

A new perennial species of *Gomphrena* (Amaranthaceae) from Mexico with nomenclatural notes on *G. decumbens*



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Abstract

Gomphrena caxcana (Amaranthaceae), a new species from the states of Jalisco and Zacatecas (Mexico), is described. It is morphologically similar to *G. serrata*, but it can be distinguished by the fleshy perennial taproot (vs. fibrous usually annual root), the presence of adventitious roots at the base of the stems (vs. absence of adventitious roots), the length of bractlets (3–4 mm vs. 4.8–7.4 mm), and the structure of staminal tube (with two short apical lobules between anthers vs. a single apical lobule between anthers). The name *Gomphrena decumbens* is also discussed and lectotypified.

Key words: Caryophyllales, Gomphrenoideae, flora of Zacatecas, flora of Jalisco.

INTRODUCTION

The genus *Gomphrena* Linnaeus (1753: 224) (Amaranthaceae Juss.) includes about 120–140 species, mostly native to America and Australia (Stevens 2001-onwards, POWO 2025). Members of this group are morphologically characterized by having opposite leaves, bisexual flowers, five stamens, filaments connated into a tube, a single style, and usually two filiform stigmas (see e.g., Clemants 2003, Ortuño-Limarino & Borsch 2020). Phylogenetic studies based on molecular data (Ortuño-Limarino & Borsch 2020) support the inclusion into *Gomphrena* of taxa previously part of the genera *Philoxerus* Brown (1810: 416), *Lithophila* Swartz (1788: 14), and *Gossypianthus* Hooker (1840: 44).

The main center of diversity of the genus *Gomphrena* is south America, especially, Bolivia, Argentina, and Brazil, where 63% of its species occur (Ortuño-Limarino & Borsch 2020, Ortuño-Limarino *et al.* 2025). In North America, 17–20 species are currently recorded (see Standley 1917, Clemants 2003, Villaseñor 2016), while around 16 native species are reported for the Mexican flora (Villaseñor 2016, Sandoval-Ortega & Zumaya-Mendoza 2023b, Zumaya-Mendoza & Sandoval-Ortega 2025).

Gomphrena is a complex genus in taxonomical terms, including issues about its nomenclature (see e.g. Iamónico 2012, Iamónico & Sánchez-del Pino 2014, Sandoval-Ortega & Zumaya-Mendoza 2023b). Although the number of species occurring in Mexico is smaller than those reported for other parts of America, it is common to verify erroneously identification in herbarium material, which sometimes even turns out to be new species (e.g. Zumaya-Mendoza & Sandoval-Ortega 2025).

As part of the ongoing study of the taxonomic revision of the family Amaranthaceae of Mexico (Sandoval-Ortega & Zumaya-Mendoza 2023a, 2023b, Zumaya-Mendoza & Sandoval-Ortega 2025) and the flora of Zacatecas, we consulted herbarium specimens of *Gomphrena* collected in Aguascalientes, Jalisco, and Zacatecas and we came across a material identified as *Gomphrena decumbens* Jacquin (1804: 41–42) that, actually, cannot be identified as such and did not correspond to any of the species previously described for Mexico. Therefore, we decided to describe

a new species for science. In addition, Jacquin’s name *Gomphrena decumbens* is studied from the nomenclatural point of view.

MATERIAL AND METHODS

The work is based on the examination of the material belonging to the genus *Gomphrena* and deposited in the Herbaria HUAA, HZAC, MEXU, and UAZ (codes follow Thiers 2025 [continuously updated]).

Based on information from the specimens consulted, field explorations were carried out in the states of Jalisco and Zacatecas. The new collected specimens were deposited at the Herbario USON. Measurements were taken using a stereoscope VELAB™ VE-S5C and a morphological description of the new *Gomphrena* species was provided.

A distribution map was prepared using QGIS program (QGIS.org 2024) and the coordinates taken in field. Information on the distribution of *Gomphrena serrata* in Mexico was obtained from the GBIF portal (GBIF.org, 2025), the data were curated and only records supported by herbarium specimens were considered.

Concerning the name *Gomphrena decumbens*, the relevant literature (protologue was included) was analyzed, as well as pertinent herbarium specimens (including online material) were examined (JACQ consortium 2004, JSTOR 2023, BR herbarium 2025, K herbarium 2025, MNHN 2025). Articles of the *International Code of Nomenclature for algae, fungi, and plants* (hereafter reported as “ICN”) cited throughout the text follow Turland *et al.* (2025).

RESULTS AND DISCUSSION

Gomphrena caxcana Sandoval-Ortega, Rodríguez-Pérez & Zumaya-Mendoza *sp. nov.* (Fig. 1 and 2).

Type:—MEXICO. Zacatecas, municipio Atolinga, 800 m al NO de la localidad Cerrito Pelón, aproximadamente a 1.6 km al E de Atolinga, por la carretera a Tlaltenango, 21°49’14.8’’N 103°25’49.4’’W, vegetación arvense, 2161 m a.s.l., Rodríguez-Pérez 9920 (holotype USON33719!; isotypes CIIDIR!, HUAA!, HZAC!, IBUG!, MEXU!, UAZ!).

Diagnosis (Table 1):—*Gomphrena caxcana* differs from *G. serrata* Linnaeus (1753: 224), *G. nealleyi* Coulter & Fisher (1892: 349–350), and *G. haageana* Klotzsch (1853: 297–298) by the fleshy perennial taproot (vs. fibrous usually annual root in *G. serrata*), the presence of adventitious roots (vs. absence of adventitious roots in *G. serrata*, *G. nealleyi*, and *G. haageana*), the length of bractlets (3–4 mm vs. 4.8–7.4 mm in *G. serrata*, 5.0–7.0 mm in *G. nealleyi*, and 10–15 mm in *G. haageana*), the two external tepals slightly sclerotic at base (vs. all tepals sclerotic at base in *G. serrata*, *G. nealleyi*, and *G. haageana*), a differentiation between tepals (the 2 external tepals densely lanate on the midvein, the other 3 tepals sparsely pilose at the base vs. all tepals densely lanate except at the apex in *G. serrata*, *G. nealleyi*, and *G. haageana*), and the structure of staminal tube (with two short apical lobules between anthers vs. staminal tube with a single long apical lobule between anthers in *G. serrata* and *G. haageana* or two long apical lobules between anthers in *G. nealleyi*).

TABLE 1. Morphological comparison between *Gomphrena caxcana*, *G. serrata*, *G. nealleyi*, and *G. haageana*.

	<i>G. caxcana</i>	<i>G. serrata</i>	<i>G. nealleyi</i>	<i>G. haageana</i>
Habit	Perennial	Usually annual	Perennial	Perennial
Adventitious roots at the base and the prostrate portion of stems	Present	Absent	Absent	Absent
Root	Fleshy	Fibrous	Fleshy	Fleshy
Inflorescence length (cm)	0.6–0.9	0.7–2.0	1.0–1.2(3.5)	2.0–3.5(6.0)
Leaf length (cm)	1.0–3.6	1.5–4.0	1.5–4.0	3.0–10
Bractlets length (mm)	3.0–4.0	4.8–7.4	5.0–7.0	10–15

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TABLE 1. (Continued)

	<i>G. caxcana</i>	<i>G. serrata</i>	<i>G. nealleyi</i>	<i>G. haageana</i>
Tepals	Only external ones sclerotic at base	All sclerotic at base	All sclerotic at base	All sclerotic at base
Tepals length (mm)	3.0–3.5	3.2–4.5	4.5–4.7	5.0–5.3
Tepals pubescence	The 2 external tepals densely lanate on the midvein, the other 3 tepals sparsely pilose near the base	All tepals densely lanate except at the apex	All tepals densely lanate except at the apex	All tepals densely lanate except at the apex
Staminal tube length (mm)	As long or slightly shorter than the tepals	Longer than the tepals	Longer than the tepals	Longer than the tepals
Apical lobules of the staminal tube between anthers	2, short, not reaching the apex of the anthers	1, long, reaching or exceeding the apex of the anthers	2, long, reaching the apex of the anthers	1, long, exceeding the apex of the anthers

FIGURE 1. *Gomphrena caxcana*, A. general view in habit, B. complete plant.

Description:—Herbs perennial; fleshy taproot up to 12 cm long and 2 cm thick; stems ascending to geniculate or procumbent, 7–30(–45) cm long, branched, reddish, usually forming adventitious roots at the base and the prostrate portion of the stems, which may extend like short rhizomes on flooded soils, pilose, trichomes 1.0–1.5 mm long, appressed, uniseriate, multicellular. **Leaves** opposite, arranged along the stem, proximal leaves petiolate, distal leaves sessile to subsessile, petiole 3.0–10 mm long, leaf blades oblanceolate, oblong-elliptic to ovate-elliptic, 1.0–3.6 × 0.4–1.2 cm, base long decurrent, margin entire, apex mucronate, adaxial surface glabrous or with some isolated trichomes, abaxial surface sparsely pilose especially on the midvein, trichomes similar to those on stems. **Inflorescences** globose to shortly spiciform, terminal, solitary or in groups of up to 3, 6.0–9.0 × 6.0–12 mm, white to pinkish, supported by 2 involucral leaves longer than the inflorescence, 10–12(–15) × 4.0–7.0 mm. **Flowers** hermaphrodite, bract 1 broadly ovate, membranous, hyaline and glabrous, reaching more or less half the length of the bractlets, 1.8–2.3 × 11.2 mm, middle vein evident, apex acute; bractlets 2, crested, cymbiform, lanceolate, membranous, glabrous, reddish to magenta, same or slightly longer than the tepals, 3.0–4.0 × 1.5–2.0 mm wide, the crest prolonged from the apex to above the middle, 0.3–0.5 mm wide, irregularly toothed; tepals 5, unequal, the 2 external cymbiform, 3.0–4.0 × 0.5–

0.7 mm, 3 oblong-lanceolate, $3.0\text{--}3.5(-4.0) \times 0.5\text{--}0.7$ mm, slightly sclerotic at base and membranous towards margin and apex, margin entire, 1-veined, lanate over the midvein, the 3 internal oblong-lanceolate, $3.0\text{--}3.5(-4.0) \times 0.5\text{--}0.7$ mm, membranous, sparsely pilose near the base; trichomes white, undulated and simple; **androecium** with filaments fused into a staminal tube $3.0\text{--}3.5$ mm long, with a pair of apical lobes shorter and alternating with the anthers; anthers ca. 0.7 mm long; **gynoecium** with subglobose ovary, ca. 1.0 mm diameter; style ca. 1.0 mm long; stigma formed by two filiform branches $0.5\text{--}1.0$ mm long. **Fruit** a subglobose translucent utricle $1.0\text{--}1.5$ mm diameter. **Seed** 1, oblong, ca. 1.0 mm diameter, testa shiny, reddish brown.

Etymology:—The new species is named after the Caxcanes, an indigenous group who inhabited the southern region of Zacatecas and surrounding areas of Jalisco (Mexico), during the pre-Hispanic era. They were part of the people known as Chichimecas by the Mexico.

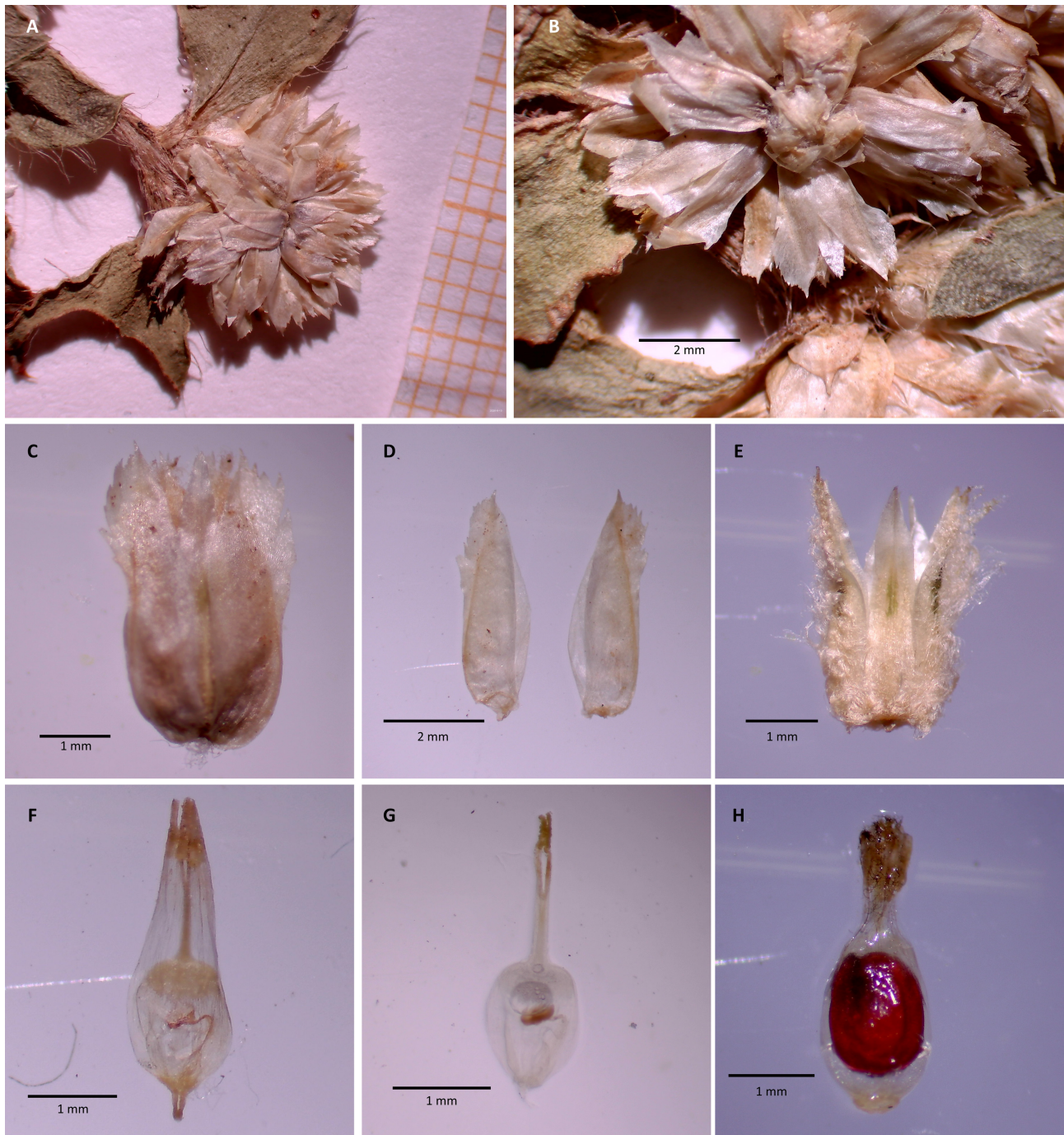


FIGURE 2. *Gomphrena caxcana*. **A.** Inflorescence, **B.** Inflorescence detail, **C.** Flower enclosed by bractlets, **D.** Bractlets, **E.** Perianth, **F.** staminal tube surrounding the gynoecium, **G.** gynoecium, **H.** staminal tube surrounding the utricle with seed.

Distribution and habitat:—*Gomphrena caxcana* grows on plains with gentle slopes with reddish clayey soil (i.e. luvisol). It is a rare element in the oak forest secondary vegetation or in natural grasslands. It is also often found in shallow, rain-fed wetlands and on the banks of crops, roads and in urban areas, where it is more common. Distributed in the Sierra Madre Occidental biogeographic province, in the states of Jalisco and Zacatecas (Fig. 3), at 1800–2000 m a.s.l.

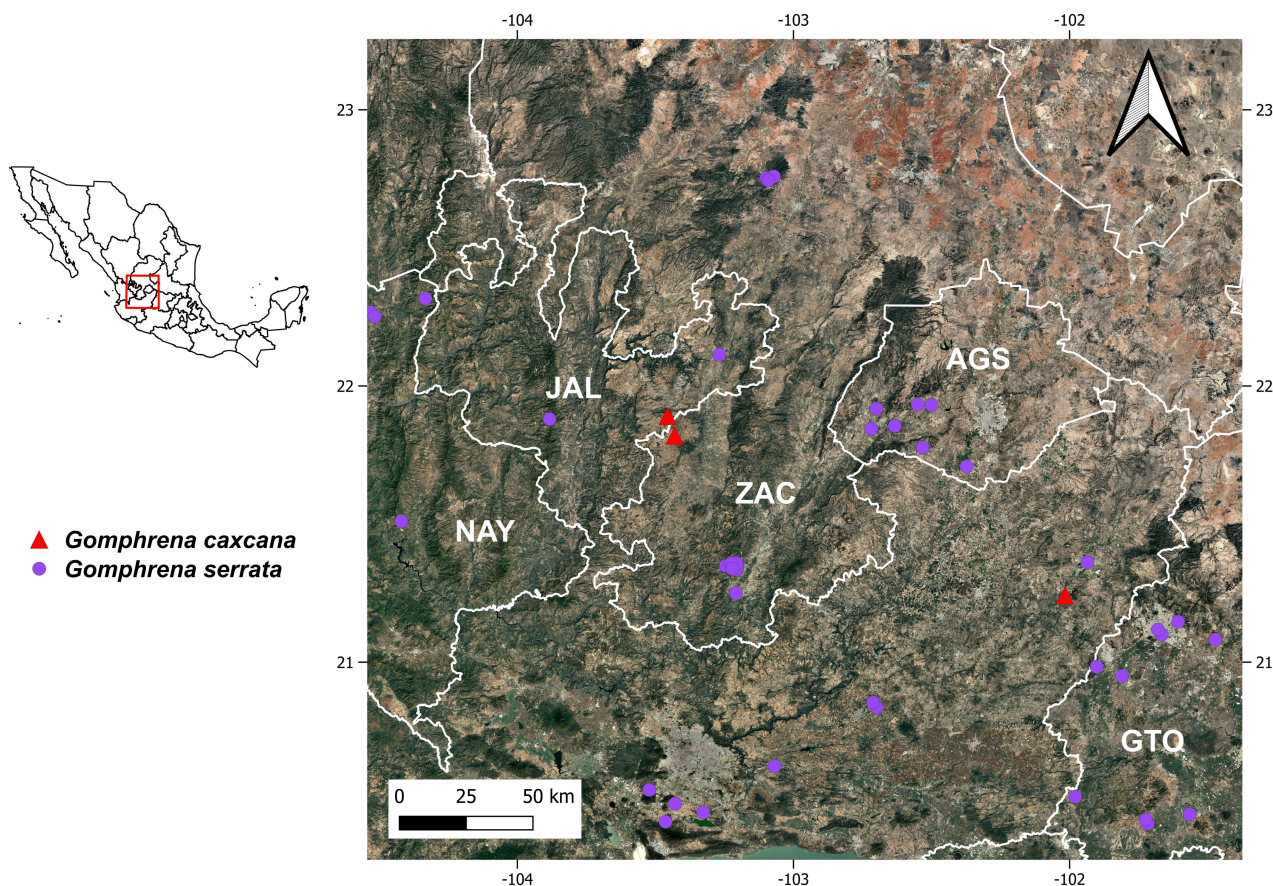


FIGURE 3. Distribution of *Gomphrena caxcana* and *G. serrata*. States: AGS= Aguascalientes, GTO= Guanajuato, JAL= Jalisco, NAY= Nayarit, ZAC= Zacatecas.

Phenology:—Flowering and fruiting times from July to October.

Conservation status:—*Gomphrena caxcana* is known only for *locus classicus* (south-western of Zacatecas) plus two other sites in the State of Jalisco. However, it is possible that this species has a wider distribution, since it was collected also in disturbance areas like roadsides and crop fields. So, we think that more extensive field surveys need to assess its conservation status. Therefore, following the guidelines of the IUCN criteria (IUCN 2025), *G. caxcana* is here assessed as Data Deficient (DD).

Notes:—At first glance, specimens of *Gomphrena caxcana* look like *G. serrata*. However, after consulting the protologue *G. serrata* (Linnaeus 1753: 224), the neotype designated by Mears (1980: 86–87, i.e. the specimen BM000522330!), as well as material deposited in MEXU and USON matching the current concept of *G. serrata* (see e.g. Clemants 2003, Zumaya-Mendoza & Sánchez-del Pino 2015), we confirmed that the material here referred to the new species does not correspond to any previously described species of *Gomphrena* from Mexico.

Additional examined material (paratypes):—**MEXICO. Zacatecas:** municipio Atolinga, Cerrito Pelón, 21°48'50"N 103°25'18"W, bosque de *Quercus*, 2079 m, 17 October 2002, *Balleza* 14497 (UAZ12185). **Jalisco:** municipio Totatiche, 4.5 km en línea recta al S de Totatiche sobre la carretera que va de Atolinga a Colotlán, 21°53'30.2"N 103°27'19.3"W, vegetación ruderal, 2059 m, 17 August 2025, *Rodríguez-Pérez* 9962 (USON33718); municipio Lagos de Moreno, Aproximadamente 2 km al Sur de Churintzio, 21°14'31.6"N 102°0'58.7"W, vegetación acuática (humedal de temporal), 1850 m, 22 August 2025, *Rodríguez-Pérez* 9964 (USON33749); Aproximadamente 2 km al Sur de Churintzio, 21°14'32.1"N 102°0'59.3"W, vegetación acuática (humedal de temporal), 1850 m, 22 August 2025, *Rodríguez-Pérez* 9965 (USON33748).

Gomphrena serrata Linnaeus (1753: 224) \equiv *Xeraea serrata* (L.) Kuntze (1891: 545).

Neotype (designated by Mears 1980: 86–87):—**MEXICO**. Vera Cruz, 1731, *Houstoun s.n.*, (BM000522330!, image available at: <https://data.nhm.ac.uk/record/ec9ffe8-f7f4-4dcd-9471-641c4922d956/20929>).

= *Gomphrena decumbens* Jacquin (1804: 41–42) \equiv *Xeraea decumbens* (L.) Kuntze (1891: 545).

Lectotype (here designated):—[Icon] Tab. 482 in *Plantarum rariorum horti caesarei Schoenbrunnensis descriptiones et icones* (Jacquin 1804: T. 482, available at: <https://www.biodiversitylibrary.org/page/273005>).

Typification of the name *Gomphrena decumbens*:—The protologue of *Gomphrena decumbens* (Jacquin 1804: 41–42) consists of a diagnosis (“*Gomphrena caulibus decumbentibus, hirsutis; foliis ovatis; capitulis subovatis, sessilibus*”), a detailed morphological description, and an illustration (T. 482), which can be considered as part of the original material for the name. However, the origin of the specimens consulted is unknown [Jacquin (1804) reported “*Patriam ignoro*”], and no information about the collector or the number of collection was provided. Jacquin’s herbarium and type are preserved at AWH, B, BM, CGE, H, JE, LINN, LIV, OXF, and UPS (see HUH-Index of Botanists 2013), but no specimen which can be considered as part of the original material for *G. decumbens* was traced. Fortunately, there is the illustration No. 482 which is very good including a colored plant with magnifications of androecium, gynoecium, fruit, and one seed. This drawing is here designated as the lectotype of *G. decumbens* according to the Arts. 9.3 and 9.4 of ICN.

To be noted that many infraspecific names were published in the past under *Gomphrena decumbens*. As far as we have been able to check, none of these names appears to refer to what we consider here as *G. caxcana*. Anyway, we argue for a revision of the taxonomy and nomenclature of *G. decumbens*.

ACKNOWLEDGEMENTS

To Raúl López García for allowing us to consult the herbarium UAZ. To Mónica Lizeth Díaz Teniente, Mara Ximena Haro Luna for their company during the field work.

REFERENCES

- Brown, R. (1810) *Prodromus Florae Novae Hollandiae*. Richardi Taylor et Socii, Londini, 590 pp.
<https://doi.org/10.5962/bhl.title.3678>
- BR herbarium (2025) *Meise Botanic Garden Virtual Collection*. Available from: www.botanicalcollections.be (accessed 28 August 2025).
- Clemants, S.E. (2003) *Gomphrena* L. In: Flora of North America Editorial Committee (eds.) *Flora of North America North of Mexico*, vol. 4. Oxford University Press, Oxford, pp. 451–454.
- Coulter, J.M. & Fisher, E.M. (1892) Some New North American Plants I. *The Botanical Gazette* 17: 348–352.
- GBIF.org (2025) *GBIF Occurrence Download*. Available from: <https://doi.org/10.15468/dl.y3b6du> (accessed 25 August 2025)
- <https://doi.org/10.15468/dl.y3b6du>
- Hooker, W.J. (1840) *Icones Plantarum*, vol. III. Longman, Orme, Brown, Green, & Longman, London, 91 pp.
- HUH-Index of Botanists (2013) *Harvard University Herbaria & Libraries, Index of Botanist*. Available from: https://kiki.huh.harvard.edu/databases/botanist_index.html (accessed 25 August 2025)
- Iamónico, D. (2012) Proposal to reject the name *Gomphrena polygonoides* (Amaranthaceae). *Taxon* 61 (6): 1326–1327.
- Iamónico, D. & Sánchez Del Pino, I. (2014) Lectotypification of the Linnaean name *Gomphrena vermicularis* L. (Amaranthaceae). *Taxon* 63 (2): 403–404.
<https://doi.org/10.12705/632.4>
- IUCN (2025) *Guidelines for using the International Union for Conservation of Nature Red List categories and criteria*, Version 15.1, Prepared by the Standards and Petitions Subcommittee of the IUCN Species Survival Commission. Available from: <https://www.iucnredlist.org/resources/redlistguidelines> (accessed 19 January 2025)
- Jacquin, N. (1804) *Plantarum rariorum horti caesarei Schoenbrunnensis descriptiones et icons*, vol. IV. C. F. Wappler, Viennae, 56 pp.
<https://doi.org/10.5962/bhl.title.332>
- JACQ consortium (2004) *Virtual Herbaria Website*. Available from: <https://www.jacq.org/> (accessed 20 August 2025)
- K herbarium (2025) *The Herbarium Catalogue, Royal Botanic Gardens, Kew*. Available from: <http://www.kew.org/hercat> (accessed 20

August 2025)

- Klotzsch, J.F. (1853) *Gomphrena Haageana* n.sp. *Allgemeine Gartenzeitung* 21 (38): 297–298.
- Kuntze, O. (1891) *Revisio Generum Plantarum*, vol. 2. A. Felix, Leipzig, 1011 pp.
<https://doi.org/10.5962/bhl.title.327>
- Linnaeus, C. (1753) *Species plantarum*, vol. 1. Salvius, Stockholm, 560 pp.
- Mears, J.A. (1980) The Linnean species of *Gomphrena* L. (Amaranthaceae). *Taxon* 29 (1): 85–95.
<https://doi.org/10.2307/1219601>
- MNHN (2025) *The vascular plants collection (P) at the Herbarium of the Muséum national d'Histoire Naturelle (MNHN - Paris)*. Version 69.422. MNHN - Muséum national d'Histoire naturelle.
<https://doi.org/10.15468/nc6rxy>
- Ortuño-Limarino, T. & Borsch, T. (2020) *Gomphrena* (Amaranthaceae, Gomphrenoideae) diversified as a C4 lineage in the New World tropics with specializations in floral and inflorescence morphology, and an escape to Australia. *Willdenowia* 50 (3): 345–381.
<https://doi.org/10.3372/wi.50.50301>
- Ortuño Limarino, T., Gutiérrez-Romero, J., Montesinos-Tubée, D.B. & Lozada-Gobilard, S. (2025) Two New Species of *Gomphrena* (Amaranthaceae) from Bolivia. *International Journal of Plant Biology* 16 (2): 51.
<https://doi.org/10.3390/ijpb16020051>
- POWO (2025) *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available from: <http://www.plantsoftheworldonline.org/> (accessed 25 September 2025)
- QGIS.org (2024) *QGIS Geographic Information System. Open Source Geospatial Foundation Project*. Available from: <http://qgis.org> (accessed 18 January 2025)
- Sandoval-Ortega, M.H. & Zumaya-Mendoza, S. (2023a) Types of some Mexican names in Amaranthaceae s.l. (Caryophyllales). *Phytotaxa* 597 (1): 8–14.
<https://doi.org/10.11646/phytotaxa.597.1.2>
- Sandoval-Ortega, M.H. & Zumaya-Mendoza, S. (2023b) Identities of some names in *Gomphrena* (Amaranthaceae). *Phytotaxa* 626 (2): 78–92.
<https://doi.org/10.11646/phytotaxa.626.2.1>
- Standley, P.C. (1917) Amaranthaceae. In: Britton, Murrill & Barnhart (eds.) *North American Flora*, vol. 21 (2). The New York Botanical Garden, New York, pp. 95–169.
- Stevens, P.F. (2001 onwards) *Angiosperm Phylogeny Website*, Version 14. Available from: <http://www.mobot.org/MOBOT/research/> (accessed 18 January 2025)
- Swartz, O. (1788) *Nova genera & species plantarum, seu, Prodromus descriptionum vegetabilium : maximam partem incognitorum quae sub itinere in Indiam Occidentalem annis 1783–87*. Bibliopoliis Acad. M. Swederi, Holmiae, 158 pp.
<https://doi.org/10.5962/bhl.title.433>
- Thiers, B. (2025 [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 25 September 2025)
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Gandhi, K.N., Gravendyck, J., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Klopfer, R.R., Knapp, S., Kusber, W.-H., Li, D.-Z., May, T.W., Monro, A.M., Prado, J., Price, M.J., Smith, G.F. & Zamora Señoret, J.C. (2025) *International Code of Nomenclature for algae, fungi, and plants (Madrid Code)*. *Regnum Vegetabile* 162. Chicago: University of Chicago Press.
<https://doi.org/10.7208/chicago/9780226839479.001.0001>
- 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>
- Zumaya-Mendoza, S. & Sánchez-del Pino, I. (2015) Amaranthaceae. In: Medina-Lemos (ed.) *Flora del Valle de Tehuacán-Cuicatlán*, Fasc. 133. Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, pp. 1–63.
- Zumaya-Mendoza, S. & Sandoval-Ortega, M.H. (2025) An overlooked new species of *Gomphrena* (Amaranthaceae) endemic to Mexico. *Phytotaxa* 687 (1): 9–14.
<https://doi.org/10.11646/phytotaxa.687.1.2>