



Types of some Mexican names in Amaranthaceae s.l. (Caryophyllales)

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Abstract

The family Amaranthaceae has a cosmopolitan distribution and it is one of the most diverse families within the order Caryophyllales. Species of Amaranthaceae live mainly in arid environments, saline habitats, or disturbed areas. Nomenclature is the necessary first-step to study the members of this group, aiming to clarify their identity which is often critical. The types of four names in Amaranthaceae (*sensu lato*, including Chenopodiaceae)—*Chenopodium berlandieri*, *Celosia monosperma*, *Iresine grandis* var. *glabrata*, *Iresine interrupta*—with Mexican loci classici are designated in the present paper, including comments on their identities.

Key words: *Chenopodium*, *Iresine rubella*, lectotype, typification

Introduction

The family Amaranthaceae Juss. (including Chenopodiaceae Vent. *sensu* APGIV 2016) has a cosmopolitan geographical distribution, and comprises 174 genera and 2050–2500 species (POWO 2023), so being one of the most diverse groups within the order Caryophyllales (Kadereit *et al.* 2003, Hernández-Ledesma *et al.* 2015). Species of Amaranthaceae grow mainly in arid environments, saline habitats, or disturbed areas, and many species are considered weeds and/or aliens (see e.g., Sandoval-Ortega *et al.* 2017, Iamónico & El Mokni 2019, Sindhu *et al.* 2021, Hassan *et al.* 2022, Iamónico *et al.* 2022).

Amaranthaceae is a family of both ecological and economic importance, since it includes several species grown for human consumption, such as beets (*Beta vulgaris* Linnaeus 1753a: 222), amaranths (e.g., *Amaranthus cruentus* Linnaeus 1759: 1269 and *A. hypochondriacus* Linnaeus 1753b: 991), quihuicha or kiwicha (*Amaranthus caudatus* Linnaeus 1753b: 990) spinach (*Spinacia oleracea* Linnaeus 1753b: 1027) and others. The most important genera in terms of number of species worldwide are: *Atriplex* Linnaeus (1753b: 1052) with 250, *Gomphrena* Linnaeus (1753a: 224) with 120, *Alternanthera* Forsskål (1775: 28). with 100 and *Chenopodium* Linnaeus (1753a: 218) with 100 (Stevens 2001-onwards).

Concerning Mexico, Amaranthaceae is one of the most diverse families of flowering plants, with 33 genera and about 211 species (Villaseñor 2016). In the country, many wild and semi-domesticated taxa are part of the traditions and diet of people, especially from rural communities. One of these taxa is, e.g., *Dysphania ambrosioides* (Linnaeus 1753a: 219–220) Mosyakin & Clemants (2002: 382), locally known as “epazote”, which is consumed as condiment and used as medicinal (Sandoval-Ortega *et al.* 2023, García-Regalado 2014), or various members of the genus *Amaranthus* Linnaeus (1753b: 989) whose young stems and leaves are eaten as (local name) “quelites” (Sandoval-Ortega & Siqueiros-Delgado 2019, Sandoval-Ortega *et al.* 2023).

The study of the members of Amaranthaceae s.l. needs a first-step analysis of the nomenclature of names, as well highlighted by several papers, recently published (see e.g., Falatoury *et al.* 2017, Iamónico 2016, 2018, 2019, 2020a, 2020b, 2023, Mestre *et al.* 2021, Raus 2022). The aim of this work was to designate the types of the names of some Amaranthaceae that occur in Mexico.

Material and methods

The material deposited in the Herbaria MEXU and USON was directly reviewed by us (acronyms follow Thiers 2023 [continuously updated]). Pertinent literature (protologues included) was also considered (Calderón de Rzedowski 2005, Robertson & Clemants 2003, Welsh *et al.* 2003). In addition, online image of specimens deposited in the Herbaria ARIZ, B, HUAP, K, MO, NY, P, and US (Curators Herbarium B 2023, K herbarium 2023, TROPICOS 2023, P herbarium 2023, NY herbarium 2023, US herbarium 2023), and those occurring in the database *Consortium of California Herbaria* (CCH2 portal 2023) and the *Global Plants platform* (JSTOR 2023) are examined. The articles the *International Code of Nomenclature for algae, fungi, and plants* cited in the text follow the current edition, i.e. the *Shenzhen Code* (hereafter reported as “ICN”; Turland *et al.* 2018).

Results

1. *Iresine ajuscana* Suessenguth & Beyerle (in Suessenguth 1935: 10) ≡ *Iresine ajuscana* f. *longiflora* Suessenguth & Beyerle (in Suessenguth 1935: 10).

Lectotype [designated by Borsch *et al.* (2018: 963–964) as “holotype”, here corrected to lectotype (Art. 9.19 of ICN)]:—MEXICO, Thal von Ajusco, 1870, *Hahn* 35 (B100177104 [image!]) Image available at <http://herbarium.bgbm.org/object/B100177104>.

= *Iresine ajuscana* f. *minutiflora* Suessenguth & Beyerle (in Suessenguth 1935: 11).

Lectotype (designated by Borsch *et al.* 2018: 964):—MEXICO. Sallo de aqua, December 1905, *Purpus* 1807 (B100715445 [image!]) image available at <https://herbarium.bgbm.org/object/B100715445>.

= *Iresine grandis* var. *glabrata* Suessenguth (in Suessenguth & Merxmüller 1952: 108).

Lectotype (here designated):—MEXICO. Oaxaca: Ayutla, Cañon Rio Tlahuitoltepec, 19–27 February 1937, *Camp* 2720 (NY01259979 [image!]) image available at <https://sweetgum.nybg.org/science/vh/specimen-details/?irn=1489059>; isolectotype: NY01259978 [image!]) image available at <https://sweetgum.nybg.org/science/vh/specimen-details/?irn=1489058>.

Notes on the type of *Iresine ajuscana*:—The protologue of *I. ajuscana* consists of a detailed morphological description; no mention of a type specimen or citation of a locality and/or a collector there is. Just after the morphological description of *I. ajuscana*, Suessenguth & Beyerle (in Suessenguth 1935: 11) describes two forms for this species, distinguishable each other by the size of the tepals: *I. ajuscana* f. *longiflora* Suessenguth & Beyerle (in Suessenguth 1935: 11) and *I. ajuscana* f. *minutiflora* Suessenguth & Beyerle (in Suessenguth 1935: 11). For each one of these forms, locality, collectors and collection numbers are reported (“Mexico, Staat Mexico, Tal von Ajusco, [leg. L. Hahn, no. 35, anno 1870]; Mexico, Staat Mexico, Sallo de aqua, [leg. C.A. Purpus no. 1803 und 1807]; Amecameca, Sacro Monte 2300 m [Leg. H. Fröderström et E. Hultén no. 1207 und 1208—Herb. Stockholm]”).

Borsch *et al.* (2018) designated lectotypes for *Iresine ajuscana* f. *longiflora* and *I. ajuscana* f. *minutiflora* and proposed both names as synonyms (heterotypic) of *I. ajuscana* s.s. However, they also mentioned that the holotype of *I. ajuscana* was the same specimen as the one designated as lectotype of *I. ajuscana* f. *longiflora*. However, this cannot be possible according to Art. 9.1 of ICN, because no holotype was indicated in the protologue and the material cited are syntypes (Art. 9.6. of ICN). According to the Art. 9.10 of ICN, Borsch *et al.*’s indication as holotype (barcode B100177104) is treated as an error to be here corrected as lectotype. *I. ajuscana* and *I. ajuscana* f. *longiflora* are homotypic synonyms.

Note on the type of *Iresine grandis* var. *glabrata*:—The protologue of *I. grandis* var. *glabrata* consists of a short description; a locality (Gebiet von Ayutla, Hoch-paß zwischen Ayutla und Tumazulapa, canon des Rio Tlahuitoltepec.- Exp. New York Bot. Garden 1937), a collector (W.H. Camp), a collection number (2720), and the herbaria where the material was deposited (“Herb. Bot. Garden New York”, referred to the Herbarium NY) are given. We traced two specimens at NY, one of which was reported by Borsch *et al.* (2018) as the holotype of *I. grandis* var. *glabrata* (the other specimen indicated as isotype). According to Art. 9.6 of ICN, these two specimens (barcodes NY01259978 and NY01259979) are syntypes, and a lectotypification is necessary. NY01259979 is here designated as lectotype, since it is a more complete specimen, matches with the protologue, and the current concept in *Iresine* (Calderón de Rzedowski 2005). NY01259978 is the isolectotype.

Notes on the identity of *Iresine rubella* Suessenguth (in Suessenguth & Merxmüller 1952: 109):—Suessenguth & Merxmüller (1952: 109) mentioned in the protologue that the type material of *Iresine rubella* is deposited at BM (“Herb.Brit.Mus.”). However, after a digital search, no original material was found by us in this or other herbaria.

Further, after contacting the BM staff, we verified that no material of *I. rubella* collected before 1890 is currently deposited at the Herbarium (we also asked for specimen identified as *I. ajuscana*). So, we reached to the conclusion that the specimen is probably lost.

Iresine rubella has been considered a synonym of *I. ajuscana* by Borsh *et al.* (2018), and so reported also in TROPICOS (2023) and POWO (2023). However, since the type is lost, the only information available to identify *I. rubella* is the collection locality (Mexico-Valle, Monte de la Parada) and the morphological description provided in the protologue, where it is mentioned that this species has glabrous pseudostaminodia, bisexual flowers and reddish tepals (Suessenguth & Merxmüller 1952: 109). *I. ajuscana* has unisexual flowers and pubescent pseudostaminodia, feature not described in the protologue (Suessenguth 1935: 10) but that can be observed in the type material (B100177104, S05-5664), so it is unlikely that *I. rubella* is a synonym of *I. ajuscana*. The species of *Iresine* reported to the Valley of Mexico are *I. ajuscana*, *I. schaffneri* Watson (1886: 437), *I. cassiniformis* Schauer (in Nees ab Esenbeck & Schauer 1847: 709), *I. latifolia* (Martens & Galeotti 1843: 349) Bentham & Hooker (1880: 42), and *I. interrupta* Bentham (1844: 156) (see Calderón de Rzedowski 2005), but no one of these taxa matches with the morphological description in the protologue of *I. rubella*. Since the identity of *I. rubella* could not be confirmed, this name was not here considered as synonym of *I. ajuscana*.

Syntypes of *Iresine ajuscana*:—MEXICO, Sallo de aqua, December 1905, *Purpus 1803* (B100715444 [image!] image available at <https://herbarium.bgbm.org/object/B100715444>); Amecameca, Sacro Monte, 3 March 1932, *Fröderström & Hultén 1207* (S05-5665 [image!] image available at <https://herbarium.nrm.se/specimens/S05-5665>); Amecameca, Sacro Monte, 3 March 1932, *Fröderström & Hultén 1208* [image!] image available at <https://herbarium.nrm.se/specimens/S05-5664>).

2. *Iresine interrupta* Bentham (1844: 156).

Lectotype (designated here):—MEXICO. Tepic, *Sinclair s.n.* (K000195155 [image!] image available at <http://apps.kew.org/herbcat/getImage.do?imageBarcode=K000195155http://specimens.kew.org/herbarium/K000195155>).

= *Iresine acuminata* Moquin-Tandon (1849: 345).

Holotype:—MEXICO. *Bates s.n.* (P00438664 [image!] image available at <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00438664>).

Note on the type of *Iresine interrupta*:—Bentham (1844: 156) provided a short morphological description for *Iresine interrupta*; no collector name or collection number are given, whereas two Mexican localities (“Tepic”, in the state of Nayarit; and “Acapulco” in the state of Guerrero) are reported. At K there are three specimens of *I. interrupta*, all bearing a label written by Bentham (barcodes K000195154, K000195155 and K000195156).

The label on K000195155 reads “Tepic” and the name “Hooker” and the year 1845, one year after the publication of *I. interrupta*. However, this information does not correspond to the collector and year of collection since W. Hooker did not collect material from Acapulco and was not part of the H.M.S. (Her Majesty’s ship) Sulphur crew. The collector seems to be Sinclair, whose name is written on the label, just after “Tepic”. Raven (1964) explains why some Bentham’s labels have a date that does not correspond to the collection date, indicating that Bentham wrote the year in which he included the duplicates provided by Hooker in his own herbarium.

The label on K000195156 reads “Acapulco” and the last name “Barclay”, who was the official collector sent out by the Royal Botanic Gardens Kew. Some of the material collected by Barclay came into the possession of Hooker, who became director of the Royal Botanic Gardens Kew in 1941, and who provided those specimens to Bentham (Raven 1964).

Finally, on the sheet K000195154 reads “Mexico” and “Beechey”.

W. Hooker sent to Bentham all the specimens collected by Hinds, Sinclair and Barclay and other members of the H.M.S. Sulphur crew. About this matter, Raven (1964) wrote: “It is important to note that all of this material was available to Bentham throughout the time he was conducting his studies, and hence all of it is equally important for purposes of typification”.

Borsch *et al.* (2018) cited one of these specimens (K000195155) as the holotype. According to Art. 9.1 of ICN, that specimen cannot be the holotype, but it is a syntype (Art. 9.6 of ICN). K000195155 is designated as lectotype, matching the protologue and the current concept in *Iresine* (Calderón de Rzedowski 2005, Sandoval-Ortega 2020).

3. *Chenopodium berlandieri* Moquin-Tandon (1840: 23).

Lectotype (designated here):—Circa Mexico, Sep. 1828, *Berlandier 1906* (G00176930 [image!], image available at <http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=178855&base=img&lang=en>); isolectotypes: P00606417 [image!], image available at <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00606417>, P00606418 [image!], image available at <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00606418>, G00206050 [image!] image available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.g00206050>, GH00037169 [image!] image available at https://kiki.huh.harvard.edu/databases/specimen_search.php?mode=details&id=12807, NY324308 [image!] image available at <https://sweetgum.nybg.org/science/vh/specimen-details/?irn=290056>)

Note on the type of *Chenopodium berlandieri*:—There are at least six duplicates of this collection deposited in four different herbaria, i.e. at P, G, GH, and NY-. All this material correspond to syntypes (Art. 9.6 of ICN). In fact, Moquin-Tandon (1840: 23) reported “v.s. [*vidi sicco*] in herb. Moricand” and Moricand’s herbarium is currently deposited at G, with duplicate elsewhere (see HUH-Index of Botanists 2023). The specimen G00176930 is here designated as lectotype since it is in better condition and shows flowers and fruits (which features are important in the identification of *Chenopodium* taxa). There is another specimen of *C. berlandieri* collected by Berlandier with the number 1906 deposited in G (barcode G00206050), probably a fragment from G00176930 or other duplicate. P, GH, and NY specimens are isolectotypes. Note that in the protologue it is reported “circa Mexico”, but on the syntypes the locality of collection is Bejar, probably Béjar (now Bexar) Texas, not far from the Mexican border.

4. *Lagrezia monosperma* (Rose) Standley (1915: 393) ≡ *Celosia monosperma* Rose (1895: 352).

Lectotype (designated here):—MEXICO, mountains near Manzanillo, 1 to 31 December 1891, *Palmer 887* (US00106216 [Image!] image available at https://ids.si.edu/ids/media_view?id=ark:/65665/m317b2b7c70e8947b78aae12fd266b8d8c&defaultView=image_dynamic; isolectotypes: US00106217 [Image!] image available at https://ids.si.edu/ids/media_view?id=ark:/65665/m3af872df426344cd9aa048d6a791b7f3a&defaultView=image_dynamic, US00893655 [Image!] image available at https://ids.si.edu/ids/media_view?id=ark:/65665/m326c8f4d08ec04dc4983ea43324f7b6af&defaultView=image_dynamic, MO216357 [Image!] image available at <http://legacy.tropicos.org/Image/65277>, GH00037042 [Image!] image available at <https://s3.amazonaws.com/huhwebimages/EC49A16F8CE3455/type/full/37042.jpg>, NY324467 [Image!] image available at <https://sweetgum.nybg.org/science/vh/specimen-details/?irn=459179>, NY324468 [Image!] image available at <https://sweetgum.nybg.org/science/vh/specimen-details/?irn=459180>, BM000993089 [Image!] image available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000993089>, RSA0000618 [Image!] image available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.rsa0000618>, UC116302 [Image!] image available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.uc116302>, K000582924 [Image!] image available at <http://specimens.kew.org/herbarium/K000582924>.

Note on the type of *Celosia monosperma*:—The protologue of *Celosia monosperma* consists of a detailed morphological description and the citation of a locality and a collector number. We found 11 specimens collected by Palmer and numbered with 887 that were collected in Manzanillo, Mexico, during December 1890 (herbaria BM, GH, K, MO, NY, RSA, UC and US). All this material are syntypes (Art. 9.6 of ICN). We here designate US00106216 as the lectotype, since it is in good conditions, shows mature flowers and matches the protologue and the current concept in *Lagrezia* (see e.g., Standley 1917). The other specimens are isolectotypes.

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