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Taxonomy of *Bouteloua juncea* and *Bouteloua triaena*, two species confused for more than a century

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Abstract

The genus *Bouteloua* is native to America and is one of the most important groups in North America grasslands. *Bouteloua juncea* is one of the only two species of this genus endemic to the Antilles. However, *B. juncea* has erroneously been reported for Mexico due to a confusion between this species and *B. triaena*. The objective of this work was to review the nomenclature of *B. juncea* and *B. triaena* to clarify the origin of the confusion between both taxa. The names *Dinebra cristata*, *Triaena racemosa* and *Triathera gracilis* are lectotypified, a morphological description and a distribution map of *Bouteloua juncea* are presented, and taxonomic comments are provided on *Bouteloua juncea* and *B. triaena* to clarify the origin of the confusion between these two taxa.

Key words: *Dinebra cristata*, lectotype, *Triaena racemosa*

Introduction

The genus *Bouteloua* Lagasca (1805: 134) belongs to the family Poaceae, subfamily Chloridoideae, tribe Cynodonteae Dumortier (1823: 83) and subtribe Boutelouinae Stapf (1917: 22) (Soreng *et al.* 2022). *Bouteloua* is native to the Americas and one of the most important groups in the North American grasslands, mainly in Mexico, where around 52 to 55 species are reported (Dávila *et al*. 2018, Sánchez-Ken 2019).

Bouteloua is a monophyletic group with 60 species (Peterson *et al*. 2015, Soreng *et al*. 2022), distributed throughout the American continent. Of the total number of species, 25 are endemic to Mexico, two to the United States of America, two to the Antilles and only one is endemic to South America (Herrera-Arrieta *et al*. 2004, Peterson *et al*. 2015, Villaseñor 2016, Sandoval-Ortega *et al*. 2019).

Bouteloua juncea (Desvaux ex Beauvois [in Beauvois 1812: 40]) Hitchcock (1913: 343) is one of the two species of the genus that are endemic to the Antilles and has been recorded from Cuba, Hispaniola (Haiti and the Dominican Republic) and Puerto Rico (Herrera-Arrieta *et al*. 2004, Gould 1979). However, it has been erroneously reported for Mexico in some recent catalogues of the Poaceae family (Villaseñor 2016, Sánchez-Ken 2019), due to the confusion between *B. triaena* (Sprengel 1825: 293) Scribner (1891: 307–308) and *B. juncea* (Sandoval-Ortega *et al*. 2019).

The several names associated to these two species have been considered synonyms in the past. Hence, it is necessary to present a distribution map and a morphological description for *Bouteloua juncea* based on current data from the specimens deposited in the main herbaria of the Antilles as well as new collections.

The objective of this work was to review the nomenclature of *B. juncea* and *B. triaena* to clarify the origin of the confusion between both taxa, as well as to provide a morphological description of *B. juncea* based on herbarium specimens and a map with known geographical distribution.

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Materials and methods

Herbaria in Cuba, Dominican Republic, Mexico, and Puerto Rico were visited in 2018. Specimens deposited in the following collections were revised: Herbario de la Universidad Autónoma de Aguascalientes (HUAA), Herbario de la Universidad de Sonora (USON), Herbario del Instituto de Ecología, A.C. (IEB), the National Herbarium of Mexico (MEXU), University of Puerto Rico Río Piedras (UPRRP), University of Puerto Rico Mayagüez (UPRM), Dr. Rafael M. Moscoso National Botanical Garden (JBSD), Herbario de la Universidad Autónoma de Santo Domingo (USD), Herbario del Instituto de Ecología y Sistemática de Cuba (HAC) and Herbarium of the National Botanical Garden of Cuba (HAJB) (acronyms follow Thiers (2023 [continuously updated]). In addition, online image of specimens deposited in the herbaria B, K, MO, NY, P, and US (Curators Herbarium B 2023, K herbarium 2023, P herbarium 2023, NY herbarium 2023, TROPICOS 2023, US herbarium 2023), as well as the JACQ consortium (2004 ff.) and Global Plants (JSTOR, 2023) platforms.

Based on the localities registered in the consulted herbarium material, collection localities were established. In the period between June 2018 and August 2019, explorations were carried out to obtain new specimens of *B. juncea* in Cuba, the Dominican Republic and Puerto Rico following the methodology proposed by Engelmann (1986). In each collection site, geographic coordinates were taken based on Datum WGS 84 (DMA 1991). The collected specimens were deposited in the HUAA herbarium, with up to four duplicates that were sent to the HAC, JBSD, UPRRP and USON herbaria. Specimens were identified using relevant literature (Gould 1979, Herrera-Arrieta *et al*. 2004, Catasús-Guerra 2015). Photographs of habit and important structures were taken for their identification and a distribution map of *Bouteloua juncea* was made based on the information recovered from the consulted herbarium material and the data taken in the field. The articles of the International Code of Nomenclature for algae, fungi, and plants cited below follow the current edition, i.e. the Shenzhen Code (hereafter reported as "ICN"; Turland *et al*. 2018). The material collected during field work is included in the list of examined specimens.

Results

Bouteloua juncea (Desvaux. ex Beauvois) Hitchcock (1913: 343). Fig. 1.

≡*Triaena juncea* (Desvaux ex Beauvois) Griffiths (1912: 354).

≡*Cynodon junceus* (Desvaux ex Beauvois) Raspail (1825: 303).

≡*Eutriana juncea* (Desvaux ex Beauvois) Trinius (1824: 238).

≡*Atheropogon domingensis* Sprengel (1825: 293).

≡*Triathera juncea* Desvaux ex Beauvois (in Beauvois 1812: 40).

Lectotype (**designated by Sandoval-Ortega *et al.* 2019**):—Plate IX, figure IVa-d in Essai d'une Nouvelle Agrostographie 1812. **Epitype** (**designated by Sandoval-Ortega *et al.* 2019**):—DOMINICAN REPUBLIC, Barahona, Quita Coraza: Entrada a Pueblo Quita Coraza, orilla de carretera, 18°28'16.7"N 71° 3'37.7"W, 126 m., 19 June 2018, *Sandoval-Ortega 1006* (HUAA 30899!).

Description:—Herbs perennial, stoloniferous, tufted; culms 10–20 cm tall, thin, the fertile ones erect, ascending or geniculate, nodes pubescent; leaves with glabrous sheath, blade flat or involute, 8–50 × 1–1.2 mm; ligule a membrane, long ciliate (Fig. 2A), trichomes 0.3–0.5 mm long; synflorescence a terminal spike 1–2(3) cm long (Fig. 2B); spikelets (8)10–25(35), drooping, solitary (Fig. 2B and 2C); glumes linear lanceolate, 1-nerved, acuminate, distinct, the first ca. 1 mm long, the second 2–2.5 mm long (Fig. 2D); fertile floret 1 (Fig. 2E), lemma ovate elliptic 2–3 mm long, 3-nerved, apex 3-mucronate (Fig. 2F), palea ovate-lanceolate, shorter than lemma, ca. 2 mm long, apex 2-mucronate (Fig. 2G); sterile floret 1, reduced to a short column with three scabrous awns ≤ 1 cm long (Fig. 2H); caryopsis oblong-elliptic, ca 1.5 mm long (Fig. 2I).

Phenology:—Specimens with spikelets have been collected from March to June.

Distribution and habitat:—Cuba, Haiti, the Dominican Republic, Puerto Rico, and the Virgin Islands (Fig. 3). It grows close to the coast in coastal and subcoastal xeric scrub, microphyllous evergreen forest and dry forest, between -30 and 400 m.

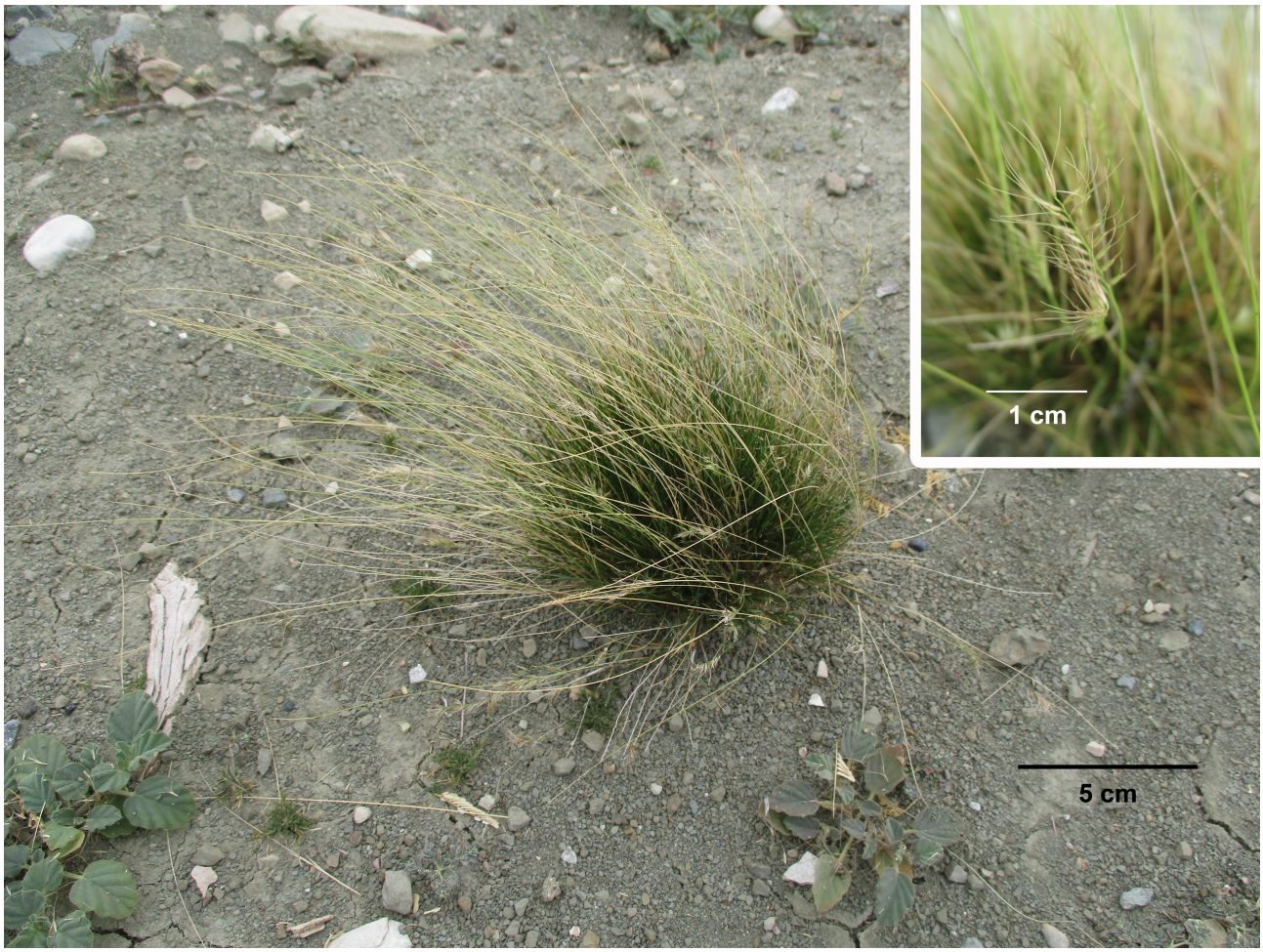


FIGURE 1. *Bouteloua juncea* (Desvaux ex Beauvois) Hitchcock. Quita Coraza, Barahona, Dominican Republic.

Examined material:—CUBA. **Granma:** Farallón de El Dudoso, oeste de ensenada de Mora -Pilón- (Oriente), 30 December 1938, *León 18610* (HAC). **Guantánamo:** US Naval Base, Guantánamo bay, Kittery Beach, ca. 0 m., 19°53'45.7''N 75°77'51.1''W, 4 October 1996, *Areces 6540* (UPRM); Imías, 5 February 1976, *Catasús 979* (HAC); Orillas de la Vía Azul, Yacabo, 12 January 1960, *Alain & Acuña 7483* (HAC); Zona seca Baitiquiri, Sur de Baracua, Provincia Oriente, 12 January 1969, *Alain s.n.* (HAC); Macambo, 28 May 1982, *Bisse s.n.* (HAC); Imías, camino de Yacabo arriba, 7 February 1976, *Bisse s.n.* (HAC); La Chivera, 23 May 1982, *Günther s.n.* (HAJB); Imías, Por el camino a Yacabo Arriba. Guantánamo, 7 February 1976, *Catasús s.n.* (HAJB); Playa Borracho, 6 July 1984, *Bermúdez 2221* (HAJB); Próximo a San Antonio del Sur. Guantánamo, 25 November 1978, *Catasús 1189* (HAJB); Vía Azul, 12 January 1960, *Alain 7483* (HAJB). **HAITI**. **Dept. Ouest:** Montagnes du Trou d'Eau, Between Source Matelas and Source Puantes, 15 October 1924, *Ekman 1057* (P). **DOMINICAN REPUBLIC**. **Azua:** al N de la población, *Howard 8640* (USD); a 2.3 km al NO de la entrada al poblado de Hatillo, 30 m., 16 September 1999, *Veloz 1776* (JBSD); Hatillo, Entrada al pueblo Hatillo, orilla de carretera, 126 m., 18°24'00''N 70°31'53.1''W, 19 June 2018, *Sandoval-Ortega 1005* (JBSD, HUAA, USON); Dry hills N of Azua, 29 August 1946, *Howard 8640* (P). **Barahona**: Las Salinas, 19 August 1946, *Howard 8363* (USD); 2 km desde Fondo Negro en la carretera a Quita Coraza y Azua, 100 m., 18°27´N 71°05´W, 15 June 1982*, Zanoni 20935*, (JBSD); Quita Coraza: Entrada a Pueblo Quita Coraza, orilla de carretera, 126 m., 18°28'16.7"N 71°3'37.7"W, 19 June 2018, *Sandoval-Ortega 1006* (JBSD, HUAA, USON). **Independencia:** Hoya de Enriquillo, 10 km al oeste de Duverge, en el camino viejo a Jimaní, en la orilla del lago Enriquillo, -30 m., 18°25´N 71°37´W, 16 April 1987, *Zanoni 39083* (JBSD). **Monte Cristi:** 2 km antes de la ciudad, entre ésta y el poblado El Rincón, 10–20 m., 19°47´N 71°38´W, 16 August 1984, *García 168* (JBSD). **Peravia:** Aprox. 3 km al este de Las Calderas (o 18.5 km desde Baní en la carretera a Las Calderas), 30 m., 18°13´N 70°28´W, 23 July 1982, *Zanoni 22016* (JBSD); Baní, 8 km al Oeste de Baní, 28 August 1946, *Howard 8627* (USD, P); Carretera Baní-Azua, 20 m., 23 June 2006, *Siqueiros-Delgado s.n.* (HUAA, IEB); Matanzas, Playa Matanzas, 18°13'53.6''N 70°24'45.0''W, 19 June 2018, *Sandoval-Ortega1004* (JBSD, HUAA, USON). **Valverde:** 1.5 km al NE del cruce Los

Quemados, sobre una loma en el lado N de la carretera hacia Mao, 180 m., 19°30'N 71°9.5′W, 9 June 1987, *García 2216* (JBSD). **PUERTO RICO. Guánica:** Bo. Montalva, Guanica Forest Reserve, along dirt road over Monte de la Brea to seashore, 5–20 m., 17°56.03′N 66°56.34′W, 26 March 1995*, Axelrod 8856* (UPRRP); Bo. Montalva, Guanica Forest Reserve, along dirt road over Monte de la Brea to seashore, 5–20 m., 17°56.03′N 66°56.34′W, 26 March 1995, *Axelrod 8862* (UPRRP); Montalva, Monte de la Brea, Guanica Forest Reserve. From road 325 taking a dirt road south to Punta Manguillo, 12 m., 17°56'11''N 66°56'33''W, 20 November 2004, *Monsegur 278*, (UPRM); Punta La Brea, 30 m., 17°56'11''N 66°56'3''W, 30 June 20018 *Sandoval-Ortega 1007*, (UPRRP, HUAA, USON); Guanica State Forest: Barrio Montalva. Interior slopes of Monte de la Brea, 40–50 m., 9 December 1987, *Proctor 44315* (HAJB). **VIRGIN ISLANDS.** Salt Island, S of Tortola, NW bay, ca. 10 m., 22 June 1968, *Byer 68-1729* (UPRRP).

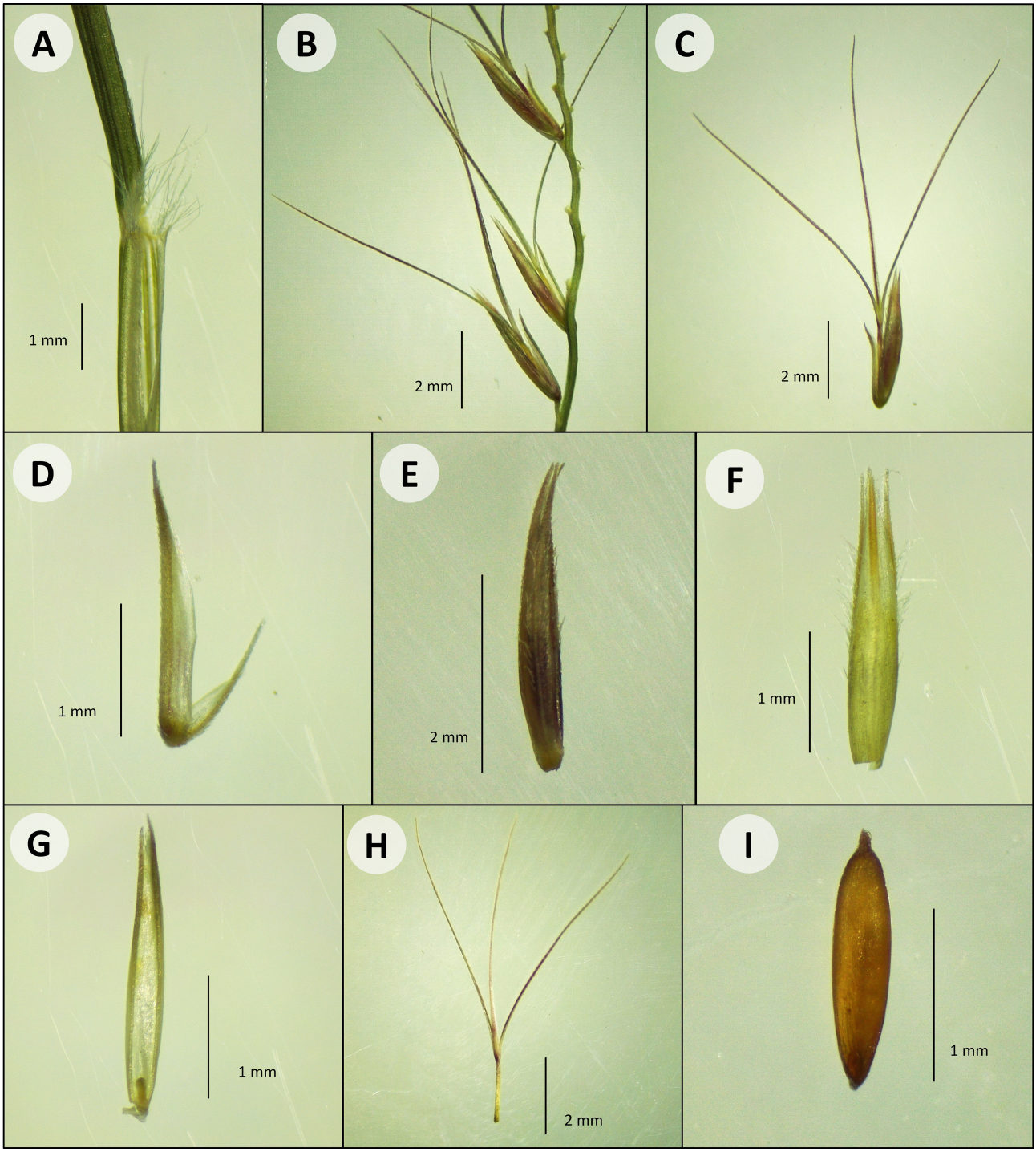


FIGURE 2. Detail of different structures of *Bouteloua juncea* (Desvaux ex Beauvois) Hitchcock. A) Ligule. B) Inflorescence. C) Spikelet. D) Glumes. E) Fertile floret. F) Lema . G) Palea. H) Rudimentary floret. I) Caryopsis.

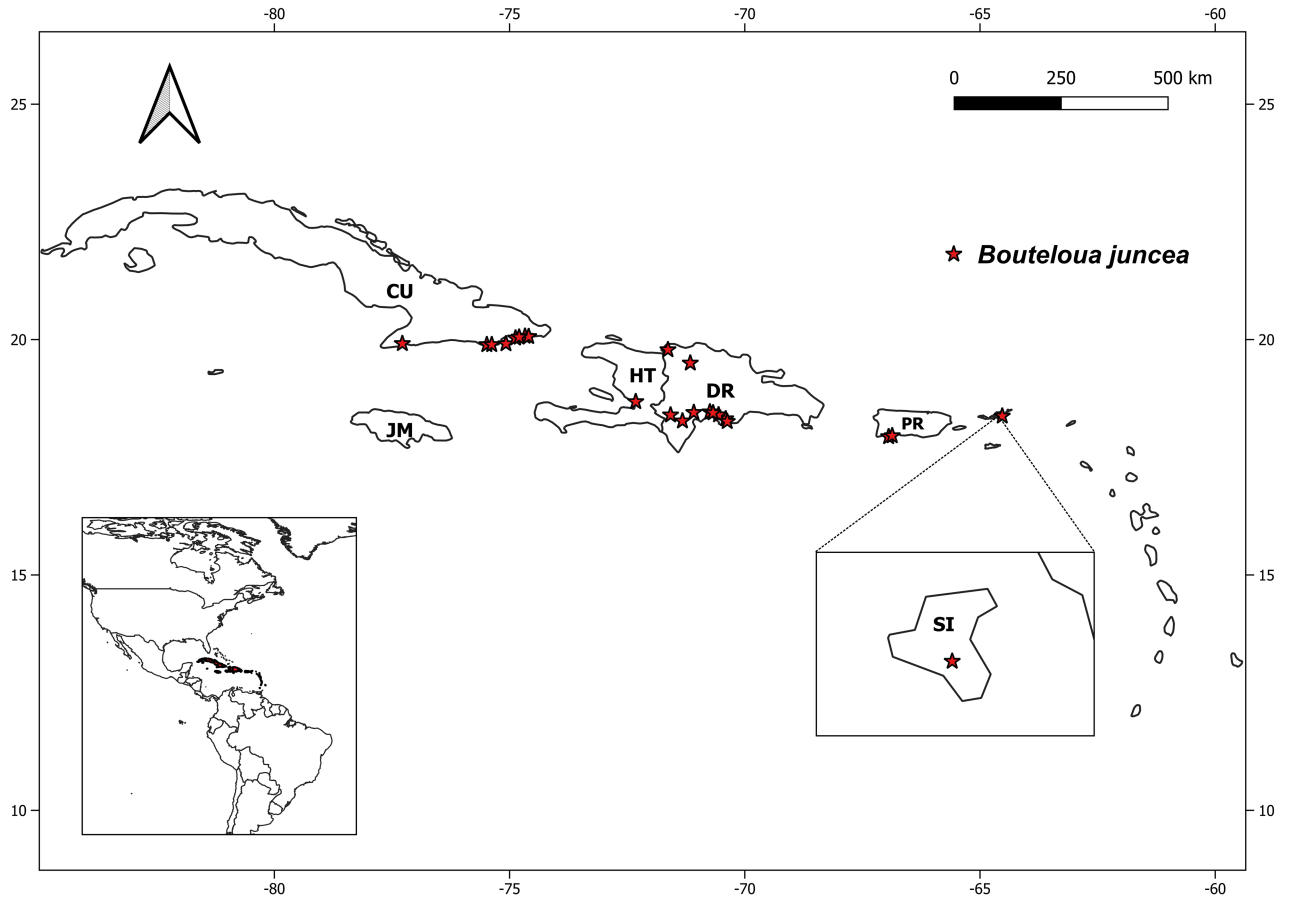


FIGURE 3. Distribution of *Bouteloua juncea* (Desvaux ex Beauvois) Hitchcock. CU= Cuba, DR= Dominican Republic, HT= Haiti, JM= Jamaica, PR= Puerto Rico, SI= Salt Island.

Bouteloua triaena (Sprengel) Scribner (1891: 307–308).

≡*Atheropogon triaena* Sprengel (1825: 293)

≡*Triaena racemosa* Kunth (in Bonpland *et al*. 1815[1816]: 144).

Lectotype (designated here):—MEXICO. Guanajuato: apricis inter Guanaxuato et Villalpando, 1803, *Bonpland & Humboldt s.n* (BW01795010 [image!]).

=*Dinebra cristata* Presl (1830: 293).

Lectotype (designated here):—MEXICO. Habitat in Mexico, s.f., *Haenke s.n.* (PR203601 [image!]) Fig. 4.

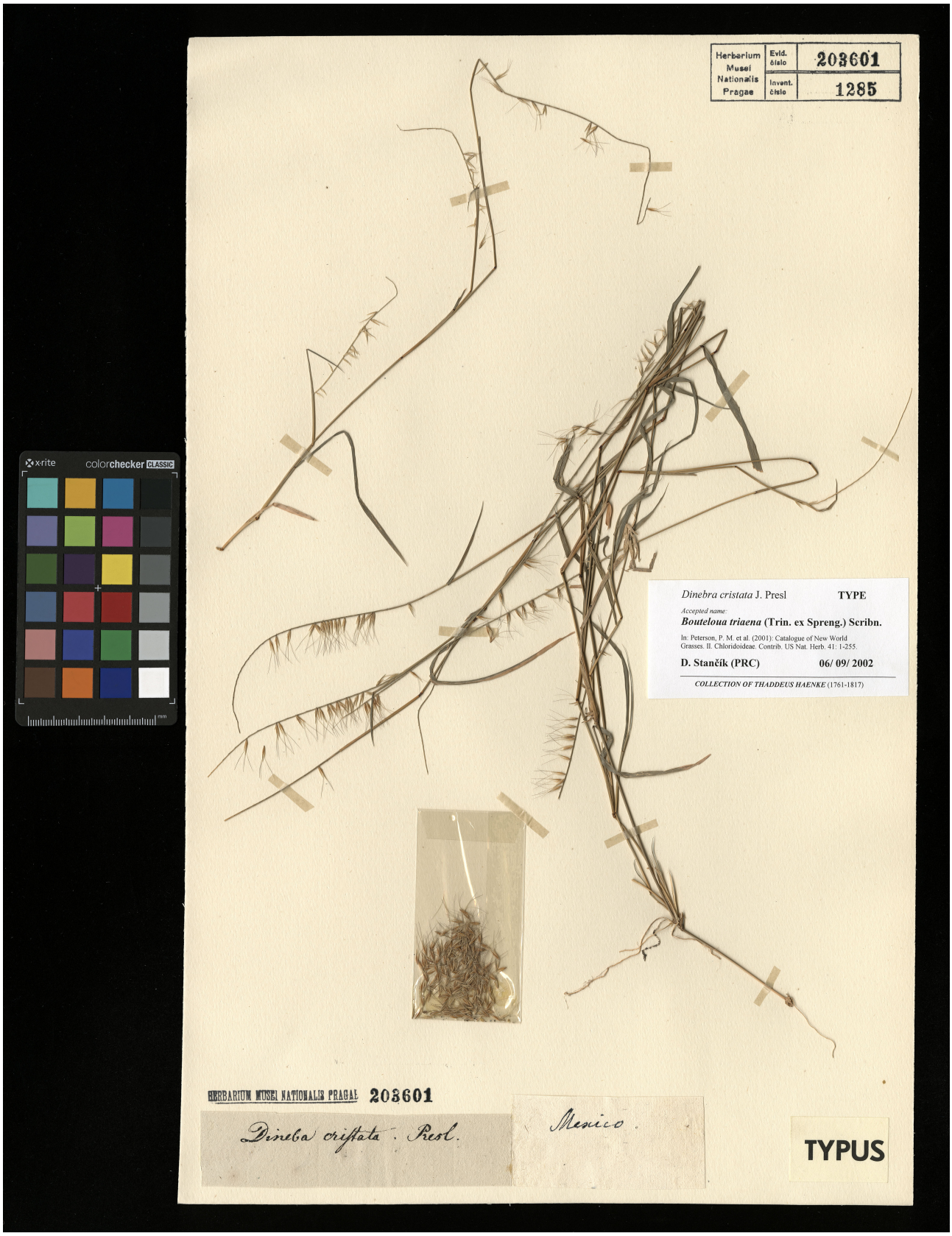
=*Triathera gracilis* Fournier (1886: 141).

Lectotype (designated here):—MEXICO, Cuernavaca, 1839, *Berlandier 1016* (W0026340 [image!]).

Notes on the type of *Triaena racemosa*:—Kunth's descriptions from "Nova Genera et Species Plantarum" are based on the botanical collections that Humboldt and Bonpland made in America from 1799 to 1808 (Bonpland *et al*. 1815 [1816], Stearn 1956). Currently, most part of the collections of Humboldt and Bonpland are deposited in P and B (HUH-Index of Botanists 2023, TL-2 2023).

In TROPICOS (2023) it is mentioned that the holotype of *T. racemosa* is deposited at P. However, the material deposited in P (P00665333) corresponds to the original drawing that was published in the protologue (tab. 61 from Bonpland *et al*. 1815 [1816]). Moreover, although P00665333 corresponds to original material (see Art. 9.4 ICN), it cannot be the holotype since it was not cited by the author as type (see Art. 9.1 ICN).

The protologue of *Triaena racemosa* provides a locality (*apricis inter Guanaxuato et Villalpando*), the only original material (other than the illustration from the protologue) that was traced is deposited in B. Therefore, the specimen BW01795010 is designated as lectotype, according to Art. 9.3 and 9.6 ICN, since this matches the protologue, has mature spikelets and corresponds to the current concept in *Bouteloua* (see e.g., Gould 1979, Herrera-Arrieta *et al*. 2004).



FTGURE 4. Lectotype of *Dinebra cristata* Presl. Specimen deposited at the Herbarium of the National Museum in Prague (PR203601).

Notes on the type of *Triathera gracilis*:—The name *T. gracilis* appears published by Fournier in "Sertum Nicaraguense" (Fournier 1880: 296), where he cites "Mexicanas plantas fasc. 2 p. 141", a treatment that would take another six years to be published. In the protologue of *T. gracilis*, Fournier (1886) cites three collections: *Berlandier 1016*, *Liebmann 578* and *Liebman 582*. However, the only one of these specimens that could be traced was *Berlandier 1016*, deposited in W. This material was also corroborated by L. Pignotti in 2010 (see label on W0026340). Here, W0026340 is designated as lectotype according to Art. 9.3 and 9.12 ICN, since it matches the protologue, shows reproductive structures, and corresponds to the current concept in *Bouteloua* (see e.g., Gould 1979, Herrera-Arrieta *et al*. 2004).

Note on the name *Eutriana racemosa* Trinius ex Fournier (in Fournier 1880: 296) *nomen nudum*:—Fournier (1880) cites *Eutriana racemosa* as a synonym of *Triathera gracilis* adding "msc. in herb. Petrop.", a name never formally published by Trinius (who died in 1844) and lacking a proper description or diagnosis.

Notes on the type of *Dinebra cristata*:—Presl's "Reliquiae Haenkeanae" is based on the material collected by Thaddaeus Haenke in America, Philippines and Mariana islands, as part of the scientific expedition led by Alessandro Malaspina from 1789 to 1794 (Presl 1830, Ramos & Alonso 2018). In the protologue of *D. cristata* only a locality is provided "*hab. in Mex.*" (Presl 1830). The material collected by Haenke is deposited in the herbaria PR and F (see HUH-Index of Botanists 2023). Some sources mention that the type material of *D. cristata* is deposited in PR (TROPICOS 2023, Herrera-Arrieta 2004), and after contacting PR herbarium staff, it was corroborated that a specimen of *D. cristata* collected by Haenke in Mexico is currently in that collection (Fig. 4). This is probably the specimen from the picture on the US00610858 sheet and the origins of the fragments that were corroborated by Peterson in 1998 (see label on sheet US00610858). Here, PR203601 is designated as lectotype according to Art. 9.3 and 9.6 ICN, since it matches the protologue, shows reproductive structures, and corresponds to the current concept in *Bouteloua* (see e.g. Gould 1979, Herrera-Arrieta *et al*. 2004).

Taxonomic notes on *Bouteloua juncea* and *Bouteloua triaena*:—In 1812, Beauvois published the name *Triathera juncea* under the authority of Desvaux. In the protologue no collector or collection number are mentioned, but an illustration of the synflorescence and spikelet is included.

Desvaux (1813) amended the description of *Triathera* Desvaux (1810: 188) and accepted the specific epithet "*juncea*" and added "*Habitat in Hispaniola*" (see also Hitchcock & Gase 1917). Three years later, Kunth described the genus *Triaena* Kunth (in Bonpland *et al*. 1815 [1816]: 144) and the species *Triaena racemosa* based on a specimen collected in Guanajuato, Mexico. Kunth mentioned that *Triaena* is very similar to *Triathera*.

In 1825, Sprengel published the new name *Atheropogon triaena* for *Triaena racemosa* and mentioned that this species is distributed in Mexico. In that same publication, Sprengel proposed the new name *A. domingensis* for *Triathera juncea* and mentioned that it is distributed in Hispaniola.

In 1882, Bentham proposed the new name *Bouteloua triathera* Bentham (1882: 104) with which he erroneously refers to both: *Triathera* and *Triaena*. However, this is a superfluous and illegitimate name (Art. 52 ICN). Some years later, Scribner noted the mistake made by Bentham (1882) and proposed the new combination *Bouteloua triaena* for *Atheropogon triaena* and, as a synonym, he included *Bouteloua triathera* adding the legend "*in part*".

At the beginning of the 20th century, Griffiths published *Triaena juncea* as a new combitaion for *Triathera juncea* based on the illustration from Beauvois (1812). However, Griffiths (1912) erroneously referred as *Triaena juncea* to specimens collected in Mexico. Those specimens and the illustration provided by Griffiths (1912) correspond to *Bouteloua triaena*, as described by Scribner (1891), and not to *Triathera juncea*. In the list of synonyms, Griffiths (1912) erroneously included *Bouteloua triaena*, *Triaena racemosa*, *Triathera gracilis*. A year later, Hitchcock, based on the work of Griffiths (1912), proposed *Bouteloua juncea* as a new combination to *Triathera juncea*, and erroneously referred with this name to specimens collected in Mexico and listed as synonyms *Bouteloua triaena* and *Triaena racemosa.*

Subsequently, Hitchcock and Chase (1917) reviewed material from the West Indies, which does not match the description provided by Griffiths (1912). They also mentioned that before the material collected in Hispaniola (*Buch 1910* [not seen] and *Britton 4918* MO-690997 [image!]) and consulted by them, the Mexican *Bouteloua triaena* (cited by them as *B. triana*) was apparently the only species to which the illustration from Beauvois (1812) could apply. This was probably the reason why Bentham and Griffiths considered the species from the Hispaniola and the species from Mexico as the same one. This time, in the list of synonyms for *B. juncea*, Hitchcock and Chase (1917) did not include *Bouteloua triaena* and *Triaena racemosa*.

Although morphologically similar, *B. triaena* and *B. juncea* can be easily distinguished from each other (Table 1).

TABLE 1. Differences between *Bouteloua triaena* and *B. juncea*.

	Bouteloua triaena	***Bouteloua juncea***
Distribution	Mexico and Guatemala	Cuba, Dominican Republic, Puerto Rico and Virgin Islands
Stems length	20–100 cm	10–20 cm
Synflorescence length	8–15 cm	1–2(3) cm
Lema apex	Smooth	3-aristate

Discussion

In some recent catalogues of the Poaceae family in Mexico (Villaseñor, 2016; Sánchez-Ken, 2019) the presence of *B. juncea* in the country is mentioned. This is because *B. juncea* and *B. triaena* have been considered synonyms by several authors (e.g., Bentham, 1882; Griffiths, 1912; Hitchcock, 1913) since both taxa are morphologically very similar. It is currently known that *Bouteloua triaena* is part of the *B. curtipendula* (Michaux 1803: 59) Torrey (in Marcy & McClellan 1853: 300) complex (Gould & Kapadia 1964), the same one in which *B. vaneedenii* Pilger (in Urban 1909: 2), the other member of *Bouteloua* endemic to the Antilles, is included (Siqueiros-Delgado *et al*., 2013).

Due to the morphological resemblance between *B. juncea* and *B. triaena*, Gould (1979) considered the two taxa to be closely related. Peterson *et al*. (2015) included *B. juncea* in the *B. curtipendula* complex. However, studies of leaf micromorphology and anatomy (Columbus 1996, Siqueiros-Delgado 2007), as well as molecular studies (Columbus 2000, Siqueiros-Delgado *et al*. 2013), suggest that *B. juncea* is not part of this complex.

Topologies resulting from molecular analyzes (Columbus *et al*. 1998; Peterson *et al*. 2015) based on the ITS fragment have suggested the closeness of *B. juncea* to *Bouteloua* section *Buchloë* (Engelmann 1859: 432) Peterson *et al*. (2015: 13) and section *Triplathera* (Endlicher 1836: 94) Peterson *et al*. (2015: 13), but with support below 50%. Therefore, additional molecular, anatomical and micromorphological studies are necessary to reveal the phylogenetic position of this taxon within the genus *Bouteloua*.

Regarding distribution, during the consultation of herbarium material, a specimen of *Bouteloua juncea*, collected on Salt Island, south of Tortola in the British Virgin Islands and deposited at UPRRP (*Byer 68-1729* UPRRP5587!), was found. This specimen indicates that *B. juncea* is not only distributed in Cuba, Haiti, the Dominican Republic, and Puerto Rico, as previously reported (Gould, 1979; Herrera-Arrieta *et al*., 2004; Catasús-Guerra, 2015), and that its distribution extends to the Lesser Antilles. However, *B. juncea* is more common in Haiti and the Dominican Republic (Hispaniola Island) , while in the rest of the islands its distribution is restricted. In Cuba it is considered an almost threatened species (González-Torres *et al*. 2016).

The confusion between *Bouteloua triaena* and *Bouteloua juncea* started when Benthamn (1882) and Griffiths (1912) erroneously considered *Triaena racemosa* and *Triathera juncea* as synonyms, which caused *Bouteloua juncea* to be reported in Mexico for more than a century. Even today, in some herbaria from Mexico and the United States of America, there are specimens of *B. triaena* identified as *B. juncea*.

However, *Bouteloua juncea* is not distributed in Mexico and is an endemic species to the Antilles, with a confirmed presence in Cuba, La Española, Puerto Rico, and British Virgin Islands, and it could be present in other Caribbean islands, like Jamaica.

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References

Beauvois, P. (1812) *Essai d'une nouvelle Agrostographie*. Imprimerie de Fain, Paris, 198 pp. https://doi.org/10.5962/bhl.title.474

Bentham, G. (1882) Notes on Gramineae. *The Journal of the Linnean Society, Botany* 19: 14–134.

Bonpland, A., Humbold, A. & Kunth, C.S. (1815 [1816]) *Nova Genera et Species Plantarum, Tomus Primus*. Librariae Graeco-Latino-Germanicae, Lutatiae Parisiorum, 302 pp. https://doi.org/10.5962/bhl.title.640

Catasús-Guerra, L. (2015) Poaceae II: Pharoideae a Chloridoideae. *In: Flora de la República de Cuba. Vol. 21.* Koeltz Scientific Books, Germany, 480 pp.

Columbus, J.T. (1996) *Lemma micromorphology, leaf blade anatomy, and phylogenetics of Bouteloua, Hilaria, and relatives (Gramineae: Chloridoideae: Boutelouinae).* Ph. D. diss., University of California, Berkeley.

Columbus, J.T., Kinney, M.S., Pant, R. & Siqueiros-Delgado, M.E. (1998) Cladistic parsimony analysis of internal transcribed spacer region (nrDNA) sequences of *Bouteloua* and relatives (Gramineae: Chloridoideae). *Aliso* 17 (2): 99–130. https://doi.org/10.5642/aliso.19981702.03

Columbus, J.T., Kinney, M.S., Siqueiros, M.E. & Porter, J.M. (2000) Phylogenetics of *Bouteloua* and relatives (Gramineae: Chloridoideae): cladistic parsimony analysis of internal transcribed spacer (nrDNA) and trnL-F (cpDNA) sequences. *In:* Jacobs, S.W.L. & Everett, J. (Eds.) *Grasses: systematics and evolution.* Victoria: CSIRO Publishing. pp. 189–194

Curators Herbarium B (2023) Digital specimen images at the Herbarium Berolinense. Data Publisher: Botanic Garden and Botanical Museum Berlin. Available from: http://ww2.bgbm.org/herbarium/ (accessed 1 May 2023)

Dávila, P., Mejia-Saulés, M.T., Soriano-Martínez, A.M. & Herrera-Arrieta, Y. (2018) Conocimiento taxonómico de la familia Poaceae en México. *Botanical Sciences* 96: 462–514. https://doi.org/10.17129/botsci.1894

Desvaux, N.A. (1810) Extrait d'un Mémoire sur quelques nouveaux genres de la famille des Graminées. *Nouveau bulletin des sciences* 2: 187–190.

Desvaux, N.A. (1813) Mémoire sur les graminées, et sur quelques genres et especes nouvelles de cette famille. *Journal de botanique appliquée à l'agriculture, à la pharmacie, à la médecine et aux arts* 1: 63–77.

DMA. (1991) *Technical Report 8350.2: World Geodetic System 1984, its definition and relationships with local Geodetic Systems. 2nd ed. The Defense Mapping Agency*. Springfield, USA, 169 pp.

Dumontier, B.C. (1823) *Observations sur les Graminees de la Flore Belgique*. Imprimerie de J. Casterman, Tournay, 153 pp. https://doi.org/10.5962/bhl.title.346

Endlicher, S. (1836) *Genera plantarum secundum ordines naturales disposita*. Beck Bibliopolam Universitatis, Vindobonae, 1484 pp. https://doi.org/10.5962/bhl.title.728

Engelmann, G. (1859) Two new dioecious grasses of the United States. *Transactions of the Academy of Science of St. Louis* 1: 431–442.

Engelmann, G. (1986) Instructions for the collection and preservation of botanical specimens. *Annals of the Missouri Botanical Garden* 73: 504–507. https://doi.org/10.2307/2399189

Fournier, E. (1880) Sertum Nicaraguense. *Bulletin de la Société Botanique de France* 27 (2): 292–296.

Fournier, E. (1886) *Mexicanas plantas pars secunda: gramineae.* Typographeo Reipublicae, Paris, 160 pp. https://doi.org/10.5962/bhl.title.475

González Torres, L.R., Palmarola, A., González Oliva, L., Bécquer, E.R., Testé, E. & Barrios, D. (Eds.) (2016) Lista roja de la flora de Cuba. *Bissea* 10 (número especial 1): 1–352.

Gould, F.W. (1979) The genus *Bouteloua* (Poaceae). *Annals of the Missouri Botanical garden* 66 (3): 348–416. https://doi.org/10.2307/2398834

Gould, F.W. & Kapadia, Z.J. (1964) Biosystematic studies in the *Bouteloua curtipendula* complex II. Taxonomy. *Brittonia* 16: 182–207. https://doi.org/10.2307/2805095

Griffiths, D. (1912) The grama grasses: Bouteloua and related genera. *Contributions from the United States national Herbarium* 14 (3): 343–428. https://doi.org/10.5962/bhl.title.53625

Herrera-Arrieta, Y., Peterson, P.M. & de la Cerda-Lemus, M. (2004) *Revisión de Bouteloua Lag. (Poaceae)*. Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional (CIIDIR), Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO), Filo de Agua, México. 187 pp.

Hitchcock, A.S. (1913) Mexican grasses in the United States National Herbarium. *Contributions from the United States national Herbarium*

17 (3): 181–389.
Hitchcock, A.S. & Chase, A. (1917) Grasses of the West Indies. *Contributions from the United States National Herbarium* 18 (7): 261−471.
HUH-Index of Botanists (2023) *Harvard University Herbaria & Libraries, Index of Botanist*. Available from: https://kiki.huh.harvard.edu/databases/botanist_index.html (accessed 1 May 2023)
JACQ consortium (2004 ff.) *Virtual Herbaria Website*. Available from: https://www.jacq.org/ (accessed 1 May 2023)
JSTOR (2023) *JSTOR Global Plants*. Available from: https://plants.jstor.org/ (accessed 17 April 2023).
K herbarium (2023) *The Herbarium Catalogue, Royal Botanic Gardens, Kew*. Available from: http://www.kew.org/herbcat (accessed 17 April 2023).
Lagasca, M. (1805) Memoria sobre un género nuevo de la familia de las gramas, llamado BOTELUA, y otro de la misma familia que le es afine. *Variedades de Ciencias, Literatura y Artes, Año 2,* 4 (21): 129–143.
Marcy, R.B. & McClellan, G.B. (1853) *Exploration of the Red River of Louisiana, in the year 1852*. Robert Armstrong, Public Printer, Washington, 320 pp.
https://doi.org/10.5962/bhl.title.43982
Michaux, A. (1803) *Flora Boreali-Americana, Tomus Primus.* Parisiis & Argentorati, Fratres Levrault, 330 pp.
NY herbarium (2023) *The New York Botanical Garden, C. V. Starr Virtual Herbarium. New York.* Available from: http://sweetgum.nybg.org/science/vh/ (accessed 17 April 2023).
P herbarium (2023) *Muséum national d'Histoire naturelle, Vascular Plants. Paris*. Available from: https://science.mnhn.fr/institution/mnhn/collection/p/list (accessed 17 April 2023).
Peterson, P.M., Romaschenko, K. & Herrera-Arrieta, Y. (2015) Phylogeny and subgeneric classification of *Bouteloua* with a new species, *B. herrera-arrietae* (Poaceae: Chloridoideae: Cynodonteae: Boutelouinae). *Journal of Systematics and Evolution* 53 (4): 351–366.
https://doi.org/10.1111/jse.12159
Presl, C. (1830) *Reliquiae Haenkeanae, tomus primus.* J.G. Calve Bibliopolam, Pragae. 356 pp.
https://doi.org/10.5962/bhl.title.515
Ramos, V.A. & Alonso, R.N. (2018) Tadeo Haenke: Primer Naturalista del Virreinato del Río de la Plata. *Anales de la Academia de Ciencias Exactas, Físicas y Naturales* 70: 117–146.
Raspail, F.V. (1825) Classification générale des Graminées, fondée sur l'etude physiologique des caractès de cette familie. Seconde partie. *Annales des Sciences naturelles (Paris)* 5: 287–311.
Sánchez-Ken, J.G. (2019) Riqueza de especies, clasificación y listado de las gramíneas (Poaceae) de México. *Acta Botanica Mexicana* 126: e1379, 1–73.
https://doi.org/10.21829/abm126.2019.1379
Sandoval-Ortega, M.H., Siqueiros-Delgado, M.E., Pérez-Molphe-Balch, E. & Cerros-Tlatilpa, R. (2019) The holotype of *Atheropogon stolonifer* (=*Bouteloua reederorum*) and lectotypification of the name *Triathera juncea* (=*B. juncea*) (Poaceae, Chloridoideae). *Phytotaxa* 415 (1): 79−84.
https://doi.org/10.11646/phytotaxa.415.1.7
Scribner, F.L. (1891) Mexican grasses. *Proceedings of the Academy of natural Sciences of Philadelphia* 43 (2): 292−309.
Siqueiros-Delgado, M.E. (2007) Culm anatomy of *Bouteloua* and relatives (Chloridoideae: Gramineae). *Acta Botanica Mexicana* 78: 39–59.
https://doi.org/10.21829/abm78.2007.1028
Siqueiros-Delgado, M.E., Ainouche, M., Columbus, J.T. & Ainouche, A. (2013) Phylogeny of the *Bouteloua curtipendula* Complex (Poaceae: Chloridoideae) Based on Nuclear Ribosomal and Plastid DNA Sequences from Diploid Taxa. *Systematic Botany* 38 (2): 379–389.
https://doi.org/10.1600/036364413X666660
Soreng, R.J., Peterson, P.M., Zuloaga, F.O., Romaschenko, K., Clark, L.G., Teisher, J.K., Gillespie, L.J., Barbera, P., Welker, C.A.D., Kellogg, E.A., Li, D. & Davidse, G. A worldwide phylogenetic classification of the Poaceae(Gramineae) III: An update. *Journal of Systematics and Evolution* 60 (3): 476–521.
https://doi.org/10.1111/jse.12847
Sprengel, C. (1825) *Systema Vegetabilium, editio decima sexta, Vol. I.* Librariae Dieterichianae, Gottingae. 992 pp.
Stapf, O. (1917) Gramineae. *In*: Prain (ed.) *Flora of Tropical Africa, Vol. IX part. I*. L. Reeve & Co., London, pp. 1–384.
https://doi.org/10.5962/bhl.title.42
Stearn, W.T. (1956) Further Information about Kunth's 'Nova Genera et Species Plantarum' and 'Mimoses'. *Taxon* 5 (7): 153–156.
https://doi.org/10.2307/1216647
Thiers, B. (2023 [continuously updated]) *Index Herbariorum. A global directory of public herbaria and associated staff. New york Botanical Garden's Virtual Herbarium.* Available from http://sweetgum.nybg.org/science/ih (accessed 2 March 2023)

TL-2 (2023) Taxonomic Literature, Edition 2 and its Supplements (TL-2). Available from: https://www.sil.si.edu/DigitalCollections/tl-2/ (accessed 4 August 2023)

Trinius, C.B. (1824) *De graminibus Unifloris et Sesquifloris.* Impensis Academiae Imperialis scientiarum, Petropoli, 314 pp. https://doi.org/10.5962/bhl.title.15650

TROPICOS (2023) *Tropicos.org, Missouri Botanical Garden*. Available from: http://www.tropicos.org/ (accessed 11 April 2023).

Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (eds.) (2018) *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code). Adopted by the Nineteenth International Botanical Congress, Shenzhen, China, July 2017.* Regnum Vegetabile 159. pp. 1–254. https://doi.org/10.12705/Code.2018

Urban, I. (1909) Nova genera et species IV. *In*: Urban (ed.) *Symbolae Antillanae seu Fundamenta florae Indiae Occidentalis. Vol. VI.* Fratres Borntraeger, Lipsiae, pp. 1–55.

US herbarium (2023) *Botany Collection, National Museum of Natural History, Smithsonian Institution, Washington*. Available from: https://collections.nmnh.si.edu/search/botany/ (accessed 2 January 2023)

Villaseñor, J.L. (2016) Checklist of the native vascular plants of Mexico. *Revista Mexicana de Biodiversidad* 87: 559–902. https://doi.org/10.1016/j.rmb.2016.06.017