 4–6 mm. Lemma 5-veined, glabrous, laxly puberulent, or densely villous, apex pointed; first lemma 5–8 mm. Palea shorter than or equaling lemma, shortly ciliate along keels. Fl. and fr. Jul–Sep.

• Dry steppes, sandy places. Gansu, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang.

- 1a. Glume apex with point ca. 1 mm;  
lemma glabrous or laxly puberulent  
..... 3a. var. *mongolicum*  
1b. Glume apex with awn ca. 2 mm;  
lemma densely villous ..... 3b. var. *villosum*

**3a. *Agropyron mongolicum* var. *mongolicum***

沙芦草(原变种) sha lu cao (yuan bian zhong)

*Agropyron cristatum* (Linnaeus) Gaertner subsp. *mongolicum* (Keng) Á. Löve.

Glume apex with point ca. 1 mm. Lemma glabrous or laxly puberulent.

• Dry steppes, sandy places. Gansu, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang.

This variety provides good forage.

**3b. *Agropyron mongolicum* var. *villosum*** H. L. Yang, Bull. Bot. Res., Harbin 4(4): 89. 1984.

毛沙芦草 mao sha lu cao

Glume apex with awn ca. 2 mm. Lemma densely villous.

• Sandy places. Nei Mongol.

**4. *Agropyron desertorum*** (Fischer ex Link) Schultes, Mant. 2: 412. 1824.

沙生冰草 sha sheng bing cao

Culms densely tufted, erect or geniculate at base, 20–70 cm tall, glabrous, or pubescent just below spike. Leaf sheath glabrous or pubescent; leaf blade glaucous green, involute, 5–10 × 0.1–0.3 cm, stiff, abaxial surface smooth, glabrous, adaxial surface scabrous. Spike erect, 4–8 × 0.5–1 cm; rachis pubes-

cent; internodes 1–2 mm. Spikelets imbricate, 5–10 × 3–5 mm, with 4–7 florets. Glumes ovate-lanceolate, glabrous, smooth but scabrous on keel; awn 1–2 mm; proximal glume (2–)3–4 mm; distal glume 4–5 mm. Lemma lanceolate, glabrous to densely pilose; awn 1–3 mm. Palea ciliate along keels, apex 2-dentate. Anthers ca. 4 mm. Fl. and fr. Jun–Aug.  $2n = 28^*$ .

Mountain slopes, frigid high pastures, dry steppes, sandy places; ca. 2700 m. Nei Mongol, Ningxia, Qinghai, Shanxi, Xinjiang [Mongolia, Russia; introduced in North America].

- 1a. Lemma glabrous, or ± bristly hairy abaxially and at margin ..... 4a. var. *desertorum*  
 1b. Lemma densely pilose throughout ..... 4b. var. *pilosiusculum*

#### 4a. *Agropyron desertorum* var. *desertorum*

沙生冰草(原变种) sha sheng bing cao (yuan bian zhong)

*Triticum desertorum* Fischer ex Link, Enum. Hort. Berol. Alt. 1: 97. 1821; *Agropyron cristatum* (Linnaeus) Gaertner subsp. *desertorum* (Fischer ex Link) Á. Löve; *A. cristatum* var. *desertorum* (Fischer ex Link) R. D. Dorn; *A. sibiricum* (Willdenow) P. Beauvois var. *desertorum* (Fischer ex Link) Boissier; *Eremopyrum sibiricum* (Willdenow) P. Candargy var. *desertorum* (Fischer ex Link) P. Candargy.

Lemma glabrous, or ± bristly hairy abaxially and at margin.

Mountain slopes, dry steppes. Nei Mongol, Shanxi [Mongolia, Russia].

**4b. *Agropyron desertorum* var. *pilosiusculum* (Melderis) H. L. Yang in P. C. Kuo, Fl. Reipubl. Popularis Sin. 9(3): 113. 1987.**

毛沙生冰草 mao sha sheng bing cao

*Agropyron desertorum* f. *pilosiusculum* Melderis in Norlindh, Fl. Mongol. Steppe 1: 121. 1949; *A. sinkiangense* D. F. Cui.

Lemma densely pilose throughout.

Frigid high pastures, sandy places; ca. 2700 m. Nei Mongol, Qinghai, Xinjiang [Mongolia].

**5. *Agropyron cristatum* (Linnaeus) Gaertner, Novi Comment. Acad. Sci. Imp. Petrop. 14: 540. 1770.**

冰草 bing cao

Culms laxly tufted, 20–60(–80) cm tall, usually puberulent, rarely glabrous. Leaf sheath hairy or glabrous; leaf blade involute or flat, 5–15(–20) × 0.2–0.5(–0.9) cm, abaxial surface glabrous, adaxial surface moderately pubescent. Spike oblong-ovoid or ovoid-lanceolate, very dense, 2–6 × 0.8–2.5 cm; rachis internodes ca. 1 mm. Spikelets pectinately arranged, diverging at wide angle from rachis, 6–18 mm, with (3–)5–11 florets. Glumes lanceolate or ovate-lanceolate, pilose or glabrous, rarely laxly spinescent hairy, usually awned; awn ± equaling glume body; proximal glume 2–3 mm; distal glume 3–4 mm. Lemma pilose, densely so, or glabrous, rarely laxly spinescent hairy, usually awned; awn 2–4 mm. Palea ciliate along keels, apex 2-

toothed. Anthers ca. 4 mm. Fl. and fr. Jun–Sep.  $2n = 28^*$ .

Dry mountain slopes, dry meadows, steppes, stony steppe slopes. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Xinjiang [Japan, Korea, Mongolia, Pakistan, Russia; SW Asia, Europe; introduced in North America].

This species provides good forage.

- 1a. Glumes and lemma glabrous, rarely laxly spinescent hairy ..... 5c. var. *pectinatum*  
 1b. Glumes and lemma pilose or densely so.  
 2a. Spike oblong-ovoid, 0.8–1.5 cm wide; spikelets 6–9(–12) mm, with (3–)5–7 florets ..... 5a. var. *cristatum*  
 2b. Spike ovoid-lanceolate, 2–2.5 cm wide; spikelets 8–18 mm, with 9–11 florets ..... 5b. var. *pluriflorum*

#### 5a. *Agropyron cristatum* var. *cristatum*

冰草(原变种) bing cao (yuan bian zhong)

*Bromus cristatus* Linnaeus, Sp. Pl. 1: 78. 1753; *Costia cristata* (Linnaeus) Willkomm; *Eremopyrum cristatum* (Linnaeus) Willkomm & Lange; *Triticum cristatum* (Linnaeus) Schreber; *Zeia cristata* (Linnaeus) Lunell.

Spike oblong-ovoid, 0.8–1.5 cm wide. Spikelets 6–9(–12) mm, with (3–)5–7 florets. Glumes pilose. Lemma densely pilose. Fl. and fr. Jun–Jul.

Dry meadows, stony steppe slopes. Gansu, Nei Mongol, Qinghai, Xinjiang [Japan, Korea, Mongolia, Pakistan, Russia; SW Asia].

**5b. *Agropyron cristatum* var. *pluriflorum* H. L. Yang, Bull. Bot. Res., Harbin 4(4): 88. 1984.**

多花冰草 duo hua bing cao

Spike ovoid-lanceolate, 2–2.5 cm wide. Spikelets 8–18 mm, with 9–11 florets. Glumes and lemma pilose. Fl. and fr. Jul–Sep.

- Steppes. Nei Mongol.

**5c. *Agropyron cristatum* var. *pectinatum* (M. Bieberstein) Roshevitz ex B. Fedtschenko, Izv. Imp. Bot. Sada Petra Velikago 14(Suppl. 2): 97. 1915.**

光穗冰草 guang sui bing cao

*Triticum pectinatum* M. Bieberstein, Fl. Taur.-Caucas. 1: 87. 1808; *Agropyron cristatum* subsp. *pectinatum* (M. Bieberstein) Tzvelev; *A. cristatum* f. *pectiniforme* (Roemer & Schultes) A. V. Bukhteeva; *A. cristatum* var. *pectiniforme* (Roemer & Schultes) H. L. Yang, nom. superfl.; *A. pectiniforme* Roemer & Schultes; *Eremopyrum cristatum* var. *pectinatum* (M. Bieberstein) P. Candargy; *Triticum pectiniforme* (Roemer & Schultes) Steudel, nom. superfl.

Glumes and lemma glabrous, rarely laxly spinescent hairy.

Dry mountain slopes. Hebei, Nei Mongol, Qinghai, Xinjiang [Mongolia, Russia; Europe].

## 107. EREMOPYRUM (Ledebour) Jaubert & Spach, Ann. Sci. Nat., Bot., sér. 3, 14: 360. 1851.

旱麦草属 han mai cao shu

*Triticum* [unranked] *Eremopyrum* Ledebour, Fl. Altaic. 1: 112. 1829.

Plants annual. Culms erect or geniculate-ascending. Leaf sheath split to base; leaf blade usually flat. Spike ellipsoid-ovoid or cylindrical-ovoid, very dense; rachis short, disarticulating at nodes. Spikelets 1 per node, held at nearly 90° to rachis, sessile, laterally compressed, with 3–6 florets; rachilla somewhat scabrous or shortly pilose, with or without joints below each floret. Glumes boat-shaped, leathery, with prominent keel, margin somewhat thickened, ultimately subhorny. Lemma leathery, 5-veined, 1-keeled, apex pointed or shortly awned; callus very short. Palea usually almost 2/3 as long as lemma, scabrous or pilose along keels. Lodicules ciliate at margin. Caryopsis somewhat adherent to lemma and palea.  $x = 7$ .

About eight species: from N Africa and the Mediterranean region to the W Himalayas; four species in China.

All species are valuable fodder plants for ephemeral spring pastures.

1a. Spikelets villous or hairy.

2a. Spikelets 12–15 mm; leaf sheath not inflated on upper leaves, or slightly dilated on uppermost leaf ..... 3. *E. bonaepartis*

2b. Spikelets 6–10 mm; leaf sheath inflated on upper leaves ..... 4. *E. triticeum*

1b. Spikelets glabrous or scabrous.

3a. Spikelets 9–14 mm; glumes linear-lanceolate; lemma pubescent; palea keels prolonged into 2 short, blunt teeth; leaf sheath slightly inflated on upper leaves ..... 1. *E. orientale*

3b. Spikelets 13–17 mm; glumes linear; lemma long villous; palea keels prolonged into 2 awned teeth 0.5–1.5 mm; leaf sheath slightly dilated but not inflated on uppermost leaf ..... 2. *E. distans*

**1. *Eremopyrum orientale*** (Linnaeus) Jaubert & Spach, Ann. Sci. Nat., Bot., sér. 3, 14: 361. 1851.

东方旱麦草 dong fang han mai cao

*Secale orientale* Linnaeus, Sp. Pl. 1: 84. 1753; *Agropyron orientale* (Linnaeus) Roemer & Schultes; *Costia orientalis* (Linnaeus) Willkomm; *Triticum orientale* (Linnaeus) M. Bieberstein (1808), not Percival (1921).

Culms geniculate at nodes, 8–25 cm tall, usually 3-noded, pubescent below spike. Leaf sheath scabrous and puberulent on lower leaves, glabrous and slightly inflated on upper leaves; leaf blade green, flat, 2–5 × 0.2–0.4 cm, both surfaces pubescent, adaxial surface also shortly pilose along veins. Spike ellipsoid-ovoid, 1.5–3 × 0.8–1.6(–1.8) cm. Spikelets green, 9–14 mm, with 3–5 florets, villous. Glumes linear-lanceolate, laterally strongly compressed, asymmetric, contorted, nearly as long as spikelet including awns, keeled, with 2 or 3 distinct lateral veins, apex long acuminate with awn 4–6 mm. Lemma lanceolate, pubescent, apex gradually tapering to scabrous awn 4–5 mm; first lemma 6–7 mm excluding awn. Palea slightly shorter than or equaling lemma, sparsely shortly ciliate along keels; keels prolonged into 2 short, blunt teeth. Fl. and fr. Apr–May.

Wooded steppes, dry barren slopes, sands; 500–1600 m. Nei Mongol, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; Mediterranean region].

This is an excellent spring pasture grass for all kinds of animals.

**2. *Eremopyrum distans*** (K. Koch) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 52. 1934.

毛穗旱麦草 mao sui han mai cao

*Agropyron distans* K. Koch, Linnaea 21: 426. 1848; *A. lasianthum* Boissier; *A. orientale* (Linnaeus) Roemer & Schultes subsp. *distans* (K. Koch) Maire; *A. orientale* var. *lasian-*

*thum* (Boissier) Boissier; *Eremopyrum orientale* (Linnaeus) Jaubert & Spach var. *lasianthum* (Boissier) Maire; *Triticum lasianthum* (Boissier) Steudel.

Culms usually geniculate at base, 14–20 cm tall, hairy below spike. Leaf sheath slightly dilated but not inflated on uppermost leaf; leaf blade green, flat, 3–5 × 0.2–0.3 cm, scabrous, abaxial surface pubescent, adaxial surface shortly pilose. Spike oblong lobed or oblong-ovoid, 2–5.5 × 1.5–2.5 cm. Spikelets green or slightly purple tinged, 13–17 mm, with 3–5 florets, villous. Glumes linear, laterally strongly compressed, slightly contorted, equaling spikelet including awn, keeled, apex gradually tapering to slender, scabrous awn 6–8 mm. Lemma long villous, apex gradually tapering to slender, scabrous awn 5–7 mm. Palea apex acuminate; keels prolonged into 2 awned teeth 0.5–1.5 mm. Anthers yellow, ca. 1.5 mm. Fl. and fr. May–Jun.  $2n = 14$ .

Wooded steppes, arid areas; ca. 800 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; Europe].

**3. *Eremopyrum bonaepartis*** (Sprengel) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 52. 1934 [“*Buona-partis*”].

光穗旱麦草 guang sui han mai cao

*Triticum bonaepartis* Sprengel, Erster Nachtr. Bot. Gart. Halle, 40. 1801; *Agropyron bonaepartis* (Sprengel) T. Durand & Schinz; *A. patulum* Trinius, nom. illeg. superfl.; *A. turkestanicum* Gandoger; *Eremopyrum bonaepartis* var. *turkestanicum* (Gandoger) Tzvelev; *Triticum patulum* Willdenow, nom. illeg. superfl.

Culms geniculate and somewhat purple tinged near base, 5–30 cm tall, pubescent below spike. Leaf sheath not inflated on upper leaves, or slightly dilated on uppermost leaf, glabrous

or rarely puberulent, scabrous; leaf blade green, 0.2–0.5 cm wide, scabrous. Spike green or faintly colored, ovoid lobed, 2–4.5 × 1.5–2.5(–2.8) cm. Spikelets divergent, pectinately arranged, closely pressed to each other, lax at maturity, 12–15 mm, with 3–5 florets, glabrous. Glumes linear, laterally strongly compressed, 9–14 mm, shorter than spikelet, apex gradually tapering to subulate tip. Lemma linear-lanceolate, 12–14 mm, glabrous, apex gradually tapering to awn 1.5–3 mm. Palea shorter and narrower than lemma, shortly thickly ciliate along keels, apex 2-dentate. Fl. and fr. Apr–May.

A weed in desert and semi-desert zones. Xinjiang [Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; E Mediterranean region].

**4. *Eremopyrum triticeum*** (Gaertner) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 52. 1934.

旱麦草 han mai cao

*Agropyron triticeum* Gaertner, Novi Comment. Acad. Sci.

Imp. Petrop. 14: 539. 1770; *A. prostratum* (Pallas) P. Beauvois; *Eremopyrum prostratum* (Pallas) P. Candargy; *Secale prostratum* Pallas; *Triticum prostratum* (Pallas) Linnaeus f.

Culms geniculate at base, 10–30 cm tall, 3- or 4-noded, puberulent below spike. Leaf sheath inflated on upper leaves, glabrous or puberulent at base; ligule 0.5–1 mm, membranous, apex truncate; leaf blade thin, flat, 1.5–8 × 0.2–0.3 cm, both surfaces scabrous or sparsely puberulent. Spike ellipsoid-ovoid or subglobose, contracted, dense, 1–1.7(–2) × 0.6–1.6 cm. Spikelets closely imbricate, green, 6–10 mm, with 3–6 florets, glabrous. Glumes lanceolate, 4–6 mm, thickly keeled, glabrous, apex subulate. Lemma scabrous but first lemma ± puberulent, 5–6 mm, apex acuminate or with short awn 1–1.5 mm; callus ca. 0.4 mm. Palea shorter than lemma, apex 2-dentate. Fl. and fr. Apr–May.

Wooded and grassy steppes, dry slopes, semideserts, sands, pebbles, alkaline and saline soils; 800–1400 m. Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; Europe].

## 108. SECALE Linnaeus, Sp. Pl. 1: 84. 1753.

黑麦属 hei mai shu

Plants annual [rarely perennial]. Culms usually erect. Spike distichous, very dense; rachis usually very brittle, pubescent. Spikelets 1 per node, sessile, with 2 florets, occasionally with rudimentary 3rd floret. Glumes linear-subulate, keeled, hispid along keel, margin membranous, apex acuminate or awned. Lemma lanceolate, asymmetric, 5-veined with 2 marginal veins forming keels, hispid along keels, apex acuminate or tapering into long, straight, scabrous awn. Palea equaling lemma, smooth or scabrous along keels or ciliate distally, apex 2-dentate. Lodicules ciliate distally. Caryopsis oblong, somewhat laterally compressed, deeply furrowed, apex pubescent.  $x = 7$ .

About five species: mainly in temperate Europe and Asia; three species (two introduced) in China.

- 1a. Glume apex long awned, awn 2–3 × as long as glume body ..... 3. *S. sylvestre*  
 1b. Glume apex acuminate or shortly awned, awn very much shorter than lemma body.  
 2a. Spike rachis tough ..... 1. *S. cereale*  
 2b. Spike rachis fragile, or sometimes tough proximally ..... 2. *S. segetale*

**1. *Secale cereale*** Linnaeus, Sp. Pl. 1: 84. 1753.

黑麦 hei mai

*Triticum cereale* (Linnaeus) Salisbury (1796), not Schrank (1789); *T. secale* Link.

Culms erect, 80–180 cm tall, scabrous or villous below spike. Leaf blade glaucous, 10–20 × (0.2–)0.5–1 cm, glabrous or abaxial surface sparsely pilose. Spike erect, 5–15 × 1–1.5 cm excluding awns; rachis tough. Spikelets ca. 15 mm excluding awns, with 2(or 3) florets. Glumes linear or linear-lanceolate, 10–12 mm, scabrous along keels, margin membranous, apex usually acuminate. Lemma strongly compressed, 12–15 mm, pectinately spinose-ciliate along keels; awn 30–50 mm. Palea equaling lemma. Fl. and fr. Jul–Aug.  $2n = 14$ .

Cultivated. Anhui, Fujian, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Nei Mongol, Ningxia, Shaanxi, Taiwan, Xinjiang, Yunnan [widely cultivated elsewhere].

**2. *Secale segetale*** (Zhukovsky) Roshevitz, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 6: 143. 1947.

脆轴黑麦 cui zhou hei mai

*Secale cereale* Linnaeus subsp. *segetale* Zhukovsky, Trudy

Prikl. Bot. 19(2): 56. 1928; *S. afghanicum* (Vavilov) Roshevitz; *S. cereale* subsp. *afghanicum* (Vavilov) K. Hammer; *S. cereale* var. *afghanicum* Vavilov; *S. segetale* subsp. *afghanicum* (Vavilov) Bondar ex Korovina; *S. segetale* var. *afghanicum* (Vavilov) Tzvelev.

Culms tufted, erect or geniculate at base, glaucous, to 100 cm tall, glabrous, or pilose below spike. Leaf blade flat or involute, 10–40 × 0.3–0.8 cm, scabrous or adaxial surface pubescent. Spike 4–13 × ca. 1 cm excluding awns; rachis fragile, or sometimes tough proximally, margin ciliate. Spikelets lanceolate, 12–15(–17) mm, with 2(or 3) florets. Glumes 9–12 mm, glabrous or sparsely puberulent, shortly scabrous-ciliate along keels, apex acuminate or with awn to 5 mm. Lemma long lanceolate, 8–12 mm, glabrous, smooth, rarely scabrous; awn 20–70 mm. Palea equaling lemma. Fl. and fr. (May–)Jul–Aug.  $2n = 14^*$ .

A weed in fields of *Triticum*. Xinjiang [Kazakhstan, Kyrgyzstan, Pakistan, Turkmenistan, Uzbekistan; SW Asia].

**3. *Secale sylvestre*** Host, Icon. Descr. Gram. Austriac. 4: 7. 1809.

小黑麦 xiao hei mai



*Secale fragile* M. Bieberstein.

Culms densely tufted, rarely solitary, erect but usually geniculate at base, ca. 40 cm tall, glabrous but pilose below spike. Leaf blade flat or involute, 5–10 × 0.2–0.3 cm, both surfaces glabrous or adaxial surface pubescent. Spike erect, 3–8 × 0.8–1 cm excluding awns; rachis fragile, margin ciliate; inter-

nodes 3–4 mm. Spikelets with 2 or 3 florets. Glumes linear-subulate, 7–9 mm; awn ca. 20 mm. Lemma spinose-ciliate along keels. Caryopsis black-brown, ca. 5 mm, apex white hairy. Fl. and fr. Jun–Aug.  $2n = 14$ .

Cultivated in N China [native to Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; SW Asia, Europe].

## 109. TRITICUM Linnaeus, Sp. Pl. 1: 85. 1753.

小麦属 xiao mai shu

*Deina* Alefeld; *Nivieria* Seringe; *Zeia* Lunell, nom. illeg. superfl.

Plants annual. Culms usually erect, rarely decumbent at base. Leaf sheath split almost to base; ligule membranous; auricles lanceolate; leaf blade usually flat. Spike linear, oblong, or ovate, distichous; rachis disarticulating or not. Spikelets 1 per node, sessile, with (2 or)3–9(–11) florets; apical floret usually sterile; rachilla without joints. Glumes ovate, oblong, or elliptic, ± leathery, 3–11(–13)-veined with 1 or 2 veins raised as keels, glabrous or hairy, smooth or very scabrous along keels, apex obliquely truncate, 1- or 2-toothed, larger tooth sometimes extending into longish awn. Lemma 7–11(–15)-veined, ± keeled, apex awned or awnless; callus very short, obtuse. Palea usually slightly shorter than lemma. Lodicules ciliate at margin. Caryopsis ovate or oblong, ± plump, deeply furrowed, apex ± hairy.  $x = 7$ .

About 25 species: distributed as cultivated plants almost throughout temperate regions of both hemispheres, also on tropical mountains; four species (all introduced) in China.

The generic name "*Gigachilon*" (Seidl in Berchtold et al., Oekon.-Techn. Fl. Böhm. 1: 425. 1836) was merely cited in synonymy (of *Triticum polonicum*) and was therefore not validly published (Saint Louis Code, Art. 34.1(c)). Under Art. 43.1, combinations in "*Gigachilon*" published by Löve (Feddes Repert. 95: 496–498. 1984) were not validly published either.

An artificial hybrid between *Aegilops tauschii* (*Triticum tauschii*) (♀) and *T. urartu* Thumanjan ex Gandilyan (♂) was described as *T. ×teres* H. R. Jiang & X. X. Kong (Acta Bot. Boreal.-Occid. Sin. 6: 206. 1986); it is not treated in this account.

In addition, the following three species have been recorded as cultivated in China (FRPS 9(3): 48–51. 1987): *Triticum carthlicum* Nevski (as *T. turgidum* Linnaeus var. *carthlicum* (Nevski) Yan ex P. C. Kuo), *T. dicoccoides* (Körnicke) Schweinfurth (as *T. turgidum* var. *dicoccoides* (Körnicke) Bowden), and *T. timopheevii* (Zhukovsky) Zhukovsky.

- 1a. Spike linear; spikelets usually with 1 fertile floret ..... 1. *T. monococcum*  
 1b. Spike cylindric, oblong or branched at base; spikelets with 2 or more fertile florets.  
 2a. Glumes ovate or broadly so; lemma awnless to long awned ..... 4. *T. aestivum*  
 2b. Glumes narrow, ± lanceolate; lemma long awned.  
 3a. Spike dense, or relatively lax and then glumes 25–30 mm, herbaceous or submembranous ..... 2. *T. turgidum*  
 3b. Spike lax; glumes 12–15 mm, papery ..... 3. *T. turanicum*

### 1. *Triticum monococcum* Linnaeus, Sp. Pl. 1: 86. 1753.

一粒小麦 yi li xiao mai

*Crithodium monococcum* (Linnaeus) Á. Löve; *Nivieria monococcum* (Linnaeus) Seringe; *Triticum aestivum* Linnaeus var. *monococcum* (Linnaeus) L. H. Bailey; *T. sativum* Lamarck var. *monococcum* (Linnaeus) Vilmorin; *T. vulgare* Villars var. *bidens* Alefeld.

Culms tufted, erect, 70–120 cm tall, 3- or 4-noded, pale pubescent at nodes. Leaf sheath margin ciliolate; leaf blade broadly linear, to 1 cm wide, scabrous, glabrous or adaxial surface shortly pubescent. Spike laterally compressed, 3–7 cm excluding awns, glabrous, rarely pubescent, apex with sterile spikelets; rachis compressed, easily disarticulating. Spikelets with 2 or 3 florets, usually basal floret fertile. Glumes lanceolate or subobovate, 6–8(–9) mm, slightly shorter than proximal florets, obscurely 7-veined, usually glabrous and lustrous, 2-keeled; 1 keel prominent, scabrous distally, prolonged at apex into triangular, acute tooth 0.75–1.5 mm; other keel less prominent, prolonged at apex into much smaller, subacute tooth.

Lemma obscurely 9-veined; awn 5–10 cm. Palea usually longitudinally breaking at maturity. Caryopsis ca. 7 × 3 mm. Fl. and fr. Jun–Jul.  $2n = 14$ .

Possibly cultivated in N China as a food plant, in experimental fields, or in fields mixed with other *Triticum* [cultivated or wild in N Africa, SW Asia, and C and SE Europe].

It is not impossible that relict cultivation of *Triticum monococcum* occurs in China, but it is most unlikely and confirming records are needed.

### 2. *Triticum turgidum* Linnaeus, Sp. Pl. 1: 86. 1753.

圆锥小麦 yuan zhui xiao mai

Culms erect, 60–180 cm tall, 4- or 5-noded, smooth, glabrous. Leaf blade erect or nodding, green or greenish, broadly linear, pubescent or glabrous. Spike simple or branched at base, dense or relatively lax, pubescent or glabrous; rachis tough, margin very slightly ciliolate. Spikelets with 2–7 florets (perfect florets 3–5), sometimes densely pubescent at base. Glumes broadly lanceolate or oblong-lanceolate, 10–30 mm, shorter to longer than lemma, herbaceous, submembranous, leathery, or

papery, very prominently keeled, rough or prickly along keel, apex usually long awned, rarely awnless; keel crested, prolonged at apex into triangular, acute tooth. First lemma awn 12–19 cm or longer, stiff to relatively slender; more distal lemmas sometimes with apical point or awnless. Palea shorter than or equaling lemma. Caryopsis usually free from lemma and palea, plump or hard and vitreous. Fl. and fr. Jun–Aug.

Frequently cultivated for food. Beijing, Gansu, Henan, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [cultivated in E and N Africa, C and SW Asia, S Europe, the Mediterranean region, and South America (Argentina)].

- 1a. Glumes 25–30 mm, longer than lemma, herbaceous or submembranous, keeled; spike relatively lax ..... 2c. subsp. *polonicum*
- 1b. Glumes 10–12 mm, shorter than or equaling lemma, papery or leathery, keeled or winged; spike dense, simple or branched at base.
- 2a. Spike usually branched at base; glumes obviously shorter than lemma, papery, keeled ..... 2a. subsp. *turgidum*
- 2b. Spike simple, never branched at base; glumes slightly shorter than or equaling lemma, leathery, winged ..... 2b. subsp. *durum*

## 2a. *Triticum turgidum* subsp. *turgidum*

圆锥小麦(原亚种) yuan zhui xiao mai (yuan ya zhong)

*Triticum aestivum* Linnaeus subsp. *turgidum* (Linnaeus) Domin; *T. aestivum* var. *turgidum* (Linnaeus) Fiori; *T. compositum* Linnaeus; *T. sativum* Lamarck var. *compositum* (Linnaeus) Alph. Wood; *T. sativum* Lamarck var. *turgidum* (Linnaeus) Hackel; *T. turgidum* var. *compositum* (Linnaeus) Gaudin; *T. vulgare* Villars var. *turgidum* (Linnaeus) Alefeld.

Spike usually branched at base, dense. Glumes obviously shorter than lemma, papery, keeled. Fl. and fr. Jun–Jul.  $2n = 28$ .

Frequently cultivated for food. Beijing, Gansu, Henan, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan; probably other provinces [cultivated in C and SW Asia and S Europe].

**2b. *Triticum turgidum* subsp. *durum*** (Desfontaines) Husnot, Graminées, 80. 1899.

硬粒小麦 ying li xiao mai

*Triticum durum* Desfontaines, Fl. Atlant. 1: 114. 1798; *T. aestivum* subsp. *durum* (Desfontaines) Thellung; *T. aestivum* var. *durum* (Desfontaines) Fiori; *T. pyramidale* Percival; *T. sativum* subsp. *durum* (Desfontaines) K. Richter; *T. turgidum* convar. *durum* (Desfontaines) Bowden; *T. vulgare* var. *durum* (Desfontaines) Alefeld.

Spike simple, never branched at base, dense. Glumes 10–12 mm, slightly shorter than or equaling lemma, leathery, winged. Fl. and fr. Jun–Jul.  $2n = 28$ .

Frequently cultivated for food in China [cultivated in E Africa, C and SW Asia, S Europe, and the Mediterranean region].

**2c. *Triticum turgidum* subsp. *polonicum*** (Linnaeus) Thellung, Naturwiss. Wochenschr., n.s., 17: 470. 1918.

波兰小麦 bo lan xiao mai

*Triticum polonicum* Linnaeus, Sp. Pl., ed. 2, 1: 127. 1762; *Deina polonica* (Linnaeus) Alefeld; *T. aestivum* var. *polonicum* (Linnaeus) L. H. Bailey; *T. petropavlovskiyi* Udachin & Migushova; *T. polonicum* var. *tibeticum* Udachin; *T. turgidum* convar. *polonicum* (Linnaeus) Mackey; *T. turgidum* var. *polonicum* (Linnaeus) Yan ex P. C. Kuo.

Spike relatively lax. Glumes 25–30 mm, longer than lemma, herbaceous or submembranous, keeled. Fl. and fr. Jun–Aug.  $2n = 28$ .

Frequently cultivated for food in China [cultivated in E and N Africa, C and SW Asia, S Europe, and South America (Argentina)].

**3. *Triticum turanicum*** Jakubziner, Selektivs. Semenov. (Moscow) 14(5): 46. 1947.

杂生小麦 za sheng xiao mai

*Triticum orientale* Percival, Wheat Pl. Monogr. 155, 204. 1921, not M. Bieberstein (1808); *T. durum* Desfontaines subsp. *turanicum* (Jakubziner) L. B. Cai; *T. percivalianum* Parodi, nom. illeg. superfl.; *T. turgidum* Linnaeus convar. *turanicum* (Jakubziner) Mackey; *T. turgidum* subsp. *turanicum* (Jakubziner) A. Löve & D. Löve.

Culms 120–130 cm tall; upper internodes solid. Leaf blade nodding, long, puberulent. Spike lax, 9–15 × ca. 1 cm; rachis tough, margin ciliate; internodes 5–6.5 mm. Spikelets 16–20 mm, with 3–5 florets (perfect florets 3 or 4). Glumes narrow, 12–15 × ca. 4 mm, keel distinct, puberulent, apex acute, tooth very short. Lemma awn nearly black, 14–16 mm, scabrous. Palea equaling lemma. Caryopsis usually free from lemma and palea, 10–12 × ca. 3 mm, vitreous. Fl. and fr. Jun–Jul.  $2n = 28$ .

Usually in fields mixed with other *Triticum*, rarely cultivated for food in China. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan; SW Asia (Iran)].

**4. *Triticum aestivum*** Linnaeus, Sp. Pl. 1: 85. 1753, nom. cons.

小麦 xiao mai

Culms hollow, 60–130(–150) cm tall, ca. 5-noded; nodes glabrous. Leaf blade flat, 10–24 × 0.4–1.5 cm, usually glabrous. Spike lax or dense, usually narrowed distally, square or sub-square in cross section, 5–18 cm, with up to 29 spikelets; rachis disarticulating or tough and not disarticulating, margin ciliate; internodes 3–4 mm. Spikelets with 4–9 florets (distal florets sterile). Glumes laxly appressed or adnate to floret, ovate or elliptic, sometimes very hard, distinctly or indistinctly to obscurely keeled, pubescent or glabrous; keel sometimes prolonged at apex into shortish tooth; tooth apex subobtusate, acute, or tapering into short awn. Lemma oblong-lanceolate, pubescent or glabrous, awnless to long awned; awn usually divergent. Palea subequaling lemma. Anthers yellow or purplish. Caryopsis usually free from lemma and palea. Fl. and fr. Apr–Aug.

Commonly cultivated, e.g., in fields of *Hordeum* and *Triticum*; below 3500 m. Throughout China [cultivated worldwide].

- 1a. Glumes obscurely keeled proximally, indistinctly so distally; spike rachis usually tough and not disarticulating ..... 4a. subsp. *aestivum*
- 1b. Glumes distinctly keeled; spike rachis disarticulating.
- 2a. Glumes adnate to floret, very hard ..... 4b. subsp. *yunnanense*
- 2b. Glumes laxly appressed to floret ..... 4c. subsp. *tibeticum*

#### 4a. *Triticum aestivum* subsp. *aestivum*

小麦(原亚种) xiao mai (yuan ya zhong)

*Triticum aestivum* var. *hybernum* (Linnaeus) Fiori, nom. rej.; *T. compactum* Host; *T. hybernum* Linnaeus, nom. rej.; *T. sativum* Lamarck, nom. illeg. superfl.; *T. sativum* var. *aestivum* (Linnaeus) Alph. Wood; *T. sativum* var. *vulgare* Hackel, nom. illeg. superfl.; *T. segetale* Salisbury, nom. illeg. superfl.; *T. vulgare* Villars (1787), nom. illeg. superfl., not (Linnaeus) Salisbury (1796); *T. vulgare* var. *aestivum* (Linnaeus) Spenner; *Zeia vulgaris* Lunell, nom. illeg. superfl.; *Z. vulgaris* var. *aestiva* (Linnaeus) Lunell.

Spike rachis usually tough and not disarticulating. Glumes obscurely keeled proximally, indistinctly so distally; keel prolonged at apex into shortish tooth; tooth apex subobtusely acute, or tapering into short awn. Fl. and fr. Jun–Aug.  $2n = 42^*$ .

Commonly cultivated throughout China [cultivated worldwide].

**4b. *Triticum aestivum* subsp. *yunnanense*** King ex S. L. Chen, *Novon* 7: 230. 1997.

云南小麦 yun nan xiao mai

Spike rachis easily disarticulating. Glumes adnate to floret, very hard, distinctly keeled. Fl. and fr. Apr–Aug.  $2n = 42^*$ .

• Cultivated for food in SW Yunnan; 1500–3000 m.

**4c. *Triticum aestivum* subsp. *tibeticum*** J. Z. Shao, *Acta Genet. Sin.* 7(2): 155. 1980.

西藏小麦 xi zang xiao mai

Spike rachis disarticulating. Glumes laxly appressed to floret, distinctly keeled.  $2n = 42^*$ .

• Fields of *Hordeum* and *Triticum*; 1700–3500 m. Xizang.

### 110. AEGILOPS Linnaeus, Sp. Pl. 2: 1050. 1753.

山羊草属 shan yang cao shu

*Aegilops* subg. *Gastropyrum* Jaubert & Spach; *Gastropyrum* (Jaubert & Spach) Á. Löve; *Patropyrum* Á. Löve.

Plants annual. Culms usually erect. Leaf sheath split almost to base; auricles crescent-shaped; leaf blade usually flat. Spike cylindrical, lanceolate, or ovoid, dense; rachis disarticulating below each spikelet into segments. Spikelets 1 per node, sessile and fitting into rachis, cylindrical or turgid, with 2–8 florets; rachilla not jointed, shortly pilose. Glumes rounded abaxially, leathery or cartilaginous, many veined, not keeled, apex truncate or toothed; teeth usually prolonged into longish awns. Lemma oblong or lanceolate, rounded abaxially, leathery-membranous to leathery, 5–7-veined, not keeled, apex usually 1–3-toothed or -awned; callus very short, obtuse. Palea equaling or subequaling lemma, ciliate along keels. Caryopsis free or adherent to lemma and palea, oblong-ovate, furrowed, apex hairy.  $x = 7$ .

About 21 species: mainly in the Mediterranean region, extending into N Africa and eastward to C Asia; one species in China.

In addition, the following mainly Mediterranean species have been recorded as cultivated in China (FRPS 9(3): 39–43. 1987): *Aegilops biuncialis* Visiani, *A. cylindrica* Host, *Aegilops ovata* Linnaeus, *A. triaristata* Willdenow, *A. triuncialis* Linnaeus, *A. umbellulata* Zhukovsky, and *A. ventricosa* Tausch. It is not clear in which sense the ambiguous name *A. ovata* was used: that of *A. geniculata* Roth, which has been its traditional application, or that of *A. neglecta* Requier ex Bertoloni, where its lectotype illustration is said to belong.

#### 1. *Aegilops tauschii* Cosson, Notes Pl. Crit. 69. 1850.

山羊草 shan yang cao

*Patropyrum tauschii* (Cosson) Á. Löve; *Triticum tauschii* (Cosson) Schmalhaus.

Culms 20–40 cm tall. Leaf sheath glabrous but margin ciliate; ligule 0.5–1 mm, membranous; leaf blade 4–6 × ca. 0.3 cm, scabrous, adaxial surface pilose. Spike cylindrical, with (5–) 7–10(–13) spikelets. Spikelets cylindrical, ca. 9 mm, with 3 or

4(or 5) florets. Glumes 4–6 mm, leathery, 7–9(–10)-veined, apex truncate or slightly toothed. Lemma lanceolate, 5-veined; first lemma ca. 7 mm; awn 1–4 cm. Palea equaling lemma. Fl. and fr. May–Jun.  $2n = 14$ .

Stony slopes, fields of *Triticum*, weedy places. Henan, Shaanxi, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; SW Asia].

The name *Aegilops squarrosa* Linnaeus has been misapplied to this species by some authors.

## 16. Tribe CENTOTHECEAE

假淡竹叶族 jia dan zhu ye zu

Liu Liang (刘亮); Sylvia M. Phillips

Annuals or perennials. Leaf blades broad with cross veins and sometimes a pseudopetiole; ligule a short scarious rim, sometimes ciliate. Inflorescence a panicle or composed of racemes. Spikelets all alike, laterally compressed, florets 1 to many, upper