

**LEPTOLOMA SYRTICOLA (POACEAE: PANICOIDEAE):
A NEW SPECIES FROM TEXAS
AND NEW COMBINATIONS IN LEPTOLOMA AND TRICHACHNE**

JOSEPH K. WIPFF
3512 25th Court SE
Albany, Oregon 97322
jkwipff@gmail.com

ROBERT B. SHAW
Department of Ecosystem Science and Management
Texas A&M University
College Station, Texas 77842
rbshaw@tamu.edu

ABSTRACT

As part of ongoing work on the grasses of Texas, we propose various taxonomic changes and novelties. *Leptoloma* and *Trichachne* are recognized distinct from *Digitaria* s. str. One new species of *Leptoloma* is described — ***Leptoloma syrticola*** Wipff & Shaw, **sp. nov.** Two new combinations are made in *Leptoloma* — ***Leptoloma clarkiae*** (Sánchez-Ken) Wipff & Shaw, **comb. nov.**, and ***Leptoloma pubiflorum*** (Vasey) Wipff & Shaw, **comb. nov.** Two new combinations are made in *Trichachne* — ***Trichachne californica*** (Benth.) Chase var. ***villosissima*** (Henrard) Wipff & Shaw, **comb. nov.**, and ***Trichachne catamarcensis*** (Rúgolo) Wipff & Shaw, **comb. nov.**

As part of ongoing work on the *Guide to Texas Grasses* (Shaw & Wipff, in prep.) and on the grasses of Texas in general, it is necessary to discuss aspects of the taxonomy that we are adopting — changes in rank, generic transfers to allow for the use of generic concepts, new or old, reinstatement of genera and species previously lost to synonymy, and clarification of characters used to delineate difficult genera or species complexes. As Weakley & al. (2017) have stated,

“Any effort to compile a flora (the book) describing the flora (the set of taxa) for a region involves the reassessment of previous taxonomies that have been applied, along with synthesis of new information. ... Each floristic author is faced with reassessing the taxonomic status quo of previous floristic authors, considering the accumulation of new and old monographs and other taxonomic papers, and when alternate taxonomic opinions have been expressed, weighing the evidence supporting the differing points-of-view.”

Chase (1906) recognized three genera currently treated within *Digitaria* Haller s. lato: ***Valota*** Adans., nom. rej. (= *Trichachne* Nees), ***Syntherisma*** Walter (= *Digitaria* Haller, nom. cons.), and ***Leptoloma***, described by her as a new genus. Chase designated *L. cognatum* (Schultes) Chase as the type species and transferred *Panicum divaricatissimum* R. Br., *P. macratenum* Benth., and *P. coenicola* F. Muell. into the genus. Chase (1906) distinguished between the three genera as follows. ***Valota***: upper spikelet lanceolate-acuminate; second glume and sterile lemma clothed with long hairs exceeding the spikelet; caryopsis unequally biconvex. ***Syntherisma***: upper spikelet elliptic; second glume and sterile lemma clothed with short hairs or nearly glabrous; caryopsis planoconvex in section; spikelets disposed in 1-sided racemes which are digitate or racemose. ***Leptoloma***: upper spikelet elliptic; second glume and sterile lemma clothed with short hairs or nearly glabrous; caryopsis planoconvex in section; spikelets upper spikelet elliptic; second glume and sterile lemma clothed with short hairs or nearly glabrous; caryopsis planoconvex in section; spikelets in panicles divergent at maturity. Chase (1911), Nash (1912) and Hitchcock (1920) followed Chase (1906) in recognizing these three genera. Chase (1911) designated *Syntherisma praecox* Walter [= *Digitaria*

sanguinalis (L.) Scop.] as the type for *Syntherisma*. Hitchcock (1920) designated *Valota insularis* (L.) Chase as the type for the genus.

Hitchcock (1927a) recognized *Syntherisma* and *Trichachne* as distinct genera. *Valota*, however, was treated as synonym of *Trichachne* because under the then existing provisions of the Type-Basis Code (old American Code) Article 2 (Hitchcock 1921). *Valota* was not “effectively published” and thus “invalid” for the lack of inclusion of even a single binomial specific name by Adanson. And the earliest effectively published name, *Acicarpa* Raddi (1823) is a later homonym (non Juss., 1803). Green (1935) proposed (Proposal 1178) to retain both *Vallota* (Amaryllidaceae) and *Valota* (Poaceae). But the Special Committee for Phanerogamae and Pteridophyta appointed by the 6th International Congress voted to conserve *Vallota* (Amaryllidaceae) and reject *Valota* (Poaceae), since they considered the two names as orthographic variants of the same name (Green & al. 1940). *Syntherisma* was used for a short period by a few authors (e.g. Nash 1895; Chase 1906, 1911; Nash 1912; Hitchcock 1920, 1927a). Additionally, Hitchcock (1927b) argued for placing the name *Digitaria* on the list of *nomina conservanda*. Rauschert (1969, 1973) also proposed the conservation of *Digitaria*. The proposal of Rauschert (1973) to conserve *Digitaria* was accepted at the 12th International Botanical Congress, Leningrad 1975 (Stafleu & Voss 1975).

Silveus (1933) and Hitchcock (1935, 1951) recognized *Digitaria*, *Leptoloma*, and *Trichachne*. Henrard (1950) treated *Trichachne* as a section and *Leptoloma* as a subgenus of *Digitaria*. Gould (1975) and Pohl (1980) recognized *Digitaria* (including *Trichachne*) and *Leptoloma*. Vega & al. (2009) studied the phylogenetic relationships within the genus and the monophyly of the currently recognized subgeneric taxa based on morphological evidence. Their results were more consistent with the classification of Chase (1906) than with Henrard (1950) in that species of both sect. *Trichachne* (incl. sect. *Trichophorae*) and subg. *Leptoloma* formed well supported clades outside the core *Digitaria* clade. Vega & al. (2009) treated the two well defined clades of *Leptoloma* and *Trichachne* + *Trichophorae* as infrageneric taxa within *Digitaria* s. lato. Lo Medico & al. (2017) provided molecular and morphological evidence for the taxonomic delimitation of *Digitaria* sect. *Trichachne* (incl. *Trichophorae*). The morphological and molecular data, in our opinion, support the phylogenetic independence of *Leptoloma* and *Trichachne* from *Digitaria*. The follow name combinations are thus required.

Leptoloma clarkiae (Sánchez-Ken) Wipff & Shaw, **comb. nov.** *Digitaria clarkiae* Sánchez-Ken, Phytotaxa 321: 126 (Figs. 1, 2). 2017. **TYPE: MÉXICO. Puebla:** Mpio. Tilapa, 2 km del entronque con la carretera Cuautla-Izúcar por la carretera a Atlapanala, aprox. 5 km W de Izúcar, [18°35' N, 98°33' W], 320 m, 4 Sep 1995, L. Aragón 362 (holotype: MEXU; isotype MEXU).

Leptoloma pubiflorum (Vasey) Wipff & Shaw, **comb. nov.** *Panicum autumnale* Bosc ex Spreng. var. *pubiflorum* Vasey, Bull. Bot. Div. Dept. Agric. (Washington, D.C.) 8: 35. 1889. *Digitaria cognata* (Schult.) Pilg. subsp. *pubiflora* (Vasey) Wipff, Sida 13: 120. 1988. *Digitaria pubiflora* (Vasey) Wipff, Sida 19: 923. 2001. **LECTOTYPE** (Wipff & Hatch, Syst. Bot. 19: 625. 1994): **Texas.** El Paso Co.: Mts. near Paso del Norte, May 1881, G.R. Vasey s.n. (US 928188!; isolectotype: US 744304!).

Trichachne californica var. ***villosissima*** (Henrard) Wipff & Shaw, **comb. nov.** *Digitaria californica* (Benth.) Henrard var. *villosissima* Henrard, Monogr. Digitaria, 109. 1950. **TYPE: Aruba.** Koolwijk, 1885, *Suringar* s.n. (holotype: L-0819940 image! (908, 92–2468); isotype: US-927379 image!).

Trichachne catamarcensis (Rúgolo) Wipff & Shaw, **comb. nov.** *Digitaria catamarcensis* Rúgolo, Hickenia 1: 22. 1976. **TYPE: Argentina. Catamarca.** Capayán, Miraflores. 12 Feb 1941, *Parodi 14356* (holotype: SI!; isotypes: BAA–4190 image!, LP image!).

Key to genera

1. Inflorescences an open panicle (as long as wide); spikelets solitary (or paired or three's) on long or short pedicels; pedicels mostly 2-several times as long as the spikelets, mostly spreading (sometimes distally appressed on branches); the entire panicle usually detaching at maturity **Leptoloma**

1. Inflorescences of digitate or sub-digitate primary branches, or primary branches alternately arranged along a central axis; with (1) 2-3 (or more) spikelets per node on primary branches, arranged in two rows along one side of the branch; spikelets appressed on branches; the entire inflorescence does not detach at maturity.

2. Inflorescences of digitate or sub-digitate primary branches, or primary branches alternately arranged along a central axis; no conspicuous elongated rachilla internodes, upper floret not stipitate; upper lemmas pale yellow, tan, gray, purple-tinged, purple, brown or dark brown; spikelets glabrous to variously pubescent; hairs various, smooth or verrucose walled, apex acute or dilated **Digitaria**

2. Inflorescences of primary branches alternately arranged along a central axis; all the rachilla internodes more or less conspicuously elongated, hence upper florets stipitate; upper lemmas dark brown at maturity; spikelets densely short to long pubescent, hairs generally exceeding the length of the spikelet and hairs spreading at maturity; hairs smoothed walled, apex acute **Trichachne**

Digitaria Haller, *nom. cons.*

Plants perennial or annual or indefinite (in tropics). Inflorescence a panicle of primary branches that are digitate or sub-digitate or alternately arranged on a central axis. The entire inflorescence does not detach at maturity. Branches with (1) 2-3 (or more) spikelets per node on primary branches; spikelets in 2 rows along one side of the branch, spikelets appressed on primary branches. Spikelets glabrous to variously pubescent; hairs various, smooth or verrucose walled, apex acute or dilated. Spikelets without elongated rachilla internodes. Upper florets not stipitate; lanceolate to elliptic, apex acute; upper lemmas pale yellow, tan, gray, purple-tinged, purple, brown or dark brown.

Trichachne Nees

Perennial, taxa native to the New World, with knotty or spreading rhizomes. Inflorescence of primary branches alternate along a central axis; primary branches unbranched or with secondary branches. The entire inflorescence does not detach at maturity. Spikelets in pairs, one sessile and the other pedicellate; spikelets in 2 rows along one side of the branch, appressed on the branch. Indumentum of unicellular hairs, hairs smooth walled, apex acute, whitish-silvery, sometimes whitish with purplish tints or ochraceous, abundant in upper glume and lower lemma (scarce in *T. laxa*), generally exceeding the length of the spikelet and spreading at maturity (shorter in *T. hitchcockii*). Spikelets with all the rachilla internodes more or less elongated, the upper florets stipitate. Upper florets lanceolate to narrowly lanceolate with acuminate apices; upper lemmas dark brown at maturity (Lo Medico & al. 2017).

Leptoloma Chase

Plants perennial or annual; densely or loosely caespitose, with or without rhizomes. Inflorescence an open panicle, the entire inflorescence disarticulating [not in *L. clarkiae* (Sánchez-Ken, 2017)] at maturity. Spikelets solitary (or paired or three's), on usually long pedicels; pedicels mostly 2-several times as long as the spikelets, mostly spreading (sometimes distally appressed on branches). Spikelets glabrous, puberulent, or densely pubescent; hairs smooth walled, apex acute. Spikelets with elongated rachilla internodes between the two glumes (Vega & al. 2009), upper florets not stipitate; upper floret elliptic to narrowly elliptic, apex acute; dark brown or pale green to yellowish (*L. clarkiae*) at maturity.

A new species of *Leptoloma*

Our studies have brought to light a new species of *Leptoloma*. This entity previously has been identified as *L. pubiflorum* but the latter is found in dry, rocky, heavy or sandy soils in Texas, Oklahoma, Colorado, New Mexico, Arizona, and México (Wipff & Hatch 1994), is densely caespitose, and does not have rhizomes. The ‘*syrticola*’ taxon is loosely caespitose or tufted, rhizomatous, and is only found on stabilized and unstabilized sands and sandy soils throughout Texas and probably into Oklahoma and New Mexico.

The geographic distribution of *Leptoloma syrticola* lies completely within that of *L. pubiflorum* and it might be suspected that the formation of rhizomes is a phenotypic trait elicited by a sandy habitat. Initiation and development of rhizomes, however, are directed by complex gene mechanisms (Hu & al. 2003, 2011; Yun & al. 2014; Yoshida & al. 2016) and the morphological architecture of axillary bud formation on underground stems is different from that on aerial shoots. Other species pairs of rhizomatous/non-rhizomatous grasses are generally recognized and accepted (e.g. *Andropogon gerardii* Vitman & *A. hallii* Hack.; *Sporobolus compositus* (Poir.) Merr. & *S. macer* (Trin.) Hitchc.; *Sorghum halepense* (L.) Pers. & *S. bicolor* (L.) Moench; *Schizachyrium scoparium* (Michx.) Nash & *S. stoloniferum* Nash — though sometimes treated at infraspecific ranks by different authors, they are still recognized as distinct taxa.

LEPTOLOMA SYRTICOLA Wipff & Shaw, **sp. nov.** (Figs. 1, 2). **TYPE: TEXAS.** Winkler Co.: 9.5 mi S on Hwy 18 from its intersection with Hwy 115 in Kermit then 16.9 mi on County Rd 404 from its intersection with Hwy 18, along roadside near fence line in Jalmar loamy fine sand, 16 Jun 1987, *J.K. Wipff 308* (holotype: TEX; isotypes: BRIT, TAES, US).

Similar to *Leptoloma pubiflorum* but differing in its extensive rhizome development (rhizomes to 60 cm) and loosely caespitose or loosely tufted habit.

Perennial, loosely caespitose or tufted; with long rhizomes present, **rhizomes** to 60 cm long; rhizome internodes 1–2 cm long, glabrous or pubescent. **Culms** 20–70 cm erect; nodes pubescent or glabrous. **Leaves** glabrous or pubescent; sheaths glabrous or pubescent; auricles erect, usually as long as the ligule; **ligules** 1–2 mm long, membranous; **blades** 1.3–7 cm long, 1.4–5 mm wide, glabrous or pubescent. **Panicles** open, the entire panicle detaches at maturity, 10–20 cm long, 11–25 cm wide; branches divergent, lower branches often with sterile pedicels at base; **pedicels** 0.5–3 cm long, divergent. **Spikelets** solitary, 2.2–3.3 mm long, narrowly elliptic; **lower glumes** 0.1–0.4 mm; **upper glumes** 1.9–3 mm, 3-veined, densely pubescent between the veins. **Lower floret neuter**; lower lemmas 2.0–3.2 mm, as long as spikelets; 5-veined, veins equidistant, densely pubescent between the veins; lower palea 0.3–1 mm, veinless membrane. **Upper floret perfect**; upper lemma 2.1–3.1 mm long, indistinctly 3-veined, glabrous, dark brown at maturity, cartilaginous, margins membranous, apex narrowly acute; upper palea 1.9–2.6 mm, 2-veined, similar to upper lemma in texture. **Anthers** 0.3–0.5 mm long. **Caryopses** ellipsoidal, slightly flattened, 1.3–1.6 mm long, 0.5–0.6 mm wide. **Chromosome number** $2n=36, 72$.

Sands (stabilized and unstabilized) and loose sandy soils in Texas (Fig 3) and expected in New Mexico. Flowering April–November.

The epithet “*syrticola*” refers to the habitat of the species on deep, unconsolidated sands and on sandy soils.

Additional collections examined. TEXAS. Andrews Co.: hardish soil, 7 Jul 1943, *Tharp 43A76* (LL). Aransas Co.: Aransas Wildlife Refuge, sandy scrubland, 4 Apr 1957, *Correll 15571 & Schweinfurth* (LL). Atascosa Co.: 1 mi N of North Pleasanton, loose deep reddish sand, Sparta outcrop, few live oaks, much sparse mesquite over predominately grassland, 8 Oct 1954, *Tharp & Johnston 541740* (TEX). Bailey Co.: 0.5 mi N on Hwy 84 from Muleshoe, then 19.1 mi W on Hwy



Figure 1. *Leptoloma syriticola* from the type collection (Wipff 308). Photo © Annette R. Wipff, May 2018.



Figure 2. *Leptoloma syrticola* from the type collection (Wipff 308). Photo © Annette R. Wipff, May 2018.

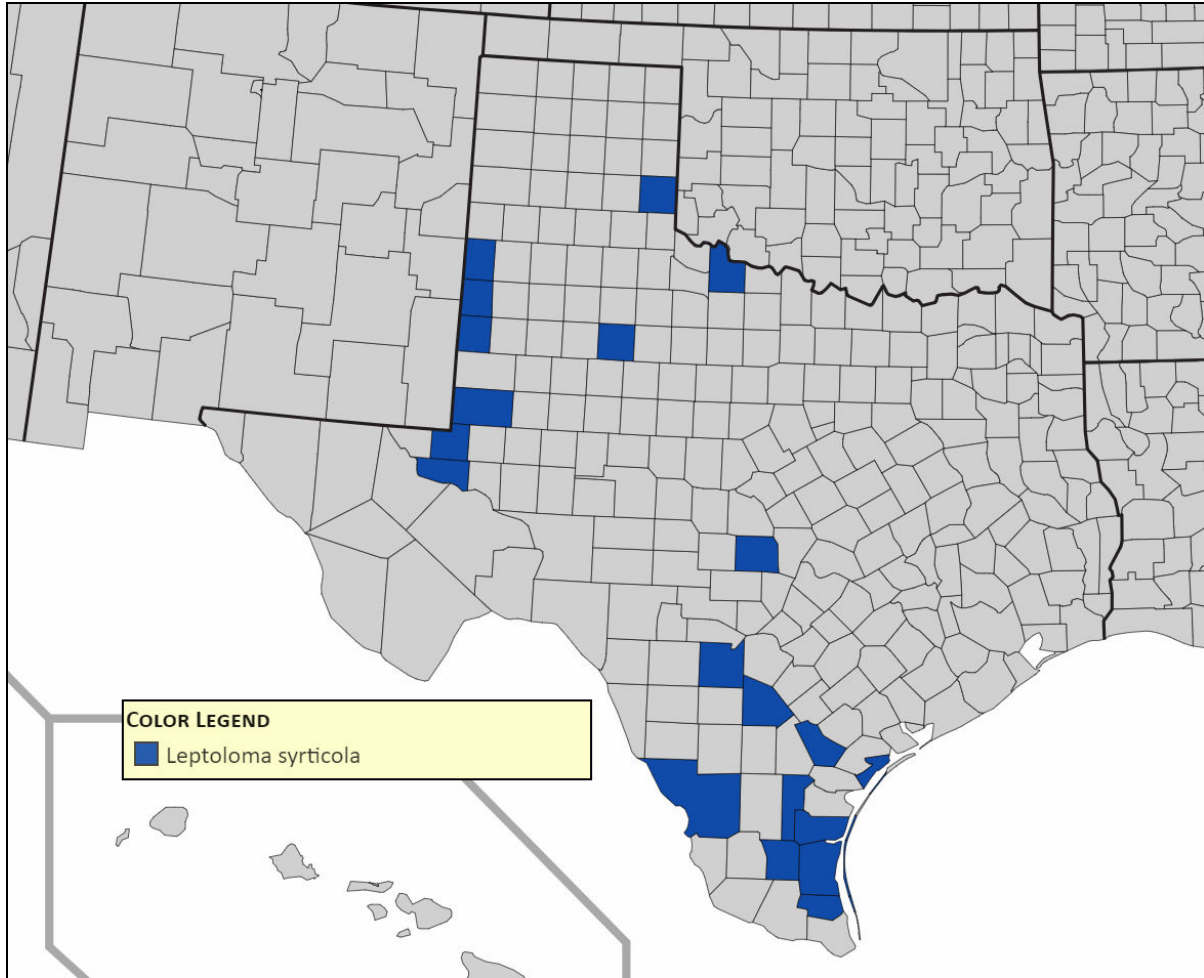


Figure 3. County distribution of *Leptoloma syrticola* in Texas. It probably also occurs in New Mexico and Oklahoma. Map made from program by Michael T. Lee (2012).

1760 from jct with Hwy 84, then 3.5 mi S on unnamed dirt road along Texas/New Mexico state line, 50 m E of road, Tivoli fine sand series (sand 15+ ft deep), very few plants flowering, 15 Jun 1987, *Wipff 301* (jkw, TEX). Bee Co.: US 181 near fence, 1 1/2 mi N of intersection US 181-FM 797, Jun 1966, *Brooks 71* (TEX). Brooks Co.: 10 mi N of Encino, near United Carbon Black Plant, loose sandy prairie, 16 Apr 1954, *Johnston 54496* (TEX). Cochran Co.: 6.4 mi W on Hwy 1585 from its jct with Hwy 214, 5.3 mi S on unnamed dirt rd., cross cattle guard and turn right and travel 0.25 mi on left side of road about 25 m into pasture, deep sand, 15 Jun 1987, *Wipff 302* (jkw, TEX); 2.2 mi W on Hwy 301 from its jct with Hwy 1780, 6.7 mi S on dirt road from its jct with Hwy 301 (Hwy 301 terminates at dirt road), 0.25 mi on main road into Beasley Ranch, 200 m E of road, Patricia Series, fine sand to a depth of 22 inches, 15 Jun 1987, *Wipff 303* (jkw, TEX); 2.7 mi S on Hwy 1780 from its jct with Hwy 301, 50 m W of hwy in pasture, Amarillo fine sandy loam, *Wipff 304* (jkw, TEX). Collingsworth Co.: stabilized dunes, 2-3 mi S of Salt Fork of Red River, 15 Sep 1950, *Tharp 50-L 1-6* (TEX). Jim Wells Co.: brushy prairie 12 mi N of Premont on sandy loam, 24 Nov 1954, *Johnston 542147* (TEX). Kenedy Co.: about 6 mi S of Sarita, among live oaks, side of hwy, white loose sands, 29 Apr 1949, *Tharp & York 50-L-41* (TEX-2 sheets); El Toro Island in Laguna Madre and adjacent coast, unstabilized dunes, 23 Jun 1949, *Tharp 50-L-26-40* (TEX); Laguna Madre, El Toro Island, 28 May 1948, *Tharp 48308* (TEX); below Sarita, hwy right-of-way, dune sand, 4 Dec 1948, *Tharp & al. 48-141* (TEX); 6.3 mi S of Armstrong, loose sand beneath live oaks, 13 Mar 1953, *Johnston 54290* (TEX); 2 mi E of headquarters, Norias Division of King Ranch, beneath mesquite and granjeno, sandy soil, 5 Jul 1954, *Johnston 541047* (TEX); Saltillo Pasture, Norias Division

of King Ranch, loose sand prairie on flat between live oak-covered sandhills, 12 Mar 1954, *Johnston 54218* (TEX); 8 1/2 mi S of Sarita, off US Hwy 77, on sand dunes, sand-binding stoloniferous perennial, 24 Apr 1949, *Lundell 14964* (LL); King Ranch, Norias Division, on sandy plain growing in shade of mesquite, stoloniferous perennial, 27 Apr 1949, *Lundell 14980* (LL). Kent Co.: 1.5 mi SW of Jayton, O.H. Hamlin Ranch, in sandy oak shinnery, 24 Jun 1944, *Lundell 13052* (LL). Kleberg Co.: 2.8 mi S of Bishop, near King Ranch loading siding, along roadside, 30 Apr 1949, *Tharp & York 49268* (TEX). Llano Co.: 9.6 mi SW on FM 2323 from its intersection with Hwy 16, then S on unnamed paved road for ca. 100 m on E side of road in sandy soil in granite outcrop, 26 Sep 1987, *Wipff 558* (jkw, TEX). Medina Co.: 2 mi SW of Devine, in deep sandy soil of Carrizo formation, extensive rhizome system, 1 May 1954, *Johnston, Tharp & Turner 3412* (TEX); 2 mi SW of Devine, in deep sandy soil of Carrizo formation, extensive rhizome system, 1 May 1954, *Johnston, Tharp & Turner 3404* (TEX). Ward Co.: among partially stabilized coppice dunes S of Shin Oak Picnic Area, E portion of S half of Monahans Sandhills State Park, Cowden Place Quadrangle, rare in loose sand among partially stabilized coppice dunes, 20 Jun 1989, *Carr 9923* (TEX); between Imperial and Monahans, elev. 2700 ft, frequent perennial in deep sand, 30 Aug 1955, *Warnock 13148* (TEX). Webb Co.: at roadside on Hwy 83, 13 mi NW of Webb, in red sand, 16 Jul 1957, *Correll & Johnston 18120* (LL). Wilbarger Co.: W of hwy, S of Red River on Round Timbers Ranch, dunes, 14 Sep 1950, *Tharp 50-L-9-14* (TEX); sandhills about 5 mi W of Odell, in large clumps, 5 Oct 1964, *Correll 30190* (LL). Willacy Co.: Sauz Ranch, sandy loam, 23 Nov 1953, *Johnston & Davis 5319.135* (TEX). Winkler Co.: 9.5 mi S on Hwy 18 from its jct with Hwy 115 in Kermit, then E (left) 6.1 mi on County Rd 404, along roadside near fence line, Penwell fine sand, sand 9+ ft deep, 16 Jun 1987, *Wipff 305* (jkw, TEX); 9.5 mi S on Hwy 18 from its intersection with Hwy 115 in Kermit; then 16.9 mi on County Rd 404 from its intersection with Hwy 18, along roadside near fence line, Jalmar loamy fine sand. 16 Jun 1987, *Wipff 308* (BRIT, jkw, TAES, TEX); 9.5 mi S on Hwy 18 from its intersection with Hwy 115 in Kermit, then 12.9 mi E on County Rd 404 from its intersection with Hwy 18, along roadside near fence line, fine sand to a depth of 20 in. then a gypsum layer 12 inches thick, then 6.3+ ft of fine sand, 16 Jun 1987, *Wipff 310* (jkw, TEX). Yoakum Co.: about 12 mi SW of Plains, grassy brushland in sandy soil, in clumps, 29 Oct 1962, *Correll 26500* (LL).

Key to the species of *Leptoloma* in Texas

1. Spikelets 3.5–4.6 mm long; upper glumes 5–7 veined; anthers more than 1 mm long; coastal dunes ***Leptoloma arenicola***
1. Spikelets 2.2–3.3 mm long; upper glumes 3(–5)-veined; anthers less than 1 mm long; various habitats.
 2. Lower lemmas 7-veined; outer veins not equally spaced; spikelets glabrous to short pubescent ***Leptoloma cognatum***
 2. Lower lemmas 5-veined; veins equally spaced; spikelets densely pubescent.
 3. Plants without rhizomes; densely caespitose ***Leptoloma pubiflorum***
 3. Plants with long rhizomes; loosely caespitose or loosely tufted ***Leptoloma syrticola***

ACKNOWLEDGMENTS

We thank George Yatskievych, TEX-LL Curator, for access to the collection. We are grateful for the reviews of the manuscript by Kanchi Gandhi, David Rosen, and Guy Nesom. We also thank Annette R. Wipff for preparing the photographs of the type collection.

LITERATURE CITED

- Chase, A. 1906. Notes on genera of Paniceae. I. Proc. Biol. Soc. Washington 1: 183–192.
 Chase, A. 1911. Notes on genera of Paniceae. IV. Proc. Biol. Soc. Washington 1: 103–160.
 Gould, F.W. 1975. The Grasses of Texas. Published for the Texas Agricultural Experiment Station by Texas A&M University Press, College Station.

- Green, M.L. 1935. Statement of cases for and against conservation – Letters Q-Z. *In* A. Rehder, C.A. Weatherby, R. Mansfield, and M.L. Green. XXXVI – Conservation of later genera homonyms. *Bull. Misc. Inform., Kew*: 341–544.
- Green, M.L. & al. 1940. XII – Additional nomina generica conservanda (Pteridophyta and Phanerogamae). *Bull. Misc. Inform., Kew*, 81–134.
- Henrard, J.T. 1950. Monograph of the genus *Digitaria*. Univ. Pers Leiden, Leiden.
- Hitchcock, A.S. 1920. The Genera of Grasses of the United States, With Special Reference to the Economic Species. U.S. Dept. of Agriculture, Bulletin 772, Washington, D.C.
- Hitchcock, A.S. 1921. Report of the Committee on Nomenclature of the Botanical Society of America: A type-basis code of botanical nomenclature principles. *Science* 53: 312–314.
- Hitchcock, A.S. 1927a. The grasses of Ecuador, Peru, and Bolivia. *Contr. U.S. Natl. Herb.* 24: 286–556.
- Hitchcock, A.S. 1927b. The validity of the grass genus *Digitaria*. *Rhodora* 29: 114–116.
- Hitchcock, A.S. 1935. Manual of the Grasses of the United States. USDA Misc. Publ. 200. Government Printing Office, Washington, D.C.
- Hitchcock, A.S. 1951. Manual of the Grasses of the United States, 2nd ed. Revised by A. Chase. USDA Misc. Publ. 200. Government Printing Office, Washington, D.C.
- Hu, F.Y., D.Y. Tao, E. Sacks, B.Y. Fu, P. Xu, J. Li, Y. Yang, K. McNally, G.S. Khush, A.H. Paterson, and Z.-K. Li. 2003. Convergent evolution of perenniality in rice and sorghum. *Proc. Natl. Acad. Sci.* 100: 4050–4054.
- Hu, F., D. Wang, X. Zhao, T. Zhang, H. Sun, L. Zhu, F. Zhang, L. Li, Q. Li, D. Tao, B. Fu and Z. Li. 2011. Identification of rhizome-specific genes by genome-wide differential expression Analysis in *Oryza longistaminata*. *BMC Pl. Biol.* 11:18 (pp 1–14).
- Lee, M.T. 2012. Custom distribution maps for US counties. Version 1.13 October 18, 2012. Herbarium, Univ. of North Carolina at Chapel Hill. <<http://www.herbarium.unc.edu/atlasMaps/about.html>>
- Lo Medico, J.M., D.S. Tosto, G.H. Rua, Z E. Rúgolo de Agrasar, M.A. Scataglini, and A.S. Vega. 2017. Phylogeny of *Digitaria* sections *Trichachne* and *Trichophorae* (Poaceae, Panicoideae, Paniceae): A morphological and molecular analysis. *Syst. Bot.* 42: 37–53.
- Nash, G.V. 1895. New or noteworthy American grasses. I. *Bull. Torr. Bot. Club* 22: 419–424.
- Nash, G.V. 1912. Poaceae, part 2. Pp. 99–196 *in* North American Flora, Vol. 17. New York Botanical Garden, Bronx.
- Pohl, R.W. 1980. Family #15, Gramineae. Field Museum of Natural History, Chicago.
- Rauschert, S. 1969. Zur Nomenklatur der Farn- und Blütenpflanzen Deutschlands (II). *Feddes Repert.* 79: 904.
- Rauschert, S. 1973. (351) Proposal to conserve the generic name *Digitaria* Rich. in Pers. (1805) vs. *Digitaria* Adans. (1763) and *Syntherisma* Walter (1788) (Gramineae). *Taxon* 22: 159–161.
- Sánchez-Ken, J.G. 2017. *Digitaria clarkiae* (Paniceae, Panicoideae, Poaceae), a new species with a paniculate synflorescence, and the first record of *D. costaricensis* from México. *Phytotaxa* 321: 125–138.
- Shaw, R.B. and J.K. Wipff. *In prep.* Guide to Texas Grasses, 2nd Edition.
- Silveus, W.A. 1933. Texas Grasses; Classification and Description of Grasses; Descriptive Systematic Agrostology. Published by the author. San Antonio, Texas.
- Stafleu, F.A. and E.G. Voss. 1975. Synopsis of proposals on botanical nomenclature, Leningrad 1975. *Taxon* 24: 201–251.
- Vega, A.S., G.H. Rua, L.T. Fabbri, and Z E. Rúgolo de Agrasar. 2009. A morphology-based cladistic analysis of *Digitaria* (Poaceae, Panicoideae, Paniceae). *Syst. Bot.* 34: 312–323.
- Weakley, A.S., D.B. Poindexter, R.J. LeBlond, B.A. Sorrie, C.H. Karlsson, P.J. Williams, E.L. Bridges, S.L. Orzell, B.R. Keener, A. Weeks, R.D. Noyes, M. Flores-Cruz, J.T. Diggs, G.D. Gann, & A.J. Floden. 2017. New combinations, rank changes, and nomenclatural and

- taxonomic comments in the vascular flora of the southeastern United States. II. J. Bot. Res. Inst. Texas 11: 291–325.
- Wipff, J.K. and S.L. Hatch. 1994. A systematic study of *Digitaria* sect. *Pennatae* (Poaceae: Paniceae) in the New World. Syst. Bot. 19: 613–627.
- Yoshida, A., Y. Terada, T. Toriba, K. Kose, M. Ashikari, and J. Kyojuka. 2016. Analysis of rhizome development in *Oryza longistaminata*, a wild rice species. Pl. Cell Physiol. 57: 2213–2220.
- Yun, L., S.R. Larson, I.W. Mott, K.B. Jensen, and J.E. Staub. 2014. Genetic control of rhizomes and genomic localization of a major-effect growth habit QTL in perennial wildrye. Molec. Genet. Genomics 289 :383–397.