

SPOROBOLUS (POACEAE: CHLORIDOIDEAE:
CYNODONTEAE: ZOYSIEAE: SPOROBOLINAE)
FROM NORTHEASTERN MÉXICO

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ABSTRACT

A taxonomic treatment of *Sporobolus* R. Br. for northeastern México (Coahuila, Nuevo León, and Tamaulipas), is given. Seventeen species and one subspecies of *Sporobolus* are recognized in the study area. *Sporobolus atroides* subsp. *regis* is endemic to Coahuila, and *S. atrovirens* and *S. spiciformis* are endemic to México. Keys for determining the species, descriptions, distributions, specimens examined, illustrations, synonymies, and a brief discussion indicating relationships among all native and adventive species of *Sporobolus* in northeastern México are provided.

RESUMEN

Se presenta un estudio taxonómico de *Sporobolus* R. Br. para el noreste de México (Coahuila, Nuevo León y Tamaulipas). Se reconocen diecisiete especies y una subespecie de *Sporobolus* para el área de estudio. *Sporobolus atroides* subsp. *regis* es endémica para Coahuila, y *S. atrovirens* y *S. spiciformis* son endémicas para México. Se incluyen claves para determinar las especies, descripciones, distribuciones, especímenes examinados, ilustraciones, sinonimias, y una discusión breve indicando las relaciones entre todas las especies nativas y adventicias de *Sporobolus* para el noreste de México.

Northeastern México (Coahuila, Nuevo León, and Tamaulipas), covers an area of 291,955 km² or 15 % of the total land of the country. This area includes portions of two natural regions known as the Chihuahuan and Tamaulipan Deserts. These regions are considered a center of origin and diversification of arid and semi-arid plant species. As part of the current revision of the grass flora of northeastern México, an examination of the taxonomy and distribution of the species of *Sporobolus*, was begun to aid the agriculture and livestock industries. This study treats 17 species and one variety, for a total of 18 taxa.

Sporobolus R. Br. is a worldwide genus of more than 160 species occurring in the tropics, subtropics, and warm temperate regions (Clayton & Renvoize

1986; Peterson et al. 1997; Watson & Dallwitz 1992). There are 72 native species of *Sporobolus* in North, Central, and South America; 27 native in the United States and Canada; and 26 native in México (Espejo-Serna et al. 2000; Peterson et al. 2001, 2003, 2005). The genus is characterized by having single-flowered spikelets, 1-nerved lemmas, fruits with free pericarps or “modified caryopses” as proposed by Brandenburg (2003), and ligules with a line of hairs (Peterson et al. 1995, 1997). Species of *Sporobolus* generally inhabit dry, saline or alkaline sandy to clay loam soils in prairies, savannahs, and along disturbed roadsides (Peterson et al. 1997).

The subtribe Sporobolinae, as currently circumscribed, consists of three New World genera: *Calamovilfa* (A. Gray) Hack., *Spartina* Schreb., and *Sporobolus* (Peterson et al. 2005). In the New World the Sporobolinae share most of the same character trends as for the tribe Zoysieae, i.e., spikelets with a single floret, spiciform inflorescences of numerous deciduous racemelets disposed along a central axis, lemmas usually rounded and rarely with apical awns, and glumes often modified and oddly shaped, but differ by having modified caryopses (pericarps reluctantly free in *Spartina*), spikelets oriented abaxially along the axis (lemma is facing the rachis), lemmas that are similar in texture to the glumes, and paleas that are relatively long and about the same length as the lemma (Peterson et al. 2005).

Within *Sporobolus*, Stapf (1898) first divided the genus into two sections: *Chaetorhacia* Stapf and *Eusporobolus* Stapf. Pilger (1956) then divided the latter section, which he elevated to *Sporobolus* subg. *Sporobolus* (Stapf) Pilg., into six groups based on life form and characteristics of the glumes and panicles. Based on caryopsis morphology, Bor (1960) divided *Sporobolus* into five rather unnatural groups (Baaijens & Veldkamp 1991). Working on the Malesian species, Baaijens & Veldkamp (1991) divided *Sporobolus* subg. *Sporobolus* into five sections based on overall morphology with special attention given to inflorescence branching. More recently, Weakley & Peterson (1998) recognized the *Sporobolus floridanus* complex to include five species in the southeastern United States and based on nuclear ribosomal DNA ITS sequences, Ortíz-Díaz & Culham (2000) presented evidence to support the recognition of at least 10 clades within *Sporobolus*. Recent major revisions of *Sporobolus* include Boechat & Wagner (1995) for Brazil, Simon & Jacobs (1999) for Australia, and Peterson et al. (2003) for the United States and Canada.

The following taxonomic treatment contains a key for determining the species, descriptions, distribution, specimens examined, illustrations, and synonymies for all native and adventive species of *Sporobolus* in northeastern México. This study is based on the examination of herbarium specimens from ANSM, COCA, MEXU, MO, NMSU, TEX, UAT, and US, including the type specimens of most of the species studied.

TAXONOMIC TREATMENT

Sporobolus R. Br., Prodr. 169. 1810. TYPE: *Sporobolus indicus* (L.) R. Br. [lectotype designated by L.K.G. Pfeiffer, Nom. Bot. 2:1274. 1874, also by Nash, Ill. Fl. N. US. (ed 2), 1:194. 1913].

Plants annual or perennial; sometimes rhizomatous, rarely stoloniferous. Flowering culms 10–250 cm tall, erect rarely mat-forming, caespitose (often forming large clumps), glabrous; leaf sheaths longer or shorter than the internodes usually with smooth margins, occasionally ciliate; ligule ciliate, a line of hairs; blades 3–70 cm long, 1–15 mm wide at base, filiform or linear, flat, involute, or terete, not pungent, cauline without auricles. Inflorescence a panicle 0.5–80 cm long, 0.3–30 cm wide, exerted or partially included in upper sheath; rachis smooth; primary branches appressed, spreading, divaricate, or reflexed from the main axis, solitary or loosely whorled, sometimes with capillary branches terminating in a spikelet; secondary branches appressed or spreading; pedicels erect, rarely secund, glabrous, scaberulous or scabrous; cleistogamous spikelets occasionally present, in axillary inflorescences. Spikelets 1–4(–7) mm long, solitary, laterally or dorsally compressed, sometimes terete; disarticulation usually above the glumes, commonly above the upper glume, occasionally below with the lemma and palea falling as a unit; glumes shorter or longer than the florets, very unequal, smooth, glabrous; lower glume without midvein or 1-veined; upper glume about the same length as the lemma, usually awnless, 1-veined; florets 1 per spikelet; lemma entire, awnless, glabrous or hairy, pubescent to pilose, 1-veined, rarely 3-veined, membranous with glabrous veins; palea glabrous, smooth, membranous, margins not enfolding the fruit, 2-veined, often splitting as grain matures; lodicules 2 or sometimes absent, truncate; stamens 2 or 3; anthers yellow, reddish-purple, or olivaceous-plumbeous; stigmas 2. Modified Caryopsis a follicoid fruit with a free pericarp, commonly swelling and mucilaginous when wet; hilum punctiform; embryo with an epiblast, scutellar tail, and elongated mesocotyl internode (formula P+PF), endosperm hard. Base chromosome number, $x = 9$, and 10. Named from Greek *Sporo*, 'seed', and *bolos*, 'a throw', referring to the free seeds.

Comments.—The following five species included in this study have been placed in four different sections of *Sporobolus*: *S. atrovirens*, *S. indicus*, and *S. jacquemontii* (sect. *Sporobolus*), *S. virginicus* (sect. *Virginicae* Veldkamp), and *S. purpurascens* [sect. *Triachyrum* (Hochst. ex A. Braun) Veldkamp]. In addition to this, we recognize three prominent "groups" within the northeastern Mexican species of *Sporobolus*: 1) Airoidae—culms tall and densely caespitose; leaf blades as viewed in cross section (Annable et al. 1992) with bundle sheath extensions, first order vascular bundles with flattened adaxial ribs, second order vascular bundles with triangular ribs, and adaxial furrows above the third order vascular bundles; spikelets dorsally compressed; modified caryopses plump; includes: *S. airoides*, *S. buckleyi*, and *S. wrightii*; 2) Cryptandrae—Leaf blades as viewed

in cross section (Annable et al. 1992) with round adaxial ribs with furrows between each adjacent vascular bundle, distinctive fan-shaped bulliform cells, and lack bundle sheath extensions; spikelets laterally compressed; glumes with scabrous nerves; endosperm translucent yellow or orange; includes *S. contractus*, *S. cryptandrus*, *S. flexuosus*, *S. giganteus*, and *S. nealleyi*; 3) Pyramidatae – Panicle branches whorled or sub-whorled; embryo pandurate with a scutellum edge; includes *S. coahuilensis* and *S. pyramidatus*. These three groups parallel those presented by Ortíz-Díaz & Culham (2000) where their group E corresponds to our Cryptandrae and their group G, in part, corresponds to our Airoidae. Our Cryptandrae group is identical to the *Sporobolus cryptandrus* complex presented by Annable et al. (1992), and their *Sporobolus airoides* group includes *S. palmeri* Scribn. and *S. splendens* Swallen that do not occur in the study area.

Morphologically, *S. compositus* and *S. spiciformis* do not appear to be allied with other northeastern Mexican species of *Sporobolus*. *Sporobolus compositus* appears to be allied with *S. neglectus* Nash and *S. vaginiflorus* (Torr. ex A. Gray) Alph. Wood from the United States and Canada, whereas *S. spiciformis* is perhaps related to *S. phleoides* Hack. from Argentina. *Sporobolus compositus*, *S. neglectus*, and *S. vaginiflorus* all have contracted panicles that are included in the uppermost sheath and an embryo nearly as long as the modified caryopsis. *Sporobolus spiciformis* and *S. phleoides* also have contracted panicles with laterally compressed spikelets and upper glumes 1/4–1/2 as long as the floret.

KEY TO THE SPECIES OF *SPOROBOLUS* IN NORTHEASTERN MÉXICO

1. Plants with rhizomes.
 2. Panicles 3–10 cm long, 0.4–1.6 cm wide, contracted, spikelike, dense; culms 10–65 cm tall _____ **16. *S. virginicus***
 2. Panicles 30–40 cm long, 10–15 cm wide, open, diffuse, subpyramidal; culms 80–130 cm tall _____ **1b. *S. airoides* subsp. *regis***
1. Plants without rhizomes.
 3. Plants annual.
 4. Lower panicle nodes with 1–2 branches; spikelets 0.7–1.2 mm long; lemmas 0.7–1.2 mm long _____ **2. *S. atrovirens***
 4. Lower panicle nodes with 7–20 branches (whorled); spikelets 1–1.8 mm long; lemmas 1.2–1.7 mm long.
 5. Pedicels 0.1–0.5(–1) mm long, appressed _____ **14. *S. pyramidatus***
 5. Pedicels (2–)3–6(–8) mm long, widely spreading _____ **4. *S. coahuilensis***
 3. Plants perennial.
 6. Spikelets usually more than 2.6 mm long.
 7. Lower panicle nodes with 3–5 branches _____ **13. *S. purpurascens***
 7. Lower panicle nodes with 1 or 2 (–3) branches.
 8. Panicles terminal and axillary; sheaths without a conspicuous tuft of hairs at the summit _____ **5. *S. compositus***
 8. Panicles all terminal, elongated; sheaths with a conspicuous tuft of hairs at the summit.

9. Culms 35–100(–120) cm tall, 2–4(–5) mm diameter near the base; mature panicles 0.2–0.8(–1) cm wide; anthers 0.3–0.5 mm long _____ **6. S. contractus**
9. Culms 100–200 cm tall, (3–)4–10 mm diameter near base; mature panicles 1–4 cm wide; anthers 0.6–1 mm long _____ **9. S. giganteus**
6. Spikelets 1–2(–2.9) mm long.
10. Lower sheaths strongly laterally compressed and keeled _____ **3. S. buckleyi**
10. Lower sheaths rounded.
11. Leaf sheaths and collar with a conspicuous tuft of white hairs.
12. Panicles contracted, spike-like; branches appressed.
13. Culms 35–100(–120) cm tall, 2–4(–5) mm diameter near the base _____ **6. S. contractus**
13. Culms 100–200 cm tall, (3–)4–10 mm diameter near the base _____ **9. S. giganteus**
12. Panicles open, branches spreading at least from the middle of the rachis to the apex, the base sometimes included.
14. Culms 10–40 cm tall, 0.7–1.2 mm diameter near base, the base hard and knotty; blades stiff, spreading at right angles _____ **12. S. nealleyi**
14. Culms 30–100(–120) cm tall, 1–3 mm diameter near base, the base not hard and knotty; blades erect or ascending, not stiff.
15. Panicles usually exerted, branches divaricate and flexuous, usually tangled between branches or panicles; lower glumes 0.9–1.5 mm long _____ **8. S. flexuosus**
15. Panicles usually included at the base, branches appressed or ascending, not markedly flexuous, not tangled; lower glumes 0.6–1.1 mm long _____ **7. S. cryptandrus**
11. Leaf sheaths and collar glabrous (sparsely appressed pilose in *S. airoides* subsp. *regis*).
16. Panicles 0.3–3 cm wide, spikelike, the branches appressed to main axis.
17. Panicles 9–17 cm long, 3–5(–10) mm wide, whitish; glumes unequal, more than two thirds as long as the floret _____ **15. S. spiciformis**
17. Panicles 7–60 cm long, 5–12 mm wide, not whitish; glumes about equal, less than two thirds as long as the floret.
18. Spikelets 2–2.6(–2.7) mm long; upper glumes usually 1/2–2/3 as long as the florets, the apex acute to obtuse, entire _____ **10. S. indicus**
18. Spikelets 1.4–1.8(–2) mm long; upper glumes usually less than 1/2 as long as the florets, rarely longer, the apex truncate, erose to denticulate _____ **11. S. jacquemontii**
16. Panicles 3–25 cm wide (sometimes only 0.3 cm wide in immature *S. pyramidatus*), open, the branches widely spreading at least from the middle of the rachis to the apex.
19. Panicle branches widely divaricate and flexuous, usually tangled within branches or panicles _____ **8. S. flexuosus**
19. Panicle branches widely open or erect, not tangled.
20. Culms 10–40 cm tall, delicate perennials, plants small; leaf blades borne near base; sheaths glabrous or with few ciliate hairs on the margins and summit.
21. Panicle branches arranged in whorls at lower nodes;

- mature panicles pyramidal (immature and extreme forms spikelike); upper glumes 1.2–1.8 mm long _____ **14. S. pyramidatus**
21. Panicle branches solitary or paired but not in whorls at the lower nodes; mature panicles oblong to ovoid; upper glumes 0.4–0.7 mm long _____ **2. S. atrovirens**
20. Culms 30–100(–120) cm tall, robust perennials, often forming large tough leafy tussocks; leaf blades cauline; sheaths usually bearded with long hairs on the margins and summit.
22. Panicles 10–45 cm long, the branches naked near the base; pedicels 0.5–2 mm long, usually erect, spreading _____ **1. S. airoides**
22. Panicles 20–60 cm long, the branches densely flowered near the base; pedicels 0.2–0.5 mm long, appressed _____ **17. S. wrightii**

1a. *Sporobolus airoides* (Torr.) Torr. subsp. ***airoides***, Pacific Railr. Rep. Parke, Bot. 7:21 1856. (**Fig. 1, A & B**). *Agrostis airoides* Torr., Ann. Lyceum Nat. Hist. New York 1:151. 1824, non (Poir.) Raspail. *Vilfa airoides* (Torr.) Trin. ex Steud., Nomencl. Bot. (ed. 2) 2:766 1841. TYPE: U.S.A. COLORADO: on the branches of the Arkansas, near Rocky Mountains, E. James s.n. (HOLOTYPE: NY-327612; ISOTYPE: US-76255 fragm. & photostat ex herb. Torrey!).

Sporobolus diffusissimus Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:90. 1862. TYPE: U.S.A. TEXAS: Western Texas, 1849, C. Wright 726 (ISOTYPE: US-3198038 fragm.).

Sporobolus schaffneri Mez, Repert. Spec. Nov. Regni Veg. 17(19–30):295. 1921. TYPE: MÉXICO. SAN LUIS POTOSÍ: W. Schaffner s.n. (ISOTYPE: US-87214 fragm.).

Sporobolus tharpitii Hitchc., Proc. Biol. Soc. Wash. 41:161. 1928. TYPE: U.S.A. TEXAS: Padre Island, 4 Sep 1927, B.C. Tharp 4772 (HOLOTYPE: US-1299827!).

Densely caespitose perennials. Culms 35–120(–150) cm tall, erect, stout, glabrous below the nodes; base diameter 1–2(–3.5) mm wide, rounded; internodes glabrous. Leaf sheaths 2/3 to about as long as the internodes above, glabrous, shiny, sometimes with a few long hairs near the summit, these hairs up to 6 mm long; ligules 0.1–0.3 mm long; blades (3–)10–45(–60) cm long, (1–)2–5(–6) mm wide, flat to involute, glabrous below and scaberulous to scabrous above; margins mostly smooth to scaberulous. Panicles (10–)15–45 cm long, 15–25 cm wide, open, diffuse, subpyramidal, often included in the uppermost sheath; branches 1.5–13 cm long, ascending to widely spreading 30–90° from culm axis; secondary branches mostly spreading and not floriferous on lower 1/4 to 1/3; pulvini in axils of primary branches glabrous; pedicels 0.5–2 mm long, spreading, glabrous to scabrous. Spikelets 1.3–2.8 mm long, spreading, purplish or greenish; glumes 0.5–2.4(–2.8) mm long, lanceolate to ovate, membranous, unequal; lower glume 0.5–1.8 mm long, often appearing without a midvein, the apex acute; upper glume 1.1–2.4(–2.8) mm long, apex acute to obtuse; lemmas 1.2–2.5 mm long, ovate, membranous, glabrous, the apex acute; paleas 1.1–2.4 mm long, ovate, membranous, glabrous, the apex acute to obtuse; stamens 3; anthers 1.1–1.8 mm

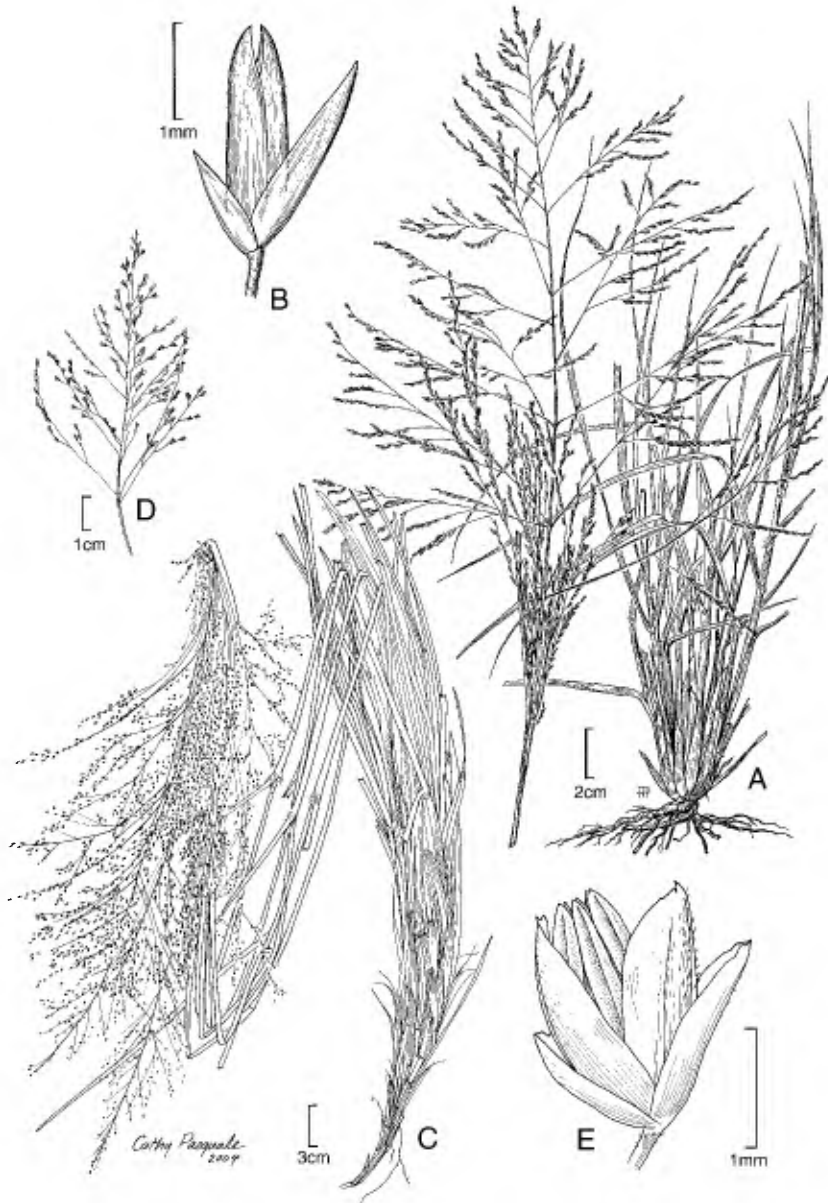


FIG. 1. *Sporobolus oiroides* ssp. *oiroides*. A. Habit. B. Spikelet. *Sporobolus oiroides* subsp. *regis*. C. Habit. D. Inflorescence, apical portion. E. Spikelet with stamens.

long, yellowish to purplish. Modified caryopses 1–1.4 mm long, ellipsoid, reddish-brown, striate. $2n = 80, 90, 108, 126$.

Distribution and habitat.—*Sporobolus airoides* occurs throughout the arid portions of northwestern North America and in México as far south as Puebla. It is common in dry to sandy gravely flats or slopes usually associated with alkaline soils, occurring with *Atriplex canescens* (Pursh) Nutt., *A. confertifolia* (Torr. & Frém.) S. Watson, *Larrea tridentata* (Sessé & Moc. ex DC.) Coville, *Sarcobatus vermiculatus* (Hook.) Torr., *Distichlis spicata* subsp. *stricta* (Torr.) Thorne, and *Ambrosia dumosa* (A. Gray) W.W. Payne; 50–2400 m. Flowering June through November. In northeastern México, *S. airoides* is a halophytic species forming the alkali zacaton grasslands where the edaphic effects of a diverse combination of chloride carbonates and sulfates accumulates to form very saline conditions.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Castaños, Paso de San Lázaro, Sierra de la Gavia, 37.6 mi S de Monclova, carretera 57, *Peterson et al.* 9985 (ANSM, US); Municipio de Cuatrociénegas, Junto a Nuevo Atalaya, *Brigada III 4a* (COCA); Cuatrociénegas, *Brigada III 6* (COCA); 5 km N de la Poza de la Becerra, *J.A. Dávila s.n.* (ANSM); 11 km E de Cuatrociénegas, *X. Hernández* 2036 (ANSM); Areas salinas S of Cuatrociénegas, *J.S. Marroquín 1351* (ANSM); Cerca de la Poza 'EL Bonito', *J.S. Marroquín s.n.* (MEXU); Dunas yesosas, cerca de la Poza El Bonito, *J.S. Marroquín s.n.* (ANSM); SE de Cuatrociénegas, *Sin collector 6* (COCA); 45 km S of Cuatrociénegas, *Peterson et al.* 10002 (ANSM, US); Laderas de la Sierra de San Marcos 24 mi S Cuatrociénegas, *Peterson et al.* 10008 (ANSM, US); Municipio de General Cepeda, Ejido La Rosa, carretera 40 Saltillo-Torreón, 20 km NE de General Cepeda, *S. Vásquez* 82 (ANSM); Municipio de Juárez, Distrito de Riego 04, Don Martín, *P. De la Garza s.n.* (ANSM); Municipio de Ocampo, Laguna La Leche, aproximadamente 63 km de Ocampo rumbo a Sierra Mojada, *M.A. Carranza* 630 (ANSM); Sierra La Encantada, rancho Puerto del Aire, *M.A. Carranza* 780 (ANSM); Sierra del Pino, Ejido Acebuches, Cañón La Vaca, *M.A. Carranza* 967 (ANSM); Rancho experimental La Rueda, 87 km NE de Ocampo, brecha Ocampo-Boquillas del Carmen, *D. Ibarra s.n.* (ANSM); Sierra El Pino, 9.2 km S of Rancho El Cimarrón along the eastern slope, *Peterson & Annable* 10618 (ANSM, US); 35.5 km NW of Monclova and 11.3 km E of Sacramento on road to Cuatrociénegas, *Peterson et al.* 8363 (ANSM, US); 4 km S de Laguna del Rey, de la Planta Química, *Peterson et al.* 8371 (ANSM, US); 4 km S of Laguna El Rey Chemical Plant, *Peterson et al.* 8374 (ANSM, US); Laguna La Leche, *Valdés-Reyna* 1330 (ANSM); Rancho experimental Santa Teresa de La Rueda, aproximadamente 87 km NE de Ocampo, brecha Ocampo-Boquillas del Carmen, *M. Vásquez s.n.* (ANSM); Municipio de Parras, Rancho el Tunal, aproximadamente 25 km ESE de Parras de la Fuente, *A. Rodríguez* 1171 (ANSM); Ejido 4 de Marzo, *F. Roing s.n.* (ANSM); 9 km S of Parras on Sierras Negras, *L. Stanford* 189 (MEXU); Municipio de Ramos Arizpe, Cañada el Diente, Sierra de la Paila, altitud 1300 m., *J.A. Villarreal* 5183 (ANSM); Municipio de Sacramento, 10 km de Sacramento rumbo a Cuatrociénegas, *A. Rodríguez* 1229 (ANSM); Municipio de Saltillo, 53.2 km S of Saltillo on México hwy 54 and 9.6 km E on road to La Ventura, *Peterson et al.* 10038 (ANSM, US); 47 km S of Saltillo on México hwy 54 to Concepcion del Oro, *Peterson et al.* 10034 (US); Rancho experimental Los Angeles, 48 km S de Saltillo, carretera 54 Saltillo-Concepción del Oro, Zacatecas, *J. Sierra s.n.* (ANSM); 2 km N del ejido La Encantada, carretera Saltillo-Concepción del Oro, Zacatecas, *Valdés-Reyna* 1511 (ANSM); 6 km W de General Cepeda. Carretera a Parras a orilla del camino, *Valdés-Reyna* 1575 (ANSM); Buenavista, 6 km S de Saltillo por la carretera Saltillo-Zacatecas, *Valdés-Reyna* 1890 (ANSM); 3 km S de la Ciudad de Saltillo, fraccionamiento Parque de la Cañada, *Valdés-Reyna* 2282 (ANSM); Ejido La Colorada, aproximadamente 15 km S de Saltillo, carretera 54, Saltillo-Concepción del Oro, Zacatecas, *Valdés-Reyna s.n.* (ANSM); Buenavista, 7 km S de Saltillo, carretera 54 Saltillo-

Concepción del Oro, Zacatecas, J.A. Villarreal 1769 (ANSM); km 34 carretera Saltillo-Concepción del Oro, Zacatecas, Entrada al rancho Los Angeles, S. Villarruel s.n. (ANSM); Municipio de Torreon, S of Torreon between Jimulco and Juan Eugenio, Peterson & Valdés-Reyna 8478 (US). **Nuevo León:** Municipio de Doctor Arroyo, Ejido Lagunita y Ranchos Nuevos, M.E. Pérez 107 (ANSM); Ejido La Escondida, 5 km N carretera 102 Doctor Arroyo-Galeana, J.A. Villarreal 6518 (ANSM); Municipio de Galeana, along highway 57, about 12 mi N of San Roberto, K. Allred 5515.5 (ANSM, NMCR); 5.6 mi E of jtn of hwy 57 on hwy 58 towards Linares, Peterson & Knowles 13296 (US); 13.4 mi E of hwy 57 on hwy 58 at crossing of Rio Potosí, Peterson & Knowles 13312 (US); Near La Trinidad, (Highway 57), 71 mi S of Saltillo, T. Soderstrom 373 (MEXU, US). **Tamaulipas:** Municipio de Bustamante, Poblado Bustamante, J.G. Galván 30 (COCA); Municipio de Llera, Ejido Portes Gil J. Barrientos 97 (COCA); Municipio de Tula, Ejido Francisco Medrano, J. Iribe 126 (COCA); Ejido 5 de Mayo, P. Moya 64 (COCA).

KEY TO THE SUBSPECIES OF *SPOROBOLUS AIROIDES*

1. Sheaths generally glabrous or minutely scabrous on abaxial surface; primary branches of the panicle glabrous, without tufts of hairs in the axils below _____ **1a. *S. airoides*** subsp. ***airoides***
1. Sheaths pilose on abaxial surface; primary branches of the panicle with a tuft of hairs in the axils below _____ **1b. *S. airoides*** subsp. ***regis***

1b. *Sporobolus airoides* subsp. *regis* (I.M. Johnst.) Wipff & S.D. Jones, Sida 16:164. 1994. (**Fig. 1, C & D**). *Sporobolus regis* I.M. Johnst., J. Arnold Arbor. 24:393. 1943. TYPE: MÉXICO. COAHUILA: Municipio de Ocampo, salt flat 4 km SE of Laguna del Rey, abundant, 1040 m, 18 Sep 1942. R. Stewart 2653 (HOLOTYPE: GH; ISOTYPE: US-90729 fragm.).

Rhizomes elongate, knotty with internodes 10–12 mm long, 3–4 mm in diameter. Culms 80–130 cm tall, erect, densely leafy. Leaf sheaths and collars pilose on abaxial surface with hairs 2–4 mm long, glabrous with age; ligules 0.1–0.3 mm long, fimbriate or densely ciliate; blades 10–30 cm long, 3–4 mm wide, usually loosely involute. Panicles 30–40 cm long, 10–15 cm wide, open, diffuse, subpyramidal, exerted or partly included below, the branches with a tuft of trichomes in the axils; glumes 1–1.8 mm long; lemmas 1.9–2.5 mm long; paleas as long as the lemma.

Distribution and habitat.—*Sporobolus airoides* subsp. *regis* is an endemic species known only from Coahuila, México on saline flats of Laguna del Rey, the type locality, and Salinas del Rey. *Sporobolus airoides* subsp. *regis* is distinguished from *S. airoides* subsp. *airoides* by its pubescent sheaths and tuft of trichomes in the axils of the panicle branches. Wipff and Jones (1994) considered these characters not significant to warrant specific rank, however, they felt that they are significant to warrant infraspecific recognition.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Ocampo, 12 km S of Salinas del Rey, Henrickson 14152 (TEX).

2. *Sporobolus atrovirens* (Kunth) Kunth, Revis. Gramin. 1:68. 1829. (**Fig. 2, A–C**). *Vilfa atrovirens* Kunth, Nov. Gen. Sp. 1:138. 1816. *Agrostis atrovirens* (Kunth) Roem. & Schult., Syst. Veg. 2:361. 1817. TYPE: MÉXICO. DISTRITO FEDERAL: in valle Mexicana prope El Penon del Marques, *Humboldt and Bonpland* s.n. (HOLOTYPE: P-Bonpl.; ISOTYPE: BM!)

Small caespitose perennials, sometimes appearing annual. Culms 7–30 cm tall,

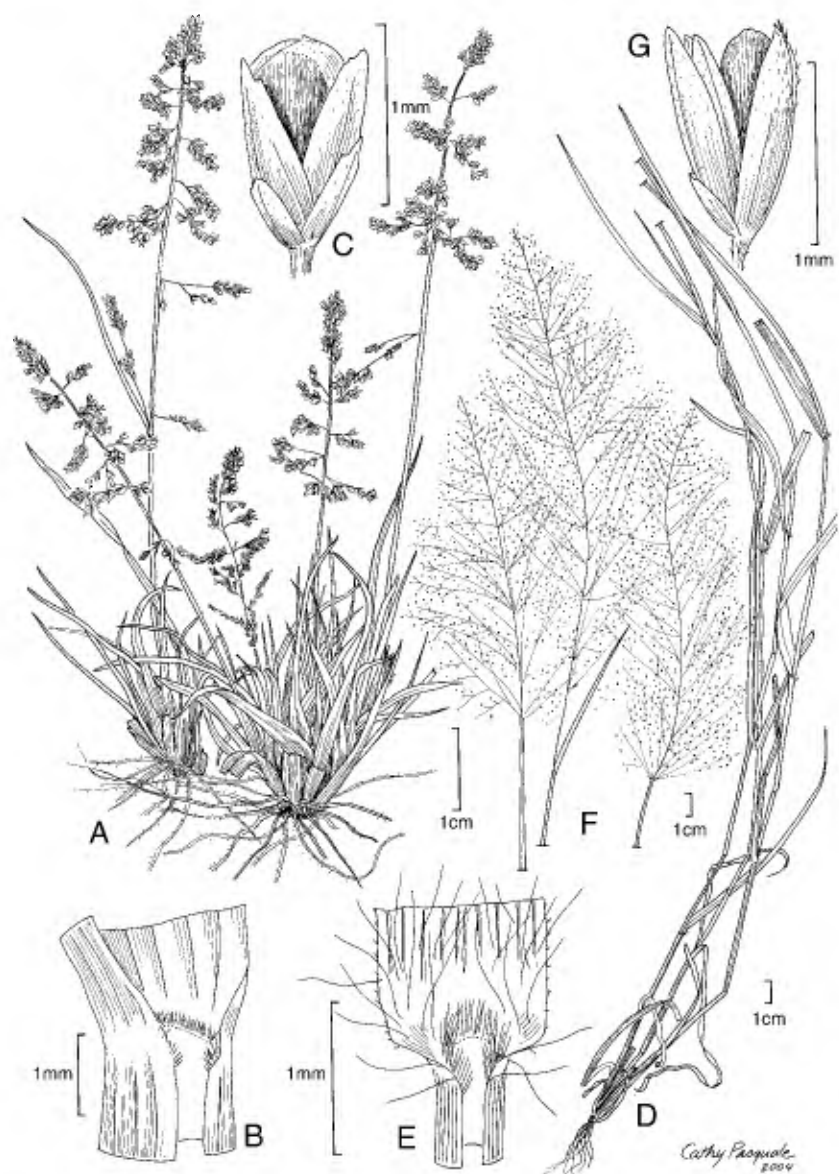


FIG. 2. *Sporobolus otrovirens*. A. Habit. B. Ligule. C. Spikelet with modified caryopsis. *Sporobolus coahuilensis*. D. Habit. E. Ligule. F. Inflorescences. G. Spikelet with modified caryopsis.

erect, with 1–2 nodes above the base; base diameter 0.5–0.8 mm. Leaf sheaths short, ciliolate; collar glabrous or with few hairs; ligules 0.1–0.2 mm long; blades 3–15 cm long, 2–4 mm wide, lanceolate, flat, glabrous, borne near base. Panicles 5–20 cm long, 3–10 cm wide, oblong to ovoid, completely exserted; primary branches spreading 70–120° from culm axis, naked below on lower 1/4–1/3, the lowermost solitary or paired at the nodes; pulvini in the axils of the primary branches glabrous, yellowish; pedicels 0.5–1.6 mm long. Spikelets 0.7–1.2 mm long, greenish or purplish to plumbeous; glumes without nerves, apex obtuse; lower glumes 0.3–0.5 mm long, the apex obtuse or erose; upper glumes 0.4–0.7 mm long, the apex obtuse to acute; lemmas 0.7–1.2 mm long, the apex acute to obtuse; paleas 0.9–1.2 mm long, the apex obtuse; stamens 1 or 2; anthers 0.4–0.8 mm long, purplish. Modified caryopses 0.5–0.8 mm long, pyriform or quadroid, somewhat laterally flattened, light brownish.

Distribution and habitat.—*Sporobolus atrovirens* is a rare species for northeastern México usually found occupying xeric habitats in gypsum soils at 10–1500 m. It has been reported in México in Aguascalientes, Baja California, Coahuila, Durango, Hidalgo, Guanajuato, Jalisco, México, Oaxaca, Puebla, San Luis Potosí, Tamaulipas, Tlaxcala, Veracruz, Yucatán, and Zacatecas. In the Sierra La Lagunita at 1450 m, *S. atrovirens* (Peterson et al. 16690) was found growing on slopes with a dominant vegetation of *Pinus pseudostrobus* Lindl., *Juniperus flaccida* Schldt., *Juglans*, *Agave*, and *Muhlenbergia dubia* E. Fourn. Other associated native and adventive species from this site include: *Chloris*, *Tragus berteronianus* Schult., *Urochloa meziana* (Hitchc.) Morrone & Zuloaga, *Paspalum dilatatum* Poir., *Erioneuron avenaceum* (Kunth) Tateoka, *Eragrostis intermedia* Hitchc., *Oplismenus hirtellus* (L.) P. Beauv., *Bromus anomalus* Rupr. ex E. Fourn., *Schizachyrium*, and *Panicum bulbosum* Kunth. This latter site was perhaps unusual for this species since it was in a heavily wooded and shaded environment.

Specimens examined. **MÉXICO. Coahuila:** Municipio Saltillo, Los Cerritos, near Saltillo, Oct 1912, *Lyonnet* s.n. (TEX). **Nuevo León:** Municipio de Monterrey, 5 mi SW of Hidalgo at Parque de Potrero (ca 15 airline mi NW of Monterrey), *B.L. Turner & J. Crutchfield* 6285 (TEX). Sierra La Lagunita, 9.5 mi SE of Aramberri on road towards Agua Fria, 24° 03' 37.9" N, 99° 45' 35.8" W, 19 Sep 2002, *Peterson et al.* 16690 (ANSM, US). **Tamaulipas:** Municipio de Jaumave, Altas Cumbres km 160 carretera Victoria-Jaumave, 950 m, *M. Martínez* 727 (ANSM, TEX, UAT); Río Guayalejo, 2 km E del ejido San Vicente rumbo a Jaumave, 10 m, *A. Mora* 5358 (UAT); Municipio de Tula, 30 km al SW de Tula, cerca del limite de San Luis Potosí and Tamaulipas, *Gonzalez Medrano* F. 4422 (TEX).

3. *Sporobolus buckleyi* Vasey, Bull. Torrey Bot. Club 10:128. 1883. (Fig. 3. A & B).

TYPE: U.S.A. TEXAS: 1883, *S.B. Buckley* s.n. (ISOTYPE: US-556873).

Caespitose perennials. Culms 40–100 cm tall, erect, glabrous, base flattened, internodes glabrous; base diameter 0.7–3 mm wide. Leaf sheaths 4/5 as long as the internodes to longer than the internodes above, glabrous, margins occasionally hairy near summit, sometimes with a line of hairs from one margin to the next, the hairs up to 1.2 mm long, lower sheaths strongly laterally compressed



FIG. 3. *Sporobolus buckleyi*. A. Habit. B. Spikelet with modified caryopsis. *Sporobolus spiciformis*. C. Habit. D. Ligule. E. Spikelet with stamens.

and keeled; ligules 0.2–0.4 mm long; blades 12–35 cm long, 4–12 mm wide, flat, glabrous below and scaberulous above; margins smooth to scaberulous. Panicles 15–50 cm long, 7–22(–30) cm wide, open, diffuse, ovate; primary branches ascending to widely spreading mostly 2–17 cm long, not floriferous on lower 1/4–1/2; secondary branches appressed to loosely spreading; pulvini in axils of primary branches glabrous; pedicels 0.2–1.2 mm long, mostly appressed, scaberulous. Spikelets 1–2 mm long, purplish or brownish; glumes 0.5–1.8 mm long, narrow lanceolate to lanceolate, membranous, unequal, prominently keeled, scaberulous along the distal portion of the keel; lower glumes 0.6–1 mm long, the apex acuminate to acute; upper glumes 1.1–1.8 mm long, the apex acute; lemmas 1.2–2 mm long, lanceolate, membranous, glabrous, the apex acute; paleas 1.2–2 mm long, ovate, membranous, often splitting in two between the veins at maturity, glabrous, the apex acute; stamens 3; anthers 0.2–0.4 mm long, purplish. Modified caryopses 0.6–1 mm long, ovoid, slightly flattened, reddish brown. $2n = 40$.

Distribution and habitat.—In northeastern México, *S. buckleyi* is a common species of the Tamaulipan desert scrub on loamy soils near margins of woods sometimes in partial sunlight associated with *Acacia*, *Quercus*, and *Prosopis* thickets and thorn scrub; 40–700 m. Flowering April to November.

Specimens examined. **MÉXICO. Nuevo León:** Montemorelos, Ojo de Agua, Matorral xerófito, *M. A. Panti* 823 (MEXU), Monterrey, *C. G. Pringle* 2520 (MEXU); Municipio de Allende, 6.1 km S de Allende on México 85 towards Montemorelos, off highway on dirt road near association of Avicultures (grain storage), just N of Canoas, *Peterson & King* 8336 (ANSM, US); Municipio de Cerralvo, Sierra de Picachos, rancho El Gallo, *S. Rodríguez* 94.102 (ANSM); Sierra de Picachos, Rancho El Gallo, *J. A. Villarreal* 8014 (ANSM); Municipio de Guadalupe, Guadalupe, *E. Cantú* s.n. (ANSM); Municipio de Linares, Rancho El Nogalar, ubicado en la carretera Linares-San Roberto, km 12, *M. Castillo* 92 (COCA); Los Fresnos, *J. Ortíz* s.n. (ANSM); Municipio de Marín, Facultad de Agronomía, Universidad Autónoma de Nuevo León, km 17, *M. Castillo* 26 (COCA); Municipio de Pesquería, A la salida del pueblo de Zacatecas rumbo a Agua Fria en las orillas del río Pesquería, *P. Jauregu* 80 (COCA); Municipio de Santa Catarina, Cañón El Diente, Sierra Madre Oriental, aproximadamente 20 km S de Monterrey, *J. Valdés-Reyna* 1969 (ANSM, UAT); Municipio de Santiago, 4 km N de Los Cavazos, *I. Cabral* 128 (ANSM); Río San Juan, *I. Cabral* 383 (ANSM); Carretera Monterrey-Marín entronque con la carretera a Zuazua, *P. A. García* 1864 (COCA). **Tamaulipas:** Municipio de Abasolo, Ejido La Esperanza, *J. Iribe* 149 (COCA); Municipio de Aldama, La Muralla, *R. Carranco* 127 (COCA); Rancho El Rosario, *M. Cervera* 211 (COCA); Ejido El Nacimiento, propiedad privada, *R. Díaz* 319 (UAT); Piedras Negras, *J. Galván* 235 (COCA); Municipio de Antiguo Morelos, Ejido Las Flores, *J. Ramos* 12 (COCA); Ejido El Refugio, *J. Ramos* 122 (COCA); Municipio de Casas, Rancho José Roberto, *R. Carranco* 278 (COCA); Ejido Lázaro Cárdenas, A orilla de la vía de EFC.C., *J. Ramos* 207 (COCA); Municipio de Gomez Farías, Ejido El Nacimiento, *M. Crespo* 310 (ANSM); Ejido Sabinas, *M. Crespo* 422 (ANSM); Municipio de González, Ejido Guadalupe Victoria, *J. Iribe* 136 (COCA); 15 mi W of Gonzalez toward Mante, *M. C. Johnston* 4929 (MEXU); Ejido Josefa Ortíz de Domínguez, *P. Moya* 36 (COCA); Municipio de Gúemez, Río Corona, *J. Iribe* 298 (COCA); Municipio de Hidalgo, Ejido Nicolás Bravo, *J. Barrientos* 100 (COCA); Ejido El Progreso, *J. Iribe* 248 (COCA); Ejido La Colombiana, *J. Iribe* 262 (COCA); Rancho La Purísima, *J. Iribe* 303 (COCA); Municipio de Hidalgo, Río Los Mimbres, 20 mi W of Río Purificación, *Peterson & Valdés-Reyna* 15939 (US); Municipio de Jiménez, Ejido Sor Juana Inés de la Cruz, *R. Carranco* 410 (COCA); Ejido Sor Juana Inés de la Cruz, *R. Carranco* 411 (COCA); 7 mi S of Santander Jiménez, *M. C. Johnston* 4393-A, 4393-B (TEX-

LL, MEXU); Municipio de Llera, Rancho el Lloradero, *A. Brito*, s.n. (UAT); km 152 carretera Llera-Mante, *R. Carranco 272* (COCA); km 157 carretera Llera-Mante, La Mina, *R. Carranco 272a* (COCA); Camino al Ejido Lucio Blanco, *J.F. Iribe 285* (COCA); Municipio de Mainero, Ejido Boreal Real, *M. Cervera 343* (COCA); Municipio de Padilla, km 65 carretera Victoria-Matamoros, *A. Brito 63* (COCA); Municipio de San Carlos, Ejido Puerto Rico, *R. Carranco. 295* (COCA); Cerro del Diente, *R. Carranco 47* (COCA); Cerro del Diente, *J. A. Franco 92* (COCA); Cerro del Diente, *J. Iribe 94* (COCA); Municipio de San Fernando, La Joya, *R. Carranco 101* (COCA); Municipio de Soto la Marina, Rancho San Alfonso, *J. Barrantes 6* (COCA); San José de las Rusias, *M. Cervera 84* (COCA); Tramo San José de las Rusias-5 de Mayo, *J.G. Galván 161* (COCA); Ejido Verde Chico, *J.F. Iribe 337* (COCA); Los Eslabones, *J.E. López 44* (COCA); Municipio de Tampico, Laguna del Chairel, *M.G. Torres s.n.* (COCA); Municipio de Tula, Puerto de La Virgen, *A. Brito, 50* (COCA); Municipio de Victoria, Libramiento Portes Gil, *M. Cervera 305* (COCA); Ejido Santa Ana, *M. Cisneros 31, 32* (COCA); Municipio de Villagrán, La Palma, *M. Cervera 160* (COCA).

4. *Sporobolus coahuilensis* Valdés-Reyna, *Phytologia* 41:81. 1978. (**Fig. 2, D–G**).

TYPE: MÉXICO. COAHUILA: 58 air mi SW of Cuatrociénegas, near 26° 17' N, 102° 40' W, 815 m, 15 Aug 1976, *J. Henrickson & B. Prigge 15363* (HOLOTYPE: LL; ISOTYPES: CSLA, MEXU).

Annuals. Culms 15–60 cm tall, ascending, glabrous. Leaf sheaths shorter than the internodes, glabrous; ligules 0.5–1 mm long, ciliate, the hairs 0.5–1 mm long; blades 4–12 cm long, 1.5–6 mm wide, flat, spreading, evenly distributed, sparsely ciliate-pustulate above. Panicles 6–22 cm long, (–)5–13 cm wide, open, sometimes contracted; branches ending in a spikelet, lowest branches whorled, in verticels of 7–20; pedicels (2)3–6(–8) mm long, widely spreading, capillary. Spikelets 1.1–1.5 mm long; glumes thin, the apex acute; lower glumes ca. 0.5 mm long; upper glumes 1.4–1.5 mm long; lemmas 1.3–1.4 mm long, the apex acute; paleas 1–1.3 mm long, hyaline. Modified caryopses 0.6–0.9 mm long, oblong, light brown; embryo 0.2–0.4 mm long.

Distribution and habitat.—In México, *S. coahuilensis* is known only from Central Coahuila, near Las Delicias and Cuatrociénegas. This species has recently been found in Texas (per. comm. B.L. Turner).

Comments.—*Sporobolus coahuilensis* appears closely related to *S. pyramidatus*, a widespread species, and can be separated from the latter species by having long capillary pedicels and wider panicles.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Cuatrociénegas, SE de Cuatrociénegas, *Brigada III 1* (COCA); cerca 45 km SW of Cuatrociénegas, 760 m., *Peterson et al. 10000* (ANSM, US).

5. *Sporobolus compositus* (Poir.) Merr. var. ***compositus***, *Circ. Div. Agrostol.*

U.S.D.A. 35:6. 1901. (**Fig. 4, A–C**). *Agrostis composita* Poir., *Encycl.* 1:254. 1810. *Vilfa composita* (Poir.) P. Beauv., *Ess. Agrostogr.* 16, 147, 181. 1812. *Muhlenbergia composita* Trin. ex Kunth, *Enum. Pl.* 1:229. 1833, *nom. inval.* TYPE: U.S.A. "CAROLINA": *L.A.G. Bosc s.n.* (HOLOTYPE: not known).

Agrostis aspera Michx., *Fl. Bor.-Amer.* 1:52. 1803, *nom. illeg. non Weber*. *Vilfa aspera* P. Beauv., *Ess. Agrostogr.* 16, 147, 181. 1812. *Muhlenbergia aspera* (P. Beauv.) Trin., *Gram. unifl. sesquifl.* 193. 1824. *Sporobolus asper* (P. Beauv.) Kunth, *Révis. Gram.* 1:68. 1829. TYPE: U.S.A. ILLINOIS: A. *Michaux s.n.* (HOLOTYPE: P-MICH; ISOTYPE: US-76431 fragm. & photo ex Pl).

Agrostis longifolia Torr., *Fl. N. Middle United States* 1:90. 1823. *Vilfa longifolia* (Torr.) Torr., *N. Amer.*

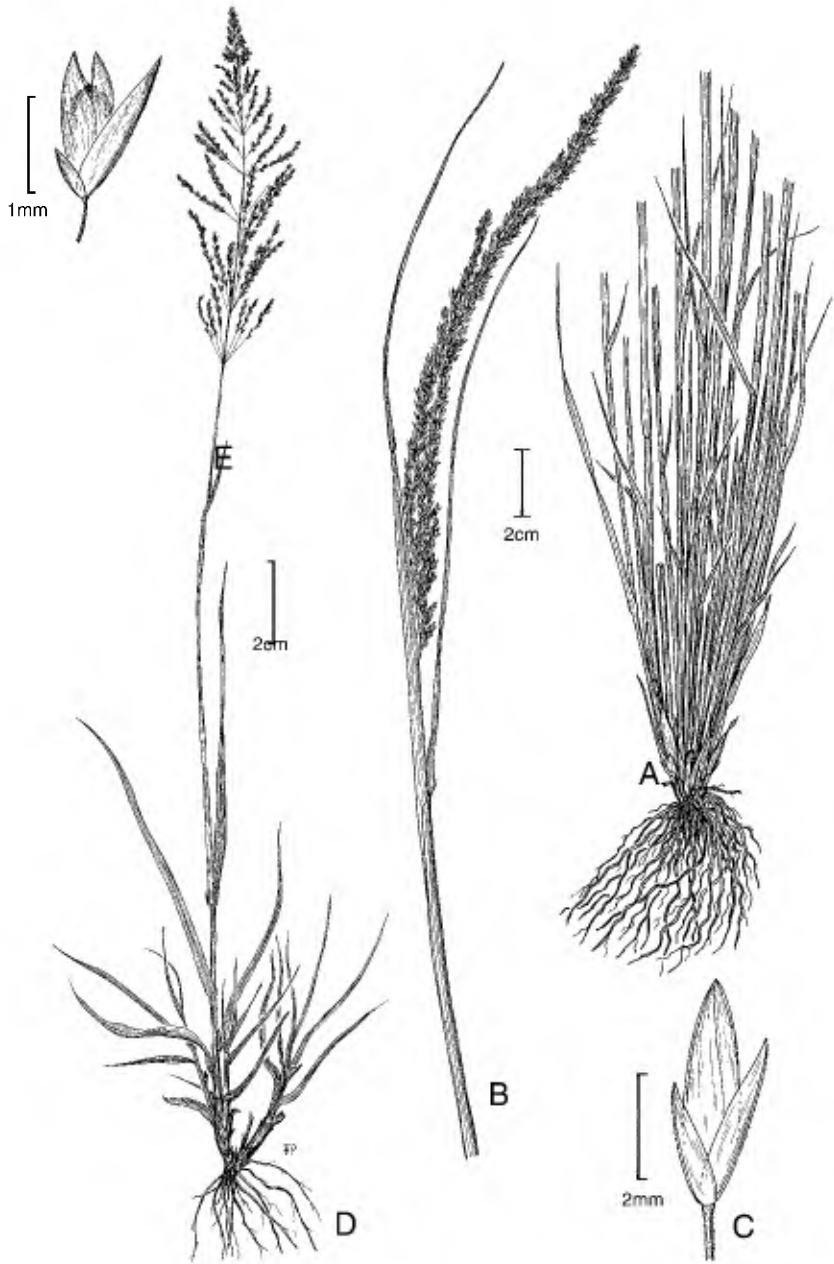


FIG. 4. *Sporobolus compositus*. A. Habit. B. Inflorescence. C. Spikelet. *Sporobolus pyramidatus*. D. Habit. F. Spikelet with modified caryopsis.

- Gram. 1:4. 1834. *Sporobolus longifolius* (Torr.) Alph. Wood, Class-book Bot. (ed. 1861) 1861:775. 1861. TYPE: U.S.A. PENNSYLVANIA: (HOLOTYPE: not known).
- Vilfa hookeri* Trin., Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6,4(1-2):106. 1840. *Sporobolus asper* var. *hookeri* (Trin.) Vasey, Descr. Cat. Grass. U.S. 43. 1885. TYPE: U.S.A. TEXAS: T. Drummond 306 (ISOTYPES: US-997649 fragm., US-997663 fragm.)
- Glyceria stricta* Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:95. 1862, nom. illeg. hom., non Hooker f. TYPE: U.S.A. TEXAS: middle Texas, S.B. Buckley s.n. (LECTOTYPE: PH, designated by Hitchcock, Man. Grass. U.S. 958. 1935, but without citing a specific sheet in a specific herbarium; ISOLECTOTYPE: US fragm. & photo ex PH!).
- Sporobolus pilosus* Vasey, Bot. Gaz. 16(1):26. 1891. *Sporobolus asper* unranked *pilosus* (Vasey) Hitchc., Proc. Biol. Soc. Wash. 41:161. 1928. *Sporobolus asper* var. *pilosus* (Vasey) Hitchc., N. Amer. Fl. 17(7):488. 1928. TYPE: U.S.A. KANSAS: Coolidge, 1890, B.B. Smyth 217 (HOLOTYPE: US-556890; ISOTYPES: US-746585!, US-75038!).

Caespitose to solitary-stemmed perennials. Culms (20-)30-130(-150) cm tall, glabrous below the nodes, internodes glabrous; base diameter 0.7-5 mm wide. Leaf sheaths 3/4 to 1 1/2 as long as the internodes above; upper (terminal) sheaths 1-6 mm wide, mostly glabrous, summit with a few hairs up to 3 mm long; ligules 0.1-0.5 mm long; blades 5-70 cm long, 1.5-10 mm wide, flat to folded or involute, glabrous below and glabrous to scaberulous above, sometimes pilose just above the ligule, rarely pilose throughout; margins mostly glabrous. Panicles 5-30 cm long, 0.4-1.6(-3) mm wide, terminal and axillary, narrow, sometimes densely spike-like, the base usually included in the uppermost sheath; primary branches 0.4-6 cm long, appressed, usually floriferous to base; secondary branches appressed; pedicels 0.3-3.5 mm long, appressed, glabrous to scaberulous. Spikelets 4-6 (-10) mm long, stramenious to purplish-tinged; glumes (1.2-)2-5(-6) mm long, lanceolate, membranous to chartaceous, usually with a greenish midvein that is scabrous towards the apex, subequal; lower glumes (1.2-)2-4 mm long, the apex acute; upper glumes (2-)2.5-5(-6) mm long, the apex acute; lemmas (2.2-)3-6(-10) mm long, lanceolate, membranous to chartaceous, rarely 2- or 3-veined, glabrous to minutely pubescent or long, ovate to lanceolate, membranous to chartaceous, the apex acute to obtuse; stamens 3; anthers 0.2-3.2 mm long, yellow to orangish. Modified caryopses 1-3 mm long, ellipsoid and laterally flattened, often striate, reddish brown. $2n = 54, 88, 108$.

Distribution and habitat.—A rare species in northeastern México, only known from a single collection initially determined by F.W. Gould. Roadsides, railroad right of ways, beaches, cedar glades, pine woods, live oak-pine forests, prairies and many other partially disturbed, semi-open sites; 0-1600 m. Flowering August to November.

Specimen examined. **MÉXICO. COAHUILA.** Municipio de Muzquiz, La Boquilla, Rancho La Encantada, J. A. Santos s.n. (ANSM).

- 6. *Sporobolus contractus*** Hitchc., Amer. J. Bot. 2:303. 1915. (**Fig. 5, A-D**). *Sporobolus cryptandrus* var. *strictus* Scribn., Bull. Torrey Bot. Club 9:103. 1882. *Sporobolus strictus* (Scribn.) Merr., Circ. Div. Agrostol. U.S.D.A. 32:6. 1901, non Franchet. TYPE: U.S.A. ARIZONA: Banks of Rillita [Rillito] Brook, near Camp Lowell, 15 Jun 1881, C.G. Pringle s.n. (ISOTYPE: US-825284!).



FIG. 5. *Sporobolus contractus*. A. Inflorescence. B. Sheath, blade, and portion of culm. C. Lower glume. D. Spikelet with modified caryopsis. *Sporobolus cryptandrus*. E. Habit. F. Glumes. G. Floret with modified caryopsis.

Caespitose perennials. Culms 35–100(–120) cm tall, erect, glabrous below the nodes, rounded near base, internodes glabrous; base diameter 2–4(–5) mm long. Leaf sheaths 3/4 to longer than the internodes above, glabrous; margins with ciliate hairs especially on the upper portions, these hairs up to 3 mm long forming a conspicuous tuft near the summit; ligules 0.4–1 mm long; blades (2–)4–35 cm long, 3–8 mm wide, flat to involute, glabrous below and above; margins whitish, somewhat scaberulous. Panicles (10–)15–45(–50) cm long, 0.2–0.8(–1) cm wide, narrow, tightly contracted, dense and spike-like, usually included in the uppermost sheath; primary branches 0.3–1.5 cm long, appressed; secondary branches appressed and floriferous to base; pulvini in axils of primary branches glabrous; pedicels 0.2–2 mm long, appressed, scaberulous. Spikelets 1.7–3.2 mm long, whitish to plumbeous; glumes 0.7–3.2 mm long, narrow lanceolate, membranous, unequal, prominently keeled, scaberulous along the keel; lower glumes 0.7–1.7 mm long, rarely without a midvein, the apex acute to acuminate; upper glumes 2–3.2 mm long, the apex acute; lemmas 2–3.2 mm long, linear membranous, glabrous, the apex acute; paleas 1.8–3 mm long, linear lanceolate, membranous, glabrous, the apex acute; stamens 3; anthers 0.3–0.5 mm long, light yellowish. Modified caryopses 0.8–1.2 mm long, ellipsoid, laterally flattened, light brownish or translucent. $2n = 36$.

Distribution and habitat.—In México, *S. contractus* ranges from Baja California, Chihuahua, and Sonora to Coahuila and Nuevo León on dry to moist sandy soils, occasionally in salt-desert scrub associated with *Atriplex confertifolia*, *A. canescens*, *Artemisia tridentata* Nutt., desert grasslands with *Bouteloua* and *Muhlenbergia*, and pinyon-juniper woodlands; 300–2300 m. Flowering July through November.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Ocampo, Sierra La Encantada, rancho Puerto del Aire, M.A. Carranza 726.767 (ANSM); Municipio de Progreso, 34 mi N of Monclova on Mex hwy 57 at junction of road to Progreso, Peterson & Valdes-Reyna 8376 (ANSM, US); 6 mi W of Saltillo along highway 40 toward Torreón, S. Hatch 5046 (ANSM, TAES); 26 km W de Saltillo, por camino Saltillo-General Cepeda. La Noria, Valdés-Reyna 1566 (ANSM); Municipio Ramos Arizpe, 6 km E of Ramos at Rancho Las Sabanier, Peterson et al. 8440 (US); N of Cañada Oscura, I. M. Johnston 8460 (MEXU). **Nuevo León:** Municipio de Doctor Arroyo, Ejido Lagunita y Ranchos Nuevos, Pérez, M.E. 126 (ANSM).

7. *Sporobolus cryptandrus* (Torr.) A. Gray, Manual 576. 1848. (Fig. 5, E–G). *Agrostis cryptandra* Torr., Ann. Lyceum Nat. Hist. New York 1:151. 1824. *Vilfa cryptandra* (Torr.) Trin., Mem. Acad. Imp. Sci. Saint-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6:69. 1840. *Sporobolus cryptandrus* var. *typicus* E.K. Jones & Fassett, nom. inval., Rhodora 52:125. 1950. TYPE: U.S.A. TEXAS or OKLAHOMA : Canadian River, E. James s.n. (HOLOTYPE: NY-128298; ISOTYPE: US-76269 fragm. & photo ex NY!).

Vilfa tenacissima var. *fuscolor* Hook., Fl. Bor.-Amer. 2:239. 1839. *Sporobolus cryptandrus* subsp. *fascicola* (Hook.) E.K. Jones & Fassett, Rhodora 52:126. 1950. *Sporobolus cryptandrus* var. *fuscolor* (Hook.) R.W. Pohl, Iowa State Coll. J. Sci. 40:500. 1966. TYPE: U.S.A. WASHINGTON: Columbia River, Menzies [Hayden's] Island, D. Douglas s.n. (HOLOTYPE: not found).

- Vilfa triniana* Steud., Syn. Pl. Glumac. 1:156. 1854. TYPE: CANADA, BRITISH COLUMBIA: (HOLOTYPE: not found).
- Sporobolus cryptandrus* var. *vaginatus* Lunell, Amer. Midl. Naturalist 2:123. 1911. TYPE: U.S.A. NORTH DAKOTA: Benson County: bare, gravelly hillsides at Pleasant Lake, 28 Jul 1911, J. Lunell 93 (HOLOTYPE: not found).
- Sporobolus cryptandrus* var. *involutus* Farw. Michigan Acad. Sci. Rep. 22: 179. 1921. TYPE: U.S.A. MICHIGAN: Rochester, 4 Sep 1919, O.A. Farwell 5393 (HOLOTYPE: not found).
- Sporobolus cryptandrus* var. *occidentalis* E.K. Jones & Fassett, Rhodora 52:125. 1950. TYPE: U.S.A. OREGON: Baker County: bars of Snake River, Ballard's Landing, ca. 3 mi NE of Homestead, 8 Jul 1899, W.C. Cusick 2222 (HOLOTYPE: US-362493).

Caespitose perennials. Culms 30–100(–120) cm tall, erect to decumbent, base flattened to rounded, glabrous below the nodes, internodes glabrous; base diameter 1–3.5 mm wide. Leaf sheaths 2/3–3/4 as long as the internodes above, glabrous to scaberulous, sometimes ciliate along the upper margins, summit with a conspicuous tuft of white hairs up to 4 mm long; ligules 0.5–1 mm long; blades (2–)5–26 cm long, 2–6 mm wide, flat to involute, erect or ascending, mostly glabrous below and scaberulous above; margins scaberulous. Panicles 15–40 cm long, 2–12(–14) cm wide, narrowly pyramidal, ultimately open, main axis ascending and straight, lower branches longest, usually included in the uppermost sheath; primary branches 0.6–6 cm long, appressed or ascending, spreading 0–130° from the culm axis; secondary branches mostly appressed not floriferous on lower 1/8–1/4; pulvini in axils of primary branches ascending, glabrous; pedicels 0.1–1.3 mm long, appressed, glabrous to scaberulous. Spikelets 1.5–2.5(–2.7) mm long, brownish, plumbeous or purplish-tinged; glumes 0.6–2.5(–2.7) mm long, linear-lanceolate to ovate, membranous, unequal; lower glumes 0.6–1.1 mm long, rarely without a midvein, the apex acute to acuminate; upper glumes 1.5–2.7 mm long, the apex acute; lemmas 1.4–2.5(–2.7) mm long, ovate to lanceolate, membranous, glabrous, the apex acute; paleas 1.2–2.4 mm long, lanceolate, membranous, glabrous, the apex acute; stamens 3; anthers 0.5–1 mm long, yellowish to purplish. Modified Caryopses 0.7–1.1 mm long, ellipsoid, light brownish to reddish-orange. $2n = 36, 38, 72$.

Distribution and habitat.—In México, *S. cryptandrus* ranges from Baja California, Chihuahua, and Sonora to Coahuila, Nuevo León and Tamaulipas. This species is found on sandy soils, rocky slopes, washes, calcareous ridges, and roadsides in salt-desert scrub with *Atriplex confertifolia*, *A. canescens*, *Grayia spinosa* (Hook.) Moq., *Ceratoides lanata* (Pursh) J.T. Howell, and *Lycium*; pinyon-juniper woodlands; yellow pine forests; and southwest plains grasslands with *Aristida*, *Buteloua*, and *Hilaria*; 60–2900 m. Flowering May through November.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Arteaga, Nueva Autopista Carbonera-Ojo Caliente, J.A. García 31 (COCA); Jamé, aproximadamente 20 km NE de la carretera nacional 57, IX Semestre de Biología, UANE s.n. (ANSM); Municipio de Castaños, Sierra de la Gavia, rancho la Gavia, aprox. 3 km S de la casa por el cañón, M.A. Carranza 2304 (ANSM); Camino al Ejido San Francisco, E. Pérez 19 (COCA); Cuesta de La Muralla, carretera 57, Saltillo-Monclova, aproximadamente 1 km N de la Cuesta de La Muralla, Vildés-Reyna 1309 (ANSM); Municipio de Cuatrociénegas, Sierra de la Mad-

era, cañada Los Posos (E-draining) in N foothill area of range: along main arroyo 1.3 mi up (W) from Tanque La Boquilla; 4.5 mi W from Rancho Cerro de la Madera by road, *Valdés-Reyna 1088* (ANSM); Entrada al Casco del Rancho Potrero de Menchaca, *R. Vásquez 60* (ANSM); Municipio de Múzquiz, Arroyo el Encinal, Hacienda La Rosita, aproximadamente 66 km N de Múzquiz, carretera Múzquiz-Boquillas del Carmen, *Valdés-Reyna 1285* (ANSM); Municipio de Ramos Arizpe, San Juan de las Bonitas, *F. Alcalá 16* (COCA); San Juan de las Bonitas, *E. Pérez 26* (COCA); Arroyo El Jaral, E de Ramos Arizpe, *A. Rodríguez 122a* (ANSM); Cañada el Diente, Sierra de la Paila, *J.A. Villarreal 5246* (ANSM); Municipio de Saltillo, Area de reforestación en Buenavista, *I. Cabral 850* (ANSM); 5 km SW de la Universidad Autónoma Agraria Antonio Narro, orillas de la carretera Saltillo-Zacatecas, *P.E. García 25* (ANSM); 3.2 mi E of Saltillo on México hwy 57 to Matehuala, *Peterson et al. 10081* (US); 5 km SW de Buenavista, a orillas de la carretera Saltillo-Concepción del Oro, Zacatecas, *P.E. García s.n.* (ANSM); Los Cerritos NE de Saltillo, *Peterson et al. 10084* (ANSM, US); Rancho experimental Los Angeles, 48 km S de Saltillo, carretera 54 Saltillo-Concepción del Oro, Zacatecas, *J.S. Sierra s.n.* (ANSM); 47 km S of Saltillo on hwy 54 to Concepcion del Oro, *Peterson et al. 10035* (US); 16 km W de Saltillo por camino Saltillo-General Cepeda, 3 km W de Palma Gorda, a la orilla del camino, *Valdés-Reyna 1564* (ANSM); 26 km W de Saltillo por camino Saltillo-General Cepeda. La Noria, *Valdés-Reyna 1565* (ANSM); Cerro del Pueblo, O de la Ciudad de Saltillo, *Valdés-Reyna 2044* (ANSM); Buenavista, 7 km S de Saltillo, carretera 54 Saltillo-Concepción del Oro, Zacatecas, *J.A. Villarreal 1770* (ANSM); Municipio de San Buenaventura, Sierra de Obayos, rancho Valle de Colombia, *R. Vásquez 246* (ANSM). **Nuevo León:** Municipio de Galeana, En los alrededores del poblado Santa Clara de González, *B. Bazaldua 104* (COCA); Alrededor de Galeana, *J.A. Ochoa 1260* (COCA); Municipio de Linares, Rio Pablillo, *J.J. Ortíz 1* (ANSM); near San Rafael, *Peterson & Valdés-Reyna 15812* (US); 16 km NE of Sandía on road to La Ascensión, *Peterson & Valdés-Reyna 15825* (US). **Tamaulipas:** Municipio de Gúemez, Carretera Gúemez-Padilla, *R.A. Carranco 113* (COCA); km 30 Tramo Gúemez-Padilla, *R.A. Carranco 118* (COCA); Municipio de Nuevo Laredo, 20 km al W de Cd. Guerrero, Matorral mediano espinoso, *F. González Medrano et al. 6329* (MEXU); Municipio de San Fernando, La Joya, *A. Brito 53* (COCA); At San Fernando in thorn scrub, *F. Martínez 2437* (MEXU); Municipio de Soto la Marina, Ejido Verde Chico, *J.F. Iribe 339* (COCA).

8. *Sporobolus flexuosus* (Thurb. ex Vasey) Rydb., Bull. Torrey Bot. Club 32:601. 1905. (**Fig. 6, A–C**). *Vilfa cryptandra* var. *flexuosa* Thurb. ex Vasey, Rep. U.S. Geogr. Surv., Wheeler 6:282. 1879 [title page 1878]. *Sporobolus cryptandrus* var. *flexuosus* (Thurb. ex Vasey) Thurb., Bot. California 2:269. 1880. TYPE: U.S.A. NEVADA and ARIZONA: 1871 and 1872, *G.M. Wheeler s.n.* (ISOTYPE: US-556875).

Caespitose perennials, rarely appearing annual. Culms 30–100(–120) cm tall, erect to decumbent, base flattened to rounded, glabrous below the nodes, and on internodes; base diameter 1–3 mm wide. Leaf sheaths 2/3–3/4 as long as the internodes above, glabrous to scaberulous, sometimes ciliate along the upper margins, summit with a tuft of hairs up to 4 mm long; ligule 0.5–1 mm long; blades (2–)5–24 cm long, 2–4(–6) mm wide, flat to involute, erect or ascending, mostly glabrous below and scaberulous to scabrous above; margins scaberulous. Panicles 10–30 cm long, 4–12 cm wide, open, subovate to oblong, the main axis flexuous and drooping, lower branches no longer than those in the middle, usually with the base included in the uppermost sheath; primary branches 1–8 (–12) cm long, widely spreading to reflexed, flexuous and tangled, mostly spreading 70–130° from the culm axis; secondary branches widely spreading not floriferous on lower 1/8–1/2; pulvini in the axils of primary branches re-

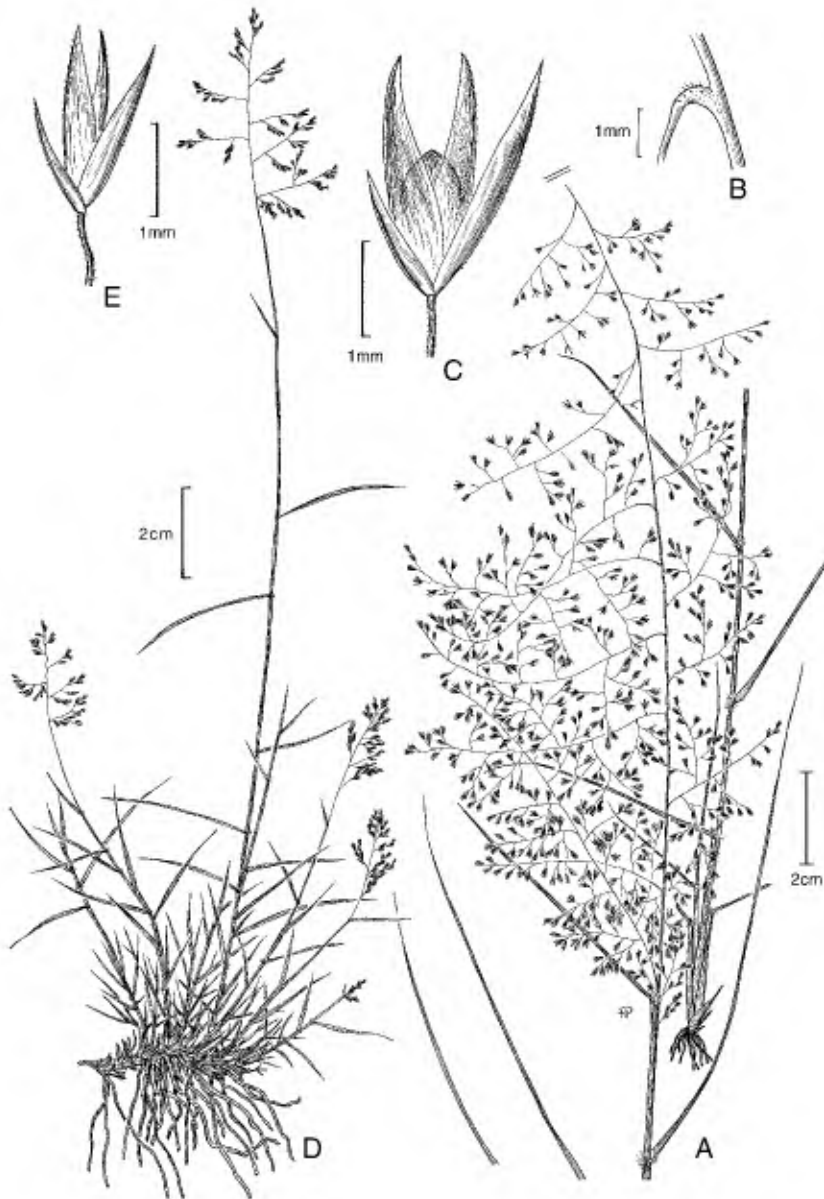


FIG. 6. *Sporobolus flexuosus*. A. Inflorescence. B. Pulvinus. C. Spikelet with caryopsis. *Sporobolus nealleyi*. D. Habit. E. Spikelet.

curved, pubescent; pedicels 0.3–3 mm long, mostly spreading, scaberulous. Spikelets 1.8–2.5 mm long, plumbeous; glumes 0.9–2.5 mm long, ovate, membranous, unequal; lower glumes 0.9–1.5 mm long, the apex acute; upper glumes 1.4–2.5 mm long, the apex acute; lemmas 1.4–2.5 mm long, lanceolate to ovate, membranous, glabrous, the apex acute; paleas 1.4–2.4 mm long, ovate, membranous, the apex acute; stamens 3; anthers 0.4–0.7 mm long, yellow. Modified caryopses 0.6–1 mm long, ellipsoid, light brownish to reddish-orange. $2n = 36, 38$.

Distribution and habitat.—In México, *S. flexuosus* occurs in Chihuahua, Sonora, and Coahuila on sandy to gravelly slopes, flats, and roadsides in desert scrub with *Atriplex* spp., *Coleogyne*, *Larrea tridentata*, *Grayia spinosa*, *Chrysothamnus*, and *Lycium*; plains grasslands with *Hilaria*, *Buchloe*, *Aristida*, and *Bouteloua*; pinyon-juniper woodlands with *Artemisia tridentata*; and yellow pine forests; 760–2100 m. Flowering May through November.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Cuatrociénegas, Cuatrociénegas, *Brigada III 14* (COCA); Dunas yesosas, cerca de la Poza El Bonito, *J.S. Marroquín s.n.* (ANSM); 45 km SW of Cuatrociénegas, *Peterson et al.* 9999 (ANSM, US); Municipio de Ocampo, 4 km S of Laguna El Rey Chemical Plant, *Peterson & Valdés-Reyna* 8372 (ANSM, US); 4 km S de Laguna del Rey, de la Planta Química, *Valdés-Reyna 2014* (ANSM).

9. *Sporobolus giganteus* Nash, Bull. Torrey Bot. Club 25:88. 1898. (Fig. 7, A & B).

Sporobolus cryptandrus var. *giganteus* (Nash) E.K. Jones, Contr. W. Bot. 14:11. 1912. TYPE: U.S.A. NEW MEXICO. Doña Ana Co.: White Sands, 4000 ft, 26 Aug 1897, *E.O. Wooton* 394 (HOLOTYPE: NY-128297; ISOTYPE: US-330618).

Sporobolus cryptandrus var. *robustus* Vasey, Contr. U.S. Natl. Herb. 1(2):56. 1890. TYPE: U.S.A. TEXAS. Presidio Co.: 1887, *G.C. Nealley* 746 (ISOTYPE: US-556883).

Robust perennials. Culms 100–200 cm tall, erect, stout, glabrous below the nodes, base rounded, internodes glabrous; base diameter (3–)4–10 mm wide. Leaf sheaths longer than the internodes above, glabrous, striate, margins with ciliate hairs especially on upper portions, these hairs up to 2 mm long forming a conspicuous tuft near the summit; ligules 0.5–1.5 mm long; blades 10–50 cm long, (3–)4–10(–13) mm wide, flat, glabrous below and above; margins whitish, scaberulous. Panicles 25–75 cm long, 1–4 cm wide, narrow, contracted, dense and spike-like, usually included in the uppermost sheath; primary branches mostly 0.5–6 cm long, appressed to spreading 0–30° from the culm axis; secondary branches appressed and floriferous to base; pulvini in axils of primary branches glabrous; pedicels 0.5–2 mm long, appressed. Spikelets 2.6–3.5(–4) mm long, whitish to plumbeous; glumes 0.6–3.5 mm long, narrow lanceolate, membranous, unequal, prominently keeled, somewhat scaberulous along the keel; lower glumes 0.6–2 mm long, the apex acute to acuminate; upper glumes 2–3.5(–4) mm long, the apex acute; lemmas 2.5–3.5(–4) mm long, linear lanceolate, membranous, glabrous, the apex acute; paleas 2.4–3.4(–3.8) mm long, linear lanceolate, membranous, glabrous, the apex acute; stamens 3; anthers 0.6–1 mm

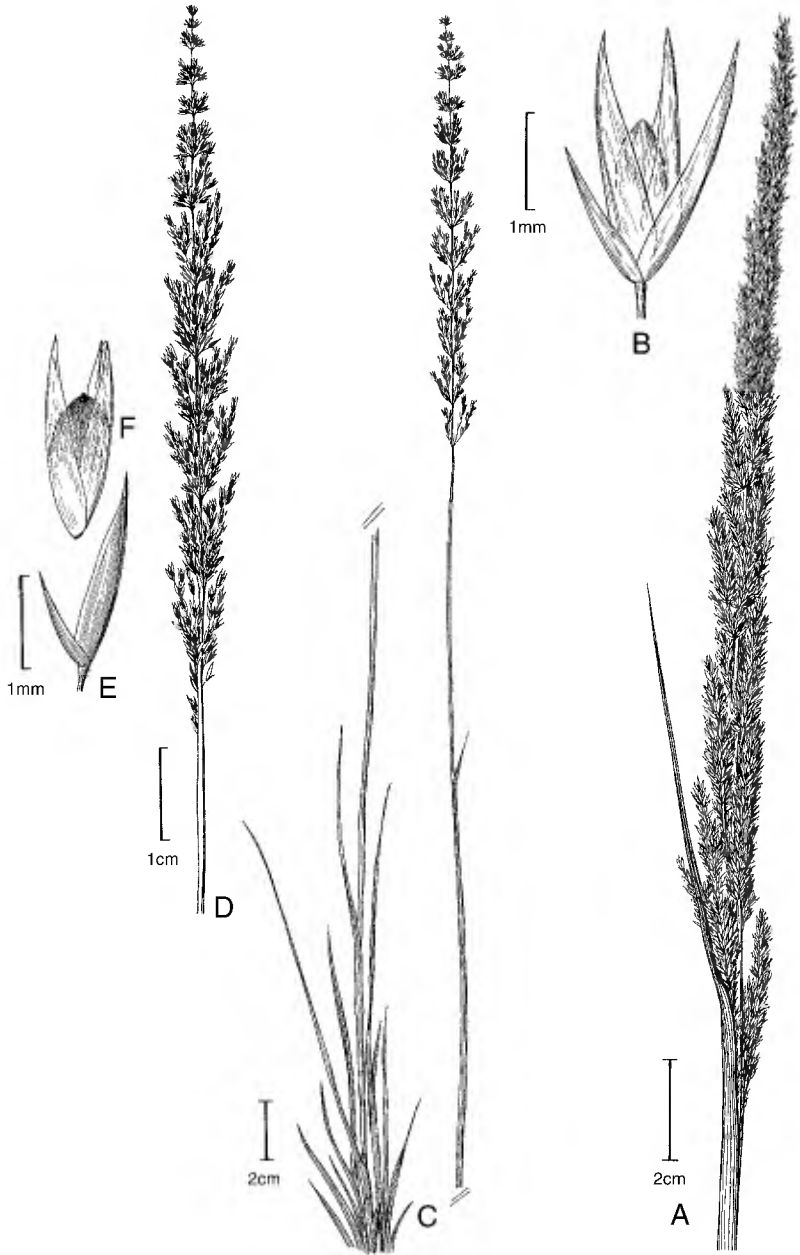


FIG. 7. *Sporobolus giganteus*. A. Inflorescence. B. Spikelet with modified caryopsis. *Sporobolus purpureoscens*. C. Habit. D. Inflorescence. E. Glumes. F. Floret with modified caryopsis.

long, yellowish. Modified caryopses 0.8–1.7 mm long, ellipsoid, light yellowish-brown sometimes translucent. $2n = 36$.

Distribution and habitat.—Sand dunes, sandy areas along rivers, calcareous slopes, roadsides, associated with *Acacia constricta* Benth. ex A. Gray, *Larrea tridentata*, *Jatropha dioica* Cerv., *Viguiera stenoloba* Blake, *Juniperus osteosperma* (Torr.) Little, and *Atriplex canescens*; 760–1220 m. Flowering July through October.

Specimens examined. **MÉXICO. Coahuila:** Cuatrociénegas, ca 33 (air) mi SSW of Cuatrociénegas, on N slopes of Sierra de Los Alamitos along trail, 6.4 mi S of El Hundido, 28 Sep 1973, near 26°30' N, 102°16' W, J. Henrickson 13659 (TEX); 24 mi SW of Cuatrociénegas & 2.6 mi S of Poza La Becerra on slopes of Sierra San Marcos, 23 Sep 1990, Peterson et al 10008 (US).

10. *Sporobolus indicus* (L.) R. Br., Prodr. 170. 1810. (Fig. 8, A & B). *Agrostis indica* L., Sp. Pl. 1:63. 1753. *Agrostis elongata* Lam., Tabl. Encycl. 1:162. 1791, nom. illeg. superfl. *Vilfa elongata* (Lam.) P. Beauv., Ess. Agrostogr. 16, 147, 181. 1812, nom. illeg. superfl. *Sporobolus lamarckii* Desv. ex Ham., Prodr. Pl. Ind. Occid. 4-5. 1825, nom. nov. *Vilfa indica* Trin., Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6, 4(1-2):96. 1840. *Vilfa indica* (L.) Trin. ex Steud., Nomencl. Bot. (ed. 2) 2:767. 1841. *Vilfa tenacissima* var. *intermedia* E. Fourn., Mexic. Pl. 2: 99. 1886, nom. illeg. TYPE: U.S.A. VIRGINIA: J. Clayton 460B (LECTOTYPE, LINN-84.36f, designated by Hubbard, Agron. Lusit. 28:67.1966; ISOLECTOTYPE: SI fragm!

Agrostis compressa Poir., Encycl., Suppl. 1:258. 1810, nom. illeg. hom., not Willd. 1790. *Milium compressum* Poir., Encycl., Suppl. 1:258. 1810, nom. inval. *Axonopus poiretii* Roem. & Schult., Syst. Veg. 2:318. 1817. *Sporobolus poiretii* (Roem. & Schult.) Hitchc., Bartonian 14:32. 1932. TYPE: U.S.A. "CAROLINA": L.A.G. Bosc s.n. (ISOTYPE: P not seen)

Agrostis tenuissima Spreng., Syst. Veg. 1:258. 1824. TYPE: WEST INDIES and SOUTH AMERICA: (HOLOTYPE: not found).

Vilfa berterovana Trin., Mem. Acad. Imp. Sci. Saint-Petersbourg, Ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 6:100. 1840. *Sporobolus berterovanus* (Trin.) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18:370. 1917. TYPE: DOMINICAN REPUBLIC. SANTO DOMINGO: C.G.L. Bertero s.n. (HOLOTYPE: LE-TRIN-1682.01f; ISOTYPES: B, MO-2095245).

Vilfa exilis Trin., Mem. Acad. Imp. Sci. Saint-Petersbourg, Ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 6, 4:89. 1840. *Vilfa tenacissima* var. *exilis* (Trin.) E. Fourn., Mexic. Pl. 2:99. 1886. *Sporobolus exilis* (Trin.) Balansa, J. Bot. (Morot) 4:164. 1890. *Sporobolus indicus* var. *exilis* (Trin.) T. Koyama, J. Jap. Bot. 37:235. 1962. TYPE: MÉXICO. JALAPA: 28 Aug, C.J.W. Schiede s.n. (HOLOTYPE: LE-TRIN-1699.03 & figl).

Sporobolus angustus Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:88. 1862. *Vilfa angustata* Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:88. 1862, nom. illeg. TYPE: U.S.A. TEXAS: Buchanan, Jun. S.B. Buckley (HOLOTYPE: PH; ISOTYPE: US-611005 fragm ex PH).

Caespitose perennials or at least long-living annuals with tough fibrous roots. Culms 30–100(–120) cm tall, erect, base mostly flattened, glabrous below the nodes, internodes glabrous; base diameter 1–3.5(–5) mm wide. Leaf sheaths 1/2 to about as long as the internodes, glabrous; ligules 0.2–0.5 mm long; blades (6–)10–30(–50) cm long, 1–5 mm wide, flat, glabrous below and above. Panicles 20–35(–50) cm long, 0.3–2.2(–3) cm wide, narrow, contracted, sometimes included in the uppermost sheath; primary branches mostly 0.4–2.5(–5) cm long, appressed sometimes ascending spreading 0–40° from the culm axis; secondary

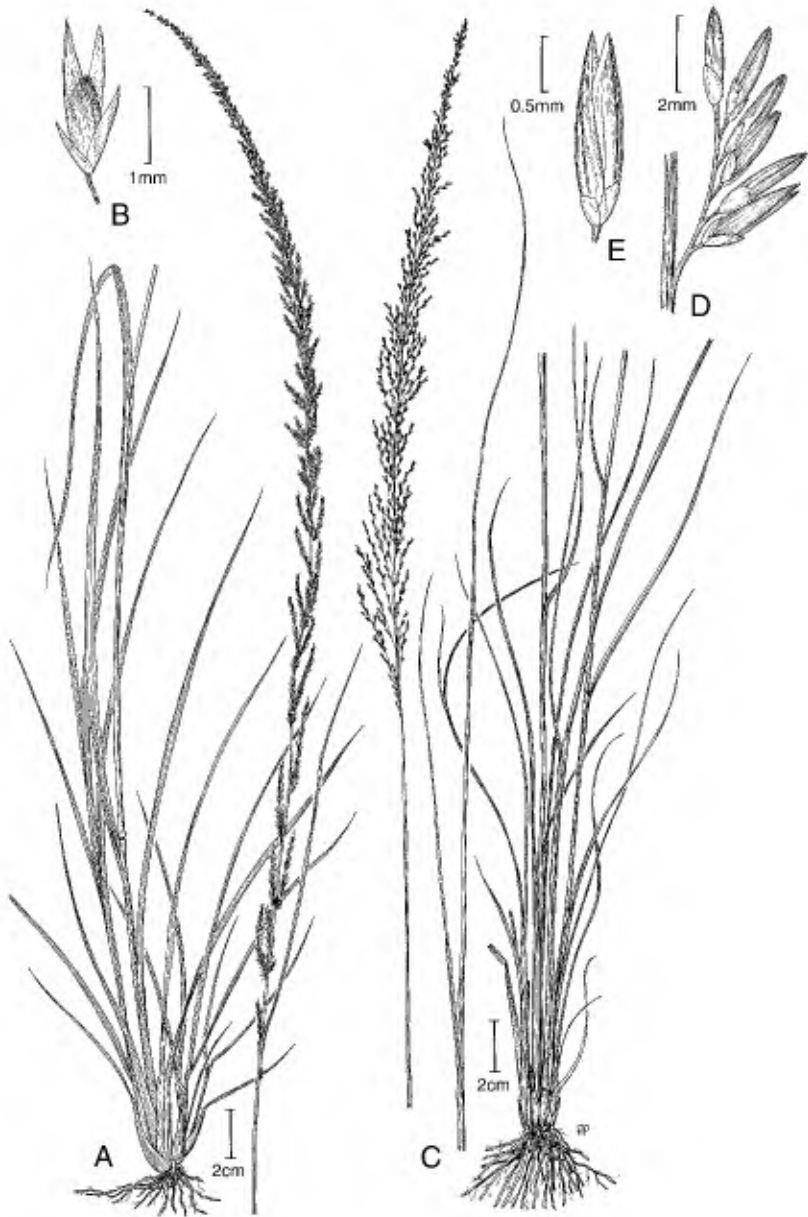


FIG. 8. *Sporobolus indicus*. A. Habit. B. Spikelet with modified caryopsis. *Sporobolus jocquemontii*. C. Habit. D. Primary branch with spikelets. E. Spikelet.

branches appressed and floriferous to base; pulvini in axils of primary branches glabrous; pedicels 0.1–1.8 mm long, appressed. Spikelets 2.0–2.6(–2.7) mm long, plumbeous to light brownish; glumes 0.4–1.6 mm long, ovate or obovate, membranous, subequal; lower glumes 0.3–1 mm long, often without a midvein, the apex acute, obtuse to truncate, often erose; upper glumes 0.6–1.6 mm long, the apex acute obtuse to truncate, often erose; lemmas 1.4–2.6(–2.7) mm long, ovate, membranous, glabrous, the apex acute or obtuse; paleas 1.3–2.4 mm long, ovate, membranous, glabrous, the apex acute; stamens 3; anthers 0.5–1.1 mm long, white, sometimes purple-tinged. Modified caryoposes 0.6–1.2 mm long, ellipsoid-quadrate, truncate towards apex, flattened laterally, reddish brown. $2n = 18, 24, 36$.

Distribution and habitat.—*Sporobolus indicus* is found throughout the western hemisphere and is common in disturbed places, open areas, roadsides, pastures, along lake shores and beaches in sandy or clay soils associated with many plant communities; 3–2460 m. Flowering throughout the year, more commonly March to December.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Arteaga, Zona Urbana, altitud 1660 m., *P. Moya* 430 (COCA). **Nuevo León:** Municipio de Garza García, Vereda a la meseta de Chipinque en San Pedro Garza García, *M.M. Castillo* 60 (COCA); Municipio de General Zaragoza, Camino a Tinajas, *G. Bores* 61 (COCA); Municipio de Marín, orillas del canal Marín, carretera Marín-Higueras a 3 km de la cabecera municipal de Marín, *P. Jauregui* 101 (COCA); Municipio de Monterrey, Sierra Madre mountains *C.H. Mueller* 381 (MEXU); Municipio de Santiago, Camino a la Cola de Caballo, localizada en Santiago, *P. Jauregui* 49 (COCA). **Tamaulipas:** Municipio de Aldama, Barra del Tordo, *M.H. Cervera* 96 (COCA); Entrada al Ejido Lauro Aguirre, *J.G. Galván* 302 (COCA); Rancho Nuevo, *J.G. Galván* 44 (COCA); Municipio de Casas, 5 de Febrero, *J.F. Iribe* 427 (COCA); Municipio de Gomez Farías, Rancho El Cielo, *M.H. Cervera* 247, 513 (COCA); El Julilo, *J.F. Iribe* 433 (COCA); El Julilo, *C.R. López* 214 (COCA); Ejido San José, *J.L. Ramos* 26 (COCA); Ejido Manantiales, *J.L. Ramos* 28 (COCA); Municipio de Güémez, Rancho Nuevo, *G. Bores* 24 (COCA); El Chihue, *J.G. Galván* 107 (COCA); Municipio de Hidalgo, Colonia Veteranos de la Revolución, *J.L. Ramos* 46 (COCA); Municipio de Jaumave, Ejido Joya de Salas, *J.A. Franco* 11 (COCA); Ejido Avila y Urbina, *J.F. Iribe* 244 (COCA); Ejido 20 de Abril, *J.F. Iribe* 423 (COCA); Ejido 20 de Abril, *C.R. López* 218 (COCA); Municipio de Tula, Ejido El Guajolote, *J.F. Iribe* 223 (COCA); Municipio de Victoria, Altas Cumbres, *G. Bores* 86 (COCA); Puerto de Arrazola, altitud 1730 m., *R.A. Carranco* 140 (COCA); Los San Pedros, *R.A. Carranco* 15 (COCA); Carretera Federal 101, km 130, *R.A. Carranco* 96 (COCA); Los San Pedros, *J.G. Galván* 23 (COCA); Camino a Altas Cumbres, Ejido El Huizachal, *J.G. Galván* 340 (COCA); Sierra de San Carlos, Cerro de la Bufa, El Diente, *O. L. Briones*, 1961 (MEXU).

11. *Sporobolus jacquemontii* Kunth, Revis. Gramin. 2:427, t. 127. 1831. (Fig. 8, C–E). *Vilfa jacquemontii* (Kunth) Trin., Mem. Acad. Imp. Sci. Saint-Petersbourg, Ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 6, 492. 1840. *Sporobolus pyramidalis* var. *jacquemontii* (Kunth) Jovet & Guédès, Taxon 22:163. 1973. TYPE: DOMINICAN REPUBLIC. SANTO DOMINGO: 1827, *V. Jacquemont* s.n. (HOLOTYPE: P; ISOTYPES: L, LE-TRIN-1712.01!).

Plants perennial, densely caespitose, without rhizomes. Culms 40–100 cm tall. Leaf sheaths keeled or rounded, glabrous, ciliate at apex; ligules 0.2–0.4 mm long; blades 10–40 cm long, 2–4 mm wide, flat but soon becoming involute,

tapering to a fine point. Panicles 14–35 cm long, 0.4–3 cm wide, contracted, interrupted, and rather lax; primary branches appressed to strongly ascending, spikelet-bearing to the base, the lower branches 1.5–5 cm long, much longer than the adjacent internodes; pedicels 0.1–1.2 (–1.8) mm long. Spikelets 1.4–1.8 (–2) mm long, plumbeous to greenish; glumes 0.3–0.7 mm long; lower glumes 0.3–0.5 mm long, obtuse; upper glumes 0.4–0.7 mm long, usually less than 1/2 as long as the florets, faintly 1-veined, truncate, erose to denticulate; lemmas 1.4–2 mm long, elliptic, glabrous, 1-veined, acute; paleas 1.4–2 mm, elliptic; stamens 3(2); anthers 0.9–1.1 mm long. Modified caryopses 0.7–1 mm long, quadrangular, laterally compressed, truncate, reddish brown. $2n = 24$.

Distribution and habitat.—This species is widely distributed and is found in Australia, Africa, and is apparently native to North America, South America, Central America, and the West Indies. In the study area, *S. jacquemontii* is more abundant in the Tamaulipan scrub vegetation at 10–1900 m.

Comments.—Simon and Jacobs (1999) noted that the spikelet morphology is essentially the same as *S. pyramidalis* P. Beauv. However, Simon and Jacobs (1999) observed *S. pyramidalis* and *S. jacquemontii* growing adjacent to each other and noted that individuals thought to be *S. jacquemontii* had shorter culms and lacked pyramidal shaped panicles. *Sporobolus jacquemontii* has been placed as a synonym of *S. pyramidalis* by Baaijens and Veldkamp (1991) and Laegaard and Peterson (2001). We choose to take the conservative route and retain *S. jacquemontii* at the rank of species until there is more evidence (Peterson et al. 2003).

Specimen examined. **MEXICO. Coahuila:** Municipio de Arteaga, 12 km de Saltillo, hacia Matehuala, *M.A. Madrigal s.n.* (ANSM). **Nuevo León:** Municipio de Allende, Río Ramos, 1 km S de Allende, carretera 85, *J.A. Villarreal 6777* (ANSM); Municipio de Linares, Las Palmas, *I. Cabral s.n.* (ANSM); Municipio de Santiago, 4 km N de Los Cavazos, *I. Cabral 217* (ANSM); San José de Las Boquillas, *I. Cabral 565* (ANSM); Municipio de General Zaragoza, 13.5 mi SE of Aramberri on road towards Agua Fria, *Peterson et al. 16708* (US). **Tamaulipas:** Municipio de Aldama, 20 km de Aldama a Barra del Tordo, *R.A. Carranco 437* (ANSM, COCA); Rancho 'Don Enrique', *M.H. Cervera 6* (COCA); Las Alazanas, *C.R. López 293* (ANSM, COCA); Ejido Lauro Aguirre, *C.R. López 309* (ANSM, COCA); Municipio de Altamira, 8 mi from of Tampico on the Mante highway, *M.C. Johnston 4063A* (MEXU); Municipio de Gomez Farías, Ejido Alta Cima, *Cisneros M. 160* (COCA); Gómez Farías, *M.E. Crespo 103* (ANSM); Ejido Alta Cima, *M.E. Crespo 197* (ANSM); Cabecera Municipal de Gomez Farías, *M.E. Crespo 26* (ANSM); Paraje casa de piedra, ejido Alta Cima, *M.E. Crespo 322* (ANSM); Camino al rancho El Cielo, *M.E. Crespo 374* (ANSM); Camino de Gómez Farías, Ejido El Azteca, *M.E. Crespo 63* (ANSM); Las Huertas. Reserva de la Biósfera El Cielo, *A. Mora 604* (ANSM); Municipio de Hidalgo, 440 km SW of hwy 85 towards Dulce Nombres, *Peterson & Valdés-Reyna 15902* (US); Municipio de Jaumave, Montecristo, *J.L. Ramos 198* (COCA); Municipio de San Carlos, San José, Sierra San Carlos, *O.L. Briones 1625* (ANSM); Cerro de la San José, Sierra San Carlos, *O.L. Briones 1961* (ANSM); Municipio de Tampico, Laguna El Chairil, *M.G. Torres s.n.* (ANSM); Municipio de Victoria, Ejido Vicente Guerrero, *M. Cisneros 21* (COCA); Camino al Molino, *P. Moya 140* (COCA); Camino a Santa Clara, *P. Moya 143* (COCA).

12. *Sporobolus nealleyi* Vasey, Contr. U.S. Natl. Herb. 1(2):57. 1890. (**Fig. 6, D & E**). TYPE: U.S.A. TEXAS. Brazos Co.: Brazos Santiago, 1887, *G.C. Neally 752* (HOLOTYPE: US-556888).

Caespitose perennials from a hard knotty base. Culms 10–40 cm tall, erect, base rounded, glabrous below the nodes and grooved on one side, internodes mostly glabrous; base diameter 0.7–1.2 mm wide. Leaf sheaths 1/2–4/5 as long as the internodes above, villous to tomentose with soft kinky hairs along the margins and back occasionally almost glabrous, the hairs up to 4 mm long; ligules 0.2–0.4 mm long; blades (0.6–)1.5–6(–7) cm long, 1–1.5 mm wide, involute, stiffly divergent from the culms at right angles, glabrous below and scaberulous above; margins smooth. Panicles 3–10 cm long, (0.3)1–5(–6) cm wide, ultimately open, subovate, the lower portion sometimes included in the uppermost sheath; primary branches 0.5–5 cm long, appressed or ascending spreading 0–90° from the culm axis, secondary branches appressed or spreading not floriferous on lower 1/8–1/4; pedicels 0.2–2 mm long. Spikelets 1.4–2.1 mm long, purplish; glumes 0.5–2 mm long, linear-lanceolate to ovate, membranous, unequal; lower glumes 0.5–1.1 mm long, the apex acuminate; upper glumes 1.3–2 mm long, the apex acuminate to acute; lemmas 1.4–2.1 mm long, ovate, membranous, glabrous, the apex acute; paleas 1.4–2.1 mm long, ovate, membranous, the apex acute; stamens 3; anthers 0.7–1 mm long, purplish. Modified caryopses 0.7–1 mm long, orangish to whitish. $2n = 40$.

Distribution and habitat.—In México, *S. nealeyi* is known only from Coahuila, Nuevo León, and San Luis Potosí on sandy and gravely soils usually derived from gypsum or near alkaline habitats associated with desert grasslands with *Pleuraphis jamesii* Torr., *Muhlenbergia villiflora* Hitchc., *Bouteloua chasei* Swallen, *Dasyochloa pulchella* (Kunth) Willd. ex Rydb., *Ephedra torreyana* S. Watson, *Chrysothamnus nauseosus* (Pall.) Britton, *Atriplex confertifolia*, and *Gutierrezia microcephala* (DC.) A. Gray; 750–2100 m. Flowering June to November.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Saltillo, 53.2 km S of Saltillo on México highway 54 and 28.5 km E on road to La Ventura, *Peterson et al. 10039* (ANSM, US); La Ventura, aproximadamente 80 km S de Saltillo, *Valdés-Reyna 1991. 3503* (ANSM). **Nuevo León:** Municipio de Galeana, Galeana, J.A. Ochoa 1009 (COCA); 2 km S del Salero, 1 km E de carretera 57 Matehuala-Saltillo, *Valdés-Reyna 1617* (ANSM); Near San Rafael, *Peterson & Valdés-Reyna 15810* (US); Carretera a Trinidad China, Ochoa-Guillemar, José Amando 1230 (COCA); 4 mi SE of Galeana, on fine gypsiferous soil, *Reeder & Reeder 3655* (MEXU).

13. *Sporobolus purpurascens* (Sw.) Ham., Prodr. Pl. Ind. Occid. 5. 1825. (Fig. 7, C–F). *Agrostis purpurascens* Sw., Prodr. 25. 1788. *Vilfa purpurascens* (Sw.) P. Beauv., Ess. Agrostogr. 16, 182. 1812. *Sporobolus purpurascens* (Sw.) Kuhlman, Comm. Lin. Telegr., Bot. 67:92. 1922. TYPE: JAMAICA: O.P. Swartz s.n. (HOLOTYPE: S not seen; ISOTYPE: BM not seen).

Vilfa densiflora E. Fourn., Mexic. Pl. 2:98. 1886. TYPE: MÉXICO: Orizaba, *Botteri 139* (HOLOTYPE: P not seen; ISOTYPES: US fragm. ex B!, US ex CGE!, US ex P!).

Vilfa grisebachiana E. Fourn., Mexic. Pl. 2:98. 1886. TYPE: CUBA. C. Wright 3427a (SYNTYPE: P? not seen); MÉXICO. VERACRUZ: Orizaba, E. Bourgeau s.n. (SYNTYPE: P not seen); M. Botteri 32 (SYNTYPE: P not seen).

Vilfa liebmanni E. Fourn., Mexic. Pl. 2:100. 1886. TYPE: MÉXICO: “Absque loco,” F.M. Liebmann 693 (SYNTYPE: P?).

Vilfa muelleri E. Fourn., Mexic. Pl. 2:98. 1886. *Sporobolus muelleri* (E. Fourn.) Hitchc., N. Amer. Fl. 17(7):490. 1937. TYPE: MÉXICO. VERACRUZ: Orizaba. 1835, Müller 2117 (LECTOTYPE: US-998486 ex W), designated by Hitchcock, N. Amer. Fl. 17:490. 1937).

Caespitose perennials, not rhizomatous. Culms 25–95 cm tall. Leaf sheaths rounded below, sometimes sparsely hispid-ciliate on the upper margins, the summit hairy, the hairs to 5 mm long; ligules 0.2–0.3 mm long; blades 8–22 cm long, 2–5 mm wide, flat or involute, glabrous abaxially, scaberulous adaxially; margins scabrous, sometimes sparsely hispid. Panicles 5–30 cm long, 0.4–1.6 cm wide, contracted, lower nodes with 3–5 primary branches; primary branches 0.3–2 cm long, appressed or spreading up to 20° from the rachis, spikelet-bearing to near the base; secondary branches appressed; pedicels 0.2–2.5 mm long, appressed, scaberulous. Spikelets 2.8–3.8 mm long, purplish-red; glumes unequal, linear-lanceolate to lanceolate or ovate, hyaline to membranous; lower glumes 0.9–3 mm long; upper glumes 2.9–3.8 mm long, subequal to the florets; lemmas 2.9–3.8 mm long, ovate, membranous, glabrous, the apex acute; paleas 2.9–3.8 mm, ovate, membranous; anthers 1.5–2 mm, yellowish to purplish. Modified caryopses 1.8–2.3 mm, ellipsoid, somewhat laterally flattened, rugulose, reddish-brown. $2n = 60$.

Distribution and habitat.—In México, *S. purpuascens* is known to occur in Chiapas, Puebla, Tamaulipas, and Veracruz; primarily in oak forests; 900–1500 m.

Specimens examined. **MÉXICO. Tamaulipas:** Highest part of the Sierra de Tamaulipas, road from Rancho Las Yucas to Santa Maria de los Nogales through El Columpio from Los Cerritos to the Cerro de San Juan, 22 Sep 1956 F. Martinez & G. Borja F-1936 (TEX).

14. *Sporobolus pyramidatus* (Lam.) Hitchc., Man. Grasses W. Ind. 84. 1936. (Fig. 4, D & F). *Agrostis pyramidata* Lam., Tabl. Encycl. 1:161. 1791. *Sporobolus affinis* Kunth, Revis. Gramin. 1:68. 1829, nom. illeg. superfl. TYPE: WEST INDIES. MARTINIQUE: J. Richard s.n. (HOLOTYPE: P not seen; ISOTYPE: LE-TRIN-1645.01 fragm. & illustr!).

Vilfa arguta Nees, Fl. Bras. Enum. Pl. 2:395. 1829. *Sporobolus argutus* (Nees) Kunth, Enum. Pl. 1:215. 1833. *Vilfa humifusa* var. *major* E. Fourn., Mexic. Pl. 2:97. 1886. non Kunth 1816. *Sporobolus arkansanus* Nutt. ex Vasey, Contr. U.S. Natl. Herb. 3:61. 1892, nom. inval. TYPE: BRAZIL: Brasilia, F. Sellow s.n. (SYNTYPE: LE-TRIN-1676.01!).

Vilfa arkansana Trin., Mem. Acad. Imp. Sci., Saint-Petersbourg, Ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 6, 4:64. 1840. TYPE: U.S.A. ARKANSAS: H.K. Beyrich s.n. (HOLOTYPE: LE-TRIN-1677.01!; ISOTYPE: US fragm. ex LE-TRIN!).

Vilfa subpyramidata Trin., Mem. Acad. Imp. Sci., Saint-Petersbourg, Ser. 6, Sci. Math., Seconde Pt. Sci. Nat. 6, 4:61. 1840. TYPE: U.S.A. TEXAS: T. Drummond 377 (HOLOTYPE: LE-TRIN-1744.01!; ISOTYPE: US-557438!).

Vilfa richardi Steud., Syn. Pl. Glumac. 1:153. 1854. *Agrostis pyramidalis* Rich. ex Steud., Syn. Pl. Glumac. 1:153. 1854, pro syn. TYPE: WEST INDIES. Antilles. (HOLOTYPE: MPU not seen).

Vilfa agrostioides Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:88. 1862. TYPE: U.S.A. TEXAS: Llano Co. (HOLOTYPE: not found).

Vilfa sabeana Buckley, Proc. Acad. Nat. Sci. Philadelphia 14:90. 1862. *Sporobolus sabeana* Buckley ex Vasey, Contr. U.S. Natl. Herb. 3:61 (1892). TYPE: U.S.A. TEXAS. San Saba Co.: S.B. Buckley s.n. (LECTOTYPE: PH, designated by Hitchcock Man. Grass. U.S. 957. 1935, not seen).

Sporobolus tuberculatus Hack., Anales Mus. Nac. Buenos Aires 13:470, t.13. 1906. *Sporobolus argustus* var. *tuberculatus* (Hack.) Hack., Anales Mus. Nac. Buenos Aires 21:90. 1911. TYPE: ARGENTINA. SALTA: Rosario de la Frontera, 1905, *M. Lillo* 3908 (HOLOTYPE: CORD-Stuckert Herb. no. 15397 not seen; ISOTYPE: US-87217 fragm!).

Sporobolus patens Swallen, J. Wash. Acad. Sci. 31:352, f. 5. 1941. TYPE: U.S.A. ARIZONA: Wilcox, 26 Sep 1938, *W.A. Silveus* 3504 (HOLOTYPE: US-1723881; ISOTYPES: US-3278441, US-F3215630).

Sporobolus pulvinatus Swallen, J. Wash. Acad. Sci. 31:351, f. 4. 1941. TYPE: U.S.A., ARIZONA. Apache Co.: Adamana, 6–15 Aug 1903, *D. Griffiths* 5107 (HOLOTYPE: US-997877).

Caespitose annuals, larger plants sometimes appearing perennial, with intravaginal branching at base. Culms 7–35(–60) cm tall, erect or decumbent, base rounded, glabrous below the nodes, internodes glabrous; base diameter 1–1.6 mm wide. Leaf sheaths 1/2 to almost as long as the internodes above, glabrous or with ciliate hairs on the margins and summit, the hairs up to 3 mm long; ligules 0.3–1 mm long; blades 2–12(–20) cm long, 2–6 mm wide, flat, glabrous below and scaberulous above, sometimes with a few hispid hairs, mostly borne near base; margins ciliate-pectinate. Panicles 4–15(–18) cm long, 0.3–6 cm wide, open and pyramidal with verticillate branches spreading 30–90°, contracted and narrow when immature; primary branches 0.5–4.5 cm long, not floriferous on the lower 1/3–1/2, lowest branches whorled in verticels of 7–12(–15), lower portions of each branch with elongated glands; secondary branches appressed; pedicels 0.1–0.5(–1) mm long, appressed. Spikelets 1.2–1.8 mm long, plumbeous or brownish, often secund along the branch; glumes 0.3–1.8 mm long, ovate to obovate, membranous, unequal; lower glumes 0.3–0.7 mm long, without a midvein, the apex acuminate, obtuse or irregularly truncate; upper glumes 1.2–1.8 mm long, the apex acute or acuminate and sometimes scaberulous; paleas 1.1–1.6 mm long, ovate to elliptic, membranous, the apex acute to obtuse; stamens 3; anthers 0.2–0.4 mm long, yellow or purplish. Modified caryopses 0.6–1 mm long, obovoid, faintly striate, light brownish. $2n = 24, 36, 54$.

Distribution and habitat.—*Sporobolus pyramidatus* is common throughout México occurring on disturbed soils, roadsides and railways, coastal sands, and alluvial slopes in many plant communities; 5–1750 m. Flowering March to November.

Comments.—Morphologically, *S. pyramidatus* is very similar to the Eastern Hemisphere *S. coromandelianus* (Retz.) Kunth, suggesting that they are closely related or perhaps represent the same taxon. Further systematic study is necessary to address this question.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Acuña, Rancho Las Norias, *J.A. Villarreal* 6920 (ANSM); Municipio de Cuatrociénegas, 3.2 km NW of Cuatrociénegas on road to Ocampo, *Peterson et al.* 9993 (ANSM, US); Ladera baja de la Sierra de San Marcos, frente a las dunas de Cuatrociénegas, *A. Rodríguez* 1145 (ANSM, MEXU); Sierra de la Madera, Rancho Laguna de la Leche, aproximadamente 62 km de Ocampo rumbo a Sierra Mojada, *M.A. Carranza* 616 (ANSM); S of Laguna de La Leche, *M.C. Johnston* 8626 (MEXU); Municipio de Parras, Ejido 4 de Marzo, *A. Roing* 156 (ANSM); Municipio de Ramos Arizpe, Cañón de Loma Prieta, rumbo al valle de los Angeles, *J.A. Marroquín* 2312 (ANSM); Predio La Esmeralda, *E. Pérez* 50 (COCA); 11 km E de Cuatrociénegas, en carretera 30 a Monclova,

bajo al S de la carretera, *Valdés-Reyna* 985 (ANSM); Municipio de Saltillo, 2 mi E de Saltillo, carretera 57 Matehuala. San Luis Potosí, *Peterson et al.* 10080 (ANSM, US); Los Cerritos NE de Saltillo, *Peterson et al.* 10083, 10085 (ANSM, US). **Nuevo León:** Municipio de China, Rancho El Chaparral, km 56 carretera China-Méndez, camino a Pobladores, *M. Castillo* 54 (COCA); 2 km N del Chilán, *Valdés-Reyna* 45 (ANSM); Presa La Ceja, carretera 40, *J.A. Villarreal* 6844 (ANSM); Municipio de Doctor González, 1 km al SE del poblado de Doctor González, rumbo a los fresnos a la orilla del río Doctor González, *B. Bazaldua* 69 (COCA); Municipio de General Bravo, 34.8 km W of China on highway 40 to Monterrey, altitud 270 m., *Peterson et al.* 11146 (ANSM); 3 km N del rancho 'El Brasil', *Valdés-Reyna* s.n. (ANSM); Municipio de Linares, Baño de San Ignacio, 22 km NE de Linares, *M. Cotera* s.n. (ANSM); Ejido Cerro Prieto, *J. Ortíz* s.n. (ANSM); Ejido el Porvenir, *J. Ortíz* s.n. (ANSM); Municipio de Los Ramones, Entronque Centro Camionero carretera 40, *J.A. Villarreal* 6825 (ANSM); Municipio de Salinas Victoria, La Soledad Salinas Victoria, *J.A. Ochoa* 1118 (COCA); Municipio de San Nicolás de los Garza, Maleza de la Ciudad Universitaria, *R. Uresti* s.n. (ANSM). **Tamaulipas:** Municipio de Abasolo, Rancho de Mauro Garza 5 km NE de Abasolo, *D. Baro* 576 (UAT); 5-6 km NW del ejido Abasolo, *R. Díaz* 140 (UAT); Canales del Distrito de riego 086 Soto la Marina, *A. Mora* 5341 (UAT); Municipio de Aldama, Santa Rosa, *G. Bores* 7 (COCA); Rancho Nuevo, *M. Cervera* 91 (COCA); Playa Rancho Nuevo, *R. Díaz* 30 (UAT); Municipio de Altamira, Al E de la Cabecera Municipal de Altamira, *J.G. Galván* 144 (COCA); Municipio de Casas, rumbo a Lavín, *G. Bores* 96 (COCA); Casas, *J.L. Ramos* 149 (COCA); Ejido Las Tortugas, *J.L. Ramos* 179 (COCA); Municipio de González, Ejido Gustavo A. Madero, *J.A. Barrientos* 21 (COCA); 5 km antes del poblado por la carretera vía corta a Tampico, *M. Cisneros* 8 (COCA); 7 km al NW de González, *P. Larraga* 40 (ANSM, COCA); Ejido Josefa Ortiz de Domínguez, *J.L. Ramos* 155 (COCA); Municipio de Gúemez, Rancho El Melón, *G. Bores* 137 (COCA); Municipio de Guerrero, Ejido San Ignacio 41 km SE de Nuevo Laredo, carretera Dorado-Ciudad Mier, *R. Díaz* 107 (UAT); Municipio de Jaumave, Ejido San Francisco del Cañón, *M. Cisneros* 145 (COCA); Ejido San Antonio km 132 carretera Victoria-Jaumave, *M. Martínez* 287 (UAT); Municipio de Jiménez, Camino al Barranco *G. Bores* 26 (COCA); Adelante de la Parida, *G. Villegas* 470 (COCA); Municipio de Llera, 2 km W de Estación Forlón, *D. Baro* 10 (ANSM, UAT); Ejido Portes Gil, *J.A. Barrientos* 96 (COCA); Ejido 1° de Abril, *M. Cervera* 79 (COCA); La Gloria II, *J.E. López* 146 (COCA); Municipio de Matamoros, km 26 al E de la carretera a playa Lauro Villar, *D. Baro* 252 (UAT); Playa Lauro Villar, *A. Brito* 1232 (UAT); km 18 carretera Matamoros-Valle Hermoso, *A. Brito* 54 (COCA); Playa Lauro Villar, *A. Brito* 61 (COCA); Los Saucitos, *J. Cantú* 1 (COCA); km 18 carretera Matamoros-Valle Hermoso, *R.A. Carranco* 103 (COCA); Antes de llegar a los Sauces, *R.A. Carranco* 110 (COCA); Playa Lauro Villar, *R.A. Carranco* 111 (COCA); Municipio de Méndez, San Tomás, *B.E. Castillo* 1 (COCA); Municipio de Ocampo, Sierra de las Cucharas, *R.A. Carranco* 371 (COCA); Municipio de Padilla, Campo Turístico El Sargento *M. Cervera* 321 (COCA); Municipio de San Fernando, Laguna Madre, *A. Brito* 62, 64 (COCA); km 120 carretera Jiménez-San Fernando, *R.A. Carranco* 346 (COCA); Municipio de Soto la Marina, Barra de Soto la Marina E del Carrizo, *D. Baro* 335 (UAT); Carretera del Poblado La Pesca-La Playa, *A. Brito* 169 (COCA); Al N del Laboratorio de cultivo de Camarón, *A. Brito* s.n. (UAT); La Pesca, *J.G. Galván* 29,256 (COCA); La Pesca, *J.F. Iribe* 318 (COCA); Canales de riego. Distrito de riego, bajo Río Bravo, *A. Mora* 5202 (UAT); Municipio de Tampico, Puente Chairel río Morillo, *D. Baro* 18 b (UAT); Municipio de Tula, Ejido La Laguna, *M. Cervera* 386 (COCA); Municipio de Victoria, Carretera Victoria-Jaumave, *M. Cisneros* 87 (COCA); Municipio de Villagrán, Rancho Vista Hermosa, *A. Rodríguez* 246 a (ANSM).

15. *Sporobolus spiciformis* Swallen, Proc. Biol. Soc. Wash. 56:78. 1943. (**Fig. 3, D & F**). TYPE: MÉXICO. COAHUILA: Puerto del norte, Cuatrociénegas, 1+60 m, 18 Jul 1939, *L.H. Harvey* 1225 (HOLOTYPE: US-176006).

Caespitose perennials. Culms 30–70 cm tall, erect, mostly glabrous; base diameter 1–1.8 mm wide. Leaf sheaths shorter than the internodes, rounded, striate, scaberulous, glabrous and hairy only at the corners; ligules 0.8–1 mm long,

densely ciliate; blades 7–20 cm long, 1.5–2 mm wide at the base, flat or becoming involute or at least boat shaped in section, firm, flexuous, adaxial surface with white ridges. Panicles 9–17 cm long, 3–5(–10) mm wide, spiciform and spikelike, white, often the lower portion included in the sheath; Spikelets 1.6–2.3 mm long; glumes 0.8–1.8 mm long, unequal, hyaline, the apex obtuse to acute, minutely erose; lower glumes 0.8–1.2 mm long; upper glumes 1–1.8 mm long, 1-nerved; lemmas 1.6–2.3 mm long, the apex obtuse to acute, minutely erose; paleas 1.6–2.3 mm long, the apex minutely two-toothed; anthers 1–1.3 mm long, yellow. Modified caryopses 0.8–1 mm long, ellipsoid. $2n = 40$.

Distribution and habitat.—*Sporobolus spiciformis* is endemic to the Chihuahuan Desert Region, reported from Chihuahua, Coahuila, and Nuevo León where it is restricted to saline or gypsum-derived soils associated with *Yucca*, *Ephedra*, *Nama*, *Suaeda*, *Chilopsis linearis* (Cav.) Sweet, *Prosopis*, and *Petalonyx*; 410–1750 m.

Comments.—*Sporobolus spiciformis* is morphologically similar to *S. phleoides*, an Argentinian desert endemic also commonly found growing on saline soils. *Sporobolus phleoides* can be separated from *S. spiciformis* by having broader leaf blades up to 6.6 mm wide, acuminate lemmas, and shorter anthers only 0.4–0.6 mm long.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Cuatrociénegas, Balneario Los Mezquites, *Brigada III 15* (COCA); Dunas yesosas, cerca de la Poza El Bonito, *J.S. Marroquin s.n.* (ANSM); 45 km SW of Cuatrociénegas, *Peterson et al. 10001* (ANSM, US); 3.2 km NW of Cuatrociénegas on road to Ocampo, *Peterson et al. 9991* (ANSM, US); 33 mi SSW of Cuatrociénegas on road to San Pedro, *Reeder & Reeder 4579* (ARIZ); 11 km E de Cuatrociénegas, en carretera 30 a Monclova, bajo al S de la carretera, *Valdés-Reyna 986* (ANSM); 6 mi NW of Las Delicias along hwy 30 & 44 mi NE of San Pedro, *J. Henrickson 6021* (CSLA, US); Municipio de Monclova, Arroyo Río Salado, 9 km N de Rancho Las Adjuntas, *Valdés-Reyna 1300, 1303a* (ANSM); Municipio de Parras, Ejido Cuatro de Marzo, *A. Roing s.n.* (ANSM); Municipio de Ramos Arizpe, Estación Paredón, *A. Rodríguez 902* (UAT); Municipio de Viesca, Camino al Bajío de Ahuichila 16 km S de Viesca, *J.A. Villarreal 7729* (ANSM); 17 km SE de Viesca, camino a Ahuichila, *J.A. Villarreal 8226* (ANSM). **Nuevo León:** 33 mi SE of jet Monterrey-Monclova, *Reeder & Reeder 5190* (ARIZ). **Tamaulipas:** Municipio de San Fernando, Near Santa Teresa, 50 mi S of Matamoros and 40 mi N of San Fernando, *M.C. Johnston 5495* (MEXU).

16. *Sporobolus virginicus* (L.) Kunth, Révis. Gramin. 1:67. 1829. (Fig. 9, A–C).

Agrostis virginica L., Sp. Pl. 1:63. 1753. *Vilfa virginica* (L.) P. Beauv., Ess. Agrostogr. 16, 149, 182. 1812. *Crypsis virginica* (L.) Nutt., Gen N. Amer. Pl. 1:49. 1818. *Podosaeum virginicum* (L.) Link, Hort. Berol. 1:85. 1827. *Sporobolus virginicus* (L.) Brongn., Voy. Monde 2:17. 1829. TYPE: U.S.A. VIRGINIA: *J. Clayton 507* (LECTOTYPE: LINN-84.30 designated by Hitchcock, Contr. U.S. Natl. Herb. 12:119. 1908; ISOLECTOTYPES: BM, US-76294 ex BM).

Agrostis littoralis Lam., Tabl. Encycl. 1:161. 1791. *Agrostis barbata* Pers., Syn. Pl. 1:75. 1805, nom. illeg. superfl. *Vilfa barbata* (Pers.) P. Beauv., Ess. Agrostogr. 16, 147, 181, nom. illeg. superfl. 1812. *Vilfa littoralis* (Lam.) P. Beauv., Ess. Agrostogr. 16, 147, 181. 1812. *Sporobolus littoralis* (Lam.) Kunth, Revis. Gramin. 1:68. 1829. *Sporobolus virginicus* var. *littoralis* (Lam.) Hitchc. N. Amer. Fl. 17(7):486. 1937. *Sporobolus virginicus* subsp. *littoralis* (Lam.) Borhidi & O. Muñiz, Bot. Közlem. 58(3):175. 1971. TYPE: ANTILLES. VIRGIN ISLANDS: May 1787, *L.C.M. Richard s.n.* (LECTOTYPE: P designated by Baaijens & Veldkamp, Blumea 35:446. 1991; ISOLECTOTYPE: P-LAM).

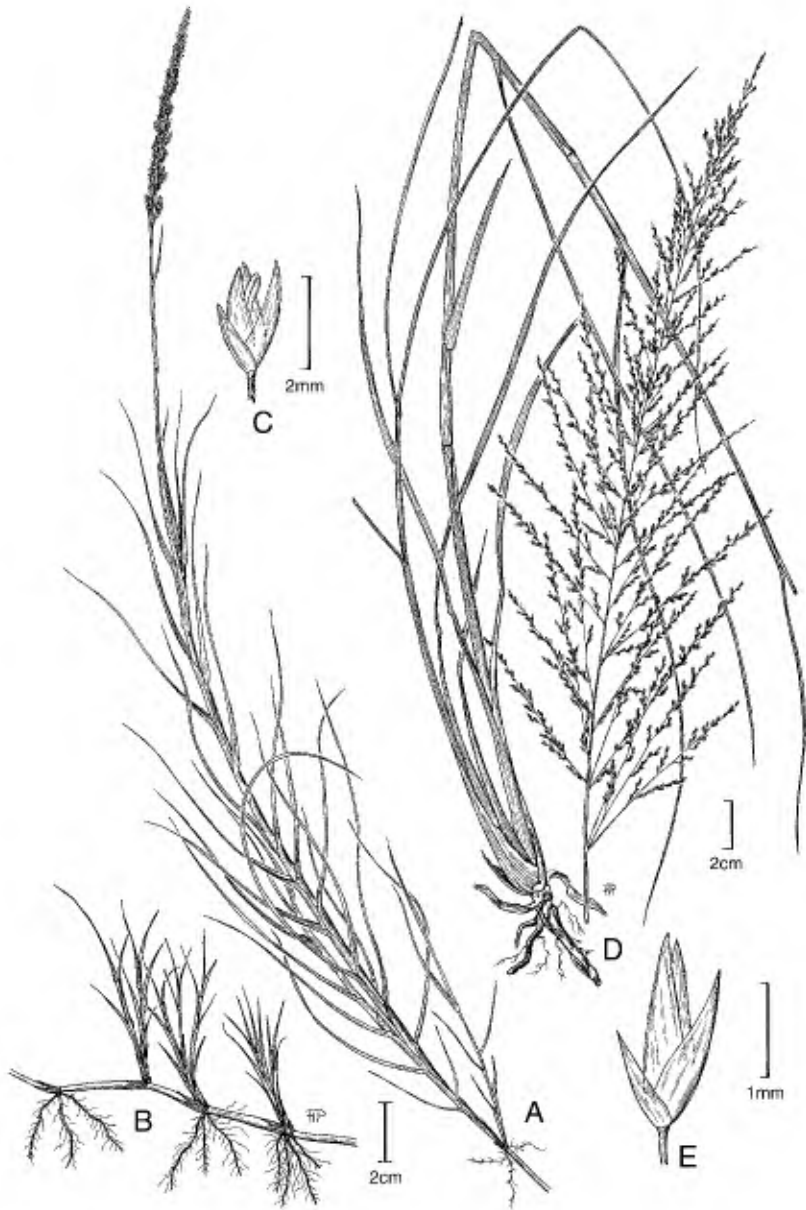


FIG. 9. *Sporobolus virginicus*. A. Habit. B. Rhizome. C. Spikelet with stamen. *Sporobolus wrightii*. D. Habit. E. Spikelet.

Vilfa intermedia Trin., Gram. Unifl. Sesquifl. 156. 1824. *Vilfa matrella* Nees, Fl. Bras. Enum. Pl. 2:400. 401. 1829, nom. illeg. superfl. *Sporobolus matrella* Nees, Fl. Afr. Austral. III. 152. 1841, nom. illeg. superfl. TYPE: WEST INDIES, MAURITIUS: *Sieber II-38* (HOLOTYPE: LE-TRIN-1710.01; ISOTYPES: K, L).

Strongly rhizomatous and stoloniferous perennials. Culms 10–65 cm tall, base flattened or rounded, widely creeping in rows and branching virgately, erect to decumbent, mostly glabrous and smooth and shiny below the nodes, internodes glabrous; base diameter 1–2.2 mm wide. Leaf sheaths 1/2 to almost as long as the internodes above, overlapping, glabrous, ciliate along the margins, summit with a tuft of hairs, the hairs up to 2 mm long; ligules 0.1–0.4 mm long; blades 4–16 cm long, 2–5 mm wide, flat to loosely involute, conspicuously distichous, glabrous below and scaberulous above; margins scaberulous. Panicles 3–10 cm long, 0.4–1.6 cm wide, narrow, contracted, densely flowered and spike-like; primary branches 0.5–2 cm long, ascending and appressed, floriferous to base; pedicels 0.2–1.4 mm long, appressed. Spikelets (1.8–)2–3.2 mm long, ochroleucus to purplish-tinged, sometimes grayish; glumes 1.5–3(–3.2) mm long, ovate-oblong, membranous, subequal, scaberulous along the keel; lower glumes 1.5–2.4 mm long, the apex acute; upper glumes 1.8–3(–3.2) mm long, the apex acute; lemmas 2.1–3 mm long, ovate to lanceolate, membranous, glabrous, the apex acute; paleas 2.1–3 mm long, ovate, membranous, the apex acute to obtuse; stamens 3; anthers 1–1.7 mm long, yellowish. Modified caryopses usually absent. $2n = 20, 30$.

Distribution and habitat.—*Sporobolus virginicus* occurs along sandy beaches, sand dunes, and saline habitats and is particularly common along the immediate coast throughout México associated with *Avicennia*, *Batis*, *Borrchia*, *Distichlis*, *Panicum amarulum* Hitchc. & Chase, *Salicornia*, and *Spartina*; 0–270 m. Flowering May to October.

Specimens examined. **MÉXICO. Nuevo León:** Municipio de Linares, Baño de San Ignacio, 22 km NE de Linares, *I. Cabral* 658 (ANSM); Baño de San Ignacio, 22 km NE de Linares, *I. Cabral* 759 (ANSM, MEXU). **Tamaulipas:** Municipio de Aldama, Rancho Nuevo, 23 km E del ejido San Rafael, *D. Baro* 32 (ANSM); Rancho Nuevo, 23 km E del ejido San Rafael, *D. Baro* 398, 420 (UAT); Barra del Tordo, Laguna, *A. Mora* 5474 (UAT); Municipio de Ciudad Madero, Playa Miramar, *D. Baro* 362 (ANSM); Municipio de Matamoros, 35 km S de la playa Lauro Villar, *D. Baro* 263 (ANSM); Playa Bagdad, 16 km al N de Playa Lauro Villar, *D. Baro* 284, 466 (ANSM); Dunas Playa Lauro Villar, *A. Brito* 15 (COCA, UAT); Camino a la Playa Lauro Villar, *M.H. Cervera* 108 (COCA); Playa Bagdad, *J.A. Villarreal* 6849 (ANSM); Municipio de San Fernando, Laguna La Carbonera, *R.A. Carranco* 112 (COCA); Municipio de San Fernando, Laguna de San Andrés, Isla de las Garzas, *A. Mora* 5539 (UAT); Municipio de Soto la Marina, Playa La Pesca, *A. Brito* 171 (COCA, UAT); La Pesca, *R.A. Carranco* 239 (COCA); Zona inundable cercana a la desembocadura del Río Soto la Marina, *A. Mora* 5432 (UAT); Municipio de Tampico, 1 km adelante del puente Moralillo, límite de estados Tamaulipas-Veracruz, *R. Diaz* 20 (UAT).

17. *Sporobolus wrightii* Munro ex Scribn., Bull. Torrey Bot. Club 9:103.1882. (**Fig. 9, D & E**). *Sporobolus airoides* var. *wrightii* (Munro ex Scribn.) Gould, Madroño 10:94. 1949. TYPE: U.S.A. ARIZONA: near Pantano, 28 Jun 1881, *C.G. Pringle* 190 (ISOTYPE: US-825415).

Bauchea karwinskyi E. Fourn., Mexic. Pl. 2:87. 1886. TYPE: MÉXICO: Cañon de las Minas and Victoria [Ciudad Victoria], W.F. Karwinsky 1015 (SYNTYPE: P not seen; ISOSYNTYPE: US-998324-fragm!); Tanquecillas, W.F. Karwinsky 1015b (SYNTYPE: P not seen).

Sporobolus altissimus Vasey, Proc. Calif. Acad. Sci., Ser. 2, 2:212. 1889. TYPE: U.S.A. CALIFORNIA. San Diego Co.: 1888, E. Palmer s.n. (HOLOTYPE: US-820159).

Sporobolus altissimus var. *minor* Vasey, Proc. Calif. Acad. Sci., Ser. 2, 2:213. 1889. *Sporobolus airoides* var. *minor* (Vasey) Beetle, Phytologia 54:5. 1983. TYPE: MÉXICO. BAJA CALIFORNIA: San Enrique, 4 May 1889, T.S. Brandegee s.n. (HOLOTYPE: US-998328).

Densely caespitose perennials. Culms 90–250 cm tall, erect, stout, glabrous below the nodes, base rounded, internodes glabrous; base diameter 2–9 mm wide. Leaf sheaths 2/3 to a little longer than the internodes above, glabrous, shiny, rarely with a few long hairs near the summit, these hairs up to 6 mm long; ligules 1–2 mm long; blades 20–70 cm long, 3–10 mm wide, flat rarely involute, glabrous below and scabrous above; margins scabrous roughened. Panicles 20–60 cm long, 12–26 cm wide, open, broadly lanceolate, exserted; primary branches 1.5–10 cm long, ascending to widely spreading 20–70° from the culm axis; secondary branches appressed and floriferous to base; pulvini in axils of primary branches glabrous; pedicels mostly 0.2–0.5 mm long, appressed. Spikelets 1.5–2.5 mm long, crowded and appressed, purplish or greenish; glumes 0.5–2 mm long, lanceolate to ovate, membranous, unequal; lower glumes 0.5–1 mm long, often appearing without a midvein, the apex acute; upper glumes 0.8–2 mm long, the apex acute to obtuse; lemmas 1.2–2.5 mm long, ovate, membranous, glabrous, the apex acute to obtuse; paleas 1.1–2.5 mm long, ovate, membranous, glabrous, the apex acute to obtuse; stamens 3; anthers 1.1–1.3 mm long, yellowish to purplish. Modified caryopses 1–1.4 mm long, ellipsoid, reddish-brown or blackish, striate. $2n = 36$.

Distribution and habitat.—Moist clay flats and rocky slopes near saline habitats associated with *Atriplex*, *Acacia*, *Suaeda*, *Prosopis*, and *Opuntia*; 5–1800 m. Flowering May to December.

Specimens examined. **MÉXICO. Coahuila:** Municipio de Acuña, 19 km by winding road N of El Jardín, 3 km S of Mina El Popo; E slope of Sierra del Carmen S of Cañon del Diablo, M.C. Johnston 11931 (ANSM); Open country between Rancho Santo Domingo and Hacienda Piedra Blanca, F. Wynd 497 (ANSM); Municipio de Cuatrociénegas, Junto a Nuevo Atalaya, *Brigada III 4* (COCA); About 2 mi W of Cuatrociénegas, J.F. Cano 47 (TAES); About 2 mi W of Cuatrociénegas, F.W. Gould 11175 (TAES); Dunas yesosas, cerca de la Poza El Bonito, J.S. Murroquín s.n. (ANSM); 3.2 km NW of Cuatrociénegas on road to Ocampo, Peterson et al. 9992 (ANSM, US); Municipio de Múzquiz, Hacienda La Babia, without collector (MEXU); Municipio de Nadadores, 22 mi NW de Monclova y 7 mi E de Sacramento por la carretera a Cuatrociénegas, Peterson & Valdés-Reyna 8362 (ANSM, US); Municipio de Ocampo, Sierra La Encantada, rancho Puerto del Aire, M.A. Carranza 790 (ANSM); S of Laguna de La Leche, I.M. Johnston 8624 (MEXU); Sierra El Pino, 18.8 km SW of Rancho El Cimarrón, Peterson & Annable 10638 (ANSM, US); Sierra La Encantada, rancho Puerto del Aire, R. Vásquez 239 (ANSM); Municipio de Saltillo, Saltillo, E. Palmer 1 (MEXU); Small suburb of Cerritos, NE of Saltillo, Peterson et al. 10082 (ANSM, US). **Nuevo León:** Municipio de Doctor Arroyo, Doctor Arroyo, J.A. Ochoa 1278 (COCA); Municipio de Galeana, Arroyo Hondo, Hacienda San José de Raices, C.H. Mueller 2292 (MEXU);

Saltillo-Monterrey, J.A. *Ochoa 1209* (COCA). **Tamaulipas:** Municipio de Jaumave, Jaumave, G. *Villegas 232* (COCA); Municipio de Matamoros, Rancho La Aurora, J. *Cantú 35* (COCA); Rancho La Aurora, J. *Cantú 36* (COCA); Municipio de San Fernando, La Carbonera, A. *Mora 5408* (UAT).

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REFERENCES

- ANNABLE, C.R., P.M. PETERSON and J. VALDÉS-REYNA. 1992. Anatomical studies in the *Sporobolus airoides* and *S. cryptandrus* complexes. *Amer. J. Bot.* 79 (abstracts):134.
- BAAIJENS, G.J. and J.F. VELDkamp. 1991. *Sporobolus* (Gramineae) in Malesia. *Blumea* 35: 393–458.
- BOECHAT, S.C. and H.M. LONGHI-WAGNER. 1995. O gênero *Sporobolus* (Poaceae: Chloridoideae) no Brasil. *Acta Bot. Bras.* 9:21–86.
- BOR, N.L. 1960. Poideae-Sporoboleae. In: *The grasses of Burma. Ceylon, India and Pakistan*. Pergamon Press, London. Pp. 622–636.
- BRANDENBURG, D.M. 2003. Notes on free pericarps in grasses (Poaceae). *J. Ky. Acad. Sci.* 64: 114–120.
- CLAYTON, W.D. and S.A. RENVOIZE. 1986. *Genera graminum: grasses of the world*. Her Majesty's Stationary Office, London.
- ESPEJO-SERNA, A., A.R. LÓPEZ-FERRARI, and J. VALDÉS-REYNA. 2000. Poaceae. In: A. Espejo Serna & A.R. López-Ferrari, eds. *Las Monocotyledóneas Mexicanas: una Sinopsis Florística*, Partes IX–XI. Consejo Nacional de la Flora de México, A.C., Universidad Autónoma Metropolitana-Izapa, and Comisión Nacional para el conocimiento y uso de la Biodiversidad, México, D.F. Pp. 10:8–236.
- LAEGAARD, S. and P.M. PETERSON. 2001. 214(2). Gramineae (part 2) subfam. Chloridoideae. In: G. Harling & L. Andersson (eds.), *Flora of Ecuador* no. 68. Botanical Institute, University of Göteborg & Section for Botany, Riksmuseum, Stockholm. Pp. 1–131.
- ORTIZ-DIAZ, J.J. and A., CULHAM. 2000. Phylogenetic relationships of the genus *Sporobolus* (Poaceae: Eragrostideae) based on nuclear ribosomal DNA ITS sequences. In: S.W.L. Jacobs and J. Everett, eds. *Grasses: Systematics and Evolution*. CSIRO Publishing, Collingwood, Australia. Pp. 184–188.

- PETERSON, P.M., J.T. COLUMBUS, and S.J. PENNINGTON. 2005. Classification and biogeography of New World grasses: Chloridoideae. In: J.T. Columbus, ed. Grass Systematics and Evolution (Grasses IV). Rancho Santa Ana Botanic Garden, Claremont, In press.
- PETERSON, P.M., S.L. HATCH, and A.S. WEAKLEY. 2003. *Sporobolus*. In: Barkworth, M.E., K.M. Capels, S. Long, and M.B. Piep, eds. Magnoliophyta: Commelinidae (in part): Poaceae, part 2. Flora of North America North of Mexico, volume 25. Oxford University Press, New York. Pp. 115–139.
- PETERSON, P.M., R.J. SORENG, G. DAVIDSE, T.S. FILGUERIAS, F.O. ZULOAGA and E.J. JUDZIEWICZ. 2001. Catalogue of New World grasses (Poaceae): II. subfamily Chloridoideae. Contr. U.S. Natl. Herb. 41:1–255.
- PETERSON, P.M., R.D. WEBSTER, and J. VALDÉS-REYNA. 1995. Subtribal classification of the New World Eragrostideae (Poaceae: Chloridoideae). Sida 16:529–544.
- PETERSON, P.M., R.D. WEBSTER, and J. VALDÉS-REYNA. 1997. Genera of the New World Eragrostideae (Poaceae: Chloridoideae). Smithsonian Contr. Bot. 87:1–50.
- PILGER, R. 1956. Sporobolinae. In: H. Melchior and E. Werdermann, eds. Gramineae II, Unterfamilien: Micraioideae, Eragrostideae, Oryzoideae, Olyoideae. Die Natürlichen Pflanzenfamilien, second ed. 14:53–67.
- SIMON, B.K. and S.W.L. JACOBS. 1999. Revision of the genus *Sporobolus* (Poaceae: Chloridoideae) in Australia. Austral. Syst. Bot. 12:375–448.
- STAPE, O. 1898. Gramineae. In: W.T. Thiselton-Dyer. Flora Capensis 7:315, 578–589. London.
- VALDÉS-REYNA, J. 1978. *Sporobolus coahuilensis* (Gramineae) a new species from Coahuila, Mexico. Phytologia 41:81–84.
- WATSON, L. and M.J. DALLWITZ. 1992. The grass genera of the World. C.A.B. International, Wallingford, U.K.
- WEAKLEY, A.S. and P.M. PETERSON. 1998. Taxonomy of the *Sporobolus floridanus* complex (Poaceae: Sporobolinae). Sida 18:247–270.
- WIPFF, J.K. and S.D. JONES. 1994. *Sporobolus potosiensis* (Poaceae: Eragrostae): a new rhizomatous species from San Luis Potosi, México, and a new combination in *S. airoides*. Sida 16:163–169.