



Typification and nomenclatural notes on twenty-seven names of *Gomphrena* L. (Amaranthaceae) linked to the South American flora

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Abstract

Twenty-seven *Gomphrena* names are here investigated, and discussed. Seventeen names are typified (sixteen lectotypes, one neotype) in the present paper on specimens preserved at B, GOET, M, P, and S, while isolectotypes are found at B, BM, BR, CORD, F, G, M, P, S, and US. Concerning the other ten names, they were previously discussed by Holzhammer, who reported the word “Typus”. According to the Art. 7.10 of the ICN Holzhammer’s statements are here interpreted as lectotypifications.

Key Words: *Gomphrena*, lectotypes, neotype, nomenclature, Southern Cone

Introduction

Gomphrena Linnaeus (1753:224) (Gomphrenoideae Schinz, Amaranthaceae Juss.) is one of the largest and most widespread genus within Amaranthaceae, including approximately 120 species (Müller & Borsch 2005, Sánchez del Pino *et al.* 2009). The center of diversity of this genus is in the New World, with high species richness in the Central Andes, in the argentinean and bolivian Puna, and in the Caatinga and Cerrado habitats from Brazil; many species are also native to Australia (De Siqueira 1992, Palmer 1998, Muller & Borsch 2005, Sánchez del Pino *et al.* 2009).

Gomphrena is represented by annual or perennial herbs (sometimes subshrubs), with developed roots, stems simple or branched, leaves usually opposite, with hairs simple or branched, synflorescences in axillary or terminal spike-like structures which are usually dense, globular or ovate, flowers medium or small (0.4–6.0 cm long), with bracts, bracteoles and scarious or papery tepals, ovaries sessile each one including one ovule, styles highly variable in length, stigma bifid, fruits as indehiscent utriculus (see e.g., Pedersen 1987).

Taxonomic treatments of *Gomphrena* were published by Stuchlik (1912), Fries (1921), Holzhammer (1956), Mears (1980), De Siqueira (1992), and Palmer (1998), while Pedersen (1967, 1976, 1987, 1990, and 1997) was the author who deeply investigated the genus, mainly referring to the South American species. On the whole, the genus *Gomphrena* is critical from the taxonomical point of view (see e.g., Sánchez del Pino *et al.* 2009), but there are also nomenclatural issues (see e.g., Iamónico 2012, Ramella 2016).

As part of the ongoing study on the *Gomphrena* species for the Argentinean Flora, I realized that several names are not still typified and need nomenclatural clarifications, which are presented in the present paper.

Material and Methods

The list of names studied is based on the *Catalogue of the Vascular Plants from the Southern Cone* by Zuloaga *et al.* (2008).

Relevant literature was analyzed (protologues are included). The herbaria acronyms cited through the text follow Thiers (2016+). Most of the cited specimens are available online through JSTOR Global Plants (<http://plants.jstor.org/>). The names are listed in alphabetical order. Accepted names are in italic-bold, while synonyms are in italic-not bold.

The articles cited in the text follow the *Melbourne Code* (McNeill *et al.* 2012).

Typification of names

Gomphrena acrotopala Suessenguth (1934: 308)

Suessenguth (1934: 308) gave a detailed diagnosis of *Gomphrena acrotopala*, and he also mentioned two collections: “Argent. septentr. 111. 1906 (I. S. Urriche-R. Hauthal, P. Rioja; Herb. Berlin). - Argent.: La Diana (Th. Stuckert n. 17218; Herb. Delessert, Genf)”. Holzhammer (1956: 233) indicated “Typus: Nord-Argentinien, La Rioja, III.1906 (Urriche et Hauthal) Herb. Berlin”. This indication is to be considered as valid, but on the basis of Art. 7.10 of the ICN (McNeill *et al.* 2012), it should be interpreted as lectotype.

I agree with Pedersen (1990: 74) in synonymizing *Gomphrena acrotopala* with *Gomphrena boliviana* Moquin-Tandon (1849: 401) which has nomenclatural priority. The latter name was published by Moquin-Tandon (l.c.) through a detailed diagnosis; the author also listed one specimen [“Culta in hort. Luxemb. aug. 1836 e seminib. Bolivianis (Gay!)”]. At the end of the description the author also stated “v.s. in h. Webb.” (visa sicca in herbarium Webbianum). I traced one specimen collected by Gay at FI (the Webb’s collection is deposited at the Florence Herbarium only - Stafleu & Cowan, 1988: 118). This specimen is here considered as the holotype of the name *Gomphrena boliviana*.

Gomphrena acrotopala Suessenguth (1934: 308).

Type (lectotype designated by Holzhammer 1956: 233):—ARGENTINA. La Rioja. Soto, 21 March 1906. *Urriche s.n.* (B-100242299!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.b+10+0242299>

= *Gomphrena boliviana* Moquin-Tandon (1849: 401).

Type (holotype):—LUXEMBOURG. Semina é Bolivia. ex h. Luxemb. 4 August 1836. *Gay s.n.* (FI-011264!), image of the holotype available at <http://parlatore.msn.unifi.it/types/search.php>.

Gomphrena arborescens Linnaeus filius (1781: 173)

The protologue of *Gomphrena arborescens* Linnaeus filius (1781: 173) consists of a short diagnosis (“GOMPHRENA arborescens pilosa, subvolubilis”), a detailed description, and the citation “*Habitat* in Nova Granada. *D. Mutis*”.

According to Rees (1819), the Linnaeus filius’ citation of the habitat and collector was an error and the specimen, in fact, was sent to Linnaeus by D. Vandelli. Also Moquin-Tandon (1849) stated: “...non in regno Novo-Granatensi a cl. Mutis reperta, uti falso in Linn. f. suppl. dicitur”. According to Holzhammer (1956), Suessenguth considered the specimen *Vandelli s.n.* as *Gomphrena arborescens* L. f.

Based on all these evidences, Holzhammer (1956) reported: “Typus: In Brasilia *Vandelli*”. Because Holzhammer’s indication was made before 2001, and on the basis of Art. 7.10, Holzhammer’s indication of “typus” should be considered valid but it has to be interpreted as lectotype.

For *Gomphrena arborescens*, I support the synonymy proposed by Holzhammer (1956: 179).

Gomphrena arborescens Linnaeus filius (1781: 173) ≡ *Bragantia vandelli* Roemer & Schultes (1819: 707) ≡ *Xeraea arborescens* (L. f.) Kuntze (1891: 545)

Type (lectotype designated by Holzhammer 1956: 179):—BRAZIL. *Vandelli s.n.* (LINN-HL319-3!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.linn-hl319-3>

Gomphrena argentina Seubert (1875: 208)

The protologue of *Gomphrena argentina* consists of a detailed description that is followed by the indication “Crescit ad vias et fluviorum ripas pr. Cordoba in republica Argentina, Brasiliae contermina: Lorentz n. 386 (in Herb. Eichler)”. The herbarium Eichler is currently housed at B. R. Vogt (pers. com.) informed that this specimen is not actually at B, as it has been destroyed during the II World War (Hiepko 1987). I have not been able to trace further exsiccata which can be considered as part of the original material. As a consequence a neotypification is required (Art. 9.7). I here designate as neotype of the name *Gomphrena argentina* a specimen (a picture) preserved at F (code 0BN003240) which bears a plant corresponding with Seubert’s diagnosis and with the current concept in *Gomphrena* (Pedersen, 1987; Townsend, 1993). The choice of a picture at F is related to the fact that this Herbarium houses a large collection of photographic negatives that correspond for sure to authentic material from B (see Grimé & Plowman, 1986).

Type (neotype here designated):—ARGENTINA. “Cordoba”. *s.d.*, Lorentz 386 (F-0BN003240!). Image of the neotype available at <http://plants.jstor.org/stable/history/10.5555/al.ap.specimen.f0bn003240>.

= *Gomphrena martiana* Gillies ex Moquin-Tandon (1849: 400) subsp. *martiana* [for lectotypification, see below under *Gomphrena martiana*]

***Gomphrena elegans* var. *claussenoides* Suessenguth (1934: 310)**

Holzhammer (1956) indicated the specimen “*P. G. Lorentz & G. H. Hieronymus* 705” as “*typus varietatis*”, but this was in fact a lectotypification since the protologue mentioned two specimens (see Art. 7.10): “Argentinien, Sierra de Tucuman, La Cienaga, I. 1874 (G. Hieronymus et P. G. Lorentz, Flora Argent. n. 705). Paraguay, Tobati, bei Cerro Aparepy. Toniger Camp. Vulgärname „*Batatilla*“ wegen der batatenähnlichen Wurzelknolle (K. Fiebrig. PI. parag. n. 796)”.

Suessenguth’s types are mainly housed at M, but this particular collection was not traced, neither at M nor at B. Actually, there are duplicates of this collection at GOET (code 015489) and CORD (code 00002558) but none of both specimens bear an indication that Holzhammer has examined it. Considering the Art. 9.17, Holzhammer’s indication should be narrowed to one single specimen in a subsequent lectotypification. According to Stafleu & Cowan (1981), Lorentz types are housed at GOET, therefore the specimen GOET-015489 is designated here as a second-step lectotype of the name *Gomphrena elegans* var. *claussenoides*.

***Gomphrena elegans* var. *claussenoides* Suessenguth (1934: 310).**

Type (first-step lectotype designated by Holzhammer 1956: 222):—ARGENTINA. Tucumán. pr. la Cienaga, January 1874. Lorentz & Hieronymus 705 [second-step lectotype here designated GOET-015489! (Fig. 1), isolectotype CORD-00002558!, image of the isolectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.cord00002558>].

***Gomphrena elegans* var. *mandonioides* Suessenguth (1934: 310)**

Suessenguth (1934: 310) mentioned two specimens in the protologue of *Gomphrena elegans* var. *mandonioides*: “Peru, Mantaro-Tal. Depart. Huanca-velica, Prov. Tayacaja, unterhalb Colcabamba, 2200 m (A. Weberbauern 6443).- Sorata, 2600 m, VIII. 1926 (C. Troll, Iter andinum n. 2412)”. I traced two sheets referring to these syntypes (see Art. 9.5): the first one at M (code 0241725) collected by C. Troll and other sheet at GH (code 00037073) collected by A. Weberbauer. Both specimens match Suessenguth’s diagnosis and bear labels reporting Suessenguth’s scripts. The GH specimen is more complete and, therefore, it is here designated as lectotype of *Gomphrena elegans* var. *mandonioides*. According to Jorgensen, *et al.* (2014) *Gomphrena elegans* var. *mandonioides* is a synonym of *Gomphrena mandonii*. The latter name was published by Fries (1921: 22) through a detailed diagnosis and the citation of a specimen: “Bolivia: Prov. Larecaja, vicinias Sorata in schistosis dumosis cultis et undique, reg. temp. 2600–3200 m. s. m. [Aug. 1859–Apr. 1860.—MANDON n. 1016; in herb. Regnell]”. I have traced 11 specimens of this collection housed at BM, G, GH, K, M, NY, P, PH and S-R, which are all part of the original material. The specimen S-R-2445 bears a stamp with the name “Herb. Typ. Regnell” and bears a label with Fries determination. Therefore I designate it here as lectotype of the name *Gomphrena mandonii*, the other specimens are isolectotypes.

Additional material seen:—BOLIVIA. Dept. La Paz. Sorata, 2600 m, 28 August 1926, Troll 2412 (M-0241725!).

***Gomphrena elegans* var. *mandonioides* Suessenguth (1934: 310)**

Type (lectotype here designated):—PERÚ. Valley of the Mantaro, below Colcabamba (Dep. Huancavelica Prov. Tayacaja. 2200 m, March 1913, Weberbauer 6443 (GH-00037073!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.gh00037073>

= *Gomphrena mandonii* R.E.Fries (1921: 22)

Type (lectotype here designated):—BOLIVIA. Provincia Larecaja. “vicinias Sorata, in schistosis dumosis, cultis, & undique”. Elevation: 2600-3200 m.a.s.l., August 1856- April 1860. *G. Mandon 1016* (S-R-2445!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s-r-2445>; isolectotypes BM-000834416!, G-00236975!, GH-00037079!, K-000583113!, M-0241751!, NY-00579242!, P-00622683!, P-00622682!, P-00622681!, PH00012666!).



FIGURE 1. Lectotype of the name *Gomphrena elegans* var. *clausenoides* (GOET-015489!).

***Gomphrena elegans* fo. *microcephala* Suessenguth (1950: 5)**

After a short diagnosis, Suessenguth (1950: 5) reported “Argentinien, Gob. Misiones, Dep. Cainguas, Puerto Rico.- Leg. E. Schwindt nr. 632 (4.III.1948).- Herb. Miguel Lillo Tucuman; Herb. München”.

Holzhammer (1956) indicated: “Typus varietatis: Argentinien: Misiones, Cainguas, Puerto Rico. III. 1948 (Schwindt no. 632)Herb. München”. Holzhammer’s statement can be considered and interpreted as a lectotypification (McNeill *et al.* 2012).

Gomphrena elegans fo. *microcephala* Suessenguth (1950: 5).

Type (lectotype designated by Holzhammer 1956: 230):—ARGENTINA. Misiones, Dep. Cainguas, Puerto Rico, *Schwindt 632* (M-0241768!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241768>.

= ***Gomphrena paraguayensis* Chodat (1901: 432)**

Type (lectotype designated by Holzhammer, 1956: 223):—PARAGUAY. “In campis prope San Estanislao. Lect. Aug.” *E. Hassler* 4110 (G-00103602!).

***Gomphrena fallax* Seubert (1875: 220)**

The protologue of *Gomphrena fallax* Seubert (1875: 220) includes a detailed diagnosis, the habitat, and the indication of a syntype [“*creciscit ad Alegres in prov. Minarum: Pohl 1851* (in herb. Caes. Vindob. [Caesareae Vindobonensis])”]. According to Naturhistorisches Museum Wien (http://www.nhm-wien.ac.at/en/research/botany/collections/lost_families) this specimen was lost (Armin Löckher, pers. com.), since the collection at W (where the herbarium Caesareae Vindobonensis is deposited) was destroyed during the II World War.

Holzhammer (1956: 206) recognized *Gomphrena fallax* as a variety of *G. desertorum* Martius (1826a: 3), and cited “typus varietatis: Brasilia (Pohl) Herb. München”. De Siqueira (1992: 104) treated Holzhammer’s variety and also *G. fallax* as synonyms of *G. desertorum*, indicating: “*Gomphrena fallax* Seub. in Mart. Fl. Bras. 13: 220. 1875. (Brasilia, s.l.: POHL 1851, s.n., s.d., M! Fotografia do Holotipo)”. Pedersen (1997: 228) recognized *G. fallax* as variety of *G. celosioides* Martius (1826b: 123), indicating “Type: *Pohl 1851* (lecto-M)”.

Holzhammer was the first author who indicated the word “typus”, and this is to be interpreted as a lectotypification of the name *Gomphrena fallax*, while the later Pedersen’s statement cannot be retained. The holotype indication by De Siqueira (1992: 104) is incorrect.

I accept here Pedersen’s (1997) recognition of *Gomphrena fallax* as a variety of *G. celosioides*.

Gomphrena fallax Seubert (1875: 220) ≡ *Xeraea fallax* (Seub.) Kuntze. (1891: 545) ≡ *Gomphrena desertorum* var. *fallax* (Seub.) Holzhammer (1956: 206) ≡ ***Gomphrena celosioides* var. *fallax*** (Seub.) Pedersen (1997: 228)

Type (lectotype designated by Holzhammer 1956: 206):—BRAZIL. In Brasilia, 1839, *Pohl 1851* (M-0241717!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241717>); isolectotypes BR-6951139!, BR-6950484!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.br0000006951139>, and at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.br0000006950484> respectively).

***Gomphrena globosa* var. *albiflora* Moquin-Tandon (1849: 409)**

The protologue of *Gomphrena globosa* var. *albiflora* (Moquin-Tandon 1849: 409) consists of a short diagnosis (“floribus subargenteo-albis”) that is followed by the indication of some specimens (syntypes according to Art. 9.5): “In regni Mexicani provinciâ Oaxacâ (Galeotti! n.429 et 443), inter Victoria et Tula (Berland.! n.2228), prope Tamaulipas (id. n. 2130), prope Mendozam (Gillies!), in Javâ (Zoll.! 2944 an culta?); in hortis culta”.

Holzhammer (1956: 193) indicated the collection *Galeotti 429* as “Typus varietatis”. Based on Art. 7.10, Holzhammer’s statement is to be interpreted as a lectotypification. Actually there are further three Galeotti’s specimens at P (codes 00622633, 00622632, and 00622631) and two at BR (codes 21450990, and 021451003). All these five specimens refer to the same gathering. According to Art. 9.17 (see e.g., Ex. 12) Holzhammer’s indication should be referred to only one of these specimens. I designate here the specimen P-00622632 as a second-step lectotype of the name *Gomphrena globosa* var. *albiflora*.

According to Pedersen (1990), *Gomphrena globosa* var. *albiflora* is a synonym of *Gomphrena boliviana* Moquin-Tandon (1849: 401).

Gomphrena globosa var. *albiflora* Moquin-Tandon (1849: 409)

Type (lectotype, first-step designated by Holzhammer 1956:193):—MEXICO. Oaxaca. Plages de l’océan pacifique. *Galeotti* 429 (second-step lectotype here designated P-00622632!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00622632>; isolectotypes P-00622631!, P-00622633!; BR-021450990!, BR-021451003!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00622631>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00622633>, <http://www.br.fgov.be/RESEARCH/COLLECTIONS/HERBARIUM/detail.php?ID=909342>, and <http://www.br.fgov.be/RESEARCH/COLLECTIONS/HERBARIUM/detail.php?ID=909335>, respectively).

= *Gomphrena boliviana* Moquin-Tandon (1849: 401) [for lectotypification, see above under *Gomphrena acrotepala*].

***Gomphrena graminea* Moquin-Tandon (1849: 416)**

Moquin-Tandon (1849: 416) provided a detailed description of *Gomphrena graminea*, and he also mentioned the following two specimens (syntypes, Art. 9.5): “In Brasiliae prov. S. Pauli (Tweedie! n. 116, Lund! n. 741)”.

Holzhammer (1956: 179) stated “Typus: Brasilia, São Paulo (*Tweedie* no. 116) Herb. Kew.”. However, actually there are two specimens collected by J. Tweedie and preserved at K. The first one is unnumbered, and the other sheet is numbered as “115”. Unfortunately, none of the labels on these specimens match the protologue. In De Candolle’s herbarium at G, I traced two further sheets (codes 00478884, and 00478884) bearing plants collected by P. Lund, while a duplicate is deposited at P (code 04960171). Among these three specimens, those at P include a label in Moquin’s handwriting (see also Burdet 1977). As a consequence, I prefer to designate the P-04960171 as the lectotype of *Gomphrena graminea*.

Additional material seen:—BRAZIL. “Found on inter moist fields of río Uapuhú”. *J. Tweedie* 115 (K-000583063!); *ibidem* (K-01209046!), BRAZIL. “camp. Taubaté” *Lund s.n.* (G-00478885!).

Gomphrena graminea Moquin-Tandon (1849: 416)

Type (lectotype here designated):—BRAZIL. “In campis elevatis prov. St. Paul”, November 1835, *Lund* 741 (P-04960171!, image of the lectotype available at <http://mediaphoto.mnhn.fr/media/1441381509348QUR7zLwPfTHzQkQS>; isolectotype G-00478884!, Fig. 2).

***Gomphrena haenkeana* Martius (1826b: 299)**

The protologue of *Gomphrena haenkeana* (Martius 1826b: 299) consists of a detailed description, the mention of a locality, and the specimen collector (“Habitat in Peruviae: *Haenke*”). Actually there is a specimen collected by Haenke at M (code 0241736), which label reports “Peru”. Pedersen (1976) stated that “it is unlikely that the plants come from Peru where the species has not been found, probably they were collected in some place in Bolivia, the labels from Haenke herbarium are often very inaccurate”. I agree with Pedersen’s indication (l.c.). The specimen M-0241736 is here designated as the lectotype of the name *Gomphrena haenkeana*, bearing a plant that matches the protologue and corresponds with the current concept in *Gomphrena* (Pedersen, 1987; Townsend, 1993)

***Gomphrena haenkeana* Mart.** (1826b: 299) ≡ *Xeraea haenkeana* (Mart.) Kuntze (1891: 545) ≡ *Gomphrena pulchella* var. *haenkeana* (Mart.) Suessenguth. (1934: 311)

Type (lectotype here designated):—BOLIVIA. *Haenke s.n.* (M-0241736!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241736>

***Gomphrena macrocephala* A.Saint-Hilaire (1825: 32)**

The protologue of *Gomphrena macrocephala* (Saint-Hilaire 1825: 32) consists of a detailed diagnosis, plus the indication of some localities; moreover an illustration, which is to be considered as part of the original material, was provided.

De Siqueira (1992: 125) reported: “Tipo: “Brésil, Prov. Saint-Paul”: SAINT-HILAIRE C², 1291, 1816 a 1821 (P! isotipo)”. The use of the word “isotipo” (= isotype) is inappropriate since any holotype was indicated by Saint-Hilaire (1825). According to Art. 9.9, De Siquiera’s statement has to be corrected and interpreted as a lectotypification.



FIGURE 2. Isolectotype of the name *Gomphrena graminea* (G- 00478884!)

I also found one further sheet at P (code 00622656), which is part of the same gathering as the P specimens reported by De Siqueira (1992: 125).

According to Art. 9.17, De Siquiera's designation should refer to one single specimen. I designate here the specimen P-00622655 as a second-step lectotype of *Gomphrena macrocephala*. The specimen P-00622656 is an isolectotype.

***Gomphrena macrocephala* A. St.-Hil.** (1825: 32) \equiv *Xeraea macrocephala* (A. St.-Hil.) Kuntze, (1891: 545)

Type (lectotype, first-step designated by De Siqueira 1992: 125):—BRAZIL. “Province de Saint-Paul. 1816-1821.” *Saint-Hilaire 1291* (P-00622655!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00622655>; isolectotype P-00622656!, image of the isolectotype available at <https://science.mnhn.fr/institution/mnhn/collection/p/item/p00622656>).

***Gomphrena martiana* var. *microcephala* Suessenguth (1950: 5)**

Suessenguth (1950: 5) mentioned three specimens in the protologue of *Gomphrena martiana* var. *microcephala*: “Argentinien, Prov. Salta, Depart. Oran, Loc. Padre Lozano 270 m.—Leg. M. R. Malvarez nr.444 (2.I.1947); Prov. Salta, Dep. Anta, Loc. General Mollinedo 335 m; leg. M. R. Malvárez nr.603 (15.I.1947); Prov. Salta, Dep. Anta, Loc. General Pizarro; leg. Idem nr. 567 (13.I.1947).- Herb. Tucuman; Herb. München”.

Holzhammer (1956: 233) indicated: “Typus varietatis: Argentinien, Salta, Orán, Padre Lozano, 270 m. s. m., I.1947 (Malvarez no. 444) Herb. München”. On the basis of Art. 7.10, Holzhammer's designation is to be interpreted as lectotype.

According to Pedersen (1997), *Gomphrena martiana* var. *microcephala* was regarded as a synonym of *Gomphrena martiana* Gillies ex Moquin-Tandon (1849: 400) s.str. The protologue of this latter taxon (l.c.) consists of a detailed diagnosis and the indication: “In prov. S. Luis (Gillies!)”, it is also stated “v.s. in h. Hook” (visa sicca in herbarium hookerianum). Three specimens were traced at E, K, and P, all bearing plant material that matches the diagnosis and corresponds with the current concept in *Gomphrena* (Pedersen, 1987; Townsend, 1993). The specimens at K and P bear an inscription that indicates Herbarium Hookerianum. I here designate the specimen K-000634970 as the lectotype of *Gomphrena martiana*, because it is the most complete regarding plant material. The other specimens are isolectotypes.

***Gomphrena martiana* var. *microcephala* Suessenguth (1950: 5)**

Type (lectotype designated by Holzhammer 1956: 233):—ARGENTINA. Salta. Oran. Padre Lozano. 270 m, 02 January 1947 *Malvarez 444* (M-0241753! image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241753>)

= ***Gomphrena martiana* Gillies ex Moquin-Tandon (1849: 400) subsp. *martiana***

Type (lectotype here designated):—ARGENTINA. San Luis province, El Morro. *Gillies s.n.* (K-000634970!; isolectotypes P-00622698!, E-00296880!). Image of the lectotype and the isolectotypes available, respectively, at <http://apps.kew.org/herbcat/getImage.do?imageBarcode=K000634970>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00622698>, and <http://plants.jstor.org/stable/10.5555/al.ap.specimen.e00296880>

***Gomphrena meyeniana* Walpers (1843: 404)**

Walpers (1843: 404) provided a detailed diagnosis of *Gomphrena meyeniana*, also stating: “Peruvia: in planitie circa Tissalomam, Laguna de Titicaca. Fl. Aprili”. There is one sheet at B (code 100673185) bearing a label whose data match those included in the protologue. I designate here the specimen B-100673185 as the lectotype of the name *Gomphrena meyeniana*.

On the other hand, the protologue of the name *Gomphrena meyeniana* var. *aureiflora* Stuchlik (1913: 521) consists of a short diagnosis (“Flores aurei, lutei v. flavescens”) and the indication of three specimens: “Argentina Lorentz 58! Et 567! Berl.); Peru (Meyen! Berl.)”. Pedersen (1990: 80) correctly selected a Meyen's collection at B as the lectotype of *Gomphrena meyeniana* var. *aureiflora*. The latter name is a synonym of *Gomphrena meyeniana*.

***Gomphrena meyeniana* Walpers (1843: 404) \equiv *Gomphrena meyeniana* var. *aureiflora* Stuchlik (1913: 521)**

Type (lectotype here designated):—PERU. “In planitie circa Tissaloma. 4/31. 15000. Dr. Meyen 1833”. *Meyen s.n.* (B-100673185!, image of the lectotype available at <http://herbarium.bgbm.org/object/B100673185>; isolectotypes B-100673186!, and F-0BN003252!, images of the isolectotypes available, respectively, at <http://herbarium.bgbm.org/object/B100673186>, and <http://plants.jstor.org/stable/10.5555/al.ap.specimen.f0bn003252>).

***Gomphrena officinalis* Martius (1823: 280)**

Martius (1823: 279) started his work stating: “Folgende Pflanzen sind ihres Gebrauches wegen in der Capitanie von S. Paul allgemein bekannt” (= “The following plants, due to their use, are generally known in the captaincy of S. Paul”). After this sentence, the author listed several vernacular plant names and provided a short description for each one. The species, which was numbered with 7, was named as “Paratudo”, and corresponded to *Gomphrena officinalis*. A diagnosis, followed by the mention to a synonym (“*Bragantia Vandelli*. p. 50 ed. Roem.) was given.

Three years later, Martius (1826a: 2) published a more detailed description of *Gomphrena officinalis*, also adding the habitat (“*Crescit in campis montanis super montium tractum, qui Serra da Mantiqueira dicitur, passim in Provincia Minas Geraes, prope Cambuí, Estiva, Mandú, S. Gonçalo atque in similibus locis Provinciae, quae a S. Paulo nomen habet, septentrionalibus, e.g. prope Taubate, S. Joze, Sorocaba...*”). Martius’ collections, which refer to his trip to Brazil during the period 1817–1820, are deposited at M. I found three specimens at M (codes 0241695, 0241696, and 0241697). However, only one of them (M-0241696) bears the script “Dr. Martius iter Brasil”. I designate here this specimen as the lectotype of the name *Gomphrena officinalis*.

According to Holzhammer (1956: 179), *Gomphrena officinalis* is a synonym of *Gomphrena arborescens*.

Additional material seen:—BRAZIL. *Martius 910* (M-0241698!, BM-000993133!, GH-00037080!).

***Gomphrena officinalis* Martius (1823: 280)**

Type (lectotype here designated):—BRAZIL. “Habitat in campis interioris. Provinciae S. Pauli, e.g. prope Parangangaba, Taubate”. *Martius s.n.* (M-0241696!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241696>; isolectotypes M-0241695!, M-0241697!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241695>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241697>).

= *Gomphrena arborescens* Linn. f. [for lectotypification, see above under *Gomphrena arborescens*].

***Gomphrena oligocephala* var. *pallida* Suessenguth (1940: 9)**

The protologue of *Gomphrena oligocephala* var. *pallida* (Suessenguth 1940: 9) consisted of a short diagnosis plus the mention of the following four specimens (syntypes according to the Art. 9.5): “Argentina: Salta, Sierra del Cajou, El Alisal 2800 m.—Leg. Rodríguez, III. 1914 no. 1420.—Tucuman, Dep. Tafí, Cerro de San José, leg. Venturi II. 1925 no. 3571.—Tucuman, Cuesta de Guasamayo, leg. Schreiter II. 1927 no. 5490.—Bolivia: prope Basorapa 1900 m; leg. K. Troll II. 1928 no. 1143”.

Holzhammer (1956: 195) indicated “Typus varietatis: Argentinien: Salta, Sierra del Cajou, El Alisal, III. 1914, 2800 m.s.m. (Rodríguez no. 1420). Herb. München”. Actually, there are four Rodríguez’s sheets at M (codes 0241762, 0241763, 0241764, and 0241766), and numbered with 1420. Since only one of these sheets bears a Holzhammer’s annotation indicating “typus varietatis” (M-0241762), I prefer to interpret it as the lectotype.

***Gomphrena oligocephala* var. *pallida* Suessenguth (1940: 9) ≡ *Gomphrena pallida* (Suess.) Pedersen (1976: 282)**

Type (lectotype designated by Holzhammer 1956: 195):—ARGENTINA. Salta. El Alisal, Sierra del Cajon, 2800 m, 22 March 1914, *Rodríguez 1420* (M-0241762!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241762>; isolectotypes M-0241763!, M-0241764!, M-0241766!, CORD-00002560!, CTES-0000310!, SI000719!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241763>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241764>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241766>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.cord00002560>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.ctes0000310>).

***Gomphrena paranensis* R. E. Fries (1921: 36)**

Fries (1921: 36) described *Gomphrena paranensis* through a detailed diagnosis, and reported five collections (syntypes according to the Art. 9.5): “Brasiliae civit. Paraná: loco accuratius haud indicato [DUSÉN 15883]; Capão Grande in campo graminoso [30 Dec. 1903; floribus et fructibus vix maturis instructa.—DUSÉN 2920]; Villa Velha in campo [25/11 1908.—DUSÉN 7230]; Jaguarihyva, in campo [27-28/10 1910.—DUSÉN 10453 et 10535]”.

The indication of “typus” by Holzhammer (1956: 210), which refers to the specimen “Dusén 15883”, can be interpreted as a lectotypification. This specimen was found at S-R (code 2447).



FIGURE 3. Lectotype of the name *Gomphrena perennis* fo. *parvifolia* (GOET-015488!).

***Gomphrena paranensis* R. E. Fries (1921: 36)**

Type (lectotype designated by Holzhammer 1956: 210):—BRAZIL. Paraná. Jaguarihyva, in campo, 21 November 1914, *Dusen 15883* (S-R-2447!), image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s-r-2447>, isolectotype GH-00037081!, image of the isolectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.gh00037081>).

***Gomphrena perennis* fo. *parvifolia* Stuchlik (1912: 154)**

After the diagnosis, Stuchlik (1912: 154) listed two collections by Lorentz (nos.387, and 170), also specifying “Berl.” (= “Berlinen Herbarium”). However none of these specimens are currently housed at B since they could have been destroyed during the II World War. Lorentz’s collections are also preserved at GOET, where I found only one specimen of those cited by Stuchlik (1912), numbered as 387 (GOET-015488). This specimen is here designated as lectotype of the name *Gomphrena perennis* fo. *parvifolia*.

According to the Catalogue of the Vascular plants from the southern cone (Zuloaga *et al.*, 2008) *Gomphrena perennis* fo. *parvifolia* is a synonym of *Gomphrena perennis* Linnaeus.

***Gomphrena perennis* fo. *parvifolia* Stuchlik (1912: 154)**

Type (lectotype here designated):—ARGENTINA. San Francisco. Las Peñas, January 1871, *Lorentz 387* (GOET-015488!) (Fig. 3).

= *Gomphrena perennis* Linnaeus (1753: 224)

Type (lectotype designated by Mears 1980: 86):—[Icon] “*Amaranthoides perenne floribus stramineis radiates*” (Dillenius 1732: t.20, f. 22, image available at <http://herbarium.bgbm.org/object/B100673185>)

***Gomphrena perennis* var. *saxatilis* R. E. Fries (1921: 40)**

Fries (1921: 40) described the name *Gomphrena perennis* var. *saxatilis* through a diagnosis and mentioning a syntype: “Bolivia: Tarija, in declivibus montis apricis siccis in fisuri, c:a 1900 m. s. m. [florifera 28 Febr. 1902.—FRIES n. 1218]”. Two sheets were traced at S (codes 2449, and 07-12666), both bearing plants that match Fries’ diagnosis. I designate here the specimen S-R-2449 as the lectotype of the name *Gomphrena perennis* var. *saxatilis* since it is the most complete.

***Gomphrena perennis* var. *saxatilis* R.E. Fries (1921: 40)**

Type (lectotype here designated):—BOLIVIA. Tarija. In declivibus montis apricis siccis in fissuris, 28 January 1902, *Fries 1218* (S-R-2449!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s-r-2449>; isolectotypes S-07-12666!, P-00623707!, US-00102799!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s07-12666>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00623707>, and <http://plants.jstor.org/stable/10.5555/al.ap.specimen.us00102799>).

***Gomphrena pohlii* Moquin-Tandon (1849: 403)**

The protologue of *Gomphrena pohlii* (Moquin-Tandon 1849: 403) included the citation of a specimen “*Pohl 2957*. v. s. in h. Mus. Vindob. [herbarium Musei Vindobonensis]”. Unfortunately, no exsiccata was traced at W, but there is a further specimen at P (code 00623709), which I designate here as lectotype of the name *Gomphrena pohlii*.

***Gomphrena pohlii* Moquin-Tandon (1849: 403) ≡ *Xeraea pohlii* (Moq.) Kuntze (1891: 545)**

Type (lectotype here designated):—BRAZIL. “Brasilia. Herb. Vindob.” *Pohl 2957* (P-00623709!). Image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00623709>

***Gomphrena regeliana* fo. *albiflora* R.E. Fries (1921: 41)**

Fries (1921: 41) gave the following indication under *Gomphrena regeliana*: “Brasilien: Paraná [Dusén n. 1153a; Villa Velha, Dusén n. 7203]. Diese exemplare stimmen mit der Beschreibung ausgezeichnet überein, ausser darin, daas die Blütenköpfchen nicht >>intense rosea>>, sondern weisslich ohne jede Rotfärbung sind [f. *albiflora* R. E. FR. nov. forma: a typo floribus albidis differt]” (= “These samples are in accordance with the description, with the exception that the flower heads are not >>intense rosea>> but whitish with no red color [f. *albiflora* R. E. FR. nov. forma: a

different type of white flowers]”). *G. regeliana* f. *albiflora* was validly published, and the specimens cited can be considered as syntypes (Art. 9.5).

These two collections were found at S, and both bear plants matching the protologue. I designate here the specimen S-07-12682 as lectotype of *Gomphrena regeliana* fo. *albiflora*. It is to be noted that Dusén had a collection assistant named G. Jönsson, and some plants were actually collected by him. This is the case of S-07-12681 where the labels bear the name G. Jönsson on top of Dusén’s label.

I agree with the proposal by Zuloaga *et al* (2008) in synonymizing the f. *albiflora* with *G. regeliana* subsp. *regeliana*. Seubert (1875: 216) provided a detailed diagnosis and cited a syntype (“*Crescit in campis siccis ad Rio Pardo prov. S. Paulo; Riedel n. 490 (in Herb.. Caes. Petropol.*”). Four specimens were traced at F, K, LE, and M which bear plants matching the diagnosis. While the material at F and M correspond to black and white pictures, the specimens at LE and K bear original plant material and labels from the Herbarium Petropolitani. The LE specimen is the most complete; therefore it is here designated as the lectotype of the name *Gomphrena regeliana*, while the other specimens are isolectotypes.

Additional material seen:—BRAZIL. Paraná. “Villa Velha, in arenosis”. Collection date: 11.26.1908. *P. K. H. Dusén* 7203 (syntype, S herbarium number S07-12681!).

Gomphrena regeliana fo. *albiflora* R. E. Fries (1921: 41)

Type (lectotype here designated):—BRAZIL. Paraná. Villa Velha, in campo arenoso, 20 October 1914. *Jönsson 1153a* (S-07-12682!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s07-12682>)

= *Gomphrena regeliana* Seubert (1875: 216)

Type (lectotype here designated):—BRAZIL. “In campis siccis Rio Pardo” *Riedel* 490 (LE! [Fig. 4], isolectotypes M-0241795!, K-000583076!, F-0BN003259!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241795>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.k000583076>, and <http://plants.jstor.org/stable/10.5555/al.ap.specimen.f0bn003259>)

***Gomphrena schlechtendaliana* Martius (1826b: 299)**

The protologue of *Gomphrena schlechtendaliana* (Martius 1826b: 299) includes a detailed diagnosis, and the indication “Habitat in Brasiliae Provincia Cisplatina: Clar. *Sellow*”. Holzhammer (1956: 190) reported “Typus: In Brasilia meridionalis, Cisplatina (Sellow) Herb. München”. I found two sheets at M (codes 0241801, and 0241802), both bearing Holzhammer’s annotation, but only one of them (M-0241801) reports the word “typus”. Holzhammer’s statement can be considered as a lectotypification, and the specimen M-0241801 is the lectotype, while the other specimen (M-0241802) is an isolectotype. Further four isolectotypes were traced at P (3 specimens), and BM (one specimen).

***Gomphrena schlechtendaliana* Martius (1826b: 299) ≡ *Xeraea schlechtendalii* (Mart.) Kuntze (1891: 545)**

Type (lectotype designated by Holzhammer 1956: 190):—BRAZIL. *Sellow s.n.* (M-0241801!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241801>!; isolectotypes M-0241802!, P-00623726!, P-00623725!, P-00623724!; BM-000993135!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241802>, <https://science.mnhn.fr/institution/mnhn/collection/p/item/p00623726>, <https://science.mnhn.fr/institution/mnhn/collection/p/item/p00623725>, <https://science.mnhn.fr/institution/mnhn/collection/p/item/p00623724>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000993135>)

***Gomphrena tarijensis* R.E. Fries (1921: 27)**

After a detailed diagnosis, Fries (1921: 27) indicated “Bolivia: Tarija, in graminosis [florifera 16 Jan. 1912.—FRIES n. 1088]”. There are two specimens of this collection at S (codes 07-12683, and 2457), and one at G (code 00236977) which correspond to syntypes (Art. 9.5). Fries worked at the herbarium S, and one of the above cited specimens (S-07-12683) has annotations and drawings in pencil which allowed me to state with certainty that the author examined it. Therefore, the specimen S-07-12683 is here designated as the lectotype of the name *Gomphrena tarijensis*.

Fries (1921) reported in the protologue “florifera 16 Jan 1912”, but both specimens at S are labelled with the collection date January, 16 1902. I considered this a typographical error by Fries.

According to Pedersen (1997: 227), *Gomphrena tarijensis* a synonym of *Gomphrena boliviana* var. *tarijensis* (R.E.Fries) Pedersen (1997: 227).



FIGURE 4. Lectotype of the name *Gomphrena regeliana* (LE!).

Gomphrena tarijensis R. E. Fries (1921: 27) ≡ *Gomphrena boliviana* var. *tarijensis* (R. E. Fries) Pedersen (1997: 227)

Type (lectotype here designated):—BOLIVIA. Tarija. In graminosis, 16 January 1902, *Fries 1088* (S-07-12683!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s07-12683>; isolectotypes S-R-2457!, G-00236977!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.s-r-2457>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.g00236977>, respectively).

Gomphrena viridifolia Suessenguth (1934: 316)

The protologue of *Gomphrena viridifolia* (Suessenguth 1934: 316) consists of a short diagnosis which was followed by the indication of four specimens (syntypes, Art. 9.5): “Uruguay, Départ. Canelones, Toledo, V. 1927 (Herter, PI. Uruguay, n. 929 [81881]; Herter, PI. Uruguay, n. 811 [81890].—Argentinien, Prov. Tucuman, Quebrada do Lules, 550 m, V. 1929 (S. Venturi n. 9055).—Prov. Buenos Aires, Dock Sud, V. 1926 (L. R. Parodi 7241)”.

Holzhammer (1956) indicated as “typus” of *Gomphrena viridifolia* the Herter’s collection no. 929/81881, which is actually preserved at M (code 0241814). On the basis of Art. 7.10, Holzhammer’s indication should be interpreted as lectotype.

According to Pedersen (1987), *Gomphrena viridifolia* was regarded as a synonym of *Gomphrena elegans* Martius (1826a: 17), synonymization that is here supported.

Gomphrena viridifolia Suessenguth (1934: 316)

Type (lectotype designated by Holzhammer 1956: 225):—URUGUAY. Canelones, Toledo. V. 1927. *W. Herter 929/81881* (M-0241814!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241814>; isolectotype US-00102806!, image of the isolectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.us00102806>)

= *Gomphrena elegans* Martius (1826a: 17)

Type (lectotype designated by Pedersen 1997: 229):—BRAZIL. Brasilia province, Bahia. *Martius s.n.* (M-0241724!).

Hebanthe holosericea Martius (1838: 65)

The protologue of *Hebanthe holosericea* (Martius 1838: 65) consisted of a short diagnosis (“241. *Hebanthe holosericea*. caule glabrescente, axillis barbatis, ramis sursum appresso-villosis, junioribus subochraecis”), and the indication of the habitat (“Crescit in praeruptis viarum, ad sylvas caeduas, locis calidis prope Sebastianopolin. Floret Sept. Dryas”). There is any mention to a specimen in the protologue, but the description is numbered with the “241”, which corresponds to the *Martii Herbarium Florae Brasiliensis*, housed at M. Moquin-Tandon (1849: 386) transferred this species to *Gomphrena* and mentioned: “*Hebanthe holosericea* Mart.! herb. Bras. n. 241”. Actually there are two sheets marked with “*Martius 241*” from the herbarium Martii (Florae Brasil) housed at M (codes 0241739, and 0241740) and two further sheets at P (codes 00623734, and 00623736). The indication of “Typus: Brasilia (Martius) Herb. München” made by Holzhammer (1956: 219) can be considered as a lectotypification. Among the M specimens, one (code 0241739) bears a label in Holzhammer’s handwriting who reported “typus”. The M-0241739 is the lectotype of the name *Hebanthe holosericea*. The other above cited specimens are isolectotypes.

Hebanthe holosericea Mart (1838: 65) ≡ *Xeraea holosericea* (Mart.) Kuntze (1891: 545) ≡ *Pfaffia holosericea* (Moq.) Standley (1937: 491) ≡ *Gomphrena holosericea* (Mart.) Moquin-Tandon, (1849: 386)

Type (lectotype designated by Holzhammer 1956: 219):—BRAZIL. In Brasilia. *Martius 241* (M-0241739!, image of the lectotype available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241739>; isolectotypes M-0241740!, P-00623734!, P-00623736!, images of the isolectotypes available at <http://plants.jstor.org/stable/10.5555/al.ap.specimen.m0241740>, <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00623734>, and <http://plants.jstor.org/stable/10.5555/al.ap.specimen.p00623736>, respectively)

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References

- Burdet, H.M. (1977) Cartulae ad botanicorum graphicem. X. *Candollea* 32(1): 165–206.
- De Siqueira, J.C. (1992) O gênero *Gomphrena* L. (Amaranthaceae) no Brasil. *Pesquisas Botânica* 43: 5–197.
- Fries, R.E. (1921) Zur kenntnis der süd- und zentralamerikanischen Amarantaceen flora. *Arkiv för Botanik* 16(12): 1–43.
- Gómez de la Maza, M. (1897) *Flora habanera*. La Moderna Poesía, La Habana, 597 pp.
- Grimé, W.E. & Plowman (1986) Type photographs at the Field Museum of Natural History. *Taxon* 35: 932–934.
- Hiepko, P. (1987) The collections of the Botanical Museum Berlin-Dahlem (B) and their history. *Englera* 7: 219–252.
- Holzhammer, E. (1956) Die amerikanischen Arten der Gattung *Gomphrena* L. *Mitteilungen der botanischen staatsammlung München* 14–15: 178–249.
- Iamónico, D. (2012) Proposal to reject the name *Gomphrena polygonoides* (Amaranthaceae). *Taxon* 61(6): 1326–1327.
- Jorgensen, P.M., Nee, M.H. & Beck, S.G. (2014) Catálogo de las plantas vasculares de Bolivia. St. Louis, Missouri. *Monographs in Systematic Botany from the Missouri Botanical Garden* 1744 pp.
- Kuntze, O. (1891) *Xeraea. Revisio generum plantarum vascularium omnium atque cellularium multarum secundum leges nomenclaturae internationales cum enumeratione plantarum exoticarum in itinere mundi collectarum*. Part 2. 545 pp.
- Linnaeus, C. (1753) *Species Plantarum*, vol. 1. Laurentius Salvius, Stockholm, 560 pp.
- Linnaeus, C. (1781) *Supplementum Plantarum Systematis Vegetabilium, Editionis Decimae Tertiae, Generum Plantarum Editiones Sextae, et Specierum Plantarum Editionis Secundae*. Editum a Carolo a Linné, Impensis Orphanotropei, Brunsvigae, 467 pp.
- Martius, C.F. (1826a) *Nova Genera et Species Plantarum Brasiliensium*, vol. 2. Monachii, Typis C. Wolf, 148 pp.
- Martius, C.F. (1826b) Amarantaceen. *Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum* 13(1): 209–322.
- Martius, C.F. (1838) Flora oder Botanische Zeitung: welche Recensionen, Abhandlungen, Aufsätze, Neuigkeiten und Nachrichten, die Botanik betreffend, enthält/herausgegeben von der Königl. *Botanischen Gesellschaft in Regensburg* 2(4): 49–96.
- McNeill, J. (2014) Holotype specimens and type citations: General issues. *Taxon* 63(5): 1112–1113.
<https://doi.org/10.12705/635.7>
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (2012) International Code of Nomenclature for algae, fungi and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011. *Regnum Vegetabile* 154: 1–240.
- Mears, J.A. (1980) The Linnaean Species of *Gomphrena* L. (Amaranthaceae). *Taxon* 29(1): 85–95.
<https://doi.org/10.2307/1219601>
- Moquin-Tandon, C.H.B.A. (1849) Amaranthaceae Juss. In: Candolle, A. de (Ed.) *Prodromus Systematis Regni Vegetabilis*, vol. 13(2). Sumptibus Victois Masson, Parisiis, pp. 231–424.
- Müller, K. & Borsch, T. (2005) Phylogenetics of Amaranthaceae Based on matK/trnK Sequence Data: Evidence from Parsimony, Likelihood, and Bayesian Analyses. *Annals of the Missouri Botanical Garden* 92(1): 66–102.
- Palmer, J. (1998) A taxonomic revision of *Gomphrena* (Amaranthaceae) in Australia. *Australian Systematic Botany* 11(1): 73–151.
<https://doi.org/10.1071/SB96020>
- Pedersen, T.M. (1967) Studies in South American Amaranthaceae. *Darwiniana* 14(2–3): 430–462.
- Pedersen, T.M. (1976) Estudios sobre las Amaranthaceae Sudamericanas. II. *Darwiniana* 20(1–2): 269–303.
- Pedersen, T.M. (1987) Amaranthaceae Juss. In: Burkart, A., Troncoso, N. & Bacigalupo, N. (Eds.) *Flora ilustrada de Entre Ríos*, Tomo VI(III). INTA, Buenos Aires, pp. 160–203.
- Pedersen, T.M. (1990) Studies in South American Amaranthaceae III (including one amphi-Atlantic species). *Bulletin Museum d'Histoire Naturelle. Paris. Adansonia* 12(1): 69–97.
- Pedersen, T.M. (1997) Studies in South American Amaranthaceae. IV. *Adansonia* 19(2): 217–251.
- Ramella, L. (2016) Nomenclatura, tipificaciones y sinónimos nuevos en la familia Amaranthaceae de la Flora del Paraguay. *Candollea* 71: 311–325.
<https://doi.org/10.15553/c2016v712a16>
- Rees, A. (1819) *The Cyclopaedia*. In: *Universal dictionary of arts, sciences, and literature*, vol.16. London, 437 pp.
- Roemers, J.J. & Schultes, J.A. (1819) *Systema Vegetabilium*, vol. 4. J.G. Cotta, Stuttgart, 888 pp.

- Saint-Hilaire, A. (1825) *Plantes usuelles des Brasiiliens*. Grimbert Libraire, Paris, 74 pp.
- Sanchez del Pino, I., Borsch, T. & Motley, T.J. (2009) trnL-F and rpl16 Sequence Data and Dense Taxon Sampling Reveal Monophyly of Unilocular Anthered Gomphrenoideae (Amaranthaceae) and an Improved Picture of Their Internal Relationships. *Systematic Botany* 34(1): 57–67.
<https://doi.org/10.1600/036364409787602401>
- Seubert, M. (1875) Amaranthaceae Juss. In: Martius, C.F.P. (Ed.) *Flora Brasiliensis*, vol. 3(1). Leipzig, Frid. Fleischer, pp. 161–252.
- Spix, J.B. & Martius, K.F.P. (1823) *Reise in Brasilien auf Befehl Sr. Majestät Maximilian Joseph I., Königs von Baiern, in den Jahren 1817 bis 1820*, vol. 1. Gedruckt bei dem Verfasser Leipzig, in Comm. bei Friedr. Fleischer, Munchen, 412 pp.
- Stafleu, F.A. & Cowan, R.S. (1981) *Taxonomic Literature II: A selective guide to botanical publications and collections with dates, commentaries and types (TL2)*, vol. III. Lh-O. Bohn, Scheltema & Holkema, Utrecht, 980 pp.
- Stafleu, F.A. & Cowan, R.S. (1988) *Taxonomic Literature II: A selective guide to botanical publications and collections with dates, commentaries and types (TL2)*, vol. 7. W-Z. Bohn, Scheltema & Holkema, Utrecht, 267 pp.
- Standley, P. (1937) Amaranthaceae Juss. In: Macbride, J.F. (Ed.) *Flora of Perú*, vol. 2. Publications of the Field Museum of Natural History, Botanical Series, Chicago, pp. 478–518.
- Stuchlik, V.J. (1912) Zur synonymik der Gattung *Gomphrena*. *Repertorium specierum novarum regni vegetabilis* 11: 151–162.
<https://doi.org/10.1002/fedr.19120110906>
- Stuchlik, V.J. (1913) Über einige neue formen von *Gomphrena*. *Beihefte zum Botanischen Centralblatt* 30(3): 392–411.
- Suessenguth, K. (1934) Neue und kritische Amaranthaceen aus Süd- und Mittel-Amerika. *Repertorium Specierum Novarum Regni Vegetabilis* 35: 298–337.
<https://doi.org/10.1002/fedr.19340351805>
- Suessenguth, K. (1940) Einige neue und seltene Amaranthaceen, Rhamnaceen und Vitaceen. *Repertorium Specierum Novarum Regni Vegetabilis* 49 (1–4): 5–15.
<https://doi.org/10.1002/fedr.19400490104>
- Suessenguth, K. (1950) Amaranthaceae. *Mitteilungen der Botanischen Staatssammlung München* 1: 1–8.
- Thiers, B. (2016) *Index herbariorum: a global directory of public herbaria and associated staff*. New York: New York Botanical Garden's *Virtual Herbarium*. Available from: <http://sweetgum.nybg.org/ih> (accessed 4 January 2017)
- Townsend, C.C. (1993) Amaranthaceae. In: Kubitzki, K., Rohwer, J.G. & Bittrich, V. (Eds.) *The families and genera of vascular plants*, vol. 2. Springer, Berlin. pp. 70–91.
https://doi.org/10.1007/978-3-662-02899-5_7
- Walpers, W.G. (1843) Amaranthaceae. *Novorum Actorum Academiae Caesareae Leopoldinae-Carolinae Naturae Curiosorum* 19(Supt. 1): 404.
- Zuloaga, F., Morrone, O. & Belgrano, M. (Eds.) (2008) Dicotyledoneae: Acanthaceae-Fabaceae (*Abarema-Schizolobium*). In: *Catálogo de las plantas vasculares del Cono Sur (Argentina, Sur de Brasil, Chile, Paraguay y Uruguay)*. Vol. 2. St. Louis, Missouri. Monographs in Systematic Botany from the Missouri Botanical Garden, 2286 pp.