

# New Species of *Festuca*, *Sporobolus*, and *Eriochloa* (Poaceae) from Mesoamerica and South America

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**ABSTRACT.** As a result of work on the Poaceae for *Flora Mesoamericana*, the following four new species are described, illustrated, and compared with their closest putative relatives: *Festuca talamanensis* from the Cordillera de Talamanca in Costa Rica, *F. herrerae* from the Cordillera de Talamanca in Costa Rica and Panama, *Sporobolus distichivaginat* from the Petén, Guatemala, and *Eriochloa stevensii* from Nicaragua, Venezuela, and Ecuador.

In addition to the new species of grasses recently described as the result of a review of the Poaceae for *Flora Mesoamericana* (Davidse & Pohl, 1992), the following four species were found to be new and are here described, discussed, and illustrated for the first time. As in the earlier paper, the new species are published under the name of the person primarily responsible for the account of the taxon.

## POAEAE

Twenty species of *Festuca* were accepted for *Flora Mesoamericana*, including the following two new species. Alexeev (1981, 1982) has most recently studied the genus for Mesoamerica. Of the five species that he described as new, three have been accepted for the *Flora Mesoamericana* treatment, and the other two were synonymized: *F. aguana* Alexeev (syn. *F. panamica* Alexeev), *F. cartagana* Alexeev, *F. swallenii* Alexeev, *F. willdenowiana* Schultes & Schultes f. (syn. *F. guatemalica* Alexeev).

***Festuca herrerae*** Davidse, sp. nov. TYPE: Costa Rica. Limón: Cordillera de Talamanca, Atlantic slope, Kámuk massif, páramo NE of the Kámuk peak, 3,000–3,300 m, 9°16'–17'N, 83°00'–02'W, *Blechnum*-shrub association in *Chusquea-Hypericum* páramos, 17–18 Sep. 1984, G. Davidse & G. Herrera Ch. 29291 (holotype, MO; isotypes, BM, CR, MEXU). Figure 1A–D.

Gramen perenne caespitosa innovationibus extra et intravaginalibus. Culmi 30–90 cm longi. Vaginae foliorum puberulae retrosum vel glabrae aliquantum fibrosae; ligula 0.3–2 mm longa; laminae 10–25 cm longae, 1–4 mm latae, planae vel plicatae, infra glabrae, supra parce scaberrulae. Panicula 6–19 cm longa, 5–11 cm lata, laxa. Spiculae 6.6–9 mm longae; gluma infra 3.1–4.5 mm longa, 1-nervia; gluma supra 5–5.8 mm longa, 3-nervia; flosculi 3–5; lemmata 5.7–6.8 mm longa, 5-nervia, acuminatis, glabra dorsaliter scaberulla apicem versum; antherae 3, 1.6–2.1 mm longae; ovarium glabrum.

Loosely caespitose, perennial herb; innovations intra- and extravaginal; rhizomes not elongated. Culms 30–90 cm long, hollow, sparsely scaberulous below the nodes; elongated internodes 2–5. Sheaths retrorsely puberulent (in the lower leaves) to glabrous, stramineous to brown, slightly fibrous in age, the margins free; auricles absent; ligule 0.3–2 mm long, ciliate, membranous, the lateral extensions to 0.6–2 mm long; blades 10–25 cm long, 1–4 mm wide, flat to folded, glabrous below, sparsely scaberulous above; abaxial and adaxial sclerenchyma girders well developed. Panicle 6–19 cm long, 5–11 cm wide, open, lax, erect; axis scaberulous; lowest panicle branches 4–5 cm long, solitary or paired, spreading and drooping at the tips; pedicels scaberulous. Spikelets 6.6–9 mm long; lower glume 3.1–4.5 mm long, subulate, 1-nerved; upper glume 5–5.8 mm long, narrowly lanceolate, 3-nerved; florets 3–5; lemmas 5.7–6.8 mm, obscurely 5-nerved, glabrous on the back, scaberulous at the tip, entire, acuminate, unawned; palea as long as the lemma to 0.7 mm shorter, scaberulous on and between the keels near the tip, nearly glabrous toward the base, bidentate, the margins glabrous; stamens 3, the anthers 1.6–2.1 mm long; ovary glabrous; styles 2, terminal, separate, long-plumose in the upper  $\frac{1}{10}$ . Caryopsis 2.9–3 mm long, 0.8 mm wide, dark brown, glabrous, convex on the embryo side, sulcate the entire length on the hilum side; embryo  $\frac{1}{10}$ – $\frac{1}{5}$  as long as the caryopsis; hilum ca.  $\frac{1}{10}$  as long as the caryopsis.

**Paratypes.** COSTA RICA. LIMÓN: Cordillera de Talamanca, Atlantic slope, Kámuk massif, main SW ridge





Figure 1. *Festuca* species. A–D. *F. herrerae* Davidse. —A. Habit. —B. Spikelet. —C. Uppermost fertile floret and the ultimate reduced sterile floret. —D. Caryopsis. E, F. *F. talamancensis* Davidse. —E. Uppermost fertile floret and the ultimate reduced sterile floret. —F. Spikelet. (A based on Davidse & Herrera 29291, B–D on Davidse et al. 25354, E, F based on Davidse 24776.)

from Kámuk peak to Cerro Dudu, 3,000–3,300 m, 9°15'–16'N, 83°02'–04'W, *Blechnum*-shrub páramo, 19 Sep. 1984, Davidse & Herrera Ch. 29369 (MO); Cordillera de Tamanca, Cerro Kámuk massif, between Cerro Dudu and Cerro Apri, 2,900–3,100 m, 9°14'30"–15°30"N,

83°03'30"–04°30"W, shrub páramo dominated by *Diplostegium*, *Blechnum* and other shrubs 1½–2 m tall, in open patches among shrubs, 23 & 26 Mar. 1984, Davidse, Herrera Ch. & Warner 25876 (CR, ISC, LE, MEXU, MO, US). LIMON–PUNTARENAS BORDER: Cordillera



de Talamanca, Cerro Kasir, on the continental divide, 2,950 m, 9°12'N, 83°03'W, small marshy páramo in forest opening, 20 Sep. 1984, *Davidse & Herrera Ch. 29405* (CR, F, MO). PANAMA. BOCAS DEL TORO: Cordillera de Talamanca, 4 airline km NW of the main peak of Cerro Fábrega along the NW ridge of the massif, 3,000–3,150 m, 9°09'N, 82°54'W, lowest páramo slopes with low-forested gullies, in open páramo, stems purple, *Davidse et al. 25390* (MO); Cordillera de Talamanca, 2 airline km NW of the main peak of Cerro Fábrega along the NW ridge of the massif, 3,150–3,200 m, páramo with low-forested gullies, around small pond, culms and spikelets dark purple, 7–8 Mar. 1984, *Davidse et al. 25354* (CR, K, MO, PMA).

This species belongs to subgenus *Festuca* sect. *Festuca*. It appears to be related to *F. willdenowia* in that the leaf blades are not permanently convolute. It differs from that species in sclerenchyma girders associated with all vascular bundles (rather than only 2), lemma essentially glabrous and unawned (not scabrous and awned 0.5–2 mm).

*Festuca herrerae* is so far known only from the two peaks of the Cordillera de Talamanca that straddle the Costa Rican–Panamanian border and which form the highest part of the International Park La Amistad. Its range overlaps that of *F. talamancensis* in the Cerro Kámuk páramos.

The species is named in honor of the expert Costa Rican field botanist and plant collector, Gerardo Herrera Chacón, a good friend and co-collector of this species.

***Festuca talamancensis*** Davidse, sp. nov. TYPE: Costa Rica. San José–Cartago: Cordillera de Talamanca, Cerros Cuericí, Parque Nacional Chirripó, continental divide, 9°35'N, 83°38'W, *Chusquea-Hypericum*-ericad shrub páramo with open areas with tussock grasses (dominated by *Cortaderia*) near the summit, 3,200–3,394 m, inflorescences nodding, 17 Sep. 1983, *G. Davidse 24776* (holotype, MO; isotypes, AAU, BM, COL, EAP, ISC, K, L, LE, MEXU, NY, PMA, PRE, SI, US, USM, VEN). Figure 1E, F.

Gramen perenne caespitosa innovationibus extravagin-alibus. Culmi 45–90 cm longi. Vaginae foliorum glabrae integrae; ligula 0.4–1 mm longa; laminae foliorum 10–30 cm longae, 0.5–0.7 mm latae, involutae, infra glabrae, supra scaberullae. Panicula 10–14 cm longa, 3–4 cm lata, laxa. Spiculae 6.4–7 mm longae; gluma infra 3.4–4.5 mm longa, 1-nervia; gluma supra 4.8–6 mm longa, 3-nervia; flosculi 3; lemmata 5–6 mm longa, 5-nervia, glabra vel scaberulla, arista 0.3–1 mm longis; antherae 3, 1.1–1.4 mm longae; ovarium glabrum.

Densely caespitose, perennial herb; innovations extravaginal; rhizomes not elongated. Culms 45–90 cm long, hollow, glabrous; elongated internodes 2(3). Sheaths glabrous, stramineous, nonfibrous, the margins free; auricles absent; ligule 0.4–1 mm long,

ciliolate, membranous, the lateral extensions unequal, the larger extension 1–1.5 mm long; blades 10–30 cm long, 0.5–0.7 mm wide, involute, glabrous below, scaberulous above; abaxial sclerenchyma girders well developed, sometimes limited to sclerenchyma strands below the marginal vascular bundles; adaxial sclerenchyma absent. Panicle 10–14 cm long, 3–4 cm wide, nodding, lax; axis glabrous; lowest branches 4–6 cm long, paired, ascending or the ends arching; pedicels glabrous. Spikelets 6.4–7 mm long; lower glume 3.4–4.5 mm long, subulate, 1-nerved; upper glume 4.8–6 mm long, lanceolate, 3-nerved, abaxially glabrous, adaxially scaberulous; florets 3, the lower 2 bisexual, the upper rudimentary; lemmas 5–6 mm long, obscurely 5-nerved, abaxially scabrous in the lower  $\frac{1}{4}$ – $\frac{1}{2}$ , scaberulous to nearly glabrous in the upper  $\frac{1}{2}$ – $\frac{3}{4}$ , adaxially scaberulous throughout, entire, the awn 0.3–1 mm long; paleas 0.5–1.5 mm shorter than the lemmas, relatively longer in the uppermost florets, densely scabrous on and between the keels, the tip slightly notched, the margins glabrous on the lower  $\frac{1}{2}$ – $\frac{3}{4}$ , scabrous in the upper  $\frac{1}{4}$ – $\frac{1}{2}$ ; stamens 3, the anthers 1.1–1.4 mm long; ovary glabrous; styles 2, terminal, separate, long-plumose in the upper  $\frac{1}{2}$ . Caryopsis 2.8–3.5 mm long, 0.7–0.8 mm wide, dark brown, glabrous, convex on the embryo side, deeply and broadly grooved on the hilum side; embryo  $\frac{1}{2}$  as long as the caryopsis; hilum ca.  $\frac{1}{3}$  as long as the caryopsis.

*Paratypes*. COSTA RICA. LIMON: Cordillera de Talamanca, Atlantic slope, Kámuk massif, páramo NE of the main Kámuk peak, 9°16'–17'N, 83°00'–02'W, *Blechnum*-shrub association in *Chusquea-Hypericum* páramo, 17–18 Sep. 1984, *Davidse & Herrera Ch. 29335* (BM, CR, ISC, MEXU, MO, US).

*Festuca talamancensis* belongs to subgenus *Festuca* sect. *Festuca*. It is closely related to *F. tolucensis* Kunth, a species distributed from Jalisco and Veracruz, México, south to Costa Rica, but *F. talamancensis* differs in its leaves glabrous abaxially (not scabrous), florets 3 (not 4–8), pedicels and inflorescence axis glabrous (not scaberulous), lower glume 3.4–4.5 mm (not 4.8–8.2 mm), upper glume 4.8–6 mm (not 6.4–9.5 mm), lemmas 5–6 mm and less strongly scabrous (not 6.5–9.5 mm), anthers 1.1–1.4 mm (not 3.2–4.2 mm). The abaxial cuticle is thicker than the epidermal cells, which are quite thick-walled. The adaxial ribs are prominent.

So far it is known only in Costa Rica from the Cordillera de Talamanca (after which it is named) in páramos associated with the two highest peaks in the country, Chirripó Grande (and its western extension Cerros Cuericí) and Cerro Kámuk. Its distribution overlaps with that of *F. tolucensis* in the Chirripó páramos.



ERAGROSTIDEAE

***Sporobolus distichivaginatus*** R. Pohl, sp. nov.

TYPE: Guatemala. Petén: Dolores, en orillando Río Machaquilla, lado sur este de caserio, fruto amarillo, en foresta alta, 18 Feb. 1971, *R. Tún Ortiz 1610* (holotype, ISC; isotypes, F, US). Figure 2.

Gramen annuum 35–50 longum. Vaginae foliorum valde distichae; laminae 2–3.5 mm latae, papilloso-ciliatae. Panicula 5–7 cm longa, 2–3 cm lata, cilindrico-pyramidalis; rami 0.5–1.5 cm longi, verticillati. Spiculae 2.8–3.4 longae; gluma inferna 1.2–1.8 mm longa; lemma 2.5–2.7 mm longum; palea findens ubi maturum; stamina 3. Utriculus 1.5–1.6 mm longus, 0.5–0.6 latus, valde complanatus.

Caespitose annual herb. Culms 35–50 cm tall, erect, unbranched, glabrous, the internodes solid. Leaves mostly basal; sheaths keeled, densely overlapping, distichous; ligule 0.1–0.2 mm long, a ciliate rim; basal blades 5–10 cm long, 2–3.5 mm wide, folded to involute toward the apex, blunt-tipped, glabrous except for basal and marginal pustulose-based elongate hairs; cauline blades ca. 2 mm, much reduced. Panicle 5–7 cm long, 2–3 cm wide, open, cylindrical-pyramidal; rachis exposed; branches 0.5–1.5 cm long, verticillate, spreading, somewhat stiff, spikelet-bearing on the outer  $\frac{1}{2}$ ; pedicels 0.2–0.6 mm long, appressed. Spikelets 2.8–3.4 mm long, brown; glumes, lemma, and palea membranous; lower glume 1.2–1.8 mm long, narrowly lanceolate, acuminate, 1-nerved, the margins frequently becoming inrolled; upper glume 2.9–3.4 mm, lanceolate, acute, 1-nerved; floret solitary; lemma 2.5–2.7 mm, lanceolate, 1-nerved; palea nearly as long as the lemma, 2-nerved, splitting as the fruit matures; flower bisexual; lodicules 2, glabrous, truncate to emarginate; stamens 3, the anthers 1–1.2 mm, yellow; stigmas 2, separate; styles plumose, white. Utricle 1.5–1.6 mm long, 0.5–0.6 mm wide, somewhat oblong in side view, strongly flattened in cross section, apically broadly rounded; pericarp gelatinous when moistened; embryo ca.  $\frac{2}{3}$  as long as the utricule.

*Paratype*. GUATEMALA. PETEN: La Cumbre, in Chacte Abajo, bordering the river, 15 Feb. 1971, *Contreras 10529* (MO).

This species is closely related to *Sporobolus erectus* A. Hitchc. but differs by its apparently annual (vs. perennial) habit, the more strongly distichous leaf sheaths (the basis of the epithet), and smaller inflorescences (5–7 × 2–3 cm vs. 13–17 × 5–7 cm).

*Sporobolus distichivaginatus* is so far known only from river margins below 500 m in the Petén, Guatemala. *Sporobolus erectus* is known from pine-

oak forests in Chiapas, Oaxaca, and Veracruz, Mexico, at elevations ranging from 1,200 to 2,300 m.

PANICEAE

***Eriochloa stevensii*** Davidse, sp. nov. TYPE: Nic-

aragua. Granada: 31 km NW of Río Ochomogo bridge along Hwy. 1, ca. 11°40'N, 85°59'W, ca. 60 m, level *Crescentia* savanna, common, erect, inflorescence whitish green, 20 Aug. 1981, *W. D. Stevens & O. M. Montiel 20608* (holotype, MO; isotypes, BRI, CR, HNMN, ISC, K, MEXU, SI, US). Figure 3A–F.

Gramen annuum 50–100 cm longum. Folia, culmi, rami inflorescentiae et pedicelli dense velutini. Panicula 14–25 cm longa, 2–5 cm lata; racemi 17–57, 1–3.5 cm longi. Spiculae 3.4–5.5 mm longae, plerumque binatae, lanceolatae, acuminatae vel aristatae ad 1.0 mm, pilosae adpressae infernae  $\frac{3}{4}$ ; flosculus superus 1.9–2.3 mm longus, 0.8–1.0 mm latus, ellipticus, apiculo vel arista 0.1–0.2(–0.4) mm longo.

Annual herb. Culms 50–100 cm tall, erect, densely velvety pubescent; internodes hollow. Leaves mostly cauline, densely velvety pubescent in all parts; sheaths somewhat keeled toward the apex; ligule with the membrane 0.1–0.2 mm long and cilia 0.5–1.0 mm long; blades 10–21 cm long, 4–14 mm wide, linear, flat. Inflorescence 14–25 cm long, 2–5 cm wide, a panicle of simple racemes or the racemes rarely with a short branch bearing solitary spikelets in large specimens; racemes 17–57, 1–3.5 cm long, ascending, the rachis 0.4–0.5 mm wide; main rachis, rachis of racemes, and pedicels densely velvety pubescent; pedicels 0.3–1.0(–2.0) mm. Spikelets 3.4–5.5 mm long, 1.2 mm wide, paired, solitary toward the apex of a raceme, ascending, lanceolate; basal callus 0.2–0.3 mm long; upper glume 3.4–5.2 mm, acuminate or aristate for 1.0 mm, lanceolate, 3-nerved, appressed pilose in the lower  $\frac{3}{4}$ ; lower floret sterile; lower lemma as long as to 1.0 mm shorter than the upper glume, lanceolate, 3-nerved, appressed pilose in lower  $\frac{2}{3}$ – $\frac{3}{4}$ , acuminate; lower palea absent; upper floret 1.9–2.3 mm long, 0.8–1.0 mm wide, minutely papillose, elliptic, glabrous except puberulent at the apex on the apiculum, obtuse, apiculate or rarely short aristate to 0.2(–0.4) mm; lodicules 2, truncate; stamens 3, the anthers 1.1–1.3 mm, yellow; stigmas 2, the styles plumose. Caryopsis 1.1–1.2 mm long, ca. 0.7 mm wide, broadly elliptic,  $\pm$  flattened on both the hilum and embryo sides; hilum ca.  $\frac{1}{3}$  as long as the caryopsis, narrowly elliptic; embryo slightly over  $\frac{1}{3}$  as long as the caryopsis.

*Paratypes*. NICARAGUA. RIO SAN JUAN: 0.5 km S of Río Oyote, bridge on road to San Miguelito, 11°43'N, 84°58'W, 40 m, 28 Aug. 1983, *Nee & Miller 27604*

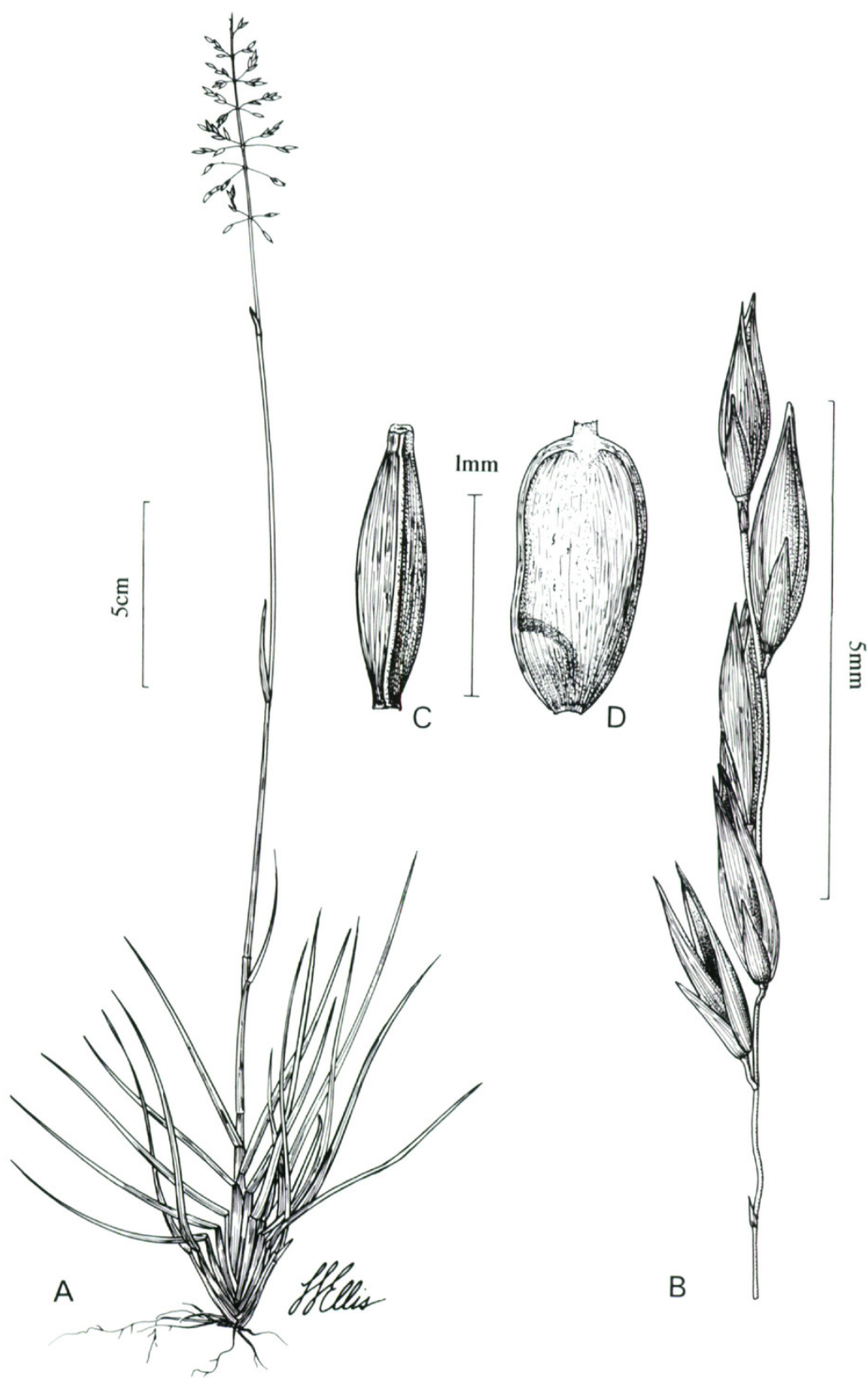


Figure 2. *Sporobolus distichivaginatatus* R. Pohl. —A. Habit. —B. Panicle branch with spikelets. C, D. Utricle. —C. End view. —D. Side view. (A, B based on Contreras 10529; C, D based on Tún Ortíz 1610.)



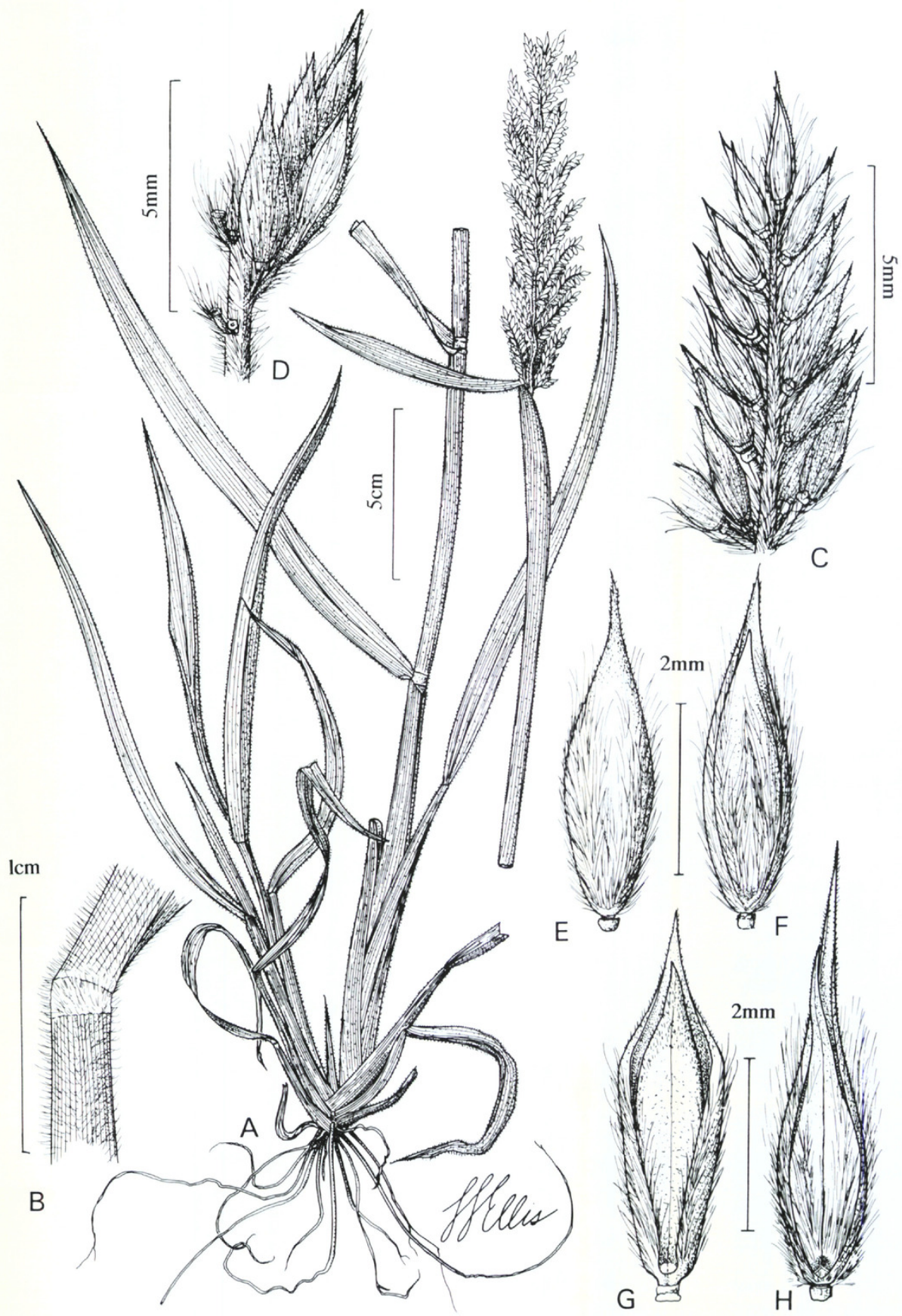


Figure 3. *Eriochloa* species. A–F. *E. stevensii* Davidse. —A. Habitat. —B. Portion of leaf in the ligular area illustrating the velvety pubescence. —C. Raceme with spikelets. —D. Portion of raceme with two spikelet pairs. E, F. Spikelets. —E. Dorsal view. —F. Ventral view. —G. *E. eggersii* A. Hitchc., ventral view of spikelet. —H. *E. pacifica* Mez, ventral view of spikelet. (A–F based on Stevens & Montiel 20608; G based on Sagástegui 2930; H based on Asplund 5738.)



(BM, CANB, ISC, MO, VEN). GRANADA: 36 km ENE of Managua, 18 Sep. 1976, *Danin 76-4-15* (MO). CHINANDEGA: Coriato, ca. 0 m, 10 Nov. 1911, *Hitchcock 8749* (US). VENEZUELA. GUARICO: Carretera Dos Caminos-El Sombrero, ca. 10 km, 17 Sep. 1981, *Trujillo & Correa 17823* (MO). ECUADOR. Puna, Ostküste, 5 m, 13 June 1934, *Schimpf 1184* (MO, US). GUAYAS: Sabanilla, 25–30 m, 12 Apr. 1951, *Solís 20594* (US); Capeira, km 21 Guayaquil to Daule, 20–200 m, 16 Mar. 1982, *Dodson & Dodson 13003* (MO, SEL). PERU. TUMBES: Prov. Zarumilla, Dtto. Matapalo, Bosque Nacional de Tumbes cerca de Campo Verde, along road to Tutumo, ca. 20 km from Tumbes, 600–800 m, 26 Apr. 1969, *Simpson & Schunke V. 833* (US).

This species has often been misidentified as *Eriochloa pacifica* Mez or sometimes as *E. eggersii* A. Hitchc., closely related annual species from Ecuador and Peru. Both of these species are similar to *E. stevensii* in having densely velvety pubescent inflorescence branches, paired spikelets, and a similar ligule.

*Eriochloa pacifica* (Fig. 3H) is a more delicate plant with fewer (4–17 vs. 17–57), more appressed racemes, relatively wider and shorter leaf blades that are glabrous to pubescent (but not densely velvety), modally larger spikelets (5.0–7.3 mm vs. 3.4–5.5 mm) with longer (1.0–3.0 mm vs. to 1.0 mm) awns, and pedicels with noticeably elongated trichomes toward the apex versus more or less the same length.

*Eriochloa eggersii* (Fig. 3G) is morphologically more variable than *E. pacifica* or *E. stevensii*. It also tends to have fewer racemes (usually fewer than 15), but some plants may rarely have as many 24. The leaf blades are similar to *E. pacifica* in tending to be relatively shorter and broader and generally less pubescent. Compared to *E. stevensii*, *E. eggersii* has longer spikelets (5.5–8.1 mm vs. 3.4–5.2 mm), the upper glume is widest at about or above the middle (vs. below the middle) and strongly clasped and enrolled over the lower lemma, the awn of the upper floret is longer (0.3–1.0 mm vs. 0.1–0.2 mm), and the tip of the upper glume is frequently bidentate (vs. entire at the apex) in at least some spikelets of a raceme. However, this may be limited to a single indentation on one side only, and the glume margins may be entire in other spikelets of the racemes.

Shaw & Webster (1987) treated *Hitchcock 8749* collected in Nicaragua as part of *E. pacifica* and considered it adventive in Nicaragua. However, it is probably native in Nicaragua, and is another example of the well-known distribution pattern exhibited by species of the dry, deciduous forest zone along the Pacific side of Mesoamerica that reoccur in Ecuador and continue on into Peru (Gentry, 1982). What is more surprising in this case is its occurrence on the eastern side of the Andes in Venezuela, although it occupies a similar vegetation type in the savannas of the Venezuelan llanos. In Nicaragua it is found in the dark, heavy clays typical of the *Crescentia* savannas.

The callus sometimes has a very narrowly triangular free lower glume up to 1.1 mm long.

The species is named in honor of Warren Douglas Stevens, Director of Research of the Missouri Botanical Garden and collector of the type collection, in recognition of his outstanding contributions to our knowledge of the Nicaraguan flora.

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