

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 “Mongolia 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 Evropejskoi 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 pubescent; 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].

Flora of China 22: 437–439. 2006.