

CONTRIBUTIONS TOWARD A MONOGRAPH OF AMERICAN SPECIES OF
Eragrostis (POACEAE: CHLORIDOIDEAE: ERAGROSTIDEAE):
NOVELTIES FOR COLOMBIA, MEXICO AND PERU

CONTRIBUCIONES PARA UNA MONOGRAFÍA DE LAS ESPECIES AMERICANAS DE
Eragrostis (POACEAE: CHLORIDOIDEAE: ERAGROSTIDEAE):
NOVEDADES PARA COLOMBIA, MÉXICO Y PERÚ

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ABSTRACT

Eragrostis acutiflora (Kunth) Nees, *E. bahiensis* Schrad. ex Schult., and *E. secundiflora* J. Presl are cited for the first time for Peru, while *E. soratensis* Jedwabn. and *E. uniolooides* (Retz.) Nees ex Steud. are cited for the first time for Colombia and Mexico, respectively. Descriptions are provided for the five species treated herein, including synonyms, and ecological and geographic distribution.

Keywords: Chloridoideae; *Eragrostis*; Poaceae; Neotropical grasses.

RESUMEN

Se destacan los primeros registros de *Eragrostis acutiflora* (Kunth) Nees, *E. bahiensis* Schrad. ex Schult. y *E. secundiflora* J. Presl para Perú, mientras que *E. soratensis* Jedwabn. y *E. uniolooides* (Retz.) Nees ex Steud. se citan por primera vez para Colombia y México, respectivamente. Se presentan las descripciones de las cinco especies tratadas, sus sinónimos y su distribución geográfica y ecológica.

Palabras clave: Chloridoideae; *Eragrostis*; Poaceae; Gramíneas neotropicales.

INTRODUCTION

Eragrostis Wolf is a large genus of approximately 350 species occurring in tropical, subtropical, and warm temperate regions throughout the world (Clayton y Renvoize 1986; Peterson *et al.* 1995, 1997; Lazarides 1997; Veldkamp 2002; Ingram, Doyle 2007; Peterson, Sánchez Vega 2007; Watson y Dallwitz 2008). There are 111 species of *Eragrostis* recorded in North, Central, and South America, and 67 native in South America (Peterson and Boechat 2001; Peterson 2003; Peterson *et al.* 2001, 2007). The genus is characterized by having many-flowered spikelets where the disarticulation of the lemma and palea occurs separately, lemmas that are usually 3-nerved and unawned, longitudinally

bowed-out paleas with ciliolate keels, paniculate inflorescences, and leaves with ciliate ligules (Peterson *et al.* 1997). Most species of *Eragrostis* occupy open habitats with poor soils, and many occur in ruderal sites (Clayton and Renvoize, 1986; Van den Borre and Watson, 1994), and their distribution exhibits wide altitudinal gradients and a high variation in humidity conditions, from the sea level to 3600 (-4000) m, and from pluvial environments to xeric habitats, respectively.

Recently, Beetle *et al.* (1991), Peterson and Sánchez Vega (2007), Peterson and Giraldo-Cañas (2008), published the taxonomic treatments of *Eragrostis* for Mexico, Peru, and Colombia, respectively, but the additional study of other specimens deposited at

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Stockholm Herbarium (S), National Herbarium of the United States (US), and «Herbario Nacional Colombiano» (COL), give us new reports for the floras of Colombia, Mexico, and Peru. The new reports belonging to *Eragrostis acutiflora* (Kunth) Nees, *E. bahiensis* Schrad. ex Schult., *E. secundiflora* J. Presl, *E. soratensis* Jedwabn., and *E. uniolooides* (Retz.) Nees ex Steud., which are mentioned and discussed herein. The present study contributes knowledge of the Neotropical grasses.

MATERIALS AND METHODS

This study is based on the examination of herbarium specimens from AAU, AMAZ, ANSM, BA, BAA, BM, CA, CAUP, COAH, COL, CORD, CPUN, CUZ, ENCB, F, GB, GH, HAO, HUA, HUT, K, LE, LIL, LINN, MA, MEXU, MICH, MO, NY, P, PSO, QCA, RSA, S, SI, TAES, UC, US, USM, UTC, W, and WIS [abbreviations according to Holmgren *et al.* (1990)], including the type specimens of the species studied. Only synonyms used frequently in Meso and South American are given. For further synonymy see Peterson *et al.* (2001), Peterson and Boechat (2001), and Soreng *et al.* (2008).

The species concept is based on Crisci (1994), McDade (1995), Wiens and Servedio (2000), and Uribe Meléndez (2008), which is a morphological concept. Thus, in this paper, we use the presence of one or more diagnostic characters which distinguish a given species from all others as a species criterion. The taxonomic analyses are based on extensive morphological and micromorphological comparisons.

RESULTS AND DISCUSSION

Eragrostis acutiflora (Kunth) Nees, Fl. Bras. Enum. Pl. 2:501-502. 1829. *Poa acutiflora* Kunth, Nov. Gen. Sp. 1:161. 1815 (1816). TYPE: COLOMBIA. On the Río Magdalena, *F. Humboldt & A. Bonpland 1603* (HOLOTYPE: P!; ISOTYPES: B-W, P, US-2891479 fragm. ex P!).

Caespitose perennials. **Culms** 20-65 cm tall, erect to geniculate spreading, glabrous and shiny below the nodes. **Leaf sheaths** 1/3 to about as long as the internodes, glabrous, ciliate at the summit; **ligules** 0.1-0.3 mm long, ciliolate-membranous; **blades** 10-20(-25) cm long, 1.5-4.2 mm wide, flat, occasionally involute, glabrous below, scaberulous above and sparingly ciliate near base. **Panicles** 8-32 cm long, 2-14 cm wide, open to somewhat contracted; the ascending primary branches 1-10 cm long, somewhat densely flowered, spreading 20-80° from the rachises; pulvini in axils of primary branches pilose; **pedicels** 1-5 mm long, erect, spreading 30-70° from the branch axis, scaberulous. **Spikelets** 5-7(-10) mm long, (1-)1.2-1.8(-2.2) mm wide, 7-14(-21)-flowered, narrowly elliptical, acute at both ends, strongly compressed, greenish straw-colored towards the center to reddish-purple tinged near the margins; **disarticulation** entire floret above the glumes or the lemmas falling individually leaving the paleas on the rachilla; **glumes** 1-2 mm long, narrowly lanceolate with scaberulous keels; **lower glumes** 1-1.4 mm long; **upper glumes** 1.4-2 mm long; **lemmas** 2-2.6 mm long, lanceolate to broadly ovate, chartaceous, keeled, scaberulous along keel, lateral nerves evident; apex acuminate to attenuate or subaristate, scaberulous, often reddish-purple; **paleas** 1.5-2.1 mm long, bowed out below, hyaline, scaberulous along keels; apex acute; **stamens** 2, anthers 0.2-0.3 mm long, reddish-brown. **Caryopses** 0.5-0.9 mm long, obovoid to ellipsoid, finely longitudinally striate, light brownish to reddish-brown.

Iconography. Peterson and Giraldo-Cañas (2008).

Distribution and habitat. *Eragrostis acutiflora* ranges from Mexico and the Caribbean through Central America to South America where it has been reported from Bolivia, Brazil, Ecuador, French Guiana, Guyana, Surinam, and Venezuela. Herein, we cited this species for the first time for Peru (Peterson and Sánchez Vega, 2007). It can be found growing in moist savannas, open disturbed areas, and sandy to gravelly roadsides; 0-2000 m.

Specimen examined. PERU. San Martín: Palma del Espino, Santa Lucía, nuevo aeropuerto, 500 m, 20 Oct 1987, *J. M. Idrobo 11895* (COL).

Eragrostis bahiensis Schrad. ex Schult., Mant. 2:318. 1824. *Eragrostis pilosa* var. *bahiensis* (Schrad. ex Schult.) Kuntze, Revis. Gen. Pl. 3(2,2):353. 1898. TYPE: BRAZIL. *Maximilian Neowidensis s.n.* (HOLOTYPE: LE).

- . *Eragrostis expansa* Link, Hort. Berol. 1:190. 1827. TYPE: URUGUAY. Montevideo, *F. Sellow s.n.* (ISOTYPE: US-2850751 fragm.!).
- . *Poa microstachya* Link, Hort. Berol. 1:185. 1827. *Eragrostis psammodes* var. *microstachya* (Link) Döll, Fl. Bras. 2(3):153. 1878. *Eragrostis microstachya* (Link) Link, Hort. Berol. 2:294. 1933. TYPE: URUGUAY. Montevideo, *F. Sellow s.n.* (HOLOTYPE: B; ISOTYPES: BAA-989 fragm. ex B!, US-2850751!).
- . *Eragrostis firma* Trin., Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4,2(1):74. 1836. TYPE: BRAZIL. SÃO PAULO: inter plantas a St. Paulo (HOLOTYPE: LE-TRIN-2342.01!; ISOTYPE: US-2891470 fragm.!).
- . *Eragrostis blepharophylla* Jedwabn., Bot. Arch. 5(3"4):197. 1924. BRAZIL. *F. Sellow 3688* (ISOTYPE: US-2891454 fragm.!).
- . *Eragrostis macra* Jedwabn., Bot. Arch. 5(3"4):200. 1924. TYPE: BRAZIL. Nov 1887, *A.F.M. Glaziou 16624* (LECTOTYPE: US-1280047! designated by Boechat & Longhi-Wagner, Iheringia, Bot. 55:147. 2001; ISOLECTOTYPES: C, US-289924!, US-1280048!).
- . *Eragrostis bahiensis* forma *riparia* Burkart, Fl. II. Entre Ríos 2:189. f.66. 1969. TYPE: ARGENTINA. ENTRE RÍOS: Concepción del Uruguay, Isla Almirón Chico, *Burkhart & Crespo 22874* (HOLOTYPE: SI; ISOTYPE: BAA-1010!).

Caespitose perennials with innovations, without

rhizomes, not glandular. **Culms** 25–95(-110) cm tall, erect, glabrous. **Leaf sheaths** glabrous, summits hairy, hairs 1-3 mm; **ligules** 0.2-0.4 mm long; **blades** (8)12-40 cm long, 2-5 mm wide, flat to involute, abaxial surfaces glabrous, adaxial surfaces scabridulous and glabrous or long ciliate basally. **Panicles** 15-30(45) cm long, (4)8-17 cm wide, narrowly ovate, open to contracted; primary branches 5-15 cm long, diverging 20-90° from the rachises, often capillary, usually naked basally; pulvini glabrous; **pedicels** 0.3-6 mm long, mostly appressed, scabridulous, always shorter than the spikelets. **Spikelets** 6-15(18) mm long, 1.3-2(2.2) mm wide, narrowly lanceolate, plumbeous, occasionally with a reddish-purple tinge, with 8-30(40) florets; **disarticulation** usually in the rachilla below the florets, occasionally the lemmas falling separately, leaving the paleas on the rachilla; **glumes** lanceolate to ovate, membranous to subhyaline, keeled; **lower glumes** 1-1.4 mm long; **upper glumes** 1.4-1.7 mm long; **lemmas** 1.5-2.2 mm, broadly ovate, leathery, scabridulous, lateral veins evident, apices acute; **paleas** 1.4-2.1 mm long, hyaline, bases not projecting beyond the lemmas, keels scabridulous, apices acute to obtuse; **stamens** 2, anthers 0.4-0.6 mm long, reddish-purple. **Caryopses** 0.6-0.8 mm long, obovoid to ellipsoid, terete, somewhat striate, reddish-brown.

Iconography. Peterson and Giraldo-Cañas (2008). **Distribution and habitat.** *Eragrostis bahiensis* grows in sandy soils near river banks, lake shores, and roadsides, at 0-1500 (-1850) m. Its range extends south from the Gulf Coast of the United States through Mexico to Bolivia, Paraguay, and Argentina. Herein it is cited for the first time for Peru (Peterson and Sánchez Vega, 2007).

Specimen examined. PERU. San Martín: Palma del Espino, Santa Lucía, 500 m, 21 Oct 1987, *J. M. Idrobo 11900* (COL).

Eragrostis secundiflora J. Presl, Reliq. Haenk. 1 (4-5):276. 1830. subsp. *secundiflora*. *Poa*

secundiflora (J. Presl) Kunth, Enum. Pl. 1:342. 1833. TYPE: MEXICO. *T. Haenke s.n.* (HOLOTYPE PR, ISOTYPES photo K!, LE, MO-123764!, US-79720 fragm. ex PR!).

. *Eragrostis compacta* Salzm. ex Steud., Syn. Pl. Glumac. 1:275. 1854. TYPE: BRAZIL. **Bahia**: *P. Salzmann s.n.* (HOLOTYPE P!, ISOTYPES K!, MO!, US-911749!, US-911748!).

. *Eragrostis yucatanana* L.H. Harv., Bull. Torrey Bot. Club 81(5):406. 1954. TYPE: MEXICO. **Yucatán**: near Progreso, 11-15 Aug 1932, *J.R. Swallen 2933* (HOLOTYPE US-1537194!).

Caespitose perennials with innovations, not glandular. **Culms** 30-75 cm tall, erect, glabrous below. **Leaf sheaths** overlapping below, ½ as long as the internodes above, mostly glabrous, hairy at the apices, hairs to 4 mm long; **ligules** 0.2-0.3 mm long; **blades** 10-25(-40) cm long, 1-5 mm wide, involute, glabrous abaxially, scabridulous adaxially, sometimes also sparsely pilose. **Panicles** (3-)5-30 cm long, 1-15 cm wide, from narrowly oblong, glomerate, and interrupted below to ovate and open; primary branches 0.5-12(-16) cm, appressed or diverging up to 40° from the rachises, stiff; pulvini glabrous or sparsely hairy; **pedicels** 0-1(-3) mm, appressed, flattened. **Spikelets** 6-16(-23) cm long, 2.4-5 mm wide, ovate to linear-elliptic, flattened, stramineous, with reddish-purple margins or completely reddish-purple, with 10-45 florets; **disarticulation** basipetal, florets falling intact and before the glumes; **glumes** ovate-lanceolate to lanceolate, membranous; **lower glumes** 1.7-3 mm long; **upper glumes** 2.2-4 mm long, apices acuminate; **lemmas** 2-6 mm long, ovate, membranous to leathery, apices usually acuminate or attenuate, sometimes acute; **paleas** 1.5-3 mm long, membranous to leathery, narrower than the lemmas, apices obtuse, sometimes bifid; **stamens** 2, anthers 0.2-0.5 mm long, brownish. **Caryopses** 0.8-1.3 mm long, ellipsoid, somewhat laterally flattened, smooth, reddish-brown.

Iconography. Peterson and Giraldo-Cañas (2008).

Distribution and habitat. *Eragrostis secundiflora* subsp. *secundiflora* occurs throughout Mexico, and in South America it is found in Bolivia, Brazil, Colombia, Guyana, and Venezuela. This species grows in sandy soils, dunes, grasslands, beaches, and roadsides; 0-1700 m. Herein it is cited for the first time for Peru (Peterson and Sánchez Vega, 2007).

Specimen examined. PERU. **San Martín**: Roque, mount La Campana, brushwood, 19 May 1925, *D. Melin 43* (S).

Eragrostis soratensis Jedwabn., Bot. Arch. 5(3-4): 213. 1924. TYPE: BOLIVIA. **La Paz**: vicinis Sorata, colle Ticacirca, Feb 1858, *G. Mandon 1331* [LECTOTYPE, designated by Hitchcock, Contr. U.S. Natl. Herb. 1927: 343 (without citing a herbarium), W!; ISOTYPES BAA 1095 ex B!, BM, G, GOET, K!, P!, S, US-1126604!, W!].

Perennial, caespitose with extravaginal innovations. **Culms** 10-40 cm tall, erect to ascending, foliage mostly basal, glabrous, 1 or 2 nodes per culm. **Leaf sheaths** overlapping, longer than the internodes, glabrous, pilose at the summit and along margins, to pilose on upper half, the hairs up to 2 mm; **ligules** 0.3-1 mm, ciliate; **blades** 4-10 cm long, 0.2-0.3 cm wide, flat to involute above, scabrous on the adaxial surface, sometimes pilose near base and along margins, glabrous abaxially. **Panicles** 10-20 cm long, 12-19 cm wide, ovate to pyramidal, open, primary branches 6-12 cm, 1 or 2 per node, naked near base, spreading 25°-90° from the rachises; secondary branches composed of loosely overlapping spikelets; pulvini glabrous or with a few hairs; **pedicels** 1.5-6 mm, erect, spreading, scaberulous. **Spikelets** 3.4-4.2 mm long, 1-1.6 mm wide, 4- to 6 (to 7)-flowered, plumbeous to purplish green; rachilla somewhat flattened with a few short hairs on the margins, the hairs less than 0.5 mm; **disarticulation** acropetal, glumes first then lemmas, paleae weakly persistent; **glumes** 1-1.4 mm, subequal, ovate; **lower glume** 1-1.2 mm, **upper**

glume 1.2-1.4 mm; **lemmas** 1.5-1.9 mm, ovate, membranous, lateral nerves inconspicuous, scaberulous along the keel; apex acute, purplish; **paleas** 1.5-1.9 mm, as long as the lemmas, hyaline; **stamens** 3, anthers 0.3-0.4 mm, reddish brown. **Caryopses** 0.6-0.8 mm, obovoid to prism-shaped, striate and reticulate, laterally flattened, ventrally grooved, irregularly rectangular with lateral sides angled, reddish brown.

Iconography. Peterson and Sánchez Vega (2007).

Distribution and habitat. Native to highlands of the Andes; this species occurs in the Altiplano region of Bolivia and Peru near Lago Titicaca, and herein we report it for this first time for Colombia (Peterson and Giraldo-Cañas, 2008). *Eragrostis soratensis* grows on rocky slopes and flats in puno vegetation and humid scrub and Andean prairies; 2500-4000 m.

Specimens examined. COLOMBIA. **Cundinamarca:** Sabana de Bogotá, entre Sibaté y San Miguel, prado, 2750 m, 15 Aug 1939, *J. Cuatrecasas 6631* (COL, S, US).

Eragrostis uniolooides (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1: 264. 1854. *Poa uniolooides* Retz., Observ. Bot. 5: 19. 1788. TYPE: INDIA. Tranquebar, 1776, *König s.n.* (SYNTYPE BM, ISOSYNTYPES BM, LE).

Tufted annuals. **Culms** 10-60 cm tall, erect to spreading, the foliage mostly basal, glabrous below the nodes. **Leaf sheaths** overlapping below and ½ the length of the internode above, glabrous, sparsely pilose at the summit, the hairs 0.4-3 mm long; **ligules** 0.1-0.2 mm long, ciliate, a dense row of white hairs; **blades** (1.8) 3-12 (18) cm long, 2-6 (8) mm wide, flat to loosely involute, glabrous below and scaberulous above with an occasional appressed hair. **Panicle** 5-17 cm long, (0.5) 2-7 cm wide, ovate, open to contracted, the ascending primary branches 0.2-6.5 cm long, glabrous, loosely or densely

flowered, appressed to spreading up 70° from the culm axis; pulvini in the axils of primary branches glabrous; **pedicels** (0.5) 2-6 (8) mm long, glabrous to scaberulous. **Spikelets** 4-8 (10) mm long, (1.6) 2-4 mm wide, 12-42 flowered, ovate-lanceolate to deltoid, strongly compressed, loosely imbricate, straw-coloured to purplish; glumes **disarticulated** first, then entire florets from base; rachilla persistent; **glumes** (0.5) 0.7-1.8 mm long, ovate-lanceolate to lanceolate, hyaline to membranous, keeled, scaberulous along the keel; **lemmas** (1.3) 1.5-1.8 (1.9) mm long, broadly ovate, membranous, keeled, smooth along the keel, lateral nerves evident, raised, apex obtuse to acute; **paleas** 1.4-1.9 mm long, bowed-out, hyaline, scaberulous along the keels, apex acute to obtuse; **stamens** 2, anthers 0.2-0.4 mm long, purplish. **Caryopses** 0.6-0.9 (1.0) mm long, ellipsoid, laterally compressed, light brownish.

Iconography. Lazarides (1997).

Distribution and habitat. This species is native to Asia, naturalized in the American continent, from USA to Venezuela, Ecuador (not recorded in Colombia and Peru), Guianas, and Caribbean. Herein we report it for this first time for Mexico (Beetle *et al.* 1991). *Eragrostis uniolooides* occurs along roadsides and disturbed ground usually below 1000 m. On the other hand, this species has been cited for the Antioquia's Flora (Colombia) (www.mobot.org/tropicos) on based specimen *R. Callejas & A. Echeverri 11494* (MO!), but this collection belongs to *Poidium juergensii* (Hack.) Matthei.

Comments. *Eragrostis uniolooides* is very similar in habit, panicle characteristics, and overall spikelet shape and color to *E. mokensis* Pilg. However, *E. uniolooides* can be separated from the latter by having ovate lemmas with acute to obtuse apices (verses orbicular lemmas with obtuse apices in *E. mokensis*), longer pedicels (0.5) 2-6 (8) mm long versus 0.5-2.5 mm long in *E. mokensis*, somewhat wider spikelets [(1.6) 2-4 mm wide verses 2-2.5(-3) mm wide], and florets with two stamens (three stamens

reported in *E. mokensis*) (Peterson and Giraldo-Cañas, 2008).

Specimen examined. MEXICO. Veracruz: Vicinity of Minantitlan, sandy road shoulder, ca. 35 m, 5 Aug 1970, *L. H. Harvey* 8590 (COL).

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LITERATURE CITED

- Beetle, A.A.**, E. Manrique Forceck, J.A. Miranda Sánchez, V. Jaramillo Luque, A. Chimal Hernández, A.M. Rodríguez Rodríguez. 1991. *Eragrostis* V. Wolf. In: *Las gramíneas de México*. Tomo III. México, DF: COTECOCA, SARH; p. 50-97.
- Clayton, W.D.**, S.A. Renvoize. 1986. *Genera Graminum: Grasses of the World*. Kew Bulletin Additional Series, Royal Botanic Gardens, Kew.
- Crisci, J.** 1994. La especie: realidad y conceptos. In: J. Llorente Bousquets, I. Luna (compiladores). *Taxonomía biológica*. México DF: Universidad Autónoma de México-Fondo de Cultura Económica; p. 53-64.
- Holmgren, P.**, N. Holmgren, L. Barnett. 1990. *Index Herbariorum*. Part I: The Herbaria of the World. New York: The New York Botanical Garden.
- Ingram, A.L.**, J.J. Doyle. 2007. *Eragrostis* (Poaceae): Monophyly and infrageneric classification. *Aliso*. **23**: 595-604.
- Lazarides, M.** 1997. A revision of *Eragrostis* (Eragrostideae, Eleusininae, Poaceae) in Australia. *Austral Syst Bot.* **10**: 77-187.
- McDade, L. A.** 1995. Species concepts and problems in practice: insight from botanical monographs. *Syst Bot.* **20**: 606-22.
- Peterson, P.M.** 2003. *Eragrostis*. In: M.E. Barkworth, K.M. Capels, S. Long, M.B. Piep (eds.). *Magno-liophyta: Commelinidae (in part): Poaceae, part 2. Flora of North America North of Mexico*. Vol 25. New York: Oxford University Press; p. 65-105.
- Peterson, P.M.**, S.C. Boechat. 2001. *Eragrostis*. In: P.M. Peterson, R.J. Soreng, G. Davidse, T.S. Filgueiras, F.O. Zuloaga, E.J. Judziewicz (eds.). *Catalogue of New World grasses (Poaceae: Chloridoideae)*. *Contr US Natl Herb.* **41**: 81-115.
- Peterson, P.M.**, D. Giraldo-Cañas. 2008. *Eragrostis* (Poaceae: Chloridoideae: Eragrostideae) in Colombia. *J Bot Res Inst Texas.* **2**: 875-916.
- Peterson, P.M.**, J.T. Columbus, S.J. Pennington. 2007. Classification and biogeography of New World grasses: Chloridoideae. *Aliso*. **23**: 580-94.
- Peterson, P.M.**, I. Sánchez Vega. 2007. *Eragrostis* (Poaceae: Chloridoideae: Eragrostideae: Eragrostidinae) of Peru. *Ann Missouri Bot Gard.* **94**: 745-90.
- Peterson, P.M.**, R.J. Soreng, G. Davidse, T.S. Filgueiras, F.O. Zuloaga, E.J. Judziewicz. 2001. *Catalogue of New world grasses (Poaceae): II. subfamily Chloridoideae*. *Contr US Natl Herb.* **41**: 1-255.
- Peterson, P.M.**, R.D. Webster, J. Valdés Reyna. 1995. Subtribal classification of the New World Eragrostideae (Poaceae: Chloridoideae). *Sida.* **16**: 529-44.
- Peterson, P.M.**, R. D. Webster & J. Valdés Reyna. 1997. Genera of the New World Eragrostideae (Poaceae: Chloridoideae). *Smithsonian Contr Bot.* **87**: 1-50.
- Soreng, R.J.**, G. Davidse, P.M. Peterson, F.O. Zuloaga, E.J. Judziewicz, T.S. Filgueiras, O. Morrone. 2008. *Catalogue of New World grasses*. (updated continuously). <http://mobot.mobot.org/W3T/Search/nwgc.html>
- Uribe Meléndez, J.** 2008. Monografía de *Frullania* subgénero *Meteoriopsis* (Frullaniaceae, Marchantiophyta). *Caldasia.* **30**: 49-94.
- Van den Borre, A.**, L. Watson. 1994. The infrageneric classification of *Eragrostis* (Poaceae). *Taxon.* **43**: 383-422.
- Veldkamp, J.F.** 2002. Revision of *Eragrostis* (Gramineae, Chloridoideae) in Malesia. *Blumea.* **47**: 157-204.
- Watson, L.**, M. J. Dallwitz. 2008. *Grass genera of the World: descriptions, illustrations, identification, and information retrieval; including synonyms, morphology, anatomy, physiology, phytochemistry, cytology, classification, pathogens, World and local distribution, and references*. (accessed 8 May 2008) <http://delta-intkey.com>
- Wiens, J. J.**, M. R. Servedio. 2000. Species delimitation in systematics: inferring diagnostic differences between species. *Proc R Soc Lond. B* **267**: 631-6.