Flora of China 22: 257–309. 2006.

66. POA Linnaeus, Sp. Pl. 1: 67. 1753.

早熟禾属 zao shu he shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng, Marina V. Olonova

Annuals or perennials. Culm bases infrequently swollen, or with bulbous sheath bases; new shoots intravaginal or extravaginal, rarely (in China) pseudointravaginal, intravaginal but with reduced or rudimentary lower leaf blades and weakly differentiated prophyl. Uppermost culm leaf sheath closed from 1/20th to entire length; ligule hyaline, membranous or infrequently papery; blade flat, folded, or involute, abaxially keeled, adaxially with 1 groove on either side of the midvein, apex prow-tipped. Inflorescence a terminal panicle; branches 1–9 per node; flowers all bisexual, or mixed bisexual and female (rarely male), with distal female flowers within spikelets, or with partially to wholly female spikelets or inflorescences. Spikelets laterally compressed, florets (1–)2–8(–10), rachilla disarticulating above glumes and between florets, uppermost floret vestigial; vivipary sometimes present; glumes mostly strongly keeled, unequal, or subequal, lower glume 1- or 3-veined, upper glume 3(or 5)-veined; lemmas laterally compressed, usually distinctly keeled, 5(–7)-veined, distal margins and apex membranous, apex awnless, rarely minutely mucronate; floret callus short, truncate, blunt, glabrous or webbed (with a dorsal tuft of woolly hairs), rarely with a line of hairs around base of lemma; palea subequal or infrequently to 2/3 as long as lemma, not gaping, keels green, distinctly separated, usually scabrid, smooth in *Poa* sect. *Micrantherae*, sometimes pilulose to villous, margins usually smooth, glabrous. Lodicules 2. Stamens 3, anthers sometimes vestigial. Ovary glabrous. Caryopsis oblong to fusiform, triangular to oval in cross section, sometimes grooved, free or adhering to the palea. $2n = 14–266$. $x = 7$.

More than 500 species: throughout Arctic and N and S temperate regions and extending to most subtropical and tropical mountains, in habitats such as temperate forests, mountain slopes, grasslands, wetlands, steppes, alpine areas and tundra, deserts, and around human habitation, on acidic to sub-basic or subsaline, dry to wet soils, from sea level to the upper limits of vegetation; 81 species (14 endemic, at least one introduced) in China.

Poa includes many species useful and important for forage, soil stabilization, and lawns, and several widespread weeds. Five of six recognized subgenera are present in China. (1) *Poa* subg. *Arctopoa*: stout plants with thick rhizomes, scabrid to ciliate lemma margins, and glabrous calluses, found in subsaline to subalkaline wetlands. (2) *Poa* subg. *Ochlopoa*: plants with bulbous sheathed culm bases (spikelets then often viviparous), or if not bulbous then commonly quite smooth throughout, with shortly villous palea keels and no callus hairs, sometimes annuals. (3) *Poa* subg. *Pseudopoa*: slender annuals with scabrid-angled panicle branches, shortish glumes, uppermost culm sheaths closed for 1/15–1/10 their length, glabrous calluses, and scabrid rachillas. (4) *Poa* subg. *Poa*: the largest and most diverse subgenus, including annuals and perennials, with or without rhizomes, but generally with the uppermost culm sheaths closed for over 1/4 their length. (5) *Poa* subg. *Stenopoa*: commonly tufted perennials generally with the uppermost culm sheaths closed for only 1/15–1/5(–1/4) their length, with mainly extravaginal shoots, mostly without rhizomes, mostly with panicle branches that are scabrid angled from the base, and with 3-veined first glumes.

Some species have races with florets that develop into bulbils that can readily send down roots as soon as they drop from the inflorescence (i.e., they are viviparous). Viviparous spikelets often have fairly normal-looking proximal florets. Pubescence on the lemmas and calluses of such florets is often poorly developed relative to that in normal spikelets, or absent. Identification is easiest with plants having normal spikelets.

Hybridization and facultative apomixis are common in some subgenera, especially *Poa* subg. *Poa* and *P.* subg. *Stenopoa*, and the vast majority of species studied are polyploid.

1a. Lemma margins scabrid to long ciliate, or at least between lower margin and marginal vein; glumes often ciliolate on lower margins; plants robust with long thick rhizomes; butts of some old basal sheaths retrorsely strigose, hairs 0.1–0.2 mm ..... 1. *P.* subg. *Arctopoa* (species nos. 1–3)

1b. Lemma margins smooth or sparsely scabrid; glumes never ciliolate on margins; rhizomes present or absent; butts of old basal sheaths glabrous, infrequently finely strigose in *P.* subg. *Stenopoa*, hairs to 0.05 mm.

2a. Culms with bulbous bases due to basally swollen sheaths; spikelets frequently viviparous ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Arenariae*: species nos. 5–7)

2b. Culms without basally swollen sheaths (rarely culm base swollen); spikelets infrequently viviparous.

3a. Palea keels smooth, pubescent; panicle branches smooth ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Micrantherae*: species nos. 8–11)

3b. Palea keels usually scabrid, glabrous or pubescent, if smooth then panicle branches scabrid; if pubescent then with 1 or more hooks near apex.

4a. Panicle branches in distinct whorls; annuals; lower glume 1-veined, much shorter than adjacent lemma ..... 3. *P.* subg. *Pseudopoa* (species no. 12)

4b. Panicle branches not clearly whorled; perennials or infrequently annual; lower glume 1- or 3-veined, subequal to or longer than adjacent lemma.

5a. Uppermost culm sheath closed for less than 1/4 of length; shoots extravaginal; rhizomes usually absent; panicle branches scabrid; lower glume 3-veined ..... 5. *P.* subg. *Stenopoa*

(species nos. 64, 66–81)

5b. Uppermost culm sheath closed for ca. 1/4 of length to near top; shoots intravaginal and/or extravaginal; rhizomes sometimes present; panicle branches smooth or scabrid; lower glume 1- or 3-veined.
6a. Leaf blades 1–4 mm wide, mostly shorter than 10 cm; lemmas densely villous on keel and marginal veins, appressed short villous between veins; palea keels shortly villous; plant less than 40 cm, forming dense tufts; callus web absent in Chinese species ..... 2. *P.* subg. *Ochlopoa* (*P.* sect. *Alpinae*: species no. 4)
6b. Leaf blades 1–10 mm wide, some often over 10 cm; lemmas glabrous or pubescent; palea keels glabrous or pubescent; plant up to 120 cm, forming loose or dense tufts; callus web present or absent.
7a. Palea keels with minute, smooth to apiculate bumps, without distinctly hooked prickle hairs, glabrous; lemmas pubescent on keel, otherwise glabrous; callus long webbed; ligule acuminate; lower glume 1-veined, often sickle-shaped ..... 5. *P.* subg. *Stenopoa* (*P.* sect. *Pandemos*: species no. 65)
7b. Palea keels with hooked prickle hairs, glabrous or pubescent between keels; lemmas glabrous or variously pubescent; callus webbed or not; ligule truncate to acuminate; lower glume 1- or 3-veined, usually not sickle-shaped ..... 4. *P.* subg. *Poa* (species nos. 13–63)

1. Poa subg. **Arctopoa** (Grisebach) Probatova, Novosti Sist. Vyssh. Rast. 8: 34. 1971.

类早熟禾亚属 lei zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Glyceria sect. *Arctopoa* Grisebach in Ledebour, Fl. Ross. 4: 392. 1852; *Arctopoa* (Grisebach) Probatova.

Perennials, stoutly rhizomatous; shoots mostly extravaginal. Culms stout, mostly 2–4 mm in diam., smooth. Lowermost leaf sheath retrorsely strigose at base, uppermost sheaths closed 1/6–1/3 of length; blade grayish green, flat, folded, or involute, papery, 2–8 mm wide, abaxially smooth, adaxially nearly smooth to densely scabrid along prominent veins, apex slender prow-tipped; ligule white or off white to brownish or yellowish, membranous-papery. Panicle contracted or open; branches stout; vivipary absent; rachilla smooth or scabrid. Glume veins prominent, margins smooth or scabrid to ciliate or villous, elsewhere smooth, lower glume 1- or 3-veined; lemmas 5–7-veined, veins faint, abaxial surface smooth or scabrid, glabrous or keel and marginal veins villous, outer margins scabrid to ciliate in part; callus obliquely angled, obtuse or pointed, glabrous or nearly so, or with sinuous hairs around the base of the lemma (*P. eminens*); palea scabrid, keels medially hairy, distally scabrid. Anthers 1.6–3.1 mm.

Four or five species: C to E Asia and North America, in high alpine areas to steppes and taiga, and on subarctic sea coasts, generally on subsaline, subalkaline, or saline moist to wet ground; three species in China.

The Chinese species all belong to *Poa* sect. *Aphydris* (Grisebach) Tzvelev. *Poa eminens* C. Presl, the only member of *P.* sect. *Arctopoa* (Grisebach) Tzvelev, was reported for Heilongjiang and Nei Mongol in FRPS (9(2): 93. 2002). We have seen no vouchers from China, and the distribution seems improbable given its otherwise strictly coastal and generally more northern distribution. However, it might yet be found in the upper Tumen River delta.

The lower and middle margins of the lemma are distinctly scabrid to long ciliate, unlike other *Poa* species. DNA data suggest the subgenus arose from hybridization between an ancient lineage of *Poa* and an ancient lineage outside the genus that today includes *Arctophila* (Ruprecht) Andersson and *Dupontia* R. Brown, and it could alternatively be recognized as a separate genus, *Arctopoa*.

1a. Callus usually with a crown of sinuous hairs to 2 mm long, slightly pointed; lemmas membranous-papery, glumes subequal to lowest lemma, lateral veins prominent; plants of coastal habitats (*P.* sect. *Arctopoa*) ..... *P. eminens* (see note above)
1b. Callus glabrous, blunt; lemmas ± papery; glumes generally distinctly shorter than lowest lemma, lateral veins indistinct at least on lower glumes; plants of inland habitats (*P.* sect. *Aphydris*).
2a. Panicle branches smooth; panicle contracted, branches erect ..... 2. *P. tibetica*
2b. Panicle branches scabrid angled; panicle open or only slightly contracted.
3a. Lemma keels glabrous or sparsely pilulose near base; panicle open ..... 1. *P. subfastigiata*
3b. Lemma keels villous; panicle slightly contracted or open ..... 3. *P.* ×*schischkinii*

1. Poa subfastigiata Trinius in Ledebour, Fl. Altaic. 1: 96. 1829.

散穗早熟禾 san sui zao shu he

Arctopoa subfastigiata (Trinius) Probatova; *Glyceria subfastigiata* (Trinius) Grisebach.

Perennials, rhizome stout, 2–3 mm in diam.; shoots mainly extravaginal. Culms erect, (30–)50–115 cm tall, 2–4 mm in diam., smooth, nodes 2 or 3, none or 1 exserted, base enclosed by withered fibrous sheaths. Leaf sheaths loose, smooth, 6–20

cm, several × as long as blade, uppermost closed for 1/6–1/4 of length; blade grayish green, flat or folded, papery, 4–20(–50) cm, 2–8 mm wide, abaxially smooth, adaxially scabrid along the prominent veins, apex slender prow-tipped; ligule white or off-white, 1.5–4 mm, abaxially scabrid, apex truncate, ciliolate, collar margins ciliolate or glabrous. Panicle open, well exserted, (6.5–)10–35 × 10–32 cm; branches widely spreading, strict, 2–5 per node, stout, scabrid angled, longest (5–)10–20 cm, divaricately branching in distal 1/2, with spikelets in distal 1/4. Spikelets ovate to lanceolate, purple or tawny, (5–)6–10 mm, florets 3–5; glumes narrowly to broadly lanceolate, keel scabrid, lower glume 3–4 mm, 1- or 3-veined, upper glume 4–5 mm, 3-veined, margins smooth or proximally sparsely scabrid to ciliate; lemmas broadly lanceolate, 4–5.5(–6) mm, glabrous throughout or base minutely hairy, intermediate veins indistinct, margins sometimes sparsely scabrid or ciliate; callus glabrous; palea proximally scabrid to pilulose between keels, keels distally scabrid, medially ciliate, pilulose or villous. Anthers 1.6–2.6(–3) mm. Fl. and fr. Jun–Jul. 2*n* = 28, 42, 91, 97.

Desert lake-basins, steppe wetlands, moist grassy places on river shores, saline sandy places, meadows. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai [Mongolia, Russia (Far East, Siberia)].

This species has spikelets up to 1 cm long, effuse panicles up to 32 cm wide, glabrous lemmas, a glabrous callus, and a thick and well-developed rhizome. It is a forage species used for soil stabilization in arid regions.

2. Poa tibetica Munro ex Stapf in J. D. Hooker, Fl. Brit. India 7: 339. 1896 [“1897”].

西藏早熟禾 xi zang zao shu he

Poa chushualana Rajeshwari et al.; *P. spiciformis* D. F. Cui (2001), not (Steudel) Hauman & Parodi (1929).

Perennials, stoutly rhizomatous or stoloniferous; shoots mainly extravaginal. Culms erect or obliquely ascending (or geniculate), (15–)20–60(–90) cm tall, 2–3 mm in diam., smooth, glabrous, nodes 1 or 2 in lower part, sometimes 1 exserted, base enclosed in withered fibrous sheaths. Leaf sheaths of culm smooth, uppermost closed for 1/4–1/3 of length, of tillers smooth and glabrous or infrequently densely retrorsely scabrid to hispidulous; blade grayish green, flat, folded, or involute, papery, 3.5–12.5 cm, (1–)2–5 mm wide, abaxial surface smooth, adaxial surface with scabrid margins and veins, apex slender prow-tipped, somewhat pungent, blades of tillers 12–18(–35) cm, surfaces glabrous (or pubescent); ligule white or off-white, brownish to yellowish, firmly membranous, 1–2(–5.5) mm, abaxially scabrid, apex rounded, ciliolate, sometimes irregularly dentate. Panicle contracted to spikelike, often interrupted, 5–13 × 1–2(–3) cm; branches erect or steeply ascending, strict, (1–)2–4(–5) per node, rounded, smooth, longest 1–5 cm with spikelets from base or in distal 1/2–3/4. Spikelets pale green, sometimes purple, (4–)5–8(–9) mm, florets 3–6(–8); vivipary absent; rachilla internodes 0.5–1.5 mm, smooth or scabrid; glumes smooth except for a few hooks on the upper part of keel, margins smooth or faintly to prominently scabrid, proximally ciliate or villous, lower glume 2.5–4.6 mm, narrow, 1- or 3-veined, upper glume 3.5–6 mm, 3-veined; lemmas broadly lanceolate, 3.8–5.7 mm, apex and margins ± membranous, sometimes minutely mucronate, lower half of keel and marginal veins villous, upper part nearly smooth to closely scabrid, intermediate veins indistinct; callus glabrous or with 1 to several hairs, these straight, to 1.5 mm; palea smooth or scabrid between keels, keels ciliate, medially pilulose or villous, distally scabrid. Anthers 2–3.1 mm. Fl. and fr. Jul–Sep.

Marshy meadows, riversides, lake banks, grassy places, ditch banks, saline meadows, saline moist places; 3000–4500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; SW Asia (Iran)].

This is a stout species with well-developed, thick rhizomes, contracted to spikelike panicles, sparsely long villous lemma keel and margins, and usually a glabrous callus. The types of *Poa chushualana*, *P. stenostachya*, and *P. spiciformis* have not been seen, but their descriptions fit within the variation of this species, though they cannot all be placed to variety reliably. *Poa chushualana*, from Kashmir, just W of the Xizang border, is said to differ by its stoloniferous form, geniculate culm bases, and leaf blades 1–3 mm wide with pubescent surfaces. *Poa tibetica* s.l. needs detailed study. Some gatherings from China might be *P. tianschanica*. The exact identity of *P. tianschanica* is problematic and the Chinese material could prove to be a robust form of *P. pratensis* or the product of past hybridization with that species.

1a. Spikelets narrowly elliptical, 6.6–8.2 mm; lemmas 5.3–5.7 mm ..... 2a. var. *aristulata*
1b. Spikelets ovate to elliptical, 5–5.5 mm; lemmas 4–4.5 mm ..... 2b. var. *tibetica*

2a. Poa tibetica var. **aristulata** Stapf in J. D. Hooker, Fl. Brit. India 7: 339. 1896 [“1897”].

芒柱早熟禾 mang zhu zao shu he

Poa pseudotibetica Noltie.

Culms stout, to 45 cm tall, smooth, leafy in lower 1/2–2/3. Blade 4–16 cm; ligule 1.5–5.5 mm, apex subacute, irregularly dentate. Panicle contracted, up to 9 cm. Spikelets narrowly elliptical, 6.6–8.2 mm, florets 3 or 4; vivipary absent; lower glume 4–4.6 × 1.5–1.7 mm, upper glume 4.8–6 × 2–2.4 mm; lemmas 5.3–5.7 mm, firmer, long acute. Anthers 2.2–3.1 mm.

Marshy meadows at high elevations. Xinjiang, Xizang [India (Sikkim)].

Plants of the S Xizang-Qinghai Plateau have been treated as a separate species, *Poa pseudotibetica*, but no clean break was noticed between this and more northern material.

2b. Poa tibetica var. **tibetica**

西藏早熟禾(原变种) xi zang zao shu he (yuan bian zhong)

Poa ciliatiflora Roshevitz; *P. stenostachya* S. L. Lu & X. F. Lu (2001), not R. Brown (1810); *P. stenostachya* var. *kokonorica* S. L. Lu & X. F. Lu.

Culms erect or obliquely ascending, 20–60 cm tall. Leaf blade 4–7 cm, of tillers 12–18 cm; ligule membranous, 1–2(–3.5) mm, apex rounded. Panicle contracted to spikelike, 5–10 cm. Spikelets ovate to elliptical, 5–5.5 mm, florets 3–5; lower glume 2.5–3.5 mm, narrow, upper glume 3.5–5 mm; lemmas 4–

4.5 mm, a little thinner and subacute. Anthers ca. 2 mm. Fl. and fr. Jul–Sep. 2*n* = 42.

Marshy meadows, riversides, lake banks, grassy places, ditch banks, saline meadows, saline moist places; 3000–4500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, W Xizang [NW India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; SW Asia (Iran)].

Poa stenostachya seems to differ from *P. tibetica* var. *tibetica* only in its longer ligules, 3–3.5 mm.

3. Poa ×schischkinii Tzvelev, Novosti Sist. Vyssh. Rast. 11: 32. 1974, pro sp.

希斯肯早熟禾 xi si ken zao shu he

Arctopoa ×schischkinii (Tzvelev) Probatova.

Perennials, stoutly rhizomatous; shoots extravaginal. Culms stout, erect, simple, 25–40(–60) cm tall, 2–3 mm in diam., smooth, nodes 2 or 3, sometimes 1 exserted, base enclosed by withered fibrous sheaths. Leaf sheaths loose, smooth, 6–20 cm, several × longer than its blade, basal ones strigose near the nodes only, uppermost closed for 1/6–1/4 length; blade grayish green, flat or folded, papery, 4–20(–50) cm, 2–8 mm wide, abaxially smooth, adaxially scabrid along the prominent veins, apex slender prow-tipped; ligule white or off-white, 1.5–3 mm, abaxially scabrid, apex truncate, ciliolate, collar margins ciliolate or glabrous. Panicle open, diffuse, 10–20 × 10–15 cm; branches spreading widely, strict, 2–5 per node, stout, angular, scabrid, longest (5–)10–20 cm, branching divaricately in distal 1/2, with spikelets in distal 1/4. Spikelets oblong to lanceolate, 5–7 mm; vivipary absent; glumes narrowly to broadly lanceolate, 3–4 mm, keel scabrid, surface smooth, lower glume slightly shorter, 1(or 3)-veined, proximally ciliate or villous, distally smooth or margins scabrid; lemmas ca. 5 mm, keel and marginal veins proximally densely villous; callus glabrous; palea proximally scabrid to pilulose between keels, keels medially ciliate, pilulose or villous. Anthers ca. 2.2 mm. Fl. and fr. Jul–Aug.

Sporadic in steppe grasslands on middle to high mountains, saline wet meadows. Nei Mongol, Qinghai, Xinjiang (Altay) [Mongolia, Russia (Siberia)].

Tzvelev (Zlaki SSSR, 1976) suggested that *Poa ×schischkinii* is a hybrid between *P. tibetica* and *P. subfastigiata*. The sporadic occurrence of intermediate forms suggests that these may represent remnants of a series of hybrids or introgressed plants between parents that are no longer or only sporadically in contact.

2. Poa subg. **Ochlopoa** (Ascherson & Graebner) Hylander, Bot. Not. 1953: 354. 1953.

黄褐早熟禾亚属 huang he zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Poa sect. *Ochlopoa* Ascherson & Graebner, Syn. Mitteleur. Fl. 2: 387. 1900; *Ochlopoa* (Ascherson & Graebner) H. Scholz.

Annuals or perennials, tufted, not rhizomatous, sometimes stoloniferous in *Poa* sect. *Micrantherae*; shoots with or without bulbous bases. Culm bases bulbous or not. Uppermost leaf sheaths smooth, closed for ca. 1/4 length; blade flat or folded, papery to thickly papery; ligule membranous. Panicle open or somewhat contracted; branches smooth or scabrid; spikelets compact; vivipary present (frequent in *P.* sect. *Arenariae*) or absent; glumes usually 3-veined. Anthers 0.2–2 mm.

Thirty species: worldwide, mostly in N Africa, C and SW Asia, and Europe, in habitats such as temperate forests, steppes, alpine areas, and disturbed places, on moist to dry ground; eight species in China.

The Chinese species belong to three sections: *Poa* sect. *Alpinae* (Hegetschweiler ex Nyman) Stapf (species no. 4); *P.* sect. *Arenariae* (Hegetschweiler ex Nyman) Stapf (species nos. 5–7); and *P.* sect. *Micrantherae* Stapf (*Poa* sect. *Ochlopoa*; species nos. 8–11).

1a. Culms with bulbous bases due to basally swollen sheaths; spikelets frequently viviparous *(P.* sect. *Arenariae*).
2a. Lemma entirely glabrous; plants of mountain slopes and meadows ..... 5. *P. bactriana*
2b. Lemma somewhat pilulose to villous in lower part of the veins (if spikelets viviparous, the pubescence is retained only on a few of the least modified lemmas or is absent); plants from lower (hilly steppe) regions and plains.
3a. Plants usually over 15 cm tall; ligules of tillers usually hyaline or slightly milky-white, 1/15–1/7(–1/5) as long as blade; panicle 2–8 cm ..... 6. *P. bulbosa*
3b. Plants (3–)5–15(–20) cm tall; ligules of tillers white, 2–5 mm long, usually 1/5–1/2 as long as blade; panicle 0.8–2.3 cm ..... 7. *P. timoleontis*
1b. Culms without basally swollen sheaths (rarely culm base swollen); spikelets infrequently viviparous.
4a. Palea keels usually scabrid; panicle branches smooth or distally sparsely scabrid (*P.* sect. *Alpinae*) ..... 4. *P. alpina*
4b. Palea keels smooth; panicle branches smooth (*P.* sect. *Micrantherae*).
5a. Anthers 0.2–1 mm; annuals; lemma with intermediate veins pubescent (rarely the whole lemma glabrous), area between veins glabrous.
6a. Anthers 0.6–1 mm, more than 1.5 × longer than wide; panicle branches ascending to widely spreading or reflexed ..... 8. *P. annua*
6b. Anthers 0.2–0.5 mm, not more than 1.5 × longer than wide; panicle branches ascending ..... 9. *P. infirma*
5b. Anthers 1.2–3.5 mm; perennials; lemma with intermediate veins glabrous or pubescent, area between veins glabrous or pubescent.

7a. Palea keels shortly villous, smooth; lemmas glabrous between veins; anthers (1.2–)1.5–1.8(–2.5) mm ..... 10. *P. supina*
7b. Palea keels glabrous, scabrid; lemmas sparsely pubescent or glabrous between veins; anthers 1.7–3.25 mm ..... 11. *P. veresczaginii*

4. Poa alpina Linnaeus, Sp. Pl. 1: 67. 1753.

高山早熟禾 gao shan zao shu he

Perennials, densely tufted; shoots intravaginal. Culms erect or obliquely ascending, (5–)10–30(–45) cm tall, usually several per tuft, smooth, nodes often 2, 1 exserted. Leaf sheath smooth, glabrous, 2 or more × as long as blade, basal ones persistent, investing culm bases, uppermost closed for 1/4 length; ligule white, 2–4(–5) mm, abaxially smooth, of tillers 1–2 cm long; blade grayish green, flat or folded, thickly papery, withering, 3–10(–16) cm, 2–6 mm wide, surfaces glabrous, margins smooth or sparsely scabrid, apex prow-tipped. Panicle loosely contracted to open, ovoid to oblong (pyramidal at anthesis), 2–7 × 2–3 cm, purple tinged; branches ascending to spreading, 2 per node, rounded, smooth or distally sparsely scabrid, longest 2(–3) cm, divaricately rebranched with moderately crowded spikelets in distal 1/2. Spikelets broadly ovate, 4–8 mm, florets 3–5(–7); vivipary absent in China; rachilla internodes ca. 0.5 mm, smooth, glabrous (rarely slightly pilulose); glumes broadly ovate, membranous-papery, subequal, faintly 3-veined, keel arched, scabrid, surfaces smooth, margins membranous, smooth, apex acute, lower glume 2.5–3(–4) mm, upper glume 3.4–4.5 mm; lemmas broadly ovate, membranous-papery, apex and margins broadly membranous, keel arched, keel villous for 2/3 of length, marginal veins for 1/2 length, intermediate veins indistinct, area between veins pilulose to short villous; callus glabrous; palea glabrous or proximally infrequently pilulose between keels, keels scabrid, often medially pilulose to shortly villous. Anthers 1.2–2 mm. Fl. and fr. Jul–Sep. 2*n* = 22, 28, 32, 33, 34, 35, 42, 44, 58.

Low arctic to subalpine meadows, sporadic in taiga, slopes, crevices along ditch banks, sandy places; 2400–3800 m. Qinghai, Xinjiang, Xizang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan; SW Asia (Iran), Europe, North America].

This species has spikelets broadly ovate, lower glumes 3-veined, lemma proximally pubescent between veins, callus glabrous, old sheaths persistent and closely overlapping, anthers more than 1.2 mm, and palea keels shortly villous, together making it quite distinct from other species. Gatherings from arctic regions and European mountains are often viviparous, but such plants have not been recorded from China.

5. Poa bactriana Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 4: 93. 1923.

荒漠早熟禾 huang mo zao shu he

Perennials, densely tufted; shoots with bulbous bases. Culms (2–)8–60 cm tall, erect, base with swollen, withered leaf sheaths. Leaf sheath smooth, glabrous, uppermost culm sheath closed for 1/4 length; blade flat or folded, thin, 2–15 cm, 1–3 mm wide, surfaces and margins scabrid, apex slender prow-tipped; ligules 1.5–3 mm, apex obtuse, rounded, of tillers 0.7–1.5 mm. Panicle loosely contracted to open, oblong to pyramidal, well exserted, 2–10 cm; branches obliquely ascending or spreading, 2–3(–4) per node, smooth, longest with sparse to moderately crowded spikelets. Spikelets green or apices purple, ovate to elliptic, (3–)4–7 mm, florets 2–4(–6); vivipary present or absent; glumes unequal, lower glume 2–3 mm, 1-veined, upper glume wider, 3–3.5 mm, 3-veined; lemmas elliptic to lanceolate, 2–3.5(–4) mm, veins glabrous throughout, keel and marginal veins scabrid; callus glabrous; palea keels scabrid. Anthers (0.6–)1.2–2 mm. Fl. and fr. Apr–May.

Juniperus forests, among shrubs, mountainous areas, dry grassy places on slopes, stony and silty slopes, desert grasslands; 400–4000 m. Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

This species is uncommon or rare in the mountains of far W and NW China.

1a. Panicle loosely contracted; normal lemmas 2.7–3.2 mm; spikelets viviparous in China ..... 5a. subsp. *bactriana*
1b. Panicle fairly diffuse; lemmas 2–2.7 mm; spikelets normal flowered in China ..... 5b. subsp. *glabriflora*

5a. Poa bactriana subsp. **bactriana**

荒漠早熟禾(原亚种) huang mo zao shu he (yuan ya zhong)

Culms 20–60 cm. Leaf blade 2–15 cm × 1–3.5 mm, surfaces and margins scabrid. Panicle loosely contracted, oblong, sometimes lobed, usually well exserted, 3–10 cm. Spikelets green or tips purple, (3–)4–7 mm, florets 2–4(–6); vivipary present in most spikelets; glumes unequal, lower glume 2–3 mm, 1-veined, upper glume wider, 3–3.5 mm, 3-veined; lemmas elliptic to lanceolate, 2.7–3.2 mm, abaxial surface glabrous, keel and marginal veins scabrid. Anthers 1.2–1.8 mm. Fl. and fr. Apr–May.

Mountainous areas, desert grasslands; 400–2700 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan].

The Chinese material all belongs to var. *vivipara* Tzvelev (Novosti Sist. Vyssh. Rast. 10: 96. 1973).

5b. Poa bactriana subsp. **glabriflora** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 96. 1973.

光滑早熟禾 guang hua zao shu he

Poa bulbosa Linnaeus var. *glabriflora* Roshevitz, Fl. Turkmen. 1: 143. 1932; *P. bactriana* subsp. *zaprjagajevii* (Ovczinnikov) Tzvelev; *P. glabriflora* (Roshevitz) Roshevitz ex Ovczinnikov; *P. scitula* Bor; *P. zaprjagajevii* Ovczinnikov.

Culms (2–)8–40 cm. Leaf blade ca. 2 cm × 0.5–2 mm, surfaces scabrid, in tillers flat or folded with margins inrolled or not, elongated, narrower. Panicle oblong to lanceolate, fairly diffuse, 2.5–10 × 1–2 cm. Spikelets tawny, purple tinged, ca. 4 mm; vivipary commonly present, or absent (in Chinese material); glumes, lower glume ca. 1.5 mm, upper glume ca. 2 mm;

lemmas 2–2.7 mm, keel and veins only slightly scabrid, otherwise glabrous. Anthers 0.6–1.2(–1.5) mm. Fl. and fr. May–Jul.

Middle and upper mountain zones, dry grassy places on slopes, stony and silty slopes; 2400–4000 m. ?Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

The distinction between subsp. *zaprjagajevii* and subsp. *glabriflora* is between plants from alpine habitats with distinctly purple, open panicles, sparsely scabrid branches with only a few spikelets (subsp. *zaprjagajevii*), and plants from middle mountains with pale green or pinkish violet tinged, loosely contracted panicles with several (often viviparous) spikelets (subsp. *glabriflora*). From the limited material seen we doubt the value of keeping them apart. *Poa scitula* Bor is an excellent match for subsp. *zaprjagajevii*.

Poa (sect. *Arenariae*) *vvedenskyi* Drobow was reported in FRPS (9(2): 224. 2002) from alpine grassy places at ca. 3000 m in Xinjiang, but no voucher has been seen by us and it is probably not present in China. Tzvelev (Zlaki SSSR, 451. 1976) wrote that *P. vvedenskyi* is endemic to the Uzbekistan Chulbair Range of the Gissar Mountains and adjacent Afghanistan as reported by Bor (in Rechinger, Fl. Iran. 70: 28. 1970). The report in FRPS from Xinjiang more likely represents *P. bactriana* subsp. *glabriflora* or (if separated) subsp. *zaprjagajevii*. *Poa vvedenskyi* can be distinguished from normal-flowered plants of *P. bactriana* by the pubescent lemmas, and from normal-flowered plants of *P. bulbosa* by having panicles sparse, with almost smooth branches, bearing 1–3 spikelets each; lemmas lanceolate, 3–5 mm, pinkish violet, apex gradually tapering, slightly pilose along veins proximally; spikelets always normal-flowered; alpine plants, 10–15 cm tall.

6. Poa bulbosa Linnaeus, Sp. Pl. 1: 70. 1753.

鳞茎早熟禾 lin jing zao shu he

Perennials, densely tufted; shoots with bulbous bases. Culms erect or geniculately ascending, (9–)15–55 cm tall, base with bulbous withered leaf sheaths, nodes 2 or 3, exserted. Leaf sheath smooth, uppermost culm sheath closed for 1/4 of length, tiller sheaths usually less than 1/15–1/7(–1/5) length of blades; blades flat or folded, thin, soon withering, mostly basal, 2–10 cm, 0.5–2(–2.5) mm wide, surfaces smooth, margins scabrid, not cartilaginous; ligule hyaline or milky-white, 1–2(–3.5) mm, apex acuminate. Panicle contracted (looser in viviparous inflorescences), oblong to ovate, 2–8 cm; branches obliquely ascending, 2–4 per node, scabrid, longest to 2 cm. Spikelets purple tinged, 3.5–5(–7.5) mm, florets 2–6 (when normal); vivipary commonly present; rachilla smooth, glabrous; glumes subequal, ovate, 3-veined, 2–3 mm, keel sparsely scabrid; lemmas normal or viviparous, lower 1 or 2 normal, (2.5–)3–3.5 mm, apex acute, keel villous to 2/3 of length, marginal veins to 1/2, area between veins glabrous, often glabrous throughout in viviparous spikelets; callus webbed, hairs moderately dense, commonly glabrous in viviparous spikelets; palea keels scabrid. Anthers (1–)1.4–1.6 mm, usually abortive in viviparous spikelets. Fl. and fr. May–Jul. $2n = 14, 28, 39, 42, 45$.

Plains, sandstone slopes, desert grasslands, river shores, wastelands near fruit gardens; 700–4700 m. Xinjiang, Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe; introduced in Australia, New Zealand, North and South America, and Pacific Islands].

This widespread and weedy species is probably introduced in China. It is a useful spring forage. It is readily recognizable by the bulbous sheathed bases of the shoots and common occurrence of vivipary. FRPS (9(2): 212. 2002) reported viviparous material of *Poa sinaica* Steudel from Qinghai and Xinjiang, but this normally non-viviparous species is unlikly to be present in China. It occurs from SW Asia to Afghanistan and W Pakistan. Normal-flowered material is needed to see the key distinctions of lemma length (3.5–4.5 mm) and glabrous calluses. The Chinese material seems a better match for *P. bulbosa*, and we conclude that *P. sinaica* does not occur in China.

1a. Viviparous spikelets present ..... 6c. subsp. *vivipara*
1b. Viviparous spikelets absent.
  2a. Callus with a tuft of long sinuate hair on dorsal surface ..... 6a. subsp. *bulbosa*
  2b. Callus glabrous; pubescence of lemma less dense, sometimes almost glabrous ..... 6b. subsp. *nevskii*

6a. Poa bulbosa subsp. **bulbosa**

鳞茎早熟禾(原亚种) lin jing zao shu he (yuan ya zhong)

Poa psammophila Schur.

Culms (9–)15–40 cm tall. Spikelets normal flowered, vivipary absent; lemmas 3–3.5 mm, apex acuminate, lower keel and marginal veins villous; callus webbed. Anthers (1–)1.4–1.6 mm. $2n = 42$.

Plains, sandstone slopes, desert grasslands; 700–4700 m. Xinjiang [Afghanistan, Pakistan (rare), Russia (European part), Turkmenistan (rare); SW Asia, Europe; introduced in North America].

This subspecies was reported from China in FRPS (9(2): 223. 2002, as var. *bulbosa*) and Fl. Xinjiang. (6: 84. 1996), but these records have not yet been confirmed by us.

6b. Poa bulbosa subsp. **nevskii** (Roshevitz ex Ovczinnikov) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 95. 1973.

尼氏早熟禾 ni shi zao shu he

Poa nevskii Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 10. 1933.

Culms 35–60 cm tall. Leaf blade 2–2.5 mm wide, narrower in tillers. Vivipary absent; lemmas 2.5–3.5 mm, keel and marginal veins sparsely shortly villous or glabrous throughout; callus glabrous. Anthers ca. 2 mm. Fl. and fr. May–Jun.

Grassy places on slopes; 3000–4000 m. Xinjiang [Tajikistan, Turkmenistan, Uzbekistan].

This subspecies was reported from Xinjiang in FRPS (9(2): 224. 2002, as *P. nevskii*), but not in Fl. Xinjiang. (6, 1996). The presence of this taxon in China has not been confirmed by us.

6c. Poa bulbosa subsp. **vivipara** (Koeler) Arcangeli, Comp. Fl. Ital. 785. 1882.

胎生鳞茎早熟禾 tai sheng lin jing zao shu he

Poa bulbosa var. *vivipara* Koeler, Descr. Gram. 189. 1802; *P. desertorum* Trinius; *P. crispa* Thuillier.

Culms 15–55 cm tall. All or most spikelets viviparous; lemmas 3–4 mm, glabrous or basal 1 or 2 pubescent; distal florets viviparous, forming bulbils, bulbil lemmas becoming swollen and purple at base, apex elongated and developing a blade; callus glabrous or webbed. Anthers occasionally well

developed in proximal floret. 2*n* = 21, 28, 39, 42.

River shores, wastelands near fruit gardens, desert grasslands; 700–4300 m. Xinjiang, Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia (Siberia), Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe; introduced in Australia, North and South America, and Pacific Islands].

Pubescence is often poorly developed or absent in proximal florets of viviparous spikelets.

7. Poa timoleontis Heldrich ex Boissier var. **dshilgensis** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 10: 94. 1973.

季茛早熟禾 ji gen zao shu he

Poa dshilgensis Roshevitz in Komarov, Fl. URSS 2: 377. 1934.

Perennials, densely tufted; shoots with bulbous bases. Culms 2–10(–19) cm tall, densely tufted, smooth. Leaf sheath margins hyaline, basal culm sheaths persistent, uppermost closed for 1/4 of length; blades folded, thin, 1–2 cm × 0.5–1 (–2.5) mm, surfaces scabrid, margins scabrid; ligules of tillers white, (2–)3–6 mm, 1/5–1/2 as long as blade. Panicle loosely contracted, oblong, compact, 0.8–2.3 cm; branches purplish violet, 1–3 per node, longest 0.5–1.5 cm. Spikelets 4–10 mm (2.5–4 mm in normal spikelets), florets 3–7; vivipary present in all or most spikelets; rachilla smooth, glabrous; glumes subequal, lower glume ca. 2 mm, upper glume ca. 2.5 mm; lemmas 1.8–2.5 mm, margins membranous, veins indistinct, keel and marginal veins proximally sparsely villous or more commonly glabrous throughout in viviparous spikelets; callus glabrous; palea keels scabrid. Anthers 1–1.5 mm (rarely developed in viviparous spikelets). Fl. and fr. Jun–Aug.

Mountain slopes, grasslands; ca. 2500 m. Xinjiang (Artux) [Afghanistan, Kazakhstan; SW Asia, S Europe].

Normal-flowered *Poa timoleontis* var. *timoleontis* occurs only in the Mediterranean region. The viviparous var. *dshilgensis* is known only from a few C Asian countries and one gathering from China, but we have expanded the circumscription to include taller viviparous plants from SW Asia and Europe; the long, white ligule and dwarf, bulbous-based habit make it readily recognizable. FRPS (9(2): 224–225. 2002) additionally reported viviparous *P. timoleontis* s.s. from China. Bor (in Rechinger, Fl. Iran. 70: 26. 1970) and Tzvelev (Zlaki SSSR, 449. 1976) gave the range of *P. timoleontis* var. *timoleontis* as Greece and SW Asia to Iran. No material from China seen by us matches the taller viviparous form, and it is possible that the material reported in FRPS belongs to *P. bulbosa*. In the former USSR, the viviparous var. *dshilgensis* is known only from the type, from Kazakhstan. Bor gave the range of *P. dshilgensis* as Afghanistan and Tajikistan, but no Russian or Tajikistani Flora has reported it from Tajikistan.

8. Poa annua Linnaeus, Sp. Pl. 1: 68. 1753.

早熟禾 zao shu he

Poa annua f. *reptans* (Haussknecht) T. Koyama; *P. annua* var. *reptans* Haussknecht; *P. crassinervis* Honda.

Annuals, sometimes over wintering, infrequently stoloniferous. Culms loosely tufted, erect or oblique, often decumbent, often geniculate, soft, 6–30(–45) cm tall, smooth, nodes 1 or 2(or 3), 1(or 2) exserted. Leaf sheath slightly compressed, thin, smooth, uppermost closed for ca. 1/3 of length; blade light to dark green, flat or folded, thin, 2–12 cm × (0.8–)1–3.5 mm, margins slightly scabrid, apex acutely prow-tipped; ligules 0.6–3 mm, abaxially smooth, glabrous, apex obtuse, margin irregularly dentate, smooth. Panicle open, moderately congested, broadly ovoid to pyramidal, (1–)3–10 cm, as long as wide; branches ascending, spreading, or a few reflexed, 1 or 2(–3) per node, smooth, longest with usually 3–5 spikelets in distal 1/2. Spikelets ovate to oblong, dark to light green, (3–)4–5.5 mm, florets 3–5, distal fertile florets often female; vivipary absent; rachilla internodes 0.5–1.5 mm, smooth, glabrous, hidden or exposed; glumes unequal, smooth or rarely keeled with hooks, lower glume lanceolate and acute to subflabellate and obtuse, 1.5–2(–3) mm, 1-veined, upper glume elliptic, 2–3(–4) mm, 3-veined, the margin angled; lemmas ovate, 2.2–3.5 mm, apex and margins broadly membranous, intermediate veins prominent, keel and marginal, and usually intermediate, veins villous in the lower 1/2, rarely glabrous throughout; callus glabrous; palea keels smooth, densely pilulose to short villous. Anthers 0.6–1 mm, usually at least 2 × as long as wide, or vestigial. Fl. Apr–May, fr. Apr–Jul. 2*n* = 28.

Weed of disturbed, often moist and shady ground; near sea level to 4800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Europe, North and South America, Pacific Islands].

Poa annua is easily distinguished from other short-anthered *Poa*, other than *P. infirma*, by the annual habit, absence of a web on the callus, and the near absence of hooks on the panicle branches and spikelet bracts, in combination with densely pubescent palea keels that lack hooked prickle hairs at the apex. Plants with glabrous florets are sporadically encountered.

Plants perennating by short stolons rooting at the nodes appear to develop repeatedly but sporadically at various elevations with prolonged, cool, mesic growing conditions, possibly in response to trampling. These are sometimes placed in var. *reptans*. Such plants have been recorded from Yunnan.

9. Poa infirma Kunth in Humboldt et al., Nov. Gen. Sp. 1: 158. 1816 [“1815”].

低矮早熟禾 di ai zao shu he

Poa annua Linnaeus subsp. *exilis* (Tommasini ex Freyn) Ascherson & Graebner; *P. annua* var. *exilis* Tommasini ex Freyn; *P. exilis* (Tommasini ex Freyn) Murbeck.

Annuals. Culms loosely tufted, erect or oblique, often decumbent, often geniculate, soft, 5–25 cm tall, smooth, nodes 1 or 2(–3), 1(or 2) exserted. Leaf sheaths, thin, smooth, uppermost closed for ca. 1/3 of length; blade light green, flat or folded, thin, 2–8 cm × 1–3 mm, margins smooth or sparsely scabrid, apex acutely prow-tipped; ligule membranous, 1–3 mm, abaxially smooth, glabrous. Panicle open, ovoid-oblong, 2–10 cm, 1–2 × as long as wide; branches ascending, 1–3 per node, smooth, longest usually with 5–9 moderately crowded spikelets in distal 1/2. Spikelets ovate to oblong, light green, 3–4 mm, florets 4–6, distal fertile florets often female; vivipary

absent; rachilla internodes 1–1.5 mm, smooth, glabrous, often exposed; glumes unequal, margins broadly membranous, smooth, lower glume lanceolate and acute to subflabellate and obtuse, 1–1.5 mm, 1-veined, upper glume elliptic, margin angled, 1.8–2.5 mm, 3-veined; lemmas ovate, membranous-papery, 2–2.5 mm, keel densely villous, marginal and lateral veins densely villous; callus glabrous; palea keels without hooks, densely pilulose to short-villous. Anthers 0.2–0.5 mm, round to short elliptical, less than 1.5 × as long as wide, or vestigial. Fl. and fr. May–Aug. 2*n* = 14.

Sporadic in moist meadows, gardens, sandy places, shady disturbed ground; 1000–2000 m. Fujian, Shanxi, Sichuan, Zhejiang [India, Pakistan, Tajikistan; Africa, SW Asia, Australia, Europe, Japan, New Zealand, North America, Pacific Islands, South America].

Poa infirma differs from *P. annua* in its shorter, more spherical or slightly lozenge-shaped anthers, and diploid chromosome number. It also has more ascending branches with more crowded spikelets.

10. Poa supina Schrader, Fl. Germ. 1: 289. 1806.

仰卧早熟禾 yang wo zao shu he

Poa variegata A. Haller, Cat. Pl. Helv. 38. 1800, not Lamarck (1791); *P. annua* Linnaeus var. *supina* (Schrader) Link; *P. supina* subsp. *ustulata* (S. E. Fröhner) Á. Löve & D. Löve; *P. ustulata* S. E. Fröhner.

Perennials, sometimes stoloniferous; shoots mostly extravaginal. Culms tufted or isolated, oblique, decumbent at base, frequently geniculate above, soft, (4–)8–20(–30) cm tall, 0.5–0.7 mm in diam., smooth, nodes 1 or 2(–3), 1(or 2) exserted. Leaf sheaths thin, smooth, basal ones drying pale brown and soon withering, enclosing culm bases, uppermost closed for 1/4–1/3 of length, 1.5–5 × longer than blade; blade light green, flat or folded, thin, 2–6 cm × 2–3 mm, surfaces smooth, margins smooth or sparsely scabrid, apex acutely prow-tipped; ligule 0.6–1.5 mm, abaxially smooth, glabrous, apex obtuse. Panicle open to loosely contracted, compactly pyramidal to ovoid, diffuse to moderately congested, (1.5–)2–5 cm, 1–2 × as long as wide; branches ascending to spreading, 1 or 2 per node, rounded, smooth, longest to 2 cm with 2–8 spikelets in distal 1/2. Spikelets ovate to oblong, light green, frequently purple tinged, 3.5–5(–6) mm, florets 3–6, distal fertile florets often female; vivipary absent; rachilla internodes 0.5–0.8 mm, smooth, glabrous; glumes unequal, smooth or sparsely scabrid, membranous-papery, lower glume lanceolate and acute to subflabellate and obtuse, ca. 1.5 mm, 1-veined, upper glume elliptic, 2–2.5 mm, margin angled, 3-veined; lemmas elliptic or oblong to ovate, membranous-papery, 1.4–3.5(–4) mm, keel and marginal veins sparsely villous or glabrous, smooth, intermediate veins distinct, margins smooth, apex obtuse; callus glabrous; palea keels smooth, hooks absent, shortly villous for most of length. Anthers (1.2–)1.5–1.8(–2.5) mm, or vestigial. Fl. and fr. Jun–Aug. 2*n* = 14, 28.

Alpine and subalpine meadows on slopes, moist places; 1000–3100 m. Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kashmir, Mongolia, Nepal, Pakistan, Russia (Far East, Siberia), Tajikistan; SW Asia, Europe, North America].

Poa supina has been divided into two taxa since the plants from C Asia, the Himalayas, and Xizang, including some but not all of the material from China, are more densely tufted and less stoloniferous than material from elsewhere. In addition, the branches are reduced to 1 per node, often rebranched near the base, and the palea looks minutely bumpy because of the globose, short cells between the veins. This material could be distinguished as *P. supina* subsp. *ustulata*. However, aside from the habit, the differences cited do not seem constant in the material from China, and material from NW China matches *P. supina* s.s.

11. Poa veresczaginii Tzvelev, Novosti Sist. Vyssh. Rast. 11: 34. 1974.

薇早熟禾 wei zao shu he

Perennials, loosely tufted or weakly stoloniferous; shoots extravaginal and intravaginal. Culms erect, sometimes decumbent at base, few per tuft, 17–60 cm tall, 0.8–1.3 mm thick, smooth, nodes 2 or 3, 1 or 2 exserted, uppermost to 1/4–1/2 way up culm. Leaf sheaths mostly 1.5–2.5 mm wide, ribs not distinctly raised, smooth, glabrous, lower leaves bladeless or with short blades, uppermost closed for 1/2–3/4 of length, 5–8 cm, 1.5–5 × as long as blade; blade green, flat, thin, 2–5 cm × 1.5–3.5 mm, surfaces smooth and glabrous, margins scabrid, longer upward along culm; ligule 2.5–4 mm, abaxially smooth, of tillers 0.5–1.5 mm, collars smooth, glabrous. Panicle open, lax, 3.5–12 × 3–8 cm; branches spreading, 1 or 2 per node, capillary, rounded, smooth, longest 2.5–5 cm with 1–3(or 4) spikelets in distal 1/4. Spikelets rosy-violet tinged and a little grayish, 4.5–7 mm, florets usually 3–5, mostly perfect, infrequently female; vivipary absent; rachilla internodes to 1–1.5 mm, smooth, glabrous; glumes unequal, submembranous-papery, smooth or upper keel with a few hooks, lower glume 2.7–4.1 mm, 1- or 3-veined, upper glume 3.7–4.7 mm, 3-veined; lemmas oblong, membranous-papery, 3.5–4.5 mm, margins broadly membranous, apex obtuse, blunt, intermediate veins moderately distinct, keel loosely villous for up to 2/3 of length, marginal veins to 1/2, surfaces smooth, abaxially glabrous or loosely pilulose; callus glabrous or sparsely webbed,

usually on proximal florets, hairs less than 1/2 as long as lemma; palea smooth and glabrous between keels, keels scabrid. Anthers 1.7–3.25 mm, vestigial or later aborted (up to 1.5 mm). Fl. and fr. Aug.

Alpine swales, stony slopes, glacial outwash; 2800–3600 m. Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Russia (Altai)].

The paratype cited from Mongolia is now within Xinjiang, in the Altay Shan very close to the new Mongolia-Russia border. Tzvelev (Zlaki SSSR, 460. 1976) placed this species in *Poa* sect. *Nivicolae*, based on the membranous-papery spikelet bracts and nearly smooth palea keels, to which features we would add the presence of female flowers in some spikelets. However, chloroplast and nuclear DNA markers place it in *P.* sect. *Micrantherae*.

3. Poa subg. **Pseudopoa** (K. Koch) Stapf in J. D. Hooker, Fl. Brit. India 7: 337. 1896 ["1897"].

假早熟禾亚属 jia zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Festuca [unranked] *Pseudopoa* K. Koch, Linnaea 21: 409. 1848; *Eremopoa* Roshevitz.

Slender annuals or ephemerals, shoots intravaginal. Culms erect. Inflorescence an open panicle; branches whorled, scabrid angled. Spikelets slightly compressed, elliptic, florets (1 or)2 to many, distant or only slightly overlapping; rachilla filiform, scabrid; glumes unequal, shorter than floret, lower glume 1-veined, upper glume 3-veined; lemmas lanceolate to narrowly oblong in side view, rounded on back or slightly keeled at base, herbaceous, 5-veined, apex obtuse to acuminate or mucronate, glabrous or keel and marginal veins pilulose to short villous, intermediate veins faint; palea equaling or shorter than lemma, keels scabrid; callus glabrous. Stamens (2–)3. Caryopsis partly adherent to lemma and palea, faintly grooved; hilum oval.

About five species: NE Africa, C and SW Asia, Europe; one species in China.

Species of *Poa* subg. *Pseudopoa* have a delicate, annual habit and whorled, scabrid-angled panicle branches. The subgenus comprises two widespread, variable species, which are sometimes subdivided, and a few local species in SW Asia. Since 1934, they have usually been recognized as a separate genus, *Eremopoa*, but molecular data place them in the middle of *Poa*. *Poa persica* Trinius occurs from Turkey to Afghanistan and Pakistan, but has not yet been found in China. It can be recognized by its lemmas with broad, membranous margins and obliquely truncate tips in side view, and by having anthers 1.4–2.5 mm.

12. Poa diaphora Trinius, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 1: 69. 1836.

阿尔泰早禾 a er tai han he

Annual. Culms 5–45 cm tall, solitary or tufted, slender. Leaf blade 2–10 cm × 1–4 mm, flat or folded, abaxial surface scabrid or smooth, adaxial surface scabrid, apex acuminate; ligule 1–3 mm. Panicle delicate, narrowly to broadly ovate in outline, 2–20 cm; branches 3–10 per node, subcapillary, scabrid. Spikelets elliptic, 4–6.5 mm, florets 2–6, green or purple tinged; lower glume lanceolate, 1–2 mm, apex acute, up to 1/2 as long as lowest lemma; upper glume narrowly ovate, 1.5–2.5 mm, apex acute or subacute; lemmas 2–4 mm, glabrous or scantily hairy to densely appressed-pubescent along lower part of veins, margins narrowly membranous, apex acuminate or often with a mucro to 0.5 mm; palea a little shorter than lemma. Anthers 0.4–1 mm. Fl. and fr. May–Aug. 2*n* = 28, 42.

Borders of streams and drying ponds, dry stony or sandy places; 1300–4000 m. Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Poa diaphora is a widespread and variable species and is sometimes divided into infraspecific taxa. The most distinct is subsp. *oxyglumis*, with hairy lemma veins appearing as silky-white stripes, although intermediates do occur. Small plants (up to 15 cm) with relatively long lemmas (over 3.5 mm) are sometimes distinguished, as subsp. *diaphora*, from the bulk of the species, which would then be placed in a "subsp. *songarica*," but this distinction is much less clear-cut and is not followed here.

1a. Lemmas glabrous or scantily hairy along proximal part of veins ..... 12a. subsp. *diaphora*

1b. Lemmas densely pubescent along proximal part of veins ..... 12b. subsp. *oxyglumis*

12a. Poa diaphora subsp. **diaphora**

阿尔泰早禾(原亚种) a er tai han he (yuan ya zhong)

Aira altaica Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 526. 1835; *Catabrosella songarica* (Schrenk) Czerepanov; *Eremopoa altaica* (Trinius) Roshevitz; *E. altaica* subsp. *songarica* (Schrenk) Tzvelev; *E. persica* (Trinius) Roshevitz var. *songarica* (Schrenk) Bor; *E. songarica* (Schrenk) Roshevitz; *Glyceria songarica* Schrenk; *Nephelochloa altaica* (Trinius) Grisebach; *N. songarica* (Schrenk) Grisebach; *Poa persica* Trinius var. *songarica* (Schrenk) Stapf; *P. songarica* (Schrenk) Boissier.

Lemmas glabrous or scantily hairy near base of veins. Anthers 0.4–0.6 mm.

Borders of streams and drying ponds, stony slopes; 1300–4000 m. Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

12b. Poa diaphora subsp. **oxyglumis** (Boissier) Soreng & G. Zhu, **comb. nov.**

旱禾 han he

Basionym: *Poa persica* Trinius var. *oxyglumis* Boissier,

Fl. Orient. 5: 610. 1884; *Eremopoa altaica* subsp. *oxyglumis* (Boissier) Tzvelev; *E. oxyglumis* (Boissier) Roshevitz; *E. persica* var. *oxyglumis* (Boissier) Grossheim.

Lemmas densely pubescent along lower parts of keel and marginal veins. Anthers 0.6–1 mm.

Dry stony or sandy places; 1900–2300 m. Xinjiang [Kazakhstan, Turkmenistan, Uzbekistan; SW Asia].

4. **Poa** subg. **Poa**

早熟禾亚属 zao shu he ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Robert J. Soreng

Annuals or perennials, with or without rhizomes, without bulbs; shoots extravaginal and intravaginal. Sheaths sometimes strongly keeled, uppermost closed for more than (1/5–)1/4 of length; ligules membranous, milky-white or hyaline. Panicle with or without unisexual flowers, loosely contracted to open; branches smooth or scabrid, round or angled; lower glumes 1- or 3-veined; lemmas distinctly keeled, glabrous or pubescent, outer margin smooth or sparsely scabrid, glabrous, intermediate veins faint or more commonly conspicuous; callus glabrous or mostly dorsally webbed, rarely diffusely villous; palea keels glabrous or pubescent, usually scabrid at least distally. Anthers 0.2–4 mm.

About 400 species: distribution as for genus; 51 species (13 endemic) in China.

The Chinese species belong to three sections: *Poa* sect. *Macropoa* F. Hermann ex Tzvelev (species nos. 13–16); *P.* sect. *Poa* (species nos. 17–29), which is further subdivided into *P.* subsect. *Nivicolae* (Roshevitz) Tzvelev (species nos. 17–19), *P.* subsect. *Poa* (species nos. 20–22), and *P.* subsect. *Cenisiae* (Ascherson & Graebner) V. Jirásek (species nos. 23–29); and *P.* sect. *Homalopoa* Dumortier (species nos. 30–63).

Poa raduliformis (species no. 22) could not be included in Key 2 below because the taxon is insufficiently known to the authors. No specimens definitely referable to *P. raduliformis* were seen for this treatment.

1a. Anthers 0.2–1 mm ..... *Key 1*
1b. Anthers more than 1 mm ..... *Key 2*

Key 1 (species with anthers up to 1 mm long: *Poa* sect. *Homalopoa* in part, species nos. 43–63).

1a. Palea keels pubescent at least medially.
2a. Palea keels without apical hooks; ligule abaxially pilulose; panicle branches proximally scabrid angled.
3a. Panicle branches erect to steeply ascending, 2–6 cm; lemmas glabrous or sparsely pilulose between veins .... 46. *P. hisauchii*
3b. Panicle branches spreading, 3–11 cm; lemmas usually sparsely to densely pilulose between veins ..... 47. *P. acroleuca*
2b. Palea keels scabrid at least at the apex (if without hooks then upper culm ligule smooth and glabrous, or at most sparsely scabrid or pilulose); ligule abaxially smooth or scabrid, glabrous or sparsely pilulose; panicle branches proximally smooth or scabrid angled.
4a. Callus glabrous; glumes distinctly shorter than lowest lemma; lemma surface and intermediate veins glabrous.
5a. Lemmas 4–5 mm; panicle 18–22 cm ..... 49. *P. imperialis*
5b. Lemmas 2.5–3.5 mm; panicle 3–15(–19.5) cm ..... 50. *P. sikkimensis*
4b. Callus webbed or if glabrous, then lower glume as long as to longer than lowest lemma; lemma surfaces and/or intermediate veins glabrous or pubescent.
6a. Ligule 2–6 mm, apex obtuse to acute; collar glabrous; lower glume only slightly narrower than upper glume, 1- or 3-veined.
7a. Annuals or short-lived perennials; leaf sheath ca. 2 × as long as blade; upper glume as long as or longer than lowest lemma ..... 60. *P. hirtiglumis*
7b. Perennials; leaf sheath slightly shorter than blade; upper glume shorter than lowest lemma ..... 51. *P. stapfiana*
6b. Ligule 0.8–1.5(–2.5) mm, apex truncate to obtuse; collar usually ciliate; lower glume distinctly narrower than upper glume, 1-veined.
8a. Palea keels densely pilulose to villous to near apex; lemma ca. 4 × as long as wide, apex obtuse to acute; roots commonly 0.2–0.3 mm in diam. ..... 48. *P. nepalensis*
8b. Palea keels pilulose only around middle, sometimes obscurely so; lemma ca. 5 × as long as wide, apex acute to acuminate; most roots ca. 0.1 mm in diam.
9a. Lemma surfaces pubescent ..... 52. *P. burmanica*
9b. Lemma surfaces glabrous.
10a. Lemma surface smooth or minutely bumpy near the base at most; ligule abaxially smooth ..... 53. *P. himalayana*
10b. Lemmas surface minutely bumpy over much of length; ligule abaxially scabrid or pilulose ..... 56. *P. khasiana*
1b. Palea keels scabrid only, not pubescent.
11a. Lower glume mostly 3-veined.
12a. Plants 4–8 cm tall; panicle 1–2.5 cm, branches 0.5–1.5 cm; lemmas and callus glabrous ..... 44. *P. pseudamoena*
12b. Plants 30–51 cm tall; panicle 8–25 cm, branches 2–7 cm; lemma and callus pubescent ..... 43. *P. eleanorae*
11b. Lower glume 1-veined, or if sometimes 3-veined then lemmas glabrous and panicle over 5 cm long.
13a. Lemmas 1.5–2.6 mm, surface finely scabrid, keel glabrous or pilulose to short villous; anthers 0.2–0.5 mm ..... 63. *P. szechuensis*

13b. Lemmas 2.7–6 mm, surface smooth or finely scabrid, keel glabrous to villous, if glabrous then lemma 3–4.5 mm; anthers 0.5–1 mm (sometimes longer).
14a. Callus glabrous; lemmas glabrous or with a few short hairs at base of keel.
15a. Ligule 0.7–1.2; lower glume 1.5–2.2 mm, upper glume 2.1–2.6 mm; lemmas 2.7–3.3 mm; larger roots mostly ca. 0.1 mm in diam. ..... 55. *P. wardiana*
15b. Ligule 2.5–6.5; lower glume 2.2–4 mm, upper glume 2.8–4.5 mm; lemmas 3.1–4.4 mm; larger roots mostly 0.2–0.3 mm in diam. ..... 62. *P. dzongicola*
14b. Callus webbed; lemmas glabrous or pubescent.
16a. Lemma glabrous.
17a. Lemma densely scabrid, 3.7–5.2 mm, papery; palea subequal to lemma ..... 61. *P. sunbisinii*
17b. Lemma smooth, 3–4 mm, membranous-papery; palea distinctly shorter than lemma ..... 58. *P. takasagomontana*
16b. Lemma pubescent at least on the keel.
18a. Glumes subequal, lower glume not more than 0.5 mm shorter than lowest lemma; ligule abaxially smooth or sparsely scabrid.
19a. Lemmas green, 4–5 mm, papery, surface minutely bumpy, otherwise glabrous ..... 57. *P. nankoensis*
19b. Lemmas usually purple tinged, 2–4(–5) mm, membranous to membranous-papery, surface smooth to sparsely scabrid, glabrous or pilulose ..... 60. *P. hirtiglumis*
18b. Glumes unequal, lower glume usually more than 0.5 mm shorter than lowest lemma; ligule abaxially smooth to densely scabrid.
20a. Lemma surface pubescent ..... 52. *P. burmanica*
20b. Lemma surface glabrous.
21a. Leaf sheaths very compressed with a winged keel, uppermost closed for 2/3–3/4 of length; collar glabrous; panicle broad, branches scabrid angled from base, longest to 12 cm ..... 45. *P. ussuriensis*
21b. Leaf sheaths somewhat compressed, with or without a slightly winged keel, uppermost closed for 1/2–2/3 of length; collar often ciliate; panicle narrow, branches smooth or sparsely scabrid angled from base; longest to 7 cm.
22a. Lower glume subulate to wedge-shaped, less than 1/2 as long as lower lemma ..... 54. *P. rajbhandarii*
22b. Lower glume narrowly lanceolate, slightly arched to sickle-shaped, more than 1/2 as long as lower lemma ..... 56. *P. khasiana*

Key 2 (species with anthers more than 1 mm long: *Poa* sect. *Macropoa*, species nos. 13–16; *P.* sect. *Poa*, species nos. 17–29; *P.* sect. *Homalopoa* in part, species nos. 30–42).

1a. Lemma and callus totally glabrous and ligule less than 3(–4) mm (if plants tufted, ligules 2.5–6 mm, and anthers 1.1–1.5 mm, see 62. *P. dzongicola*).
2a. Plants densely tufted, all or most shoots flowering, extravaginal, rhizomes absent; leaf blade thin, 1–2 mm wide, scabrid; lemma thinly finely scabrid or minutely bumpy throughout; branches distally moderately scabrid ..... 32. *P. perennis*
2b. Plants densely or loosely tufted, sterile shoots usually present, intra- and extravaginal, rhizomes present or absent, if all shoots extravaginal then rhizomes well developed; leaf blade thick or thin, usually 1.5–4 mm wide; lemmas smooth or variously scabrid; panicle branches distally smooth or scabrid.
3a. Flowering shoots fewer than sterile shoots, rhizomes absent or poorly developed; panicle branches rounded, smooth or sparsely scabrid.
4a. Lemma surfaces smooth; paleas smooth between the keels ..... 24. *P. hissarica*
4b. Lemma surfaces scabrid; paleas scabrid between the keels ..... 26. *P. qinghaiensis*
3b. Flowering shoots as many or more than sterile shoots, rhizomes well developed or not; panicle branches smooth or more commonly scabrid at least distally (*Poa* sect. *Macropoa*).
5a. Major roots ca. 0.1 mm in diam.; plants (apparently) without rhizomes; uppermost leaf sheath shorter than blade ..... 13. *P. bomiensis*
5b. Major roots 0.2–1 mm in diam.; plants with rhizomes; uppermost leaf sheath 1–4 × as long as blade.
6a. Major roots to 1 mm in diam.; sheaths of tillers retrorsely hispidulous to pilulose near collar; uppermost culm leaf sheath 3–4 × as long as blade ..... 14. *P. binodis*
6b. Major roots 0.2–0.4 mm in diam.; sheaths of tillers smooth or scabrid near the collars; uppermost culm leaf sheath ca. 1–4 × as long as blade.
7a. Palea keels scabrid for 1/3–1/2 of length, smooth or minutely bumpy between keels; plants almost always pinkish violet; panicle branches smooth or scabrid; alpine plants from C Asia ..... 15. *P. bucharica*
7b. Palea keels scabrid for 2/3–3/4 of length, with sparse slender spinules between keels; plants with or without pinkish violet coloration; panicle branches scabrid; plants widespread ..... 16. *P. sibirica*
1b. Lemma or callus pubescent with at least a few short hairs; ligule 0.2–10 mm.
8a. Culms with 5–12 nodes, mostly 50–150 cm; longest panicle internodes usually more than 4 cm; leaf blade commonly over 4 mm wide; sheaths prominently compressed-keeled.
9a. Branches moderately to densely scabrid distally ..... 30. *P. remota*
9b. Branches smooth or very sparsely scabrid.

10a. Longest branches with 2–5 spikelets; culms glabrous below all nodes, not rebranched except at base ..... 41. *P. gammieana*
10b. Longest branches with 7–26 spikelets; culms strigose below lowest nodes, frequently rebranched above .... 42. *P. grandis*
8b. Culms with 1–4 nodes, mostly 10–80 cm; longest panicle internodes usually less than 4 cm; leaf blade usually less than 4 mm wide; sheaths indistinctly to prominently compressed-keeled.
11a. Collars of at least the lower leaves with a distinct wedge-shaped area on either side, usually densely scabrid to strigose or villous on wedge but not above or below it; blade margins not abruptly flared; ligule truncate, 0.5–1.5 mm ..... 34. *P. mairei*
11b. Collars usually with an indistinct narrow junction, rarely pubescent much back from margin but then hairs not confined to junction; blade margins abruptly flared or not; ligule truncate to acuminate, 0.4–10 mm.
12a. Callus glabrous.
13a. Palea keels medially pilulose to villous; panicle open.
14a. Culm blades 3 or 4, flat, middle culm ones medially smooth on the margins and surfaces, 4–5 mm wide, apex abruptly prow-tipped; glumes distinctly punctate-papillate; lemmas conspicuously 5–7-veined, pubescent between the veins ..... 40. *P. polyneuron*
14b. Culm blades 2 or 3, flat, folded or involute, middle culm ones scabrid at least on the margins, 1–3 mm wide, apex gradually prow-tipped; glumes not or indistinctly punctate-papillate; lemmas 5-veined, lateral veins faint to moderately conspicuous, glabrous or pubescent between the veins.
15a. Lemmas moderately densely scabrid to crisply pilulose between veins near base; plants loosely tufted ..... 39. *P. nitidespiculata*
15b. Lemmas smooth or sparsely scabrid, sometimes loosely soft pilulose, between veins near base; plants densely to loosely tufted ..... 25. *P. lipskyi*
13b. Palea keels scabrid throughout; panicle open or contracted.
16a. Longest ligules to 1(–1.5) mm, truncate; panicle branches moderately to densely scabrid.
17a. Plants densely tufted, without rhizomes, tillers all or most intravaginal with blades firm involute, abaxially scabrid, ribs indistinct; lemmas glabrous between veins ..... 34. *P. mairei*
17b. Plants densely to loosely tufted, with or without rhizomes, tillers intra- and extravaginal with blades thin involute, abaxially smooth or scabrid, ribs distinct; lemmas glabrous or pilulose between veins ..... 18. *P. polycolea*
16b. Longest ligules 1.5–8 mm, truncate to acuminate; panicle branches smooth to densely scabrid.
18a. Panicle branches distally rounded or faintly angled, smooth or very sparsely scabrid.
19a. Glumes membranous, surfaces minutely punctate with purple pigment in papillate cells, not shiny, otherwise smooth or with sparsely scabrid keels ..... 37. *P. pagophila*
19b. Glumes membranous to sub-papery, surfaces not evidently minutely punctate, or only near apex, shiny or not, keels smooth or scabrid.
20a. Uppermost sheaths closed for 1/2–3/4 of length; palea keels sparsely scabrid (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*
20b. Uppermost sheaths closed for 1/3–1/2 of length; palea keels moderately to densely scabrid ..... 25. *P. lipskyi*
18b. Panicle branches distally angled, sparsely to densely scabrid.
21a. Lower culm leaf ligule less than 0.8(–1) mm, truncate, to 1.5(–2.2) mm for upper culm leaves.
22a. Sterile tiller shoots common, intra- and extravaginal, laterally pointing shoots commonly present; basal sheaths persistent, straw colored, shiny; spikelet bracts acute, rachilla internodes mostly less than 1 mm ..... 18. *P. polycolea*
22b. Sterile tiller shoots infrequent, mostly extravaginal, laterally pointing shoots absent; basal sheaths not persisting, not shiny; spikelet bracts sharply acute to acuminate, rachilla internodes often reaching 1.2 mm ..... 32. *P. perennis*
21b. Lower culm leaf ligule more than 1 mm, truncate to acute, to 2–8 mm for upper culm leaves.
23a. Panicle branches usually 3–5 per node, moderately to densely scabrid angled in distal 1/2, longest with 6–26 moderately crowded spikelets; uppermost ligules 3–8 mm, often lacerate ..... 31. *P. asperifolia*
23b. Panicle branches usually 1–2 per node, sparsely to moderately scabrid in distal 1/2, longest with 1–8 loosely arranged spikelets; uppermost ligules (1–)2–6 mm, generally entire.
24a. Culm leaf blades reaching the panicle, uppermost node above the middle; glumes distinctly covered by papillate cells; plants not glaucous ..... 38. *P. falconeri*
24b. Culm leaf blades not reaching the panicle, uppermost node in the lower 1/3; glumes with a few indistinct papillate cells; plants distinctly glaucous ..... 39. *P. nitidespiculata*
12b. Callus pubescent.
25a. Panicle narrowly pyramidal with 5 densely scabrid branches per node, the longest to 3 cm with 6–9 spikelets from near the base; palea hyaline, distinctly shorter than lemma ..... 29. *P. xingkaiensis*

25b. Panicle not narrowly pyramidal with 5 densely scabrid branches per node, or if so then longest branch more than 3 cm with florets in the distal 1/2; paleas distinctly colored in part, not mostly hyaline, distinctly shorter to as long as lemma.
26a. Plants less than 25 cm tall.
27a. Ligule 0.1–1.2 mm, truncate.
28a. Lower culm sheaths thin with prominent ribs; blade thin, with distinct abaxial ribs; lower glume subulate ..... 18. *P. polycolea*
28b. Lower culm sheaths without distinct abaxial ribs; lower glume broader ..... 35. *P. langtangensis*
27b. Ligule of upper leaves more than 1.5 mm, truncate to acuminate.
29a. Glumes membranous-papery, weakly keeled, covered by punctate-papillate cells, keel smooth or with sparse hooks, apex obtuse or acute, often blunt, lower glume 1(or 3)-veined.
30a. Plants with slender rhizomes and isolated shoots; glumes green, upper one to 2–2.7 mm; lowest lemmas 2.5–3.3 mm ..... 35. *P. langtangensis*
30b. Plants loosely to moderately densely tufted, not rhizomatous or infrequently with some isolated shoots; glumes usually purple, upper one 3–3.5 mm; lowest lemmas 3.2–4.8(–5) mm ..... 37. *P. pagophila*
29b. Glumes very thinly to thickly papery, not or only sparsely covered by punctate papillae (or if so then strongly keeled, and upper with prominent lateral veins, and sharply acuminate; *P. tenuicula*), keels smooth or densely scabrid.
31a. Plants densely tufted, without rhizomes; glumes sharply acute to acuminate, the upper one prominently 3-veined; lemmas pubescent between the veins; rachilla densely pilulose to short villous ..... 59. *P. tenuicula*
31b. Plants with distinct lateral tending shoots, rhizomatous to weakly stooling, with isolated flowering shoots, or with few shoots per tuft; glumes acute or acuminate, apex generally not so sharply pointed; lemmas glabrous or pilose between the veins; rachillas glabrous or pilulose.
32a. Palea keels with 2–6 hooks per keel; lemmas in the upper 1/4–1/2 membranous, turning golden-brown; panicle branches round, smooth to sparsely scabrid, to 2.5 cm with 2–12 spikelets clustered distally ..... 17. *P. calliopsis*
32b. Palea keels with more than 6 hooks per keel, lemmas distally thicker, membranous only in the upper 1/5 or less, with at most a narrow golden-brown band; branches smooth or scabrid, round or angled in part, usually without spikelets distinctly clustered distally.
33a. Uppermost sheaths closed 1/4–2/5; lemmas glabrous between the veins; paleas glabrous between the keels; plants with well-developed branching rhizome systems; panicle branches sometimes scabrid, longest branch with (3–)7–18, small to moderate-sized spikelets ..... 21. *P. pratensis*
33b. Uppermost sheaths closed over 1/2; lemmas usually pubescent between the veins; plants loosely tufted, with short, unbranched rhizomes or stooling; panicle always smooth or nearly so, longest branch with 1–3(–7) large spikelets.
34a. Palea keels sparsely scabrid, glabrous, between keels glabrous; callus hairs sparse, dorsal or diffuse; viviparous spikelets unknown (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*
34b. Palea keels distinctly scabrid and usually often pilulose to short-villous medially, between keels usually pilulose; callus hairs dorsal, well developed; spikelets infrequently viviparous ..... 27. *P. smirnowii*
26b. Plants more than 25 cm tall.
35a. Lemmas glabrous, but densely scabrid over most of surface; paleas densely scabrid between keels ..... 61. *P. sunbisinii*
35b. Lemmas pilulose to villous at least on the keel, between veins smooth, minutely bumpy, scabrid, glabrous or pubescent; paleas smooth or scabrid, glabrous or pubescent between keels.
36a. Lower glume subulate, keel straight or slightly arched, usually 1-veined, less than 1/2 the width of upper glume, both glumes smooth throughout or sparsely to moderately scabrid on the keel only, not punctate-papillate on the sides, generally shiny; shoots intra- and extravaginal, some lateral tending shoots usually present; rachillas well exposed mostly with upper internodes exceeding 1.2 mm; female flowers common; normal anthers 2.3–3 mm; lemma sides glabrous or pilulose in the basal part, with conspicuous intermediate veins; ligule of lower culm and tiller leaves less than 0.5 mm, of upper culm leaves to 1(–2.2) mm, truncate to obtuse; lower culms covered by closely overlapping, long, narrow sheaths ..... 18. *P. polycolea*
36b. Lower glume subulate or broader, keel slightly to distinctly arched, 1–3-veined, often more than 1/2 as wide as upper glume, glume texture as above or scabrid or punctate-papillate, shiny or not; shoots sometimes all intra- or all extravaginal, lateral tending shoots present or absent; rachillas hidden to well exposed, often with most internodes less than 1.2 mm; female flowers common or absent; normal anthers 1.2–3.5 mm; ligule of lower shoots often longer than 0.5 mm, those of the

upper leaves often more than 2 mm, truncate to acuminate; lower culms mostly not covered in closely overlapping, long, narrow sheaths; in any case not with the above combination of characters.

37a. Lower lemmas pubescent between veins.

38a. Plants definitely not rhizomatous; lower glume 1(–3)-veined; glume surfaces distinctly covered with punctate-papillate cells; culms to 40 cm.

39a. Anthers 1.2–1.5 mm; flowers all perfect; glumes papery, strongly keeled, green, and a bit glaucous; panicle loosely contracted, branches ascending, moderately scabrid on angled branches distally (if in the Himalayas see *P. stapfiana*, a species with anthers to 1.2 mm and glumes membranous) ..... 59. *P. tenuicula*

39b. Anthers 2–3.5 mm; flowers sometimes female; glumes membranous to membranous-papery, often weakly keeled, usually purple; panicle open, branches spreading, smooth and round throughout, or sparsely scabrid angled distally.

40a. Lemmas subpapery, minutely bumpy, not or sparsely scabrid above; all shoots intravaginal ..... 36. *P. nubigena*

40b. Lemmas membranous-papery, not minutely bumpy, moderately to densely scabrid above; some shoots extravaginal ..... 37. *P. pagophila*

38b. Plants with at least some distinct laterally tending shoots to clearly rhizomatous, or lower glume distinctly 3-veined; glume surfaces not or only slightly punctate-papillate in the margins; culms 25–120 cm.

41a. Panicle branches moderately to densely scabrid angled (distally at least); basal sheaths becoming fibrous; uppermost ligules 3–8 cm, entire to long lacerate; lower glumes 1(–3)-veined; web usually absent, when present, always dorsal, usually scanty ..... 31. *P. asperifolia*

41b. Panicle branches smooth or sparsely scabrid, round or weakly angled; basal sheaths becoming papery or soon withering; ligules 1–4(–6) cm, entire; lower glumes commonly 3-veined in most spikelets (1-veined in *P. tangii*); callus hairs usually present, dorsal or diffuse.

42a. Ligules ca. 1 mm long; hairs diffuse or dorsal on the callus; lower glumes 1-veined ..... 19. *P. tangii*

42b. Ligules 2–6 cm; hairs of the callus all dorsal, or some diffuse; lower glumes 1- or 3-veined.

43a. Leaf sheaths of upper culm leaves closed 1/4 to 1/3 of length ..... 23. *P. arctica*

43b. Leaf sheaths of upper culm leaves closed over (2/5–)1/2 of length.

44a. Plants glaucous throughout, with at most a scant dorsal web of 1 to few hairs; panicle branches distally sparsely scabrid; sheaths closed 2/5–1/2 of length ..... 39. *P. nitidespiculata*

44b. Plants not or little glaucous, with a well-developed dorsal or diffuse web; panicle branches smooth, or sparsely scabrid; sheaths closed over 1/2–3/4 of length.

45a. Palea keels sparsely to moderately scabrid, glabrous, between keels glabrous; callus hairs scant, dorsal or diffuse; panicle branches totally smooth; plants without distinct rhizomes, sometimes weakly stoloniferous (*P.* subg. *Ochlopoa*) ..... 11. *P. veresczaginii*

45b. Palea keels scabrid and usually medially pilulose to short villous, between keels usually pilulose; callus hairs dorsal, well developed; panicle branches smooth or sparsely (moderately) scabrid; plants with distinct rhizomes ..... 27. *P. smirnowii*

37b. Lemmas between veins glabrous throughout (intermediate veins infrequently pubescent).

46a. Glume surfaces distinctly covered with punctate-papillate cells; anthers 2–3.5 mm; lower glume 1(–3)-veined, often weakly keeled; plants definitely not rhizomatous (infrequently with short delicate rhizomes in *P. pagophila*); flowers sometimes female; panicle open, branches spreading, smooth and round throughout, or sparsely scabrid angled distally.

47a. Lemmas almost papery, minutely bumpy, not or sparsely scabrid above; all shoots intravaginal ..... 36. *P. nubigena*

47b. Lemmas membranous-papery, not minutely bumpy, moderately to densely scabrid above; some shoots extravaginal ..... 37. *P. pagophila*

46b. Glume surfaces not or only slightly punctate-papillate in the margins; or anthers shorter than 2 mm, or branches distinctly scabrid distally, or glumes 3-veined, or plants strongly rhizomatous.

48a. Plants tufted, without rhizomes; sheaths smooth, glabrous; panicle branches scabrid angled; ligules (1–)1.5–3 mm, obtuse; blades flat, smooth on both surfaces, 1–3 mm wide; lower glumes 3-veined; lemmas 4–5.5 mm, villous along keel and marginal veins, between veins glabrous; palea keels pilulose; anthers 2.5–3 mm ..... 28. *P. macroanthera*

48b. Plants tufted or not, with or without rhizomes, sheaths smooth or scabrid, sometimes pubescent; panicle branches smooth or sparsely to densely scabrid; ligules 1–8 mm, truncate to acuminate; blades flat, folded or involute, surfaces smooth or scabrid, 1–5 mm wide; lower glumes 1- or 3-veined; lemmas 2.5–6 mm, pilulose to villous along keel at least; palea keels scabrid only or medially pilulose to villous; anthers 1.2–3.5 mm; in any case

not with the above combination of characteristics.

49a. Sheaths closed 2/5–3/4 of length; panicle branches smooth; anthers 2.5–3.5 mm, or sometimes vestigial; lemmas 4–5.5 mm long; uppermost ligules ca. 1 mm; callus hairs dorsal or diffuse, loose; lemma keel hairs sparse, long and soft ..... 19. *P. tangii*

49b. Sheaths closed (1/5–)1/4–3/5 of length; panicle branches smooth or scabrid; anthers 1.2–2.5(–3) mm, sometimes vestigial or not; uppermost ligules mostly 1–8 mm; callus hairs dorsal only; lemma keel hairs not sparse, long and soft.

50a. Lemma keel short villous or pilulose in lower 1/3; callus web scanty; palea keels glabrous.

51a. Ligules of upper culm leaves (2–)3–8 mm, of lower culm more than ca. 1 mm ..... 31. *P. asperifolia*

51b. Ligules of upper culm leaves to 2.2 mm, of lower culm less than ca. 1 mm.

52a. Plants densely tufted, without lateral tending shoots ..... 32. *P. perennis*

52b. Plants loosely tufted, subrhizomatous ..... 33. *P. zhongdianensis*

50b. Lemma keel villous to lanate in 1/2–3/4 of length; callus web dense; palea keels glabrous or pilulose-villous medially.

53a. Uppermost culm leaf blades 0.6–0.9 × as long as their sheaths; panicle branches proximally sparsely to moderately scabrid, distally densely scabrid angled ..... 20. *P. lhasaensis*

53b. Uppermost culm leaf blades 0.1–0.7 × as long as their sheaths; panicle branches smooth or variously scabrid.

54a. Uppermost culm sheaths closed over (1/2–)2/3 of length; culm blades 1–5 cm × 2–4 mm, flat or folded, not much different from tillers; panicle branches smooth or nearly so, longest with 1–3(–7) large spikelets; palea keels with a few soft hairs medially and between keels of some lemmas; anthers 2–2.5 mm ..... 27. *P. smirnowii*

54b. Uppermost culm sheaths closed 1/4–2/5 of length; culm blades various in length and width, but generally not consistently short and broad, or if so, the tillers commonly involute; panicle branches smooth to densely scabrid angled, longest usually with 7 or more spikelets; palea keels glabrous or rarely pilulose; anthers mostly (1.2–)1.4–2.5(–2.8) mm ..... 21. *P. pratensis*

13. Poa bomiensis C. Ling, Acta Phytotax. Sin. 17(1): 101. 1979.

波密早熟禾 bo mi zao shu he

Annuals (?or perennials), tufted, not rhizomatous; shoots extravaginal. Culms erect, solitary or few per sparse tuft, 20–35(–55) cm tall, 0.8–1.5 mm in diam., compressed, scabrid below nodes, nodes 2 or 3, 0–3 exserted. Leaf sheaths longer to slightly shorter than internodes 8–12 cm, slightly shorter than blade, uppermost closed for 3/7–1/2 of length, finely retrorsely scabrid, glabrous, keel slightly raised; blade flat, thin, 6–11 cm (uppermost often longest), 2–5 mm wide, adaxially smooth or scabrid on keel and veins, adaxially scabrid on and between veins, margins smooth to finely scabrid; ligule 1–2.5 mm, abaxially smooth, apex truncate, obtuse or acute. Panicle open, narrow, slightly lax, 7–14 × 1–3 cm, longest internodes 2–2.5 cm; branches ascending to spreading, 2 per node, slender, flexuous, proximally smooth or scabrid, distally scabrid on and sometimes between angles, longest 3–5 cm with 1–4 spikelets in distal 1/3. Spikelets elliptic, green or slightly purple tinged, 5–6 mm, florets 2 or 3; vivipary absent; rachilla scabrid, glabrous; glumes unequal, apex acuminate, upper keel and surface scabrid, lower glume subulate to narrowly lanceolate, 2.3–3.5 mm, 1- or 3-veined, upper glume lanceolate, 3.3–4.5 mm, 3-veined; lemmas ovate to oblong to lanceolate, 3.2–5 mm, apex acuminate, intermediate veins 5(–7), prominent, surfaces minutely scabrid; callus glabrous; palea finely scabrid, keels scabrid 2/3–3/4 of length. Anthers (1–)1.2–1.7 mm. Fl. and fr. Jun–Sep.

● Mountain meadows among thickets; 4000–4200 m. SE Xizang (Bomi).

Though originally described as a perennial, the two specimens seen appear to be slender-rooted annuals.

14. Poa binodis Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 388. 2002.

双节早熟禾 shuang jie zao shu he

Perennials, rhizomatous; shoots extra- and intravaginal. Plants grayish green. Culms erect, decumbent at base, loosely tufted, 40–80 cm tall, 1–2 mm in diam., smooth, nodes 2, 1 exserted. Leaf sheath pale, prominently keeled with a short ± leathery wing, smooth, lower ones hispidulous to pilulose, to 16 cm, 3–4 × as long as blade, uppermost closed for 2/3 of length, smooth, glabrous; blade folded with slightly inrolled margins, or involute, leathery, 4–10 cm × ca. 3 mm, surfaces smooth to sparsely scabrid, of tillers to 15 cm, abaxially somewhat reflexed hispid; ligule 1–2 mm, collar smooth, scabrid or hispidulous or ciliate. Panicle loosely contracted, 12–20 × 3–5 cm; branches ascending to spreading, 2 or 3 per node, slender, proximally smooth or scabrid along angles throughout, longest 3–9 cm with 10–17 moderately crowded spikelets in distal 1/2, pedicels 0.5–1 mm, terminal one ca. 2 mm. Spikelets pale, sometimes purplish near apex, (3.5–)4–7 mm, florets 3 or 4(–6); vivipary absent; rachilla internodes 0.5–1.5 mm, scabrid; glumes unequal, apex acute, keel scabrid, area between veins sparsely, minutely scabrid, lower glume 2–2.5 mm, 1-veined, upper glume 2.8–3.5 mm, 3-veined; lemmas (3–)3.5–4 mm, minutely bumpy and moderately scabrid from base, glabrous throughout, keel finely scabrid for most of length, prominently 5(–7)-veined, margins smooth, apex acute; callus glabrous; palea minutely bumpy between keels, hooks sparse or absent, keels scabrid in distal 1/3–1/2 (30–50 hooks per keel). Anthers

ca. 2 mm. Fl. and fr. Jul–Aug.

● Ditch banks, grassy places on slopes; ca. 3800 m. W Sichuan.

This species is similar to *Poa sibirica*, but differs in its grayish green coloration, stout roots (to 1.2 mm thick), 2-noded culms, and hispid leaves. It is known from only two gatherings.

15. Poa bucharica Roshevitz, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 4: 94. 1923.

布查早熟禾 bu cha zao shu he

Perennials, loosely tufted, rhizomatous; shoots extravaginal. Culms erect, decumbent at base, 50–80 cm tall, 1–2 mm in diam., nodes 2 or 3, 1 or 2 exserted, lower internodes smooth or scabrid. Leaf sheaths pale green, compressed, moderately keeled, smooth or scabrid, glabrous, 2–4 × as long as blade, uppermost closed for 1/3–2/5 of length; blade flat or folded with margins slightly inrolled, thin to moderately thin, 5–20 cm × 1–3 mm, abaxially smooth or sparsely to densely scabrid, margins scabrid, of tillers and lower culm to 30 cm; ligule 0.5–1(–2.7) mm, abaxially smooth or scabrid, glabrous, apex truncate or infrequently obtuse, collar margins scabrid, glabrous. Panicle loosely contracted to open, (3–)5–15 × 1–9 cm; branches contracted to spreading, 2–5 per node, slender, proximally round and smooth, distally scabrid angled, longest 0.5–7 cm with 2–10 spikelets in distal 1/3–1/2. Spikelets pale green and rosy to dark purple, 4–6 mm, florets 3–4(–6); vivipary absent; rachilla internodes 0.5–1.5 mm, smooth or sparsely scabrid; glumes subequal, keel sparsely scabrid, apex acuminate, lower glume 2–3 mm, 1- or 3-veined, upper glume 3–3.5(–4.5) mm, 3-veined; lemmas pale green and violet to dark purple above, papery-membranous to papery, 4–5 mm, abaxially smooth or minutely bumpy, adaxially smooth or sparsely scabrid, glabrous throughout, keel distally scabrid, intermediate veins prominent, margins smooth, apex acute; callus glabrous; palea smooth or minutely bumpy between keels, keels scabrid in distal 1/2, 5–40 hooks per keel. Anthers 1.5–3 mm. Fl. and fr. Jun–Jul.

Alpine grassy places on slopes, swales and stony slopes; 2800–3500 m. Xinjiang [Afghanistan (rare), Kashmir, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Poa koksuensis Goloskokov is expected from the Jungarian Alatau border of China. It can be distinguished from *P. bucharica* by the totally smooth panicle branches and palea keels with only 1–6 short spinules or entirely smooth.

1a. Culms 50–80 cm tall; panicle loosely contracted, branches scabrid over most or all of length, longest with 3–10 spikelets; palea with 5–40 hooks per keel ..... 15a. subsp. *bucharica*

1b. Culms 20–65(–70) cm tall; panicle open, pyramidal, diffuse, branches smooth or distally sparsely scabrid, longest with 2–5 spikelets; palea with 5–15 hooks per keel ..... 15b. subsp. *karateginensis*

15a. Poa bucharica subsp. **bucharica**

布查早熟禾(原亚种) bu cha zao shu he (yuan ya zhong)

Culms 50–80 cm tall, lower internodes scabrid. Uppermost leaf sheaths 2–3 × as long as blade; ligule 0.5–1 mm; uppermost blades 4–9 cm. Panicle loosely contracted, ovoid to lanceolate, interrupted or not, 5–10 × 1–3 cm; branches contracted to steeply ascending, 3–5 per node, sparsely to moderately scabrid over most or all of length, longest 0.5–4 cm with 3–10 moderately crowded spikelets in distal 1/2. Spikelets 4–6 mm, florets 3–4(–6); rachilla internodes 0.5–1.5 mm, smooth or sparsely scabrid; lower glume 2–3 mm, upper glume 3–3.5 mm; lemmas thinly papery to papery, ca. 4 mm, intermediate veins prominent; palea with 5–40 hooks per keel. Anthers 1.5–2.8 mm. Fl. and fr. Jun–Jul. 2*n* = 14.

Alpine grassy places on slopes; 2800–3500 m. Xinjiang [Afghanistan (rare), Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

15b. Poa bucharica subsp. **karateginensis** (Roshevitz ex Ovczinnikov) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 28. 1974.

卡拉蒂早熟禾 ka la di zao shu he

Poa karateginensis Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 12. 1933; *P. suruana* H. Hartmann.

Culms 20–65(–70) cm tall, lower internodes smooth. Leaf sheaths, uppermost 3–4 × as long as blade; ligules 0.3–2.7 mm; uppermost blades 1–4 cm. Panicle open, pyramidal, diffuse, (3–)6–15 × 3–9 cm; branches ascending to spreading, 2 or 3(or 4) per node, smooth or distally sparsely scabrid, longest 2–7 cm with 2–5 spikelets in distal 1/2. Spikelets 6–7 mm, florets 3 or 4(–5); rachilla internodes 1–1.5 mm, smooth; lower glume 3–3.5 mm, upper glume 3.5–4 mm; lemmas thinly papery, 4–5 mm, intermediate veins moderately distinct; palea with 5–15 hooks per keel. Anthers 2–3 mm. Fl. and fr. Jul–Aug.

Alpine grassy slopes; ca. 3000 m. Xinjiang [Kashmir, W Tajikistan (Karataginsky Range)].

The type of *Poa suruana*, from Kashmir (Karakorum Mountains), resembles subsp. *karateginensis* in its open panicle with fairly smooth branches, but seems intermediate to subsp. *bucharica* in its more typical glumes and longer panicle with a few more spikelets per branch, distinct ligules to ca. 2 mm long, and height of 65–70 cm. *Poa bucharica* subsp. *aksuensis* Roshevitz ex Tzvelev keys out to subsp. *karateginensis* but has palea keels each with 15–40 spinules. It comprises plants from the Tien Shan on or near the Kyrgyzstan-China border and potentially occurs in China.

16. Poa sibirica Roshevitz, Izv. Imp. S.-Peterburgsk. Bot. Sada 12: 121. 1912.

西伯利亚早熟禾 xi bo li ya zao shu he

Perennials, rhizomatous; shoots extravaginal and a few intravaginal. Culms erect, decumbent at base, (20–)40–120 cm tall, 1–4 mm in diam., loosely tufted, shiny, smooth or sparsely short scabrid below panicle, nodes 3 or 4, 1 or 2 exserted, with a few persistent whitish sheaths. Leaf sheaths green, compressed, with keel up to 0.4 mm deep, smooth or finely scabrid, glabrous, 8–20 cm, 1–2 or more × as long as blade, uppermost closed for 1/2–2/3 of length; blade flat or folded, thin, 4–25 cm × (1.5–)2–6(–8) mm, abaxially smooth, adaxially smooth to scabrid, margins scabrid, apex prow-tipped, of tillers often

folded, abaxially smooth; ligule (0.5–)1–2.7 mm, abaxially smooth or scabrid, glabrous or puberulent, apex truncate to obtuse, irregularly dentate, collar margins smooth or coarsely scabrid, glabrous. Panicle loosely contracted to wide open, exserted, (4–)6–15(–18) cm, longest internodes 1–4 cm; branches ascending to spreading, 2–5 per node, slender, round to weakly angled, proximally smooth or scabrid along angles throughout, longest 3–9 cm with 3–17 moderately crowded spikelets in distal 1/2. Spikelets pale green to dark purple, (3.5–)4–5.5(–6.5) mm, florets 2–5; vivipary absent; rachilla internodes 0.5–1 mm, smooth or scabrid; glumes lanceolate, acute, upper keel and veins scabrid, lower glume (1.2–)2–2.5(–3.5) mm, 1(or 3)-veined, upper glume 2.5–3(–4.5) mm, 3-veined; lemmas pale green or sometimes violet to dark purple above, 2.5–4(–5.5) mm, proximally minutely bumpy to scabrid, distally scabrid, glabrous throughout (sometimes obscurely strigulose on keel base), keel scabrid, intermediate veins prominent, apex and margins narrowly membranous, apex acute; callus glabrous; palea minutely bumpy and with slender hooks between keels, keels finely and densely scabrid to subciliate for (1/2–)2/3–3/4 of length, 40–60 hooks per keel. Anthers 1.5–2.5 mm. Fl. and fr. Jun–Jul.

Forest margins, meadows among thickets, grassy places on slopes in river valleys, subalpine meadows; 1700–2800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan, NW Xinjiang, Yunnan [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe (Russia to W of Ural Mountains)].

1a. Lower lemmas within spikelets 2.8–3.8 mm; panicle branches spreading; leaf blade 1.5–4 mm wide; culm 1–2 mm in diam. at lower nodes ..... 16a. subsp. *sibirica*

1b. Lower lemmas within spikelets (3.5–)3.8–5.2 mm; panicle branches erect to ascending; blade 2–8 mm wide; culm 2–4 mm in diam. at lower nodes ..... 16b. subsp. *uralensis*

16a. Poa sibirica subsp. **sibirica**

西伯利亚早熟禾(原亚种) xi bo li ya zao shu he (yuan ya zhong)

Culms 50–100 cm tall, 1–2 mm in diam. at lower nodes. Leaf sheaths shorter than internodes, uppermost 8–18 cm, 1.5–4 × longer than blade; ligule (0.5–)1–2.7 mm, abaxially scabrid; blade 1.5–4(–5) mm wide, uppermost to 10 cm. Panicle loosely contracted to open, ovoid to pyramidal, 4–15 cm, longest internodes 1–2.5(–3) cm. Spikelets 2–5-flowered; lower glume 2–2.5 mm, upper glume 2.5–3 mm; lemmas 2.5–3.8 mm. Anthers 1.5–2.5 mm. Fl. and fr. Jun–Jul. 2*n* = 14.

Forest margins, meadows among thickets, grassy places on slopes in river valleys, subalpine meadows; 1700–2800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi, Sichuan, NW Xinjiang, Yunnan [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe (Russia to W of Ural Mountains)].

This subspecies is quite variable, but is readily distinguishable from other species over most of its range. Material from Sichuan, however, looks somewhat different and needs further study.

16b. Poa sibirica subsp. **uralensis** Tzvelev, Novosti Sist. Vyssh. Rast. 9: 50. 1972.

显稃早熟禾 xian fu zao shu he

Poa insignis Litvinov; *P. sibirica* subsp. *insignis* (Litvinov) Olonova; *P. sibirica* var. *insignis* (Litvinov) Sergievskaja.

Culms up to 120 cm tall, 2–4 mm in diam. at lower nodes. Leaf sheaths longer than their internodes, nearly equaling its blade; ligules ca. 1.5 mm, abaxially sparsely scabrid to pilulose; blades moderately thin, 2–8 mm wide, uppermost to 20 cm. Panicle loosely contracted, ovoid to cylindrical, 10–20 cm, longest internodes 2.5–4 cm. Spikelets (1–)2(–3)-flowered; lower glume 2.5–3.5 mm, upper glume 3–4.5 mm; lemmas (3.5–)3.8–5.2(–5.5) mm. Anthers 2–2.5 mm. Fl. and fr. Jun–Aug. 2*n* = 28.

Grasslands on slopes, meadows along forest margins; 2000–2800 m. NW Xinjiang (Toli) [Kazakhstan, Korea, Russia (Siberia); Europe (Russia: Ural Mountains)].

17. Poa calliopsis Litvinov ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 11. 1933.

花丽早熟禾 hua li zao shu he

Poa phariana Bor.

Perennials, with small tufts or isolated shoots, with slender rhizomes; shoots extravaginal. Culms erect, mostly solitary, 3–15(–25) cm tall, 0.5–1 mm in diam., smooth, nodes 1 or 2(–3), none or 1 exserted, uppermost 1/5–1/3 way up. Leaf sheaths smooth, ribs indistinct, lower ones 1.5–2 mm wide, 1.5–6.5 cm, 1–4 × as long as blade, uppermost closed for 1/3 of length, basal ones soon becoming fibrous, not persisting; blade flat or folded, moderately thin, 0.3–4 cm × 1–3 mm, abaxially smooth, adaxially smooth or finely scabrid, glabrous, margins scabrid, apex prow-tipped, of tillers and lower culm frequently curved, 1–4(–7) cm; ligule 0.5–2(–3) mm, abaxially smooth, apex truncate to obtuse, collars smooth, glabrous, uppermost erect or slightly divergent. Panicle initially contracted, ovoid, later open and pyramidal, 1.2–5 × 1.5–4 cm, longest internodes 0.25–1.3 cm; branches (1 or)2 per node, eventually spreading to reflexed, flexuous, rounded, smooth or distally scabrid, longest 0.7–2.5 cm, with 2–12 spikelets clustered distally; flowers perfect or female, sometimes whole inflorescence female. Spikelets broadly elliptic or ovate, golden tawny or purple, 3.5–4.5 mm, florets (1–)2 or 3; vivipary usually absent; rachilla internodes 0.3–0.6 mm, smooth, glabrous; glumes elliptic or ovate or subflabellate, subequal, smooth or keel with a few hooks, lower glume (2–)2.25–3.3 mm, 1- or 3-veined, upper glume (2.2–)2.5–3.8 mm, 3-veined; lemmas broadly oblong, slightly arched along keel, 2.75–4.2(–4.7) mm, upper 1/4–1/2 membranous, turning golden-brownish, apex obtuse to acute, keel villous for 1/2 of length, marginal veins villous for 1/4 of length, area between veins smooth, glabrous or infrequently proximally pilulose; callus webbed, hairs dense, 1/2 as long as lemma; palea glabrous or proximally pilulose between keels, keels sparsely scabrid, 2–6 hooks per keel. Anthers 1.5–2 mm, or vestigial, ca. 0.1 mm. Fl. and fr. Jul–Aug. 2*n* = 28.

Alpine areas, meadows, waterside grassy places; 3000–3700

(–5400) m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

Most material placed here is of low-growing plants with long, slender rhizomes and delicate panicles with pendent spikelet clusters. Hybrids with *Poa qinghaiensis* are occasionally found in the NE Xizang-Qinghai Plateau. Intermediates are stouter and have larger spikelets and more scabrid lemma and palea keels than are typical for *P. calliopsis*, but the lemmas are strongly pubescent on the keel and marginal veins. Such plants are difficult to separate from *P. lipskyi*, except that they have the more pendent spikelet clusters typical of *P. calliopsis* and *P. qinghaiensis*, and often a trace of webbing on the callus, and might be referred to *P. pratensis* subsp. *staintonii*.

18. Poa polycolea Stapf in J. D. Hooker, Fl. Brit. India 7: 342. 1896 [“1897”].

多鞘早熟禾 duo qiao zao shu he

Poa chalarantha Keng ex L. Liu; *P. gilgitica* Dickoré; *P. lithophila* Keng ex L. Liu; *P. maerkangica* L. Liu; *P. triglumis* Keng ex L. Liu.

Perennials, loosely to densely tufted, often shortly stoloniferous or rhizomatous; shoots extra- and intravaginal. Culms erect, decumbent, or ascending, usually several per tuft, 10–60(–75) cm tall, 0.5–1 mm in diam., smooth, nodes 1–3, 1 or 2 exserted, uppermost usually 1/4–1/3 way up. Lowermost leaf sheaths closely overlapping, straw colored, often somewhat thickly papery and persistent, not or only slightly fibrous, lower and middle sheaths 1–1.3(–1.5) mm wide distally, with distinct closely spaced ribs, membranous between ribs, smooth or scabrid, sometimes retrorsely hispidulous, uppermost smooth, glabrous, 4–20 cm, 1/2–4 × as long as blade, closed for ca. 1/2 of length; blade flat or folded with inrolled margins, thin, 2–10(–20) cm × 0.8–1.5(–2.5) mm, abaxially often shiny, smooth, ribs distinct, margins finely scabrid, adaxially smooth or sparsely scabrid, glabrous or strigose, of tillers with margins inrolled, to 20(–30) cm, adaxially smooth or scabrid, glabrous or pilulose to strigose, visible veins 5–9 including keel; lower ligules 0.1–0.5 mm, adaxially smooth or scabrid, apex truncate, glabrous or ciliolate, upper to 0.5–1(–2.2) mm, apex truncate to obtuse, collar margins abruptly flared, smooth or scabrid, glabrous or lower ones ciliate to strigose. Panicle open, erect or diffuse, 5–15(–20) × 2–9 cm, longest internodes 1–3(–3.5) cm; branches spreading to reflexed, 2–5 per node, capillary, usually angled, scabrid, longest 3–9 cm with 2–9 spikelets in distal 1/3–1/2. Spikelets lanceolate, green or purple tinged, 4–7 mm, florets 2–4(–5), commonly female, sometimes whole inflorescence female; vivipary absent; rachilla internodes 0.7–1.6 mm, smooth or slightly bumpy, or scabrid, usually visible laterally; glumes membranous-papery, generally shiny, keel and veins scabrid, surface smooth (rarely slightly scabrid distally), apex acute to acuminate, lower glume subulate, 1.5–3(–4) mm, 1/3–1/2 as wide as upper, 1(or 3)-veined, upper glume elliptic, 3–4(–5) mm, 3-veined; lemmas lanceolate, very thinly papery, 3–5(–5.5) mm, keel straight, 5(or 7)-veined, margins membranous, apex acute to acuminate, glabrous, or keel sparsely pilulose to shortly villous for 2/3 of length, marginal veins for 1/2 of length, intermediate veins conspicuous, area between them smooth or sparsely scabrid, glabrous or basally pilulose; callus usually sparsely webbed, hairs less than 1/2 as long as lemma; paleas smooth, minutely bumpy, or scabrid, glabrous or pilulose between keels, keels scabrid, sometimes medially pilulose. Anthers (2–)2.3–3 mm, or vestigial. Fl. and fr. Jun–Aug.

Common in alpine rocky slopes, mountain slopes, meadows among thickets, coniferous, *Quercus*, and *Larix* forests on slopes; 3000–5000 m. Qinghai, W Sichuan, SW Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Nepal, Pakistan].

Poa polycolea is a distinctive and common species of the upper mountains from west to east along the Himalayas, extending northward through Hengduan Shan. It has slender culms and blades, short ligules, and long anthers, or florets, spikelets, or inflorescences that are female. It is quite variable in floret vestiture, and in the east it grades toward *P. asperifolia*, which has stouter culms with more raised nodes and longer leaf blades and ligules, and *P. tangii*, which has softer leaves and smooth branches, broader first glumes, and more often blunt lemmas. Infrequently some spikelets have an additional sterile bract above the 2 normal glumes as in the type of *P. triglumis*.

19. Poa tangii Hitchcock, Proc. Biol. Soc. Washington 43: 94. 1930.

唐氏早熟禾 tang shi zao shu he

Poa shansiensis Hitchcock.

Perennials, loosely tufted, sometimes short rhizomatous; shoots mainly extravaginal. Culms erect, sometimes abruptly decumbent at base, few per tuft, 25–50 cm tall, 0.5–1 mm in diam., smooth, nodes 2 or 3, 1 or 2 exserted, uppermost usually 1/3–1/2 way up. Lower leaf sheaths mostly 1.2–1.5 mm wide, with well-spaced moderately raised ribs, thin between the ribs, smooth or scabrid, sometimes hispidulous, lowermost ones not closely overlapping, papery, withering, longest 4–10 cm, smooth, glabrous, 2–4 × as long as blade, uppermost closed for 2/5–3/4 of length; blade flat, papery to thickly papery, 2–4(–10) cm × 1–2(–3) mm, abaxially smooth, adaxially smooth or scabrid, glabrous, margins finely scabrid, of tillers flat or folded, 5–20 cm, generally with only primary veins expressed abaxially (3–5 veins visible including keel); ligule 0.5–1 mm, apex truncate, errose to fimbriate, adaxially smooth or scabrid, collar margins not or weakly flared, smooth or scabrid, glabrous or the lower ones sometimes ciliate. Panicle open, erect or lax, diffuse, exserted, 2–8 × 2–4 cm, longest internodes 1.2–3.5 cm; branches spreading, 2 per node, slender, rounded, smooth, longest 1.5–4 cm with 1–3 spikelets in distal 1/3; flowers female or perfect, sometimes whole inflorescences female. Spikelets ovate, grayish green, 5–8 mm, florets 3–6; vivipary absent; rachilla internodes 0.7–2.5 mm, smooth or sparsely scabrid, glabrous or sparsely pilulose; glumes very thinly papery, surface smooth, keel smooth or sparsely scabrid, apex obtuse to acute, blunt or pointed, lower glume lanceolate, 2.5–3.5 mm, 1/2–3/4 as wide as upper, 1-veined, upper glume 3–5.5 mm, 3-veined; lemmas oblong, very thinly papery, 4–5.5 mm, apex obtuse, veins glabrous or keel loosely villous for 1/2 of length, marginal veins to 1/3, area between veins smooth or distally scabrid, proximally glabrous or laxly pilulose; callus webbed or diffusely hairy, hairs less than 1/2 as long as lemma; palea, smooth or minutely bumpy (or with sparse minute hooks), glabrous between keels, keels sparsely scabrid, sometimes medially pilulose. Anthers 2.5–3.5 mm, or vestigial. Fl. and fr. May–Jul.

● Wet grassy places along forest margins; 1500–3600 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi.

Poa tangii is variable in spikelet pubescence, but the variation is not geographically correlated. The species becomes especially difficult to distinguish from *P. polycolea* in Gansu and Qinghai, except by its smooth, rounded branches and sparsely scabrid palea keels. Compare *P. tangii* also with *P. veresczaginii* in *P.* subg. *Ochlopoa*.

20. Poa lhasaensis Bor, Bull. Bot. Surv. India 7: 132. 1965.

江萨早熟禾 jiang sa zao shu he

Poa jaunsarensis Bor.

Plants grayish to tawny grayish, perennials, rhizomatous. Culms 40–80 cm tall, 1.5–2 mm in diam., nodes 3 or 4. Lower leaf sheaths retrorsely scabrid, 14–19 cm, 1.1–1.6 × as long as blade, uppermost closed for (1/5–)1/4 of length; blades flat or folded, moderately thin, 8.5–19 cm × 2.5–4 mm, uppermost 8.5–13 cm, surfaces and margins scabrid, apex slender prow-tipped; ligule 2.5–5 mm, apex entire to lacerate, abaxially scabrid. Panicle loosely contracted or somewhat open, oblong to pyramidal, 10–19 × 2–5 cm; branches loosely ascending, 3–5 per node, proximally rounded, sparsely scabrid, distally densely scabrid on and between angles, longest 4–8 cm with spikelets moderately crowded in distal 1/2. Spikelets elliptic, 4–5 mm, florets 2–4; vivipary absent; rachilla glabrous; glumes thinly papery, scabrid on keels and marginal veins, lower glume lanceolate to oblong, 2.3–3.5 mm, 1- or 3-veined, apex acuminate, upper glume elliptic to oblong, 3.5–3.8 mm; lemmas 3.5–4 mm, keel villous for 1/2 of length, marginal veins to 1/3; callus webbed; palea keels scabrid, glabrous. Anthers 1.4–2 mm. Fl. and fr. Jun–Aug.

High-elevation grassy places on slopes; 3300–4500 m. Sichuan, Xizang [India, Kashmir, Nepal].

Poa lhasaensis needs further study. The types of *P. jaunsarensis* and *P. lhasaensis* are large plants with long upper culm leaves (10–13 cm), upper sheaths closed for only 1/4 their length, and the lowest sheaths moderately to densely retrorsely scabrid; *P. jaunsarensis* has the uppermost ligule to 5 mm long and lacerate. The few specimens referable to *P. jaunsarensis* could be accommodated in *P. pratensis* except for the several long, relatively scabrid leaf blades along the culms, their unusually open sheaths, long ligules, and the thin glumes, which in combination suggest the specimens might be something else, perhaps intermediates between *P. pratensis* and *P. asperifolia*. The anthers are longer and the panicle branches more numerous in the type specimens than in the original descriptions of both *P. lhasaensis* and *P. jaunsarensis*.

21. Poa pratensis Linnaeus, Sp. Pl. 1: 67. 1753, nom. cons.

草地早熟禾 cao di zao shu he

Poa florida N. R. Cui.

Perennials, loosely tufted or with isolated shoots, strongly rhizomatous, often forming turf; shoots extra- and often intravaginal. Plants green to pale or yellowish green, or purplish to strongly grayish glaucous. Culms 10–120 cm, 1–2.5 mm in diam., erect or decumbent, 1 to several per tuft, smooth, nodes (1–)2–4, 1 or 2 exserted. Leaf sheaths moderately compressed and keeled, uppermost closed for (1/4–)1/3–2/5 of length, smooth or infrequently retrorsely scabrid or pilulose; blades flat or folded, papery to thickly papery, 1–5 mm wide, surfaces smooth or sparsely scabrid, margins scabrid, adaxially glabrous or frequently sparsely hispidulous to strigulose, of tillers, flat or folded with margins inrolled, intravaginal ones when present often folded, 0.5–2 mm wide, extravaginal ones flat or folded (1–)1.5–5 mm wide; ligule whitish, 0.5–4(–5) mm, abaxially nearly smooth to densely scabrid, apex truncate to rounded, often finely scabrid to ciliolate or pilulose. Panicle loosely contracted to open, oblong to broadly pyramidal, erect or slightly lax, (2–)5–20(–25) cm, longest internodes 1–4.2 cm; branches steeply ascending to widely spreading, (2–)3–5(–9) per node, rounded or distally angled, nearly smooth to distally scabrid with hooks on and between angles, longest branch 1.5–5(–10) cm with (3–)7–18 spikelets in distal 1/3–2/3, sometimes clustered distally. Spikelets ovate, green or grayish, frequently purple tinged, 3–7(–9) mm, florets 2–5(–9); vivipary absent in China; rachilla internodes 0.5–1(–1.2) mm, smooth, glabrous (rarely sparsely pilulose); glumes subequal, strongly keeled, keels and sometimes lateral veins dorsally scabrid, first glume 1.5–3(–4) mm. 1–3-veined, upper glume 2–4 mm, 3(or 5)-veined; lemmas ovate to lanceolate (or narrowly lanceolate), 2.5–4(–5) mm, apex slightly obtuse to acuminate, keel villous for 3/4 of length, marginal veins to 1/2 length, intermediate veins prominent, glabrous (rarely sparsely pilulose), glabrous between veins, minutely bumpy, sparsely scabrid distally; callus webbed, hairs as long as lemma, frequently with less well-developed tufts from below marginal veins; palea usually narrow, glabrous or with sparse hooks, usually minutely bumpy, glabrous between keels, keels scabrid, infrequently medially pilulose in subsp. *pruinosa*. Anthers (1.2–)1.4–2.5(–2.8) mm, infrequently poorly formed, but not vestigial. Fl. and fr. Jun–Sep. 2*n* = 28–144.

Temperate to arctic, moderately moist to wet conditions, from coastal meadows to forest shade, to alpine and tundra, often in disturbed sites; 500–4400 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia, Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Australia, Europe, North America, Pacific Islands, South America].

Poa pratensis is a valuable species for soil stabilization and forage. Its taxonomy is complicated by the occurrence of facultative apomixis and an extensive polyploid series. It comprises many local and variable, widespread races. It is possible to recognize the widespread forms as subspecies, but there are many intermediates between them that do not fit well and we can only treat them as *P. pratensis* s.l. The type of *P. florida* appears to belong to this species, but has many more florets per spikelet (6–9) than is usual.

1a. Blades somewhat tough and slightly fleshy, folded, not setiform, 2–5 mm wide, grayish green, sterile shoot leaves usually curved outward; panicle somewhat lax, branches ± smooth; plants from somewhat saline habitats in mountains and steppe basins of C Asia ..... 21d. subsp. *pruinosa*

1b. Blades flat or folded, sometimes setiform,

not fleshy, 0.5–4(–5) mm wide, sometimes with a bluish tinge, but not grayish green; sterile shoot leaves mostly straight (sometimes curved in subsp. *alpigena*).

2a. Lemmas 4–4.5 mm, lower glume 3–4 mm.
- 3a. Panicle 4–8 cm; branches 2 per node, distally sparsely scabrid, spikelets clustered in distal 1/3, clusters somewhat pendent ..... 21f. subsp. *staintonii*
- 3b. Panicle 10–15 cm; branches 3–5 per node, distally moderately scabrid, spikelets loosely arranged in distal 1/2, not pendant ..... 21g. subsp. *stenachyra*

2b. Lemmas 2.5–3.5(–5) mm, lower glume 2–3.5(–4) mm.
- 4a. Innovations and flowering shoots in small clusters, usually enclosed by dead leaf sheaths; shoots connected by long rhizomes; blades of the innovation leaves usually setiform, convolute, 0.4–1 mm in diam.; plants 20–100 cm tall; panicle usually slightly lax, compressed after anthesis; branches slightly scabrid; lemmas 2.5–3.5 mm; ligule glabrous ..... 21b. subsp. *angustifolia*
- 4b. Innovation shoots usually solitary, rarely somewhat appressed, but not forming dense clusters.
  - 5a. Sheaths of lower leaves somewhat scabrid due to very short hairs; innovation leaf blades usually convolute, moderately firm, 0.4–0.7 mm in diam.; panicle lax, branches scabrid; lemmas 2.8–3.5 mm; culms 30–80 cm tall; forest plants of Heilongjiang basin ..... 21e. subsp. *sergievskajae*
  - 5b. Sheaths of lower leaves glabrous and smooth (rarely pilulose, but then blades broader and flat); panicle branches usually slightly scabrid or smooth; lemmas 2.5–4(–5) mm.
    - 6a. Plants 8–30(–50) cm tall, with bluish coating, especially prominent on glumes; blades 1.3–4 mm wide, flat; panicle broad, lax; branches slightly scabrid, 1 or 2(or 3) per node; ligule abaxially pilulose ..... subsp. *irrigata* . (see note under 21c. subsp. *pratensis*)
    - 6b. Plants usually larger, usually without bluish coating; panicle branches usually 3–5 per node at lowest nodes.
      - 7a. Panicle branches with scattered spinules, sometimes nearly smooth; leaf blade usually flat; plants often with compact aerial shoots; widespread ..... 21c. subsp. *pratensis*
      - 7b. Panicle branches smooth or nearly so; leaf blade often convolute; plants almost always with solitary shoots; arctic and alpine ..... 21a. subsp. *alpigena*

21a. Poa pratensis subsp. **alpigena** (Lindman) Hiitonen, Suom. Kasvio. 205. 1933.

高原早熟禾 gao yuan zao shu he

Poa alpigena Lindman, Sv. Fanerogamfl. 91. 1918; *P. pratensis* var. *alpigena* Blytt, nom. illeg. superfl.; *P. pratensis* var. *contracta* Keng; *P. pratensis* var. *iantha* Laestadius.

Plants green or more often purplish, with slender rhizomes; shoots extravaginal. Culms 10–70 cm tall, 0.7–1 mm in diam., mostly solitary, nodes 1 or 2. Leaf sheaths smooth, glabrous; blades flat or more often folded, 2–5 cm × 0.6–2(–3) mm, surfaces and margins slightly scabrid or smooth, adaxially frequently sparsely hairy, of tillers often curved upward, to 12 cm; ligules 0.8–2.5 mm, abaxially smooth or sparsely scabrid. Panicle loosely contracted or eventually open, erect, 5–10(–20) × 1–3.5(–5) cm; branches spreading at anthesis, slightly flexuous, 2–4 per node, slender, smooth or sparsely scabrid, longest 1.5–4 cm, with 9–15 spikelets in distal 1/2. Spikelets purple-violet, 3–5 mm, florets 2 or 3; glumes subequal, lower glume 2–3.5 mm, upper glume 2.5–4 mm; lemmas ovate, 3.3–4.3 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins glabrous or sparsely pilulose to short villous; palea smooth or proximally with sparse hooks between keels, keels scabrid, sometimes medially pilulose. Anthers (1.2–)1.3–1.8 mm. Fl. and fr. Jul–Aug. 2*n* = 28, 35, 42, 56, 63, 70, 74–78, 84.

Mountain meadows, alpine cold grasslands, riverside sandy places; 700–1000 m. Hebei, Heilongjiang, Nei Mongol [Russia; Europe, North and South America].

Only a few specimens from NE China seem to be of this race. Records from western provinces cited in FRPS (9(2): 101–102. 2002, as *P. alpigena*) seem to be based on material better placed in subsp. *pruinosa* or subsp. *staintonii*.

21b. Poa pratensis subsp. **angustifolia** (Linnaeus) Lejeun, Comp. Fl. Belg. 82. 1828.

细叶早熟禾 xi ye zao shu he

Poa angustifolia Linnaeus, Sp. Pl 1: 67. 1753; *P. pratensis* var. *angustifolia* (Linnaeus) Smith.

Plants pale green, sometimes purplish, forming tufts, not turf; shoots extra- and intravaginal, with fascicles of slender intravaginal shoots. Culms (15–)20–80 cm tall, several per tuft. Leaf sheaths longer than basal internodes, shorter than upper internodes, several times as long as blades; blades flat or folded with margins inrolled, thin to moderately thin, 3–9 cm × 1–2

mm, of tillers intravaginal ones setiform, folded with inrolled margins, papery to thickly papery, to 45 cm × 0.5–1 mm, surfaces smooth, often adaxially pubescent; ligule 0.5–2 mm, apex truncate, abaxially scabrid. Panicle open, oblong to narrowly pyramidal, 5–10(–15) × 2–4(–5) cm; branches ascending or spreading, 3–5 per node, scabrid, longest 2–5 cm with 6–18 spikelets in distal 1/2–2/3. Spikelets ovate, frequently purple tinged, 4–5 mm, florets 2–5; glumes subequal, apex acuminate, keel scabrid, lower glume 2.2–3 mm, 1-veined, upper glume 2.5–3.2 mm, 3-veined; lemmas 2.5–3.5(–4) mm, apex acute, narrowly membranous, keel villous for 2/3 of length, marginal veins for 1/2 length, intermediate veins glabrous; palea smooth to minutely bumpy between keels, keels scabrid. Anthers 1.3–2 mm. Fl. and fr. Jun–Jul, fr. Jul–Sep. 2*n* = 28, 46, 51, 56, 63, 66, 72.

Coniferous and *Quercus* forest margins, grasslands on slopes; 500–4400 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; introduced in North America].

This subspecies is probably introduced, at least in part, in China. It grades into subsp. *pratensis*.

21c. Poa pratensis subsp. **pratensis**

草地早熟禾(原亚种) cao di zao shu he (yuan ya zhong)

Poa angustiglumis Roshevitz; *P. pratensis* [unranked] *anceps* Gaudin; *P. pratensis* var. *anceps* (Gaudin) Grisebach; *P. viridula* Palibin.

Plants green or pale green, often forming turf, strongly rhizomatous; shoots extra- and intravaginal. Culms (15–)20–80(–120) cm, few to several per tuft, erect, nodes 2–4. Leaf sheaths smooth or retrorsely scabrid, lower ones longer than internodes, usually distinctly longer than blade, uppermost to 20 cm; blades flat, moderately papery to thickly papery, 2–10 cm × 2–4(–5) mm, surfaces smooth or adaxial surface and margins sparsely scabrid, abaxially glabrous or less often sparsely pubescent, of tillers flat and folded or all flat with margins inrolled or not, papery to thickly papery, to 45 cm × 1–4(–5) mm; ligules 1–4(–5) mm, abaxially scabrid. Panicle loosely contracted to open, oblong to broadly pyramidal, 5–20(–25) × 3–5(–10) cm; branches spreading, straight or flexuous and slightly lax, 3–7(–9) per node, smooth or scabrid, longest 5–10 cm with 3–10(–18) spikelets in distal 1/2. Spikelets ovate, frequently purple tinged, 4–7(–9) mm, florets 3–5(–8); glumes ovate to lanceolate (narrowly lanceolate), apex acute to acuminate, keel distally scabrid, lower glume 1.5–3(–4) mm, 1- or 3-veined, upper glume 2–3(–5) mm, 3-veined; lemmas ovate to lanceolate 2.5–4(–5) mm, apex slightly obtuse to acute, keel villous for 3/4 of length, marginal veins for 1/2 length, intermediate veins glabrous; palea smooth or minutely bumpy, rarely with a few hooks between keels, keels scabrid. Anthers (1.2–)1.5–2.2(–2.8) mm. Fl. May–Jun, fr. Jul–Sep. 2*n* = 28, 35, 42, 49, 50, 52, 56, 58, 63, 64, 66, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140.

Moist meadows, sandy places, grassy slopes; 500–4000 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Myanmar, Nepal, New Guinea, Pakistan, Russia (Far East, Siberia), Sri Lanka, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Australia, Europe, North America, Pacific Islands, South America].

The race is widely cultivated for forage, soil stabilization, and lawns. It is probably also native to China. Cultivated, soft-leaved plants are sometimes called subsp. *irrigata* (Lindman) H. Lindberg, but such cultivated plants are not readily classified. *Poa pratensis* subsp. *irrigata* was reported from Xinjiang in FRPS (9(2): 194. 2002, as *P. irrigata* Lindman), but, while it is potentially present there, no authentic material has been seen by us. It was mapped for the Russian Far East only from the Commander Isles by Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 279. 1985).

21d. Poa pratensis subsp. **pruinosa** (Korotky) Dickoré, Stapfia 39: 173. 1995.

粉绿早熟禾 fen lü zao shu he

Poa pruinosa Korotky, Repert. Spec. Nov. Regni Veg. 13: 291. 1914; *P. grisea* Korotky; *P. macrocalyx* var. *tianschanica* Regel; *P. markgrafii* H. Hartmann; *P. pachyantha* Keng ex Shan Chen; *P. pamirica* Roshevitz ex Ovczinnikov; *P. tianschanica* (Regel) Hackel ex O. Fedtschenko.

Plants grayish green, loosely tufted, not forming turf; shoots mainly extravaginal, often curved upward. Culms often decumbent, 15–70 cm tall, solitary or infrequently few per tuft, 1–2 mm in diam., nodes 2 or 3, uppermost node less than 1/3 way up. Blades flat or usually folded with margins inrolled, moderately papery to thickly papery, 2–5 mm wide, of tillers folded, thickly papery and firm, usually distinctly curved, 3–10(–18) cm × (1–)2–5 mm, often adaxially sparsely pubescent; ligule 0.5–4 mm, abaxially scabrid (rarely smooth). Panicle usually loosely contracted, oblong to pyramidal, somewhat lax, 4–10(–15) cm; branches ascending to spreading, (1–)2–5(–7) per node, smooth or distally scabrid, longest with spikelets in distal 1/3–1/2. Spikelets usually grayish and purple tinged, 3–6(–7) mm, florets 2–5(–7); lower glume 2.5–3.5 mm, 1- or 3-veined, upper glume 3–4 mm, 3-veined; lemmas ovate to lanceolate, 3–4.5 mm, apex acute, keel villous for 2/3 of length, marginal veins for 1/2; palea keels scabrid, glabrous or infrequently medially pilulose. Anthers 2–2.5 mm. Fl. and fr. Jun–Sep. 2*n* = 42.

Mountains, moist weakly saline or alkaline grassy places, alpine river banks, marshy grasslands in the north. Gansu, Heilongjiang, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (Siberia), Tajikistan].

This race is native to China. The inclusion of *Poa tianschanica* s.s. needs further study. *Poa pruinosa* s.s. (including *P. grisea*) includes plants from E Siberia with a profuse, waxy bloom and culms strongly flattened at the base. The types of *P. markgrafii* and *P. pamirica* seem typical of the subspecies. Plants without a waxy bloom, with stiff culms that are weakly flattened at base, occurring from the Altai, Khakass, and Tuva in Siberia southward through C Asia, are sometimes distinguished as *P. tianschanica* s.s. Tzvelev (Zlaki SSSR, 459. 1976) treated these as one species, possibly derived from hybridization between *P. pratensis* and *P. tibetica*. *Poa pachyantha* seems to fit within *P. pratensis* subsp. *pruinosa*; although the culms are not flattened, the lower sheaths are flattened and somewhat keeled, and the plants are gray with antho-

cyanic spikelets that are somewhat clustered. *Poa sabulosa* (Turczaninow ex Roshevitz) Turczaninow ex Roshevitz was reported in FRPS (9(2): 102. 2002) from Heilongjiang, in low, wet, sandy places by river banks, lake shores, seashores, and saline meadows. No voucher was seen, and it is doubtfully present in China. In Russia it is considered a narrow endemic of subsaline meadows in the Baikal region of Siberia and N Mongolia, and is treated as a low-growing (10–30 cm), small-spikeleted (lemmas 2.3–2.8 mm) race, as *P. pratensis* subsp. *sabulosa* (Turczaninow ex Roshevitz) Tzvelev, or lumped within *P. pratensis* subsp. *pruinosa* s.l.

21e. Poa pratensis subsp. **sergievskajae** (Probatova) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 27. 1974.

色早熟禾 se zao shu he

Poa sergievskajae Probatova, Novosti Sist. Vyssh. Rast. 8: 28. 1971.

Plants loosely tufted, not forming a turf, slender rhizomatous, shoots mainly extravaginal. Culms solitary, erect, slender, 20–80 cm tall. Leaf sheaths of lower leaves retrorsely hispidulous, blades flat with slightly inrolled margins, 1–3 mm wide, adaxially sparsely pubescent, of tillers folded, to 25 cm × 0.8–1.4 mm. Panicle open, pyramidal, 5–15 cm; branches slightly flexuous, slender, nearly smooth to moderately scabrid, longest with 3–10 spikelets. Spikelets pale green, 3–5 mm; glumes unequal, lower glume 1-veined; lemmas 2.5–3.5 mm, keel and marginal veins loosely villous; palea glabrous between keels, keels scabrid. Anthers 1.3–1.8 mm. Fl. and fr. Jul.

Betula and *Picea* forests, shade of shrubs, moist ground. ?Heilongjiang, ?Jilin, ?Xizang [Russia (Far East, Siberia)].

A number of gatherings from China fits this taxon, which may merely represent a minor variation within *Poa pratensis*, possibly from low nutrient (acidic), shady, moist habitats.

21f. Poa pratensis subsp. **staintonii** (Melderis) Dickoré, Stapfia 39: 174. 1995.

长秆早熟禾 chang fu zao shu he

Poa alpigena subsp. *staintonii* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 142. 1978; *P. dolichachyra* Keng ex P. C. Keng & G. Q. Song.

Plants green or purplish, not forming a turf. Culms 30–40 cm tall, nodes 2, uppermost node to 1/3 of way up. Leaf sheaths smooth, weakly keeled, uppermost 9–11 cm, several times longer than blade; blades folded, moderately papery to thickly papery, 3–7 cm × 2–3 mm, abaxially smooth, adaxially sparsely pubescent, of tillers 20–25 cm × 1–2 mm; ligules 1.5–3 mm, apex obtuse, abaxially smooth. Panicle open, 4–8 cm; branches spreading, 2 per node, proximally smooth, distally sparsely scabrid, longest 3–5 cm with spikelets clustered in distal 1/3, clusters somewhat pendent. Spikelets ovate, purple tinged, 4.5–6 mm, florets 2–4; glumes sparsely scabrid on keels, smooth or very sparsely scabrid on lateral veins, smooth between veins, lower glume ca. 3 mm, 1-veined, upper glume ca. 4 mm, 3-veined; lemmas 4–4.5 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins glabrous; palea keels medially scabrid or pilulose. Anthers ca. 2 mm. Fl. and fr. Jul–Aug.

River banks in high mountain areas, waterside grassy slopes; 3400–3800 m. Qinghai, N Sichuan, Xizang, Yunnan [Nepal].

This race is native to the Xizang-Qinghai Plateau. It has larger spikelets than *Poa calliopsis*, but seems intermediate to it in the possession of spikelets crowded near the somewhat pendent branch tips.

21g. Poa pratensis subsp. **stenachyra** (Keng ex P. C. Keng & G. Q. Song) Soreng & G. Zhu, **comb. et stat. nov.**

窄颖早熟禾 zhai ying zao shu he

Basionym: *Poa stenachyra* Keng ex P. C. Keng & G. Q. Song, Acta Biol. Plateau Sin. 12: 10. 1994.

Plants green or pale green, loosely tufted, not forming a turf, shoots mainly extravaginal. Culms erect, solitary or few per tuft, 80–110 cm tall, smooth, rounded or slightly compressed, nodes 2–4, 1 or 2 exserted, uppermost node 1/5–1/4 way up. Leaf sheaths smooth, somewhat keeled, uppermost to 19 cm, ca. 2 × as long as blade; blades flat with margins slightly inrolled, leathery, 10–16 cm × 3–4 mm, adaxially sparsely scabrid; ligule 1–2 mm, abaxially scabrid, margin erose, apex obtuse. Panicle open, 10–15 × 4–8 cm, longest internode 3.7–4.2 cm; branches widely spreading to nodding, 3–5 per node, proximally rounded and smooth, distally moderately scabrid, longest 6–8 cm with 8–13 spikelets in distal 1/2. Spikelets 5–6 mm, florets 3; glumes subequal, keel moderately scabrid, surfaces sparsely scabrid, lower glume 3.5–4 mm, 1- or 3-veined, upper glume 4–5 mm, 3-veined, as long or slightly longer than first lemma; lemma narrowly lanceolate, 4–4.5 mm, apex acuminate, yellow bronze, intermediate veins prominent, keel villous for 1/2 length, marginal veins to 1/3, surfaces indistinctly minutely bumpy, sparsely scabrid; palea glabrous between keels, keels finely scabrid. Anthers ca. 2.3 mm. Fl. and fr. Jun–Aug.

● Forest margins on slopes, grassy places among thickets; 3700–4300 m. Qinghai, NW Sichuan.

This rare race differs from the others by having glumes and lemmas narrowly acuminate, the glumes subequal to the lowest lemma.

22. Poa raduliformis Probatova, Novosti Sist. Vyssh. Rast. 8: 25. 1971.

糙早熟禾 cao zao shu he

Poa remota Forselles subsp. *raduliformis* (Probatova) Voroschilov.

Perennials, shortly rhizomatous, rhizomes yellowish orange to reddish brown, slender. Plants yellowish green. Culms 35–90 cm tall, 3–4 mm in diam., nodes 2 or 3, uppermost node ca. 1/2 way up, often slightly scabrid below the panicle and nodes. Leaf sheaths compressed, keeled, 10–20 cm, lower ones distinctly retrorsely hispidulous, uppermost closed for 1/3 of length; blade flat or infrequently folded, moderately thin, 8–15 cm × (1.5–)3–5 mm, adaxial surface of basal blades sparsely pilulose; ligules 2–3.5 mm, apex ciliolate, abaxially sparsely puberulent. Panicle open, oblong, 8–20 cm; branches ascending, spreading in anthesis, scabrid throughout, longest 3–5 cm with 3–10 spikelets in distal 1/2. Spikelets green, 3.5–6 mm, florets 2–4; vivipary absent; glumes strongly keeled, keel almost straight, keel and lateral veins moderately densely scabrid, surface sometimes moderately scabrid above, 3-veined, apex acuminate, lower glume 2–3 mm, upper glume 2.5–3.5

mm; lemmas lanceolate, 3.3–4.5 mm, keel and marginal veins with lower part sparsely pilulose, surfaces glabrous, finely minutely bumpy; callus webbed; palea glabrous between keels, keels scabrid. Anthers 1.8–2.4 mm. Fl. and fr. Jun–Jul. 2*n* = 70.

Forest margins, roadside thickets; ca. 2600 m. ?Shanxi [Japan, Mongolia, Russia (Far East, E Siberia)].

Tzvelev (Zlaki SSSR, 451. 1976) considered *Poa raduliformis* as probably "a result of hybridization of *P. pratensis* with *P. remota*, *P. radula*, or *P. sibirica*." It seems few gatherings from China might be called *P. raduliformis*, and the report from Shanxi in FRPS (9(2): 130–131. 2002) is doubtful. The species should be looked for in Heilongjiang.

23. Poa arctica R. Brown subsp. **caespitans** Simmons ex Nannfeldt, Symb. Bot. Upsal. 4: 71. 1940.

极地早熟禾 ji di zao shu he

Poa tolmatchewii Roshevitz.

Perennials, densely tufted, short rhizomatous or not (Chinese plants); shoots extravaginal and some intravaginal. Culms solitary to several (rarely up to 20, Chinese plants), 7.5–60 cm tall, 0.5–2 mm in diam., smooth, glabrous, nodes 1 or 2, none or 1 exserted, uppermost to 1/3 way up, base of culms with sheaths soon withering (in Chinese plants). Leaf sheaths weakly keeled, smooth, glabrous, 2–15 cm, 1.5–5 × as long as blade, uppermost closed for 1/4–1/3 of length; blades flat or folded, papery to thickly papery, 1–6 mm wide, surfaces smooth or sparsely scabrid, of tillers folded, 2–15 cm; ligule 2–4 mm, abaxially smooth or sparsely scabrid, apex obtuse to acute. Panicle open, ovoid to pyramidal, well exserted, 3–10 (–15) × 2–6 cm, internodes 0.8–1.5(–3) cm; branches spreading early, sinuous and flexuous to strict, (1–)2–5 per node, slender to moderately stout, rounded, smooth or distally scabrid, longest 1.5–5 cm with 2–7 spikelets in distal 1/3. Spikelets ovate, strongly purple tinged, 4–5(–5.5) mm, florets (2–)3–4 (–6); vivipary absent (within China); rachilla internodes 0.8–1.2 mm, smooth, glabrous, or short villous (within China); glumes subequal, lanceolate, very thinly papery, 3-veined, weakly keeled, smooth or sparsely scabrid, lower glume (2–)2.5–4.5 mm, upper glume (2.5–)3–5 mm; lemmas lanceolate to broadly lanceolate, 3.5–4.5 mm, margins broadly membranous, apex acute, keel densely long-villous for 3/4 of length, marginal veins to 2/3, intermediate veins prominent, area between veins smooth to moderately bumpy, distally smooth or sparsely scabrid, proximally (sparsely to) densely shortly villous; callus webbed, hairs usually dense, to 1/2 as long as lemma; palea sparsely to moderately pilulose between keels, keels scabrid, medially pilulose. Anthers 1.4–2.5 mm. Fl. and fr. Jul–Aug. 2*n* = 77.

Wet places along glacial rivers or lakes, alpine meadows, grassy places on rocky slopes; ca. 2100 m. Heilongjiang, Jilin [Russia; Europe (Scandinavia), North America].

The only Chinese material seen by the authors is from Jilin (Changbai Shan), and this is tentatively placed within subsp. *caespitans*. The specimens have no evident rhizomes, like subsp. *caespitans*. The rachillas are strongly pilose as in subsp. *lanata* (Scribner & Merrill) Soreng (incl. *Poa malacantha* Komarov), but the leaf blades are too thin and the spikelets too small for that taxon. *Poa arctica* subsp. *arctica* is distinguished by its loose, rhizomatous habit, mostly solitary culms, and generally glabrous rachillas. These gatherings had been identified as *P. shinoana* Ohwi (*P. malacantha* subsp. *shinoana* (Ohwi) T. Koyama; *P. malacantha* var. *shinoana* (Ohwi) Ohwi). FRPS (9(2): 132. 2002) reported *P. tolmatchewii* from Heilongjiang, but we have not seen a voucher specimen. Specimens named as *P. arctica* subsp. *arctica* from Gansu, Hebei, Nei Mongol, Qinghai, and Xinjiang have been redetermined as other species, mostly *P. tangii*. *Poa arctica* subsp. *arctica* is a circumboreal arctic and alpine species, and is known as far south as ca. 50°N in the mountains S of Lake Baikal (but not from Mongolia) and from northernmost Korea (*P. deschampsioides* Ohwi), but there seems to be little or no suitable habitat in adjacent parts of China.

24. Poa hissarica Roshevitz ex Ovczinnikov, Izv. Tadzh. Bazy Akad. Nauk SSSR 1: 12. 1933.

希萨尔早熟禾 xi sa er zao shu he

Poa laudanensis Roshevitz ex Ovczinnikov.

Perennials, densely tufted, with or without short lateral shoots; shoots extravaginal and intravaginal. Culms few to several per tuft, erect or obliquely ascending, (10–)15–40 cm tall, 0.5–0.8 mm in diam., smooth, nodes 2 or 3, 1 or 2 exserted, uppermost to 1/4 way up, base enclosed by persistent pale brown leaf sheaths. Leaf sheaths smooth, glabrous, 3–9 cm, 4–5 × as long as blade, uppermost closed for 1/3–2/3 of length; blades folded with margins inrolled or not, moderately papery to thickly papery, ca. 2 mm wide, abaxially smooth, adaxially smooth or sparsely scabrid, margins scabrid, longest intravaginal ones to 3–8 cm; ligule 1–2 mm, abaxially smooth or sparsely scabrid, margin dentate to lacerate, sometimes ciliolate, apex truncate to obtusely rounded, collars smooth, glabrous. Panicle loosely contracted or open, erect, exserted, (3–)4–10 × 3–7 cm; branches spreading, straight or slightly flexuous, 2 per node, slender, rounded and smooth throughout or distally slightly angled and pedicels sparsely scabrid, longest (1.2–)2–5 cm with 1–5 spikelets in distal (1/3–)1/2. Spikelets ovate, tinged pale purple, (4–)5–8(–10) mm, florets (2–)3–6; vivipary absent; rachilla internodes 0.8–1.2 mm, smooth, glabrous; glumes unequal to subequal, very thinly papery, shiny, smooth or keel sparsely scabrid distally, lower glume (2–)2.5–3.5 mm, 1- or 3-veined, upper glume 3–4 mm, 3-veined; lemmas ovoid to broadly lanceolate, 3–4.8 mm, intermediate veins indistinct, smooth throughout to sparsely and finely scabrid on and along margins, glabrous throughout, margins broadly membranous, apex obtuse to acute; callus glabrous; palea smooth, glabrous between keels, keels medially scabrid to ciliate, distally scabrid. Anthers ca. 2 mm. Fl. and fr. Jun–Jul.

Alpine moist rocky grassy slopes; (2800–)3700–4000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Poa hissarica is possibly endemic to the W slope of the C Asian Republics, but one specimen from Xinjiang (Tian Shan, 2800 m), with very sparse callus web and very sparsely hispid between the lemma veins, is close to this species. Perhaps *P. hissarica* would be better treated as a subspecies of *P. lipskyi*.

25. Poa lipskyi Roshevitz, Izv. Bot. Sada Akad. Nauk SSSR 30: 303. 1932.

疏穗早熟禾 shu sui zao shu he

Perennials, densely tufted, with or without short lateral shoots; shoots extra- and intravaginal. Culms several per tuft, erect or obliquely ascending, (5–)10–55 cm tall, 1–2 mm in diam., smooth, nodes (1–)2 or 3, none or 1 exserted, uppermost to 1/4–1/2 way up, base enclosed in layers of old, pale brown sheaths. Leaf sheaths smooth or the lower ones scabrid, glabrous, 4–10 cm, 1.5–4 × as long as blade, uppermost closed for 1/3–1/2 of length; blades flat or folded, thickly papery, 2–10 cm × 1–3(–4) mm, abaxially smooth, adaxially densely scabrid, less often nearly smooth, glabrous, margins scabrid, apex prow-tipped, of tillers 3–12 cm; ligule 1.6–4 mm, abaxially scabrid, apex truncate to obtuse, dentate to lacerate, sometimes ciliolate, collar usually smooth, glabrous. Panicle open or loosely contracted, erect or somewhat lax, exserted, 4–10(–15) × 3–8 cm; branches ascending to spreading, straight or slightly flexuous, 1 or 2(–5) per node, slender, rounded and smooth throughout or distally slightly angled and very sparsely scabrid, longest 2–7 cm with 2–4(–8) spikelets in distal 1/4–1/3. Spikelets ovate, 6–9 mm, florets 3–5(–6), purple tinged; vivipary present or commonly absent; rachilla internodes 0.8–1.2 mm, smooth, glabrous; glumes unequal to subequal, very thinly papery, shiny, smooth or keel sparsely scabrid distally, lower glume 3.5–4 (–5.2) mm, 1- or 3-veined, upper glume 3.5–5(–6) mm, 3-veined; lemmas broadly lanceolate, 4.5–6.2 mm, acute, intermediate veins indistinct, keel villous for 1/2 of length, marginal veins for 1/3, intermediate veins and surfaces proximally smooth, glabrous or loosely pilulose to short villous, keel and surfaces sparsely scabrid distally, apex acute; callus glabrous (rarely with a few hairs less than 1 mm); palea smooth, glabrous or sparsely pilulose between keels, keels scabrid, some medially pilulose to short villous. Anthers 2–2.8 mm. Fl. and fr. Jun–Aug.

Alpine meadows, swales, moist gravel slopes; 2200–3600 m. Qinghai, Xinjiang, Xizang [?Kashmir, Kazakhstan, Kyrgyzstan, NW Mongolia, Tajikistan, Uzbekistan].

Poa lipskyi is fairly common at high altitudes in C Asian mountains bordering W China and in the Kunlun Shan. Two geographically overlapping subspecies are commonly recognized.

1a. Lemma glabrous between veins ..... 25a. subsp. *dschungarica*

1b. Lemma loosely pilulose to short villous between veins ..... 25b. subsp. *lipskyi*

25a. Poa lipskyi subsp. **dschungarica** (Roshevitz) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 26. 1974.

准噶尔早熟禾 zhun ga er zao shu he

Poa dschungarica Roshevitz, Izv. Bot. Sada Akad. Nauk SSSR 30: 778. 1932.

Leaf blade papery to thickly papery, 2–3(–5) mm wide. Panicle open, 6–12 × 6–8 cm; lemmas glabrous between veins; palea keels scabrid, sometimes medially sparsely pilulose. Fl. and fr. Jun–Jul.

Alpine grassy places; ca. 3000 m. Xinjiang [Kazakhstan, Kyrgyzstan, NW Mongolia, Tajikistan, Uzbekistan].

25b. Poa lipskyi subsp. **lipskyi**

疏穗早熟禾(原亚种) shu sui zao shu he (yuan ya zhong)

Poa bedeliensis Litvinov; *P. contracta* Ovczinnikov & Czukavina (1957), not Retzius (1783); *P. kungeica* Goloskokov; *P. lipskyi* var. *contracta* Tzvelev; *P. macroanthera* D. F. Cui subsp. *meilitzyka* D. F. Cui; *P. ovczinnikovii* Ikonnikov; *P. pseudodisiecta* Ovczinnikov.

Blades thickly papery, 1–3(–4) mm wide. Panicle open or loosely contracted, 5–15 × 3–8 cm; lemmas loosely pilulose to short villous between veins; palea keels medially pilulose. Fl. and fr. Jun–Aug. 2*n* = 70.

Alpine meadows, gravel slopes; 2200–3600 m. Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Tajikistan].

Poa macroanthera subsp. *meilitzyka* would seem to fall here, although we have not seen the type.

26. Poa qinghaiensis Soreng & G. Zhu, **sp. nov.**

青海早熟禾 qing hai zao shu he

Type: China. Qinghai: Dulan Xian, Ngola Shan, 36°28'N, 98°14'E, steep S-facing slope, in duff in open *Picea* stand, ca. 3900 m, 22 Sep 1997, *R. J. Soreng, P. M. Peterson & Sun Hang 5461* (holotype, US; isotypes, KUN, PE, others to be distributed).

Haec species a P. hissarica Roshevitz ex Ovczinnikov *et* P. lipskyi Roshevitz *lemmate glabris vel carina ad basim paulo pilosula abaxialiter modice ad dense scabro nervis intermediis prominentibus praedito atque palea inter carinas scabra ad carinas dense scabra; a* P. pagophila Bor *spiculis plerumque longioribus, 5–9(–10) mm, glumis non papillatis differt*.

Perennials, tufted, with or without short rhizomes; shoots extravaginal and intravaginal. Culms few to several, erect (5–)15–55, nodes 1–3, 0–2 exserted, uppermost to 1/4–1/2 way up, base enclosed in few to many layers of old pale brown sheaths. Leaf sheaths smooth or the lower ones coarsely scabrid, glabrous, 2–15 cm, 1.5–3 × as long as blade, uppermost closed for 1/2 of length; blades flat or folded, moderately thin, 2–10 cm × 2–3(–5) mm, abaxially smooth or scabrid, adaxially scabrid, of tillers to 20 cm; ligules 2–4 mm, abaxially smooth. Panicle open or loosely contracted, 2–10 × 1.5–6 cm, longest internodes 0.4–2.1 cm; branches spreading to reflexed, sinuously flexuous or arched, (1 or)2(–4) per node, rounded and smooth or distally sparsely scabrid and slightly angled, longest 1–6 cm with 2–6 spikelets clustered in distal 1/3, clusters frequently pendent; flowers female or perfect, sometimes whole inflorescences female. Spikelets ovate, purple tinged, 5–9(–10) mm, florets 2–4; vivipary present or commonly absent; rachilla internodes 0.5–1(–1.2) mm, smooth, glabrous; glumes subequal, smooth or keel sparsely scabrid, lower glume 3.5–6 mm, 1- to faintly 3-veined, upper glume 4–7 mm, 3-veined; lemmas (4–)4.5–7.5 mm, veins 5(–9), intermediate veins distinct, apex acute, keel and veins scabrid, hooks fine to coarse, sometimes elongated, occasionally developed into short villous hairs in the lower 1/3, surfaces proximally moderately to densely scabrid, distally moderately to sparsely scabrid or minutely bumpy; callus glabrous; palea scabrid between keels, keels densely scabrid. Anthers 2–3 mm, or vestigial. Fl. and fr. Jul–Aug.

● Arid subalpine forests, alpine meadows, gravel slopes; 3500–5100 m. Gansu, Qinghai, SE Xinjiang, NE Xizang.

Poa qinghaiensis differs from other species in *P.* subsect. *Cenisiae* by the combination of the lemmas lacking villous hairs, being scabrid on the lower sides, and in having pronounced intermediate veins. Specimens were previously treated under the name *P. lipskyi* or remained unidentified. Although not well studied in *P. hissarica* or *P. lipskyi*, vestigial anthers are common in the new species and have not been found in other species in *P.* subsect. *Cenisiae*. In many respects, *P. qinghaiensis* approaches *P. pagophila*, but that species generally has smaller spikelets and the glumes are strongly papillate. Intermediates between *P. qinghaiensis* and *P. calliopsis* have been found at the Kunlun Pass and presumably represent hybridization between them.

27. Poa smirnowii Roshevitz, Izv. Glavn. Bot. Sada SSSR 28: 381. 1929.

史米诺早熟禾 shi mi nuo zao shu he

Perennials, loosely tufted, shortly rhizomatous; shoots all extravaginal, or a few intravaginal. Culms 1–5 per clump, 5–40 cm tall, nodes 1–3. Leaf sheaths smooth, glabrous, 4–8 cm, 1.5–3 × as long as upper blade, uppermost closed for over (1/2–)2/3 of length; blade flat or folded, moderately thin, 1–5 cm × 2–4 mm, surfaces smooth or adaxially sparsely scabrid, margins scabrid, apex prow-tipped, of tillers 2–15 cm; ligule 2–4 mm, abaxially smooth, collars smooth, glabrous. Panicle loosely contracted to open, slightly lax, exserted, 2–8 × 1.2–5 cm, longest internodes 1–2.5 cm; branches rounded, ascending or spreading, 2(–5) per node, smooth or sparsely (rarely moderately) scabrid, longest 1.5–4.5 cm with 1–3(–7) spikelets in distal 1/3. Spikelets ovate, usually purple tinged, 5–8 mm, florets 2–4(–5); vivipary present or absent; rachilla glabrous or sparsely pilulose to short villous; glumes subequal or equal, lower glume 3.5–4 mm, (1 or) faintly 3-veined, upper glume ca. 4 mm, 3-veined; lemmas 4.5–5 mm, mostly purple, margins membranous, keel villous for 3/4 of length, marginal veins for 2/3, area between veins proximally loosely pilulose or infrequently glabrous, distally smooth to sparsely scabrid; callus webbed, hairs long, dense; palea glabrous or pilulose between keels, keels scabrid, usually medially pilulose to short-villous. Anthers 2–2.5 mm. Fl. and fr. Jul–Aug.

Alpine shady grassy areas, open moist gravelly slopes, riversides; 2000–3300 m. Xinjiang [N Mongolia, Russia (C and E Siberia)].

Three subspecies are recognized, all of which appear to be rare in China.

1a. Spikelets viviparous ..... 27c. subsp. *polozhiae*
1b. Spikelets not viviparous.
  2a. Plants (5–)10–25(–33) cm tall, culms usually solitary or sometimes forming small tufts; panicle 1.2–3 cm wide ..... 27a. subsp. *mariae*
  2b. Plants (15–)24–40(–55) cm tall, culms usually several in loose tufts; panicle 3.5–5 cm wide ... 27b. subsp. *smirnowii*

27a. Poa smirnowii subsp. **mariae** (Reverdatto) Tzvelev, Novosti Sist. Vyssh. Rast. 11: 26. 1974.

美丽早熟禾 mei li zao shu he

Poa mariae Reverdatto, Sist. Zametki Mater. Gerb. Tomsk. Univ. 1933(3–4): 2. 1933; *P. alpina* Linnaeus var. *saposhnikovii* Sergievskaja.

Culms 1(–3) per clump, (5–)10–25(–33) cm tall. Leaf blade 1–5 cm × 2–4 mm, of tillers 2–11 cm. Panicle loosely contracted to slightly open, slightly lax, 2–6(–8) × 1.2–3 cm; branches ascending to weakly spreading, longest 1.2–2.5(–4.5) cm. Callus hairs moderately dense. Fl. and fr. Jul–Aug.

Alpine shady grassy areas, open gravelly slopes, riversides; ca. 3300 m. Xinjiang (Altay Shan, Tian Shan) [Russia (Siberia)].

27b. Poa smirnowii subsp. **smirnowii**

史米诺早熟禾(原亚种) shi mi nuo zao shu he (yuan ya zhong)

Poa arctica R. Brown subsp. *smirnowii* (Roshevitz) Malyschev.

Culms (1–)2–5 per clump, (15–)24–40(–55) cm tall. Leaf blade 3–5 cm × 3–4 mm, of tillers 5–15 cm. Panicle open, lax, 5–8 × 3.5–5 cm; branches spreading, longest 2.5–4.5 cm. Callus hairs dense. Fl. and fr. Jul–Aug. $2n = 42, 70$.

Alpine shady grassy areas, open gravelly slopes, riversides; 2000–2600 m. Xinjiang (Altay Shan, Tian Shan) [N Mongolia, Russia (C and E Siberia)].

This subspecies differs from subsp. *mariae* mainly by its more tufted habit, greater height, and broader panicles.

27c. Poa smirnowii subsp. **polozhiae** (Revjankina) Olonova, Turczaninowia 1(4): 7. 1998.

朴咯早熟禾 po ka zao shu he

Poa polozhiae Revjankina, Fl. Rastitel'n. Altaya 1996: 102. 1996.

Culms several (ca. 5) per tuft, ca. 20 cm tall. Spikelets viviparous. Fl. and fr. Aug.

Alpine screes; ca. 3700 m. Xinjiang [Russia (Siberia)].

This taxon was described from Russia (Altai). One gathering is known from China.

28. Poa macroanthera D. F. Cui, Acta Bot. Boreal.-Occid. Sin. 7: 97. 1987.

大药早熟禾 da yao zao shu he

Perennials, loosely to densely tufted, without rhizomes; shoots extra- and intravaginal. Culms 40–55 cm tall, rounded, smooth, glabrous, nodes 2–4, 1 or 2 exserted, uppermost at mid-culm. Leaf sheath shorter than internode, smooth, glabrous, 10–11 cm, slightly compressed, uppermost closed for over 1/5–1/4 of length, old basal sheaths persisting, becoming fibrous, overlapping; blade flat or folded, moderately thin, 3–15 cm, uppermost shortest, 1–3 mm wide, surfaces smooth or sparsely scabrid, glabrous; ligule (1–)1.5–3 mm, abaxially smooth or sparsely scabrid, apex obtuse. Panicle open, diffuse, 8–15 cm; branches ascending to spreading, 2–3 per node, slender, smooth throughout or distally scabrid angled, longest to 5 cm with 8 spikelets in distal 1/2; flowers female or perfect. Spikelets elliptic to lanceolate, green or purple, 5.6–7 mm, florets 3 or 4; vivi-

pary absent; rachilla internodes to 2 mm, smooth, glabrous, exposed; glumes lanceolate, smooth or sparsely scabrid on keel, lower glume 3–4 mm, 3-veined, upper glume 3.5–5 mm, 3-veined; lemmas lanceolate, very thinly papery, 4–5.5 mm, purple above veins, apex acuminate, keel villous for 1/2 length, marginal veins to 1/3, intermediate veins prominent, area between them glabrous, above sparsely scabrid; callus weakly webbed, hairs sparse, short; palea keels scabrid, medially pilulose to shortly villous. Anthers 2.5–3 mm. Fl. and fr. Jun–Jul.

● Riversides in ravines, subalpine meadows along forest margins; 2500–3300 m. Xinjiang (Kunlun Shan, Tian Shan).

The placement of this species near *Poa smirnowii* is controversial. The type, examined by M. V. Olonova, has sheaths open for 1/5–1/4 their length and scabrid-angled panicle branches. This argues against any relationship to *P. smirnowii* and inclines us to think it might be better placed in *P.* subg. *Stenopoa*.

29. Poa xingkaiensis Y. X. Ma, Bull. Bot. Res., Harbin 22: 387. 2002.

星早熟禾 xing zao shu he

Perennial, rhizomatous; shoots extravaginal. Culms erect, 40–50 cm, 1–2 mm in diam., nearly smooth, nodes 3 or 4. Leaf sheaths smooth, usually longer than internodes, uppermost ca. 11 cm, ca. 3/4 as long as blade; blades flat, thin, 5–20 cm × 2–3 mm, distinctly longer upward along culm, apex slender prow-tipped; ligules 2.5–3 mm, abaxially puberulent, apex truncate. Panicle open, narrowly pyramidal, 10–15 × 2–3 cm, longest internodes ca. 2 cm; branches ascending, usually 5 per node, capillary, scabrid, longest ca. 3 cm with 6–9 moderately crowded spikelets in distal 4/5. Spikelets narrowly lanceolate, 3.5–4 mm, florets 2; vivipary absent; glumes narrowly lanceolate, equal, as long as spikelet, apex acuminate, keels scabrid from near base, lower glume 3.8–4 mm, 3-veined, upper glume 4.1–4.5 mm, 3-veined; lemmas narrowly lanceolate, 3–3.3 mm, keel shortly villous for 1/2 of length, marginal veins for 1/4, area between veins glabrous; callus webbed, hairs short; palea "hyaline," distinctly shorter than lemma. Anthers 0.7–0.8 mm (doubtfully mature, presumably over 1.2 mm at maturity). Fl. and fr. Aug.

● About 400 m. Heilongjiang.

Except for its rhizomatous habit, this species seems different from other members of *Poa* subg. *Poa* and is only tentatively placed here. It is known only from the type, which we have not seen, but the description and illustration suggest the plant may be immature. The illustration looks somewhat like immature specimens of *P. compressa*, with a *Koeleria*-like inflorescence at anthesis. We wonder if it could be a species of *P.* subg. *Stenopoa*, perhaps *P. sphondylodes* or *P. versicolor* subsp. *ochotensis* with an odd habit.

30. Poa remota Forselles, Linn. Inst. Skrift. 1: 6. 1807.

疏序早熟禾 shu xu zao shu he

Poa quadripedalis Ehrhart ex Koeler; *P. sudetica* Haenke var. *remota* (Forselles) Fries.

Perennials, loosely tufted, shortly rhizomatous; shoots mainly extravaginal. Culms erect, 50–150 cm tall, 1–3 mm in diam., compressed, smooth or sparsely scabrid, nodes 3–5, 1 or 2 exserted. Leaf sheath with keel winged, 0.4–0.8 mm deep, scabrid, 10–20 cm, about as long as blade, uppermost closed for (1/2–)2/3–9/10 of length; blade light green, flat, moderately thin, 3–11 mm, surfaces smooth or sparsely scabrid, margins densely scabrid, apex slender prow-tipped; ligule 2–3(–3.5) mm, abaxially smooth or sparsely scabrid, apex obtuse, collar margins abruptly flared, scabrid, glabrous or rarely pilulose. Panicle open, 15–30 × 7–20 cm, longest internodes 4–7 cm; branches spreading, 3–7 per node, slender, proximally scabrid angled, distally scabrid all around on angles, longest 7–15 cm with 12–40 spikelets in distal 1/2. Spikelets lanceolate, green, rarely purple tinged, 4.5–6 mm, florets 3–5; vivipary absent; rachilla internodes 0.7–1 mm, densely minutely bumpy; glumes narrowly lanceolate, keel and lateral veins prominently scabrid, area between veins sparsely scabrid, lower glume 2–3 mm, 1(or 3)-veined, upper glume 2.5–3.5 mm, 3-veined; lemmas lanceolate, 3–4.5 mm, veins prominent, edge finely scabrid, apex acute, keel pilulose for 1/3 of length, marginal veins for 1/4, area between veins minutely bumpy to sparsely scabrid, glabrous; callus sometimes webbed, hairs sparse, to 2 mm; palea minutely bumpy to sparsely scabrid, keels densely scabrid. Anthers 1.1–1.6 mm. Fl. and fr. Jun–Jul. $2n = 14$.

Moist to wet ground, *Picea* and *Larix* forest openings. Xinjiang [Kazakhstan, Russia; Europe].

The occurrence of this species in China is based on a gathering by Regel, determined by Tzvelev. The only voucher so determined seen by us we placed in *Poa pratensis*.

31. Poa asperifolia Bor, Kew Bull. [7] 1952: 130. 1952.

糙叶早熟禾 cao ye zao shu he

Poa megalothyrsa Keng ex Tzvelev.

Perennials, green or grayish green, tufted, rhizomatous, rhizomes fairly stout, short; shoots extra- and intravaginal. Culms erect or decumbent, (35–)40–120 cm tall, 1–2(–2.5) mm in diam., usually several per tuft, nodes (2–)3 or 4, 1 or 2 exserted, smooth, commonly enveloped by fibrous lower sheaths. Leaf sheaths distinctly keeled, smooth or retrorsely scabrid, glabrous, 7–20 cm, 3/4–2 × as long as blade, uppermost closed for 1/4–2/5 of length; blade flat or folded, thin to moderately thin, 7–22 cm (longest at mid-culm), (1.5–)2–5 mm, surfaces scabrid along veins only, margins whitish, densely scabrid, apex slender prow-tipped; ligule hyaline, (2–)3–8 mm, abaxially smooth or sparsely scabrid, apex obtuse, entire or long-lacerate, those of lower culm usually ca. 1 mm or longer, collar margins scabrid, abruptly flared. Panicle open, erect to slightly lax, (9–)13–35 × 4–15 cm, longest internode 2–6 cm; branches ascending to widely spreading, somewhat flexuous, (2–)3–5 per node, fairly slender, proximally rounded to slightly angled, smooth or sparsely scabrid, distally slightly angled, scabrid on and between angles, longest (3–)4–15 cm with (3–)6–26 spikelets in distal 1/2. Spikelets narrowly lanceolate to lanceolate, green, or purple tinged, 4.5–6(–8.5) mm, florets 2–4(–6); vivipary absent; rachilla internodes 0.7–1.5 mm, minutely bumpy, scabrid, or infrequently smooth; glumes unequal, apex acute to acuminate, keel and veins scabrid, area between veins sparsely scabrid, lower glume 2.5–3.5(–4) mm, 1(or 3)-veined, upper glume 3–4.5(–5.4) mm, 3-veined; lemmas lanceolate, elliptic to oblong or obovate, 3.5–4.5(–5.6) mm, apex acuminate, interme-

diate veins prominent, keel sparsely shortly villous for 1/3 (–1/2) of length, infrequently densely villous or glabrous, marginal veins villous for 1/5(–1/4), proximally densely scabrid to minutely bumpy, glabrous or sparsely pilulose, distally scabrid and minutely bumpy; callus glabrous or occasionally webbed, hairs few and usually short, or infrequently several to 1/2 as long as lemma; palea glabrous, area with slender hooks or crisply pilulose between keels, keels scabrid. Anthers 1.5–3 mm. Fl. and fr. May–Jul.

Fairly common, low alpine to upper forests, openings and thickets on granite, shale, limestone, or sandstone slopes; 3300–4500 m. Gansu, Qinghai, Sichuan, E Xizang, Yunnan [Bhutan].

Poa asperifolia is easily distinguished by the combination of large panicles, long, hyaline, and lacerate ligules, fairly stout, short rhizomes, and fibrous basal sheaths, but its lemma vestiture is highly variable. It approaches *P. pratensis* through *P. lhasaensis* (*P. jaunsarensis*), but differs in having leaf blades very scabrid and often thin, ligules long and lacerate, lemmas minutely hairy or densely scabrid proximally between the veins, and callus glabrous or nearly so. It appears to hybridize with species of *P.* subg. *Stenopoa*, but those species lack rhizomes and have more crowded and narrower culms in the regions where they overlap. Tzvelev reported it from SW Xinjiang (Pamirs), but all material seen by us is from the eastern Himalayas and Hengduan Shan, where it is fairly common.

32. Poa perennis Keng ex P. C. Keng, Acta Bot. Yunnan. 4: 276. 1982.

宿生早熟禾 su sheng zao shu he

Perennials, densely tufted; shoots all or mostly extravaginal, all or most shoots flowering. Culms erect to ascending, 20–60 cm tall, 0.5–1.5 mm in diam., rounded, smooth, not or only slightly ridged, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths moderately firm, not persisting, not shiny, 4–10 cm, 1/2–2/3 as long as blade, lower sheaths glabrous or scabrid to retrorsely strigose near collars, uppermost closed for 1/4–1/2 of length; blade flat or folded with margins slightly inrolled, thin, 5–10 cm × 1–2 mm, surfaces smooth or scabrid, adaxially glabrous or retrorsely strigulose near base, margins scabrid; ligule 0.5–2 mm, apex dentate, collar margins glabrous or with some cilia. Panicle open, 6–13 × 2–7 cm, longest internodes 1.4–3.5 cm; branches flexuous, 2 or 3 per node, slender, proximally rounded and smooth, distally scabrid and weakly angled, longest 2–8 cm with 3–10 spikelets in distal 1/2. Spikelets green or purple tinged, 4–7 mm, florets 2–4; vivipary absent; rachilla internodes to 1.2 mm, smooth or scabrid; glumes unequal, lanceolate, usually purple, apex acuminate, lower glume 2–2.5 mm, 1-veined, upper glume 2.7–3.5 mm, keel scabrid to coarsely ciliate near apex, smooth elsewhere, distinctly shorter than first lemma; lemmas 3.3–4.8 mm, apex sharply acute to acuminate, intermediate veins faint to moderately distinct, keel lower part and marginal veins scabrid, glabrous or for 1/3 of length sparsely pilulose, area between veins scabrid to minutely bumpy throughout; callus glabrous, or infrequently with a few hairs to 2 mm; palea smooth or scabrid, glabrous between keels, keels scabrid. Anthers 1.5–2.3 mm. Fl. and fr. Jun–Aug.

● Grassy places on gravel slopes; 2500–3500 m. ?SE Xizang, NW Yunnan.

Poa perennis in its typical form is distinct from all other *Poa* species. The circumscription is challenging because many specimens do not agree in detail with the type, but are not readily assignable to other species. We have not seen any material from Xizang, but it is expected to occur there.

33. Poa zhongdianensis L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 405. 2002.

中甸早熟禾 zhong dian zao shu he

Perennials, loosely tufted, subrhizomatous; shoots extravaginal, tillers few. Culms 40–70 cm tall, nodes 3 or 4, 2 exserted, 1–1.5 mm in diam., smooth. Lower leaf sheaths somewhat keeled, moderately compressed, proximally retrorsely scabrid to distally hispidulous to strigulose, 4.5–7.5 cm, 5/9–5/6 as long as blade, uppermost closed for ca. 3/5 of length, sometimes united further by a hyaline membrane; blades flat or folded with inrolled margins, moderately thin, 5–20 cm, uppermost 5–12 cm × 2–3 mm, abaxially smooth or sparsely scabrid, shiny, adaxially and margins scabrid, apex slender prow-tipped; ligule 1.7–2.2 mm, abaxially scabrid, apex truncate to obtuse, lower ligules 0.3–0.5 mm, scabrid margined, collar margins strigose to ciliate. Panicle open, well exserted, 10–18 × up to 10 cm, longest internodes 2–3.5 cm; branches spreading, 2(–4) per node, slender, proximally rounded, smooth or sparsely scabrid, distally scabrid angled, longest 4–7 cm with 4–12 spikelets in distal 1/2; flowers female or perfect. Spikelets 4–5.5 mm, florets 2(or 3); vivipary absent; rachilla internodes to 1(–1.2) mm, smooth, minutely bumpy, or scabrid; glumes unequal sublustrous, keel scabrid distally, lower glume 1.5–2.3 mm, to 1/2 as long as first lemma, to 1/2 as wide as upper glume, 1-veined, upper glume 2.5–3 mm, 3-veined; lemmas thinly papery, 3.5–4 mm, proximally moderately scabrid to minutely bumpy, distally minutely bumpy, apex acute, keel villous or short villous to 1/3 of length, marginal veins to 1/5, intermediate veins moderately prominent; callus webbed, hairs sparse, to 1/3 the lemma; palea minutely bumpy to densely scabrid between keels, keels scabrid, glabrous. Anthers 1.8–2 mm, vestigial in unisexual flowers. Fl. and fr. Jun–Jul.

● Open places, *Picea* and *Quercus* forests; 3400–3600 m. NW Yunnan.

This species differs from other species in *Poa* sect. *Homalopoa* in having leaf sheath sparsely and retrorsely strigose, sheath collar margins strigose to ciliate, leaf blade adaxial surface or both surfaces scabrid, spikelets 4–5.5 mm, with 2(or 3) florets, and lower glume short, 1.5–2.3 mm.

34. Poa mairei Hackel, Repert. Spec. Nov. Regni Veg. 12: 387. 1913.

毛稃早熟禾 mao fu zao shu he

Poa ludens R. R. Stewart; *P. patens* Keng ex P. C. Keng; *P. pseudopratensis* J. D. Hooker (1896), not Beyer (1891).

Perennials, densely tufted, not rhizomatous; shoots all intravaginal. Culms (10–)20–85 cm tall, 1–2 mm in diam., smooth, nodes 2 or 3, 1–3 exserted, uppermost node to 1/3–1/2 way up. Leaf sheaths keeled, smooth or infrequently sparsely scabrid, glabrous, lowermost loose, short, firm, becoming papery, 7–15 cm, 1.5–5 × as long as blade, uppermost closed for

1/3 of length; blade usually folded with slightly inrolled margins, thickly papery, 3–9 cm × 1–2(–3) mm, abaxially smooth or infrequently sparsely scabrid, shiny, ribs indistinct, margins scabrid, adaxially often pale, scabrid, of tillers to 4–30 cm; ligule 0.5–1.2(–1.5) mm, apex truncate to obtuse, ciliolate, abaxially scabrid or with coarse short hairs, collars of lower and tiller leaves with a distinctly wedge-shaped zone of dense, short, stiff strigose to subvillous hairs, margins sometimes with a few ciliate hairs. Panicle open, broadly triangular, well exserted, (4–)6–15(–20) × 3–10(–15) cm, longest internodes 1–3.5 cm; branches spreading, flexuous, (1–)2 or 3(–5) per node, proximally rounded or weakly angled, smooth or sparsely scabrid, distally smooth and rounded to densely scabrid on and between angles, longest 2.5–8 cm with 3–15 spikelets in distal 1/3–1/2; flowers rarely female. Spikelets elliptic to oblong, (3.7–)4–8 mm, florets 2–4(–6); vivipary absent; rachilla internodes to 1.2 mm, smooth or scabrid, glabrous or hispidulous to pilulose; glumes ovate to oblong, purplish, unequal to subequal, firm, surfaces minutely punctate with purple papillae, apex acute to acuminate, keel nearly smooth to quite scabrid, lower glume (2.1–)2.5–4 mm, 1- or 3-veined, upper glume (3–)3.5–5 mm, 3(–5)-veined, apex acuminate; lemmas proximally light green, becoming purplish distally, firm, (3.9–)4.2–5(–6) mm, 5–7-veined, apex acute to acuminate, keel villous to pilulose for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, sometimes shortly villous to pilulose, proximally scabrid, or minutely bumpy throughout, glabrous or sparsely pilulose to shortly villous between veins; callus webbed or infrequently glabrous; palea scabrid or pilulose between keels, keels scabrid, sometimes medially pilulose. Anthers 1.8–2.5 mm, or vestigial. Fl. and fr. Jun–Sep.

Subalpine and alpine slopes, fairly common in grassy places among thickets, meadows; 2500–4100 m. SW Sichuan, SE Xizang, N Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa mairei is marked by the absence of extravaginal shoots, the short, firm, folded, lower culm leaf blades, the abaxially glabrous and smooth leaf sheaths and blades with triangular, lateral patches on the sides of the collar region that are strigose with upward or marginally directed hairs, and short truncate ligules. *Poa ludens* and *P. patens* do not differ substantially from the type of *P. mairei*.

35. Poa langtangensis Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 143. 1978.

朗坦早熟禾 lang tan zao shu he

Perennials, with isolated shoots, rhizomes present, slender. Culms isolated or few together, 9–25 cm tall, 0.6–0.8 mm in diam., erect, smooth, with 2 or 3 nodes above base, none or 1 exserted, and several short leaves at the base. Leaf sheaths smooth, glabrous, 3.5–5 cm, 1.5–2 × as long as blade, uppermost closed for just over 1/2 of length, lowermost soon withering, becoming fibrous, not persisting; blades flat or folded, thin, 1.5–5 cm × 1–1.5(–2) mm, surfaces and margins smooth, of tillers few, short; ligule 0.5–1 mm, abaxially smooth, glabrous, apex truncate to obtuse, smooth, collars smooth, glabrous. Panicle open, 3–5 × to 3 cm, longest internodes 1–2 cm; branches spreading, flexuous, (1 or)2 per node, capillary, smooth (hooks very rare), longest 1.5–2.5(–3) cm with 3–4 spikelets in distal 1/2. Spikelets narrowly lanceolate, green or purple tinged, 3–3.5 mm, 2–3 × longer than broad, florets 2; vivipary absent; rachilla smooth, glabrous; glumes green, narrow, keel weak, veins inconspicuous, surfaces smooth, very thinly papery, minutely punctate-papillate, lower glume 1.5–2.2 mm, 1(or 3)-veined, keel smooth or sparsely scabrid, upper glume 2–2.7 mm, broader (to 0.6 mm), 3-veined, keel minutely scabrid; lemmas oblong, slightly arched along the keel, very thinly papery, 2.5–3.3 mm, apex acute, with a narrow bronze band below the narrow whitish tip, keel and marginal veins proximally pilulose to short villous, intermediate veins faint, area between veins glabrous (not minutely bumpy), distally smooth to sparsely scabrid; callus webbed with hairs to 1/2 as long as lemma on the lowest floret; palea smooth, glabrous between keels, keels finely scabrid, 3–16 hooks per keel. Anthers ca. 1.5 mm. Fl. and fr. Jun–Jul.

Grassy places in alpine river valleys; ca. 4000 m. ?Xizang [Nepal].

Poa langtangensis could be a weak form of *P. pagophila* from a cold, shady habitat. Unlike *P. calliopsis*, it has narrow spikelets that are not so clustered and deflexed. Although we have not found a voucher specimen for the record from Xizang, the type, from Nepal, is from within 10 km of the Xizang border.

36. Poa nubigena Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 400. 2002.

云生早熟禾 yun sheng zao shu he

Perennials, densely tufted, not rhizomatous; shoots intravaginal. Culms 30–65 cm tall, ca. 1 mm in diam., smooth, nodes 2 or 3, 1–3 exserted, uppermost node to 1/3–1/2 way up culm. Leaf sheaths narrowly keeled, smooth or sparsely scabrid, glabrous, lowermost loose, short, moderately firm, becoming papery, 4.5–12 cm, 1.3–1.8 × as long as blade, uppermost closed for 3/7–4/7 of length; blades flat or folded with margins inrolled or not, thin to moderately thin, 3–11 cm × 1–2 mm wide, uppermost 3–7 cm, abaxially smooth except the upper keel scabrid, adaxial surface and margins scabrid, of tillers 4–20 cm, adaxially strigose in some; ligules 2–4.1 mm, abaxially smooth, apex obtuse to acute, of tillers ca. 0.5 mm, abaxially scabrid, apex truncate, scabrid, collars of lower and tiller leaves smooth, glabrous, or margins with a few ciliate hairs. Panicle open, lax, narrowly triangular, well exserted, diffuse, 5.5–14 × 3–8 cm, longest internodes 2–3.5 cm; branches spreading, flexuous, 2 per node, slender, round, smooth (or with a few hooks), longest 3–7.5 cm with 3–11 spikelets in distal 1/3; flowers female, perfect, or male. Spikelets elliptic, 3.5–6 mm, florets 2(or 3); vivipary absent; rachilla internodes to 1.2 mm, scabrid or densely hispidulous; glumes unequal, ovate to oblong, surfaces minutely punctate with purple papillae, membranous to very thinly papery, keels scabrid above, lower glume 2.3–3.5 mm, 1- to faintly 3-veined, upper glume 2.7–4.5 mm, faintly 3-veined, broadest above middle, 1.5–2 × broader than lower one, shorter than 1st lemma by 1–2 mm; lemmas thinly papery, 3.5–5.2 mm, apex narrowly membranous, acute, keel villous for 1/2 of length, marginal veins to 1/4, intermediate veins moderately prominent, area between veins proximally minutely bumpy, scabrid or crisply pilulose, distally smooth or sparsely scabrid, minutely bumpy; callus webbed; palea proximally densely scabrid to hispidulous between keel, keels scabrid. Anthers ca.

2 mm or vestigial. Fl. and fr. Jun–Aug.

● Meadows on slopes, river bank rocky grassy places, ravines; 2200–3700 m. W Sichuan, E Xizang, NW Yunnan.

The type of *Poa nubigena* differs from *P. mairei* in its longer ligules, smooth, glabrous collars, presence of numerous female flowers, and slightly thinner leaf blades, branches, and glumes. The species approaches *P. pagophila*, but is generally taller and occurs at lower elevations.

37. Poa pagophila Bor in K. H. Rechinger, Fl. Iran. 70: 38. 1970.

曲枝早熟禾 qu zhi zao shu he

Poa levipes Keng ex L. Liu; *P. nigropurpurea* C. Ling.

Perennials, loosely to moderately densely tufted, usually not rhizomatous, infrequently with short delicate rhizomes; shoots extravaginal and pseudointravaginal. Culms erect or decumbent, often geniculate, 5–30(–40) cm tall, 0.5–1 mm in diam., round, smooth, nodes 2 or 3, none or 1(–2) exserted, nodes distinctly constricted and translucent, basal sheaths soon withering. Leaf sheaths smooth or finely scabrid, glabrous, loose, 2–10 cm, 1.25–5 × as long as blade, uppermost closed for 1/3–2/3 of length; blade flat, thin, 2–9 cm × 1.5–2.5 mm, surfaces and margins nearly smooth to scabrid, apex slender prow-tipped, uppermost erect or slightly divergent, 1–4.5 cm, of tillers 2–8 cm; ligule 1.5–4.3(–6) mm, abaxially smooth or sparsely scabrid, apex acute, sometimes blunt, collars smooth, glabrous. Panicle open, lax, exserted, 3–10 × 2–5 cm, longest internodes 1–3 cm; branches spreading to reflexed, flexuous, often arched upward, sometimes looping back, rounded, 1 or 2 per node, smooth or slightly scabrid distally on pedicels, longest 2–4 cm, with 2–6 spikelets in distal 1/2; flowers female or perfect. Spikelets elliptic, (4–)4.3–5.5(–5.8) mm, florets (1 or)2 or 3(or 4); vivipary absent; rachilla internodes 0.5–3 mm, smooth, bumpy, glabrous or rarely pilulose; glumes unequal to subequal, narrow, surfaces minutely punctate with purple papillae, keels weak, keels and veins sometimes sparsely scabrid distally, lower glume 2.5–3.5(–4) mm, 1-veined, often blunt, upper glume 3–3.5(–4.9) mm, 3-veined; lemmas very thinly papery, 3.2–4.8(–5) mm, intermediate veins faint to moderately prominent, keel and marginal veins proximally villous, area between veins proximally scabrid or pilulose, distally scabrid; callus glabrous or webbed, hairs sparse; palea smooth or scabrid, glabrous between keels, keels finely scabrid for over 3/4 of length. Anthers 2–3.5 mm or vestigial. Fl. and fr. Jun–Aug.

Alpine to subalpine grassy places on riversides, slopes, thickets; (3200–)3600–5200 m. ?Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

Poa pagophila is difficult to separate from *P. lipskyi* and *P. qinghaiensis*. It has shorter spikelets, glumes that are more evidently papillate-punctate, and less well-developed, dense basal tufts of leaves. Although it was reported in Fl. Qinghai. (4: 46. 1999), we have seen no authentic material from Qinghai. When *P. pagophila* was first described by Bor (Kew Bull. [4] 1949: 239. 1949), the name was not validly published.

38. Poa falconeri J. D. Hooker, Fl. Brit. India 7: 342. 1896 ["1897"].

福克纳早熟禾 fu ke na zao shu he

Perennials, not glaucous, loosely tufted, not rhizomatous; shoots extravaginal. Culms erect or decumbent at base, 10–80 cm tall, 1–2.5 mm in diam., smooth or finely scabrid, nodes 3 or 4, 2 or 3 exserted, uppermost more than 1/2 way up. Leaf sheaths smooth or scabrid, glabrous, lowermost becoming papery, 6–13 cm, 2/3–1.5 × as long as blade, uppermost closed for 1/2–3/5 of length; blades flat, thin, 4.5–20 cm × 1–4 mm, abaxially dull, surfaces and margins scabrid, uppermost reaching into the panicle; ligule milky-membranous, (1–)2–4 mm, abaxially smooth or scabrid, apex obtuse to acute, collar smooth or scabrid. Panicle open, lax, 6–20 × 1–5 cm, longest internode 2–5 cm; branches ascending, spreading or reflexed, flexuous, 1 or 2 per node, slender, proximally rounded and smooth, distally scabrid on and sparsely between angles, longest 3.5–9 cm with 1–7 well-spaced spikelets in distal 1/2. Spikelets elliptic-oblong, 5–7.5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.7–1.8(–2.5) mm, smooth, minutely bumpy, or pilulose; glumes unequal to subequal, narrowly lanceolate to lanceolate, apex acuminate, surfaces minutely punctate with purple papillae, smooth or sparsely scabrid, keel and sometimes lateral veins scabrid, lower glume (2.7–)3–5 mm, 1(or 3)-veined, upper glume (3.4–)4–6.3 mm, 3-veined; lemmas 4–6.3 mm, intermediate veins faint to moderately prominent, keel shortly villous or pilulose for 1/3 of length, marginal veins to 1/4, surfaces proximally densely crisply pilulose to finely scabrid or minutely bumpy, distally minutely bumpy to sparsely scabrid; callus glabrous; palea scabrid or pilulose between keels, keels scabrid. Anthers 1.6–2.8 mm. Fl. and fr. Jun–Aug. 2*n* = 42.

Alpine meadows; 3700–4000 m. Xizang [India (Himachal Pradesh, Uttar Pradesh), Kashmir, Nepal].

Poa falconeri, *P. nitidespiculata*, and *P. pagophila* represent extremes that seem to grade toward one another. There are few plants from China that can be called *P. falconeri* with certainty.

39. Poa nitidespiculata Bor, Kew Bull. [3] 1948: 139. 1948 [*"nitide-spiculata"*].

闪穗早熟禾 shan sui zao shu he

Perennials, glaucous throughout, loosely tufted, subrhizomatous; shoots extra- and intravaginal. Culms erect or ascending, 30–60 cm, ca. 1 mm in diam., nodes 2, none or 1 exserted, smooth or sparsely scabrid below, uppermost less than 1/3 way up. Leaf sheaths glabrous or lowermost scabrid to covered with minute hairs, 8–11 cm, 1–1.5 × as long as blade, uppermost closed for 2/5–1/2 of length; blades flat or folded with margins inrolled, thickly papery, 4–12 cm × (1–)2–3.1 mm, abaxially smooth, adaxially sparsely scabrid, margins scabrid, apex slender prow-tipped, of tillers short; ligule milky-membranous, 2.7–6 mm, abaxially smooth, lower ones scabrid, of tillers 0.7–1 mm, abaxially scabrid, collar margins rounded, glabrous or sparsely ciliate. Panicle open, well exserted, 11–16 × 6–10 cm, longest internodes 3–3.5 cm; branches spreading, flexuous, 2 per node, proximally smooth, distally sparsely scabrid, longest 4–7 cm with 4–8 spikelets in distal 1/2; flowers

female or perfect. Spikelets ovate to oblong, glaucous, 6.2–6.7 mm, florets 2 or 3; vivipary absent; rachilla internodes up to 1 mm, scabrid or pilulose; glumes unequal to subequal, lanceolate or oblong, keel distally scabrid, surfaces smooth or faintly punctate-papillate, lower glume 3.1–4.5 mm, 1- or 3-veined, upper glume 4.1–5 mm, 3-veined; lemmas oblong, 6–6.5 mm, apex obtuse, keel crisply pilulose to short villous for 2/5 of length, marginal veins to 1/3, intermediate veins moderately raised, area between veins proximally densely scabrid to crisply pilulose, distally smooth or sparsely scabrid; callus glabrous or sparsely webbed; palea scabrid or pilulose between keels, keels scabrid. Anthers 2.5–3 mm, or vestigial. Fl. and fr. Jun–Aug.

Alpine sunny slopes, grassy places in river valleys; 4400–4700 m. Xizang [India (Sikkim), Nepal].

The lemmas have a shortly pubescent abaxial surface and a broad, membranous margin, and the callus is glabrous. The species is similar to *Poa polyneuron*, but differs in having long leaf blades and ligules, larger spikelets up to 7 mm, long glumes and lemmas, and the lemma only 5-veined.

40. Poa polyneuron Bor, Kew Bull. [7] 1952: 223. 1952.

多脉早熟禾 duo mai zao shu he

Perennials, loosely tufted, rhizomatous; shoots extravaginal. Culm base slightly decumbent, 30–55 cm × 1–2.5 mm, nodes 3 or 4, 1 or 2 exserted. Leaf sheaths strongly keeled with a narrow wing, basal ones finely retrorse strigose, becoming fibrous, middle and upper ones smooth, 11–15 cm, ca. 3 × as long as blade, uppermost closed for 1/2–2/3 of length; blade flat or folded, moderately thin, 3–8 cm × (1.5–)4–5 mm, surfaces smooth, or adaxially sparsely scabrid, margins and keel smooth or scabrid, apex abruptly prow-tipped, tillers to 15 cm × 2 mm; ligules brown, membranous, ca. 2 mm, abaxially smooth, apex acuminate. Panicle open, lax, 10–17 × 2–6 cm, longest internode 3–4 cm; branches spreading, 2 per node, smooth throughout or with infrequent hooks, longest 3–8 cm with 3–6 well-spaced spikelets in distal 1/3. Spikelets elliptic, 5.5–7 mm, florets 3 or 4; vivipary absent; rachilla internodes to 1.2 mm, smooth, glabrous; glumes broadly lanceolate, keel scabrid above, surfaces minutely punctate with or without purple papillae, lower glume 4.5–5 mm, 3-veined, upper glume ca. 5 mm, 3(or 5)-veined, smooth or sparsely scabrid; lemmas broadly elliptic, ca. 5 mm, 5–7-veined, keel slightly arched, keel shortly villous for 2/3 of length, marginal veins for 1/2, intermediate veins prominent, surfaces proximally densely pilulose, distally sparsely scabrid; callus glabrous or scantily webbed with a few hairs to 1/2 as long as lemma; palea with slender hooks to proximally pilulose between keels, keels medially pilulose, distally scabrid. Anthers 1.6–2.2 mm. Fl. and fr. Jun–Aug.

High mountains, grassy slopes; ca. 4000 m. Xizang [India (Sikkim)].

The type of *Poa polyneuron* is from the India-Xizang border. Rajbhandari (Bull. Univ. Mus. Univ. Tokyo 34: 203. 1991) discussed it under *P. gammieana*. It also approaches *P. grandis*. The flowers examined were perfect, but if it were related to *P. grandis* it would be expected also to have female florets.

41. Poa gammieana J. D. Hooker, Fl. Brit. India 7: 345. 1896 ["1897"].

茛密早熟禾 gen mi zao shu he

Perennials, loosely tufted, not rhizomatous; shoots extravaginal. Culms decumbent, sometimes geniculate, (40–)50–85 cm tall, 1.5–3 mm in diam., smooth, glabrous, nodes 5–7, 1 or 2 exserted. Leaf sheaths keeled, 8–15 cm, 1–1.3 × as long as blade, uppermost closed for 2/3–5/7 of length, lower sheaths scabrid, upper sheaths smooth; blade flat, moderately thin, 8–12 cm × 2–7 mm, distinctly keeled, surfaces smooth, keel and margins smooth or scabrid, apex abruptly slender prow-tipped; ligule 3–6.5 mm, abaxially scabrid, apex obtuse to acute, basal and tiller ligules shorter, collars smooth to long scabrid on margins. Panicle open, lax, 10–20 × 1–6 cm, longest internodes 3–5 cm; branches ascending to spreading, 1 or 2 per node, proximally rounded, distally slightly angled, smooth, longest 3–9 cm with 2–5 well-spaced spikelets in distal 1/3. Spikelets green, sometimes glaucous, 5.5–9.2 mm, florets 3–5; vivipary absent; rachilla internodes 0.8–2.3 mm, smooth or minutely bumpy, glabrous or hispidulous; glumes surfaces minutely papillate-punctate, apex acuminate, keel distally scabrid, lower glume 3.3–4 mm, (1 or)3-veined, upper glume 4–4.7 mm, 3-veined; lemmas 4.5–5.2 mm, apex narrowly membranous, keels shortly villous for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, glabrous or sparsely pilulose, area between veins finely scabrid throughout; callus webbed; palea scabrid between keels, keels scabrid, medially pilulose. Anthers 1.1–1.6(–2) mm. Fl. and fr. Jun–Aug.

Alpine grassy slopes; 4000–4300 m. Xizang [Bhutan, India (Assam, Sikkim)].

Poa gammieana is known in China from one gathering. It has fewer spikelets per branch and shorter glumes than *P. grandis*.

42. Poa grandis Handel-Mazzetti, Symb. Sin. 7: 1284. 1936.

阔叶早熟禾 kuo ye zao shu he

Poa spontanea Bor.

Perennials, loosely tufted, from a tough, shortly rhizomatous crown, tillers sometimes clambering; shoots extravaginal. Culms erect, 1 to several, somewhat compressed, (50–)70–120 cm tall, 2–5 mm in diam., smooth, nodes 5–12, several exserted, slightly swollen, usually with leafy lateral shoots from mid to upper nodes (these infrequently flowering), lowest to mid-culm nodes strigose above and below. Leaf sheaths strongly compressed, prominently keeled above, glabrous, or sometimes strigose near the base, ?pilulose also, 6–9 cm, ca. 1/2 as long as blade, uppermost closed from 3/4 of length to near the top; blade absent or nearly so on lowermost sheaths, flat, moderately thin, 7–25 cm, uppermost often longest, (2–)4–12 mm wide, distinctly keeled, surfaces smooth, margins smooth or scabrid, adaxially often pilulose, apex prow-tipped; ligule membranous, 2–6 mm, abaxially smooth or scabrid, apex truncate or rounded, collar margins often prominently flared. Panicle open, erect, diffuse, 15–35 × 10–20 cm, longest internodes (3–)4–5(–8) cm; branches eventually spreading to reflexed, strict, (2–)3–7(–9) per node, fairly stout, smooth throughout or distally very sparsely scabrid, longest 6–12 cm with 7–26 spikelets in distal 1/2; flowers female or perfect, some inflorescences entirely female. Spikelets elliptic, 5–7 mm, florets 2 or 3(–5); vivipary absent; rachilla internodes 0.3–1 mm, densely scabrid or smooth, glabrous, or pilulose to hispidulous; glumes lanceo-

late to ovate, surface minutely papillate-punctate, apex acuminate, keel and upper surface smooth or scabrid, lower glume 2.3–4 mm, 1(or 3)-veined, upper glume 3.5–5 mm, 3-veined; lemmas elliptic to lanceolate, 3.5–5 mm, keel sparsely shortly villous for 1/3 of length, marginal veins for 1/4, intermediate veins faint to prominent, area between veins proximally scabrid to crisply pilulose, distally scabrid; callus sparsely webbed or glabrous; palea densely scabrid or with slender hooks between keels, keels scabrid, sometimes medially pilulose. Anthers 1.8–2.8 mm, or vestigial. Fl. and fr. Jun–Aug.

High-elevation meadows and *Fargesia* thickets along streams in mountainous areas, alpine slopes and river valleys; 2700–4500 m. SW Sichuan, SE Xizang (Mêdog), NW Yunnan [Myanmar].

Poa grandis is unusual in its multinoded culms with branching shoots from the upper nodes, and dense, thick, shortly rhizomatous crowns. Keng (Fl. Ill. Pl. Prim. Sin. Gram. 163. 1959, as *"P. plurinodis"*) reported it as dioecious, but from population samples and additional gatherings it appears to be sequentially gynomonoecious. The types of *P. spontanea*, from adjacent Myanmar, and *"P. plurinodis*," from NW Yunnan, are not significantly different. *"Poa plurinodis* Keng" (Claves Gen. Sp. Gram. Prim. Sin. 165. 1957 and loc. cit. 1959) was not validly published because no Latin description was provided. *"Poa plurinodis* Keng ex P. C. Keng" (Acta Bot. Yunnan. 4: 275. 1982) was not validly published because two types were indicated.

43. Poa eleanorae Bor, Kew Bull. [3] 1948: 142. 1948.

易乐早熟禾 yi le zao shu he

Perennials, loosely tufted, rhizomes not recorded; shoots extravaginal. Culms ascending, sometimes geniculate, 30–50 cm tall, 1–2 mm in diam., smooth, nodes 2 or 3, none or 1 exserted. Leaf sheaths loose, smooth, glabrous, lowermost scabrid, becoming fibrous, 8–13 cm, 3/5–1 × as long as blade, uppermost closed for ca. 1/9 of length; blade folded with margins inrolled, thin, 7–22 cm × 1–3 mm, abaxially shiny, smooth, adaxially scabrid, margins smooth; ligule 0.5–2(–2.5) mm, abaxially scabrid, apex truncate to obtuse, collar smooth, glabrous, or lowermost sparsely scabrid. Panicle open, 8–24 × 3–12 cm, longest internodes 2–7 cm; branches spreading to reflexed, flexuose, sometimes arched upward, 2 per node, proximally smooth to sparsely scabrid, distally scabrid on and between angles, longest with 5–15 well-spaced spikelets in distal 1/2, pedicel mostly shorter than spikelet. Spikelets cuneate, 5–7 mm, florets 2 or 3; vivipary absent; rachilla internodes 1.5–1.7 mm, smooth or scabrid, glabrous or pilulose; glumes subequal, surfaces minutely punctate with purple papillae, smooth or sparsely scabrid, keels straight, or slightly curved, finely scabrid, 3-veined, apex acuminate, lower glume 5.6–6.5 mm, upper glume 5.7–7 mm, as long as or slightly longer than first lemma; lemmas elliptic, 4.2–6.5 mm, apex acute, scabrid throughout, intermediate veins prominent, keel shortly villous for 1/3 of length, marginal veins sometimes near base; callus glabrous or sparsely webbed; palea scabrid throughout. Anthers (0.4–)0.6–1 mm. Fl. and fr. Jul–Aug.

Alpine grassy places; 3800–4000 m. ?Sichuan, ?Xizang, ?Yunnan [India (Sikkim), Nepal].

Poa eleanorae is unlike other species in the short-anthered group in having long, open sheaths and large spikelets with glumes as long as or longer than the first lemma. Specimens with well-preserved bases have not been seen, and it is possible that short rhizomes might be produced. The species was reported from Sichuan, Xizang, and Yunnan in FRPS (9(2): 170. 2002), but not in the provincial Chinese Floras. No authentic material from China has been seen by us.

44. Poa pseudamoena Bor, Kew Bull. [8] 1953: 276. 1953.

拟早熟禾 ni zao shu he

Poa amoena Bor, Kew Bull. [3] 1948: 140. 1948, not (J. Presl) Kunth, 1833; *P. platyglumis* (L. Liu) L. Liu; *Puccinellia platyglumis* L. Liu.

Annuals or short-lived perennials, densely tufted. Culms included in the basal tufts or slightly exserted, erect or decumbent, 4–8 cm tall, smooth, nodes 1 or 2, hidden. Leaf sheaths smooth, glabrous, 1–3 cm, subequal to shorter than blade, uppermost closed for ca. 1/4 of length; blade flat or folded, thin, 1–4 cm × 1–1.6 mm, abaxially smooth, adaxially smooth or sparsely scabrid, margins smooth to scabrid; ligules 0.5–2.2 mm, abaxially smooth, apex acute, lacerate to dentate, collars smooth. Panicle contracted to subspiciform, or open at anthesis, ovoid to cylindrical, erect, 1–2.5 × 0.6–1 cm, longest internodes 0.4–0.8 cm; branches erect to ascending, 1 or 2 per node, proximally smooth, distally sparsely to moderately scabrid on weak angles, longest 0.5–1.5 cm with 1–3(–8) spikelets distally. Spikelets elliptic, pale green to purple tinged 3.2–6 mm, florets 2–4; vivipary absent; rachilla internodes 0.4–1 mm, smooth, glabrous; glumes subequal, keels smooth or sparsely scabrid, lower glume 1.8–4 mm, (1 or)3-veined, upper glume 2.4–4.6 mm, oblong, 3-veined; lemmas broadly elliptic, 2.5–4 mm, glabrous throughout, apex acute, occasionally mucronulate, keel sparsely scabrid, intermediate veins faint to moderately prominent, area between veins smooth; callus glabrous; palea smooth between veins, keels scabrid. Anthers 0.6–1 mm. Fl. and fr. Aug–Sep.

Xizang-Qinghai Plateau: grassy frost-heaved slopes, glacial outwash, lake shores; 2800–5600 m. Qinghai, S Xinjiang, Xizang [India (Uttar Pradesh)].

Poa pseudamoena is infrequently collected. It looks much like a form of *Poa annua* with glabrous lemmas, but with more congested panicles. The type of *Puccinellia platyglumis*, from SW Xizang, has smaller spikelets and a more open panicle, at least at anthesis. We have seen authentic *Poa pseudamoena* from S Xinjiang on mixed sheets with *Puccinellia*.

45. Poa ussuriensis Roshevitz in Komarov, Fl. URSS 2: 754. 1934.

乌苏早熟禾 wu su zao shu he

Poa ussuriensis f. *angustifolia* I. C. Chung; *P. ussuriensis* f. *scabra* I. C. Chung.

Weakly perennial, loosely tufted. Culms erect, 30–80 cm tall, ca. 0.8 mm in diam., scabrid below nodes, nodes 3 or 4(–5), 2 or 3 exposed. Leaf sheaths very compressed with a winged keel, 4–13 cm, 1/2–1 × as long as blade, uppermost closed for 2/3–3/4 of length; blade flat or weakly folded, thin, deeply keeled, 2–15 cm × (1.5–)2–3(–4.5) mm, adaxially scabrid, margins densely scabrid; ligule (0.5–)1–2(–2.5) mm, abaxially scabrid, apex truncate to obtuse, collars scabrid, margins glabrous. Panicle open, lax, diffuse, 7–20 cm, broad, longest internodes 3–5 cm; branches eventually spreading, lax, 2–5 per node, slender, scabrid on and between angles throughout, long-

est to 12 cm with 3–13 loosely arranged spikelets in distal 1/3. Spikelets oblong-lanceolate, light green, (3–)4–6 mm, florets 3–5(–6); vivipary absent; rachilla internodes ca. 1 mm, smooth, glabrous; glumes unequal, acute, keels sparsely scabrid, lower glume 1.5–2 mm, 1-veined, upper glume 2.5–3 mm, 3-veined; lemmas 3–4 mm, apex acuminate, keel villous for 2/3 of length, marginal veins for 1/3, intermediate veins prominent, area between veins minutely bumpy, glabrous; callus sparsely webbed; palea smooth or minutely bumpy between keels, keels scabrid. Anthers 0.4–1 mm. Fl. and fr. Jun. 2*n* = 28, 42.

Deciduous forests, mixed forests, glades, riparian gravels. Heilongjiang, ?Jilin (expected) [Korea, Russia (Far East)].

Poa ussuriensis is common on the Russian side of the Chinese border east and west of Vladivostok. *Poa radula* Franchet & Savatier was reported in FRPS (9(2): 113–114. 2002) from Jilin, but it is doubtfully present in China. According to Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 283. 1985), *P. radula* is a species of Sakhalin, the Kuril Islands, and S Kamchatka, but is not found elsewhere in the Russian Far East, China, or Japan. Chung (Korean Grass. 72. 1965) reported it from S Korea, but not N Korea or China; Japanese authors have not mentioned it for Korea or China; and Kitagawa (Neo-Lineam. Fl. Manshur. 102–105. 1979) did not list it for Manchuria. *Poa radula* can be difficult to distinguish from *P. ussuriensis*: it has a broader leaf blade, (3–)4.5–10 mm wide, longer ligule, (1.5–)2.5–4 mm, larger spikelets (5–)6–8(–10) mm, and hexaploid chromosome number.

46. Poa hisauchii Honda, Bot. Mag. (Tokyo) 42: 132. 1928.

久内早熟禾 jiu nei zao shu he

Annuals or short-lived perennials. Culms ascending to erect, 20–60 cm tall, nodes 3 or 4. Leaf sheaths shorter than internodes, smooth or scabrid; blade flat, grayish green, 4–8 cm × 1–3 mm, surfaces and margins scabrid; ligule 0.5–1.5 mm, abaxially pilulose, apex truncate to rounded, collar margin ciliate. Panicle narrowly oblong, 8–15 cm, longest internodes 3–5 cm; branches erect or curved ascending (sometimes spreading in fruit), 2 or 3(–5) per node, slender, scabrid angled from base, longest 2–6 cm with 5–15 spikelets in distal 1/2. Spikelets oblong to ovate, green, 4–5 mm, florets 3 or 4; vivipary absent; rachilla internodes 0.6–0.9 mm, glabrous; glumes slightly unequal, lanceolate, keel and veins distally scabrid, lower glume 2–2.4 mm, 1-veined, apex acuminate, upper glume oblong to lanceolate, 2.2–2.8 mm long, 3-veined, apex acuminate; lemmas 2.8–3.2 mm, keel villous for 3/4 of length, marginal veins to 1/2, area between veins glabrous or sparsely pilulose near keel; callus webbed; paleas distinctly shorter than the lemma, keels pilulose. Anthers (0.3–)0.4–0.7 mm. Fl. Jun–Jul. 2*n* = 28.

Shady and moist forest openings, grassy places. Hebei, Zhejiang [Japan, Korea].

Records from Sichuan and Yunnan in FRPS (9(2): 155. 2002) were based on misidentifications. This species has the pilulose ligules and branches scabrid from the base characteristic of *Poa acroleuca*, but the branches are shorter and erect to steeply ascending, and the lemmas are somewhat longer and usually glabrous or with a few hairs between the veins.

47. Poa acroleuca Steudel, Syn. Pl. Glumac. 1: 256. 1854.

白顶早熟禾 bai ding zao shu he

Annuals or short-lived perennials. Culms ascending to erect, sometimes slightly swollen at the base, sometimes with moniliform swelling, 30–85 cm tall, 0.6–1 mm in diam., smooth, glabrous to retrorsely strigulose, nodes 3 or 4, 2 exserted. Leaf sheaths weakly keeled, smooth or sparsely scabrid, glabrous or retrorsely strigulose, 8–13 cm, slightly shorter or longer than blade, uppermost closed for over 2/3 of length, lowermost becoming fibrous in age; blades flat, thin, 7–20 cm × (1–)1.5–5(–11) mm, surfaces smooth to moderately scabrid, margins moderately to densely scabrid; ligule 0.5–1.5(–2) mm, abaxially pilulose, apex truncate to rounded, collar margins ciliate. Panicle open, elliptic, narrowly ovate, or pyramidal, exserted, 10–21 × 3–10 cm, longest internodes 3–5.5 cm; branches ascending to widely spreading, or reflexed, 2–5 per node, slender, angular, scabrid from base, longest 3–11 cm with 9–40 spikelets in distal 1/2. Spikelets ovate, green, 2.5–5 mm, florets (2–)3–5; vivipary absent; rachilla internodes 0.5–0.8 mm, smooth to sparsely scabrid, glabrous or pilulose; glumes slightly unequal, lanceolate, keel and veins distally scabrid, lower glume 1.5–2.4 mm, 1-veined, upper glume 2–2.8 mm, 3-veined, often as long or slightly longer than lowest lemma; lemmas oblong, 1.6–2.6(–3) mm, apex obtuse to acute, keel shortly villous for 5/6 of length, marginal veins to 3/4, intermediate veins moderately prominent, area between veins pilulose for 4/5 of length, rarely glabrous; callus sparsely webbed; palea pilulose between keels, keels smooth, rarely with a few apical hooks, pilulose to shortly villous to apex. Anthers (0.4–)0.5–1 (–1.3) mm. Fl. and fr. Apr–Jun. 2*n* = 28.

Moist and shady grassy places, ditch banks, parks, disturbed ground; 500–1500(–2400) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Korea, Japan].

Poa acroleuca is usually well marked by the pilulose lemma surfaces and palea keels, callus web presence, and scabrid branches. It appears to intergrade with *P. nepalensis*, but that species normally has glabrous lemma surfaces, shorter, more contracted panicles, upper glume shorter than the first lemma, smooth, glabrous ligules (at least on the upper culm leaves), and tends to be paler overall.

1a. Lemma surfaces and intermediate veins moderately to densely pubescent ..... 47a. var. *acroleuca*
1b. Lemma surfaces and intermediate veins glabrous or sparsely pubescent ..... 47b. var. *ryukyuensis*

47a. Poa acroleuca var. **acroleuca**

白顶早熟禾(原变种) bai ding zao shu he (yuan bian zhong)

Lemma surfaces and intermdiate veins moderately to densely pubescent.

Moist and shady grassy places, ditch banks, parks, disturbed ground; 500–1500(–2400) m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Korea, Japan].

47b. Poa acroleuca var. **ryukyuensis** Koba & Tateoka, J. Jap. Bot. 67: 205. 1992.

如昆早熟禾 ru kun zao shu he

Lemma surfaces and intermediate veins glabrous or sparsely pubescent.

Sporadic at low elevations. Guangdong, Shandong, Zhejiang [Japan (Okinawa)].

It is not uncommon to find plants of *Poa acroleuca* in China with glabrous or nearly glabrous lemmas. The range of such plants, recently named from Okinawa as var. *ryukyuensis*, has not yet been fully documented. These can be confused with *P. hisauchii*, except that in that species the panicles are narrow with short, erect or ascending branches, and the anther to lemma length ratio is less than 1:5 (vs. 1:5–2:5); or with *P. nepalensis*, except that in that species all ligules are pilulose and the paleas are pilulose to the apex.

48. Poa nepalensis (G. C. Wallich ex Grisebach) Duthie, List Grasses N. W. India 40. 1883.

尼泊尔早熟禾 ni bo er zao shu he

Poa annua Linnaeus var. *nepalensis* G. C. Wallich ex Grisebach, Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 3: 75. 1868.

Annuals to short-lived perennials, tufted or weakly stoloniferous. Culms erect, geniculate, or obliquely ascending, 15–50(–80) cm tall, 0.5–2 mm in diam., smooth, nodes 2–4, 0–2 exposed. Leaf sheaths loose, keeled, smooth, glabrous, 5–11 cm, about as long as blade, uppermost closed for 1/2(–3/4) of length; blades flat, thin to moderately thin, 4–20 cm × (1.5–)2–7(–11) mm, uppermost 3–10 cm, surfaces smooth to sparsely scabrid, margins scabrid, apex acutely to acuminately prow-tipped; ligule 0.5–1.5(–2) mm, abaxially smooth or scabrid, glabrous or rarely pilulose, apex truncate to obtuse, collar margins usually ciliate. Panicle open or loosely contracted, ovate or elliptic, exserted, 5–15(–22) × 3–10 cm, longest internodes 1–3 cm; branches ascending to reflexed, 2(–4) per node, proximally smooth or sparsely scabrid angled, distally nearly smooth to densely scabrid angled, longest 3–9 cm with 10–35 spikelets in distal 1/2. Spikelets elliptic, light green, 3.5–5(–7) mm, florets 3–6(–7); vivipary absent; rachilla internodes 0.5–0.8 mm, smooth, glabrous; glumes subequal to equal, keel and sometimes veins scabrid, lower glume narrow, 1.3–3.3 mm, 1-veined, upper glume broader, 1.5–3.4 mm, 3-veined; lemmas oblong to elliptic, 2.4–4(–5) mm, apex obtuse, rarely acute, keel villous to near apex, marginal veins for 3/4 of length, intermediate veins prominent, glabrous, rarely pilulose, areas between veins minutely bumpy, glabrous or infrequently pilulose proximally between keel and intermediate veins; callus webbed; palea smooth, glabrous, rarely sparsely pilulose, between keels, keels pilulose to short villous for most of length, distally pilulose or with a few hooks. Anthers (0.4–)0.6–1 mm. Fl. and fr. Apr–Jun.

Meadows on slopes, roadsides, disturbed ground, at lower elevations in E China; 1900–4000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Liaoning, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Japan, Kashmir, Korea, Myanmar, Nepal, Pakistan].

1a. Panicle branches proximally smooth or sparsely scabrid angled ..... 48a. var. *nepalensis*
1b. Panicle branches sparsely to moderately scabrid from the base ..... 48b. var. *nipponica*

48a. Poa nepalensis var. **nepalensis**

尼泊尔早熟禾(原变种) ni bo er zao shu he (yuan bian zhong)

Poa mariesii Rendle; *P. micrandra* Keng; *P. nephelophila* Bor.

Culms 15–50(–80) cm tall, 0.5–2 mm in diam. Uppermost leaf sheath subequal to blade, closed for 1/2(–3/4) of length; ligule 0.5–1.5(–2) mm. Panicle branches proximally smooth or sparsely scabrid angled, distally nearly smooth to shortly scabrid angled; lower glume 1.3–3.3 mm, upper glume 1.5–3.4 mm; lemmas with intermediate veins glabrous, infrequently pilulose, areas between veins minutely bumpy; palea keels distally pilulose or scabrid with few to several hooks. Fl. and fr. Apr–Jun. 2*n* = 42.

Meadows on slopes, roadsides, disturbed ground, at lower elevations in E China; 1900–4000 m. Gansu, Hebei, Henan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Kashmir, Myanmar, Nepal, Pakistan].

Poa nepalensis var. *nepalensis* is very variable, and more sensitive analyses might reveal additional taxa, but we were unable to divide the specimens in any meaningful way. This subspecies is much more widespread than was previously understood. The types of *Poa mariesii*, from Jiangsu, and *P. nephelophila*, from Myanmar (with branches nearly smooth throughout), are robust forms.

48b. Poa nepalensis var. **nipponica** (Koidzumi) Soreng & G. Zhu, **comb. et stat. nov.**

日本早熟禾 ri ben zao shu he

Basionym: *Poa nipponica* Koidzumi, Bot. Mag. (Tokyo) 31: 256. 1917.

Culms 20–40 cm tall, 1–2 mm in diam. Uppermost leaf sheaths slightly longer than blade, closed for ca. 1/2 of length; ligule 1–1.6(–2) mm. Panicle branches proximally sparsely to moderately scabrid angled from base, distally sparsely to moderately densely long scabrid angled; lower glume 2.5–3.3 mm, upper glume 2.5–3.4 mm; lemmas with intermediate veins glabrous or proximally pilulose to short villous, smooth between veins; palea keels pilulose only. Fl. and fr. May–Jul. 2*n* = 42, 56.

Thickets, moist meadows on sunny slopes. Liaoning [Korea, Japan].

Poa nepalensis var. *nipponica* is generally more robust than var. *nepalensis*, and the lower glume to lower lemma length ratio is slightly greater. It is common in Japan, but seems to be absent from most of China.

49. Poa imperialis Bor, Kew Bull. [12] 1957: 414. 1958.

茁壮早熟禾 zhuo zhuang zao shu he

Annuals or short-lived perennials, stoloniferous. Culms decumbent ascending, 70–85 cm tall, 2–3 mm in diam., smooth, nodes 3–6, none or 1 exserted. Leaf sheaths loose, keeled, smooth, glabrous, 14–17 cm, slightly longer than blade, uppermost closed for ca. 3/4 of length; blade flat, thin, base abruptly narrowed, surfaces smooth, margins scabrid, apex long slender prow-tipped; ligule 3–6 mm, abaxially smooth, apex obtuse, collars smooth, glabrous. Panicle open, 18–22 cm, longest internodes 3.5–4 cm; branches spreading to reflexed, 2 per node, proximally smooth, angled, distally scabrid angled, longest 8–11 cm with 20–40 spikelets in distal 2/3. Spikelets up to 6–7 mm, florets 5 or 6; vivipary absent; glumes purple tinged, keel

and sometimes veins sparsely scabrid, lower glume elliptic, 3–3.5 mm, 1-veined, back convex, upper glume 3.7–4 mm, oblong, 3-veined; lemmas 4–5 mm, keel villous for 2/3 of length, marginal veins for 1/2, intermediate veins moderately prominent, areas between veins smooth, glabrous; callus glabrous; palea smooth, glabrous between keels, keels scabrid, medially pilulose. Anthers 0.6–0.9 mm. Fl. and fr. May–Jul.

Grassy places on slopes along *Abies* forest margins; 3700–4500 m. ?Sichuan [Nepal].

Poa imperialis could be simply a large form *P. sikkimensis*.

50. Poa sikkimensis (Stapf) Bor, Kew Bull. [7] 1952: 130. 1952.

锡金早熟禾 xi jin zao shu he

Poa annua var. *sikkimensis* Stapf in J. D. Hooker, Fl. Brit. India 7: 346. 1896 [“1897”]; *P. eragrostioides* L. Liu; *P. tunicata* Keng ex C. Ling.

Annuals or short-lived perennials, tufted to weakly stoloniferous. Culms erect or arching, or geniculate ascending, 4–42 cm tall, 0.5–2 mm in diam., smooth, nodes 1–3(–4), none or 1 exserted, uppermost to 1/3 way up culm. Leaf sheaths loose, smooth, glabrous, 2–8 cm, 1–3 × as long as blade, uppermost closed for 1/3–1/2 of length; blade flat, thin, 3–10 cm × (1.5–) 2–5 mm, surfaces smooth or sparsely scabrid, margins scabrid, apex acutely prow-tipped, of tillers 1–10 cm; ligule 1.5–4(–6) mm, abaxially smooth or sparsely scabrid, apex obtuse to acute, collars glabrous. Panicle loosely contracted to open, oblong to pyramidal, 3–15(–19.5) × 1.5–5 cm, longest internodes 0.5–3 cm; branches obliquely ascending, spreading, or reflexed, flexuous, 2 per node, proximally smooth, distally scabrid, longest to 1–7 cm with 4–30 spikelets in distal 2/3. Spikelets ovate, usually purple tinged, 3.8–5(–6) mm, florets 3–5; vivipary absent; rachilla internodes 0.4–0.9 mm, smooth, glabrous; glumes usually purple, subequal to unequal, broad, keels smooth or sparsely scabrid, lower glume 1.5–2.7 mm, 1-veined, upper glume 2–3.1 mm, 3-veined; lemmas broadly elliptic, 2.5–3.3 mm, apex obtuse to acute, keel pilulose to shortly villous, rarely glabrous, for 1/2 length, marginal veins to 1/3, intermediate veins prominent, areas between veins smooth, glabrous; callus glabrous; palea glabrous between keels, keels sparsely scabrid, some smooth, medially sparsely pilulose. Anthers 0.5–0.9 mm. Fl. and fr. Jul–Sep. $2n = 28, 42$.

Grassy slopes, meadows, marshy ground, sandy bottoms, roadsides, disturbed ground; 3000–4700 m. SW Gansu, S Qinghai, W Sichuan, E Xizang (Yadong, Zayü), NW Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa sikkimensis lacks a webbed callus and has ligules 2–6 mm. It is most difficult to distinguish from *P. annua*, but has sparsely scabrid palea keels and branches and no pubescence on the intermediate veins of the lemmas.

51. Poa stapfiana Bor, Kew Bull. [4] 1949: 239. 1949.

斯塔夫早熟禾 si ta fu zao shu he

Poa tremula Stapf in J. D. Hooker, Fl. Brit. India 7: 344. 1896 [“1897”], not Lamarck (1791); *P. tremula* var. *micranthera* Stapf.

Perennials, loosely tufted, weakly stoloniferous; shoots extra- and intravaginal. Culms 20–60 cm tall, 0.6–1.4 mm in diam., erect or obliquely ascending, smooth, glabrous, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths loose, smooth, glabrous, 5–10 cm, slightly shorter than blade, uppermost closed for 1/4–1/3 of length; blade flat or folded, thin, 5–14 cm × 1–5 mm, adaxially sometimes scabrid, margins scabrid, apex slender prow-tipped or mucronate; ligule 2.5–5 mm, abaxially smooth, apex obtuse. Panicle open, lax, 8–25 cm, longest internodes 2.2–4 cm; branches widely spreading, flexuous, 2 per node, slender, proximally smooth, distally scabrid angled, longest 3.5–7 cm with 9–20 spikelets in distal 1/2. Spikelets elliptic to oblong, green or grayish, 4–6 mm, florets 3–6; vivipary absent; rachilla smooth, glabrous or pilulose; glumes subequal or lower to 1.5 mm shorter, scabrid only on keel, apex acuminate, faintly or not evidently punctate-papillate, lower glume lanceolate to elliptic, 2.7–3.9 mm, 1(or 3)-veined, upper glume oblong, 3–4.5 mm, faintly 3-veined; lemmas oblong, very thinly papery, 3–4.5 mm, apex acute, keel villous for 3/4 of length, marginal veins to 1/2, intermediate veins prominent, areas between softly pilulose; callus webbed; paleas shorter than the lemma, keels scabrid, medially pilulose. Anthers 0.7–1.2 mm. Fl. and fr. Jul–Sep.

Alpine meadows; 2500–4300 m. ?Xizang [N India, Kashmir, Nepal, Pakistan; SW Asia (Iran)].

This species approaches *Poa himalayana* on one end of its range of variation and *P. hirtiglumis* on the other, but it has longer lemmas and generally longer anthers than either of those species. The occurrence of this species in China requires confirmation.

52. Poa burmanica Bor, Kew Bull. [3] 1948: 141. 1948.

缅甸早熟禾 mian dian zao shu he

Annuals or short-lived perennials, weakly stoloniferous; shoots extra- and intravaginal. Culms loosely tufted, mostly flowering, 10–60 cm tall, 0.5–0.8 mm in diam., smooth or sparsely retrorse scabrid below lower nodes, glabrous, nodes 3–5, 3 or 4 exserted. Leaf sheaths smooth, glabrous or sparsely retrorsely strigulose, 7–12 cm, 1–2 × as long as blade, uppermost closed for 1/4–1/3 of length; blade flat, thin, 2–6 cm × 1.5–2.5 mm, adaxial surface and margins scabrid, apex slender prow-tipped; ligule 0.8–1.3 mm, abaxially smooth or scabrid, apex truncate to obtuse, collars smooth or slightly scabrid, margins glabrous or ciliate. Panicle open, lax, slightly exserted, 8–13 × 3–5 cm, longest internodes 2–3.5 cm; branches spreading, flexuous, 2 per node, capillary, scabrid throughout, distally angled, longest 2–5 cm with 2–5 spikelets, Spikelets 5–5.5 mm, florets 2 or 3; vivipary absent; rachilla internodes to 1 mm, smooth, glabrous; glumes lanceolate, unequal, lower glume subulate, 1.6–3 mm, distinctly shorter than the upper, keel nearly smooth, 1-veined, upper glume 3.2–4.1 mm, strongly 3-veined, keel scabrid; lemmas oblong, 3.7–4.6 mm, ca. 5 × as long as wide, 5(–7)-veined, apex slightly acuminate, keel shortly villous for 4/5 of length, marginal veins for 2/3, intermediate veins prominent, areas between veins basally pilulose, apically scabrid; callus densely webbed; palea distinctly shorter than lemma, sparsely pilulose between veins, keels scabrid, sometimes medially pilulose. Anthers 0.6–1 mm. Fl. and fr. May–Jun.

Alpine meadows; ca. 3700 m. SW Sichuan, SE Xizang, NW Yunnan [Myanmar].

Poa burmanica is distinguished from *P. himalayana*, *P. khasiana*, and *P. rajbhandarii* by the pubescent sides of the lemmas and by little else.

53. Poa himalayana Nees ex Steudel, Syn. Pl. Glumac. 1: 256. 1854.

史蒂瓦早熟禾 shi di wa zao shu he

Poa gracilior Keng ex L. Liu; *P. stewartiana* Bor.

Annuals or short-lived perennials. Culms 1 to several, erect or geniculately ascending, (12–)20–50(–70) cm tall, 0.5–0.8 mm in diam., smooth or scabrid below the lower nodes, glabrous, nodes 2–5, 1 or 2 exserted. Leaf sheaths smooth or scabrid or glabrous to strigulose near the collars, 5–15 cm, 1–3 × as long as blade, uppermost closed for 2/5–1/2 of length; blade flat, thin, 3–15 cm × (0.5–)1–2.5 mm, abaxially smooth or scabrid, adaxially and margins densely scabrid, glabrous, apex slender prow-tipped, of tillers up to 10 cm; ligule 0.8–2.5 mm, abaxially smooth, glabrous, apex truncate to obtuse, collar margins sparsely shortly ciliate or glabrous. Panicle open, ovoid, lax, (6–)9–20 × 3–8 cm, longest internodes 3–5 cm; branches ascending, spreading to reflexed, 2 per node, slender, proximally smooth or sparsely scabrid, distally scabrid angled, longest 4–9 cm with (3–)5–10 spikelets in distal 1/3. Spikelets narrowly elliptic, 3–5 mm, florets 2–4; vivipary absent; rachilla internodes to 1 mm, smooth, glabrous; glumes unequal, slender, acuminate, keels slightly convex, sparsely scabrid, surfaces apically smooth or sparsely scabrid, lower glume (2–)3–3.7 mm, 1-veined, upper glume (3–)3.5–4.5 mm, prominently 3-veined; lemmas oblong to elliptic, very thinly papery, 2.5–4.3 mm, ca. 5 × as long as wide, apex slightly acuminate, keel of at least some lemmas pilulose to short villous for 1/3(–1/2) of length, marginal veins for 1/4(–1/3), intermediate veins faint to prominent, areas between veins smooth or minutely bumpy only near base, glabrous; callus sparsely webbed; paleas distinctly shorter than the lemma, smooth, glabrous between keels, keels scabrid, medially sparsely pilulose, area margins narrowly hyaline. Anthers 0.6–1 mm. Fl. and fr. May–Jul.

Grassy places on slopes; 1900–3500 m. W Sichuan, ?Xizang, Yunnan [India (Himachal Pradesh, Uttar Pradesh), Kashmir, Pakistan].

Poa himalayana is the correct name for *P. stewartiana* Bor, and differs from *P. rajbhandarii* (*P. himalayana sensu* Bor and Rajbhandari) by the pilulose palea keels and relatively long glumes, especially the lower ones. It is common in the W Himalayas, but seems to be rare in China. However, as the two species are quite similar and some specimens seem intermediate, they might be better treated as subspecies. It was reported from Yunnan in FRPS (9(2): 145, 153, 154. 2002) under *P. himalayana*, *P. gracilior*, and *P. stewartiana*, but the voucher specimens from Yunnan belong to other species, mainly *P. khasiana*.

54. Poa rajbhandarii Noltie, Edinburgh J. Bot. 57: 288. 2000.

喜马拉雅早熟禾 xi ma la ya zao shu he

Annuals or short-lived perennials, loosely tufted, weakly stoloniferous. Culms 1 to several, erect or geniculate ascending, 16–45 cm tall, 0.5–1 mm in diam., smooth or sparsely retrorse scabrid below lower nodes, glabrous, nodes 2 or 3, 1 or 2 exserted. Leaf sheaths smooth or sparsely scabrid near the collars, glabrous, 6–13 cm, slightly longer than blade, uppermost closed for 3/5 of length; blades flat, thin, 5–18 cm × 1–2.5 mm, abaxially nearly smooth to scabrid, adaxially and margins densely scabrid, apex slender prow-tipped; ligule 0.4–1.5(–2.3) mm, abaxially scabrid or puberulent, truncate to obtuse, collar margins often ciliate. Panicle open, lax, 8–18 × 3–8 cm, longest internodes 2.5–4 cm; branches ascending to spreading, flexuous, 1–4 per node, slender, scabrid throughout, longest 3–7 cm with 3–8 spikelets in distal 1/3. Spikelets narrowly elliptic, 3.7–5.2 mm, florets (1–)2–3(–4); vivipary absent; rachilla internodes to 1–1.5 mm, smooth, glabrous; glumes distinctly unequal, slender, acuminate, distinctly shorter than first lemma, keels scabrid, upper surface and edges smooth or scabrid, lower glume, subulate to wedge-shaped, 1.5–2.4 mm, straight or only slightly convexed, 1-veined, upper glume 2.2–3.3 mm, 3-veined; lemmas oblong to elliptic, very thinly to thinly papery, (2.8–)3.3–4.2 mm, ca. 5 × as long as wide, apex slightly acuminate, margins finely scabrid along edge, keel pilulose to shortly villous for 1/3–1/2 of length, marginal veins to 1/3, intermediate veins faint to prominent, areas between veins smooth or minutely bumpy over some or most of length, glabrous; callus webbed; palea distinctly shorter than lemma, smooth, glabrous between keels, keels scabrid, glabrous. Anthers 0.6–1 mm. Fl. and fr. May–Jul.

Alpine grassy places; 2700–4000 m. SC and SE Xizang, NW Yunnan [Bhutan, India (Assam, Sikkim), Nepal].

Poa rajbhandarii includes *P. himalayana sensu* Bor. *Poa himalayana* s.s. has panicles more lax and palea keels medially pilulose. *Poa rajbhandarii* is similar to *P. khasiana*, but differs in the lower glume being straighter and shorter, less than half the length of the first lemma.

55. Poa wardiana Bor, Kew Bull. [3] 1948: 143. 1948.

瓦迪早熟禾 wa di zao shu he

Annuals or short-lived perennials. Culms several, 28–35 cm tall, 0.6–0.8 mm in diam. base obliquely ascending, nodes 3 or 4, 1 or 2 exserted, scabrid below nodes. Leaf sheaths sparsely scabrid, 4.5–9 cm, 1.2–2 × as long as blade, uppermost closed for 1/2 of length; blades flat, thin, 2.5–8 cm × 1.5–2 mm, abaxially smooth to scabrid, adaxially and margins scabrid, slender prow-tipped; ligule 0.7–1.2 mm, abaxially scabrid, apex truncate to obtuse, erose, collars glabrous. Panicle open, 8–15 × 2–4 cm, longest internodes 2–3.5 cm; branches ascending to spreading, flexuous, 2 per node, capillary to slender, proximally smooth to scabrid, distally scabrid along weak angles, longest 3–7 cm with 5–13 spikelets in distal 1/3. Spikelets oblong to lanceolate, 4.5–5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.5–1 mm, smooth, glabrous; glumes subequal to slightly unequal, 2–2.5 mm, keel scabrid, apex acuminate, purplish violet, lower glume broadly subulate, 1.5–2.2 mm, 1-veined, upper glume 2.1–2.6 mm, 3-veined; lemmas oblong, 2.7–3.3 mm, apex acute, keel basally sparsely pilulose, area between veins scabrid, glabrous, intermediate veins moderately prominent; callus glabrous; palea shorter than lemma, scabrid on and between keels. Anthers 0.7–0.8 mm. Fl. and fr. Jul.

Grassy places among *Rhododendron* thickets on slopes; 3300–4000 m. Xizang, Yunnan [India (Assam)].

Poa wardiana is perhaps only a depauperate form of *P. rajbhandarii* with subglabrous lemmas, in which case the name *P. wardiana* has priority, but its lemmas are somewhat scabrid on the sides. The similar *P. lachenensis* Noltie, from India (Sikkim), differs as follows: lower glume 2.2–3 mm; lemma sides scabrid to minutely bumpy near base, keel glabrous; lower part of culms smooth, shiny, ligule margins smooth; palea smooth between keels, keels medially pilulose.

56. Poa khasiana Stapf in J. D. Hooker, Fl. Brit. India 7: 343. 1896 [“1897”].

喀斯早熟禾 ka si zao shu he

Poa formosae Ohwi.

Annuals or short-lived perennials, loosely tufted, weakly stoloniferous. Culms 1 to several, clambering to erect with base geniculate, 30–70 cm tall, 0.5–1.5 mm in diam., smooth to retrorsely scabrid or hispidulous below nodes, nodes 3 or 4, 1–3 exserted. Leaf sheaths finely retrorsely scabrid to strigulose near the collars, lower ones often tinged with purple, 6–15 cm, 1.4–4 × as long as blade, uppermost closed for 2/5–1/2 of length; blades flat, thin, 3–10 cm × 1.5–3 mm, abaxially smooth, margins smooth or finely scabrid, adaxially scabrid, apex slender prow-tipped; ligule 0.8–1(–1.5) mm, abaxially scabrid or pilulose, apex truncate or obtuse, rounded, collar margins usually shortly ciliate or strigulose. Panicle open, narrow, 7–21 × 2–5 cm, longest internodes 3–6 cm; branches ascending to spreading or reflexed, flexuous, 2–4 per node, slender, proximally smooth to scabrid, distally scabrid, angled, longest 3–6 cm with 2–8 spikelets in distal 1/3–1/2. Spikelets ovate to oblong, pale green, 4–6 mm, florets 3–4(–5); vivipary absent; rachilla internodes 0.7–1.2 mm, smooth, glabrous; glumes unequal, slender, apex acuminate, upper keel scabrid, upper surfaces and edges smooth to scabrid, lower glume 1.8–3.2 mm, narrowly lanceolate, slightly convex to often sickle-shaped, 1-veined, upper glume 2.7–3.7 mm, 3-veined; lemmas lanceolate to oblong, thinly papery to papery, 3.2–4.4 mm, ca. 5 × as long as wide, apex acute to acuminate, sparsely scabrid along edge, keel shortly villous to pilulose for 2/3 of length, marginal veins to 1/2, intermediate veins prominent, areas between veins minutely bumpy, glabrous; callus densely webbed; palea distinctly shorter than lemma, smooth, glabrous, or pilulose between keels, keels scabrid throughout or infrequently medially shortly ciliate to pilulose, margins minutely bumpy and then membranous-papery. Anthers 0.6–1 mm. Fl. and fr. Jul–Sep. 2*n* = 28.

Alpine scattered forests, grassy places among thickets on slopes, roadsides, *Fargesia* thickets; 300–4000 m. Guizhou, W Sichuan, Taiwan, SE Xizang, NW Yunnan [India (Khasi Hills), Myanmar].

Poa khasiana has firmer lemmas than most other taxa in the complex except *P. rajbhandarii*, but the lower glumes are relatively long in comparison to the first lemma, and are more sickle-shaped than in that species. A report from India (Sikkim) by Rajbhandari (Bull. Univ. Mus. Univ. Tokyo 34: 214. 1991) was rejected by Noltie (Fl. Bhutan 3(2): 572. 2000).

57. Poa nankoensis Ohwi, Acta Phytotax. Geobot. 2: 165. 1933.

南湖大山早熟禾 nan hu da shan zao shu he

Perennials, tufted. Culms ascending, 10–20(–40) cm tall, 0.8–1 mm in diam., smooth, nodes 3–5, none exserted. Leaf sheaths smooth, glabrous, several times longer than internodes, 5–8 cm, 1–3 × as long as blade, uppermost closed for 3/10–1/3 of length; blade flat or folded, thickly papery, 2–8 cm × 1.5–3 (–4) mm, abaxially smooth, adaxially and margins smooth to sparsely scabrid, apex acute to acuminately prow-tipped, of tillers to 16 cm; ligule 1–2(–3) mm, abaxially smooth or sparsely scabrid, apex obtuse to acute, collar glabrous. Panicle open, slightly included to exserted, 5–13 cm, longest internodes 2–3 cm; branches ascending to spreading, 1 per node, rounded, distally sparsely scabrid, longest 3–4 cm with 10–16 spikelets in distal 2/3. Spikelets green, (4–)5–6 mm, florets 2–3(–4); vivipary absent; rachilla internodes ca. 0.5 mm long, smooth, glabrous; glumes subequal, smooth, lower glume 3.5–4 mm, 1-veined, upper glume 3.5–5 mm, 3-veined; lemmas lanceolate, firm, 4–5 mm, apex acuminate, keel villous for 3/4 of length, marginal veins for 1/2, intermediate veins faint to moderately prominent, areas between veins minutely bumpy; callus densely webbed; palea distinctly shorter than lemma, minutely bumpy between keels, keels scabrid. Anthers 0.8–1 mm. Fl. and fr. Jun–Aug.

● Alpine grassy places. Taiwan.

58. Poa takasagomontana Ohwi, Repert. Spec. Nov. Regni Veg. 36: 41. 1934.

高砂早熟禾 gao sha zao shu he

Annuals or short-lived perennials, weakly stoloniferous. Culms ascending, loosely tufted, 40–50 cm tall, 0.4–1 mm in diam., sparsely scabrid below the nodes, nodes 4 or 5, none or 1 exserted. Leaf sheaths sparsely scabrid, 9–12 cm, 5/7–1 × as long as blade, uppermost closed for ca. 3/5 of length; blade flat, thin, 10–15 cm × 1.5–3 mm, abaxially sparsely scabrid, adaxially and margins scabrid, apex slender prow-tipped; ligules 1–1.5(–2) mm, abaxially scabrid, apex obtuse, collars ciliate margined. Panicle open, lax, 10–15 cm, barely exserted, longest internodes 2.5–3 cm; branches spreading, 2 per node, densely scabrid angled throughout, longest 2–4 cm with 5–8 spikelets in distal 1/2. Spikelets 3.5–5 mm, florets (1 or)2; vivipary absent; rachilla to 1.2 mm, smooth, glabrous; glumes unequal, very thinly papery, keels scabrid, lower glume narrowly lanceolate, 1.5–3 mm, 1-veined, upper glume 3–4 mm, 3-veined; lemmas 3–4 mm, very thinly papery, glabrous, keel faintly scabrid toward the apex, intermediate veins moderately prominent, areas between veins smooth, minutely bumpy, apex sharply acute to acuminate; callus webbed; palea shorter than lemma, smooth between keels, keels scabrid. Anthers 0.7–1 mm. Fl. and fr. Jul–Aug.

● Alpine wet places along forest margins. Taiwan.

With its thin, smooth, glabrous lemmas and webbed callus, *Poa takasagomontana* stands out, but seems closely related to *P. khasiana*. However, it has longer anthers than most species in this group.

59. Poa tenuicula Ohwi, Repert. Spec. Nov. Regni Veg. 36: 42. 1934.

细杆早熟禾 xi gan zao shu he

Perennials, densely tufted; shoots extra- and intravaginal. Culms ascending to erect, 19–40 cm tall, ca. 1 mm in diam., smooth, nodes 2–4, none or 1 exserted, uppermost node to 1/3–

1/2 way up culm. Leaf sheaths weakly keeled, smooth, 5–8 cm, 2–4 × as long as blade, uppermost closed for 2/5–3/5 of length; blade flat or folded, thin, 1.5–8 cm × 2–2.8 mm, apex prow-tipped, abaxially smooth, often ribbed, adaxially finely scabrid, margins smooth or scabrid, of tillers 1–3.5 cm; ligule 1–3 mm, abaxially smooth, apex obtuse to acute, of tiller and lower leaves 0.2–0.5 mm, abaxially scabrid, collar smooth. Panicle loosely contracted, 5–8 cm, longest internodes 1.5–2 cm; branches ascending, 1 or 2 per node, proximally rounded, smooth, distally scabrid angled, longest 2.5–4 cm with 6–12 spikelets in distal 1/2. Spikelets lanceolate, slightly purple tinged, 4–6.5 mm, florets 2–4; vivipary absent; rachilla internodes to 1 mm, pilulose to short villous or sparsely scabrid; glumes papery, strongly keeled, keel apically sparsely scabrid, sides punctate-papillate, somewhat glaucous, apex sharply acute to acuminate, lower glume 3–4.1 mm, 1(–3)-veined, upper glume 4–4.7 mm, prominently 3-veined, lateral veins to 2/3 as long; lemmas 3.5–4.7 mm, apex acute to acuminate, margins purple, keel villous for 3/4 of length, marginal veins for 2/3, and sometimes intermediate veins to 1/2 length, areas between veins proximally densely pilulose to shortly villous, distally minutely bumpy; callus densely webbed; palea densely pilulose to villous between keels, keels scabrid, medially densely pilulose to villous. Anthers (1–)1.2–1.5 mm. Fl. and fr. Jun–Aug.

● Alpine grassy slopes. Taiwan.

Poa tenuicula differs from *P. nankoensis* in being taller and having panicles longer, spikelets pubescent between lemma veins and on rachilla, and anthers longer.

60. Poa hirtiglumis J. D. Hooker, Fl. Brit. India 7: 343. 1896 ["1897"].

毛花早熟禾 mao hua zao shu he

Annuals or short-lived perennials, shoots extra- and intravaginal. Culms tufted, several, slightly arching, erect or geniculate at base, 4–35(–44) cm, 1–1.6 mm in diam., smooth, glabrous, nodes 1–3, none or 1 exserted, uppermost to 1/4 way up culm. Leaf sheaths thin, loose, soon withering, smooth, glabrous, 3–9 cm, ca. 2 × as long as blade, uppermost closed for 1/5–1/4 of length; blade flat or folded, thin, 2–8 cm × 1.5–3(–4) mm, surfaces smooth, margins and keel smooth to scabrid, apex acutely prow-tipped; ligules milky, ovate, 2–5 mm, abaxially smooth, glabrous, apex obtuse, entire to lacerate, collar smooth, glabrous. Panicle open, exserted, 3–7(–9) × 1.5–4 cm, longest internode 1–2 cm; branches spreading to reflexed, flexuous, often arched, 1 or 2(–3) per node, proximally sparsely scabrid, distally scabrid on and between angles, longest 1.5–4.5 cm with 9–25 spikelets in distal 1/2. Spikelets obovate, usually purple tinged, 2.5–4.5 mm, florets 2 or 3; vivipary absent; rachilla internodes 0.5–0.7(–1) mm, smooth or sparsely scabrid or pilulose; glumes lanceolate, subequal, upper often as long as or slightly longer than lower lemma, keel scabrid, surface smooth to distally sparsely scabrid, lower glume (1.5–)2.2–4 mm, 1- or 3-veined, upper glume (2–)2.3–5(–6) mm, 3-veined; lemmas broadly oblong, 2–4(–5) mm, intermediate veins distinct, keel shortly villous for 1/2–4/5 of length, marginal veins for 1/3–2/3, surfaces pilulose, sparsely scabrid near obtuse apex; callus glabrous or sparsely webbed; palea pilulose or minutely bumpy between keels, keels distally scabrid, pilulose for most of length. Anthers 0.6–1 mm. Fl. and fr. May–Aug.

Subalpine and alpine meadows; 2700–4900(–5500) m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Assam, Sikkim), Nepal].

This species appears to be a derivative of *Poa stapfiana*, which is taller with longer lemmas and relatively shorter glumes.

1a. Lemmas between veins pilulose; palea keels pilulose over most of the length ..... 60a. var. *hirtiglumis*

1b. Lemmas between veins glabrous or sparsely pilulose only near the base; palea keels scabrid only ..... 60b. var. *nimuana*

60a. Poa hirtiglumis var. **hirtiglumis**

毛花早熟禾(原变种) mao hua zao shu he (yuan bian zhong)

Culms 1–1.6 mm in diam., nodes 1–2. Leaf sheaths smooth, glabrous, uppermost closed for 1/5–1/4 of length; ligule abaxially smooth, glabrous. Longest panicle branches 1.5–4.5 cm with 9–25 spikelets in distal 1/2. Spikelets 2.5–4.5 mm; rachilla internodes smooth, pilulose; upper glume 2.3–4 mm; lemmas 2–3.3 mm, keel densely villous for 4/5 of length, marginal veins for 2/3, surfaces pilulose, sparsely scabrid near obtuse apex; palea pilulose between keels, keels pilulose for most of length, distally scabrid. Fl. and fr. May–Aug.

Subalpine and alpine meadows; 2700–4900(–5500) m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, India (Assam, Sikkim), Nepal].

Poa hirtiglumis var. *hirtiglumis* is usually well marked by the possession of spikelets with glumes subequal to each other and subequal to or slightly longer than the first lemmas, the lemmas commonly pilose between the veins, and the paleas pilose for much of their length. Plants from the E Xizang-Qinghai Plateau sometimes lack the hairs between the lemma veins and on the palea keels.

60b. Poa hirtiglumis var. **nimuana** (C. Ling) Soreng & G. Zhu, **comb. et stat. nov.**

尼木早熟禾 ni mu zao shu he

Basionym: *Poa nimuana* C. Ling, Acta Phytotax. Sin. 17(1): 103. 1979; *P. macrolepis* Keng ex C. Ling; *P. zhongbaensis* C. Ling.

Culms 0.6–1.5 mm in diam., 1–3 nodes. Lower leaf sheaths finely scabrid, uppermost closed for 1/4–2/5 of length; ligule smooth to sparsely scabrid. Longest panicle branches 2–7 cm with up to 5–11 spikelets in distal 1/2–2/3. Spikelets 3–5(–6) mm; rachilla internodes smooth or sparsely scabrid; upper glume (2–)3–5(–6) mm; lemmas (2.5–)3–4(–5) mm, keel villous for 1/2 of length, marginal veins to 1/3, surfaces scabrid or sparsely pilulose near base; palea minutely bumpy between keels, keels scabrid for 1/4–2/3 of length, glabrous. Fl. and fr. Jun–Aug.

● Grassy places on mountain tops, riverside fields, roadsides, frigid alpine crevices, frost scars, marshy ground; 3000–5500 m. Gansu, Qinghai, Sichuan, Xizang.

Poa hirtiglumis var. *nimuana* differs from var. *hirtiglumis* in the scabrid palea keels and glabrous and more scabrid lemma sides. *Poa macrolepis* is a taller form with larger spikelets, but there is nothing else

to distinguish it from *P. hirtiglumis*. *Poa zhongbaensis* is a shorter, smaller-spikeleted form that may be better placed in *P. szechuensis* var. *rossbergiana*.

61. Poa sunbisinii Soreng & G. Zhu, **sp. nov.**

孙必兴早熟禾 sun bi xing zao shu he

Type: China. Yunnan: Fugong Xian, above Bijiang ca. 9 km by road, W slope of Bilou Mts. (divide between Nu Jiang and Lancang Jiang drainages), 26°35'N, 98°59'E, opening in *Abies-Tsuga* forest–*Fargesia* thicket contact zone, 2900 m, 8 Sep 1997, *R. J. Soreng, P. M. Peterson & Sun Hang 5222* (holotype, US; isotypes, KUN, PE, others to be distributed).

Haec species a P. eleanorae Bor *foliorum superiorum vaginarum marginibus per dimididum longitudinis connatis, lemmate glabro atque glumis 1.5 mm brevioribus quam lemmatibus; a* P. gammieana J. D. Hooker *inflorescentiae ramis scabris, lemmatis paleaeque carinis glabris atque ligula plerumque breviore, 1–2(–5) mm; a* P. dzongicola Noltie *callo dorso lanuginoso atque ligula breviore differt*.

Annuals or short-lived perennials. Major roots capillary to slender, 0.1–0.2 mm. Culms tufted, erect or slightly decumbent at base, 25–80 cm tall, 1–3.5 mm in diam., smooth or sparsely scabrid below nodes, nodes 2–4, 1 or 2 exserted, uppermost ca. 1/2 way up culm. Leaf sheaths smooth, glabrous, 6–15 cm, 0.5–1 × as long as blade, uppermost closed for ca. 1/2 of length; blades flat or folded, moderately thin, uppermost 8–30 cm × 1.5–5 mm, abaxial surface and margins smooth or sparsely scabrid, adaxially scabrid, keel and 4–10 primary veins abaxially pronounced, apex slender prow-tipped; ligule 1–2(–5) mm, apex obtuse, abaxially scabrid, collar glabrous. Panicle open, eventually exserted, 8–25 cm, longest internode ca. 4 cm; branches initially ascending and flexuous, eventually spreading or reflexed and lax, mostly 2 per node, scabrid all round, angled in part, longest 8–11 cm with 5–13 spikelets loosely arranged in distal 1/2. Spikelets lanceolate, purple tinged, (4–)5–7 mm, florets 2 or 3; vivipary absent; rachilla internodes ca. 1 mm, usually densely slender-scabrid to hispidulous; glumes thinner-textured than the lemmas, frequently purple on margins or all over, keel scabrid, surface uniformly minutely punctate, apex sharply acute, lower glume narrowly lanceolate, 3.3–4.6 mm, 1- or 3-veined, upper glume lanceolate 3.8–5 mm, 3-veined; lemmas 3.7–5.2 mm, moderately firm, apex sharply acute, margins very narrowly membranous, with a narrow purple band, keel and marginal veins scabrid, intermediate veins faint to moderately prominent, areas between veins usually densely scabrid over most of the surface; callus of proximal florets sparsely webbed, hairs short, callus of distal florets glabrous; palea scabrid throughout. Anthers 0.7–1.6 mm. Fl. and fr. Aug.

● Openings in upper forested and subalpine slopes, 2900–3900. NW Yunnan.

Poa sunbisinii differs from *P. eleanorae* by having more closed leaf sheaths, a lack of hairs on the lemma keels, and shorter spikelets with glumes shorter than the lemmas by (on average) ca. 1.5 mm. It has a long palea as in *P. gammieana*, but that species has smooth inflorescence branches, pilose lemma and palea keels, and longer ligules. *Poa dzongicola* has glabrous calluses and longer ligules.

62. Poa dzongicola Noltie, Edinburgh J. Bot. 57: 283. 2000.

雅江早熟禾 ya jiang zao shu he

Poa yakiangensis L. Liu.

Annuals or short-lived perennials, tufted to loosely tufted. Culms ascending to erect, (13–)25–76 cm, smooth or sparsely scabrid below nodes, nodes 3 or 4, 0–2 exserted. Leaf sheaths scabrid, 6–14 cm, slightly shorter than to 2 × as long as blade, uppermost closed for 1/4–1/2 of length; blade flat, thin to moderately thin, 5–22 cm × 2–4(–5) mm, surfaces and margins smooth to sparsely scabrid; ligules 2.5–6.5 mm, abaxially smooth or sparsely scabrid, apex truncate to acute, collars, smooth to scabrid, glabrous. Panicle open, narrowly pyramidal, 6.5–18 × 3–6 cm, longest internodes 2–6 cm; branches spreading to reflexed, flexuose, sinuous to twisted to arched, 1–3 per node, scabrid throughout, distally angled, longest 2–8 cm with 5–15(–28) spikelets in distal 1/2–2/3. Spikelets lanceolate, purple tinged, 4–7 mm, florets 2–4(–6); vivipary absent; rachilla internodes 0.8–0.9 mm, smooth to densely scabrid; glumes subequal to unequal, narrow, keel, veins and distal surface sparsely scabrid, lower glume 2.2–4 mm, 1- or 3-veined, upper glume 2.8–4.5 mm; lemmas lanceolate, 3.1–4.4 mm, glabrous throughout, apex acute to acuminate, keel and veins scabrid, intermediate veins prominent, areas between veins scabrid throughout, or partly minutely bumpy; callus glabrous; palea minutely bumpy, sometimes scabrid between keels, keels scabrid. Anthers 0.5–0.9(–1.5) mm. Fl. and fr. Jul–Sep.

Coniferous forests openings, low alpine moist sometimes rocky thickets, disturbed ground; 3700–4600 m. SW Sichuan, SE Xizang [Bhutan, India (Sikkim)].

Poa dzongicola differs from *P. szechuensis* s.l. by the longer ligules, longer, acute glumes and lemmas, and longer anthers. The type of *P. dzongicola* differs from *P. yakiangensis* only by the scabrid sheaths and slightly longer glumes.

63. Poa szechuensis Rendle, J. Bot. 46: 173. 1908.

四川早熟禾 si chuan zao shu he

Annuals or short-lived perennials, tufted. Culms 1–60 cm tall, 0.2–1.5 mm in diam., smooth or scabrid below nodes, glabrous, nodes 1–5, 0–3 exserted. Leaf sheaths smooth or scabrid, glabrous, 1–15 cm, slightly shorter than to 2 × as long as blade, uppermost closed for 1/3–1/2 of length; blade flat or infrequently folded, thin, 1–8 cm × 0.5–3(–4) mm, scabrid throughout, apex slender prow-tipped, of tillers 1–15 cm; ligule 0.5–6 mm, abaxially smooth or scabrid, apex truncate to acute, sometimes minutely dentate, collar glabrous. Panicle open, lax, ovoid to pyramidal, included to slightly exserted, (1–)2–20 cm, longest internode (0.5–)1–5 cm; branches ascending to spreading or reflexed, flexuous, 1 or 2(–3) per node, capillary, proximally smooth or scabrid angled, distally scabrid, longest 1–8 cm with 2–20 spikelets in distal 1/4–1/2. Spikelets ovate, green or purple tinged, 2.3–4 mm, florets 2–4(–5); vivipary absent; rachilla internodes 0.5–0.7 mm, smooth or scabrid, glabrous; glumes unequal to subequal, keel scabrid, surface distally scabrid, lower glume 1–2(–2.5) mm, 1(or 3)-veined, upper glume 1.5–2.5(–3) mm; lemmas elliptic, 1.5–2.6(–3.5) mm, apex obtuse to acute, keel scabrid only or pilulose to shortly villous for 1/2 of length, marginal veins for 1/4, veins distally scabrid, in-

termediate veins prominent, areas between veins minutely bumpy for most of length, sparsely scabrid at least near apex, glabrous; callus glabrous or scantily webbed; palea smooth or minutely bumpy, and sometimes scabrid between keels, keels densely scabrid. Anthers 0.2–0.5 mm. Fl. and fr. May–Sep.

Grassy places among thickets, along forest margins on slopes, natural and disturbed places; (2000–)4700 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].

Poa szechuensis, as treated here, includes a highly variable (phenotypically plastic) and strongly inbreeding complex of three varieties. The lemmas of the types of *P. szechuensis*, *P. chumbiensis*, and *P. tibeticola* are glabrous, but there are many similar specimens with 1 to several hairs on some lemmas in some spikelets, and we therefore feel justified in applying a broader species concept. All have lemmas mostly 2–2.6 mm and anthers 0.2–0.5 mm.

1a. Lemmas glabrous throughout; callus glabrous ..... 63c. var. *szechuensis*
1b. Lemmas pilulose to shortly villous on keel; callus glabrous or with a few dorsal hairs.
2a. Culms not arching, 10–30 cm tall; callus of lowest florets with or without a few short hairs; plants of mid elevations ..... 63a. var. *debilior*
2b. Culms arching, 1.5–10 cm tall; callus glabrous; alpine plants ..... 63b. var. *rossbergiana*

63a. Poa szechuensis var. **debilior** (Hitchcock) Soreng & G. Zhu, **comb. et stat. nov.**

垂枝早熟禾 chui zhi zao shu he

Basionym: *Poa debilior* Hitchcock, Proc. Biol. Soc. Washington 43: 93. 1930; *P. declinata* Keng ex L. Liu.

Annuals or short-lived perennials, slender tufted. Culms 20–60 cm tall, nodes 3–5. Leaf sheaths smooth or scabrid, uppermost 4–15 cm; ligule (0.5–)1.4–5 mm. Panicle 7–20 cm, longest internode 2–5 cm; longest branches 2–8 cm. Florets 2–3(–5); lemma keel and marginal veins usually partly hairy (at least in lower florets), apex acute; callus glabrous or scantily webbed (at least in basal florets). Fl. and fr. Jun–Aug.

● Shady moist places in ravines, streamsides on mountain slopes, thickets, subalpine meadows, grassy slopes; (2000–)4500 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, NW Sichuan, Yunnan.

Plants included here have at least some hairs on the lemma keels and are generally spindly in habit. The type of *Poa declinata* is tentatively placed here. It has somewhat longer-than-average lemmas with denser pubescence on the keels, more crowded spikelets, slightly thicker roots, and longer anthers. It seems to be transitional between *P. szechuensis* and *P. nepalensis* or *P. khasiana*.

63b. Poa szechuensis var. **rossbergiana** (K. S. Hao) Soreng & G. Zhu, **comb. et stat. nov.**

罗氏早熟禾 luo shi zao shu he

Basionym: *Poa rossbergiana* K. S. Hao, Bot. Jahrb. Syst. 68: 581. 1938; *P. rohmooana* Noltie.

Annuals, densely tufted. Culms 1–10 cm tall, nodes 1 or 2. Leaf sheaths smooth, uppermost 1–3 cm; ligule 1–2 mm. Panicle (1–)2–4 cm, longest internodes 0.5–1.5 cm; longest branches 1–2 cm. Florets 3 or 4; glumes ovate to lanceolate; lemma keel and marginal veins partly hairy; callus glabrous. Fl. and fr. Jun–Sep.

Alpine grassy slopes, in and around *Kobresia* mats, moraine gravels, silts; 4200–4700 m. Qinghai, Xizang [India (Sikkim)].

Included here are densely tufted, dwarf, high-alpine forms with sparsely pubescent lemmas. This race is similar in form to *Poa pseudoabbreviata* Roshevitz, but that species is perennial and occurs in arctic Russia and North America. The other varieties comprise lower-elevation and some subalpine plants that are taller, with leafy culms.

63c. Poa szechuensis var. **szechuensis**

四川早熟禾(原变种) si chuan zao shu he (yuan bian zhong)

Poa gracillima Rendle, J. Linn. Soc., Bot. 36: 424. 1904, not Vasey (1893); *P. chumbiensis* Noltie; *P. omeiensis* Rendle, nom. illeg. superfl.; *P. tibeticola* Bor.

Annuals. Culms 10–40 cm tall, nodes 2–4. Leaf sheaths smooth or scabrid, uppermost 2–15 cm; ligule (0.7–)1–4.3(–6) mm. Panicle 3.5–20 cm, longest internodes 1–5 cm. Florets 2 or 3; glumes lanceolate or elliptic to lanceolate; lemmas glabrous throughout; callus glabrous. Fl. and fr. May–Aug.

Mountainous areas, sparse forests, thickets, alpine grassy places; (3000–)4600–4700 m. Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].

In var. *szechuensis* the lemmas are completely glabrous. There is a continuum of specimens between *Poa chumbiensis*, a tall and broad-leaved form, *P. tibeticola*, an intermediate form, and the type of *P. szechuensis*, a spindly little plant.

5. Poa subg. **Stenopoa** (Dumortier) Soreng & L. J. Gillespie, Aliso, in press, 2006.

林地亚属 lin di ya shu

Zhu Guanghua (朱光华), Liu Liang (刘亮); Marina V. Olonova

Poa sect. *Stenopoa* Dumortier.

Perennials, tufted, some with thin, short rhizomes, sometimes stoloniferous (*P.* sect. *Pandemos*) or strongly rhizomatous (*P.* sect. *Tichopoa*). Shoots extra- and intravaginal. Culms usually rounded, sometimes strongly compressed (*P.* sect. *Tichopoa*), smooth or scabrid. Leaf sheaths mostly closed for 1/20–1/6(–1/4 in *P.* sect. *Pandemos*) of length; leaf blades flat, thin, soft to folded or inrolled, firm and hard. Panicle lax to very dense, and spiciform, branches with dense short prickles on angles. Spikelets 3–5(–8) mm, florets 1–3(–8); vivipary absent; rachilla smooth, warty or pubescent; both glumes 3-veined; lemma soft, usually pubescent at least on keel and marginal veins, sometimes also lower part between veins, rarely entirely glabrous; veins slightly raised; callus webbed to glabrous or with a short crown of hairs; palea usually smooth, sometimes pubescent between keels, keels with short prickles, very rarely proximally ciliate. Anthers (1–)1.2–2 mm.

Flora of China 22: 257–309. 2006.

About 40 species: Asia, Europe, North America, a few species in South America; 18 species (one endemic, at least one introduced) in China.

The Chinese species belong to four sections: *Poa* sect. *Secundae* V. L. Marsh ex Soreng (species no. 64); *P.* sect. *Pandemos* Ascherson & Graebner (species no. 65); *P.* sect. *Tichopoa* Ascherson & Graebner (species no. 66); and *P.* sect. *Stenopoa* Dumortier (species nos. 67–81). The other two sections in the subgenus, namely *P.* sect. *Abbreviatae* Nannfeldt ex Tzvelev and *P.* sect. *Oreinos* Ascherson & Graebner, do not occur in China.

Many species in *Poa* sect. *Stenopoa* hybridize easily, and have formed a series of morphologically and genetically distinct populations. These are supposed to have been stabilized by apomixis. The situation is made more complex by *P. glauca*, *P. nemoralis*, and *P. palustris*, which are represented by many cytological races of vague taxonomic status. These have hybridized with other species of *P.* sect. *Stenopoa* to form agamic complexes, which are supposed to have arisen quite long ago, perhaps during the Pleistocene (Tzvelev, Fl. European Part USSR 1: 117–368. 1974). Four of these have differentiated sufficiently to be treated as the distinct hybridogenous species *P. albertii*, *P. araratica*, *P. lapponica*, and *P. urssulensis*. Some polytypic species are also accepted. Their subspecies are geographically separated; some may be of hybrid origin, but are close to one parent as result of introgression.

1a. Sheaths of upper culm leaves closed for 1/4(–1/3) of length; lower glume 1-veined, often sickle-shaped; lemma with or without a bronze-yellowish band below apex, lateral veins faint to prominent; vegetative shoots extravaginal and/or intravaginal; plants loosely tufted, stoloniferous (sometimes with short lateral shoots with small beadlike swellings); sheaths compressed, usually densely retrorsely scabrid, collars not ciliate; blade papery, flat, apex simple acuminate (*P.* sect. *Pandemos*) ..... 65. *P. trivialis*

1b. Sheaths of upper culm leaves closed for 1/20–1/5(–1/4) of length; lower glumes (1 or)3-veined; lemma commonly with a bronze-yellowish band below apex, lateral veins mostly faint; vegetative shoots all or mostly extravaginal (rarely mostly intravaginal); plants rarely with well-developed rhizomes (but if rhizomatous then culms and nodes strongly compressed: *P.* sect. *Tichopoa*).

2a. Plants with well-developed rhizomes; culms isolated, nodes and internodes strongly compressed; callus usually webbed (*P.* sect. *Tichopoa*) ..... 66. *P. compressa*

2b. Plants without rhizomes (or at most with poorly developed lateral shoots, or short upward-directed bladeless shoots, or somewhat stoloniferous in riparian forms of *Poa palustris*); culms usually closely clustered, nodes and internodes not or only slightly compressed, but if compressed then plants not rhizomatous; callus webbed or not.

3a. Lemmas weakly keeled, glabrous; spikelets 2.5 or more × as long as wide; callus glabrous; panicle contracted, linear; spikelets not viviparous (*P.* sect. *Secundae*) ..... 64. *P. secunda*

3b. Lemmas strongly keeled, pubescent (infrequently glabrous); spikelets commonly 1.5–2 × as long as wide; callus with a dorsal web or glabrous; panicle open or contracted, linear to pyramidal; spikelets sometimes viviparous (*P.* sect. *Stenopoa*).

4a. Panicle with viviparous spikelets ..... 80. *P. albertii*

4b. Panicle without viviparous spikelets.

5a. Plants up to 25(–40) cm of alpine and subalpine belt (if from lower elevation steppe see 77. *P. versicolor*); upper node usually not exposed.

6a. Plants 20–30 cm, subalpine (to low alpine).

7a. Ligule 3–8 mm, 2–4 × as long as blade width, lemma glabrous between veins ..... 76. *P. hylobates*

7b. Ligule 0.7–3 mm (if longer, lemma pubescent between veins), usually equal to blade width ..... 78. *P. araratica*

6b. Plants 5–15(–25) cm, alpine, if taller, then spikelets 5–8 mm, leaf blade green, soft.

8a. Panicle contracted, densely ovoid to spiciform, longest branches 1(–1.5) cm, spikelets crowded, 3–4(–5) mm; uppermost internode not more than 1 mm wide; leaf blade firm in age, narrow, folded or inrolled; plant pale or grayish yellow, glumes sometimes with purplish bands.

9a. Densely tufted, shoots mostly intravaginal; leaf blades inrolled, 0.5–1 mm wide ..... 79. *P. attenuata*

9b. Moderately tufted, shoots mostly extravaginal; leaf blades folded, 1–1.5 mm wide ..... 80. *P. albertii*

8b. Panicle elongated, sometimes quite open, longest branches 1.5–2 cm, spikelets moderately crowded to sparse, (3.8–)4–5.5(–6) mm; uppermost internode frequently up to 1.5–2 mm wide; leaf blade withering, folded or flat; plant glaucous, glumes and vegetative parts frequently strongly purplish.

10a. Callus glabrous (rarely with a few short hairs) ..... 80. *P. albertii*

10b. Callus webbed ..... 81. *P. glauca*

5b. Plants (25–)30–100 cm, sometimes alpine; uppermost node usually exposed.

11a. Mesomorphic plants; culm with uppermost node more than 1/3(–1/2) way up, leaf blade soft, flat, 1–5 mm wide, usually longer than sheath; ligule up to 1.5 × blade width; panicle open.

12a. Ligule 2–3 mm, callus of lemma webbed ..... 70. *P. palustris*

12b. Ligule of uppermost leaves 0.2–1.5 mm, usually less than blade width (if C Asia, see also 75. *P. nemoraliformis*).

13a. Spikelets 4–8 mm, blades (2–)3–8 mm, plants with bluish bloom, scabrid near nodes ..... 69. *P. sichotensis*
13b. Spikelets up to 4 mm; blades 1–3 mm, plants green, smooth near nodes.
14a. Rachilla pubescent.
15a. Ligule up to 1 mm; palea with prickles on keels and glabrous between them ..... 67. *P. nemoralis*
15b. Ligule 1–2 mm; if less than 1 mm, then palea with short hairs on the lower part of keels and pubescent between them ..... 68. *P. lapponica*
14b. Rachilla glabrous.
16a. Culm with uppermost node usually at or above middle, culm usually smooth; rachilla warty, never pilose (infrequently sparsely hispidulous) ..... 68. *P. lapponica*
16b. Culm with uppermost node 1/3–1/2 way up; culm usually scabrid; rachilla warty or pilose.
17a. Plants firm and robust; leaf blade 1.5–2.5(–3) mm, firm; leaf sheath usually longer than blade; low-elevation grasslands of central and eastern provinces ..... 72. *P. sphondylodes*
17b. Plants soft and slender; leaf blade 1–1.5(–2) mm, thin; leaf sheath usually shorter than blade; mountain forest margins and high-elevation grass slopes of central and western provinces ..... 73. *P. faberi*

11b. Xeromorphic plants; culm with uppermost node up to 1/3 way up, if up to 1/2 way up and/or plant mesomorphic, then ligule more than 1.5 × blade width; leaf blade firm or soft, folded or flat, 0.5–2.5(–3.5) mm broad, much shorter to infrequently longer than sheath.
18a. Plants with 2(or 3) nodes above 1 cm at the base; leaf blade firm or soft and withering in age; uppermost blade usually very narrow and folded, short, usually less than 1/2 as long as sheath to subequal; panicle open to densely spiciform.
19a. Panicle dense, contracted to spiciform, branches erect, the longest ones 1/5–1/3(–2/5) as long as panicle; uppermost node usually below 1/6 way up culm ..... 77. *P. versicolor*
19b. Panicle usually open, especially while flowering, longest branches 1/3–1/2 as long as panicle; uppermost node usually ca. 1/6 way up culm.
20a. Plants robust, up to 100(–120) cm; uppermost internode 30–80 cm, up to 2.5 mm in diam. in fruiting material; plants of E and NE China ..... 71. *P. alta*
20b. Plants slender, 30–45(–55) cm, uppermost internode up to 35 cm long, up to 1.5 mm in diam.
21a. Densely to sparsely tufted plants with few leaves; spikelets up to 5 mm; ligule (1–)2–7 mm; plants widespread ..... 77. *P. versicolor*
21b. Loosely tufted, leafy plants; spikelets up to 6(–6.5) mm; ligule up to 1(–1.5) mm; plants of NW mountains ..... 75. *P. nemoraliformis*
18b. Plants with 3–5 nodes above 1 cm at the base (if 2, then leaves long, soft, and flat), leaf blade soft and withering with age, never firm, uppermost blades frequently flat, usually more than 1/2 as long as sheath; panicle open or contracted (if contracted, then with blades soft and withering in age), with long erect branches, 1/2 as long as panicle, never dense and spiciform.
22a. Plants with 2 nodes; panicle with scattered spikelets; spikelets 4.5–5.5(–8) mm; uppermost internode frequently thick, up to 1.5–2 mm, but not elongated; plant glaucous, frequently dark purple; plants of alpine and subalpine belts ..... go to lead 7
22b. Plants with 3–5 nodes; panicle usually with crowded spikelets; spikelets 3–5.5(–6) mm; uppermost internode usually 1–1.5 mm (if 1.5–2.5(–3) mm then very elongated); plants green or tinged purple, of hills to lower alpine belt.
23a. Ligule up to 2 mm.
24a. Ligule up to 1(–1.5) mm ..... 71. *P. alta*
24b. Ligule 1–2 mm.
25a. Panicle elongated-pyramidal with quite dense to scattered spikelets 3–4 mm; plants of lower mountain belt in N China ..... 74. *P. urssulensis*
25b. Panicle with long erect branches and scattered spikelets (3.5–)5–7 mm; plants of high mountain belt in W and NW China ..... 75. *P. nemoraliformis*

23b. Ligule 2–8 mm.
26a. Callus glabrous (sometimes with a few short hairs), panicle usually open ..... 76. *P. hylobates*
26b. Callus usually webbed; panicle usually loosely contracted.
27a. Plants firm and robust; leaf blade 1.5–2.5(–3) mm, firm; leaf sheath usually longer than blade; low-elevation grasslands of C and E provinces ..... 72. *P. sphondylodes*
27b. Plants soft, slender; leaf blade 1–1.5(–2) mm, thin; leaf sheath usually shorter than blade; mountain forest margins and high-elevation grass slopes of C and W provinces ..... 73. *P. faberi*

64. Poa secunda J. Presl subsp. **juncifolia** (Scribner) Soreng, Phytologia 71: 401. 1992 ["1991"].

巨早熟禾 ju zao shu he

Poa juncifolia Scribner, Bull. Div. Agrostol., U.S.D.A. 11: 52. 1898; *P. ampla* Merrill.

Plants bluish. Perennials, densely tufted, sterile shoots intra- and extravaginal. Culms erect, 40–120 cm tall. Leaf sheath smooth or scabrid, uppermost closed for 1/15–1/5 of length; blade flat or folded, papery to thickly papery, up to 25 cm × 1–3(–4) mm, adaxially scabrid; ligule 0.5–3 mm, abaxially scabrid, truncate to acute, of tillers all truncate, collar glabrous. Panicle narrow, dense, 10–15 × 1–3 cm; branches steeply ascending, scabrid angled, with spikelets from the base. Spikelets narrowly lanceolate, weakly compressed, 8–10 mm, florets 4–7; vivipary absent; glumes broad, subequal, lower glume 3–3.5 mm, upper glume 4–4.5 mm, nearly as long as lower lemma; lemmas weakly keeled, 4–6 mm, apex obtuse to acute, glabrous, abaxially scabrid; callus glabrous; palea keels scabrid. Anthers 1.5–3 mm. Fl. and fr. May–Jul. 2*n* = 62, 63, 64, 65, 68, 70, 71, 97.

Introduced in China [India, Pakistan; SW Asia (Iran), Australia; native to North and South America].

Poa secunda subsp. *juncifolia* was introduced to China for forage and rangeland stabilization under the name *P. ampla*. A few vouchers exist from experimental stations, but whether or not it occurs outside of cultivation in China was not verified. *Poa secunda* subsp. *secunda* has acute to acuminate ligules, softer foliage, and crisply puberulent lemma surfaces.

65. Poa trivialis Linnaeus, Sp. Pl. 1: 67. 1753.

普通早熟禾 pu tong zao shu he

Perennials, tufted, stoloniferous, shoots with or without beadlike swellings. Culms decumbent to geniculate, 20–100 cm tall, 1–2 mm in diam., nodes 3 or 4, scabrid below panicle and nodes. Lower leaf sheaths usually densely retrorsely scabrid, 8–15 cm, subequal to blade, uppermost closed for ca. 1/4 of length; blade flat, papery, 8–20 cm × 2–5 mm, surfaces scabrid, apex acuminate; ligule 3.5–10 mm, abaxially scabrid, acute to acuminate, collar smooth or scabrid, glabrous. Panicle oblong to pyramidal, 9–20 × 2–4 cm; branches obliquely ascending to spreading, 4–5 per node, densely scabrid throughout, longest ca. 4 cm with many spikelets crowded in distal 1/2, pedicels very short. Spikelets 2.5–3.5(–4) mm, florets 2 or 3; vivipary absent; glumes scabrid on keel, lower glume narrow, often sickle-shaped, 1.5–2 mm, 1-veined, upper glume 2.2–3 mm, 3-veined; lemmas ca. 2.5 mm, abaxial surface slightly arched, keel shortly villous for ca. 1/2 of length, marginal veins glabrous or pilulose to short-villous in lower 1/3, intermediate veins prominent, areas between veins minutely bumpy, glabrous; callus webbed, hairs long; palea subequal to lemma, minutely bumpy between keels, glabrous, keels minutely scabrid or bumpy. Anthers ca. 1.5 mm. Fl. and fr. May–Jul.

Moist places, grassy places on slopes; 1000–3500 m. Hebei, Jiangsu, Jiangxi, Nei Mongol, N Sichuan, Xinjiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in Africa, Australia, New Zealand, and North and South America].

Poa trivialis is sometimes seeded as a pasture and lawn species. It establishes well in cool, moist, shady sites, including gardens, trails, adjacent woods, and disturbed ground. It is probably introduced in China. Two races (or species) are usually recognized, with subsp. *trivialis* far more widely dispersed beyond the native European–SW Asian range of the species.

1a. Lemma marginal veins glabrous or pilulose for up to 1/4 of length; stolons without beadlike swellings ..... 65a. subsp. *trivialis*
1b. Lemma marginal veins pilulose to shortly villous for up to 1/3 of length; stolons with beadlike swellings ..... 65b. subsp. *sylvicola*

65a. Poa trivialis subsp. **trivialis**

普通早熟禾(原亚种) pu tong zao shu he (yuan ya zhong)

Horizontal shoots without beadlike swellings. Lemma with marginal veins glabrous or pilulose for up to 1/4 of length. Fl. and fr. May–Jul. 2*n* = 14, 28.

Moist places, grassy places on slopes. Hebei, Jiangsu, Jiangxi, Nei Mongol, Xinjiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe; introduced in Africa, Australia, New Zealand, and North and South America].

This subspecies is commonly confused with *Poa khasiana*, a species with shorter ligules, often hairy collar margins, and scabrid palea keels.

65b. Poa trivialis subsp. **sylvicola** (Gussoni) H. Lindberg, Öfvers. Finska Vetensk.-Soc. Förh. 48(13): 9. 1906.

欧早熟禾 ou zao shu he

Poa sylvicola Gussoni, Enum. Pl. Inarim. 371. 1854; *P. trivialis* var. *sylvicola* (Gussoni) Hackel.

Horizontal shoots with beadlike swellings. Lemma with marginal veins pilulose to short-villous for up to 1/3 of length. Fl. and fr. Jun–Jul. 2*n* = 14.

Meadows along forest margins on slopes, fields and grassy places in low mountainous areas; 1000–3500 m. N Sichuan, Xinjiang [Kyrgyzstan, W Russia, Tajikistan, Turkmenistan; N Africa, SW Asia, Europe].

This subspecies is native to W Eurasia. We have not seen vouchers from China.

66. Poa compressa Linnaeus, Sp. Pl. 1: 69. 1753.

加拿大早熟禾 jia na da zao shu he

Perennials, strongly rhizomatous, shoots extravaginal. Culms wiry, compressed, erect, often geniculate at base, simple or sparsely tufted, 15–50(–60) cm tall, 1.5–2 mm wide, nodes compressed, 3–6, 2–5 exserted. Leaf sheaths compressed to keeled, smooth, uppermost closed for 1/10–1/5 of length; blades flat, 5–12 cm × 1.4–4 mm, surfaces smooth or adaxially scabrid; ligule 1–3 mm, abaxially scabrid, truncate to obtuse. Panicle contracted or slightly open, erect, narrow, 4–11 × 0.5–1(–3) cm; branches erect or steeply ascending, or eventually spreading, 1–3 per node, densely scabrid angled from base, longest 2–4 cm with spikelets moderately crowded from the base or in distal 2/3. Spikelets ovate-lanceolate, 3.5–5 mm, florets 2–4; glumes lanceolate, nearly equal, 2–3 mm, 3-veined, apex acute or thinly mucronate, keel scabrid, rachilla smooth or minutely bumpy; lemmas oblong, 2.3–3.5 mm, apex obtuse, keel shortly villous for 2/3 of length, marginal veins to 1/3, intermediate veins faint, areas between veins glabrous; callus sparsely webbed or glabrous; palea keels scabrid. Anthers 1.3–1.8 mm. Fl. and fr. Jun–Aug. 2*n* = 14, 35, 42, 45, 49, 50, 56, 59.

Moist grassy places in forests. Hebei, Jiangxi, Qinghai, Shandong, Taiwan, Xinjiang, Yunnan [India (Himachal Pradesh), Japan, Kazakhstan, Russia (Far East, Siberia); Africa, SW Asia, Australia, Europe, North and South America, Pacific Islands].

Poa compressa is native to W Eurasia. It is infrequent in China and is perhaps present only as an introduction in C to E Russia and China. It is distinguishable by its strong rhizome system, long, open sheaths, compressed culms and nodes, and scabrid-angled panicle branches. It is a good soil binder in riparian habitats. It is expected in Heilongjiang because it is frequent on the Russian side of the Chinese border.

67. Poa nemoralis Linnaeus, Sp. Pl. 1: 69. 1753.

林地早熟禾 lin di zao shu he

Culms loosely tufted, 30–80(–100) cm tall, erect or lightly geniculate, nodes 3–5(–6), uppermost at or above 1/2 way up. Leaf sheaths smooth or scabrid, shorter than blade; blade flat, soft, 5–12 cm × 1–3 mm, margins and both surfaces scabrid; ligule 0.2–1(–1.5) mm, truncate to obtuse. Panicle slender, 5–15(–22) cm, branches spreading, 2–5 per node, basal primary branch 1/2–2/3 as long as panicle with spikelets in distal 1/2. Spikelets lanceolate, 3.5–5(–6) mm, florets mostly 3; rachilla pilose; glumes narrowly lanceolate, 2.5–3.7 mm; lemma oblong-lanceolate, 2.5–3.7(–4.2) mm, keel shortly villous for 1/2 of length, marginal veins to 1/3, apex membranous; callus sparsely webbed, rarely glabrous; palea smooth and glabrous between keels. Anthers 1.3–1.5 mm. Fl. May–Jun. 2*n* = 14, 35, 70.

Forested slopes, shady and moist places, forest margins, grassy places among thickets; 1000–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe, naturalized in North America].

Poa nemoralis is represented by many cytological races, which form a huge series of agamic complexes of very variable hybrid populations. Such a complex, arising from hybridization with *P. palustris*, is treated here as *P. lapponica* and is common in NE Europe, Siberia, and Mongolia. The many hybrids with *P. versicolor* subsp. *relaxa* and *P. nemoraliformis*, reported by Ovczinnikov (in Ovczinnikov & Chukavina, Fl. Tadzhiksk. SSR 1: 144. 1957), also seem to form agamic complexes. *Poa nemoralis* commonly hybridizes with *P. glauca* in Scandinavia, but obvious hybrids between these species have not yet been found in China. Pure populations of *P. nemoralis* usually occur in broad-leaved forests, quite far from *P. nemoraliformis*, *P. palustris*, and *P. versicolor* subsp. *relaxa*.

1a. Ligule of upper leaf 0.8–1 mm; rachilla pubescent; callus webbed ..... 67a. var. *nemoralis*
1b. Ligule of upper leaf 0.8–1.5 mm; rachilla smooth or scabrid; callus glabrous or very sparsely villous ..... 67b. var. *parca*

67a. Poa nemoralis var. **nemoralis**

林地早熟禾(原变种) lin di zao shu he (yuan bian zhong)

Ligule of upper leaf 0.8–1 mm. Panicle quite lax, 5–15(–22) cm. Spikelets 3.5–5(–6) mm; rachilla pubescent; callus webbed. 2*n* = 28, 33, 42, 56.

Forested slopes, shady and moist places, forest margins, grassy places among thickets; 1000–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe; naturalized in North America].

67b. Poa nemoralis var. **parca** N. R. Cui, Acta Bot. Boreal.-Occid. Sin. 7(2): 103. 1987.

疏穗林地早熟禾 shu sui lin di zao shu he

Upper culm internode sometimes elongated, especially after flowering. Ligule of upper leaf 0.8–1.5 mm. Panicle effuse, 10–12 cm. Spikelets 3–5 mm; rachilla smooth or scabrid; callus glabrous or very sparsely villous.

● Meadows along forest margins; 1200–1600 m. Xinjiang.

In spite of the morphological resemblance to the hybrid complexes *Poa lapponica* and *P. urssulensis*, this variety seems to be closest to *P. nemoralis*. The glabrescence of the lemma callus and rachilla might be caused by mutation. Its status and relationship need to be defined more exactly.

Gatherings with a short ligule and unwebbed lemma callus, treated by Liu et al. (FRPS 9(2): 113. 2002) as *Poa rhomboidea* Roshevitz, might belong here. *Poa rhomboidea* is otherwise an endemic of limestone cliffs of the W Caucasus.

68. Poa lapponica Prokudin, Zhurn. Inst. Bot. Vseukraïns'k. Akad. Nauk 20: 198. 1939.

拉扒早熟禾 la ba zao shu he

Culms loosely tufted or with short rhizomes, 30–50(–75) cm tall, nodes 3–5, uppermost less than 1/2 way up. Leaf

sheaths smooth or slightly scabrid, subequal to blade; blade flat, quite soft, 7–15 cm × 1–3 mm, adaxial surface smooth or scabrid; ligule 0.5–1.5 mm, obtuse. Panicle effuse, 5–12(–18) cm, branches 2–5 per node, upper part with sparse spikelets. Spikelets 3.5–5(–8) mm, florets 2 or 3; glumes narrowly lanceolate, slightly unequal; rachilla glabrous or scabrid to densely hairy; lemma lanceolate, keel and marginal veins sparsely pubescent along proximal 1/3; callus sparsely villous or glabrous. Anthers 1.5–2 mm. Fl. Jun–Aug.

Open stony, rocky, and grassy slopes, alpine meadows; 300–4200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe].

Hybridization between *Poa nemoralis* and *P. palustris* is very common in the northern parts of Eurasia. Both species form numerous cytological races, and apomixis is common. Members of this agamic complex are here accepted as a separate, polytypic species of ancient origin and stabilized by apomixis and selection, which needs to be distinguished from the products of recent hybridization and for which the name *P.* ×*intricata* Wein can be used.

1a. Rachilla glabrous; panicle narrow ..... 68a. subsp. *acmocalyx*
1b. Rachilla pubescent; panicle effuse ..... 68b. subsp. *pilipes*

68a. Poa lapponica subsp. **acmocalyx** (Keng ex L. Liu) Olonova & G. Zhu, **comb. et stat. nov.**

尖颖早熟禾 jian ying zao shu he

Basionym: *Poa acmocalyx* Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 388. 2002.

Culms loosely tufted, ca. 45 cm, erect. Leaf sheaths glabrous, longer than internodes, uppermost 10–15 cm, almost reaching panicle, slightly longer than blade; blade 7–14 cm × 2–3 mm, adaxially scabrid; ligule 0.5–0.8 mm. Panicle effuse, 12–15 cm; primary branch 5–10 cm. Spikelets 5–6 mm, florets 2 or 3; rachilla glabrous; callus sparsely villous. Anthers ca. 1.5 mm. Fl. and fr. Jun–Aug.

● Grassy places on sunny slopes; 1000–3900 m. Jilin, N Sichuan.

This subspecies combines the characters of *Poa nemoralis* (ligule not exceeding ca. 1 mm) and *P. palustris* (rachilla glabrous). The type material of *P. acmocalyx* is quite mesomorphic, with the uppermost node at about the middle of the culm, although FRPS (loc. cit.) gives it as in the lower 1/4, which would be a better match for *P. faberi*.

68b. Poa lapponica subsp. **pilipes** (Keng ex Shan Chen) Olonova & G. Zhu, **comb. et stat. nov.**

毛轴早熟禾 mao zhou zao shu he

Basionym: *Poa pilipes* Keng ex Shan Chen in Ma et al., Fl. Intramongol., ed. 2, 5: 594. 1994.

Culms 30–70 cm tall, slender and soft, nodes 3 or 4, usually with many tillers. Leaf sheath smooth, glabrous, subequal to blade; blade very soft to quite firm, 5–15 cm; ligule of terminal leaf 0.5–1.5 mm. Panicle narrow, (7–)10–18 cm, basal primary branch 2–4 cm, erect. Spikelets 3.5–5 mm; rachilla pilulose; first lemma 3–5 mm; callus sparsely villose or glabrous; palea keels distally with prickles, proximally shortly hairy, middle and upper parts longer ciliate; shortly hairy between keels. Anthers 1.5–2 mm, yellow. Fl. Jun–Aug.

● Grassy places on slopes, alpine meadows; 2000–4200 m. Hebei, Nei Mongol, Sichuan.

Poa lapponica subsp. *pilipes* is very close to *P. nemoralis*, but differs in having a longer ligule, as in *P. palustris*. The type differs by its unusual palea, which is pubescent between the keels proximally and has short, soft hairs on the middle part of the keels. These characters of the palea do not appear to be constant among Chinese material and subsp. *pilipes* might be a modern hybrid. Its variation at population level needs more research.

69. Poa sichotensis Probatova, Novosti Sist. Vyssh. Rast. 10: 68. 1973.

西可早熟禾 xi ke zao shu he

Poa hengshanica Keng ex L. Liu.

Culms loosely tufted, 60–120 cm tall, erect, or slightly geniculate, with bluish bloom; uppermost node above middle of culm. Lower leaf sheaths scabrid; leaf blade flat or folded, uppermost 3 or more × as long as sheath, (2–)3–6(–8) mm wide; ligule 0.5–1.5 mm. Panicle narrow, 15–26 cm, branches erect; lower ones 1/3–1/2 as long as panicle, with 6–16 spikelets. Spikelets slightly silverish, 4–7 mm, florets 3–6; rachilla hairy; glumes 2.8–6 mm; lemma 2.5–5 mm, keel and marginal veins proximally sparsely pubescent for 1/3 of length, glabrous between veins; callus villose; palea keels ciliate, proximally shortly and densely pubescent between keels. Anthers ca. 1.2–2 mm. Fl. Jun–Aug. 2*n* = 42, 49–50, 56, 70.

Meadows among thickets in deciduous forests. Heilongjiang, Jilin [Russia (Far East)].

Poa sichotensis is closely allied to *P. alta*, but is less xeromorphic. The type of *P. hengshanica* and other material so named match *P. sichotensis*.

70. Poa palustris Linnaeus, Syst. Nat., ed. 10, 2: 874. 1759.

泽地早熟禾 ze di zao shu he

Culms loosely tufted, 40–80(–120) cm tall, erect or slightly geniculate, rarely branching near base; nodes 5 or 6, uppermost at or above middle of culm. Shoots extravaginal. Leaf sheath smooth or rarely scabrid; equal to or shorter than blade; blade flat, 8–20 cm × 2–3(–5) mm; ligule 2–3 mm. Panicle slightly contracted, 10–20(–30) cm; branches obliquely ascending, 3–8 per node, basal primary branch 1/2–2/3 as long as panicle with spikelets in distal 1/2. Spikelets ovate-oblong, yellowish green, 2.5–5(–7) mm, florets (2–)3–5(–7); rachilla scabrid or warty, rarely smooth; glumes almost equal, 2–3.5(–4) mm; lemma 3–3.5(–4) mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, apex golden or rarely silvery, membranous; callus webbed; palea keel scabrid, area between keels smooth and glabrous. Anthers 1.2–1.5(–2) mm. Fl. Jun–Jul. 2*n* = 28, 30, 32, 42.

Meadows among scattered thickets on slopes, marshy grasslands; 300–3500 m. Anhui, Hebei, Heilongjiang, Henan, Nei Mongol, Xinjiang [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; SW Asia, Europe, North America].

Poa palustris, like *P. nemoralis*, is one of the most complicated and polymorphic species. Hybridization with *P. nemoralis*, coupled with apomixis, has formed a series of morphologically and genetically distinct populations treated here as *P. lapponica*.

Despite its great polymorphism, *Poa palustris* has not been divided satisfactorily into stable taxa. Its distribution in China seems to be quite restricted, limited to the northern regions only. It is probably naturalized in central and southern areas. In the mountains of the south and southwest it is replaced by the allied species *P. faberi*. In E China, Japan, and Korea it is very close to, and probably replaced by, a third, related species, *P. sphondylodes*. Unusual plants in Anhui differ by the glumes and lemma being much narrower with a prominent vein. Some populations of *P. palustris* in N China and even in the Russian Far East differ from normal *P. palustris* by the appearance of characters of *P. sphondylodes*: ligule longer than 3–4 mm, upper node infrequently only to 1/3 way up culm, leaf blades soft and flat, panicle branches sometimes very short, spikelets crowded at very base of branches, and longest branches at 2nd node of panicle. Both Ohwi (Fl. Jap. 164. 1965) and Koyama (Grasses Japan Neighboring Regions, 96. 1987) reported *P. palustris* with a ligule to 5 mm from Japan; similarly Chung (Korean Grass. 71. 1965) and Lee (Man. Korean Grass. 154. 1966) from Korea. *Poa palustris* with such long ligules occurs in the Pacific area only, and these plants might be closer to *P. sphondylodes*. Such plants may also be found in coastal areas of China.

71. Poa alta Hitchcock, Proc. Biol. Soc. Washington 43: 93. 1930.

高株早熟禾 gao zhu zao shu he

Poa flavida Keng ex L. Liu; *P. mongolica* (Rendle) Keng ex Shan Chen; *P. nemoralis* Linnaeus var. *mongolica* Rendle; *P. pseudonemoralis* Skvortsov (1954), not Schur (1866); *P. pseudopalustris* Keng ex Shan Chen, nom. illeg. superfl.; *P. skvortzovii* Probatova; *P. vaginans* Keng.

Culms tufted, (40–)60–110(–120) cm tall, usually robust, erect, scabrid, nodes 3; upper internode elongated, to ca. 80 cm, ca. 2.5 mm thick. Leaf sheath scabrid, slightly longer than leaf blade; leaf blade flat, scabrid, 2–4 mm wide, ligule membranous, (0.2–)0.5–3.5 mm. Panicle narrow, 10–23 × (1–)2–4(–6) cm; branches straight, lower part naked, upper part with 4–6 spikelets. Spikelets 3.5–8 mm, florets 2–5(–6); rachilla pubescent, prickled, warty or glabrous; glumes subequal, lanceolate, apex slightly acuminate, 2.5–3.5(–5) mm; lemma broadly lanceolate, 3–4 mm; keel scabrid, lower half and lower 1/3 of marginal veins villous; callus sparsely villous; palea keels, scabrid or shortly pubescent, area between glabrous. Anthers 1.4–2 mm. Fl. Aug. $2n = 28, 35, 42$.

Mountain tops, open grassy slopes; ca. 2500 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Mongolia, Russia].

The types of *Poa flavida* and, probably, *P. nemoralis* var. *mongolica* show these taxa to be less robust forms of *P. alta*. The type of *P. skvortsovii* (*P. pseudonemoralis* Skvortsov, not Schur; *P. pseudopalustris*) looks like the most common form of *P. alta*. According to the protologue, *P. vaginans* differs from *P. flavida* in having culms with 4 or 5 nodes, in having a panicle with 2 or 3 branches at the lowest node, in spikelet size, and in the lemma being pubescent proximally between the veins; however, the type of *P. vaginans* has the lemma smooth between the veins and culms with only 2 or 3 nodes, and it does not differ in the number of panicle branches or in spikelet size. All the species of this group should be treated as *P. alta*.

72. Poa sphondylodes Trinius in Bunge, Enum. Pl. China Bor. 71. 1833.

硬质早熟禾 ying zhi zao shu he

Culms loosely tufted, (15–)30–50(–70) cm tall, erect or obliquely ascending, firm and robust, scabrid below inflorescence, rarely smooth, nodes (2or)3 or 4, uppermost up to 1/3(–1/2) way up. Shoots extravaginal. Leaf sheaths scabrid, much shorter than internodes, usually longer or equal to blade; blade flat and usually firm, (4–)6–12 × 0.15–0.25(–0.3) cm; ligule (2–)3–5(–10) mm. Panicle narrow and dense, (4–)6–10 cm, branches erect, 2–5 per node, basal ones 1/6–1/2 as long as panicle with spikelets crowded near branch base. Spikelets lanceolate, sometimes very narrow and elongated, green or grassy yellow, 3.5–5(–10) mm, florets 2–5(–11); rachilla glabrous or warty; glumes, narrowly lanceolate, unequal, 2.5–4(–4.5) mm; lemma lanceolate, 3–4 mm; callus webbed or glabrous.

Open sandy ground, frequently on river banks, meadows among scattered thickets on slopes, grassy places on sunny slopes; 100–3200 m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Russia (Far East), Japan, Korea].

Poa sphondylodes is treated here as a polymorphic species with a broad ecological amplitude and many ecotypes. Its appearance depends on the environment, varying from quite mesomorphic to almost xeromorphic.

Tzvelev (Zlaki SSSR, 472. 1976) and Probatova (in Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 1: 283. 1985) considered this species to be synonymous with *Poa versicolor* subsp. *ochotensis*, but the type of *P. sphondylodes* and other gatherings so named differ from that subspecies in their broader leaf blades and quite soft habit. The most mesomorphic populations of *P. sphondylodes* seem to be confused with *P. palustris*, but the typical forms differ from the latter species as follows: uppermost node in lower part of culm; ligule of uppermost leaf much longer, 3–5(–8) mm; panicle usually with very short branches, longest branches at 2nd node of panicle; spikelets proximally crowded on branches. Specimens with rather more lax panicles and longer branches are common in C China.

1a. Spikelets 6–10 mm ..... 72d. var. *subtrivialis*
1b. Spikelets 3.5–5 mm.
  2a. Panicle branches with spikelets proximal ..... 72a. var. *sphondylodes*
  2b. Panicle branches with spikelets along distal half.
    3a. Ligule 2–3 mm, palea sometimes pubescent between keels ..... 72b. var. *erikssonii*
    3b. Ligule 3–5 mm, palea never pubescent between keels .... 72c. var. *macerrima*

72a. Poa sphondylodes var. **sphondylodes**

硬质早熟禾(原变种) ying zhi zao shu he (yuan bian zhong)

Poa kelungensis Ohwi, Acta Phytotax. Geobot. 4: 60. 1935; *P. palustris* Linnaeus var. *strictula* (Steudel) Hackel; *P. sphondylodes* var. *kelungensis* (Ohwi) Ohwi; *P. strictula* Steudel.

Panicle quite dense, branches short, erect, with spikelets crowded from base. Spikelets 3.5–5 mm.

Open sandy ground, frequently on river banks, meadows among scattered thickets on slopes, grassy places on sunny slopes; 100–2500 m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Sichuan, Taiwan [Japan, Korea, Russia (Far East)].

The type and other gatherings of *Poa kelungensis*, which are quite soft and with the uppermost internode almost equal to its blade, closely resemble the type of *P. sphondylodes*. Gatherings from sandy beaches

are quite different from typical *P. sphondylodes*, but those from shady forests are closely allied and form intermediate populations. The extreme form probably represents a discrete (maybe apomictic) population, which cannot be treated without more research. The type of *P. strictula* and most gatherings so named represent a mesomorphic form of *P. sphondylodes*.

72b. Poa sphondylodes var. **erikssonii** Melderis in Norlindh, Fl. Mongol. Steppe 1: 99. 1949.

多叶早熟禾 duo ye zao shu he

Poa longiglumis Keng ex L. Liu; *P. plurifolia* Keng.

Ligule 2–3 mm. Panicle branches with spikelets in distal 1/2. Spikelets 3.5–5(–5.5) mm; palea sometimes pubescent between keels.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes. Hebei, Henan, Nei Mongol, Shaanxi, Shanxi, Sichuan.

This variety is closer to *Poa palustris* in its shorter ligule than to typical *P. sphondylodes*, so it might be of hybrid origin. The variability of this variety depends very much on environment, and both the leaf characters and the panicle characters appear to vary. The panicles of the same clone may differ greatly in the shape, length, and width of their branches when grown in the wet seasons or when the habitat turns dry. The type of *P. longiglumis* is very close to this variety.

72c. Poa sphondylodes var. **macerrima** Keng, Sunyatsenia 6: 55. 1941.

瘦弱早熟禾 shou ruo zao shu he

Ligule 3–5 mm. Panicle branches with spikelets in distal 1/2. Spikelets 3.5–5(–6) mm.

Grassy places on sunny slopes; 1000–3200 m. Anhui, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

This variety is quite common to the east. It resembles *Poa palustris* in its more open panicle, with panicle branches longer and spikelets crowded distally, probably forming intermediate populations.

72d. Poa sphondylodes var. **subtrivialis** Ohwi, Acta Phytotax. Geobot. 10: 126. 1941.

大穗早熟禾 da sui zao shu he

Poa grandispica Keng ex L. Liu.

Ligule 3–5(–5.5) mm. Panicle branches with spikelets in distal 1/2 or crowded from base. Spikelets 6–10 mm.

● Grassy places on sunny slopes; 1000–3200 m. Hebei, Henan, Sichuan, Shanxi.

Among the varieties of *Poa sphondylodes* this variety most closely resembles var. *macerrima*, but differs from them all in being more robust and in its longer spikelets, to 10 mm. It is quite rare, with sporadic occurrence, and has probably arisen independently in different areas. The type of *P. grandispica* seems to belong here.

73. Poa faberi Rendle, J. Linn. Soc., Bot. 36: 423. 1904.

法氏早熟禾 fa shi zao shu he

Culms loosely tufted, (25–)30–50(–70) cm tall, erect or obliquely ascending, soft and slender, scabrid, rarely smooth below inflorescence, nodes (2–)3 or 4, uppermost up to 1/3(–1/2) way up culm. Shoots extravaginal. Leaf sheaths scabrid, long, the uppermost only 2–5 cm shorter than internode and usually shorter than blade; leaf blades flat, very thin and soft, (4–)6–12 × 0.1–0.15(–0.2) cm; ligule (2–)3–5(–8) mm. Panicle narrow, congested to loose, (4–)6–12 × 1–1.5(–2) cm, branches erect, 2–5 per node, basal ones 1/3–1/2 as long as panicle with spikelets distally crowded. Spikelets lanceolate, sometimes very narrow and elongated, green or bluish, 3.5–5(–8) mm long, florets 2–5; rachilla glabrous or pubescent; glumes narrowly lanceolate, unequal, 2.5–4(–4.5) mm; lemma lanceolate, sometimes very narrow, (2.5–)3–4 mm, rarely pubescent between veins, apex membranous; callus sparsely webbed (rarely glabrous).

● Mountain forest margins, meadows among scattered thickets on slopes, grassy places on sunny slopes; 200–1200(–4400) m. Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Shaanxi, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

Poa faberi resembles *P. sphondylodes* s.s. in the uppermost node position and long ligules, but differs from it in being softer and also in distribution and ecology, growing commonly at higher elevations in S and SW China. It is represented by many morphological types, some of them described as species, but material is lacking and further research is needed to confirm its taxonomic status. Some of these types have undeveloped spikelets and stamens and look like immature and sterile modern hybrids.

The highest concentration of different morphological variants of this species is in Sichuan and Xizang. These unusual and very soft plants with long leaf blades, very thin, almost smooth panicle branches, and abnormally narrow spikelets, glumes, and lemmas occur quite frequently in the highlands of Sichuan, Xizang, and Yunnan. They look like hybrids involving *Poa asperifolia* (*P.* sect. *Homalopoa*), which has a long ligule, thin panicle branches, elongated parts of the rachilla, and very narrow spikelets.

1a. Rachilla pubescent ..... 73c. var. *longifolia*
1b. Rachilla glabrous.
  2a. Ligule (2–)3–6(–8) mm ..... 73a. var. *faberi*
  2b. Ligule ca. 10 mm ..... 73b. var. *ligulata*

73a. Poa faberi var. **faberi**

法氏早熟禾(原变种) fa shi zao shu he (yuan bian zhong)

Poa linearis Trinius (1833), not Schumacher (1827); *P. paucifolia* Keng ex Shan Chen; *P. prolixior* Rendle.

Ligule (2–)3–6(–8) mm. Rachilla glabrous; lemma callus sometimes not webbed.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes; 200–1200(–3000) m. Anhui, Gansu, Guizhou, Henan, Hubei, Hunan, Sichuan, Xinjiang, Xizang, Yunnan.

Type material at BM and K is heterogeneous. Three of the syntypes differ clearly from *Poa sphondylodes* by the very thin, soft stems and leaves, the uppermost leaf sheaths almost reaching the panicle, and the rather long panicle branches. Although the fourth syntype has the uppermost node in the lower 1/3 of the culm, it matches *P. sphondylodes* in being robust with thick, dense culms and leaf blades and a narrow, dense panicle. Moreover, some of them have an unwebbed callus.

The type of *Poa paucifolia* looks like normal *P. faberi* var. *faberi*. The protologue and syntypes of *P. prolixior* do not differ significantly from *P. faberi*.

73b. Poa faberi var. **ligulata** Rendle, J. Linn. Soc., Bot. 36: 424. 1904.

尖舌早熟禾 jian she zao shu he

Ligule up to 10 mm. Rachilla glabrous, lemma callus sometimes not webbed.

● Meadows among scattered thickets on slopes. Sichuan.

This is a very rare plant that requires further study.

73c. Poa faberi var. **longifolia** (Keng) Olonova & G. Zhu, **comb. nov.**

毛颖早熟禾 mao ying zao shu he

Basionym: *Poa orinosa* Keng var. *longifolia* Keng, Fl. Tsinling. 1(1): 439. 1976; *P. fascinata* Keng ex L. Liu; *P. lepta* Keng ex L. Liu; *P. malaca* Keng; *P. pubicalyx* Keng ex L. Liu.

Rachilla pubescent, lemma callus usually webbed.

● Meadows among scattered thickets on slopes, grassy places on sunny slopes; 2900–4400 m. Gansu, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan.

The type of *Poa orinosa* var. *longifolia*, which is mesomorphic with a long (ca. 3.5 mm) ligule, appears to be closer to *P. faberi* than to the quite xeromorphic *P. orinosa*, which is treated here as *P. versicolor* subsp. *orinosa*.

Poa malaca combines the characters of *P. nemoralis* and *P. palustris*, having a long ligule and pubescent rachilla. The type is very soft and thin. It seems to be much closer to the *P. faberi* complex, differing only by the shorter ligule, and occupies almost the same area.

Poa pubicalyx has lemmas not pubescent but sometimes with prickles, which is quite common with *P.* sect. *Stenopoa*. The types and all available gatherings of *P. lepta* and *P. fascinata* are poorly developed, feeble plants that look like unstabilized hybrids. Specimens with seeds or, at least, normally developed flowers are needed for confirmation of their status.

74. Poa urssulensis Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 527. 1835.

乌苏里早熟禾 wu su li zao shu he

Culms loosely tufted, 35–60 cm tall, obliquely ascending, nodes 3–5, uppermost 1/3–1/2 way up culm. Shoots extravaginal. Leaf sheaths scabrid, rarely almost glabrous, shorter than internode; blade usually shorter than sheath, flat, or folded, (1–)1.5–2 mm wide, both surfaces scabrid; ligule 0.2–1.5(–2) mm. Panicle effuse, 6–10 × 2.5–5 cm, branches spreading, 2–5 per node, basal primary branch 1/3–1/2 as long as panicle with spikelets in distal 1/2. Spikelets ovate-lanceolate, (3–)3.5–4(–5) mm, florets 2–4; rachilla glabrous or warty, rarely ciliata or pilosa; glumes narrowly lanceolate, lower glume 3–4 mm, upper glume 3.5–4.5 mm; lemma lanceolate, 3–4(–4.5) mm, keel shortly villous for 1/2 of length, marginal veins to 1/3, apex membranous; callus webbed to glabrous; palea smooth and glabrous between keels. Anthers ca. 1.2 mm. Fl. Jun–Aug.

Open grassy and rocky slopes, thickets; (300–)1000–3200(–4200) m. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shandong, Xinjiang, Xizang [Kazakhstan, Korea, Mongolia, Russia; Europe].

This is a variable species of hybrid origin, close to *Poa lapponica*, that might represent a complex of independently arisen populations. The diagnostic characters, such as the pubescence of the lemma and rachilla, and the length of the ligule, vary greatly, both within populations and between populations. Some variants have been recognized as species but are here treated as varieties.

1a. Callus webbed (rarely almost glabrous) ..... 74a. var. *urssulensis*
1b. Callus glabrous.
  2a. Panicle quite spreading, ligule 0.5–1.5 mm, rachilla glabrous or pilose ..... 74b. var. *kanboensis*
  2b. Panicle narrow and dense, ligule 0.2–1 mm, rachilla pilose ..... 74c. var. *korshunensis*

74a. Poa urssulensis var. **urssulensis**

乌苏里早熟禾(原变种) wu su li zao shu he (yuan bian zhong)

Ligule 0.5–1.5(–2) mm. Panicle spreading to contracted; rachilla warty, ciliate, or pilose; lemma callus webbed to almost glabrous. $2n = 28, 42$.

Open grassy and rocky slopes, thickets; (300–)1000–3200(–4200) m. Gansu, Heilongjiang, Nei Mongol, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia; Europe].

74b. Poa urssulensis var. **kanboensis** (Ohwi) Olonova & G. Zhu, **comb. et stat. nov.**

坎博早熟禾 kan bo zao shu he

Basionym: *Poa kanboensis* Ohwi, Acta Phytotax. Geobot. 10: 125. 1941; *P. krylovii* Reverdatto.

Ligule 0.5–1.5(–2) mm. Panicle spreading, with scattered spikelets; rachilla ciliate, pilose or glabrous; lemma callus glabrous.

Grassy places on slopes. Hebei, Liaoning, Shandong [Korea].

74c. Poa urssulensis var. **korshunensis** (Goloskokov) Olonova & G. Zhu, **comb. et stat. nov.**

柯顺早熟禾 ke shun zao shu he

Basionym: *Poa korshunensis* Goloskokov, Vestn. Akad. Nauk Kazakhsk. SSR 14: 72. 1955.

Ligule 0.2–1 mm. Panicle contracted and narrow; rachilla pilose; lemma callus glabrous.

Grassy places on slopes; 1300–3200 m. ?Xinjiang [Kazakhstan].

This variety differs from var. *kanboensis* in having a more narrow and contracted panicle, and geographically.

75. Poa nemoraliformis Roshevitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 11: 30. 1949.

林早熟禾 lin zao shu he

Poa major D. F. Cui.

Culms loosely to densely tufted, 30–50 cm tall, erect, usually hard, scabrid, nodes 2–5, uppermost in lower 1/3; base covered by withered leaf sheaths. Shoots extravaginal. Leaf sheath scabrid, longer than blade; blade usually flat, later folded or inrolled, 1.5–2.5 mm wide, scabrid; ligule (0.5–)1–1.5 mm.

Panicle oblong, conferted, 8–16(–20) cm, branches thin, 2–4.5 cm. Spikelets elliptic-lanceolate, green or tinged with purple, 4–6(–6.5) mm, florets 3 or 4, usually with upper floret rudimentary; rachilla usually glabrous; glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, margins dry membranous, keel scabrid; lemma oblong-lanceolate, 3.2–4 mm; margins membranous, keel and marginal veins usually short-villous to glabrous along lower 1/2; callus glabrous. Anthers ca. 2 mm. Fl. Jun–Aug.

Open grasslands on rocky slopes, meadows along forest margins, thickets; 1100–4300 m. Xinjiang, Xizang [India, Tajikistan].

Poa nemoraliformis differs from *P. nemoralis* in its longer ligule 1–1.5 mm (vs. 0.2–1 mm), glabrous rachilla, and unwebbed lemma callus, and differs from *P. versicolor* subsp. *relaxa* in never forming dense tufts. The syntypes represent a sequence of increasing xeromorphism (leaf blades more firm, position of uppermost node varying from 1/2 to 1/3 way up culm). The first two syntypes differ from the description in the protologue in having the rachilla shortly hairy; the second syntype differs in having a long ligule ca. 2.4 mm.

Records of *Poa sterilis* M. Bieberstein from China are probably based on this species. Examination of the type of *P. major* has shown that it was misplaced in *P.* subg. *Poa* and belongs here.

76. Poa hylobates Bor, Bull. Bot. Surv. India 7: 132. 1965.

喜巴早熟禾 xi ba zao shu he

Poa elanata Keng ex Tzvelev.

Culms tufted, 30–50 cm tall, erect, usually hard, scabrid, nodes 3 or 4, uppermost in lower 1/3; base covered by withered leaf sheaths. Shoots extravaginal. Leaf sheath scabrid, longer than blade; blade usually flat, later folded or inrolled, 1.5–2.5 mm wide, scabrid; ligule (2–)3–4.5(–6.5) mm. Panicle oblong, conferted, 7–15 cm, branches 2–3(–4.5) cm. Spikelets elliptic-lanceolate, green or tinged with purple, 4–6(–6.5) mm, florets 3–5(–7); rachilla glabrous; glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, margins dry membranous, keel scabrid; lemma oblong-lanceolate, 3.2–3.7(–4) mm; margins white or golden yellow membranous, keel and marginal veins usually shortly villous to glabrous along lower 1/2; callus glabrous. Anthers ca. 2 mm. Fl. Jun–Aug.

Grassy places along forest margins on slopes. 2900–4400 m. Qinghai, Sichuan, Xinjiang, Xizang [Nepal].

Poa hylobates is allied to *P. nemoraliformis* and quite frequently forms intermediate populations in Sichuan and Xizang. Quite common are specimens that combine a glabrous callus and rachilla with a ligule longer than ca. 5 mm or 1–3 mm, or a pubescent callus and rachilla with a ligule ca. 5 mm; these features exceed the bounds of known species, including *P. hylobates*.

The type of *Poa elanata* looks immature, but taking into account the length and panicle shape of dry culms from the preceding year, which are well represented, it may be attributed to *P. hylobates*.

77. Poa versicolor Besser, Enum. Pl. 41. 1821.

变色早熟禾 bian se zao shu he

Poa attenuata Trinius var. *versicolor* (Besser) Regel.

Culms erect, densely tufted, (25–)30–60(–75) cm tall, nodes 2–3(–5), uppermost to 1/3 way up culm. Shoots extravaginal. Leaf sheath scabrid, usually longer than blade; blade narrowly linear, flat or inrolled, 0.5–2.5(–3) mm wide, scabrid; ligules 1–3(–7) mm. Panicle contracted, narrow to spiciform, (4.5–)6–15(–17) × 1–3(–5) cm; branches erect, 1 or 2 per node, (1/5–)1/4–1/3(–1/2) × as long as panicle. Spikelets lanceolate, (3–)3.5–6(–7) mm, green or tinged with purple, apex yellow, ± violet; florets (2–)3–5(–7); rachilla warty, rarely pilose; glumes subequal, lanceolate to oblong-lanceolate, 3–4.2 mm; lemma oblong-lanceolate, 3.2–4 mm, keel usually shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous or pubescent; callus webbed to glabrous; palea glabrous or pubescent between keels. Anthers 1.3–2 mm. Fl. Jun–Aug.

Meadows along forest and thicket margins, grasslands on slopes, steppes; 200–4300 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

Poa versicolor is supposed to be a xeromorphic derivate of *P. palustris*. It is interpreted here as a widespread complex of feebly differentiated geographic races, and it is perplexingly polymorphic. *Poa versicolor* s.s. is distributed in S Europe and is absent from China. All subspecies in this complicated species seem to be close allies, differing from one another by complexes of characters only and connected by intermediate populations. This complex is also connected with other species in *P.* sect. *Stenopoa* through hybridization.

1a. Lemma pubescent between veins ..... 77d. subsp. *reverdattoi*
1b. Lemma glabrous between veins.
  2a. Panicle dense, contracted to spiciform, branches erect, the longest ones 1/5–1/3 (–2/5) as long as panicle; culm with uppermost node up to 1/6 way up culm.
    3a. Culm under panicle usually with dense prickles ..... 77c. subsp. *orinosa*
    3b. Culm under panicle usually with few or no prickles, usually warty ..... 77f. subsp. *ochotensis*
  2b. Panicle usually open, especially at anthesis, longest branches 1/3–1/2 as long as panicle; culm with upper node usually ca. 1/6 way up culm.
    4a. Ligule (3–)4–7 mm ..... 77e. subsp. *varia*
    4b. Ligule 1–3 mm.
      5a. Culm under the panicle usually with dense prickles; spikelets usually green; plants of lower and middle elevations ..... 77a. subsp. *stepposa*
      5b. Culm under the panicle usually with few or no prickles, usually warty; spikelets usually purplish; plants of middle and upper elevations ..... 77b. subsp. *relaxa*

77a. Poa versicolor subsp. **stepposa** (Krylov) Tzvelev, Novosti Sist. Vyssh. Rast. 9: 51. 1972.

低山早熟禾 di shan zao shu he

Poa attenuata Trinius var. *stepposa* Krylov, Fl. Altai Gov. Tomsk 7: 1856. 1914; *P. attenuata* subsp. *botryoides* Tzvelev; *P. botryoides* (Trinius ex Grisebach) Komarov; *P. serotina* Ehrhart ex Hoffmann var. *botryoides* Trinius ex Grisebach; *P. stepposa* (Krylov) Roshevitz; *P. transbaicalica* Roshevitz.

Culms (15–)25–50(–70) cm tall, erect, scabrid; leaf blades narrowly linear, flat or folded, 0.5–1.2 mm wide, ligule (1–)2–3 mm. Panicle contracted, narrow, (4.5–)6–10(–12) cm; branches scabrid, up to 4 cm, with few spikelets. Spikelets 3–5(–7) mm; lemma 3.5–4 mm, glabrous between veins; callus sparsely webbed. Anthers 1.2–1.5 mm. Fl. Jun–Aug. 2*n* = 28.

Grasslands on slopes, steppes; 200–1500 m. Heilongjiang, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia; Europe].

This subspecies is most polymorphic, and several of its populations were described as distinct species, but the characters on which these divisions were based are very unreliable and the entities cannot be recognized, even as subspecies.

Tzvelev (Novosti Sist. Vyssh. Rast. 11: 31. 1974) treated *Poa botryoides* as a lower-elevation subspecies of *P. attenuata*, the typical race of which he treated as alpine. Nevertheless, the type of *P. botryoides* appears to be closer to *P. versicolor* subsp. *stepposa*, being as tall as this taxon and with panicle branches as long. The type of *P. transbaicalica* looks like typical *P. versicolor* subsp. *stepposa*.

77b. Poa versicolor subsp. **relaxa** (Ovczinnikov) Tzvelev, Tadzhikist. Bazy Akad. Nauk 1: 20. 1933.

新疆早熟禾 xin jiang zao shu he

Poa relaxa Ovczinnikov, Izv. Tadzhikist. Bazy Ak. Nauk 1: 20. 1933; *P. acuminata* Ovczinnikov (1933), not Scribner (1896); *P. fragilis* Ovczinnikov.

Culms 30–50 cm tall, usually hard, scabrid, base covered by withered leaf sheaths slightly tinged with red. Leaf blade usually flat, later folded or inrolled, 1.5–2.5 mm wide; ligule 1–1.5(–6) mm. Panicle oblong, conferted, 7–15 cm, branches 1 or 2 per node, 2–3 cm. Spikelets elliptic-lanceolate, 4–6(–6.5) mm, green or tinged with purple, florets 3–5(–7); glumes oblong-lanceolate, apex acuminate, lower glume ca. 3.5 mm, upper glume 4–4.2 mm, keel scabrid; lemma 3.2–3.7(–4) mm; margins white or golden yellow membranous. Anthers ca. 2 mm. Fl. Jun–Aug. 2*n* = 42.

Meadows along forest and thicket margins, open grasslands on rocky slopes; 1100–4300 m. Gansu, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

This subspecies is probably of hybrid origin and forms numerous morphological variants. It appears to be intermediate between *Poa nemoralis* and *P. versicolor*, replacing the Siberian *P. urssulensis* and *P. versicolor* subsp. *stepposa* in C Asia. Pazij (Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 17: 18–42. 1962) has reported hybrids of subsp. *relaxa* with *P. attenuata*, *P. nemoralis*, and even *P. pratensis*. Ovczinnikov (in Ovczinnikov & Chukavina, Fl. Tadzhiksk. SSR 1: 149. 1957) has reported that the extreme forms make subsp. *relaxa* very difficult to identify. Typical *P. fragilis*, with entirely glabrous lemmas, is rather rare, but in spite of its differing clearly from the type of subsp. *relaxa*, numerous intermediate samples form a continuum. For this reason, *P. fragilis* does not seem to deserve even subspecific rank.

77c. Poa versicolor subsp. **orinosa** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

山地早熟禾 shan di zao shu he

Basionym: *Poa orinosa* Keng, Fl. Tsinling. 1(1): 439. 1976; *P. incerta* Keng ex L. Liu; *P. schoenites* Keng ex L. Liu; *P. stereophylla* Keng ex L. Liu.

Culms (25–)30–45(–70) cm tall. Leaf blades flat or folded; ligule 0.9–3 mm. Panicle contracted, narrow, 8–10 × (0.5–)1–1.5 cm, basal branches (1/4–)1/3–1/2 as long as panicle. Spikelets 3–4 mm, florets 2–3(–5); rachilla pubescent or rarely glabrous; callus of lemma glabrous or webbed.

● Grassy places on slopes; 2500–3600 m. Hebei, Henan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan.

This subspecies, described from C and S China, is quite close to *Poa versicolor* subsp. *stepposa*, and probably replaces it in this area. The types of *Poa incerta* and *P. schoenites* are allied to subsp. *orinosa*, and their populations appear to form a continuum with it. The type of *P. stereophylla* differs in its wiry culm, but this is not a constant feature and depends very much on the environment. *Poa versicolor* subsp. *orinosa* might be intermediate between *P. versicolor* and *P. alta*, but as the characters of *P. versicolor* are absolutely prevailing it is attributed here to that species.

77d. Poa versicolor subsp. **reverdattoi** (Roshevitz) Olonova & G. Zhu, **comb. et stat. nov.**

瑞沃达早熟禾 rui wo da zao shu he

Basionym: *Poa reverdattoi* Roshevitz in Komarov, Fl. URSS 2: 407. 1934; *P. argunensis* Roshevitz.

Culms densely tufted, (15–)35–45(–60) cm tall, erect, scabrid, sometimes tinged with grayish green, terminal node 1/6–1/3 way up culm. Leaf sheaths scabrid, shorter than internode, terminal sheath ca. 2 × as long as blade; blades folded or inrolled, hard, short, 0.5–1(–1.5) mm wide, abaxial surface and margin scabrid, adaxial surface minutely hairy; ligule (1–)2–2.5(–3) mm. Panicle contracted to spiciform, laxer at anthesis, 3–4 × (0.5–)1–5(–8) cm, branches 2 or 3 per node, with spikelets near base. Spikelets sometimes tinged with purple, 3–5(–6) mm, florets 2–4; rachilla glabrous or pilulose; glumes (2–)2.8–3(–3.5) mm; lemma keel shortly villous for 1/2 length, marginal veins for 1/3, area between veins minutely hairy for lower 1/3; callus usually moderately webbed to glabrous; palea minutely hairy in lower area between keels. Anthers ca. 2 mm. Fl. Jun. 2*n* = 28, 35, 42.

Dry grasslands on rocky slopes; 200–1000 m. Liaoning, Nei Mongol [Mongolia, Russia (S Siberia)].

This is a variable subspecies with a rather restricted distribution limited to low elevations of China, Mongolia, and S Siberia. Records of this subspecies from Xinjiang and the Altai region belong to *Poa albertii*.

Poa argunensis differs from subsp. *reverdattoi* only in variable and unreliable characters and forms many intermediate populations.

77e. Poa versicolor subsp. **varia** (Keng ex L. Liu) Olonova & G. Zhu, **comb. et stat. nov.**

多变早熟禾 duo bian zao shu he

Basionym: *Poa varia* Keng ex L. Liu, Fl. Reipubl. Popularis Sin. 9(2): 404. 2002.

Culms tufted, 30–40 cm tall, erect or geniculately ascending, scabrid, nodes 2–3(–4), uppermost to 1/6 way up culm.

Leaf sheath scabrid, longer than internode; blade narrow, 1–1.5 mm wide, both surfaces scabrid; ligule 4–7 mm. Panicle 5–10 × 2–5 cm, branches 2–5 per node, spikelets in distal 1/2, dense. Spikelets 4–5 mm; rachilla warty or glabrous; lemma 3–3.5 mm, slightly yellowish bronze below, keel shortly villous for 1/2 length, marginal veins for 1/3; callus sparsely villous; palea glabrous between keels. Anthers ca. 1.5 mm. Fl. and fr. Jun–Aug.

● Grassy places on slopes; 2500–3000 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xizang, Yunnan.

77f. Poa versicolor subsp. **ochotensis** (Trinius) Tzvelev, Zlaki SSSR, 472. 1976.

乌库早熟禾 wu ku zao shu he

Poa ochotensis Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 377. 1831; *P. nemoralis* Linnaeus subsp. *ochotensis* (Trinius) Tzelev; *P. subaphylla* Honda.

Culms 35–60 cm tall, slender, usually almost smooth under inflorescence, nodes 2–3(–4), uppermost node to 1/3 way up culm. Leaf sheaths longer than blade; blade narrowly linear, 1–1.5 mm wide, flat, scabrid; ligule (0.5–)1–2(–4) mm. Panicle narrow, sometimes almost spiciform, dense, 3–8 × 0.5–1.5 cm; basal branches 1/5–1/3 as long as panicle; rachilla warty, glabrous, rarely minutely pilose. Spikelets 3–5(–6) mm, florets 6 or 7; glumes narrowly lanceolate; lemma 3–3.5 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus nearly glabrous; palea sometimes pilulose between keels. 2*n* = 28, 42, 49.

Grassy places on slopes; 200–1000 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Japan, Korea, Mongolia, Russia (Far East)].

This taxon seems to be a stabilized hybrid between *Poa sphondylodes* and *P. versicolor*. It is treated here as a subspecies of *P. versicolor* because the characters of that species prevail. Material with a glabrous callus was described as *P. subaphylla*.

Most gatherings identified by Chinese, Japanese, and Korean botanists as *Poa viridula* Palibin seem to belong here. True *P. viridula* has not been recorded from China.

78. Poa araratica Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 486. 1875.

阿洼早熟禾 a wa zao shu he

Poa crymophila Keng ex C. Ling.

Culms tufted, 20–35(–45) cm tall, erect or slightly geniculate, scabrid or glabrous, nodes 2 or 3, at or above base, upper part often naked, uppermost internode frequently thick, up to 1–2 mm. Shoots extravaginal. Leaf sheath longer than blade; blade flat or folded, 3–8 cm × 1–2 mm, scabrid; ligule (0.5–)1.5–2.5(–7) mm. Panicle 3–5(–10) × 1–2 cm, branches 1–3(–5) per node, spikelets scattered. Spikelets 4.5–5.5(–8) mm, rachilla glabrous to pilose; glumes subequal, usually almost as long as spikelet; lemma 2.5–3.8 mm, keel, veins and area between veins hairy to entirely glabrous; callus webbed or glabrous; palea glabrous to pubescent between keels. Anthers 1.2–1.4 mm. Fl. Aug–Oct.

Open grassy slopes, subalpine forest margins; 2000–4200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia].

Poa araratica is treated here as a hybrid complex comprising many populations of different stages of stabilization and of obscure taxonomic status. It seems to have arisen through hybridization between *P. versicolor* and *P. glauca*.

1a. Lemma pubescent between veins.
  2a. Ligule 1–3 mm ..... 78c. subsp. *ianthina*
  2b. Ligule 3–7 mm ..... 78e. subsp. *altior*
1b. Lemma glabrous between veins.
  3a. Lemma keel and marginal veins almost entirely glabrous, sometimes with minute or single hairs ..... 78d. subsp. *psilolepis*
  3b. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3.
    4a. Ligule 1.5–2.5 mm ..... 78a. subsp. *araratica*
    4b. Ligule 0.5–1 mm ..... 78b. subsp. *oligophylla*

78a. Poa araratica subsp. **araratica**

阿洼早熟禾(原亚种) a wa zao shu he (yuan ya zhong)

Ligule 1.5–2.5(–3) mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous; callus glabrous or minutely webbed.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Xinjiang, Xizang [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia].

78b. Poa araratica subsp. **oligophylla** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

贫叶早熟禾 pin ye zao shu he

Basionym: *Poa oligophylla* Keng, Fl. Tsinling. 1(1): 436. 1976; *P. arjinsanensis* D. F. Cui.

Ligule 0.5–1 mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, area between veins glabrous; callus webbed or glabrous.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang [Russia (Siberia)].

The type of *Poa arjinsanensis* looks like typical *P. araratica* s.l. but with a short ligule and lemmas glabrous between the veins.

78c. Poa araratica subsp. **ianthina** (Keng ex Shan Chen) Olonova & G. Zhu, **comb. et stat. nov.**

堇色早熟禾 jin se zao shu he

Basionym: *Poa ianthina* Keng ex Shan Chen in Ma et al., Fl. Intramongol. 7: 260. 1983; *P. sinoglauca* Ohwi.

Ligule 1–3 mm. Lemma keel shortly villous for 1/2 of length, marginal veins for 1/3, areas between veins pubescent; callus webbed or glabrous.

● Open grassy slopes, subalpine forest margins; 3300–4200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan.

The protologue of *Poa sinoglauca* reported the lemma to be pubescent on the intermediate veins. The type proved to have the lemma quite frequently pubescent both on the intermediate veins and on the

area between the veins, and thus it is a better match with *P. araratica* subsp. *ianthina*.

78d. Poa araratica subsp. **psilolepis** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

光稃早熟禾 guang fu zao shu he

Basionym: *Poa psilolepis* Keng, Sunyatsenia, 6: 56. 1941.

Lemma almost entirely glabrous, sometimes with only minute or single hairs on keel and marginal veins. 2*n* = 28, 42.

Open grassy slopes, subalpine forest margins; 3300–4200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Tajikistan].

The lemma indumentum is not consistent: spikelets with entirely glabrous lemmas and with obviously pubescent lemmas may be found on the same herbarium sheet.

78e. Poa araratica subsp. **altior** (Keng) Olonova & G. Zhu, **comb. et stat. nov.**

高阿洼早熟禾 gao a wa zao shu he

Basionym: *Poa attenuata* Trinius var. *altior* Keng, Sunyatsenia 6: 57. 1941.

Culms densely tufted, erect, 35–45(–50) cm tall, uppermost node in lower 1/6. Leaf sheath shorter than internode, scabrid; blade short, hard, folded, rarely flat, both surfaces and margin scabrid; ligule 4–6 mm. Panicle contracted, 4–6 × 1–4 cm, branches 2 or 3 per node. Spikelets 3–4(–5) mm, florets 2–4, tinged with purple; rachilla pubescent, glumes (2–)2.8–3(–3.5) mm; lemma keel shortly villous for 1/2 of length, marginal veins for 1/3 length, area between veins minutely hairy for lower 1/3; callus webbed; palea minutely hairy proximally between keels. Anthers 1.3–2 mm. Fl. Jun.

● Grassy places; 2000–3400 m. Gansu, Sichuan, Xizang.

The type of *Poa attenuata* var. *altior* has culms too tall to be *P. attenuata* and seems to have similarities to *P. glauca*.

79. Poa attenuata Trinius, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 527. 1835.

渐尖早熟禾 jian jian zao shu he

Culms densely tufted, 7–15(–25) cm tall, pale, glabrous or slightly scabrid under the panicle, nodes 2, both near culm base. Shoots usually intravaginal. Leaf sheath usually slightly scabrid, uppermost 1/2 as long as internode; blade folded or inrolled to needle-shape, firm, usually up to 1/2 as long as sheath, 0.3–0.8(–1.5) mm wide, scabrid; ligule 1.5–2.5 mm. Panicle dense, contracted to spiciform, a bit more open at anthesis, 1.5–4 × 0.4–1 cm; branches 2 or 3 per node, 1/5–1/3 as long as panicle. Spikelets lanceolate, (2.5–)3–4.5(–5) mm, florets 2 or 3(–5); rachilla warty; glumes shorter than spikelet, usually equal to first lemma, lemma (2.5–)3–3.5 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus webbed or glabrous; palea glabrous between veins. Anthers 1.2–1.5 mm. Fl. Jun–Aug.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan, Uzbekistan].

Most botanists recognize *Poa attenuata* as one of the most complicated and problematic complexes in the flora of C Asia. It has hybridized with *P. glauca* to form an apomictic complex, which is treated here as *P. albertii*, while *P. attenuata* is supposed to be a more or less pure group of xeromorphic alpine populations.

1a. Callus webbed ..... 79a. var. *attenuata*
1b. Callus glabrous ..... 79b. var. *dahurica*

79a. Poa attenuata var. **attenuata**

渐尖早熟禾(原变种) jian jian zao shu he (yuan bian zhong)

Poa tetrantha Keng ex L. Liu.

Lemma callus webbed. 2*n* = 28, 42.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang [Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan, Uzbekistan].

79b. Poa attenuata var. **dahurica** (Trinius) Grisebach, Fl. Ross. 4: 371. 1852.

达呼里早熟禾 da hu li zao shu he

Poa dahurica Trinius, Mém. Imp. Acad. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4(2): 63. 1836.

Lemma callus glabrous.

Dry grasslands, rocky and stepped slopes; 3300–5500 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan].

The callus indumentum is known to be a rather unreliable character, varying not only in populations, but also in the same specimen and even the same panicle, so it cannot be the basis for species recognition.

80. Poa albertii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 611. 1881.

阿拉套早熟禾 a la tao zao shu he

Culms dense to loosely tufted, 7–15(–25) cm tall, scabrid (sometimes only slightly), nodes 1 or 2, usually near base. Shoots extravaginal, rarely some intravaginal, sometimes with ascending tillers. Leaf sheath scabrid; blade flat, folded or inrolled, (0.5–)1.5–2(–3) mm wide, scabrid; ligule 1–2.5(–3.5) mm. Panicle oblong, narrow, dense to quite loose, (2–)4–6 × 0.5–1.5 cm; branches 2–5 per node, primary basal branch 2/7–2/3 as long as panicle. Spikelets lanceolate, sometimes tinged with purple or variegated, 3–4(–6) mm, florets 2 or 3; sometimes upper floret viviparous; rachilla smooth, warty or papillose; lower glume 1.5–2 mm, upper glume 2–2.5 mm; lemma narrowly lanceolate, glabrous to uniformly pubescent, apex acuminate; callus webbed or glabrous; palea glabrous or smooth between keels. Anthers 1.2–1.5 mm. Fl. and fr. Jul–Aug. 2*n* = 28, 42.

Alpine grasslands; 2000–5600 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran)].

Poa albertii represents an apomictic hybrid complex combining the characters of the parent species *P. attenuata* s.l. and *P. glauca* s.l., and perhaps additionally *P. versicolor* subsp. *relaxa*.

1a. Panicle with viviparous spikelets ..... 80c. subsp. *arnoldii*
1b. Panicle without viviparous spikelets.
2a. Lemma glabrous between veins.
3a. Lemma distinctly pubescent on keel and marginal veins ..... 80a. subsp. *albertii*
3b. Lemma entirely glabrous (rarely with a few short hairs) ..... 80d. subsp. *poophagorum*
2b. Lemma pubescent between veins.
4a. Panicle contracted, densely ovoid to spiciform, branches up to 1(–1.5) cm, spikelets crowded, 3–4(–5) mm; uppermost internode not more than 1 mm wide; leaf blade firm, narrow, folded or inrolled; plant pale or grayish yellow, glumes sometimes with purplish bands ..... 80b. subsp. *kunlunensis*
4b. Panicle elongated, sometimes quite open, branches up to 1.5–2 cm, spikelets moderately crowded to sparse; (3.8–)4–5.5(–6) mm; uppermost internode frequently up to 1.5–2 mm wide; leaf blade withering, folded or flat; plant glaucous, frequently glumes and vegetative parts strongly purplish ..... 80e. subsp. *lahulensis*

80a. Poa albertii subsp. **albertii**

阿拉套早熟禾(原亚种) a la tao zao shu he (yuan ya zhong)

Poa breviligula Keng ex L. Liu; *P. densissima* Roshevitz ex Ovczinnikov; *P. juldusicola* Regel; *P. festucoides* N. R. Cui (1987), not Lamarck (1791); *P. litvinoviana* Ovczinnikov; *P. sinattenuata* Keng; *P. sinattenuata* var. *breviligula* Keng; *P. parafestuca* L. Liu; *P. poophagorum* Bor subsp. *hunczilapensis* Keng ex D. F. Cui.

Culms 6–20 cm tall, scabrid. Leaf blade folded or inrolled, 0.5–1 mm wide; ligule 1–2(–3.5) mm. Panicle oblong, narrow, dense to quite loose, 2–4 × 0.5–1.5 cm; branches 2 or 3 per node, basal primary branch 2/7–2/3 as long as panicle. Spikelets lanceolate, never viviparous; rachilla smooth or pilulose; lemma lanceolate to narrowly lanceolate, keel shortly villous for 1/2 of length, marginal veins for 1/3, other parts glabrous; callus glabrous. $2n = 28$.

Alpine grassy places; 2000–5200 m. Gansu, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Altai), Tajikistan, Uzbekistan].

The types of both *Poa densissima* and *P. juldusicola* match *P. albertii* subsp. *albertii* well. The type of *P. litvinoviana* seems to be of hybrid origin and resembles both *P. attenuata* and *P. glauca*, so it should be assigned to *P. albertii*. The types of both *P. sinattenuata* and its var. *breviligula* differ from *P. albertii* subsp. *albertii* only by the pilulose rachilla, but rachilla indumentum is too variable within this hybrid complex to be a reliable basis for recognizing even subspecies. The type of *P. parafestuca* has not been seen, but descriptions and other gatherings show that it should be assigned to subsp. *albertii*.

80b. Poa albertii subsp. **kunlunensis** (N. R. Cui) Olonova & G. Zhu, **comb. nov.**

高寒早熟禾 gao han zao shu he

Basionym: *Poa festucoides* N. R. Cui subsp. *kunlunensis* N. R. Cui, Acta Bot. Boreal.-Occid. Sin. 7(2): 97. 1987; *P. indattenuata* Keng ex P. C. Keng & G. Q. Song; *P. koelzii* Bor; *P. rangkulensis* Ovczinnikov & Czukavina; *P. roemeri* Bor; *P. scabriculmis* N. R. Cui [*"scabristemmed"*].

Culms 4–10(–20) cm tall. Leaf blades folded, short, 0.7–1(–1.5) mm wide; ligule 1–3 mm. Panicle dense, contracted, 1–2.5(–3) × 0.5–2 cm, branches mostly paired. Spikelets purple when old, never viviparous; rachilla glabrous; lemma laterally elliptic-oblong, keel and marginal veins proximally villous, areas between veins proximally densely shortly pubescent, apex obtuse; callus sparsely webbed or sometimes glabrous. $2n = 28$.

Alpine grasslands; 4000–5200 m. Qinghai, Xinjiang, Xizang [Afghanistan, India, Pakistan, Russia (S Siberia), Tajikistan, Uzbekistan; SW Asia (Iran)].

The type of *Poa festucoides* subsp. *kunlunensis* has not been seen, but the protologue and illustration indicate that it belongs here and it therefore provides the earliest epithet at subspecific rank. *Poa roemeri* differs from *P. albertii* subsp. *kunlunensis* in having a loose panicle and thin, withering leaf blades. The two entities are connected by intermediate populations and differ in such negligible characters that *P. roemeri* cannot be recognized at any rank. The type of *P. scabriculmis* has also not been seen, but the protologue and illustration indicate that it cannot be separated from the other entities within this subspecies. The types of both *P. indattenuata* and *P. rangkulensis* look like type material of *P. festucoides* subsp. *kunlunensis* and do not differ from most gatherings so named.

80c. Poa albertii subsp. **arnoldii** (Melderis) Olonova & G. Zhu, **comb. et stat. nov.**

阿诺早熟禾 a nuo zao shu he

Basionym: *Poa arnoldii* Melderis in H. Hara et al., Enum. Fl. Pl. Nepal 1: 142. 1978; *P. mustangensis* Rajbhandari.

Culms 5–15(–25) cm tall. Leaf sheath usually smooth; blade flat, 1–2 mm wide, abaxial surface glabrous, adaxial surface scabrid; ligules 2.3–3 mm. Panicle loosely spreading, 4–6 cm; branches paired, lowermost 1–2 cm. Spikelets 4–4.5 mm, florets 2, upper floret viviparous; lemma elliptic-oblong, keel and marginal veins proximally villous, areas between veins usually proximally shortly pubescent; callus glabrous.

Alpine grassy places; 4000–5600 m. Gansu, Qinghai, Xizang [Nepal].

Viviparous spikelets are very rare within *Poa* sect. *Stenopoa* and are restricted to taxa closely allied to *P. glauca* or which have originated through hybridization with that species. *Poa mustangensis*, which was described from neighboring Nepal, seems not to be separable from this subspecies.

80d. Poa albertii subsp. **poophagorum** (Bor) Olonova & G. Zhu, **comb. et stat. nov.**

波伐早熟禾 bo fa zao shu he

Basionym: *Poa poophagorum* Bor, Kew Bull. [3] 1948: 143. 1948 [*"poiphagorum"*].

Culms 5–10(–18) cm tall, smooth or scabrid. Leaf blade flat, folded or inrolled, 1–1.5 mm wide, ligule 2–3.5 mm. Panicle narrow, 2–5 × 0.5–1.5 cm; branches short, scabrid. Spikelets 3–4(–5) mm, tinged with purple, florets 2–4; rachilla glabrous

or scabrid, sometimes minutely hairy; glumes subequal; lemma glabrous throughout, rarely along keel and marginal veins proximally sparsely minutely hairy; callus glabrous.

Alpine grasslands; 3000–5500 m. Qinghai, Xinjiang, Xizang, Yunnan [Bhutan, India, Nepal].

80e. Poa albertii subsp. **lahulensis** (Bor) Olonova & G. Zhu, **comb. et stat. nov.**

拉哈尔早熟禾 la ha er zao shu he

Basionym: *Poa lahulensis* Bor, Kew Bull. [3] 1948: 138. 1948; *P. borealitibetica* C. Ling.

Culms 10–20 cm tall, nodes 1 or 2. Leaf blade flat or folded, quite soft, 3–5 cm × 1.5–2.5 mm, both surfaces scabrid, frequently withering; ligule 1–3 mm. Panicle elliptic, 4–6 × 1.5–3 cm, branches 2 or 3 per node. Spikelets obovate, green or slightly tinged with purple, 4.5–6 mm, florets 3–6; glumes broadly lanceolate; lemma oblong-lanceolate, slightly membranous, keel and marginal veins densely pubescent below middle, areas between veins proximally pubescent; callus glabrous or minutely hairy.

Alpine grasslands; 2000–5500 m. Xizang, Yunnan [India].

The types of both *Poa lahulensis* and *P. borealitibetica* differ from other members of this complex by being more mesomorphic and look like dwarf plants of *P. versicolor* subsp. *relaxa*, with leaf blades softer and withering with age, panicles lax, and spikelets larger. The pubescence between the veins can vary, as far as complete absence, but other characters are quite constant. This might be evidence of the contribution of *P. versicolor* subsp. *relaxa* to the genotype of *P. albertii* subsp. *lahulensis*. More research is needed to find out the relationships and parentage of the subspecies of *P. albertii*, since subsp. *lahulensis* might not be of hybrid orgin but instead a direct derivate of *P. versicolor* subsp. *relaxa*.

81. Poa glauca Vahl, Fl. Dan. 6(17): 3. 1790.

灰早熟禾 hui zao shu he

Culms erect, glaucous, sometimes strongly purplish, (5–) 10–15(–35) cm tall, nodes 1 or 2, uppermost to 1/5 way up culm, covered by sheath; uppermost internode up to 1.5–2 mm wide. Shoots always extravaginal, even when densely tufted. Leaf sheath longer than blade, flat or folded, sometimes quite soft, withering, 1–2 mm wide, margins and both sides of veins scabrid; ligule 1–1.5(–2) mm. Panicle contracted, later quite open, 4–7 cm; branches 1 or 2 per node, 2–3 cm, with a few scattered spikelets. Spikelets oblong-ovate, (3.8–)4–5(–7) mm, tinged with purple, florets 2–4; glumes narrowly lanceolate, unequal, as long as lower lemma; lemma narrowly lanceolate, lower lemma ca. 4 mm, keel shortly villous for 1/2 of length, marginal veins for 1/3; callus sparsely webbed or glabrous. Fl. Jun–Aug.

Dry gravel slopes, grassy places on river beaches; 2000–5200 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran), Europe, North America].

Poa glauca is probably one of the most polymorphic species in the genus. In C Asia it has probably been almost consumed by introgressive hybridization. Most gatherings seem to belong to the hybrid complexes *P. albertii* and *P. araratica* s.l. Pure populations of *P. glauca* are rather rare in China.

1a. Culms 5–15(–20) cm tall, usually glaucous or purplish; leaf blade usually folded; panicle branches quite thick, firm, obliquely ascending ..... 81a. subsp. *glauca*

1b. Culms (10–)20–35 cm tall, usually green; leaf blade usually flat and broad; panicle branches thin, frequently curved, erect ..... 81b. subsp. *altaica*

81a. Poa glauca subsp. **glauca**

灰早熟禾(原亚种) hui zao shu he (yuan ya zhong)

Deyeuxia hugoniana Rendle; *Poa taiwanicola* Ohwi.

Culms 5–15(–20) cm tall, usually glaucous or purplish. Leaf blade usually folded. Panicle branches quite thick, firm, obliquely ascending. Callus webbed. 2*n* = 42–49, 50, 56, 60, 63, 64, 65, 70, 72, 75, 78.

Dry gravel slopes, grassy places on river beaches; 2000–5200 m. Gansu, Nei Mongol, Qinghai, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan; Europe, North America].

81b. Poa glauca subsp. **altaica** (Trinius) Olonova & G. Zhu, **comb. et stat. nov.**

阿尔泰早熟禾 a er tai zao shu he

Basionym: *Poa altaica* Trinius in Ledebour, Fl. Altaic. 1: 97. 1829; *P. tristis* Trinius ex Regel.

Culms (10–)20–35 cm tall, usually green. Leaf blade usually flat and broad, 1.5–2 mm wide. Panicle branches thin, frequently curved, erect. Callus webbed. 2*n* = 28, 42.

Alpine grassy places; 2300–3600 m. ?Xinjiang [Kazakhstan, Russia (Altai)].

Poa glauca subsp. *altaica* is currently known only from high elevations in Kazakhstan and the SW Altai region of Russia. Although no examples have been seen from China, the subspecies might be found in the neighboring province Xinjiang. The type of *P. tristis* looks like an immature specimen of subsp. *altaica*.

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