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A REVISION OF *TRisetum*,
PEYRITSCHIA, AND
SPHENOPHALIS (POACEAE:
POOIDEAE: AVENINAE) IN
MEXICO AND CENTRAL
AMERICA¹

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ABSTRACT

A taxonomic treatment of *Trisetum*, *Peyritschia*, and *Sphenophalis* for Mexico and Central America is given. In Mexico and Central America four species of *Peyritschia*, two species of *Sphenophalis*, and 17 species of *Trisetum* s. str. are recognized. *Peyritschia deyeuxioides* and *P. pringlei* range from Mexico to Ecuador. *P. kaelerioides* is found in southern Mexico to Guatemala, and *P. humilis* is endemic to Mexico. *Sphenophalis obtusata* ranges from Canada to the U.S.A. and Mexico, whereas *S. interrupta* is found in the southwestern U.S.A. and Baja California, Mexico. Mexico has the largest number of *Trisetum* species at 15, and nine of these are endemic. Five species of *Trisetum* are found in Guatemala, three in Costa Rica and Panama, and a single species is found in Honduras and the Dominican Republic. A new subgenus *Deschampsiaidea* (Louis-Marie) Finot in *Trisetum* is proposed. Four new species of *Trisetum* from Mexico are described and illustrated: *T. durangense* Finot & P. M. Peterson, *T. martha-gonzaleziae* P. M. Peterson & Finot, and *T. spellenbergii* Soreng, Finot & P. M. Peterson (all in subg. *Deschampsiaidea*); and *T. ligulatum* Finot & Zuloaga (in subg. *Trisetum*, sect. *Trisetaera*). Keys for the genera, subgenera, sections, and species of *Trisetum*, *Peyritschia*, and *Sphenophalis* that occur in Mexico and Central America are given. The names *Trisetum gracile* E. Fourn. and *Trisetum* subsect. *Deschampsiaidea* Louis-Marie are lectotypified.

Key words: Aveninae, Gramineae, *Peyritschia*, Poaceae, Pooideae, *Sphenophalis*, *Trisetum*.

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RESUMEN

Se presenta un tratamiento taxonómico de los géneros *Trisetum*, *Peyritschia* y *Sphenopholis* para México y América Central. Cuatro especies de *Peyritschia*, dos especies de *Sphenopholis* y 17 especies de *Trisetum* s. str. fueron reconocidas en México y Centroamérica. *Peyritschia deyeuxiaoides* y *P. pringlei* habitan desde México a Ecuador, *P. koele-rioides* se encuentra desde el sur de México hasta Guatemala y *P. humilis* es endémica de México. *Sphenopholis abtusata* se encuentra en Canadá, EE. UU. y México, mientras *S. interrupta* habita el sudoeste de EE. UU. y Baja California, México. México posee el mayor número de especies de *Trisetum*, 15 especies, nueve de ellas endémicas. Cinco especies de *Trisetum* se encuentran en Guatemala, tres en Costa Rica y Panamá y sólo una en Honduras y República Dominicana. Se propone un nuevo subgénero *Deschampsiaidea* (Louis-Marie) Finot en *Trisetum*. Cuatro nuevas especies de *Trisetum* de México son descritas e ilustradas: *T. durangense* Finot & P. M. Peterson, *T. martha-gonzaleziae* P. M. Peterson & Finot y *T. spellenbergii* Soreng, Finot & P. M. Peterson (todas en subg. *Deschampsiaidea*); y *T. ligulatum* Finot & Zuloaga (en subg. *Trisetum*, sect. *Trisetiæra*). Se presentan claves para los géneros, subgéneros, secciones y especies de *Trisetum*, *Peyritschia* y *Sphenopholis* presentes en México y América Central. Los nombres *Trisetum gracile* E. Fourn. y *Trisetum* subsect. *Deschampsiaidea* Louis-Marie fueron lectotipificados.

Trisetum Pers. comprises about 70 species in temperate regions of Europe, Asia, America, Australia, and New Zealand (Louis-Marie, 1928–1929; Hitchcock, 1939; Swallen, 1948; Tsvelev, 1970, 1983; Jonsell, 1980; Veldkamp & Van der Have, 1983; Clayton & Renvoize, 1986; Pohl & Davidse, 1994, 2002; Edgar, 1998; Soreng et al., 2003). A general account of the American taxa of *Trisetum* was published by Louis-Marie (1928–1929), in which he recognized a total of 60 species. Hitchcock (1939) recognized 19 species of *Trisetum* in North America, including Mexico. There are 38 species of *Trisetum* in North, Central, and South America (Finot, 2003b). With the noteworthy exception of the cosmopolitan *T. spicatum* (L.) K. Richt., most species of *Trisetum* have a rather restricted geographical distribution. The majority of the species are from Mexico, where 9 are endemic, and only *T. irazuense* (Kuntze) Hitchc. extends from Mexico and Central America to Ecuador in South America.

The systematic relationships of the Mexican and Central American species of *Trisetum* are not well known, in part due to the close affinity with *Peyritschia* E. Fourn. and *Sphenopholis* Scribn. Fournier (1886) described the genus *Peyritschia* with one species from Mexico and Guatemala, *P. koele-rioides* (Peyr.) E. Fourn. Hitchcock (1939) also recognized *Peyritschia* in his treatment of the North American flora. Koch (1979) transferred to *Peyritschia* a second species from Mexico, Costa Rica, and Guatemala, *Deschampsia pringlei* Scribn. [= *P. pringlei* (Scribn.) S. D. Koch]. Hernández-Torres and Koch (1987) did not recognize *Peyritschia* and placed both of these species in *Trisetum*. The systematic position of these two species in *Trisetum* has not gained universal acceptance, although some recent treatments recognize *Peyritschia* (Clayton &

Renvoize, 1986; Watson & Dallwitz, 1992; Finot, 2003a). One further species, *Peyritschia conferto* (Pilg.) Finot, occurs in Venezuela, Ecuador, and Bolivia. *Peyritschia* differs from *Trisetum* in having 1-nerved glumes, lemmas with bilobed apices that are awnless, mucronate, or with a well-developed awn borne near the base, paleas that are tightly enclosed by the margins of the lemma, and florets with only two stamens. *Trisetum* has a first glume 1- to 3-nerved, a second glume 3- to 5-nerved, lemma apices with 2 to 4 short awns with the central awn inserted above the middle of the lemma, paleas that are not tightly enclosed by the lemma (i.e., gaping), and florets with 3 stamens.

Sphenopholis was described by Scribner (1906) to include seven species and seven subspecies. He characterized the genus as having spikelets that disarticulate below the glumes and between the florets, second glumes that are usually broadly obovate, and lemmas with an entire or 2-toothed apex that is awnless or awned just below the apex. In contrast, *Trisetum* has spikelets that disarticulate above the glumes and between the florets, second glumes that are lanceolate to ovate, and lemmas with a biaristulate to bidentate apex that is awned on the upper third. On the basis of these characters, Scribner (1906) transferred three species of *Trisetum* to the new genus *Sphenopholis*: *S. interrupta* (Buckley) Scribn., *S. hallii* (Scribn.) Scribn., and *S. palustris* (Michx.) Scribn. Hitchcock (1939) and Hitchcock and Chase (1951) retained these three species in *Trisetum*, although Hitchcock (1915) earlier placed *S. palustris* as a synonym of a fourth species, *S. pensylvanica* (L.) Hitchc. Erdman (1965) also recognized *S. pensylvanica* but did not include *S. interrupta*, although he recognized that this species resembles *Sphenopholis* in spikelet disarticulation.

Stuedel (1854), who recognized four species, made one of the earliest enumerations of *Trisetum* in Mexico: *T. deyeuxioides* (Kunth) Kunth, *T. elongatum* (Kunth) Kunth, *T. toluicense* (Kunth) Kunth, and *T. viride* (Kunth) Kunth. An important contribution to the knowledge of Mexican species was made by Fournier (1886), who described six new species: *T. gracile* E. Fourn., *T. nivosum* E. Fourn., *T. interruptum* E. Fourn., *T. paniculatum* E. Fourn., *T. bambusiforme* E. Fourn., and *T. virletii* E. Fourn. On the basis of Pringle's collections from Mexico, Scribner in Beal's (1896) *Grosses of North America* described three new taxa: *T. deyeuxioides* var. *pubescens* Scribn. ex Beal, *T. filifolium* Scribn. ex Beal var. *filifolium*, and *T. filifolium* var. *aristatum* Scribn. ex Beal. In a general synopsis of Mexican grasses, Hitchcock (1913) described *T. palmeri* Hitchc. and mentioned nine other species. By the middle of the 20th century, most Mexican species of *Trisetum* had been described. More recently, Morden and Valdés-Reyna (1983) described a new species, *T. curvisetum* Morden & Valdés-Reyna, endemic to Nuevo León, Mexico.

Hernández-Torres and Koch (1988) have published the most recent revisionary study for all Mexican species of *Trisetum*, and they recognized 11 species: *T. altijugum* (E. Fourn.) Scribn., *T. curvisetum*, *T. deyeuxioides*, *T. filifolium*, *T. interruptum*, *T. irazuense*, *T. kochianum* Hern. Torres, *T. pringlei*, *T. spicatum*, *T. viride*, and *T. virletii*. Espejo-Serna et al. (2000), as a part of the floristic list of Mexican monocotyledons, mentioned for southern Mexico the presence of *T. angustum* Swallen and *T. pinetorum* Swallen, both originally described from Guatemala. Other recent treatments of the genus are those of McVaugh (1983) for Nueva Galicia, Herrera-Arrieta (2001) for Durango, and Herrera and Rzedowski (2001) for Valle de Mexico.

In Central America, Pohl (1980) in *Flora Costaricensis* mentioned four species: *Trisetum deyeuxioides*, found also from Mexico to Central and South America, *T. irazuense*, *T. pringlei* from Mexico to Central America, and *T. tonduzii* Hitchc. known only from Costa Rica and Panama. McVaugh (1983) and Hernández-Torres and Koch (1988) cited *T. viride* from Guatemala, and Hernández-Torres and Koch (1988) cited *T. kochianum* from Guatemala and Costa Rica.

The only subgeneric treatment of *Trisetum* in the Americas was done by Louis-Marie (1928–1929), who prepared a key to the subgenera, sections, and subsections. His *Trisetum* subg. *Heterolytrum* Louis-Marie sect. *Anaulacoa* Louis-Marie included: *T. filifolium*, *T. interruptum* (as *T. disjunctum* Louis-Marie), *T. irazuense*, *T. rosei* Scribn. & Merr., *T.*

spicatum, *T. viride* (as *T. paniculatum* E. Fourn.), and *T. virletii*. In subsection *Sphenophoidea* Louis-Marie he placed *Sphenopholis interrupta* (as *T. interruptum*); in subsection *Deschampsioidea* Louis-Marie he placed *T. palmeri*; in subsection *Grappheporum* (Desv.) Louis-Marie he placed *Peyritschia koelerioides* [as *T. altijugum* (E. Fourn.) Scribn.], and *T. pringlei*; in subgenus *Isolytrum* Louis-Marie he placed *Peyritschia deyeuxioides* (Kunth) Finot (as *T. deyeuxioides*) and *T. viride*.

Here, we describe and illustrate four new Mexican species of *Trisetum* (*T. durangense* Finot & P. M. Peterson, *T. martha-gonzaleziae* P. M. Peterson & Finot, *T. spellenbergii* Soreng, Finot & P. M. Peterson, and *T. ligulatum* Finot & Zuloaga), and we discuss the systematics for *Trisetum*, *Peyritschia*, and *Sphenopholis* in Mexico and Central America. We also include a subgeneric classification of the species in *Trisetum* for Mexico and Central America.

MATERIAL AND METHODS

This study is based on the examination of herbarium specimens from BAA, BAF, C, CIIDIR, CONC, CR, P, QCA, US, S, SI, including the type specimens of most of the species studied. For anatomical observations, hand cross sections were made from the central portion of the blade below the flag leaf, and surface features were observed on the adaxial portion of the ligule. Abaxial epidermis preparations were made according to the method in Metcalfe (1960). Slides were observed on a Zeiss microscope at SI.

KEY FOR DISTINGUISHING *TRISETUM*, *SPHENOPHOLIS*, AND *PEYRITSCHIA*

- 1a. Stamens 2; glumes linear, isomorphic, 1-nerved; lemmas awnless or awned with a 2-lobate apex; palea tightly enclosed by the margins of the lemma (not gaping) *Peyritschia*
- 1b. Stamens 3; glumes lanceolate, ovate-lanceolate, or oblanceolate, heteromorphic, first glume 1- to 3-nerved, second glume 3- to 5-nerved; lemmas with 2 to 4 short awns at the apex or entire or 2-toothed; palea not tightly enclosed by the margins of the lemma (gaping).
 - 2a. Perennials; disarticulation between the florets and above the glumes; upper glumes lanceolate to ovate-lanceolate *Trisetum*
 - 3a. Lemma apex opaque, the intermediate nerves extended beyond the apex as two short awns; awn inserted on the upper third of the lemma *Trisetum* subg. *Trisetum*
 - 4a. Panicle lax, ± open, ovate to pyramidal *Trisetum* sect. *Trisetum*
 - 4b. Panicle narrow, spiciform *Trisetum* sect. *Trisetaera*

- 3b. Lemma apex hyaline, without nerves or with both intermediate and marginal nerves extended beyond the apex as four short awns; awn inserted on the middle of the lemma
..... *Trisetum* subg. *Deschampsioidea*
- 2b. Annuals or perennials; disarticulation of florets below the glumes; upper glumes oblanceolate to obovate *Sphenopholis*

TAXONOMIC TREATMENTS

Sphenopholis Scribn., *Rhodora* 8: 142. 1906.
TYPE: *Sphenopholis obtusata* (Michx.) Scribn.

Annuals or perennials, without rhizomes; culms 20–120 cm tall, glabrous. Leaf sheaths glabrous or sparsely pubescent; ligule membranous; blades 1–12 mm wide, glabrous or sparsely pubescent, flat, soft. Inflorescence in panicles 5–25 cm long, lax and narrow. Spikelets 2- or 3-flowered; pedicels short and glabrous; disarticulation below the glumes; glumes heteromorphic, usually shorter than the spikelet; first glume narrow, shorter than or as long as the second glume, linear-lanceolate, 1-nerved; second glume obovate to oblanceolate, 3- to 5-nerved; lemmas smooth or scabrous, mucous or awned, 3- to 5-nerved, blunt to biaristate at the apex; awn, when present, borne on the upper third of the lemma; callus glabrous to subglabrous; palea 2-keeled, shorter than its lemma; lodicules 2, membranous, minutely dentate at the apex, 0.5 mm long; stamens 3, anthers 0.5–1 mm long; ovary glabrous. Caryopsis with liquid endosperm.

Sphenopholis is a small genus with five species from Canada to Mexico (Clayton & Renvoize, 1986). Erdman (1965) revised *Sphenopholis* and recognized four species in addition to the hybrid *Sphenopholis* × *pollens* (Biehler) Scribn. [*S. obtusata* (Michx.) Scribn. × *S. pensylvanica* (L.) Hitchc.]. Two species are represented in Mexico and Central America.

KEY TO THE SPECIES OF *SPHENOPHOLIS* IN MEXICO AND CENTRAL AMERICA

- 1a. Lemmas awned, the awns 4–8 mm long; spikelets 4–6 mm long 1. *S. interrupta*
1b. Lemmas unawned; spikelets 1.5–3.6 mm long 2. *S. obtusata*

1a. *Sphenopholis interrupta* (Buckley) Scribn. subsp. *interrupta*, *Rhodora* 8: 145. 1906. Basionym: *Trisetum interruptum* Buckley, Proc. Acad. Nat. Sci. Philadelphia 14: 100. 1862. TYPE: U.S.A. Middle Texas, *Buckley s.n.* (lectotype, designated by Hitchcock (1935: 973), PH not seen.; isotype, US-fragment & photo ex PH!).

Avena elongata Kunth, Nov. Gen. Sp. 1: 148. 1816. *Trisetarium elongatum* (Kunth) Poir., Encycl. 5: 366. 1817. *Trisetum elongatum* (Kunth) Kunth, Rev. Gram. 1: 101. 1829. TYPE: Mexico. In scopulosis prope urbem Mexico, 1833, *Banpland s.n.* (holotype, P!; isotype, US-3102206 ex B!).

Calamagrostis longirastris Buckley, Prelim. Rep. Surv. Texas 2. 1866. TYPE: U.S.A. Texas. [No type material has been located. Although the type locality is presumed to be Texas, Buckley did not cite a locality nor did he mention a collector in his original protologue.]

Trisetum hallii Scribn., Bull. Torrey Bot. Club 11: 6. 1884. *Sphenopholis hallii* (Scribn.) Scribn., *Rhodora* 8(92): 146. 1906. *Trisetum interruptum* UNRANKED *hallii* (Scribn.) Hitchc. TYPE: U.S.A. Texas; prairies Houston, 1872, *Hall 799* (holotype, US-72664!).

Annual; culms 10–40 cm tall, glabrous, mostly 3 nodes, the nodes glabrous. Leaf sheaths glabrous or sparsely pubescent, with one side extended upward, shorter than internodes; ligules 1 mm long, truncate, ciliate, pilose on the dorsal surface; blades 3–10 cm × 1–4 mm, flat. Panicles 5–12 cm × 4–15 mm, narrow. Spikelets 4–6 mm long, 2- or 3-flowered; rachilla sparsely pubescent; glumes 3.5–5 mm long, about equal in length and equaling or shorter than the spikelet, glabrous, scaberulous along the keel; first glume linear-lanceolate, 3-nerved; second glume obovate to oblanceolate, 5-nerved; lemmas 3.5–5 mm long, lanceolate, glabrous, 3- to 5-nerved, 2-aristulate at the apex, awned on the upper third of the lemma; awn 4–8 mm long, slightly twisted and twice geniculate; palea 2–2.5 mm long, about half the length of the lemma, 2-nerved, the nerves scabrous, 2-dentate at the apex; callus glabrous to subglabrous; lodicules 0.5 mm long, slightly bilobate at the apex, the lobes rounded, obtuse to acute. Anthers about 0.5 mm long.

Distribution. U.S.A. and Mexico. According to Gould and Moran (1981), *Sphenopholis interrupta* is widely distributed in the southwestern United States.

Specimens studied. MEXICO. **Baja California:** near U.S. Boundary, "Northern Lower California," 1 Apr. 1886, *C. R. Orcutt 1431* (US).

KEY TO THE SUBSPECIES OF *SPHENOPHOLIS INTERRUPTA*

- 1a. Glumes glabrous *S. interrupta* subsp. *interrupta*
1b. Glumes pubescent .. *S. interrupta* subsp. *californica*

1b. *Sphenopholis interrupta* subsp. *californica* (Vasey) Scribn., *Rhodora* 8: 146. 1906. Basionym: *Trisetum californicum* Vasey, U.S.D.A. Div. Bot. Bull. 13(1): t. 46. 1892. *Trisetum interruptum* Buckley var. *californicum* (Vasey) Louis-Marie, *Rhodora* 30: 240. 1929. TYPE:

Mexico. Northern Lower California, *C. R. Orcutt 1437* (lectotype, designated by Hitchcock (1939: 552) and Hernández-Torres & Koch (1988: 80), US-868402!; isotype, MO-2526390 not seen).

Glumes pubescent, the trichomes 0.1–0.4 mm long.

Distribution. *Sphenopholis interrupta* subsp. *californica* was described for Northern Lower California, and its distribution seems to be restricted to the type locality.

Notes. Hitchcock (1939) designated the lectotype for *Trisetum californicum* without explicitly citing the herbarium. Hernández-Torres and Koch (1988) then specifically designated the US sheet as the lectotype.

Comments. Though the systematic position of this taxon in *Sphenopholis* was proposed by Scribner (1906), subsequent treatments by Louis-Marie (1928–1929), Hitchcock and Chase (1951), and Erdman (1965) excluded this species from *Sphenopholis*. According to Erdman (1965) further study is needed to clarify the generic placement of this species. On the basis of micromorphological characters of lemma epidermes of several genera in Aveninae, including *Trisetum* and typical species of *Sphenopholis*, Finot and Matthei (unpublished results) support the generic position of this species in *Sphenopholis*. Louis-Marie (1928–1929) created *Trisetum* subsect. *Sphenophoidea* for species that disarticulate below the glumes and included in this *T. interruptum*, *T. interruptum* var. *californicum*, *T. hallii*, *T. pensylvanicum* (L.) P. Beauv., *T. palustre* (Michx.) Torr., and *T. ludovicianum* Vasey. We believe that all of these species belong in *Sphenopholis*.

2. *Sphenopholis obtusata* (Michx.) Scribn., Rhodora 8(92): 144. 1906. Basionym: *Aira obtusata* Michx., Fl. Bor. Amer. 1: 62. 1803. *Airopsis obtusata* (Michx.) Desv., J. Bot. appl. 1: 200. 1808. *Poa obtusata* (Michx.) Link, Hort. Berol. 1: 76. 1827. *Agrostis obtusata* (Michx.) Steud., Nomencl. Bot. ed. 2, 1: 41. 1840. *Koeleria obtusata* (Michx.) Trin. ex Steud., Nomencl. Bot. ed. 2, 1: 41. 1840. *Rebouleo obtusata* (Michx.) A. Gray, Manual 591. 1848. *Eatonia obtusata* (Michx.) A. Gray, Manual ed. 2, 558. 1856. TYPE: U.S.A. Florida: *Michaux s.n.* (lectotype, designated by Hitchcock (1908: 152), Pl., photo NY not seen & US!; isotype, US-72667-fragment!).

Aira truncata Muhl., Descr. Gram. 83. 1817. *Koeleria*

truncata (Muhl.) Torr., Fl. N. Middle United States 1: 116. 1823. TYPE: U.S.A. Pennsylvania: *H. C. Muhlenberg 127* (holotype, PH not seen; isotype, US-1535792-fragment!).

Koeleria paniculata Nutt., Gen. N. Amer. Pl. 2: (Add. 2). 1818. TYPE: U.S.A. East Florida. *T. Say s.n.* (holotype, PH not seen, photo US!; isotype, US-fragment!).

Rebaulea gracilis Kunth, Revis. Gram. 2: 341, t. 84. 1830, nom. illeg. TYPE: *Michaux s.n.* (holotype, B not seen; isotypes, Pl., US-76319-fragment ex B!).

Trisetum lobatum Trin., Mem. Acad. Imp. Sci. St.-Petersbourg. Ser. 6, Sci. Math. 1: 66. 1830. *Sphenophalis obtusata* subsp. *labata* (Trin.) Scribn., Rhodora 8: 144. 1906. *Sphenophalis obtusata* var. *labata* (Trin.) Scribn. ex B. L. Rob., Rhodora 10: 65. 1908. TYPE: Ad flumen rubrum (Red River), America borealis (holotype, LE-TRIN-2437.01!).

Eatonia densiflora E. Fourn., Mexic. Pl. 2: 111. 1886. *Aira mexicana* Trin. ex E. Fourn., Mexic. Pl. 2: 111. 1886, nom. inval. TYPE: U.S.A. Texas: Bejar. Feb. 1839, *J. L. Berlandier 1617* (holotype, W not seen; isotypes, B not seen, LE-TRIN-1951.02!, US-72668-fragment!).

Eatonia obtusata var. *robusta* Vasey ex L. H. Dewey, Contr. U.S. Natl. Herb. 2: 544. 1894. *Eatonia robusta* (Vasey ex L. H. Dewey) Rydb., Bull. Torrey Bot. Club 32: 602. 1905. *Sphenophalis robusta* (Vasey ex L. H. Dewey) A. Heller, Muhlenbergia 6: 12. 1910. TYPE: U.S.A. Texas: Wallisville, 1881, *Wallis s.n.* (holotype, US!; isotype, NY not seen).

Eatonia obtusata var. *robusta* Vasey ex Rydb., Contr. U.S. Natl. Herb. 3(3): 190. 1895, nom. illeg. hom. TYPE: U.S.A. Nebraska: Mullen. *P. A. Rydberg 1807* (holotype, not located; isotypes, NY, US!).

Eatonia obtusata var. *purpurascens* Vasey ex Rydb. & Shear, Bull. Div. Agrostol. U.S.D.A. 5: 30. 1897. *Sphenopholis obtusata* var. *labata* fo. *purpurascens* (Vasey ex Rydb. & Shear) Waterf., Rhodora 50: 93. 1948. TYPE: U.S.A. Oklahoma: False Washita, 1868, *E. Palmer 404* (lectotype, designated by Hitchcock (1935: 956), US-868756!).

Eatonia pubescens Scribn. & Merr., Bull. Div. Agrostol. U.S.D.A. 26: 6. 1900. *Sphenophalis obtusata* subsp. *pubescens* (Scribn. & Merr.) Scribn., Rhodora 8: 144. 1906. *Sphenophalis obtusata* var. *pubescens* (Scribn. & Merr.) Scribn. ex B. L. Rob., Rhodora 10: 65. 1908. *Sphenophalis pubescens* (Scribn. & Merr.) A. Heller, Muhlenbergia 6: 12. 1910. *Rebaulea obtusata* var. *pubescens* (Scribn. & Merr.) Farw., Rep. Michigan Acad. Sci. 17: 181. 1916. TYPE: U.S.A. Mississippi: Starkeville, 30 Apr. 1891, *S. M. Tracy s.n.* (holotype, US-72670!).

Eatonia annua Suksd., W. Amer. Sci. 15: 50. 1906. *Sphenophalis annua* (Suksd.) A. Heller, Muhlenbergia 6: 12. 1910. TYPE: U.S.A. Oregon: Wasco Co., Dalles on Columbia River, 8 June 1897, *W. N. Suksdorf 1553* (isotypes, F not seen, GH not seen, ISC not seen, NY not seen, UC not seen, US-72671!).

Annual; culms 20–120 cm tall. Leaf sheaths glabrous, scabrous, or finely pubescent; blades 8–15 cm × 3–12 mm, flat. Panicles 5–25 cm × 5–20 mm, narrow. Spikelets 1.5–3.6 mm long, 2- or 3-flowered; rachilla mostly glabrous; glumes 1–3(–3.6) mm long, about equal in length, dimorphic,

shorter than the spikelet, scaberulous especially along the keel; first glume linear-lanceolate, 1-nerved; second glume conspicuously obovate, 3-nerved; lemmas 1.8–2.8 mm long, lanceolate, glabrous to scaberulous, entire at the apex, unawned; callus glabrous; anthers 0.5–0.7 mm long.

Anatomy and micromorphology. Ligule apices with papillose cells and short, stiff trichomes; ligule epidermis composed of long cells with straight walls; stomata absent; macrohairs absent; prickles present. Foliar epidermis with long cells rectangular to fusiform, with sinuate lateral walls; short cells present in costal zones only, rectangular, with sinuous walls; trichomes absent; stomata present.

Specimens studied. MEXICO. **Coahuila:** Diaz, Rio Grande Valley, 17 Apr. 1900. *C. G. Pringle 8285* (US); Villa Union, 20 Apr. 1965. *F. W. Gould 11136* (US); Muzquiz, Santa Elana City Park, 24 Apr. 1965. *F. W. Gould 11227* (US). **Distrito Federal:** vicinity of Mexico, 27–30 July 1910. *A. S. Hitchcock 5893*. **Durango:** city of Durango & vicinity, June 1896. *E. Palmer 255* (US). **Guanajuato:** 2 km NE of San Miguel, 31 Oct. 1952. *E. R. Sohns 500* (US). **Nuevo León:** Monterrey, 6–8 June 1910. *A. S. Hitchcock 5571* (US). **Oaxaca:** Oaxaca, 12, 13 Aug. 1910. *A. S. Hitchcock 6166* (US). **Puebla:** Rancho Posada, 20 May 1910. *Nicolas s.n.* (US); *G. Arsene s.n.* (US). **Sonora:** Alamos, 1890. *E. Palmer 577* (US).

Peyritschia E. Fourn., *Mexic. Pl.* 2: 109. 1886.
TYPE: *Peyritschia koelerioides* (Peyr.) E. Fourn.

Perennials, with or without rhizomes; culms 20–200 cm tall, mostly glabrous. Leaf sheaths glabrous or pubescent; blades flat; ligule membranous. Inflorescence in panicles narrow, contracted, spiciform or lax and somewhat open. Spikelets 2-flowered; rachilla glabrous to copiously pubescent; disarticulation above the glumes and between the florets; glumes isomorphic, 1-nerved, equal or subequal, as long as the spikelet or longer; lemmas bilobed at the apex, awned near the base or the middle of the lemma, rarely mucicous or shortly mucronate near the tip (*P. koelerioides* mucronate or mucicous); palea tightly enclosed by the margins of the lemma (not gaping), 2-keeled; stamens 2; lodicules 2, membranous; ovary glabrous. Caryopses with liquid endosperm.

KEY TO THE SPECIES OF *PEYRITSCHIA* IN MEXICO AND CENTRAL AMERICA

- 1a. Lemma without a dorsal awn, apex mucicous or with a subapical mucro 2. *P. koelerioides*
- 1b. Lemma with a dorsal awn, borne near the middle or upper third of the lemma, the awn geniculate and extended beyond the glumes.
 - 2a. Rachilla copiously pubescent, the trichomes 2–3 mm long 1. *P. deyeuxioides*

- 2a. Rachilla pubescent, the trichomes only 0.2–0.8 mm long.
- 3a. Culms 5–12 cm tall; leaf blades 2.5–3.5 cm long; panicles about 2.5 cm long, 0.5 cm wide, contracted, narrow 3. *P. humilis*
- 3b. Culms 20–200 cm tall; leaf blades 5–15 cm long; panicles 5–20 cm long, 1–3(–4) cm wide, narrow but relatively open 4. *P. pringlei*

1. *Peyritschia deyeuxioides* (Kunth) Finot, *Contr. U.S. Natl. Herb.* 48: 478. 2003. Basionym: *Avena deyeuxioides* Kunth, *Nov. Gen. Sp.* 1: 147. 1816. *Trisetaria deyeuxioides* (Kunth) Poir., *Encycl. Suppl.* 5: 366. 1817. *Trisetum deyeuxioides* (Kunth) Kunth, *Rev. Gram.* 1: 102. 1829. *Deyeuxia triflora* Nees, *Linnaea* 19: 691. 1847. TYPE: Mexico. “Ad ripam Lacus Tezucucensis,” *Humboldt & Bonpland s.n.* (holotype, P!; isotypes, BM not seen, LE-TRIN-1913.05!, US-865589 fragment ex P!).

Avena trichopodia J. Presl, *Reliq. Haenk.* 1: 254. 1830. TYPE: Mexico. *Haenke s.n.* (holotype, PR not seen; isotypes, LE-TRIN-1945.01a!, US-0865583 fragment ex PR!).

Deyeuxia evoluta E. Fourn., *Bull. Soc. Bot. France* 24: 181. 1877. *Trisetum evolutum* (E. Fourn.) Hitchc., *Contr. U.S. Natl. Herb.* 17: 325. 1913. TYPE: Mexico. Veracruz: Mirador, 1841, *F. M. Liebmann 730* (lectotype, designated by Hitchcock (1939: 557) and Hernández-Torres & Koch (1988: 78), US-207459!; isotypes, C not seen, LEI, MO-3056872!, P not seen).

Trisetum deyeuxioides var. *pubescens* Scribn. ex Beal, *Grasses N. Amer.* 2: 374. 1896. TYPE: Mexico. Michoacán: dry hills near Patzcuaro, 19 Nov. 1891. *C. G. Pringle 3950* (holotype, MSC not seen; isotypes, BM not seen, ENCB not seen, MEXU not seen, MO-3056871 not seen, P!, US-868407!).

Perennial, without rhizomes; culms 50–180 cm tall, glabrous. Leaf sheaths glabrous or pubescent; ligule 1–3(–5) mm long, truncate, erose, glabrous; blades 0.5–4 mm wide, flat, narrow toward apex, glabrous or sparsely pubescent, sometimes densely pubescent. Panicles 10–35 × 1–5 cm, lax, somewhat open and nodding. Spikelets 4.5–8 mm long, 2- or 3-flowered; rachilla copiously pubescent, the trichomes 2–3 mm long; glumes (3.5–)4–5.5(–8) mm long, equal, shorter or longer than the florets, linear; first glume with a green midnerve, purplish otherwise, the margins usually hyaline, the keel scabrous; lemmas 4–6 mm long, glabrous, terete, rounded in cross section, 5-nerved, nerves inconspicuous, dorsally awned near the middle or upper third of the lemma; apex entire, bilobed or bidentate; awn 4.5–8(–12) mm long, geniculate and twisted, purple, scabrous; callus short pubescent,

the trichomes 0.3–1 mm long; paleas 2.5–3.5 mm long; lodicules 0.5 mm long, linear, narrow, irregularly lobed at the apex; anthers 1.3–1.7 mm long. Caryopses 1.8–2.5 mm long.

Chromosome number. $2n = 14, 28$ (Tateoka, 1962; Hernández-Torres & Koch, 1988).

Anatomy. Leaf blades are slightly keeled in transverse section, abaxial ribs not well developed, furrows less than one half of the leaf thickness; vascular bundles of first and second order with adaxial and abaxial girders, bundles of third order with adaxial and abaxial strands; marginal sclerenchyma present; bulliform cells large, conspicuous, in fan-shaped groups at the base of adaxial furrows; abaxial epidermis with long rectangular to fusiform intercostal cells; costal zone with cork cells and silica bodies in short rows or more rarely in cork cell-silica body pairs; prickles present.

Distribution. Mexico to Ecuador [Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico (Aguascalientes, Chiapas, Chihuahua, Distrito Federal, Durango, Guerrero, Guanajuato, Hidalgo, Jalisco, México, Michoacán, Morelos, Oaxaca, Puebla, Queretaro, San Luis Potosí, Veracruz, Zacatecas), Nicaragua, Panama, Venezuela] (Pohl & Davidse, 1994; Finot, 2003a) in humid prairies and open woods, 1000–2600 m.

Notes. Hitchcock (1939) designated the lectotype for *Deyeuxia evoluta* without explicitly citing the herbarium. Hernández-Torres and Koch (1988) then specifically designated the US sheet as the lectotype.

Comments. Based on 25 morphological characters, Koch (1979) pointed out that *P. deyeuxioides* shows an intermediate position between *Peyritschia* and *Trisetum*. However, the androecium is composed of only two stamens, the glumes are 1-nerved, the lemma is terete and dorsally awned near the middle, the apex of the lemma is bilobed, and the palea is tightly enclosed by the margins of the lemma. These characters indicate that this species should be placed in *Peyritschia*.

Specimens studied. COSTA RICA. **Cartago:** Cordillera Central, Volcán Irazú, 2 km NW Sanatorio Durán, 19 Nov. 1968. Pahl & Davidse 11449 (CR). MEXICO. **Chihuahua:** 19.6 km W of Balleza & 74.2 km E of Guachochi, 18 Sep. 1991, Peterson et al. 10752 (US); 24.2 km S of San Juanito & 4.8 km N of Creel on MEX 127, 10 Sep. 1989, Peterson et al. 8007 (US); 122.5 km W of La Junta & 56.7 km W of Tomochic in Parque Nacional Cascada de Basaseachic, 1 Oct. 1989, Peterson & King 8231 (US); canyons of Sierra Madre, 13 Oct. 1887. Pringle 1432 (US); Sierra Madre Occidental, Parque Natural Barranca del Cobre, 13.6 mi. NE of La Bufa on road toward Samachique, 31 Oct. 1995, Peterson et al. 13575 (US). **Coahuila:** Sierra Madre Oriental, 5 mi. W of Chapultepec on

cutoff road between Hwy. 54 & 57, 23 mi. S of Saltillo, 16 Oct. 1995, Peterson & Knowles 13276 (US); ca. 5 km E of Saltillo (Las Palapas) up camino de Quatro, 20 Sep. 2003, Peterson et al. 17868 (CIIDIR, US). **Distrito Federal:** Desierto de Los Leones, 19 Oct. 1960, Tateoka 1152 (US). **Durango:** 4.2 km of San Miguel de La Michilia, 24 Sep. 1991, Peterson et al. 10913 (US); 16.1 km NW of MEX 40 on logging road to Santo Domingo, 5 Oct. 1989, Peterson & King 8288 (US); 20 mi. SE of Mesquital on road to Charcos, 7 Nov. 1995, Peterson et al. 13632 (US). **Hidalgo:** boggy margins of Lago Atexca below Molango, 24 July 1947, H. E. Moore Jr. 3466 (US). **México:** Valle de Mexico, 10 June 1901, Pringle 8512 (P), Shaffner 15 (P); prope Tacubaya, Shaffner 319 (P). **Michoacán:** 13.5 km SE of Zacapu on MEX 15 km toward Quiroga, 1 Oct. 1991, Peterson et al. 10994 (US). **Morelia:** San Miguel, 8 Aug. 1912, Arsènes 8645 (P). **Oaxaca:** on Huantla Road 19 km from Teotitlan, 6 Nov. 1963, McKee 10869 (P). **Queretaro:** 16 mi. E of Landa, 12 Dec. 1960, Smitchfield & Jahnstan s.n. (US). **San Luis Potosí:** between Puerta Huerta and Rioverde in the Sierra de Alvarez, 11 Sep. 1954, Sohns 1177 (US); near Puerta Huerta in the Sierra de Alvarez, 4 Sep. 1954, Sohns 1034 (US).

2. *Peyritschia koelerioides* (Peyr.) E. Fourn., Mexic. Pl. 2: 110. 1886. *Airo koelerioides* Peyr., Linnaea 30: 5. 1859. *Deschampsia koelerioides* (Peyr.) Benth., J. Linn. Soc., Bot. 19: 96. 1881. TYPE: Mexico. México: Volcan de Toluca. 8800 ft., 1846, C. Heller 311 (holotype, P not seen; isotype, US-1647945-fragment ex P-DRAKE!).

Grappheporum altijugum E. Fourn., Mexic. Pl. 2: 111. 1886. *Trisetum altijugum* (E. Fourn.) Scribn., Rhodora 8(89): 89. 1906. TYPE: Mexico. Veracruz: in monte Orizabensi, 12,000–14,000 ft., F. M. Liebmann 603 (holotype, P not seen; isotype, US-734835!).

Perennial, rhizomes absent; culms 25–85 cm tall, glabrous; nodes 2 or 3, glabrous. Leaf sheaths glabrous, rarely pubescent, shorter than the internodes; ligule 1–3 mm long, truncate, erose; blades 1.5–4 mm wide, usually glabrous, flat. Panicles 7–20 cm × 4–8(–10) mm, spiciform; rachis and pedicels scabrous. Spikelets 3–5 mm long, 2-flowered; rachilla glabrous to sparsely pubescent, the trichomes less than 0.5 mm long; glumes 3–5 mm long, lanceolate to ovate-lanceolate, equal, longer than the florets, 1-nerved; lemmas 2.5–4 mm long, glabrous, terete, dorsally rounded, 5-nerved; apex bilobed, the lobes short, obtuse, mucous or with a mucro about 1 mm long or less borne near the apex; callus glabrous or short pubescent, trichomes less than 0.5 mm long; paleas 2.4–3.8 mm long; anthers 0.5–1.3 mm long. Caryopses 1.5–3.5 mm long.

Chromosome number. $2n = 28$ (Tateoka, 1962; Hernández-Torres & Koch, 1988).

Micramarphalagy: Ligule apices have papillate cells and short trichomes, the epidermis with more or less rectangular long cells, hooks, and trichomes; no stomata were seen.

Distribution. Southern Mexico (México, Michoacán, Oaxaca, Veracruz) and Guatemala (Pohl & Davidse, 1994; Finot, 2003a), 2400–4300 m.

Specimens studied. MEXICO. **México**: 20 km al NE de Texcoco, sobre la carretera a Calpulalpán, 10 Oct. 1965, *Rzedowski 21417* (US); Sierra Las Cruces, 1 Oct. 1892, *Pringle 4306* (US); Amecameca, carretera al Paso de Cortés, 20 km al E de la desviación a la carretera a Cuantla, 14 km al ESE de Amecameca, 18 Oct. 1976, *Koch 76206* (US 2989662); 18 mi. S of Patzcuaro, 20–25 Nov. 1961, *King & Soderstrom 5159* (US); 20 km NE de Texcoco, sobre la carretera a Calpulalpán, no date, *Rzedowski s.n.* (US). **Oaxaca**: Sierra de San Felipe, Aug. 1894, *Pringle 4775* (P). **Puebla**: San Nicolás de los Ranchos, declive E del Paso de Cortes, 3.5 km NE entronque de carretera a Amecameca y camino entre Popocatepetl e Ixtaccihuatl, 15 km ESE de Amecameca, 3 Dec. 1976, *Koch 73309* (US).

3. *Peyritschia humilis* (Louis-Marie) Finot, Contr. U.S. Natl. Herb. 48: 478. 2003. Basionym: *Trisetum humile* Louis-Marie, Rhodora 30: 244. 1929. *Deyeuxia gracilis* E. Fourn., Mexic. Pl. 2: 106. 1886, nom. illeg., non *Deyeuxia gracilis* Wedd. 1875. TYPE: Mexico. Mirador, *F. M. Liebmann 602* (holotype, C!; isotypes, US-3048345 fragment ex hb. Haun!).

Perennial; culms 5–12 cm tall. Leaf sheaths flattened; ligule membranous, short, laciniate; blades 2.5–3.5 cm long. Panicles 2.5 × 0.5 cm, contracted, narrow, exserted. Spikelets 4 mm long, 2-flowered; pedicels glabrous; rachilla 0.5 mm long, pilose, the trichomes less than 0.8 mm long; glumes 4 mm long, equal, lanceolate, longer than the spikelet, slightly scabrous on the keel, acute at the apex; lemmas 3–3.5 mm long, terete, awned, the margins involute toward the base, bilobed at the apex, the lobes obtuse; awn 4–5 mm long, inserted from the middle to the lower third on the dorsal surface, twisted and geniculate; callus obtuse, sparsely pilose, trichomes ca. 0.2 mm long; paleas shorter than the lemma and enclosed by the margins of the lemma. Caryopses ca. 2 mm long.

Comments. The type of *Deyeuxia gracilis* E. Fourn. conserved in Copenhagen (C) includes a complete plant, 12 cm tall, and a fragment of the panicle, identified by Hitchcock and Chase as *Trisetum spicatum* (L.) K. Richt. The isotype in US bears the same identification. Hernández-Torres and Koch (1988), who synonymized the species within *T. spicatum*, followed this criterion. The mor-

phology of the spikelets confirms its placement within *Peyritschia*: spikelets 4 mm long, 2-flowered; glumes equal, 1-nerved, longer than the spikelet; lemma with a bilobed apex, the awn geniculate and twisted, inserted near the middle of the lemma; callus with short trichomes; rachilla sparsely pilose; stamens 2; ovary glabrous.

Trisetum humile Louis-Marie was a new name for the illegitimate *Deyeuxia gracilis* E. Fourn. 1886, non Weddell 1875, and therefore we use it as the basionym for the new combination in *Peyritschia*.

4. *Peyritschia pringlei* (Scribn.) S. D. Koch, Taxon 28: 233. 1979. Basionym: *Deschampsia pringlei* Scribn., Proc. Acad. Nat. Sci. Philadelphia 43: 300. 1891. *Trisetum kachianum* Hern. Torres, Phytologia 61: 454. 1987. TYPE: Mexico. Chihuahua: wet places, pine plains, base of Sierra Madre, 7 Oct. 1987, *C. G. Pringle 1429* (holotype, US-747292!; isotypes, LL not seen, MEXU not seen, MICH not seen, US-867629!, US-821538!, VT not seen).

Perennial, without rhizomes; culms 20–200 cm tall. Leaf sheaths glabrous, rarely pubescent; ligule 0.5–4 mm long, truncate or rounded at the apex; blades 5–15 cm × 1.5–4 mm, flat. Panicles 5–20 × 1–3(–4) cm, narrow but relatively open. Spikelets 4–5.5 mm long, 2- or 3-flowered; rachilla pubescent, the trichomes 0.2–0.8 mm long; glumes 4–5.3 mm long, lanceolate, as long as the florets or longer, apex acute; lemmas 3–4.3 mm long, glabrous, terete, bilobed at the apex, rounded in cross section, awned near the base; awn 4.5–7 mm long, geniculate and twisted, exserted; palea 2.3–3 mm long, shorter than its lemma; anthers 0.8–1 mm long. Caryopses 1.5–1.7 mm long, fusiform-cylindrical.

Anatomy and micramarphalagy: Ligule apices composed only of papillate cells, epidermal long cells rectangular to fusiform, with few hooks and no trichomes; no stomata were seen. Leaf blades in transverse section without a keel, without well-developed ribs, furrows less than one half of the leaf thickness; all vascular bundles, except the marginal ones, with both adaxial and abaxial girders; marginal sclerenchyma absent; abaxial epidermis with rectangular long cells with straight side walls, costal cork cells and silica bodies present, prickly hairs present.

Distribution. Mexico (Aguascalientes, Chihuahua, Chiapas, Durango, Guanajuato, Hidalgo, Jalisco, México, Puebla, Querétaro, San Luis Potosí, Sonora, Tlaxacala), Guatemala, Costa Rica, Venezuela, Ecuador (Espejo-Serna et al., 2000; Fi-

not, 2003a). The documentation of the presence of this species in Venezuela and Ecuador provides new records for the distribution of *Peyritschia pringlei*. It was collected by *Peterson & Judziewicz 9302*, in the Provincia de Bolívar, ca. 3000 m, in the Andes of Ecuador, and by *Peterson & Judziewicz 9477* in Provincia de Loja, Ecuador. Lasser found the species in Mérida, Venezuela, in 1942 (*Lasser 431*). According to Hernández-Torres and Koch (1988) this species also occurs in Guatemala. Elevations range from 1600 to 3270 m.

Specimens studied. COSTA RICA. **Cartago:** Cordillera Central, lower slopes of Volcán Irazú, 1 km below San Juan de Chicao, 8 Nov. 1968, *Pohl & Davidse 11416* (US). ECUADOR. **Bolívar:** 14.5 km E of Guaranda on road to Río Bamba, 24 May 1990, *Peterson & Judziewicz 9302* (US). **Loja:** 6 km W of Colaisaca on road to Sozoranga, 2 June 1990, *Peterson & Judziewicz 9477* (US). GUATEMALA. **Quezaltenango:** 19 June 1954, *Koninck 137* (US). MEXICO. **Chihuahua:** 85.4 km W of Balleza and 8.8 km E of Guachochi, 19 Sep. 1991, *Peterson et al. 10786* (US); 38.6 km SW of La Junta & ca. 70.8 km N of Creel at Paso Arroyo Ancho crossing, 24 Sep. 1988, *Peterson & Annable 5348* (US); Miñaca, 13 Oct. 1910, *Hitchcock 7762* (US). **Durango:** 45 km W of Durango on Hwy. 40 toward El Salto, 27 Oct. 1995, *Peterson et al. 13489* (US); 2 mi. NW of Charcos on road toward Milpas, 9 Nov. 1995, *Peterson et al. 13679* (US); 24 mi. NE of El Salto on Hwy. 40 toward Durango, 26 Oct. 1995, *Peterson et al. 13471* (US); W of Ciudad Durango, 4 mi. W of El Salto, 27 Aug. 1958, *Reeder & Reeder 3124* (US); 4 mi. E of El Salto, 1 Oct. 1953, *Reeder & Reeder 2561* (US); 20 mi. S of Mezquital, 11 Sep. 2003, *Peterson & F. Sánchez-Alvarado 17729* (CIIDIR, US). **Guanajuato:** 8 km W de San Felipe, 27 Oct. 1952, *Sohns 460* (US). **Hidalgo:** Pachuca, 6–7 Sep. 1910, *Hitchcock 6730* (US); *Hitchcock 6737* (US). **Jalisco:** Sierra Cacoma, 7 mi. NW of Los Volcanes on road toward Mascota, 15 Nov. 1995, *Peterson 13724* (US); Tepatitlán-Guadalajara, 26 Sep. 1946, *Hernández X., Ruppert & Guevara 2694* (US); Zempoala, 15 km N of Ciudad Sahagún & 1 km NE of Zempoala, sobre la carretera a Sta. Maria Tecajete, 26 Aug. 1977, *Koch 77179* (US); Mineral del Chico, Parque Natural El Chico, 17 km al N de la carretera Pachuca–Zacualtipán, 4 Dec. 1977, *Koch 77532* (US). **México:** Toluca, 13 Sep. 1910, *Hitchcock 6889* (US). **Puebla:** San Marcos, railway embankment, 29 Aug. 1910, *Hitchcock 6522* (US); Acajete, El Pinal, a 10 km al E de Acajete, 19°09'N, 97°55'W, 16 Sep. 1988, *Tenorio 15165* (US). **Querétaro:** parte mas alta del cerro Zamorano, Mun. Colon, 13 Nov. 1971, *Rzedowski & McVaugh 473* (US). **San Luis Potosí:** 15–18 July 1910, *Hitchcock 5685* (US); Cañón del Lobo, Sierra de San Miguelito, *Sohns 1162* (US); Puerta Huerta in the Sierra de Alvarez, 4 Sep. 1954, *Sohns 1019* (US). **Tlaxcala:** ca. 3 mi. NE of Tlaxco, 23 Sep. 1953, *Sohns 597* (US). VENEZUELA. **Mérida:** Otra Banda, near Mérida, 22 Sep. 1942, *Lasser 431* (US).

Trisetum Pers., Syn. Pl. 1: 97. 1805. *Trisetarium* Poir., Encycl. Suppl. 5: 365. 1817, nom. superfl. *Acrospelion* Besser ex Schult. & Schult. f., Syst. Veg. Mant. 3: 526, 1827, nom. illeg. superfl. *Rebentischia* Opiz, Lotos 4: 104. 1854, nom. superfl., non P. A. Karsten 1869. TYPE: *Trisetum flavescens* (L.) P. Beauv., Ess. Agrostogr. 88, 153, t. 18, f. 1. 1812.

Rupestrina Prov., Fl. Canad.: 689. 1862. TYPE: *Rupestrina pubescens* Prov. [= *Trisetum spicatum* (L.) Richt.]

Perennials, caespitose, sometimes shortly rhizomatous; culms 5–300 cm tall, erect to geniculate at base, glabrous or pubescent. Leaf sheaths glabrous or pubescent, longer or shorter than the internodes; blades flat, conduplicate, convolute or involute, soft, rarely rigid; ligule membranous. Inflorescence in panicles contracted or open, spiciform, ovate, or pyramidal; the rachis glabrous, scabrous, or pubescent. Spikelets (1)2- to 6-flowered, short pedicellate; rachilla pubescent or glabrous, usually prolonged beyond the upper floret; disarticulation above the glumes and between the florets; glumes heteromorphic, lanceolate to ovate-lanceolate, equal or unequal, first glume 1- to 3-nerved, usually shorter and narrower than the second, second glume 3- to 5-nerved; lemmas lanceolate, (3)5(7)-nerved, usually awned or muticous, with apex and margins hyaline, glabrous or pubescent, slightly keeled and compressed, rarely terete; apex with 2 to 4 short awns, entire, or 2-toothed; central awn from the upper third, rarely the middle, of the subapical portion of the lemma; awn exerted, geniculate or merely divaricate; callus short pilose; palea not tightly enclosed by the margins of the lemma (gaping), 2-keeled, hyaline, usually shorter than the lemma; stamens 3, anthers 0.3–4.5 mm long; lodicules 2, membranous; ovary glabrous or with short and shining trichomes near the apex; endosperm solid or liquid, soft or hard. Caryopses compressed, soft; hylum short, punctiform. Basic chromosome number $x = 7$.

Comments. Our subgeneric treatment of the species that occur in Mexico and Central America includes two subgenera: *Trisetum* subg. *Trisetum* and *T.* subg. *Deschampsioidea*, and two sections in subgenus *Trisetum*: section *Trisetum* and section *Trisetoea* (Appendix 1). In the following key we have indicated what subgenus and/or section most species occur in (see leads 5a, 5b, 6a, and 8a).

KEY TO SPECIES OF *TRISETUM* IN MEXICO AND CENTRAL AMERICA

- 1a. Lemmas with the apex entire, slightly bidentate, or irregularly dentate; nerves of the lemma not prolonged beyond the apex; lemma muticous or with a short subapical awn (but awned in *T. filifolium* var. *aristatum*).

- 2a. Glumes very unequal in length, shorter than the spikelet, covering nearly half of the spikelet length; spikelets 1- to 3-flowered; lemma with the apex obtuse to irregularly dentate; leaf blades flat or sometimes convolute or involute, never filiform; lodicules lanceolate, acute at the apex.
- 3a. Panicles 4–12 cm wide, open, lax; the branches capillary and flexuous; first glume 1.4–2.6 mm long; second glume 2–4.5 mm long 5. *T. pringlei*
- 3b. Panicles 0.6–1 cm wide, narrow and densely flowered; the branches closely appressed; first glume (2.7–)3–4 mm long; second glume 4–5.8 mm long 1. *T. angustum*
- 2b. Glumes subequal to equal in length, about two-thirds as long as the spikelet or as long as the spikelet; spikelets 2- or 3-flowered; lemma with the apex slightly bidentate to entire; leaf blades involute, filiform; lodicules linear, slightly bilobate at the apex.
- 4a. Lemma mucous or with a short subapical mucro 0.2–0.5 mm long 3a. *T. filifolium* var. *filifolium*
- 4b. Lemma awned on the upper third; the awn 3–5 mm long, geniculate 3b. *T. filifolium* var. *aristatum*
- 1b. Lemmas bidentate at the apex; intermediate and marginal nerves or only intermediate nerves prolonged beyond the apex as 2 to 4 apical setae; apical teeth sometimes without nerves; lemma aristate, the awn well developed, borne on the upper third, middle, or lower third of the lemma, not subapical.
- 5a. Awn always inserted on the upper third of the lemma (sometimes nearly in this position in *T. palmeri*); glumes unequal, the first glume shorter and narrower than the second glume; apex of the lemma with two setae formed by the projection of the intermediate nerves; lemma ± keeled in cross section; palea gaping (*Trisetum* subg. *Trisetum*).
- 6a. Panicles 2–15 cm wide, lax, mostly open or narrow, pyramidal; ovary pubescent or glabrous; culms glabrous below the inflorescence (*Trisetum* sect. *Trisetum*).
- 7a. Lemmas (2.5–)2.7–4.3 mm long, smooth to slightly scabrous; apex of the lemma bidentate; dorsal awn delicate, curved; first glume 1.7–2.5 mm long; second glume 2.8–3.8 mm long; lodicules truncate at the apex; endemic to Nuevo León, Mexico 2. *T. curvatum*
- 7b. Lemmas 4.3–6 mm long, strongly scabrous; apex of the lemma biaristulate; dorsal awn not delicate, geniculate; first glume 2.5–5 mm long; second glume 3.5–6.5 mm long; lodicules lobulate at the apex; from central Mexico to Peru 4. *T. irazuense*
- 6b. Panicles 0.5–1.3(–2) cm wide, spiciform or subspiciform; ovary glabrous; culms pubescent below the inflorescence.
- 8a. Lemmas glabrous; glumes scabrous on the keel, not ciliate; awn slightly scabrous; paleas scabrous on the keels (*Trisetum* sect. *Trisetiaera*).
- 9a. Glumes shorter than the spikelet, wide, the first 1-nerved, the second 3-nerved; ligule 0.5–1 mm long; plant not rhizomatous 9. *T. spicatum*
- 9b. Glumes as long as the spikelet, the first (1)3-nerved, the second (3)5-nerved; ligule 3–4 mm long; plants rhizomatous 7. *T. ligulatum*
- 8b. Lemmas pubescent; glumes scabrous or ciliate on the keel; awn scabrous or plumose; paleas scabrous or ciliate on the keels.
- 10a. Glumes ciliate on the keel and slightly shorter to as long as or longer than the spikelet; first glume 3.7–6 mm long, ovate-lanceolate; second glume 4.5–6.5 mm long, ovate-lanceolate to ovate; lemma awns plumose; paleas ciliate on the keels 8. *T. rosei*
- 10b. Glumes somewhat scabrous on the keel and shorter than the spikelet (about 2/3 the length); first glume 3–3.2 mm long, linear-lanceolate; second glume about 4 mm long, linear-lanceolate to lanceolate; lemma awns not plumose, but ciliate near the base; paleas scabrous on the keels 6. *T. barbatipaleum*
- 5b. Awn inserted on the lower third or near the middle of the lemma; glumes subequal, nearly as long as the spikelet or longer; lemma with apical teeth without prolongation of the intermediate nerves or with 2 to 4 setae; lemma rounded in cross section; palea sometimes enclosed by the margins of the lemma, not gaping (*Trisetum* subg. *Deschampsioidea*).
- 11a. Spikelets 2-flowered; panicles narrow, subspiciform to spiciform, 0.6–2(4) cm wide.
- 12a. Glumes equal in length and longer than the spikelet; spikelets 7.5–9 mm long; lemmas bidentate at the apex; panicles 1.5–2(–4) cm wide, tinged with purple and gold; ovary with trichomes at the apex 11. *T. martha-gonzaleziae*
- 12b. Glumes subequal, shorter than the spikelet; spikelets 6.5–7 mm long; lemmas with four setae at the apex; panicles 0.6–1 cm wide, green; ovary glabrous at the apex 13. *T. pinetorum*
- 11b. Spikelets 2- to 6-flowered; panicles open, lax, (1–)2–20 cm wide.
- 13a. Culms 150–300 cm tall, bambusiform, 5–7(–10) mm diam. below; lemma apex 2- or 4-dentate or -toothed, sometimes appearing almost entire, the lateral nerves do not contain nerves (vascular tissue) 17. *T. virletii*
- 13b. Culms 40–150 cm tall, herbaceous, usually less than 4 mm diam. below; lemma apex 2-lobed, or 4-awned due to the projection of intermediate and marginal nerves (setae) beyond the apex.
- 14a. Lemmas dorsally hirsute below the awn insertion; ovary with trichomes at the apex 10. *T. durangense*
- 14b. Lemmas glabrous or dorsally scabrous; ovary glabrous, rarely pilose (see *T. martha-gonzaleziae*).

- 15a. Lemma apex 2-lobed and 4-awned as teeth or setae.
 16a. Lemmatal awns borne above the middle of the lemma.
 17a. Lemma apex with four setae, the setae 0.6–1 mm long; paleas slightly shorter than the lemma; callus trichomes 1.2–1.7 mm long 15. *T. tonduzii*
 17b. Lemma apex without four setae; paleas as long as or slightly longer than the lemma; callus trichomes 0.5–1 mm long or less 12. *T. palmeri*
 16b. Lemmatal awns borne near the middle or on lower 1/3 or 1/4 of the lemma.
 18a. Ligules 3–6 mm long; paleas as long as or slightly longer than the lemma; rachilla trichomes about 0.5–1(–1.4) mm long ... 12. *T. palmeri*
 18b. Ligules 0.5–1(–2) mm long; paleas shorter than the lemma; rachilla trichomes 1.5–3 mm long 16. *T. viride*
 15b. Lemma apex 2-lobed without any additional awns or setae.
 19a. Spikelets (4)5- to 6-flowered 14. *T. spellenbergii*
 19b. Spikelets 2- or 3-flowered.
 20a. Ligules 3–6 mm long; rachilla trichomes 0.5–1(–1.4) mm long 12. *T. palmeri*
 20b. Ligules 0.5–1(–2) mm long; rachilla trichomes 1.5–3 mm long.
 21a. Glumes 7.5–9 mm long, equal, longer than the spikelet; panicles 1.5–2(–4) cm wide, contracted, subspiciform; ovary pilose 11. *T. martha-gonzaleziae*
 21b. Glumes 3–7 mm long, unequal, shorter than the spikelet; panicles 2–3 cm wide, open or somewhat contracted; ovary glabrous 16. *T. viride*

1. *Trisetum angustum* Swallen, *Phytologia* 4(7): 423. 1953. TYPE: Guatemala. San Marcos: between San Sebastián and summit of Volcán Tajumulco, on top of dry ridge in pine forest, 13 Feb. 1940, *J. A. Steyermark 35525* (holotype, F-1046546!; isotype, US-2236479 fragment & photo ex F!).

Perennial; culms 12–24 cm tall, glabrous, densely caespitose. Leaf sheaths glabrous or pubescent below; ligule 1.5–2.2 mm long; blades 3–8 cm × ca. 1 mm, flat, glabrous or sparsely pilose. Panicles 4–11 × 0.6–1 cm, narrow, densely flowered, the branches closely appressed. Spikelets 4.6–6 mm long, 2-flowered; rachilla sparsely pubescent, the trichomes about 0.6 mm long; glumes shorter than the spikelet, unequal; first glume (2.7–)3–4 mm long, 1-nerved; the second glume 4–5.8 mm long, 3-nerved; lemmas (lowest) 4–4.8 mm long, scabrous; apex irregularly toothed to 4-dentate, muticous or with a short subapical mucro; the mucro up to 0.5 mm long; callus obtuse, short pubescent, the trichomes 0.2–0.6 mm long; anthers 0.8–0.9 mm long. Caryopses ca. 2.1 mm long; endosperm solid, hard.

Distribution. This species was described from a Guatemalan specimen by Swallen (1953). A specimen from Chiapas, Mexico (*Matuda 2342a*), was cited in Pohl and Davidse (1994); however, we were not able to study this. This species was not cited for Mexico by Hernández-Torres and Koch (1988) but was included in Espejo-Serna et al. (2000).

Comments. The above description is based on

the study of type material and includes the description for *Trisetum angustum* given by Pohl and Davidse (1994), who also studied the holotype. This species appears closely related to *T. pringlei*. Pohl and Davidse (1994) suggested that *T. angustum* might be better treated as a variety of *T. pringlei* since these species are morphologically very similar. Both species have obtuse lemma apices and lack well-developed awns. These characteristics do not correspond well with the generic characteristics of *Trisetum*. Therefore, we consider the systematic position of these two species to be tentative or provisional. We have placed *T. angustum* and *T. pringlei* in *Trisetum* subg. *Trisetum* but have not assigned them to a section (see Appendix 1).

2. *Trisetum curvisetum* Morden & Valdés-Reyna, *Brittonia* 35: 375. 1983. TYPE: Mexico. Nuevo León: Zaragoza, Sierra Madre Oriental, Ejido La Encantada, sitio La Tinaja, 1 km N del aserradero, ca. 23°55'N, 99°45'W, 2830 m, 25 July 1981, *Valdés-Reyna & Capó VR-1419* (holotype, TAES not seen; isotypes, ANSM not seen, ENCB not seen, MEXU not seen, MO-3102085 not seen, NY not seen, TEX not seen, US-2978399!, UT not seen, XALU not seen).

Perennial, with short rhizomes; culms 50–150 cm tall, glabrous, weak; nodes 4, glabrous, dark. Leaf sheaths shorter than the internodes, glabrous to sparsely pubescent or only ciliate on the margins; ligule 1.1–2.5 mm long, membranous, oval,

ciliate or denticulate; blades (5–)9–20 cm × 1.5–8.5 mm, flat, glabrous or sparsely pubescent on the adaxial surface. Panicles 11–30(–36) × 2–15 cm, lax, mostly open, pyramidal, paucispiculate, rachis glabrous; pedicels 0.5–4.5 mm long, scabrous toward the apex; the branches flexuous, in verticels of five, ascending, widely spaced below becoming crowded near the apex. Spikelets 3–5.2 mm long, (1)2- or 3-flowered; rachilla 1–1.8 mm, glabrous to scabrous, sometimes with a few trichomes at the apex; glumes shorter than the spikelet, unequal, margins hyaline, apex acute, scabrous on the keel; first glume 1.7–2.5 mm long, linear-lanceolate, attenuate, 1-nerved; second glume 2.8–3.8 mm long, ovate-lanceolate, 3-nerved; lemmas (2.5–)2.7–4.3 mm long, lanceolate, laterally compressed, slightly keeled, awned, 5-nerved, the nerves conspicuous, glabrous to scabrous, slightly bidentate at the apex or the apex entire, the margins and apex hyaline; awn 3–5.5 mm long, borne on the upper $\frac{1}{4}$ or $\frac{1}{5}$, less than 1 mm from the apex, flexuous, delicate, curved, scabrous; callus obtuse, glabrous or sparsely pubescent, the trichomes ca. 0.1 mm long; paleas 2–3.1 mm long, hyaline, shorter than the lemma, 2-nerved, the nerves scabrous, acute at the apex; lodicules oblong truncate, 0.2–0.3 mm long; anthers 0.5–1 mm long; ovary with 1 or 2 short, curved and shining trichomes on the apex. Caryopses 1.7–2.2 × 0.4–0.6 mm; endosperm soft.

Chromosome number. $2n = 28$ (Hernández-Torres & Koch, 1988).

Anatomy and micromorphology. Ligule apices composed of papillose cells; trichomes absent; ligule epidermis more or less rectangular, short, with straight walls; prickles and macrohairs absent. Leaf sections flat; keeled and well developed; adaxial ribs absent; bulliform cells in fan-shaped groups between vascular bundles; abaxial epidermis composed of fusiform long cells, with straight walls; prickles present; short cells present both in costal and intercostal zones; stomata present only in abaxial epidermis.

Distribution. Endemic to Mexico, known only from Nuevo León, 2100–2500 m.

Comments. Although the occurrence of oblong truncate lodicules in *Trisetum curvisetum* is unusual in the genus in comparison with the typical form (lobulate to irregularly lobed or toothed) in the genus (Morden & Valdés-Reyna, 1983), no other characters seem to pose questions as to the generic position of this species. The presence of short, curved, and shining trichomes on the apex of the ovary and caryopsis confirms its generic position. The habit of the plant, the structure of the panicle,

the morphology of the spikelets, the presence of trichomes on the ovary, and caryopsis shape all suggest an affinity with *T. cernuum*.

Specimens studied. MEXICO. **Nuevo León:** Zaragoza, Sierra Madre Oriental, 7 km SE antes de La Encantada, por el camino Zaragoza–Ejido La Encantada, 23°55'N, 99°45'W, 25 July 1981. *J. Valdés-Reyna & M. Capó VR-1417* (US-2978400, paratype); ca. 15 mi. SW of Aramberri, 24°02'32.2"N, 99°44'04.1"W, 20 Sep. 2002, *Peterson et al. 16719* (ANSM, CONC. US); ca. 17 mi. SW of Aramberri, 20 Sep. 2002. *Peterson et al. 16723* (ANSM, CONC. US); Sitio La Encantada-La Tinaja on road to La Tinaja, 23°53'14.4"N, 99°47'44.2"W, 21 Sep. 2002, *Peterson et al. 16764* (ANSM, CONC. US).

3a. *Trisetum filifolium* Scribn. ex Beal var. ***filifolium***, Grasses N. Amer. 2: 375. 1896.

TYPE: Mexico. Chihuahua: cool slopes of the Sierra Madre, 9000 ft., 3 Oct. 1887, *C. G. Pringle 1431* (holotype, US-81773!; isotypes, CM not seen, US-825600!).

Perennial, caespitose, rhizomes absent; culms 30–60 cm tall, glabrous. Leaf sheaths glabrous, scaberulous, or pubescent; ligule (0.2–)1–3.5 mm long, membranous, truncate, glabrous or with short trichomes; blades 5–22 cm × 0.5–2 mm, involute, filiform, curved and flexuous, glabrous or slightly scabrous. Panicles 12–15 × 2–3 cm, lax, somewhat open, narrow, exerted; the branches semiverticillate, the half-whorls with 3 to 7(8) branches, the lower ones 4–6 cm long; rachis glabrous. Spikelets 3.5–6 mm long, (1)2- or 3-flowered; pedicels scabrous; rachilla 1–1.2 mm long, with trichomes ca. 1.5 mm long, the trichomes longer at the apex; glumes subequal, shorter, slightly longer, or about as long as the spikelet; first glume 2.5–6 mm long, 1(3)-nerved, second glume 3–7 mm long, 3-nerved; lower floret 3.5 mm long; lemmas 3.5–5 mm long, obscurely 5-nerved, strongly scabrous, sometimes scabrous-pubescent, terete, the margins involute enclosing the palea; apex entire or shortly bilobed, each lobe with two short teeth, muticous or with a short subapical mucro; mucro 0.2–0.5 mm long; callus pubescent or subglabrous, obtuse, trichomes ca. 0.2 mm long; paleas 3–4.5 mm long, shorter than the lemma, enclosed by the involute margins of the lemma (not gaping), 2-keeled, the keels well apart, ciliate or conspicuously scabrous; lodicules with acute apex and a lateral lobe below the middle, 0.4–0.5 mm long; anthers 1–2 mm long; ovary glabrous. Caryopses 1.5–2 mm long; endosperm solid.

Anatomy. Leaf blades in transverse section are without a well-developed keel and with prominent ribs; furrows more than one half of the leaf thick-

ness; sclerenchyma present as a continuous abaxial band, adaxial girders T-shaped, marginal sclerenchyma present; adaxial epidermis has trichomes and inconspicuous bulliform cells; the abaxial epidermis lacks trichomes or prickles.

Distribution. Endemic to Chihuahua, Durango (Herrera-Arrieta, 2001), and Hidalgo, Mexico, 1600–3100 m.

Comments. *Trisetum filifolium* differs from typical *Trisetum* species by having a terete lemma (vs. lemma keeled), the lemma apex entire or bilobed (vs. 2-aristulate to 2-dentate in *Trisetum*), the palea enclosed by the lemma (free from the lemma in *Trisetum*), and by having linear lodicules (vs. 2 or 3 lobate at the apex in *Trisetum*).

Specimens studied. MEXICO. **Chihuahua:** Sánchez, 12 Oct. 1910, *Hitchcock 7682* (US); 27.6 mi. NW of Rocheachi on road to Basigochi, 19 Sep. 1991, *Peterson et al. 10797* (US). **Hidalgo:** Zacualtíplán, trailsides, slopes & ravines by Río Panotlán, between Zacualtíplán & Olotla on road to Metztlán, 3 July 1947, *Moore 3250* (US).

KEY TO VARIETIES OF *TRISETUM FILIFOLIUM*

- 1a. Lemmas mucronate, the mucro 0.2–5 mm long, inserted apically 3a. *T. filifolium* var. *filifolium*
1b. Lemmas awned, the awn 3–5 mm long, geniculate and twisted, borne on the upper third of the lemma, i.e., inserted below the apex
..... 3b. *T. filifolium* var. *aristatum*

3b. *Trisetum filifolium* var. *aristatum* Scribn. ex Beal, *Grass. N. Amer.* 2: 375. 1896. TYPE: Mexico. Chihuahua: cool slopes of the Sierra Madre, alt. 9000 ft., 7 Oct. 1887, *C. G. Pringle 1430* (holotype, US-868411!; isotypes, MO-3727972 not seen, NY not seen).

Distribution. Endemic to Mexico in the Sierra Madre Occidental in Chihuahua and Durango and Sierra Madre Oriental in Coahuila, México, and Hidalgo (Hernández-Torres & Koch, 1988; Finot, 2003b).

Comments. Though Beal (1896) suggested that variety *aristatum* could be a different species, the overall morphology of the plant and the structure of the spikelets conform with the general description of *Trisetum filifolium*.

Specimens studied. MEXICO. **Durango:** 3.2 mi. S of La Peña on road toward La Puerta, 15 Sep. 2003, *Peterson et al. 17785* (CIIDIR, US). **Hidalgo:** Zimapán, near Puerto Ing. Isidro Díaz, km 230–235 on hwy. between Zimapán & Jacala, 7 July 1948, *Moore & Wood, Jr. 3765* (US). **México:** 28.3 mi. NE of Temascaltepec on Mex 134 towards Toluca, 7 Oct. 1991, *Peterson & Annable 11084* (US).

4. *Trisetum irazuense* (Kuntze) Hitchc., *Proc.*

Biol. Soc. Wash. 40: 82. 1927. Basionym: *Colomagrostis irazuensis* Kuntze, *Revis. Gen. Pl.* 2: 763. 1891. TYPE: Costa Rica. Volcán Irazú, 3000 m, Waldregion, 24 June 1874, *C. E. O. Kuntze 2334* (holotype, NY-346300 ex Herb. Kuntze!).

Trisetum scabriflorum Hitchc., *Contr. U.S. Natl. Herb.* 24: 358. 1927. TYPE: Colombia. Cauca: collected below Pitayó, Río Palo Basin, Tierra Adentro, 2400 m, Feb. 1906, *H. Pittier 1435* (holotype, US-531631!).

Trisetum scabrivalve Sodiro, *Revista Colegio Nac. Vicente Rocafuerte* 11: 84, 88 (Reprint 32, 36), 1930. TYPE: Ecuador. Crece en los pajonales del Pichincha, Paluguillo (Pifo), Chimborazo y El Altar (type not located).

Trisetum gracile E. Fourn., *Mexic. Pl.* 2: 108. 1886. hom. illeg., non *Trisetum gracile* (Moris) Boiss. *Trisetum fournierianum* Hitchc., *Contr. U.S. Natl. Herb.* 17: 326. 1913. TYPE: “San Luis de Potosí,” *M. Virlet d’Aoust 1382* (lectotype, designated here, P!; isotype, US-726971b fragment ex P!).

Perennial, caespitose; culms 75–100 cm tall, glabrous, up to 2 mm diam. on the lower internodes; nodes 3, glabrous. Leaf sheaths shorter or slightly longer than the internodes, glabrous or pubescent; basal sheaths pubescent; ligule 2–4 mm long, membranous, pubescent to densely pubescent, the apex truncate, dentate or ciliate; blades 20–30 cm × 2.5–6 mm, flat, glabrous or pubescent; upper blades 5–10 cm long. Panicles (7–)13–25 × (1–)2–5 cm wide, lax, narrow, yellow-green to deep green and purple; rachis glabrous to sparsely pubescent; the branches appressed and ascending. Spikelets 4–7(–9) mm long, 2- or 3-flowered; pedicels 2–7 mm long, glabrous to sparsely pubescent, sometimes scabrous; rachilla 1–1.7 mm long, covered with stiff trichomes, the trichomes 0.5–1 mm long; glumes very unequal, shorter than the spikelet; the keel scabrous on the upper half, the margins hyaline; lower glume 2.5–5 mm long, narrow, linear, 1-nerved, acute at the apex, half as long as the spikelet; upper glume 3.5–6.5 mm long, lanceolate to ovate-lanceolate, abruptly attenuate, 3-nerved, $\frac{3}{4}$ as long as the spikelet; lemmas 4.3–6 mm long, 5-nerved, the nerves inconspicuous toward the base, strongly scabrous on the upper half, green and purplish toward the apex, sometimes with short trichomes toward the base; apex awned, hyaline, biaristate or toothed, the apical awns ca. 0.5 mm long, conspicuous; awn (2.5–)5.5–8.5 mm long, borne on the upper $\frac{1}{3}$ or $\frac{1}{4}$, straight or twisted and geniculate; callus obtuse, with short trichomes, the trichomes ca. 0.2–0.3 mm long; paleas 3.2–4.6 mm long, slightly shorter than the lemma, hyaline, 2-keeled, the keels scabrous on the upper half, 2-dentate to 2-awned at the apex; lodicules ca. 0.7

mm long, bilobed at the apex, the lobes acute; anthers (0.8–)1.2–1.8 mm long; ovary glabrous. Caryopses 2.2–3 mm long; endosperm soft.

Chromosome numbers. $2n = 28, 42$ (Hernández-Torres & Koch, 1988).

Anatomy. Leaf blades are flat in transverse section, with rounded adaxial ribs; furrows less than one half of the leaf thickness; first-order vascular bundles with adaxial and abaxial girders; second-order vascular bundles with adaxial girder; third-order vascular bundles with small sclerenchyma strands; bulliform cells in fan-shaped groups at the base of the furrows; abaxial epidermis with fusiform intercostal long cells with straight side walls; stomata not seen; prickles rare; trichomes present; costal cork cells and silica bodies in pairs or short rows.

Distribution. This species has been reported for Mexico (Chiapas, Distrito Federal, Durango, Hidalgo, México, Oaxaca, Puebla, San Luis Potosí, and Veracruz), Costa Rica, Panama, Honduras, Colombia, Venezuela, Ecuador, and Peru; 2700–3600 m (Pohl, 1980; Hernández-Torres & Koch, 1988; Davidse et al., 1994; Finot, 2003b).

Comments. A lectotype (*M. Virlet d'Aoust 1382*) at P was here chosen to stabilize the name since there was another syntype (*F. M. Liebmann 613*) cited in the original protologue by Fournier (1886). A specimen of *Liebmann 613* was not found at P.

Specimens studied. COSTA RICA. **San José:** pasture upper slopes of volcán Irazú, 24 Feb. 1965, *Godfrey 66635* (US); San José, S-SW of Cerro Chirripó, 10 Dec. 1967, *Weston 3673* (CR). GUATEMALA. **Huehuetenango:** near Tunimá, Sierra de los Cuchumatanes, 6 July 1942, *Steyermark 48276* (US 2208636). MEXICO. **La Hoya, Liebmann 613** (isosyntypes, C, US-726971). **México:** Popo Park, 4 Aug. 1910, *Hitchcock 1448* (P), 4–8 Aug. 1910, *Hitchcock 5974* (US); open fir woods, Sierra de Las Cruces, 5 Oct. 1895, no collector (P). PANAMA. **Chiriquí:** Chiriquí volcano, 29 Sep. 1911, *Hitchcock 8221* (US), 29–30 Sep. 1911, *Hitchcock 8224* (S). PERU. **Piura:** 23 km E of Sónдор, on road toward Tabacones, 31 Mar. 2000, *Peterson & Refulio-Rodríguez 15135* (US).

5. *Trisetum pringlei* (Scribn. ex Beal) Hitchc., Proc. Biol. Soc. Wash. 40: 82. 1927. Basionym: *Gropheporum pringlei* Scribn. ex Beal, Grasses N. Amer. 2: 561. 1896. TYPE: Mexico. Oaxaca: summit of Sierra de San Felipe, 10,000 ft., 4 Aug. 1894, *C. G. Pringle 4765* (holotype, US-822340!; isotypes, CM not seen, ENCB not seen, MO not seen, P!, US-749287!, US-251958!).

Perennial, caespitose; culms 25–80 cm tall, glabrous; nodes (1)2 or 3, glabrous. Leaf sheaths glabrous or pubescent, sometimes only pubescent at

the apex, shorter or longer than the internodes, sometimes one side extended above summit as a sheath auricle; ligule 0.5–1.5 mm long, the apex truncate to ovate, minutely denticulate and ciliate; blades 4–9(–12) cm × 2–5 mm, flat, sometimes subinvolute, the lower blades glabrous or pubescent, ciliate on the margins, the upper blades glabrous. Panicles 4–17 × 4–12 cm, open, lax, usually purplish; branches up to 8 cm long, verticillate, capillary and flexuous; rachis glabrous to somewhat scabrous. Spikelets 3.5–6.5 mm long, 1- or 2(3)-flowered, pedicels up to 4 mm long, capillary, glabrous, purple; rachilla 1–1.5 mm long, with trichomes 0.5–1 mm long, distributed toward the apex; glumes unequal, shorter than the spikelet, acute, the keel smooth or scabrous on the upper half; first glume 1.4–2.6 mm long, linear-lanceolate, shorter and narrower than the second, 1-nerved; second glume 2–4.5 mm long, lanceolate, 3-nerved; lemmas 2.6–4 mm long, strongly scabrous, sometimes covered by short trichomes, purple, terete, 5-nerved, the nerves conspicuous toward the apex; margins hyaline; apex truncate, entire or mucronate; subapical mucro when present less than 1 mm long; paleas 2.2–2.9 mm long, shorter than the lemma, hyaline, 2-nerved, sometimes purple-tinged, the keels scabrous to ciliate-scabrous on the upper half; callus obtuse, with trichomes 0.1–0.5 mm long; lodicules 0.4–0.7 mm long, linear, not lobed, the apex obtuse, ciliate; apex rounded or acute; anthers 0.6–1.2 mm long; ovary glabrous. Caryopses 1.4–1.9 mm long, ca. 0.4 mm wide; endosperm solid.

Anatomy and micromorphology. Leaf ligule apex has only papillate cells and the epidermis is composed of more or less rectangular long cells with straight side walls; hooks and prickle hairs present; stomata were not seen. Leaf blades in transverse section are without a keel and have well-developed ribs; furrows more than one half of the leaf thickness, bulliform cells inconspicuous; vascular bundles with both adaxial and abaxial girders alternate with free bundles without associated sclerenchyma, adaxial girder T-shaped, abaxial girders I-shaped, marginal sclerenchyma present; trichomes on both adaxial and abaxial surfaces, stomata present on the adaxial epidermis; abaxial epidermis composed of long cells with undulate side walls; costal cork cells-silica bodies present, trichomes present, prickles not seen.

Distribution. Mexico (Chiapas, Oaxaca, Puebla), Guatemala, Costa Rica, and Panama; 1500–3500 m (Hernández-Torres & Koch, 1988; Finot, 2003b).

Comments. The number of florets in *Trisetum pringlei* varies from one to three per spikelet. One-flowered spikelets are infrequent in *Trisetum*, and are found in some individuals of *T. filifolium*, *T. pringlei*, and in the South American *T. ambiguum* Rúgolo & Nicora (Rúgolo de Agrasar & Nicora, 1988).

On the basis of morphological, anatomical, and embryological characteristics, Hernández-Torres and Koch (1988) concluded that this species belongs in *Trisetum*, as was proposed by Hitchcock (1927). *Trisetum pringlei* differs from typical species of *Trisetum* by having lemma apices that are entire and mucronate, and linear lodicules with entire (not lobed) apices. Further studies are needed to clarify the generic assignment of *T. pringlei* (see Appendix 1).

Specimens studied. COSTA RICA. **Cartago:** along the Pan American Hwy., Cerro de la Muerte, 8 Aug. 1972, Taylor 11750 (US); Cráter volcán Irazú, 26 Oct. 1950, Anderson 1339 (US-2042177); Cerro de la Muerte, Pan American Hwy., 5 km above Millsville, cordillera de Talamanca, 22 July 1949, Holm & Iltis 483 (P). **San José:** Cordillera de Talamanca, Cerro de La Muerte, Asunción summit, 13 July 1968, Pohl & Davidse 10694 (CR). GUATEMALA. **Huehuetenango:** between Tojquiá and Caxán bluff, summit of Sierra de los Cuchumatanes, 6 Aug. 1942, Steyermark 50224 (US). **Totonicapán:** region of Chiu Jolán, mounts above Totonicapán, on road to Desconsuelo, 23 Jan. 1941, Standley 84473 (US). PANAMA. **Chiriquí:** Chiriquí Volcano, 29–30 Sep. 1911, Hitchcock 8228 (US). MEXICO. **Oaxaca:** summit of Sierra de San Felipe, 4 Aug. 1894, Pringle 4756 (P); vicinity of Cerro San Felipe, 1894, Nelson 1108 (US).

6. *Trisetum barbatipaleum* (Hultén ex Veldkamp) Finot, Contr. U.S. Natl. Herb. 48: 661. 2003. Basionym: *Trisetum spicatum* var. *barbatipaleum* Hultén ex Veldkamp, Gard. Bull. Singapore 36(1): 135. 1983. *Trisetum spicatum* subsp. *tolucense* var. *barbatipaleum* Hultén, Svensk Bot. Tidskr. 53: 223. 1959, nom. inval. TYPE: Mexico. Hidalgo: Trinidad Iron Works, 1770 m, 21 Aug. 1905, C. G. Pringle 10032 (lectotype, designated by Veldkamp, in Veldkamp & Van der Have (1983: 135), S not seen; isotypes, C not seen, L not seen, P!, SI!, US-462083!).

Perennial, caespitose; culms ca. 40 cm tall, pubescent; nodes pubescent. Leaf sheaths shorter than the internodes, pubescent; blades ca. 7 cm × 1–2 mm, flat, pubescent abaxially, glabrous adaxially. Panicles 8–10 × 0.5–1 cm, spiciform, interrupted; rachis pubescent; pedicels pubescent. Spikelets 5–5.2 mm long, 2-flowered; rachilla ca. 1 mm long, pilose; glumes unequal, shorter than the spikelet, somewhat scabrous on the keel; first

glume 3–3.2 mm long, shorter and narrower than the second glume, linear-lanceolate to lanceolate, slightly longer than half of the spikelet, 1-nerved; second glume ca. 4 mm long, ovate-lanceolate to ovate, $\frac{2}{3}$ as long as the spikelet, 3-nerved; lemmas 3.5–5 mm long, pubescent, 2-aristulate at the apex, awned on the upper third; awn ca. 6 mm long, curved, divaricate, not geniculate or twisted, ciliate near the base and scabrous above; callus with short trichomes, the trichomes ca. 2 mm long; paleas shorter than the lemma, ciliate toward the apex. Lodicules ca. 1 mm long, bilobed at the apex; ovary glabrous. Caryopses not seen.

Distribution. Endemic to Mexico where the species is known only from the type locality.

Comments. *Trisetum barbatipaleum* differs from *T. spicatum* in having conspicuously pubescent lemmas. It is closely related to *T. rosei* and differs from the latter by having a narrower panicle, glumes that are shorter than the spikelets and scabrous along the keel, and a first glume that is narrow and linear-lanceolate. *Trisetum rosei* has ovate glumes as long as the spikelet, a wider and more densely flowered panicle, glumes that are conspicuously ciliate on the keel, and a lemma with a plumose awn.

7. *Trisetum ligulatum* Finot & Zuloaga, sp. nov.

TYPE: Mexico. Veracruz: La Perla, N side of Pico de Orizaba, above the Piedra Grande mountaineering shelter, 19°03'N, 97°16'W, 4200 m, 21 Sep. 1986, M. Nee 33192 (holotype, SI!; isotype, CONC!). Figure 1.

Planta rhizomatosa, 13–30 cm alta; culmi erecti, pilosi; vaginae pilosae; ligula 3–4 mm longa, hialina, truncata, dorso pilosa; laminae planae (5–20 cm × 1–2.5 mm), pilosae; panicula spiciformis; spicula 5–6.5 mm longa, 2–3-flora; glumae subaequales, inferiores (1)3-nervatae, superiores (3)5-nervatae; lemmata scabra, 5-nervata, ad terciam superiorem aristata, apice biaristato; arista 2–3.5 mm longa; callus brevis pilosus; palea paulo brevior quam lemma; lodiculae ad apicem 3-lobatae; ovarium glabrum.

Perennial, with short rhizomes; culms 13–30 cm tall, erect, pilose below the panicle, the trichomes antrorse above then retrorse below; nodes 1 to 3, glabrous. Leaf sheaths longer than the internodes, pubescent; ligules 3–4 mm long, dorsally pilose, truncate; blades 5–20 cm × 1–2.5 mm, flat or conduplicate, pubescent. Panicles 5–9 × 0.5–1.2 cm, spiciform, green or purple; rachis densely pubescent; spikelets 5–6.5 mm long, 2- or 3-flowered; rachilla ca. 1 mm long, sparsely pubescent, the trichomes 0.5 mm long; glumes subequal, nearly as long as the spikelet, acute, the keel scabrous on the upper half, green or purple; first glume 3.8–6

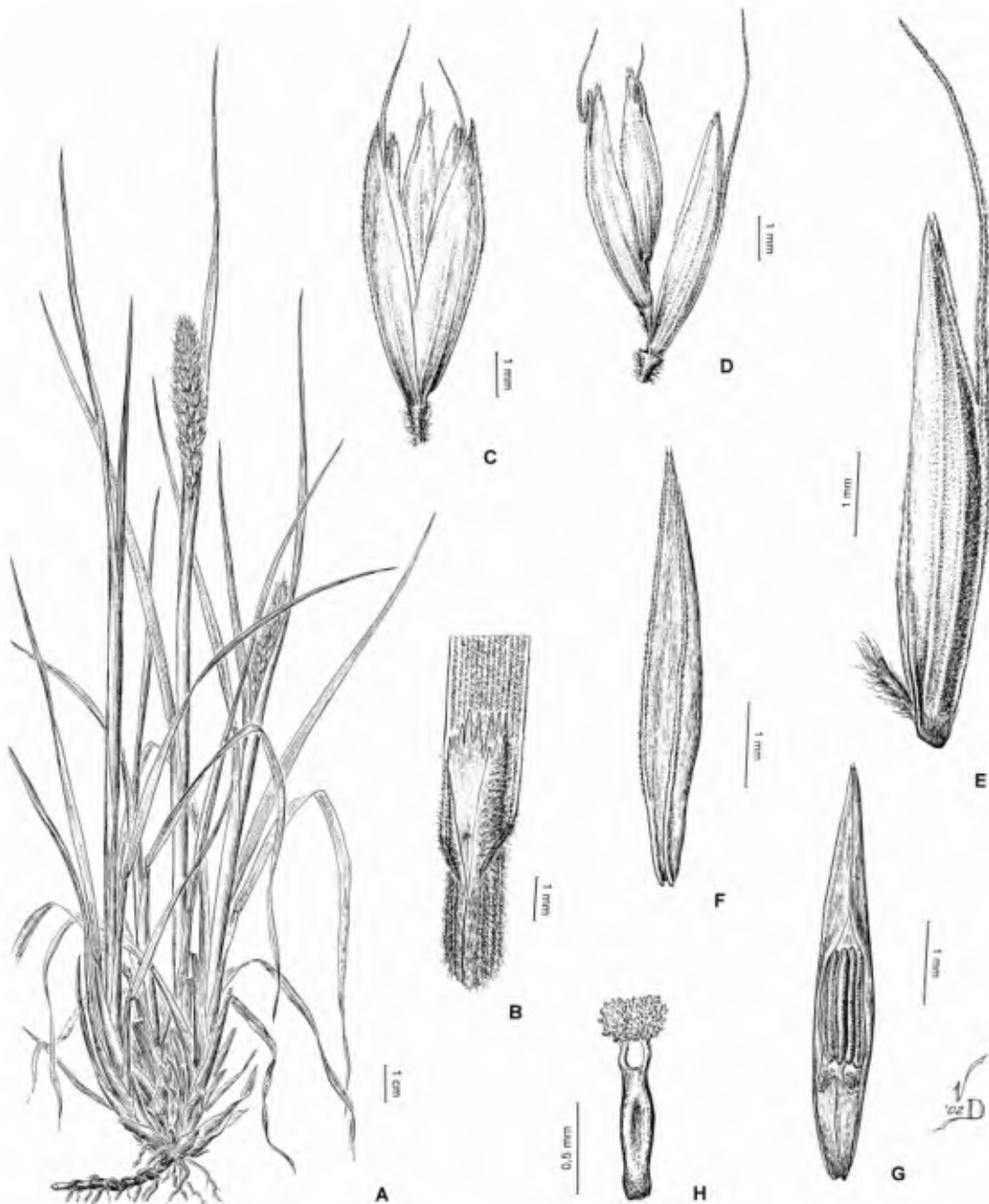


Figure 1. *Trisetum ligulatum* (Nee 33192). —A. Habit. —B. Sheath, ligule, and portion of the blade. —C. Spikelet. —D. Florets (3). —E. Floret. —F. Palea, dorsal view. —G. Palea, lodicules, and stamens, ventral view. —H. Pistil.

mm long, as long as or shorter than the first floret, (1)3-nerved; second glume 4.5–6.5 mm long, (3)5-nerved; lemmas 4.3–6.5 mm long, scabrous, 5-nerved, keeled, awned; margins hyaline toward the apex; apex biaristate; awn inserted on the upper third, 2–3.5 mm long, curved, scabrous; callus short pilose, the trichomes 0.5 mm long; palea

nearly as long as its lemma, scabrous on the keels; lodicules 3-lobed at the apex; anthers ca. 1.5 mm; ovary glabrous. Caryopses not seen.

Anatomy. Leaf blades in transverse section are without a keel and have well-developed ribs with furrows more than half the leaf thickness; bulliform

cells are inconspicuous, trichomes present only in the abaxial epidermis, continuous abaxial sclerenchyma band absent, vascular bundles of first order without girders, bearing small strands of both adaxial and abaxial sclerenchyma, marginal sclerenchyma present; stomata present in both adaxial and abaxial epidermes; abaxial epidermis with rectangular to fusiform long intercostal cells, short costal cells solitary or in cork cell-silica body pairs, prickly hairs present.

Distribution. This new species is known only from the higher elevations (3810–4200 m) of Jalisco and Veracruz, Mexico.

Comments. *Trisetum ligulatum* resembles *T. spicatum* in having spiciform panicles and culms pilose below the inflorescence. It differs from *T. spicatum* in having short rhizomes (vs. none), dorsally pubescent ligules 3–4 mm long (vs. glabrous ligules ca. 1 mm long), spikelets with the first glume 3-nerved and the second glume 5-nerved (vs. first glume 1-nerved and second glume 3-nerved, and with both glumes nearly as long as the spikelet (vs. shorter than the spikelet).

Paratype. MEXICO. **Jalisco:** Nevado de Colima, 20 mi. SW of Ciudad Guzmán and 14 mi. SW of paved hwy. up road toward the Nevado, 23 Nov. 1995. *P. M. Peterson & R. Blackburn 13778* (US).

8. *Trisetum rosei* Scribn. & Merr., Contr. U.S. Natl. Herb. 8(4): 289. 1905. *Trisetum rosei* var. *tenerum* Scribn. & Merr., Contr. U.S. Natl. Herb. 8: 289. 1905. *Trisetum rosei* Scribn. & Merr. fo. *tenerum* (Scribn. & Merr.) Louis-Marie, Rhodora 30: 239. 1929. TYPE: Mexico. Volcán Popocatepetl, 3600 m, 7–8 Aug. 1901, *J. N. Rose & R. Hoy 6016* (holotype, US-395813!; isotypes, ENCB not seen, MEXU-4703 not seen, NY-431715 not seen).

Perennial, caespitose; culms 25–50 cm tall, densely pubescent, the trichomes antrorse above then retrorse below; nodes 2. Leaf sheaths glabrous or retrorsely tomentose, shorter than the internodes; ligule 1–2.5 mm long, scabrous on the dorsal surface, truncate, conspicuously ciliate; blades 6–15 cm × 2–4 mm, flat, glabrous to pubescent on both sides, soft or stiff, conduplicate or the margins involute, the uppermost leaf blade 3–6 cm long. Panicles 6–13 × 1–1.5 cm, subspiciform, dense, ± linear, acute at the apex, sometimes interrupted; rachis pubescent. Spikelets 5–7 mm long, 2(3)-flowered; pedicels up to 3 mm long; rachilla ca. 1 mm long, pubescent, the trichomes stiff, ca. 0.5 mm long; glumes slightly shorter to as long as or longer than the spikelet, ciliate on the keel, the margin

hyaline, the apex acute, faintly tinged with purple; first glume 3.7–6 mm long, lanceolate to ovate-lanceolate, usually 1- or 3-nerved; second glume 4.6–6.5 mm long, ovate-lanceolate to ovate, 3-nerved; lemmas 4.2–6.2 mm long, pubescent, awned; apex bisetulate and hyaline, seta 0.3–0.7 mm long; awn 2.5–5 mm long, borne on the upper third, plumose, curved, not twisted or bent; callus obtuse, with trichomes 0.3–0.5 mm long; paleas 3–4.5 mm long, glabrous to pubescent, shorter than the lemma, 2-nerved, the keels ciliate; apex bidentate, hyaline; lodicules 0.5–1 mm long, 2-lobed at the apex, the lobes unequal, acute; anthers 1–1.5 mm long; ovary glabrous. Caryopses 2.5–2.7 mm long, ca. 0.6 mm wide; endosperm liquid or soft.

Anatomy and micromorphology. Ligule apices have short stiff trichomes, and the epidermis is composed of more or less rectangular long cells with straight side walls, hooks very frequent; no trichomes or stomata were seen. Leaf blades in transverse section did not have a keel but had well-developed ribs with furrows more than one half the leaf thickness; bulliform cells inconspicuous; trichomes present in both adaxial and abaxial epidermes with a continuous abaxial sclerenchymatic band present; first- and second-order vascular bundles with adaxial and abaxial girders; adaxial girders T- or anchor-shaped; marginal sclerenchyma present; abaxial epidermis with long cells with undulated side walls, intercostal hooks and stomata present, cork cells and silica bodies present in costal zones; no trichomes were seen in the abaxial epidermis.

Distribution. Guatemala and Mexico (Hidalgo, México, Puebla, and Veracruz), between 2500 and 4300 m (Espejo-Serna et al., 2000).

Comments. *Trisetum rosei* was considered a synonym of *T. spicatum* by Hernández-Torres and Koch (1988). *Trisetum rosei* can be easily recognized by its pubescent lemmas, ciliate glumes, plumose awned lemmas, paleas with ciliate keels (vs. lemmas glabrous, glumes scabrous, lemma awns not plumose, and scabrous palea keels in *T. spicatum*), and, in cross section, an abaxial band of continuous sclerenchymatous tissue (absent in *T. spicatum*).

Specimens studied. GUATEMALA. **Huehuetenango:** Sierra de los Chuchumatanes, 6 July 1942, *Steyermark 48279* (US). MEXICO. **Hidalgo:** Inter Pachuca et Mineral del Chico, 20 Dec. 1931, *Fröderström & Hultén 3* (S); mtns. above Pachuca, 4 Aug. 1898, *Pringle s.n.* (US); between Pachuca & Real del Monte, 19 July 1905, *J. N. Rose, Painter & J. S. Rose 8686* (US). **México:** Volcán Ixtaccihuatl, media falda, 13 Sep. 1953, *Matuda 29044* (US); 24.2 km E of Amecameca & 2.5 km S of Paso de

Cortéz, 10 Oct. 1991, *Peterson & Annable 11103* (US); Paso de Cortéz, 17 Sep. 1958, *Beaman 2562* (US); Mt. Popocatepetl, 5–6 Aug. 1910, *Hitchcock 5987* (US); Ixtaccihuatl, NW side of mt. ca. 9 km E of San Rafael, 16 July 1959, *Beaman 2853* (US). **Puebla:** N side of Popocatepetl, 11 Sep. 1957, *Beaman 1729a* (US); ca. 1 km Paso de Cortéz, 21 July 1959, *Beaman 2892* (US); Mt. Orizaba, 17–18 Aug. 1910, *Hitchcock 6261* (US); Mpio. San Nicolás de Los Ranchos, La Joya, Volcán Ixtaccihuatl, 7 km N carretera a Amecameca, 13 km E Amecameca, 28 Oct. 1976, *Koch 76231* (US); Mpio. de Tochimilco, Paso Cortéz, Tlamacos, 16 km ESE of Amecameca, 18 Oct. 1976, *Koch 76205b* (US). **Veracruz:** Mt. Orizaba, Mar. 1908, *Purpus 3018* (BAF); Pico de Orizaba, N of Cueva del Muerto, 21 Sep. 1957, *Beaman 1778a* (US).

9. *Trisetum spicatum* (L.) K. Richt., Pl. Eur. 1: 59. 1890. Basionym: *Aira spicata* L., Sp. Pl. 1: 64. 1753. *Aira subspicata* L., Syst. Nat. ed. 10 2: 873. 1759, nom. illeg. superfl. *Avena airoides* Koeler, Descr. Gram. 298, 1802, nom. illeg. superfl. *Trisetum subspicatum* (L.) P. Beauv., Ess. Agrost. 88, 149. 1812, nom. illeg. superfl. *Trisetaria airoides* (Koeler) Baumg., Enum. Stirp. Transsilv. 3: 265. 1816, nom. illeg. superfl. *Trisetum airoides* (Koeler) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 666. 1817, nom. illeg. superfl. *Koeleria subspicata* (L.) Rehb., Fl. Germ. Excurs. 49. 1830, nom. illeg. superfl. *Koeleria spicata* Rehb. ex Willk. & Lange, Prodr. Fl. Hispan. 1: 72. 1861, nom. inval. *Trisetaria spicata* (L.) Paunero, Anales Jard. Bot. Madrid 9: 516. 1959. TYPE: Sweden. Lapland: 1732, *Linnaeus s.n.* (lectotype, designated by Edgar & Connor, in Edgar (1998: 556), LINN-85.7!; isotype, S!).

Avena talucensis Kunth, Nov. Gen. Sp. 1: 148. 1816. *Trisetum talucense* (Kunth) Kunth, Revis. Gram. 1: 101, t. 60. 1829. *Trisetum spicatum* subsp. *talucense* (Kunth) Hultén, Svensk Bot. Tidskr. 53: 222. 1959. TYPE: Mexico: "crescit in apricis, frigidis, prope urbem mexicanam Toluca, alt. 1380 hexap.," *Humboldt & Bonpland s.n.* (holotype, P!; isotypes, BAA-3419 fragment ex K!, BAA-3420 fragment ex P!).

Trisetum nivasum E. Fourn., Mexic. Pl. 2: 107. 1886. *Trisetum spicatum* var. *nivasum* (E. Fourn.) Louis-Marie, Rhodora 30: 239. 1928 [1929]. TYPE: Mexico. Nevado de Toluca, Sep. 1865, *Hahn s.n.* (lectotype, designated by Finot (2003b: 688), P!; isotype, US-fragment ex P-Fourn!).

Perennial, caespitose; culms 9–50 cm tall, erect, densely pubescent below the inflorescence, the trichomes antrorse above, retrorse below; nodes 1 or 2. Leaf sheaths 1–3(–6) cm long, glabrous; ligule 0.5–1 mm long, minutely denticulate; blades 1–4 cm × 1–1.5 mm, flat, conduplicate toward the apex, glabrous to pubescent, sometimes scabrous or ciliate on the margins, the upper blade 1–5 cm long. Panicles 2.5–7(–10) × 0.5–1.3(–2) cm, spi-

ciform, green to purple, shining, usually interrupted on the lower portions; rachis pubescent. Spikelets 4.5–5.5 mm long, (1)2-flowered; pedicels pubescent; rachilla ca. 1 mm long with trichomes 0.5–1 mm long; glumes subequal, wide, shorter than the spikelet, or the first glume somewhat shorter and narrower than the second glume, scabrous or more rarely ciliate on the keel; first glume 3.7–4.8 mm long, lanceolate to ovate-lanceolate, 1-nerved; second glume 4.5–5.5 mm long, ovate, 3-nerved; lemmas 3.8–5 mm long, glabrous, purplish toward the base, awned; margins hyaline; apex 2-aristate; awn 3.5–5 mm long, borne on the upper third or upper fourth, geniculate to curved, sometimes slightly twisted, scabrous, purplish; callus obtuse with trichomes 0.3 mm long; paleas 3–4 mm long, free from the lemma, shorter to slightly longer than the lemma, hyaline, 2-nerved, the keels scabrous; lodicules 0.6 mm long, hyaline, 2-lobed at the apex; ovary glabrous. Caryopses 2–2.8 mm long, ca. 0.6 mm wide; endosperm liquid.

Anatomy and micromorphology. Ligule apices have long cells and papillate cells with trichomes absent; epidermis with rectangular long cells with straight side walls, without trichomes, hooks, or stomata. Leaf blades in transverse section have prominent ribs with furrows deeper than one half the leaf thickness; adaxial and abaxial girders present; marginal sclerenchyma present; adaxial epidermis with inconspicuous bulliform cells; abaxial epidermis without trichomes and only few prickles present.

Distribution. Cosmopolitan and widespread. Hultén (1959) and Clebsch (1960) gave a detailed account of the distribution of *Trisetum spicatum*. In Mexico and Central America *T. spicatum* is usually found between 1900 and 4500 m.

Comments. *Trisetum spicatum* has been considered a complex, with many subspecies or varieties (Louis-Marie, 1928–1929; Hultén, 1959). Louis-Marie recognized 14 varieties and Hultén (1959) divided *T. spicatum* into 22 infraspecific taxa, including 14 subspecies and 8 varieties. In a phenetic study, Randall and Hilu (1986) concluded that the morphological variation is extreme and does not support the recognition of infraspecific taxa. In this treatment we interpret *T. spicatum* in a stricter sense, revalidating *T. rosei* and raising *T. spicatum* var. *barbatipaleum* to specific status. However, *T. spicatum* remains an extremely variable taxon with a large number of synonyms. In this revision we have included only those synonyms that occur in the study area, in addition to the basionym and its nomenclatural synonyms.

Specimens studied. DOMINICAN REPUBLIC. **Distrito Nacional:** Santo Domingo, Tierra de Ocoa. Prov. de Azua, San José de Ocoa, Cuchilla del Pino Atravesado. 1 Mar. 1929, *Ekman 11714* (S); Cordillera Central. Prov. de la Vega, Pico del Valle Nuevo. 15 Oct. 1929, *Ekman 13759* (S). **Barahona:** Cordillera de Baharuco, Tierra de Los Comisarios. 29 Aug. 1926, *Ekman 6803* (S). MEXICO. **Durango:** in montibus Convalli Mexicani prope aguae stagni sen fluitans. Aug. 1857, *Shaffner 57* (P). **Hidalgo:** Sierra de Pachuca, 21 July 1901, *Pringle 9603* (US). **México:** Nevado de Toluca, 5 Sep. 1958, *Hernández X 10197* (US); Nevado de Toluca, en el cráter. 25 Sep. 1892, *Pringle 4303* (S, US); Nevado de Toluca, cráter. Nov. 1907, *Diguet s.n.* (P); Mt. Popocatepetl. *Hitchcock 5996* (US); Valle de Mexico, falda de Ixtaccihuatl. 1 May 1952, *Matuda 26101* (US); Nevado de Toluca. 12 July 1938, *Balls 5025* (US); Volcán Toluca. 9 Sep. 1893, *Nelson 17* (US); Ixtaccihuatl. above timberline. Oct. 1905, *Purpus 1617* (US). **Jalisco:** Nevado de Colima. 26 Aug. 1958, *Beaman 2357* (US). **Puebla:** Mt. Orizaba, between timber and snow line. *Hitchcock 6258* (US); Mt. Orizaba, alpine region. Nov. 1906, *Rose 1270* (US).

10. *Trisetum durangense* Finot & P. M. Peterson, sp. nov. TYPE: Mexico. Durango: Sierra Madre Occidental, 56 km W of Durango on Hwy. 40, 2400 m, 29 Sep. 1988, *P. M. Peterson & C. R. Annable 6034* (holotype, US!). Figure 2.

Planta perennis; culmi glabri vel scabri sub panicula; vaginæ pilosæ, internodia paulo breviores vel æquales; ligula 3–6(–7) mm longa, acuta, lacerata; laminae conduplicatæ, rigidae, 15–50 cm × 1–4 mm, subtus scabrae, supra scabrae vel sparse pilosæ; paniculae 15–22 × 5–20 cm, laxae; rhachis scabra; spiculae 7–9 mm longae, 2(3)-florae; glumae subæquales, quam anthoecia contigua minores; gluma inferior quam superior brevior angustiorque. 5–6 mm longa; gluma superior 6–9 mm longa; spicula inferior 7–9 mm longa; lemmata pilosa, 5-nervia, 4-aristulata; callus pilosus; rhachilla pilosa. 2 mm longa; palea 5.8–7 mm longa; lodiculæ 0.7–1.1 mm longae; stamina 3; ovarium ad apicem breve pilosum.

Perennial, caespitose, short rhizomatous; culms 75–110 cm tall, glabrous or retrorsely scabrous below the panicle; nodes 3, pubescent. Leaf sheaths 11–23 cm long, pilose, as long as or shorter than the internodes, with the membranous margin on one side sometimes projecting upward as long as a sheath-auricle; ligule 3–6(–7) mm long, acute, lacerated above; blades 15–50 cm × 1–4 mm, narrow, flat to conduplicate, rigid, strongly scabrous on the abaxial surface, scabrous and sparsely pubescent on the adaxial surface, ciliate on the margins. Panicles 15–22 × 5–20 cm, lax, drooping, open, pyramidal; branches appressed or ascending to spreading 0 to 75° from the culm axis, branches in 4 or 5 verticillate whorls per panicle, each whorl composed by 4 to 6 branches, apical branches 3–7 cm long, the lower branches 8–14 cm long; rachis, branches and pedicels strongly scabrous, cap-

illary, bearing spikelets on the distal ends. Spikelets 7–9 mm long, 2(or 3)-flowered; glumes equal to subequal, similar in shape, as long as the spikelet or slightly shorter than the spikelet (first); first glume 5–6 mm long, lanceolate, slightly shorter and narrower than the second glume, 3-nerved, scabrous on the keel, apex acute; second glume 6–9 mm long, lanceolate, 3-nerved, apex acute; lemmas 7–8 mm long, awned near the middle, pilose especially below the awn insertion, 5-nerved, the nerves conspicuous toward the apex but vanishing toward the base of the lemma; margins of the lemma flat; apex 2-lobed, the lobes acute with the intermediate and marginal nerves prolonged into 4 short apical awns; awn 7–10 mm long, geniculate and twisted, golden brown, exerted; callus pubescent, the trichomes ca. 1 mm long; rachilla ca. 2 mm long, pubescent; paleas 5.8–7 mm long, hyaline, 2-nerved, the nerves ciliate; lodicules 0.7–1.1 mm long, ciliate at the apex; anthers 2–3 mm long, curved trichomes; ovary ca. 1 mm long, covered with short, curved and shining trichomes near the apex. Caryopses 2–2.7 × ca. 0.7 mm; endosperm soft.

Anatomy and micromorphology. Ligule apex composed of trichomes and some papillose cells; ligule epidermis composed of long cells with straight walls; prickles absent on the dorsal surface, only present at margins; macrohairs and stomata absent. Transversal section of the leaf blade with conspicuous adaxial ribs; vascular bundles with adaxial girders T-shaped; abaxial girders united forming a continuous band of abaxial sclerenchyma; abaxial epidermis with macrohairs and abundant prickles; epidermal long cells with undulate lateral walls; short cells present in costal and intercostal zones; stomata absent in abaxial epidermis.

Distribution. Known only from the state of Durango, *Trisetum durangense* occurs in open pine forests between 2400 and 2600 m.

Comments. *Trisetum durangense* is distinguished by its pilose sheaths; pubescent nodes; strongly scabrous blades; panicle with rachis, branches, and pedicels strongly scabrous; long, pilose lemmas; and an ovary with short, curved, and shining trichomes at the apex. The presence of these apical trichomes on the ovary is found in several taxa, including *T. cernuum* Trin. and *T. canescens* Buckley from North America, and *T. hirtiflorum* Hack., *T. caudulatum* Trin. var. *correae* Nicora, and *T. longiglume* Hack. var. *longiglume* from South America. *Trisetum durangense* is the only species in subgenus *Deschampsioidea* with pubescent lemmas and with an ovary with curved and

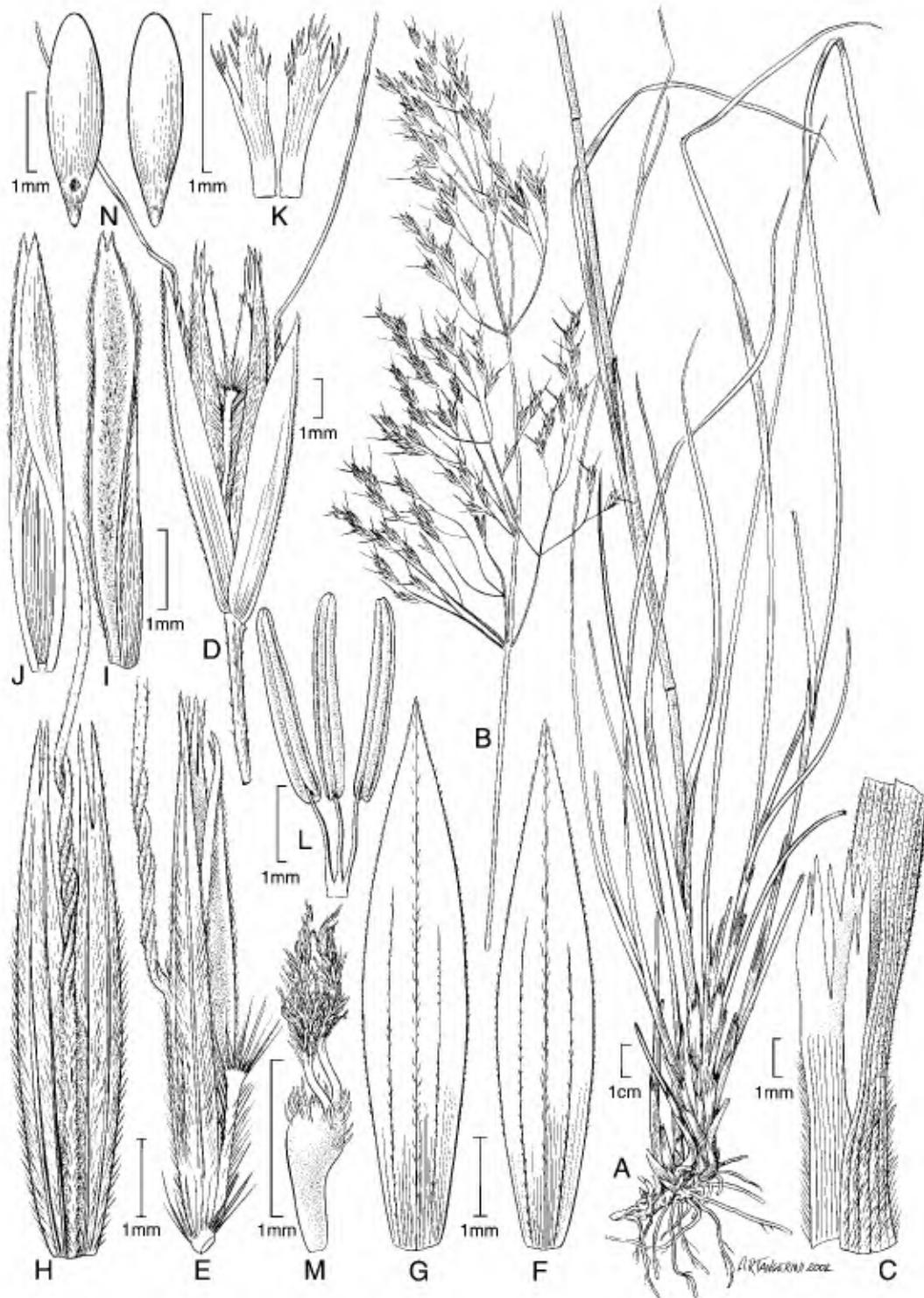


Figure 2. *Trisetum durangense* (Peterson & Annable 6034). —A. Habit. —B. Inflorescence. —C. Sheath, ligule, and portion of the blade. —D. Spikelet. —E. Floret. —F. First glume, dorsal view. —G. Second glume, dorsal view. —H. Lemma, dorsal view. —I. Palea, dorsal view. —J. Palea, ventral view. —K. Lodicules (2). —L. Stamens (3). —M. Pistil. —N. Caryopses (2).

shining trichomes near the apex. *Trisetum durangense* appears closely related to *T. viride* and can be easily distinguished from the latter by possessing pilose lemmas (glabrous in *T. viride*) and pubescent ovaries (glabrous in *T. viride*).

Paratypes. MEXICO. **Durango:** Mpio. de Durango, Parque El Tecuán, 58 km W of Durango, 20 Sep. 1984, F. Casillas, R. Flores & F. Ruiz 9 (CIIDIR); 56 km W of Durango on Hwy. 40 toward Mazatlán, 23°54'45.7"N, 105°01'10.0"W, 6 Oct. 2002, P. M. Peterson & L. E. Brothers 16964 (CONC. US); ca. 28 mi. N of Unidos Venceremos on road toward San Miguel de Cruces, 24°17'49.8"N, 105°29'32.2"W, 7 Oct. 2002, P. M. Peterson & L. E. Brothers 16985 (CONC. US).

11. *Trisetum martha-gonzaleziae* P. M. Peterson & Finot, sp. nov. TYPE: Mexico. Durango: El Mezquital, 25 km de Los Charcos por camino a La Guajolota, 2110 m, 14 Mar. 1985, M. González-Elizondo et al. 1645 (holotype, CIIDIR!). Figure 3.

Planta perennis; culmi glabri, striati, 3-nodi, 75–100 cm alti; vaginæ glabrae, striatae, quam internodia breviores; ligula 0.5–1 mm, ovata; laminae planae vel convolutae, rigidae; panícula contracta, acuta, 10–20 × 1.5–2(–4) cm; spiculae biflorae (triflorae), 7.5–9 mm longae; glumae aequales, 7.5–9 × 0.8–1.1 mm; lemmata glabra ad apicem bidentata; callus pilosus; ovarium pilosum.

Perennial; culms 75–100 cm tall, glabrous, striate, nodes 3, glabrous, dark. Leaf sheaths 3–10 cm long, glabrous, striate, shorter than the internodes, ciliate on the margins near the summit; ligule 0.5–1 mm long, longer in vegetative culms, ovate, slightly cleft at the apex, minutely denticulate-ciliate at the apex, glabrous on the dorsal surface; blades 10–30 cm × 2–3.5 mm, flat or convolute, stiff, scabrous on both sides. Panicles 10–20 × 1.5–2(–4) cm, contracted, subspiciform, acute, tinged with gold and purple, the branches semi-verticillate, each whorl composed of 5 or 6 branches, the lowest branch up to 5 cm long; rachis glabrous. Spikelets 7.5–9 mm long, 2(3)-flowered; pedicels glabrous; rachilla 1.4–1.5 mm long, densely pubescent, the trichomes ca. 1.5 mm long; glumes 7.5–9 mm long, 0.8–1.1 mm wide, equal, longer than the spikelet, weakly purple at the base, yellow at the apex, the keel slightly scabrous, the apex acute; lemmas ca. 5 mm long, glabrous, 5-nerved, rounded in cross section, bidentate at the apex, the intermediate nerves reaching the apex or prolonged beyond the apex as very short hyaline setae; awn ca. 5 mm long, inserted (1.5 mm from the base) near the middle or lower third, strongly twisted, geniculate, as long as the lemma; callus obtuse, pilose, the trichomes 1–1.2 mm long; palea ca. 5 mm long, about as long as or longer than the

lemma, 2-nerved, the nerves well apart, tinged with purple and slightly scabrous; lodicules ca. 0.5 mm long, bilobed at the apex; ovary pilose.

Distribution. Endemic to Mexico (Chihuahua and Durango) between 2110 and 2450 m.

Paratypes. MEXICO. **Chihuahua:** 53 mi. W of Balleza and 5.5 mi. E of Guachochi, 19 Sep. 1991, Peterson et al. 10784 (US). **Durango:** Mpio. El Mezquital, a 5 km del entronque del camino de Charcos a El Mezquital, 19 Mar. 1985, O. García 82 (CIIDIR); Mpio. El Mezquital, alrededores de Santa María Ocotán, Nov. 1985, M. González-Elizondo s.n. (CIIDIR).

Etymology. This species honors the Mexican botanist Martha González-Elizondo, collector of the type specimen.

12. *Trisetum palmeri* Hitchc., Contr. U.S. Natl. Herb. 17: 325. 1913. TYPE: Mexico. Durango: Otinapa, 25 July–5 Aug. 1906, E. O. Palmer 342 (holotype, US-571365!; isotypes, GH!, MO-3056877!).

Perennial, caespitose; culms 60–100 cm tall, glabrous. Leaf sheaths glabrous or scabrous; ligule 3–6 mm long, truncate, dentate, conspicuously ciliate at the apex, glabrous on the dorsal surface; leaf blades 10–20 cm × 1–3(–5) mm, involute or flat, stiff, scabrous, sometimes glaucous. Panicles 10–20 × 2–6 cm, lax, open, somewhat narrow, the branches 4 to 6, verticillate, the branches in distant whorls; rachis and pedicels glabrous. Spikelets 5–6.5 mm long, 2- or 3-flowered; rachilla ca. 2 mm long, pubescent, the trichomes 0.5–1(–1.4) mm long; glumes subequal, linear-lanceolate, both glumes shorter than the spikelet, the margin hyaline, the keel smooth or only slightly scabrous; apex acute; first glume 3.5–4.5 mm long, 1-nerved, slightly shorter and narrower than the second; second glume 4–5 mm long, 3-nerved; lemmas 4–5.3 mm long, somewhat fragile, translucent, terete, scabrous toward the apex, awned, the awn borne at the middle or upper third, 5-nerved, the nerves conspicuous below and vanishing toward the apex, or more rarely prolonged in 4 very short awns; apex 2-lobed, the lobes obtuse, sometimes erose; awn 5–7 mm long, geniculate and twisted, exerted; callus with trichomes, the trichomes 0.5–1 mm long or less; paleas 4–5.5 mm long, equal to slightly longer than the lemma, free; anthers 2–2.5 mm long; ovary glabrous. Caryopses not seen.

Anatomy and micromorphology. Ligule apices have short stiff trichomes and some papillate cells, epidermis with long cells rectangular to fusiform with straight side walls, hooks present; no tri-

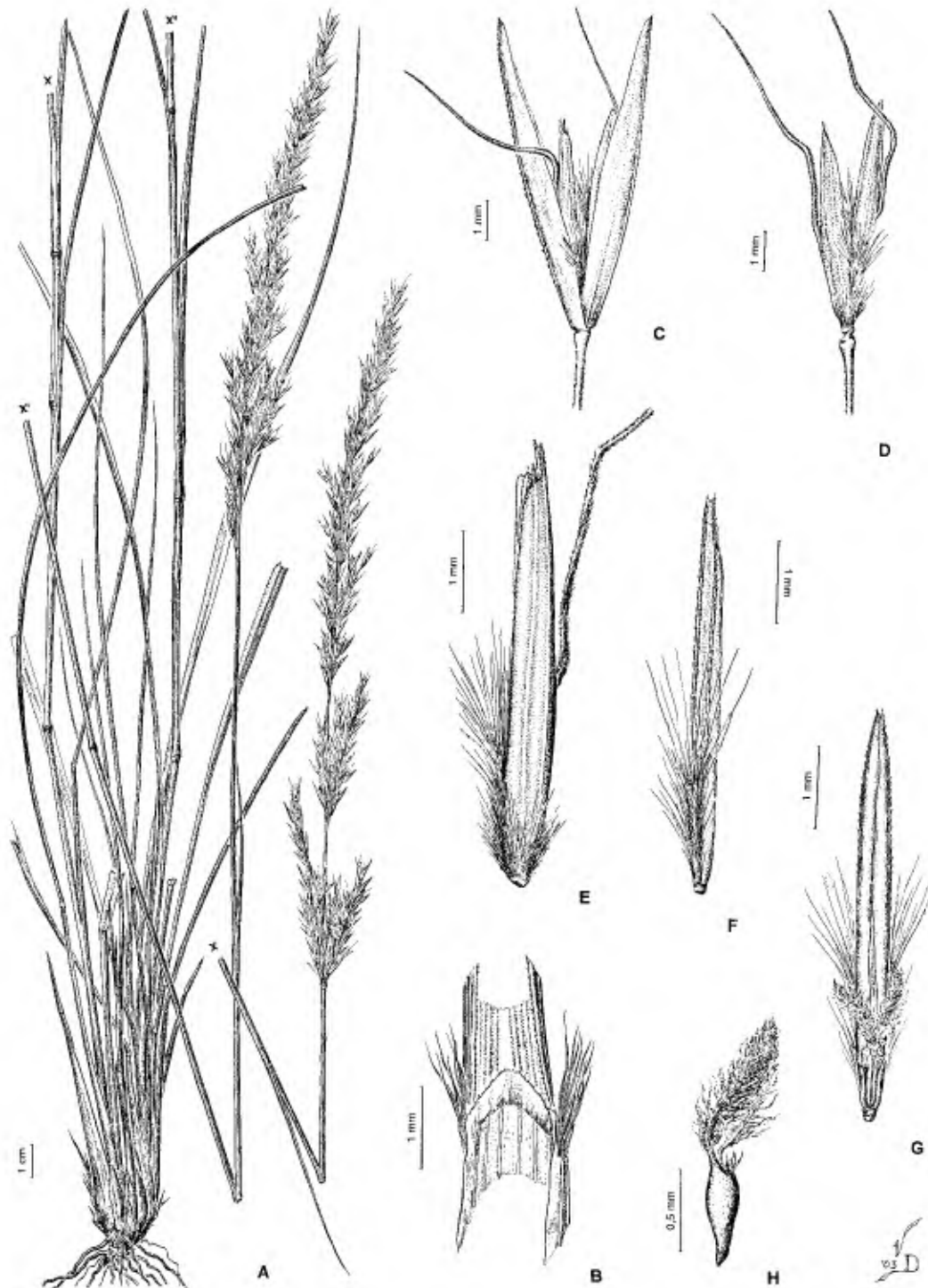


Figure 3. *Trisetum martha-gonzaleziae* (Gonzalez et al. 1945). —A. Habit. —B. Sheath, ligule, and portion of the blade. —C. Spikelet. —D. Florets (2). —E. Floret. —F. Palea with rachilla, dorsal view. —G. Palea, lodicules, pistil, and stamens, ventral view. —H. Pistil.

chomes or stomata were observed. Leaf blades in transverse section are without a well-developed keel but have well-developed ribs; furrows more than half the leaf thickness, bulliform cells in assemblages of 4 to 9 in fan-shaped groups at the bottom of the furrows; trichomes present on the adaxial epidermis only; continuous abaxial sclerenchyma band present; first- and second-order vascular bundles with adaxial and abaxial girders, the adaxial ones T-shaped, marginal bundles only with adaxial girder; stomata present on adaxial epidermis only, marginal sclerenchyma present; epidermis showed costal/intercostal differentiation, hooks both in costal and intercostal zones, cork cells and silica bodies in pairs; no stomata or trichomes were seen.

Distribution. Endemic to Mexico (Chihuahua, Coahuila, Durango, Jalisco, Nuevo León, Sinaloa, and Sonora) between 2700 and 3400 m (Espejo-Serna et al., 2000; Finot, 2003b).

Comments. Hitchcock (1913) pointed out that *Trisetum palmeri* is closer to *Deschampsia* than to *Trisetum*; however, he described the species under *Trisetum* on the basis of the glumes shorter than the florets. *Trisetum palmeri* was synonymized with *T. viride* by Hernández-Torres and Koch (1988), from which it differs in having more rigid leaves and a longer ligule (3–6 mm long). *Trisetum viride* has a short ligule (0.5–1(–2) mm long).

Specimens studied. MEXICO. **Coahuila:** 55.3 km SE of Saltillo and 16.6 km SE of Jame on road to Sierra La Viga, 26 Sep. 1990, Peterson et al. 10065 (US). **Durango:** Sierra Madre Occidental, 2 mi. N of Hwy. 40 on road to Neveros, 24 Oct. 1995, Peterson et al. 13424 (US); 3.2 mi. S of La Peña on road toward La Puerta, 15 Sep. 2003, Peterson et al. 17786 (CIIDIR, US); 14.6 mi. S of Tepehuana and 4.7 mi. N of Mesa La Gloria, 11 Sep. 2003, Peterson & F. Sánchez-Alvarado 17743 (CIIDIR, US). **Nuevo León:** Sierra Madre Oriental, 11.4 mi. W of Dieciocho de Marzo up road toward Cerro Potosi, 18 Oct. 1995, Peterson & Knowles 13336 (US).

13. *Trisetum pinetorum* Swallen, Phytologia 4(7): 424. 1953. TYPE: Guatemala. Quezaltenango: Volcán Santo Tomas, 22 Jan. 1940, J. A. Steyermark 34824 (holotype, F-1048257 not seen; isotype, US-2236478 ex F!).

Perennial; culms 35–70 cm tall, glabrous. Leaf sheaths glabrous, with the margin extended up as a sheath-auricle 3 mm long, as long as or longer than the ligule; ligule 2–3 mm long, hyaline, truncate, the apex denticulate, glabrous on the dorsal surface; blades 1–2 mm wide, flat, glabrous. Panicles 8–15 × 0.6–1 cm, spiciform, narrow, densely flowered, interrupted, green; branches 1–3 cm long, closely appressed and ascending; rachis glabrous

to slightly scabrous. Spikelets 6.5–7 mm long, 2-flowered; glumes subequal, ovate-lanceolate, acute at the apex, green, the margins hyaline, the keel slightly scabrous, both glumes slightly shorter than the spikelet; first glume 5–6 mm long, 1- to 3-nerved; second glume ca. 6 mm long, 3-nerved; lemmas ca. 6 mm long, scabrous near the apex, 5-nerved, awned from the middle or lower third, the margins hyaline and involute below, the apex hyaline and deeply bidentate, with 4 hyaline setae formed by the prolongation of the intermediate and marginal nerves beyond the apex; awn 10–12 mm long, geniculate and twisted; callus obtuse with trichomes ca. 1 mm long; paleas 3–4 mm long, shorter than the lemma and enclosed by the involute margins of the lemma; anthers ca. 1.5 mm long; ovary glabrous. Caryopses not seen.

Distribution. Guatemala and Mexico. Espejo-Serna et al. (2000) cited *Trisetum pinetorum* for Chiapas, Mexico.

Comments. The above description is based only on study of the type specimen at US and the original description. However, the Latin paragraph of the original description by Swallen (1953) mentioned 3-flowered spikelets, and the English paragraph mentioned 2-flowered spikelets. Spikelets with 3 florets were not found in the specimen examined. Though the subspiciform panicle of *T. pinetorum* resembles the species of *Trisetum* subg. *Trisetum* sect. *Trisetaero*, this species has a lemmatal apex with four setae, and the awn is borne on the middle of the lemma.

14. *Trisetum spellenbergii* Soreng, Finot & P. M. Peterson, sp. nov. TYPE: Mexico, Chihuahua: Mpio. Ocampo, Parque Nacional de Cascada Basaseachic, 2100 m, on nearly barren rock at overlook ca. 1 km S of Cascada, 3 Oct. 1986, R. W. Spellenberg, R. J. Soreng, R. Corral & T. Lebgue 8654 (holotype, US!; isotypes, ESAHE!, ID!, K!, MEXU!, MO!, NMC!, RSA!, SI!, TAES!). Figure 4.

Planta rhizomatosa; culmi 40–60 cm alti, glabri; vaginae quam internodia longiores, inferiores pilosae, superiores glabrae; laminae 20–30 cm × 2–3.5 mm, planae, subtus glabrae, supra sparse pilosae; ligula 4.5–6 mm longa, glabra, lacerata; panícula 9–14 × 2–8 cm, laxa; spiculae 7–9 mm longae, (4)5–6-florae; glumae subaequales; gluma inferior 5.5–6.5 × 0.3–0.5 mm, quam superior paulo brevior, 1-nervia; gluma superior 6.5–7.5 × 0.6–0.8 mm; lemmata glabra, 5-nervia, apice hialino; arista 8–12 mm longa, dorso medio inserta; callus pilosus; palea 3.5–5 mm longa, quam lemma sua brevior; lodiculæ ad apicem bilobulatae, ciliatae; stamina 3; ovarium glabrum.

Perennial, with short rhizomes; culms 40–60 cm

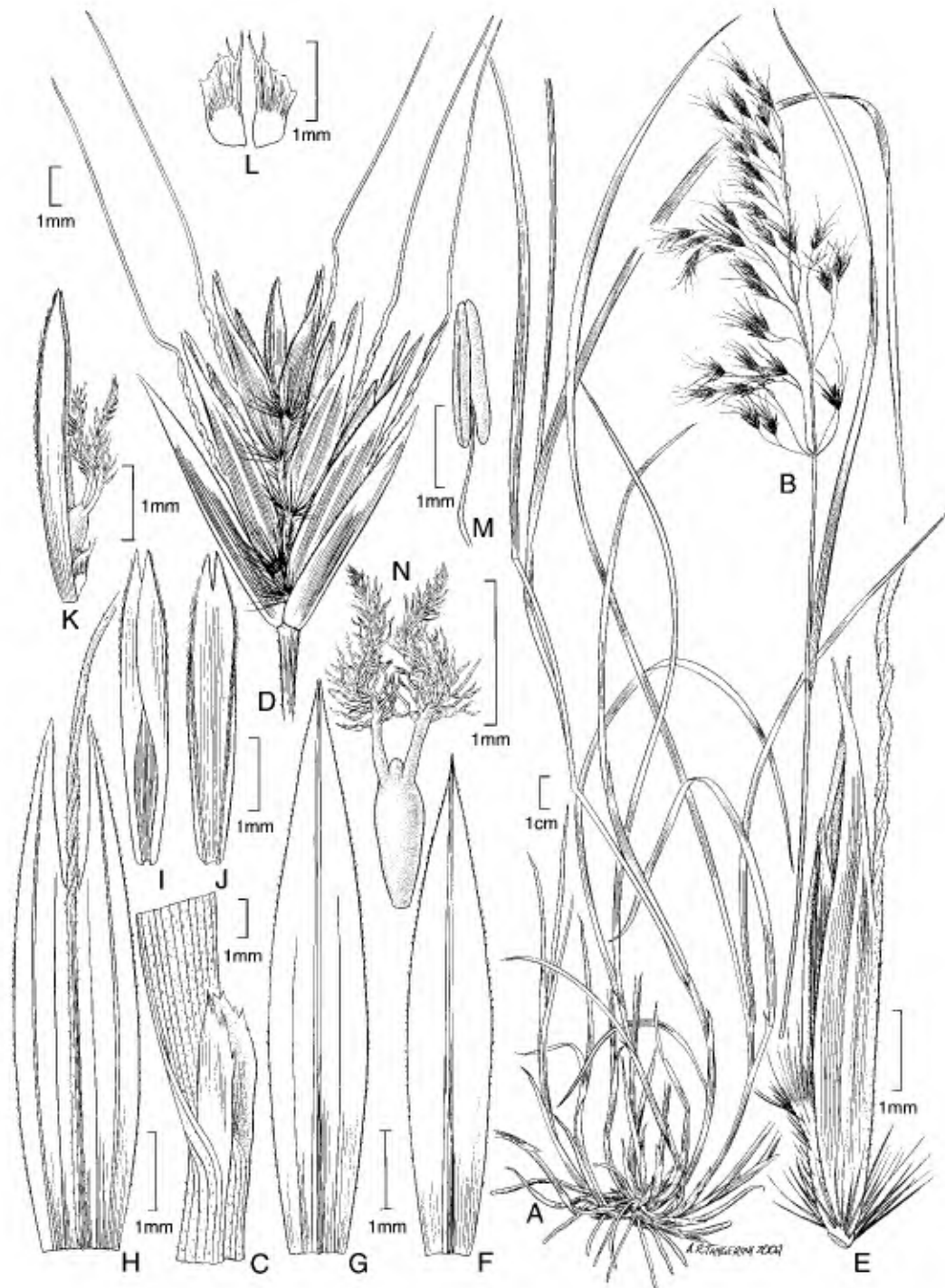


Figure 4. *Trisetum spellenbergii* (Spellenberg, Soreng, Corral & Lebgue 8654). —A. Habit. —B. Inflorescence. —C. Sheath, ligule, and portion of the blade. —D. Spikelet. —E. Floret. —F. First glume, dorsal view. —G. Second glume, dorsal view. —H. Lemma, dorsal view. —I. Palea, ventral view. —J. Palea, dorsal view. —K. Palea, lodicules, and pistil. —L. Lodicules (2). —M. Stamen. —N. Pistil.

tall, geniculate at the base, glabrous; nodes 2 to 4, glabrous. Leaf sheaths glabrous, longer than the internodes, the lower sheaths loose and pilose, the upper ones open only at the apex; margins membranous sometimes on one side projecting upward as a sheath-auricle as long as the ligule; ligule 4.5–6 mm long, scabrous on the dorsal surface; apex deeply lacerate, without cilia; blades 20–30 cm × 2–3.5 mm, flat, soft, glabrous on the lower surface, scabrous above, with or without a few long trichomes on the upper surface; uppermost culm leaf blade 10–20 cm long. Panicles 9–14 × 2–8 cm, lax, open, exserted; branches in 3 to 5 whorls of 2 to 5 branches per node, each branch bearing spikelets to near the base; lower branches 3.5–5 cm long. Spikelets 7–9 mm long, (4)5- or 6-flowered; rachilla ca. 1.5 mm long, pubescent, the trichomes 1–1.5 mm long, the rachilla prolonged beyond the uppermost floret bearing a reduced floret; glumes 5.5–7.5 mm long, shorter than the spikelet, green, purple to the apex and margin; keel smooth or slightly scabrous; first glume 5.5–6.5 mm long, slightly shorter than the second, 1-nerved; second glume 6.5–7.5 mm long; lemmas 4–6.5 mm long, glabrous, conspicuously 5-nerved, awned; intermediate nerves not extended as apical awns; marginal nerves vanish below the apex; apex bilobed, the lobes each ca. 2 mm long; awn 8–12 mm long, borne on the middle of the dorsal surface, twisted at the base, geniculate, usually twice as long as the lemma; callus pubescent, the trichomes ca. 1 mm long; paleas 3.5–5 mm long, shorter than the lemma, 2-nerved, the nerves scabro-ciliate; lodicules 1–1.5 mm long, the apex entire or with 2 short and unequal lobes, ciliate; anthers 1.2–2.5 mm long; ovary glabrous. Caryopses not seen.

Anatomy and micromorphology. Sheath ligule apex is composed of long cells with a few very short trichomes and the epidermis with prickles principally on the lower half and margins, no trichomes or stomata seen. Leaf blades in transverse section keeled, with prominent adaxial ribs, furrows between ribs more than one half the thickness; sclerenchyma of first- and second-order vascular bundles with adaxial and abaxial girders; adaxial girders T-shaped, abaxial girders I-shaped; marginal sclerenchyma present; epidermis with costal/intercostal zones differentiated, the intercostal zone only with long cells more or less rectangular with straight side walls, and costal zone with cork cells and silica bodies in short rows; adaxial epidermis with short trichomes, bulliform cells inconspicuous; abaxial epidermis with hooks, stomata present only on the adaxial surface.

Distribution. *Trisetum spellenbergii* is endemic to Chihuahua and Sonora, Mexico.

Comments. *Trisetum spellenbergii* is morphologically similar to *T. viride* but can be separated from the latter species by the presence of rhizomes (vs. absent in *T. viride*), its shorter stature (culms 40–60 cm tall in *T. spellenbergii* vs. culms 50–150 cm tall), soft and glabrous blades (vs. stiff and glaucous blades), spikelets with a greater number of florets (4- to 6-flowered in *T. spellenbergii* vs. 2- or 3-flowered), and lemmas with long bilobed apices (the lobes ca. 2 mm long in *T. spellenbergii* vs. less than 0.5 mm long and bidentate).

Etymology. The specific epithet honors Richard William Spellenberg (1940–) a Mexicophile and plant systematist at New Mexico State University.

Paratype. MEXICO. **Sonora:** Sierra Madre Occidental, 9.6 mi. E of Maycoba on Hwy. 16 toward Yepachic, 1420 m, 28°26'13"N, 108°33'05"W, 14 Oct. 1992, P. M. Peterson & C. R. Annable 12509 (US).

15. *Trisetum tonduzii* Hitchc., N. Amer. Fl. 17(8): 558. 1939. TYPE: Costa Rica. Mount Poás, 2460 m, Nov. 1896, A. Tonduz 10749 (holotype, US-358711!).

Perennial with rhizomes; culms 30–85 cm tall, erect, glabrous. Leaf sheaths glabrous, usually with trichomes at the apex, with one of the sides extended up as a sheath-auricle; ligule 1–3 mm long, truncate, dentate, ciliate; blades 3–21 cm × 2–6 mm, flat or involute, stiff, glabrous, occasionally loosely pubescent above. Panicles 6–15 × 2–10 cm, lax, open, ovoid-pyramidal, with ascending glabrous branches, usually as long as wide, purple; rachis glabrous; branches up to 8 cm long, densely flowered above, verticillate, up to 7 per node. Spikelets 4.5–6.5 mm long, 2-flowered; pedicels glabrous, scabrous distally; rachilla 1–2 mm long, pubescent, the trichomes 3 mm long; glumes 4–6.5 mm long, equal to subequal, nearly as long as the spikelet, usually purple, acute or awn-tipped, sometimes the first glume slightly shorter and narrower than the second glume; first glume 1- to 3-nerved; second glume 3-nerved; lemmas 3.8–6 mm long, lanceolate, glabrous, awned, slightly scabrous, 5-nerved, the nerves conspicuous toward the apex, the intermediate and marginal nerves prolonged beyond the apex as 4 setae or teeth, the setae 0.6–1 mm long; awn 7–13 mm long, borne a little above the middle, bent and twisted; callus pubescent, the trichomes 1.2–1.7 mm long; paleas 2.8–5.7 mm long, slightly shorter than the lemma, free from the lemma; lodicules truncate at the apex; anthers 1–2

mm long, purple; ovary glabrous. Caryopsis 2 mm long; endosperm soft.

Chromosome number. $n = 14$ (Pohl, 1980).

Anatomy. Leaf blades in transverse section are without well-developed keels or well-developed ribs, furrows more than one half the leaf thickness, bulliform cells in groups of 4 or 5 arranged in fan-shaped groups; trichomes absent in both epidermes; vascular bundles with adaxial and abaxial girders, except the marginal bundles; marginal sclerenchyma present; stomata present on the adaxial epidermis only; abaxial epidermis with intercostal rectangular long cells, costal short cells solitary or in cork cell-silica body pairs, prickles present intercostally.

Distribution. Costa Rica and Panama, 1500–3500 m.

Specimens studied. COSTA RICA. **Cartago:** 7 Aug. 1966, *Davidse & Pohl 842* (MO); Cantón de Oreamuno, P. N. Volcán Irazú, Cordillera Central, 09°58'49"N, 83°50'50"W. 28 Aug. 1995. *Morales & Dauphin 4801* (CR); Crater of Volcán Irazú, 7 Aug. 1966, *Pohl & Calderán 10230* (CR); Cratère du volcan Turrialba, 1 Jan. 1899. *Pittier 13082* (US); Sommet du Poas, Aug. 1890. *Pittier 841* (US); Potrero del alto. Volcán Poas, Nov. 1896. *Tonduz 214* (US); Sommet du Poas, Aug. 1890. *Pittier 2954* (P). **San José:** Las Nubes, 20–22 Mar. 1924. *Standley 38398* (US). PANAMA. **Chiriquí:** Chiriquí, 18 Mar. 1938. *White 54* (MO).

16. *Trisetum viride* (Kunth) Kunth, Revis. Gramin. 1: 101. 1829. Basionym: *Avena viridis* Kunth, Nov. Gen. Sp. 1: 147. 1816. *Trisetarium viride* (Kunth) Poir., Encycl. 5: 366. 1817. *Deyeuxia viridis* (Kunth) E. Fourn., Bull. Soc. Bot. France 24: 181. 1877. TYPE: Mexico. "Crescit in alta planitie Mexicana inter Salamanca et Queretaro, 900 hexap., *Humboldt & Bonpland s.n.* (holotype, P!; isotype, US-865584 fragment ex P!).

Trisetum altum Swallen, Phytologia 4: 423. 1953. TYPE: Guatemala. Sierra de las Minas. E of Finca Piamonte, El Progreso, 11 Feb. 1952. *J. A. Steyermark 43836* (holotype, US-1935005!; isotype, US-2208606!).

Deschampsia mexicana Swallen, Bol. Soc. Bot. Mexico 23: 28. 1958. *Trisetum mexicanum* (Swallen) S. D. Koch, Taxon 28: 233. 1979. TYPE: Mexico. Mexico: Valle de Bravo, 1800 m. 21 Nov. 1952. *E. Matuda 27795* (holotype, US-2119866!; isotype, MEXU not seen).

Perennial, caespitose; culms 50–150 cm tall; nodes 4, glabrous. Leaf sheaths shorter than the internodes, glabrous or pubescent, ciliate at the apex; ligule 0.5–1(–2) mm long, membranous; apex obtuse, minutely ciliate; blades 14–35 cm × 2–6(–9) mm, usually flat, somewhat stiff, sometimes con-

volute, glabrous with the adaxial face glaucous, the abaxial green. Panicles 12–30(–37) × 2–8 cm, lax, open or somewhat contracted, greenish to yellowish; lower branches 5–16 cm long, ascending, verticillate; rachis glabrous. Spikelets 5–8 mm long, 2- or 3-flowered; pedicels 1–3 mm long, glabrous; rachilla 1.5 mm long, pubescent, the trichomes 1.5–3 mm long especially near the apex, the lower portion subglabrous or pilose; glumes 3–7 mm long, subequal, somewhat translucent; first glume 3–6 mm long, 1-nerved, slightly shorter than the spikelet; second glume 4–7 mm long, 3-nerved, equaling or slightly longer than the spikelet; lemmas 4–7 mm long, glabrous, awned; apex bidentate, 5-nerved, the intermediate and marginal nerves sometimes prolonged as 2 or 4 hyaline setae ca. 0.2 mm long; awn 5–10 mm long, borne from the middle to the lower third or fourth, geniculate and twisted; callus obtuse, pubescent, the trichomes 0.5–1 mm long; paleas 3–6 mm long, shorter than the lemma, hyaline, 2-nerved, the keels scabrous; anthers 1–3.3 mm long; ovary glabrous. Caryopses 2–2.5 mm long; endosperm liquid.

Chromosome number. $2n = 28$ (Herrera-Arrieta, 2001).

Anatomy and micromorphology. Ligule apices have papillate cells and short trichomes; epidermal long cells elongated perpendicular to the vertical axis of the ligule, rectangular, with undulate side walls; no trichomes, prickles, or stomata were seen in the epidermis. Leaf blades in transverse section are without a well-developed keel but have well-developed ribs, furrows more than one half the leaf thickness, trichomes present only in the adaxial epidermis; first- and second-order vascular bundles with both adaxial and abaxial girders, the marginal bundles with sclerenchyma in small abaxial strands; abaxial epidermis with intercostal rectangular long cells with undulate side walls, costal short cells present as cork cell-silica body pairs, sometimes solitary; stomata and trichomes not seen, prickles present.

Distribution. *Trisetum viride* grows in Mexico and Guatemala between 1500 and 3100 m. In Mexico it occurs in the following states: Chihuahua, Chiapas, Durango, Guerrero, Guanajuato, Jalisco, México, Michoacán, Oaxaca, and Querétaro (Hernández-Torres & Koch, 1988; Espejo-Serna et al., 2000; Herrera-Arrieta, 2001).

Comments. Hernández-Torres and Engleman (1995) more recently performed an anatomical survey of *Trisetum* in Mexico and they considered *T. mexicanum* a distinct species. They noted that *T. mexicanum* could be distinguished by the size of

the bulliform cells, but no further morphological characteristics were discussed. We choose to place *T. mexicanum* as a synonym of *T. viride*.

Specimens studied. MEXICO. **Coahuila:** Sierra Madre Oriental, ca. 5 km E of Saltillo (Las Palapas) np camino de Cuatro, 20 Sep. 2003, *Peterson et al. 17863* (CIIDIR, US). **Durango:** along Mazatlán–Durango hwy., 3–15 km toward El Salto from the Sinaloa boundary at El Palmito, 13 Apr. 1965, *McVaugh 23605* (US); 10 km N carretera Durango–Mazatlán, 6 Oct. 1978, *Koch & Sánchez 78155* (US); San Ramón, 21 Apr.–18 May 1906, *Palmer 128* (US); Sierra Madre Occidental, 2.4 mi. N of Borbollones, N of hwy. 40, 25 Oct. 1995, *Peterson et al. 13432* (US); 2 mi. N of Tepehuana on road toward Mezquital, 11 Sep. 2003, *Peterson & F. Sánchez-Alvarado 17739* (CIIDIR, US). **Guerrero:** entre Aynsinapa y Petatlán, 14 Dec. 1894, *Nelson 2123* (US); Teotepec, 11 May 1939, *Hinton et al. 14795* (US). **Oaxaca:** Sierra de San Felipe, 18 Sep. 1894, *Pringle 4919* (P, US).

17. *Trisetum virletii* E. Fourn., *Mexic. Pl.* 2: 108. 1886. TYPE: Mexico. San Luis Potosí: 1851, *Virlet 1304* (lectotype, designated by Finot (2003b: 675), P!; isotype, US-91219 fragment ex P-Fourn. 247!).

Trisetum bambusifforme E. Fourn., *Mexic. Pl.* 2: 108. 1886. TYPE: Mexico. In sylvia de la desierta Vieja vallis Mexicensis, 3 Nov. 1865, *E. Bourgeau 1304* (holotype, P!; isotypes, GH not seen, US-fragment ex P-Fourn-248!; US-fragment ex MPU-Fourn-248!).

Perennial with rhizomes; culms 1.5–3 m tall, 5–7(–10) mm diam. below with extravaginal branches on the upper nodes, glabrous, bambusifform. Leaf sheaths minutely scabrous, longer than the internodes; ligule (2–)5–10 mm long, membranous, apex obtuse to truncate, lacinate and ciliate, the cilia up to 2 mm long; blades 30–45 cm × 5–13 mm, flat, minutely scabrous. Panicles 20–45 × 5–12(–20) cm, lax, ± open, pyramidal, dense, green or yellow-green; branches usually 10–15 cm long, verticillate; rachis glabrous. Spikelets 5–7.5 mm long, (3)4- or 5-flowered; pedicels 1–4 mm long, scabrous; rachilla 0.5–0.7 mm long, densely pubescent, the trichomes 2–3.3 mm long, more numerous at the apex; glumes unequal, acute to shortly awned, the first slightly shorter and narrower than the second, both glumes shorter than the spikelet, scabrous along the nerves; first glume (3–)4–5.1(–6) mm long, linear-lanceolate to lanceolate, 1-nerved; second glume 4–6(–8) mm long, lanceolate to ovate-lanceolate, 3-nerved; lemmas 4–6 mm long, scabrous, 5-nerved, awned, the nerves not conspicuous near the apex, somewhat rounded in cross section, the margins hyaline toward the apex; apex 2- or 4-dentate (sometimes appearing almost entire), the teeth short not prolonged as setae or awns; callus obtuse with a few short trichomes, the

trichomes 0.5–1 mm long; awn 1.5–4(–4.5) mm long, borne on the upper third, geniculate, slightly twisted; paleas 3.5–5 mm long, shorter than the lemma, 2-nerved, the nerves scabrous; anthers 1.8–2.5(–3) mm long. Caryopses 1.5–2.5 mm long; endosperm liquid.

Chromosome number. $2n = 28$ (Tateoka, 1962).

Anatomy and micromorphology. Ligule apex has long cilia and short hair; epidermis composed of long cells with undulate side walls, with abundant prickles; no trichomes or stomata were seen. Leaf blades in transverse section are without a well-developed keel or ribs, furrows less than one half the leaf thickness with trichomes present on the adaxial epidermis only; vascular bundles with adaxial and abaxial girders; marginal sclerenchyma as a small rounded strand, stomata present in the adaxial epidermis only; bulliform epidermis present; adaxial epidermis with rectangular long cells with straight side walls, short costal cells present, stomata absent, prickles present.

Distribution. Endemic to Mexico (Chiapas, Distrito Federal, Durango, Guanajuato, Jalisco, México, Michoacán, Morelos, Puebla, Querétaro, San Luis Potosí, and Veracruz (Espejo-Serna et al., 2000; Herrera-Arrieta, 2001; Finot, 2003b)). *Trisetum virletii* grows in moist woods between 2000 and 3500 m.

Specimens studied. MEXICO. **Distrito Federal:** Cerro Gordo, Cerro Cantillo Grande, ¼ km S of La Cima Station, just N and W of old hwy. 95, 12 July 1960, *H. Iltis, Koepfen & F. Iltis 152* (US). **Hidalgo:** along Hwy. 105 between Pachuca and Tampico, vicinity of Mineral del Monte, 20°08'N, 98°3'W, 27 Feb. 1987, *Croat & Hannon 65794* (SI ex MO). **Jalisco:** NNE-facing slopes of Volcán Colima, 19°38'N, 103°35'W, 31 Dec. 1978, *Iltis, Guzmán & Nee 1065* (US); SE slopes of Nevado de Colima, 2 Apr. 1951, *McVaugh 11721* (US); N slopes of Nevado de Colima, 2 Apr. 1949, *McVaugh 10161* (US). **México:** Mpio. Amecameca, cañada del cerro Venacho, 12 km al E de Amecameca, 23 Dec. 1976, *Koch 76337* (US); vicinity of La Cima railroad station, on top of the Serjána de Ajusco, 19°07'N, 99°12'W, 23 Jan. 1963, *Iltis & Iltis 1671-a* (US); Valle de Mexico, C. de León, 7 Jan. 1951, *Matuda 20892* (US); Amecameca, Cerro Venacho, 15 Feb. 1953, *Matuda et al. 28076* (US); Sierra de Las Cruces, 20 Apr. 1898, *Pringle 7571* (US); Ixtaccihuatl, Jan. 1906, *Purpus 1612* (US); Temascaltepec, Mesón Viejo, 12 Jan. 1932, *Hinton 2745* (US); Texcoco, ca. Cerro Texaltepec, 3 km SSE de San Pablo Ixayoc y 13 km SE Texcoco, 9 Nov. 1975, *Koch 75706* (US). **Michoacán:** vicinity of Morelia, 9 Feb. 1911, *Arsène 5410* (US); cool slopes of mountains near Patzcuaro, 21 Dec. 1891, *Pringle 3970* (US); Coalcomán, Barroloso, 3 Mar. 1941, *Hinton 15747* (US); Mt. Tancitaro, 22 July 1941, *Leavenworth & Leavenworth 1122* (US). **Morelos:** Tres Mariás, 16 Dec. 1907, *Pringle 15002* (US); 5 mi. S of Morelos-Federal District border, 14 Mar. 1961, *King 4155* (US).

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APPENDIX 1. Subgeneric treatment of *Trisetum* in Mexico and Central America

Trisetum

Species, incertae sedis: *T. angustum*, *T. filifolium*, *T. pringlei*

Trisetum subg. **Trisetum**

Panicles spiciform or more rarely contracted to open. Spikelets usually 2- or 3-flowered; glumes lanceolate, unequal, glabrous or rarely pilose, shorter or longer than the spikelet; first glume 1(3)-nerved, usually shorter and narrower than the second; second glume 3(5)-nerved; lemmas lanceolate, glabrous or pilose, slightly keeled, laterally compressed, 5-nerved, the nerves prolonged beyond the 2-dentate apex as 2 or 4 setae, awned from the upper third; awn exserted, geniculate or merely divaricate, sometimes twisted; ovary glabrous or with short and shining trichomes at the apex. Caryopses compressed, soft, glabrous or with short trichomes at the apex; endosperm liquid or more rarely solid.

Trisetum subg. **Trisetum** sect. **Trisetum**

Species: *T. curvisetum*, *T. irazuense*

Trisetum subg. **Trisetum** sect. **Trisetiaera** Asch. & Graebn., Syn. Mitteleur. Fl. 2: 270. 1895. TYPE: *Trisetum spicatum* (L.) K. Richt., Pl. Eur. 1: 59. 1890.

Panicle spiciform, narrow, densely flowered; rachis densely pilose to pubescent below the inflorescence. Spikelets 2- to 4-flowered, rarely 1- or (2)-flowered; glumes unequal, mostly shorter than the spikelet, sometimes longer.

Species: *T. barbatipaleum*, *T. ligulatum*, *T. rosei*, *T. spicatum*

Trisetum subg. **Deschampsioidea** (Louis-Marie) Finot, stat. nov. Basionym: *Trisetum* subsect. *Deschampsioidea* Louis-Marie, Rhodora 30(59): 211. 1928. TYPE: *Trisetum palmeri* Hitchc., lectotype, designated here.

Panicles lax, open, rarely spiciform. Spikelets 2- to 6-flowered; glumes 2, \pm equal, lanceolate, keeled, muticous, glabrous, slightly shorter than or equaling the spikelet; first glume 1-nerved; second glume 3-nerved; lemmas lanceolate, membranous, with the apex and margins hyaline, glabrous or rarely hirsute, slightly rounded in cross section, 5-nerved, the nerves disappearing toward the apex or rarely prolonged beyond the 2-dentate apex in (2) or 4 setae, usually awned from the middle; awn geniculate; ovary usually glabrous or rarely with short trichomes at the apex. Caryopses compressed, soft, usually glabrous, rarely with short and shining trichomes at the apex.

Species: *T. durangense*, *T. martha-gonzaleziae*, *T. palmeri*, *T. pinetorum*, *T. spellenbergii*, *T. touduzii*, *T. viride*, *T. virletii*

Comments. A lectotype was chosen because Louis-Marie (1928) cited two species without designating a type.

APPENDIX 2. List of names and synonyms. **Accepted names** are presented in bold and synonyms are *italicized*.

Acraspelion Besser ex Schult. & Schult. f. = **Trisetum**
Agrostis obtusata (Michx.) Steud. = **S. obtusata**

Aira koelerioides Peyr. = **P. koelerioides**

Aira mexicana Trin. ex E. Fourn. = **S. obtusata**

Aira obtusata Michx. = **S. obtusata**

Aira spicata L. = **T. spicatum**

Aira subspicata L. = **T. spicatum**

Aira truncata Muhl. = **S. obtusata**

Airopsis obtusata (Michx.) Desv. = **S. obtusata**

Avena airoides Koeler = **T. spicatum**

Avena deyeuxioides Kunth = **P. deyeuxioides**

Avena elongata Kunth = **S. interrupta** subsp. **interrupta**

Avena toluensis Kunth = **T. spicatum**

Avena trichopodia J. Presl = **P. deyeuxioides**

Avena viridis Kunth = **T. viride**

Calamagrostis irazuensis Kuntze = **T. irazuense**

Colamagrostis longirostris Buckley = **S. interrupta** subsp. **interrupta**

Deschampsia kaelerioides (Peyr.) Benth. = **P. koelerioides**

Deschampsia mexicana Swallen = **T. viride**

Deschampsia pringlei Scribn. = **P. pringlei**

Deyeuxia evoluta E. Fourn. = **P. deyeuxioides**

Deyeuxia gracilis E. Fourn. = **P. humilis**

Deyeuxia triflora Nees = **P. deyeuxioides**

Deyeuxia viridis (Kunth) E. Fourn. = **T. viride**

Eatonia annua Suksd. = **S. obtusata**

Eatonia densiflora E. Fourn. = **S. obtusata**

Eatonia obtusata (Michx.) A. Gray = **S. obtusata**

Eatonia obtusata var. *purpurascens* Vasey ex Rydb. & Shear = **S. obtusata**

Eatonia obtusata var. *robusta* Vasey ex L. H. Dewey = **S. obtusata**

Eatonia obtusata var. *robusta* Vasey ex Rydb. = **S. obtusata**

Eatonia pubescens Scribn. & Merr. = **S. obtusata**

Eatonia robusta (Vasey ex L. H. Dewey) Rydb. = **S. obtusata**

Graphephorum altijugum E. Fourn. = **P. koelerioides**

Graphephorum pringlei Scribn. ex Beal = **T. pringlei**

Koeleria obtusata Trin. ex Steud. = **S. obtusata**

Koeleria paniculata Nutt. = **S. obtusata**

Koeleria spicata Rehb. ex Willk. & Lange = **T. spicatum**

Koeleria subspicata (L.) Rehb. = **T. spicatum**

Koeleria truncata (Muhl.) Torr. = **S. obtusata**

Peyritschia E. Fourn.

Peyritschia deyeuxioides (Kunth) Finot

Peyritschia humilis (Louis-Marie) Finot

Peyritschia koelerioides (Peyr.) E. Fourn.

Peyritschia pringlei (Scribn.) S. D. Koch

Poa obtusata (Michx.) Link = **S. obtusata**

Rebentischia Opiz = **Trisetum**

Reboulea gracilis Kunth = **S. obtusata**

Reboulea obtusata (Michx.) A. Gray = **S. obtusata**

Reboulea obtusata var. *pubescens* (Scribn. & Merr.) Farw. = **S. obtusata**

Rupestrina Prov. = **Trisetum**

Rupestrina pubescens Prov. = **T. spicatum**

Sphenopholis Scribn.

Sphenopholis annua (Suksd.) A. Heller = **S. obtusata**

Sphenopholis hallii (Scribn.) Scribn. = **S. interrupta** subsp. **interrupta**

Sphenopholis interrupta (Buckley) Scribn.

Sphenopholis interrupta (Buckley) Scribn. subsp. **interrupta**

Sphenopholis interrupta subsp. **californica** (Vasey) Scribn.

Sphenopholis obtusata (Michx.) Scribn.

- Sphenapholis obtusata* fo. *purpurascens* (Vasey ex Rydb. & Shear) Waterf. = **S. obtusata**
- Sphenapholis obtusata* subsp. *lobata* (Trin.) Scribn. = **S. obtusata**
- Sphenapholis obtusata* subsp. *pubescens* (Scribn. & Merr.) Scribn. = **S. obtusata**
- Sphenapholis obtusata* var. *lobata* (Trin.) Scribn. ex B. L. Rob. = **S. obtusata**
- Sphenapholis obtusata* var. *pubescens* (Scribn. & Merr.) Scribn. ex B. L. Rob. = **S. obtusata**
- Sphenapholis pubescens* (Scribn. & Merr.) A. Heller = **S. obtusata**
- Sphenapholis robusta* (Vasey ex L. H. Dewey) A. Heller = **S. obtusata**
- Trisetaria airaides* (Koeler) Baumg. = **T. spicatum**
- Trisetaria deyeuxiaoides* (Kunth) Poir. = **P. deyeuxioides**
- Trisetaria spicata* (L.) Paunero = **T. spicatum**
- Trisetarium* Poir. = **Trisetum**
- Trisetarium elongatum* (Kunth) Poir. = **S. interrupta** subsp. **interrupta**
- Trisetarium viride* (Kunth) Poir. = **T. viride**
- Trisetum** Pers.
- Trisetum** subg. **Deschampsioidea** (Louis-Marie) Finot
- Trisetum** sect. **Trisetaera** Asch. & Graebn.
- Trisetum** sect. **Trisetum**
- Trisetum** subg. **Trisetum**
- Trisetum* subsect. *Deschampsioidea* Louis-Marie = **Trisetum** subg. **Deschampsioidea**
- Trisetum airaides* (Koeler) P. Beauv. ex Roem. & Schult. = **T. spicatum**
- Trisetum altijugum* (E. Fourn.) Scribn. = **P. koelerioides**
- Trisetum altum* Swallen = **T. viride**
- Trisetum angustum** Swallen
- Trisetum bambusiforme* E. Fourn. = **T. virletii**
- Trisetum barbatipaleum** (Hultén ex Veldkamp) Finot
- Trisetum californicum* Vasey = **S. interrupta** subsp. **californica**
- Trisetum curvisetum** Morden & Valdés-Reyna
- Trisetum deyeuxiaoides* (Kunth) Kunth = **P. deyeuxioides**
- Trisetum deyeuxioides* var. *pubescens* Scribn. ex Beal = **P. deyeuxioides**
- Trisetum durangense** Finot & P. M. Peterson
- Trisetum elongatum* (Kunth) Kunth = **S. interrupta** subsp. **interrupta**
- Trisetum evalutum* (E. Fourn.) Hitchc. = **P. deyeuxioides**
- Trisetum filifolium** Scribn. ex Beal
- Trisetum filifolium** Scribn. ex Beal var. **filifolium**
- Trisetum filifolium** var. **aristatum** Scribn. ex Beal
- Trisetum fournieranum* Hitchc. = **T. irazuense**
- Trisetum gracile* E. Fourn. = **T. irazuense**
- Trisetum hallii* Scribn. = **S. interrupta** subsp. **interrupta**
- Trisetum humile* Louis-Marie = **P. humilis**
- Trisetum interruptum* Buckley = **S. interrupta** subsp. **interrupta**
- Trisetum interruptum* E. Fourn. = **T. spicatum**
- Trisetum interruptum* UNRANKED *hallii* (Scribn.) Hitchc. = **S. interrupta** subsp. **interrupta**
- Trisetum interruptum* var. *californicum* (Vasey) Louis-Marie = **S. interrupta** subsp. **californica**
- Trisetum irazuense** (Kuntze) Hitchc.
- Trisetum kachianum* Hern. Torres = **P. pringlei**
- Trisetum ligulatum** Finot & Zuloaga
- Trisetum lobatum* Trin. = **S. obtusata**
- Trisetum martha-gonzaleziae** P. M. Peterson & Finot
- Trisetum mexicanum* (Swallen) S. D. Koch = **T. viride**
- Trisetum nivasum* E. Fourn. = **T. spicatum**
- Trisetum palmeri** Hitchc.
- Trisetum paniculatum* E. Fourn. = **T. viride**
- Trisetum pinetorum** Swallen
- Trisetum pringlei** (Scribn. ex Beal) Hitchc.
- Trisetum rosei** Scribn. & Merr.
- Trisetum rasei* var. *tenerum* Scribn. & Merr. = **T. rosei**
- Trisetum rasei* fo. *tenerum* (Scribn. & Merr.) Louis-Marie = **T. rosei**
- Trisetum scabriflorum* Hitchc. = **T. irazuense**
- Trisetum scabrinerve* Sodiro = **T. irazuense**
- Trisetum spellenbergii** Soreng. Finot & P. M. Peterson
- Trisetum spicatum** (L.) K. Richt.
- Trisetum spicatum* subsp. *taluceuse* var. *barbatipaleum* Hultén = **T. barbatipaleum**
- Trisetum spicatum* subsp. *taluceuse* (Kunth) Hultén = **T. spicatum**
- Trisetum spicatum* var. *barbatipaleum* Hultén = **T. barbatipaleum**
- Trisetum spicatum* var. *barbatipaleum* Hultén ex Veldkamp = **T. barbatipaleum**
- Trisetum spicatum* var. *nivasum* (E. Fourn.) Louis-Marie = **T. spicatum**
- Trisetum subspicatum* (L.) P. Beauv. = **T. spicatum**
- Trisetum toluicense* (Kunth) Kunth = **T. spicatum**
- Trisetum tonduzii** Hitchc.
- Trisetum viride** (Kunth) Kunth
- Trisetum virletii** E. Fourn.