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A REVISION OF *PANICUM* SECT. *DICHOTOMIFLORA* (POACEAE: PANICOIDEAE: PANICEAE)

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Abstract. Zuloaga, F. O. 2022. A revision of *Panicum* sect. *Dichotomiflora* (Poaceae: Panicoideae: Paniceae). *Darwiniana*, nueva serie 10(2): 325-364.

Panicum sect. *Dichotomiflora* comprises a complex of annual and perennial species, distributed all over the world. They are characterized by its glabrous, ellipsoid to ovoid or lanceolate spikelets, with the lower glume 1/6 to 1/4(-1/3) the length of the spikelet, nerveless to 3-nerved, and upper glume and lower lemma subequal, 7-11(-13)-nerved. A total of 20 species are recognized in the section: *Panicum aquaticum, P. dichotomiflorum, P. gilvum, P. impeditum, P. lacustre, P. laevinode, P. luzonense, P. madipirense, P. mlahiense, P. obseptum, P. paludosum, P. perangustatum, P. pilgerianum, P. porphyrrhizos, P. schinzii, P. subalbidum, P. sublaeve, P. sumatrense, P. trichonode,* and *P. vaseyanum.* Also, lectotypes are designated for *Panicum hygrophilum, P. ingens, P. lacustre, P. longiramum, P. oryzetorum, P. madipirense, P. porphyrrhizos, P. praelongum, P. proliferum* var. *longijubatum,* and *P. telmatodes.* A geographic analysis of the species is presented, together with illustrations, and a key for the species. Additional comments on morphology of sect. *Dichotomiflora* are also included.

Keywords. *Panicum* sect. *Dichotomiflora*; Poaceae; taxonomy.

Resumen. Zuloaga, F. O. 2022. Revisión de las especies de *Panicum* sect. *Dichotomiflora* (Poaceae: Panicoideae: Paniceae). *Darwiniana*, nueva serie 10(2): 325-364.

Panicum sect. *Dichotomiflora* incluye especies anuales y perennes distribuidas en todo el Mundo. Sus taxones se caracterizan por las espiguillas glabras, elipsoides a ovoides o lanceoladas, con la gluma inferior 1/6 a 1/4(-1/3) del largo de la espiguilla, enervia a 3-nervia, y gluma superior y lemma inferior subiguales, 7-11(-13) nervias. Se reconocen un total de 20 especies en la sección: *Panicum aquaticum, P. dichotomiflorum, P. gilvum, P. impeditum, P. lacustre, P. laevinode, P. luzonense, P. madipirense, P. mlahiense, P. obseptum, P. paludosum, P. perangustatum, P. pilgerianum, P. porphyrrhizos, P. schinzii, P. subalbidum, P. sublaeve, P. sumatrense, P. trichonode, y P. vaseyanum.* Se designan lectotipos para *Panicum hygrophilum, P. ingens, P. lacustre, P. longiramum, P. oryzetorum, P. madipirense, P. porphyrrhizos, P. praelongum, P. proliferum var. longijubatum, y P. telmatodes.* Se presenta la distribución geográfica de las especies; también se incluyen ilustraciones, una clave de diferenciación de las especies, y observaciones de la morfología de la sección *Dichotomiflora*.

Palabras clave. *Panicum* sect. *Dichotomiflora*; Poaceae; taxonomía.

INTRODUCTION

Panicum L., as traditionally circumscribed, was one of the largest genera of the Poaceae, with nearly 450 species distributed worldwide (Clayton & Renvoize, 1986; Zuloaga, 1987), and inhabiting habitats from sea level to approximately 2500 m. The main character placing species in the genus

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was the spikelet structure, with a lower glume present, usually shorter than the upper glume and lower lemma, the latter subequal, a lower flower present or absent, the upper anthecium indurate and abaxially convex, and a caryopsis with a punctiform to oblong hilum. However, these characters are also present in other members of the *Paniceae* and *Paspaleae*. On the other hand, a wide array of differential characters were present in *Panicum sensu lato*, including photosynthetic pathway, with species C3, C4 and intermediate C3/C4, anatomical features associated with the Kranz syndrome, and chromosome numbers. These characters were evaluated by Giussani et al. (2001), Aliscioni et al. (2003) and Morrone et al. (2012), who concluded that Panicum was a polyphyletic genus, and that many of its species were in need of transfer to other genera of grasses. As a result, subgenera were raised or reinstated at the generic level, such as *Dichanthelium* (Hitchc. & Chase) Gould, *Phanopyrum* Raf., *Steinchisma* Raf., and *Megathyrsus* (Pilg.) B.K. Simon & S.W.L. Jacobs (Zuloaga et al., 1998; Aliscioni et al., 2003; Freckmann & Lelong, 2003; Simon & Jacobs, 2003; Barkworth, 2006). Also, several new genera, from species previously placed in *Panicum*, have been established (Bess et al., 2006; Zuloaga et al., 2010, 2015; Scataglini & Zuloaga, 2013). Finally, Zuloaga et al. (2018) restricted the genus, within subtribe *Panicinae* to its type subgenus (Soreng et al., 2022), with approximately 163 species, and all remaining species classified as "incertae sedis" within tribes *Panicinae* and *Paspaleae*. Within Panicum s. str., Zuloaga et al. (2018) propose seven sections as follows: sect. *Arthragrostis* (Lazarides) Zuloaga, endemic of Australia and southeast Asia, sect. *Yakirra* (Lazarides & R.D. Webster) Zuloaga, endemic of Australia, sect. *Rudgeana* (Hitchc.) Zuloaga, endemic of America, and four pantropical sections: sect. *Dichotomiflora* (Hitchc.) Hitchc. & Chase ex Honda, sect. *Hiantes* Stapf, sect. *Panicum*, and sect. *Repentia* Stapf.

Sections of *Panicum* can be distinguished by the following key

1. Rachilla prominent between the glumes and lower lemma 2
1. Rachilla not prominent betwen the glumes and lower lemma 3
2(1). Upper anthecium stipitate, with a pair of winged appendages ..... Sect. *Yakirra*
2. Upper anthecium stipitate or not, without a pair of winged appendages ..... Sect. *Arthragrostis*
3(1). Plants with an heterogenous stipe in the base of the upper anthecium ..... Sect. *Rudgeana*
3. Plants not stipitate, if a stipe if rarely present, it is homogenous in the base of the upper anthecium 4
4(3). Plants annual or perennial, if perennial shortly rhizomatous, without prominent rhizomes 5
4. Plants perennial, with prominent rhizomes 6
5(4). Lower glume 1/3 or less the length of the spikelet, truncate to obtuse or subacute. Plants aquatic or palustrial, usually present in open and humid environments ..... Sect. *Dichotomiflora*
5. Lower glume 1/2 or more the length of the spikelet, acute. Plants of open and dry enviroments, growing in campos, savannas or cerrados ..... Sect. *Panicum*
6(4). Lower glume 1/4 to 1/3 the length of the spikelet, occasionally up to 1/2; spikelets no gaping at maturity ..... Sect. *Repentia*
6. Lower glume 1/2 to 4/5 the length of the spikelet; spikelets gaping at maturity ..... Sect. *Hiantes*

The aim of this work is to complete a worldwide revision of species of *Panicum* sect. *Dichotomiflora*, including section characters, key to species, description, distribution, and illustrations of 16 species.

HISTORY AND MORPHOLOGY

Panicum L., Section *Dichotomiflora* was initially treated as a group by Hitchcock & Chase (1910), who considered four species within it:

P. vaseyanum Scribn., *P. bartowense* Scribn. & Merr., *P. dichotomiflorum* Michx., and *P. elephantipes* Nees [= *Louisiella elephantipes* (Nees ex Trin.) Zuloaga]. Later, Honda (1930) considered this group at the sectional level. Stapf (1920) treated African species of this section, *P. porphyrrhizos* Steud. and *P. schinzii* Hack., within sect. *Coloratae* (= sect. *Repentia*), while Pilger (1931, 1940), considered in sect. *Dichotomiflora* the following species: *P. dichotomiflorum, P. elephantipes* Nees (= *Louisiella elephantipes*), *P. longijubatum* Stapf (= *P. subalbidum* Kunth), and *P. paludosum* Roxb. Zuloaga et al. (2018) concluded, in their molecular analysis based on nine species of the group, that *Dichotomiflora* is a monophyletic section and tentatively place 17 species within it.

Species of sect. *Dichotomiflora* are characterized as being annual, or less frequently perennial species, with culms erect to geniculate ascending, decumbent and rooting at the lower nodes; internodes are hollow, with or without aerenchyma, and nodes are conspicuously pilose to glabrous. Sheaths are open, striate, pilose, with or without urticant hairs, or glabrous. Ligules are membranouswith a ciliate margin. Blades are linear to lanceolate, flat, less frequently involute, pilose or glabrous, rounded to cordate at the base, the apex acuminate. Inflorescence is an open to contracted, terminal panicle, exserted or partially included on the upper blades, with branches alternate to opposite, spikelets paired or solitary and appressed or loose on the branches, pedicels claviform, scabrous to smooth; axillary panicles are present or absent. Spikelets are long ellipsoid to ellipsoid, ovoid or lanceolate, glabrous, pale to greenish or tinged with purple, solitary or paired, the lower glume usually 1/6 to 1/4, less frequently up to 1/3 the length of the spikelet, nerveless to 3(-7)-nerved, acute to truncate; upper glume and lower lemma subequal, membranous, 7-11(-13)-nerved, acute; lower palea as long as the upper lemma, hyaline, glabrous, to reduced or absent; lower flower staminate, anthers 3, or absent; upper anthecium as long as or shorter than the upper glume and lower lemma, indurate, smooth, shiny, glabrous; upper lemma 5-7-nerved. The caryopsis is ellipsoid to ovoid or obovoid, with the hilum punctiform to oblong, rarely linear, embryo 1/3 to more than 1/2 the length of the caryopsis.

Distribution and ecology. All the species distribution, here discussed, are natural. Five species of sect. *Dichotomiflora* are restricted to America: *P. aquaticum* Poir., with two varieties, *P. dichotomiflorum*, with two subspecies, *P. lacustre* Hitchc. & Ekman, *P. sublaeve* Swallen, and *P. vaseyanum.*Two species are endemic of Australia: *P. laevinode* Lindl. and *P. obseptum* Trin. Three species grow in Asia: *P. luzonense* J. Presl, *P. paludosum* Roxb., and *P. sumatrense* Roth ex Roem. & Schult.; while ten species are restricted to Africa, three of them: *P. gilvum* Launert, *P. impeditum* Launert, and *P. schinzii* Hack., growing in southern Africa; *P. subalbidum* in Africa and Madagascar, and the remaining species in central Africa: *P. madipirense* Renvoize, *P. mlahiense* Renvoize, *P. perangustatum* Renvoize, *P. pilgerianum* (Schweick.) Clayton, *P. porphyrrhizos*, and *P. trichonode* Launert & Renvoize.

All species are typically found in open and humid habitats, occasionally on forest edges, are common in margins of lakes, rivers and ponds.

CHROMOSOME NUMBERS

Panicum aquaticum, n = 36 (Davidse & Pohl, 1972); 2n = 36 (Davidse & Pohl, 1974; Mehra & Chaudhary, 1974); 2n = 72 (Pohl & Davidse, 1971).

Panicum dichotomiflorum, n = 18 (Davidse & Pohl, 1974, under *P. chloroticum*; Dubcovsky & Zuloaga, 1991); 2n = 36 (Brown, 1948), 2n = 54 (Church, 1929; Gould, 1958, 1968; Probatova & Sokolovskaya, 1983; Hamoud et al., 1994).

Panicum luzonense, 2n = 18 (Veldkamp, 1996).

Panicum paludosum, 2n = 36, 54 (Veldkamp, 1996).

Panicum schinzii, 2n = 18, 40 (Veldkamp, 1996).

Panicum sublaeve, n = 18 (Dubcovsky & Zuloaga, 1991).

Panicum sumatrense, 2n = 14, 36, 40, 54 (Veldkamp, 1996).

MATERIAL AND METHODS

Morphological and anatomical analyses were based on herbarium specimens from B, BA, BAA, BAF, BR, C, COL, CORD, F, G, GH, ICN, K, LE, LIL, M, MA, MBM, MEXU, MO, NY, P, SI, US, VEN, W, and WIS (Thiers, 2022).

Types were studied in person or with images available online at the JStor Global Plants website (http://plants.jstor.org) and/or at the websites of aforementioned herbaria.

TAXONOMIC TREATMENT

Panicum sect. *Dichotomiflora* (Hitchc.) Hitchc. & Chase ex Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3(1): 244, 246. 1930. *Panicum* [unranked] *Dichotomiflora* Hitchc., N. Amer. Fl. 3(2): 200, 202. 1915. *Panicum* group Dichotomiflora Hitchc. & Chase, Contr. U.S. Natl. Herb. 15: 28, 47. 1910, nom. inval. Type species: *Panicum dichotomiflorum* Michx.

Plants annual or perennial, the latter shortly rhizomatous, with culms erect to decumbent, rooting and branching at the lower nodes, hollow, with or without aerenchyma. Ligules membranous with a ciliate margin. Blades oblong-lanceolate to lanceolate, linear-lanceolate or linear, flat, cordate to rounded at base, pilose to glabrous. Inflorescence a terminal panicle, lax to contracted, multiflowered to few flowered, fully exserted or partially included on the upper blades; peduncle and main axis pilose to glabrous; axillary inflorescences present or absent. Spikelets ellipsoid to long ovoid or lanceolate, pale to greenish or tinged with purple, glabrous, solitary or paired; lower glume 1/6 to 1/4(-1/3) the length of the spikelet, nerveless to 1-3(-7)-nerved, apex acute to truncate; upper glume and lower lemma subequal, upper glume 7-11(-13)-nerved, lower lemma 7-11(-13)-nerved; lower palea elliptic, hyaline, glabrous, as long as the lower lemma to reduced or absent; lower flower staminate or absent; upper anthecium ellipsoid to long ovoid, pale to dark brown at maturity, glabrous, smooth, indurated, as long as the upper glume and lower lemma or shorter, occasionally early deciduous at maturity; upper lemma 5-7-nerved, upper palea 2-nerved, inclosed by the lemma. Caryopsis ellipsoid to ovoid or obovoid; hilum punctiform to oblong, ocassionally linear, embryo 1/3 to little more than 1/2 the length of the caryopsis.

Section with 20 species distributed in all continents; they grow in open and humid places, being common elements of margins of rivers, swamps, lakes, and also present in forest edges. A few species are fully aquatic.

Key to the species of *Panicum* sect. *Dichotomiflora*

1. Lower palea conspicuous, as long as the lower lemma; lower flower staminate, anthers 3 2
1. Lower palea reduced; lower flower absent 7
2(1). Hilum linear, as long as the caryopsis; culms with aerenchyma ..... *P. pilgerianum*
2. Hilum punctiform to oblong, short; culms without aerenchyma 3
3(2). Upper glume and lower lemma 11-13-nerved ..... *P. sublaeve*
3. Upper glume and lower lemma 7-9(-11)-nerved 4
4(3). Lower glume 1/4 to 1/3 the length of the spikelet, 1-3-nerved 5
4. Lower glume 1/6 to 1/5 the length of the spikelet, nerveless to 1-nerved 6
5(4). Plants annual; blades lanceolate, 0.8-1.2 cm wide, cordate. Africa..... *P. madipirense*
5. Plants perennial; blades linear, 0.3-0.6 cm wide, rounded at base. America ..... *P. aquaticum*
6(4). Nodes conspicuously pilose; blades linear-lanceolate, up to 0.5 cm wide; axillary inflorescences absent; plants perennial ..... *P. trichonode*
6. Nodes glabrous; blades lanceolate, up to 1.5 cm wide; axillary inflorescences present; plants annual ..... *P. schinzii*
7(1). Inflorescence pauciflowered, partially included on the upper sheaths, 2-10 cm long 8
7. Inflorescence multiflowered, exserted, up to 50 cm long 11
8(7). Upper glume 7-nerved 9
8. Upper glume 9-11(-13)-nerved 10
9(8). Axillary inflorescences present; upper anthecium early deciduous at maturity; plants annual. America ..... *P. vaseyanum*

9. Axillary inflorescences absent; upper anthecium not early deciduous; plants perennial. Australia ..... *P. obseptum*
10(8). Lower glume nerveless to 1-nerved; spikelets long ellipsoid, 2.5-3.4 mm long ..... *P. gilvum*
10. Lower glume 3-5-nerved; spikelets lanceolate, 3.5-4.5 mm long ..... *P. perangustatum*
11(7). Plants perennial 12
11. Plants annual 14
12(11). Spikelets 2 mm long; upper glume and lower lemma 7-nerved. Cuba ..... *P. lacustre*
12. Spikelets 2.5-4 mm long; upper glume and lower lemma 7-9-nerved. Africa 13
13(12). Culms with aerenchyma, decumbent and rooting at the lower nodes; nodes sharply demarcated ..... *P. subalbidum*
13. Culms without aerenchyma, geniculate to erect, not decumbent and rooting at the lower nodes; nodes not sharply demarcated ..... *P. porphyrrhizos*
14(11). Upper glume 11-15-nerved ..... *P. sumatrense*
14. Upper glume 7-9-nerved 15
15(14). Spikelets 2.2-2.5 mm long; lower glume up to 1/3 the length of the spikelet, 3-5-nerved 16
15. Spikelets 2.5-4.2 mm long; lower glume 1/5 to 1/3 the length of the spikelet, nerveless to 3-nerved 18
16(15). Sheaths covered with urticant hairs; blades with tubercullate hairs all over its surface; upper glume and lower lemma with anastomosed nerves. Asia ..... *P. luzonense*
16. Sheaths and blades glabrous; upper glume and lower lemma without anastomosed nerves 17
17(16). Blades lanceolate, 3-6(-10) × 0.3-0.4 cm; panicles up to 17 cm long. Africa ..... *P. mlahiense*
17. Blades oblong-lanceolate to lanceolate, 10-45 × 0.5-1.4 cm; panicles up to 30 cm long. America ..... *P. dichotomiflorum*
18(15). Plants with aerenchyma, aquatic; culms with aerenchyma ..... *P. paludosum*
18. Plants not without aerenchyma, growing in humid areas, not aquatic; culms without aerenchyma 19
19(18). Panicle with the main axis pilose; peduncle with tubercullate hairs; axillary inflorescences absent. Australia ..... *P. laevinode*
19. Panicle with the main axis glabrous; peduncle without tubercullate hairs; axillary inflorescences present 20
20(19). Blades 10-45 × 0.5-1.5 cm; panicles up to 30 cm long; spikelets 2.4-3 mm. America ..... *P. dichotomiflorum*
20. Blades 4-11 × 0.3-0.5 cm; panicles up to 14 cm long; spikelets (2.8-)3.1 mm. Africa ..... *P. impeditum*

1. Panicum aquaticum Poir.

Plants perennial, shortly rhizomatous, 80-200 cm tall; culms decumbent and rooting at the lower nodes, then erect; internodes terete, glabrous, hollow; nodes brownish, glabrous. Sheaths striate, 8-15 cm long, usually longer than the internodes, densely papillose-pilose all over its surface or densely hispid toward the upper portion or glabrous, the margins membranous. Ligules membranous-ciliate, 1-4 mm long; collar pale to brownish, pilose or glabrous. Blades linear, 9-25 × 0.3-0.6 cm, flat, ascendent, rounded at the base, the apex acuminate, adaxial surface papillose-pilose, more densely so toward the base, abaxial surface sparsely pilose or both surfaces glabrous, the lower margins ciliate o not. Inflorescence a terminal exserted, lax panicle, 15-26(-30) × 8-15 cm; peduncle terete, glabrous; main axis terete, glabrous, pulvini brownish, glabrous, first order branches alternate, the upper ones whorled or alternate, axis of the branches and pedicels triquetrous, scabrous, spikelets paired and congested on second order branches, pedicels 2-4 mm long. Spikelets long ovoid, 2.7-3.5 × 1 mm, greenish or tinged with purple, glabrous; lower glume 0.8-1.4 mm long, ca. 1/3 the length of the spikelet, 1-3-nerved, acute to obtuse, upper glume and lower lemma subequal, 9-nerved; lower palea elliptic, 2.4 × 0.8 mm, glabrous, hyaline;

lower flower staminate, stamens 3, anthers 1.2-1.4 mm long; upper anthecium long ovoid, 1.9-2.2 × 0.8 mm, whitish, smooth, shiny, indurated, glabrous. Caryopsis ellipsoid, 1.3 × 0.6 mm, whitish; hilum oval, embryo 1/3 the length of the caryopsis.

Observation. This species is morphologically similar to *P. dichotomiflorum*, the latter an anual species, with spikelets 2-3 mm long and lower flower absent.

Key to the varieties

1. Sheaths densely hispid; panicles less than 25 cm long ..... *P. aquaticum* var. *aquaticum*
1. Sheaths densely papillose; panicles ca. 30 cm long ..... *P. aquaticum* var. *cartagoense*

1a. Panicum aquaticum Poir. var. **aquaticum**, Encycl., Suppl. 4: 281. 1816. TYPE. Puerto Rico, without locality, 1797, *M. Ledru s.n.* (lectotype P 00371641!, designated as "type" by Hitchcock & Chase, 1910: 48; isolectotypes FI, US 00148147).

Panicum chloroticum var. *sylvestre* Nees ex Trin. Gram. Pan.: 236. 1826. TYPE. Brazil. Bahia. Almada, *L. Riedel s.n.* (holotype LE-TRIN-0633.06!; isotype US-974404!).

Panicum chloroticum Nees ex Trin. var. *sylvestre* Nees, Fl. Bras. Enum. Pl. 2(1): 164. 1829, nom. illeg. hom., non Trin. 1826. TYPE. Brazil. "Habitat in sylvis ad Almada, Ferradas et in via Felisbertia districtus Insulanorum prov. Bahiensis; (Martius et Maximil. Princ. Neovid.)", *C. F. P. von Martius s.n.* (lectotype M, designated, as "type", by Hitchcock & Chase, 1910: 49; isolectotype US 00148356).

Panicum hygrophilum Salzm. ex Steud., Syn. Pl. Glumac. 1: 71. 1853. TYPE. Brazil. Bahia: without locality, 1827, *P. Salzmann s.n.* (lectotype here designated, P 00740831!; isolectotypes G00099659!, G00099660!, GH!, HAL0133162!, K 000003808!, K 000003809!, MO-105084!, MPU 024441!, MPU 024442!, MPU 024443!, P 00740830!, P 00740831!, P 00740832!, US!, W 18890239825!, W 19160024808!).

Panicum proliferum var. *strictum* Griseb., Cat. Pl. Cub.: 232. 1866. TYPE. Cuba. Without locality, 1860-1864, *C. Wright 3456* (holotype unknown; isotypes G 00099640!, G 00099641!, GH 00135362!, K 000309158!, K 000309159!, P 00740938!, MO-321061!, NY 01767173!, S04-321!, US 00139898!, fragment).

Distribution and ecology. México and the Caribbean to Argentina; it grows in margins of lakes and rivers, from sea level up to 1300 m a.s.l.

Representative specimens examined

ARGENTINA. **Corrientes.** 3 km E de Ituzaingó, ruta 12, 7-IV-1978, *Ahumada 2143* (MO).

BELIZE. 9 mi W of Belize on the Western highway to Belmopan, 50 m, 21-III-1987, *Davidse & Brant 32947* (MO, NY).

BRAZIL. **Bahia.** Near Salvador, low moist ground near tidal marsh, 23-XII-1924, *Chase 8022* (F, MO, NY, US)

COSTA RICA. **Guanacaste.** Road to Hacienda Inocentes, 12 km from CIA, 330 m, 27-VII-1971, *Pohl 12651* (F, MO)

CUBA. **Pinar del Río.** 13 km south of Pinar del Río, 25-XI-1926, *Hitchcock 23290* (US).

GUATEMALA. **Jutiapa.** Vicinity of Jutiapa, 850 m, 24-X-1940, *Standley 76308* (MO).

HONDURAS. **El Paraíso.** 32 km W of Danli along highway 4, 700 m, 21-VII-1970, *Pohl & Davidse 12386* (F, MO).

MÉXICO. **Quintana Roo.** En brecha a Vallarta, a 5 kms al W de Puerto Morelos, 31-VIII-1980, *Sousa 11207* (MEXU).

NICARAGUA. **Zelaya.** Puerto Isabel, scrubby growth near seabeach, 3-I-1970, *Seymour 2895* (GH, MO).

PERU. Without locality, *Dombey s.n.* (P), *Gaudichaud s.n.* (P).

PUERTO RICO. Floresta del Río Piedras, vicinity of San Juan, NE of Río Piedras, *Chase 6778* (RB, US).

SURINAM. Near Dohsen savanna, *Krukoff 130* (NY).

TRINIDAD-TOBAGO. Pitch Lake, 7-XII-1912, *Hitchcock 10099* (G, MO, NY, US).

VENEZUELA. **Apure.** Without locality, *Ramia 7195* (VEN).

1b. Panicum aquaticum Poir. var. **cartagoense** Davidse, Novon 2: 103. 1992. TYPE. Costa Rica. Cartago: 0.5 km E of Planta Radiográfica along railroad, 2 km W of Paraíso, 1300 m, 6 Feb 1969, plants 1-2 meters tall, rooted in a dense tangle of

herbage, *R. W. Pohl & G. Davidse 11700* (holotype ISC-v-0000567!; isotypes F!, MO-183078!).

Distribution and ecology. This variety is restricted to edges of forests in Costa Rica.

2. Panicum dichotomiflorum Michx.

Plants anual, caespitose, 10-140 cm tall; culms decumbent, rooting and densely branching at the lower nodes to erect, simple or branching; internodes terete, 3-16 cm long, hollow, glabrous; nodes brownish, compressed, glabrous. Sheaths striate, 4-15 cm long, pale or tinged with purple, glabrous to densely hirsute, the margins membranous. Ligules membranous-ciliate, up to 2 mm long; collar brownish, glabrous. Blades oblong-lanceolate to lanceolate, 10-45 × 0.5-1.4 cm, flat, subcordate, the apex attenuate, glabrous, the margins scaberulous. Inflorescence a lax, diffuse, terminal panicle, 4-30 × 2-20 cm, first order branches opposite to alternate, less frequently whorled, divergent and distant, spikelets paired or solitary on third order branches; main axis scaberulous, pulvini glabrous; pedicels triquetrous 2-7 mm long, scabrous; axillary panicles usually present, similar to the terminal one. Spikelets long ovoid, (2-)2.4-3 × 0.9-1.1 mm, glabrous, acuminate, pale or tinged with purple; lower glume 0.7-1.2 mm long, 1/4 to 1/3 the length of the spikelet, ovate, 1-3-nerved; upper glume and lower lemma subequal, acuminate, upper glume 9-nerved, lower lemma 7-9-nerved; lower palea elliptic, 2.1-2.5 × 0.5-0.7 mm, hyaline, glabrous to absent; lower flower absent; upper anthecium ellipsoid, 2-2.5 × 0.7-1.1 mm, pale, dark brown at maturity, glabrous, smooth, indurated; upper lemma 7-nerved. Caryopsis elipsoid, 1.5-1.6 × 0.9-1 mm, brownish; hilum oblong, embryo half the length of the caryopsis.

Key to the subspecies

1. Sheaths glabrous; spikelets 2.4-3 mm long ..... *P. dichotomiflorum* subsp. *dichotomiflorum*
1. Sheaths densely hirsute; spikelets 2.2-2.4 mm long ..... *P. dichotomiflorum* subsp. *bartowense*

2a. Panicum dichotomiflorum Michx. subsp. **bartowense** (Scribn. & Merr.) Freckmann & Lelong, Sida 20(1): 171. 2002. *P. bartowense* Scribn. & Merr., Circ. Div. Agrostol. U.S.D.A. 35: 3. 1901. *P. dichotomiflorum* Michx. var. *bartowense* (Scribn. & Merr,) Fernald, Rhodora 38(455): 387. 1936. TYPE. United States of America. Florida: Polk County, Bartow, 29-IX-1898, *R. Combs 1220* (lectotype US 00133099!, designated as "type" by Hitchcock & Chase, 1910: 52; isolectotype ISC-v-0000569!).

Panicum proliferum Lam. var. *pilosum* Griseb., Cat. Pl. Cub.: 232. 1866. TYPE. Cuba, Ad lagunas, *C. Wright 1865* (lectotype GOET 006760!, designated by L. Catasús Guerra, 2004: 85; isolectotypes GOET 006761!, GOET 006762!, US 00139897!, fragment ex GOET).

Distribution and ecology. Subspecies restricted to southern United States and the Caribbean; it grows at margins of swamps and in flooded habitats.

Observation. It differs from the type subspecies by its densely hirsute sheaths and shorter spikelets, usually 2-2.2 mm long.

Representative specimens examined

BAHAMAS. **Grand Bahama.** About Freeport dump north of Airport, 25-I-1976, *Correll & Popenoe 46671* (MO).

CAICOS ISLAND. **Pine Cay**, in clumps in drying open pond of coppice on norhteast side, *Correll 43251* (NY).

CUBA. **Habana.** Barabanó, in coastal swamps, 10-XII-1920, *Ekman 12602* (G, US).

JAMAICA. **St. Elizabeth**. Near the town of Black River, in a swamp along the Black River, 22-X-1912, *Hitchcock 9645* (MO, NY, US).

UNITED STATES OF AMERICA. **Florida.** Miami, *Hitchcock s.n., Amer. Gr. Hb. 17* (US, W).

2b. Panicum dichotomiflorum Michx. subsp. **dichotomiflorum**, Fl. Bor.-Amer. 1: 48. 1803. TYPE. United States of America. "Hab. in occidentalibus montium Alleghanis", *A. Michaux s.n.* (holotype P-MICHX!; isotype P 00740942!). (Fig. 1).

Panicum miliaceum Walter, Fl. Carol.: 72. 1788, nom. illeg. hom., non L., 1753. TYPE. United States of America. South Carolina (holotype unknown).

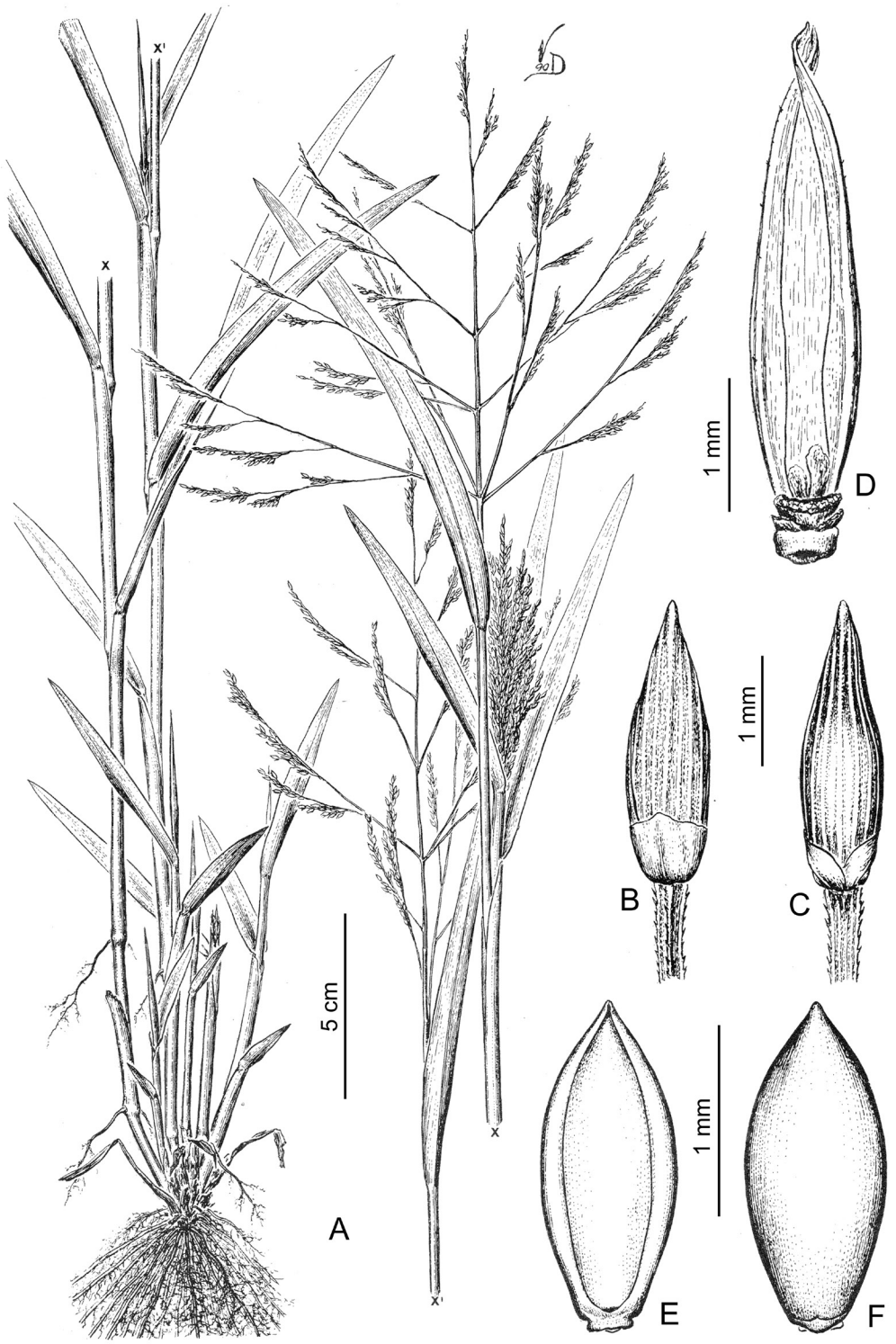

Fig. 1. *Panicum dichotomiflorum*. **A,** Habit. **B,** Spikelet, ventral view. **C,** Spikelet, dorsal view. **D,** Lower palea. **E,** Upper anthecium, ventral view. **F,** Upper anthecium, dorsal view. (From *Ahumada 610*, CTES).

Panicum geniculatum Muhl., Cat. Pl. Amer. Sept.: 9. 1813. TYPE. United States of America. Without locality, *Muhlenberg Hb. Fol. 181* (holotype PH 00047147!; isotype US 00148518!, fragment, probable isotype, BM 001042409!).

Panicum multiflorum Poir., in Lamarck, Encycl. Suppl. 4: 282. 1816. TYPE. United States of America: "cette plante croit a la Caroline; elle m'a ete communiquee par M. Bosc.", *L. A. G. Bosc s.n.* (lectotype P 00740941!, designated as "type" by Hitchcock & Chase, 1910: 48; isolectotypes US 00139776!, US 00139777!, fragments).

Panicum brachiatum Bosc ex Spreng. Syst. Veg. [Sprengel] 1: 321. 1825, nom. illeg. hom., non Poiret, 1816. TYPE. Bermuda. "Ins. Bermud" (holotype B-W-18843-01 0!; isotype US 00148189!, fragment ex Willd. herb.).

Panicum chloroticum Nees ex Trin., Gram. Panic.: 236. 1826. *P. chloroticum* var. *agreste* Nees ex Trin., Gram. Panic.: 236. 1826. *Panicum proliferum* Lam. var. *chloroticum* (Nees ex Trin.) Hack., Repert Spec. Nov. Regni Veg. 6(21-26): 343. 1909. *P. aquaticum* var. *chloroticum* (Nees) R.C. Foster, Rhodora 68: 320. 1966. TYPE. Brazil: "V. utriusque spp. Brasil. (N. ab Esenb. Langsdorff)", *G. H. von Langsdorff s.n.* (holotype LE-TRIN-0633.01!).

Panicum chloroticum Nees ex Trin. var. *agreste* Nees, Fl. Bras. Enum. Pl. 2(1): 164. 1829. TYPE. Brazil: "Habitat in graminosis cultis prope Soteropolin et Oeiras provinciae Bahiensis et Piauhiensis", *C. F. P. von Martius s.n.* (lectotype M, designated as "type" by Hitchcock & Chase, 1910: 49; isolectotype US 00148354!, fragment).

Panicum chloroticum Nees ex Trin. var. *pingue* Nees, Fl. Bras. Enum. Pl. 2(1): 164. 1829. SYNTYPES. Brazil: "Habitat in cultis ad Soteropolin, provinciae Bahiensis; in campis prope Almeirim et alibi ad flumen Amazonum, provinciae Paraensis: statura maxima, culmo digitali". In campis prope Almeirim et alibi ad flumen Amazonum, *C. F. P. von Martius s.n.* (M!). Habitat in cultis ad Soteropolin. Provinciae Bahiensis", *C. F. P. von Martius s.n.* (lectotype M, designated as "type" by Hitchcock & Chase, 1910: 49; isolectotype US 00148355!, fragment).

Panicum retrofractum Delile ex Desv., Mém. Soc. Agric. Angers 1: 200. 1831. TYPE. [United States of America], "America borealis", *sin colector s.n.* (lectotype P 00661391!, designated as "type" by Hitchcock & Chase, 1910: 49; isolectotypes LINN-HS 118-84!, US 00139933!, fragment ex P).

Panicum chloroticum Nees ex Trin. var. *luxurians* Döll, in C. Martius, Fl. Bras. 2 (2): 198. 1877. TYPE. Holotype unknown.

Panicum proliferum Lam. var. *richardii* Döll, in C. Martius, Fl. Bras. 2(2): 200. 1877. TYPE. Brazil. Pará: "prope urbem Para, in littore arenoso (L. C. Richard), *L. C. Richard s.n.* (holotype unknown; isotype W 19040013871!).

Panicum amplectens Chapm., Bot. Gaz. 3(3): 20. 1878. TYPE. United States of America. "South Florida", *J. L. Blodgett s.n.* (holotype unknown).

Panicum francavillanum E. Fourn., Mexic. Pl. 2: 25. 1886. *P. francavillanum* E. Fourn. ex Hemsl., Biol. Cent.-Amer. Bot. 3: 489. 1885. nom. nud. TYPE. México: Tabucaya, *J. W. Schaffner 301* (lectotype P 00740939!, designated as "type" by Hitchcock & Chase, 1910: 50; isolectotype W 0021637!).

Panicum proliferum Lam. var. *geniculatum* Alph. Wood, Amer. Bot. Fl. 2: 392. 1871. *Panicum dichotomiflorum* Michx. var. *geniculatum* (Alph. Wood) Fernald, Rhodora 38(455): 387, pl. 441, fig. 2. 1936. TYPE. United States of America (holotype unknown).

Panicum dichotomiflorum Michx. var. *imperiorum* Fernald, Rhodora 44(526): 380. 1942. TYPE. United States of America. Virginia: Greensville County, Fontaine Creek, southwest of Haley's Bridge, 14-X-1941, *M. L. Fernald & Long 13877* (holotype GH 00023012!; isotypes GH 00023013!, NY 00413977!, PH 00018649!).

Panicum dichotomiflorum Michx. var. *purinatorum* Svenson, Rhodora 22(261): 154, fig. 1-5. 1920. *P. dichotomiflorum* Michx. subsp. *purinatorum* (Svenson) Freckmann & Lelong, Sida 20(1): 171. 2002. TYPE. United States of America. Maine: Barnstable, 13-IX-1919, *M. L. Fernald 306* (holotype GH 00024098!; isotypes BR 0000008408792!, NEBC 00028645!, NY 00413974!, P 00740940!, PH 00018647!, PH 00018648!, US 00147806!).

Distribution and ecology. This subspecies is widely distributed in America from Canada and the United States to Argentina. It is usually found in open and humid habitats, being present in margins of rivers and streams and in lower fields; it is also present as a weed.

The following names are nom. nud. which correspond to this subspecies:

Panicum ammophilum Trin. ex Nees, Fl. Bras. Enum. Pl. 2(1): 164. 1829. nom. nud. *Panicum elliottii* Trin. ex Nees, Fl. Bras. Enum. Pl. 2(1): 170. 1829. nom. nud, as a synonym of *P. proliferum*.

Panicum proliferum Lam. var. *xantochlorum* Hackel ex Bertoni, Anales Ci. Parag.: 150. 1918.

Representative specimens examined

ARGENTINA. **Buenos Aires.** Tigre: Paraná Miní, *Cabrera 1607* (F, LP, NY).

BAHAMAS. Near Nassau, 25-IV-1903, *Curtiss 177* (MO, US).

BERMUDA. Hamilton, Millspaugh 126 (US); roadside, Hungry Bay, *Brown & Britton 1638* (NY).

BOLIVIA. **Beni.** Estancia El Porvenir, 50 km E of the Rio Mariqui on the road to Trinidad, 17-XI-1985, *Solomon 14771* (MO).

BRAZIL. **Distrito Federal.** West margin of Lagoa Paranoa, Brasília, 11-III-1966, *Irwin et al. 13875* (F, MO, NY, UB).

COLOMBIA. **Meta.** De Cumaral a San Nicolás, 10 km del desvío a San Nicolás, bosque secundario junto a arroyo y sabana, 480 m, 11-VI-1989, *Zuloaga 3867* (COL, SI).

CUBA. **Pinar del Río.** Remates, *Ekman 11211* (NY, US).

ECUADOR. **Archipielago de Colón.** Isla Santa Cruz, 3-VIII-1974, *van der Werff 1373* (MO).

FRENCH GUIANA. Pres de Loca-Loca, sur le Maroni, *Schnell 11424* (P).

GUADALUPE. Without locality, 1892, *Duss 3180* (MO).

HAITÍ. Massif da la Hatte, Miragoane, 15-XI-1926, *Ekman 7233* (US).

MÉXICO. **Puebla.** Laguna Epatlán, 11-XII-1942, *Miranda 2496* (MEXU).

PANAMÁ. **Los Santos.** 5 km SW of Chitre, 22-I-1966, *Tyson et al. 3034* (MO).

PARAGUAY. **Central.** Cerca del lago Ipacaray, *Hassler 12537* (BAF, G, GH, K, LIL, MO, NY).

PERÚ. **Loreto.** Mazán, slight above Baradero de Mazán, 11-X-1979, *Rimachi 4657* (MO).

SURINAM. 2 km above confluence with Lucie River, 3-VII-1963, *Maguire et al. 54053* (F, MO, NY).

URUGUAY. **Artigas.** Bella Unión, *Rosengurtt B-7373* (US).

VENEZUELA. **Anzoátegui.** Pariaguán, Laguna de los Patos, 17-VII-1946, *Burkart 17289* (SI, VEN).

3. Panicum gilvum Launert, Mitt. Bot. Staatssamml. München 8: 153, tab. 1, fig. 9. 1970. TYPE. Namibia. Ikahandja Distr., Pad Okahandja-Otjisazu, 12 km, 20-III-1912, *M. K. Dinter 2544* (holotype Z 000080546!; isotypes L 0044857!, M). (Fig. 2).

Panicum laevifolium Hack. var. *contractum* Pilg., Notizbl. Bot. Gart. Berlin-Dahlem 15: 448. 1940. Type. Namibia. Ikahandja Distr., Pad Okahandja-Otjisasu, 12 km, 20-III-1912, *M. K. Dinter 2544a* (holotype B †; isotype Z).

Plants annual, caespitose, 25-60 cm tall, culms decumbent, rooting at the lower nodes, and geniculate, then ascending, branching at the lower and upper nodes; internodes terete, (3-) 5-10 cm long, hollow, glabrous; nodes compressed, brownish, glabrous. Sheaths (4-)5-13 cm long, longer than the internodes, striate, glabrous; collar brown, glabrous. Ligules membranous-ciliate, 0.9-2(-2.4) mm long. Blades linear to linear-lanceolate, 3-18(-22) × 0.3-0.7 cm, flat, acute, sparsely pilose toward the base, otherwise glabrous, the margins pilose to scabrous. Inflorescence a terminal, contracted, partially included in the upper blades panicle, 3-10 × 0.2-0.6(-5) cm, oblong to elliptic; main axis triquetrous, glabrous, first order branches appressed to ascendent, alternate, triquetrous, pulvini glabrous; spikelets paired or solitary on pedicels 1-6 mm long, triquetrous, claviform. Spikelets long ellipsoid, 2.5-3.4 × 0.8-1 mm, glabrous, pale and tinged with purple; lower glume. 0.8-1 mm long, 1/5 to 1/4 the length of the spikelet, nerveless to 1-nerved, truncate to obtuse; upper glume and lower lemma subequal, membranous, acute, upper glume 9-11(-13)-nerved, lower lemma 9-nerved; lower palea 1 × 0.5 mm, hyaline, glabrous; lower flower absent; upper anthecium ellipsoid, 1.7-1.9 × 0.7-0.8 mm, pale, indurated, glabrous, smooth and shiny, upper lemma 7-nerved. Caryopsis broadly ellipsoid, 1.6-1.7 × 0.8-0.9 mm; hilum oblong, embryo 1/2 the length of the caryopsis.

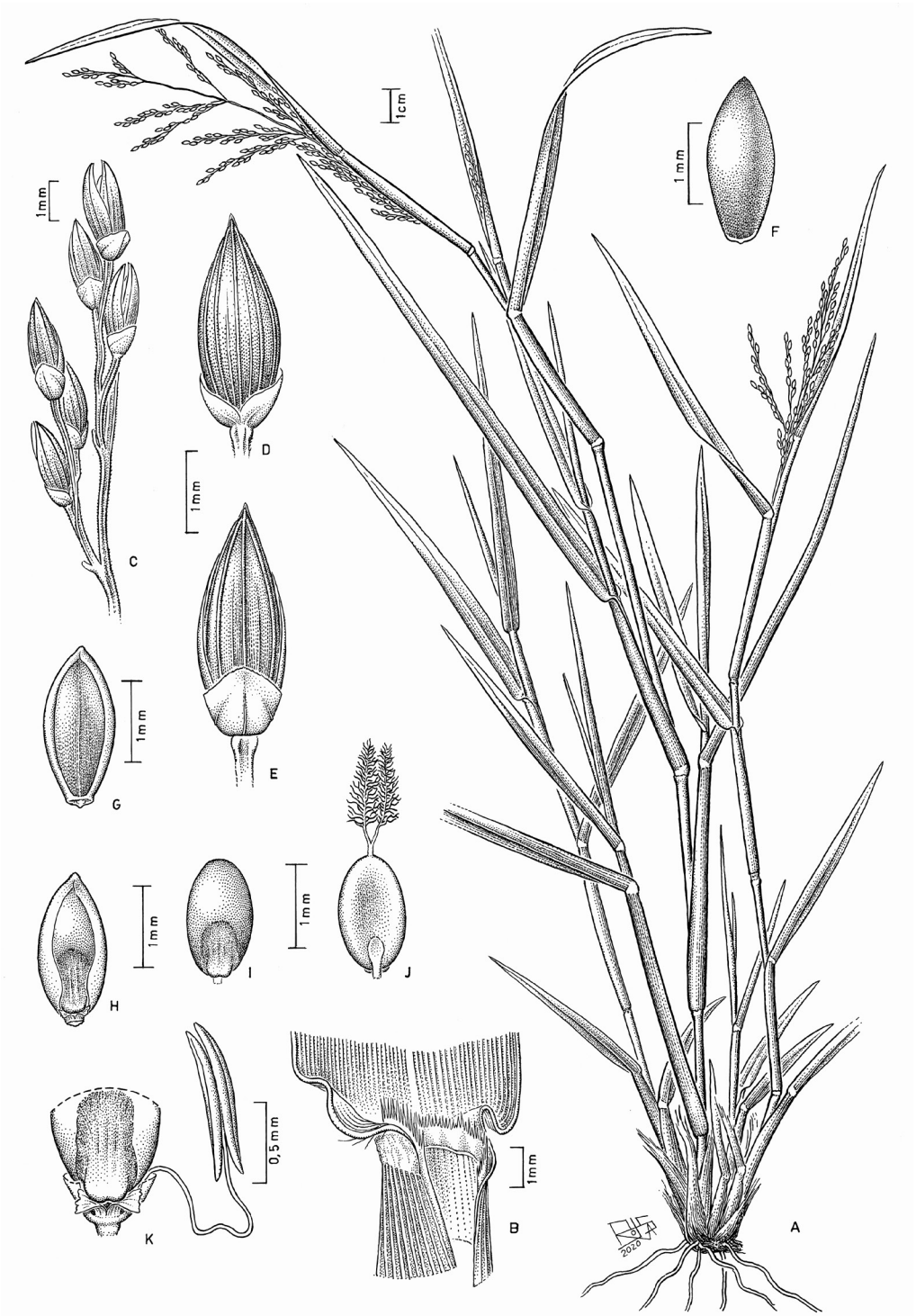

Fig. 2. *Panicum gilvum.* **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, dorsal view. **E,** Spikelet, ventral view. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Upper palea with caryopsis. **I,** Caryopsis, embryo view. **J,** Caryopsis, hilum view. **K,** Base of the upper palea and anther (A-B, H-K from *Smook 5807*, G; D-G from *Dinter 2544*, M).

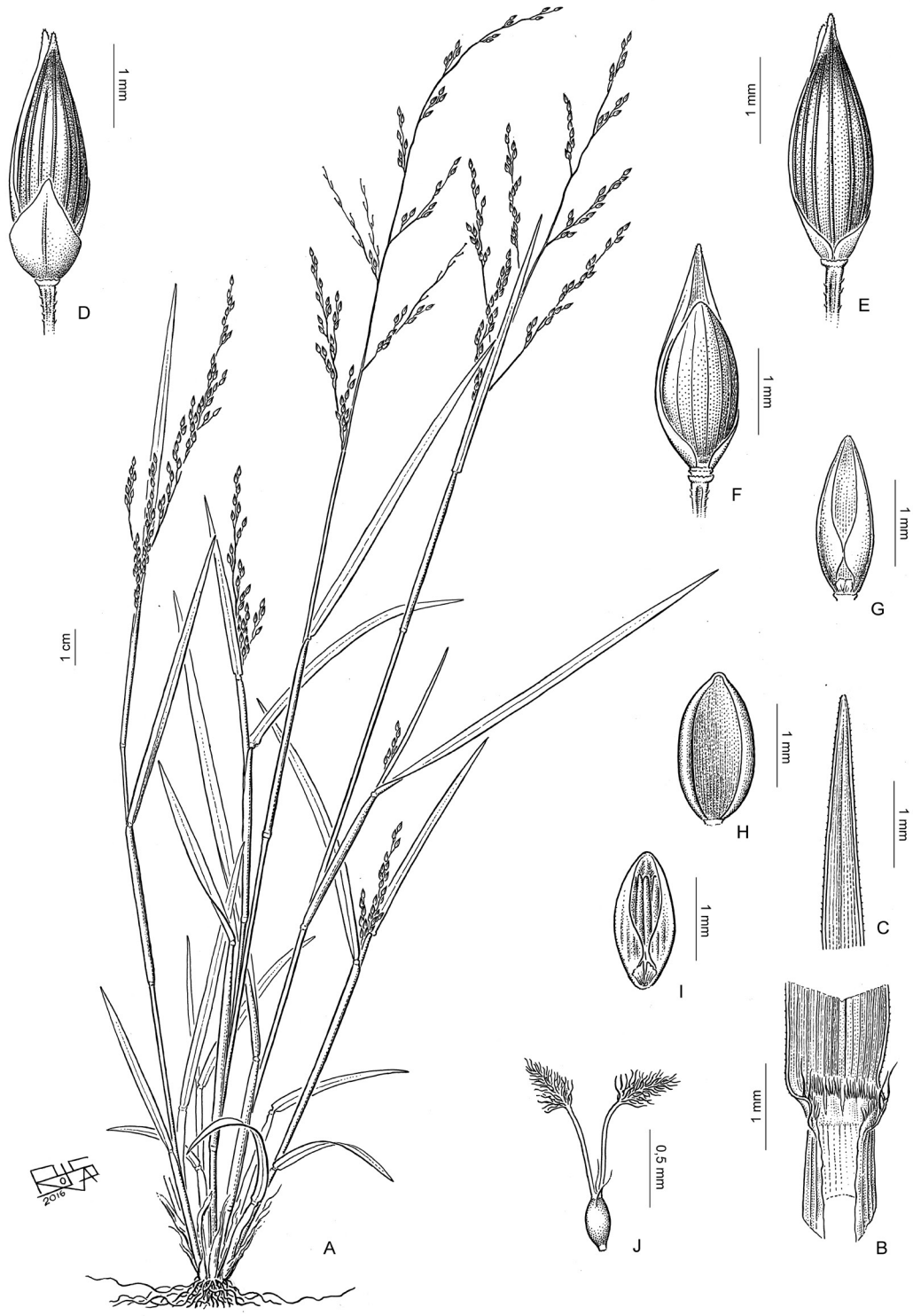

Fig. 3. *Panicum impeditum.* **A,** Habit. **B,** Ligule region. **C,** Upper portion of a blade. **D,** Spikelet, ventral view. **E,** Spikelet, dorsal view. **F,** Spikelet, dorsal view, without the upper glume. **G,** Lower palea. **H,** Upper anthecium, ventral view. **I,** Upper palea, anthers, and lodicules. **J,** Gynoecium. (From *Smook 6999*, US).

Distribution and ecology. Originally described from Namibia, it also grows in Botswana, Kenya, and South Africa; introduced in Australia and Europe; it is found in wet, sandy soils, frequently in ephemeral rainwater pan.

Observation. Related to *P. impeditum* (see comments under this species).

Representative specimens examined

BOTSWANA. In the bed of a fossil river valley at 20º43'S, 21º05'E, 23-III-1980, *Smith 3300* (K); near the Tsau-Xaixai road, 19º55'S, 21º24'E, 21-IV-1982, *Smith 3846* (K).

KENYA. South Baringo, Gobat, 11-XI-1960, *Knight 5086* (K).

NAMIBIA. Okongo, II-1917, *Dinter s.n.* (K).

SOUTH AFRICA. 40 km S of Dewetsdorp Farm Bloemspruit, 2-IV-1986, *Smook 5807* (G).

4. Panicum impeditum Launert, Mitt. Bot. Staatssamml. München 8: 150. 1970. TYPE. Namibia: Gideon Distr.: Mariental, 10-V-1955, *De Winter 3483* (holotype K 000255501!; isotypes M 0103858!, PRE 0033208-0!). (Fig. 3).

Plants annual, caespitose, (15-)20-50 cm tall; culms branching at the lower and middle nodes, erect; internodes 5-12 cm long, terete, hollow, striate, glabrous; nodes pale, glabrous. Sheaths striate, 4-11 cm long, usually shorter than the internodes, sparsely pilose toward the apex, otherwise glabrous; collar pale, glabrous. Ligules membranous-ciliate, 0.6-1 mm long, greenish to purple. Blades lanceolate, 4-11 × 0.3-0.5 cm, flat, acute, glabrous. Inflorescence a terminal, oblong and exserted panicle, 7-14 × 3-5 cm; peduncle terete, up to 12 cm long, glabrous, first order branches alternate, ascending, axis of the branches triquetrous, glabrous, pulvini glabrous, spikelets appressed, paired or solitary on first and second order branches; pedicels 0.5-5 mm long, claviform, glabrous; axillary inflorescences present, similar to ther terminal one. Spikelets long ellipsoid, (2.8-)3.1 × 1-1.1 mm, greenish, glabrous; lower glume 0.7-0.8 mm long, 1/4 the length of the spikelet, nerveless to 3-nerved, acute; upper glume and lower lemma subequal, 9-nerved; lower palea 2.3-2.4 × 0.9-1 mm, hyaline, glabrous, lower flower absent; upper anthecium ellipsoid, 2-2.1 × 0.9-1 mm, smooth, shiny, glabrous and indurate; upper lemma 5-nerved. Caryopsis ellipsoid, 1.3-1.4 × 0.9 mm; hilum punctiform, embryo 1/2 the length of the caryopsis.

Distribution and ecology. This species grows in wet places, around edges of dams and other water surfaces. It is restricted to South Africa and Namibia.

Observation. This species is related with *P. gilvum* Launert, a species also from southern Africa, which differs by having the panicles partially included on the upper leaves and shortly exserted, and spikelets with the upper glume 9-11(-13)-nerved.

Representative specimens examined

SOUTH AFRICA. **Cape.** 30.7 km NW of Britstown at turn off to Jagskerm on main road to Prieska, 16-III-1988, *Smook 6999* (US); 30.7 km SW of Britstown on road to Victoria West, 12-III-1998, *Smook 6877* (P); 36.4 km N of Victoria West, Fram Rietpoort, 15-III-1988, *Smook 6974* (P). **Northern Cape.** Northwest of Kimberley, Kopmansfonte in Agriculture Research Station Pan area, 4-III-1998, *Smook 10117* (C). **Orange Free.** 8 km from Luckhoff on road to Jacobsal, 30-III-1980, *Smook & Gibbs Russell 2453* (US).

5. Panicum lacustre Hitchc. & Ekman, Man. Grasses W. Ind.: 253, fig. 205. 1936. TYPE. Cuba. Pinar del Río: Laguna de la Máquina, 31-X-1923, *E. L. Ekman 17878* (lectotype here designated US 00132924!; isolectotypes B 10 0248983!, BAA 00000387!, BR 0000008408877!, DAO 000465583!, G 00099619!, GH 00135365!, ISC-v-0000574!, LD 1010829!, LIL 000085!, MICH 1127266!, MO 128363!, MVFA 0000436!, NY 00071083!, NY 00803749!, P 00740958!, R 0000076339!, S13-12944!, SI 002808!, US 00132923!, W 1959000033!). (Fig. 4).

Plants perennial, shortly rhizomatous, 100-150 cm tall; culms erect, with aerenchyma, with adventitious roots at the lower nodes; basal internodes short, terete, hollow, glabrous; nodes brownish, glabrous. Sheaths striate, with anastomosed veins, glabrous, the lower sheaths

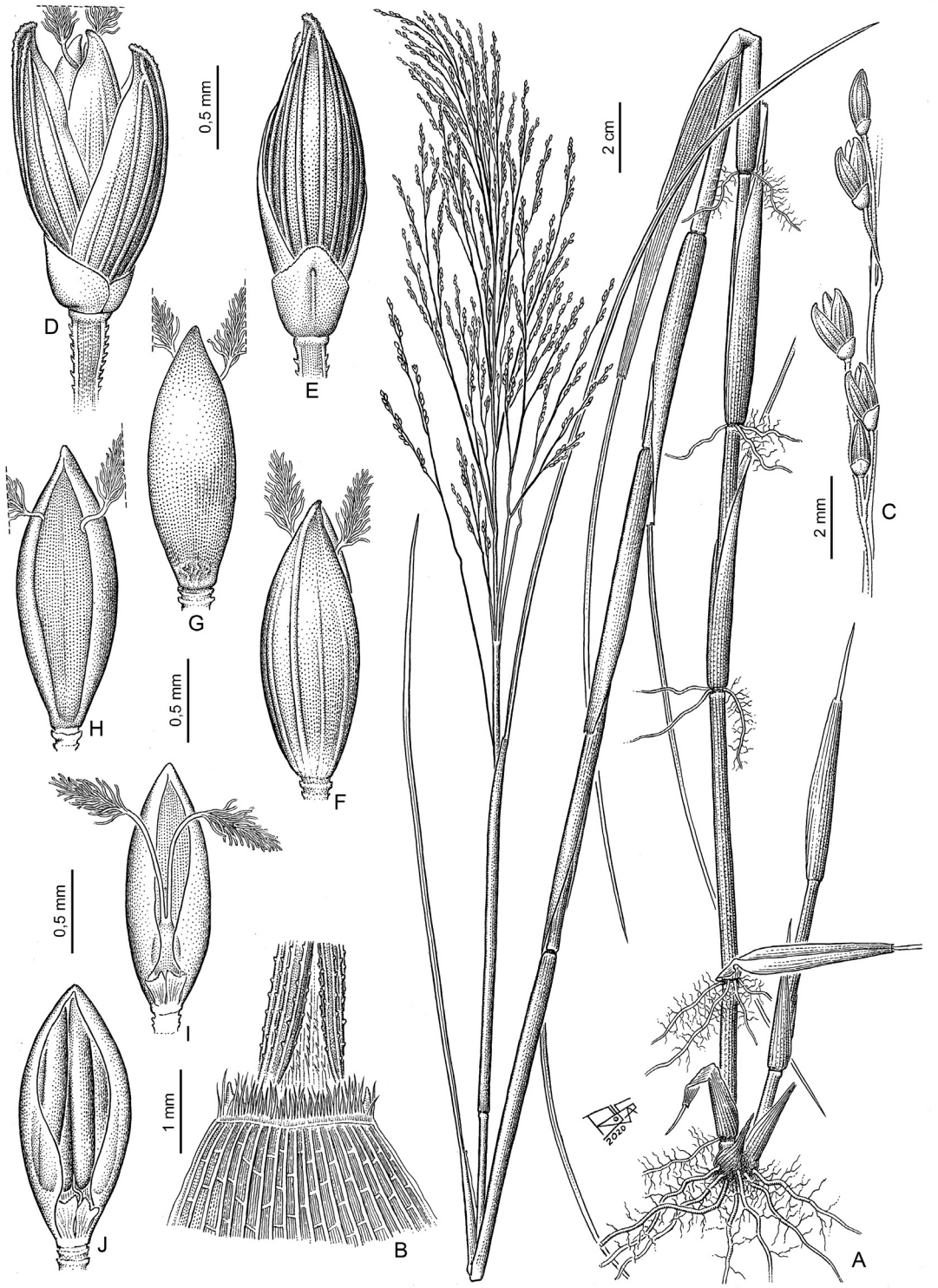

Fig. 4. *Panicum lacustre***. A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, lateral view. **E,** Spikelet, ventral view. **F,** Spikelet, dorsal view. **G,** Upper anthecium, dorsal view. **H,** Upper anthecium, ventral view. **I,** Upper lemma, lodicules and gynoecium. **J,** Upper lemma, lodicules and androecium. (From *Ekman 17878*, US).

shorter than the internodes, pale to purplish, the upper ones with membranous margins, the upper ones shortly pilose or glabrous. Ligules membranous-ciliate, ca. 2 mm long; collar brownish, glabrous. Blades linear-lanceolate, the lower ones reduced, the upper ones ca. 20 × 0.2 cm, the lower margins involute, then flattened, narrowed at the base, the apex long subulate, adaxial surface densely hispid toward the base, sparsely hispid at the apical portion, the abaxial surface scabrous, the margins scabrous. Inflorescence a terminal, exserted and multiflowered panicle 20-30 cm long; peduncle terete, scabrous; main axis wavy, scabrous, pulvini brownish, glabrous, first order branches alternate to opposite, axis of the branches and pedicels triquetrous, scabrous, spikelets paired and congested on short pedicels at the upper portion of the branches. Spikelets narrowly ellipsoid, 2 × 0,8 mm, glabrous, greenish or tinged with purple; lower glume 0.5 mm long, 1/4 the length of the spikelet, 3-nerved, ovate to truncate; upper glume and lower lemma subequal, acute, or the upper glume shorter and obtuse, 7-nerved; lower palea and lower flower absent; upper anthecium ellipsoid, 1.8 × 0.7 mm, whitish, smooth and glabrous, shiny. Caryopsis not seen.

Distribution and ecology. Species endemic of Cuba, where it is found in margins of lagoons and ponds.

Observation. This species is characterized by being a perennial species, with the lower blades reflexed and falling, and spikelets with the upper glume and lower lemma 7-nerved, the lower palea and lower flower absent.

Representative specimens examined

CUBA. **Pinar del Río.** Pinar del Río, in a small Laguna at km 12 of the carretera to La Colona, 28-X-1923, *Ekman 17822* (G); La Grifa, at a Laguna north of town, 14-VI-1920, *Ekman 11271* (G).

6. Panicum laevinode Lindl., Three Exped. Austral. 1: 238. 1838. TYPE. Australia. *Mitchell's expedition s.n. specimen no. 3* (lectotype CGE! [right-hand specimen), designated by S. Jacobs, Kew Bull. 40(3): 662. 1985; isolectotype W 0023593!].

Panicum withei J.M. Black, Trans. & Proc. Roy. Soc. South Australia 41: 632, tab. 39. 1917. TYPE. Australia. Strzelecki Creek, south-west of Innamincka, Cooper Creek, at Cuttapin corner, 27-IX-1916, *S. A. White s.n.* (lectotype AD 99140233!; isolectotype K 000674341!).

Plants annual, caespitose, 60-80(-120) cm tall, cataphylls pilose; culms erect, internodes cylindrical, 4.5-12 cm long, hollow, glabrous or pilose; nodes brownish, pilose. Sheaths 3-10 cm long, striate, densely covered with tubercullate caducous hairs or glabrous; collar pale, glabrous. Ligules membranous-ciliate, 1-1.2 mm long. Leaves lanceolate, 6-20 × 0.4-0.6 cm, flat, with tubercullate caducous hairs on the lower portion and the basal margins, otherwise glabrous, acute or acuminate. Inflorescence a lax, diffuse, many flowered panicle, 10-50 × 8-25 cm; peduncle up to 20 cm long, with tubercullate caducous hairs, main axis pilose, pulvini brownish, spikelets paired and adpressed on the branches, pedicels 1-6 mm long, claviform, scaberulous; axillary inflorescences absent. Spikelet long ovoid, 2.5-3.4 × 0.9-1 mm, glabrous, pale; lower glume 0.6-1.1 mm long, 1/4 to 1/3 the length of the spikelet, acute or truncate, glabrous, 1-3-nerved; upper glume and lower lemma subequal, acute, 7-9-nerved; lower palea 1-1.8 × 0.5-0.6 mm, hyaline, glabrous; lower flower absent; upper anthecium ellipsoid, 1.8-2 × 0.8-1 mm, shorter than the upper glume and lower lemma, pale, olivaceous at maturity, indurated, smooth and shiny, upper lemma 5-7-nerved, with simple papillae toward the apex. Caryopsis ellipsoid, 1.7 × 0.8 mm; hilum oblong, embryo less than half the length of the caryopsis.

Distribution and ecology. Species endemic of Australia, it grows in humid woodlands, and semiarid and arid grasslands.

Observation. Webster (1987) stressed that this species is an important forage species, widely distributed in arid and semiarid central Australia.

Representative specimens examined

AUSTRALIA. **Northern Territory**. On nutwood Downs Station Queensland, 2-V-1947, *Blake 17591* (US); about 24 miles NE of Anthony Lagoon, 15-V-1947, *Blake 17794* (US). **Queensland**. Frensham, near Kynuna, 13-V-1936, *Blake 11491* (K);

64 miles south of Richmond, 20-VI-1954, *Lazarides 4462* (US); 26 miles NW of McKinlay, 20-III-1954, *Lazarides 4455* (US).

7. Panicum luzonense J. Presl, Reliq. Haenk. 1(4-5): 308. 1830. TYPE. Philippines. Luzon, without locality, *T. Haenke s.n.* (lectotype PR-612343!, designated by J. F. Veldkamp as "holotype", Blumea 41: 195. 1996; isolectotypes LE 800.1!, fragment, W 0021811!, fragment). (Fig. 5).

Panicum caesioglaucum Nees ex Steud., Syn. Pl. Glumac. 1: 75. 1853. TYPE. Indonesia, Java (not located).

Panicum extensum Steud., Syn. Pl. Glumac. 1: 72. 1853, nom. illeg. hom., non Desvaux, 1831. TYPE. Philippines. Without locality, *H. Cuming 652* (lectotype P!, designated by J. F. Veldkamp, Blumea 41: 195. 1996; isolectotypes BM!, G 00374956!, K 000290312!, L 0044818!, W 0021810!, W 18890086675!).

Panicum reticulatum Thwaites ex Trimen, J. Bot. 23: 271. 1885, nom. illeg. hom., non Torr., 1853. *Panicum caesium* Nees ex Hook. f., Fl. Brit. India 7(21): 48. 1897[1896], nom. illeg. hom., non Nees, 1841. *Panicum cruciabile* Chase, J. Arnold Arbor. 20: 309. 1939. TYPE. Sri Lanka: Hewesse, Pasdun Korle, 1868, *G. H. K. Thwaites 3890* (lectotype PDA, designated by A. Chase, J. Arnold Arbor. 20: 309. 1939; isolectotypes G 00176537!, G 00176538!, K 000245241!, K 000245242!, P 00740923!, US-1715318!, US-1298826!, US-Z1445622!, W 18890163875!). Syntype. Culloden Estate, near Kalutara, 1881, *W. Ferguson s.n* (not located).

Panicum cambogiense Balansa, J. Bot. (Morot) 4(7): 142. 1890. TYPE. Cambodia, without locality, *A. Godefroy 62* (lectotype L 0044815!, designated by J. Veldkamp, Blumea 41: 195. 1996; isolectotypes K 000290303!, fragment, P!). Syntype. Cambodia. Without locality, 5-VI-1875, *A. Godefroy 257* (L 0044814!).

Panicum oryzetorum Balansa, J. Bot. Morot. 4: 141. 1890. TYPE. Vietnam, Tonkin, Ouonbi, 1-XI-1885, *B. Balansa 472* (lectotype here designated G 00176526!; isolectotypes G 00374960!, L 0056274!, L 0056275!, P 01859733!, US 00139821! ex G, US 00139822 ex L). Syntype. Vietnam, Tonkin, Ouonbi, Nov 1885, *B. Balansa 1628* (G 00374958!, L 0056276!, P 01859731!, US 00139822! fragment ex L).

Plants annual, 30-90(-150) cm tall, culms branching at the base and at the upper nodes, erect or geniculate ascending; internodes 2-8 cm long, terete, hollow, striate, pilose; nodes densely pilose, compressed. Sheaths striate, open, 1.5-7 cm long, covered with urticant hairs, as long as or shorter than the internodes. Ligules membranous-ciliate, 1-1.5 mm long, with long hairs beneath at the base of the blade; collar pilose. Blades lanceolate, 4-11(-40 × 0.4-0.7(-1.6) cm, flat, subcordate, its surface covered with tubercullate hairs, the margins ciliate. Inflorescence a lax, terminal panicle, 12-40 × 10-24 cm; main axis triquetrous, wavy, hispid, covered with tubercullate hairs, pulvini hispid, first and second order branches divergent, alternate, scabrous and hispid, spikelets paired on second order branches, pedicels 2-10 mm long, scabrous, claviform; axillary panicles present, similar to the terminal one. Spikelets broadly ellipsoid, 2-2.5 × 1-1.1 mm, glabrous, greenish to pale; lower glume 0.7-0.8 mm, 1/3 the length of the spikelet, acute, 5-nerved; upper glume and lower lemma subequal, membranous, 7-9-nerved, the nerves anatomosed toward the apex, acute; lower palea 2-2.1 × 0.6-0.7 mm, hyaline, glabrous; lower flower absent; upper anthecium ellipsoid, 1.8-1.9 × 0.8-0.9 mm, whitish, indurate, glabrous; upper lemma 5-nerved. Caryopsis broadly ellipsoid, 1.3-1.4 × 0.9-1 mm, whitish; hilum punctiform, embryo 1/3 the length of the caryopsis.

Distribution and ecology. Asia tropical and temperate, China and eastern Asia, India, Sri Lanka, Indo-China, Malesia, Papuasia and Australia. It is a frequent, and variable, species in open and humid places, also present in beaches, in roadsides and a weed in tea and rubber plantations (Veldkamp, 1996), between sea level and 1300 m a.s.l.

Observations. This species is characterized (Chase, 1939) by the presence of short irritating hairs; also axillary inflorescences are conspicuous in all specimens. When describing *Panicum oryzetorum*, Balansa cited two syntypes from Vietnam, *B. Balansa 472* and *1628*. Of these, the specimen *Balansa 472* from G is selected as the lectotype, since is a complete specimen and fully agrees with the protologue of the species. For comments on other typifications see Veldkamp (1996).

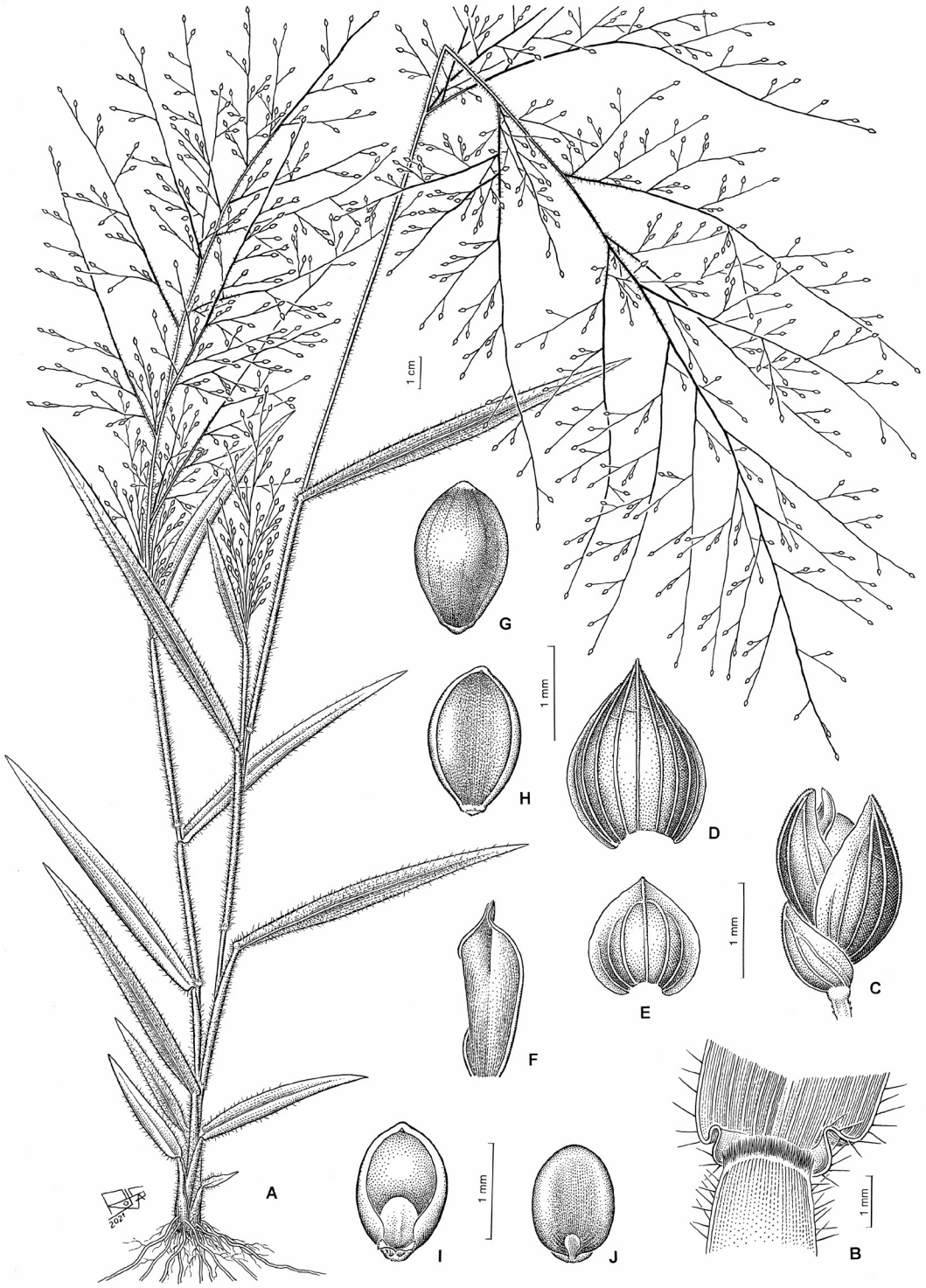

Fig. 5. *Panicum luzonense.* **A,** Habit. **B,** Ligule region. **C,** Spikelet, lateral view. **D,** Upper glume. **E,** Lower glume. **F,** Lower palea. **G,** Upper anthecium, dorsal view. **H,** Upper anthecium, ventral view. **I,** Upper palea with caryopsis, embryo view. **J,** Caryopsis, hilum view. (A-B from *Balansa 1628*, G; C-J from *Balansa 472*, G).

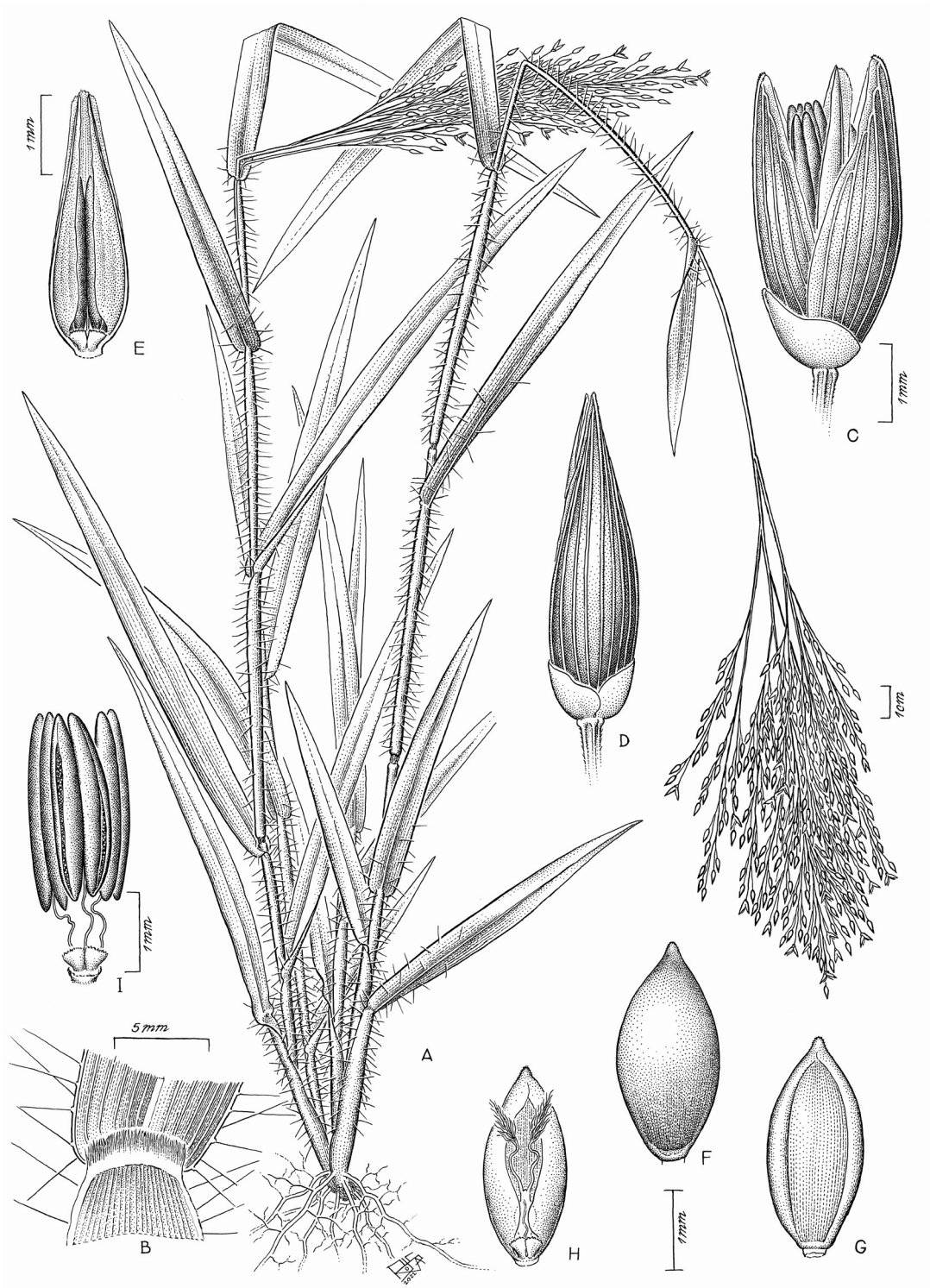

Fig. 6. *Panicum madipirense.* **A,** Habit. **B,** Ligule region. **C,** Spikelet, lateral view. **D,** Spikelet, dorsal view. **E,** Lower palea, anthers and lodicules. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Upper palea with gynoecium and lodicules. **I,** Lodicules and stamens caryopsis, embryo view. **J,** Caryopsis, hilum view. (From *Barker s.n.*, US).

Representative specimens examined

CAMBODIA. **Chhnang**, VII-1921, *Petelot 251* (P).

MALAYSIA. Kampong Naka, Kedah, 9-IX-1933, *Holttum s.n.* (K); Kedah, 4-VIII-1919, *Vesterdal 4* (C); Kelantan, Sungal Lebir at Bukit Batu Papan, 7-VII-1935, *Henderson s.n.* (P 01931258); Kampong Naka, Kedah, 9-IX-1933, *Henderson s.n.* (P 01931259); Singapore, Raffles College Ground, 14-XI-1932, *Nor s.n.* (P 01931260).

PHILIPPINES. **Rizal.** Antipolo, X-1913, *Ramos s.n.* (MO-755528); Taytay, V-1913, *Merrill 1238* (G, MO, P); Luzon, X-1913, *Ramos 2057* (G); Sulu, Tawitawi, VII-1924, *Ramos s.n.* (P 01931252); Pampanga, Arayat, IX-1905, *Merrill 1229* (G).

THAILAND. Chantaburi, Soi Dao, 7-VI-1963, *Larsen 9864* (C); Phitsanulok, Nakawn Thai Road, 24-VII-1966, *Larsen et al. 850* (K); N Srithamarat, Kapiat, 28-VI-1956, *Snan 715* (K); Kuan Karong, 40 km northwest of Satun, *Charoenphol et al. 3789* (C).

8. Panicum madipirense Mez, Bot. Jahrb. Syst. 57: 189. 1921. TYPE. Tanzania. Mbeya District, Kiwere, 28-II-1909, *E. Zimmerman s.n., Inst. Amani 2582* (lectotype here designated EA 000000481; isolectotypes K 000255581!, US 00148269!). Syntype: Tanzania. Mbeya District, *E. Zimmerman s.n., Inst. Amani 2583* (K 000255581!, US 00148269!, another fragment). (Fig. 6).

Plants annual, caespitose, 30-120 cm tall, culms erect, branching at the base; internodes terete, 4-15 cm long, glabrous, hollow; nodes brownish, compressed, glabrous. Sheaths 4-12 cm long, as long as or shorter than the internodes, 4-12 cm long, densely hispid to glabrous; collar pale, glabrous. Ligules membranous-ciliate, 1-1.2 mm long. Blades lanceolate, 12-26 × 0.8-1.2 cm, cordate, acuminate, glabrous or hispid toward the base, the margins ciliate. Inflorescence terminal, exserted; peduncle ca. 15-20 cm long, glabrous; panicle lax, open, multiflowered, 14-25 × 5-12 cm, pyramidal, first order branches alternate, divergente, axis of the branches scaberulous; pedicels claviform, 5-12 mm long, scaberulous. Spikelets long ellipsoid, 3.2-4 × 0.9-1 mm, pale or tinged with purple, solitary, glabrous; lower glume 0.9 mm long, less than 1/3 the length of the spikelet, 1(-3)-nerved, acute; upper glume and lower lemma subequal, acute, upper glume 9-11-nerved, lower lemma 9-nerved; lower palea elliptic, 2.9 × 0.8 mm, hyaline, glabrous; lower flower staminate, anthers 3; upper anthecium ellipsoid, 2.7 × 1 mm, shorter than the upper glume and lower lemma, pale, glabrous, indurated, with papillae at the apex of lemma and palea. Caryopsis not seen.

Distribution and ecology. Africa, where it is found in swamps and damp areas.

Representative specimens examined.

MALAWI. South Nyasa, Damo, I-1929, *Barker s.n.* (P, US 2975890).

TANZANIA. Near Ukenyule, Mbeya, I-1963, *Proctor 2370* (US).

9. Panicum mlahiense Renvoize, Kew Bull. 34(3): 554. 1979(1980). TYPE. Tanzania. Ulanga District, Mlahi, Kilombero River, 8º17´S, 37º05´E, 5-V-1977, *K. Vollesen 4563* (holotype C 10001151!; isotype K 000255579!). (Fig. 7).

Plants annual, 30-60 cm tall, culms erect, branching at the middle and upper nodes; internodes cylindrical, 3-15 cm long, striate, hollow, glabrous; nodes brownish, glabrous. Sheaths striate, 3-5 cm long, shorter than the internodes, glabrous. Ligules membranous-ciliate, 1-1.5 mm long, the ciliate portion short; collar glabrous. Blades lanceolate, 3-6(-10) × 0.3-0.4 cm, rounded at the base, flat or with involute margins, acuminate, glabrous. Inflorescence a terminal, lax panicle, 5-17 × 5-12 cm; peduncle 5-15 cm long, glabrous; main axis triquetrous, glabrous, pulvini glabrous, first order branches alternate, divergent or reflexed, spikelets solitary or paired on the branches, pedicels 2-7 mm long, claviform, scaberulous; axillary panicles present, similar to the terminal one. Spikelets long ovoid, 2.2-2.5 × 0.8-1.2 mm, pale to purplish, glabrous; lower glume 0.8-0.9 mm long, ca. 1/3 the length of the spikelet, 3-5-nerved, acute to truncate; upper glume and lower lemma subequal, membranous, upper glume 9-nerved, lower lemma glumiform, 7-9-nerved; lower palea 1.2-1.3 x 0.4-0.5 mm, hyaline, glabrous; lower flower absent;

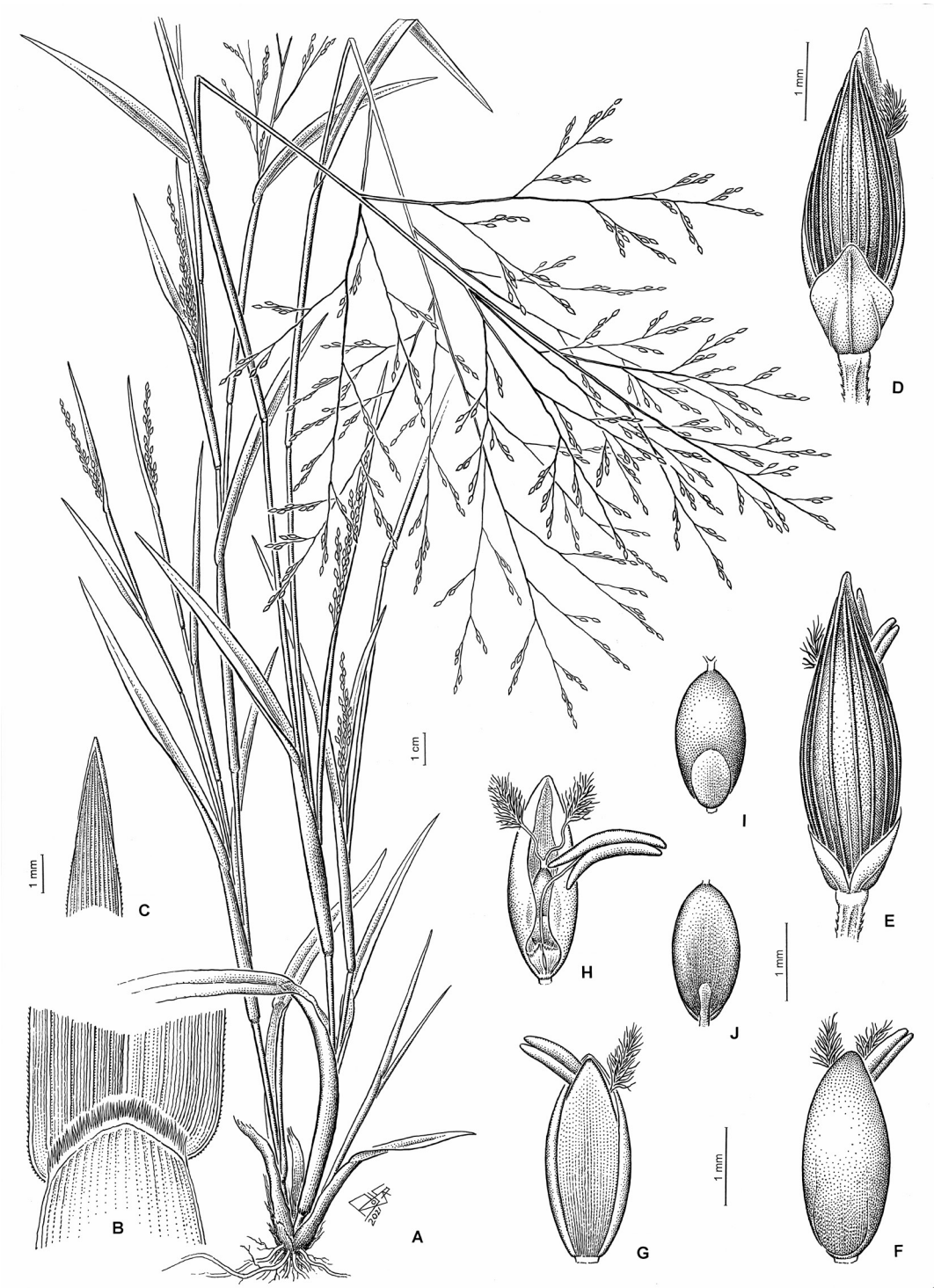

Fig. 7. *Panicum mlahiense.* **A,** Habit. **B,** Ligule region. **C,** Upper portion of a blade. **D,** Spikelet, ventral view. **E,** Spikelet, dorsal view. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Upper palea, lodicules, anthers and gynoecium. **I,** Caryopsis, embryo view. **J,** Caryopsis, hilum view. (A-C from *Phipps & Vesey-FitzGerald 3220*, K; D-J from *Webster A251*, K).

upper anthecium ovoid, 1.7-2 × 0.8-1 mm, pale, glabrous, indurated, smooth and shiny, upper lemma 7-nerved, with simple papillae toward the apex. Caryopsis ovoid, 1.3-1.4 × 1-1.1 mm, whitish, brown at maturity; hilum oblong, embryo less than 1/2 the length of the caryopsis.

Distribution and ecology. Species restricted to Zambia and Tanzania, it grows (according to Renvoize, 1989) in riverine thickets and laterite pans, between 280-1800 m a.s.l.

Representative specimens examined

ZAMBIA. Moporokoso, Mugombwe, 15-IV-1961, *Phipps & Vesey-FitzGerald 3220* (K); Abercorn, 27-III-1959, *Webster A251* (K); Uningi Pans, Abercorn, 5-III-1965, *Richards 17933* (K).

10. Panicum obseptum Trin., Gram. Panic.: 149. 1826. TYPE. Australia. "V. spp. nov. Holl.", *J. Lindley s.n.* (holotype LE 0857-01!). (Fig. 8).

Plants perennial, shortly rhizomatous, 20-50 cm tall, stolons present or absent; culms decumbent at the lower nodes, then erect, internodes cylindrical, 2.5-8 cm long, hollow, glabrous; nodes brownish, pilose. Sheaths 2-3 cm long, usually shorter than the internodes, striate, with long whitish hairs at the base and toward the apex; collar pale or tinged with purple. Ligules membranous-ciliate, ca. 0.5-1 mm long. Leaves linear-lanceolate, 2.5-11 × 0.2-0.3 cm, flat or with involute borders, reflexed, membranous, glabrous. Inflorescence a shortly exserted or partially included panicle, 3-4 × 1.5-2 cm, contracted; peduncle striate, glabrous, main axis striate, glabrous, pulvini glabrous, spikelets paired on first order branches, axis of the branches scaberulous; pedicels 1-5 mm long, claviform, scaberulous; axillary inflorescences absent. Spikelets long ellipsoid, 2.7-3 × 0.9-1 mm, glabrous, pale and tinged with purple; lower glume 0.4-0.5 mm long, 1/4 the length of the spikelet, acute to truncate, nerveless to 1-nerved; upper glume and lower lemma subequal, acute, 7-nerved, membranous; lower palea and lower flower absent; upper anthecium long ellipsoid, 2.4-2.6 × 0.9-1 mm, pale, smooth, indurated and glabrous, brownish at maturity, not early deciduous. Caryopsis not seen.

Distribution and ecology. It is endemic to Australia, where it grows in humid areas at edge of lagoons.

Representative specimens examined

AUSTRALIA. **New South Wales**. Ca. 1 mile by road NNE of Cattai, 7.5 miles NE of Windsor, 21-I-1969, *Coveny 774* (K). **Queensland**. Stanthorpe, 11-III-1931, *Hubbard 5732* (K).

11. Panicum paludosum Roxb., Fl. Ind. 1: 310. 1820. *Panicum decompositum* var. *paludosum* (Roxb.) Trimen, Syst. Cat. Fl. Pl. Ceylon: 105. 1885. *Panicum repens* var. *paludosum* (Roxb.) Kuntze, Revis. Gen. Pl. 3(3): 363. 1898. *Panicum proliferum* var. *paludosum* (Roxb.) Stapf, Fl. Cap. 7. 407. 1899. *Lousiella paludosa* (Roxb.) Landge, Phytotaxa 512(2): 109. 2021. TYPE. [India]. "It grows generally in sweet water amongs the Circar mountains", *W. Roxburgh s.n.* (lectotype K 00113133!, designated by I. M. Turner et al., Gard. Bull. Singapore 71(1): 28. 2019; possible isolectotypes BM 000795696!, BM 000959566!, US 00139833!, fragment ex BM). (Fig. 9).

Panicum telmatodes Balansa, Bull. Soc. Bot. France 19: 324. 1872. TYPE. New Caledonia. Marais des environs de Boural, 4-IV-1869, *B. Balansa 895* (lectotype here designated P 00625052!; isolectotypes P 00625050!, P 00625051!).

Plants annual, (20-)30-150 cm tall, aquatics, with culms with aerenchyma, decumbent and rooting at the lower nodes, floating, then erect; internodes 4-20 cm long, compressed, glabrous, hollow, with aerenchyma; nodes conspicuous, brownish, glabrous. Sheaths striate, shorter than the internodes, 5-15 cm long, glabrous; collar brownish to black, glabrous. Ligules membranous ciliate, 3-4 mm long. Blades lanceolate, (5-)12-40 × (0.5)-0.7-2 cm, flat, rounded to subcordate at base, glabrous, the midnerve manifest. Inflorescence a terminal, lax and multiflowered panicle, 6-25 × 6-15 cm. exserted; peduncle terete, glabrous, main axis glabrous, lower branches whorled, then alternate to subopposite, pulvini glabrous, spikelets paired and appressed on triquetrous, scabrous branches, pedicels 2-6 mm long, claviform, scabrous.

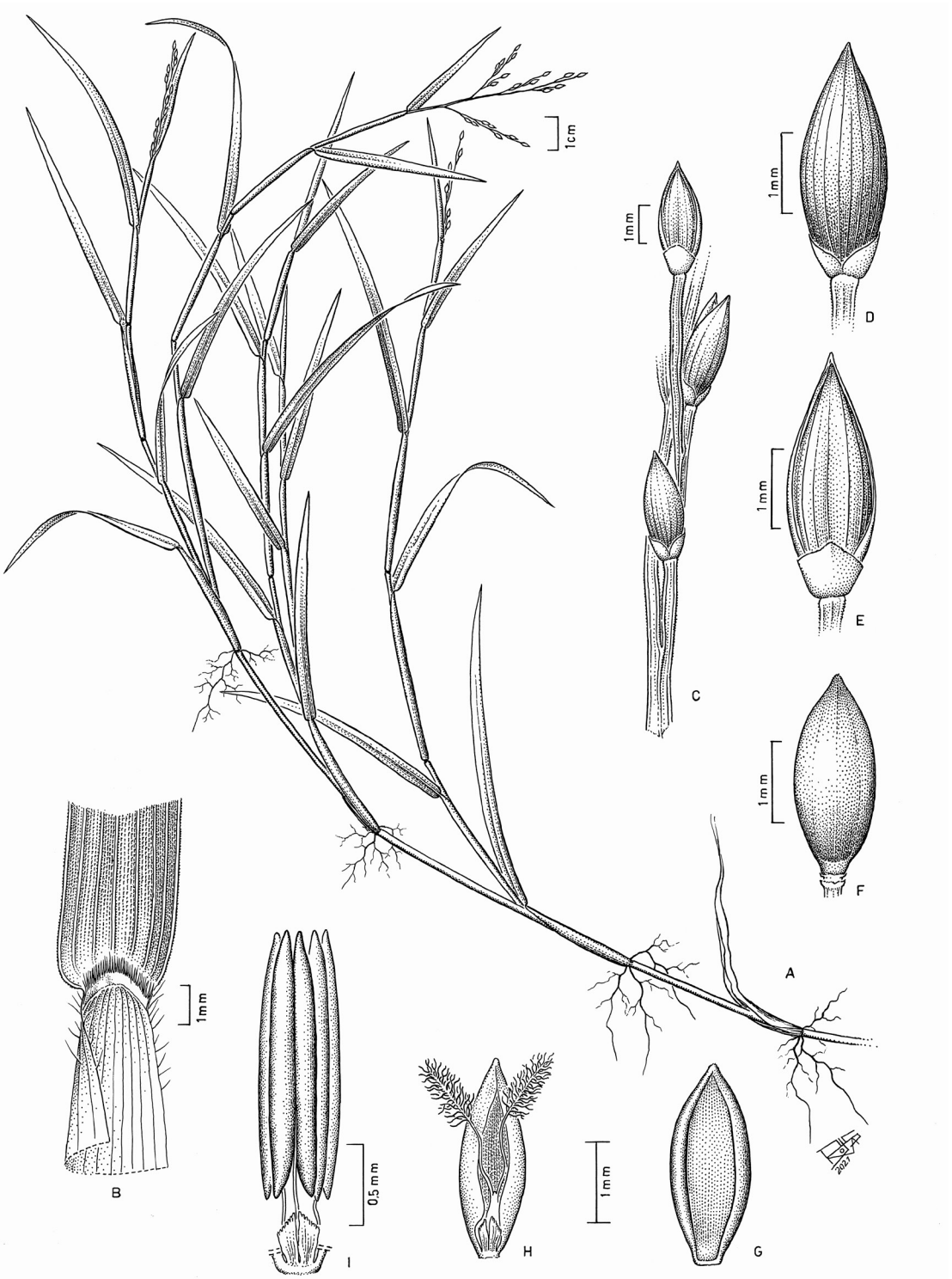

Fig. 8. *Panicum obseptum.* **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, dorsal view. **E,** Spikelet, ventral view. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Upper palea with lodicules, anthers and gynoecium. **I,** Lodicules and anthers. (From *Hubbard 5732*, K).

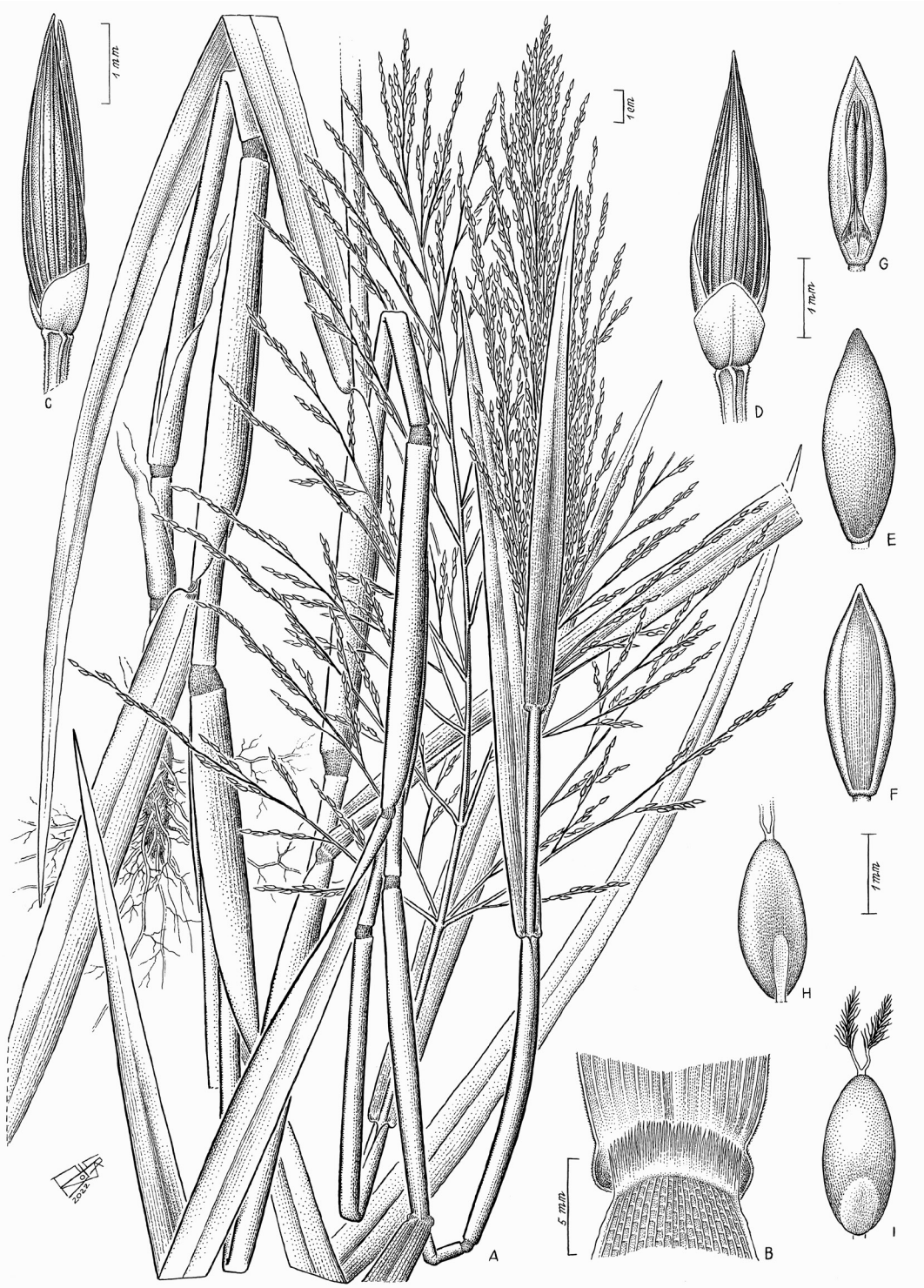

Fig. 9. *Panicum paludosum.* **A,** Habit. **B,** Ligule region. **C,** Spikelet, ventral view. **D,** Spikelet, dorsal view. **E,** Upper palea with lodicules and anthers. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Caryopsis, hilum view. **I,** Caryopsis, embryo view. (From *Balansa 4578,* P).

Spikelets lanceolate, 3-4(-4.2) × 0.9-1.1 mm, glabrous, greenish; lower glume 0.6-1.3 mm long, 1/4 the length of the spikelet, the apex truncate to acute, nerveless to 1-nerved; upper glume and lower lemma subequal, acuminate, 7-9-nerved; lower palea and lower flower absent; upper anthecium long ellipsoid, 2.4-2.6 × 0.9-1 mm, shorter than the upper glume and lower lemma, pale, indurated, smooth and glabrous; upper lemma 5-nerved. Caryopsis not seen.

Distribution and ecology. This species grows in India, Sri Lanka, China, Taiwan, Thailand, Malesia, Vietnam, New Guinea, Japan, the Philippines, Australia and New Caledonia. It is found floating in shallow water, ditches, and rice fields, between sea level and 2000 m a.s.l.

Observation. Recently, Landge & Shinde (2021) transferred this species to the genus *Louisiella* Hubbard & Leonard, based on morphological characters and without a molecular analysis of this species or its comparison with both species of *Louisiella*. It should be noted that the presence of culms with aerenchyma, and a linear hilum (which does not look linear in the published figure of the authors) is also present in species of sect. *Dichotomiflora*. For this reason, in this contribution *P. paludosum* is considered with this section and *Panicum*, until there is additional evidence that supports this segregation.

Shouliang & Renvoize (2006) cited *P. dichotomiflorum* as apparently an introduced species in China, including *P. paludosum* as a synonym. However, *P. paludosum* is distinguished from *P. dichotomiflorum* by being a perennial, aquatic species, with culms with aerenchyma, and spikelets 3-4.2 mm long (vs. plants annual, non aquatic, with culm herbaceous, and spikelets 2-3 mm long in *P. dichotomiflorum*).

Veldkamp (1996) indicated that it is a "favourite fodder of elephants and cattle. In India flour is used for making cakes".

Representative specimens examined

AUSTRALIA. **Queensland**. Without locality, *Dietrich 1548* (P); Bauple, Wide Bay, 10-VI-1945, *Clemens s.n.* (SI-51923).

CHINA. **Kwangtung**. Guangdong, Pakhoi, 20-IX-1921, *Hitchcock 19234* (US); Kowloon, 22-V-1941, *Taam 2059* (G).

INDIA. Belatal, 2-IV-1962, *Bhallachoryya s.n.* (MO-3738145); Tirap River Valley, 12.4 mile mark on Ledo Road, 6-IX-1945, *Juan s.n.* (G 00375026).

JAPAN. Mie, Honshu, Kuwana-gun, 31-VII-1964, *Shimizu 14370* (C).

NEW CALEDONIE. Diahot, *Vieillard 1470* (P).

PHILIPPINES. **Luzon**. Cagayan, III-1909, *Ramos 7429* (P); Benguet, Baguio, III-1904, *Elmer 5972* (G).

SRI LANKA. Ruhuna National Park, Block 2; at Walaskema, 31-VII-1969, *Cooray s.n.* (P 001883373).

TAIWAN. Tapieh, 29-IV-1903, *Faurie 731* (P); Tomita-cho, Taihoku-shi, 14-IX-1932, *Tanaka & Shimada 11191* (G).

THAILAND. Chiengmai, Doi Sutep, *Sorensen et al. 4475* (C).

VANUATU. Lac au pied du volcan de Tanua, 7-V-1970, *Schmid 3197* (P); Eramanga, IX-1858, *Cuming 18* (G).

VIETNAM. Taai Wong Mo Shan, near Chuk-phai, Ha-coi, Tonkin, V-1939, *Tsang s.n.* (C, P 01883469); Son Tay, 10-VIII-1885, *Balansa 1627* (P); Hanoi, 28-V-1891, *Balansa 4578* (P); Ouombi, 19-XI-1885, *Balansa 471* (P).

12. Panicum perangustatum Renvoize, Kew Bull. 44(3): 545. 1989. TYPE. Zambia. Kasama, Misamfu, 22-I-1961, *E. A. Robinson 4293* (holotype K!; isotype PRE 0592240-0!). (Fig. 10).

Plants annual, 20-30 cm tall, culms geniculate at base, then ascending, conspicuously branching at the lower and middle nodes; internodes 2-8 cm long, hollow, striate, glabrous, greenish to purplish; nodes pale, glabrous. Sheaths 2-6 cm long, as equal or shorter than the internodes, striate, pilose on the upper margins, otherwise glabrous, greenish or purple. Ligules membranous-ciliate, 1 mm long; collar pale, glabrous to sparsely pilose. Blades linear, 4-10 × 0.2-0.5 cm, flat to involute, acute, the lower margins pilose, otherwise glabrous. Inflorescence a terminal, contracted panicle, 4-5 × 0.5-0.7 cm, shortly exserted and partially included in the upper leaves; main axis triquetrous, glabrous, first order branches appressed, pulvini glabrous, spikelets paired and appressed on first order branches, pedicels 2-6 mm long, claviform, glabrous.

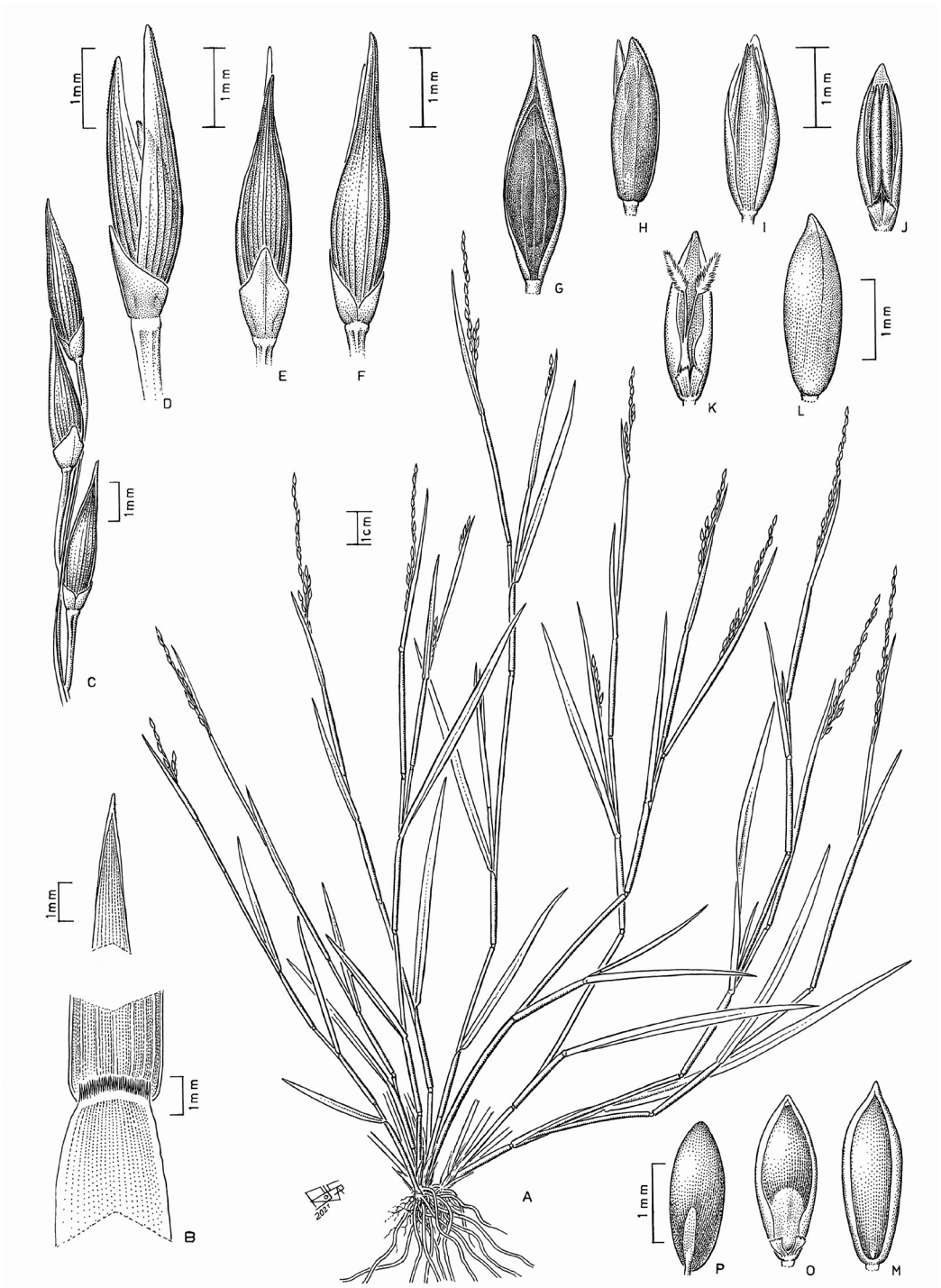

Fig. 10. *Panicum perangustatum.* **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, lateral view. **E,** Spikelet, ventral view. **F,** Spikelet, dorsal view. Upper anthecium, dorsal view. **G,** Lower lemma and upper anthecium, dorsal view. **H-L,** Upper anthecium, dorsal view **I,** Upper anthecium, ventral view **J,** Upper palea, lodicules and anthers. **K,** Upper palea, lodicules and gynoecium. **M,** Upper anthecium, ventral view. **N,** Caryopsis, hilum view. **O,** Upper palea and caryopsis, embryo view. (From *Robinson 4293,* K).

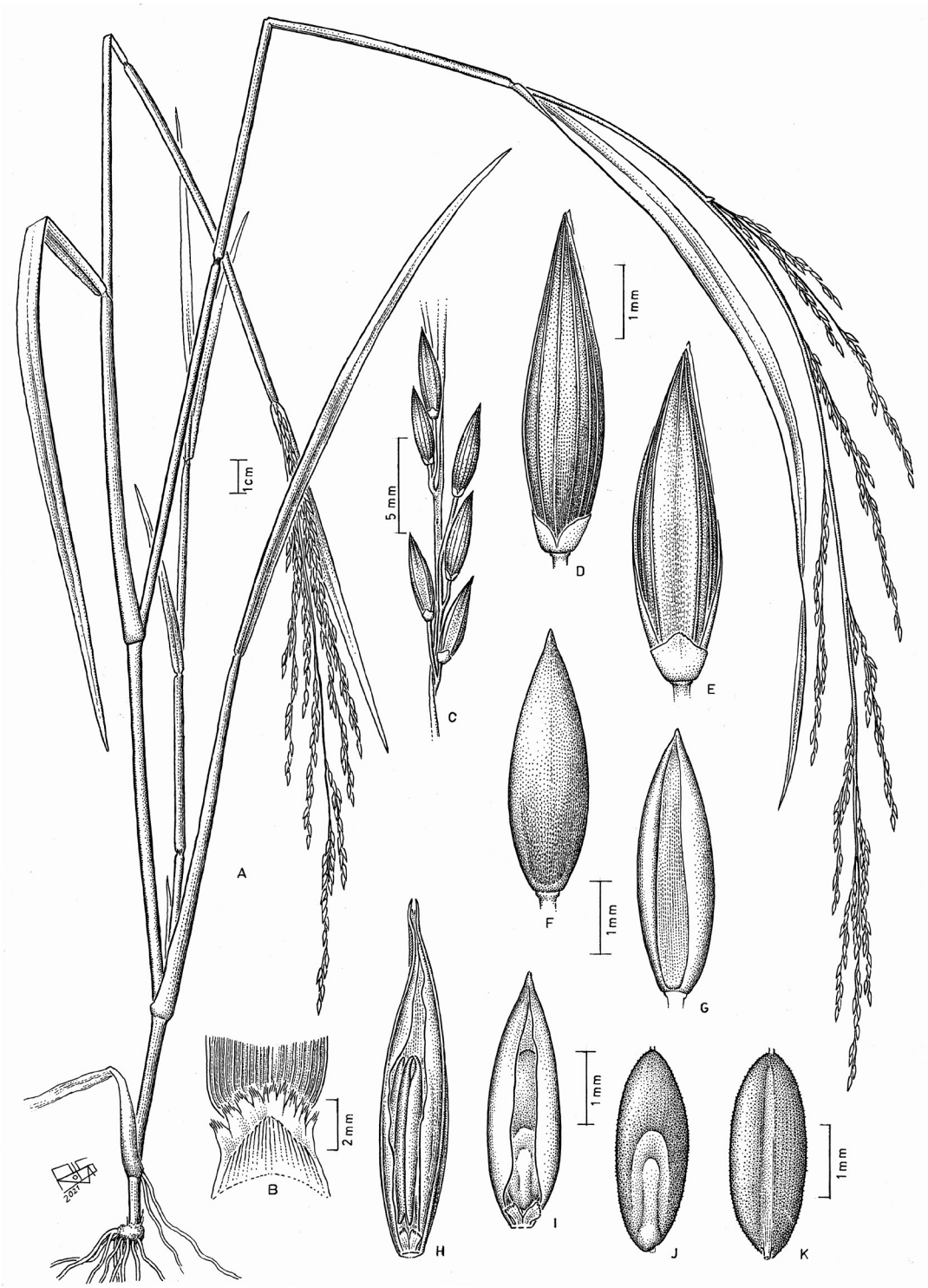

Fig. 11. *Panicum pilgerianum*. **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, dorsal view. **E,** Spikelet, ventral view. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Lower palea with lodicules and anthers. **I,** Upper palea with caryopsis. **J,** Caryopsis, embryo view. **K,** Caryopsis, hilum view. (From *Seydel 2211*, BR).

Spikelets lanceolate, (3.5-)3.7-4.5 × 0.9-1 mm, acuminate, pale, glabrous; lower glume 0.9-1.2 mm long, nearly 1/4 the length of the spikelet, 3-5-nerved, glabrous; upper glume and lower lemma subequal, upper glume 9-11-nerved, membranous, lower lemma 7-9-nerved, membranous; lower palea 2.5-2.8 × 0.7 mm, hyaline, glabrous; lower flower absent; upper anthecium long ellipsoid, 2.2-2.3 × 0.7-0.8 mm, shorter than the upper glume and lower lemma, not indurated, pale, glabrous. Caryopsis obovoid, 2 × 0.7 mm, whitish; hilum oblong, embryo little less than half the length of the caryopsis.

Distribution and ecology. Species endemic of Zambia, where it is found in wet places; only known from the type specimen.

13. Panicum pilgerianum (Schweick.) Clayton, Kew Bull. 42(2): 402. 1987. *Acroceras pilgerianum* Schweick., Notizbl. Bot. Gart. Berlin-Dahlem 14(122): 199. 1938. *Psilochloa pilgeriana* (Schweick.) Launert, Mitt. Bot. Staatssamml. München 8: 156. 1970. TYPE. Namibia. Damaraland, Ovikokorero, 25-XI-1914, *M. K. Dinter 3395* (holotype B 10 0167254!; isotypes K!, PRE 0031873-0!, US-766249!, fragment ex B). (Fig. 11).

Plants annual, 40-60(-120) cm tall, branching at the upper nodes; culms erect, geniculate and rooting at the lower nodes; internodes with aerenchyma, 4-14(-20) cm long, hollow, glabrous; nodes brownish, glabrous. Sheaths 3-11(-17) cm long, as long as or shorter than the internodes, striate, glabrous. Ligules membranous-ciliate, 1.2-2 mm long; collar glabrous. Leaves lanceolate, 4-30 × 0.3-1.1 cm, flat, rounded at the base, the apex acuminate, glabrous. Inflorescence a terminal, contracted to lax panicle, 23-30 × 4-20 cm; main axis triquetrous, wavy, glabrous, first order branches adpressed, axis of the branches striate, glabrous, spikelets solitary or paired on first and second order branches; pedicels 2-7 mm long, claviform, striate, glabrous; axillary panicles present, similar to the terminal one. Spikelets long ovoid, 4-5.3 × 1-1.1 mm, acuminate, glabrous, greenish; lower glume 0.9-1.4 mm long, 1/5 to 1/4 the length of the spikelet, hyaline, truncate, nerveless to 1-nerved; upper glume and lower lemma subequal, 7-9-nerved, acuminate, glabrous; lower palea elliptic, 4.2-4.3 × 1.1-1.2 mm, hyaline, glabrous; lower flower staminate, anthers 3-3.2 mm long; upper anthecium long ovoid, 2.5-2.6 × 0.8-0.9 mm, shorter than the upper glume and lower lemma, pale, glabrous, not indurated at maturity; upper lemma 7-nerved. Caryopsis oblong, 2.6-2.8 × 0.8 mm, whitish to olivaceous; hilum linear, embryo more than 1/2 the length of the caryopsis.

Distribution and ecology. It is restricted to South Africa, Namibia, and Botswana. This species grows in water, in seasonally flooded areas.

Observation. *Panicum pilgerianum* is morphologically characterized by being an aquatic plant, with culms with aerenchyma, and spikelets long ovoid, the caryopsis with a linear hilum.

Representative specimens examined

BOTSWANA. Samedupe Bridge, 5-II-1977, *Smith 1899* (K); Content Farm, 10-III-1978, *Hansen 3370* (C, K).

NAMIBIA. Okahandja, *Pretorius 26* (K); 13-III-1940, *Volk 2917* (K); Omuramba, 23-IV-1950, *Schweickerdt 2199* (K); Waterberg, V-1949, *Liehenberg 4740* (K); Okatjongeama, 28-III-1960, *Seydel 2211* (BR, K).

14. Panicum porphyrrhizos Steud., Syn. Pl. Glumac. 1: 72. 1853. TYPE**.** Ethiopia. "In planitie montana Schire", 10-X-1840, *G. H. W. Schimper 1808* (lectotype here designated P 01933656!; isolectotype W 0023588!). Other syntype. Ethiopia. Prope Gafta, 18-IX-1842, *G. H. W. Schimper 1230* (BM 000923133!, BR 0000008367433!, G 00022434!, G 00022435!, GOET 006787!, L 0044835!, L 0044836!, M 0103981!, STU 000128!, STU 000129!, US 00902247!, US 00147972!, US 00147973!, W 0023589!, W 18890236397!). (Fig. 12).

Panicum praelongum Mez, Bot. Jahrb. Syst. 57: 186. 1921, nom. illeg. hom., non Steud., 1853. TYPE. Sudan, without locality, *Roriani 8* (lectotype here designated B 10 0168705!; isolectotype B 10 0168704!).

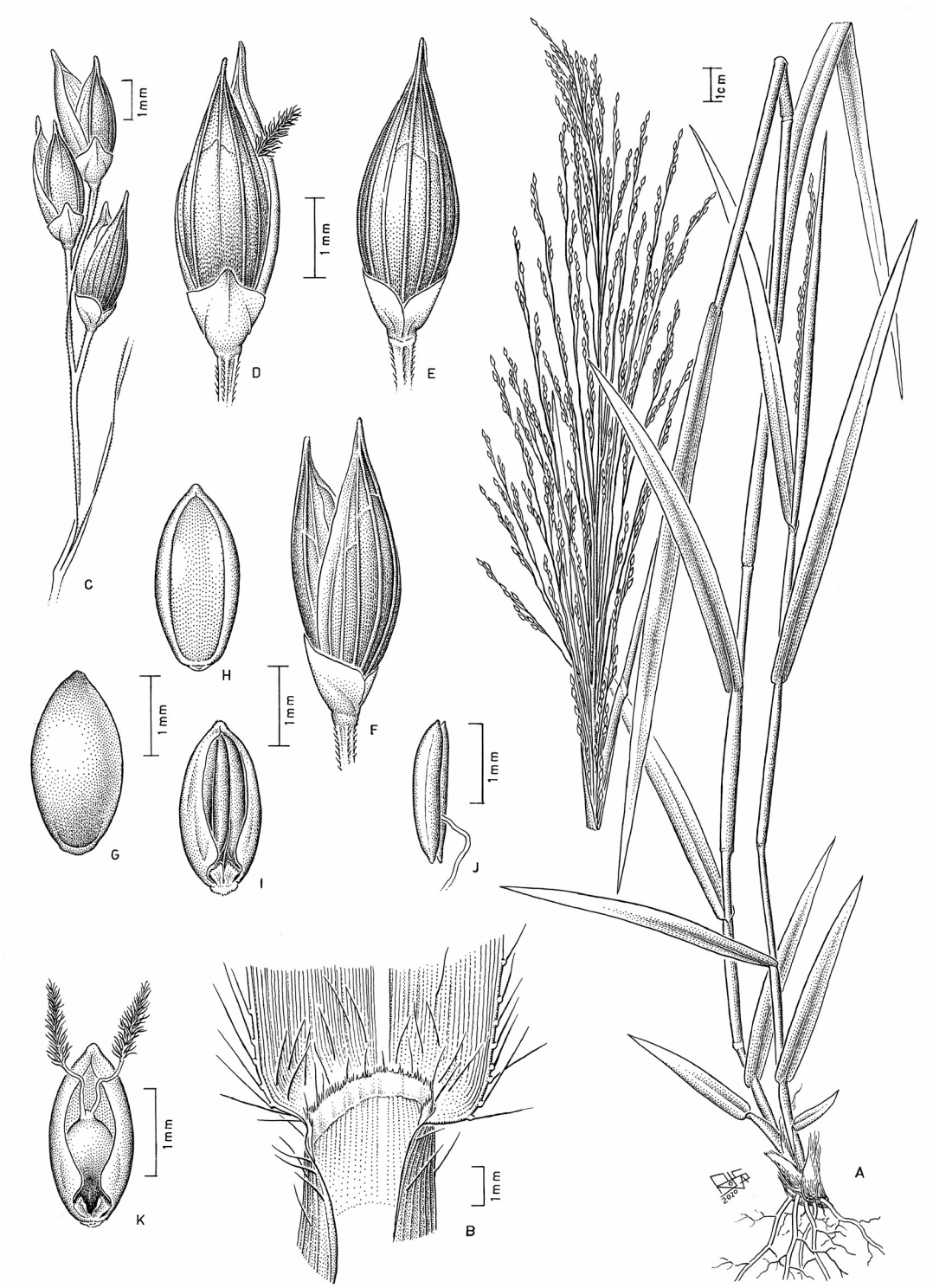

Fig. 12. *Panicum porphyrrhizos.* **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, ventral view. **E,** Spikelet, dorsal view. **F,** Spikelet, lateral view. **G,** Upper anthecium, dorsal view. **H,** Upper anthecium, ventral view. **I,** Upper palea with lodicules and anthers. **J,** Stamen. **K,** Upper palea with lodicules and caryopsis. (From *Schweinfurth 1160*, G).

Plants perennial, shortly rhizomatous, 60-120 cm tall, culms simple, erect or geniculate at the base, internodes 5-20 cm long, cylindrical, hollow, glabrous, without aerenchyma; nodes compressed, dark, glabrous, not sharply demarcated. Sheaths 3-11 cm long, shorter than the internodes, striate, glabrous. Ligules membranous-ciliate, 1-1.3 mm long, the ciliate portion short. Blades lanceolate, 10-27 × 0.5-0.9 cm, flat, acuminate, the lower half and lower margins with tubercullate hairs, otherwise glabrous. Inflorescence a terminal, exserted, lax and multiflowered panicle, 20-40 × 15-20 cm; peduncle 15-20 cm long, terete, glabrous; main axis striate, glabrous, the branches alternate to opposite, distant, divergent, glabrous, pulvini glabrous, spikelets distant on second and third order branches, pedicels 2-6 mm long, claviform, scabrous. Spikelets long ovoid, 2.9-3.5(-3.8) × 1.1-1.2 mm, glabrous, acuminate, greenish to purplish; lower glume 0.9-1 mm long, 1/4 the length of the spikelet, acute, 1-3-nerved; upper glume and lower lemma subequal, membranous, upper glume 9-nerved, lower lemma 7-nerved; lower palea 2-2.4 × 0.5-0.8 mm, hyaline, glabrous; lower flower absent; upper anthecium long ovoid, 2-2.4 × 0.9-1 mm, glabrous, smooth, indurated, brownish at maturity; upper lemma 5-nerved, palea and lemma with papillae toward the apex. Caryopsis not seen.

Distribution and ecology. Africa. This is a widely distributed African species, from Ethiopia and Sudan in the north to Botswana, Zimbabwe and Mozambique in the south; it is found in wet habitats, near swamps and rivers, between 400 and 2200 m a.s.l.

Observation. When describing *P. porphyrrhizos*, Steudel mentioned two syntypes, both collected by *Schimper* in Ethiopia, #1230 and #1808. Of these, the specimen *Schimper 1808,* P 01933656 of the Steudel herbarium, is here designated as lectotype of the species; it is a complete specimen which agrees with the protologue of the species.

There are two syntypes of *P. praelongum* Mez in B; of these the specimen B 10 0168705 is here selected as lectotype of the species; it is a more complete specimen and has Mez script with the designation of a new species.

Representative specimens examined.

EGYPT. Cairo, *Gay s.n.* (US 04303922).

ETHIOPIA. Amozai, 19-IX-1862, *Schimper s.n.* (US 04303921); about 200 km SW of Addis Adeba, 23-VIII-1965, *de Wilde et al. 7875* (C)

GHANA. Adisabel Estate, Cape Coast, 16-V-1965, *Hall 3050* (US).

KENYA. 20 miles east of Nairobi, 16-VII-1951 *Bogdan 3137* (K).

MALAWI. Nyasaland, ca. 2 miles north of Kasungu, 14-I-1959, *Robson 1172* (K, P).

SUDAN. Callabat, Matamma, 1865, *Schweinfurth 1144* (P), *1160* (G).

TANZANIA. Selous Game Reserve, Kingupira, 27-II-1976, *Vollesen 3291* (C).

UGANDA. Kotido, Karamoja, 3-VI-1940, *Thomas 3696* (K, MO).

ZAMBIA. Fort Jameson, I-1963, *Verboom 501* (C, US).

ZIMBAWE. Sengwa Research Station, 13-II-1977, *Guy 2471* (K).

15. Panicum schinzii Hack. ex Schinz., Verh. Bot. Vereins Prov. Brandenburg 30: 142. 1888. TYPE. Namibia, Olukonda, 1886, *H. Schinz 641* (lectotype Z 000080584!, designated as "holotype" by Veldkamp, 1996: 204; isolectotypes K 000255500!, US 00139969!, fragment ex W). (Fig. 13).

Panicum laevifolium Hack., Bull. Herb. Boissier 3(8): 378. 1895. TYPE. South Africa. Transvaal. Hogge Veld inter Porter et Trigardsfont, *A. Rehmann 6614* (lectotype here designated K 000255496!; possible isolectotype W 0177664!). Other syntypes: South Africa. Transvaal. Pretoria, Kuduspoort, *A. Rehmann 4697* (W). Transvaal. Boshveld inter Elandsriver et Klippan, *A. Rehmann 5123* (W). Donkershoek, *A. Rehmann 6552* (K 000255498!, W).

Panicum laevifolium Hack. var. *amboense* Hack., Vierteljahrsschr. Naturf. Ges. Zurich 56: 71. 1911. TYPE. Namibia. Amboland: swischen Ondonga und Uukuanyama, XI-1906, *M. Rautanen 593* (K 0002555499!, US-80727!, fragment, possible type W 19080009792! labeled as *M. Rautanen 5*).

Plants annual, (30-)40-180 cm tall; culms erect to decumbent and geniculate at base, simple or branching, internodes terete, 3-30 cm long, hollow, glabrous; nodes brownish, glabrous.

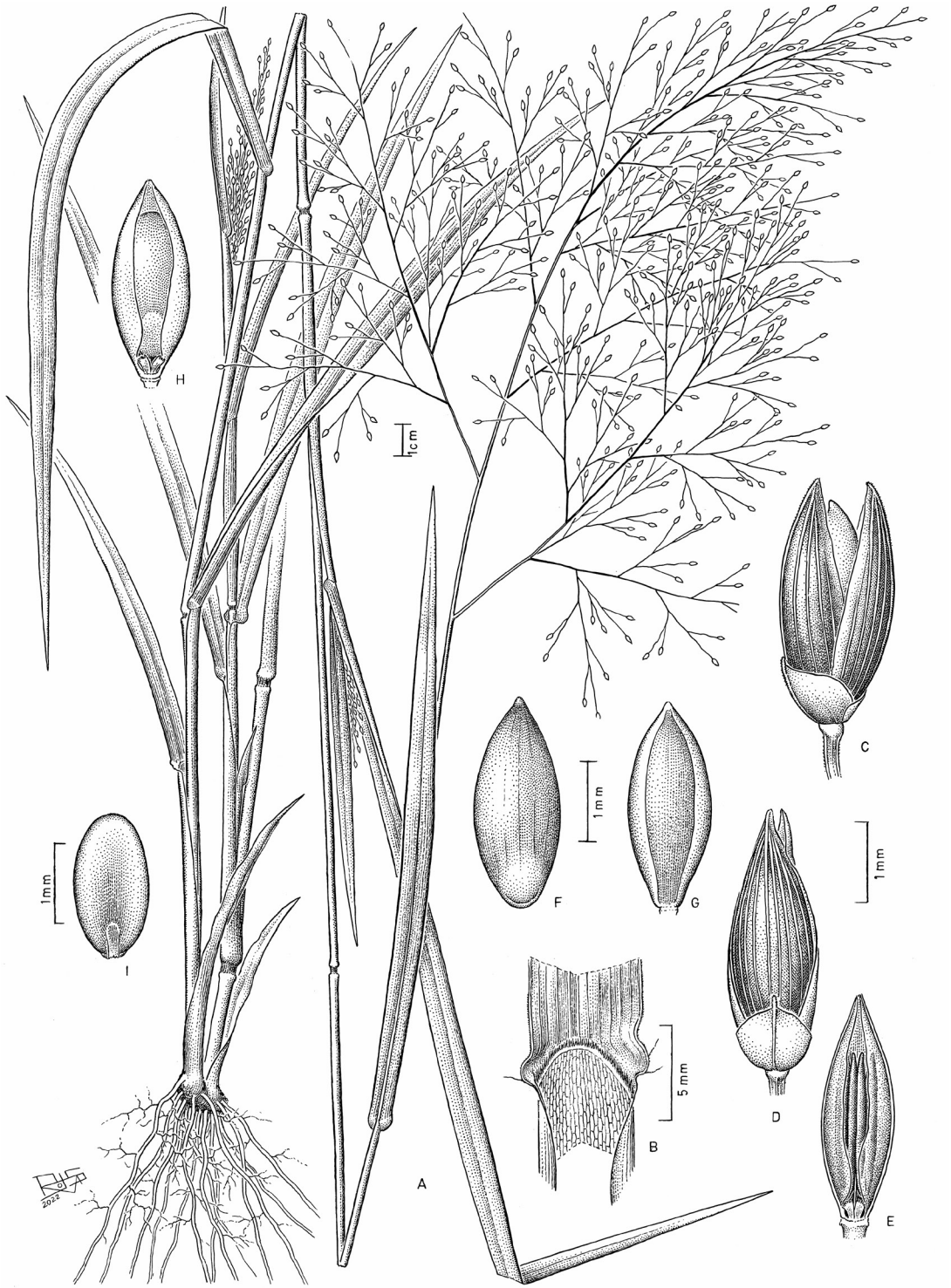

Fig. 13. *Panicum schinzii* **A,** *Habit.* **B,** Ligule region. **C,** Spikelet, lateral view. **D,** Spikelet, ventral view. **E,** Lower palea with lodicules and anthers. **F,** Upper anthecium, dorsal view. **G,** Upper anthecium, ventral view. **H,** Upper palea with caryopsis, embryo view. **I,** Caryopsis, hilum view. (From *Drummond 5330,* P).

Sheaths striate, open, glabrous, 2-15 cm long; collar pale, glabrous. Ligules membranous-ciliate, 1.5-2 mm long. Blades lanceolate, 10-25(-35) × 1-1.5 cm, flat, subcordate, the lower margins ciliate, otherwise glabrous. Inflorescence a lax, open and terminal panicle, (13-)20-27 × (-5)10-20 cm; main axis triquetrous, glabrous, pulvini glabrous, first order branching alternate, distant, ascending, spikeletes dispersed on first and second order branches; pedicels 2-7 mm long, scaberulous, claviform; axillary inflorescences present, similar to the terminal one. Spikelets ellipsoid, 2.5-2.8 × 0.9-1 mm, glabrous, pale to greenish; lower glume 0.6-0.7 mm long, 1/5 to 1/4 the length of the spikelet, acute to truncate, 1-nerved, upper glume and lower lemma subequal, 7-9-nerved, membranous, acute; lower palea elliptic, 2.5-2.6 × 0.9-1 mm, hyaline, glabrous, lower flower staminate, anthers 3, 1.5 mm long; upper anthecium long ellipsoid, 2-2.1 × 0.9-1 mm, pale, black at maturity, indurated, smooth and shiny, upper lemma 5-nerved. Caryopsis ellipsoid, 1.7-1.8 × 0.9-1 mm, whitish; hilum oblong, embryo less than half the length of the caryopsis.

Distribution and ecology. It is widespread in South Africa and Namibia, reaching Botswana and Zimbabwe; introduced in Malesia (Java), Australia and New Zealand. It grows in open, and seasonally flooded, fields, commonly as a weed, between 500 and 2000 m a.s.l.

Observation. The lectotype here designated of *P. laevifolium* is *Rehmann 6614*, not *6646* as it was originally included in the type diagnosis.

Representative specimens examined

AUSTRALIA. **New South Wales**. Glen Innes, 8-IV-1931, *Hubbard 8210* (CANB, P).

BOTSWANA. Content Farm, 27-I-1978, *Hansen 3341* (K).

NEW ZEALAND. Kekerengu Ecological District, 1-I-2014, *Jones s.n.* (AK).

SOUTH AFRICA. 28 miles east of Bethlehem, 16-III-1964, *Oakes 493* (SI); Tweespruit, Thaba Pitswa, 18-II-1994, *Du Preez 2702* (C); Nylstroom, Mosdene Farm, 4-II-1986, *Smook 2428* (C). Transvaal. Apiesrivier, 14-I-1894, *Schlechter 4166* (G, P).

ZIMBABWE. Hunyani, 3-II-1932, *Stent 5557* (K); Mensa Pan, ESE of Chirundu bridge, 29-I-1958, *Drummond 5320, 5330* (P); Melsetter, Pasture Research Substation, 12-II-1950, *Williams 61* (K, US), *Williams 27247* (P); Salisbury, Salisbury Experimental Station, 1-II-1961, *Phipps 2846* (P); Mana Pools National Park, 21-III-1998, *Poilecot 7771* (G).

16. Panicum subalbidum Kunth in Révis. Gramin. 2: 397, tab. 112. 1831. TYPE. Senegal. Dagana, Walo, IX-1925, *F. M. R. Leprieur s.n.* (holotype P 00442196!; possible isotype B 10 0168673!). (Fig. 14).

Panicum glabrescens Steud., Syn. Pl. Glumac. 1: 71. 1853. TYPE. Senegal. Without locality, *F. M. R. Leprieur s.n.* (holotype P 00731447!).

Panicum kermesinum Mez, Bot. Jahrb. Syst. 57: 189. 1921. TYPE. Cameroon. Adamana, *Ledermann 4115* (holotype B †; isotype? US 00148215!, fragment ex B. Hitchcock mentioned in this fragment that "this seems to be the type, *Ledermann 4225* not in Berlin", 1935).

Panicum longijubatum (Stapf) Stapf, Fl. Trop. Afr. 9: 718. 1920. *Panicum proliferum* var. *longijubatum* Stapf, Fl. Cap. 7: 406. 1899. TYPE. South Africa. Eastern Region: near Durban, *Williamson 21* (lectotype here designated K 000255491!; isolectotype PRE 0038229-0!). Other syntypes. South Africa, Coast Region. Komgha division: by the Kei River, near Komgha, 1-XII-1891, *H. G. Flanagan 953* (GRA 0000092-0!, K 000255495!). Eastern Region: Natal, near the Umzimkulu River, 1840, *Drège s.n.* (K 000255493!). Eastern Region, common near Umpumulo, *Buchanan 267* (K 000255494!, W 19160023954!).

Panicum ingens Peter, Repert. Spec. Nov. Regni Veg. Beih. 40(1): 40, tab. 24, fig. 2. 1929. TYPE. Tanzania. "Deutsch-Ostafrika: Ngulu: Gweko westl. [to] Igalula im Wasser. ...", 15-I-1926, *G. A. Peter 34926* (holotype B †; lectotype here designated W 1960020754!; isolectotype G 00022441!).

Panicum longiramum Peter, Repert. Spec. Nov. Regni Veg. Beih. 40(1): 44, tab. 29, fig. 1. 1929. TYPE. Tanzania. "Deutsch-Ostafrika: Ngulu: Malongwe Nyahua ...", 9-I-1926, *G. A. Peter 34539* (holotype B †; lectotype here designated W 19600020878!).

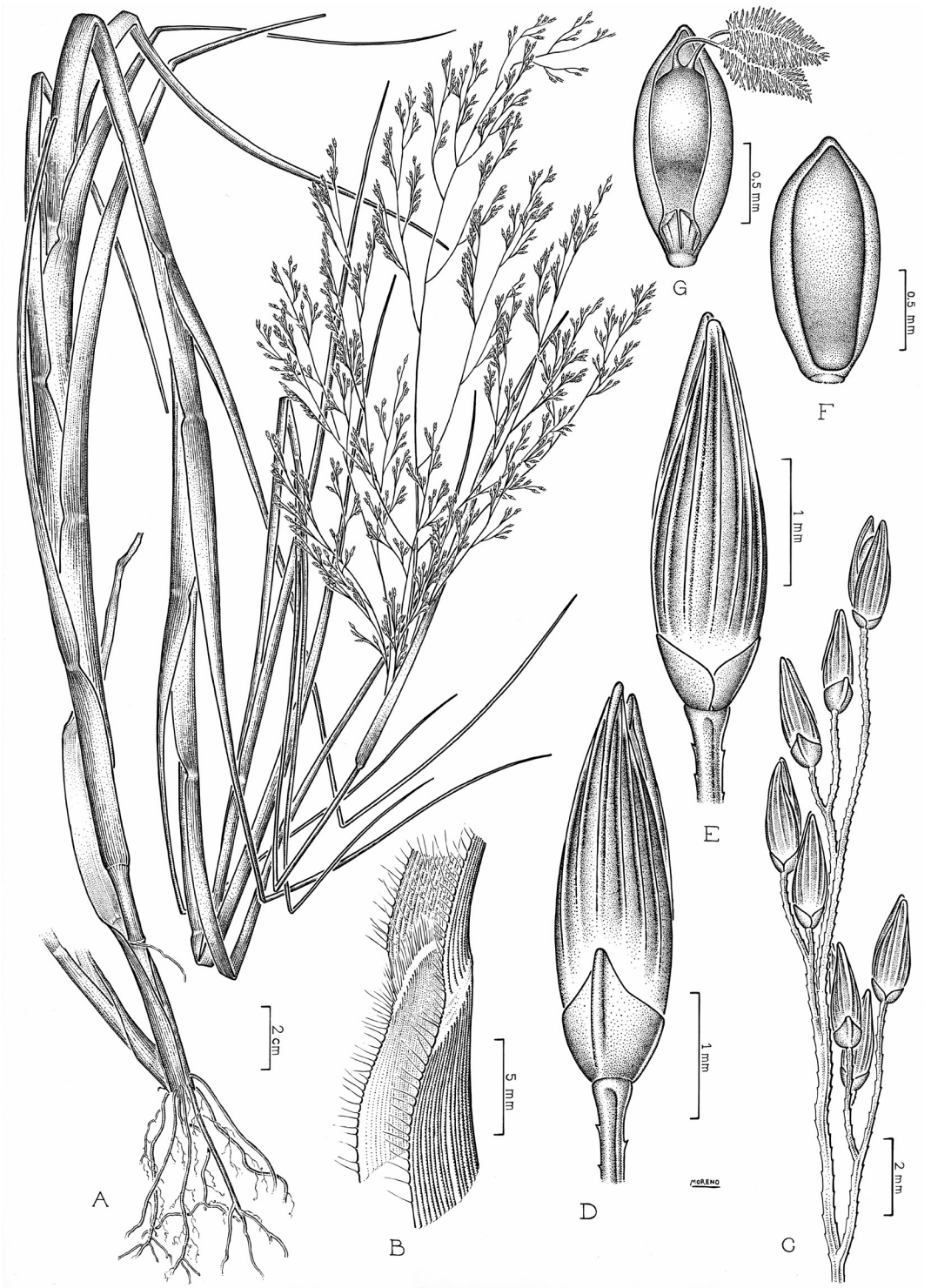

Fig. 14. *Panicum subalbidum*. **A,** Habit. **B,** Ligule region. **C,** Inflorescence branch. **D,** Spikelet, ventral view. **E,** Spikelet, dorsal view. **F,** Upper anthecium, ventral view. **G,** Upper palea with lodicules and gynoecium. (From *Friis & Vollesen 318*, C).

Panicum bicuspidatum A. Camus, Bull. Soc. Bot. France 99: 64. 1952. TYPE. Madagascar. Prov. Antsiranana: collines et plateaux calcaires de l'Ankarana, XII-1937/I-1938, *H. Humbert 18855* (holotype P 00450278!).

Plants perennial, shortly rhizomatous, 30-100 cm tall, with adventitious roots and rooting at the lower nodes, culms decumbent at the base, then erect, 1-2 m tall; internodes 2-18 cm long, cylindrical, with aerenchyma, hollow, glabrous; nodes compressed, dark, sharply demarcated, glabrous. Sheaths 7-20 cm long, longer than the internodes, striate, glabrous; collar brown, glabrous. Ligules membranous-ciliate, 1-3 mm long. Blades lanceolate, 30-40 × 0.8-1.2 cm, flat, glabrous, the lower margins ciliate. Inflorescence a terminal, multiflowered, lax and open panicle, 15-35 × 10-25 cm, partly or fully exserted, the branches naked at the base, spikelets paired and appressed on second order branches; peduncle glabrous, main axis and pulvini glabrous; branches triquetrous, scabrous; pedicels 2-5 mm long, triquetrous, scabrous and claviform. Spikelets lanceolate, 2.6-3 × 0.8-1 mm, glabrous, greenish to purple; lower glume 0.7-0.8 mm long, 1/4 to 1/3 the length of the spikelet, acute to obtuse, 1-3-nerved; upper glume and lower lemma subequal, 7-9-nerved; lower palea and lower flower absent; upper anthecium ellipsoid, 1.8-2.5 × 0.8-1.1 mm, shorter than the upper glume and lower lemma, indurate, brownish at maturity, shiny. Caryopsis long ellipsoid, 2 × 1 mm, whitish; hilum oblong, embryo ca. 1/2 the length of the caryopsis.

Distribution and ecology. Common African grass, also growing in Madagascar, usually found growing in water, edges of rice paddies, 0-2100 m a.s.l.

Observations. This species is recognisable by its aquatic habit, with culms with aerenchyma, decumbent and rooting at the lower nodes, and dark nodes.

The specimen *Williamson 21*, from K, is designated as lectotype of *P. proliferum* var. *longijubatum* Stapf, among the syntypes originally cited in this variety, since it is a full specimen and agrees with the protologue.

Representative specimens examined

BURUNDI. Muramvya, entrée Teza, 5-VI-1975, *Reekmans 5239* (BR).

CHAD. Baguirmi, Nigui, 10-VIII-1903, *Chevalier 9453* (P); Fort Lamy, 15-IX-1938, *Eloueh 263* (P).

COTE D'IVOIRE. Route entre Sikensi et IV Dancé, *without collector 381A* (P).

DEMOCRATIC REPUBLIC OF CONGO. Kahuzi, Marais Musisi, 2-VI-1959, *Leonard 4479* (BR); plaine de la Ruzizi, Luvungi, 27-II-1950, *Germain 6318* (BR); Yangambi, 11-XI-1947, *Leonard 1518* (C).

ETHIOPIA. Shoa, in the upper part of the Mugher river system, about 50 km N of Addis Adeba, 12-XI-1972, *Friis et al. 1126* (C).

MADAGASCAR. Mahajanga. Near Antanimbary, environs of Maevatanana, 13-II-2013, *Vorontsova et al. 913* (K).

MALI. De Sebé a Mopti, 1899, *Chevalier 2199* (K); Macina, de Randiagara a Mopti, 7-IX-1910, *Chevalier 24910* (P).

RUANDA. Rutsiro, 28-VII-1974, *Lambinon 74/595* (BR).

SENEGAL. Basse Casamance, Djifanghor, 4-VIII-1978, *Berghen 261a* (BR).

SOUTHERN SUDAN. Between Gilo and Mt. Konoro, 18-XI-1980, *Friis & Vollesen 318* (C).

TANZANIA. Arusha National Park, near Meru, 8-VII-1970, *Hansen 323* (C).

17. Panicum sublaeve Swallen, Contr. U.S. Natl. Herb. 29(9): 424. 1950. *Panicum rigidum* Swallen, Ann. Missouri Bot. Gard. 30(2): 215. 1943, nom. illeg. hom., non Balfour, 1884. TYPE. Panamá. Sabana de Juan Corso, near Chepo, 1-X-1911, *H. Pittier 4526* (holotype US 00147999!). (Fig. 15).

Plants anual, caespitose, 15-65 cm tall; culms geniculate to erect, branching; internodes terete, hollow, glabrous; nodes brownish, glabrous. Sheaths longer than the internodes, striate, glabrous. Ligules membranous-ciliate, ca. 1.6 mm long, the membranous portion 0.3 mm long; collar brownish, glabrous. Blades linear-lanceolate, (3-)13-24 × (0.2-)0.5-1.2 cm, rounded to subcordate at the base, the apex attenuate, flat, the adaxial surface sparsely pilose, abaxial surface glabrous.

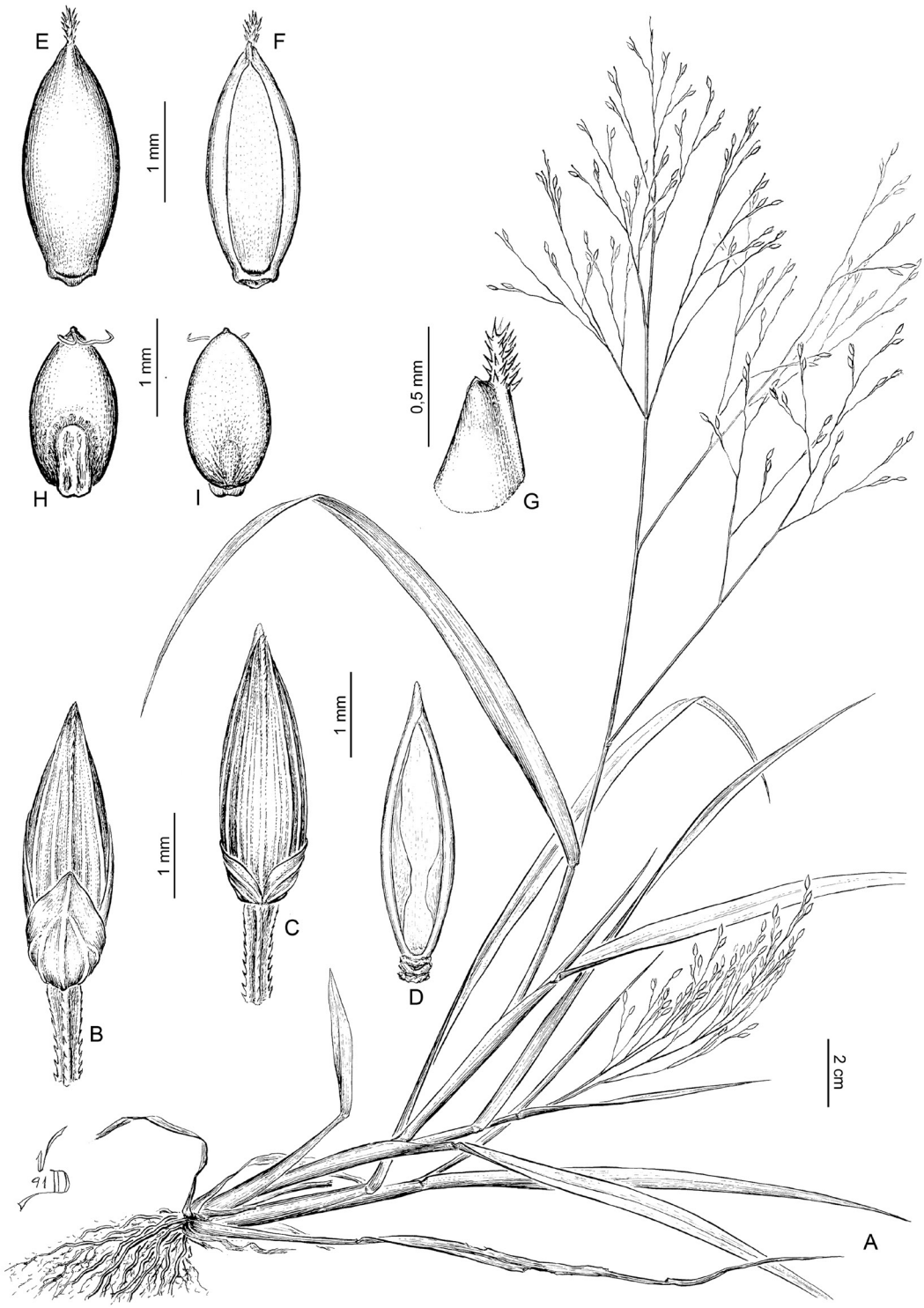

Fig. 15. *Panicum sublaeve.* **A,** Habit. **B,** Spikelet, ventral view. **C,** Spikelet, dorsal view. **D,** Lower palea. **E,** Upper anthecium, dorsal view. **F,** Upper anthecium, ventral view. **G,** Apex of the upper anthecium. **H,** Caryopsis, embryo view. **I,** Caryopsis, hilum view. (From *Zuloaga 4354*, SI).

Inflorescence a terminal, exserted and lax panicle, 15 × 10 cm; peduncle terete, 5-20 cm long, glabrous; main axis wavy, scaberulous to glabrous, pulvini glabrous, first order branches alternate, axis of the branches and pedicels triquetrous, scabrous, spikelets solitary and disperse on the branches; axillary panicles present. Spikelets long ovoid, 3.5-4 × 0.7-1.2 mm, glabrous, greenish; lower glume ovate, 1.2-1.5 mm long, acute, 5-7-nerved; upper glume and lower lemma subequal, 11-13-nerved, acute, membranous; lower palea elliptic, 2.7-3.3 × 1 mm, hyaline, glabrous; lower flower staminate, anthers 3; upper anthecium long ovoid, 2.5-2.8 × 0.9-1.2 mm, shorter than the upper glume and lower lemma, whitish, smooth, indurated, shiny; upper lemma 7-nerved, apiculate and with conspicuous prickles toward the apex and papillae all over its surface. Caryopsis long ellipsoid, 1.9 × 0.8 mm, whitish; hilum oblong, embryo more than half the length of the caryopsis.

Distribution and ecology. Species distributed from Mexico and Mesoamerica up to Venezuela; it grows in open and humid habitats, from sea level to 1100 m a.s.l.

Observation. This species is characterized by having spikelets with the upper glume and lower lemma 11-13-nerved, upper anthecium shorter and apiculate, with conspicuous prickles at the apex.

Representative specimens examined.

COSTA RICA. **Guanacaste.** Nicoya Peninsula, 5 km SSW of Veinte Siete, 17-VIII-1968, *Pohl & Davidse 10941* (F).

EL SALVADOR. **La Libertad. A**long CIA, km 38, ca. 10 km W of La Libertad, open roadside near Pacific Ocean, 10 m, 17-VIII-1971, *Pohl 12774* (F, MO).

HONDURAS. **Francisco Morazán.** Vicinity of El Zamorano, 17-X-1951, *Swallen 10839* (MO, US).

MEXICO. **Chiapas.** Small forested stream and adjacent savanna 2 km SE of Arriaga, 27-VIII-1974, *Breedlove 36852* (MEXU, MO).

PANAMA. **Canal Zone.** Monagre Beach 5 mi SE of Chitre, 22-I-1966, *Tyson et al. 3030* (MO).

VENEZUELA. **Guárico.** Miranda, 10 km al N de Camaguan, 6-VIII-1989, *Zuloaga et al. 4354* (SI, VEN).

18. Panicum sumatrense Roth ex Roem. & Schult., Syst. Veg. (ed. 15bis) 2: 434. 1817. TYPE. Indonesia. Sumatra, *B. Heyne s.n.* (lectotype B 10 0366235!, designated by J. F. Veldkamp et al., Blumea 34: 82. 1989).

Panicum attenuatum Willd, Enum. Pl.: 1033. 1809, nom. illeg. hom., non Moench, 1802. *Panicum proliferum* var. *attenuatum* Schrad., Linnaea 12: 428. 1838. TYPE. Place or origin unknown, *J. T. Klein 195* (B-W-18740-09-0!; US 00148155!, fragment ex B).

Panicum psilopodium Trin., Gram. Panic.: 217. 1826. *Panicum sumatrense* subsp. *psilopodium* (Trin.) de Wet, J. Agric., Tradit. Bot. Appl. 30: 159. 1983. TYPE. India. Without locality, *J. Lindley s.n.* (holotype LETRIN-0908.01!; isotype L 0044865!, fragment).

Panicum simplex Rottler ex Trin., Gram. Panic.: 216. 1826. TYPE. "V. sp. Ind. Or.", *Swartz s.n.* (LE).

Panicum crispum Llanos, Fragm. Fl. Filip.: 41. 1851. TYPE. Philippines, Benguet, Luzon, 1-V-1914, *E. D. Merrill 1764* (neotype L, designated by J. F. Veldkamp, Blumea 41: 206. 1996; isoneotypes GH 00091557!, NY 00328834!, SING 0054929!).

Panicum psilopodium Trin. var. *coloratum* Hook. f., Fl. Brit. India 7(21): 47. 1897. SYNTYPES. Burma. Shan Hills, *Collett s.n.* (K?). India?. Mt. Abu, *Duthie s.n.* (K).

Panicum psilopodium Trin. var. *epaleatum* Keng ex S.L. Chen, T.D. Zhuang & X.L. Yang, Bull. Bot. Res., Harbin 4(2): 124. 1984. TYPE. China. Guizhou: Du Shan, 7-IX-1930, *Y. Tsiang 6912* (JSIB).

Panicum longiloreum M.M. Rahman, Kew Bull. 44(3): 485. 1989. TYPE. Thailand. Sena, Ayuthia, 23-IX-1930, *A. F. G. Kerr 19709* (holotype K 000290301!; isotypes BM 000959569!, BK 257944!, BRI-AQ269481!, L 0044813!).

Plants annual, 10-90 cm tall; culms erect to rooting and branching at the lower nodes, internodes 3-10 cm long, terete, hollow, glabrous; nodes brownish, glabrous to sparsely pilose. Sheaths striate, with sparse tubercullate, caducous hairs to glabrous, 4-7 cm long, shorter or longer than the internodes.

Ligules membranous-ciliate, 0.6-1.7 mm long; collar brownish, glabrous. Blades linear to lanceolate, (5-)10-35 × 0.4-1.4 cm, flat, rounded at base, acuminate, sparsely ciliate toward the base to glabrous, the margins membranous, smooth. Inflorescence a contracted to lax panicle, 6-40 × 2-15 cm; main axis wavy, smooth to scaberulous, pulvini dark, glabrous; first order branches alternate, ascending to appressed, axis of the branches wavy, scaberulous; spikelets paired or solitary, pedicels 2-9 mm long, scaberulous. Spikelets ellipsoid, (2.2-)3-3.5(-4) × 1.1-1 mm, glabrous; lower glume 0.6-1.1 mm long, 1/4 to 1/3 the length of the spikelet, 1-3-nerved, acute to truncate at the apex; upper glume and lower lemma subequal, acute, upper glume 11-15-nerved, membranous, lower lemma 9-11-nerved; lower palea almost as long as the lower lemma, hyaline, glabrous; lower flower staminate; upper anthecium ellipsoid, 2.3-2.6 × 0.9-1 mm, shorter than the upper glume and lower lemma, indurate, dark brown, shiny, glabrous. Caryopsis ellipsoid, 1.7-1.9 × 0.9-1 mm; hilum oblong, embryo ca. 1/2 the length of the caryopsis.

Common names. "Blue panic", "little millet", "sama" (Veldkamp, 1996).

Distribution and ecology. This species grows in Tropical Asia (India, Pakistan, China, Sri Lanka to Vietnam, and Malesia). It is common in open fields and forest edges and in rice fields and grassy roadsides, between sea level and 1800 m a.s.l.

Observations. Bor (1960) mentioned this is the valid name for *P. psilopodium*. However, the lower glume is more than 1/2 the length of the spikelet, therefore not pertaining to sect. *Dichotomiflora*.

Representative specimens examined.

CHINA. **Yunnan**. Lou-pou, *Maire s.n.* (P 01907989); Hainan, Pak shik Ling and vicinity, Ku Tung Village, 21-V-1933, *Lei 685* (P); Yun-Nan, 18-II-1906, *Ducloux 4193* (P).

INDIA. Assam, below Kohima, Naga Hills, 2-VII-1950, *Chand 3229* (US); Bombay, Borivali National Park, 11-VIII-1952, *Fernandez 101* (K).

NEPAL. Near Tilhar, 19-V-1954, *Stainton et al. 2772* (G).

PHILIPPINES. **Luzon**. Baguio, Benquet, VIII-1928, *Clemens 18291* (C); Manila, VI-1911, *Merrill 597* (G).

SRI LANKA. **Eastern Province**. Amparai, Lahugala-Kitulana Sanctuary at edge of the Lahugala Tank, 2-XII-1974, *Davidse 8960* (CANB, K, MO, US); near Padikema, Ruhuna National Park, 6-XII-1969, *Cooray s.n.* (MO-4378481).

THAILAND. Ban Kao, 12-XI-1961, *Larsen 8159* (C).

VIETNAM. Chapa, VII-1927, *Petelot 5063* (US).

19. Panicum trichonode Launert & Renvoize, Prodr. Fl. Südwestafrika 34(160): 226. 1970. TYPE. Zambia. 80 km W of Chingola, 18-XII-1963, *E. A. Robinson 6124* (holotype K 000282461!; isotype SRGH 0106321-0!). (Fig. 16).

Plant perennial, caespitose and shortly rhizomatous, 30-110 cm tall, shortly rhizomatous, cataphyls pilose; culm erect, simple, internodes 4-15 cm long, cylindrical, hollow, striate, glabrous; nodes densely pilose, with conspicuous white short hairs. Sheaths striate, as long as or longer than the internodes, 8-25 cm long, covered with tubercullate caducous hairs; collar brown, pilose. Ligules membranous-ciliate, 0.6-0.8 mm long. Blades linear-lanceolate, 12-25 × 0.3-0.5 cm, rounded at the base, the apex acuminate, with caducous tubercullate hairs all over its surface and margins, the lower ones ciliate. Inflorescence a terminal lax panicle, 3-20 × 1.5-5 cm; peduncle terete, glabrous, up to 25 cm long, first order branches appressed, the branches triquetrous, smooth; pulvini glabrous, spikelets appressed on first and second order branches; pedicels 1-2.5 mm long, triquetrous, scaberulous; axillary inflorescences absent. Spikelets long ellipsoid, 2.5-3 × 1-1.1 mm, glabrous, greenish or tinged with purple; lower glume 0.4-0.8 mm long, 1/5 to 1/4 the length of the spikelet, truncate to acute, nerveless to 1-nerved; upper glume and lower lemma subequal, 7-9-nerved, membranous; lower palea 2.7 × 0.7 mm, narrowly ellipsoid, glabrous, hyaline; lower flower staminate, anthers 1.3 mm long; upper anthecium narrowly ellipsoid, 2.2-2.6 × 1 mm, indurated, pale, smooth, shiny. Caryopsis ellipsoid, 1.7 × 0.9 mm; hilum oblong, embryo 1/3 the length of the caryopsis.

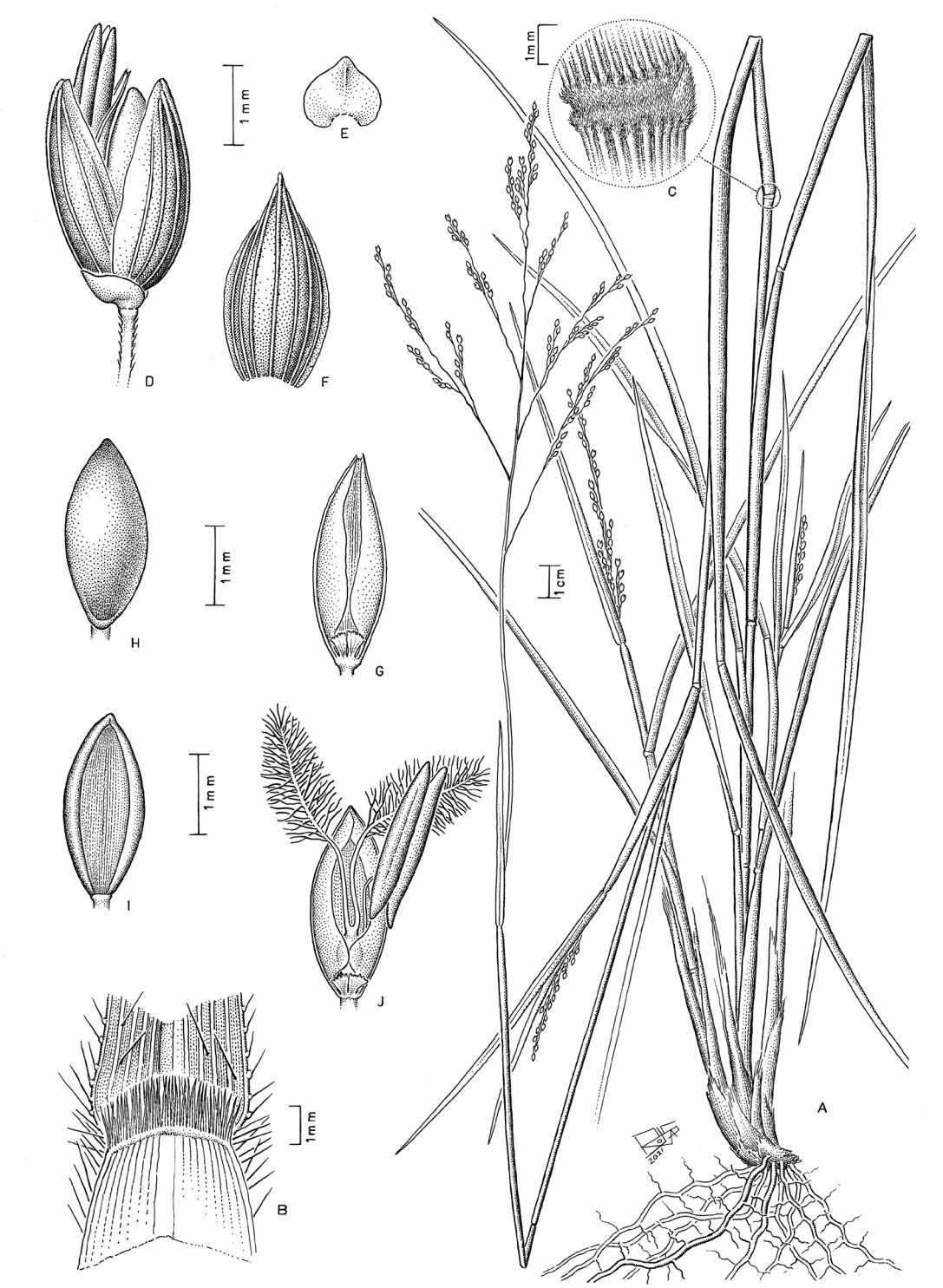

Fig. 16. *Panicum trichonode.* **A,** Habit. **B,** Ligule region. **C,** Detail of node. **D,** Spikelet, lateral view. **E,** Lower glume. **F,** Upper glume. **G,** Lower palea with lodicules. **H,** Upper anthecium, dorsal view. **I,** Upper anthecium, ventral view. (From *Smith 1413*, K).

Distribution and ecology. It is restricted to southern tropical Africa (Botswana, Zambia and Zimbabwe), and southern Africa (Namibia). It is found in open, damp grasslands on clay soils; 1000-2000 m a.s.l.

Representative specimens examined

BOTSWANA. On the sides of Karongana river, 19º45'S, 22º24'E, 18-VIII-1975, *Smith 1413* (K); Okovango River, 14-II-1979, *Smith 2640* (K).

NAMIBIA. Kunene Banks, III-1923, *Barnard 26* (K).

ZAMBIA. Barotseland, Mongu, 20-I-1966, *Robinson 6816* (K); Kalomo, near Senkobo, *Astle 284b* (K); two miles from Namwala, 10-XII-1962, *van Rensburg 1051* (K); Dambo centre, I-1979, *Heery 25* (K).

ZIMBABWE. Salisbury, 7-II-1919, *Eyles 1524* (K); without precise locality, IV-1920, *Eyles 2205* (K); Guruve, 3-I-1979, *Nyariri 614* (K).

20. Panicum vaseyanum Scribn. ex Beal, Grass. N. Amer. 2: 140. 1896. TYPE. Mexico. Chihuahua. Base of Sierra Madre, 30-IX-1887, *C. G. Pringle 1415* (lectotype US 00148082!, designated as "type" by Hitchcock & Chase, 1910: 47; isolectotypes COLO 00392639!, COLO 00392621!, E 00373819!, F 0046899F!, GH 00024127!, K 000309146!, MEXU 00003724!, MICH 1108751!, MIN 1001936!, MO-128362!, MSC 00922516!, NDG 06888!, NY 00381781!, NY 00381782!, PH 00018737!, RSA 0000465!, US 00148081!, US 00037314!, UVMVT 027972!, W 19160022600!).

Plants annual, caespitose, 15-70 cm tall; culms geniculate, decumbent and rooting at the lower nodes, then erect, branching at the upper nodes; internodes compressed, with aerenchyma, pale to purplish, glabrous, hollow; nodes dark, glabrous. Sheaths striate with anastomosed veins, glabrous, the margins membranous. Ligules membranous-ciliate, 0.5-2 mm long; collar brownish to purplish, glabrous. Blades lanceolate, 3-25 × 0.2-0.6 cm, flat or with involute borders toward the base, rounded at base, the apex attenuate, greenish to purplish, glabrous, the margins scabrous. Inflorescence a contracted, shortly exserted panicle 2-9 ×1-1.5 cm; main axis wavy, scaberulous to glabrous, pulvini glabrous, first order branches alternate to opposite, ascendent, appressed, spikelets paired or solitary on short second order branches; pedicels short, claviform, scabrous; axillary inflorescences present. Spikelets long ellipsoid, 2.2-3.2 × 1.1-1.4 mm, acute, greenish, glabrous; lower glume 1/4 to 1/3 the length of the spikelet, ovate, hyaline, 1-nerved, obtuse to truncate; upper glume and lower lemma subequal, membranous, acute, 7-nerved; lower palea and lower flower absent; upper anthecium long ovoid, 2-2.7 × 1-1.2 mm, smooth, shiny, glabrous, pale, dark brown at maturity, with verrucose papillae toward the apex of the palea, early deciduous at maturity. Caryopsis ellipsoid; hilum oblong, embryo 1/2 the length of the caryopsis.

Distribution and ecology. Species endemic of Mexico, where it grows in humid áreas between 1700-2700 m a.s.l.

Observation. *Panicum vaseyanum* is well defined by having contracted panicles, axillary inflorescences present, spikelets with the upper glume and lower lemma 7-nerved, lower palea and lower flower absent, and upper anthecium dark brown and easily deciduous at maturity.

Representative specimens examined

MEXICO. **Aguas Calientes.** Near Aguas Calientes, 2-X-1910, *Hitchcock s.n.*, AGH 15 (F, MEXU, MO, NY, P) **Chiapas.** San Cristóbal de las Casas, west edge of San Cristóbal de las Casas, plant in marsh, 2195 m, 29-X-1981, *Breedlove & Davidse 53971* (MO). **Chihuahua.** Pine-Oak región, Sierra Madre Occidental, west of Casas Grandes, five miles south of Hernandez, 18-IX-1960, *Reeder et al. 3526* (MEXU, US). **Durango.** Reserva La Michila, 80 km al SE de Durango, 2500 m, 6-X-1980, *Carrillo 9* (MEXU). **Guanajuato.** About 6 km W of San Felipe, on dry slopes approaching Cerro del Fraile, 24-X-1952, *Sohns 399* (US). **Jalisco.** Guadalajara, road to Barranca Oblato, 6100 ft, 27-IX-1910, *Hitchcock 7315* (US). **Mexico.** Ciudad de Progreso, 2700 m, 30-IX-1950, 2700 m, 30-IX-1950, *Matuda 19747* (MEXU, MO, US). **Michoacán**. 25 km E of Morelia, on highway 15, 2000 m, 20-X-1976, *Brunken & Perino 448* (MO). **Puebla.** Autopista de Puebla a Orizaba, al NE de Puebla, 1.4 km al E de la Puente Amaluca, 2260 m, *Vibrans 2453* (MEXU).

SPECIES EXCLUDED FROM SECT. *DICHOTOMIFLORA*

Zuloaga et al. (2018) considered *P. bechuanense* Brem. & Oberm. within sect. *Dichotomiflora*, while in fact this is a species of sect. *Repentia* Stapf.

Veldkamp (1989) considered as synonym of *P. sumatrense* the following species:

Panicum albidulum Steud., Syn. Pl. Glumac. 1: 69. 1853. TYPE. Sudan. Cordofan, Abu Gerad, 22 Sep 1839, *C. G. T. Kotschy 42* (holotype P 00731470!; isotypes BR 0000008767523!, L 0044866!, M 0103913!, W 0023395!, W 18890236406!, W 18890236407!, W 19040010290!).

In fact, *P. albidulum* is a synonym of *P. laetum* Kunth, species of sect. *Panicum.*

Panicum cristatellum Keng, Sinensia 11: 412. 1940. TYPE. China. Jiangsu: Jiangyin, June 1922, *A. Allison 202* (holotype US 00148386!).

This species, mentioned as a possible synonym of *P. sumatrense* (Shouliang & Renvoize, 2006), clearly does not belong to sect. *Dichotomiflora*, since it has a lower glume 3/4 the length of the spikelet. It is most likely related to species of sect. *Hiantes.*

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