

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. obvipo-dus*
 - 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. ruoqi-angensis*
 - 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. tianschanicus*
 - 12b. Glumes shorter than spikelet.
 - 16a. Glumes oblong-lanceolate, apex with awn 4–5 mm 5. *L. aristiglu-mis*
 - 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. yiu-nensis*
 - 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

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

伊吾赖草 yi wu lai cao

Leymus yiunensis 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 yiunensis 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. yiunensis*.

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 ori-

ginal 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. Pflanzen. 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, ciliate 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. Tsent. 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, Bemerck. 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 chinensis* (Trinius ex Bunge) Keng; *E. auritus* Keng; *Leymus auritus* (Keng) Á. 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, ciliolate 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 obvipedus* 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 persistent 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 ciliolate; 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, ciliolate 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 ciliolate; ligule ca. 0.5 mm, apex truncate; leaf blade 10–20 × ca. 0.3 cm, abaxial sur-

face 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 Trinius 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].

