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New Species of *Digitaria*, *Pennisetum*, and *Poa* (Gramineae) from Costa Rica¹

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Descriptions of four endemic grasses from Costa Rica, *Digitaria costaricensis*, *Pennisetum tempisqueuse*, *Poa talamancae*, and *Poa chirripoensis*, are given. Chromosome number of *D. costaricensis* is $n = 27$ and that of *P. tempisqueuse* $n = 36$.

Fractions stated after shapes of structures indicate length/width proportions.

Digitaria costaricensis Pohl, sp. nov.

Sect. *Aequiglumis* Henrard pertinens, *D. aequiglumi* (Hack. et Arech.) Parodi similis, sed ab eo foliis dense papilloso-pilosis, laminis latioribus, racemis longioribus, gluma prima truncata, nervis glumae secundae 5-7 et lemmatis sterilis 7-9, antherisque purpureis 0.9-1.5 mm longis recedens.

Probably perennial; plants with long decumbent rooting culm bases, up to 80 cm. long, sometimes becoming buried and appearing rhizomatous; culms 1-3 mm. thick, hollow, thick-walled, glabrous, branching abundantly from lower and middle nodes; prophylla up to 2 cm. long, papillose-pilose; sheaths mostly longer than the internodes, densely retrorsely papillose-pilose, the hairs silky, up to 3.5 mm. long; ligule a thin erose membrane, 1.5-2.5 mm. long, decurrent on the sheath margins; blades soft, flat, 8-15 cm. long, 3.5-7.0 mm. wide, softly velvety. Peduncle glabrous, exerted up to 15 cm.; inflorescences terminal on erect leafy branches, 7-14 cm. long, narrow and erect, the 4-7 racemes borne on a short rachis up to 2-3 cm. long; several

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short racemes of 1-several spikelets borne at the base of the longer racemes. Spikelets paired, rather remote on the slender triquetrous rachis, which is strongly scabrous on the angles; sessile spikelet reaching about to the base of the spikelet next above it; spikelets of the pair equal, 3.5-4.0 mm. long; shorter pedicel 0.5-0.7 mm. long, the longer one 2.0-3.0 mm.; spikelets acute, narrowly ovate 3.5-4.0/1; first glume a thin, evanescent, nerveless, truncate, cuff-like scale, ca. 0.3 mm. long; second glume and sterile lemma equal, slightly longer than the fertile floret, both with short silky white hairs on the margins and in the outer internerves, somewhat silky on the back above the base and with scattered hairs on the remainder of the back; second glume slightly narrower than the sterile lemma, but covering the fertile floret completely, 5-7-nerved; sterile lemma similar, 7-9-nerved, the nerves equidistant; fertile floret 3.0-3.2 mm. long, the lemma narrowly ovate, acute, striate, grayish, faintly 3-nerved, the palea equal; stamens 3, the anthers purple, 0.9-1.5 mm. long; stigmas purple. Mature fruit not seen.

HOLOTYPE: Costa Rica: Prov. Cartago. 25 km. S of El Tejar along the Carretera Interamericana; elev. 1,780 m. In roadside ditch. Plants very villous, inflorescence branches erect. Chromosome number $n = 27$. Oct. 8, 1968. *Pohl & Davidse* 11215. Holotype in ISC; isotypes in F, US, UC, CR, K, L.

Other collections: Costa Rica: Prov. Cartago: Rio Macho Reservoir, 1,700 m. elevation, Oct. 3, 1968, *Pohl & Davidse* 11190; 2 km. W. of Paraíso, along drainage ditch, April 21, 1969, $n = 27$, *Pohl & Davidse* 11789.

This species occurs at middle elevations in the region east and south of Cartago. It is a member of the section *Aequiglumae* Henrard, *Monog. Digitaria* 641. This is a group of about 16 species native to the American tropics and subtropics, the members having equal paired spikelets with the first glume small or absent. The second glume and sterile lemma are subequal and usually exceed the fertile floret. Among this group, *Digitaria costaricensis* seems most similar to *D. aequiglumis* (Hack. et Arech.) Parodi, from which it differs in the following characteristics: heavily pubescent foliage, wider leaf blades, longer racemes, presence of a cuff-like first glume, more numerous nerves of the second glume and sterile lemma, longer anthers.

***Pennisetum tempisqueense* Pohl, sp. nov.**

A *P. complanato* (Nees) Hemsl. habitu caespitoso non rhizomato, setis minus numerosis albidis, spicularum acuminatarum flosculo infimo sterili, stylisque 2 inter se separatis differt. A *P. nervoso* (Nees) Trin. culmis solidis, inflorescentiis minoribus, setis minus numerosis, spicularum breviorum gluma prima breviori necnon chromosomatum numero $n = 36$ recidit. *P. frutescenti* ($2n = 63$) similis sed ab eo habitu caespitoso, culmis solidis, statura minora et chromosomatum numero distans.



FIG. 1. *Digitaria costaricensis*. Scale lines = 1 mm.

Caespitose perennial; plants 39-100 cm. tall; culms erect, unbranched, densely clustered, glabrous, glaucous, rather thin walled, the interior filled with parenchyma; nodes glabrous, constricted, dark; leaves ca. 7 per culm; sheaths mostly shorter than the internodes, compressed and keeled, glabrous and glaucous, the margin thin and membranaceous; ligule a short membrane, densely long-ciliate, 1.0-1.8 mm. long; leaf blades flat or folded, keeled near the base, firm, scabrous-margined, the base narrower than the summit of the sheath, glabrous and glaucous, 4.5-7.5 mm. wide, 8-22 cm. long, the uppermost shorter. Peduncle exerted; inflorescence a stiff and erect solitary terminal spike of fascicles, whitish, 7-10 cm. long, 2.0-2.5 cm. thick, including the bristles; rachis ca. 1 mm. thick, longitudinally striate, densely short-hispid; fascicles crowded, horizontally spreading, mostly 10-14 mm. long, borne on minute projections of the rachis; bristles ca. 20 per fascicle, whitish, of varying lengths, the outermost 3-4 mm. long, the majority 8-10 mm. long, the innermost one longer and thicker, 12-17 mm. long, all straight, upwardly scabrous, attached to a short, rounded common stipe ca. 0.2-0.3 mm. long. Spikelet one per fascicle and sessile within it, narrowly ovate, acuminate, 5-6 mm. long; first glume ovate, 1.0-1.5 mm. long, acute to rounded, scarcely nerved, membranaceous; second glume, lower lemma, and upper lemma subequal, acuminate or awn-tipped; second glume 5.0-5.5 mm. long, striate, 7-nerved; lower lemma 5.7-5.9 mm. long, 5-nerved, without a palea or flower; upper lemma 5.2-5.7 mm. long, faintly 5-nerved, the palea about equal, 2-nerved, acuminate; anthers purple, 1.2-1.5 mm. long; ovary with 2 separate styles; stigmas purple; caryopsis oblong, tan, 2.1-2.2 mm. long. Chromosome number $n = 36$, determined from the type, *Pohl & Davidse* 11725. (Published originally as *P. nervosum* in *Pohl & Davidse*, 1971).

HOLOTYPE: Costa Rica: Prov. Guanacaste: 8 km. N of Hacienda Palo Verde, 14 km. WSW of Bagaces. Elev. 10 m. Black gumbo clay flats. *Pohl & Davidse* 11725. Feb. 20, 1969. Holotype in ISC, isotypes in US, K, F, UC, CR. Progeny grown from seed of the holotype in the Iowa State University greenhouse are in ISC as *Pohl* 12987.

This species differs from the widespread *P. complanatum* (Nees) Hemsl. in being caespitose rather than rhizomatous, in the fewer, more slender whitish bristles, the acuminate spikelets with sterile lower floret, and the separate styles. It differs from the South American *P. nervosum* in its smaller size, solid culms, smaller inflorescences, fewer bristles, shorter spikelets with short first glume, and chromosome number ($n = 36$, that of *P. nervosum* being $n = 18$). It appears similar to *P. frutescens* Leeke of southern South America, from which it differs in its solid culms, longer bristles, smaller size, lack of rhizomes, and different chromosome number. *Pennisetum frutescens* has $2n = 63$ (Nuñez, 1952). The specific name is derived from the Rio Tempisque, near the type locality.

Poa talamancae Pohl, sp. nov.

P. orizabensi affinis sed ab ea foliis basalibus planis crebris, nodis caulinis 3, ligulis longioribus, spiculis majoribus, necnon lemmatibus longioribus abhorrens.



FIG. 2. *Pennisetum tempisqueense*. Scale line for inflorescence = 1 cm., for spikelets and parts = 1 mm.

Gramen perenne caespitosum, basi dense foliatum, foliis planis laxis; panícula parva tenella, ramis binatis vel solitariis flexuosis; spiculae 2-3-florae; lemmata basi sparsim comata.

Plants perennial, caespitose in dense tufts with abundant basal foliage; sheaths of basal leaves keeled; blades flat, olivaceous, 3-14 cm. long, 2-4 mm. wide, their surfaces minutely scaberulous, the margins scabrous, tip conspicuously cucullate; basal foliage often floccose with fungus hyphae; culms erect or somewhat decumbent at the base, slender, 20-60 cm. tall; internodes 3, ca. 1 mm. thick, hollow, glabrous, slightly scabrid, with a light-colored band just below the prominent, purple nodes; culm leaves usually 3; sheaths much shorter than the internodes, glabrous, slightly keeled and scabrid on the keel; ligule a thin membrane, up to 2 mm. long; blades of culm leaves flat, 2-6 (-14) cm. long, 2-4 mm. wide, the uppermost usually short. Peduncle exerted up to 11 cm.; inflorescence a solitary terminal panicle, 8-11 cm. long, up to 6 cm. wide, very open, the solitary or paired slender flexuous branches up to 3 cm. long; spikelets few, appressed along the outer halves of the branches. Spikelets 4.5-5.6 mm. long, laterally compressed, usually purple; glumes shorter than the florets, the first ovate as folded, 1-nerved, 1.8-2.9 mm. long; second glume oblong to obovate, 3-nerved, 2.3-3.4 mm. long, both glumes scabrous on the keel; florets 2-3, the rachilla prolonged beyond the last as a slender bristle one-third to one-half as long as the floret, sometimes bearing a minute rudiment at its tip; lemmas oblong-obovate in side view, 5-nerved, 3.1-4.1 mm. long; lower third to half of the keel silky-ciliate, as also the basal portion of the marginal nerves; upper part of the keel and surface of the lemma scabrid; at least the lowermost lemma bearing a scant cottony web on the callus; palea about equal to the lemma, scabrous on the keels; anthers 3, yellow, 1.1-1.3 mm. long; caryopsis brown, narrowly ovoid, 2 mm. long.

HOLOTYPE: Costa Rica: Prov. San José: Asunción Summit of Cerro de la Muerte. Elev. 3,335 m., open windswept páramo. July 22, 1966. *Mori & Anderson* 214. ISC, WIS.

Other specimens: Costa Rica: Prov. Cartago: Páramo, elev. ca. 3,500 m., Cerro de la Muerte. Feb. 26, 1965. *Godfrey* 66754. US, FSU; Costa Rica, without locality or date: *Jorge León* 2714. US.

Poa talamancae is not closely related to any other species of *Poa* found in Costa Rica. It could probably be assigned to the informal group "Palustres" of Hitchcock. It appears most similar to *P. orizabensis* Hitchc., Contrib. U. S. Nat. Herb. 17: 374. 1913, a Mexican species, from which it differs in the abundant soft, flat, basal leaf blades, three stem nodes, longer ligules, and larger spikelets with longer lemmas. The specific name is derived from the Talamanca Range.

***Poa chirripoensis* Pohl, sp. nov.**

Gramen perenne dense caespitosum, foliis basalibus elongatis erectis rigidis conpuplicatis apiculatis; panícula parva; spiculae 1-2-florae; lemmata pilis rigidis brevissimis apice rotundatis lineolatim scabra basi que sparsissime comata.

Perennial; densely caespitose; culms erect, unbranched, 37-50 cm. tall, hollow, glabrous, elliptical in cross-section; nodes not prominent, dark; basal foliage abun-



FIG. 3. *Poa talamancae*. Scale lines = 1 mm.

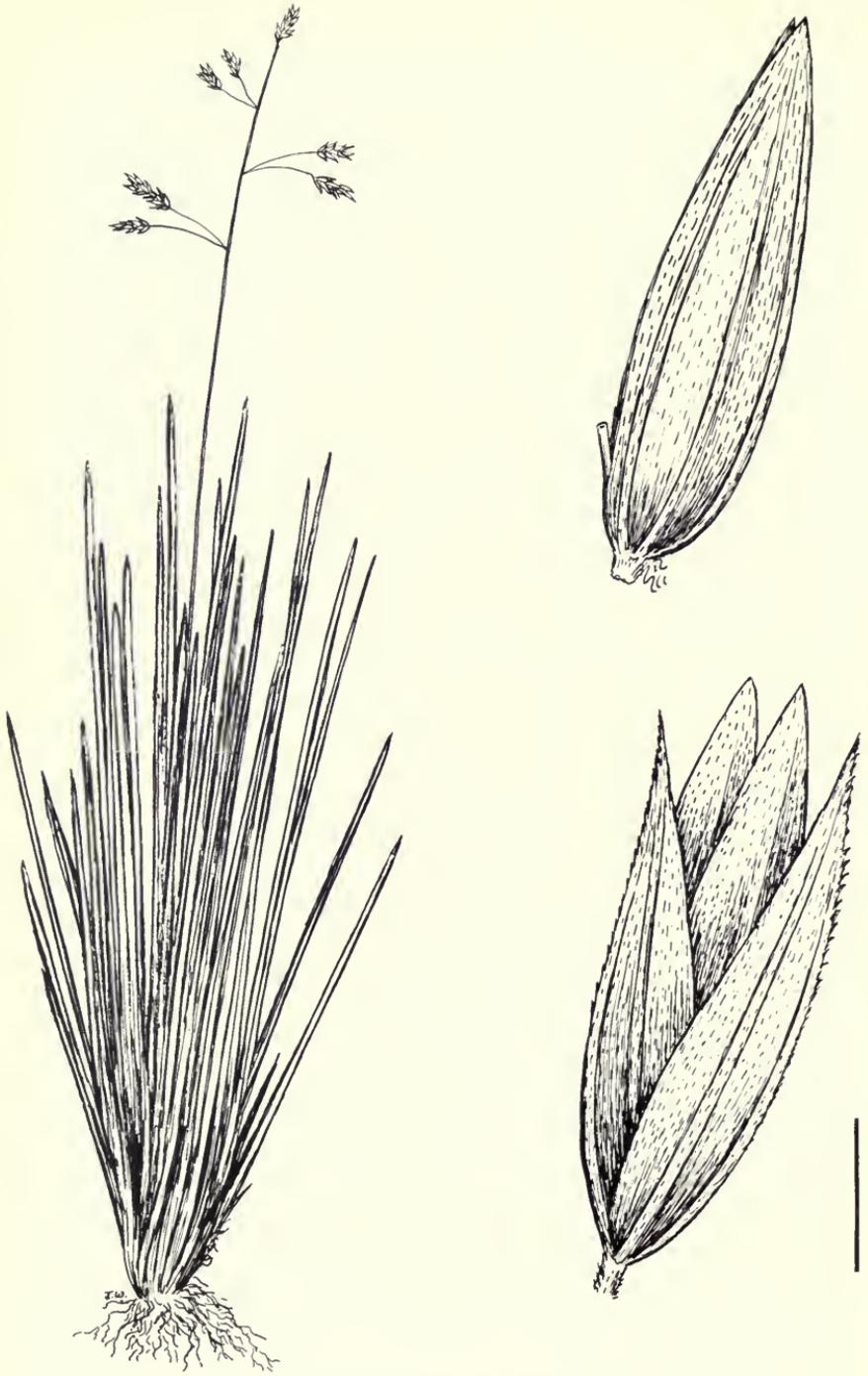


FIG. 4. *Poa chirripoensis*. Scale line = 1 mm.

dant, the blades stiff, erect, up to 20 cm. long, reaching about to midculm; sheaths keeled, slightly scabrid, those of the 2-3 short culm leaves shorter than the internodes; ligule a thin membrane, 2.0-4.5 mm. long, tapering abruptly to a point; leaf blades 2-3 mm. wide, stiff, permanently folded, erect, tapering abruptly to a sharp rigid cusp, the surfaces minutely roughened. Peduncle smooth, exerted 7-25 cm.; inflorescence a solitary terminal panicle, open, pyramidal, 6-8 cm. long, 3-5 cm. wide; branches paired, spreading, flexuous, bearing a few peg-like hairs like those of the lemmas; pedicels thick, scabrous in lines with similar hairs; spikelets clustered toward the outer ends of the branches. Spikelets 3.7-4.4 mm. long, 1-2-flowered, the glumes keeled, 3.5-4.0 mm. long, nearly as long as the florets; first glume triangular 5/1 as folded, the second slightly wider, both 3-nerved, tapering to acuminate tips, scabrous on the keels and nerves; lemmas ovate, 3.5-3.9 mm. long, 4/1-5/1 as folded, blunt tipped, densely scabrous in lines with thick, stiff, round-tipped hairs 0.05-0.10 mm. long; callus usually with a few short cobwebby hairs; palea nearly as long as the lemma, scabrous on the keels with hairs similar to those of the lemmas.

Known only from the type, collected on the summit of Chirripó Grande.

HOLOTYPE: Costa Rica: Prov. San José: Among rocks on top of Chirripó at 3,820 m. Forming tufts. Open páramo formation with stands of *Chusquea* bamboo 1-2.5 m. tall. 9°30'N, 83°31'W. *Burger & Liesner* 7448. Jan. 19-22, 1970. Holotype in F; isotypes in ISC, US, CR.

This species is easily distinguished from others in Central America by its dense clusters of erect basal leaves, and by the unique rigid spicule-like hairs of the lemmas. It is not closely related to any other North American species.

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