

18. Tribe ARUNDINEAE

芦竹族 lu zhu zu

Liu Liang (刘亮); Sylvia M. Phillips

Perennials, mostly tall reeds, culms hollow. Leaf blades linear or broadly linear; ligule a line of hairs or membranous. Inflorescence an open or contracted panicle, often large and plumose with numerous spikelets. Spikelets laterally compressed, florets 2 to several, fertile with uppermost reduced, or lowest sterile, disarticulating above glumes and between florets, lowest persistent when sterile; floret callus truncate to linear, glabrous, laterally pilose or long-plumose; glumes persistent, variable in length, shorter than lemmas or as long as spikelet, membranous, 1–5-veined, apex acute to acuminate; lemmas narrow, rounded on back, hyaline to chartaceous, 1–7-veined, glabrous or plumose, apex acute or 2-toothed, awnless or a short straight awn arising from apex; palea short or subequaling lemma. Stamens 2 or 3. Caryopsis with hilum short or long-linear. Leaf anatomy non-Kranz; microhairs slender with long, narrow terminal cell. $x = 9$ or 12 .

Four genera and ten species: one genus cosmopolitan, otherwise temperate Old World, but widely introduced elsewhere; three genera and six species in China.

The circumscription of this tribe is not yet settled. It is recognized here in the narrow sense, to include the tall, reedlike grasses with unspecialized spikelets, and their near relatives.

- 1a. Plants tufted; leaf blades articulated; culms up to 1 m tall; lemmas glabrous 114. *Molinia*
 1b. Plants reedlike; leaf blades cauline, persistent; culms up to 6 m tall (if less than 1 m, lemmas plumose).
 2a. Spikelet hairs arising from lemma back; ligule membranous 115. *Arundo*
 2b. Spikelet hairs arising from floret callus; ligule ciliate 116. *Phragmites*

114. MOLINIA Schrank, Baier. Fl. 1: 100, 334. 1789.

麦氏草属 mai shi cao shu

Moliniopsis Hayata.

Perennial. Culms tufted, internodes unequal, the lowest short, clavately swollen and persisting for several years. Leaves all in lower part of culm, leaf sheaths longer than internodes; leaf blades linear, articulated with sheath; ligule a line of hairs. Inflorescence an open or contracted panicle. Spikelets weakly laterally compressed, florets 2 to several, disarticulating above glumes and between florets; rachilla internodes slender, usually 1/3–1/2 length of lemma; glumes shorter than lowest lemma, 1–3-veined; floret callus truncate, glabrous or bearded; lemmas papery, 3(–5)-veined, glabrous, apex acute; palea almost as long as lemma, keels ciliate or glabrous.

Two species: one from W Europe to W Siberia, the other in E Asia; one species in China.

The second species in the genus, *Molinia caerulea* (Linnaeus) Moench, differs in its 1-veined glumes, shorter, glabrous callus, and more prominently veined lemmas. Both species are very variable in habit.

1. Molinia japonica Hackel, Bull. Herb. Boissier 7: 704. 1899.

拟麦氏草 ni mai shi cao

Molinia hui Pilger; *Moliniopsis hui* (Pilger) Keng; *M. japonica* (Hackel) Hayata.

Shortly rhizomatous perennial. Culms stiffly erect, 60–100 cm tall, 2–5 mm in diam., unbranched. Leaf sheaths usually thinly pilose, a ring of short hairs externally at junction with blade; leaf blades tough, 30–60 cm, 3–14 mm wide, midvein convex on abaxial surface, adaxial surface paler, glabrous or thinly pilose, apex acuminate; ligule 0.5–1 mm. Panicle 15–40 cm, open; primary branches ascending, branched from base,

spikelets loosely appressed to secondary branches. Spikelets 6.5–10 mm, with 3–5 spaced florets, uppermost floret reduced, smooth, glossy; rachilla internodes 1.5–2 mm, puberulous, often with longer hair-tuft at apex; glumes much shorter than lowest lemma, 3-veined; lower glume ovate, 2–4 mm, acute; upper glume elliptic-ovate, 3–5 mm, subacute; callus hairs 1–2 mm; lemmas ovate-oblong, 4–7 mm, inconspicuously 3-veined, subacute; palea ciliate along upper keels. Anthers 2–3 mm. Fl. and fr. Jul–Aug. $2n = 50$.

Moist upland grasslands and moorlands, in the open or in shade; ca. 1500 m. Anhui, Zhejiang [Japan, S Korea, Russia (S Kuril Islands, S Sakhalin)].

115. ARUNDO Linnaeus, Sp. Pl. 1: 81. 1753.

芦竹属 lu zhu shu

Perennials, usually tall reeds, rhizomatous. Culms usually robust, rarely rather slender, hollow. Leaf blades cauline, broadly linear, tough, flat, base rounded or cordate; ligule membranous with minutely ciliate margin. Inflorescence a large, copiously branched, plumose panicle of numerous spikelets. Spikelets wedge-shaped, laterally compressed, florets 2–5, disarticulating above

glumes and between florets; rachilla internodes glabrous; glumes subequal, narrow, as long as spikelet, membranous, 3–5-veined; floret callus laterally pilose; lemmas narrow, membranous, rounded on back, 3–7-veined, plumose below middle with spreading silky-white hairs, tapering to an entire or bidentate apex tipped by a straight awnlet; palea 1/2–2/3 length of lemma body, keels glabrous or shortly ciliate. $x = 12$.

Three species: Mediterranean region to China; two species in China.

- 1a. Culms 2–6 m tall; lemmas 8–11 mm, hairs 5–6 mm 1. *A. donax*
 1b. Culms 0.6–1.2 m tall; lemmas 3.5–6 mm, hairs 1.5–3 mm 2. *A. formosana*

1. *Arundo donax* Linnaeus, Sp. Pl. 1: 81. 1753.

芦竹 lu zhu

Aira bengalensis (Retzius) J. F. Gmelin; *Amphidonax bengalensis* (Retzius) Nees ex Steudel (1854), not Roxburgh ex Nees (1836); *Arundo bengalensis* Retzius; *A. coleotricha* (Hackel) Honda; *A. donax* var. *coleotricha* Hackel; *Donax arundinaceus* P. Beauvois; *D. bengalensis* (Retzius) P. Beauvois; *Scolochloa donax* (Linnaeus) Gaudin.

Robust reed from a thick knotty rhizome. Culms very stout, erect, 2–6 m tall, 1–1.5 cm in diam., unbranched or with bamboolike clusters of slender branches from nodes. Leaf sheaths longer than internodes, usually glabrous except long pilose at mouth; leaf blades 30–60 × 2–5 cm, margins scabrous, tapering to a slender filiform apex; ligule 0.7–1.5 mm. Panicle 30–60 cm, dense, usually purplish; branches 10–25 cm, ascending. Spikelets 10–15 mm, florets 2–5; glumes narrowly lanceolate, 8–12 mm, 3–5-veined, lower glume acute, upper glume sharply acuminate; lemmas linear-lanceolate, 8–11 mm, 3–7-veined, dorsal hairs 5–6 mm, apex minutely bidentate with 1–2 mm awnlet from sinus, lateral veins also shortly extended; palea 1/2 length of lemma body. Fl. and fr. Oct–Dec.

River banks and other damp places, but it will also grow when planted in dryish habitats. Fujian, Guangdong, Guizhou, Hainan, Hunan, Jiangsu, Sichuan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, Cambodia, India, Indonesia, Japan, Kazakhstan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; N Africa, C and SW Asia, S Europe; widely introduced elsewhere].

Forms with variegated leaf blades are sometimes cultivated in gar-

dens, e.g., var. *versicolor* (Miller) Stokes (*Arundo versicolor* Miller), with longitudinally green- and white-striped leaf blades. *Arundo donax* var. *coleotricha* refers to a wild variant with pubescent leaf sheaths.

The culms have many uses, including light construction, basket making, matting, musical pipes, and ornaments.

2. *Arundo formosana* Hackel, Bull. Herb. Boissier 7: 724. 1899.

台湾芦竹 tai wan lu zhu

Arundo formosana var. *gracilis* Hackel; *A. formosana* var. *robusta* Conert; *A. parviflora* Ohwi.

Tufted perennial from a short rhizome. Culms relatively slender, suberect to pendant, 0.6–1.2 m tall, 2–6 mm in diam., with slender clusters of branches from nodes. Leaf sheaths longer than internodes, glabrous; leaf blades 10–25 × 0.5–1.5 cm, margins scabrous, basal part with long silky hairs, apex acuminate; ligule 0.5–1 mm. Panicle 10–30 cm, loosely contracted, light brownish; branches 5–8 cm, ascending. Spikelets 6–10 mm, florets 2–5, uppermost floret much reduced; glumes 3–4 mm, 3-veined, lower glume lanceolate-elliptic, acuminate, upper glume lanceolate, acuminate; lemmas narrowly lanceolate, 3.5–6 mm, 5-veined, dorsal hairs 1.5–3 mm, apex subentire to minutely bidentate with 1.5–3 mm awn from sinus, lateral veins shortly extended or not; palea 2/3 length of lemma body. Fl. and fr. Jun–Dec.

Dry coastal grassland and sea cliffs. Taiwan [Japan (Iriomote Island in S Ryukyu Islands), Philippines].

The culms are used for basket making.

116. PHRAGMITES Adanson, Fam. Pl. 2: 34, 559. 1763.

芦苇属 lu wei shu

Perennial reeds, rhizomatous. Culms tall, erect, leafy, hollow. Leaf blades all cauline, broadly linear, base rounded, deciduous; ligule membranous with ciliate margin. Inflorescence a large, plumose, copiously branched panicle with numerous, crowded, silky-hairy spikelets. Spikelets laterally compressed, with several loosely arranged florets, lowest floret masculine or empty, resembling glumes but longer, persistent, succeeding florets bisexual, rachilla disarticulating between bisexual florets; glumes shorter than lemmas, unequal, papery, 3–5-veined; floret callus linear, silky-plumose with long spreading hairs; lemmas of bisexual florets very narrow, hyaline, 1–3-veined, glabrous, entire, long caudate; palea short, hyaline. Stamens 2 or 3.

Four or five species: cosmopolitan; three species in China.

This is a genus of tall, aquatic or semiaquatic reeds found in nearly all parts of the world. The species are very variable, closely related, and indistinctly separated. Liu (*Phragmites* Resources, 1989) recognized five varieties in *Phragmites japonicus*, five varieties in *P. karka*, and 74 varieties in *P. australis*!

Arundo and *Neyraudia* have a similarly tall, reedy habit and plumose panicle, but both differ from *Phragmites* in the spikelet hairs arising on the lemmas and not on the floret callus. *Neyraudia* is further distinguished by its solid culms. *Arundo* generally has broader leaves cordate at the junction with the sheath.

Phragmites reeds provide a source of fiber, the rhizomes have medicinal uses, and the plants also aid soil retention. Reed beds can also be used for the purification of water.

- 1a. Lower glume 1/2–3/5 length of lowest lemma; stolons bent zigzag, nodes hirsute 1. *P. japonicus*
 1b. Lower glume up to 1/2 length of lowest lemma; stolons if present straight, nodes glabrous.
 2a. Spikelets 10–18 mm; upper glume 6–9 mm; panicle branches usually spiculate to base; culms up to 2 m tall ... 2. *P. australis*
 2b. Spikelets 8–10 mm; upper glume 3.5–5 mm; panicle branches often bare around lowermost node; culms
 4–6 m tall 3. *P. karka*

1. *Phragmites japonicus* Steudel, Syn. Pl. Glumac. 1: 196. 1854.

日本苇 ri ben wei

Phragmites japonicus var. *prostratus* (Makino) L. Liu; *P. prostratus* Makino; *P. serotinus* Komarov.

Perennial with underground rhizomes and long overground stolons; stolons bent zigzag, nodes hirsute. Culms up to 2 m tall, 4–5 mm in diam., nodes pubescent. Leaf sheaths tinged purple upward; leaf blades 10–30 × 2–3 cm, margins scabrous, apex acuminate; ligule 0.2–0.6 mm, ciliolate, hairs ca. 0.1 mm. Panicle 20–30 × 5–8 cm; axis puberulous; pedicels 6–7 mm, pilose, hairs soft, up to 2 mm. Spikelets purplish, 8–12 mm, florets 3–4; glumes acute, lower glume 1/2–3/5 length of lowest lemma, ca. 5 mm, upper glume ca. 5.5 mm; lowest lemma linear-lanceolate, 6–10 mm; floret callus bare in lower 1/3, upper 2/3 with silky hairs 3/4 length of lemma; bisexual lemmas very narrowly lanceolate, 6–9 mm, apex acuminate. $2n = 48$.

Swamps and lakesides; 200–1000 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia (Far East, Kuril Islands)].

2. *Phragmites australis* (Cavanilles) Trinius ex Steudel, Nomencl. Bot., ed. 2, 1: 143. 1840.

芦苇 lu wei

Arundo australis Cavanilles, Anales Hist. Nat. 1: 100. 1799; *A. phragmites* Linnaeus; *Phragmites communis* Trinius.

Robust perennial from an extensive creeping rhizome; overground stolons sometimes present, straight, nodes glabrous. Culms up to 2 m or more tall, ca. 6 mm in diam., usually farinose below nodes, nodes glabrous or pubescent. Leaf sheaths light green, glabrous or thinly hairy; leaf blades usually drooping, up to 50 × 1–3 cm, smooth or margins scabrous, tapering to a filiform apex; ligule a minute membranous rim, ciliate, hairs 0.2–0.6 mm. Panicle 20–50 × ca. 10 cm, branches of lowermost whorl usually spiculate to base, densely hirsute at insertion; pedicels 2–4 mm, glabrous or pilose only at base. Spikelets 10–18 mm, florets 2–5; glumes acute, lower glume up to 1/2 length of lowest lemma, 3–5 mm, upper glume 6–9 mm; lowest lemma linear-lanceolate, 8–15 mm; floret callus with hairs equal to lemma; bisexual lemmas very narrowly lanceolate, 9–16 mm,

apex long attenuate. Fl. and fr. Jul–Nov. $2n = 36, 44, 46, 48, 49, 50, 51, 52, 54, 84, 96, 120$.

Moist places along river banks and lake margins, forming large colonies. Throughout China [cosmopolitan].

This is an extremely polymorphic, cosmopolitan reed with numerous chromosomal variants and ecotypes. Plants from the high Himalayas sometimes form short, leafy tufts with strongly distichous, short, pungent leaf blades. Similar variants occur elsewhere in the world in extreme conditions.

3. *Phragmites karka* (Retzius) Trinius ex Steudel, Nomencl. Bot., ed. 2, 1: 144. 1840.

卡开芦 ka kai lu

Arundo karka Retzius, Observ. Bot. 4: 21. 1786; *A. roxburghii* Kunth; *Phragmites cinctus* (J. D. Hooker) B. S. Sun; *P. roxburghii* (Kunth) Steudel; *Trichoon roxburghii* (Kunth) Wight.

Robust perennial from an extensive creeping rhizome. Culms very stout, often woody, 4–6 m tall, 1.5–2.5 cm in diam. Leaf sheaths greenish, glabrous; leaf blades erect-ascending, up to 80 × 2–3 cm, abaxial surface scabrous, apex stiff, long acuminate; ligule 0.5–1 mm, ciliolate. Panicle 30–50 × 10–20 cm; branches of lowermost whorl bare of spikelets toward base, ± glabrous at insertion. Spikelets 10–12 mm, florets 4–6; glumes lanceolate-elliptic, obtuse to acuminate, lower glume up to 1/2 length of lowest lemma, 2.5–4 mm, upper glume 3.5–5 mm; lowest lemma narrowly elliptic, 7–12 mm; floret callus with hairs 4–8 mm; bisexual lemmas linear-lanceolate, 8.5–10 mm, apex long attenuate. Fl. and fr. autumn. $2n = 24, 36, 38, 48$.

Warm swampy valleys and river banks; under 1000 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Pacific Islands].

This is a very robust species found in warm parts of the Old World. It has stiffer, more scabrous leaf blades and smaller spikelets with shorter callus hairs than *Phragmites australis*.

The name "*Arundo vallatoria* Linnaeus" (Herb. Amboin. 15. 1754) belongs here, but was not validly published (see Art. 34 Ex. 2 of the Saint Louis Code), and hence neither was the combination "*Phragmites vallatoria* (Linnaeus) Veldkamp" (Blumea 37: 233. 1992).

19. Tribe DANTHONIEAE

扁芒草族 bian mang cao zu

Wu Zhenlan (吴珍兰), Chen Shouliang (陈守良); Sylvia M. Phillips

Perennial or rarely annual, occasionally forming tall tussocks, culms usually solid. Leaf blades linear to setaceous; ligule a line of hairs (*Elytrophorus* membranous). Inflorescence an open or contracted panicle, sometimes spikelike or scanty and racemelike. Spikelets alike (except *Cortaderia*, *Elytrophorus*), laterally compressed, fertile florets several, uppermost florets reduced, disarticulating between florets; floret callus usually bearded, short and obtuse or elongate; glumes persistent (except *Schimus*), variable in length, shorter than lemmas to as long as spikelet, usually membranous, 1–9-veined, apex acute to acuminate; lemmas rounded on back, hyaline to leathery, glabrous, pilose or villous, hairs sometimes in tufts, (1–)3–11-veined, apex entire or 2-lobed, awnless or a