

hairs, midvein scabrous, apex obtuse, clearly demarcated from awn; awn 1–1.5 cm; lemma 0.5–1 mm. Anthers ca. 0.3 mm. Caryopsis terete, narrowly ellipsoid, 1–1.8 mm.

Stream banks, roadsides, other weedy places, on sandy soil. Guangdong, Hainan, Shandong, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa (probably introduced), Australia (Queensland)].

**3. *Perotis hordeiformis*** Nees in Hooker & Arnott, Bot. Beechey Voy. 248. 1838.

麦穗茅根 mai sui mao gen

*Perotis chinensis* Gandoger.

Annual or short-lived perennial. Culms loosely tufted, erect or decumbent at base, 25–40 cm tall. Leaf sheaths glabrous; leaf blades lanceolate to narrowly ovate, 2–4 cm, 4–7

mm wide, glabrous, margins spiny-scabrous or loosely ciliate near base; ligule ca. 0.5 mm. Inflorescence up to 20 cm; spikelets usually densely arranged, ascending or horizontally spreading; rachis scabrous. Spikelets 1.5–2.5 mm (excluding awns); basal callus 0.1–0.2 mm, obtuse; glumes narrowly lanceolate, back scaberulous-hirtellous in rather indistinct close rows (most obvious toward lemma base), midvein pectinate-ciliolate, apex abruptly acute, clearly demarcated from awn; awn 0.5–1.5 cm. Anthers ca. 0.3 mm. Caryopsis terete, narrowly ellipsoid, ca. 1.5 mm. Fl. and fr. summer and autumn.  $2n = 40$ .

Sandy places, along seashores. Guangdong, Hebei, Jiangsu, Yunnan [India, Indonesia, Malaysia, Nepal, Myanmar, Pakistan, Sri Lanka, Thailand].

This species is very close to *Perotis indica* and is sometimes included within it. No single character by itself is reliable for separating the two, but the combination of characters given in the key will usually suffice.

## 24. Tribe PANICEAE

黍族 shu zu

Chen Shouliang (陈守良); Sylvia M. Phillips, Stephen A. Renvoize

Perennial or annual. Leaf blades usually linear or lanceolate; ligule membranous, a line of hairs, or a short membrane with ciliate fringe (rarely absent in some *Echinochloa*). Inflorescence variable, an open to spike-like panicle or composed of unilateral racemes, these digitate or spread along a central axis; spikelets single, paired or clustered, sometimes supported by spines or bristles. Spikelets all alike (sexes separate in *Spinifex* and *Thuarea*), florets 2, without a rachilla extension, lower floret staminate or barren, upper floret bisexual, spikelets dorsally or infrequently lightly laterally compressed, falling entire, usually awnless; glumes membranous or herbaceous, lower glume usually shorter than the spikelet and sometimes very small or rudimentary, upper glume often as long as the spikelet; lower lemma usually as long as the spikelet and resembling the upper glume, with or without a palea; upper floret commonly indurated, tightly enclosing the caryopsis, lemma margins narrow and inrolled or broad and hyaline. Caryopsis with a large embryo 1/3–1/2 its length, hilum punctiform (rarely linear in *Acroceras*, *Oplismenus*, and some *Panicum*). Leaf anatomy: mixed, including non-Kranz, Kranz MS, and Kranz PS types.  $x = 9$ , occasionally 10 (rarely other numbers reported).

About 100 genera and ca. 2000 species: tropical and subtropical regions of the world, extending into temperate regions especially in North America; 27 genera (one endemic, two introduced) and 145 species (16 endemic, 12 introduced) in China.

The *Paniceae* are a distinctive tribe on account of the uniform pattern of deciduous, 2-flowered spikelets with a staminate or barren lower floret and an indurated, fertile upper floret enclosing the caryopsis.

- 1a. Plants dioecious; female inflorescence a large globose spiny head ..... 179. *Spinifex*  
 1b. Plants bisexual; inflorescence not as above.  
 2a. Spikelets of 2 kinds, the upper staminate portion of the raceme folding over 1–2 bisexual spikelets ..... 168. *Thuarea*  
 2b. Spikelets all alike.  
 3a. Spikelets (at least some of them) subtended by bristles or a spiny involucre; or raceme rachis prolonged into a bristle or short point beyond the uppermost spikelet.  
 4a. Inflorescence of racemes, only the uppermost spikelet of each raceme subtended by a bristle or short (often inconspicuous) point.  
 5a. Racemes ending in a long bristle; upper glume acuminate-aristate ..... 176. *Pseudoraphis*  
 5b. Racemes ending in an inconspicuous point; upper glume not awned.  
 6a. Racemes very short, sunk in pockets on the broad or thick inflorescence axis; upper lemma smooth ..... 173. *Stenotaphrum*  
 6b. Racemes not sunk in pockets, inflorescence axis slender; upper lemma rugose or granulate ..... 172. *Paspalidium*  
 4b. Inflorescence paniculate, often spike-like, all or many of the spikelets subtended by bristles or a spiny involucre.  
 7a. Bristles persisting on the axis after the spikelets have fallen ..... 171. *Setaria*  
 7b. Bristles or spines falling as involucre around the spikelets.  
 8a. Involucral bristles slender, free to the base ..... 177. *Pennisetum*  
 8b. Involucral bristles and spines flattened and connate below, forming a cup ..... 178. *Cenchrus*  
 3b. Spikelets not subtended by bristles; or raceme rachis terminating in a spikelet.  
 9a. Inflorescence an open, contracted or spike-like panicle; pedicels usually all slender and distinct.

- 10a. Spikelets laterally compressed.
- 11a. Glumes keeled; upper floret with wings or scars at the base ..... 155. *Ichnanthus*
- 11b. Glumes not keeled; upper floret without basal wings or scars.
- 12a. Lower lemma entire, awnless; upper lemma gibbously semiorbicular with a little greenish crest near the apex ..... 160. *Cyrtococcum*
- 12b. Lower lemma bilobed or shortly awned; upper lemma elliptic, not crested ..... 174. *Melinis*
- 10b. Spikelets dorsally compressed.
- 13a. Panicle spikelike.
- 14a. Upper glume gibbous; culms hollow ..... 158. *Sacciolepis*
- 14b. Upper glume not gibbous; culms filled with aerenchyma ..... 157. *Hymenachne*
- 13b. Panicle open, the spikelets evenly spaced or appressed along the primary branches.
- 15a. Upper glume as long as or only slightly shorter than the spikelet.
- 16a. Margins of upper palea free toward apex; trailing semi-aquatic perennial .... 157. *Hymenachne*
- 16b. Margins of upper palea clasped by upper lemma along whole length ..... 156. *Panicum*
- 15b. Upper glume 2/3 spikelet length or less.
- 17a. Upper glume 1/2–2/3 spikelet length, 3–5-veined; spikelets on short appressed secondary racemelets ..... 159. *Ottochloa*
- 17b. Upper glume very small, usually veinless; spikelets on long capillary pedicels ..... 175. *Digitaria*
- 9b. Inflorescence of unilateral racemes; spikelets usually single or paired; pedicels often very short, at least for one spikelet of a pair.
- 18a. Apex of upper lemma awned, crested or with a tuft of setae.
- 19a. Upper lemma awned; upper glume ciliate on the margins ..... 164. *Alloteropsis*
- 19b. Upper lemma apex crested or with a tuft of setae; upper glume glabrous.
- 20a. Apex of upper lemma with a tuft of short setae ..... 161. *Setiacticis*
- 20b. Apex of upper lemma with a little green crest ..... 162. *Acroceras*
- 18b. Apex of upper lemma not as above.
- 21a. Spikelets laterally compressed or glumes awned; leaf blades lanceolate to ovate; trailing forest grasses.
- 22a. Glumes not awned, upper glume armed with hooked bristles at maturity ..... 153. *Pseudechinolaena*
- 22b. Glumes awned, the awns often sticky ..... 154. *Oplismenus*
- 21b. Spikelets dorsally compressed; lower glume awnless.
- 23a. Spikelets densely packed in 4 rows or congested into clusters; apex of upper palea reflexed ..... 163. *Echinochloa*
- 23b. Spikelets mostly in 1 or 2 rows; apex of upper palea tucked in.
- 24a. Spikelets supported on a basal globular beadlike swelling; lower glume vestigial ..... 167. *Eriochloa*
- 24b. Spikelets without a basal beadlike swelling (rarely with a barrel-shaped basal stipe, but then lower glume well developed).
- 25a. Upper lemma cartilaginous to papery, the margins broad, flat and hyaline, covering much of the palea ..... 175. *Digitaria*
- 25b. Upper lemma coriaceous to bony with inrolled or flat margins exposing much of the palea (if texture thinner than margins inrolled).
- 26a. Lower glume present.
- 27a. Upper lemma acute, obtuse or briefly mucronulate, subequaling spikelet; spikelets plumply elliptic, acute or obtuse; back of upper lemma facing away from rachis ..... 165. *Brachiaria*
- 27b. Upper glume clearly mucronate, shorter than spikelet; spikelets plano-convex, acuminate; back of upper lemma lying against rachis ..... 166. *Urochloa*
- 26b. Lower glume absent.
- 28a. Back of upper lemma lying against rachis; spikelets strongly plano-convex, often orbicular ..... 169. *Paspalum*
- 28b. Back of upper lemma facing away from rachis; spikelets thinly biconvex, oblong-elliptic ..... 170. *Axonopus*

**153. PSEUDECHINOLAENA** Stapf, Prain, Fl. Trop. Africa 9: 494. 1919.

钩毛草属 *gou mao cao shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals. Culms trailing. Leaf blades lanceolate; ligule membranous. Inflorescence composed of several slender, loosely spiculate racemes spaced along a central axis, spikelets paired but the sessile spikelet often reduced. Spikelets laterally compressed, florets 2; glumes equaling the spikelet or slightly shorter, lower glume acute to awned, upper glume gibbous, armed at maturity with coarse, tubercle-based hooklike bristles, apex acute or rarely awned; lower lemma equaling the spikelet, papery to subcoriaceous but membranous on the margins and with a median hyaline patch at the base; upper lemma laterally compressed, obliquely ellipsoid, cartilaginous to coriaceous, margins flat or inrolled.

Six species: one species throughout the tropics (including China), five endemic to Madagascar, in forest shade.

**1. Pseudechinolaena polystachya** (Kunth) Stapf in Prain, Fl. Trop. Africa 9: 495. 1919.

钩毛草 *gou mao cao*

*Echinolaena polystachya* Kunth, Nov. Gen. Sp. 1: 119. 1816; *Panicum heteranthum* Link; *P. uncinatum* Raddi.

Culms slender, stoloniferous, rooting and forming a loose mat, up to 50 cm tall. Leaf sheaths usually shorter than the internodes; leaf blades lanceolate, thin, 2–8 × 0.6–1.2 cm, glabrous or hispidulous, apex acute or acuminate; ligule 1–2 mm.

Inflorescence narrow, 5–15 cm, bearing 3–5 loosely ascending racemes with distant spikelet pairs, lowest raceme 1–4 cm; pedicels 1–2 mm. Spikelets 4–5 mm; glumes papery, the lower lanceolate, 3-veined, acuminate, the upper thicker, navicular, 7-veined, with tubercle-based hooks between the veins; lower lemma 7-veined; upper lemma subcoriaceous, ca. 3 mm, pale, glossy. Caryopsis fusiform, ca. 2.5 mm, acute. Fl. and fr. Sep–Oct.  $2n = 36$ .

Forest shade. Fujian, Guangdong, Guangxi, Hainan, Xizang, Yunnan [throughout the tropics].

## 154. OPLISMENUS P. Beauvois, Fl. Oware 2: 14. 1810 [“1807”], nom. cons.

求米草属 *qiu mi cao shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

*Orthopogon* R. Brown, nom. rej.

Perennials or annuals. Culms trailing, ascending from a decumbent base, the internodes mostly with a villous line adaxial to the subtending leaf. Leaf blades ovate, lanceolate or linear-lanceolate, often with cross veins; ligule a ciliate membrane. Inflorescence composed of several unilateral racemes spaced along a central axis; racemes elongate or reduced to fascicles of a few spikelets, spikelets usually paired on short pedicels, the lowermost often reduced. Spikelets lanceolate to oblong, weakly dorsally or laterally compressed, florets 2; glumes subequal, 1/2–3/4 spikelet length, often pilose, the lower or both tipped by a viscid awn; lower lemma equaling the spikelet, acute to shortly awned, its palea absent or much reduced; upper lemma papery or subcoriaceous, smooth and shiny, acute, indistinctly crested.  $x = 9$ .

Five to nine species: throughout the tropics and subtropics; four species (one endemic) in China.

This is a genus of closely related, intergrading species where the number of taxa meriting recognition is still open to doubt.

- 1a. Racemes reduced to dense cuneate fascicles less than 2 cm long ..... 1. *O. undulatifolius*  
 1b. Racemes elongate, 2–10 cm long.  
 2a. Spikelets single; fertile lemma mucronate at apex ..... 4. *O. patens*  
 2b. Spikelets paired or 3 at the base; fertile lemma acute at apex.  
 3a. Awn of lower glume 2–3 times longer than glume body ..... 2. *O. compositus*  
 3b. Awn of lower glume equaling or slightly longer than glume body ..... 3. *O. fujianensis*

**1. Oplismenus undulatifolius** (Arduino) Roemer & Schultes, Syst. Veg. 2: 482. 1817.

求米草 *qiu mi cao*

Perennial. Culms slender, straggling, ascending from a prostrate base, 20–50 cm tall. Leaf sheaths usually densely tuberculate-hairy, less often glabrous; leaf blades lanceolate to narrowly ovate, 1–15 × 0.3–3 cm, glabrous or variously hairy, base subrounded and usually suboblique, apex acute; ligule ca. 1 mm. Inflorescence axis 9–15 cm, glabrous or hispidulous; racemes 4–9, reduced to dense cuneate fascicles less than 2 cm long, the rachis often setose. Spikelets in 3–5 clustered pairs, lanceolate, hispidulous; glumes herbaceous, awned, the awns stout, purple, viscid; lower glume 3–5-veined, awn 5–10(–15) mm; upper glume 5-veined, awn 2–5 mm; lower lemma herbaceous, 5–9-veined, apex with a stout 1–2 mm mucro, palea ab-

sent; upper lemma subcoriaceous, smooth. Fl. and fr. Jul–Nov.  $2n = 54$ .

Light shade in forests, moist places. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [warm-temperate and subtropical regions of the N hemisphere, uplands of India and Africa].

*Oplismenus undulatifolius* is sometimes considered synonymous with *O. hirtellus* (Linnaeus) P. Beauvois. Although the two taxa intergrade, *O. hirtellus* (*O. aemulus* (R. Brown) Roemer & Schultes) generally has longer racemes (to 3 cm) of contiguous spikelets, at least in the lower part of the inflorescence. It has a more tropical distribution than *O. undulatifolius* and has recently been reported from Taiwan and Yunnan.

- 1a. Inflorescence with short branches.  
 2a. Leaves and inflorescence axis

- hispidulous, or leaf blades densely tuberculate-hairy ..... 1a. var. *undulatifolius*
- 2b. Leaves and inflorescence axis glabrous or scabrous, or rarely leaf blades puberulous.
- 3a. Leaf blades broadly lanceolate to narrowly ovate-elliptic, 5–15 × 1.2–3 cm, glabrous or scabrous ..... 1b. var. *japonicus*
- 3b. Leaf blades linear-lanceolate to narrowly lanceolate, 4–9 × 0.5–1 cm, glabrous or puberulous ... 1c. var. *imbecillis*
- 1b. Inflorescence with spikelets practically sessile on main axis.
- 4a. Leaves and inflorescence axis hispidulous or with tubercle-based hairs ..... 1d. var. *binatus*
- 4b. Leaves and inflorescence axis glabrous or scabrous.
- 5a. Leaf blades 1–3 × 0.3–0.5 cm ..... 1e. var. *microphyllus*
- 5b. Leaf blades 5–10 × 1–2 cm ..... 1f. var. *glaber*

**1a. *Oplismenus undulatifolius* var. *undulatifolius***

求米草(原变种) qiu mi cao (yuan bian zhong)

*Panicum undulatifolium* Arduino, Animadv. Bot. Spec. Alt. 14, t. 4. 1764; *Orthopogon undulatifolius* (Arduino) Sprengel.

Leaf blades densely hairy with tubercle-based hairs. Inflorescence with short branches, the axis hispidulous. Fl. and fr. Jul–Nov.  $2n = 54$ .

Light shade in forests, moist places, common. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [warm-temperate and subtropical regions of the N hemisphere, uplands of India and Africa].

**1b. *Oplismenus undulatifolius* var. *japonicus* (Steudel) G. Koidzumi, Bot. Mag. (Tokyo) 39: 302. 1925.**

日本求米草 ri ben qiu mi cao

*Panicum japonicum* Steudel, Flora 29: 18. 1846; *Oplismenus japonicus* (Steudel) Honda.

Leaf sheaths glabrous; leaf blades broadly lanceolate or narrowly ovate-elliptic, 5–15 × 1.2–3 cm, glabrous or scabrous. Inflorescence axis up to 15 cm, glabrous. Fl. and fr. Aug–Nov.

Roadsides, moist grasslands. Anhui, Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan].

**1c. *Oplismenus undulatifolius* var. *imbecillis* (R. Brown) Hackel, Publ. Bur. Sci. Gov. Lab. 25: 82. 1906 [“1905”].**

狭叶求米草 xia ye qiu mi cao

*Orthopogon imbecillis* R. Brown, Prodr. 194. 1810; *Oplismenus imbecillis* (R. Brown) Roemer & Schultes; *O. imbecillis* var. *morrisonensis* Honda; *Panicum imbecille* (R. Brown) Trinius.

Leaf sheaths glabrous and smooth, or ciliate along the margins; leaf blades narrowly lanceolate or linear-lanceolate, 4–

9 × 0.5–1 cm, glabrous or puberulous. Inflorescence axis glabrous. Spikelets usually pilose. Fl. and fr. Aug–Nov.

Hill slopes, moist grasslands. Anhui, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Taiwan, Yunnan, Zhejiang [Japan].

**1d. *Oplismenus undulatifolius* var. *binatus* S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 471. 1984.**

双穗求米草 shuang sui qiu mi cao

Leaf blades and inflorescence axis hispidulous or with tubercle-based hairs. Spikelets 2 per node.

• Moist places in forests. Anhui, Hebei, Jiangsu, Zhejiang.

**1e. *Oplismenus undulatifolius* var. *microphyllus* (Honda) Ohwi, Bot. Mag. (Tokyo) 55: 546. 1941.**

小叶求米草 xiao ye qiu mi cao

*Oplismenus microphyllus* Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 274. 1930; *O. hirtellus* (Linnaeus) P. Beauvois var. *microphyllus* (Honda) Fosberg & Sacht; *O. hirtellus* subsp. *microphyllus* (Honda) U. Scholz.

Leaf blades 1–3 × 0.3–0.5 cm, glabrous or scabrous. Spikelets 2 per node, or 3 per node at base, one spikelet usually sterile.

Moist grassy places in forests. Taiwan [Philippines].

**1f. *Oplismenus undulatifolius* var. *glaber* S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 471. 1984.**

光叶求米草 guang ye qiu mi cao

Plant glabrous except for ciliate margins of leaf sheaths; leaf blades 5–10 × 1–2 cm, glabrous. Spikelets 2 per node.

• Moist places in forests. Anhui, Hunan, Shanxi, Sichuan, Zhejiang.

**2. *Oplismenus compositus* (Linnaeus) P. Beauvois, Ess. Agrostogr. 54. 1812.**

竹叶草 zhu ye cao

Perennial. Culms stoloniferous, straggling, ascending to 20–80 cm. Leaf sheaths glabrous, pilose or tuberculate-hairy; leaf blades lanceolate to ovate-lanceolate, 3–20 × 0.5–3 cm, subglabrous to tuberculate-hairy, base usually oblique. Inflorescence axis 5–15 cm, glabrous to tuberculate-hairy; racemes 3–6, 2–6 cm, ascending to erect. Spikelets in 7–14 widely spaced, sometimes patent pairs, lanceolate, glabrous to thinly pilose; glumes herbaceous, awned, the awns stout, green or purple, viscid; lower glume awn 5–10 mm; upper glume awn to 3 mm or occasionally absent; lower lemma subcoriaceous, 7–9-veined, acute or with a stout 0.3–1 mm mucro; upper lemma subcoriaceous, ca. 2.5 mm, smooth. Fl. and fr. Sep–Nov.  $2n = 54, 72^*$ .

Moist places in forests and along forest margins, hill slopes. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Philippines, Thailand, and elsewhere in tropical Asia extending westward through India to E Africa; Australia, Pacific Islands (Polynesia)].

1a. Panicle axis, rachis, leaf sheaths, and leaf

blades pilose, hispid or tuberculate-hairy;  
upper glume awned.

2a. Leaf blades 5–10 × 0.5–1.8 cm

..... 2d. var. *intermedius*

2b. Leaf blades 10–20 × 2–3 cm ..... 2e. var. *owatarii*

1b. Panicle axis, rachis, leaf sheaths, and leaf blades glabrous, or puberulous or only ciliate at the mouth of the leaf sheath; or if panicle axis pilose, then upper glume awnless.

3a. Leaf blades 9–13 × 1.2–2.5 cm;

spikelets 3.5–4 mm ..... 2c. var. *formosanus*

3b. Leaf blades 3–8 × 0.8–1.4 cm;  
spikelets 2.5–3.5 mm.

4a. Upper glume with 1–2 mm

awn ..... 2a. var. *compositus*

4b. Upper glume awnless ..... 2b. var. *submuticus*

## 2a. *Oplismenus compositus* var. *compositus*

竹叶草(原变种) zhu ye cao (yuan bian zhong)

*Panicum compositum* Linnaeus, Sp. Pl. 1: 57. 1753; *P. aristatum* Retzius.

Leaf sheaths subglabrous or puberulous; leaf blades 3–8 × 0.8–1.4 cm, glabrous or margins ciliate. Inflorescence axis glabrous or puberulous. Spikelets ca. 3 mm; lower glume awn 7–20 mm, upper glume awn 1–2 mm. Fl. and fr. Sep–Nov. 2n = 54, 72\*.

Moist places in forests. Guangdong, Guizhou, Jiangxi, Sichuan, Taiwan, Yunnan [tropical Asia extending westward through India to E Africa; Australia, Pacific Islands (Polynesia)].

2b. *Oplismenus compositus* var. *submuticus* S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 470. 1984.

无芒竹叶草 wu mang zhu ye cao

Leaf sheaths glabrous except for ciliate margins; leaf blades 3–8 × 0.8–1.4 cm. Inflorescence axis scabrous or pilose. Spikelets ca. 3 mm; lower glume awn 5–10 mm; upper glume without awn. Fl. and fr. autumn.

• Moist places along forest margins. Sichuan, Yunnan.

2c. *Oplismenus compositus* var. *formosanus* (Honda) S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 470. 1984.

台湾竹叶草 tai wan zhu ye cao

*Oplismenus formosanus* Honda, Repert. Spec. Nov. Regni Veg. 20: 361. 1924.

Leaf blades lanceolate, 9–13 × 1.2–2.5 cm, usually glabrous. Inflorescence axis usually glabrous. Spikelets 3.5–4 mm; upper glume awn to 3 mm. Fl. and fr. autumn.

• Moist places in forests. Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan.

2d. *Oplismenus compositus* var. *intermedius* (Honda) Ohwi, Acta Phytotax. Geobot. 11: 35. 1942.

中间型竹叶草 zhong jian xing zhu ye cao

*Oplismenus burmannii* var. *intermedius* Honda, Bot. Mag. (Tokyo) 38: 191. 1924.

Leaf sheaths densely tuberculate-hairy, margins ciliate; leaf blades 5–10 × 0.5–1.8 cm, base cordate. Inflorescence axis pilose or hispid. Spikelets 3–3.5 mm; lower glume awn 5–10 mm; upper glume awn shorter. Fl. and fr. autumn.

Moist places in forests, hill slopes. Guangdong, Guangxi, Sichuan, Taiwan, Yunnan, S Zhejiang [Japan, Philippines].

2e. *Oplismenus compositus* var. *owatarii* (Honda) J. Ohwi, Acta Phytotax. Geobot. 11: 35. 1942.

大叶竹叶草 da ye zhu ye cao

*Oplismenus owatarii* Honda, Repert. Spec. Nov. Regni Veg. 20: 316. 1924.

Leaf sheaths, leaf blades, and inflorescence axis densely hairy with long, soft or tubercle-based hairs; leaf blades 10–20 × 2–3 cm. Spikelets ca. 4 mm; lower glume awn ca. 8 mm; upper glume awn ca. 1 mm. Fl. and fr. autumn.

Undergrowth in moist forests on hill slopes. Guangdong, Guizhou, Taiwan, Yunnan [Japan, Thailand].

3. *Oplismenus fujianensis* S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 469. 1984.

福建竹叶草 fu jian zhu ye cao

Culms decumbent at the base, 40–80 cm tall. Leaf sheaths densely hairy with tubercle-based hairs; leaf blades lanceolate or ovate-lanceolate, 5–10 × 1.5–2.5 cm, densely pubescent on both surfaces, base oblique, apex acute. Ligule a ciliate membrane. Inflorescence axis 10–15 cm, densely tuberculate-hairy; racemes 2–5 cm. Spikelets secund, paired or 3 at the base of raceme, closely spaced, ovate-lanceolate, 2.5–3 mm, pilose; glumes herbaceous, lower glume 3–5-veined, awn 2–4 mm, equaling or only slightly longer than the glume body; upper glume acute or with a ca. 0.5 mm mucro; lower lemma 7–9-veined, lower palea membranous, short and narrow; upper lemma smooth. Fl. and fr. Jul–Oct.

• Moist places in thickets. Fujian.

4. *Oplismenus patens* Honda, Repert. Spec. Nov. Regni Veg. 20: 360. 1924.

疏穗竹叶草 shu sui zhu ye cao

Culms slender, 30–60 cm tall, glabrous. Leaf sheaths glabrous except for ciliate margins; leaf blades linear-lanceolate to ovate-lanceolate, 5–15 × 0.4–3.5 cm, glabrous on both surfaces; ligule membranous, ciliolate. Inflorescence axis 20–25 cm, glabrous or puberulous; racemes 5–8, 6–10 cm. Spikelets borne singly, ovate-lanceolate; glumes both awned; lower glume awn ca. 10 mm, upper glume awn 1/5–1/2 length of awn of lower glume; lower lemma equaling spikelet, 7–9-veined, dorsally puberulous, margins ciliate, awn 1–2.5 mm, lower palea absent; upper lemma papery or coriaceous, smooth, mucro 0.5–1 mm. Fl. and fr. Sep–Nov.

Undergrowth in moist forests on hillsides, moist places in open forests. Fujian, Guangdong, Hainan, Taiwan, Yunnan [Japan].

This species is sometimes regarded as a variant of *Oplismenus compositus*.

- 1a. Awn of upper glume 1/5 length of awn of lower glume; leaf blades linear-lanceolate to lanceolate, 0.4–0.7 cm wide ..... 4c. var. *angustifolius*
- 1b. Awn of upper glume 1/3–1/2 length of awn of lower glume; leaf blades lanceolate to lanceolate-ovate, 0.7–3.5 cm wide.
- 2a. Leaf blades 10–15 × 2–3.5 cm ..... 4a. var. *patens*
- 2b. Leaf blades 5–9 × 0.7–1.8 cm ... 4b. var. *yunnanensis*

#### 4a. *Oplismenus patens* var. *patens*

疏穗竹叶草(原变种) *shu sui zhu ye cao* (yuan bian zhong)

*Oplismenus compositus* (Linnaeus) P. Beauvois subsp. *patens* (Honda) T. Koyama; *O. compositus* var. *patens* (Honda) Ohwi.

Leaf blades oblong-lanceolate to ovate-lanceolate, 10–15 × 2–3.5 cm, glabrous on both surfaces. Upper glume awn 1/2 length of awn of lower glume. Lower lemma 7–9-veined, awn 2–2.5 mm. Fl. and fr. Sep–Nov.

Undergrowth in moist forests on hillsides. Guangdong, Hainan, Taiwan, Yunnan [Japan].

**4b. *Oplismenus patens* var. *yunnanensis*** S. L. Chen & Y. X. Jin, *Acta Phytotax. Sin.* 22: 471. 1984.

云南竹叶草 *yun nan zhu ye cao*

Leaf blades lanceolate to narrowly lanceolate, 5–9 × 0.7–1.8 cm. Upper glume awn 1/3–1/2 length of awn of lower glume. Lower lemma awn ca. 1 mm. Fl. and fr. autumn–winter.

• Moist places in open forests. Hainan, Yunnan.

**4c. *Oplismenus patens* var. *angustifolius*** (Chia) S. L. Chen & Y. X. Jin, *Acta Phytotax. Sin.* 22: 470. 1984.

狭叶竹叶草 *xia ye zhu ye cao*

*Oplismenus compositus* (Linnaeus) P. Beauvois var. *angustifolius* L. C. Chia, *Fl. Hainan.* 4: 540. 1977.

Leaf blades lanceolate to linear-lanceolate, 5–9 × 0.4–0.7 cm. Upper glume awn 1/5 length of awn of lower glume. Lower lemma 7-veined. Fl. and fr. autumn–winter.

• Moist places in open forests. Hainan, Yunnan.

## 155. *ICHNANTHUS* P. Beauvois, *Ess. Agrostogr.* 56. 1812.

距花黍属 *ju hua shu shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

*Navicularia* Raddi (1823), not Heister ex Fabricius (1759).

Perennial or rarely annual. Culms varying from tall and canelike to rambling and decumbent. Leaf blades linear to ovate but usually lanceolate and asymmetrically narrowed at the base. Inflorescence a panicle or the primary branches simple and racemelike. Spikelets lanceolate, laterally compressed, florets 2; glumes prominently keeled, 3–7-veined, acuminate; lower glume usually more than half spikelet length; upper glume equaling or longer than lower glume; upper floret with a semicircular to oblong callus, this laterally expanded into 2 membranous wings adnate to the lemma base, these often represented in dried material by scars, upper lemma dorsally compressed, smooth and shiny, the margins flat or inrolled.

About 30 species: New World tropics and subtropics, one species pantropical including China.

**1. *Ichnanthus pallens*** (Swartz) Munro ex Benth var. *major* (Nees) Stieber, *Syst. Bot.* 12: 207. 1987 [*“majus”*].

大距花黍 *da ju hua shu*

*Panicum pallens* Swartz var. *majus* Nees, *Fl. Bras. Enum.* Pl. 2: 138. 1829; *Ichnanthus vicinus* (F. M. Bailey) Merrill; *Panicum vicinum* F. M. Bailey.

Rambling perennial. Culms long, slender, decumbent and rooting at the lower nodes, ascending to 15–50 cm. Leaf sheaths pubescent or only margins ciliate; leaf blades ovate-lanceolate to ovate, tessellate, 3–8 × 1–2.5 cm, glabrous or puberulous on both surfaces, apex sharply acuminate; ligule ca. 1 mm, a ciliate membrane. Panicles terminal and axillary from upper nodes, 5–10 cm, usually with soft hairs in the axils, the branches spaced, loosely ascending, subracemose with laxly

arranged spikelets. Spikelets 4–5 mm; glumes with obvious veins, lower glume 3–3.5 mm, 3-veined, apex usually long attenuate; upper glume 5-veined, acuminate; lower lemma herbaceous, 5-veined; upper floret much shorter than lower lemma, 2–2.5 mm, shiny white to light brown, oblong, obtuse, scars at base ca. 1 mm. Fl. and fr. Aug–Nov.  $2n = 40$ .

Damp places in forests, along shady streamsides. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; W Africa, Australia (Queensland), Pacific Islands (Polynesia), South America].

*Ichnanthus pallens* var. *pallens* is distinguished by its smaller (2.5–4 mm), plumper spikelets, lower glume without a long attenuate apex, and more compact panicle. It mostly occurs in America, from Mexico to Argentina, and in the Caribbean, but a few specimens with these spikelet dimensions are known from W Africa and Malaysia.

## 156. *PANICUM* Linnaeus, *Sp. Pl.* 1: 55. 1753.

黍属 *shu shu*

Chen Shouliang (陈守良); Stephen A. Renvoize

Annuals or perennials. Culms erect, geniculate ascending or decumbent. Leaves basal or cauline; leaf blades filiform or linear to lanceolate or ovate, usually flat. Inflorescence usually a terminal open panicle, variously condensed or occasionally spicate rarely racemose. Spikelets usually symmetrical and dorsally compressed, disarticulating below the glumes; 2-flowered, the lower floret staminate or barren, the upper bisexual. Glumes herbaceous to membranous, ovate or oblong, obtuse to acute, acuminate or cuspidate; lower usually shorter than the spikelet, rarely equal, an internode between the glumes sometimes present, upper glume as long as spikelet, or slightly shorter; lower lemma similar to upper glume, with or without a palea; upper floret coriaceous, bony or cartilaginous, the margins of the lemma inrolled and clasping the palea, apex obtuse to acute or apiculate, crested or excavated. Hilum rounded to oval.  $x = 9, 10$ .

About 500 species: pantropical, extending into temperate regions of North America; 21 species (four introduced) in China.

*Panicum miliaceum* (Proso Millet) is grown in China as a cereal crop. *Panicum coloratum* (Buffalo Grass), *P. maximum* (Guinea Grass), and *P. virgatum* (Switch Grass) have been introduced to China and are widely grown for fodder.

- 1a. Upper floret rugose ..... 1. *P. maximum*  
 1b. Upper floret papillate or smooth.  
 2a. Glumes or at least the lower, acuminate to cuspidate.  
 3a. Plant perennial.  
 4a. Panicle effuse, spikelets 3.5–4 mm ..... 11. *P. elegantissimum*  
 4b. Panicle moderately branched, spikelets 2–3 mm.  
 5a. Lower glume 1/4–1/3 length of spikelet ..... 7. *P. coloratum*  
 5b. Lower glume 2/3–3/4 length of spikelet ..... 13. *P. virgatum*  
 3b. Plant annual.  
 6a. Spikelets 1.5–2 mm ..... 12. *P. humile*  
 6b. Spikelets 3–5 mm.  
 7a. Panicle dense, branches drooping; spikelets 4–5 mm; cultivated ..... 14. *P. miliaceum*  
 7b. Panicle open, branches spreading or ascending; spikelets 3–3.5 mm; wild ..... 15. *P. curviflorum*  
 2b. Glumes obtuse or acute.  
 8a. Leaf-leaf blades ovate to lanceolate.  
 9a. Culms herbaceous.  
 10a. Spikelets ca. 1.3 mm ..... 16. *P. trichoides*  
 10b. Spikelets 1.5–2 mm ..... 17. *P. brevifolium*  
 9b. Culms terete, woody.  
 11a. Lower glume separated by an internode; upper lemma glabrous at the apex ..... 18. *P. notatum*  
 11b. Lower glume not separated by an internode; upper lemma ciliolate at the apex.  
 12a. Lower glume 1/4–1/3 length of spikelet ..... 21. *P. khasianum*  
 12b. Lower glume 1/2–3/4 length of spikelet.  
 13a. Panicle branches not tangled ..... 19. *P. sarmentosum*  
 13b. Panicle branches tangled ..... 20. *P. incommutatum*  
 8b. Leaf-leaf blades linear to narrowly lanceolate.  
 14a. Panicle spikelike or if primary branches well developed then ascending or appressed and the secondary branches very short ..... 10. *P. auritum*  
 14b. Panicle open, primary branches spreading.  
 15a. Plant annual.  
 16a. Lower glume cufflike, 1/6–1/3 length of spikelet, obtuse to bluntly acute.  
 17a. All panicle branches spreading ..... 9. *P. sumatrense*  
 17b. Secondary or tertiary panicle branches appressed, lower lemma 7–9-veined ..... 3. *P. dichotomiflorum*  
 16b. Lower glume ovate or oblong, acute to acuminate, 1/3–1/2 length of spikelet.  
 18a. Lower glume not separated by an internode; spikelets in pairs and clustered toward the ends of the branches ..... 5. *P. bisulcatum*  
 18b. Lower glume separated by an internode; spikelets not in pairs, evenly spread throughout the panicle ..... 8. *P. luzonense*  
 15b. Plant perennial.  
 19a. Lower glume acute.  
 20a. Culms scrambling, woody below ..... 6. *P. amoenum*  
 20b. Culms erect, herbaceous ..... 7. *P. coloratum*  
 19b. Lower glume obtuse, cufflike.  
 21a. Secondary branches well developed, spreading; lower glume separated by an internode ..... 4. *P. decompositum*  
 21b. Secondary or tertiary branches short, appressed; lower glume not separated by an internode.

- 22a. Plant with wiry culms ..... 2. *P. repens*  
 22b. Plant with soft, herbaceous culms ..... 3. *P. dichotomiflorum*

**1. *Panicum maximum*** Jacquin, Icon. Pl. Rar. 1: 2. 1781.

大黍 da shu

*Megathyrsus maximus* (Jacquin) B. K. Simon & S. W. L. Jacobs; *Panicum hirsutissimum* Steudel; *P. jumentorum* Persoon; *P. maximum* var. *hirsutissimum* (Steudel) Oliver; *P. polygamum* Swartz.

Perennial, rhizomatous; rhizome stout. Culms robust, erect, 1–3 m tall, nodes glabrous or pilose. Leaves basal and cauline; leaf sheaths glabrous to hispid; leaf blades linear to narrowly lanceolate, flat, 20–60 × 1–3.5 cm, narrowed at base, glabrous or pilose, margins scabrid, apex acuminate; ligule 1–3 mm, membranous, with dense cilia dorsally. Panicle oblong or pyramidal in outline, 10–45 cm, much branched; branches spreading, lowest arranged in a whorl. Spikelets oblong, 3–4.5 mm, glabrous or pubescent, often tinged purple, obtuse or acute, occasionally overtopped by long hairs from apex of pedicel; lower glume broadly ovate, 1/3–1/2 length of spikelet, 3-veined, obtuse or acute; upper glume ovate-oblong, as long as spikelet, 5-veined, acute; lower floret staminate, lemma similar to upper glume, palea well developed; upper floret thinly coriaceous, pale yellow or green, shiny, finely transverse rugulose. Fl. and fr. Aug–Oct.  $2n = 32$ .

Widely cultivated for forage. Guangdong, Taiwan [native to tropical Africa and America].

**2. *Panicum repens*** Linnaeus, Sp. Pl., ed. 2, 1: 87. 1762.

铺地黍 pu di shu

Perennial, rhizomatous. Culms tough, erect or decumbent, 30–125 cm tall. Leaves cauline; leaf sheaths glabrous, striate, puberulous to ciliate on margins, especially toward throat; leaf blades linear, flat or convolute, often stiff and pungent, markedly distichous, ascending close to the culm, 7–25 × 0.2–0.8 cm, apex acute or acuminate; ligule 0.5–1.5 mm, a ciliolate membrane. Panicle terminal, narrowly oblong in outline, 5–20 cm, sparsely to moderately branched; branches glabrous, scabrid, ascending. Spikelets ovate, 2.5–3 mm, acute; lower glume broadly ovate, 1/3 length of spikelet, hyaline, 1(–3)-veined, clasping at the base of the spikelet, obtuse or acute; upper glume ovate, as long as spikelet, membranous, 7–9-veined, acute; lower floret staminate, lemma similar to upper glume, palea well developed; upper floret almost as long as spikelet, pale yellow, shiny. Fl. and fr. Jun–Nov.  $2n = 40$ .

Moist places, marine habitats, streams. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [tropical and subtropical locations worldwide].

**3. *Panicum dichotomiflorum*** Michaux, Fl. Bor.-Amer. 1: 48. 1803.

洋野黍 yang ye shu

*Panicum paludosum* Roxburgh.

Aquatic annual or rhizomatous perennial. Culms geniculate ascending, rooting at lower nodes, branching, succulent,

30–110 cm tall, upper nodes glabrous, often conspicuous. Leaves cauline; leaf sheaths striate, glabrous, lower sheaths often inflated; leaf blades linear, flat, 7–35 × 0.5–1 cm, glabrous, scabrid, base straight or subcordate, apex acute; ligule 1–2 mm, a ciliate membrane. Panicle terminal or axillary, pyramidal when fully exerted, 10–20 cm, much branched; branches glabrous, scabrid, secondary and tertiary branches often appressed. Spikelets lanceolate to narrowly ovate, 3–4 mm, glabrous, acuminate; lower glume broadly ovate, 1/6–1/3 length of spikelet, clasping at the base of the spikelet, membranous, 0–1-veined, obtuse to acute; upper glume as long as spikelet, 7–9-veined; lower lemma similar to upper glume, palea absent or present and well developed; upper floret 2/3 length of spikelet, green or pale yellow, smooth, shiny. Fl. and fr. Jun–Oct.

Shallow waters, swampy places. Fujian, Guangdong, Guangxi, Taiwan, Yunnan [India, Malaysia; tropics of the New World].

**4. *Panicum decompositum*** R. Brown, Prodr. 191. 1810.

多子黍 duo zi shu

*Panicum proliferum* Lamarck var. *decompositum* (R. Brown) Thellung.

Perennial, caespitose. Culms erect, 60–100 cm tall, nodes glabrous. Leaves basal; leaf sheaths striate, glabrous; leaf blades linear, flat, 15–30 × 0.5–0.8 cm, glabrous, tough, base straight, apex tapering to a fine point; ligule ca. 1 mm, a ciliolate membrane. Panicle broadly ovate in outline when fully exerted, terminal, 20–40 cm, much branched; branches rigid, ascending and spreading, scabrid or smooth. Spikelets elliptic, 2–3 mm, glabrous, acuminate; lower glume broadly ovate, 1/5–1/3 length of spikelet, clasping the base of the spikelet, 0–1-veined, obtuse or acute, separated by an internode; upper glume as long as spikelet, 7-veined; lower lemma similar to upper glume, palea poorly developed; upper floret slightly shorter than spikelet, pale yellow, smooth, shiny.

Taiwan [Australia, Pacific Islands].

**5. *Panicum bisulcatum*** Thunberg, Nova Acta Regiae Soc. Upsal. 7: 141. 1815.

糠稷 kang ji

*Panicum acroanthum* Steudel; *P. acroanthum* var. *brevipedicellatum* Hackel.

Annual. Culms erect or ascending, sometimes rooting at lower nodes, 30–180 cm tall, nodes glabrous. Leaves cauline; leaf sheaths striate, glabrous, ciliate on the margins, especially toward the throat; leaf blades linear, 5–20 × 0.5–1.5 cm, subglabrous, base rounded, apex acuminate; ligule ca. 0.5 mm, a ciliolate membrane. Panicle ovate or orbicular in outline, 10–40 cm, loose, much branched; branches slender, flexuous, scabrid, with the spikelets in pairs and clustered toward the ends of the branches. Spikelets elliptic, 2–2.5 mm, sparsely puberulous; lower glume ovate, 1/2 length of spikelet, 1–3-veined, acute or acuminate; upper as long as spikelet, 5-veined; lower lemma similar to upper glume, palea absent; upper floret as long as



spikelet, pale yellow, smooth, shiny. Fl. and fr. Sep–Nov.  $2n = 36$ .

Moist places. Anhui, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Philippines; Australia, Pacific Islands].

**6. *Panicum amoenum*** Balansa, J. Bot. (Morot) 4: 142. 1890.

可爱黍 ke ai shu

Perennial. Culms woody, scrambling 1–3 m long. Leaves cauline; leaf sheaths striate, glabrous, the margins ciliate toward the throat; leaf blades linear, flat, 10–28 × 0.5–1.5 cm, glabrous, scabrid or smooth, base truncate or rounded, apex acuminate; ligule ca. 0.2 mm, membranous. Panicle broadly ovate to oblong in outline, 15–40 cm, much branched; branches slender, scabrid, spreading at maturity. Spikelets elliptic-oblong, 1.2–1.5 mm, glabrous; lower glume ovate, 1/2 length of spikelet, 3-veined; upper glume as long as spikelet, 5-veined; lower lemma similar to upper glume, palea absent; upper floret coriaceous, pale yellow, smooth, shiny. Fl. and fr. Jul–Dec.

Grasslands. S Yunnan [Borneo, NE India, Malaysia, Myanmar, Thailand, Vietnam].

**7. *Panicum coloratum*** Linnaeus, Mant. Pl. 1: 30. 1767.

光头黍 guang tou shu

Perennial, tufted. Culms erect or ascending from a knotty base, 15–100 cm tall. Leaves basal and cauline; leaf sheaths glabrous, pilose or hispid; ligule 0.5–1 mm, a ciliate membrane; leaf blades linear, flat, 7–30 × 0.5–1 cm, glabrous or pilose, base straight to amplexicaul, apex acute or acuminate. Panicle ovate in outline, 4–30 cm, much branched; branches ascending or spreading, the spikelets evenly spread or clustered on the branches. Spikelets ovate-elliptic, 2–3 mm, glabrous, acute; lower glume broadly ovate, 1/4–1/3 length of spikelet, 1–3-veined, acute to acuminate; upper glume ovate, as long as spikelet, 7–9-veined, acute; lower floret staminate, lemma similar to upper glume, palea well developed; upper floret pale yellow or brown, smooth, shiny.

Introduced for pasture [native to tropical and subtropical Africa; introduced elsewhere].

**8. *Panicum luzonense*** J. Presl in C. Presl, Reliq. Haenk. 1: 308. 1830.

大罗湾草 da luo wan cao

*Panicum cambogiense* Balansa; *P. cruciabile* Chase.

Annual, tufted, hispid. Culms erect or geniculately ascending, 30–150 cm tall, nodes bearded. Leaves cauline; leaf sheaths loose; leaf blades linear to linear-lanceolate, flat, 5–20(–40) × 0.5–1.5 cm, base cordate, margins scabrid, apex acute; ligule ciliate. Panicles terminal and axillary, ovate to oblong in outline, 10–30(–50) cm, moderately branched with the spikelets evenly spread throughout the panicle, branches scabrid. Spikelets elliptic to obovate, somewhat plump, 2–2.5 mm, glabrous; lower glume broadly ovate, 1/3–1/2 length of spikelet, 5–7-veined, acute, separated by an internode; upper glume ovate, as long as spikelet, 9–11-veined, transverse veins present, acute; lower lemma similar to upper glume, palea well developed but

floret barren; upper floret elliptic, yellow, smooth, shiny. Fl. and fr. Aug–Oct.  $2n = 18$ .

Fields, forest margins. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [India, Indonesia, Myanmar, Philippines, Sri Lanka; Australia].

**9. *Panicum sumatrense*** Roth ex Roemer & Schultes, Syst. Veg. 2: 434. 1817.

细柄黍 xi bing shu

*Panicum flexuosum* Retzius; *P. psilopodium* Trinius; *P. psilopodium* var. *coloratum* J. D. Hooker; *P. psilopodium* var. *epaleatum* Keng ex S. L. Chen, T. D. Zhuang & X. L. Yang.

Annual. Culms erect or decumbent, 20–60(–150) cm tall, nodes dark in color, glabrous. Leaves cauline; leaf sheaths loose, glabrous; leaf blades linear, flat, 8–40 × 0.4–0.8 cm, glabrous, base cordate to straight, apex acute or tapering; ligule ca. 1 mm, a ciliate membrane. Panicle terminal, oblong or ovate in outline, 10–40 cm, densely branched and drooping or sparsely branched and erect; branches slender, scaberulous. Spikelets oblong in outline, 2.5–3.5 mm, glabrous; lower glume broadly ovate or cufflike, 1/4–1/3 length of spikelet, 3-veined, bluntly acute; upper glume as long as spikelet, 9–13-veined; lower lemma similar to upper glume, palea present or absent; upper floret brown or yellow, smooth, shiny. Fl. and fr. Jul–Oct.  $2n = 54$ .

Rather dry situations. Guizhou, Taiwan, Xizang, Yunnan [India, Malaysia, Philippines, Sri Lanka].

Special forms of this variable species have been selected for cultivation. Plants with a denser and more profuse panicle, which droops at maturity under the weight of the spikelets, are grown as a cereal crop. Wild plants with more lightly branched, erect panicles and sparse spikelets may be distinguished as *Panicum psilopodium*. Although the cultivated types are readily identifiable, there are sufficient intermediates to make a clear boundary with the wild types impossible to define.

*Panicum cristatellum* Keng (Sinensia 11: 412. 1940), described from Jiangsu (Jiangyin), may be referable to *P. sumatrense*.

**10. *Panicum auritum*** J. Presl ex Nees, Fl. Bras. Enum. Pl. 2: 176. 1829.

紧序黍 jin xu shu

*Hymenachne aurita* (J. Presl ex Nees) Balansa; *H. insulicola* (Steudel) L. Liu; *Panicum insulicola* Steudel; *Sacciolepis insulicola* (Steudel) Ohwi.

Perennial, rhizomatous. Culms geniculately ascending, branched, up to 4 m long, nodes glabrous. Leaves cauline; leaf sheaths shorter than internodes, glabrous, sometimes ciliate on margins and at throat, striate; leaf blades linear, 10–60 × 0.5–2.5(–3.5) cm, glabrous, base cordate, apex acuminate; ligule short, membranous, ca. 0.5 mm. Panicle contracted to spikelet, 10–45 cm; branches appressed, glabrous, scabrid. Spikelets lanceolate or elliptic, 2–3 mm, glabrous, acute; lower glume ovate, 1/3 length of spikelet, membranous, 3-veined; upper glume as long as spikelet, 5–7-veined; lower lemma similar to upper glume, palea poorly developed; upper floret as long as spikelet, pale yellow, smooth, shiny. Fl. and fr. Aug–Oct.

Streams, lakesides, forest margins. Fujian, Guangdong, Hainan,

Yunnan [Bhutan, India, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

*Panicum auritum* may be confused with *Hymenachne amplexicaulis*, since both species have a similarly contracted panicle. The *Hymenachne* may be distinguished by the membranous upper lemma, which clasps the palea only at the base, leaving it free at the apex, and by the larger spikelets 4.5–6 mm.

**11. *Panicum elegantissimum*** J. D. Hooker, Fl. Brit. India 7: 52. 1896 [“1897”].

旱黍草 han shu cao

*Panicum curviflorum* Hornemann var. *suishaense* (Hayata) Veldkamp; *P. suishaense* Hayata; *P. trypheron* Schultes var. *suishaense* (Hayata) C. C. Hsu.

Perennial, tufted. Culms erect, 25–60 cm tall, nodes glabrous. Leaves mostly basal; leaf sheaths pilose to hispid; leaf blades linear, flat, 12–50 × 0.3–0.8 cm, pilose, base narrowed, apex acuminate; ligule a ciliate collar. Panicle oblong in outline, 10–30 cm, moderately branched; pedicels pilose. Spikelets ovate, 3–4 mm, glabrous, acuminate, upper glume and lower lemma divergent at maturity; lower glume ovate, 1/2–2/3 length of spikelet, 3–5-veined, acuminate, separated by an internode; upper glume ovate, as long as spikelet, 7-veined, acuminate; lower floret barren, lemma similar to upper glume, palea poorly developed; upper floret pale yellow, rarely black, smooth, shiny. Fl. and fr. May–Oct.  $2n = 36$ .

Dry grasslands, mountain slopes. Guangdong, Guangxi, Taiwan, Xizang [Borneo, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

**12. *Panicum humile*** Nees ex Steudel, Syn. Pl. Glumac. 1: 84. 1854.

南亚稷 nan ya ji

*Panicum austroasiaticum* Ohwi; *P. watense* Mez; *P. vesicum* R. R. Stewart, nom. illeg. superfl.

Annual, slender. Culms erect, branched, 20–70 cm tall. Leaves mostly cauline; leaf sheaths glabrous, occasionally ciliate on the margins; leaf blades linear, flat, 7–20 × 0.2–0.6 cm, glabrous, base tapering, apex acute or acuminate; ligule ca. 1 mm, a ciliolate membrane. Panicles axillary or terminal, ovate or oblong in outline, usually scarcely exerted from the uppermost sheath, 5–15 cm, moderately branched. Spikelets ovate, 1.5–2 mm, glabrous, upper glume and lower lemma divergent at maturity; lower glume ovate, 1/2–3/4 length of spikelet, 3-veined, acuminate or cuspidate; upper glume ovate, as long as spikelet, 3–5-veined acuminate; lower floret barren, lemma similar to upper glume, palea present; upper floret pale yellow, smooth, shiny. Fl. and fr. Aug–Dec.  $2n = 18$ .

Fields on rather dry soils, mountain slopes. Guangdong, Guangxi, Hainan, Taiwan, Xizang [India, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa].

**13. *Panicum virgatum*** Linnaeus, Sp. Pl. 1: 59. 1753.

柳枝稷 liu zhi ji

*Chasea virgata* (Linnaeus) Nieuwland; *Milium virgatum* (Linnaeus) Lunell; *Panicum giganteum* Scheele; *P. glaberrimum* Steudel; *P. purinimum* Bernhardt ex Trinius.

Perennial with scaly rhizomes. Culms tough, erect, 60–200 cm tall, usually unbranched, nodes glabrous or pubescent. Leaves basal and cauline; leaf sheaths rounded, glabrous; leaf blades linear, flat, 20–40 × 0.3–1.5 cm, glabrous, apex acuminate; ligule 1.5–7 mm, a ciliate fringe, membranous at the base. Panicle open, oblong or rhomboid in outline, 15–55 cm, the spikelets often clustered on the secondary branches. Spikelets ovate, 3–5 mm, glabrous; glumes ovate, acuminate; lower glume 2/3–3/4 length of spikelet, 5-veined; upper glume as long as spikelet, 5-veined; lower floret staminate, lemma similar to upper glume, 5–7-veined, palea well developed; upper floret pale, shiny. Fl. and fr. Jul–Oct.  $2n = 21, 25, 30, 32, 36, 72$ .

Commonly cultivated for forage [native to North America].

**14. *Panicum miliaceum*** Linnaeus, Sp. Pl. 1: 58. 1753.

稷 ji

Annual. Culms robust, 20–150 cm tall, glabrous or lower nodes and internodes pubescent or hispid. Leaves cauline; leaf sheaths hispid; leaf blades linear or narrowly lanceolate, 15–40 × 1–2.5 cm, glabrous to pilose or hispid, base cordate to amplexicaul, apex finely tapering; ligule 1.5–3 mm, a fringe of hairs from a membranous base. Panicle oblong to ovate in outline, 15–35 cm, drooping at maturity with the weight of the dense spikelets which are clustered toward the ends of the branches. Spikelets ovate to ovate-oblong, 4–5 mm, glabrous, acute to acuminate; lower glume ovate, 1/2–3/4 length of spikelet, 5-veined, acute or acuminate, separated by a short internode; upper glume equal to spikelet, 9–13-veined, acute or acuminate; lower floret barren, lemma similar to upper glume, palea reduced or absent; upper floret orange or yellow, smooth, shiny, usually persistent. Fl. and fr. Jul–Oct.  $2n = 36, 40$ .

Commonly cultivated, especially in mountainous regions [cultivated in Bhutan, India, Japan, and widely elsewhere].

**15. *Panicum curviflorum*** Hornemann, Hort. Bot. Hafn., Suppl. 116. 1819.

弯花黍 wan hua shu

*Panicum trypheron* Schultes.

Annual, loosely tufted. Culms erect or geniculately ascending, (15–)30–90 cm tall, nodes glabrous. Leaves mostly basal; leaf sheaths striate, hispid with tubercle-based hairs; leaf blades linear or lanceolate, flat, 7–30 × 0.2–0.9 cm, hispid, base straight, apex acute or acuminate; ligule 0.3–1 mm, a fringe of hairs. Panicle open, oblong in outline, 10–35 cm, axis smooth, moderately branched; branches ascending or spreading, scabrid. Spikelets lanceolate, 3–3.5 mm, glabrous, acuminate; glumes broadly ovate, scaberulous on veins, acuminate to cuspidate; lower glume 1/2–2/3 length of spikelet, 5-veined, clasping at the base, separated by an internode; upper glume as long as spikelet, 7–9-veined; lower floret barren, lemma similar to upper glume, finely acute, palea poorly developed; upper floret oblong, 3/4 length of spikelet, pale yellow or olive green, shiny, obtuse.

Grasslands, disturbed places. Yunnan [India, Indonesia, New Guinea, Pakistan, Sri Lanka, Thailand].

**16. *Panicum trichoides*** O. Swartz, Prodr. 24. 1788.

发枝稷 fa zhi ji

Annual, delicate. Culms geniculately ascending, rooting from lower nodes, 10–80 cm tall, branched, nodes puberulous. Leaves cauline; leaf sheaths striate, pilose or hispid; leaf blades lanceolate, membranous, 3–8 × 0.5–2 cm, pilose, base asymmetrically cordate or narrowed, apex acuminate; ligule ca. 0.2 mm, a ciliolate membrane. Panicle ovate or oblong in outline, 4–20 cm, much branched; branches fine and bearing the spikelets on long pedicels. Spikelets asymmetrically ovate, 1–1.5 mm, pubescent; lower glume ovate, 1/2 length of spikelet, 1–3-veined, separated by an internode; upper glume as long as spikelet, 3–5-veined; lower lemma similar to upper glume, palea 1/2 as long as lemma; upper floret as long as spikelet, thinly coriaceous, glabrous, white, granulose. Fl. and fr. Sep–Dec.  $2n = 18$ .

Roadsides, waste places. Guangdong, Hainan [tropical America; introduced in tropical Africa and Asia].

**17. *Panicum brevifolium*** Linnaeus, Sp. Pl. 1: 59. 1753.

短叶黍 duan ye shu

*Panicum arborescens* Linnaeus; *P. brevifolium* var. *hirtifolium* (Ridley) Jansen; *P. hirtifolium* Ridley; *P. longiglume* H. Peng & L. H. Zhou; *P. ovalifolium* Poiret.

Annual. Culms rambling, often rooting at lower nodes, 15–100 cm tall, nodes glabrous or pubescent. Leaves cauline; leaf sheaths puberulous or glabrous, ciliate on margins; ligule ca. 0.2 mm, a ciliolate membrane; leaf blades narrowly ovate to ovate, 5–10 × 1–3 cm, membranous, glabrous or pilose, cross veins present, base amplexicaul, apex finely acute to acuminate. Panicle oblong or ovate in outline, 5–15 cm, much branched; branches delicate, often tangled, glabrous or pilose, glandular patches present. Spikelets asymmetrically borne on the pedicels, ovate or elliptic in outline, 1.5–2 mm, sparsely puberulous to pilose; lower glume ovate, as long as spikelet, hyaline, 1–3-veined, separated by an internode; upper glume as long as spikelet, 5-veined; lower lemma similar to upper glume, palea well developed; upper floret white, scaberulous, shiny. Fl. and fr. May–Dec.  $2n = 36$ .

Humid places, forest margins. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; tropical Africa].

**18. *Panicum notatum*** Retzius, Observ. Bot. 4: 18. 1786.

心叶稷 xin ye ji

*Panicum montanum* Roxburgh.

Perennial. Culms scrambling, often rooting at lower nodes, 1–2 m long, branched, terete, glabrous, nodes glabrous to puberulous. Leaves cauline; leaf sheaths striate, puberulous to subglabrous, ciliolate on margins toward throat; leaf blades lanceolate, 5–20 × 1–3 cm, subglabrous to pubescent, cross veins present, margins scabrid, base cordate, apex finely pointed to acuminate; ligule scarcely developed, ca. 0.5 mm, a ciliolate membrane. Panicle broadly ovate in outline, 10–40 cm, much branched; branches slender, spreading, glabrous, smooth or scabrid, bearing spikelets toward the extremities. Spikelets elliptic, 2–2.5 mm, puberulous; lower glume ovate or oblong, 3/4 as

long to equaling the spikelet, 3–5-veined, separated by an internode; upper glume as long as spikelet, 3–5-veined; lower lemma similar to upper glume, palea absent; upper floret as long as spikelet, pale yellow or green, smooth, shiny. Fl. and fr. May–Nov.  $2n = 36$ .

Forest margins. Fujian, Guangdong, Guangxi, Taiwan, Xizang, Yunnan [Bhutan, Borneo, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

**19. *Panicum sarmentosum*** Roxburgh, Fl. Ind. 1: 311. 1820.

卵花黍 luan hua shu

Perennial. Culms rambling or climbing, up to 15 m long, branched, glabrous to puberulous or hispid, terete, solid. Leaves cauline; leaf sheaths striate, puberulous; ligule ca. 0.5 mm, a ciliolate membrane; leaf blades narrowly lanceolate, 10–35 × 1–3 cm, puberulous, margins scabrid, base abruptly narrowed, apex acuminate. Panicle oblong to ovate in outline, 15–30 cm, axis glabrous or pilose, much branched; branches viscid or smooth. Spikelets ovate, 1.5–2 mm, sparsely puberulous to glabrous; lower glume ovate, 2/3–3/4 length of spikelet, 3–5-veined; upper glume as long as spikelet, 5-veined; lower lemma similar to upper glume, palea well developed; upper floret as long as spikelet, pale brown, smooth, shiny, apex apiculate.

Forest shade. Hainan, Taiwan [India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand; Australia].

**20. *Panicum incomtum*** Trinius, Gram. Panic. 200. 1826.

藤竹草 teng zhu cao

*Panicum submontanum* Hayata.

Perennial. Culms rambling, often rooting at lower nodes, 1–2 m long, branched, terete, subglabrous to puberulous, nodes glabrous or puberulous. Leaves cauline; leaf sheaths loose, striate, puberulous; leaf blades narrowly lanceolate, 10–25 × 1–2 cm, pilose, base abruptly narrowed, apex acuminate; ligule ca. 1 mm, ciliate. Panicle oblong to ovate in outline, 10–23 cm, the axis puberulous, much branched; branches tangled, viscid. Spikelets ovate, 1.5–2 mm, sparsely puberulous to glabrous; lower glume ovate, 2/3–3/4 length of spikelet, 3–5-veined; upper glume as long as spikelet, 5-veined; lower lemma similar to upper glume, palea well developed; upper floret as long as spikelet, pale brown, smooth, shiny. Fl. and fr. Jul–Mar.  $2n = 36$ .

Forest shade. Fujian, Guangdong, Guangxi, Jiangxi, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; Australia].

**21. *Panicum khasianum*** Munro ex J. D. Hooker, Fl. Brit. India 7: 54. 1896 [“1897”].

滇西黍 dian xi shu

Perennial. Culms rambling, often rooting at lower nodes, 1–2 m long, branched, terete, nodes glabrous. Leaves cauline; leaf sheaths striate, loose, glabrous, hispid or sparsely ciliate on margins and toward throat; leaf blades narrowly lanceolate, 10–30 × 1–3 cm, subglabrous to pilose or hispid, base abruptly narrowed, apex acuminate; ligule 0.5–1 mm, a ciliolate membrane. Panicle broadly oblong to orbicular in outline, 15–35 cm, much

branched; branches spreading, scabrid, bearing spikelets mostly in the upper half. Spikelets elliptic-oblong, glabrous; lower glume ovate, 1/4–1/3 length of spikelet, 0–5-veined, acute or obtuse, not separated by an internode; upper glume as long as spikelet, 5-veined; lower lemma similar to upper glume, palea

absent; upper floret as long as spikelet, pale yellow, smooth, shiny, minutely ciliolate at the apex. Fl. and fr. Jul–Dec.

Humid grasslands, valley slopes; 1000–2500 m. W Yunnan [Bhutan, NE India].

### 157. HYMENACHNE P. Beauvois, Ess. Agrostogr. 48. 1812.

膜稈草属 mo fu cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Aquatic perennials. Culms long, decumbent, spongy, rooting at lower nodes, internodes solid, filled with aerenchyma. Leaf blades linear or broadly linear. Inflorescence usually a cylindrical spikelike panicle, rarely with spreading primary branches. Spikelets lanceolate, dorsally compressed, veins prominent, florets 2; lower glume usually about 1/3 spikelet length, base clasping; upper glume shorter than or subequaling spikelet, 5-veined; lower lemma as long as spikelet, 5-veined, apex acute to shortly awned; lower palea absent or much reduced; upper lemma membranous, rarely thinly cartilaginous, smooth, margins hyaline, gripping edges of palea below but free toward apex, apex acute.

Five species: tropics of the Old World and New World; three species (one endemic) in China.

*Hymenachne* is a genus of swamp grasses similar to *Sacciolepis*, and both are segregates from the large genus *Panicum*. The culms of *Sacciolepis* are hollow, but in *Hymenachne* they are filled with aerenchyma.

- 1a. Panicle open, up to 9 cm wide; spikelets loose; culm nodes villous ..... 1. *H. patens*  
 1b. Panicle spikelike, 1–2 cm wide; spikelets dense; culm nodes glabrous.  
 2a. Spikelets 4–6 mm; upper glume and lower lemma cuspidate-acuminate or extended into mucro up to 2 mm ..... 2. *H. amplexicaulis*  
 2b. Spikelets 2–3.2 mm; upper glume and lower lemma acute to acuminate.  
 3a. Spikelets 3–3.2 mm, lanceolate, acuminate ..... 3. *H. assamica*  
 3b. Spikelets 2–2.5 mm, ovate-lanceolate, acute ..... 10. *Panicum auritum* (see p. 507)

**1. *Hymenachne patens*** L. Liu, Bot. Res. Acad. Sin. 4: 35. 1989.

展穗膜稈草 zhan sui mo fu cao

Culms decumbent, ascending to ca. 50 cm, nodes 4 or 5, villous. Leaf blades linear-lanceolate, 10–20 × 0.5–1 cm, glabrous on both surfaces, base rounded and clasping, apex acuminate. Panicle 15–20 × 4–9 cm, open; branches 5–12 cm, distant, laxly ascending, spikelets on side branchlets, 2 or 3 per node; pedicels 1–2 mm, smooth. Spikelets green or brownish green, 3.2–4 × ca. 1 mm, acute; lower glume 1/3–1/2 as long as spikelet, 3–5-veined; upper glume subequal to spikelet, herbaceous with membranous margins, 5-veined, acute; lower lemma similar to upper glume but slightly longer; upper lemma slightly shorter than spikelet, thinly cartilaginous, smooth, margins flat below middle, apex acute. Anthers ca. 1 mm. Fl. and fr. Jun–Oct.

- Wet field margins; ca. 100 m. Anhui, Fujian, Jiangxi.

The open panicle and villous nodes are very unusual in *Hymenachne*, but the spikelets are typical of the genus.

**2. *Hymenachne amplexicaulis*** (Rudge) Nees, Fl. Bras. Enum. Pl. 2: 276. 1829.

膜稈草 mo fu cao

*Panicum amplexicaule* Rudge, Pl. Guian. 1: 21. 1805; *Hymenachne acutigluma* (Steudel) Gilliland; *H. pseudointerrupta* C. Mueller; *Panicum acutiglumum* Steudel.

Culms decumbent, up to 1 m tall, 6–10 mm in diam.; nodes many, brown, glabrous. Leaf blades broadly linear, thick, 30–40 × ca. 2 cm, glabrous or the adaxial surface and margins loosely tuberculate-hairy, base rounded and slightly clasping, apex acuminate. Ligule membranous, 1–2 mm. Panicle 20–40 × 1–2 cm; spikelike, branches 0.5–2 cm, erect, appressed; rachis winged; pedicels scabrous. Spikelets narrowly lanceolate, 4.5–6 × ca. 1 mm, veins smooth at base, otherwise scabrous; both glumes and lower lemma separated by a short stipe; lower glume ovate, ca. 1.2 mm, 1-veined, acuminate; upper glume and lower lemma lanceolate, 3–4 mm, apex with 0.5–2 mm awn; upper lemma ca. 3 mm, margins flat, apex acuminate. Anthers 0.75–1 mm. Caryopsis ca. 1.5 mm, apex rounded. Fl. and fr. summer to autumn.

Streams in shallow water, ricefields; below 1000 m. Hainan, Taiwan, Yunnan [India, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

**3. *Hymenachne assamica*** (J. D. Hooker) Hitchcock, Lingnan Sci. J. 7: 222. 1931 [“1929”].

弊草 bi cao

*Panicum assamicum* J. D. Hooker, Fl. Brit. India 7: 40. 1896 [“1897”].

Culms decumbent, 50–70 cm tall, ca. 5 mm in diam., nodes many, brown, glabrous. Leaf sheaths with one margin tuberculate-ciliate; leaf blades linear-lanceolate, 10–20 × 0.4–1.2 cm, a few setae at base above ligule, base rounded, apex acuminate; ligule 0.3–0.5 mm. Panicle narrow, dense, pale

green, 8–18 × 1–3 cm; branches 1–4 cm, appressed to rachis with tightly clustered spikelets; rachis scabrous, narrowly winged; pedicels 0.2–0.8 mm, scabrous. Spikelets lanceolate, 3–3.2 × ca. 1 mm, veins scabrous toward apex, otherwise smooth, glumes and lower lemma not separated; lower glume broadly ovate, 1/3 spikelet length, 1–5-veined, acute; upper glume slightly shorter or as long as lower lemma, 5-veined,

nearly smooth, sharply acute; lower lemma as long as spikelet, sharply acute; upper lemma ca. 2.5 mm, margins flat for most of their length or only toward apex, apex acute. Fl. and fr. Jul–Oct.

Streams. Guangdong, Guangxi, Hainan, Yunnan [NE India, Thailand].

### 158. *SACCIOLEPIS* Nash, Man. Fl. N. States 89. 1901.

囊颖草属 nang ying cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Leaf blades linear to convolute; ligule membranous. Inflorescence a narrowly cylindrical, densely spike-like panicle. Spikelets asymmetrical, lanceolate-oblong to ovate, usually laterally or rarely dorsally compressed, plump, florets 2; glumes prominently ribbed, lower glume 1/4–3/4 spikelet length, broad, loose and slightly inflated, upper glume equaling spikelet, deeply concave and gibbous on the back; lower lemma resembling upper glume but less gibbous, staminate or neuter, its palea often much reduced; upper floret readily deciduous, the lemma dorsally compressed, often much shorter than spikelet, thinly coriaceous to cartilaginous, smooth, shiny, margins inrolled or flat but never hyaline.  $x = 9$ .

About 30 species: tropics, predominantly in Africa; three species in China.

This is a genus of aquatic and marshland grasses, recognized by the spike-like panicle of asymmetrical, ribbed spikelets.

- 1a. Perennial with spongy, often floating stems; spikelets dorsally compressed, 3–5 mm ..... 1. *S. interrupta*  
 1b. Annuals with firm stems, not floating; spikelets laterally compressed, 1.5–2.8 mm.  
 2a. Spikelets 2–2.8 mm, lanceolate ..... 2. *S. indica*  
 2b. Spikelets 1.5–2 mm, ovate ..... 3. *S. myosuroides*

**1. *Sacciolepis interrupta*** (Willdenow) Stapf in Prain, Fl. Trop. Africa 9: 757. 1920.

间序囊颖草 jian xu nang ying cao

*Panicum interruptum* Willdenow, Sp. Pl., ed. 4, 1: 341. 1797; *Hymenachne interrupta* (Willdenow) Buse; *Panicum inundatum* Kunth, nom. illeg. superfl.; *Sacciolepis simaoensis* Y. Y. Qian.

Vigorous aquatic perennial. Culms rooting and floating in water, spongy, succulent, hollow, smooth, glabrous, 20–50 cm tall or more, up to 1 cm in diam. Leaf sheaths loose, papery; leaf blades linear, flat, soft, 4–12 × 0.3–0.6 cm, base abruptly rounded, apex acuminate; ligule truncate. Panicle spike-like, 10–30 cm. Spikelets light green, asymmetrically oblong, lightly dorsally compressed, 3.3–5 mm, glabrous, acute to subacute; lower glume broadly ovate, 1/4–1/3 spikelet length, 3–5-veined; upper glume ovate, slightly gibbous, 9-veined, acute; lower floret neuter or infrequently staminate, lemma as long as upper glume, ovate, 7-veined; lower palea present, often much reduced; upper lemma yellowish, narrowly ovate, 2/3–3/4 spikelet length, acute. Fl. and fr. Jun–Dec.  $2n = 18$ .

Swamps, shallow water, rice fields. SW Yunnan [India, Indonesia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa].

*Sacciolepis interrupta* has a mainly Asian distribution. *Sacciolepis africana* C. E. Hubbard & Snowden is its counterpart in Africa, but has on average somewhat shorter (2.5–4 mm), more obtuse spikelets. However, the division between the two species is not clear-cut, and there is some overlap in individual characters.

**2. *Sacciolepis indica*** (Linnaeus) Chase, Proc. Biol. Soc. Washington 21: 8. 1908.

囊颖草 nang ying cao

*Aira indica* Linnaeus, Sp. Pl. 1: 63 [*“spicata”*], errata [1231, *“indicum”*]. 1753; *Panicum angustum* Trinius; *Sacciolepis angusta* (Trinius) Stapf; *S. spicata* Honda ex Masamune, nom. illeg. superfl.

Annual. Culms slender, weakly ascending from a branch-like, decumbent base, 20–100 cm tall. Leaf sheaths slightly keeled; leaf blades linear, flat to loosely involute, 5–20 × 0.2–0.5 cm, apex acute; ligule 0.2–0.5 mm. Panicle spike-like, 11–16 × 0.3–0.5 cm, axis glabrous. Spikelets green or purplish green, lanceolate, laterally compressed, 2–2.8 mm, glabrous or papillose-hispid, obtuse; glumes ovate, herbaceous with broad hyaline margins and apex, lower glume 1/3–1/2 spikelet length, 3–7-veined; upper glume 7–11-veined; lower lemma as long as upper glume; palea small and hyaline; upper lemma yellowish, narrowly ovate, 1/2 spikelet length. Fl. and fr. Jul–Nov.  $2n = 18$ .

Moist places, valleys, streams. Anhui, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Jiangxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Myanmar, Nepal, Thailand, Vietnam; Africa, Australia, Pacific Islands].

The name *Aira indica* was originally given as *“Aira spicata,”* but this was corrected by Linnaeus in the errata on the final page [1231] of *Species Plantarum*.

The combination *“Sacciolepis indica* var. *angusta* (Trinius) Keng” (Fl. Ill. Pl. Prim. Sin. Gram. 662. 1959) was not validly published because a full and direct reference to the basionym was not provided.

**3. *Sacciolepis myosuroides*** (R. Brown) Chase ex E. G. Camus & A. Camus in Lecomte, Fl. Indo-Chine 7: 460. 1922.

鼠尾囊颖草 shu wei nang ying cao

Annual. Culms slender, tufted, erect or slightly decumbent at the base, 15–100 cm tall. Leaf sheaths smooth; leaf blades linear, flat, 3–20 × 0.1–0.5 cm, adaxial surface papillose, apex acuminate; ligule ca. 0.5 mm. Panicle very slender, densely spikeletlike, 2–20 × 0.2–0.5 cm, axis glabrous. Spikelets purple, ovate-elliptic, slightly curved, laterally compressed, 1.5–2 mm, glabrous or pilose, acute or subobtusate; lower glume 1/2–2/3 spikelet length, 3–5-veined; upper glume 7–9-veined; lower lemma with a small palea; upper lemma slightly shorter than spikelet. Fl. and fr. winter.  $2n = 36$ .

Moist places and shallow water, rice fields. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific Islands].

- 1a. Culms 30–100 cm tall; leaf blades 10–20 cm; panicle 6–20 cm ..... 3a. var. *mysuroides*  
 1b. Culms 15–30 cm tall; leaf blades 3–5 cm; panicle 2–4 cm ..... 3b. var. *nana*

**3a. Sacciolepis mysuroides** var. **mysuroides**

鼠尾囊颖草(原变种) shu wei nang ying cao (yuan bian zhong)

*Panicum mysuroides* R. Brown, Prodr. 189. 1810; *Hymenachne mysuroides* (R. Brown) Balansa; *Panicum spiciforme* Hochstetter ex A. Richard; *Sacciolepis mysuroides* var. *spiciformis* (Hochstetter ex A. Richard) Engler; *S. spiciformis* (Hochstetter ex A. Richard) Stapf.

Culms erect from a decumbent base, rooting at the lower nodes, 30–100 cm tall. Leaf blades 10–20 × 0.2–0.5 cm. Panicle 6–20 × 0.2–0.5 cm. Fl. and fr. winter.  $2n = 36$ .

Moist places, shallow water and rice fields. Guangdong, Guizhou, Hainan, Yunnan, Xizang [India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific Islands].

**3b. Sacciolepis mysuroides** var. **nana** S. L. Chen & T. D. Zhuang, Bull. Bot. Res., Harbin 4: 124. 1984.

矮小囊颖草 ai xiao nang ying cao

Culms 15–30 cm tall. Leaf blades 3–5 × 0.1–0.3 cm. Panicle 2–4 × ca. 0.3 cm.

- Shallow water along streams. Guangdong, Guangxi, S Yunnan.

**159. OTTOCHLOA** Dandy, J. Bot. 69: 54. 1931.

露籽草属 lu zi cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Hemigymnia* Stapf in Prain, Fl. Trop. Africa 9: 741. 1920, not Griffith (1842).

Perennials. Culms tufted or rambling and stoloniferous. Leaf blades lanceolate; ligule membranous, truncate, ciliate, or sometimes obscure. Inflorescence an open panicle, primary branches spaced along the central axis, spikelets borne on short secondary branches, singly or in appressed secondary racemelets. Spikelets dorsally compressed, 2-flowered; glumes similar, subequal, herbaceous, 1/2–2/3 spikelet length, 3–5(–7)-veined; lower floret herbaceous, sterile or staminate, its lemma as long as the spikelet, 7–9-veined; upper lemma as long as the spikelet, coriaceous to cartilaginous, flattened on the back, smooth or rugulose, margins narrow, hyaline, incurved upward.  $x = 9$ .

Three species: Old World tropics; one species in China.

This genus resembles *Panicum*, but can be immediately distinguished by its short glumes.

**1. Ottochloa nodosa** (Kunth) Dandy, J. Bot. 69: 55. 1931.

露籽草 lu zi cao

Perennial. Culms slender, decumbent, rooting and branching at the nodes, ascending up to 60 cm. Leaf sheaths conspicuously ciliate along one margin; leaf blades narrowly lanceolate, 4–11 × 0.5–1 cm, smooth, glabrous, base rounded or cordate, margins scabrous, apex acuminate; ligule ca. 0.3 mm. Panicle 10–15 cm, branches 3–8 cm, stiffly spreading, subverticillate in the lower part, the spikelets grouped in clusters or short racemelets, or sometimes loosely spaced. Spikelets elliptic to elliptic-oblong, 2–3.2 mm, acute; glumes lanceolate, lower glume 1/2 spikelet length, 3–5-veined; upper glume 1/2–2/3 spikelet length, 5–7-veined; lower lemma 7-veined; upper lemma smooth, apex laterally compressed to a very small crest. Fl. and fr. Jul–Sep.  $2n = 18$ . Fl. and fr. Jul–Sep.  $2n = 18$ .

Forests (not in deep shade), forest margins, clearings, often scrambling over other plants; 100–1700 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, NE Aus-

tralia, Pacific Islands (Polynesia)].

The name *Ottochloa malabarica* (Linnaeus) Dandy (based on *Poa malabarica* Linnaeus) has been applied to this grass. The identity of *P. malabarica* is unclear from the protologue, which probably includes more than one species, but the name has more frequently been applied to the completely different species *Leptochloa fusca*. *Poa malabarica*, a name of uncertain application, has been formally rejected.

- 1a. Spikelets 2.8–3.2 mm ..... 1a. var. *nodosa*  
 1b. Spikelets 2–2.5 mm ..... 1b. var. *micrantha*

**1a. Ottochloa nodosa** var. **nodosa**

露籽草(原变种) lu zi cao (yuan bian zhong)

*Panicum nodosum* Kunth, Enum. Pl. 1: 97. 1833, based on *P. multinode* J. Presl, Reliq. Haenk. 1: 303. 1830, not Lamarck (1798); *Hemigymnia arnottiana* (Nees ex Steudel) Stapf; *H. multinodis* (J. Presl) Stapf; *Ottochloa arnottiana* (Nees ex Steudel) Dandy; *Panicum arnottianum* Nees ex Steudel.

Spikelets 2.8–3.2 mm; upper glume 1/2–2/3 spikelet length; lower lemma 7-veined.

Forests, forest margins, clearings; 100–1700 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand; Africa, NE Australia, Pacific Islands (Polynesia)].

**1b. *Ottochloa nodosa* var. *micrantha*** (Balansa ex A. Camus) S. L. Chen & S. M. Phillips, *Novon* 13: 467. 2003.

小花露籽草 xiao hua lu zi cao

*Hemigymnia arnottiana* Stapf var. *micrantha* Balansa ex A. Camus in Lecomte, *Fl. Indo-Chine* 7: 455. 1922.

Spikelets 2–2.5 mm; upper glume ovate, ca. 1/2 spikelet length, 7-veined; lower lemma 5–7-veined. Fl. and fr. Jul–Nov.

Valleys, moist forest margins. Guangdong, Hainan [Vietnam].

The name "*Panicum nodosum* var. *micranthum* Balansa" (J. Bot. (Morot) 4: 142. 1890) is a *nomen nudum* and was therefore not validly published. The combination *Ottochloa nodosa* var. *micrantha* was not previously validly published by P. C. Keng (*Iconogr. Cormophyt. Sin.* 5: 160. 1976) because no reference to the basionym was provided.

## 160. *CYRTOCOCCUM* Stapf in Prain, *Fl. Trop. Africa* 9: 15. 1917.

弓果黍属 gong guo shu shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annual or perennial. Culms decumbent, rooting at the nodes, much branched and leafy. Leaf blades linear-lanceolate to narrowly ovate; ligule membranous. Inflorescence an open or contracted panicle. Spikelets asymmetrical, obovate, laterally compressed, florets 2, lower floret sterile, upper floret bisexual; glumes both shorter than spikelet, unequal, membranous to herbaceous, 3–5-veined; lower glume smaller, ovate, clasping, subacute; upper glume boat-shaped, obtuse; lower lemma usually equal to spikelet, 5-veined, nearly straight on the back, its palea small or absent; upper lemma laterally compressed, gibbously semiorbicular, subcoriaceous to crustaceous, smooth or minutely pitted, a little greenish crest near the apex which swells at maturity, upper palea dorsally slightly convex.  $x = 9$ .

Eleven species: Old World tropics, in shady places; two species in China.

This genus is a segregate from *Panicum* distinguished by its laterally compressed, gibbous spikelets with short glumes and a crested upper lemma.

- 1a. Pedicels mostly shorter than the spikelet, stout; panicle contracted; spikelets reddish brown ..... 1. *C. oxyphyllum*  
1b. Pedicels much longer than the spikelet, filiform; panicle open, often diffuse; spikelets purplish ..... 2. *C. patens*

**1. *Cyrtococcum oxyphyllum*** (Hochstetter ex Steudel) Stapf, *Hooker's Icon. Pl.* 31: t. 3096. 1922.

尖叶弓果黍 jian ye gong guo shu

*Panicum oxyphyllum* Hochstetter ex Steudel, *Syn. Pl. Glumac.* 1: 65. 1853; *Cyrtococcum pilipes* (Nees & Arnott ex Buse) A. Camus; *Panicum hermaphroditum* Steudel; *P. pilipes* Nees & Arnott ex Buse.

Culms rambling, smooth and glabrous, 15–50 cm tall. Leaf sheaths glabrous to pubescent, ciliate on one margin; leaf blades narrowly lanceolate, 5–18 × 0.5–1.5 cm, glabrous to pilose, midvein abaxially distinct, apex acuminate; ligule 1–1.5 mm. Panicle 3–12 × 1–2 cm, contracted, branches ascending, up to 3 cm, pilose with long scattered hairs or hairs mostly confined to the axils; pedicels stout, short. Spikelets reddish brown at maturity, ca. 2 mm, glabrous except for some hairs at the base (hairs up to 2/3 length of lower glume); glumes 3-veined, acute, the lower 1.2–1.5 mm, the upper slightly shorter than spikelet; lower lemma obtuse or subtruncate; upper lemma yellowish or yellowish brown, smooth and shining. Anthers ca. 1 mm. Fl. and fr. Oct–Mar.  $2n = 36$ .

Damp places in shade. Guangdong, Guangxi, Hainan, Yunnan [Bhutan, India, Malaysia, Myanmar, Philippines, Sri Lanka, Vietnam; Australia].

**2. *Cyrtococcum patens*** (Linnaeus) A. Camus, *Bull. Mus. Natl. Hist. Nat.* 27: 118. 1921.

弓果黍 gong guo shu

Culms creeping, smooth and glabrous, 15–60 cm tall. Leaf sheaths loosely pilose with tubercle-based hairs; leaf blades lanceolate, 3–15 × 0.3–2 cm, pubescent on both surfaces or subglabrous, basal margins with a few long, stiff, tubercle-based hairs, apex acuminate; ligule 0.5–2 mm, subrounded. Panicle 5–30(–40) cm, often diffuse, branches loosely ascending to widely spreading, very slender, glabrous; pedicels filiform, longer than spikelets. Spikelets purplish at maturity, 1.3–1.8 mm, varying from glabrous to appressed-pubescent or shortly hispid with stiff, conspicuously tubercle-based hairs; glumes 3-veined, the lower ca. 1/2 spikelet length, the upper 2/3 spikelet length; lower lemma subequaling spikelet, margins ciliate, apex obtuse; upper lemma minutely pitted. Anthers ca. 0.8 mm. Fl. and fr. Sep–Feb.  $2n = 18, 36$ .

Moist places in grasslands and forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bangladesh, Bhutan, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Pacific Islands (Polynesia)].

*Cyrtococcum patens* is a very variable species, and specimens with large, diffuse panicles have a different habit from small- or narrow-panicled forms. This difference is acknowledged here at varietal rank, but it should be realized that variation is continuous and intermediates will be encountered.

Spikelet pubescence varies from completely glabrous, through forms with sparse to dense, short, appressed hairs, to forms with some or all of the basal hair tubercles enlarged and prominent. This last-mentioned form has been separated as var. *schmidtii* (Hackel) A. Cam-

us. It is found throughout the entire size range of the species, and also over the whole geographic range, and is not taxonomically significant.

- 1a. Panicle up to 17 cm; leaf blades 3–8 × 0.3–1 cm ..... 2a. var. *patens*  
 1b. Panicle large and diffuse, 16–30 cm; leaf blades 7–15 × 1–2 cm ..... 2b. var. *latifolium*

### 2a. *Cyrtococcum patens* var. *patens*

弓果黍(原变种) gong guo shu (yuan bian zhong)

*Panicum patens* Linnaeus, Sp. Pl. 1: 58. 1753; *Cyrtococcum muricatum* (Retzius) Bor; *C. patens* var. *schmidtii* (Hackel) A. Camus; *C. patens* var. *warburgii* (Mez) Reeder; *C. radicans* (Retzius) Stapf; *C. warburgii* (Mez) Stapf; *Panicum carinatum* J. Presl & C. Presl; *P. muricatum* Retzius; *P. obliquum* Roth ex Roemer & Schultes; *P. radicans* Retzius; *P. schmidtii* Hackel; *P. warburgii* Mez.

Culms 15–30 cm tall. Leaf blades 3–8 × 0.3–1 cm; ligule 0.5–1 mm. Panicle 5–15 cm. Fl. and fr. Sep–Feb.  $2n = 18$ .

Moist places in grasslands and forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Pacific Islands (Polynesia)].

**2b. *Cyrtococcum patens* var. *latifolium*** (Honda) Ohwi, Acta Phytotax. Geobot. 11: 47. 1942.

散穗弓果黍 san sui gong guo shu

*Panicum patens* Linnaeus f. *latifolium* Honda, Bot. Mag. (Tokyo) 37: 25. 1923; *Cyrtococcum accrescens* (Trinius) Stapf; *Panicum accrescens* Trinius; *P. patens* var. *latifolium* (Honda) Honda.

Culms up to 60 cm tall. Leaf blades 7–15 × 1.2–2 cm; ligule 1–2 mm. Panicle 16–30 cm. Fl. and fr. autumn–winter.  $2n = 36$ .

Moist places in shade, sometimes forming an undercover. Guangdong, Guangxi, Guizhou, Hunan, Taiwan, Xizang, Yunnan [India, Japan (Ryukyu Islands), Malaysia, Thailand, Vietnam].

## 161. SETIACIS S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 26: 217. 1988.

刺毛头黍属 ci mao tou shu shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials. Culms decumbent at the base, usually rooting at the nodes. Leaf blades flat, linear-lanceolate. Inflorescence a terminal panicle, spikelets solitary or paired near the base. Spikelets dorsally compressed, florets 2; glumes herbaceous; lower glume shorter than spikelet, 5–7-veined; upper glume subequalling spikelet, 9–11-veined, its apex never thickened; lower lemma similar to upper glume, 11-veined; lower palea oblong, keels ciliate; upper lemma slightly convex on back, cartilaginous, apex obtuse, slightly thickened with several hairs; upper palea cartilaginous, apex pubescent. Caryopsis ellipsoid.

- One species: S China (Hainan).

This genus is similar to *Acroceras* and *Lasiacis* (Grisebach) Hitchcock, but differs in the upper glume apex lacking a thickened crest or woolly hairs, the ciliate keels of the lower palea, and the cartilaginous upper floret bearing several hairs at its apex. The leaf epidermis has similar long cells on both surfaces, dumb-bell-shaped or nodular silica bodies, and parallel-sided stomatal subsidiary cells, confirming the separation of this genus from *Acroceras*.

**1. *Setiacis diffusa*** (L. C. Chia) S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 26: 219. 1988.

刺毛头黍 ci mao tou shu

*Acroceras diffusum* L. C. Chia, Fl. Hainan. 4: 538. 1977.

Culms 0.6–1 m tall. Leaf sheaths shorter than internodes, compressed, keeled, one margin ciliate; leaf blades 10–15 × 1–1.3 cm, both surfaces glabrous, base slightly rounded, margins thickened and repand, midvein obscure with transverse veinlets.

apex acuminate; ligule ca. 0.5 mm. Panicle lax, ca. 15 × 9 cm, branches 7–10, with slender branchlets. Spikelets oblong, ca. 3.2 mm; lower glume ovate-lanceolate, ca. 2/3 spikelet length, 5–7-veined; upper glume and lower lemma similar, 9–11-veined; lower floret with an oblong membranous palea; upper lemma glabrous, shining. Caryopsis ca. 1.7 mm. Fl. and fr. Sep–Oct.

- Moist places in forests. Hainan.

## 162. ACROCERAS Stapf in Prain, Fl. Trop. Africa 9: 621. 1920.

凤头黍属 feng tou shu shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Neohusnotia* A. Camus.

Annuals or perennials. Culms decumbent, often rooting near the base. Leaf blades flat, lanceolate or linear-lanceolate, usually with obscure transverse veins; ligule a narrow membrane. Inflorescence of lax racemes along a central axis, sometimes panicle-like due to irregular secondary branching; spikelets paired or rarely single, pedicels of each pair connate at base. Spikelets lanceolate to oblong, plump, dorsally or weakly laterally compressed, glabrous, florets 2; glumes subequal or lower glume shorter, papery; upper



glume and lower lemma thickened and laterally compressed at apex to form a green crest; upper lemma dorsally compressed, crustaceous, smooth or finely striate, apex glabrous with a little green crest; upper palea with reflexed apex slightly protruding from lemma.  $x = 9$ .

Nineteen species: throughout the tropics (12 species endemic to Madagascar); two species in China.

*Acroceras* species are grasses of damp, shady situations, recognized by the thickened, green crests at the tips of the spikelet scales. The leaf anatomy contrasts with that of the closely related genus *Setiactis*, with long cells differing in shape on the abaxial and adaxial surfaces, silica bodies short and dumbbell-shaped to cross-shaped, and stomatal subsidiary cells dome-shaped.

- 1a. Spikelets ca. 4 mm; nodes glabrous; inflorescence with simple racemes ..... 1. *A. munroanum*  
 1b. Spikelets 5–5.5 mm; nodes pubescent; inflorescence with compound racemes ..... 2. *A. tonkinense*

**1. *Acroceras munroanum*** (Balansa) Henrard, *Blumea* 3: 444–445. 1940.

凤头黍 feng tou shu

*Panicum munroanum* Balansa, *J. Bot. (Morot)* 4: 140. 1890; *Acroceras crassiapiculatum* (Merrill) Alston; *Panicum crassiapiculatum* Merrill.

Perennial. Culms slender, long, creeping and rooting, the erect tips 15–40 cm tall. Leaf sheaths glabrous or one margin ciliate; leaf blades lanceolate, 3–7 × 0.4–0.9 cm, glabrous or sparsely pilose, base subcordate, margins glabrous, apex acuminate; ligule ca. 0.4 mm. Panicle 4–6 × 2–3 cm; racemes 3–6, short, erect, unbranched; spikelets on short pedicels along racemes and upper part of main axis, usually paired or single toward raceme apex. Spikelets ca. 4 mm, elliptic, stramineous when mature, subglabrous; lower glume broadly ovate, ca. 3.5 mm; upper glume and lower lemma similar, as long as spikelet, 5–7-veined, apex crested, slightly protruding; lower palea hyaline, narrow; upper lemma smooth, shining, 3–3.5 mm. Fl. and fr. Sep–Oct.  $2n = 18$ .

Grassland on hill slopes, light shade of forest margins. Hainan [Cambodia, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

**2. *Acroceras tonkinense*** (Balansa) C. E. Hubbard ex Bor, *Indian Forest Rec., Bot.* 1(3): 78. 1938.

山鸡谷草 shan ji gu cao

*Panicum tonkinense* Balansa, *J. Bot. (Morot)* 4: 140. 1890; *Neohusnotia tonkinensis* (Balansa) A. Camus.

Perennial. Culms up to 100 cm tall, nodes densely pubescent with soft white hairs. Leaf sheaths glabrous or with tubercle-based hairs, one margin tuberculate-ciliate; leaf blades lanceolate, 10–20 × 1–3 cm, glabrous or abaxial surface pilose, margins thickened, pectinate-ciliate at base, scabrous, midvein prominent abaxially, apex narrowly acuminate; ligule ca. 1 mm, obtuse. Panicle open, 15–25 × 5–10 cm, axis and branches stiff, scabrous; racemes ascending, with secondary branching; spikelets widely spaced, paired or single in upper part. Spikelets 5–5.5 mm; lower glume broadly elliptic, 3/4 spikelet length, 5-veined; upper glume and lower lemma as long as spikelet, 5-veined, apex slightly thickened; lower palea hyaline, narrow; upper lemma smooth, shining, slightly shorter than spikelet, apex thickened and protruding. Fl. and fr. Aug–Oct.

Moist places in forest shade. Hainan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

This is a more robust species than *Acroceras munroanum*, with larger leaves and harshly scabrous leaf margins and inflorescence.

### 163. ECHINOCHLOA P. Beauvois, *Ess. Agrostogr.* 53. 1812, nom. cons.

稗属 bai shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Tema* Adanson, nom. rej.

Annual or perennial. Culms often coarse and robust. Leaf blades flat, linear or broadly linear; ligule absent (ciliate in some species outside China). Inflorescence composed of racemes along a central axis; racemes simple or compound, densely spiculate, spikelets paired in 4 rows, or congested on secondary racemelets. Spikelets narrowly elliptic to subrotund, plump, plano-convex, often hispidulous or spinulose, acute to awned; lower glume triangular, 1/3–1/2(–3/5) spikelet length, sheathing; upper glume and lower lemma equaling the spikelet or upper glume somewhat shorter in cultivated forms, prominently 5–7-veined, acute to rostrate or lower lemma extended into a stout awn; upper lemma coriaceous, smooth, shining, terminating in a short, laterally compressed, incurving beak; upper palea acute, apex briefly reflexed.  $x = 9$ .

About 35 species: tropical and warm-temperate regions of the world; eight species (at least one introduced) in China.

The reflexed upper palea tip, although a very tiny character, is nevertheless important for distinguishing *Echinochloa* from neighboring genera, especially *Brachiaria*. The absence of a ligule is also a good spot character for recognition of the genus in China.

Species of *Echinochloa* typically grow in aquatic or moist situations. Several have become widespread weeds, especially of irrigated crops, and two are sometimes cultivated as minor cereals.

- 1a. Grain persisting at maturity; spikelets plumply ovate; branches of inflorescence incurving; cultivated plants.  
 2a. Spikelets dark greenish when mature, awnless; racemes rather spaced, simple ..... 1. *E. frumentacea*

- 2b. Spikelets purplish brown when mature, acute to awned, awn 0.5–2 cm; racemes very dense, closely packed, usually branched ..... 2. *E. esculenta*
- 1b. Grain readily deciduous at maturity; spikelets ovate, ovate-lanceolate or ovate-elliptic; branches of inflorescence not incurving; wild plants.
- 3a. Lower lemma convex, hard and shining ..... 6. *E. glabrescens*
- 3b. Lower lemma flat on the back, herbaceous.
- 4a. Spikelets ovate, 3.8–6 mm; culms erect, forming narrow tuft ..... 3. *E. oryzoides*
- 4b. Spikelets elliptic-ovate, mostly 2–4 mm; culms spreading, forming loose tuft.
- 5a. Racemes neatly 4-rowed, simple, openly spaced, often erect; spikelets awnless, acute, 2–3 mm ..... 4. *E. colona*
- 5b. Racemes untidily 2- to several-rowed, at least the longer often with short branchlets; spikelets acuminate to shortly awned, 2–4 mm.
- 6a. Racemes distinctly compound with many short branchlets; spikelets 2–3 mm; awn of lower lemma 1–1.5 cm ..... 5. *E. crusgallonis*
- 6b. Racemes simple or only inconspicuously branched; spikelets 2.5–4 mm; lower lemma acute to long-awned.
- 7a. Inflorescence green or purple-tinged, moderately dense; spikelets 3–4 mm; lower lemma acuminate or awned ..... 7. *E. crusgalli*
- 7b. Inflorescence dark purple, very dense; spikelets 2.5–3 mm; lower lemma awned, awn 3–5 cm ..... 8. *E. caudata*

### 1. *Echinochloa frumentacea* Link, Hort. Berol. 1: 204. 1827.

湖南稗子 hu nan bai zi

*Panicum frumentaceum* Roxburgh, Fl. Ind. 1: 307. 1820, not Salisbury (1796); *Echinochloa colona* (Linnaeus) Link var. *frumentacea* Ridley; *E. crusgalli* (Linnaeus) P. Beauvois var. *edulis* Hitchcock, nom. illeg. superfl.; *E. crusgalli* var. *frumentacea* (Link) W. P. Wight; *Oplismenus frumentaceus* (Link) Kunth.

Annual. Culms robust, erect, 1–1.5 m tall. Leaf sheaths smooth and glabrous; leaf blades linear, soft, 15–40 × 1–2.4 cm, glabrous, margins thickened and wavy. Inflorescence erect, lanceolate, 10–20 cm, axis robust, scabrous along edges and with tubercle-based hairs; racemes 1–3 cm, curved, simple, closely spaced and overlapping. Spikelets greenish, tardily deciduous, plump, ovate-elliptic to rotund, 2.5–3.5 mm, pubescent to hispid, awnless; lower glume 1/3–2/5 as long as spikelet; upper glume slightly shorter than spikelet; lower lemma herbaceous, sterile; upper lemma 2–3 mm. Caryopsis long persistent, eventually falling. Fl. and fr. Aug–Sep.  $2n = 36, 54$ .

A crop plant. Anhui, Guangxi, Guizhou, Heilongjiang, Henan, Nei Mongol, Ningxia, Sichuan, Taiwan, Yunnan [cultivated in Africa and tropical Asia].

*Echinochloa frumentacea* is cultivated both for grain and as a forage crop. It is thought to be a cultivated derivative of *E. colona* that arose in India and perhaps Africa.

### 2. *Echinochloa esculenta* (A. Braun) H. Scholz, Taxon 41: 523. 1992.

紫穗稗 zi sui bai

*Panicum esculentum* A. Braun, Index Sem. Hort. Berol. 1861(App.): 3. 1861; *Echinochloa frumentacea* Link subsp. *utilis* (Ohwi & Yabuno) Tzvelev; *E. utilis* J. Ohwi & Yabuno.

Annual. Culms robust, erect, 1–1.5 m tall. Leaf sheaths smooth and glabrous; leaf blades linear, 20–50 × 1.2–2.5 cm, glabrous, margins thickened and wavy. Inflorescence erect, lanceolate, 10–30 cm, axis robust, scabrous along edges and with

tubercle-based hairs; racemes 2–6 cm, robust, usually branched, closely spaced and overlapping. Spikelets purplish, tardily deciduous, plump, ovate or obovate-elliptic, 3.5–4 mm, hispid along veins with tubercle-based hairs; lower glume 1/3 as long as spikelet, acute; upper glume slightly shorter than spikelet; lower lemma herbaceous, sterile, acute or with a 0.5–2 cm awn; upper lemma 2.8–3.5 mm. Caryopsis long persistent, eventually falling. Fl. and fr. Aug–Oct.  $2n = 54, 56, 72$ .

A crop plant. Guizhou, Hubei, Yunnan [cultivated in warm-temperate regions of Asia and Africa; introduced in America].

*Echinochloa esculenta* is cultivated both for grain and forage, like *E. frumentacea*, and the two are most easily distinguished by the color of the seeding heads. *Echinochloa esculenta* is thought to be a cultivated derivative of *E. crusgalli* that arose in China, Japan, and Korea.

### 3. *Echinochloa oryzoides* (Arduino) Fritsch, Verh. Zool.-Bot. Ges. Wien 41: 742. 1891.

水田稗 shui tian bai

*Panicum oryzoides* Arduino, Animadv. Bot. Spec. Alt. 16, t. 5. 1764; *Echinochloa coarctata* Kossenko; *E. crusgalli* (Linnaeus) P. Beauvois subsp. *oryzicola* (Vasinger) T. Koyama; *E. crusgalli* var. *oryzicola* (Vasinger) Ohwi; *E. macrocarpa* Vasinger; *E. oryzicola* (Vasinger) Vasinger; *E. oryzoides* subsp. *phyllopogon* (Stapf) Tzvelev; *E. persistentia* Z. S. Diao; *E. phyllopogon* (Stapf) Stapf ex Kossenko; *E. phyllopogon* subsp. *oryzicola* (Vasinger) Kossenko; *Panicum oryzicola* Vasinger; *P. phyllopogon* Stapf.

Annual. Culms erect, forming a narrow tuft up to 1 m tall. Leaf sheaths and blades glabrous or rarely lower leaves with a dense tuft of hairs on abaxial side at junction of sheath and blade; leaf blades stiffly erect, linear, flat, 10–30 × 1–1.5 cm, margins thickened and scabrous. Inflorescence 8–15 × 1.5–3 cm; racemes simple. Spikelets light green, ovate, 3.8–6 mm; glumes hispid along veins, lower glume 1/2–2/3 as long as spikelet, acuminate; upper glume acuminate; lower lemma acuminate or with an awn up to 2 cm; upper lemma 3.5–5 mm. Fl. and fr. Jul–Oct.  $2n = 54$ .

A weed of rice fields. Anhui, Guangdong, Guizhou, Hainan, Hebei, Henan, Hunan, Jiangsu, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; Europe, America].

*Echinochloa oryzoides* is adapted as a weed of rice (*Oryza*), which it resembles in habit. A variant from ricefields in Italy has a dense band of hairs on the outer side of the leaf sheath and blade junction, particularly on the lower leaves. This is the basis of the name *E. phyllopogon*.

**4. *Echinochloa colona*** (Linnaeus) Link, Hort. Berol. 2: 209. 1833.

光头稗 *guang tou bai*

*Panicum colonum* Linnaeus, Syst. Nat., ed. 10, 2: 870. 1759; *Echinochloa crusgalli* (Linnaeus) P. Beauvois subsp. *colona* (Linnaeus) Honda; *Milium colonum* (Linnaeus) Moench; *Oplismenus colonus* (Linnaeus) Kunth; *P. crusgalli* subsp. *colonom* (Linnaeus) Makino & Nemoto.

Annual. Culms erect or ascending, up to 60 cm or more tall. Leaf sheaths compressed and keeled; leaf blades linear, flat, 3–20 × 0.3–0.7 cm, glabrous, sometimes with transverse purple bands, margins slightly scabrous, apex acute. Inflorescence narrow, 5–10 cm; racemes 1–2 cm, erect or sometimes stiffly diverging, simple, separated or overlapping by up to half their length or more, rachis usually without long, tubercle-based hairs, spikelets tightly congested in 4 neat rows. Spikelets plumply ovate-oblong, 2–3 mm, hirtellous, sharply acute; lower glume ca. 1/2 as long as spikelet; lower lemma staminate or sterile; upper lemma whitish at maturity, elliptic. Fl. and fr. summer and autumn.  $2n = 36$ .

A weed of damp places and irrigated fields. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [warm regions throughout the world].

*Echinochloa colona* is a widespread, weedy species, distinguished by its short, neat, usually rather openly spaced racemes of rounded, awnless spikelets.

**5. *Echinochloa cruspavonis*** (Kunth) Schultes, Mant. 2: 269. 1824.

孔雀稗 *kong que bai*

*Oplismenus cruspavonis* Kunth, Nov. Gen. Sp. (quarto ed.) 1: 108. 1815 [“1816”]; *Echinochloa crusgalli* (Linnaeus) P. Beauvois var. *cruspavonis* (Kunth) Hitchcock; *Panicum cruspavonis* (Kunth) Nees.

Perennial or rarely annual. Culms robust, usually decumbent at base and forming a large clump, 1.2–1.8 m tall. Leaf sheaths loose, smooth and glabrous; leaf blades linear, lush, 10–40 × 1–1.5 cm, glabrous, midrib broad and white, margins harshly scabrous. Inflorescence nodding, large, loose, 15–25 cm; branches mostly compound, spikelets many, crowded on secondary branchlets. Spikelets purple-tinged, ovate-lanceolate, 2–3 mm, hispid on veins, the hairs not tubercle-based; lower glume 1/3–2/5 as long as spikelet; upper glume rostrate; lower lemma sterile, herbaceous, 5–7-veined, with a stout, 1–1.5 cm awn; upper lemma 2–2.5 mm. Fl. and fr. summer–autumn.  $2n = 36, 54$ .

Streamsides and other damp places. Anhui, Fujian, Guangdong, Guizhou, Hainan, Shaanxi, Sichuan [throughout the tropics].

This is a segregate from *Echinochloa crusgalli* with a larger, more branched inflorescence and smaller spikelets.

**6. *Echinochloa glabrescens*** Kossenko, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 11: 40. 1949.

硬稗 *ying fu bai*

*Echinochloa crusgalli* (Linnaeus) P. Beauvois var. *formosensis* Ohwi; *E. glabrescens* var. *barbata* Kossenko; *E. glabrescens* var. *glabra* Kossenko; *E. glabrescens* var. *pilosa* Kossenko; *E. micans* Kossenko; *E. pachychloa* Kossenko.

Culms erect or slightly decumbent at base, 50–120 cm tall. Leaf sheaths smooth and glabrous; leaf blades stiffly erect, linear, flat, 10–30 × 0.6–1.2 cm, glabrous, margins thickened, apex acuminate. Inflorescence narrow, 8–15 × 1–2(–3) cm; racemes 1–4 cm, simple. Spikelets light green, 3.5–5 mm, awnless or awned; glumes 5-veined; lower glume 1/3–1/2 as long as spikelet, acute; upper glume equal to spikelet, inconspicuously scabrous to shortly hispid along veins, cuspidate to awn-tipped; both lemmas coriaceous, hard and shining, especially down the center, the lower cuspidate to awned. Fl. and fr. summer–autumn.  $2n = 54$ .

Damp places, streams. Guangdong, Guangxi, Guizhou, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, Nepal; Africa].

This is an extreme variant from the *Echinochloa crusgalli* gene pool distinguished by the hard, glossy lower floret.

**7. *Echinochloa crusgalli*** (Linnaeus) P. Beauvois, Ess. Agrostogr. 53. 1812.

稗 *bai*

Annual. Culms coarse, erect or geniculately ascending, 20–150 cm tall. Leaf blades linear, 5–40 × 0.2–1.2 cm, usually glabrous, smooth except for scabrous margins, apex acute. Inflorescence erect, lanceolate to ovate or pyramidal, 6–22 cm; racemes 2–10 cm, usually ascending, simple or the longest with inconspicuous branchlets near the base, rachis usually with tubercle-based setae, spikelets loosely to densely crowded. Spikelets green or purplish, ovate, 2.5–4 mm, spinulose along veins; lower glume ca. 1/3 as long as spikelet, acute; lower lemma sterile, herbaceous, acuminate or extended into an awn to 3 cm; upper lemma pale brownish at maturity, elliptic, 2–3 mm. Fl. and fr. summer and autumn.  $2n = 36, 48, 54, 72$ .

Damp weedy places, streamsides, rice fields. Throughout China [warm-temperate and subtropical regions of the world].

*Echinochloa crusgalli* is a widespread, polymorphic weed with many intergrading variants. The following varieties may be recognized in China:

- 1a. Racemes with some secondary branching.
  - 2a. Racemes soft; awn of lower lemma 5–15(–30) mm ..... 7a. var. *crusgalli*
  - 2b. Racemes stiff; awn of lower lemma absent or less than 5 mm ..... 7b. var. *mitis*
- 1b. Racemes all simple.

- 3a. Spikelets 3–4 mm, awnless ..... 7c. var. *zelayensis*  
 3b. Spikelets 2.5–3 mm, awnless or with awn less than 5 mm.  
 4a. Leaf blades 2–5 mm broad; racemes erect, appressed to axis ..... 7d. var. *austrojaponensis*  
 4b. Leaf blades 4–10 mm broad; racemes ascending.  
 5a. Spikelets green ..... 7e. var. *brevisetata*  
 5b. Spikelets purplish ..... 7f. var. *praticola*

**7a. *Echinochloa crusgalli* var. *crusgalli***

稗(原变种) bai (yuan bian zhong)

*Panicum crusgalli* Linnaeus, Sp. Pl. 1: 56. 1753; *Echinochloa hispidula* (Retzius) Nees; *Milium crusgalli* (Linnaeus) Moench; *Panicum hispidulum* Retzius; *Pennisetum crusgalli* (Linnaeus) Baumgarten.

Culms 50–150 cm tall. Leaf blades 10–40 × 0.5–2 cm. Inflorescence pyramidal, 6–20 cm; axis scabrous or with tubercle-based setae; racemes ascending, soft. Spikelets 3–4 mm, veins with tubercle-based setae; lower lemma with 5–15(–30) mm awn.

Damp weedy places, streamsides, rice fields. Throughout China [warm-temperate and subtropical regions of the world].

**7b. *Echinochloa crusgalli* var. *mitis* (Pursh) Petermann, Fl. Lips. Excurs. 82. 1838.**

无芒稗 wu mang bai

*Panicum crusgalli* var. *mite* Pursh, Fl. Amer. Sept. 66. 1813 [“1814”]; *Echinochloa crusgalli* subsp. *spiralis* (Vasinger) Tzvelev; *E. spiralis* Vasinger.

Culms robust, erect, 50–120 cm tall. Leaf blades 20–30 × 0.6–1.2 cm. Inflorescence 10–20 cm; racemes ascending or spreading, stiff, usually branched. Spikelets ca. 3 mm, awnless or with an awn less than 5 mm.

Roadsides, streamsides. Throughout China [warm-temperate and subtropical regions of the world].

**7c. *Echinochloa crusgalli* var. *zelayensis* (Kunth) Hitchcock, Bull. U.S.D.A. 772: 238. 1920.**

西来稗 xi lai bai

*Oplismenus zelayensis* Kunth, Nov. Gen. Sp. (quarto ed.) 1: 108. 1816 [“1815”]; *Echinochloa zelayensis* (Kunth) Schultes; *Panicum zelayense* (Kunth) Steudel.

Culms 50–75 cm tall. Leaf blades 5–20 × 0.4–1.2 cm. Inflorescence 11–19 cm. Spikelets 3–4 mm, hispid along veins but without tubercle-based setae; lower lemma usually awnless.

Streams, rice fields. Throughout China [America].

**7d. *Echinochloa crusgalli* var. *austrojaponensis* Ohwi, Acta Phytotax. Geobot. 11: 38. 1942 [“*austro-japonensis*”].**

小旱稗 xiao han bai

Culms 20–40 cm tall. Leaf blades often involute, 0.2–0.5

cm broad. Inflorescence narrow; racemes short, erect, appressed to axis. Spikelets purplish, 2.5–3 mm, hispid along veins; lower lemma awnless or with a short awn.

Streams, damp grasslands. Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Japan (Ryukyu Islands), Philippines].

**7e. *Echinochloa crusgalli* var. *brevisetata* (Döll) Podpéra, Kvetena Moravy 6: 475. 1926.**

短芒稗 duan mang bai

*Panicum crusgalli* var. *brevisetum* Döll, Fl. Bad. 1: 232. 1857.

Culms 30–70 cm tall. Leaf blades 8–15 × 0.4–0.6 cm. Inflorescence narrow, 8–10 cm. Spikelets green, ca. 3 mm, hispid along veins; lower lemma awnless or with a short awn less than 5 mm.

Grasslands. Guangdong, Taiwan [India, Malaysia, Sri Lanka; Africa].

**7f. *Echinochloa crusgalli* var. *praticola* Ohwi, Acta Phytotax. Geobot. 11: 37. 1942.**

细叶旱稗 xi ye han bai

*Echinochloa crusgalli* subsp. *submutica* (Meyer) Honda; *Panicum crusgalli* var. *submuticum* Meyer.

Culms usually purplish at base, 20–70 cm tall. Leaf blades 0.4–1 cm broad. Racemes simple, short, loose. Spikelets purplish, 2.5–3 mm, hispid along veins or with tubercle-based setae; lower lemma awnless.

Roadsides and other disturbed places. Anhui, Guangxi, Guizhou, Hebei, Hubei, Jiangsu, Taiwan, Yunnan [Japan].

This variety grows in rather drier conditions than the other varieties.

**8. *Echinochloa caudata* Roshevitz in Komarov, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 2: 91. 1936.**

长芒稗 chang mang bai

*Echinochloa crusgalli* (Linnaeus) P. Beauvois subsp. *caudata* (Roshevitz) Tzvelev; *E. crusgalli* var. *caudata* (Roshevitz) Kitagawa.

Annual. Culms forming small dense tufts, 1–2 m tall. Leaf sheaths glabrous to tuberculate-hairy; leaf blades broadly linear, 10–40 × 1–2 cm, glabrous, margins thickened and scabrous. Inflorescence slightly nodding, spikelets dense, 10–25 × 1.5–4 cm, axis scabrous and bearing long tubercle-based setae. Spikelets purplish, ovate-elliptic, 2.5–4 mm; lower glume 1/3–2/5 as long as spikelet, acuminate; upper glume equaling spikelet, 5-veined, with a stout 0.1–0.2 mm mucro; lower lemma herbaceous, loosely hispid along veins, awn 3–5 cm; upper lemma coriaceous. Fl. and fr. summer–autumn.

Streams, fields, roadsides. Anhui, Guizhou, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Nei Mongol, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East)].

This is a segregate from *Echinochloa crusgalli* with a very dense, purple inflorescence and long awns.

**164. ALLOTEROPSIS** Presl, Reliq. Haenk. 1: 343. 1830.

毛颖草属 mao ying cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Culms erect or decumbent. Leaf blades convolute, linear or lanceolate. Inflorescence composed of slender racemes, these digitate or in whorls on a short common axis, each raceme with a weakly unilateral, narrowly triquetrous rachis, spikelets in pairs or clusters. Spikelets ovate to elliptic, dorsally compressed, florets 2; glumes unequal, acute to briefly awned; lower glume 1/2 spikelet length, membranous, 3-veined; upper glume as long as spikelet, herbaceous, 5-7-veined, ciliate along margins; lower floret staminate, lemma herbaceous, glabrous; lower palea much shorter than the anthers, bifid; upper lemma cartilaginous, margins inrolled, shortly awned; upper palea acute, the flaps basally auriculate. Caryopsis ellipsoid.  $x = 9$ .

Five species: tropical and S Africa, India, SE Asia, Australia; two species in China.

*Alloteropsis* is best distinguished from other panicoid genera by its awned spikelets and ciliate upper glume.

- 1a. Tussocky perennial; leaf blades linear, base narrow, margins smooth; raceme rachis pilose ..... 1. *A. semialata*  
 1b. Annual; leaf blades lanceolate, base cordate, margins pectinate; raceme rachis glabrous ..... 2. *A. cimicina*

**1. *Alloteropsis semialata*** (R. Brown) Hitchcock, Contr. U. S. Natl. Herb. 12: 210. 1909.

毛颖草 mao ying cao

Perennial, tussocky from a short rhizome. Culms slender, erect, 30–70 cm, nodes bearded. Basal leaf sheaths persistent, densely and conspicuously silky hairy; leaf blades linear, flat or convolute, stiff, 10–50 × 0.1–1 cm, abaxial surface glabrous, adaxial surface sparsely to densely hairy, base narrow; ligule membranous, ca. 1 mm. Inflorescence digitate; racemes 2–4, 4–12 cm, narrowly ascending, rachis pilose, spikelets grouped on pedicels of varying length. Spikelets lanceolate, 5–6 mm, pale to dark brown, sometimes with transverse banding; glumes sharply acute to shortly awned; lower glume ovate; upper glume margins ciliate, occasionally winged; lower lemma with a small palea corresponding to a thin triangular basal patch on the lemma; upper lemma ovate-lanceolate, ca. 4 mm, smooth, with a rigid 2–3 mm awn-point. Anthers orange, ca. 3 mm. Fl. and fr. Feb–Aug.  $2n = 18$ .

Hill slopes. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Thailand, Vietnam; Africa, Pacific Islands].

*Alloteropsis semialata* is a polymorphic species, and is unique among grasses in possessing leaf anatomy corresponding to both  $C_3$  and  $C_4$  photosynthetic types. These physiological variants correspond very approximately to the color variants recognized below, which have been raised to subspecific rank for that reason. However, other morphological characters that have been used to separate the subspecies in South Africa do not result in a division into two taxa in China, so the subspecies are not upheld here. Investigations in South Africa have shown var. *eckloniana* to be diploid ( $2n = 18$ ), whereas var. *semialata* comprises a polyploid series from tetraploid to octoploid.

- 1a. Lower lemma pale; racemes with loosely arranged spikelets ..... 1a. var. *semialata*  
 1b. Lower lemma purplish brown or with dark transverse bands; racemes with congested spikelets ..... 1b. var. *eckloniana*

**1a. *Alloteropsis semialata* var. *semialata***

毛颖草(原变种) mao ying cao (yuan bian zhong)

*Panicum semialatum* R. Brown, Prodr. 192. 1810; *Axonopus semialatus* (R. Brown) J. D. Hooker; *Oplismenus semialatus* (R. Brown) Desvaux; *Urochloa semialata* (R. Brown) Kunth.

Leaf anatomy:  $C_4$ . Spikelets lax. Lower lemma pale. Fl. and fr. Feb–Aug.  $2n = 18$ .

Hill slopes. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [India, Malaysia; Africa, Pacific Islands].

**1b. *Alloteropsis semialata* var. *eckloniana*** (Nees) Pilger in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 14e: 37. 1940.

紫纹毛颖草 zi wen mao ying cao

*Bluffia eckloniana* Nees, Del. Sem. Hort. Hamburg. 1834: 8. 1834; *Alloteropsis eckloniana* (Nees) Hitchcock; *A. semialata* subsp. *eckloniana* (Nees) Gibbs-Russell; *Axonopus semialatus* var. *ecklonianus* (Nees) Peter; *A. semialatus* var. *ecklonii* Stapf, nom. illeg. superfl.; *Panicum semialatum* var. *ecklonianum* (Nees) Hackel ex T. Durand & Schinz.

Leaf anatomy:  $C_3$ . Spikelets usually congested. Lower lemma purplish brown or with dark transverse bands. Fl. and fr. Feb–Aug.  $2n = 54$ .

Hill slopes. Guangdong, Guangxi, Yunnan [India, Indonesia, Malaysia; Africa, Pacific Islands].

**2. *Alloteropsis cimicina*** (Linnaeus) Stapf, Prain, Fl. Trop. Africa 9: 487. 1919.

臭虫草 chou chong cao

*Milium cimicinum* Linnaeus, Mant. Pl. 184. 1771; *Axonopus cimicinus* (Linnaeus) P. Beauvois; *Panicum cimicinum* (Linnaeus) Retzius; *Urochloa cimicina* (Linnaeus) Kunth.

Annual. Culms tufted, ascending, up to 60 cm tall. Leaf sheaths tuberculate-hispid; leaf blades lanceolate, cordate, 3–10 × 1–2 cm, abaxial surface pectinate-setose along margins and veins, adaxial surface glabrous; ligule ca. 1 mm, ciliate. Inflorescence digitate; racemes 4–6, 10–15 cm, narrowly ascending, rachis glabrous, bare of spikelets in the lower part, spikelets paired or single. Spikelets elliptic, 3.5–5.5 mm, pale green; low-

er glume ovate-lanceolate, ca. 2 mm, acuminate; upper glume papery, elliptic, shiny, margins ciliate with silky white or pinkish hairs, apex caudate; lower lemma similar to upper glume but thicker and glabrous; upper lemma ovate-elliptic, 3/5 spikelet length, obtuse with a fine scabrous 2–3 mm awn; upper palea

papillose with swollen lacrimiform hairs. Anthers purple, ca. 1 mm. Fl. Sep.  $2n = 36$ .

Weedy places, dry open forest. Hainan [Cambodia, India, Indonesia, Malaysia, Myanmar, New Guinea, Sri Lanka, Thailand; Africa, Australia, Pacific Islands].

## 165. BRACHIARIA (Trinius) Grisebach, Ledebour, Fl. Ross. 4: 469. 1853.

臂形草属 bi xing cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Panicum* sect. *Brachiaria* Trinius, Gram. Panic. 51, 125. 1826.

Annual or perennial. Leaf blades linear to lanceolate, often with cartilaginous margins. Inflorescence composed of racemes along a central axis; raceme rachis triquetrous or flattened, sometimes winged; spikelets sessile or pedicelled, single or paired, rarely in fascicles or on secondary racemelets. Spikelets plump, usually elliptic, florets 2; lower glume adaxial, varying in length from very small and veinless to many-veined and subequaling spikelet, base sheathing, sometimes extended downward as a short stipe; upper glume and lower lemma similar, as long as spikelet, membranous or cartilaginous; upper lemma coriaceous, smooth, striate or rugose, margins inrolled, apex obtuse to acute, occasionally minutely mucronate; upper palea apex tucked within lemma.  $x = 7, 9$ .

About 100 species: tropics and subtropics mainly of the Old World, especially Africa; nine species (one endemic) in China.

*Brachiaria* is sometimes included within *Urochloa*, but usually they can be distinguished without difficulty.

- 1a. Culms robust, up to 2 m tall; inflorescence with 10–20 racemes ..... 1. *B. mutica*  
 1b. Culms slender, up to 60 cm tall; inflorescence with less than 10 racemes.  
 2a. Inflorescence with erect appressed racemes; fertile floret smooth and shiny, obtuse, readily falling from spikelet ..... 2. *B. eruciformis*  
 2b. Inflorescence with spreading racemes; fertile floret rugulose, acute to mucronate, persistent within the spikelet.  
 3a. Spikelets 1.5–2.7 mm; leaf blades broadly lanceolate, 1–4 cm long.  
 4a. Spikelets elliptic, 2–2.7 mm ..... 3. *B. villosa*  
 4b. Spikelets ovate, gibbous, 1.5–2 mm ..... 4. *B. semiundulata*  
 3b. Spikelets 2.5–4 mm; leaf blades lanceolate or linear-lanceolate, 4–15 cm long.  
 5a. Spikelets paired, one subsessile and one pedicelled ..... 5. *B. ramosa*  
 5b. Spikelets single (except sometimes at raceme base).  
 6a. Rachis of racemes triquetrous, 0.2–0.4 mm wide; spikelets herbaceous, pubescent or glabrous.  
 7a. Spikelets contiguous, 3.8–4 mm, pubescent ..... 6. *B. fusiformis*  
 7b. Spikelets distant, 2.5–3.5 mm, glabrous ..... 7. *B. kurzii*  
 6b. Rachis of racemes flat on back, 0.4–0.5 mm wide; spikelets cartilaginous, glabrous or almost so.  
 8a. Lower glume 1/3–1/2 spikelet length, separated from upper glume by a short internode; upper lemma subacute ..... 8. *B. subquadripara*  
 8b. Lower glume 1/2–3/5 spikelet length, not separated from upper glume; upper lemma mucronate ..... 9. *B. urochlooides*

**1. *Brachiaria mutica*** (Forsskål) Stapf in Prain, Fl. Trop. Africa 9: 526. 1919.

巴拉草 ba la cao

*Panicum muticum* Forsskål, Fl. Aegypt.-Arab. 20. 1775; *Brachiaria purpurascens* (Raddi) Henrard; *P. barbinode* Trinius; *P. purpurascens* Raddi; *Urochloa mutica* (Forsskål) T. G. Nguyen.

Robust perennial. Culms stout, trailing and rooting freely from lower nodes, ascending to 2 m, 5–8 mm in diam., nodes densely villous. Leaf sheaths villous or glabrous; leaf blades broadly linear, 10–30 × 1–2 cm, thinly pilose or subglabrous; ligule membranous, 1–1.3 mm. Inflorescence axis 7–20 cm; racemes 10–20, 5–15 cm, single, paired or grouped; rachis narrow, winged, scabrous; spikelets paired or single in upper part of raceme, in untidy rows or sometimes on short secondary

branchlets in lower part of raceme; pedicels usually setose. Spikelets elliptic, green or purplish, 2.5–3.5 mm, glabrous, acute; lower glume triangular, 1/4–1/3 spikelet length, 1-veined; upper glume 5-veined; upper lemma rugulose, apex obtuse. Fl. and fr. Aug–Nov.

Forming a dense cover along streams and in other wet places, sometimes forming floating rafts. Fujian, Hong Kong, cultivated in Taiwan [tropical Africa and America].

This is a forage grass (Para Grass) widely cultivated in tropical regions of the world and often found as a naturalized escape. Its country of origin is unknown.

**2. *Brachiaria eruciformis*** (Smith) Grisebach, Fl. Ross. 4: 469. 1853.

臂形草 bi xing cao

*Panicum eruciforme* Smith in Sibthorp & Smith, Fl. Gra-

eca 1: 44, t. 59. 1806; *Brachiaria isachne* (Roth ex Roemer & Schultes) Stapf; *Echinochloa eruciformis* (Smith) Koch; *Moorochloa eruciformis* (Smith) Veldkamp; *P. caucasicum* Trinius; *P. isachne* Roth ex Roemer & Schultes.

Annual. Culms loosely tufted, slender, much branched, geniculately ascending, 30–40 cm tall, nodes softly hairy. Leaf sheaths glabrous or loosely tuberculate-hairy; leaf blades linear-lanceolate, 1.5–10.5 × 0.3–0.6 cm, glabrous or pilose; ligule ciliate. Inflorescence axis 3–6 cm; racemes 4–10, 1–3 cm, erect or narrowly ascending; rachis narrow, triquetrous, ciliate or scabrous; spikelets single, in 2 rows, overlapping. Spikelets elliptic, 1.8–3 mm, pilose, subacute; lower glume 0.2–0.3 mm, membranous, glabrous; upper glume and lower lemma as long as spikelet, 5-veined; upper floret readily deciduous, oblong, ca. 1.5 mm, thinly crustaceous, smooth, glossy, apex obtuse. Fl. and fr. summer–autumn.  $2n = 18$ .

Open and disturbed situations on hill slopes and in dry fields as an arable weed. Fujian, Guizhou, Yunnan [India, Malaysia, Thailand; N Africa, Mediterranean region].

This is the only species of *Brachiaria* occurring in China with a fertile floret which is shed from the mature spikelet. The fertile floret is also distinctive due to its smooth, glossy texture and obtuse apex.

This species and two close relatives in Africa have been placed in the separate genus *Moorochloa* Veldkamp.

**3. *Brachiaria villosa*** (Lamarck) A. Camus in Lecomte, Fl. Indo-Chine 7: 433. 1922.

毛臂形草 mao bi xing cao

Annual. Culms loosely tufted, slender, usually decumbent and branching below, 10–40(–50) cm tall. Leaf sheaths glabrous or pubescent, especially along margins and mouth; leaf blades broadly lanceolate, 1–4 × 0.3–1 cm, both surfaces glabrous to densely pubescent, base rounded or subcordate, margins cartilaginous, scabrous, apex acute; ligule ciliate. Inflorescence axis 3–7 cm; racemes 4–8, (1–)3–6 cm, secund, ascending; rachis triquetrous, ± villous; spikelets mostly single. Spikelets elliptic, 2–2.7 mm, without a stipe, glabrous or pubescent, sometimes transversely bearded below apex, acute or subacute; lower glume 1/3–1/2 spikelet length, clasping, 3-veined, acute; upper glume separated from lower by a slight internode, 5-veined; upper lemma striate and transversely rugulose, apex acute to minutely mucronate. Fl. and fr. Jul–Oct.  $2n = 36$ .

Mountain or hill slopes, fields, roadsides, other weedy or grassy places. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa].

This is a weedy species recognizable by its short, broad, usually softly hairy leaf blades and secund racemes of rather small spikelets.

- 1a. Leaves, culms and spikelets pubescent ..... 3a. var. *villosa*  
1b. Leaves, culms and spikelets glabrous  
except sheath margins ..... 3b. var. *glabrata*

**3a. *Brachiaria villosa* var. *villosa***

毛臂形草(原变种) mao bi xing cao (yuan bian zhong)

*Panicum villosum* Lamarck, Tab. Encycl. Méth. Bot. 1: 173. 1791; *Brachiaria villosa* var. *barbata* Bor; *P. coccosperrum* Steudel; *Urochloa coccosperra* (Steudel) Stapf ex Reeder; *U. villosa* (Lamarck) T. Q. Nguyen.

Culms to 40 cm but often shorter. Leaf sheaths and blades ± pubescent. Spikelets puberulous or pubescent, upper glume and lower lemma sometimes with a subapical transverse white fringe.

Hill slopes, fields. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa].

Forms with bearded spikelets have been separated as var. *barbata*, but as the type of *Panicum villosum* itself has bearded spikelets, the autonymic variety (var. *villosa*) is clearly synonymous and has statutory priority.

**3b. *Brachiaria villosa* var. *glabrata*** S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22(6): 472. 1984.

无毛臂形草 wu mao bi xing cao

Culms ca. 50 cm. Leaf sheaths and blades glabrous except for ciliolate sheath margins. Spikelets glabrous, apex without white beard (but pedicels loosely hirsute).

- Roadsides, grassy places; ca. 800 m. Yunnan.

**4. *Brachiaria semiundulata*** (Hochstetter) Stapf in Prain, Fl. Trop. Africa 9: 556. 1919.

短颖臂形草 duan ying bi xing cao

*Panicum semiundulatum* Hochstetter ex A. Richard, Tent. Fl. Abyss. 2: 364. 1851.

Annual. Culms loosely tufted, slender, decumbent at base, rooting at lower nodes, 20–50 cm tall. Leaf sheaths pubescent; leaf blades ovate-lanceolate, 1–3 × 0.1–0.8 cm, both surfaces densely pubescent, margins cartilaginous, crinkled-serrate; ligule ciliate. Inflorescence axis 2–7 cm; racemes 5–8, 0.5–2 cm, ascending; rachis triquetrous, setose; spikelets single, in neat 2 rows, overlapping. Spikelets ovate, plump, strongly gibbous on abaxial side, flat on adaxial side, 1.5–2 mm, glabrous to pubescent, subacute; lower glume 1/3–2/5 spikelet length, 3-veined; upper glume 4/5 spikelet length, 5-veined; upper lemma swollen, striate, transversely rugulose, apex acute. Fl. and fr. Jul–Oct.

Mountain slopes, fields. Hainan, Yunnan [tropical Africa, S Asia].

**5. *Brachiaria ramosa*** (Linnaeus) Stapf in Prain, Fl. Trop. Africa 9: 542. 1919.

多枝臂形草 duo zhi bi xing cao

*Panicum ramosum* Linnaeus, Mant. Pl. 1: 29. 1767; *P. brachylachnum* Steudel; *P. canescens* Roth ex Roemer & Schultes; *Urochloa ramosa* (Linnaeus) T. Q. Nguyen.

Annual. Culms tufted, loosely ascending, 30–60 cm tall. Leaf sheaths glabrous to pubescent; leaf blades narrowly lanceolate, 4–12 × 0.4–0.8 cm, velvety-pubescent, margins thickened and slightly wavy, scaberulous, apex acuminate; ligule

short, ciliate. Inflorescence axis 6–13 cm; racemes 3–6, 2–5 cm, loosely erect to ascending; rachis triquetrous, hispid; spikelets mostly borne in loosely contiguous pairs, one spikelet subsessile, the other shortly pedicelled, single toward raceme apex, lightly appressed to axis. Spikelets elliptic, 2.5–3.5 mm, with a 0.1–0.5 mm basal stipe, glabrous, pubescent or hispidulous, acute to cuspidate; lower glume broadly ovate, 1/3–1/2 spikelet length, 5-veined; upper glume 5–7-veined; upper lemma distinctly rugose, apex acute. Fl. and fr. summer–autumn.  $2n = 32$ , 36.

Grasslands, hill slopes, weedy places. Hainan, Yunnan [Bhutan, Cambodia, India, Malaysia, Nepal, Pakistan, Thailand, Vietnam; Africa].

**6. *Brachiaria fusiformis*** Reeder, J. Arnold Arbor. 29: 274. 1948.

细毛臂形草 xi mao bi xing cao

*Brachiaria subquadriflora* var. *setulosa* S. L. Chen & Y. X. Jin; *Urochloa fusiformis* (Reeder) Veldkamp.

Annual. Culms loosely tufted, branching, 30–50 cm tall, basal internodes purplish, pubescent, upper internodes glabrescent. Leaf sheaths densely pilose; leaf blades lanceolate, 4–5.5 × 0.7–0.9 cm, densely pilose, base rounded, margins cartilaginous, scaberrulous and spinulose, apex acute; ligule 0.5–1.5 mm. Inflorescence axis 6–8 cm, pubescent; racemes 4–5, 3–5 cm, narrowly ascending to suberect, lowermost with basal racemelets; rachis triquetrous, 0.3–0.4 mm wide; spikelets single, their own length apart or overlapping; pedicels setose. Spikelets narrowly elliptic, 3.8–4 mm, with a 0.3–0.5 mm basal stipe, herbaceous, softly pubescent, strongly veined, apex sharply contracted, shortly acuminate; lower glume 1/2 spikelet length, clasping, 3–5-veined, obtuse; upper glume as long as spikelet, 5-veined, cross veinlets toward apex; lower lemma similar to upper glume, back flat to slightly sulcate; upper lemma shorter than spikelet, inconspicuously punctate-rugulose, apex acute, minutely scabrous-pubescent, slightly crested.

Mountain slopes. Yunnan (Yongsheng) [Indonesia, New Guinea, Philippines].

The Chinese population of this little-known species has larger spikelets than specimens from tropical SE Asia, but is otherwise typical. In the Philippines the spikelets have an apical fringe of longer hairs, but other *Brachiaria* species are also variable in this character. The very slender, triquetrous rachis and contracted, acuminate spikelet apex are unusual in the genus.

**7. *Brachiaria kurzii*** (J. D. Hooker) A. Camus in Lecomte, Fl. Indo-Chine 7: 438. 1922.

无名臂形草 wu ming bi xing cao

*Panicum kurzii* J. D. Hooker, Fl. Brit. India 7: 38. 1896 [“1897”]; *Urochloa kurzii* (J. D. Hooker) T. Q. Nguyen.

Annual. Culms decumbent or shortly stoloniferous, rooting at lower nodes, 15–60 cm long, nodes pubescent. Leaf sheaths glabrous, outer margin ciliate; leaf blades lanceolate, 5–8 × 0.8–1.8 cm, sparsely pilose, base cordate, margins thickened, setose near base, apex acuminate. Inflorescence axis 5–8 cm; racemes 3–7, 5–7.5 cm, divergent, the lower with short

racemelets bearing 2 (or infrequently more) spikelets; rachis triquetrous, 0.2–0.4 mm wide, with scattered bristles; spikelets single, distant; pedicels scabrid. Spikelets elliptic, 2.5–3.5 mm, glabrous, apex acute; lower glume ovate, 1/3 spikelet length, clasping, 3–5-veined, obtuse; upper glume 1/2 spikelet length, 7-veined, acuminate; lower lemma similar to upper glume, as long as spikelet, 5–7-veined, acute; upper lemma shorter than spikelet, rugose, apex briefly apiculate.

Thickets; ca. 1400 m. Yunnan (Jianshui) [India, Indonesia, Thailand; Australia (Queensland)].

**8. *Brachiaria subquadriflora*** (Trinius) Hitchcock, Lingnan Sci. J. 7: 214. 1931 [“1929”].

四生臂形草 si sheng bi xing cao

Annual or short-lived perennial. Culms slender, straggling, rooting at lower nodes, 20–60 cm tall, nodes pubescent. Leaf sheaths loose, glabrous or with tubercle-based hairs or ciliate margins; leaf blades lanceolate or linear-lanceolate, 4–15 × 0.4–1 cm, glabrous or pubescent, base subrounded, margins thicker and scabrous, apex acute or acuminate. Inflorescence axis 3–10 cm; racemes 3–6, 2–4 cm, divergent to reflexed; rachis flat, 0.7–1 mm wide, narrowly winged, nearly glabrous; spikelets single, in 2 rows; pedicels glabrous. Spikelets elliptic to narrowly obovate, (3–)3.5–4 mm, glabrous, acute; lower glume broadly ovate, 1/3–1/2 spikelet length, 5–7-veined; upper glume separated from lower glume by a short internode, 5–7-veined; upper lemma finely rugose, apex subacute. Fl. and fr. Sep–Nov.  $2n = 72$ .

Hill slopes, grassy places, fields, open forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [tropical Asia, Australia, Pacific Islands].

This species is a troublesome weed.

- 1a. Spikelets elliptic, broadest at middle, acuminate ..... 8a. var. *subquadriflora*  
 1b. Spikelets narrowly obovate, broadest above middle, acute ..... 8b. var. *miliiformis*

**8a. *Brachiaria subquadriflora* var. *subquadriflora***

四生臂形草(原变种) si sheng bi xing cao (yuan bian zhong)

*Panicum subquadriflorum* Trinius, Gram. Panic. 145. 1826; *P. pseudodistachyum* Hayata; *Urochloa subquadriflora* (Trinius) R. D. Webster.

Leaf sheaths and blades usually glabrous, rarely with tubercle-based hairs on sheaths or pubescent on both surfaces of blades. Pedicels glabrous. Spikelets elliptic, broadest in middle, glabrous. Fl. and fr. Sep–Nov.

Mountain slopes, grassy places, fields, open forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan [tropical Asia, Pacific Islands].

**8b. *Brachiaria subquadriflora* var. *miliiformis*** (Presl) S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 472. 1984.

锐头臂形草 rui tou bi xing cao

*Panicum miliiforme* Presl, Reliq. Haenk. 1: 300. 1830; *Brachiaria miliiformis* (Presl) A. Chase.



Leaf sheaths glabrous or loosely tuberculate-hairy or margins ciliate. Pedicels glabrous. Spikelets narrowly obovate, broadest above middle, 3–3.5 mm, acute. Fl. and fr. autumn.  $2n = 54-56, 72$ .

Roadsides, grassy places. Hong Kong, Yunnan [India, Malaysia, Sri Lanka].

**9. *Brachiaria urochlooides*** S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 471. 1984. [“*urocooides*”].

尾稃臂形草 wei fu bi xing cao

Annual. Culms slender, decumbent and rooting at base, branching, 40–60 cm tall. Leaf sheaths glabrous or with tubercle-based hairs, ciliate along one margin; leaf blades linear-lanceolate,  $5-9 \times 0.3-0.5$  cm, both surfaces with tubercle-based

hairs, margins cartilaginous, scabrous, apex acute; ligule ciliate, hairs ca. 1 mm. Inflorescence axis 1–2.5 cm; racemes 2–4, 1.5–3 cm, secund, ascending; rachis scarcely winged, 0.5–0.6 mm wide, scabrous on edges; spikelets single or paired in the lower part. Spikelets lanceolate, 3.5–4 mm, without a stipe, subglabrous, abruptly acuminate; lower glume ovate, 1/2–3/5 spikelet length, clasping, 3–5-veined, acute; upper glume 5-veined, thinly pubescent near margins; upper lemma clearly shorter than spikelet, ca. 2.5 mm, rugulose, apex mucronate. Fl. and fr. May–Oct.

• Grassy places. S Yunnan.

This species resembles *Urochloa* in its mucronate upper lemma, but the lower glume is adaxial and characters of the leaf epidermis show it to be better placed in *Brachiaria*.

## 166. UROCHLOA P. Beauvois, Ess. Agrostogr. 52. 1812.

尾稃草属 wei fu cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials, often coarse and weedy. Leaf blades linear to broadly lanceolate; ligule a ciliate membrane. Inflorescence composed of racemes along a central axis; spikelets single or paired on a flattened or triquetrous rachis. Spikelets lanceolate or elliptic, plano-convex, cuspidate to acuminate, florets 2; lower glume abaxial, variable in length; upper glume and lower lemma similar, as long as spikelet, membranous to firmly papery; upper lemma coriaceous, rugulose or granular, margins inrolled, shorter than spikelet with a slender mucro lying within the cuspidate spikelet tip.  $x = 7, 10, 16$ .

Twelve species: tropics of the Old World; four species in China.

*Urochloa* is closely related to *Brachiaria*, and the two are united by some authors. They are distinguished mainly by habit, *Urochloa* having rather more flattened, cuspidate spikelets enclosing a pronounced mucro from the upper lemma. The different spikelet orientation is also characteristic, though not obvious when the spikelets are paired. In *Urochloa* the lower glume faces outward, whereas in *Brachiaria* it lies against the rachis.

- 1a. Lower glume 2/3–3/4 spikelet length ..... 1. *U. paspaloides*  
 1b. Lower glume less than 1/3 spikelet length.  
 2a. Spikelets 2–2.5 mm ..... 2. *U. reptans*  
 2b. Spikelets 3.5–5 mm.  
 3a. Perennial from a knotty rootstock; spikelets paired; fertile floret with a tiny mucro ca. 0.1 mm ..... 3. *U. setigera*  
 3b. Annual, spikelets usually single or paired only at base; fertile floret with a pronounced mucro  
 0.3–1 mm ..... 4. *U. panicoides*

**1. *Urochloa paspaloides*** J. Presl, Reliq. Haenk. 1: 318. 1830.

雀稗尾稃草 que bai wei fu cao

*Brachiaria ambigua* (Trinius) A. Camus; *B. paspaloides* (J. Presl) C. E. Hubbard; *Panicum ambiguum* Trinius; *Urochloa ambigua* (Trinius) Pilger.

Annual. Culms slender, spreading, branching and rooting at lower nodes, 20–60 cm or more tall, nodes pubescent. Leaf sheaths glabrous or loosely pilose; leaf blades linear,  $5-20 \times 0.3-0.8$  cm, thinly pilose on both surfaces with tubercle-based hairs, apex acuminate; ligule ca. 1 mm. Inflorescence axis 1.5–4 cm; racemes 2–4, 2–5 cm, rather stiffly ascending; rachis narrow, triquetrous, scabrous; spikelets usually paired, loosely overlapping. Spikelets lanceolate, 3.5–4 mm, glabrous, sharply acute; lower glume lanceolate, 2/3–3/4 spikelet length, 5–7-veined, acute and apiculate; upper glume 5–7-veined, sharply acute; lower lemma obscurely 5-veined, palea very small; upper lemma elliptic-oblong, only slightly shorter than spikelet, finely rugulose, mucro 0.4–0.5 mm. Fl. and fr. May–Oct.  $2n = 36$ .

Mountain slopes, forests. Hainan, Yunnan [India, Japan (Ryukyu Islands), Malaysia, Philippines, Sri Lanka].

This is the only species of *Urochloa* in China with a long lower glume.

**2. *Urochloa reptans*** (Linnaeus) Stapf in Prain, Fl. Trop. Africa 9: 601. 1920.

尾稃草 wei fu cao

Annual. Culms slender, creeping, rooting at lower nodes, ascending to 10–50 cm tall. Leaf sheaths glabrous, one margin densely ciliate; leaf blades lanceolate,  $2-6 \times 0.3-1.2$  cm, glabrous or loosely hispidulous, base subcordate, margins scabrous, pectinate-ciliate at base; ligule ca. 1 mm, ciliate. Inflorescence pyramidal, axis 1–8 cm; racemes 3–6(–12), 0.5–4 cm, spreading; rachis triquetrous, scabrous; spikelets paired, crowded, pedicels setose. Spikelets ovate or ovate-elliptic, 2–2.5 mm, usually glabrous, acute; lower glume cufflike, 1/8–1/4 spikelet length, thinly membranous, veinless or obscurely 3-veined, truncate or rounded; upper glume (5–)7–9-veined; lower lemma 5-veined, palea well developed; upper lemma broadly elliptic, 1.8–2 mm, finely rugose, apiculate. Fl. and fr. summer–autumn.  $2n = 14, 18$ .

Grassy places, fields. Guangdong, Guangxi, Guizhou, Hunan, Sichuan, Taiwan, Yunnan [tropics throughout the world].

This weedy species is widely distributed in the Old World and introduced in America. It is a borderline species in the genus: the small, plump spikelets are reminiscent of *Brachiaria*, where it is placed by some authors.

- 1a. Rachis and pedicels with long tubercle-based setae ..... 2a. var. *reptans*  
1b. Rachis and pedicels glabrous ..... 2b. var. *glabra*

### 2a. *Urochloa reptans* var. *reptans*

尾稃草(原变种) wei fu cao (yuan bian zhong)

*Panicum reptans* Linnaeus, Syst. Nat., ed. 10, 2: 870. 1759; *Brachiaria prostrata* (Lamarck) Grisebach; *B. reptans* (Linnaeus) C. A. Gardner & C. E. Hubbard; *Panicum prostratum* Lamarck.

Rachis of raceme and pedicels with long tubercle-based setae.

Grassy places, fields. Guangdong, Guangxi, Guizhou, Hunan, Sichuan, Taiwan, Yunnan [tropics throughout the world].

### 2b. *Urochloa reptans* var. *glabra* S. L. Chen & Y. X. Jin, Acta Phytotax. Sin. 22: 475. 1984.

光尾稃草 guang wei fu cao

Rachis of raceme and pedicels glabrous.

- Grassy and waste places. Yunnan.

### 3. *Urochloa setigera* (Retzius) Stapf in Prain, Fl. Trop. Africa 9: 598. 1920.

刺毛尾稃草 ci mao wei fu cao

*Panicum setigerum* Retzius, Observ. Bot. 4: 15. 1786; *Brachiaria setigera* (Retzius) C. E. Hubbard; *Urochloa cordata* Keng ex S. L. Chen & Y. X. Jin.

Perennial from a knotty base. Culms rigid, decumbent, ascending to 1 m, nodes densely bearded. Leaf sheaths puberulous and with tubercle-based hairs, one margin ciliate; leaf blades lanceolate, 8–15 × 1.8–2.5 cm, pubescent, base cordate-amplexicaul, margins scabrous, pectinate-ciliate usually at least

to the middle, apex acuminate; ligule ca. 2 mm, ciliate. Inflorescence axis 6–13 cm; racemes 6–12, 2–5 cm, ascending; spikelets usually paired, setose especially on pedicels. Spikelet ovate-lanceolate, 4–5 mm, densely pubescent, acuminate-cuspidate; lower glume ovate, ca. 1/5 spikelet length, triangular, subacute; upper glume (5–)7–9-veined; lower lemma slightly shorter than upper glume, staminate or sterile, 5–7-veined, palea well developed, keels very narrowly winged upward; upper lemma broadly elliptic, coriaceous, rugulose, mucro ca. 0.1 mm. Fl. and fr. Jul–Sep.

Forests. Guangdong, Hainan [India, Myanmar, Nepal, Sri Lanka, Thailand].

### 4. *Urochloa panicoides* P. Beauvois, Ess. Agrostogr. 53. 1812.

类黍尾稃草 lei shu wei fu cao

*Panicum panicoides* (P. Beauvois) Hitchcock; *Urochloa jinshaicola* B. S. Sun & Z. H. Hu; *U. longifolia* B. S. Sun & Z. H. Hu; *U. longifolia* var. *yuanmuensis* (B. S. Sun & Z. H. Hu) S. L. Chen & Y. X. Jin; *U. yuanmuensis* B. S. Sun & Z. H. Hu.

Annual. Culms loosely tufted, geniculate ascending, 20–80 cm tall, nodes bearded. Leaf sheaths loose, with tubercle-based setae, one margin densely ciliate; leaf blades linear-lanceolate, 5–15(–20) × 0.5–1.5 cm, glabrous to thinly pilose, margins pectinate-ciliate at least toward amplexicaul base, apex acuminate; ligule 1.5–2 mm. Inflorescence axis 3–6 cm; racemes 3–10, 2–6 cm, stiff, diverging; rachis flattened, setose mainly from the short stout pedicels; spikelets usually borne singly or in pairs at base, occasionally mostly paired, overlapping by ca. 1/3 their length. Spikelets ovate-elliptic, 4–5 mm, glabrous or pubescent, cuspidate; lower glume ovate, 1/4–1/3 spikelet length, 3–5-veined, obtuse; upper glume 5–9-veined with evident cross veins; upper lemma rugose, mucro 0.4–1 mm. Fl. and fr. Sep–Oct.

Moist grasslands, lakesides. Sichuan, Yunnan [Bhutan, India; E and S Africa].

*Urochloa setigera* can be confused with forms of *U. panicoides* with pubescent, paired spikelets, especially when the base is missing. *Urochloa panicoides* has less abruptly cuspidate spikelets, a more coarsely rugose fertile floret, and a much longer mucro on the upper lemma.

## 167. *ERIOCHLOA* Kunth, Nov. Gen. Sp. 1: 94. 1816.

野黍属 ye shu shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Leaf blades linear, flat; ligule ciliate. Inflorescence of racemes along a central axis, spikelets pedicellate, single, paired or clustered on a narrow rachis, adaxial. Spikelets lanceolate to elliptic, thinly biconvex, subcartilaginous, acute to aristate, a little globose swelling at spikelet base, florets 2; lower glume vestigial; upper glume equaling spikelet, facing outward, often awn-pointed; lower lemma similar but usually slightly shorter, neuter or staminate, with or without palea; upper lemma crustaceous, papillose, margins inrolled, apex obtuse and often mucronate.  $x = 9$ .

About 30 species: tropical and warm-temperate regions of the world, especially tropical Africa and America; two species in China.

The main diagnostic feature of *Eriochloa* is the beadlike swelling at the spikelet base. This is formed by the swollen lowest rachilla internode and adnate lower glume. The lanceolate, pointed spikelets are also characteristic.

- 1a. Racemes densely pilose; spikelets single, 4.5–5 mm; upper lemma subacute to acute ..... 1. *E. villosa*

1b. Racemes glabrous or almost so; spikelets paired or in threes, 3–4 mm; upper lemma with ca. 0.5 mm mucro ..... 2. *E. procera*

**1. *Eriochloa villosa*** (Thunberg) Kunth, Révis. Gramin. 1: 30. 1829.

野黍 *ye shu*

*Paspalum villosum* Thunberg in Murray, Syst. Veg., ed. 14, 105. 1784; *Eriochloa villosa* var. *stenantha* Ohwi; *Panicum tuberculiflorum* Steudel.

Annual. Culms erect or geniculately ascending, branching, 30–100 cm tall, nodes pubescent. Leaf sheaths loose, glabrous, pubescent or ciliate along one margin; leaf blades broadly linear, 5–25 × 0.5–1.5 cm, pubescent, margins firm, wavy, scaberulous, apex acute. Inflorescence axis 7–15 cm; racemes 4–8, 1.5–4 cm, erect or only slightly diverging; spikelets single, closely overlapping in 2 rows; axis and rachis densely pubescent, rachis margins and pedicels villous with spreading hairs. Spikelets ovate-elliptic, plump, thinly cartilaginous, dully shining, 4.5–5(–6) mm, acute, basal swelling ca. 0.5 mm; free portion of lower glume a ca. 0.2 mm truncate frill; upper glume and lower lemma 5–7-veined, puberulous, lower palea absent; upper lemma weakly rugulose, subacute. Fl. and fr. Jul–Oct.  $2n = 54$ .

Mountain slopes, moist places. Anhui, Fujian, Guangdong, Guizhou, Heilongjiang, Henan, Hubei, Jiangxi, Jiangsu, Jilin, Nei Mongol, Shaanxi, Shandong, Sichuan, Taiwan, Tianjin, Yunnan, Zhejiang [Japan, Korea, Russia (Far East), Vietnam].

**2. *Eriochloa procera*** (Retzius) C. E. Hubbard, Bull. Misc. In-

form. Kew 1930: 256. 1930.

高野黍 *gao ye shu*

*Agrostis procera* Retzius, Observ. Bot. 4: 19. 1786; *A. ramosa* (Retzius) Poiré; *Eriochloa annulata* (Flüggé) Kunth; *E. hackelii* Honda; *E. ramosa* (Retzius) Kuntze; *Milium ramosum* Retzius; *Paspalum annulatum* Flüggé.

Annual or short-lived perennial. Culms erect or geniculately ascending, branching, 30–150 cm tall, nodes pubescent. Leaf sheaths keeled, glabrous; leaf blades linear, 8–20 × 0.2–0.8 cm, glabrous, apex acuminate. Inflorescence axis 10–20 cm; racemes several, 3–7 cm, loosely ascending, bare of spikelets proximally; spikelets mostly paired, single toward raceme apex; axis and rachis very slender, puberulous, pedicels usually without setae, those of a pair often partially connate. Spikelets lanceolate, 3–4 mm, herbaceous, sharply acute, basal swelling ca. 0.3 mm and often purplish; lower glume minute; upper glume and lower lemma 5-veined, pilose with appressed silky hairs, lower palea absent; upper lemma rugulose-punctulate, mucro 0.3–0.5 mm. Fl. and fr. summer–autumn.  $2n = 36$ .

Streams, moist places. Fujian, Guangdong, Hainan, Taiwan [India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia; introduced in Africa, tropical America].

This species is a good forage grass.

## 168. THUAREA Persoon, Syn. Pl. 1: 110. 1805.

蒴雷草属 *chu lei cao shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials. Culms creeping. Leaf blades linear-lanceolate, stiff; ligule ciliate. Inflorescence monoecious, composed of a single deciduous raceme with foliaceous rachis bearing 1–2 persistent bisexual or female spikelets at the base and several deciduous staminate spikelets above, spikelets secund in one row; staminate portion of the rachis shedding the spikelets after fertilization and folding onto the fertile spikelets, thus enclosing them in a capsule-like fruit-case. Bisexual spikelets adaxial, biconvex, florets 2; lower glume small or suppressed; upper glume equal to spikelet, 5-veined; lower floret neuter or staminate, its lemma resembling upper glume, palea often deeply split; upper floret fertile, thinly papery, its lemma with flat margins and hairy apex. Staminate spikelets similar but both florets staminate, smaller than the bisexual florets, with thinner scales.  $x = 9$ .

Two species: Madagascar to Polynesia, on sandy seashores; one species in China.

**1. *Thuarea involuta*** (G. Forster) R. Brown ex Smith, Cycl. 35. 1817 [“1819”].

蒴雷草 *chu lei cao*

*Ischaemum involutum* G. Forster, Fl. Ins. Austr. 73. 1786; *Thuarea latifolia* R. Brown; *T. media* R. Brown; *T. sarmentosa* Persoon.

Culms long and creeping, much branched, rooting at nodes, flowering culms up to 20 cm tall. Leaf sheaths loose, imbricate on the short erect shoots, pilose or only ciliate along margins; leaf blades 2–5 × 0.3–0.8 cm, usually puberulous on both surfaces; ligule 0.5–1 mm. Inflorescence a terminal raceme, not exerted from the uppermost spathe-like leaf sheath; rachis broad and winglike in lower fertile part, nar-

rowed above in staminate part. Spikelets pubescent; staminate spikelet oblong-lanceolate, 3–4 mm; fertile spikelet ovate-lanceolate, 3.5–4.5 mm. Fl. and fr. Apr–Dec.

Sandy seashores. Guangdong, Hainan, Taiwan [Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Indian Ocean Islands, Madagascar, Pacific Islands (Polynesia)].

The short flowering shoots bend down as the seed ripens, and the seed may become buried in the sand. The plant is an efficient sand binder, and the prostrate, rooting stems form widely spreading mats. With its curious, watertight, buoyant fruit-case, this grass is also adapted to long-distance dispersal by sea.

The combination *Thuarea involuta* has often been attributed to Roemer & Schultes (Syst. Veg. 2: 808. 1817), but this was not published until November 1817, whereas Smith published in May of that year.

**169. PASPALUM** Linnaeus, Syst. Nat., ed. 10, 2: 855. 1759.

雀稗属 que bai shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials or annuals. Culms tufted, or with creeping rhizomes and stolons. Leaf blades linear or narrowly lanceolate, flat; ligule membranous. Inflorescence composed of single, digitate or scattered racemes; rachis flat, often winged; spikelets single or paired, pedicellate in 2–4 rows, densely crowded, lower lemma abaxial. Spikelets orbicular, ovate or elliptic plano-convex; lower glume absent or rarely present as a small scale; upper glume as long as spikelet or nearly so, rarely absent, convex, membranous to subpapery, 3–7-veined; lower lemma resembling upper glume, flat, neuter without palea; upper lemma usually coriaceous to crustaceous, rarely softer, margins inrolled, apex obtuse to apiculate.  $x = 10$ .

About 330 species: tropical and warm-temperate regions, especially in the New World; 16 species (two endemic, eight introduced) in China.

This genus includes a number of good forage grasses and also some widespread weeds.

- 1a. Spikelets with a marginal ciliate fringe of silky hairs; hairs 1–2 mm.  
 2a. Racemes 2, paired; stoloniferous perennial ..... 1. *P. conjugatum*  
 2b. Racemes usually more than 2, spread along an axis.  
 3a. Spikelets 3–4 mm; upper floret equal to 2/3 length of spikelet ..... 2. *P. dilatatum*  
 3b. Spikelets 2–3 mm; upper floret equal to or only slightly shorter than spikelet.  
 4a. Spikelets light green or purplish, ovate; upper glume pubescent, fringed along whole length ..... 3. *P. urvillei*  
 4b. Spikelets brown, obovate; upper glume puberulous, fringed only above middle ..... 4. *P. virgatum*
- 1b. Spikelets glabrous or pubescent, without a marginal fringe of silky hairs.  
 5a. Upper glume and lower lemma broadly winged along margins ..... 5. *P. fimbriatum*  
 5b. Upper glume and lower lemma not winged.  
 6a. Both glumes absent; upper lemma papery, with conspicuous riblike veins. .... 6. *P. malacophyllum*  
 6b. Upper glume present; upper lemma cartilaginous or coriaceous, with obscure veins.  
 7a. Plants with long stolons and/or rhizomes; racemes 2(–3), paired, the spikelets borne singly; spikelets lanceolate to ovate or obovate.  
 8a. Plant with robust woody rhizomes; upper glume and lower lemma cartilaginous and shiny, obtuse ..... 7. *P. notatum*  
 8b. Plant with slender stolons; upper glume and lower lemma papery, acute.  
 9a. Upper glume pubescent; spikelets plano-convex, obovate-oblong ..... 8. *P. distichum*  
 9b. Upper glume glabrous; spikelets strongly flattened, lanceolate-oblong ..... 9. *P. vaginatum*  
 7b. Plants tufted; racemes up to 20 along a common axis, the spikelets single or paired; spikelets broadly elliptic, obovate or suborbicular.  
 10a. Fertile floret dark glossy brown at maturity; spikelets usually glabrous.  
 11a. Lower lemma conspicuously rugose inside margins; spikelets paired ..... 10. *P. plicatulum*  
 11b. Lower lemma usually smooth, occasionally slightly rugose; spikelets usually single, occasionally paired.  
 12a. Pedicels glabrous; nodes, culm apex and leaf blades often glabrous ..... 11. *P. scrobiculatum*  
 12b. Pedicels pilose; nodes, culm apex and leaf blades densely hairy ..... 12. *P. hirsutum*  
 10b. Fertile floret yellowish green to pale brown at maturity; spikelets pubescent or glabrous.  
 13a. Spikelets 1–1.5 mm ..... 13. *P. paniculatum*  
 13b. Spikelets 2–3 mm.  
 14a. Rachis 2–4 mm wide; spikelets 2–2.5 mm, paired, pubescent ..... 14. *P. longifolium*  
 14b. Rachis 1–1.5 mm wide; spikelets 2.5–3 mm, single or loosely paired.  
 15a. Upper glume pubescent especially along the margins; leaf blades hirsute, 5–8 mm wide ..... 15. *P. thunbergii*  
 15b. Upper glume glabrous; leaf blades glabrous, 3–4 mm wide ..... 16. *P. delavayi*

**1. Paspalum conjugatum** Bergius, Acta Helv. Phys.-Math. 7: 129. 1772.

两耳草 liang er cao

Perennial with long stolons. Culms in small tufts along the stolons, compressed, nearly solid, 30–60 cm tall. Leaf sheaths keeled, glabrous or pilose along upper margins and mouth, a line of hairs abaxially at junction with blade; leaf blades lanceolate-linear, thin, 5–20 × 0.5–1 cm, glabrous or papillose-pilose along margins, apex acute. Inflorescence digitate; racemes 2,

divaricate, very slender, 6–12 cm; spikelets single, in 2 rows; rachis 0.5–1 mm wide. Spikelets pale yellowish, ovate to suborbicular, 1.5–1.8 mm, abruptly acute; upper glume hyaline, 2-veined with the veins marginal, ciliate along margins with long silky hairs; lower lemma similar but not ciliate; upper lemma pallid at maturity, ovate, as long as spikelet, crustaceous, obscurely striate. Fl. and fr. May–Sep.  $2n = 40, 80$ .

Open places in forests, forest margins, mostly on moist soils, sometimes forming a sward. Fujian, Guangxi, Hainan, Hong Kong, Taiwan, Yunnan [tropics and subtropics throughout the world].

This is a distinctive species, easily recognized by the combination of a stoloniferous habit and an inflorescence composed of a pair of widely spreading racemes with small, pale, fringed spikelets.

**2. *Paspalum dilatatum*** Poiret, Encycl. 5: 35. 1804.

毛花雀稗 mao hua que bai

*Digitaria dilatata* (Poiret) H. J. Coste.

Perennial from a short rhizome. Culms forming a coarse, spreading tuft, 50–150 cm tall, ca. 5 mm in diam., glabrous. Leaf sheaths glabrous or pilose in the lower part; leaf blades linear, 10–45 × 0.3–1.2 cm, glabrous, apex attenuate; ligule 2–4 mm. Inflorescence axis 2–20 cm; racemes 2–10, 5–12 cm, spaced, diverging, axils pilose; spikelets paired; rachis 1–1.5 mm wide, glabrous. Spikelets green or purplish, broadly ovate, 3–4 mm, sharply acute; upper glume membranous, 5–9-veined, sparsely pubescent to almost glabrous on back, margins fringed with long white hairs; lower lemma similar but not hairy; upper lemma pallid at maturity, orbicular, ca. 2 mm, clearly shorter than spikelet, papillose-striate, apex rounded. Fl. and fr. May–Jul.  $2n = 40$ , 50–63.

Roadsides, waste places, naturalized. Fujian, Guangxi, Guizhou, Hong Kong, Hubei, Shanghai, Taiwan, Yunnan, Zhejiang [native to South America].

This native of South America is now widely distributed throughout the tropics as a forage grass and also occurs as a weed of cultivation.

**3. *Paspalum urvillei*** Steudel, Syn. Pl. Glumac. 1: 24. 1853.

丝毛雀稗 si mao que bai

Perennial from a short rootstock. Culms robust, up to 2 m tall, glabrous. Leaf sheaths densely hispid, long hairs at the mouth; leaf blades linear, 15–50 × 0.5–1.5 cm, glabrous or pilose at the base, apex attenuate; ligule 3–5 mm. Inflorescence axis 10–30 cm; racemes 10–25, 8–15 cm, narrowly ascending or suberect; spikelets paired; rachis ca. 0.5 mm wide. Spikelets light green or purplish, ovate, 2–3 mm, sharply acute; upper glume membranous, 3-veined with laterals marginal, appressed-pubescent on back, margins densely fringed with long white hairs; lower lemma similar but glabrous on back; upper lemma elliptic, striate, obtuse. Fl. and fr. May–Oct.  $2n = 40$ , 60.

Roadsides, waste places, introduced. Fujian, Hong Kong, Taiwan [native to South America].

This is a native of South America related to *Paspalum dilatatum* and likewise introduced widely in the tropics as a forage grass and weed.

**4. *Paspalum virgatum*** Linnaeus, Syst. Nat., ed. 10, 2: 855. 1759.

粗秆雀稗 cu gan que bai

Perennial from short rootstock. Culms robust, forming a dense tussock, erect, 1–2 m tall. Leaf sheaths compressed, usually papillose-hirsute at margins and summit; leaf blades linear, flat, stiff, 30–75 × 1–2.5 cm, margins serrate, apex acuminate; ligule 2–3 mm. Inflorescence axis 10–30 cm; racemes up to 20, 5–15 cm, ascending or drooping; spikelets paired, in 4 dense rows; rachis 0.5–1.5 mm wide, scabrous, glabrous or with a few setae. Spikelet brownish, obovate, 2.2–3 mm, acute;

upper glume membranous, 3–5-veined, dorsally puberulous, margins fringed with short silky hairs above middle; lower lemma resembling upper glume but glabrous; upper lemma brownish, as long as spikelet, coriaceous, finely punctulate-striate, subacute. Fl. and fr. summer–autumn.  $2n = 40$ , 80.

Moist or swampy ground, naturalized. N Taiwan [native to America from the United States to Brazil].

**5. *Paspalum fimbriatum*** Kunth, Nov. Gen. Sp. 1: 93. 1816 [“1815”].

裂颖雀稗 lie ying que bai

Annual. Culms tufted, erect, 30–100 cm tall. Leaf sheaths thinly hispid; leaf blades linear-lanceolate, 10–30 × 0.3–1 cm, both surfaces coarsely appressed hispid especially toward base, margins pectinate-ciliate, apex acuminate; ligule ca. 2 mm. Inflorescence axis 6–10 cm; racemes 3–5, 3–7 cm, loosely ascending, axils with long stiff hairs; spikelets usually paired but one of the pair often reduced; rachis flat, 1.2–1.5 mm wide, serrate-margined. Spikelets often purplish, circular in outline, 2.5–3.5 mm, acute; upper glume ovate, 3-veined, with stiff marginal wings ca. 1 mm wide, wings lacerate, wing margin ciliate with short stout hairs; lower lemma similar to upper glume but wing less developed; upper lemma ovate-elliptic, slightly shorter than spikelet, smooth, shining. Fl. and fr. summer–autumn.  $2n = 40$ .

Recently naturalized. Taiwan [native to Central and South America and the West Indies].

*Paspalum fimbriatum* is easily separable from other species of *Paspalum* in China by its distinctive, winged spikelets.

**6. *Paspalum malacophyllum*** Trinius, Sp. Gram. 3: t. 271. 1836.

稜稈雀稗 leng fu que bai

Perennial with short rhizomes. Culms slender to robust, 1–2 m tall. Leaf sheaths papillose-pilose in upper part and mouth; leaf blades linear-lanceolate, flat, 10–40 × 0.6–3 cm, glabrous or pilose, the lower narrowed to a slender base, apex long acuminate; ligule ca. 2 mm. Inflorescence axis 4–20 cm; racemes up to 30, 3–6 cm, ascending, axils long pilose; spikelets paired, in 4 dense rows; rachis winged, 0.5–1.5 mm wide, margins scabrous, sometimes setose. Spikelets often purplish, oblong-navicular, 1.5–2.5 mm, glabrous; both glumes absent; lower lemma as long as spikelet, concave, membranous, 3-veined with laterals marginal; upper lemma dorsally convex, papery, 5-veined, veins prominent and forming ribs, apex acute. Fl. and fr. summer–autumn.  $2n = 20$ , 40.

Cultivated. Gansu [native to South America].

This is the only species of *Paspalum* in China lacking both glumes.

The species is cultivated for hay and sometimes used in soil conservation work.

**7. *Paspalum notatum*** Flügge, Gram. Monogr., Paspalum 106. 1810.

百喜草 bai xi cao

Perennial with stout, woody, many-noded rhizomes and stolons forming a mat. Culms 15–80 cm tall. Leaf sheaths

keeled, compressed, glabrous; leaf blades broadly linear, flat or folded, stiffly spreading, 5–30 × 0.3–1 cm, glabrous, apex acuminate; ligule very short. Inflorescence of 2(–3) racemes at culm apex; racemes 4–9(–16) cm, recurved-ascending; spikelets single, in 2 row; rachis 1–1.8 mm wide, scabrous. Spikelets green, ovate to obovate, plumply plano-convex, 2.5–3.5 mm, smooth, shining, obtuse; upper glume cartilaginous, 3-veined, glabrous; lower lemma resembling upper glume but slightly shorter; upper lemma pale green, slightly shorter than spikelet, finely striate, obtuse. Fl. and fr. Sep.  $2n = 40, 30$ .

Cultivated. Fujian, Gansu, Hebei, Yunnan [native to tropical and subtropical America].

This species is widely introduced in tropical and warm-temperate regions as a forage grass and also sometimes for erosion control.

**8. *Paspalum distichum*** Linnaeus, Syst. Nat., ed. 10, 2: 855. 1759.

双穗雀稗 shuang sui que bai

*Digitaria paspalodes* Michaux; *Paspalum paspalodes* (Michaux) Scribner.

Perennial with rhizomes and stolons. Culms 20–50 cm tall, nodes usually pubescent. Leaf sheaths keeled, glabrous, margins ciliate; leaf blades linear, 5–10 × 0.3–0.7 cm, glabrous, apex acute; ligule 2–3 mm. Inflorescence of 2(–3) racemes arising together or separated by a short axis; racemes 3–7 cm; spikelets single, in 2 rows; rachis straplike, 1.5–2 mm wide. Spikelets pallid, obovate-oblong, plano-convex, 3–3.5 mm, acute; lower glume vestigial or a narrow triangular scale up to 1/2 spikelet length or more; upper glume papery, 3–5-veined with distinct middle vein, loosely appressed pubescent; lower lemma 3–5-veined, usually glabrous; upper lemma pale green, almost equal to spikelet, cartilaginous, apex apiculate and minutely pubescent. Fl. and fr. May–Sep.  $2n = 40, 48, 60$ .

Fields, roadsides, ditches and other disturbed places, mostly on moist fertile soils. Anhui, Fujian, Guangxi, Guizhou, Hainan, Henan, Hong Kong, Hubei, Hunan, Jiangsu, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [tropical and warm-temperate regions of the world].

The length of the lower glume is very variable, even within a single raceme. The spikelets are not obviously hairy because the pubescent upper glume faces inward, but the creeping habit together with paired racemes of plump spikelets are distinctive. Rarely the upper glume is glabrous, but such specimens can be separated from the closely related *Paspalum vaginatum* by spikelet shape and by the longer, apiculate fertile floret.

**9. *Paspalum vaginatum*** Swartz, Prodr. 21. 1788.

海雀稗 hai que bai

*Digitaria vaginata* (Swartz) Magnier ex Debeaux; *Paspalum distichum* subsp. *vaginatum* (Swartz) Maire; *Paspalum distichum* var. *vaginatum* (Swartz) Grisebach; *Sanguinaria vaginata* (Swartz) Bubani.

Perennial with short rhizome and long stolons. Culms solitary or tufted, many-noded, 10–50 cm tall. Leaf sheaths imbricate, often keeled, margins membranous; leaf blades distichous, linear, rather stiffly ascending, 2.5–15 × 0.3–0.8 cm, apex acute; ligule 0.5–1 mm. Inflorescence of (1–)2(–3) racemes aris-

ing together at culm apex; racemes 2–5 cm, usually closely approximate when young, later spreading; spikelets single, in 2 rows; rachis 1–2 mm wide. Spikelets pale brownish green, narrowly lanceolate-oblong, strongly flattened, 3.5–4 mm, acute; lower glume absent or rarely a tiny vestige; upper glume thinly papery, weakly 5-veined, midvein often suppressed, glabrous; lower lemma resembling upper glume; upper lemma pale green, 2.5–3 mm, shorter than spikelet, cartilaginous, apex minutely pubescent. Fl. and fr. Jun–Sep.

Sandy seashores, swamps, along the margins of slow-moving streams. Hainan, Hong Kong, Taiwan, Yunnan [tropics and subtropics throughout the world].

This is one of the first plants to colonize the seashore. It is an efficient sand binder and a common saltmarsh plant, where it may form pure stands. It is sometimes also found in inland saline marshes.

**10. *Paspalum plicatum*** Michaux, Fl. Bor.-Amer. 1: 45. 1803.

皱稗雀稗 zhou fu que bai

*Panicum plicatum* (Michaux) Kuntze.

Perennial. Culms tufted, erect or ascending, usually compressed, 30–150 cm tall. Leaf sheaths longer than internodes, keeled, glabrous or pubescent at base; leaf blades linear, usually folded at base, flat above, 10–50 × 0.3–1 cm, adaxial surface pilose at base and mouth, apex acuminate; ligule 1–2 mm. Inflorescence axis 3–15 cm; racemes 3–10, 5–8 cm, laxly ascending to spreading, axils pilose; spikelets paired; rachis 0.75–1 mm wide. Spikelets brown at maturity, obovate, 2–3 mm, subacute to obtuse; upper glume membranous, 5-veined, glabrous or sometimes appressed-pubescent; lower lemma membranous, 3–5-veined, glabrous, with short transverse wrinkles just inside the slightly raised margin; upper lemma deep brown, strongly convex dorsally, subequaling spikelet, smooth, shiny. Fl. and fr. summer–autumn.  $2n = 20, 40, 60$ .

Cultivated in Gansu [native to tropical and subtropical America].

“*Paspalum plicatum* Persoon” (Syn. Pl. 1: 86. 1805) is merely an orthographical variant of *P. plicatum*.

This species is used for fodder.

**11. *Paspalum scrobiculatum*** Linnaeus, Mant. Pl. 1: 29. 1767.

鸭跖草 ya jie cao

Perennial or annual. Culms tufted, slender to robust, erect or decumbent and rooting at lower nodes, 30–90(–150) cm tall. Leaf sheaths compressed, keeled, usually glabrous; leaf blades linear or linear-lanceolate, 10–40 × 0.4–1.2 cm, usually glabrous, base subrounded, margins scabrous, apex acuminate; ligule 0.5–1 mm. Inflorescence of 2–5(–8) racemes, subdigitate or on a short axis; racemes 3–10 cm, ascending to widely spreading; spikelets usually single, overlapping in 2 rows, sometimes paired especially in middle of raceme; rachis ribbonlike, 1.5–3 mm wide, margins scabrous. Spikelets green becoming brown, suborbicular, ovate or broadly elliptic, 2–3 mm, glabrous, obtuse to apiculate; upper glume membranous, 3–7-veined; lower lemma membranous or sometimes indurate, 3–5(–7)-veined; upper lemma brown at maturity, subequaling spikelet, coriaceous, finely striate, obtuse. Fl. and fr. May–Nov.  $2n = 20, 40$  or 60.

Roadsides, weedy places, often on damp soils. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [tropics and subtropics of the Old World; introduced in America].

This polymorphic species complex is thought to comprise an apomictic swarm. Some of its components have been described as separate species, but variation is continuous throughout. Robust forms are sometimes separated as *Paspalum auriculatum* J. Presl & C. Presl. Three recognizable entities are maintained here at varietal rank.

- 1a. Spikelets, or some of them, often paired, broadly obovate, 2–2.2 mm; lower lemma 3–5-veined; upper lemma yellow-brown or mid-brown ..... 11c. var. *orbiculare*
- 1b. Spikelets single, usually suborbicular, 2–3 mm; lower lemma 5–9-veined; upper lemma dark brown at maturity.
- 2a. Spikelets 2.5–3 mm; leaf blades usually glabrous, 10–20 × 0.4–1.2 cm ..... 11a. var. *scrobiculatum*
- 2b. Spikelets 2–2.5 mm; leaf blades usually pilose, 5–15 × 0.2–0.6 cm ..... 11b. var. *bispicatum*

#### 11a. *Paspalum scrobiculatum* var. *scrobiculatum*

鸭跖草(原变种) ya jie cao (yuan bian zhong)

Annual or perennial. Culms erect or decumbent at base, up to 90(–150) cm tall. Leaf blades 10–20 × 0.4–1.2 cm, usually glabrous. Spikelets single, usually suborbicular, 2.5–3 mm; upper glume 7–13-veined, lower lemma 7–9-veined, veins often concolorous with back; upper lemma dark brown at maturity. Fl. and fr. May–Sep.  $2n = 40$ .

Roadsides, weedy places, often on damp soils. Guangxi, Hainan, Taiwan, Yunnan [India, tropical SE Asia].

An annual form is cultivated in India as a cereal (Kodo Millet).

#### 11b. *Paspalum scrobiculatum* var. *bispicatum* Hackel, Allg. Bot. Z. Syst. 20: 146. 1914.

圆雀稗 nan que bai

*Paspalum akoense* Hayata; *P. commersonii* Lamarck; *P. scrobiculatum* var. *commersonii* (Lamarck) Stapf.

Perennial. Culms tufted, 30–50 cm tall. Leaf blades 5–15 × 0.2–0.6 cm, pilose, rarely glabrous. Spikelets single, usually suborbicular, 2–2.3 mm; upper glume and lower lemma 5–7-veined, veins often concolorous with back; upper lemma dark brown at maturity. Fl. and fr. Jul–Oct.  $2n = 20, 40, 60, 90$ .

Hill slopes. Fujian, Guangdong, Guangxi, Jiangsu, Sichuan, Taiwan, Yunnan, Zhejiang [tropics and subtropics of the Old World].

#### 11c. *Paspalum scrobiculatum* var. *orbiculare* (G. Forster) Hackel, Bot. Jahrb. Syst. 6: 233. 1885.

圆果雀稗 yuan guo que bai

*Paspalum orbiculare* G. Forster, Fl. Ins. Austr. 7. 1786; *P. thunbergii* Kunth ex Steudel var. *minus* Makino.

Perennial. Culms tufted, erect, 30–90 cm tall. Leaf blades 10–20 × 0.5–1 cm, usually glabrous. Spikelets often paired, at least in middle part of raceme, broadly obovate, 2–2.2 mm; upper glume and lower lemma 3–5-veined, veins green, back pallid; upper lemma yellow-brown or mid-brown at maturity. Fl. and fr. Jun–Nov.  $2n = 20, 40, 54, 60$ .

Hill slopes, roadsides, fields. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [SE Asia; Australia, Pacific Islands (Polynesia)].

This variety is unusual in *Paspalum scrobiculatum* in frequently having paired spikelets, although often the inner spikelet of the pair is reduced. There is also a less well-defined difference from var. *bispicatum* in shape of the spikelet and color of the spikelet veins, and for this reason this variety is sometimes treated as a separate species. However, when the inner spikelets are vestigial or absent, the racemes are 2-rowed and then the two varieties are very difficult to separate.

#### 12. *Paspalum hirsutum* Retzius, Observ. Bot. 2: 7. 1781.

台湾雀稗 tai wan que bai

*Paspalum formosanum* Honda.

Perennial. Culms tufted, slender, 20–40 cm tall, pilose-tomentose on nodes and below inflorescence. Leaf sheaths compressed, hirsute; leaf blades lanceolate, 5–18 × 0.3–0.5 cm, both surfaces densely hirsute, apex acuminate; ligule ca. 2 mm. Racemes 2–4, 2–3 cm; spikelets single, in 2 rows; rachis flattened, winged, ca. 1.5 mm wide; pedicels pilose with soft white hairs. Spikelets broadly elliptic, 2–2.3 mm, usually glabrous, subacute; upper glume membranous, 3–5-veined, occasionally minutely pubescent on margins; lower lemma 5–7-veined, glabrous, subacute; upper lemma brown, as long as spikelet, cartilaginous, finely punctulate-striate, obtuse. Fl. and fr. May–Oct.

- Hill slopes. Guangdong, Guangxi, Taiwan.

*Paspalum hirsutum* is a local segregate from the *P. scrobiculatum* complex distinguished by its slender facies coupled with hirsute leaves, and particularly by its hairy nodes, culm apex, and pedicels. The hirsute leaves are very similar to those of *P. thunbergii*, but that species has puberulous spikelets and a pallid fertile floret.

This species may have a wider distribution if specimens from SE Asia referred to *Paspalum scrobiculatum* var. *homeri* (Henrard) Koning & Sosef are conspecific.

#### 13. *Paspalum paniculatum* Linnaeus, Syst. Nat., ed. 10, 2: 855. 1759.

开穗雀稗 kai sui que bai

Perennial, forming coarse tussocks. Culms erect or geniculately ascending, 30–120 cm tall, nodes pubescent. Leaf sheaths often hispid; leaf blades linear-lanceolate, flat, 9–50 × 0.6–2.5 cm, scabrid or hispid, margins usually undulate, apex acuminate; ligule 0.2–0.5 mm. Inflorescence axis 5–20 cm; racemes 7–60, fascicled, 4–12 cm, ascending or spreading; spikelets paired; rachis ca. 0.5 mm wide. Spikelets brown at maturity, orbicular or obovate, 1–1.5 mm; upper glume membranous, subequaling spikelet, 3-veined, pubescent; lower lemma resembling upper glume, subglabrous on central portion of back; upper lemma as long as spikelet, pallid at maturity.

Moist places along roadsides, naturalized. Taiwan [native to Afri-

ca, Australia, New Guinea, Pacific Islands (Polynesia), and South America].

**14. *Paspalum longifolium*** Roxburgh, Fl. Ind. 1: 283. 1820.

长叶雀稗 chang ye que bai

*Paspalum scrobiculatum* Linnaeus var. *longifolium* (Roxburgh) Domin.

Perennial. Culms tufted, fairly robust, usually erect, 80–130 cm tall, many-noded, glabrous. Leaf sheaths broad, papery, overlapping and concealing the nodes, keeled, papillose-pilose along margins; leaf blades linear, 10–20 × 0.5–1 cm, glabrous, apex acuminate; ligule 1–2 mm, usually with tawny hairs on back. Inflorescence axis 4–10 cm; racemes 5–20, 4–8 cm, ascending; spikelets normally paired, occasionally single but 2nd vestigial spikelet present; densely overlapping; rachis broadly winged, (1.5–)2–4 mm wide, purplish, margins scabrous with conspicuous close-set teeth; pedicels scabrous. Spikelets purple or pale green, broadly obovate, narrowed to base, lightly plano-convex, 2–2.5 mm, apiculate; upper glume and lower lemma membranous, 3-veined with laterals marginal, minutely crisped-pubescent; upper lemma pallid, as long as spikelet, punctulate-striate, subacute. Fl. and fr. Jul–Oct.  $2n = 40, 50$ .

Mountain slopes, field margins, in moist and swampy places. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; N Australia, Pacific Islands].

This is a rather lush, leafy species. The broad, purplish rachis bearing very closely packed, paired, shortly hairy spikelets is characteristic.

**15. *Paspalum thunbergii*** Kunth ex Steudel, Nomencl. Bot., ed. 2, 2: 273. 1841.

雀稗 que bai

*Paspalum dissectum* Thunberg, Fl. Jap. 45. 1784, not (Linnaeus) Linnaeus (1762); *P. scrobiculatum* Linnaeus var. *thunbergii* (Kunth ex Steudel) Makino.

Perennial from short knotty rootstock. Culms tufted, erect, 50–100 cm tall, nodes glabrous or pilose. Leaf sheaths keeled, hirsute; leaf blades linear, 10–25 × 0.5–0.8 cm, hirsute on both

surfaces, rarely glabrous, apex acuminate; ligule 0.5–1.5 mm. Inflorescence axis 1–9 cm; racemes 2–6, 3–10 cm, laxly ascending or spreading, axils pilose; spikelets commonly paired at least in central part of raceme or a vestigial 2nd spikelet present; rachis ca. 1 mm wide, margins scaberulous; pedicels minutely puberulous. Spikelets elliptic to orbicular-elliptic, plumply plano-convex, 2.5–3 mm, rounded or subacute; upper glume membranous, 3-veined with laterals marginal, sparsely pubescent especially along margins; lower lemma similar but glabrous; upper lemma pallid, as long as spikelet, coriaceous, punctulate-striate, obtuse. Fl. and fr. May–Oct.  $2n = 20, 40$ .

Fields, waste places, usually on moist soils. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India (Darjeeling, Sikkim), Japan, Korea].

This species is similar to *Paspalum scrobiculatum*, but most easily distinguished by its pale fertile floret. The marginal pubescence on the spikelets is a good confirmatory character.

**16. *Paspalum delavayi*** Henrard, Repert. Spec. Nov. Regni Veg. 24: 239. 1928.

云南雀稗 yun nan que bai

Perennial from a short thick rhizome. Culms erect, 50–70 cm tall, 4–6-noded, lower nodes glabrous or puberulous. Leaf sheaths compressed, keeled, lowest hirsute, upper glabrous; leaf blades flat, fairly rigid, 10–15 × 0.3–0.4 cm but upper blades much shorter, glabrous, apex acuminate; ligule 3–4 mm. Inflorescence axis 3–6 cm; racemes 2–3, 2.5–4 cm, axils glabrous or bearded; pedicels paired but lateral spikelets poorly developed except sometimes in middle of raceme, spikelets in 2–3 irregular rows; rachis ca. 1 mm wide. Spikelets pale green, elliptic to obovate, 2.8–3 mm, glabrous, acute; upper glume and lower lemma 3-veined with laterals marginal; upper lemma yellowish green, ovate, ca. 2.5 mm, slightly shorter than spikelet, minutely punctate, obtuse. Fl. and fr. May–Sep.

• Dry mountain slopes, along moist roadsides; 1200–1900 m. Yunnan.

**170. AXONOPUS** P. Beauvois, Ess. Agrostogr. 12. 1812.

地毯草属 di tan cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials, rarely annuals. Culms tufted or stoloniferous. Leaf blades flat or involute, often obtuse; ligule short, membranous-ciliolate. Inflorescence composed of 2 to many slender racemes, mostly subdigitate but sometimes along a short central axis; spikelets borne singly, subsessile, alternating in 2 rows along the narrow triquetrous rachis, lower lemma adaxial. Spikelets lanceolate to oblong, flatly biconvex, florets 2 (but apparently 1); lower glume absent; upper glume membranous, as long as spikelet, obscurely 4- or 5-veined; lower floret neuter, reduced to an empty lemma similar to upper glume, its palea absent; upper floret crustaceous, lemma margins inrolled, apex obtuse.  $x = 9, 10$ .

About 110 species: tropical and subtropical America, one species in Africa; two species (both introduced) in China.

Many species of *Axonopus* are good forage or lawn grasses. The two species found in China have been widely introduced in the humid tropics of the world.

- 1a. Nodes of culm bearded; spikelets 2–2.7 mm; upper floret shorter than spikelet; leaf blades 6–12 mm wide ..... 1. *A. compressus*  
 1b. Nodes of culm glabrous; spikelets 1.6–2 mm; upper floret equaling spikelet; leaf blades 3–6 mm wide ..... 2. *A. fissifolius*



**1. *Axonopus compressus*** (Swartz) P. Beauvois, Ess. Agrostogr. 12. 1812.

地毯草 di tan cao

*Milium compressum* Swartz, Prodr. 24. 1788; *Paspalum compressum* (Swartz) Raspail (1825), not Rafinesque (1817); *P. guadaloupense* Steudel.

Perennial with vigorous creeping stolons, forming sward. Culms 15–60 cm tall, nodes bearded. Leaf sheaths loose, strongly compressed, keeled, basal sheaths imbricate; leaf blades broadly linear to lanceolate, flat or folded, 5–20 × 0.6–1.2 cm, glabrous or adaxial surface pilose, apex obtuse; ligule 0.3–0.5 mm. Racemes 2–5, digitate or subdigitate, 4–10 cm, only slightly diverging; rachis glabrous. Spikelets oblong-lanceolate, 2–2.7 mm, pilose or glabrous, apex acute; upper glume and lower lemma 2–4-veined, midvein absent, laterals marginal; upper lemma pale, oblong-elliptic, shorter than spikelet, obtuse with an apical tuft of hairs; stigmas pale. Fl. and fr. summer–autumn.  $2n = 40, 50, 60, 80$ .

Roadsides, weedy places on moist ground, naturalized. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [native to tropical America; widely introduced elsewhere].

This is a good lawn and fodder grass.

**2. *Axonopus fissifolius*** (Raddi) Kuhlmann, Comm. Linh. Telegr., Bot. 67(Bot. 11): 87. 1922.

类地毯草 lei di tan cao

*Paspalum fissifolium* Raddi, Agrostogr. Bras. 26. 1823; *Axonopus affinis* Chase; *A. compressus* var. *affinis* (Chase) M. R. Henderson; *Paspalum xizangense* B. S. Sun & H. Sun.

Perennial with creeping stolons. Culms compressed, 15–50 cm tall, nodes glabrous. Leaf sheaths compressed, strongly keeled; leaf blades broadly linear, folded, 5–20 × 0.3–0.6 cm, apex obtuse; ligule ca. 0.2 mm. Racemes 2–4, 2-paired, any others spaced slightly below, 3–8 cm, only slightly diverging; rachis glabrous. Spikelets oblong-elliptic, 1.5–2 mm, pilose near margins and apex or subglabrous, apex subacute; upper glume and lower lemma 2–4-veined, midvein absent; upper lemma pale, ovate, as long as spikelet, obtuse with a short apical tuft of hairs; stigmas purple. Fl. and fr. summer–autumn.  $2n = 54, 80$ .

Moist muddy or sandy meadows, naturalized. Taiwan, Xizang [native to tropical America].

This species is similar to *Axonopus compressus*, but tends to favor rather cooler and more waterlogged situations. It is naturalized in Taiwan and has also been found in Xizang.

**171. SETARIA** P. Beauvois, Ess. Agrostogr. 51. 1812, nom. cons., not Acharius ex Michaux (1803).

狗尾草属 gou wei cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Chaetochloa* Scribner, nom. rej.

Annuals or perennials. Culms usually tufted, slender to robust or canelike. Leaf blades linear to lanceolate, sometimes plicate or narrowed to a false petiole; ligule ciliate from a membranous base. Inflorescence a panicle, dense and spikelike or open with the spikelets contracted around the primary branches; spikelets (or some of them) subtended by one to several bristles which persist on the branches after the spikelets fall. Spikelets elliptic, plano-convex, sometimes gibbous, awnless, florets 2; glumes and lower lemma membranous to herbaceous; lower glume ovate from a clasping base, usually less than 1/2 spikelet length, 3–5-veined; upper glume half as long to equaling spikelet, several-veined; lower floret staminate or neuter, sometimes sulcate, its palea present, reduced or absent; upper lemma crustaceous, strongly convex, rugose, punctate or smooth, margins inrolled.  $x = 9$ .

About 130 species: tropics and subtropics, extending to warm-temperate regions of the world; 14 species (three endemic, one introduced) in China.

The bristles in the inflorescence represent modified branchlets. The genus includes pasture grasses, a cereal crop, and a few noxious weeds.

- 1a. Panicle open to contracted with obvious, spaced branches; spikelets usually subtended by a solitary bristle (some lacking a bristle, or rarely with up to 3).
- 2a. Leaf blades plicate, fusiform-lanceolate to linear-lanceolate, narrowed toward base.
  - 3a. Leaf blades 2–7 cm wide; panicle branches up to 20 cm long; lower glume 1/3–1/2 spikelet length, usually acute to obtuse; lower lemma with narrow falcate apex, longer than upper lemma ..... 1. *S. palmifolia*
  - 3b. Leaf blades 1–3 cm wide; panicle branches up to 8 cm long; lower glume 1/4–1/3 spikelet length, usually broadly obtuse to truncate; lower lemma equaling upper lemma ..... 2. *S. plicata*
- 2b. Leaf blades flat, not plicate, linear or linear-lanceolate, straight or rounded at base.
  - 4a. Upper glume subequaling spikelet; only branch or branchlet tips extending into a bristle, rarely a solitary bristle below a few spikelets ..... 3. *S. yunnanensis*
  - 4b. Upper glume distinctly shorter than spikelet; most spikelets subtended by one or more bristles.
    - 5a. Tufted annual; upper lemma coarsely rugose ..... 4. *S. intermedia*
    - 5b. Perennials, sometimes rhizomatous; upper lemma smooth or finely punctate-rugose.
      - 6a. Plant tufted; bristles stiff, stout; lower floret usually staminate with well-developed palea ..... 5. *S. forbesiana*
      - 6b. Plant with long scaly rhizomes; bristles slender; lower floret neuter with reduced palea.

- 7a. Spikelets elliptic; lower lemma equal to spikelet; upper lemma smooth, shiny ..... 6. *S. chondrachne*  
 7b. Spikelets lanceolate; lower lemma slightly shorter than spikelet; upper lemma punctate-rugulose ..... 7. *S. guizhouensis*
- 1b. Panicle densely spike-like with congested branchlets, sometimes lobed; spikelets subtended by several to many bristles.
- 8a. Each branchlet from the main axis with only one mature spikelet; upper glume up to 1/2 as long as spikelet, upper floret clearly exposed.
- 9a. Spikelets (2.2–)2.5–3.5 mm; lower floret often staminate, its palea ovate, as wide as upper floret; upper lemma coarsely rugose ..... 8. *S. pumila*  
 9b. Spikelets 1.8–2.3(–2.5) mm; lower floret neuter, its palea lanceolate, much narrower than upper floret; upper lemma finely rugose ..... 9. *S. parviflora*
- 8b. Each branchlet from the main axis with several mature spikelets; upper glume 2/3 as long to equaling spikelet.
- 10a. Upper glume 2/3–3/4 length of fertile floret, upper lemma exposed above it; spikelets 2.8–3 mm, acute ..... 10. *S. faberi*  
 10b. Upper glume subequaling fertile floret, almost completely covering upper lemma; spikelets 2–2.5(–3) mm, usually obtuse.
- 11a. Upper floret falling free from the glumes and lower lemma at maturity; cultivated plant ..... 11. *S. italica*  
 11b. Upper floret retained within spikelet, this falling whole; wild plants.
- 12a. Bristles retrorsely scabrous ..... 14. *S. verticillata*  
 12b. Bristles antrorsely scabrous.
- 13a. Spikelets 2–2.5 mm; lower glume 1/4–1/3 as long as the spikelet, usually obtuse ..... 12. *S. viridis*  
 13b. Spikelets 2.5–3 mm; lower glume ca. 1/2 as long as the spikelet, acuminate ..... 13. *S. arenaria*

**1. *Setaria palmifolia*** (J. König) Stapf, J. Linn. Soc., Bot. 42: 186. 1914.

棕叶狗尾草 zong ye gou wei cao

*Panicum palmifolium* J. König, Naturforscher 23: 208. 1788 [“*palmaefolium*”]; *Chamaeraphis palmifolia* Kuntze; *Chaetochloa palmifolia* Hitchcock & Chase; *Panicum neurodes* Schultes; *P. palmifolium* Willdenow ex Poiret (1816), not J. König (1788); *P. plicatum* Willdenow (1809), not Lamarck (1791).

Perennial from a short knotty rhizome. Culms erect or slightly geniculate, 75–200 cm tall, 3–7(–10) mm in diam. Leaf sheaths usually sparsely hispid, margins tuberculate-ciliate near ligule, otherwise glabrous; leaf blades fusiform-lanceolate, plicate, 20–60 × 2–7 cm, glabrous or hispid, narrowed toward base, apex acuminate; ligule 2–3 mm, ciliate. Panicle 20–60 × 2–10 cm, branches up to 20 cm, laxly spreading, flexuous, some spikelets subtended by a single 5–15 mm bristle. Spikelets broadly lanceolate, 3–4 mm, acute; lower glume triangular-ovate, 1/3–1/2 as long as spikelet, obtuse to acute; upper glume ovate, 1/2–3/4 as long as spikelet, 5–7-veined, acute; lower lemma neuter, often distinctly longer than upper floret, 5-veined, tipped with a short incurved beak; lower palea narrow, hyaline, 2/3 as long as lemma; upper lemma indistinctly rugulose to almost smooth, slightly shiny, apex apiculate, green and compressed. Fl. and fr. Aug–Dec.  $2n = 36, 54$ .

Open forests, thicket margins, shady pathsides. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [W Africa, tropical Asia].

*Panicum palmifolium* Willdenow ex Poiret (1816) is a *nomen novum* for the illegitimate later homonym *P. plicatum* Willdenow (1809), not Lamarck (1791), but is itself illegitimate as a later homonym of *P. palmifolium* J. König (1788). Both *Chamaeraphis palmifolia* and *Chaetochloa palmifolia* are based on *P. palmifolium* Willdenow ex Poiret, but must be treated as *nomina nova* rather than new combinations.

This species is used for food and medicine.

**2. *Setaria plicata*** (Lamarck) T. Cooke, Fl. Bombay 2: 919. 1908.

皱叶狗尾草 zhou ye gou wei cao

Perennial from a knotty rootstock. Culms loosely tufted, erect or decumbent, 45–130 cm tall, up to 6 mm in diam. Leaf sheaths ± papillose-pilose, margins usually ciliate; leaf blades narrowly lanceolate, plicate, thin, 10–40 × 1–3 cm, papillose-pilose, hispidulous or glabrous, narrowed toward base, apex attenuate; ligule ca. 3 mm, ciliate. Panicle 15–33 cm, branches up to 8 cm, loose, ascending, some spikelets subtended by a single 10–20 mm bristle. Spikelets ovate-oblong, 3–4 mm, acute; glumes with broad papery margins; lower glume ovate-orbicular, 1/4–1/3 as long as spikelet, obtuse to truncate; upper glume 1/2–3/4 as long as spikelet, 5–7-veined, obtuse or acute; lower lemma staminate or neuter, usually equaling upper floret, 5-veined; lower palea often well developed; upper lemma usually distinctly rugose, rarely smooth, apiculate. Fl. and fr. Jun–Oct.  $2n = 36$ .

Open forests, valleys, moist roadsides. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Indochina, Japan, Malaysia, Nepal, Thailand].

*Setaria plicata* is a more slender species than *S. palmifolia*, with a narrower panicle of shorter branches. However, the two species intergrade and must be separated by a combination of characters, as none is reliable on its own. Besides the key characters, *S. plicata* usually has a more distinctly rugose upper floret and shows a greater tendency to develop anthers in the lower floret.

- 1a. Upper lemma distinctly rugose ..... 2a. var. *plicata*  
 1b. Upper lemma nearly smooth, shiny ..... 2b. var. *leviflora*

**2a. *Setaria plicata* var. *plicata***

皱叶狗尾草(原变种) zhou ye gou wei cao (yuan bian zhong)

*Panicum plicatum* Lamarck, Tab. Encycl. 1: 171, no. 892.

1791; *P. excurrens* Trinius; *P. neurodes* var. *blepharoneuron* A. Braun; *Setaria excurrens* (Trinius) Miquel; *S. palmifolia* var. *blepharoneuron* (A. Braun) Veldkamp.

Culms up to 130 cm tall. Upper lemma distinctly rugose. Fl. and fr. Jun–Oct.  $2n = 36$ .

Moist roadsides, valleys, understory of forests. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Malaysia, Nepal, Thailand].

**2b. *Setaria plicata* var. *leviflora*** (Keng ex S. L. Chen) S. L. Chen & S. M. Phillips, **comb. nov.**

光花狗尾草 *guang hua gou wei cao*

Basionym: *Setaria excurrens* (Trinius) Miquel var. *leviflora* Keng ex S. L. Chen, Bull. Nanjing Bot. Gard. 1988–1989: 3. 1990.

Culms up to 70 cm tall. Upper lemma nearly smooth, shiny.

• Mountain slopes, in open forests. Guangdong, Guangxi, Sichuan.

This combination was not previously validly published by Chen and Sheng (Bull. Bot. Res., Harbin 4(1): 64. 1984) because the basionym was not at that time validly published. Chen and Sheng cited the basionym from Keng (Clav. Gen. Sp. Gram. Sin. 126, 227. 1957 and Fl. Ill. Pl. Prim. Sin. Gram. 707. 1959), where no Latin description was provided.

**3. *Setaria yunnanensis*** Keng & G. D. Yu ex P. C. Keng & Y. K. Ma, Acta Bot. Yunnan. 2: 418. 1980.

云南狗尾草 *yun nan gou wei cao*

Annual. Culms rather slender, ca. 70 cm tall, ca. 1.5 mm in diam., nodes pubescent. Leaf sheaths glabrous or papillose-pilose, margins ciliate; leaf blades linear-lanceolate, thin, 3–14 × 0.4–1.2 cm, papillose-pilose on both surfaces, narrowed toward base, apex acuminate. Panicle open, 4–17 × 0.5–3 cm, branches ascending, simple or the lowermost with secondary branchlets, every branchlet tip extended into a 1–8 mm bristle, rarely a few spikelets also subtended by a single bristle; axis scabrous to ciliate along the edges. Spikelets ovate-lanceolate to elliptic, 2.4–2.6 mm, yellowish green or tinged purple; lower glume triangular, 1/3 as long as spikelet, 1–3-veined, acute or acuminate; upper glume as long as or slightly shorter than spikelet, 5-veined, acute or obtuse; lower lemma as long as spikelet, subpapery, 3–5-veined, acute; upper lemma as long as lower, finely punctate-rugose. Fl. and fr. Jun–Oct.

• Roadsides, streams, coniferous forests; 2300–3900 m. Sichuan, Xizang, Yunnan.

This species, with a bristle only at the branch tips, is close to *Paspalidium*. The bristles are very inconspicuous when they are shorter than the spikelets.

**4. *Setaria intermedia*** Roemer & Schultes, Syst. Veg. 2: 489. 1817.

间序狗尾草 *jian xu gou wei cao*

*Panicum tomentosum* Roxburgh; *Setaria tomentosa* (Roxburgh) Kunth.

Annual. Culms slender, geniculate at base and rooting from nodes, up to 60 cm tall, glabrous. Leaf sheaths usually loose, lower glabrous and smooth, upper papillose-pilose, margins densely ciliate especially at mouth; leaf blades broadly linear, thin, 10–35 × 0.6–1 cm, papillose-hispid along the main veins, apex acuminate; ligule densely ciliate. Panicle contracted, narrowly lanceolate, 10–17 × 1–1.5 cm, lowest branches 1.5–2 cm, spikelets subtended by 1–2(–3 or more) bristles; axis scabrous to puberulous; bristles 3–10 mm, stiff. Spikelets elliptic-ovate, 1.5–2 mm, acute; glumes thin, submembranous; lower glume broadly ovate, 1/3–1/2 as long as spikelet, obtuse or acute; upper glume 1/2–2/3 as long as spikelet, 5-veined; lower floret neuter; lower palea almost as long as lemma; upper lemma orange-brown at maturity, dorsally strongly convex, rugose. Fl. and fr. Jul.

Roadsides, fields. Yunnan [Bhutan, India, Japan, Myanmar, Russia, Sri Lanka; E Africa].

This weedy annual is recognized by its sprawling, tufted habit and coarsely rugose, orange-brown fertile floret. The spikelets are usually subtended only by a single bristle, but there are many aborted spikelets in the panicle, giving the appearance of more bristles below each fully developed spikelet.

**5. *Setaria forbesiana*** (Nees ex Steudel) J. D. Hooker, Fl. Brit. India 7: 81. 1896 [“1897”].

西南葶草 *xi nan fu cao*

Perennial from a knotty rootstock. Culms rigid, erect or geniculate, 60–170 cm tall, 2–4 mm in diam., glabrous. Leaf sheaths glabrous, margins densely ciliate with silky hairs; leaf blades broadly linear or linear-lanceolate, 10–40 × 0.4–2 cm, glabrous, base subrounded or cuneate, apex acuminate; ligule ca. 3 mm. Panicle open, linear to narrowly pyramidal, 10–40 cm, erect or slightly nodding, branches spaced, ascending, lowest 0.5–2 cm, spikelets subtended by a single bristle; axis scabrous to hispid; bristles 3–4 times spikelet length, stout, stiff green or purple. Spikelets elliptic or ovate, 2.8–3.2 mm, strongly veined; lower glume broadly ovate, 1/3–1/2 as long as spikelet, acute; upper glume 2/3–3/4 as long as spikelet, (5–)7–9-veined; lower floret staminate, as long as upper floret; lower palea well developed; upper lemma finely punctate-rugose. Fl. and fr. Jul–Oct.

Mountain slopes, valleys, roadsides, streams; 300–2000 m. Anhui, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang [Bhutan, N India, Myanmar, Nepal].

- 1a. Bristles 3–4 times length of spikelet;  
lower floret usually staminate ..... 5a. var. *forbesiana*  
1b. Bristles equal to spikelet or slightly  
longer; lower floret neuter ..... 5b. var. *brevisetata*

**5a. *Setaria forbesiana* var. *forbesiana***

西南葶草(原变种) *xi nan fu cao* (yuan bian zhong)

*Panicum forbesianum* Nees ex Steudel, Syn. Pl. Glumac. 1: 98. 1854; *Chaetochloa forbesiana* (Nees ex Steudel) Scribn. & Merrill; *Setaria dubia* P. C. Keng & Y. K. Ma.

Spikelet subtended by a stiff bristle 3–4 times its length.

Lower floret usually staminate. Lower palea as long as lower lemma, as broad as upper floret. Fl. and fr. Jul–Oct.

Mountain slopes, valleys, roadsides, streams; 300–2000 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang [Bhutan, N India, Myanmar, Nepal].

**5b. *Setaria forbesiana* var. *brevisetata*** S. L. Chen & G. Y. Sheng, Bull. Bot. Res., Harbin 4: 64. 1984.

短刺西南葶草 duan ci xi nan fu cao

Spikelet subtended by a slender bristle of equal length or only slightly longer. Lower floret usually neuter. Lower palea shorter than lower lemma, narrow. Fl. and fr. Jul–Oct.

• Roadsides. Guizhou.

**6. *Setaria chondrachne*** (Steudel) Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 234. 1930.

葶草 fu cao

*Panicum chondrachne* Steudel, Syn. Pl. Glumac. 1: 51. 1853; *Chaetochloa chondrachne* (Steudel) Honda; *C. matsumurae* (Matsumura) Keng; *Panicum matsumurae* Hackel; *Setaria matsumurae* Hackel ex Matsumura.

Perennial with slender rhizomes clothed in imbricate, ovate, appressed-pubescent scales. Culms slender, ascending, 60–170 cm tall, glabrous. Leaf sheaths glabrous, long ciliate along margins and at mouth; leaf blades linear-lanceolate, thin, 5–38 × 0.5–2 cm, glabrous or rarely papillose-pilose, base rounded, margins scabrous, apex attenuate; ligule ca. 0.5 mm, densely ciliate. Panicle open, linear to narrowly pyramidal, 12–30 cm, slightly nodding, branches spaced, stiffly spreading, lowest 1–2.5(–5) cm, most spikelets subtended by a single bristle; axis scabrous, sometimes also hispid; bristles 4–10 mm. Spikelets plumply elliptic, ca. 3 mm, acute; lower glume ovate, 1/3–1/2 as long as spikelet, acute; upper glume 3/4 as long as spikelet, 5(–7)-veined; lower floret neuter, as long as upper floret; lower lemma 5-veined; lower palea narrowly lanceolate, shorter than its lemma; upper lemma finally light brown, smooth, shiny, acute. Fl. and fr. Aug–Oct.  $2n = 36$ .

Woodlands, moist mountain slopes, roadsides. Anhui, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

This is a distinctive species on account of its long, scaly rhizomes, elongate, narrow panicle, and smooth, shiny fertile floret.

**7. *Setaria guizhouensis*** S. L. Chen & G. Y. Sheng, Bull. Bot. Res., Harbin 4: 62. 1984.

贵州狗尾草 gui zhou gou wei cao

Perennial with scaly rhizomes. Culms erect, 37 cm or more tall, nodes usually hairy. Leaf sheaths papillose-pilose dorsally and along margins, but nearly glabrous toward ligule; leaf blades linear-lanceolate, 10–15 × 0.4–0.6 cm, scabrous on both surfaces, base subrounded, apex acuminate; ligule ca. 1.5 mm. Panicle linear, 11–35 cm, branches spaced, very short, appressed to axis, spikelets subtended by 1 or 2 slightly flexuous bristles; axis pubescent to pilose. Spikelets elliptic-lanceolate, ca. 2.5 mm, acute; lower glume triangular-ovate, 1/3 as long as

spikelet, acute; upper glume 1/2–2/3 as long as spikelet, 5-veined, acute; lower floret neuter, shorter than upper floret, with or without palea; upper lemma finely rugose-punctate, apex purplish, acute. Fl. and fr. Sep.

• Mountain slopes, thickets, roadsides; 1300–1600 m. Guizhou, Yunnan.

- 1a. Culms ca. 37 cm tall; lower floret without palea ..... 7a. var. *guizhouensis*  
 1b. Culms more than 37 cm tall; lower floret with palea ..... 7b. var. *paleata*

**7a. *Setaria guizhouensis* var. *guizhouensis***

贵州狗尾草(原变种) gui zhou gou wei cao (yuan bian zhong)

Culms ca. 37 cm tall. Panicle ca. 11 cm. Lower floret without palea. Fl. and fr. autumn.

• Mountain slopes, roadsides; ca. 1600 m. Guizhou.

**7b. *Setaria guizhouensis* var. *paleata*** S. L. Chen & G. Y. Sheng, Bull. Bot. Res., Harbin 4: 64. 1984.

具稃贵州狗尾草 ju fu gui zhou gou wei cao

Culms more than 37 cm tall. Panicle ca. 35 cm. Lower floret with palea. Fl. and fr. autumn.

• Thickets; ca. 1300 m. Guizhou.

**8. *Setaria pumila*** (Poir.) Roemer & Schultes, Syst. Veg. 2: 891. 1817.

金色狗尾草 jin se gou wei cao

*Panicum pumilum* Poir. in Lamarck, Encycl., Suppl. 4: 273. 1816; *Setaria glauca* (Linnaeus) P. Beauvois var. *dura* (I. C. Chung) I. C. Chung; *S. lutescens* (Weigel ex Stuntz) F. T. Hubbard var. *dura* I. C. Chung.

Annual. Culms erect or geniculate, 20–90 cm tall, smooth or scabrous just below inflorescence, nodes glabrous. Leaf sheaths keeled, glabrous; leaf blades linear, 5–40 × 0.2–1 cm, abaxial surface smooth, adaxial surface scabrous or pilose at base; ligule ca. 1 mm. Panicle densely cylindrical, 3–17 × 0.4–0.8 cm; branches reduced to a single mature spikelet subtended by 5–10 or more bristles (sometimes an aborted spikelet also present); axis pubescent; bristles gold, brownish gold or sometimes purple, 2–3 times spikelet length. Spikelets broadly ovate, (2.2–)2.5–3.5 mm; glumes ovate; lower glume 1/3–1/2 as long as spikelet; upper glume 1/2–2/3 as long as spikelet; lower floret usually staminate; lower palea hyaline, ovate, matching the upper floret in size and shape, keels narrowly winged; upper lemma broadly ovate, coarsely rugose. Fl. and fr. Jun–Oct.  $2n = 18, 36$ .

Waste places, mountain slopes, roadsides, forest margins. Anhui, Beijing, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Ningxia, Shaanxi, Shandong, Shanghai, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [originally from temperate and subtropical Asia and Europe, but now widespread].

The name *Setaria glauca* (Linnaeus) P. Beauvois has been misapplied to this species.

*Setaria pumila* and *S. parviflora* are different facets of the same polymorphic complex, and are sometimes regarded as a single, variable species. No character taken on its own is reliable for separating the two species, but the combination of all characters listed in the key will enable most specimens to be assigned to one or the other.

The name *Setaria lutescens* var. *dura* refers to a form with the lower lemma hardened and rugose like the upper lemma. This is a rare variant, known from Fujian and Yunnan and also from Korea. Hardening of the lower floret is known to occur occasionally in other genera of *Panicaceae*.

This species is cultivated for forage.

**9. *Setaria parviflora*** (Poirét) Kerguélen, *Lejeunia* 120: 161. 1987.

幽狗尾草 you gou wei cao

*Cenchrus parviflorus* Poirét in Lamarck, *Encycl.* 6: 52. 1804; *Chaetochloa geniculata* (Poirét) Millspaugh & Chase; *Panicum geniculatum* Poirét; *P. pallidifusum* Schumacher; *P. rubiginosum* Steudel; *Setaria glauca* (Linnaeus) P. Beauvois var. *pallidifusca* (Schumacher) T. Koyama; *S. gracilis* Kunth; *S. pallidifusca* (Schumacher) Stapf & C. E. Hubbard.

Annual or short-lived perennial with basal buds or a short knotty rhizome. Culms erect or geniculate, 20–90 cm tall. Leaf sheaths keeled, glabrous; leaf blades stiff, flat or involute, 5–30 × 0.2–0.8 cm, glabrous or adaxial surface pilose at base, apex acuminate; ligule ca. 1 mm. Panicle densely cylindrical, 2–15 × 0.5–1.2 cm; branches reduced to a single mature spikelet subtended by 8–12 bristles; axis pubescent; bristles golden or purplish brown when mature, 2–3 times spikelet length. Spikelets elliptic, 1.8–2.5 mm; lower glume ovate, 1/3 as long as spikelet, acute; upper glume broadly ovate, ca. 1/2 as long as spikelet, obtuse; lower floret neuter; lower palea firmly membranous, lanceolate, about as long as the upper floret but narrower, keels wingless, minutely papillose; upper lemma ovate-elliptic, finely rugose. Fl. and fr. Oct–Dec.  $2n = 72$ .

Mountain slopes, roadsides, waste places. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [throughout the tropics and subtropics].

Forms with perennating basal buds persisting for more than one season are sometimes separated as a different species, but there are no other distinguishing features and this character is probably of little significance. Specimens lacking basal parts become impossible to assign to species. However, if they are separated, *Setaria pallidifusca* is the correct name for the annual form.

The perennial form of *Setaria parviflora* has been known as *S. geniculata* P. Beauvois, but that name was based not on *Panicum geniculatum* Poirét (1798), as has been widely supposed, but on *P. geniculatum* Willdenow (1809), which applies to a different species.

This species is a forage grass and is used medicinally.

**10. *Setaria faberi*** R. A. W. Herrmann, *Beitr. Biol. Pflanzen* 10: 51. 1910.

大狗尾草 da gou wei cao

*Setaria autumnalis* Ohwi.

Annual. Culms solitary, erect or geniculate and rooting at the lowermost nodes, 50–120 cm tall, up to 6 mm in diam.,

glabrous. Leaves all cauline; leaf sheaths ciliate on upper margins; leaf blades broadly linear, 10–40 × 0.5–2 cm, glabrous or adaxial surface with scattered hairs, narrowed to base, apex acuminate; ligule 1–2 mm. Panicle densely cylindrical, 5–24 × 0.6–1.3 cm, nodding, branchlets bearing several spikelets each subtended by 1–3 bristles; axis white-pilose; bristles green or brownish purple, 10–15 mm. Spikelets elliptic, 2.8–3 mm, glumes and lower lemma thinly membranous; lower glume 1/3–1/2 as long as spikelet; upper glume 2/3–3/4 as long as spikelet; lower floret neuter; lower palea up to 1/2 as long as lemma, sometimes very small; upper lemma finely rugose under upper glume, almost smooth on exposed apex. Fl. and fr. Jul–Oct.  $2n = 36$ .

Mountain slopes, roadsides, waste places. Anhui, Fujian, Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea; introduced in North America].

This robust, annual species is frequently confused with large forms of *Setaria viridis*, but has broader, acute spikelets and a shorter upper glume clearly exposing the tip of the upper lemma.

**11. *Setaria italica*** (Linnaeus) P. Beauvois, *Ess. Agrostogr.* 51. 1812.

梁 liang

*Panicum italicum* Linnaeus, *Sp. Pl.* 1: 56. 1753; *Chaetochloa germanica* (Miller) Smyth; *C. italica* (Linnaeus) Scribner; *C. italica* var. *germanica* (Miller) Scribner; *Chamaeraphis italica* (Linnaeus) Kuntze; *C. italica* var. *germanica* (Miller) Kuntze; *Panicum chinense* Trinius; *P. germanicum* Miller; *P. italicum* var. *germanicum* (Miller) Koeler; *Pennisetum germanicum* (Miller) Baumgarten; *P. italicum* (Linnaeus) R. Brown; *Setaria germanica* (Miller) P. Beauvois.

Annual. Culms robust, erect, up to 150 cm, nodes glabrous. Leaf sheaths glabrous or pubescent, ciliate; leaf blades linear-lanceolate, 15–45 × 0.6–2 cm, usually glabrous; ligule 1–3 mm. Panicle dense, lobed, 6–40 × 0.5–5 cm, very variable, erect or pendent when mature; spikelets subtended by several bristles 1–5 times spikelet length; axis villous. Spikelets elliptic to ovate or subglobose, 2–3 mm, yellow, brown, orange or purple; lower glume 1/3–1/2 as long as spikelet; upper glume about as long as spikelet, 5–7(–9)-veined, obtuse; lower lemma equal to spikelet, 5–7-veined; lower palea absent or narrow, up to 1/2 as long as lemma; upper floret yellow or orange-yellow, oblong or ovate-oblong, cartilaginous, deciduous at maturity, finely rugose to smooth and shiny. Fl. and fr. summer to autumn.  $2n = 18$ .

Cultivated. Anhui, Beijing, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Jiangxi, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [origin uncertain; now introduced and cultivated sporadically worldwide].

This grass (Foxtail Millet) has been cultivated as a cereal in China since ancient times and exists in many races differing in size, shape, and hairiness of the panicle, color of the grain, and length of the bristles. It is also a useful forage grass. It is thought to be derived from *Setaria viridis*.

**12. *Setaria viridis*** (Linnaeus) P. Beauvois, Ess. Agrostogr. 51. 1812.

狗尾草 gou wei cao

Annual. Culms tufted, erect or geniculate, up to 70(–150) cm tall, 3–7 mm in diam. Leaf sheaths glabrous to papillose-pilose, margins densely ciliate; leaf blades linear to linear-lanceolate, flat, glabrous or papillose-pilose on both surfaces, base subrounded or subtruncate, margins scabrous, apex acuminate; ligule 1–2 mm. Panicle dense, usually cylindrical, usually tapering upward, 1–24 cm, erect or slightly nodding, branchlets bearing several spikelets each subtended by 3–7(–25) bristles; axis pilose or pubescent; bristles green, brown or purple, 4–12 mm. Spikelets elliptic-oblong, 2–2.5(–3) mm, obtuse; lower glume 1/4–1/3 as long as spikelet, obtuse or rarely acute; upper glume elliptic, as long as spikelet, lower lemma equal to spikelet; lower palea about 1/3 as long as lemma; upper lemma pale green, oblong, finely punctate-rugose, obtuse. Fl. and fr. May–Oct.  $2n = 18$ .

Hill slopes, roadsides, grassy waste places. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [temperate and subtropical regions of the Old World; introduced elsewhere].

- 1a. Culms 5–25 cm tall; panicle ovate or elliptic, 1–4 cm ..... 12c. subsp. *pachystachys*  
 1b. Culms usually more than 25 cm tall; panicle cylindrical, up to 24 cm.  
 2a. Culms up to 70 cm, much branched at base; panicle to 12 cm, not lobed; spikelets 2–2.5 mm ..... 12a. subsp. *viridis*  
 2b. Culms 60–150 cm, little branched; panicle to 24 cm, sometimes lobed; spikelets 2.5–3 mm ..... 12b. subsp. *pyncocoma*

**12a. *Setaria viridis* subsp. *viridis***

狗尾草(原亚种) gou wei cao (yuan ya zhong)

*Panicum viride* Linnaeus, Syst. Nat., ed. 10, 2: 870. 1759; *P. viridescens* Steudel; *Setaria viridis* var. *purpurascens* Petermann; *S. viridis* var. *weinmannii* (Roemer & Schultes) Heynhold; *S. weinmannii* Roemer & Schultes.

Culms branching at base, up to 70 cm tall. Leaf blades broadly linear, 5–20 × 0.2–1.8 cm. Panicle cylindrical, 2–12 × 0.4–1.3 cm; bristles below the spikelet 3–7, green, yellowish brown, purplish red or purple, 4–12 mm. Spikelets livid-green, 2–2.5 mm. Fl. and fr. May–Oct.  $2n = 18$ .

Mountain slopes, roadsides, grassy waste places. Distribution for species [temperate and subtropical regions of the Old World; introduced elsewhere].

This is a cosmopolitan annual weed of warm-temperate regions.

**12b. *Setaria viridis* subsp. *pyncocoma*** (Steudel) Tzvelev, Novosti Sist. Vyssh. Rast. 5: 19. 1968.

巨大狗尾草 ju da gou wei cao

*Panicum pyncocomum* Steudel, Syn. Pl. Glumac. 1: 462. 1854; *P. viride* var. *giganteum* Franchet & Savatier; *P. viride* var. *majus* Gaudin; *Setaria gigantea* (Franchet & Savatier) Makino; *S. pyncocoma* (Steudel) Henrard ex Nakai; *S. viridis* var. *major* (Gaudin) Petermann (1838), not Gray (1821).

Culms little branched at base, 60–150 cm tall. Leaf blades 15–40 × 1–2.5 cm, glabrous on both surfaces. Panicle sometimes lobed, 7–24 × 1.5–2.5 cm; bristles green, brownish or purplish, 7–12 mm. Spikelets 2.5–3 mm. Fl. and fr. Jun–Oct.

Roadsides, forest margins, a crop weed, especially in *Setaria italica* fields; below 2700 m. Gansu, Guizhou, Hebei, Heilongjiang, Hong Kong, Hubei, Hunan, Jilin, Nei Mongol, Shaanxi, Shandong, Sichuan, Xinjiang [Japan, Russia; C and SW Asia, C and S Europe, North America].

This robust form of *Setaria viridis* may be of hybrid origin, resulting from crossing with *S. italica*. Unlike *Setaria italica*, the spikelets are shed whole.

**12c. *Setaria viridis* subsp. *pachystachys*** (Franchet & Savatier) Masamune & Yanagihara, Trans. Nat. Hist. Soc. Taiwan 31: 327. 1941.

厚穗狗尾草 hou sui gou wei cao

*Panicum pachystachys* Franchet & Savatier, Enum. Pl. Jap. 2: 594. 1879; *Chaetochloa viridis* (Linnaeus) Scribner var. *pachystachys* (Franchet & Savatier) Honda; *Setaria pachystachys* (Franchet & Savatier) Matsumura; *S. viridis* var. *pachystachys* (Franchet & Savatier) Makino & Nemoto.

Culms usually decumbent at base, much branched, 5–25 cm tall. Leaf sheaths densely tuberculate-pilose in the lower part; leaf blades narrowly lanceolate, stiff, 1.5–5 × 0.2–0.4 cm, glabrous but scabrous on both surfaces. Panicle ovate or elliptic, 1–4 cm; bristles below spikelet 10–25, very dense, green, yellow, or purple, 6–8 mm. Spikelets 2–2.5 mm.

Sand and pebbles of the seashore. Guangdong, Taiwan [Japan, Korea].

This is a maritime form characterized by its low, branching habit and short, broad, densely bristly panicle.

**13. *Setaria arenaria*** Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 4: 77. 1940.

断穗狗尾草 duan sui gou wei cao

*Setaria viridis* var. *sinica* Ohwi.

Annual. Culms densely tufted, geniculate at base, slender, 20–100 cm tall, smooth, glabrous. Leaf sheaths loose, lower papillose-pubescent, upper glabrous, margins and mouth ciliate; leaf blades narrowly lanceolate, thin, 5–15 × 0.2–0.7 cm, glabrous, scabrous on both surfaces, base subrounded, apex long acuminate. Panicle narrowly cylindrical, commonly interrupted below, 2–9 × 0.5–0.8 cm; branchlets with several spikelets, these subtended by 1–4 bristles; axis pilose, rarely glabrous; bristles green or purple, 2–8 mm. Spikelets narrowly elliptic, 2.5–3 mm, acute; lower glume ovate, thinly papery, ca. 1/2 as long as spikelet, acuminate; upper glume as long as spikelet or slightly shorter; lower floret neuter, lemma equal to spikelet, 5-veined; lower palea small, narrowly lanceolate; upper lemma

pale green or yellowish, finely rugose, acuminate. Fl. and fr. Jul–Sep.

• Sandy places; 1000–1300 m. Hebei, Heilongjiang, Nei Mongol, Shanxi.

**14. *Setaria verticillata*** (Linnaeus) P. Beauvois, Ess. Agrostogr. 51. 1812.

倒刺狗尾草 dao ci gou wei cao

*Panicum verticillatum* Linnaeus, Sp. Pl., ed. 2, 1: 82. 1762; *Chaetochloa brevispica* Scribner & Merrill; *C. verticillata* (Linnaeus) Scribner; *Chamaeraphis italica* (Linnaeus) Kuntze var. *verticillata* (Linnaeus) Kuntze; *C. verticillata* (Linnaeus) Porter; *Panicum asperum* Lamarck; *Pennisetum verticillatum* (Linnaeus) R. Brown; *Setaria brevispica* (Scribner & Merrill) K. Schumann.

Annual. Culms tufted, much branched, ascending, 20–100 cm tall, glabrous. Leaf sheaths thin, glabrous or papillose-pub-

erulous, margins ciliolate; leaf blades broadly linear, flaccid, 5–20 × 0.4–1.8 cm, usually glabrous, base subrounded, margins scabrous, apex long acuminate; ligule 0.5–1 mm. Panicle densely spikeletlike, or lobed with short lateral branches on vigorous specimens, 4–15 cm, spikelets subtended by 1–4 bristles; axis shortly hispidulous; bristles green or brownish, 3–8 mm, retrorsely barbed and often becoming entangled. Spikelets elliptic, 1.8–2.4 mm, green with obvious darker veins, obtuse; lower glume 1/3–1/2 as long as spikelet, obtuse; upper glume boat-shaped, as long as spikelet, 7-veined; lower floret neuter; lower palea much reduced; upper lemma dorsally compressed, finely rugose. Fl. and fr. Jun–Sep.  $2n = 18, 36$ .

Roadsides, open weedy places; 300–1000 m. Nei Mongol, Taiwan, Yunnan [tropical and warm-temperate regions of the Old World; introduced in America].

This is an easy species to recognize because of its clinging, retrorsely barbed bristles.

## 172. PASPALIDIUM Stapf in Prain, Fl. Trop. Africa 9: 582. 1920.

类雀稗属 lei que bai shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials. Culms usually thick, often rooting from the lower nodes. Leaf blades flat or involute; ligule a ciliate rim. Inflorescence of short erect racemes; racemes imbricate or distant along the central axis, spikelets borne singly, usually imbricate in 2 neat rows, sometimes also on short basal branchlets; rachis (and branchlet when spikelets clustered) terminating in an inconspicuous point or bristle. Spikelets dorsally compressed or often strongly convex, florets 2; glumes membranous to herbaceous, rounded, lower abaxial, short and broad, upper 1/2 as long to equaling the spikelet; lower floret staminate or neuter, lemma resembling upper glume, lower palea present or absent; upper lemma coriaceous to bony, margins inrolled or only narrowly hyaline; upper palea apex often briefly reflexed.  $x = 9$ .

About 40 species: throughout the tropics, especially Australia; two species in China.

Most species of *Paspalidium* are clearly distinct from *Setaria*, with a completely different appearance, so for that reason the two genera are maintained here. However, some species of *Setaria* with very few bristles (especially in Australia) are intermediate, and *Paspalidium* is included within *Setaria* by some authors. *Setaria yunnanensis* is the only intermediate species in China.

1a. Racemes distant; upper glume 2/3–3/4 length of spikelet; upper lemma granulate ..... 1. *P. flavidum*  
1b. Racemes overlapping; upper glume 1/4–1/2 length of spikelet; upper lemma finely rugose ..... 2. *P. punctatum*

**1. *Paspalidium flavidum*** (Retzius) A. Camus in Lecomte, Fl. Indo-Chine 7: 419. 1922.

类雀稗 lei que bai

*Panicum flavidum* Retzius, Observ. Bot. 4: 15. 1786; *P. floridum* Royle; *P. granulare* Lamarck; *Setaria flavida* (Retzius) Veldkamp.

Perennial. Culms tufted, slightly compressed, 30–100 cm tall from a decumbent base. Leaf sheaths strongly keeled, smooth; leaf blades linear-lanceolate, flat or folded, 5–30 × 0.5–1 cm, base subcordate and tuberculate-setose, apex abruptly acute; ligule ca. 0.5 mm. Inflorescence axis 5–20 cm; racemes 6–9, 1.5–2.5 cm, widely spaced; rachis ca. 0.5 mm wide, slightly winged, prolonged into a point. Spikelets plumply ovate, gibbous, 1.5–2.5 mm, milk-white or purplish; lower glume broadly ovate, ca. 1/2 as long as spikelet; upper glume 2/3–3/4 as long as spikelet, 7-veined; lower lemma as long as spikelet, 5-veined; upper lemma bony, granulate. Fl. and fr. Jul–Oct.

Roadsides, field edges, moist open places; 100–1500 m. Guangdong, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Indian Ocean Islands (Mauritius, Réunion), Pacific Islands].

**2. *Paspalidium punctatum*** (N. L. Burman) A. Camus in Lecomte, Fl. Indo-Chine 7: 419. 1922.

尖头类雀稗 jian tou lei que bai

*Panicum punctatum* N. L. Burman, Fl. Indica 26. 1768; *P. mucronatum* Roth ex Roemer & Schultes; *Paspalidium mucronatum* (Roth ex Roemer & Schultes) Ohwi; *Paspalum aquaticum* Masamune & Syozi; *P. punctatum* (N. L. Burman) Stapf ex Ridley (1925), not (Linnaeus) Flügge (1810); *Setaria punctata* (N. L. Burman) Veldkamp.

Perennial. Culms stout, spongy, trailing and rooting at the lower nodes, flowering shoots 50–100 cm or more tall. Leaf sheaths dilated, smooth, margins membranous; leaf blades line-

ar-lanceolate, 10–25 × 0.3–0.8 cm, scabrous, adaxial surface papillose, apex acuminate; ligule 1–2 mm. Inflorescence axis 10–30 cm; racemes 8–15, 1–5 cm, overlapping at least in upper part of inflorescence; rachis 0.5–1.5 mm wide, undulate, apex acicular. Spikelets ovate-oblong, 2–3 mm; lower glume cuff-like, 1/4 as long as spikelet, truncate; upper glume suborbicular, 1/4–1/2 as long as spikelet, 3–5-veined, rounded or truncate; lower floret neuter, lemma ovate, as long as or slightly shorter

than upper floret, prominently 3–5-veined, acute, palea absent; upper lemma ovate, finely rugose, cuspidate-acuminate. Fl. and fr. Jul–Oct.

Floating in fresh water, rooting along marshy streamsides, in wet soil; 100–500 m. Fujian, Guangdong, Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam; E Africa].

### 173. *STENOTAPHRUM* Trinius, Fund. Agrost. 175. 1822 [“1820”].

钝叶草属 *dun ye cao shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

*Diastemenanthe* Steudel; *Ophiurinella* Desvaux.

Annuals or perennials, stoloniferous. Leaf blades linear to narrowly lanceolate; ligule ciliate. Inflorescence of very short racemes bearing a few sessile spikelets; racemes arranged singly and sunk in pockets on one or both sides of a foliaceous or corky axis, variously disarticulating at maturity, raceme rachis ending in a point. Spikelets ovate-lanceolate to lanceolate; glumes both short or the upper equal to spikelet, membranous; lower floret staminate or neuter, lemma as long as the spikelet, usually coriaceous, rarely papery, smooth, acute; upper lemma slightly shorter than lower lemma, papery, rarely coriaceous, margins flat.  $x = 9$ .

Seven species: tropics and subtropics, mostly on seashores or near the coast from the Indian Ocean to SE Asia and the Pacific Ocean, one species pantropical; three species (one introduced) in China.

- 1a. Inflorescence with broad foliaceous axis, spikelets not sunk in axis cavities; lower lemma herbaceous, upper lemma coriaceous ..... 1. *S. helferi*  
 1b. Inflorescence with thick, non-foliaceous axis, spikelets sunk in axis cavities; lower lemma cartilaginous, upper lemma papery.  
 2a. Spikelets on opposite sides of a cylindrical axis, 2.5–3.5 mm, in short racemes; leaf blades sharply acuminate ..... 2. *S. micranthum*  
 2b. Spikelets on one face of a flattened axis, 4–5 mm, solitary; leaf blades obtuse ..... 3. *S. secundatum*

**1. *Stenotaphrum helferi*** Munro ex J. D. Hooker, Fl. Brit. India 7: 91. 1896 [“1897”].

钝叶草 *dun ye cao*

Perennial. Culms stoloniferous, flowering shoots 10–40 cm tall. Leaf sheaths loose, laterally compressed, keeled, glabrous; leaf blades broadly linear, 5–17 × 0.5–1.1 cm, glabrous, base truncate, apex abruptly acute; ligule ca. 0.3 mm. Inflorescence 10–15 cm; axis with foliaceous wing, 3–5 mm wide, midrib sharply triquetrous with scabrous margins; racemes 7–18 mm, appressed within the curves of the midrib, bearing 3–7 spikelets, lowest racemes free; raceme rachis triquetrous, margins spinulose. Spikelets ovate-lanceolate, dorsally flattened, 4–4.5 mm, strongly veined, acuminate; glumes herbaceous, acute; lower glume broadly ovate, 1/2–2/3 as long as spikelet, (3–)5–7-veined; upper glume as long as spikelet, 9–11-veined; lower floret staminate or neuter, lemma firmly herbaceous, 7-veined, palea well developed; upper lemma coriaceous, smooth, cuspidate-mucronate, tardily deciduous. Fl. and fr. autumn.

Moist lawns, forest edges, open forests; below 1100 m. Fujian, Guangdong, Hainan, Yunnan [Malaysia, Myanmar, Thailand, Vietnam].

**2. *Stenotaphrum micranthum*** (Desvaux) C. E. Hubbard in C. E. Hubbard & R. E. Vaughan, Grasses Mauritius Rodriguez, 73. 1940.

锥穗钝叶草 *zhui sui dun ye cao*

*Ophiurinella micrantha* Desvaux, Mém. Soc. Agric. Angers 1: 179. 1831; *Stenotaphrum diplotaphrum* Pilger; *S. lepturoides* Henslow; *S. subulatum* Trinius.

Annual. Culms decumbent at base, up to 35 cm tall. Leaf sheaths rounded, ciliate along one margin; leaf blades lanceolate, 4–8 × 0.5–1 cm, glabrous or pubescent, apex sharply acuminate; ligule ca. 1 mm. Inflorescence 6–14 cm, slender, cylindrical; axis 1.5–2.5 mm wide; racemes 5–10 mm, sunk in depressions on opposite sides of the axis, bearing (1–)3–6 spikelets; raceme rachis stoutly triquetrous, ciliolate along margins. Spikelets oblong-lanceolate, 2.5–3.5 mm, obtuse to subacute, falling entire; glumes membranous, 1/5–1/4 as long as spikelet or upper glume slightly longer, truncate; lower floret neuter, lemma cartilaginous, flat, enclosing fertile floret in inflorescence axis, 3-veined, grooved on either side of midvein, margins inflexed at lateral veins, lower palea absent; upper lemma papery, subequal to spikelet, smooth, acute. Fl. and fr. spring.

Coral islands on coastal sands, understory of littoral woodlands. South China Sea Islands (Xisha Qundao) [small islands around New Guinea; Australia (Great Barrier Reef Islands), Coral Sea Islands, Indian Ocean Islands, Pacific Islands (Polynesia); probably introduced to E Africa (Tanzania)].

**3. *Stenotaphrum secundatum*** (Walter) Kuntze, Revis. Gen. Pl. 2: 794. 1891.

侧钝叶草 *ce dun ye cao*

*Ischaemum secundatum* Walter, Fl. Carol. 249. 1788.

Perennial, stoloniferous and forming a dense sward. Culms much branched, flowering shoots 10–30 cm tall. Leaf sheaths strongly keeled, often grouped in flabellate clusters; leaf blades



broadly linear, folded when young, up to 15 × 0.4–1 cm, apex obtuse; ligule ca. 0.5 mm. Inflorescence 5–12 cm, slender, cylindrical; axis corky, disarticulating into segments at maturity; racemes 4–10 mm, reduced to 1–3 spikelets embedded in one face of the rachis, alternating on either side of the sinuous midrib; raceme rachis a stout pointed appendage within the axis cavity. Spikelets lanceolate, 4–5 mm, acute; lower glume up to 1/4 as long as spikelet; upper glume as long as spikelet; lower

floret staminate, lemma cartilaginous, 3-veined, palea well developed; upper lemma papery, subequal to spikelet, smooth, acute. Fl. and fr. summer.

Cultivated as lawn grass. Hong Kong [tropical and subtropical shores on both sides of Atlantic Ocean, extending around S Africa to Mozambique].

This grass is widely cultivated in the moist tropics as a lawn grass (St. Augustine Grass).

## 174. MELINIS P. Beauvois, Ess. Agrostogr. 54. 1812.

糖蜜草属 tang mi cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Rhynchelytrum* Nees.

Annuals or perennials. Culms tufted, often decumbent at the base. Leaf sheaths usually loose; leaf blades linear; ligule a ciliate rim. Inflorescence a panicle; pedicels slender, glabrous or with a few long hairs at the tip. Spikelets elliptic or oblong, laterally compressed, hairy or glabrous; lower glume small or absent; upper glume as long as spikelet, membranous to papery, 5–9-veined, acute, emarginate or 2-lobed, awned or awnless, sometimes gibbous on the back and tapering to a beak; lower floret staminate or neuter, lemma resembling the upper glume, 3–7-veined, palea with ciliate or scaberulous keels or absent; upper floret laterally compressed, membranous to thinly cartilaginous, readily deciduous.  $x = 9$ .

Twenty-two species: mainly in tropical and S Africa; two species introduced throughout the tropics, including China.

- 1a. Leaf blades densely tomentose, sticky; panicle dark purple; spikelets 1.7–2.2 mm, usually glabrous ..... 1. *M. minutiflora*  
 1b. Leaf blades glabrous; panicle silvery-pink; spikelets 2–12 mm, conspicuously villous with fluffy spreading hairs .... 2. *M. repens*

### 1. *Melinis minutiflora* P. Beauvois, Ess. Agrostogr. 54. 1812.

红毛草 hong mao cao

糖蜜草 tang mi cao

*Muhlenbergia brasiliensis* Steudel; *Panicum melinis* Trinius, nom illeg. superfl.; *P. minutiflorum* (P. Beauvois) Raspail; *Suardia picta* Schrank; *Tristegis glutinosa* Nees.

*Saccharum repens* Willdenow, Sp. Pl., ed. 4, 1: 322. 1797; *Rhynchelytrum repens* (Willdenow) C. E. Hubbard; *R. roseum* (Nees) Stapf & C. E. Hubbard; *Tricholaena rosea* Nees.

Perennial. Culms tufted, geniculately ascending, rooting at lower nodes, 50–150 cm tall. Leaf sheaths and blades densely tomentose with glandular hairs, slightly sticky with a strong smell; leaf blades linear, 5–20 × 0.5–1.5 cm. Panicle purplish, narrowly ovate, 10–20 cm; pedicels glabrous, scaberulous, rarely with a few hairs toward the apex. Spikelets narrowly ovate-oblong, 1.7–2.2 mm; lower glume ovate, 0.1–0.4 mm, veinless; upper glume prominently 7-veined, obtusely 2-lobed, awnless or with a mucro to 1 mm from the sinus; lower floret neuter without a palea, lemma similar to upper glume but narrower, prominently 5-veined, acutely 2-lobed, awnless or with a slender awn to 15 mm from the sinus; upper floret whitish, thinly cartilaginous, smooth, shining, slightly shorter than lower lemma. Fl. and fr. Jul–Oct.  $2n = 36$ .

Annual or loosely tufted short-lived perennial. Culms geniculately ascending, often rooting at lower nodes, up to 150 cm tall. Leaf sheaths loose, usually with tubercle-based hairs; leaf blades linear, up to 20 × 0.2–1.4 cm. Panicle silvery-pink or purple, ovate to oblong, 8–20 cm, fluffy; branches capillary; pedicels with a few long hairs. Spikelets ovate, 2–4.5 mm, densely villous, hairs up to 6 mm; lower glume narrowly oblong, 0.3–1.5 mm, 1-veined, with stiff short hairs, separated from the upper by a short internode; upper glume 5-veined, gibbous below middle, tapering upward into a glabrous membranous beak 1/4–1/2 its length, emarginate, mucronate or with short awn up to 1 mm; lower floret staminate, lemma similar to upper glume but narrower and less gibbous, palea keels ciliate; upper floret whitish, thinly cartilaginous, smooth, shining, ca. 2 mm. Fl. and fr. Jun–Nov.  $2n = 36$ .

Introduced into S China as a fodder grass, locally naturalized. Hong Kong, Taiwan, Yunnan [native to Africa].

Grasslands, open or disturbed places, naturalized. Fujian, Guangdong, Taiwan [native to Africa].

This species has been introduced into many tropical countries for fodder (Molasses Grass).

This is a polymorphic, pantropical weed, recognizable by its pink, fluffy panicles.

### 2. *Melinis repens* (Willdenow) Zizka, Biblioth. Bot. 138: 55. 1988.

## 175. DIGITARIA Haller, Hist. Stirp. Helv. 2: 244. 1768, nom. cons., not Heister ex Fabricius (1759), nom. rej.

马唐属 ma tang shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Leptoloma* Chase; *Syntherisma* Walter.

Annual or perennial. Culms erect or decumbent, occasionally stoloniferous. Leaf blades linear or linear-lanceolate; ligule membranous. Inflorescence of digitately arranged racemes, sometimes on a short axis or with secondary branchlets, very rarely paniculate; spikelets usually in groups of 2–3(–4), imbricate to effuse, the latter often on notably long and unequal pedicels. Spikelets puberulous to villous, typically in stripes between the well-defined veins, rarely glabrous; lower glume absent or reduced to a little scale up to 1/4 spikelet length; upper glume variable; lower lemma usually  $\pm$  equal to spikelet; upper floret pallid to black, apex subacute to acuminate, rarely apiculate.  $x = 9$ .

About 250 species: tropical and warm-temperate regions of the world; 22 species (three endemic) in China.

*Digitaria* has been traditionally divided on the nature of the spikelet hairs, which may be clavate, capitate, verrucose (warty, appearing beaded), or with crooked tips. As good magnification is required to see these features, the grouping of the spikelets on the raceme is a more practical aid to identification. Many species have regularly paired spikelets, which present no difficulty. In those species where the spikelets are grouped in clusters of 3 or more, care must be taken, as often the longest pedicel of a group is partially fused to the rachis so that the spikelets appear alternately paired and single, or sometimes one spikelet may be vestigial, or the spikelets may be paired toward the raceme tips.

Many species are very variable in spikelet pubescence and lemma nervation, even within a single raceme. Additionally, there are a number of complexes of intergrading species, so intermediates may occasionally be encountered. This has led to the publication of many superfluous names.

- 1a. Inflorescence an open panicle with long capillary branches ..... 1. *D. fujianensis*  
 1b. Inflorescence composed of racemes.
- 2a. Spikelets of a pair heteromorphic, lower spikelet glabrous or almost so, upper spikelet conspicuously hairy.
- 3a. Annual; midrib of rachis narrow, clearly winged; lower lemma with 7 slender veins ..... 10. *D. ciliaris*  
 3b. Perennial and stoloniferous or annual; midrib of rachis thick, scarcely winged; lower lemma with 7–11 thick, prominent veins.
- 4a. Perennial, stoloniferous; spikelets 4–4.5 mm, spaced on rachis ..... 3. *D. heterantha*  
 4b. Annual; spikelets ca. 3 mm, imbricate on rachis ..... 4. *D. bicornis*
- 2b. Spikelets all similar.
- 5a. Tussocky perennial; leaf sheaths breaking up into fibers at base ..... 2. *D. fibrosa*  
 5b. Annuals or short-lived perennials; leaf sheaths not forming fibrous tussock.
- 6a. Spikelets paired; pedicels with truncate tips.
- 7a. Lower glume absent or almost so ..... 5. *D. setigera*  
 7b. Lower glume small but clearly present.
- 8a. Raceme rachis with smooth margins; racemes 2–3 ..... 6. *D. radicata*  
 8b. Raceme rachis with scabrous margins; racemes often more than 3.
- 9a. Upper glume 1/3–1/2 length of spikelet.
- 10a. Lateral veins of lower lemma scabrous toward apex; upper glume subacute; upper lemma acuminate, equaling lower lemma ..... 7. *D. sanguinalis*  
 10b. Lateral veins of lower lemma smooth; upper glume rounded; upper lemma apiculate, exceeding lower lemma ..... 8. *D. cruciata*
- 9b. Upper glume 1/2–3/4 length of spikelet; lateral veins of lower lemma smooth; upper lemma not exceeding lower lemma.
- 11a. Racemes erect, forming a narrow fascicle; spikelets 2.2–2.8 mm ..... 9. *D. henryi*  
 11b. Racemes widely spreading at maturity; spikelets 2.5–3.5 mm ..... 10. *D. ciliaris*
- 6b. Spikelets in groups of 3 or more, at least in middle part of raceme (sometimes a pedicel fused to the rachis, or a spikelet abortive, or if paired pedicels long and flexuous); pedicels usually with discoid tips.
- 12a. Spikelets with capitate or clavate hairs (if glabrous, pedicel tips hairy).
- 13a. Tips of pedicels with a circlet of stiff, overtopping hairs or spicules up to 1 mm.
- 14a. Spikelets 1.8–2.5 mm; upper glume 2/3–4/5 spikelet length ..... 11. *D. ternata*  
 14b. Spikelets 1.2–1.5 mm; upper glume 1/4–1/2 spikelet length ..... 12. *D. stricta*
- 13b. Tips of pedicels without overtopping hairs or spicules.
- 15a. Rachis of raceme flat, winged; spikelets 2–2.2 mm ..... 20. *D. ischaemum*  
 15b. Rachis of raceme slenderly triquetrous, not or scarcely winged; spikelets 1.3–2 mm.
- 16a. Spikelets 1.8–2 mm; leaves conspicuously hispid ..... 13. *D. hengduanensis*  
 16b. Spikelets 1.3–1.7 mm; leaves glabrous to pilose.
- 17a. Racemes 2–5, 3–8 cm; culms 30–90 cm; spikelets pubescent; apex of fertile floret protruding above lower lemma ..... 14. *D. abludens*  
 17b. Racemes 5–8, 10–17 cm; culms 80–110 cm; spikelets coarsely villous; apex of fertile floret not protruding ..... 15. *D. jubata*
- 12b. Spikelets with smooth or verrucose hairs (tips sometimes coiled), or glabrous; pedicel tips glabrous.

- 18a. Upper lemma pale yellowish brown or gray at maturity; plant stoloniferous.  
 19a. Spikelets 1.7–2.3 mm; lower lemma with equidistant veins ..... 16. *D. mollicoma*  
 19b. Spikelets 1.2–1.5 mm; lower lemma with broader intervein spaces flanking  
 midvein ..... 17. *D. longiflora*
- 18b. Upper lemma dark brown to blackish purple at maturity; plant usually tufted.  
 20a. Spikelets glabrous ..... 19. *D. stewartiana*  
 20b. Spikelets pilose.  
 21a. Racemes 2–4, divaricate; spikelets elliptic, 2–2.2 mm ..... 20. *D. ischaemum*  
 21b. Racemes (2–)3–10, ascending; spikelets elliptic-oblong, 1.2–1.9 mm.  
 22a. Upper glume 1/4–1/2 spikelet length ..... 22. *D. fauriei*  
 22b. Upper glume subequaling spikelet.  
 23a. Rachis 0.5–0.8 mm broad; spikelets 1.4–1.9 mm ..... 21. *D. violascens*  
 23b. Rachis 0.3–0.5 mm broad; spikelets 1.2–1.5 mm ..... 18. *D. leptalea*

**1. *Digitaria fujianensis*** (L. Liu) S. M. Phillips & S. L. Chen, *Novon* 13: 467. 2003.

福建薄稃草 *fu jian bao fu cao*

*Leptoloma fujianensis* L. Liu, *Bot. Res. Acad. Sin.* 1: 41. 1983.

Annual. Culms tufted, erect, 30–50 cm tall, 4–5-noded. Leaf sheaths papillose-pilose; leaf blades linear or linear-lanceolate, 6–20 × 0.3–0.6 cm, thinly pilose, margins thickened, smooth, apex acuminate; ligule brown, 2–3 mm. Inflorescence paniculate, open, 12–18 cm; branches capillary, 5–10 cm, spreading; spikelets toward the panicle periphery; pedicels long, capillary, scaberulous. Spikelets lanceolate-elliptic, 3.3–4 mm, acute; lower glume ca. 0.5 mm, veinless, obtuse or emarginate; upper glume 3/4–4/5 as long as spikelet, 3–5-veined, appressed silky pubescent between lateral veins and along margins; lower lemma as long as spikelet, 7-veined, margins and intervein spaces appressed silky pubescent; upper lemma yellowish, apiculate. Anthers purplish, ca. 2 mm. Fl. and fr. Jul.

- Between rocks. Fujian.

This is a very unusual species on account of its diffuse, paniculate inflorescence, but the spikelets are typical of *Digitaria*. It is similar to *D. cognata* (Schultes) Pilger, from the E United States, but that species has smaller (2.5–3 mm) spikelets and shorter leaf blades. *Digitaria tomentosa* (Koenig) Henrard, from Thailand and S India, also has an open, paniculate inflorescence, but differs in its broader leaf blades, up to 8 mm wide, and especially by the smaller (2.2–2.5 mm) spikelets with tiny glumes.

**2. *Digitaria fibrosa*** (Hackel) Stapf, *Bull. Misc. Inform. Kew* 1912: 428. 1912.

纤维马唐 *xian wei ma tang*

*Panicum fibrosum* Hackel, *Oesterr. Bot. Z.* 51: 330. 1901; *Digitaria fibrosa* var. *yunnanensis* (Henrard) L. Liu; *D. yunnanensis* Henrard.

Perennial forming a dense tussock. Culms surrounded at base by fibrous remains of old leaf sheaths, erect, 30–50 cm tall. Leaf sheaths pilose to hirsute; leaf blades linear, flat, up to 25 × 0.25–0.4 cm, subglabrous, pilose or hirsute, apex acuminate; ligule ca. 0.5 mm. Inflorescence subdigitate, axis usually glabrous, hairy in hirsute specimens; racemes 2–4, suberect, 4–11 cm; spikelets paired or ternate, loosely arranged; rachis slenderly triquetrous, not winged; pedicels tips slightly swollen.

Spikelets oblong-lanceolate, 2.8–3.3 mm, pilose with white or brownish, minutely capitate hairs; lower glume very small, subrounded; upper glume ca. 4/5 as long as spikelet but narrow, 3-veined, pilose; lower lemma as long as spikelet, 7-veined, hairiness variable, usually glabrous and purple-tinged on either side of midvein, 2nd intervein space and margins usually pilose, rarely pilose throughout; upper lemma dark brown to purplish black. Fl. and fr. May–Aug.

Mountain grasslands. Fujian, Guangdong, Guangxi, Sichuan, Yunnan [Laos, Myanmar, Thailand].

*Digitaria fibrosa* is sometimes included in *D. setifolia* Stapf. Both have an identical habit, inflorescence, and spikelet structure, but *D. setifolia* has narrower, inrolled, filiform leaves and is confined to South Africa. *Digitaria fibrosa* is maintained here on account of this difference and the disjunct distribution.

This is the only species in China with a tussocky, fibrous base. Hairiness of the leaves and spikelets is variable, but the loose, narrowly ascending racemes of rather large spikelets with dark fertile florets are easily recognizable.

**3. *Digitaria heterantha*** (J. D. Hooker) Merrill, *Enum. Philipp.* Fl. Pl. 1: 54. 1923.

二型马唐 *er xing ma tang*

*Paspalum heteranthum* J. D. Hooker, *Fl. Brit. India* 7: 16. 1896 [“1897”], based on *Panicum heteranthum* Nees & Meyen (1841), not Link (1827); *Digitaria baliensis* Ohwi; *D. bantamensis* Ohwi; *D. dispar* Henrard, nom. illeg. superfl.; *D. heterantha* var. *hirtella* L. C. Chia; *D. shimadana* Ohwi.

Perennial, stoloniferous. Culms branching and rooting at lower nodes, 50–100 cm tall. Leaf sheaths glabrous to papillose-pilose; leaf blades broadly linear, 5–15 × 0.3–0.6 cm, glabrous to papillose-pilose on both surfaces; ligule 1–2 mm. Inflorescence digitate; racemes 2–4, stiffly ascending to divaricate, 5–15(–20) cm, the longer sparsely spiculate at base; spikelets paired, not imbricate, appressed and appearing slightly sunken; rachis triquetrous, thick, scarcely winged. Spikelets lanceolate, 3.5–4.5(–6) mm, those of a pair different, lower spikelet glabrous, upper spikelet villous; lower glume very small, veinless; upper glume lanceolate, 1/2 as long as to equaling spikelet, 3–5-veined; lower lemma as long as spikelet, closely 7–11-veined, veins equidistant, thick, prominent, interspaces slitlike; upper spikelet with rows of silky hairs, usually also setose, the hairs spreading halo-like at maturity; upper lemma pallid, acuminate. Fl. and fr. Jun–Oct.  $2n = 36, 72$ .

Coastal sands. Fujian, Guangdong, Hainan, Taiwan [Indonesia, Malaysia, Palau Islands, Philippines, Thailand, Vietnam].

**4. *Digitaria bicornis*** (Lamarck) Roemer & Schultes, Syst. Veg. 2: 470. 1817.

异马唐 yi ma tang

*Paspalum bicorne* Lamarck, Tabl. Encycl. 1: 176. 1791; *Digitaria biformis* Willdenow; *Panicum bicorne* (Lamarck) Kunth; *P. biforme* (Willdenow) Kunth.

Annual. Culms decumbent, rooting at lower nodes, 30–60 cm tall. Leaf sheaths glabrous or lower sheaths papillose-pilose; leaf blades linear, 2.5–15 × 0.2–0.9 mm, usually scabrid on both surfaces, rarely sparsely pilose; ligule 1–3.5 mm. Inflorescence digitate or subdigitate; racemes 2–5, 4–14 cm; spikelets paired, imbricate; rachis triquetrous, ca. 1 mm wide, winged. Spikelets lanceolate, ca. 3 mm, those of a pair usually different; lower spikelet glabrous, upper spikelet pubescent; lower glume very small, almost absent or up to 0.4 mm, triangular or bifid, veinless; upper glume lanceolate, ca. 2/3 length of spikelet, 3-veined, pilose; lower lemma as long as spikelet, 7-veined, lower spikelet with equidistant veins, upper spikelet with wider glabrous interspaces on either side of midvein, lateral veins crowded near margins, rows of silky hairs between lateral veins, usually also setose, the hairs spreading halo-like at maturity; upper lemma yellowish, slightly shorter than spikelet. Fl. and fr. May–Sep.  $2n = 54, 72$ .

Waste ground, often on sand, including seashore sand; below 2000 m. Fujian, Hainan, Yunnan [India, Indonesia, Malaysia, Myanmar, New Guinea, Sri Lanka, Thailand; Africa, Australia; introduced in America].

**5. *Digitaria setigera*** Roth ex Roemer & Schultes, Syst. Veg. 2: 474. 1817.

海南马唐 hai nan ma tang

*Digitaria hainanensis* Hitchcock ex Keng; *Digitaria microbachne* (J. Presl) Henrard; *D. microstachya* Henrard; *D. pruriens* (Fischer ex Trinius) Buse; *D. sanguinalis* (Linnaeus) Scopoli var. *pruriens* (Fischer ex Trinius) Prain; *Panicum microbachne* J. Presl; *P. pruriens* Fischer ex Trinius; *P. sanguinale* Linnaeus var. *microbachne* (J. Presl) Hackel; *Syntherisma microbachne* (J. Presl) Hitchcock.

Annual. Culms tufted, decumbent, branching and rooting at lower nodes, 30–100 cm tall. Leaf sheaths glabrous or papillose-pilose; leaf blades linear-lanceolate, 5–20 × 0.3–1 cm, glabrous on both surfaces, papillose-pilose at base, base subrounded, apex acuminate; ligule 1–2 mm. Inflorescence digitate or subdigitate, axis 1–4 cm; racemes 5–12, stiff, 5–15 cm; spikelets paired, imbricate by about 2/3 their length; rachis triquetrous, narrowly winged, ca. 0.6 mm broad, margins scabrous. Spikelets narrowly lanceolate-oblong, 2–2.5(–3) mm, acute; lower glume absent or a minute rim; upper glume up to 1/3 as long as spikelet, 1–3-veined, margins ciliate, apex villous with overtopping hairs; lower lemma as long as spikelet, 5–7-veined, veins evenly spaced or with a wider interspace flanking the midvein, lateral intervein spaces and margins appressed pubescent to villous, rarely ciliate or setose; upper lemma yellowish to gray, subequaling lower lemma, acuminate. Fl. and fr. Jun–Nov.  $2n = 27, 36, 54, 72$ .

Moist slopes, stream banks, roadsides and weedy places. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Thailand, Vietnam; E Africa (Tanzania), Australia, Indian Ocean Islands (Seychelles), Madagascar, Pacific Islands].

This coarse, weedy species is widespread in warm parts of Asia. Spikelet pubescence is very variable, as in most members of the complex around *Digitaria ciliaris*, but the species can be readily distinguished by the lack of a lower glume and the presence of only a very short upper glume.

Specimens have sometimes been misidentified as *Digitaria corymbosa* Merrill. True *D. corymbosa* is a synonym of *D. compacta* (Roemer & Schultes) Veldkamp from India.

**6. *Digitaria radicata*** (J. Presl) Miquel, Fl. Ned. Ind. 3: 437. 1857.

红尾翎 hong wei ling

*Panicum radicosum* J. Presl, Reliq. Haenk. 1: 297. 1830; *Digitaria chinensis* Hornemann var. *hirsuta* (Honda) Ohwi; *D. formosana* Rendle; *D. formosana* var. *hirsuta* (Honda) Henrard; *D. radicata* var. *hirsuta* (Honda) C. C. Hsu; *D. tenuispica* Rendle; *D. timorensis* (Kunth) Balansa; *Panicum formosanum* (Rendle) Makino & Nemoto; *P. timorensis* Kunth; *Syntherisma formosana* (Rendle) Honda; *S. formosana* var. *hirsuta* Honda.

Annual. Culms slender, trailing, branching, 30–50 cm tall, glabrous. Leaf sheaths usually glabrous; leaf blades linear-lanceolate, 2–6 × 0.3–0.7 cm, abaxial surface scabrous, adaxial surface glabrous, pubescent or papillose-pilose at base; ligule 0.75–2 mm. Inflorescence digitate; racemes 2–3(–4), slender, 4–10 cm; spikelets paired, loosely imbricate by about half their length; rachis triquetrous, narrowly winged, ca. 0.6 mm broad, margins smooth or almost so. Spikelets narrowly lanceolate, 2.8–3 mm; lower glume triangular, 0.2–0.3 mm; upper glume narrow, long triangular, 1/3–2/3 as long as spikelet, 1–3-veined, villous throughout; lower lemma as long as spikelet, 5–7-veined, a broad intervein space on either side of midvein, lateral veins very close together near margin, appressed silky pubescent, very rarely with a ciliate fringe, never setose; upper lemma yellowish at maturity, narrowly lanceolate. Anthers 0.5–1 mm. Fl. and fr. summer–autumn.  $2n = 18$ .

Moist grasslands, roadsides, weedy places. Anhui, Fujian, Guangdong, Hainan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand; Australia, Indian Ocean Islands, Madagascar, Pacific Islands; introduced in Pakistan, Tanzania, and a few other places].

This species is related to *Digitaria ciliaris*, but differs in its slender, trailing habit, fewer digitate racemes with smooth-edged rachis, and narrow spikelets with contiguous lateral veins in the lower lemma, which thereby appears 3-veined.

This species is used for forage.

**7. *Digitaria sanguinalis*** (Linnaeus) Scopoli, Fl. Carniol., ed. 2, 1: 52. 1771.

马唐 ma tang

*Panicum sanguinale* Linnaeus, Sp. Pl. 1: 57. 1753; *Paspalum sanguinale* (Linnaeus) Lamarck.

Annual. Culms erect or decumbent at base, 10–80 cm tall,

glabrous or nodes bearded. Leaf sheaths glabrous or sparsely papillose-pilose; leaf blades linear-lanceolate, 5–20 × 0.4–1.2 cm, glabrous or pilose, margins thickened, scabrous; ligule 1–3 mm. Inflorescence digitate or subdigitate, axis 1–2 cm; racemes 4–12, stiff, 5–18 cm; spikelets paired, overlapping by about 2/3 their length; rachis winged, midrib triquetrous, margins scabrous. Spikelets elliptic-lanceolate, 3–3.5 mm, acute; lower glume small, ca. 0.2 mm, triangular; upper glume lanceolate, 1/3–1/2 spikelet length, 3-veined, pubescent, subacute; lower lemma as long as spikelet, 7-veined, veins evenly spaced or a broader interspace flanking the midvein, midvein smooth, lateral veins setiform-scabrous especially toward the apex, appressed-pubescent on lateral intervein spaces and margins, rarely also setose; upper lemma greenish gray or light brown, lanceolate, as long as spikelet, apex acuminate. Anthers ca. 1 mm. Fl. and fr. Jun–Sep.  $2n = 28, 36$ .

Fields, roadsides, weedy places. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang [warm-temperate and upland subtropical regions throughout the world].

The scabrous veins of the lower lemma, although a small character requiring a good lens, are the best means of distinguishing this species from *Digitaria ciliaris*.

This species is a good forage grass.

**8. *Digitaria cruciata*** (Nees ex Steudel) A. Camus in Lecomte, Fl. Indo-Chine 7: 399. 1922.

十字马唐 shi zi ma tang

*Panicum cruciatum* Nees ex Steudel, Syn. Pl. Glumac. 1: 39. 1853; *Paspalum sanguinale* (Linnaeus) Lamarck var. *cruciatum* (Nees ex Steudel) J. D. Hooker.

Annual. Culms decumbent at base, branching and rooting at lower nodes, 30–100 cm tall, nodes thinly hispid. Leaf sheaths glabrous or hispid; leaf blades linear-lanceolate, 5–20 × 0.3–1 cm, papillose-hispid on both surfaces or adaxial surface glabrous, margins thickened, undulate, scabrous; ligule 1–2.5 mm. Inflorescence subdigitate, axis 1–5 cm; racemes 5–8, 3–15 cm; spikelets paired, imbricate; rachis winged, ca. 1 mm broad, midrib triquetrous, margins scabrous. Spikelets plumply elliptic-oblong, 2.5–3 mm; lower glume minute, veinless; upper glume broadly ovate, 1/3 as long as spikelet, 3-veined, subglabrous, margins membranous, apex broadly obtuse; lower lemma slightly shorter than upper lemma, 7-veined with intervein spaces nearly equidistant, glabrous or margins pilose; upper lemma pale purplish gray at maturity, apex abruptly apiculate, exerted from spikelet. Fl. and fr. Jun–Oct.  $2n = 18, 36, 72$ .

Upland grasslands; 1000–2700 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal].

This species is a common weed in the Himalayan region, generally occurring at higher altitudes than other members of the *Digitaria ciliaris* complex. It is usually clearly distinguished by its relatively broad spikelets with a short, rounded upper glume and apiculate apex to the fertile floret.

*Digitaria cruciata* var. *esculenta* Bor is a minor cereal cultivated in the Khasi hills of NE India. It has longer racemes than the wild form, and a turgid, persistent grain. The name has been misapplied to wild-growing plants in Xizang (Lhasa).

**9. *Digitaria henryi*** Rendle, J. Linn. Soc., Bot. 36: 323. 1904.

亨利马唐 heng li ma tang

*Digitaria sasakii* (Honda) Tuyama; *Panicum henryi* (Rendle) Makino & Nemoto; *Syntherisma henryi* (Rendle) Newbold; *S. sasakii* Honda.

Perennial. Culms tufted, slender, prostrate, often rooting at lower nodes, 20–50 cm tall. Leaf sheaths glabrous; leaf blades narrowly lanceolate, 3–8 × 0.2–0.5 cm, glabrous or sparingly hispid near base, apex acute; ligule 1–2 mm. Inflorescence subdigitate, axis short; racemes 3–9, erect and clustered, never divergent, 4–8 cm; spikelets paired; rachis flat, winged ca. 0.5 mm broad, margins scaberulous. Spikelets lanceolate, 2.2–2.8 mm, acuminate; lower glume ca. 0.2 mm; upper glume lanceolate, 1/2 as long as spikelet, 3-veined, pilose; lower lemma slightly longer than upper lemma, 7-veined with broader intervein spaces flanking the midvein, pilose along lateral intervein spaces and margins; upper lemma yellowish green to gray, apex acute. Fl. and fr. summer–autumn.  $2n = 36$ .

Sandy seashores, grasslands near the sea. Fujian, Guangdong, Guangxi, Hainan, Shanghai, Taiwan [S Japan, Vietnam; naturalized in Hawaii].

The spikelets of *Digitaria henryi* resemble those of *D. ciliaris*, to which it is closely related, but *D. henryi* is a rather smaller, more slender plant of different habit, most obviously distinguishable by its cluster of erect racemes.

**10. *Digitaria ciliaris*** (Retzius) Koeler, Descr. Gram. 27. 1802.

纤毛马唐 xian mao ma tang

Annual. Culms decumbent at base, branching and rooting at lower nodes, 30–100 cm tall. Leaf sheaths ± pilose; leaf blades linear to linear-lanceolate, 5–20 × 0.3–1 cm, adaxial surface usually pilose, margins thickened and scabrous; ligule 1–2 mm. Inflorescence digitate or subdigitate, axis short; racemes 3–10, 5–17 cm; spikelets paired, imbricate by about 2/3 their length; rachis winged, ca. 1 mm broad, midrib triquetrous, margins scabrous. Spikelets lanceolate, 2.5–3.5 mm, acute; lower glume very small, triangular; upper glume lanceolate, 2/3–4/5 as long as spikelet, 3-veined, pilose; lower lemma as long as spikelet, 7-veined, veins evenly spaced or a broader glabrous interspace flanking the midvein, lateral interveins appressed pubescent to ciliate or villous, sometimes with a halo-like fringe, sometimes setose; upper lemma yellowish green, gray or pale brown, elliptic, as long as lower lemma, apex acuminate. Fl. and fr. May–Oct.  $2n = 36, 54, 72$ .

Roadsides, weedy places. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [throughout the tropics and subtropics, but rare in Africa].

*Digitaria ciliaris* is a pantropical, weedy annual very variable in spikelet pubescence and nervation. It lies at the center of a complex of similar and somewhat intergrading, weedy species including *D. bicornis*, *D. cruciata*, *D. henryi*, *D. radicata*, *D. sanguinalis*, and *D. setigera*. Occasionally intermediate specimens will be encountered that are difficult to place.

Most species in this complex include forms with or without stiff, glassy bristles near the margins of the lower lemma. These lie flat along the lemma when young, coloring yellow and spreading as a conspicuous pectinate fringe at maturity. The pectinate form of *Digitaria ciliaris* is sometimes distinguished at varietal rank.

- 1a. Lower lemma pubescent to villous, but not setose ..... 10a. var. *ciliaris*  
 1b. Lower lemma pubescent to villous and also setose, bristles spreading at maturity ..... 10b. var. *chrysoblephara*

### 10a. *Digitaria ciliaris* var. *ciliaris*

纤毛马唐(原变种) xian mao ma tang (yuan bian zhong)

*Panicum ciliare* Retzius, Observ. Bot. 4: 16. 1786; *Digitaria adscendens* (Kunth) Henrard; *D. chinensis* Hornemann; *D. sanguinalis* (Linnaeus) Scopoli var. *ciliaris* (Retzius) Parlato; *D. sericea* (Honda) Honda ex Ohwi; *Panicum adscendens* Kunth; *Syntherisma ciliaris* (Retzius) Schrader; *S. sericea* Honda.

Lower lemma pubescent to villous, but lacking glassy bristles.  $2n = 36, 54$ .

Roadsides, weedy places. Beijing, Fujian, Guangdong, Guizhou, Hainan, Hubei, Jiangxi, Nei Mongol, Ningxia, Shandong, Shanghai, Shanxi, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [throughout the tropics and subtropics].

**10b. *Digitaria ciliaris* var. *chrysoblephara*** (Figari & De Notaris) R. R. Stewart, Kew Bull. 29: 444. 1974.

毛马唐 mao ma tang

*Digitaria chrysoblephara* Figari & De Notaris, Mem. Reale Accad. Sci. Torino, ser. 2, 14: 364. 1852; *D. adscendens* (Kunth) Henrard subsp. *chrysoblephara* (Figari & De Notaris) Henrard; *D. ciliaris* subsp. *chrysoblephara* (Figari & De Notaris) S. T. Blake.

Lower lemma pilose and also setose with hard glassy bristles, these spreading and yellowing at maturity; sometimes bristles only present on upper spikelet of a pair.  $2n = 72$ .

Roadsides, fields, weedy places. Anhui, Fujian, Gansu, Guangdong, Hainan, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan [tropical and warm-temperate regions of the world].

This variety is sometimes included in *Digitaria bicornis*, and there is some similarity, especially when the spikelets are heteromorphic. However, *D. bicornis* is a distinct species with only 2 or 3 racemes, a thick midrib, appressed spikelets, which appear slightly sunken, and thick, prominent veins on the lower lemma, with the intervein spaces forming slitlike furrows.

**11. *Digitaria ternata*** (Hochstetter ex A. Richard) Stapf, Fl. Cap. 7: 376. 1898.

三数马唐 san shu ma tang

*Cynodon ternatus* Hochstetter ex A. Richard, Tent. Fl. Abyss. 2: 405. 1851; *Panicum ternatum* (Hochstetter ex A. Richard) Hochstetter ex Steudel; *Paspalum ternatum* (Hochstetter ex A. Richard) J. D. Hooker; *Syntherisma ternata* (Hochstetter ex A. Richard) Newbold.

Annual. Culms loosely tufted, ascending, up to 100 cm tall, glabrous or pilose with long fine hairs below inflorescence. Leaf sheaths puberulous or glabrous; leaf blades linear, 10–30 × 0.6–1 cm, adaxial surface papillose-pilose, base subrounded, apex acuminate; ligule 1–2 mm. Inflorescence subdigitate, axis villous; racemes 3–8, 10–20 cm; spikelets ternate; rachis broadly winged, ca. 1 mm broad, midrib low, margins scabrous; pedicel tips hispid with 0.2–0.8 mm setae. Spikelets oblong-lanceolate or elliptic-lanceolate, 1.8–2.5 mm, pale grayish green, hairs clavate; lower glume absent; upper glume 2/3–3/4 as long as spikelet, narrower than spikelet, intervein spaces and margins appressed-pilose to hirsute; lower lemma as long as spikelet, 5-veined with a central group of 3 and 2 marginal veins, intervein spaces and margins hairy; upper lemma blackish brown at maturity, as long as spikelet. Anthers 0.4–0.8 mm. Fl. and fr. Jun–Sep.  $2n = 36$ .

Grassy, weedy places. Guangxi, Guizhou, Hong Kong, Sichuan, Yunnan [Bhutan, India, Indonesia, Malaysia, Nepal, Philippines, Thailand; Africa; introduced in America and Australia].

This species is a good forage grass.

**12. *Digitaria stricta*** Roth ex Roemer & Schultes, Syst. Veg. 2: 474. 1817.

竖毛马唐 shu mao ma tang

Annual. Culms tufted, slender, erect, 20–40 cm tall. Leaf sheaths loose, keeled, glabrous or papillose-pilose, especially at mouth; leaf blades linear, soft, 5–20 × 0.3–0.5 cm, adaxial surface tuberculate-hispid in lower 1/3, apex finely acuminate; ligule 1–1.5 mm. Inflorescence subdigitate, axis 1–3 cm; racemes 2–8 or more, 5–12 cm; spikelets ternate; rachis triquetrous, narrowly winged, margins scabrous; pedicels scabrous, tips slightly dilated with overtopping spicules up to 1 mm. Spikelets elliptic, 1.2–1.4 mm, hairs clavate, rarely glabrous; lower glume absent; upper glume variable, 1/4–1/2 as long as spikelet, rarely vestigial or absent, veinless or 1–3-veined; lower lemma slightly shorter than spikelet, 3–5-veined, intervein spaces and margins sparsely pubescent to villous; upper lemma chestnut brown to purplish black with a paler, apiculate, slightly protruding apex. Anthers ca. 0.3 mm. Fl. and fr. autumn.

Grasslands; below 1800 m. Fujian, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Sri Lanka].

This species is allied to *Digitaria ternata*, which has bigger spikelets with a longer upper glume.

*Digitaria stricta* is a fairly uniform species, recognizable by its slender, tufted habit and small spikelets with exposed, dark upper floret ringed by setae from the pedicel apex. However, the spikelet pubescence is variable, ranging from subglabrous to conspicuously villous forms, and the small upper glume may sometimes be only vestigial or even occasionally completely absent. Two extreme variants from the typical plant have been given varietal status, as follows.

- 1a. Spikelets glabrous or almost so ..... 12b. var. *glabrescens*  
 1b. Spikelets sparsely to densely hairy with clavate hairs.  
 2a. Upper glume distinct ..... 12a. var. *stricta*  
 2b. Upper glume absent ..... 12c. var. *denudata*

**12a. *Digitaria stricta* var. *stricta***

豎毛馬唐(原变种) shu mao ma tang (yuan bian zhong)

*Agrostis pilosa* Retzius; *Digitaria puberula* Link; *D. royleana* (Nees ex J. D. Hooker) Prain; *Paspalum royleanum* Nees ex J. D. Hooker; *Setaria stricta* (Roth ex Roemer & Schultes) Kunth.

Spikelets obviously hairy with clavate hairs, pubescence varying from short and appressed to longer, dense and spreading; upper glume 1/4–1/2 as long as spikelet.

Grasslands; ca. 1800 m. Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Sri Lanka].

**12b. *Digitaria stricta* var. *glabrescens* Bor, Webbia 11: 336. 1955.**

秃穗馬唐 tu sui ma tang

*Digitaria glabrescens* (Bor) L. Liu.

Spikelets glabrous or nearly so; otherwise like var. *stricta*.

Hill slopes, fields; ca. 200 m. Fujian [N India].

**12c. *Digitaria stricta* var. *denudata* (Link) Henrard, Monogr. *Digitaria*, 175. 1950.**

露籽馬唐 lu zi ma tang

*Digitaria denudata* Link, Hort. Berol. 1: 222. 1827; *Panicum denudatum* (Link) Kunth.

Upper glume absent; otherwise like var. *stricta*.

Streams, grasslands; 1000–1800 m. Sichuan, Xizang, Yunnan [India, Nepal].

**13. *Digitaria hengduanensis* L. Liu, Bot. Res. Acad. Sin. 4: 37. 1989.**

横断山馬唐 heng duan shan ma tang

Annual. Culms loosely tufted, slender, 30–60 cm tall. Leaf sheaths papillose-hispid; leaf blades linear-lanceolate, 3–8 × 0.2–0.6 cm, papillose-hispid on both surfaces, apex acute; ligule 0.5–2 mm. Inflorescence axis 2–5 cm; racemes 2–7, loosely ascending, 3–10 cm; spikelets mostly in lax pairs, distant, lower sometimes on short branchlets; rachis slender, triquetrous, narrowly winged, angles scabrous; pedicels of a pair very unequal, one flexuous, up to 8 mm, the other about as long as spikelet, tips discoid. Spikelets elliptic, 1.8–2 mm, hairs clavate; lower glume minute; upper glume as long as spikelet, 3-veined, intervein spaces and margins densely hairy; lower lemma similar to upper glume, 5–7-veined; upper lemma yellowish brown, finally chestnut brown, ca. 1.6 mm, apex apiculate. Fl. and fr. Aug–Oct.

• Forest margins, riverside sands, mountain grasslands; 1200–3000 m. Sichuan, Yunnan.

**14. *Digitaria abludens* (Roemer & Schultes) Veldkamp, Blumea 21: 53. 1973.**

粒状馬唐 li zhuang ma tang

*Panicum abludens* Roemer & Schultes, Syst. Veg. 2: 457. 1817; *Digitaria granularis* (Trinius ex Sprengel) Henrard; *D.*

*pedicellaris* (Trinius ex J. D. Hooker) Prain, nom. illeg. superfl.; *Paspalum granulare* Trinius ex Sprengel; *P. pedicellare* Trinius ex J. D. Hooker.

Annual. Culms erect or ascending, 30–90 cm tall. Leaf sheaths usually glabrous; leaf blades linear or linear-lanceolate, 2–15 × 0.2–0.4 cm, scabrous or papillose-pilose; ligule 1–3 mm. Inflorescence axis 1–4 cm; racemes 2–5, loosely spiculate, divaricate, 3–8 cm; spikelets paired or ternate, or the clusters grading into short branchlets; rachis slenderly triquetrous, not winged, ca. 0.5 mm broad, margins scabrous; pedicels very unequal, smoothly terete, spreading out from rachis, tips disklike. Spikelets elliptic, 1.3–1.7 mm, hairs clavate; lower glume absent; upper glume narrower than spikelet and 1/2–4/5 as long, 3–5-veined, intervein spaces and margins pubescent; lower lemma slightly shorter than spikelet, 5–7-veined, interveins and margins pubescent, tip subrounded; upper lemma slightly protruding, yellowish brown becoming chestnut at maturity with a pale apiculate apex. Anthers 0.4–0.65 mm. Fl. and fr. Jun–Oct.  $2n = 36$ .

Hill slopes, forest margins; below 1000 m. Hainan, S Henan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand].

**15. *Digitaria jubata* (Grisebach) Henrard, Blumea 1: 100. 1934.**

棒毛馬唐 bang mao ma tang

*Paspalum jubatum* Grisebach, Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 3: 84. 1868.

Annual. Culms solitary, erect, 80–110 cm tall. Leaf sheaths shortly pilose to glabrescent; leaf blades linear, 10–20 × 0.3–0.5 cm, scabrous, base subrounded, apex acuminate; ligule 1–2 mm. Inflorescence axis 9–13 cm; racemes 5–8, verticillate at base, slender, ascending, slightly flexuous, often compound; spikelets several in clusters or on short ascending racemelets; rachis very slender, triquetrous, not winged, margins scabrous; pedicels up to 1 cm, scabrous, tips slightly expanded with longer spicules below. Spikelets elliptic, 1.5–1.7 mm, often purple-tinged, hairs capitate; lower glume absent; upper glume slightly shorter than spikelet, 3-veined, villous, acute; lower lemma as long as spikelet or slightly shorter, 3–5-veined, villous; upper lemma yellowish brown or purplish brown, as long as spikelet, narrowly acute, apex usually extended. Anthers ca. 0.5 mm. Fl. and fr. Jun–Sep.

Mountain grasslands. Guizhou, Yunnan [NE India].

*Digitaria jubata* appears to be a species of rather restricted distribution. It is similar to *D. abludens*, but has taller, solitary (vs. tufted) culms, and longer racemes with the branchlets and pedicels lying closer to the rachis (vs. widely spreading). The spikelet pubescence is denser, with more obviously pin-headed hairs.

**16. *Digitaria mollicoma* (Kunth) Henrard, Blumea 1: 97. 1934.**

绒馬唐 rong ma tang

*Paspalum mollicomum* Kunth, Enum. Pl. 1: 47. 1833; *Digitaria hayatae* (Honda) Honda ex Ohwi; ?*D. magna* (Honda) Tuyama; *Panicum hayatae* (Honda) Makino & Nemoto (1925), not A. Camus (1923); ?*P. hayatae* var. *magnum* (Honda) Makino & Nemoto; *Syntherisma hayatae* Honda; ?*S. hayatae* var. *magna* Honda; ?*S. magna* (Honda) Honda.

Short-lived perennial, stoloniferous and mat-forming. Culms slender, flowering shoots ascending, 20–50 cm tall. Leaf sheaths glabrous to pilose; leaf blades linear-lanceolate, 2–6 × 0.3–0.5 cm, glabrous to pilose, short and patent on the stolons, longer and softer on the flowering shoots; ligule 1–2 mm. Inflorescence digitate; racemes 2–3(–5), 3–9 cm; spikelets ternate; rachis ribbonlike, winged, ca. 1 mm broad, margins scabrous; pedicels usually terete, smooth, tips discoid. Spikelets elliptic, 1.7–2.3 mm, hairs smooth or verrucose; lower glume absent or nearly so; upper glume as long as or slightly shorter than spikelet, 3–5-veined, pilose; lower lemma as long as spikelet, with 7 equidistant, rather prominent veins, pilose; upper lemma yellow to pale brown at maturity. Anthers 0.5–0.9 mm. Fl. and fr. Aug–Oct.

Dry sandy soils, near seashores; below 1200 m. Anhui, Jiangxi, Taiwan, Zhejiang [Indonesia, Malaysia, Philippines; Pacific Islands].

*Digitaria magna* is an inadequately known entity which may be synonymous with *D. mollicoma*. *Syntherisma hayatae* var. *magna* was described from Taiwan, but the protologue is not sufficient to establish its identity.

**17. *Digitaria longiflora*** (Retzius) Persoon, Syn. Pl. 1: 85. 1805.

长花马唐 chang hua ma tang

*Paspalum longiflorum* Retzius, Observ. Bot. 4: 15. 1786; *Digitaria propinqua* (R. Brown) P. Beauvois; *Panicum longiflorum* (Retzius) J. F. Gmelin; *P. parvulum* Trinius, nom. illeg. superfl.; *P. propinquum* R. Brown; *Syntherisma longiflora* (Retzius) H. C. Skeels.

Annual or short-lived perennial, usually with slender, many-noded stolons. Culms ascending, leafy, 10–40 cm tall. Leaf sheaths pubescent or glabrous; leaf blades broadly linear, 2–5 × 0.2–0.4 cm, glabrous or papillose-pilose at base, apex acute; ligule 1–1.5 mm. Inflorescence digitate; racemes 2–3, arching at maturity, 2–5 cm; spikelets ternate; rachis ribbonlike, winged, 0.5–0.8 mm broad, midrib low and rounded; pedicels terete, smooth, with discoid tips. Spikelets elliptic, 1.2–1.5 mm, apex acuminate, hairs verrucose; lower glume absent; upper glume as long as spikelet, 5-veined, densely appressed-pubescent; lower lemma as long as spikelet, 7-veined, glabrous between middle and lateral veins, otherwise pubescent; upper lemma yellowish brown or pale gray, apex acuminate. Anthers 0.6–0.8 mm. Fl. and fr. Apr–Oct.  $2n = 18$ .

Field margins, grasslands, weedy places; 600–1100 m. Fujian, Guangdong, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; Old World tropics, America].

*Digitaria fuscescens* (J. Presl) Henrard differs from *D. longiflora* only by its glabrous spikelets and slightly longer, fractionally exerted upper floret. Most likely it is simply a glabrous variant of *D. longiflora*. It is widespread throughout the tropics, and although reported from S China, no specimens have been seen.

**18. *Digitaria leptalea*** Ohwi, Acta Phytotax. Geobot. 11: 31. 1942.

丛立马唐 cong li ma tang

*Digitaria leptalea* var. *recticulmis* Ohwi.

Perennial, tufted or stoloniferous. Culms ascending, leafy, up to 40 cm tall. Leaf sheaths pubescent or glabrescent; leaf blades linear, 2–5(–10) × 0.2–0.4 cm, glabrous or margins papillose-pilose at base, apex acute; ligule 1–1.5 mm. Inflorescence digitate; racemes 2–3, ascending, slightly arching at maturity, 2–7 cm; spikelets ternate; rachis ribbonlike, narrowly winged, 0.3–0.5 mm broad, midrib low; pedicels almost smooth, with discoid tips. Spikelets elliptic, 1.2–1.5 mm, apex acuminate, hairs verrucose; lower glume an obscure rim; upper glume subequaling spikelet, 5-veined, densely appressed-pubescent; lower lemma as long as spikelet, 7-veined, similar to upper glume; upper lemma purplish black when fully mature. Anthers ca. 0.4 mm. Fl. and fr. Apr–Oct.  $2n = 18$ .

Dry banks and hillsides. Taiwan [Japan (Ryukyu Islands)].

*Digitaria leptalea* closely resembles *D. longiflora*, but has a very slender rachis and its dark purplish fertile floret is like that of the closely related *D. violascens*.

**19. *Digitaria stewartiana*** Bor, Kew Bull. [6] 1951: 166. 1951.

昆仑马唐 kun lun ma tang

*Digitaria ischaemum* (Schreber) Muhlenberg subsp. *stewartiana* (Bor) Tzvelev.

Annual. Culms tufted, slender, decumbent at base, ascending, 15–30 cm tall. Leaf sheaths glabrous; leaf blades up to 6 × 0.5 cm, glabrous, base subrounded, margins scabrous, apex acuminate; ligule 1–1.5 mm. Inflorescence subdigitate; racemes 2–3, 4–5 cm; spikelets ternate; rachis ribbonlike, broadly winged, midrib triquetrous; pedicels terete, scabrous, tips cupuliform. Spikelets elliptic, 1.8–2 mm, glabrous; lower glume usually absent; upper glume ca. 4/5 as long as spikelet, hyaline, translucent, glabrous, 3-veined, broadly obtuse; lower lemma purplish, as long as spikelet, 5-veined with 3 central veins close together and outer 2 marginal, veins connected at tip; upper lemma purplish brown at maturity. Anthers ca. 0.5 mm. Fl. and fr. summer–autumn.

Mountains; 2000–3000 m. Xinjiang, Xizang [Kashmir].

This seldom collected species is allied to *Digitaria ischaemum*, but differs in its glabrous spikelets and delicate, rounded upper glume. It may prove to be a high-altitude variant of *D. ischaemum* when better known.

This species is used for forage.

**20. *Digitaria ischaemum*** (Schreber) Muhlenberg, Descr. Gram. 131. 1817.

止血马唐 zhi xue ma tang

*Panicum ischaemum* Schreber in Schweigger, Spec. Fl. Erlang. 16. 1804; *Digitaria asiatica* (Ohwi) Tzvelev; *D. humifusa* Persoon; *D. ischaemum* subsp. *asiatica* (Ohwi) Tzvelev; *D. ischaemum* var. *asiatica* Ohwi; *Panicum humifusum* (Persoon) Kunth; *Paspalum humifusum* (Persoon) Poiré; *Syntherisma humifusa* (Persoon) Rydberg.

Annual, whole plant often purple-tinged. Culms loosely tufted, erect or ascending, 15–40 cm tall. Leaf sheaths loose, usually keeled, glabrous or pilose; leaf blades linear-lanceolate,



5–12 × 0.4–0.8 cm, ± pilose, base subrounded, apex acuminate; ligule ca. 0.6 mm. Inflorescence digitate or on a short axis; racemes 2–4, divaricate, 2–9 cm; spikelets ternate; rachis ribbon-like, winged, 0.8–1.1 mm broad, midrib white, rounded or triquetrous, narrower than the green or purple wings, margins serrulate; pedicels angular, scabrous, tips discoid. Spikelets elliptic, 2–2.2 mm, pilose with verrucose hairs, some with curled tips; lower glume absent or a tiny hyaline rim; upper glume as long as spikelet or slightly shorter, 3–5-veined, intervein spaces and margins appressed-pilose; lower lemma as long as spikelet, 5–7-veined, interveins and margins appressed-pilose; upper lemma purplish brown to blackish at maturity. Fl. and fr. Jun–Nov.  $2n = 36$ .

Open grassy places. Anhui, Fujian, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang [Japan, Pakistan, Russia; Europe, North America].

*Digitaria ischaemum* is very close to *D. violascens*, but has a slightly stouter habit with broader leaves, a few short, widely spreading racemes, and larger, plumper spikelets. It also has a more temperate distribution.

*Digitaria ischaemum*, *D. fauriei*, *D. longiflora*, and *D. violascens* belong to a group of *Digitaria* known as the *Verrucipilae* because of their warty spikelet hairs. A compound microscope is required to see this, but the hairs have a beadlike appearance under moderate magnification. These spikelet hairs also have curled tips in *D. ischaemum* (and sometimes in *D. violascens*), which led to the hairs being described as capitate or clavate in the past.

## 21. *Digitaria violascens* Link, Hort. Berol. 1: 229. 1827.

紫马唐 *zi ma tang*

*Digitaria chinensis* (Nees) A. Camus (1923), not Hornemann (1819); *D. pertenuis* Buse; *D. thwaitesii* (Hackel) Henrard var. *tonkinensis* Henrard; *D. violascens* (Link) var. *villosa* Keng; *Panicum steudelianum* Domin; *P. violascens* (Link) Kunth; *Paspalum chinense* Nees; *P. minutiflorum* Steudel (1853), not Desvaux (1831); *Syntherisma chinensis* (Nees) Hitchcock.

Annual. Culms loosely tufted, infrequently shortly stoloniferous, 20–60 cm tall. Leaf sheaths glabrous or pilose, especially at mouth; leaf blades linear-lanceolate, 5–15 × 0.2–0.6 cm, scabrous, glabrous or adaxial surface pilose at base, apex acute; ligule 1–2 mm. Inflorescence subdigitate; racemes (2–)

3–7(–10), ascending, 3–12 cm; spikelets ternate; rachis ribbon-like, winged, 0.5–0.8 mm broad, midrib low and rounded, margins serrate; pedicels angular, scabrous, with discoid tips. Spikelets elliptic-oblong, 1.4–1.9(–2.5) mm, hairs verrucose, sometimes hook-tipped; lower glume absent; upper glume lanceolate, slightly shorter than spikelet, 3(–5)-veined, intervein spaces and margins appressed-pubescent; lower lemma as long as spikelet, 5–7-veined, intervein spaces and margins pubescent, but usually glabrous flanking the middle vein; upper lemma dark brown or purplish black at maturity. Anthers 0.3–0.6 mm. Fl. and fr. Jul–Nov.  $2n = 36$ .

Hillsides, roadsides, weedy places; ca. 1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Qinghai, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Australia, South America].

This widespread, weedy species is closely related to *Digitaria longiflora*, and there is some overlap between the two. *Digitaria violascens* tends to be tufted rather than stoloniferous, with 3 or more longer racemes, angular, scabrous pedicels, a shorter, 3-veined upper glume, and distinctive, blackish fruits.

## 22. *Digitaria fauriei* Ohwi, Acta Phytotax. Geobot. 11: 31. 1942.

佛欧里马唐 *fo ou li ma tang*

Annual. Culms tufted, shortly stoloniferous at base, 15–20 cm tall, glabrous. Leaf sheaths subcompressed, glabrescent; leaf blades 3–5 × 0.2–0.4 cm, sparsely pilose; ligule ca. 0.4 mm, truncate. Inflorescence subdigitate; racemes 2–4, erect, slender, 3–5 cm; spikelets ternate; rachis winged, 0.8–1 mm broad, wing broader than midrib, margins scabrous. Spikelets oblong-elliptic, 1.3–1.5 mm, pale green, apex acute, hairs white becoming dirty yellow, verrucose, often with coiled tips; lower glume absent; upper glume 1/4–1/2 as long as spikelet; lower lemma elliptic, 5–7-veined, pilose, obtuse; upper lemma purplish black at maturity, elliptic-ovate, subequaling lower lemma. Anthers 0.3–0.5 mm. Fl. and fr. autumn.

- Near seashores, open places. Taiwan (Taipei).

This species is reported in the literature to have paired spikelets, but in fact they are ternate and the hairs are verrucose with coiled tips, not capitate. The species is close to the widespread, weedy *Digitaria violascens*, but is remarkable for its very short upper glume, clearly exposing the purple upper floret, and its curling spikelet hairs.

## 176. PSEUDORAPHIS Griffith ex Pilger, Notizbl. Bot. Gart. Berlin-Dahlem 10: 210. 1928.

伪针茅属 *wei zhen mao shu*

Chen Shouliang (陈守良); Sylvia M. Phillips

Aquatic or semi-aquatic perennials. Culms decumbent to stoloniferous, many-noded, rooting at lower nodes or floating. Leaf sheaths compressed; leaf blades linear to lanceolate; ligule membranous or ciliate. Inflorescence open or contracted, composed of racemes on all sides of a common axis; racemes solitary or grouped, rachis slender, bearing 1 to several alternate shortly pedicelled spikelets, terminating in a bristle. Spikelets lanceolate, terete or slightly dorsally compressed, florets 2; lower glume very small, veinless; upper glume equaling the spikelet, firmly herbaceous, scabrous to setose, long-acuminate or briefly awned; lower lemma resembling upper glume but usually slightly shorter, enclosing a shorter hyaline palea; upper floret 1/2 as long, shortly stipitate, membranous, smooth, shiny. Caryopsis eventually much larger than upper floret and filling spikelet when mature.  $x = 7, 9$ .

Six species: India to Japan and throughout SE Asia to Australia; three species in China.

- 1a. Inflorescence open, lanceolate to ovate; racemes spreading, 2–3-spiculate ..... 1. *P. brunoniana*  
 1b. Inflorescence contracted, linear to oblong; racemes erect, usually 1-spiculate.  
 2a. Spikelets numerous; upper glume longer than lower lemma, narrowly acuminate; lower lemma 7-veined; 2  
 stamens in lower floret ..... 2. *P. sordida*  
 2b. Spikelets 10 or less; upper glume slightly shorter than lower lemma, acute; lower lemma 13-veined; 3 stamens  
 in lower floret ..... 3. *P. balansae*

**1. *Pseudoraphis brunoniana*** (Wallich & Griffith) Pilger, Notizbl. Bot. Gart. Berlin-Dahlem 10: 210. 1928.

伪针茅 wei zhen mao

*Panicum brunonianum* Wallich & Griffith, J. Asiat. Soc. Bengal 5: 574. 1836; *Chamaeraphis brunoniana* (Wallich & Griffith) A. Camus; *C. spinescens* (R. Brown) Poiret var. *brunoniana* (Wallich & Griffith) J. D. Hooker.

Culms soft, compressed, usually floating, emergent flowering shoots 20–40 cm, nodes pubescent. Leaf sheaths usually longer than internodes, mouth with lanceolate auricles adnate to the ligule; leaf blades linear-lanceolate, 3–9 × 0.3–0.6 cm, base contracted, apex acute; ligule membranous, lacerate, ciliate. Inflorescence open, lanceolate to ovate in outline, 5–10 cm; racemes stiff, ascending to patent, bearing (1–)2–3 distant spikelets on a slender scabrous rachis, terminal bristle (7–)15–30 mm. Spikelets 5.5–8(–10) mm; lower glume 0.5–1 mm, broadly rounded or truncate; upper glume lanceolate, as long as spikelet, 7–11-veined, sparsely spinulose on veins and margins, apex slenderly acuminate; lower lemma slightly shorter than upper glume, 7–9-veined; anthers 3, 1.3–2 mm; upper lemma ca. 2 mm. Fl. and fr. Jul–Aug.

Rooting in shallow water, floating in deep water. Anhui, Guangdong, Taiwan [Bangladesh, NE India, Myanmar, Philippines, Thailand, Vietnam].

This species is closely related to *Pseudoraphis spinescens* (R. Brown) Vickery, with which it has often been confused. *Pseudoraphis spinescens* has a widespread distribution from India and Sri Lanka through Malaysia and Indonesia to Australia. It differs in its densely hairy nodes with shiny, white, appressed, silky hairs; longer racemes bearing 5–10 approximate spikelets, usually with a shorter terminal bristle; and by its caudate upper glume much exceeding the lower lemma.

**2. *Pseudoraphis sordida*** (Thwaites) S. M. Phillips & S. L. Chen, Novon 13: 469. 2003.

瘦脊伪针茅 shou ji wei zhen mao

*Panicum sordidum* Thwaites, Enum. Pl. Zeyl. 443. 1864; *Chamaeraphis spinescens* (R. Brown) Poiret var. *depauperata* Nees ex J. D. Hooker; *Pseudoraphis depauperata* (Nees ex J. D. Hooker) Keng; *P. spinescens* (R. Brown) Vickery var. *depauperata* (Nees ex J. D. Hooker) Bor; *P. ukishiba* Ohwi.

Culms tufted, slender, 20–50 cm, internodes often purplish, nodes pubescent to subglabrous. Leaf sheaths loose, auricles variable, often inconspicuous; leaf blades linear, 2–6 × 0.2–0.4 cm, base contracted, apex acute; ligule a ciliate membrane. Inflorescence contracted, almost spikelike, oblong, 2–8 cm, enclosed at the base by the uppermost leaf sheath or only slightly exerted; racemes erect, bearing a single spikelet (rarely 2), terminal bristle 8–12 mm. Spikelets 4–6 mm; lower glume 0.6–0.8 mm; upper glume as long as the spikelet, 7 main veins with thinner intermediaries, sparsely strigose on lower back and near margins, sharply acuminate; lower lemma subequal to upper glume, 7-veined; anthers 2, 0.6–1.1 mm; upper lemma 1.3–1.4 mm. Fl. and fr. autumn.

Shallow lakes, streams; 100–500 m. Fujian, Hubei, Hunan, Jiangsu, Shandong, Yunnan, Zhejiang [India, Japan, Korea, Sri Lanka].

The name "*Chamaeraphis depauperata* Nees ex Steudel" (Syn. Pl. Glumac. 1: 49. 1853) was not validly published because it was merely cited as a synonym of *Panicum asperum* Wight ex Steudel (1853), not Lamarck (1779).

**3. *Pseudoraphis balansae*** Henrard, Blumea, Suppl. 1: 230. 1937.

长稈伪针茅 chang fu wei zhen mao

*Pseudoraphis longipaleacea* L. C. Chia.

Perennial, with rhizomes. Culms slender, floating, 20–70 cm long when flowering, smooth, nodes glabrous. Leaf sheaths loose, keeled, glabrous, mouth with lanceolate auricles adnate to the ligule; leaf blades linear, soft, 3–5 × 0.2–0.4 cm, abaxial surface smooth, adaxial surface scabrous, base rounded, apex subacute; ligule membranous, white, glabrous, subtruncate. Inflorescence linear, 4–5 cm, composed of few spikelets; racemes erect, alternate, bearing a single spikelet (rarely 2), terminal bristle 8–24 mm. Spikelets 4.5–6.5 mm, acute; lower glume 0.5–0.7 mm, obtuse or subtruncate; upper glume as long as or slightly shorter than lower lemma, glabrous, 7–9-veined, acute; lower lemma equal to spikelet, 13-veined; anthers 3, ca. 3 mm; upper lemma ca. 2.5 mm. Fl. and fr. Sep–Oct.

Ponds, lakes. Hainan [Thailand, Vietnam].

*Pseudoraphis balansae* is distinctive in the genus because its spikelets are merely acute, lacking the drawn-out, narrow tip on the upper glume found in most species. The short, subacute leaves, white, truncate ligule, and few-spiculate inflorescence are also characteristic.

## 177. PENNISETUM Richard, Syn. Pl. 1: 72. 1805.

狼尾草属 lang wei cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Gymnotrix* P. Beauvois.

Annuals or perennials. Culms tufted or rhizomatous, prostrate to over 3 m tall. Leaf blades flat, folded or convolute; ligule a

ciliate membrane. Inflorescence a spike-like panicle, cylindrical to subglobose; branches numerous, contracted into short clusters of one or more spikelets subtended by an involucre of bristles; involucres sessile or with a short basal stipe, deciduous with the spikelets at maturity leaving peduncle stumps or scars on the main axis; bristles slender, scabrous, sometimes plumose, simple or very rarely branched, very unequal, outer shorter, often innermost stouter and conspicuously exceeding the rest. Spikelets usually lanceolate, dorsally compressed, herbaceous, acute or obtuse, florets 2, glumes and lower lemma variable; glumes often small and not exceeding 1/2 spikelet length; lower lemma staminate or neuter, equaling spikelet or reduced; upper lemma equaling spikelet, herbaceous or indurated, obtuse to acute.  $x = 9$ .

About 80 species: throughout the tropics; 11 species (four endemic, four introduced) in China.

*Pennisetum* is a large and variable genus, but the bristly, spike-like inflorescence is always readily recognizable. The only other panicoid genus with a similar bristly inflorescence is *Setaria*, but in that genus the bristles are not deciduous with the spikelets, instead remaining on the rachis at maturity. The bristles are derived from reduced panicle branches.

Many species provide good forage. Several species, including *Pennisetum glaucum* in China, are used for food.

- 1a. Inflorescence reduced to 2–4 spikelets within the uppermost leaf sheath; low sward-forming perennial ..... 1. *P. clandestinum*  
 1b. Inflorescence spike-like, clearly exerted above the leaves.  
 2a. Bristles of involucre obviously branched above base ..... 2. *P. lanatum*  
 2b. Bristles of involucre unbranched or branched only at extreme base.  
 3a. Inflorescence axis with sharp decurrent wings below each involucre; upper floret deciduous; bristles densely woolly with crinkled hairs ..... 3. *P. polystachion*  
 3b. Inflorescence axis not winged; upper floret persistent; bristles glabrous or hairs not crinkled, often tubercle-based.  
 4a. Culms robust, often 2 m or more; upper lemma indurated in lower half, membranous toward apex; anthers with apical tuft of hairs.  
 5a. Perennial; bristles longer than spikelets ..... 4. *P. purpureum*  
 5b. Annual; bristles shorter than spikelets ..... 5. *P. glaucum*  
 4b. Culms usually less than 1.5 m; upper lemma of uniform texture; anthers without apical tuft of hairs.  
 6a. Involucres with a basal 2–3 mm stipe; bristles glabrous ..... 6. *P. alopecuroides*  
 6b. Involucres subsessile or basal stipe less than 1 mm; bristles glabrous or plumose.  
 7a. Inflorescence axis glabrous; plant with long spreading rhizomes.  
 8a. Bristles equaling or longer than spikelets ..... 7. *P. flaccidum*  
 8b. Bristles shorter than spikelets (except longest) ..... 8. *P. sichuanense*  
 7b. Inflorescence axis puberulous to hirtellous; plant loosely tufted or base decumbent.  
 9a. Bristles soft, numerous, plumose; leaf sheaths glabrous ..... 9. *P. qianningense*  
 9b. Bristles stiff, mostly in a single whorl, glabrous or thinly plumose; lower leaf sheaths papillose-pilose.  
 10a. Leaf blades 1.2–2 cm wide; inflorescence 20–30 cm ..... 10. *P. longissimum*  
 10b. Leaf blades 0.2–1.2 cm wide; inflorescence less than 20 cm ..... 11. *P. shaanxiense*

**1. *Pennisetum clandestinum*** Hochstetter ex Chiovenda, *Annuario Reale Ist. Bot. Roma* 8: 41. 1903.

铺地狼尾草 pu di lang wei cao

Perennial, low, sward forming with slender rhizomes and extensive, stouter, much branched stolons. Vegetative shoots up to 20 cm tall, flowering shoots compact, 2–4 cm tall. Leaf sheaths loose, imbricate, subinflated; leaf blades linear, up to 15 × 0.2–0.5 cm on vegetative shoots, 1–4 cm on flowering shoots; ligule ca. 1.2 mm. Inflorescence reduced to 2–4 spikelets enclosed within the uppermost leaf sheath, only spikelet tips protruding; bristles very delicate, 1/2–3/4 as long as spikelet, scabrous to ciliate. Spikelets linear-lanceolate, 13–20 mm, acuminate; lower glume absent; upper glume cufflike, 1–3 mm or sometimes absent; lower floret neuter, lower lemma as long as spikelet, 10–13-veined, palea absent; upper lemma similar; anthers long exerted on threadlike filaments up to 5 cm; stigma simple or shortly bifid, up to 3 cm. Fl. and fr. summer–autumn.  $2n = 36$ .

Naturalized. Taiwan, Yunnan [native to E Africa].

This is a most unusual species of *Pennisetum* with a highly reduced inflorescence. The bristles must be searched for within the uppermost leaf sheaths. The anthers emerge at night on their long filaments and are visible in the morning as a grayish white haze over the sward.

This species is widely introduced in upland areas of the tropics and subtropics on fertile soils as a pasture and lawn grass (Kikuyu Grass). It has now become an invasive, difficult to eradicate weed in some parts of the world.

**2. *Pennisetum lanatum*** Klotzsch, *Bot. Ergebn. Reise Walde-mar* 65. 1862.

西藏狼尾草 xi zang lang wei cao

Perennial with extensive branching rhizomes clothed in cataphylls. Culms erect, 25–150 cm tall. Leaf sheaths usually pubescent; leaf blades linear, 10–45 × 0.4–1.3 cm, pubescent to villous or occasionally glabrous; ligule 1–2 mm. Inflorescence linear, 5–15 × 1.5–2.5 cm; axis loosely pubescent, with shallow angular ribs below the cupular involucre-scars; involucre enclosing 2–4 shortly pedicelled spikelets; bristles greenish, softly plumose, rarely almost glabrous, branched (often several times)

above the base. Spikelets ovate-lanceolate, 4–5.5 mm; lower glume 1/3–2/5 as long as spikelet, 3-veined, subacute to rotund, rarely apiculate; upper glume 1/2 as long as spikelet, obtuse to apiculate; lower floret staminate, lemma as long as spikelet, acuminate; upper lemma slightly shorter than lower, acute; anthers without hairs at tip. Fl. and fr. Aug–Oct.

Dry mountain slopes; above 1500 m. W Xizang [Afghanistan, NW India, Kashmir, Nepal, Pakistan].

This is a distinctive species on account of its long, scaly rhizomes and branched bristles in the inflorescence.

**3. Pennisetum polystachion** (Linnaeus) Schultes, Mant. 2: 146. 1824.

牧地狼尾草 mu di lang wei cao

*Panicum polystachion* Linnaeus, Syst. Nat., ed. 10, 2: 870. 1759; *Cenchrus setosus* Swartz; *Panicum cenchroides* Richard; *P. erubescens* Willdenow; *Pennisetum purpurascens* Kunth; *P. setosum* (Swartz) Richard.

Short-lived perennial or annual. Culms much branched, 50–150 cm tall. Leaf blades linear, 10–20 × 0.3–1.5 cm, hispid. Inflorescence linear, 10–25 × 0.8–1 cm, yellow or purplish; axis angular with sharp decurrent wings below the involucre, these densely packed, often spreading at right angles at maturity; involucre with numerous bristles obscuring the single spikelet, densely ciliate in lower half with crinkled matted hairs, longest bristle 1–2 cm. Spikelet narrowly lanceolate, 3–4.5 mm; lower glume absent or a small triangular scale; upper glume as long as spikelet, 5-veined, obtuse, ciliolate, apiculate; lower floret staminate or neuter, lemma similar but slightly shorter, obtusely 3-lobed; upper floret 2/3 spikelet length, cartilaginous, smooth, shiny, readily deciduous at maturity; anthers without hairs at tip.  $2n = 54$ .

Naturalized. Hainan, Hong Kong, Taiwan [throughout the tropics].

This is a widespread and polymorphic species, sometimes cultivated for pasture or fodder. The soft, crinkled hairs around the spikelet and the deciduous upper floret are clear-cut characters for recognition.

**4. Pennisetum purpureum** Schumacher, Beskr. Guin. Pl. 44. 1827.

象草 xiang cao

*Gymnotrix nitens* Andersson; *Pennisetum benthamii* Steudel; *P. flexispica* K. Schumann; *P. hainanense* H. R. Zhao & A. T. Liu; *P. macrostachyum* Benth (1849), not (Brongniart) Trinius (1834); *P. nitens* (Andersson) Hackel.

Perennial forming large tussocks, often with short rhizomes. Culms robust, decumbent and rooting at the base, ascending to 2–4 m tall. Leaf sheaths glabrous or hispid; leaf blades linear, up to 120 × 5 cm, abaxial surface glabrous, adaxial surface hispid or papillose-pilose at base, midrib prominent, margins scabrous; ligule 1.5–5 mm. Inflorescence linear, 10–30 × 1–3 cm, golden, brownish or purplish; axis densely pilose, closely beset with small peduncle stumps; involucre comprising many slender bristles, enclosing 1–5 spikelets, terminal spikelet fertile, subsessile, laterals when present staminate with 1–2 mm

pedicels; inner bristles thinly plumose, longest 1–4 cm. Spikelets 5–7 mm; lower glume vestigial or absent; upper glume 1/4–1/2 as long as spikelet, acute; lower floret staminate or neuter, lemma 1/2–3/4 spikelet length, 5–7-veined, minutely hispidulous, acuminate; upper lemma membranous and obviously 5-veined toward narrowly acuminate tip, lower half cartilaginous, smooth and shiny; anthers with a tuft of short hairs at tip. Fl. and fr. Aug–Oct.  $2n = 27, 28$ .

Cultivated. Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan [native to Africa].

This is an excellent forage grass, native in Africa, but now introduced to many tropical countries (Elephant Grass, Napier Grass).

**5. Pennisetum glaucum** (Linnaeus) R. Brown, Prodr. 1: 195. 1810.

御谷 yu gu

*Panicum glaucum* Linnaeus, Sp. Pl. 1: 56. 1753; *Alopecurus typhoides* N. L. Burman; *Panicum americanum* Linnaeus; *Pennisetum americanum* (Linnaeus) Leeke; *P. americanum* subsp. *typhoideum* Maire & Weiller; *P. spicatum* (Linnaeus) Körnicke var. *typhoideum* T. Durand & Schinz; *P. typhoides* (N. L. Burman) Stapf & C. E. Hubbard; *P. typhoideum* Richard, nom. illeg. superfl.

Annual. Culms robust, up to 3 m tall, densely pubescent at nodes and below inflorescence. Leaf sheaths loose, smooth; leaf blades 20–100 × 2–5 cm, both surfaces and margins scabrous; base subcordate; ligule 2–3 mm. Inflorescence linear to broadly elliptic, dense, 40–50 × 1.5–2.5 cm; axis densely pubescent; involucre persistent, enclosing 1–9 spikelets, basal stipe pubescent, 1–25 mm; bristles usually shorter than spikelets, almost glabrous to densely plumose. Spikelets obovate, 3.5–4.5 mm; lower glume minute, ca. 1 mm; upper glume 1.5–2 mm, 3-veined; lower floret staminate, lemma ca. 2.5 mm, 5-veined, margins membranous and ciliate, palea thinly papery, puberulous; upper lemma 5–7-veined, thinly papery, puberulous, margins ciliate, tip obtuse; anthers with a tuft of short hairs at tip. Fl. and fr. Sep–Oct.  $2n = 14$ .

Cultivated. N and E China [native to Africa; widely introduced elsewhere].

This is a cultivated species grown for both grain and forage, and is especially suited to regions with a short growing season (Bulrush Millet, Pearl Millet).

**6. Pennisetum alopecuroides** (Linnaeus) Sprengel, Syst. Veg. 1: 303. 1825.

狼尾草 lang wei cao

*Panicum alopecuroides* Linnaeus, Sp. Pl. 1: 55. 1753; *Cenchrus purpurascens* Thunberg; *Gymnotrix japonica* (Trinius) Kunth var. *viridescens* Miquel; *Pennisetum alopecuroides* var. *erythrochaetum* Ohwi; *P. chinense* Steudel; *P. compressum* R. Brown; *P. dispiculatum* L. C. Chia; *P. japonicum* Trinius; *P. purpurascens* (Thunberg) Kuntze (1891), not Kunth (1816).

Perennial forming dense tussocks. Culms stout, 30–120 cm tall, hispid below inflorescence. Leaf sheaths papery, keeled, imbricate at culm base; leaf blades linear, flat or often

involute, 10–80 × 0.3–1 cm, base papillose-hispid, apex long acuminate; ligule 0.5–2.5 mm. Inflorescence linear, 5–25 × 1.5–3.5 cm; axis hispid, peduncle stumps short with crateriform tips; involucre usually enclosing one spikelet, rarely 2, basal stipe (1–)2–3 mm; bristles greenish or purple, longest 2–3 cm but not conspicuously longer than the others, all slender, hispid. Spikelet lanceolate, 5–8 mm; lower glume 0.6–3 mm, 0–1-veined, obtuse; upper glume ovate-lanceolate, 1/3–2/3 as long as spikelet, 3–5-veined; lower lemma as long as spikelet, 7–11-veined; upper lemma lanceolate, as long as spikelet, papery, acuminate; anthers usually glabrous, occasionally with 1 or 2 hairs at tip. Fl. and fr. summer and autumn.  $2n = 18$ .

Grassy hillsides, roadsides, field margins; sea level to 3200 m. Anhui, Beijing, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Tianjin, Xizang, Yunnan, Zhejiang [NE India, Indonesia, Japan, Korea, Malaysia, Myanmar, Philippines; Australia, Pacific Islands (Polynesia)].

This species is used for forage.

**7. *Pennisetum flaccidum*** Grisebach, Gött. Nachr. 1868: 86. 1868.

白草 bai cao

*Pennisetum centrasiatricum* Tzvelev; *P. centrasiatricum* var. *lanpingense* S. L. Chen & Y. X. Jin; *P. centrasiatricum* var. *qinghaiense* Y. H. Wu; *P. flaccidum* var. *interruptum* Grisebach; *P. longissimum* S. L. Chen & Y. X. Jin var. *axiglabrum* B. S. Sun & X. Yang; *P. mongolicum* Franchet; *P. sichuanense* S. L. Chen & Y. X. Jin var. *equidistans* B. S. Sun & X. Yang; *P. sinense* Mez.

Perennial with tough spreading rhizomes. Culms tufted, up to 1 m tall. Leaf sheaths loose, subglabrous, rounded, imbricate at base; leaf blades linear with a broad white midrib, 3–25 × 0.2–1.2 cm, glabrous, acuminate; ligule 1–2 mm. Inflorescences terminal and also sometimes axillary from upper leaf sheaths, linear, straight or slightly flexuous, loose to moderately dense, 5–18 cm; axis glabrous, smooth or scaberulous, beset with short peduncle stumps or scars; involucre enclosing 1 spikelet (rarely 2); bristles many, usually pale green, occasionally purple-tinged, soft, slender, longest 0.9–2 cm, rarely inner thinly plumose. Spikelet narrowly ovate-oblong, 4–7 mm; lower glume usually 1/4 spikelet length or less, obtuse, acute or erose; upper glume 1/3–3/4 spikelet length, 1–3-veined, acuminate; lower floret staminate, lemma as long as spikelet, 3–5(–7)-veined, concave along midline, acuminate-rostrate, palea fully developed; upper lemma acuminate-rostrate, 5-veined; anthers without hairs at tip. Fl. and fr. Jul–Oct.

Hillsides, field margins, roadsides on dry sandy soils, sometimes also on slightly saline alluvial soils on flood plains; 800–5000 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, NW India, Kashmir, Nepal, Pakistan, Tajikistan; SW Asia (Iran)].

This is a widespread and rather variable species, but it always has tough, spreading rhizomes, a glabrous inflorescence axis, and involucre of soft bristles. The bristles are usually glabrous, but occasionally a few hairs are present on some of the inner bristles. Specimens with axillary inflorescences (the basis of *Pennisetum centrasiatricum* var. *qinghai-*

*ense*) occur throughout the range of the species and do not merit separate status.

This species is a good forage grass.

**8. *Pennisetum sichuanense*** S. L. Chen & Y. X. Jin, Bull. Nanjing Bot. Gard. 1988–1989: 5. 1990.

四川狼尾草 si chuan lang wei cao

Perennial, rhizomatous. Culms tufted, erect, 40–60 cm tall. Leaf sheaths loose, usually shorter than internodes, hispidulous throughout, pilose at mouth; leaf blades linear, 3–12 × 0.2–0.5 cm, both surfaces papillose-pilose when young; ligule 1.5–2 mm. Inflorescence narrowly linear, dense, erect or slightly curved, 5–12 × 0.6–1 cm; axis pubescent; involucre enclosing one spikelet; bristles glaucous, sparse, 0.3–0.5 cm, usually shorter than spikelet. Spikelet ovate-lanceolate, 4–6 mm; lower glume ovate, membranous, 1/3–1/2 as long as spikelet, 0–3-veined, acute; upper glume thickly membranous, slightly shorter than spikelet, 3–5-veined, acute or acuminate; lower floret usually staminate, lemma as long as spikelet, thickly membranous; upper lemma slightly shorter than spikelet, papery, acute; anthers without hairs at tip. Fl. and fr. Aug–Nov.

• Mountainsides, stream banks; 2000–3000 m. Sichuan, Yunnan.

This species is close to *Pennisetum flaccidum*.

**9. *Pennisetum qianningense*** S. L. Zhong, J. S. W. Agric. Coll. 1982(4): 75. 1982 [“*qianningensis*”].

乾宁狼尾草 qian ning lang wei cao

Perennial forming loose tufts. Culms ascending, 50–130 cm tall, nodes pilose. Leaf sheaths glabrous but pilose at mouth; leaf blades linear, flat with broad white midrib, 10–40 × 0.4–1 cm, glabrous, apex acuminate; ligule 1–2 mm. Inflorescence linear, 10–17 × 1.5–2 cm; axis puberulous, ribbed, peduncle stumps ca. 1 mm; involucre enclosing 1(–3) spikelets, basal stipe ca. 0.5 mm; bristles purplish brown, soft, numerous, plumose in the lower part, mostly about as long as the spikelet, longest twice as long, up to 2 cm. Spikelets lanceolate, 5–6.5 mm; lower glume ovate, membranous, 1–1.5 mm, veinless; upper glume lanceolate, 1/2–2/3 as long as spikelet, 5-veined; lower floret staminate or neuter, lemma as long as spikelet; upper lemma herbaceous; anthers without hairs at tip. Fl. and fr. May–Sep.

• Dry mountain slopes, valleys, roadsides; 1500–3200 m. Sichuan, Yunnan.

*Pennisetum qianningense* is very similar to *P. orientale* Richard, but that species has a pubescent inflorescence axis and definitely plumose bristles, which often enclose more than one spikelet. *Pennisetum orientale* is a widespread species extending from N India, Nepal, and Pakistan to C and SW Asia and N Africa. It is to be expected in neighboring parts of China.

**10. *Pennisetum longissimum*** S. L. Chen & Y. X. Jin, Bull. Bot. Res., Harbin 4: 65. 1984.

长序狼尾草 chang xu lang wei cao

*Pennisetum baojiense* W. X. Tong.

Perennial forming loose tussocks. Culms decumbent, rooting at base, up to 1.8 m tall, 8–14-noded. Leaf sheaths usually

longer than internodes, glabrous or papillose-pilose; leaf blades linear, 50–90 × 0.5–2 cm; ligule 2.5–3 mm. Inflorescence up to 30 cm, usually pendulous; axis densely hispidulous with angular ribs, peduncle stumps crowded, very short with a tuft of spiculae; involucre enclosing 1(–3) spikelets, basal stipe ca. 0.5 mm; bristles glaucous or purple, stiff, glabrous, unequal, one conspicuously longer and stouter, up to 4 cm. Spikelets lanceolate, 6–8 mm; lower glume ovate, ca. 1/4 as long as spikelet, 0–1-veined, obtuse, acute or erose; upper glume 1/3–1/2 as long as spikelet, 1–3(–5)-veined, acuminate; lower floret usually neuter, lemma as long as spikelet, 5–7-veined, scaberulous, acuminate-rostrate; upper lemma similar but usually slightly shorter; anthers without hairs at tip. Fl. and fr. Jul–Oct.

• Open hill slopes; 500–2000 m. Gansu, Guizhou, Shaanxi, Sichuan, Yunnan.

This species is very similar to *Pennisetum shaanxiense*, but is rather more vigorous. The involucre bristles appear to be always glabrous.

**11. *Pennisetum shaanxiense*** S. L. Chen & Y. X. Jin, Bull. Bot. Res., Harbin 4: 68, pl. 3. 1984.

陕西狼尾草 shan xi lang wei cao

*Pennisetum longissimum* var. *intermedium* S. L. Chen & Y. X. Jin.

Perennial forming loose tufts. Culms ascending from a shortly decumbent rooting base, 80–150 cm tall. Lower leaf sheaths papillose-pilose especially at mouth; leaf blades linear, thin, flaccid, 30–50 × 0.5–1.8 cm, subglabrous, smooth except for papillose-pilose base, margins scabrous; ligule ca. 2.5 mm. Inflorescence linear, 10–20 × 1.5–2 cm; axis densely hispidulous with angular ribs, peduncle stumps crowded, very short with a tuft of spiculae; involucre narrow, ascending, enclosing 1 spikelet; bristles purple, stiff, glabrous or inner thinly plumose in the lower part, unequal with one much longer than rest, longest 1.5–2.5 cm. Spikelet ovate-lanceolate, 5–6 mm; lower glume ovate, submembranous, ca. 2 mm, 1-veined or veinless, obtuse or erose; upper glume 1/3–1/2 as long as spikelet, 1–3-veined, acuminate; lower floret neuter, lemma as long as spikelet, 5–7-veined, palea small or absent; upper lemma 5–7-veined; anthers without hairs at tip. Fl. and fr. Jul–Nov.

• Mountain slopes, roadsides, field margins; 500–1100 m. Gansu, Hunan, Qinghai, Shaanxi, Sichuan, Yunnan.

This species is variable in the hairiness of the involucre bristles, which are never more than thinly hairy, and the hairs may be confined to the stout, longest bristle, or even absent altogether. The species can be recognized by its thin, flat leaves with papillose-pilose lower sheaths, hispidulous rachis, narrow involucre of stiff bristles, and empty lower lemma.

## 178. *CENCHRUS* Linnaeus, Sp. Pl. 2: 1049. 1753.

蒺藜草属 ji li cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Culms usually branched near the base. Leaf blades usually flat; ligule a ciliate rim. Inflorescence spike-like, cylindrical, composed of spiny or bristly deciduous burrs arranged along an angular, often sinuous rachis; burrs sessile or with an obconical basal stipe, each composed of 1 or more sessile spikelets surrounded by an involucre of spines and bristles; bristles flexuous or more often spinous, ± flattened, grooved on the outer face, united below, the degree of union varying from a small basal disk to a deep cupule, inner spines or bristles often ciliate around spikelets. Spikelets lanceolate, acute; glumes unequal, shorter than spikelet, lower sometimes suppressed; lower floret membranous, staminate or neuter; upper floret firmer, protogynous. Lodicules absent.

Twenty-three species: tropical and warm-temperate regions of the world; four species (all introduced) in China.

- 1a. Inner spines of burr extended beyond spikelets as long, slender bristles, connate only at base; outer bristles often longer than spikelets, numerous ..... 1. *C. ciliaris*  
 1b. Inner spines of burr stiff, flattened, connate to form a deep cupule; outer bristles shorter than inner spines or absent.  
 2a. Burr consisting of several whorls of connate, flattened spines, free tips emerging at irregular intervals over body of burr ..... 2. *C. incertus*  
 2b. Burr consisting of 1 whorl of connate, flattened spines, usually surrounded by whorls of smaller, finer bristles.  
 3a. Spines of burr retrorsely barbed, tenaciously prickly; outer bristles many ..... 3. *C. echinatus*  
 3b. Spines of burr antrorsely barbed; outer bristles few or absent ..... 4. *C. setigerus*

**1. *Cenchrus ciliaris*** Linnaeus, Mant. Pl. 2: 302. 1771.

水牛草 shui niu cao

*Pennisetum ciliare* (Linnaeus) Link.

Perennial, tufted or shortly rhizomatous. Culms erect or ascending from a decumbent or stoloniferous base, slender to moderately stout, sometimes much branched, up to 1 m tall. Leaf sheaths glabrous or pubescent; leaf blades linear, green or grayish, 10–50 × 0.4–0.8 cm, with scattered, tubercle-based

hairs; ligule 0.5–3 mm. Inflorescence 3–15 cm, densely bristly, burrs contiguous, rachis puberulous. Burrs composed of many bristles; bristles antrorsely barbed; inner bristles 7–14 mm (one stouter and slightly longer), connate at extreme base to form a shallow disc 0.5–1.5 mm wide, somewhat flattened around spikelets, grooved on outer face, ciliate on inner margins, tips extended into flexuous bristles clearly exceeding spikelets; outer bristles numerous, shorter, slender. Spikelets 1–4 in burr, 3–5 mm; lower glume 1/3–1/2 spikelet length; upper glume ca. 1/2 spikelet length.  $2n = 36$ .

Pastures and weedy places, introduced. Taiwan [native to India, Pakistan; Africa, SW Asia; introduced in America and Australia].

This is a polymorphic species occurring naturally from Africa to India. Some superior strains have been selected and distributed in warm parts of the world for pasture and fodder in dry areas (Buffel Grass), and the grass has become a widespread weed. It was introduced to Taiwan as a pasture grass, and is now naturalized in the south of that island.

*Cenchrus ciliaris* may easily be mistaken for a species of *Pennisetum*, as the basal fusion of the bristles is rather slight. However, the flattening and grooving of the bristles around the spikelets is a characteristic feature of *Cenchrus* and is not found in *Pennisetum*.

**2. *Cenchrus incertus*** M. A. Curtis, Boston J. Nat. Hist. 1: 135. 1837.

光梗蒺藜草 guang geng ji li cao

Annual or short-lived perennial. Culms geniculate, decumbent or erect, 40–100 cm tall. Leaf sheaths keeled, loose, glabrous or pilose near margins; leaf blades linear or narrowly lanceolate, 3–20 × 0.2–0.6 cm, glabrous on both surfaces; ligule 0.5–1.5 mm. Inflorescence 1.5–6.5 × ca. 1 cm, open or compact, rachis scabrous. Burrs variable, globose or ovoid, ca. 1 cm, stipe glabrous, spines retrorsely barbed, connate for much of their length, spiny tips diverging irregularly throughout body of burr, involucre cupule cleft on 2 sides, pubescent, spines rigid, long and slender to short and broad. Spikelets 2–3 in burr, 3.5–6 mm; lower glume 1/3–1/2 spikelet length; upper glume 3/4 spikelet length. Fl. and fr. autumn.

Seashore sand dunes. Liaoning [native to America].

This native of America is now widespread as a weed.

**3. *Cenchrus echinatus*** Linnaeus, Sp. Pl. 2: 1050. 1753.

蒺藜草 ji li cao

Annual. Culms geniculate, usually rooting at basal nodes, 15–90 cm tall. Leaf sheaths keeled, usually imbricate at base; leaf blades linear or linear-lanceolate, 5–20(–40) × 0.4–1 cm, glabrous to pubescent; ligule ca. 1 mm. Inflorescence 3–10 ×

ca. 1 cm, burrs contiguous, rachis scabrous. Burrs globose, 0.4–1 cm, truncate, stipe pubescent, all spines and bristles retrorsely barbed; inner spines connate for 1/3–1/2 their length forming a globose cupule, the flattened free tips triangular, erect or bent inward, cupule and tips pubescent, outer spines in 2 divergent whorls, a median whorl of stout rigid spines equaling the inner teeth, and an outermost whorl of relatively few short, slender bristles. Spikelets 2–4 in burr, 4.5–7 mm; lower glume 1/2 spikelet length; upper glume 2/3–3/4 spikelet length. Fl. and fr. summer.  $2n = 34, 68$ .

Seashore sand dunes, roadsides, waste places. Fujian, Guangdong, Hainan, Taiwan, Yunnan [native to America; now a widespread weed of the tropics and subtropics].

The name *Cenchrus caliculatus* Cavanilles has been misapplied to this species in China. *Cenchrus caliculatus* is a larger species with culms to 2 m tall and an inflorescence to 24 cm. It is further distinguished by its burrs, which have only a shallow basal cupule. It occurs in Indonesia, Australia, and the S Pacific Islands.

**4. *Cenchrus setigerus*** Vahl, Enum. Pl. 2: 395. 1805.

倒刺蒺藜草 dao ci ji li cao

Perennial. Culms somewhat bulbous at base, geniculately ascending, 20–60 cm tall. Leaf sheaths keeled, scabrous; leaf blades linear, 2–20 × 0.4–0.8 cm, adaxial surface pilose with long scattered hairs; ligule ca. 0.5 mm. Inflorescence rather stiff, 4–12 × 0.6–0.7 cm, burrs overlapping by about half their length, rachis scabro-puberulous. Burrs broadly oblong with rounded base, 0.3–0.7 cm, sessile; inner spines connate for 1/4–1/2 their length forming a tough cupule, flattened free tips narrowly triangular, erect, antorsely scaberulous with a broad green groove on outer face, inner face shortly ciliate; outer spines very short or almost suppressed, reduced to bristles around periphery of cupule. Spikelets 1–4 in burr, 3.5–5 mm; lower glume 1/2 spikelet length; upper glume 4/5 spikelet length.  $2n = 34, 36$ .

Introduced and cultivated for fodder. Yunnan (Honghe) [native to NW India, Pakistan; E and NE Africa, SW Asia].

## 179. SPINIFEX Linnaeus, Mant. Pl. 2: 163, 300. 1771.

鬣刺属 lie ci shu

Chen Shouliang (陈守良); Sylvia M. Phillips

Perennials, rhizomatous; dioecious or sometimes androdioecious. Leaf blades hard, linear to subulate-involute; ligule a line of hairs. Inflorescence terminal, compound, composed of many single racemes subtended by prophylls and spatulate sheaths and condensed into a compact fascicle. Staminate inflorescence with exserted racemes bearing several spikelets and ending in a short point. Female or bisexual inflorescence stellately globose, falling entire, composed of numerous racemes reduced to a single basal spikelet hidden among subtending spathes, its rachis prolonged into a long needle-like spine. Spikelets dorsally compressed, staminate spikelets herbaceous, female spikelets papery. Staminate spikelet with shorter glumes and both florets staminate. Female spikelet with glumes equal to spikelet and lower floret sometimes paleate and staminate. Upper lemma in both slightly indurate with flat hyaline margins.  $x = 9$ .

Four species: seashores from India to Japan, SE Asia, and Australia; one species in China.

**1. *Spinifex littoreus*** (N. L. Burman) Merrill, Philipp. J. Sci. 7: 229. 1912.

老鼠芳 lao shu li

*Stipa littorea* N. L. Burman, Fl. Indica 29. 1767; *Spinifex*

*squarrosus* Linnaeus; *Stipa spinifex* Linnaeus.

Culms stoloniferous, hard, stout, many-noded, rooting and copiously branching at nodes, flowering shoots ascending to 30–100 cm, internodes farinose. Leaf sheaths broad, rounded on back, imbricate; leaf blades distichous, very tough, involute-

subulate, curved, 5–20 × 0.2–0.3 cm, margins scabrous, apex spiny; ligule densely ciliate. Staminate inflorescence of 2–5 clustered turbinate heads 5–10 × 6–8 cm; racemes 3–6 cm, bearing 5–10 loosely imbricate spikelets. Staminate spikelets lanceolate, 8–12 mm; glumes oblong-lanceolate, 7–9-veined, lower glume 1/2 spikelet length, upper glume 2/3 spikelet length; lower lemma 5-veined, 8–10 mm, palea with winged ciliate keels; upper lemma with unkeeled palea. Female inflorescence globose, 20–35 cm in diam.; racemes unispiculate with needle-like 10–18 cm rachis. Female spikelets lanceolate-oblong, 10–20 mm, acuminate; glumes oblong-lanceolate, low-

er glume many-veined, upper glume 7–9-veined; lower lemma ovate-lanceolate, 5-veined, palea absent; upper lemma lanceolate, yellowish. Fl. and fr. summer-autumn.

Sandy beaches, seashore dunes. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Cambodia, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

This species is an efficient sand binder, forming large colonies and stabilizing dunes. The female inflorescences act as tumbleweeds. The seeds within are dispersed as the spiky head is transported along the coast by wind and sea.

## 25. Tribe ISACHNEAE

柳叶箬族 liu ye ruo zu

Chen Shouliang (陈守良); Sylvia M. Phillips

Annuals or perennials. Leaf blades narrowly lanceolate to ovate; ligule a line of hairs, rarely absent. Inflorescence an open or contracted panicle. Spikelets all alike, florets 1 or 2, when 2 lower florets bisexual or male, upper floret bisexual or female, dorsally compressed, awnless, disarticulating above glumes and sometimes tardily between florets; glumes shorter than or equaling spikelet, membranous, deciduous or persistent; lemmas rounded on back, membranous to leathery, obscurely 0–7-veined, glabrous or pubescent, margins inrolled and clasping edges of palea. Caryopsis ellipsoid to plano-convex; hilum round to oval. Leaf anatomy: non-Kranz; microhairs slender or stout.  $x = 10$ .

Five genera and ca. 100 species: throughout the tropics, but mainly in Asia; three genera and 20 species (four endemic) in China.

- 1a. Upper lemma indurate ..... 180. *Isachne*  
 1b. Upper lemma membranous.  
   2a. Spikelets with 2 florets; glumes persistent ..... 181. *Coelachne*  
   2b. Spikelets with 1 floret; glumes deciduous ..... 182. *Sphaerocaryum*

## 180. ISACHNE R. Brown, Prodr. 196. 1810.

柳叶箬属 liu ye ruo shu

Annual or perennial. Culms erect or decumbent or creeping, many-noded. Leaf blades narrowly lanceolate to ovate, margin frequently white and thickened; ligule a line of stiff hairs. Inflorescence an open or contracted panicle, branches and pedicels sometimes spotted with yellow glandular patches. Spikelets with 2 florets, florets both bisexual or lower floret bisexual or male and upper floret male or female, separated by a short internode or contiguous, disarticulating below each floret; glumes falling soon after florets, subequal, 3/4 to as long as spikelet, 5–9-veined; lower lemma variable, resembling the upper or of different size and texture; upper lemma orbicular to broadly elliptic, papery to leathery, glabrous or pubescent with short curved hairs, 5–7-veined, obtuse. Stamens 3. Caryopsis ellipsoid or subglobose.

About 90 species: throughout the tropics, but mainly in Asia; 18 species (four endemic) in China.

- 1a. Florets unequal in size and of different texture; lower floret longer, flatter and more delicate.  
   2a. Upper floret 1/2 length of lower floret; panicle eglandular ..... 1. *I. hainanensis*  
   2b. Upper floret slightly shorter and broader than lower floret; panicle glandular.  
     3a. Perennial; culms to 80 cm tall, nodes glabrous; leaf blades narrowly lanceolate, 3–11 cm ..... 2. *I. globosa*  
     3b. Annual; culms to 25 cm tall, nodes hispid; leaf blades ovate-amplexicaul, 2–3 cm ..... 3. *I. pulchella*  
 1b. Florets equal in size or nearly so and of similar texture.  
   4a. Spikelets 2 mm or more.  
     5a. Panicle branches and pedicels glandular.  
       6a. Leaf sheaths longer than internodes; nodes pubescent; glumes truncate ..... 4. *I. truncata*  
       6b. Leaf sheaths shorter than internodes; nodes glabrous; glumes obtuse to rounded.  
         7a. Leaf blades linear, 0.3–1 cm wide, suberect; panicle 5–14 cm; spikelets globose ..... 5. *I. himalaica*  
         7b. Leaf blades lanceolate, 0.8–1.8 cm wide, ascending; panicle 17–25 cm; spikelets elliptic to obovate ..... 6. *I. hoi*  
     5b. Panicle branches and pedicels eglandular.  
       8a. Lemmas densely ciliate along margins, otherwise glabrous; culms 30–60 cm tall ..... 7. *I. ciliatiflora*  
       8b. Lemmas not above; culms 5–25 cm tall.  
         9a. Leaf blades ovate-lanceolate or lanceolate 1–1.8 cm wide; glumes densely scabrid-hispidulous, obtuse or subrounded ..... 8. *I. repens*  
         9b. Leaf blades narrowly lanceolate, 0.4–0.8 cm wide; glumes glabrous, subacute ..... 9. *I. sikkimensis*