

14. Tribe **BROMEAE**

雀麦族 que mai zu

Liu Liang (刘亮), Chen Shouliang (陈守良), Zhu Guanghua (朱光华); Klaus H. Ammann, Sylvia M. Phillips

Annual or perennial. Leaf sheaths often tubular with connate margins; leaf blades linear; ligule membranous. Inflorescence a panicle, large and open or contracted. Spikelets all alike, florets several to many with the uppermost reduced, laterally compressed, disarticulating below each floret; glumes persistent, shorter than lowest lemma, entire; lemmas herbaceous to leathery, keeled or rounded, 5–13-veined, apex \pm 2-lobed, with straight or recurved subapical awn, rarely awnless; lodicules glabrous; ovary with an apical hairy lobed appendage, stigmas subterminal, plumose. Caryopsis narrowly ellipsoid to linear, hollowed on hilar face, embryo small, hilum linear. Leaf anatomy non-Kranz; microhairs absent; starch grains of endosperm simple, rounded. $x = 7$.

Two or three genera and ca. 150 species: mainly in temperate regions of the N hemisphere; two genera and 59 species (11 endemic, at least three introduced) in China.

Bromeae resembles *Poeae* morphologically, but is characterized by the distinctive, hairy, apical appendage on the ovary, persisting on the mature grain. The simple, rounded starch grains in the endosperm are another unusual feature, linking the tribe to *Triticeae*.

- 1a. Margins of leaf sheaths free and overlapping 96. *Littledalea*
1b. Margins of leaf sheaths connate for most of their length 97. *Bromus*

96. **LITLEDALEA** Hemsley, Hooker's Icon. Pl. 25: t. 2472. 1896.

扇穗茅属 shan sui mao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials, often rhizomatous. Leaf sheaths with free margins overlapping almost to the base. Panicle open or loosely contracted, composed of few spikelets. Spikelets large, wedge-shaped to oblong, flat, florets few to several; glumes unequal, membranous or scariosus, shorter than florets, lower glume 1–3-veined, upper glume 3–5-veined; floret callus small, rounded; lemmas elliptic-oblong, usually papery, rounded on back, 7–9-veined, glabrous or puberulous, apex obtuse to truncate and erose, awnless or infrequently mucronate; palea shorter and narrower than lemma, scabrid to ciliate along keels, apex 2-toothed. Anthers 3, usually nearly as long as palea.

Four species: China, Kazakhstan, Kyrgyzstan, ?Nepal, Tajikistan; four species (three endemic) in China.

This is a small genus of decorative, mountain grasses with large, usually papery spikelets, almost endemic to China.

- 1a. Culms 15–25 cm; panicle contracted, branches erect, much shorter than spikelets 1. *L. alaica*
1b. Culms 25–70 cm; branches flexuously spreading, longer than spikelets.
2a. Lemma apex narrowly obtuse or emarginate and mucronate; palea 2/3–7/8 lemma length, keels ciliate 2. *L. przewalskyi*
2b. Lemma apex rounded, sometimes erose; palea 1/2–2/3 lemma length, keels scabrid-ciliolate.
3a. Lemmas puberulous, lowest 1.2–1.5 cm; leaf blades pubescent; pedicels scabrid; if panicle branch
2-spiculate, lower spikelet sessile 3. *L. tibetica*
3b. Lemmas almost smooth, lowest 1.4–2.7 cm; leaf blades subglabrous; pedicels smooth; if panicle branch 2-spiculate, both spikelets on long pedicels 4. *L. racemosa*

1. **Littledalea alaica** (Korshinsky) Petrov ex Nevski, Fl. URSS 2: 553. 1934.

帕米尔扇穗茅 pa mi er shan sui mao

Bromus alaicus Korshinsky, Zap. Imp. Akad. Nauk Fiz.-Mat. Otd. 4: 101. 1896.

Culms erect, 15–25 cm tall. Leaf sheaths pubescent, auriculate, auricles linear, reflexed; leaf blades gray-green, usually convolute, abaxial surface smooth, adaxial surface scabrid; ligule densely puberulous. Panicle contracted, racemose; branches erect, 1–1.5 cm, much shorter than spikelets. Spikelets 2.5–3.5 cm, florets 5–11; lower glume 8–10 mm, 1–3-veined, upper glume 10–13 mm, 3–5-veined; lemmas elliptic-lanceolate, lowest 1.5–1.7 cm, purple with brown apex, faintly 7–13-veined, back glabrous, margins ciliolate toward apex, apex obtuse or emarginate; palea 2/3 lemma length. Fl. and fr. Jun–Aug.

Stony mountain slopes, scree and sand. Qinghai, Xizang [Kazakhstan, Kyrgyzstan (Alai Mountains), Tajikistan (Pamirs)].

2. **Littledalea przewalskyi** Tzvelev, Rast. Tsent. Azii 4: 173. 1968.

泽沃扇穗茅 ze wo shan sui mao

Perennial, rhizomatous, basal sheaths papery, in tight bunches, eventually becoming fibrous. Culms solitary or tufted, 25–70 cm tall, ca. 2 cm in diam. Leaf sheaths glabrous, scaberulous toward ligule; leaf blades convolute, gray-green, 9–20 cm \times 0.8–3 mm, abaxial surface smooth, adaxial surface scabrid, apex acute; ligule 1–2.5 mm. Panicle 5–19 cm, lax, racemose, few-spiculate; branches mostly unbranched, flexuous, scabrid or almost smooth, bearing 1 or rarely 2 spikelets. Spikelets wedge-shaped, 1.6–3 cm, florets 5–11; rachilla scabrid; glumes lanceolate to oblong, apex obtuse to acute with ciliolate margin, lower glume 4–9 mm, upper glume 6–14 mm; lemmas

elliptic-oblong, lowest 1.1–1.8 cm, herbaceous with scarios margins and apex, back scabrid on lateral veins and toward apex, otherwise smooth, apex narrowly obtuse or emarginate, often with mucro to 2.5 mm from sinus; palea 2/3–7/8 lemma length, longer than anthers, keels ciliate. Anthers 4–6.7 mm.

- Steep clay slopes; 2200–5700 m. Gansu, Qinghai, Xizang.

The name "*Littledalea tibetica* var. *paucispica*" (Keng, *Claves Gen. Sp. Gram. Prim. Sin.* 173. 1957) belongs here, but was not validly published because no Latin description was provided.

3. *Littledalea tibetica* Hemsley, Hooker's Icon. Pl. 25: t. 2472. 1896.

藏扇穗茅 zang shan sui mao

Perennial, rhizomatous. Culms tussocky, 40–70 cm tall, ca. 1.5 mm in diam. Leaf sheaths glabrous or lower pubescent; leaf blades usually convolute, 2–10(–15) cm × 0.2–4 mm, both surfaces pubescent or abaxial surface glabrous, subacute; ligule 1–4 mm. Panicle 7–11 cm, lax, sometimes reduced to a few-spicate raceme; branches mostly unbranched, flexuous, scabrid, lower often binate, each bearing 1 spikelet or a close pair, lateral spikelet on ca. 1 mm pedicel, slightly narrower than terminal spikelet. Spikelets oblong to wedge-shaped, 1.3–2.5 cm, purple and golden brown, florets 2–8; rachilla scabrid or smooth; glumes variable, apex obtuse with ciliolate margin, lower glume oblong to oblanceolate, 2.5–9 mm, upper glume broadly oblong to oblanceolate, 5–11 mm; lemmas elliptic-oblong, lowest 1.2–1.5 cm, papery becoming membranous toward apex, veins scaberulous, back scaberulous-puberulous especially lower flanks, apex rounded, minutely ciliolate; palea 1/2–2/3 lemma length, keels scabrid-ciliolate. Anthers 4–5 mm. Fl. and fr. Jul–Aug.

- Rocky slopes, river gravel; 5000–5500 m. Xizang, Yunnan [Nepal].

This species is very close to *Littledalea racemosa*, but the spikelets are slightly smaller and, when paired, more bunched on the panicle branches. The leaf blades are also hairier.

Hara et al. (*Enum. Fl. Pl. Nepal* 1: 137. 1978) cited *Stainton 4356* and *Stainton 4357* from Nepal.

4. *Littledalea racemosa* Keng, *Contr. Biol. Lab. Chin. Assoc. Advancem. Sci., Sect. Bot.* 9: 136. 1934.

扇穗茅 shan sui mao

Perennial, rhizomatous. Culms solitary or tufted, 25–40 cm tall, ca. 2 mm in diam. Leaf sheaths loose, papery, smooth, glabrous; leaf blades flat or loosely convolute, 3.5–22 cm × 2–5 mm, abaxial surface glabrous, adaxial surface puberulous, subacute; ligule 1–5 mm. Panicle 7–16 cm, usually reduced to a lax raceme of 3–9 spikelets; branches unbranched, flexuous, smooth, lower binate, each bearing 1 or 2 spikelets, lateral spikelets on pedicels ca. 1 cm or more long. Spikelets wedge-shaped, 2.2–3.2 cm, purple and golden brown, florets 5–8; rachilla smooth; glumes narrowly lanceolate to elliptic, apex acute to erose, lower glume lanceolate, (3–)7–9 mm, upper glume broadly lanceolate or elliptic, 12–15 mm; lemmas narrowly elliptic-oblong, lowest 1.4–2.7 cm, papery, membranous, smooth or scaberulous near margins and apex, apex rounded or erose; palea 1/2 lemma length or less, keels scabrid-ciliolate. Anthers 4.5–7.5 mm. Fl. and fr. Jul–Aug.

- Stony mountainsides, alpine steppe, river gravel; 2700–5000 m. Qinghai, Sichuan, Xizang, Yunnan.

The spikelets are variable in size, but always striking because of their colorful, conspicuously papery texture and very obtuse lemmas.

97. *BROMUS* Linnaeus, Sp. Pl. 1: 76. 1753.

雀麦属 que mai shu

Liu Liang (刘亮), Zhu Guanghua (朱光华); Klaus H. Ammann

Bromopsis (Dumortier) Fourreau; *Ceratochloa* P. Beauvois; *Nevskiella* Kreczetowicz & Vvedensky.

Annuals or perennials. Culms erect, tufted or with rhizomes. Leaf sheaths closed; leaf blades linear, usually flat; ligules membranous. Panicles spreading or contracted, branches scabrid or pubescent, elongated or arched. Spikelets large, with 3 to many florets, upper florets often sterile; rachilla disarticulating above glumes and between florets, scabrid or shortly hairy; glumes unequal or subequal, shorter than spikelet, lanceolate or nearly ovate, (1–)5–7-veined, apex acute or long acuminate or aristiform; floret callus glabrous or both sides thinly hairy; lemmas rounded on back or compressed to keel, 5–9(–11)-veined, herbaceous or nearly leathery, margins often membranous, apex entire or 2-toothed; awn terminal or arising from lemma between teeth slightly under apex, rarely awnless or 3-awned; palea narrow, usually shorter than lemma, keels ciliate or scabrid. Lodicules 2. Stamens 3. Ovary apex with appendage; styles 2, arising from lower front of appendage. Caryopsis oblong, apex hairy, adaxial surface sulcate. Chromosomes large, $x = 7$, $2n = 14, 28, 42, 56, 70$.

About 150 species: temperate regions, mainly in the N hemisphere, also on mountains in the tropics; 55 species (eight endemic, at least three introduced) in China.

In addition to the species treated below, *Bromus pubescens* Muhlenberg ex Willdenow (*Enum. Pl.* 120. 1809) was recorded by Jung et al. (Taiwania 51: 2. 2005) from a roadside at 2400 m in Taiwan (Nantou).

1a. Spikelets strongly laterally compressed, lemmas 7–13-veined, keeled (*B.* sect. *Ceratochloa* (P. Beauvois) Grisebach).

2a. Perennial; leaf sheaths retrorsely pubescent; lemmas often hairy, awn 5–7 mm 53. *B. marginatus*

2b. Annual; leaf sheaths glabrous; lemmas mostly glabrous, mucronate or awned.

- 3a. Lemmas awnless or with mucro, ca. 1 mm; palea 1/2 lemma length 54. *B. catharticus*
 3b. Lemmas with ca. 10 mm awn; palea subequal to lemma 55. *B. carinatus*
- 1b. Spikelets slightly laterally compressed to ± cylindrical, lemmas 5–9-veined, rounded on back.
- 4a. Perennials, tufted or rhizomatous.
- 5a. Glumes subequal to lower florets; awn stout, recurved, mostly as long as lemma; panicle narrow, branches simple (*B. sect. Sinobromus* Keng ex P. C. Keng).
- 6a. Lower glume 5–8 mm, upper glume 7–12 mm; lemmas 8–10 mm 24. *B. himalaicus*
 6b. Lower glume 8–15 mm, upper glume 11–17 mm; lemmas 9–16 mm.
- 7a. Glumes glabrous.
- 8a. Culms 50–70 cm tall, nodes 3; lemmas glabrous 26. *B. epilis*
 8b. Culms up to 100 m tall, nodes 7–8; lemmas marginally and distally pubescent 27. *B. mairei*
- 7b. Glumes pubescent.
- 9a. Panicle branches each with 1–5 spikelets; spikelets 12–20 mm; awn arising near lemma apex 28. *B. sinensis*
 9b. Panicle branches each with 1 apical spikelet; spikelets 18–25 mm; awn arising between apical lobes 25. *B. porphyranthos*
- 5b. Glumes conspicuously shorter than lower florets; awn slender, straight, mostly shorter than lemma; panicle contracted to effuse (*B. sect. Bromopsis* Dumortier).
- 10a. Plants usually more than 1 m tall; lemma with long or short awn.
- 11a. Plants tufted, without rhizomes or stolons; culms with 6–9 nodes.
- 12a. Lemma 3–5-veined; rachilla clearly visible from side in mature spikelet.
- 13a. Rachilla internodes 3–4 mm; lemma 5-veined, ca. 12 mm 1. *B. magnus*
 13b. Rachilla internodes 1–2 mm; lemma 3-veined, ca. 10 mm 2. *B. plurinodis*
- 12b. Lemma often 7-veined; rachilla not visible from side of intact mature spikelet.
- 14a. Panicles contracted; lemmas 10–12 mm 3. *B. erectus*
 14b. Panicles spreading; lemmas 12–15 mm.
- 15a. Panicle branches 3–5 cm, with 1–3 spikelets 4. *B. pseudoramosus*
 15b. Panicle branches up to 20 cm, with 2–9 spikelets 5. *B. ramosus*
- 11b. Plants rhizomatous; culms often with fewer than 6 nodes.
- 16a. Plants with long creeping rhizomes.
- 17a. Panicles spreading 7. *B. pumpellianus*
 17b. Panicles narrow.
- 18a. Panicles racemelike; lemmas glabrous 6. *B. stenostachyus*
 18b. Panicles narrowly contracted; lemmas pubescent on veins.
- 19a. Lemma pubescent along keel and marginal veins to middle or slightly above; awn 1–5 mm 8. *B. sibiricus*
 19b. Lemma pubescent on marginal veins almost to apex; awn up to 2 mm 14. *B. korotkiji*
- 16b. Plant with short rhizomes.
- 20a. Panicle branches (2–)6–9 per node.
- 21a. Awns 1–1.5 mm; rachilla not visible from side, internodes very short 13. *B. inermis*
 21b. Awns 5–10 mm; rachilla clearly visible from side, internodes 3–4 mm 12. *B. remotiflorus*
- 20b. Panicle branches 2–5 per node.
- 22a. Leaf blades 3–5 mm wide 9. *B. staintonii*
 22b. Leaf blades 5–12 mm wide.
- 23a. Lemmas 11–14 mm; anthers 2.5–3 mm 10. *B. benekenii*
 23b. Lemmas 10–12 mm; anthers 1–1.2 mm 11. *B. ciliatus*
- 10b. Plants less than 1 m tall (if more than 1 m, then lemma awn shorter than 3 mm, sometimes absent).
- 24a. Awns absent or less than 2(–4) mm; plants with long rhizomes.
- 25a. Lemmas glabrous, scabrid near base; anthers 3–4 mm 13. *B. inermis*
 25b. Lemmas pilose, at least on keel and marginal veins; anthers 5–6 mm 14. *B. korotkiji*
- 24b. Awns more than 2 mm; plants tufted or rhizomatous.
- 26a. Plants with long downwardly extending rhizomes 15. *B. formosanus*
 26b. Plants tufted or with short rhizomes.
- 27a. Plants loosely tufted, or with short inconspicuous rhizomes.
- 28a. Plants ca. 20 cm tall; panicle contracted, lower branches crowded 20. *B. variegatus*
 28b. Plants 20–60 cm tall; panicle open, lower branches not crowded, spreading.
- 29a. Plants ca. 60 cm tall, with short rhizomes 21. *B. confinis*
 29b. Plants ca. 20–50 cm tall, tufted.
- 30a. Awns ca. 3 mm 17. *B. paulsenii*
 30b. Awns 8–12 mm.
- 31a. Panicle branches each with 2–4 spikelets; spikelets 2–2.5 cm 22. *B. morrisonensis*
 31b. Panicle branches each with 1 or 2 spikelets; spikelets 3–4 cm 23. *B. nepalensis*

- 27b. Plants densely tufted.
- 32a. Plants 40–90 cm tall.
- 33a. Lower glume 8–10 mm, upper glume 10–12 mm 17. *B. paulsenii*
- 33b. Lower glume 5–6 mm, upper glume 7–8 mm 19. *B. tytholepis*
- 32b. Plants up to 40(–50) cm tall.
- 34a. Awns 6–8 mm 16. *B. riparius*
- 34b. Awns 3–5 mm.
- 35a. Leaf blades ca. 5 mm wide; panicles 10–12 cm 17. *B. paulsenii*
- 35b. Leaf blades 1.5–2 mm wide; panicles 5–9 cm.
- 36a. Panicle branches scabrid, shorter than spikelet; lemmas glabrous, often scabrid 17. *B. paulsenii*
- 36b. Panicle branches slender, flexuous, often longer than spikelets; lemmas pubescent 18. *B. cappadocicus*
- 4b. Annuals.
- 37a. Spikelets broadened upward, wedge-shaped; glumes narrow, lower glume 1(–3)-veined, upper glume 3(–5)-veined.
- 38a. Awn 4–6 times length of lemma; lemma apex minutely 2-toothed (*B. sect. Nevskiella* (Kreczetowicz & Vvedensky) Tourmay) 35. *B. gracillimus*
- 38b. Awn 1–3 times length of lemma; lemma apex clearly 2-toothed, teeth 3–7 mm (*B. sect. Genea* Dumortier).
- 39a. Panicle lax, branches spreading or drooping.
- 40a. Panicle much branched, branches longer or shorter than spikelets, pubescent; spikelets 1–8 per branch, secund 29. *B. tectorum*
- 40b. Panicle simple, branches up to 10 cm, with 1 or no branchlets; spikelets sparse, 1 or 2(or 3) per branch 30. *B. sterilis*
- 39b. Panicle contracted, branches erect or ascending, never drooping.
- 41a. Lower glume 15–20 mm; lemmas 20–30 mm, awn 30–40 mm 31. *B. rigidus*
- 41b. Lower glume 6–10 mm; lemmas 10–15 mm, awn 10–20 mm.
- 42a. Panicle lax; branches 2–3 cm, scabrid; culms glabrous below inflorescence; stamens 2 32. *B. madritensis*
- 42b. Panicle contracted; branches shorter than spikelets, ca. 1 cm, culms pubescent below inflorescence; stamens usually 3.
- 43a. Plants 5–15 cm tall; panicle ca. 5 cm, branches each with 1 or 2 spikelets; lemmas 13–15 × 1–1.5 mm 33. *B. fasciculatus*
- 43b. Plants 30–40 cm tall; panicle ca. 10 cm, branches each with 4 or 5 spikelets; lemmas 10–13 × ca. 2 mm 34. *B. rubens*
- 37b. Spikelets narrowed upward, oblong-lanceolate; glumes broad, lower glume 3–5-veined, upper glume 5–9-veined (*B. sect. Bromus*).
- 44a. Lemmas 3-awned 52. *B. danthoniae*
- 44b. Lemmas 1-awned.
- 45a. Spikelets (2–)3–4 cm; lemmas 14–18 mm.
- 46a. Spikelets oblong-lanceolate, ca. 6 mm wide; lemma apex deeply toothed, teeth (1.5–)3–4 mm; panicle open, branches several times longer than spikelets, nodding.
- 47a. Lower glume ca. 10 mm; lemma 15–18 mm, awn 20–25 mm, lower part slightly flattened, twisted, conspicuously recurved 48. *B. oxyodon*
- 47b. Lower glume 5–8 mm; lemma 10–15 mm, awn 8–17 mm, terete, straight, usually erect 49. *B. pectinatus*
- 46b. Spikelets broadly elliptic, ca. 10 mm wide; lemma apex shallowly toothed, teeth 1–2 mm; panicle slightly contracted, branches not longer than spikelets, obliquely ascending.
- 48a. Lemma scabrid; awn 5–10 mm, straight; anthers 2–3 mm; panicle branches on 1 side of axis 50. *B. grossus*
- 48b. Lemma smooth; awn 10–20 mm, conspicuously recurved; panicle branches on all sides on axis 51. *B. lanceolatus*
- 45b. Spikelets (1–)1.5–2.5(–3) cm; lemmas 5–11 mm.
- 49a. Lemma margins inrolled, not covering adjacent florets; rachilla internodes exposed in mature spikelets 36. *B. secalinus*
- 49b. Lemma margins overlapping adjacent florets; rachilla internodes enclosed in mature spikelets.
- 50a. Lemmas 5–7 mm; awn shorter than lemma body, straight; spikelets 1–1.5(–2.5) cm.
- 51a. Lemmas 6–11 mm; anthers 1.5–3 mm; caryopsis enclosed by lemma, not exposed 41. *B. racemosus*
- 51b. Lemmas 5–6 mm; anthers 0.5–1.5 mm; caryopsis longer than lemma, exposed.
- 52a. Culms 30–50 cm tall; leaf blades ca. 10 cm; panicle 5–10 cm; lemmas 5.5–6.5 mm 37. *B. lepidus*
- 52b. Culms ca. 10 cm tall; leaf blades 3–4 cm; panicle ca. 3 cm; lemmas 4–5 mm 38. *B. brachystachys*
- 50b. Lemmas 8–12 mm, awn as long as or longer than lemma body, straight or recurved; spikelets (1.5–)2–3 cm.

- 53a. Lemmas broadly ovate-elliptic, 3–4 mm wide in side view, margins broadly membranous with a conspicuous obtuse angle about halfway between base and apex; panicle subracemose, branches each with 1 or 2 apical spikelets 39. *B. squarrosus*
- 53b. Lemmas elliptic, ca. 2 mm wide in side view, margins without any conspicuous angle; panicle laxly spreading or contracted.
- 54a. Panicle lax, open, 15–25 cm, branches and pedicels longer than spikelets.
- 55a. Anthers ca. 4 mm; palea subequal to lemma; leaf sheaths glabrous 40. *B. arvensis*
- 55b. Anthers 0.5–3 mm; palea conspicuously shorter than lemma; leaf sheaths pubescent.
- 56a. Awns straight; all awns within a spikelet subequal 41. *B. racemosus*
- 56b. Awns curved outward, lower awns within a spikelet shorter than upper awns.
- 57a. Lemma 10–15 mm, apex deeply 2-lobed, acuminate; awn arising 3–4 mm below apex, terete, spreading 49. *B. pectinatus*
- 57b. Lemma 8–10 mm, apex with short, obtuse teeth; awn arising 1–2 mm below apex, base slightly flattened, recurved outward when mature 42. *B. japonicus*
- 54b. Panicle contracted, 3–10 cm, branches and pedicels shorter than spikelets.
- 58a. Lemmas glabrous; awn as long as or slightly longer than lemma body.
- 59a. Panicle ca. 10 cm; lower glume ca. 7 mm, awn straight, arising ca. 1 mm below lemma apex; anthers ca. 1 mm 43. *B. sewerzowii*
- 59b. Panicle 3–7 cm; lower glume 3–4 mm; awn curved downward, arising 1.5–3 mm below lemma apex; anthers 0.3–0.6 mm.
- 60a. Panicle with few spikelets, 1-sided; lemmas 8–10 mm, apical teeth 0.5–1 mm 44. *B. tythanthus*
- 60b. Panicle dense, with many clustered spikelets; lemmas 7–8 mm, apical teeth 1.3–2.5 mm 45. *B. scoparius*
- 58b. Lemmas pubescent; awn slightly shorter than lemma body.
- 61a. Plant 40–80 cm tall; culms pubescent on nodes and below panicle, panicle branches and pedicels pubescent; awns slender, straight 46. *B. hordeaceus*
- 61b. Plant 20–40(–60) cm tall; culms, panicle branches, and pedicels glabrous; awns conspicuously recurved, base slightly flattened, twisted.
- 62a. Spikelets 10–15 mm; lower glume 2/3 as long as upper glume; lemma apex with 2–3 mm teeth; anthers ca. 1 mm 47. *B. intermedius*
- 62b. Spikelets 15–50 mm; glumes subequal; lemma apex with 1–1.5 mm teeth; anthers 1–1.5 mm 39. *B. squarrosus*

1. *Bromus magnus* Keng, Sunyatsenia 6: 53. 1941.

大雀麦 da que mai

Perennial. Culms 1–1.2 m tall, loosely tufted, (3–)6–8-noded. Leaf sheaths pubescent; leaf blades 20–30 cm × 6–8 mm, adaxial surface pubescent, scabrid; ligule 3–4 mm, apex lacerate. Panicle spreading, ca. 30 cm, slightly nodding; branches 2 per node, up to 15 cm. Spikelets ca. 25 × 5–6 mm, florets 5–7(–9); rachilla internodes 3–4 mm, shortly hairy, laterally visible and conspicuously exposed; glumes narrow, margins membranous, lower glume 7–8 mm, 1-veined, upper glume 9–11 mm, 3-veined; lemmas narrow, ca. 12 × ca. 1 mm in side view, 5-veined, intermediate veins inconspicuous, proximally sparsely scabrid, awned from apex; awn 4(–7) mm, slender, straight. Anthers ca. 3 mm. Fl. and fr. Jul–Aug.

• *Picea* forest margins, gravel thickets, river banks, meadows; 2300–3800 m. Gansu, Qinghai, Sichuan, Xizang.

2. *Bromus plurinodis* Keng, Fl. Tsinling. 1(1): 439. 1976.

多节雀麦 duo jie que mai

Perennial. Culms erect, up to 1 m tall, ca. 5 mm in diam., glabrous, 7–9-noded. Leaf sheaths longer than internodes, scabrid, persistent when dry; brown membranous; leaf blades 20–30 cm × 6–8 mm, adaxial surface pubescent, margins scabrid; ligule 2–4 mm. Panicle 20–30 cm; branches 2–4 per node,

obliquely ascending, up to 15 cm, scabrid. Spikelets 15–20 × ca. 2 mm, florets 5–7; rachilla internodes 2–2.5 mm, shortly hairy, laterally visible; glumes narrow, margins membranous, lower glume ca. 5 mm, 1-veined, apex acuminate, upper glume 6–9 mm, 3-veined, apex long acuminate; lemmas narrow, ca. 10 × ca. 1 mm in side view, 3-veined, keel scabrid, lower margins and veins proximally minutely hairy, pubescent throughout, awned from apex; awn 10(–14) mm, slender, straight; palea 6–7 mm, keels thinly ciliate. Anthers ca. 2 mm. Fl. and fr. Jun–Aug.

• Thickets, meadows, ditch banks, grassy places on rocky slopes; 2000–3600 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, SE Xizang, Yunnan.

3. *Bromus erectus* Hudson, Fl. Angl. 39. 1762.

直立雀麦 zhi li que mai

Bromopsis erecta (Hudson) Fourreau; *Festuca erecta* (Hudson) Wallroth; *Forasaccus erectus* (Hudson) Bubani; *Schedonorus erectus* (Hudson) Gaudin ex Roemer & Schultes; *Zerna erecta* (Hudson) Panzer.

Perennial. Culms erect, densely tufted, 40–100 cm tall, slender or stout. Leaf sheaths glabrous or scattered pubescent; leaf blades 20–35 cm, lower leaves inrolled, 2–3 mm wide, upper leaf blades flat, 2–3 mm wide, glabrous or scattered pubes-

cent, apex acuminate; ligule ca. 2 mm. Panicle erect, 10–20 cm, contracted; branches obliquely ascending, each bearing 1–4 spikelets; pedicels as long as or shorter than spikelets. Spikelets lanceolate-oblong, ca. 15–25(–30) mm, florets 5–12; rachilla internodes ca. 2.5 mm; lower glume 7–12 mm, 1–3-veined, upper glume 8–14 mm, 3-veined; lemmas 10–12 mm, glabrous or sometimes hairy, 7-veined, margins inrolled when mature; awn (1–)2–6 mm, slender, straight; palea slightly shorter than lemma. Anthers 4–7 mm. Fl. May–Jul. $2n = 28, 56, 70$.

River valleys, plains, wet grassy places on dry river beds; ca. 4600 m. Xizang [Europe].

4. *Bromus pseudoramosus* Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 347. 1982.

假枝雀麦 jia zhi que mai

Perennial. Culms loosely tufted, erect, 70–120 cm tall, 2–3 mm in diam., glabrous, 5–8-noded. Leaf sheaths glabrous or with sparse hairs, upper sheaths with leaf auricles; leaf blades 20–45 cm × 4–9 mm, abaxial surface and margins scabrid, adaxial surface pubescent; ligule ca. 1.5 mm. Panicle spreading, 20–30 cm, nodding; branches 2 per node, 3–5 cm, scabrid, slender, curved, each bearing 1–3 spikelets. Spikelets 20–25 × 6–10 mm, tinged with purple, florets 6–10; rachilla internodes ca. 2 mm, minutely hairy, laterally visible; lower glume ca. 8–10 mm, 1-veined, upper glume 11–13 mm, 3-veined, margins pubescent, not membranous, apex acuminate-mucronate; lemmas lanceolate, 12–15 × 1.5–2 mm in side view, inconspicuously 7-veined, margins pubescent, awned from apex; awn 4(–9) mm, slender, straight; palea slightly shorter than lemma and narrow, keels ciliate. Anthers ca. 2 mm.

- Alpine meadows; ca. 3600 m. Xizang, NW Yunnan.

No material has been seen of *Bromus pseudoramosus* var. *sedgioides* B. S. Sun & H. Peng (Guihaia 13: 224. 1993), described from Guizhou (Hezhang).

5. *Bromus ramosus* Hudson, Fl. Angl. 40. 1762.

类雀麦 lei que mai

Bromopsis ramosa (Hudson) Holub; *Bromus asper* Murray; *Forasaccus asper* (Murray) Bubani; *Zerna aspera* (Murray) Panzer; *Z. ramosa* (Hudson) Lindman.

Perennial. Culms loosely tufted, erect, 60–150 cm tall, ca. 6 mm in diam., 7–8-noded; densely and shortly pubescent. Leaf sheaths pubescent with reflexed 1–2 mm hairs, narrow auricles present at mouth; leaf blades soft, 10–40 cm × 7–15 mm, scattered pubescent; ligule ca. 2 mm, glabrous. Panicle 15–40 cm, broad, loosely nodding; branches 2 per node, up to 20 cm, each bearing 2–9 spikelets, lowermost branches with ciliate bracts at base. Spikelets elliptic-oblong, 20–30 × 4–6 mm, florets 4–10; lower glume subulate, 6–8 mm, 1-veined, upper glume lanceolate, 9–11 mm, 3-veined, apex mucronate or shortly awned; lemmas lanceolate, 10–13 mm, 7-veined, veins and margins pubescent; awn 5–8 mm, straight; palea conspicuously shorter than lemma, keels minutely ciliate. Anthers 2–3 mm. Fl. and fr. Jun–Aug. $x = 21$; $2n = 42$.

Thickets in forested areas, roadsides, grassy places; 2900–3500 m. Xizang (Yadong) [Kashmir, Pakistan; N Africa, SW Asia, Europe].

Bromus ramosus is closely related to *B. benekenii*, but they hybridize only very rarely.

6. *Bromus stenostachyus* Boissier, Fl. Orient. 5: 643. 1884.

窄序雀麦 zhai xu que mai

Bromopsis stenostachya (Boissier) Holub; *Zerna stenostachya* (Boissier) Nevski.

Perennial, with slender creeping rhizomes, base covered by dry leaf sheaths. Culm base decumbent, later erect, up to 100 cm tall, slender. Leaf sheaths pubescent to hispid, with auricles at mouth; leaf blades linear-acuminate, grayish green, ca. 15 cm × 2–3 mm, both surfaces very shortly pubescent, margins scabrid. Panicle 11–18 cm, racemelike; branches short, each bearing 1 spikelet. Spikelets oblong or cuneate, 20–25 mm, later lax, florets 7–9; lower glume 6–8 mm, 3-veined, upper glume 9–12 mm, 3-veined, glabrous, apex acuminate; lemmas oblong, 10–16 mm, 5–9-veined, glabrous, shiny, apex acuminate, emarginate; awn 3–4 mm; palea shorter than lemma, keels ciliate. Anthers 4–5 mm. Fl. May–Jul.

High-elevation slopes; 3000–4200 m. Xinjiang [Afghanistan, Pakistan; SW Asia (Iran)].

7. *Bromus pumpellianus* Scribner, Bull. Torrey Bot. Club 15: 9. 1888.

紧穗雀麦 jin sui que mai

Bromopsis pumpelliana (Scribner) Holub; *Bromus inermis* (Leysser) Holub subsp. *pumpellianus* (Scribner) Wagnon; *B. uralensis* Govoruchin; *Zerna pumpelliana* (Scribner) Tzvelev.

Perennial, with creeping stolons. Culms erect, 60–120 cm tall, 4–6-noded, with dense, reflexed hairs. Leaf sheaths glabrous or sparsely reflexed pubescent; leaf blades ca. 15 cm × 6–7 mm, adaxial surface sparsely pubescent, abaxial surface and margin scabrid; ligule ca. 1 mm, apex erose. Panicle spreading, ca. 20 cm; branches 2–4 per node, 2–6 cm, each bearing 1 or 2 spikelets. Spikelets 25–40 × 5–8 mm wide, florets 9–13; rachilla internodes 2–2.5 mm, pubescent or spinulose; lower glume 7–9 mm, 1-veined, upper glume 9–11 mm, 3-veined, margins membranous, apex acuminate; lemmas lanceolate, 10–14 × ca. 1.5 mm in side view, 7-veined, intermediate and marginal veins short or inconspicuous, margins membranous, keel and margins often proximally stiffly pubescent, hairs 1–2 mm, awned from apex; awn 2–5 mm; palea slightly shorter than lemma, keels stiffly ciliate. Anthers 4–6 mm. Fl. and fr. Jun–Aug. $2n = 28$.

Mid-mountain meadows, thickets, grassy areas in river valleys; 1000–2500 m. Heilongjiang, Nei Mongol, Shanxi [Russia; W North America].

The stiff hairs of the spikelets are the only consistent and easily interpreted character by which this species can be separated from *Bromus inermis*. However, this is generally not a very reliable character in *Bromus*.

This species has been incorrectly named *Bromus richardsonii* Link by some authors.

8. *Bromus sibiricus* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 12: 229. 1914.

西伯利亚雀麦 xi bo li ya que mai

Bromus inermis Leysser var. *sibiricus* (Drobow) Krylov.

Perennial, with creeping stolons, base brown, covered by dry leaf sheaths. Plants 20–100 cm tall, nodes pubescent. Leaf sheaths smooth, glabrous; leaf blades flat, ca. 15 cm, scabrid, glabrous or scattered pubescent; ligule ca. 0.5 mm. Panicle 8–15(–20) cm, erect, narrow, contracted, sometimes nodding; branches shorter than spikelets, each bearing 1 or 2 spikelets. Spikelets narrowly oblong, 15–25 mm, purple, florets 4–8; rachilla thinly hairy; glumes glabrous, lower glume 6–8 mm, 1- or 3-veined, upper glume 7–10 mm, 3-veined; lemmas lanceolate, 10–12 mm, 5–7-veined, marginal veins densely pubescent to middle or slightly above, midrib and intermediate veins pubescent or scabrid; awn 1–5 mm; palea shorter than lemma, keels ciliate. Anthers 2–4 mm. Fl. and fr. Jun–Aug.

Plains, grassy places; 500–1000 m. Hebei, Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia); Europe].

It is difficult to distinguish *Bromus sibiricus* from *B. inermis*, and the former species could well be merely a dwarf form of the latter.

9. *Bromus staintonii* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 125. 1978.

大序雀麦 da xu que mai

Perennial, with short rhizomes. Culms tufted, ca. 1 m tall. Leaf sheaths pubescent or with reflexed hairs, scabrid along veins, mouth with auricles; leaf blades soft, ca. 20 cm × 3–5 mm, abaxial surface and margins scabrid, adaxial surface pubescent; ligule ca. 1 mm, abaxial surface hairy. Panicle spreading, ca. 25 cm; branches 2–5 per node, up to 12 cm, scabrid, each bearing 2 or 3 spikelets. Spikelets ca. 20 mm, florets 7–9; rachilla internodes 3–4 mm, shortly hairy; glumes scabrid, margins membranous, lower glume 6–7 mm, 1-veined, upper glume 8–10 mm, 3-veined, apex long acuminate to aristiform; lemmas narrow, 10–12 mm, 5–7-veined, pubescent; awn 4–11 mm, not recurved, scabrid; palea subequal to lemma, keels shortly stiffly ciliate. Anthers ca. 3 mm. Fl. and fr. Jun–Aug.

Grassy slopes; 2700–3200 m. S Xizang [Bhutan, N India, Kashmir, Nepal].

10. *Bromus benekenii* (Lange) Trimen, J. Bot. 10: 333. 1872 [“*benekeni*”].

密丛雀麦 mi cong que mai

Schedonorus benekenii Lange, Fl. Dan. 48: 5. 1871; *Bromus asper* Murray var. *benekenii* (Lange) Syme; *B. ramosus* Hudson var. *benekenii* (Lange) Ascherson & Graebner.

Perennial, rhizomes crowded. Culms densely tufted, 50–120 cm tall, erect, minutely hairy. Leaf sheaths densely pubescent with reflexed hairs or upper part glabrous; leaf blades flat, 10–25 cm × 5–12 mm, scattered pubescent, margins densely hairy. Panicle spreading, 12–20 × 10–15 cm, 1-sided, apex nodding; branches elongate, slender, bearing 1–4 spikelets, lowermost branches with basal non-ciliate bracts. Spikelets lanceolate-acuminate, 15–30 mm, florets 5–9; glumes scabrid, lower glume linear-lanceolate, 7–8 mm, 1-veined, upper glume oblong-lanceolate, 9–11 mm, 3-veined; lemmas narrowly lanceolate, 11–14 mm, pubescent; awn 5–8 mm, straight; palea conspicuously shorter than lemma. Anthers 2.5–3 mm. Fl. Jun–Jul. $2n = 28$.

Forest margins, thickets, upland meadows, river valley grasslands. Xinjiang [Kazakhstan, Russia; SW Asia, Europe].

11. *Bromus ciliatus* Linnaeus, Sp. Pl. 1: 76. 1753.

加拿大雀麦 jia na da que mai

Bromopsis canadensis (Michaux) Holub; *Bromus canadensis* Michaux; *B. yezoensis* Ohwi; *Zerna yezoensis* (Ohwi) Sugimoto.

Perennial, with short rhizomes. Culms 70–120 cm tall, pubescent with reflexed hairs, 6-noded. Leaf sheaths pubescent; leaf blades 2–3 cm × 6–10 mm, glabrous or sparsely pilose on adaxial surface; ligule ca. 1 mm. Panicle broadly ovoid, nodding, 15–25 cm; branches 2 or 3 per node, curved, each bearing 1–3 spikelets. Spikelets 15–20 mm, green with membranous yellowish brown apex, florets 6 or 7; rachilla 1–2 cm, sparsely pubescent; glumes scabrid on keel, lower glume 6–7 mm, 1-veined, upper glume narrow, 8–9 mm, 3-veined; lemmas 10–12 mm, 5–7-veined, pilose near margins in lower half and along lower 1/3 of midrib, back glabrous, apex obtuse or bilobed, awned from between teeth; awn 2–6 mm, erect; palea 8–9 mm, keels ciliate. Anthers 1–1.5 mm. Fl. and fr. Jul–Sep. $2n = 14$.

Mid-elevation mountains, low-elevation wet forested places, meadows. Nei Mongol [Japan, Mongolia, Russia (Far East); North America].

12. *Bromus remotiflorus* (Steudel) Ohwi, Acta Phytotax. Geobot. 4: 58. 1935.

疏花雀麦 shu hua que mai

Festuca remotiflora Steudel, Syn. Pl. Glumac. 1: 315. 1854; *Bromus pauciflorus* (Thunberg) Hackel (1899), not Schumacher (1801); *F. pauciflora* Thunberg.

Perennial, with short rhizomes. Culms 60–120 cm tall, 6- or 7-noded, nodes pubescent. Leaf sheaths densely retrorsely pubescent; leaf blades 20–40 cm × 4–8 mm, adaxial surface pubescent; ligule 1–2 mm. Panicle large, lax, 20–30 cm; branches 2–6 per node, long, slender, scabrid, nodding when mature, spikelets few. Spikelets (15–)20–25(–40) × 3–4 mm, florets 5–10; rachilla internodes 3–4 mm, clearly laterally visible; glumes narrowly lanceolate, lower glume 5–7 mm, 1-veined, upper glume 8–12 mm, 3-veined, apex acuminate to mucronate; lemmas narrowly lanceolate, 10–12(–15) × ca. 1.2 mm in side view, 7-veined, glabrous, margins membranous, apex acuminate; awn 5–10 mm; palea narrow, shorter than lemma, keels thinly ciliate. Anthers 2–3 mm. Caryopsis 8–10 mm. Fl. and fr. Jun–Jul. $2n = 14$.

Slopes, forest margins, roadsides, riverside grassy places; 1800–3200(–4100) m. Anhui, Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Korea].

13. *Bromus inermis* Leysser, Fl. Halens. 16. 1761.

无芒雀麦 wu mang que mai

Bromopsis inermis (Leysser) Holub; *Bromus pskemensis* Pavlov; *Zerna inermis* (Leysser) Lindman.

Perennial, with spreading rhizomes. Culms loosely tufted, erect, 50–120 cm tall, glabrous or retrorsely hairy below nodes. Leaf sheaths glabrous or shortly hairy; leaf blades flat, 20–30 cm × 4–8 mm, both surfaces and margins scabrid, glabrous or margins sparsely ciliate, apex acuminate, ligule 1–2 mm. Panicle dense at first, spreading after anthesis, 10–20 cm; branches 3–5 per node, up to 10 cm, scabrid, each bearing 2–6 spikelets. Spikelets 15–25 mm, florets 6–12; rachilla internodes 2–3 mm, spinulose; glumes lanceolate, margins membranous, lower glume 4–7 mm, 1-veined, upper glume 6–10 mm, 3-veined; lemmas oblong-lanceolate, 8–12 mm, 5–7-veined, glabrous, base scabrid, apex obtuse or emarginate; awn up to 3–4 mm, or awnless; palea shorter than lemma, keels ciliate. Anthers 3–4 mm. Fl. and fr. Jul–Sep. $2n = 14, 28, 56$.

Gullies on slopes, roadsides, river banks, dominant species of mountain meadows; 1000–3500 m. Gansu, Guizhou, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Uzbekistan; SW Asia (Caucasus), Europe].

This species has been spread worldwide through seed production for pasture and fodder.

14. *Bromus korotkiji* Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 12: 238. 1914.

甘蒙雀麦 gan meng que mai

Bromopsis korotkiji (Drobow) Holub; *B. pumpelliana* (Scribner) Holub subsp. *korotkiji* (Drobow) Tzvelev; *B. pumpelliana* var. *ircutensis* (Komarov) Tzvelev; *Bromus ircutensis* Komarov; *Zerna korotkiji* (Drobow) Nevski.

Perennial, with long, creeping rhizome; old basal sheaths lacerate to fibrous. Culms erect, 70–90 cm tall, stout, hard, densely retrorsely pubescent below nodes and in inflorescence. Leaf sheaths longer than internodes, densely pubescent to glabrous; leaf blades hard, 15–30 cm × 3–6 mm, adaxial surface pubescent; ligule brown, ca. 1 mm, hard. Panicle erect, narrow, 7–15 cm; branches 2–5 per node, erect, ca. 1–2(–5) cm, shortly hairy, each bearing 1 or 2 spikelets. Spikelet 1.5–3.5 × ca. 1 cm, florets 5–10, light brown sometimes violet tinged; rachilla 2–4 mm, laterally visible, sparsely to densely pilose; glumes membranous, glabrous, lower glume narrowly lanceolate, 6–8 mm, 1-veined, upper glume narrowly lanceolate, 6–11 mm, 3-veined; lemmas broadly lanceolate, 10–15 mm, 5–7-veined, margins densely pubescent with white, 1–2 mm hairs, apex obtuse; awn absent; palea narrow, subequal to lemma, keels ciliate in upper part. Anthers 5–7 mm. Fl. and fr. May–Sep.

Wet riverside sands, sand dunes. Gansu, Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

15. *Bromus formosanus* Honda, Bot. Mag. (Tokyo) 42: 136. 1928.

台湾雀麦 tai wan que mai

Perennial, with downwardly extending long rhizomes and dense, fibrous roots up to 20 cm deep. Culms 20–30 cm tall, ca. 1 mm in diam. Leaf sheaths persistent; leaf blades 10–20 cm × 3–5 mm, glabrous, apex acuminate; ligule ca. 0.5 mm. Panicle

10–12 cm, nearly racemose; branches paired, slender, bearing few spikelets. Spikelets elliptic-lanceolate, ca. 20 × 5–9 mm, purplish brown, florets 5–7; rachilla internodes exposed, 2–3 mm, loosely pubescent; glumes pubescent, apex acute, lower glume linear-lanceolate, 8–9 mm, 1-veined, upper glume 10–12 mm, 3-veined; lemmas long elliptic, 15(–18) × ca. 2 mm in side view, 7-veined, scabrid, margins densely pubescent, awned from apex; awn 3–7 mm, straight; palea ca. 9 mm, keels densely ciliate. Anthers ca. 2 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Alpine areas, rock crevices, cliffs, exposed rocks; 3500–3800 m. Taiwan.

16. *Bromus riparius* Rehmman, Verh. Naturf. Vereins Brünn. 10: 8. 1872 [“1871”].

山丹雀麦 shan dan que mai

Bromopsis riparia (Rehmann) Holub; *Zerna riparia* (Rehmann) Nevski.

Perennial, with short rhizomes, base covered by fibrous dry leaf sheaths. Culms densely tufted, 30–50(–90) cm tall. Leaf sheaths ± scattered villous; leaf blades narrowly linear, 15–20 cm × 1–2 mm, scabrid, margins ciliate; ligule short. Panicle lax, 10–15 × ca. 10 cm; branches obliquely erect, scabrid, bearing 1 or 2 spikelets. Spikelets wedge-shaped, 25–35 × 6–7 mm, florets 5–7, lax; rachilla 3–4 mm, shortly hairy, laterally visible; glumes apex acuminate, lower glume 8–10 mm, 1–3-veined, upper glume 9–12 mm; lemmas 11–13 mm, puberulous along sides or throughout, 5–7-veined, membranous, apex acuminate; awn 5–8 mm, slender, straight; palea shorter than lemma, keels spinulose. Anthers ca. 6 mm. Fl. and fr. May–Jul. $2n = 56$.

Dry meadows, grasslands, forest margins, low-mountain thickets, on calcareous soils. Gansu [Russia (European part, adventive in Far East); SW Asia, Europe].

No specimens of this species were found in PE.

17. *Bromus paulsenii* Hackel ex Paulsen, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1903: 174. 1903.

波申雀麦 bo shen que mai

Bromopsis angrenica (Drobow) Holub; *B. pamirica* (Drobow) Holub; *B. paulsenii* (Hackel ex Paulsen) Holub; *B. paulsenii* subsp. *angrenica* (Drobow) Tzvelev; *B. paulsenii* subsp. *pamirica* (Drobow) Tzvelev; *B. paulsenii* subsp. *turkestanica* (Drobow) Tzvelev; *B. turkestanica* (Drobow) Holub; *Bromus angrenicus* Drobow; *B. pamiricus* Drobow; *B. turkestanicus* Drobow; *Zerna angrenica* (Drobow) Nevski; *Z. pamirica* (Drobow) Nevski; *Z. paulsenii* (Hackel ex Paulsen) Nevski subsp. *pamirica* (Drobow) Tzvelev; *Z. turkestanica* (Drobow) Nevski.

Perennial, often with rhizomes, basal sheaths persistent, fibrous or lacerate. Culms densely tufted, erect or geniculately ascending, 20–40 cm tall, pubescent or upper part often glabrous, 2-noded. Leaf sheaths smooth, glabrous; leaf blades linear-acuminate, hard, erect, flat or slightly inrolled, 8–15 cm × (2–)3–5 mm, densely pubescent; ligule short. Panicle ovoid, erect or spreading, (6–)10–12 × 5–6 cm; branches paired or single, often shorter than spikelet, scabrid, each bearing 1 spike-

let. Spikelets lanceolate, 20–25 mm, florets 5–7, yellow; glumes lanceolate, glabrous, apex acuminate, lower glume 6–8 mm, 3–5-veined, upper glume 8–10 mm, 3–5-veined; lemmas broadly lanceolate, ca. 10 mm, 7-veined, glabrous, smooth or scabrid, margins and apex dry membranous; awn 3–5 mm, straight. Fl. Jun–Aug.

Grassy slopes; 2000–4000 m. Nei Mongol, Xinjiang [Afghanistan, Kazakhstan (Tien Shan), Kyrgyzstan, Tajikistan (Pamirs), Uzbekistan].

18. *Bromus cappadocicus* Boissier & Balansa, Bull. Soc. Bot. France 4: 306. 1857.

卡帕雀麦 ka pa que mai

Bromus tomentellus Boissier subsp. *cappadocicus* (Boissier & Balansa) Tzvelev.

Perennial, old basal sheaths persistent, fibrous. Culms densely tufted, slender, 25–45 cm tall. Leaf sheaths smooth, glabrous; leaf blades flat or inrolled, 4–10 cm × ca. 1.5 mm, scattered pubescent or glabrous, apex acuminate, cauline leaves short. Panicle ovate-elliptic, 5–9 cm, erect; branches 2–3 per node, slender, reflexed, nodding, each bearing 1 or 2 spikelets. Spikelets 15–25 × 3–5 mm, florets 5 or 6, green or grayish white; glumes unequal, lower glume 5–7 mm, upper glume 7–8 mm; lemmas lanceolate, 8–10 mm, pubescent, thin, awned from apex; awn 4–5(–10) mm, straight or slightly recurved; palea shorter than lemma. Anthers 2–2.5 mm. Fl. Jun–Jul. $2n = 42, 56$.

Dry slopes; 1000–3200 m. Gansu [SW Asia (Caucasus, Iran, Turkey), Europe].

19. *Bromus tytholepis* (Nevski) Nevski in Komarov, Fl. URSS 2: 563. 1934.

土沙雀麦 tu sha que mai

Zerna tytholepis Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 16. 1934; *Bromopsis tytholepis* (Nevski) Holub.

Perennial, base enclosed in old withered leaf sheaths. Culms densely tufted with many tillers, 50–90 cm tall, 4–6-noded, uppermost node ca. 1/2 way up culm, pubescent below nodes. Leaf sheaths glabrous or pubescent; leaf blades narrowly linear, flat, 15–20 cm × 3–5 mm, densely pubescent or glabrous, margins scabrid; ligule ca. 1.5 mm. Panicle narrow, contracted, 7–15 cm, axis scabrid; branches 2–6 per node, each bearing 1 or 2 spikelets. Spikelets linear-lanceolate, 20–25 mm, pale green or slightly yellow or tinged with purple, florets 5–11; lower glume 5–6 mm, 1-veined, upper glume 7–8 mm, 3-veined; lemmas 5–7-veined, 8–9 mm, glabrous, scabrid, awned from apex; awn 2–3 mm, scabrid. Fl. and fr. Jun–Jul.

Dry rocky slopes. Xinjiang [E Kazakhstan, Kyrgyzstan, Tajikistan].

20. *Bromus variegatus* M. Bieberstein, Fl. Taur.-Caucas. 3: 79. 1819.

变色雀麦 bian se que mai

Bromopsis variegata (M. Bieberstein) Holub; *Zerna variegata* (M. Bieberstein) Nevski.

Perennial, old basal sheaths persistent. Culms ca. 20 cm tall, glabrous. Leaf sheaths densely pubescent in lower part; leaf blades ca. 5 cm × 2–4 mm, glabrous or both surfaces pubescent, adaxial surface and margins scabrid. Panicle contracted, 5–10 cm; lower branches crowded, erect, each bearing 5–15 clustered spikelets. Spikelets 15–25 mm, green or tinged with purple, florets 5–7; glumes acuminate, lower glume 7–10 mm, 1-veined, upper glume oblong, 8–12 mm, 5-veined; lemmas 10–12 mm, glabrous or scabrid, awned from apex; awn 4–9 mm. $2n = 14$.

Grassy slopes; (1600–)2400–3800 m. Xizang [Afghanistan; SW Asia].

21. *Bromus confinis* Nees ex Steudel, Syn. Pl. Glumac. 1: 320. 1854.

毗邻雀麦 pi lin que mai

Bromopsis confinis (Nees ex Steudel) Holub; *Bromus inermis* Leysser var. *confinis* (Nees ex Steudel) Stapf; *B. munroi* Boissier.

Perennial, with short rhizomes. Culms erect, ca. 60 cm tall, ca. 5 mm in diam., 3- or 4-noded. Leaf sheaths smooth, glabrous; leaf blades firm, 20–40 cm × 3–4 mm, adaxial surface and margins scattered pubescent; ligule ca. 2 mm. Panicle 10–16 cm; branches scabrid, varying in length, 2–4 per node, often with a single apical spikelet. Spikelets 15–25 mm, often purple, florets 5–7(–11); glumes narrowly lanceolate, pubescent or scabrid along keels; rachilla pubescent; lower glume ca. 7 mm, 1-veined, upper glume ca. 9 mm, 3-veined; lemmas 10–15 mm, abaxially pubescent, marginal veins densely hairy, awned from apex; awn 2.5(–6) mm, straight; palea as long as lemma, keels ciliate. Anthers ca. 4 mm. Fl. Jun–Aug.

Open grassy places; 1000–2000 m. Gansu [NW India, Pakistan; SW Asia].

22. *Bromus morrisonensis* Honda, Bot. Mag. (Tokyo) 43: 137. 1928.

玉山雀麦 yu shan que mai

?*Bromus piananensis* (Ohwi) L. Liu; ?*B. remotiflorus* (Steudel) Ohwi var. *piananensis* Ohwi.

Perennial. Culms tufted ca. 30 cm tall, ca. 1 mm in diam. Leaf sheaths densely pubescent; leaf blades ca. 15 cm × ca. 3 mm; ligule ca. 0.5 mm. Panicle spreading, ca. 15 cm; branches 5–8 cm, each bearing 2–4 spikelets in upper part. Spikelets 20–25 mm, florets 9–11; rachilla ca. 2 mm, shortly hairy; lower glume narrow, ca. 5 mm, 1-veined, upper glume ca. 7 mm, 3-veined; lemmas 7–9 × ca. 1.2 mm in side view, thickly chartaceous, 5-veined, intermediate veins inconspicuous, awned from apex; awn 5(–9) mm, straight; palea slightly shorter than lemma, keels sparsely ciliate. Anthers ca. 2 mm. Fl. and fr. Jul–Aug.

• Grassy places on gravel slopes; ca. 2800 m. Taiwan.

The identity of *Bromus piananensis* is uncertain. The type, a specimen from Taiwan, has not been seen.

23. *Bromus nepalensis* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 125. 1978.

尼泊尔雀麦 ni bo er que mai

Perennials. Culms tufted, erect from an oblique base, ca. 50 cm tall, glabrous. Lower leaf sheaths shortly pilose, upper sheaths glabrous; leaf blades flat, 5–10 cm × 2.5–4 mm, veins fine, abaxial surface glabrous, adaxial surface scattered pubescent, apex acuminate; ligule 0.5–1 mm, lacerate. Panicle spreading, 8–15 cm, nodding, rachis glabrous; branches 3–5 per lower node, 2–4 cm, slender, recurved, scabrid, each bearing 1 or 2 spikelets. Spikelets 3–4 cm, keel distally scabrid, compressed; rachilla internodes ca. 2 mm, thick, pubescent; lower glume lanceolate, 5–6 mm, 3-veined, apex acuminate, upper glume ca. 8 mm, broadly lanceolate, 5–7-veined, apex acute or obtuse; lemmas 11–13 mm, conspicuously 5–7-veined, abaxial surface pubescent, awned from apex; awn 8–12 mm, straight; palea subequal to lemma. Anthers 0.8–1 mm, brownish purple. Fl. May–Aug.

River banks, grassy places, thickets on slopes; ca. 3000 m. Xizang [Nepal].

24. *Bromus himalaicus* Stapf in J. D. Hooker, Fl. Brit. India 7: 358. 1896 [“1897”].

喜马拉雅雀麦 xi ma la ya que mai

Bromopsis himalaica (Stapf) Holub; *Zerna himalaica* (Stapf) Henrard.

Perennial, loosely tufted. Culms erect, 50–70 cm tall, 3–4-noded, nodes pubescent with retrorse hairs. Leaf sheaths pubescent; leaf blades flat, 10–20 cm × 4–6 mm, adaxial surface pubescent, abaxial surface and margin scabrid; ligule 1–3.5 mm, brown. Panicle 10–25 cm, simple; branches 1–3 per node, spreading or drooping, bearing 1–3 spikelets. Spikelets 1.5–2.5 cm, florets 6–12; lower glume narrow, 5–8 mm, 1-veined, apex acute to awned, upper glume 7–12 mm, 3(–5)-veined, keel scabrid, apex often shortly awned; lemmas 8–10 mm, herbaceous, 5–7-veined, hairy near margins, apex acuminate; awn as long as or longer than lemma, 10–15 mm, scabrid, recurved outward; palea shorter than lemma, apex obtusely rounded, keels spinulose. Anthers 2–3 mm. Fl. and fr. Jun–Aug. $2n = 14$.

Alpine meadows; 3000–3500 m. Xizang (Yadong), Yunnan (Gaoiligong Shan) [Bhutan, India (Darjeeling, Sikkim), Nepal].

25. *Bromus porphyranthos* Cope, Fl. Pakistan 143: 574. 1982.

大药雀麦 da yao que mai

Bromus himalaicus Stapf var. *grandis* Stapf in J. D. Hooker, Fl. Brit. India 7: 359. 1896 [“1897”]; *B. grandis* (Stapf) Melderis (1978), not (Shear) Hitchcock (1912).

Perennial. Culms loosely tufted, 50–70 cm tall. Leaf sheaths glabrous or hairy when young; leaf blades 10–20 cm × 3–5 mm, abaxial surface and margins scabrid, adaxial surface hairy. Panicle simple, lax, 10–20 cm; branches arched, often with a single apical spikelet. Spikelets 18–25 mm, florets 5–9; rachilla internodes later exposed; glumes pubescent, lower glume 12–15 mm, 1-veined, apex acuminate, upper glume 14–17 mm, 3-veined, apex shortly aristiform; lemmas 12–16 mm, 7-veined, densely pubescent throughout, apex shortly 2-toothed, awned from sinus; awn 12–18 mm, stout, scabrid, straight, later recurved; palea shorter than lemma, keels ciliate, abaxial surface minutely hairy. Anthers 1.5–2 mm. Fl. May–Aug.

Sandy places, meadows; ca. 3700 m. Xizang, Yunnan [Bhutan, India (Sikkim), Nepal, Pakistan].

26. *Bromus epilis* Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 348. 1982.

光稃雀麦 guang fu que mai

Perennial. Culms loosely tufted, 50–70 cm tall, 1–2 mm in diam., 3-noded, uppermost node ca. 1/2 way up culm. Leaf sheaths glabrous, uppermost sheath ca. 10 cm; leaf blades 15–30 cm × 2–4 mm, rolled when dry, glabrous, abaxial surface and margins scabrid; ligule ca. 1 mm, ciliate. Panicle spreading, 15–20 cm, nodding; branches 2–4 per node, basal primary branch 4–6 cm, each bearing 1 or 2 spikelets. Spikelets 15–20 × ca. 10 mm, tinged with purple, florets 5–7; rachilla ca. 3 mm, spiny scabrid; glumes lanceolate, subequal to lower florets, upper keel scabrid, apex acuminate-mucronate, lower glume 10–12 mm, 1-veined, upper glume 12–15 mm, 3–5-veined; lemmas oblong-lanceolate, 12–15 × ca. 2 mm in side view, 5–7-veined, glabrous, margins narrowly membranous, yellowish brown, awned from apex; awn 8–14 mm, later recurved; palea ca. 10 mm, keels ciliate. Anthers 2.5–3 mm. Fl. and fr. Jul–Aug.

• Mountain slopes, *Pinus yunnanensis* forests, grassy places, scrub; 2800–3300 m. NW Yunnan.

27. *Bromus mairei* Hackel ex Handel-Mazzetti, Symb. Sin. 7: 1290. 1936.

梅氏雀麦 mei shi que mai

Zerna mairei (Hackel ex Handel-Mazzetti) Henrard.

Perennials. Culms loosely tufted, up to 100 cm tall, 7–8-noded. Leaf sheaths sparsely pubescent; leaf blades 20–30 cm × 4–6 mm, adaxial surface thinly pubescent; ligule ca. 1 mm, finely toothed. Panicle spreading, ca. 20 cm; branches 3–5 per node, 5–7 cm, nodding, finely spinulose, each bearing 1–3 spikelets in upper part. Spikelets 20–25 × ca. 10 mm wide, florets 6–8; rachilla ca. 3 mm, sparsely hairy; glumes with membranous margins, apex acuminate into 1–3 mm awn, lower glume 8–10 mm, 1-veined, upper glume 10–13 mm, 3-veined; lemmas lanceolate, 9–12 × 2–3 mm in side view, 7-veined, 3 median veins conspicuously thick, scabrid to hirsute throughout or near margins, awned from apex; awn 10–15 mm, recurved; palea ca. 8 mm, keels ciliate. Anthers ca. 3 mm. Fl. Aug.

• Thickets along margins of *Abies* forests, river beaches, grassy places; 3900–4300 m. Qinghai, Sichuan, Xizang, N Yunnan.

This species is sometimes misinterpreted as *Bromus sinensis*.

28. *Bromus sinensis* Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 349. 1982.

华雀麦 hua que mai

Perennial. Culms loosely tufted, 30–70 cm tall, ca. 2 mm in diam., glabrous or with retrorse hairs, 3- or 4-noded. Leaf sheaths pubescent, auricles present; leaf blades erect, flat or rolled when dry, 10–25 cm × 2–5 mm, ± pubescent, midrib raised abaxially; ligule 1–3 mm, abaxial surface and margin hairy, toothed. Panicle spreading, 12–24 cm, nodding; branches (1–)2–4 per node, up to 10 cm, scabrid, each bearing 1–3 spikelets, or basal branch with branchlets and 4–5 spikelets.

Spikelets 12–20 × 6–8 mm, hairy throughout, florets (2–)5–8, lax, flabellate at anthesis; rachilla internodes 1–3 mm, pubescent; glumes shortly hairy, apex acuminate to aristiform, lower glume ca. 8 mm, 1-veined, upper glume 10–15 mm, 3-veined; lemmas lanceolate, 10–15 × ca. 1.5 mm in side view, 5-veined, back pubescent, awned from apex; awn 8–15 mm, recurved; palea 8–10 mm, keels ciliolate. Anthers 2–3 mm. Fl. Jul.

• *Cupressus* forests, grassy places, sunny slopes, exposed crevices; 3500–4300 m. Qinghai, W Sichuan, Xizang, Yunnan.

- 1a. Panicle branches 2–4 per node; culms 50–70 cm tall; spikelets ca. 15 mm, florets 5–8 28a. var. *sinensis*
 1b. Panicle branches 1 or 2 per node; culms ca. 30 cm tall; spikelets 10–14 mm, florets 2 or 3 28b. var. *minor*

28a. *Bromus sinensis* var. *sinensis*

华雀麦(原变种) hua que mai (yuan bian zhong)

Culms loosely tufted, 50–70 cm tall. Leaf blades 15–25 cm × 3–5 mm. Panicle branches 2–4 per node, bearing 1–3 spikelets, or lower branches with branchlets and 4 or 5 spikelets. Spikelets 15–20 mm, florets 5–8.

• Grassy places, sunny slopes, exposed crevices; 3500–4300 m. Qinghai, W Sichuan (Kangding, Xiangcheng), Xizang, Yunnan.

28b. *Bromus sinensis* var. *minor* L. Liu, Fl. Xizang. 5: 136. 1987.

小华雀麦 xiao hua que mai

Culms tufted, ca. 30 cm tall. Leaf blades ca. 10 cm × 2–3 mm. Panicle branches 1 or 2 per node, slender, bearing 1 or 2 spikelets at apex. Spikelets 10–14 mm, florets 2 or 3.

• *Cupressus* forests, sunny slopes; ca. 3800 m. Qinghai, Xizang.

29. *Bromus tectorum* Linnaeus, Sp. Pl. 1: 77. 1753.

旱雀麦 han que mai

Annual. Culms erect, 20–60 cm tall, 3- or 4-noded. Leaf sheaths pubescent; leaf blades 5–20 cm, 2–4 mm wide, pubescent; ligule 1.5–2 mm. Panicle spreading, 8–15 cm, secund; branches 3–5 at lower nodes, slender, mostly curved, scabrid, pubescent, each bearing 1–8 slightly nodding spikelets. Spikelets 10–35(–50) mm; florets 4–8; rachilla internodes 2–3 mm; glumes narrowly lanceolate, margins membranous, lower glume 8–15 mm, 1–3-veined, upper glume 11–17 mm, 3–7-veined, apex acute, obtuse, or shortly aristiform; lemmas 9–22 mm, 1–1.5 mm wide in side view, 5–7-veined, scabrid or pubescent, margins thinly membranous, shiny, apex acuminate, acute, or obtuse, 2-toothed, awned from sinus, awn 12–25(–40) mm, slender, straight; palea shorter than or subequal to lemma, keels ciliate. Stamens 3; anthers 0.5–2 mm. Fl. and fr. May–Sep.

Grassy places, dry slopes, river beaches, dry sandy places, wastelands, roadsides; 100–3400(–4200) m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [NW India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in America and Australia].

This species is a widespread weed, adventive in most temperate regions of the world.

- 1a. Lower glume 1-veined, upper glume 3-veined; lemmas 9–13 mm, awn 12–18 mm 29a. subsp. *tectorum*
 1b. Lower glume 3-veined, upper glume 5–7-veined; lemmas 15–22 mm, awn 15–25(–40) mm 29b. subsp. *lucidus*

29a. *Bromus tectorum* subsp. *tectorum*

旱雀麦(原亚种) han que mai (yuan ya zhong)

Anisantha tectorum (Linnaeus) Nevski; *Festuca tectorum* (Linnaeus) Jessen; *Genea tectorum* (Linnaeus) Dumortier; *Schedonorus tectorum* (Linnaeus) Fries.

Culms erect, 20–60 cm tall. Panicle branches scabrid, pubescent, slender, with 4–8 spikelets. Spikelets 10–18 mm; lower glume 12–15 mm, 1-veined, apex acuminate, upper glume 14–17 mm, 3-veined, apex shortly aristiform; lemmas 9–13 mm, 7-veined, densely pubescent throughout, awn 12–18 mm; palea shorter than lemma, abaxial surface minutely hairy. Fl. and fr. Jun–Sep. $2n = 14$.

Grassy places, dry slopes, river beaches, wastelands, roadsides; 100–2300(–4200) m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in America and Australia].

29b. *Bromus tectorum* subsp. *lucidus* Sales, Fl. Veg. Mundi 9: 32. 1991.

绢雀麦 juan que mai

Bromus sericeus Drobow in Vvedensky et al., Key Fl. Tashkent 1: 36. 1923, not Tenore (1811); *Anisantha sericea* Nevski.

Culms erect or geniculately ascending, 20–30 cm tall. Panicle branches shorter than spikelets, thinly hairy or scabrid, curved or reflexed, apex with 1 or 2 spikelets; rachis glabrous. Spikelets 20–35(–50) mm; lower glume 8–10(–14) mm, 3-veined, apex acuminate, upper glume broadly lanceolate, 11–15 mm, 5–7-veined, apex acute or obtuse; lemmas 15–22 mm, conspicuously 5–7-veined, abaxial surface pubescent, awn 15–25(–40) mm, straight; palea subequal to lemma. Fl. and fr. May–Aug. $2n = 14$.

Dry sandy places; 2700–3400 m. Xizang, Yunnan [NW India, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan; SW Asia (Iran, Iraq, Turkey)].

30. *Bromus sterilis* Linnaeus, Sp. Pl. 1: 77. 1753, nom. cons.

贫育雀麦 pin yu que mai

Anisantha sterilis (Linnaeus) Nevski; *Festuca sterilis* (Linnaeus) Jessen; *Genea sterilis* (Linnaeus) Dumortier; *Schedonorus sterilis* (Linnaeus) Fries; *Zerna sterilis* (Linnaeus) Panzer.

Annual. Culms simple or loosely tufted, erect or geniculately ascending, 50–100 cm tall, ca. 5 mm in diam., glabrous. Leaf sheaths pubescent; leaf blades soft, 5–20 cm × 4–10

mm, pubescent; ligule 2–4 mm. Panicle lax, open, 10–20 × 7–12 cm, nodding; branches spreading, up to 10 cm, each bearing 1–3 nodding spikelets. Spikelets oblong, wedge-shaped when mature, 20–35 × 4–8 mm, florets 5–9; lower glume subulate, 8–14 mm, 1-veined, upper glume oblong-lanceolate, 10–20 mm, 3-veined; lemmas lanceolate, 15–20 × 2–4 mm in side view, 7-veined, margins white membranous, apex 2-toothed, teeth 1–2 mm, awned from sinus; awn 15–30 mm, as long as or longer than lemma body, slender, straight; palea subequal to lemma, keels sparsely ciliate. Stamens 3, anthers ca. 1 mm. Fl. May–Jun. $2n = 14$.

Wastelands; 600–3200 m. Jiangsu, Sichuan [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in America and Australia].

This species is a widespread weed, adventive in most temperate regions of the world.

31. *Bromus rigidus* Roth, Bot. Mag. (Römer & Usteri) 4(10): 21. 1790.

硬雀麦 ying que mai

Anisantha diandra (Roth) Tutin ex Tzvelev subsp. *rigida* (Roth) Tzvelev; *A. rigida* (Roth) Hylander; *Bromus diandrus* Roth subsp. *rigidus* (Roth) O. Bolòs, R. M. Masalles & J. Vigo; *B. diandrus* var. *rigidus* (Roth) F. Sales; *B. gussonii* Parlato var. *rigidus* (Roth) H. Lindberg; *B. madritensis* Linnaeus var. *rigidus* (Roth) Babington ex Syme; *B. rubens* Linnaeus var. *rigidus* (Roth) Mutel; *B. villosus* Scopoli var. *rigidus* (Roth) Ascherson & Graebner; *Genea rigida* (Roth) Dumortier.

Annual. Culms tufted, erect, 20–70 cm tall, pubescent below inflorescence. Leaf sheaths with spreading hairs; leaf blades 10–25 cm × 4–6 mm, both surfaces densely pubescent; ligule 3–5 mm. Panicle contracted, stiffly erect, 10–25 cm; branches short, scabrid, hairy, bearing erect spikelets. Spikelets wedge-shaped, 15–30 × 7–8 mm, florets 5–7; glumes linear-lanceolate, lower glume 15–20 mm, 1-veined, upper glume 20–25 mm, 3-veined; floret callus pointed, scar elliptic; lemmas narrowly lanceolate, 20–30 × 1–1.5 mm in side view, conspicuously 7-veined, scabrid, apex 2-toothed, awned from sinus; awn 20–40 mm, straight, stiff, scabrid; palea shorter than lemma. Stamens 2, anthers ca. 1 mm. Fl. and fr. Apr–Jul. $2n = 42$, 56, 70.

Streamsides, moist places; ca. 1000 m. Jiangxi, Taiwan [N Africa, C and SW Europe, SW Asia, Mediterranean region; introduced in America and Australia].

Bromus diandrus Roth has been recorded from Xizang, but this is most probably based on a misidentification. It is distinguished from *B. rigidus* by a laxer, spreading panicle and a rounded floret callus with a circular scar.

32. *Bromus madritensis* Linnaeus, Cent. Pl. 1: 5. 1755.

马德雀麦 ma de que mai

Anisantha madritensis (Linnaeus) Nevski; *Festuca madritensis* (Linnaeus) Desfontaines; *Genea madritensis* (Linnaeus) Dumortier; *Zerna madritensis* (Linnaeus) Panzer ex B. D. Jackson.

Annual. Culms loosely tufted, simple, erect or geniculately ascending, 40–60 cm tall, glabrous. Leaf sheaths hairy, at least

the lower; leaf blades linear-lanceolate, flat, ca. 20 cm × 2–4 mm, glabrous or pubescent, margins scabrid, apex acuminate; ligule 1.5–4 mm. Panicle dense or slightly lax, erect, 4–15 × 2–6 cm; branches 2–3 per node, 1–3 cm, hairy, sometimes branched. Spikelets oblong, flabellate at maturity, 35–60 mm, florets 6–13, lax; lower glume subulate, 6–11 mm, 1-veined, upper glume linear-lanceolate, 10–16 mm, 3-veined; lemmas oblong, 12–19 × 3–3.5 mm in side view, 7-veined, glabrous or pubescent, margins inrolled, apex acuminate, 2-toothed; awn 12–18 mm, straight or weakly recurved; palea shorter than lemma. Stamens 2, anthers ca. 1 mm. Fl. May–Aug. $2n = 14$, 28.

Sunny slopes, dry sandy grassy places; ca. 3500 m. Xizang [N Africa, America, SW Asia (Iran, Iraq), Europe].

33. *Bromus fasciculatus* C. Presl, Cyper. Gramin. Sicul. 39. 1820.

束生雀麦 shu sheng que mai

Anisantha fasciculata (C. Presl) Nevski; *Bromus rubens* Linnaeus subsp. *fasciculatus* (C. Presl) Trabut; *Genea fasciculata* (C. Presl) Dumortier.

Annual. Culms erect or geniculately ascending, 5–20(–25) cm tall, pubescent below inflorescence. Leaf sheaths pubescent; leaf blades 2–10 cm × 1–2 mm, hairy. Panicle racemelike, stiffly erect, 2–5 × 0.7–2 cm; branches shorter than spikelets, rigid, each bearing 1 or 2 spikelets. Spikelets broadly wedge-shaped, 10–30 mm; glumes narrowly lanceolate, lower glume 7–8 mm, upper glume 12–14 mm; lemmas 13–15 × 1–1.5 mm in side view, glabrous or hairy, margins sometimes incurved, recurved outward when mature, apex 2-toothed, teeth ca. 3 mm; awn 13–18 mm, subequal to lemma body, stout, straight or slightly divaricate at maturity; palea shorter than lemma. Stamens 3, anthers ca. 1 mm. Fl. May–Jun. $2n = 14$.

Wastelands. Xinjiang [Europe, Mediterranean region].

The presence of this species in China has not been confirmed.

34. *Bromus rubens* Linnaeus, Cent. Pl. 1: 5. 1755.

红雀麦 hong que mai

Anisantha rubens (Linnaeus) Nevski; *Bromus madritensis* Linnaeus subsp. *rubens* (Linnaeus) Husnot; *B. scoparius* Linnaeus var. *rubens* (Linnaeus) Saint-Amans; *Festuca rubens* (Linnaeus) Persoon; *Zerna rubens* (Linnaeus) Grossheim.

Annual. Culms tufted, erect or ascending, 15–35 cm tall, pubescent below inflorescence. Leaf sheaths pubescent; leaf blades 5–10 cm × 3–5 mm, both surfaces pubescent. Panicle densely contracted, narrowly elliptic in outline, stiffly erect, 4–7 × ca. 2 cm, often tinged with purple; branches 2–5 mm, much shorter than spikelets, branches and pedicels pubescent. Spikelets 15–25 mm, florets 4–9, upper florets sterile, reduced; glumes minutely hairy, keel ciliate, lower glume 7–9 mm, upper glume 10–12 mm; lemmas 12–16 mm, scabrid to pubescent, 2-toothed, apical teeth 4–5 mm, awned from sinus; awn 10–20 mm, scabrid, spreading at maturity; palea shorter than lemma, keels sparsely villous. Stamens (2 or)3, anthers to 2 mm. Fl. May–Jul. $2n = 14$, 28.

Dry slopes; ca. 3900 m. Xinjiang [Tajikistan, Turkmenistan; N Africa, SW Asia, S Europe; introduced in America and Australia].

Many Chinese gatherings identified as *Bromus rubens* were misidentified specimens of *B. tectorum*. The presence of this species in China has not been confirmed.

35. *Bromus gracillimus* Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 7: 527. 1851.

细雀麦 xi que mai

Nevskiella gracillima (Bunge) V. I. Kreczetowicz & Vvedensky.

Annual. Culms slender, erect or geniculately ascending, 20–40 cm tall, sparsely hairy. Leaf sheaths pubescent; leaf blades flat, 10–15 cm × ca. 3 mm, both surfaces pubescent, margins scabrid; ligule ca. 2 mm. Panicle ovate in outline, lax, 4–10 × 3–5 cm; branches whorled, 4–8 per node, 2–6 cm, glabrous, each bearing 1–4 spikelets. Spikelets broadly elliptic, 5–8 mm, florets 3–6; internodes exposed; lower glume lanceolate, 3–4 mm, 1-veined, upper glume narrowly ovate, 4–5 mm, 3-veined, margins membranous, apex acuminate; lemmas oblanceolate, 3.5–4.5 mm, 5–7-veined, margins strongly inrolled and sparsely ciliate, apex minutely 2-toothed, awned from sinus; awn 15–20 mm, slender, straight; palea subequal to lemma, keels ciliate. Anthers 0.3–0.5 mm. Fl. and fr. Jun–Aug. $2n = 14$.

Mountain slopes, river banks, grassy places among thickets; 2000–3400(–4200) m. Xinjiang, W Xizang [Afghanistan, Kashmir, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

36. *Bromus secalinus* Linnaeus, Sp. Pl. 1: 76. 1753.

黑麦状雀麦 hei mai zhuang que mai

Avena secalina (Linnaeus) Salisbury; *Bromus mollis* Linnaeus var. *secalinus* (Linnaeus) Hudson; *Forasaccus secalinus* (Linnaeus) Bubani; *Serrafalcus secalinus* (Linnaeus) Babington.

Annual. Culms stout, erect, 30–60(–100) cm tall. Leaf sheaths usually glabrous; leaf blades 5–15 cm × 3–6 mm, pubescent; ligule 1–2 mm. Panicle lax, 5–15 × 2–6 cm, oblique, nodding; branches subwhorled, up to 8 cm, each bearing 1–4 spikelets. Spikelets narrowly oblong, 15–20 × 6–8 mm, florets 5–15, not overlapping at maturity; rachilla internodes exposed; glumes subequal, firm, veins inconspicuous, scabrid, lower glume 4–5 mm, 3–5-veined, upper glume 6–7 mm, 7-veined, apex obtuse, mucronate; lemmas elliptic, 8–9 × 4–5 mm in side view, herbaceous, 7-veined, glabrous, margins inrolled, apex obtuse, awned from back below apex; awn 5–7 mm, shorter than lemma body, slightly reflexed; palea as long as or slightly shorter than lemma. Anthers ca. 2 mm. Caryopsis ca. 5 × 1 mm, longitudinally inrolled, brownish red. Fl. and fr. May–Aug. $2n = 28$.

Slopes, grassy places; 500–1500 m. Gansu, Taiwan, Xinjiang, Xizang [Japan, Russia; SW Asia, Europe; introduced in America].

This species is adventive in many temperate countries as a field weed.

37. *Bromus lepidus* Holmberg, Bot. Not. 1924: 326. 1924.

鳞稃雀麦 lin fu que mai

Bromus gracilis Krösche, Repert. Spec. Nov. Regni Veg.

19: 329. 1924, not Leysser (1761), nor Weigel (1772); *Bromus hordeaceus* Linnaeus subsp. *lepidus* (Holmberg) A. Pedersen.

Annual or biennial. Culms slender, erect, 20–50 cm tall, 2–6-noded. Leaf sheaths pubescent or upper sheaths glabrous; leaf blades flat, 5–20 cm × 2–4 mm, pubescent; ligule up to 1 mm. Panicle erect, narrow, lax or dense, 2–10 cm; branches clustered, up to 4 cm, each bearing 1–3 spikelets. Spikelets lanceolate, 7–15 × 2.5–4 mm, glabrous, shiny, florets 3–11, overlapping at first, later slightly separated; glumes unequal, lower glume ca. 6 mm, upper glume 7–8 mm; lemmas broadly ovate, 7–8 mm, 7-veined, scaberulous, margins membranous, sharply incurved at maturity, apex 2-toothed; awn 2–5 mm, straight; palea shorter than lemma, keels ciliate. Anthers 0.5–2 mm. Caryopsis longer than palea. $2n = 28$.

Waste ground; ca. 700 m. Xinjiang [Europe; introduced in America].

38. *Bromus brachystachys* Hornung, Flora 16: 417. 1833.

短轴雀麦 duan zhou que mai

Annual. Culms loosely tufted with basal branches, erect or geniculately ascending, ca. 10 cm tall, glabrous. Leaf sheaths sparsely pubescent; leaf blades flat, 3–4 cm × ca. 2 mm, both surfaces densely pubescent; ligule ca. 1 mm. Panicle contracted, ca. 3 cm, with few spikelets; pedicels short, minutely pubescent. Spikelets ca. 10 × 4 mm, florets 5–8; glumes with membranous margins, apex acuminate, lower glume ca. 4 mm, 3-veined, upper glume 4–5 mm, 5-veined; lemmas broadly elliptic, 4–5 × 3–4 mm in side view, 7-veined, smooth or scabrid, margins membranous, ciliate, apex 2-toothed, teeth ca. 0.5 mm, awned from sinus; awn 4–7 mm, recurved at maturity; palea 4–5 mm, keels sparsely ciliate. Anthers ca. 1 mm. Fl. and fr. Jul–Sep.

Riversides, grassy places; ca. 1000 m. Gansu [Afghanistan; SW Asia, Europe].

The treatment here is doubtful and is probably based on a misidentification of *Bromus pseudobrachystachys* H. Scholz (Bot. Jahrb. Syst. 91: 462. 1972), recorded from Afghanistan, Iran, Iraq, Syria, and Turkey. *Bromus brachystachys* is a little-known species described from Germany.

39. *Bromus squarrosus* Linnaeus, Sp. Pl. 1: 76. 1753.

偏穗雀麦 pian sui que mai

Bromus wolgensis Fischer ex J. Jacquin; *Forasaccus squarrosus* (Linnaeus) Bubani; *Serrafalcus squarrosus* (Linnaeus) Babington.

Annual. Culms erect or geniculately ascending, 20–60 cm tall, 3–4(–5)-noded. Leaf sheaths pubescent; leaf blades flat, up to 15 cm × 2–5 mm, pubescent; ligule ca. 1 mm. Panicle lax, (5–)20 × 4–6 cm, usually 1-sided; branches few, shorter than or equaling spikelets, each bearing 1 or 2 pendent spikelets. Spikelets ovate, upper part gradually narrowed, (15–)20–50 × 5–15 mm, florets (6–)10–25; rachilla ca. 2 mm, smooth or scabrid; glumes oblong to elliptic, margins membranous, glabrous, lower glume 5–7 mm, 5-veined, apex acuminate, upper glume 6–8 mm, 9-veined, apex obtuse; lemmas obovate, 8–11 × (2–)3–6 mm in side view, 9-veined, glabrous or pubescent, margins

white-membranous and angled near halfway point, apex entire or shallowly 2-toothed, awned from sinus ca. 2 mm below apex; awn 7–12 mm, longer on upper lemmas than lower lemmas, base flattened, slightly twisted, divaricate at maturity; palea 1/3 length of lemma, keels stiffly ciliate. Anthers 1–1.5 mm. Fl. and fr. May–Jul. $2n = 14$.

Field margins, grasslands, waste ground; 500–3000 m. Gansu, Xinjiang [Kazakhstan, Mongolia, Russia; N Africa, SW Asia, Europe; introduced in America].

The name *Bromus wolgensis* has been applied to a variant with pubescent spikelets.

40. *Bromus arvensis* Linnaeus, Sp. Pl. 1: 77. 1753.

田雀麦 tian que mai

Avena arvensis (Linnaeus) Salisbury; *Bromus arvensis* Linnaeus var. *phragmitoides* (A. Nyárády) Borza; *B. erectus* Hudson var. *arvensis* (Linnaeus) Hudson; *B. phragmitoides* A. Nyárády; *Forasaccus arvensis* (Linnaeus) Bubani; *Serrafalcus arvensis* (Linnaeus) Godron.

Annual. Culms loosely tufted, 40–100 cm tall, 2–5-noded. Leaf sheaths hairy; leaf blades 10–20 cm × 3–6 mm, scattered pubescent, margins and adaxial surface scabrid; ligule 2–4 mm. Panicle lax, 15–30 × 10–20 cm; branches clustered, spreading or nodding, scabrid, each bearing 5–8 spikelets. Spikelets oblong-lanceolate, 12–22 × 3–4 mm, tinged with purple, florets 5–8, overlapping; rachilla ca. 2 mm; glumes unequal, margins membranous, apices acuminate, lower glume 4–6 mm, 3-veined, upper glume 6–8 mm, 5–7-veined; lemmas broadly elliptic or obovate, 7–9 mm, back rounded, 7-veined, glabrous, margins membranous with obtuse angle, apex minutely 2-toothed, awned from ca. 2 mm below apex; awn 7–10 mm, slender, straight; palea subequal to lemma, keels ciliate. Anthers 3–4.5 mm. Caryopsis blackish brown, 7–9 × ca. 1 mm. Fl. and fr. Jun–Aug. $2n = 14$.

Roadsides, fields, forest margins, moist places. Gansu, Jiangsu [Russia; N Africa, SW Asia, Europe; introduced in America].

41. *Bromus racemosus* Linnaeus, Sp. Pl., ed. 2, 1: 114. 1762.

总状雀麦 zong zhuang que mai

Brachypodium commutatum (Schrader) P. Beauvois; *Bromus arvensis* Linnaeus var. *racemosus* (Linnaeus) Neileich; *B. commutatus* Schrader; *B. mollis* Linnaeus var. *commutatus* (Schrader) Sanio; *B. mutabilis* F. W. Schultz var. *commutatus* (Schrader) F. W. Schultz; *B. popovii* Drobow; *B. racemosus* subsp. *commutatus* (Schrader) Maire & Weiller; *B. racemosus* var. *commutatus* (Schrader) Cosson & T. Durand; *B. squarrosus* Linnaeus var. *racemosus* (Linnaeus) Regel; *Forasaccus commutatus* (Schrader) Bubani; *F. racemosus* (Linnaeus) Bubani; *Serrafalcus commutatus* (Schrader) Babington; *S. racemosus* (Linnaeus) Parlatores; *S. racemosus* subsp. *commutatus* (Schrader) Rouy; *S. racemosus* var. *commutatus* (Schrader) Husnot.

Annual. Culms slender, loosely tufted, erect or ascending, 25–80(–100) cm tall, glabrous or pubescent, 2–5-noded. Leaf sheaths hairy toward base, upper sheaths sparsely hairy or glabrous; leaf blades 5–30 cm × 2–8 mm, pubescent; ligule 1–3

mm. Panicle erect, narrow, 12–15 × 2–4 cm, sometimes nodding at maturity; branches 2–6 per node, lowest up to 6 cm, each bearing 1–4 spikelets. Spikelets oblong, slightly compressed, 12–20 × 4–6 mm, florets 5–10, overlapping; glumes unequal, apex acuminate, lower glume 4–6 mm, 3-veined, upper glume 4.5–7 mm, 5–7-veined; lemmas elliptic, 6–10 × 2–2.5 mm in side view, scabrid, 7–9-veined, apex obtuse, awned from ca. 1 mm below apex; awn 3–9 mm, straight; palea shorter than lemma. Anthers 1.5–3 mm. Caryopsis thin, flat, ca. 7 × 2 mm, slightly shorter than palea. Fl. and fr. Jun–Aug. $2n = 14$, 28, 56.

River valleys, moist grasslands, roadsides, grassy places; 2700–4400 m. Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, Bhutan; N Africa, Europe].

42. *Bromus japonicus* Thunberg in Murray, Syst. Veg., ed. 14, 119. 1784.

雀麦 que mai

Serrafalcus japonicus (Thunberg) Wilmott.

Annual. Culms erect, 40–90 cm tall. Leaf sheaths pubescent; leaf blades 12–30 cm × 4–8 mm, both surfaces pubescent; ligule 1–2.5 mm. Panicle effuse, 20–30 × 5–10 cm, nodding; branches 2–8, 5–10 cm, slender, each bearing 1–4 spikelets. Spikelets lanceolate-oblong, 12–20 × ca. 5 mm, yellowish green, florets 7–11, closely overlapping; rachilla internodes shortly clavate, ca. 2 mm; glumes subequal, keel scabrid, margins membranous, lower glume 5–7 mm, 3–5-veined, upper glume 5–7.5 mm, 7–9-veined; lemmas elliptic, 8–10 × ca. 2 mm in side view, herbaceous, 9-veined, usually glabrous, margins membranous with conspicuous angle at maturity, scabrid, apex obtuse, minutely 2-toothed, awned from 1–2 mm below apex; awn 5–10 mm, longer on upper lemmas than lower lemmas, base slightly flattened, conspicuously recurved at maturity; palea shorter than lemma, ca. 1 mm wide, keels stiffly ciliate. Anthers ca. 1 mm. Caryopsis 7–8 mm. Fl. and fr. May–Jul. $2n = 14$.

Forest margins, roadsides, waste ground, river beaches; near sea level to 2500(–3500) m. Anhui, Gansu, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe; introduced in North America].

43. *Bromus sewerzowii* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 75: 601. 1881.

密穗雀麦 mi sui que mai

Annual. Culms 30–70 cm tall, pubescent on nodes and below panicle. Leaf sheaths pubescent; leaf blades flat, 10–20 cm × 3–5 mm, pubescent; ligule 2–3 mm, abaxial surface and margin ciliate. Panicle contracted, oblong in outline, erect, ca. 10 × 3–4 cm; branches short, pubescent, each bearing 1–3 erect spikelets. Spikelets lanceolate, 15–25 mm, florets 6–10; glumes unequal, acuminate, lower glume linear-lanceolate, ca. 7 mm, 3-veined, upper glume 5-veined, slightly longer than lower glume; lemmas lanceolate, 9–11 mm, glabrous or pubescent, margins broadly membranous, apex 2-toothed, teeth acute, awned from sinus ca. 1 mm below apex; awn 8–15 mm, straight

or slightly divergent; palea ca. 2 mm shorter than lemma. Anthers ca. 1 mm. Caryopsis long elliptic, ca. 5 × ca. 1 mm, pale brown. Fl. and fr. Jun–Jul. $2n = 28$.

Desert grasslands; 700–1400 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia (NE Iran)].

44. *Bromus tythanthus* Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 30. 1934.

裂稃雀麦 lie fu que mai

Bromus gracilis Popov (1922), not Weigel (1772).

Annual. Culms 10–30 cm tall. Leaf sheaths pubescent; leaf blades 6–10 cm × ca. 2 mm, both surfaces pubescent. Panicle contracted, 3–7 cm, 1-sided, spikelets few; branches short, straight, scabrid, shorter than spikelets. Spikelets lanceolate, 12–18 mm, florets 4–8; glumes linear-lanceolate, apex acute to acuminate, veins 3, lateral veins sometimes inconspicuous, lower glume ca. 4 mm, upper glume ca. 5 mm; lemmas lanceolate, 8–10 mm, pubescent, apex 2-toothed, teeth lanceolate, 0.5–1 mm, awned from ca. 3 mm below apex; awn as long as lemma body, base slightly flattened, recurved at maturity; palea shorter than lemma. Anthers 0.5–1 mm. Fl. Jun–Jul.

Mountain thickets, stony slopes. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; SW Asia (NE Iran)].

45. *Bromus scoparius* Linnaeus, Cent. Pl. 1: 6. 1755.

帚雀麦 zhou que mai

Serrafalcus scoparius (Linnaeus) Parlatores.

Annual. Culms erect or geniculately ascending, 20–50 cm tall. Leaf sheaths glabrous or scattered hirsute; leaf blades 10–20 cm × 2–5 mm, adaxial surface hairy. Panicle densely contracted, oblong or ovate in outline, sometimes interrupted, base wedge-shaped, top rounded, 4–7 × 2–3 cm, with many spikelets; branches very short, straight, spikelets subsessile. Spikelets oblong-lanceolate, 12–20 × 2–3 mm, florets 7–12, overlapping; rachilla internodes thick, ca. 1 mm, not exposed; glumes lanceolate, margins membranous, lower glume 4–5 mm, 3-veined, upper glume 5–7 mm, 5–7-veined; lemmas oblanceolate, 7–8(–10) × ca. 1 mm in side view, 7-veined, glabrous or pubescent, margins and apex membranous, apex 2-toothed, teeth 1.3–2.5 mm, acute, awned from sinus; awn 7–10 mm, slightly flattened at base, recurved at maturity; palea slightly shorter than lemma, keels ciliate. Anthers 0.3–0.6 mm. Fl. May–Jul. $2n = 14$.

Waste ground, moist fields; 400–2300 m. Jiangsu, W Xinjiang [NW India, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

46. *Bromus hordeaceus* Linnaeus, Sp. Pl. 1: 77. 1753.

毛雀麦 mao que mai

Avena mollis (Linnaeus) R. A. Salisbury; *Bromus mollis* Linnaeus; *B. secalinus* Linnaeus var. *hordeaceus* (Linnaeus) Linnaeus; *Serrafalcus hordeaceus* (Linnaeus) Grenier & Godron; *S. mollis* (Linnaeus) Parlatores.

Annual. Culms erect from a creeping or obliquely ascending base, 30–80 cm tall, minutely hairy immediately below in-

florescence, nodes thinly hairy. Leaf sheaths pubescent; leaf blades linear, flat, 3–5 mm wide, soft, both surfaces pubescent; ligule ca. 1 mm. Panicle erect, usually dense, 5–10 cm; branches short; pedicels mostly shorter than spikelets, pubescent, spikelets many. Spikelets oblong, 12–20 × 4–6 mm, usually hairy, florets 6–12(–16), distal florets mostly sterile; rachilla internodes ca. 1 mm, with small bristles; glumes unequal, margins membranous, pubescent, obtuse, lower glume 4–5 mm, 3–5-veined, upper glume 5–8 mm, 5–7-veined; lemmas elliptic, 8–11 × ca. 2 mm in side view, papery, glabrous, prominently 7–9-veined, pubescent, margins membranous, apex obtuse, minutely 2-toothed, awned from 1–2 mm below apex; awn 5–10 mm, stout, straight; palea shorter than lemma, keels ciliate. Anthers 0.2–1 mm. Caryopsis shorter than or as long as palea. Fl. and fr. May–Jul. $2n = 28$.

Gansu, Hebei, Qinghai, Taiwan, Xinjiang [Pakistan, Russia; SW Asia, Europe; adventive in America and Australia].

This species is widely introduced in temperate parts of the world.

47. *Bromus intermedius* Gussone, Fl. Sicul. Prodr. 1: 114. 1827.

中间雀麦 zhong jian que mai

Bromus hordeaceus Linnaeus var. *intermedius* (Gussone) Shear; *B. lanceolatus* Roth subsp. *intermedius* (Gussone) Lloret; *Serrafalcus hughii* Todaro.

Annual. Culms erect or obliquely ascending, 20–60 cm tall, glabrous. Leaf sheaths pubescent; leaf blades 5–10 cm × 2–4 mm, flat, scattered pubescent. Panicle lax, 5–10 cm, erect or nodding; branches 1 or 2(–5) per node, slender, recurved, glabrous, each bearing 1–3 spikelets; pedicels about as long as or longer than spikelet. Spikelets lanceolate, 10–15(–25) mm, with curved pubescence; rachilla internodes short, not exposed; glumes unequal, lower glume 4–5 mm, upper glume 6–8 mm; lemmas oblong-lanceolate, 7–9 mm, pubescent, margins narrowly membranous, apex deeply 2-toothed, teeth 2–3 mm; awn 5–9 mm, base slightly flattened and twisted, spreading or recurved; palea shorter than lemma. Anthers ca. 1 mm. Fl. and fr. Apr–Jul. $2n = 14$.

Moist places in fields, deciduous forests; 1200–1800 m. Xinjiang [N Africa, SW Asia, S Europe].

The presence of this species in China has not been confirmed.

48. *Bromus oxyodon* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 355. 1842.

尖齿雀麦 jian chi que mai

Bromus lanceolatus Roth subsp. *oxyodon* (Schrenk) Tzvelev; *B. macrostachys* Desfontaines var. *oxyodon* (Schrenk) Grisebach.

Annual. Culms loosely tufted, erect or geniculately ascending, 30–60 cm tall. Lower leaf sheaths retrorsely pubescent, upper sheaths glabrous; leaf blades linear, 10–20 cm × 4–8 mm, both surfaces pubescent. Panicle lax, spreading, 10–25 × 10–15 cm, often purplish; branches whorled, usually much longer than spikelets, filiform, flexuous, scabrid, each bearing 2–4 nodding spikelets. Spikelets lanceolate, 25–35 mm, florets 6–10, overlapping; glumes unequal, lanceolate, margins mem-

branous, apex acuminate, lower glume 9–11 mm, upper glume 11–14 mm; lemmas oblong-elliptic, 12–15 mm, 7-veined, glabrous or pubescent, margins broad, hyaline, apex 2-toothed, teeth acuminate, 1.5–3 mm, awned from sinus; awn 15–25 mm, base flattened and slightly twisted, recurved at maturity; palea 2/3 as long as lemma, keels ciliate. Anthers 1.2–1.8 mm. Caryopsis lanceolate, 8–10 × ca. 2 mm. Fl. and fr. May–Aug. $2n = 28$.

Desert grasslands, semi-dry slopes, mountain ravines, roadsides; 500–2600 m. Xinjiang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, W Mongolia, Pakistan, Tajikistan, Uzbekistan].

This is a short-lived forage grass in deserts and dry mountains.

49. *Bromus pectinatus* Thunberg, Prodr. Fl. Cap. 1: 22. 1794.

篦齿雀麦 bi chi que mai

Bromus japonicus Thunberg var. *pectinatus* (Thunberg) Ascherson & Graebner; *B. patulus* Mertens & W. D. J. Koch var. *pectinatus* (Thunberg) Stapf; *B. gedrosianus* Pénzes; *B. rechingeri* Melderis.

Annual. Culms loosely tufted, geniculately ascending, 50–80 cm. Leaf sheaths pubescent; leaf blades 15–30 cm × 4–8 mm. Panicle lax, spreading, 15–25 cm; branches and pedicels longer than spikelets, ascending or nodding, filiform, flexuous. Spikelets lanceolate, 20–30 mm, florets 6–10; glumes unequal, lower glume 5–8 mm, narrowly lanceolate, 3-veined, apex acuminate, upper glume 8–10 mm, 5-veined, apex acute; lemmas narrowly oblanceolate, (8–)10–15 mm, herbaceous, margins membranous, inrolled at maturity, apex 2-toothed, teeth acuminate, 2–3 mm, awned from sinus; awn 8–17 mm, usually straight, erect or weakly recurved; palea keels pectinate-ciliate, hairs ca. 0.5 mm. Anthers 0.5–1.4 mm. Fl. and fr. May–Sep.

Slopes, grassy places, ditch banks; 700–1400 m. Gansu, Hebei, Henan, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan, Tajikistan; Africa, SW Asia, Europe].

50. *Bromus grossus* Desfontaines ex Candolle in Lamarck & Candolle, Fl. Franç., ed. 3, 3: 68. 1805.

粗雀麦 cu que mai

Serrafalcus grossus (Desfontaines ex Candolle) Rouy.

Annual. Culms erect, stout, 60–120 cm tall. Leaf sheaths hairy or glabrous; leaf blades large. Panicle erect, effuse, 15–20 cm, one-sided at maturity. Spikelets ovate-lanceolate, 20–40 × ca. 10 mm, florets 10–12; glumes leathery, veins conspicuous, sometimes with a short mucro at apex; lemmas 11–14 mm, scabrid, margins obtusely angled, apex shallowly 2-toothed, awned from below sinus; awn 5–10 mm, straight, stout; palea slightly shorter than lemma. Anthers 2–3 mm. Caryopsis 10–20 mm, inrolled when mature, slightly shorter than lemma. Fl. and fr. Jun–Sep. $2n = 28$.

Waste ground on slopes. Xizang [Europe].

The presence of this species in China has not been confirmed.

51. *Bromus lanceolatus* Roth, Catal. Bot. 1: 18. 1797.

大穗雀麦 da sui que mai

Forasaccus lanceolatus (Roth) Bubani; *Serrafalcus lanceolatus* (Roth) Parlato.

Annual. Culms erect or geniculately ascending, 60–80 (–100) cm tall. Leaf sheaths pubescent; leaf blades 15(–20) cm × 3–6 mm, both surfaces pubescent. Panicle narrow, 8–15 cm; branches erect, shorter than spikelets, scabrid, rather stout. Spikelets lanceolate cylindrical, 20–30 × 6–10 mm, florets 10–16, overlapping; rachilla internodes not visible; lower glume 6–8 mm, 3–5-veined, apex acuminate, upper glume 9–11 mm, 5–7-veined; lemmas elliptic, 12–15 × 2–2.5 mm in side view, herbaceous, smooth, glabrous or pubescent, margins membranous, 7–9-veined, apex 2-toothed, teeth acuminate, 1–2 mm, awned from sinus; awn 10–20 mm, base slightly flattened, twisted, recurved at maturity; palea slightly shorter than lemma, keels ciliate. Anthers 1.5–2.5 mm. Fl. and fr. Apr–Jul. $2n = 28$.

Forest margins, slopes, thickets, grasslands; 300–1800 m. Xinjiang [Afghanistan, Pakistan, Turkmenistan; N Africa, SW Asia, S Europe].

52. *Bromus danthoniae* Trinius ex C. A. Meyer, Verz. Pfl. Casp. Meer. 24. 1831.

三芒雀麦 san mang que mai

Boissiera danthoniae (Trinius) A. Braun; *Bromus lanceolatus* Roth var. *danthoniae* (Trinius) Dinsmore; *B. macrostachys* Desfontaines var. *danthoniae* (Trinius) Ascherson & Graebner; *Trinisia danthoniae* (Trinius) Steudel.

Annual. Culms erect or geniculately ascending, 30–50 cm tall, pubescent below inflorescence. Leaf sheaths pubescent; leaf blades 10–15 cm × 2–4 mm, both surfaces densely pubescent or later glabrescent. Panicle contracted or racemelike, dense, ovate in outline, 5–10 × 1–5 cm; branches and pedicels shorter than spikelets, ascending, scabrid. Spikelets oblong-lanceolate, 20–40 × 6–12 mm, florets 8–16, overlapping; rachilla internodes not visible; glumes broad, lower glume 5–8.5 mm, 3–5-veined, upper glume 7–9 mm, 7–9-veined; lemmas broadly elliptic, 9–12 mm, glabrous, pubescent or villous, 9–11-veined, veins scabrid, margins broadly membranous, broader and obtusely angled in upper half, apex lacerate, lowest lemmas shortly 1-awned, upper lemmas 3-awned from 2–4 mm below apex; central awn 15–25 mm, base flattened, twisted, recurved, lateral awns 4–10 mm, straight or recurved; palea shorter than lemma, keels ciliate. Anthers 1–1.8 mm. Fl. May–Aug.

Wastelands, dry grassy places on gravel slopes; 1500–3000 m. W Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Mediterranean (Cyprus)].

Bromus danthoniae has been placed in *B. sect. Trinisia* (Steudel) Nevski. However, the available molecular data indicate that the species is nested within *B. sect. Bromus*.

53. *Bromus marginatus* Nees ex Steudel, Syn. Pl. Glumac. 1: 322. 1854.

山地雀麦 shan di que mai

Ceratochloa marginata (Nees ex Steudel) W. A. Weber; *Forasaccus marginatus* (Nees ex Steudel) Lunell.

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*