

**208. ARTHRAXON** P. Beauvois, Ess. Agrostogr. 111. 1812.

荻草属 jin cao shu

Chen Shouliang (陈守良); Sylvia M. Phillips

*Batratherum* Nees; *Lucaea* Kunth; *Pleuroplitis* Trinius.

Annual or perennial. Culms slender, much branched, often trailing, nodes bearded or infrequently glabrous. Leaf blades lanceolate to ovate, cordate, often clasping culm, usually pectinate-setose on lower margins; ligule membranous, hairy on margin and back. Inflorescence of subdigitate, slender, fragile racemes, these terminal on culms and branches, not spatulate; rachis internodes and pedicels filiform to linear, glabrous or ciliate on angles; spikelets of a pair dissimilar, or spikelets apparently solitary. Sessile spikelet linear to lanceolate, dorsally or laterally compressed; callus short, truncate; lower glume membranous to leathery, back flat or convex, several-veined, with or without lateral keels, scaberulous to spinulose; upper glume boat-shaped, keel herbaceous, margins hyaline, apex acute to mucronate; lower floret reduced to an empty hyaline lemma; upper lemma hyaline, entire or shortly 2-toothed, awned from near base; awn geniculate, glabrous. Stamens 2 or 3. Caryopsis terete. Pedicelled spikelet variable, awnless, well developed, reduced, or represented by the pedicel only, sometimes almost completely suppressed.  $x = 9$ .

About 26 species: Old World tropics, mainly in India; introduced in America; 12 species (one endemic) in China.

*Arthraxon* is a rather isolated genus with no obvious close relatives, distinguished from the other awned *Andropogoneae* by its broad, clasping leaf blades on slender, branching culms, together with a sub-basally awned fertile lemma. It is superficially similar to *Microstegium*, but that genus has awned pedicelled spikelets.

- 1a. Lower glume of sessile spikelet laterally 2-keeled, margins inflexed; perennial; anthers 3.
  - 2a. Keels of lower glume stoutly pectinate-spinose, intercarinal veins usually muricate; leaf blades pubescent; uppermost sheath inflated, spatulate ..... 1. *A. echinatus*
  - 2b. Keels of lower glume tuberculate or almost smooth, intercarinal veins smooth or scaberulous; leaf blades glabrous or sparsely hispid; uppermost sheath tightly cylindrical.
    - 3a. Plant with knotty rootstock covered in velvety scales; lower glume of sessile spikelet with 2 rows of tubercles along each keel, intercarinal veins obscure except near apex ..... 2. *A. prionodes*
    - 3b. Plant with spreading branching rhizomes; lower glume of sessile spikelet with 1 row of tubercles along each keel, intercarinal veins visible from base ..... 3. *A. epectinatus*
- 1b. Lower glume of sessile spikelet without lateral keels, margins flat; annual or perennial; anthers 2 or 3.
  - 4a. Sessile spikelets 1.2–2.1 mm ..... 6. *A. junnarensis*
  - 4b. Sessile spikelets 2–8 mm.
    - 5a. Pedicelled spikelets present, at least at raceme apex.
      - 6a. Sessile spikelets lanceolate, strongly scabrid to spinulose ..... 7. *A. hispidus*
      - 6b. Sessile spikelets smooth to scaberulous.
        - 7a. Lower glume of sessile spikelet linear, obscurely veined, smooth below middle ..... 11. *A. lancifolius*
        - 7b. Lower glume of sessile spikelet lanceolate or elliptic, strongly 6- or 7-veined with deep grooves between ..... 12. *A. microphyllus*
    - 5b. Pedicelled spikelets absent or vestigial, represented by the pedicel only, this sometimes reduced to a minute stump.
      - 8a. Stamens 2.
        - 9a. Culms 10–30 cm tall; lower glume 5–9-veined ..... 7. *A. hispidus*
        - 9b. Culms 30–60 cm tall; lower glume 9–11-veined ..... 8. *A. multinervis*
      - 8b. Stamens 3.
        - 10a. Sessile spikelets 4–8 mm; anthers (1.5–)2–3.5 mm.
          - 11a. Raceme bases terete, pubescent all over; upper glume broad, leathery, hyaline margins 0.1–0.2 mm; lemma margins ciliate ..... 4. *A. castratus*
          - 11b. Raceme bases flattened on inner face, only flattened surface pubescent; upper glume narrow, leathery, hyaline margins 0.6–0.7 mm; lemma margins glabrous ..... 5. *A. typicus*
        - 10b. Sessile spikelets 2.8–4.2 mm; anthers 0.4–2 mm.
          - 12a. Sessile spikelets apparently awnless; anthers 1.5–2 mm ..... 9. *A. submuticus*
          - 12b. Sessile spikelets with exerted awn; anthers 0.4–0.5 mm ..... 10. *A. nudus*

**1. *Arthraxon echinatus*** (Nees) Hochstetter, Flora 39: 188. 1856.

粗刺荻草 cu ci jin cao

*Andropogon echinatus* (Nees) Heyne; *Arthraxon lanceolatus* (Roxburgh) Hochstetter var. *echinatus* (Nees) Hackel; *A. spathaceus* J. D. Hooker; *Batratherum echinatum* Nees.

?Perennial (base not seen). Culms straggling, ascending to 60 cm. Leaf sheaths tuberculate-hispid, uppermost sheath slightly inflated, spathe-like with reduced blade; leaf blades lanceolate, 3–6 cm × 7–13 mm, both surfaces pubescent, base amplexicaul, margins closely pectinate-ciliate along whole length, apex acuminate; ligule ca. 1 mm. Racemes 2–3, ca. 5 cm, suberect, yellowish green, enclosed at base in uppermost sheath or finally shortly exerted; rachis internodes ca. 2/3 length of sessile spikelets, shortly ciliate, hairs 0.3–1 mm. Sessile spikelet 5.2–7 mm; lower glume lanceolate, shallowly convex, laterally keeled, margins inflexed, keels stoutly pectinate-spinose, back 3–7-veined between keels, muricate along length of veins, or only toward apex, or occasionally completely absent; upper lemma acuminate or shortly 2-toothed; awn 8–13 mm. Pedicelled spikelet narrowly lanceolate, 4–4.5 mm, sterile, infrequently reduced toward raceme base; pedicel stout, less than half internode length. Fl. and fr. Aug–Oct.  $2n = 18$ .

Mountain slopes, streams; 1900–2300 m. Yunnan [India, Nepal].

**2. *Arthraxon prionodes*** (Steudel) Dandy in Andrews, Fl. Pl. Sudan 3: 399. 1956.

茅叶荩草 *mao ye jin cao*

*Andropogon prionodes* Steudel, Syn. Pl. Glumac. 1: 383. 1854, based on *A. serrulatus* A. Richard, Tent. Fl. Abyss. 2: 458. 1850, not Link (1827); *Arthraxon lanceolatus* (Roxburgh) Hochstetter var. *glabratus* S. L. Chen & Y. X. Jin; *A. pilophorus* B. S. Sun.

Perennial, loosely tufted, base knotty, covered in silky-tomentose scales. Culms stiff, erect or straggling, 40–60 cm long. Leaf sheaths glabrous or tuberculate-hispid; leaf blades lanceolate to narrowly ovate, tough, glaucous, 2–7 cm × 5–15 mm, usually glabrous, base rounded, margins cartilaginous and pectinate-setose from stout tubercles, apex setaceous acuminate; ligule 0.5–1 mm. Racemes 2–11, 2–7 cm, pale green or tinged purple, suberect; rachis internodes 1/3–2/3 length of sessile spikelets, pilose, hairs increasing to 2–3 mm at apex. Sessile spikelet 5.8–7.2 mm; lower glume linear, strongly convex, laterally keeled, margins inflexed, back obscurely veined below middle, glabrous or puberulous, rarely shortly pubescent, 5 scaberulous veins between keels toward apex, keels stoutly tuberculate-spinose, a second row of smaller tubercles on inner side of keels; upper lemma subtire to shortly denticulate, teeth 0.1–0.4 mm; awn 10–15 mm; palea absent. Anthers 3, 2.4–3.8 mm. Pedicelled spikelet narrowly lanceolate, 4–5 mm, staminate. Fl. and fr. Jul–Oct.  $2n = 16, 36$ .

Rocky mountain slopes, streamsides, roadsides. Anhui, Beijing, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Sichuan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Myanmar, Pakistan, Thailand, Vietnam; E Africa, SW Asia].

*Arthraxon prionodes* has often been confused with *A. lanceolatus* (Roxburgh) Hochstetter, from the hills of S India. The latter species differs in its slightly broader, linear-lanceolate sessile glume with a flat back between the tuberculate lateral keels and obvious, raised intercarinal veins clearly visible from the glume base upward.

Occasionally the sessile glume is shortly pubescent, and the name *Arthraxon pilophorus* is based on such a plant. The name *A. lanceolatus*

var. *raizadae* (Jain et al.) Welzen has been misapplied in China to this variant. It correctly applies to a low annual from peninsular India with long (6–7 mm), velutinous sessile spikelets.

**3. *Arthraxon epectinatus*** B. S. Sun & H. Peng, Guizhou Sci. 9: 289. 1991.

光脊荩草 *guang ji jin cao*

*Arthraxon guizhouensis* S. L. Chen & Y. X. Jin; *A. xinanensis* S. L. Chen & Y. X. Jin; *A. xinanensis* var. *laxiflorus* S. L. Chen & Y. X. Jin.

Perennial with spreading branching rhizomes. Culms stiff, erect or decumbent, 30–70 cm long. Leaf sheaths glabrous or tuberculate-hispid; leaf blades lanceolate, firm, green or glaucous, 3–10 cm × 4–15 mm, glabrous or sparsely hispid, base subcordate, margins serrulate, pectinate-setose near base, apex slenderly acuminate; ligule 0.5–1.5 mm. Racemes 2–6, 3–10 cm, yellowish green, lax, slightly flexuous; rachis internodes slightly shorter than equaling sessile spikelets, margins villous. Sessile spikelet 5–7 mm; lower glume linear-lanceolate, herbaceous, shallowly convex, laterally keeled, margins inflexed, glabrous, 5–7-veined between keels, veins visible along length of glume, keels scabrid to tuberculate in a single row, tubercles spinescent toward apex; upper lemma awned from 0.75–1.3 mm above base, apex subtire or 2-denticulate, teeth (0.1–) 0.5–0.7 mm; awn 7.5–13 mm; palea 0.5–1 mm. Anthers 3, 2.4–3.5 mm. Pedicelled spikelet narrowly lanceolate, 4.5–6 mm, staminate; pedicel villous. Fl. and fr. Jul–Nov.

Grassy slopes, among rocks, roadsides; 700–2500 m. Gansu (Wenxian), Guizhou, Shaanxi, Sichuan, Yunnan [Bhutan, Nepal].

This grass is easily confused with *Arthraxon prionodes* when the base is absent. However, besides the key characters of the lower glume, *A. epectinatus* is also distinguished by some less obvious differences. The leaf blades are usually a little narrower with the cartilaginous margin serrulate (vs. smooth) between the tubercle-based bristles, the awn arises slightly higher up the back of the upper lemma, and an upper palea is present. The apex of the upper lemma is not deeply 2-toothed as reported in Chinese literature. The delicate hyaline tissue is easily split down the midline during dissection.

Like *Arthraxon prionodes*, this grass has often been misidentified as the S Indian species *A. lanceolatus* (Roxburgh) Hochstetter, which has flatter, lower glumes with fewer, more prominent intercarinal veins, and a sub-basally awned upper lemma.

**4. *Arthraxon castratus*** (Griffith) V. Narayanaswami ex. Bor, Fl. Assam 5: 376. 1940.

海南荩草 *hai nan jin cao*

*Andropogon castratus* Griffith, Not. Pl. Asiat. 3: 89. 1851; *A. pilipes* Backer; *A. rudis* Nees ex Steudel; *Arthraxon hainanensis* Keng & S. L. Chen; *A. rudis* (Nees ex Steudel) Hochstetter.

Perennial. Culms straggling, decumbent, rooting from lower nodes, 60–200 cm long, culm apex pubescent. Leaf sheaths glabrous to densely papillose-hispid; leaf blades lanceolate, 3–11 cm × 7–15 mm, glabrous or sparsely appressed-hispid, base cordate, margins pectinate-setose, apex acuminate; ligule 1–2 mm. Racemes 2–5, 3–7 cm, brownish green or purplish brown,

raceme bases slenderly terete, pubescent; rachis internodes 1/3–4/5 length of sessile spikelets, softly pilose, hairs 0.4–1.5 mm. Sessile spikelet 4–8 mm; lower glume broadly lanceolate, leathery, weakly convex, not laterally keeled, margins flat, back asperulous, 7–9-veined, tuberculate-spinulose above middle especially near margins, spicules longer toward apex; upper glume longer than lower glume, broadly leathery, hyaline margins 0.1–0.2 mm, spicules present along upper midline; lemma margins ciliate; upper lemma 2-toothed, teeth ca. 0.4 mm; awn 10–14 mm; palea lanceolate, 1/2 length of lemma. Anthers 3, 2–3.8 mm. Pedicelled spikelet absent; pedicel subulate, 1–3 mm, pilose. Fl. and fr. autumn–winter.  $2n = 18, 36$ .

Dry mountain slopes. Hainan [India, Indonesia, Myanmar, Sri Lanka, Thailand, Vietnam; Australia (Queensland)].

*Arthraxon castratus* has a distinctive, narrowly elongate, pubescent base to each raceme, and the pubescence is carried down onto the upper part of the culm. The unusually broad, leathery upper glume also imparts a characteristic, broad side view to the spikelets.

**5. *Arthraxon typicus*** (Buse) Koorders, Exkurs.-Fl. Java 1: 110. 1911.

洱源芨草 er yuan jin cao

*Lucaea typica* Buse in Miquel, Pl. Jungh. 467. 1854; *Arthraxon breviaristatus* Hackel; *A. hispidus* (Thunberg) Makino var. *robustior* Welzen; *A. junghuhnii* (Steudel) Hochstetter; *A. maopingensis* S. L. Chen & Y. X. Jin; *Lucaea junghuhnii* Steudel.

Perennial. Culms decumbent, rooting from lower nodes, 60 cm or more long. Leaf sheaths glabrous or tuberculate-hispid; leaf blades ovate or lanceolate, 6–10 cm × 10–23 mm, both surfaces subglabrous to hispid, base amplexicaul, margins pectinate-setose at least toward base, apex cuspidate; ligule 0.5–1 mm. Racemes 5–13, 3–8 cm, pale green or purplish, raceme bases flattened on inner face, flattened surface pubescent; rachis internodes 1/2–4/5 length of sessile spikelets, glabrous or thinly ciliate, hairs 0.2–0.5 mm. Sessile spikelet 4–5.5 mm; lower glume lanceolate, leathery, weakly convex, margins not inflexed, back asperulous, 7–9-veined, small spinulose tubercles along veins, rarely tubercles sparse; upper glume equaling or slightly longer than lower glume, narrowly leathery, hyaline margins 0.6–0.7 mm, midline smooth; lemma margins not ciliate; upper lemma subtire or 2-toothed, teeth 0.1–0.35 mm; awn 5–11 mm; palea absent. Anthers 3, (1.5–)2–3 mm. Pedicelled spikelet absent; pedicel subulate, glabrous or thinly ciliate, up to 2 mm.

Moist places; 1300–2000 m. Guangdong, Yunnan [NE India, Indonesia, N Myanmar, Nepal, Thailand].

*Arthraxon typicus* resembles *A. castratus*, but, besides the key characters, differs by its shorter awns and lack of a palea. It is also similar to *A. hispidus*, but is a more vigorous perennial and can be clearly distinguished by the presence of 3 longer anthers. Awn length is variable and, when short, the awn may be exerted from the spikelet by less than ca. 2 mm.

**6. *Arthraxon junnarensis*** S. K. Jain & Hemadri, J. Bombay Nat. Hist. Soc. 68: 300. 1971.

微穗芨草 wei sui jin cao

*Arthraxon hispidus* (Thunberg) Makino var. *junnarensis* (Jain & Hemadri) Welzen.

Culms very slender, much branched, 5–30 cm tall. Leaf sheaths glabrous; ligule ca. 0.5 mm; leaf blades lanceolate to ovate, 0.6–3 cm × 3–12 mm, glabrous on both surfaces or laxly tuberculate-hispid, margins pectinate-ciliate below middle. Racemes 2–3, 0.7–0.9 cm; rachis internodes 0.6–1.5 mm, glabrous or pilose. Sessile spikelet 1.2–2.1 mm; lower glume broadly lanceolate, papery, convex, margins not inflexed, 7-veined above middle, veins hispidulous; upper glume glabrous, smooth; lower lemma usually absent, if present, then ca. 1 mm; awn ca. 6 mm. Anthers 2, ca. 0.5 mm. Pedicelled spikelet absent.

Stream banks, damp places; ca. 1100 m. W Yunnan (Zhenkang) [W India].

This is apparently a rare species, otherwise known only from the state of Maharashtra in W India. Specimens from Yunnan have not been seen by the authors.

**7. *Arthraxon hispidus*** (Thunberg) Makino, Bot. Mag. (Tokyo) 26: 214. 1912.

芨草 jin cao

Annual. Culms slender, sprawling, decumbent, rooting from lower nodes, weakly ascending up to 30 cm or more. Leaf sheaths glabrous to tuberculate-hispid, margin ciliate; leaf blades ovate to narrowly ovate, 2–5 cm × 6–15 mm, glabrous or hispid, base amplexicaul, margins pectinate-setose at least around base, apex sharply acute; ligule 0.5–3 mm. Racemes 2–10 or more, 1.5–4 cm, pale green or purple; rachis internodes (1/2–)2/3–3/4 length of sessile spikelets, glabrous or sparsely to densely pilose, hairs less than 0.5 mm. Sessile spikelet 3–5 mm; lower glume lanceolate, weakly convex, margins not inflexed, 6–9-veined, veins scabrid-hispidulous to spinulose; upper glume slightly longer than lower, apex cuspidate; awn up to 11 mm, well developed and exerted from glumes, or sometimes reduced and included; palea absent. Anthers 2, 0.7–1 mm. Pedicelled spikelet usually absent; pedicel reduced to a minute stump, sometimes up to 2 mm or more at raceme apex, glabrous, sparsely ciliate, or infrequently densely pilose. Fl. and fr. Sep–Nov.  $2n = 10, 18, 36$ .

Streamsides, damp meadows, among crops, other moist places; 100–2300 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Nei Mongol, Ningxia, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Nepal, New Guinea, Pakistan, Philippines, Russia (Far East), Sri Lanka, Tajikistan, Thailand, Uzbekistan; Africa, SW Asia (Caucasus, Oman), Australia].

*Arthraxon hispidus* is an extremely polymorphic, polyploid species, to which many names have been applied, both at specific and infraspecific rank. It is now a widespread weed, occurring in many warm-temperate and tropical parts of the world.

*Arthraxon hispidus* is based on a gathering from Japan with rather small (ca. 3.5 mm), spinulose spikelets and glabrous raceme internodes and pedicel stumps. *Arthraxon micans* is based on a gathering from NE

India with slightly longer (ca. 4.2 mm), merely scabrid spikelets and densely pilose internodes and pedicels. These two entities are often maintained as separate species. While populations at the margins of the distribution of this widespread taxon are often fairly uniform, over the main part of its distribution in SE Asia and China there is every possible combination of characters. It has proved impossible to recognize more than one species in China.

The awn is usually well developed and clearly exerted, but there is continuous variation through more shortly awned forms to those with the awn included within the glumes, thereby making the spikelets appear awnless. The name *Arthraxon hispidus* var. *cryptatherus* has been applied in China to apparently awnless forms, but in fact the type of the species name, from Japan, has included awns. *Arthraxon langsdorffii* is based on a Japanese specimen with well-exserted awns.

Pubescence of the rachis internodes and pedicels, spikelet length, and degree of development of spinules on the lower glume are also very variable and without clear discontinuities. Spikelet length given here applies to specimens seen from China. Elsewhere, spikelets may be as long as ca. 8 mm. Infrequently, lanceolate pedicelled spikelets up to 3.5 mm are present at the raceme apex, including on the type of *Arthraxon micans*. Such specimens are easily distinguished from *A. lancifolius* by their flatter, broader, spinulose sessile spikelets.

- 1a. Leaf blades glabrous or puberulous on abaxial surface; tubercle-based bristles present on lower 1/3 of leaf margins only ..... 7a. var. *hispidus*
- 1b. Leaf blades thinly hispid on both surfaces; tubercle-based bristles present on margins for most of length from base ..... 7b. var. *centrasiaticus*

**7a. *Arthraxon hispidus* var. *hispidus***

荩草(原变种) jin cao (yuan bian zhong)

*Phalaris hispida* Thunberg, Syst. Veg., ed 14, 104. 1784; *Alectoridia quartiniana* A. Richard; *Andropogon micans* (Nees) Steudel; *Arthraxon ciliaris* P. Beauvois; *A. ciliaris* var. *cryptatherus* Hackel; *A. ciliaris* var. *hookeri* Hackel; *A. cryptatherus* (Hackel) Koidzumi; *A. cuspidatus* Hochstetter ex A. Richard var. *micans* (Nees) Hackel; *A. hispidus* Humboldt & Bonpland ex Willdenow subsp. *langsdorffii* (Thunberg) Tzvelev; *A. hispidus* var. *cryptatherus* (Hackel) Honda; *A. hispidus* var. *muticus* (Honda) Ohwi; *A. hookeri* (Hackel) Henrard; *A. langsdorffii* (Trinius) Hochstetter ex Roshevitz; *A. micans* (Nees) Hochstetter; *A. okamotoi* Ohwi; *A. pauciflorus* Honda; *A. pauciflorus* var. *muticus* Honda; *A. quartinianus* (A. Richard) Nash; *Batratherum micans* Nees; *Digitaria hispida* (Thunberg) Sprengel; *Lasiolytrum hispidum* (Thunberg) Steudel; *Pleuroplitis langsdorffii* Trinius; *P. langsdorffii* var. *chinensis* Regel.

Leaf blades ovate, glabrous or abaxial surface occasionally puberulous, lower 1/3 of margins pectinate with tubercle-based bristle; awn variable, well developed or reduced. Fl. and fr. Sep–Nov.

Streamsides, damp meadows, among crops, other moist places; 100–2300 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Nei Mongol, Ningxia, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Nepal, New Guinea, Pakistan, Philippines, Russia (Far East), Sri Lanka,

Tajikistan, Thailand, Uzbekistan; Africa, SW Asia (Caucasus, Oman), Australia].

**7b. *Arthraxon hispidus* var. *centrasiaticus*** (Grisebach) Honda, Bot. Mag. (Tokyo) 39: 278. 1925.

中亚荩草 zhong ya jin cao

*Pleuroplitis centrasiatica* Grisebach in Ledebour, Fl. Ross. 4: 477. 1853; *Arthraxon centrasiaticus* (Grisebach) Gamajouva; *A. ciliaris* P. Beauvois var. *centrasiaticus* (Grisebach) Hackel; *A. hispidus* (Thunberg) Makino subsp. *centrasiaticus* (Grisebach) Tzvelev; *Pleuroplitis langsdorffii* Trinius var. *centrasiatica* (Grisebach) Regel.

Leaf blades lanceolate, 1–3 cm, sparsely hispid on both surfaces, margins pectinate with tubercle-based bristles for most of length from base; awn well developed, long exerted. Fl. and fr. Aug–Sep.

Moist places. C, E, and N China [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; C and SW Asia].

This is a primarily C Asian variant, now adventive elsewhere.

**8. *Arthraxon multinervis*** S. L. Chen & Y. X. Jin, Bull. Bot. Res., Harbin 13: 102. 1993 [*“multinervis”*].

多脉荩草 duo mai jin cao

Annual. Culms robust, decumbent at base, 30–60 cm tall. Leaf sheaths densely hispid with tubercle-based hairs, margin densely ciliate; leaf blades narrowly ovate, 4–7 cm × 12–18 mm, glabrous on both surfaces, base cordate, margins pectinate-spinose, apex slenderly acuminate. Racemes 2–7, 3–4 cm; rachis internodes 2/3–3/4 length of sessile spikelets, pilose. Sessile spikelet 4–4.5 mm; lower glume lanceolate, weakly convex, margins not inflexed, 9–11-veined, veins scabrid or tuberculate-hairy, apex acuminate; upper glume shorter than lower, apex acuminate; awn 1.5–4 mm, included or rarely slightly exerted; palea absent. Anthers 2, ca. 0.8 mm. Pedicelled spikelet absent, pedicel ca. 0.4 mm. Fl. and fr. Oct–Dec.

- Mountain slopes; 1200 m. Guizhou.

This is a rather robust segregate from the polymorphic species *Arthraxon hispidus*.

**9. *Arthraxon submuticus*** (Nees ex Steudel) Hochstetter, Flora 39: 188. 1856.

无芒荩草 wu mang jin cao

*Andropogon submuticus* Nees ex Steudel, Syn. Pl. Glumac. 1: 382. 1854; *Arthraxon ciliaris* P. Beauvois subsp. *submuticus* (Nees ex Steudel) Hackel; *Batratherum submuticum* (Nees ex Steudel) W. Watson.

Annual, loosely tufted. Culms decumbent, moderately branched, 10–30 cm tall. Leaf sheaths shorter than internodes, densely tuberculate-hispid to glabrous, margin tuberculate-ciliate; leaf blades ovate, 2–6 cm × 5–20 mm, hispid with scattered hairs or glabrous, base amplexicaul, margins densely pectinate-setose, apex sharply acuminate; ligule ca. 2 mm. Racemes 3–10, 2–4(–8) cm, pale green or purplish; rachis internodes ca. 3/4 length of sessile spikelets, glabrous. Sessile spikelet 2.8–4.2 mm; lower glume narrowly elliptic, herbaceous, convex, margins not inflexed, 6–8-veined, veins strongly scabrid, apex sub-

acute; upper glume subequal to lower glume, scabrid along keel, apex acute; upper lemma lanceolate, acute; awn rudimentary, shorter than lemma, not exerted; palea present, small. Anthers 3, 1.5–2 mm. Pedicelled spikelet absent; pedicel up to 2 mm at raceme apex, glabrous.

River banks, moist places; 1600–2100 m. Yunnan [NW India, Nepal].

This species is similar to awnless forms of *Arthraxon hispidus*, but has a slightly plumper sessile spikelet with a broader apex, as well as three longer anthers.

**10. *Arthraxon nudus*** (Nees ex Steudel) Hochstetter, Flora 39: 188. 1856.

光轴草 *guang zhou jin cao*

*Andropogon nudus* Nees ex Steudel, Syn. Pl. Glumac. 1: 383. 1854; *Arthraxon ciliaris* P. Beauvois subsp. *nudus* (Nees ex Steudel) Hackel; *A. hispidus* (Thunberg) Makino var. *nudus* (Nees ex Steudel) Ohwi.

Annual. Culms rather stiff, decumbent, ascending to 50 cm. Leaf sheaths glabrous or tuberculate-hispid; leaf blades narrowly ovate, 2–8 cm × 5–20 mm, glabrous on both surfaces, base amplexicaul, margins scabrid or pectinate-setose at base, apex sharply acuminate to caudate; ligule 2–3 mm. Racemes very slender, 3–9, often rebranched and hence up to 20, 2–8 cm, suberect when young, stiffly divergent at maturity; rachis internodes 4/5 as long to equaling spikelets, glabrous. Sessile spikelet 3–4.5 mm; lower glume linear-lanceolate, leathery, strongly convex, margins not inflexed, back minutely granular, obscurely 6–7-veined below middle, veins scabrid above middle, apex acute; upper glume with acute apex; awn 5.7–9 mm. Anthers 3, 0.4–1 mm. Pedicelled spikelet absent; pedicel 1–2 mm, glabrous.

Swamps, shady places, roadsides; 1200–1300 m. Yunnan [India, Malaysia, Myanmar, Thailand; SW Asia (Oman)].

When anthers are absent, *Arthraxon nudus* is best distinguished from *A. hispidus* by its very slender racemes of narrow spikelets spaced almost their own distance apart. The racemes finally spread divaricately as they disarticulate.

**11. *Arthraxon lancifolius*** (Trinius) Hochstetter, Flora 39: 188. 1856.

小叶草 *xiao ye jin cao*

*Andropogon lancifolius* Trinius, Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 2: 271. 1833; *Arthraxon microphyllus* (Trinius) Hochstetter var. *lancifolius* (Trinius) Hackel; *A. mollis* (Nees) Duthie; *A. schimperi* (Hochstetter ex A. Richard) Hochstetter; *Batratherum lancifolium* (Trinius) W. Watson; *B. molle* Nees; *Lucaea schimperi* (Hochstetter ex A. Richard) Steudel; *Pleuroplitis lancifolia* (Trinius) Regel; *Psilopogon schimperi* Hochstetter ex A. Richard.

Annual, delicate. Culms loosely tufted, very slender, decumbent, much branched, up to 30 cm long, glabrous or pubescent. Leaf sheaths loose, margin ciliate; leaf blades elliptic to narrowly ovate, thin, flaccid, 0.5–4 cm × 2–9 mm, puberulent to densely pubescent, often with scattered tubercle-based hairs, base cordate, basal margins pectinate-setose, apex setaceously acuminate; ligule 0.7–1.5 mm. Racemes 2–9, 1–2.5 cm; rachis

internodes 1/2 length of sessile spikelets, margins silky ciliate, hairs increasing to 1.5–2.5 mm at apex. Sessile spikelet 2–3.3 mm; lower glume linear, strongly convex, margins not inflexed, veins indistinct in lower part, scaberulous toward apex, apex finely 2-toothed; upper glume extended into 0.5–1.5 mm apical mucro; awn 4–8 mm; palea absent. Anthers 2, 0.5–0.7 mm. Pedicelled spikelet usually present at least at raceme apex, lanceolate, 1.5–2.5 mm, sterile, usually composed of 2 empty glumes. Fl. and fr. Sep–Nov.  $2n = 18, 36$ .

Damp rocky places on mountain slopes. Guizhou, Sichuan, Yun-

Flora of China 22: 616–621. 2006.

nan [Bhutan, India, Indonesia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, SW Asia (S Arabia)].

Young inflorescences should be examined for pedicelled spikelets, as these may be present only at the tips of the racemes and soon disarticulate.

**12. *Arthraxon microphyllum*** (Trinius) Hochstetter, *Flora* 39: 188. 1856.

小荩草 xiao jin cao

*Andropogon microphyllus* Trinius, *Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math.* 2: 275. 1833; *A. lancifolius* Trinius var. *microphyllus* (Trinius) Kuntze; *A. sikkimensis* Bor; *Pleuroplittis microphylla* (Trinius) Regel.

Ephemeral, delicate. Culms solitary or loosely tufted, very slender, 10–25 cm tall, glabrous. Leaf sheaths glabrous to hispid; leaf blades lanceolate to ovate, 0.5–1.5 cm × ca. 5 mm, tuberculate-hispid on both surfaces, base rounded, margins tuberculate-setose, apex acuminate; ligule 1.5–2 mm. Racemes 1–3, 1–2.5 cm; rachis internodes  $\frac{2}{3}$  length of sessile spikelets, margins ciliate, hairs increasing to 1–1.3 mm at apex. Sessile spikelet 3–4 mm; lower glume elliptic or lanceolate, shallowly convex or almost flat, margins not inflexed, strongly 6- or 7-veined with deep grooves between, veins smooth except below apex, apex emarginate; upper glume with acute apex; awn 8–10.5 mm; palea absent. Anthers 2, 0.6–0.8 mm. Pedicelled spikelet present throughout, linear, 2–3.5 mm, male or sterile and reduced to 2 empty glumes. Fl. and fr. Sep–Nov.  $2n = 18$ .

Dry mountain slopes; 2000–3000 m. Yunnan [Bhutan, NE India, Nepal, N Thailand].

Flora of China 22: 616–621. 2006.