



<https://doi.org/10.11646/phytotaxa.331.1.8>

Nomenclature of *Caroxylon imbricatum* s.lat. (Amaranthaceae / Chenopodiaceae), with a new combination at variety rank

ATIYE NEJAD FALATOURY¹, DUILIO IAMONICO^{2*} & HELMUT FREITAG³

¹Iranian Research Institute of Plant Protection, Agricultural Research, Education and Extension Organization (AREEO), 19858-13111, Tehran, Iran

²Section Environment and Landscape, Department PDTA, University of Rome Sapienza, 00196 Rome, Italy;
e-mail: d.iamonico@yahoo.it

³Institute of Biology, University of Kassel, D-34132 Kassel, Germany

*author for correspondence

Abstract

A nomenclatural study of the names linked to the critical *Caroxylon imbricatum* is presented. The names *Chenopodium baryosmon*, *Salsola foetida* var. *gaetula*, *S. foetida* var. *glabrescens*, *S. foetida* var. *hirtipetala*, *S. foetida* var. *scopiformis*, and *S. imbricata* were studied. *Salsola foetida* Delile ex Sprengel is lectotypified on a specimen preserved at MPU, while for *Chenopodium baryosmon* we clarified the statement by Botschantzev (lectotype at BM). Isolectotypes of *C. baryosmon* are deposited at BM, BR, E, G, K, M, and LE. *Salsola foetida* Delile ex Moquin-Tandon is an illegitimate name and a homotypic synonym of *C. baryosmon* (Art. 52.2 of the ICN). A taxonomic treatment of the *C. imbricatum* group is proposed, with two species recognised: *C. imbricatum* s.lat. (incl. var. *imbricatum* and var. *hirtipetalum* comb. nov.) and *C. gaetulum*.

Keywords: nomenclatural change, typification, *Salsola*

Introduction

Caroxylon imbricatum (Forsskål 1775: 57) Moquin-Tandon (1849: 177) is the name usually applied to a common subshrub or small desert shrub species distributed throughout the Saharo-Sindian floristic region from Senegal to NW-India and from S-Iran to Yemen and Somalia (Botschantzev 1975, Freitag & Rilke 1997). Its correct name, delimitation with related species, and subdivision were stepwise settled more recently (see Boulos 1991), though by using the basionym *Salsola imbricata* Forssk. It is listed under that name in many recent checklists and floristic accounts, such as *Flora Iranica* (Freitag & Rilke 1997), *Flora of Egypt* (Boulos 1999), *Flora of Saudi Arabia* (Chaudhary 1999), *Flora of Pakistan* (Freitag 2001), *Flore de Tunisie* (Boulos in Le Floc'h & al. 2010), *Euro+Med PlantBase* (Uotila 2011), and *The Plant List* (2013). Confusingly, in the reclassification of Salsoleae by Akhani & Roalson (2007) the name appeared in two variants: (1) as the supposedly new combination *Caroxylon imbricatum* (Forssk.) Akhani & Roalson (2007: 947) and (2) in the list of “Other species” as “*Caroxylon imbricatum* Moq.” (Akhani & Roalson 2007: 948). Tropicos (2017) even lists *S. imbricata* Forssk., *C. imbricatum* (Forssk.) Moq. and *C. imbricatum* (Forssk.) Akhani & Roalson side by side. Botanists are confronted with the fact that in many herbaria the respective specimens are filed under the synonymous names *S. foetida* Delile (1813: 57) or *S. baryosma* (Schultes 1820: 269) Dandy (in Andrew 1950: 111). Both names also were used in some more recent floras, e.g. *S. foetida* for N-Africa (Maire 1962, Quezel & Santa 1962) and *S. baryosma* for Egypt (Taekholm 1974), Palestine (Zohary 1966), Libya (Jafri & Rateeb 1978), and Morocco (Fennane & Ibn Tattou 2005). The latter name was recombined as *Nitrosalsola baryosma* (Roem. & Schult.) Theodorova (2015: 443). Though Wikispecies (2017) already contains an abbreviated revision of the names related to *C. imbricatum*, for the sake of clarity we also checked them and re-evaluated their types which in some cases proved to be not designated yet, or sometimes designated incorrectly. In addition, we also checked the relevant infraspecific names.

Material and methods

The present study was carried out through extensive analysis of literature, and the examination of specimens kept in the Herbaria B, BAS, HAL, IRAN, M, MPU, K, P, and Z (herbaria acronyms follow Thiers 2017+). The ICN articles cited through the text follow the *Melbourne Code* (McNeill *et al.* 2012).

Results and discussion

Salsola imbricata

Salsola imbricata was described by Forsskål (1775) from Lohajae [Al Luhayyah] in Yemen, but as the description was somewhat vague and no original material could be detected in Forsskål's Arabian collections (see e.g., Hepper & Friis 1994: 107) for a long time, the name of the species was not generally accepted and the respective plants, except for those from Arabia, were mostly named either *S. foetida* or *S. baryosma*, both described from Egypt (see below). Botschantzev (1975: 166) typified *S. imbricata* by the illustration Tab. VIIIc in Forsskål's (in fact, Niebuhr's) *Icones rerum naturalium* (1776). Beside of *S. imbricata*, for a larger part of Arabia he also recognized *S. baryosma* that was said to differ by its curved hairs of the indumentum, slightly smaller tepals and style, as well as by less deeply split anthers. Botschantzev's viewpoint was overtaken by Chaudhary & Akram (1986). Freitag (1989: 159) indicated that the respective illustration named *S. imbricata* and chosen by Botschantzev as the "iconotypus" in fact shows *S. longifolia* Forssk., and Hepper & Friis (1994) gave evidence that Forsskål had never seen the illustration. Freitag (l.c.) suggested to reject the name and to replace it by *S. baryosma* which, according to his experience, cannot be reliably separated as a species distinct from *S. imbricata*. All later authors agreed on a wider circumscription of the species, but Boulos (1991: 138) returned to the name *S. imbricata* by designating a neotype in K collected at Hodeida at the Red Sea coast of Yemen, about 100 km NNW of Forsskål's locality.

Moquin-Tandon, while at first maintaining the name *S. imbricata* (1840: 142), recombined it later (1849: 177) as *Caroxylon imbricatum*, but subsequent authors from Fenzl (1851) to Iljin (1936) and Ulbrich (1936) reduced the genus *Caroxylon* Thunberg (1782: 37) to a section of *Salsola* until Tzvelev (1993) revived it based on morphological evidence. The genus rank of *Caroxylon* was definitely confirmed by molecular phylogenetic data of Akhani *et al.* (2007). Unfortunately, both authorships of *C. imbricatum* given in their publication are erroneous. "*Caroxylon imbricatum* Moq." cannot be retained as a new species because it is evident that Moquin-Tandon (1849: 177) just proposed a nomenclatural combination based on Forsskål's name *Salsola imbricata*, which Moquin-Tandon mentioned in synonymy. Consequently, "*Caroxylon imbricatum* Moq." as cited in Akhani *et al.* (2007) is just an incorrect (incomplete) citation of the authorship of the name, and their new combination (cited with the authorship "(Forssk.) Akhani et Roalson") should be regarded as a later isonym (Art. 6.3 Note 2 of the ICN).

Salsola foetida by Sprengel

The name *Salsola foetida* was introduced by Delile (1813: 57) as species no. 310, together with the vernacular Arabic name "mulleyh" and the provenance "Aeg. Sup. [Upper Egypt]". However, since neither a diagnosis nor a description was given, Delile's "*S. foetida*" is *nomen nudum* and was thus not validly published (Art. 38.2 of the ICN, Ex. 1). One specimen, which is kept at MPU (code 310725, see Fig. 1) and which carries a pertinent description and other data in Delile's hand ["*Odor Chenopodium vulvaria fortissime, / folia carnosa sessilia cordata imbricata / plantae juvenis folia interdum angustata / [unreadable] (Mullah arab.) dans les ravins en allant aux tombeaux / des rois = "in ravines leading to the tombs of kings" [Theben]*"], should be part of the original material used by Delile (l.c.) to propose his *S. foetida*.

"*Salsola foetida* Delile" was later validated by Sprengel (1824: 925) through a short diagnosis ("*S. [Salsola] foliis teretibus abbreviatis acutiusculis incanis, floribus spicatis, caule fruticoso. Aegypti*"). However, Sprengel's name is a later homonym of *S. foetida* Vest ex Schultes (1820: 238) and as a consequence it is illegitimate under Art. 53.1 of the ICN.

As to the typification of *Salsola foetida*, Boulos (1991: 139) cited a possible holotype kept in MPU but he added a question mark because he did not see it. However, it is most unlikely that Sprengel was familiar with the specimen from MPU mentioned above because otherwise he would probably have used Delile's description. He eventually had seen a duplicate of Delile's collection that probably was kept in B but destroyed during World War II. This MPU specimen bears a label which is written in parts by Delile as "Gebel Ghareb près la mer rouge / Apporté du Ghebel

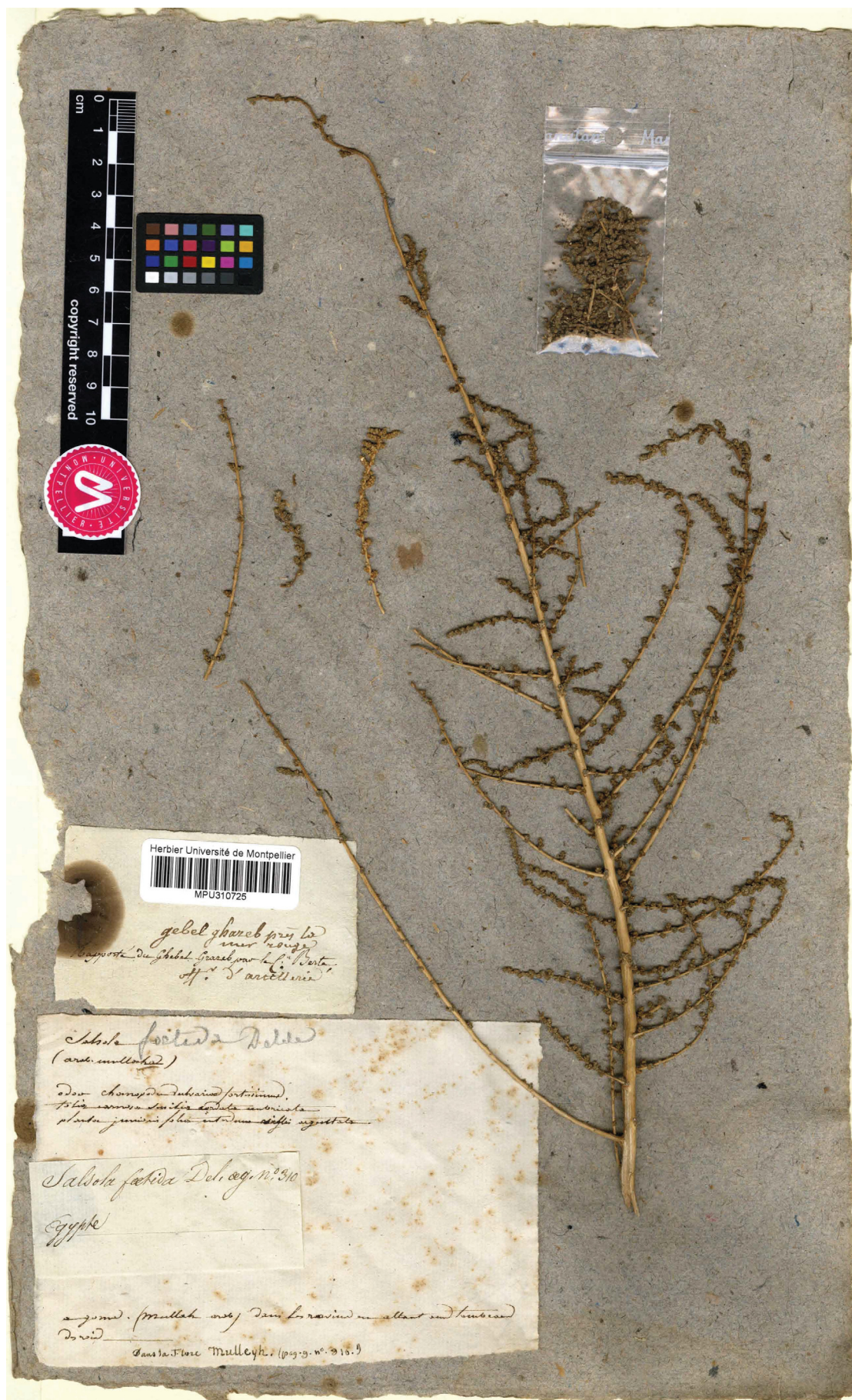


FIGURE 1. Lectotype of *Salsola foetida* (by courtesy of the University herbarium Montpellier, MPU).

Ghareb par le Cⁿ [Commandant] Berte / Off^r d'artillerie"¹ ("Ghebel Ghareb [now Jebel Gharib] near the Red Sea / brought from Ghebel Ghareb by Commander Berte / Artillery Officer") and it is here designated as the lectotype of the name *Salsola foetida* Del. ex Spreng.

We found two further specimens in Delile's collection at P (barcodes P00799063 and P00799064), but none of them bears notes in Delile's hand. Both these specimens were seen by Moquin-Tandon, who listed them under *Caroxylon foetidum* (Schult. 1820: 269) Moquin-Tandon (1849: 178). The specimen P00799063 is remarkable by a ticket that contains the draft of a description and a series of nice pencil drawings in Moquin-Tandon's hand. We consider these two specimens as duplicates of the MPU one and so isolectotypes of *Salsola foetida* Del. ex Spreng.

***Salsola baryosma* and *Salsola foetida* by Moquin-Tandon**

The basionym of *Salsola baryosma* is *Chenopodium baryosmon* Schultes (1820: 269) that was validated with a short diagnosis and a detailed description. The citation "*SALSOLA foetida* Delisle [= Delile, obviously an orthographic error] *Descript. de l'Egypte n. 310*" refers to the name invalidly published by Delile (see discussion above). Provenance and collector were also given as "*In Aegypto superiore; Tentyrae* [Dendera] *Sieber*". As Delile (1813: 57) did not validly publish the name *Salsola foetida* (see above), Schultes' name *Chenopodium baryosmon* can be interpreted as a new species, and at the same time as validation of Delile's species (published as *Salsola foetida*, *nom. inval.*) with the new name.

Chenopodium baryosmon was recombined as *Salsola baryosma* by Dandy in Andrew (1950: 111) and since then used in several regional floras (see Introduction above). Recently Theodorova (2015: 443) transferred the species to the genus *Nitrosalsola* Tzvelev (1993: 80) but the renaming does not appear to be sufficiently justified from a phylogenetic viewpoint and is not yet generally accepted.

Botschantzev (1975: 168) cited two specimens preserved at BM and LE as, respectively, the "type" and isotype. That view was overtaken by Freitag (1989) and Boulos (1991), and the first author added two further isotypes kept in E and K. However, though no holotype has been explicitly indicated by Schultes (1820: 269), they mentioned just one specimen in the protologue that he studied in his own herbarium ("Specimen nostrum ex *Herb. Sieberiano*..."). Schultes worked in the former small Bavarian university of Landshut, whose herbarium was later, at least to a bigger part, transferred to the Munich herbarium that today keeps many Schultes types (pers. comm. by H.-J. Esser). Consequently we started the search for the putative holotype in M, and indeed there a specimen was traced "ex herbario Musei bot. Landshuth" (M0243779, see Fig. 2) that fits in all details, in particular in size and length of branches, in Schultes' protologue. It was tempting to approve it as holotype, but unfortunately the specimen lacks any annotation of Schultes and the labels are not written by Schultes himself. Therefore we can not exclude the possibility that the Munich specimen is a post-1820 accession to the former Landshut herbarium. We also asked the curators of other herbaria that might have original Schultes specimen (B, BAS, HAL, Z) but they did not detect any. In this situation we think that it is better to follow Botschantzev (1975) whose choice of a BM specimen from among many other duplicates of the respective Sieber collection can be considered as effective lectotypification, even if the specimen is not the best suited one. However, two specifications appear to be needed: (1) The "type" is understood as the lectotype, not holotype as it could be interpreted from the original context. (2) From the two Sieber specimens in the BM identified as *Salsola baryosma* by Botschantzev, barcodes BM000910454 and BM000793154 (left-hand plant) the first one, with Botschantzev's label "Typus", is the lectotype. Corresponding isolectotypes are kept in BR (from herb. Martius), E, G (from herb. Moricand), K, LE, and M.

Moquin-Tandon (1840: 143) accepted Delile's "*Salsola foetida*", and provided a description [corrected citation should be *Salsola foetida* Delile ex Moq. \equiv *Caroxylon foetidum* Moquin-Tandon (1849: 178)]. However, Moquin-Tandon (1840) did not mention the earlier validation of the name by Sprengel (1824) and, moreover, made his *S. foetida* superfluous and illegitimate under Art. 52.2 since the valid name *Chenopodium baryosmon* was cited in synonymy.

Salsola imbricata* var. *hirtitepala

This variety described by Freitag (2001: 160) from Pakistan (southern Baluchistan) differs in having long spinulose hairs covering the tepal back, and distinctly unequal wings. No combination under *Caroxylon* was available for this variety; here we transfer it to *Caroxylon*. Freitag (l.c.) already stated that his taxon might deserve species rank. However, further studies including sequence data are needed to verify the correct rank of this taxon.

¹ Probably these two locations could be explained in a way that Delile collected himself at the first place, and the officer brought him material of the same species from the second location.

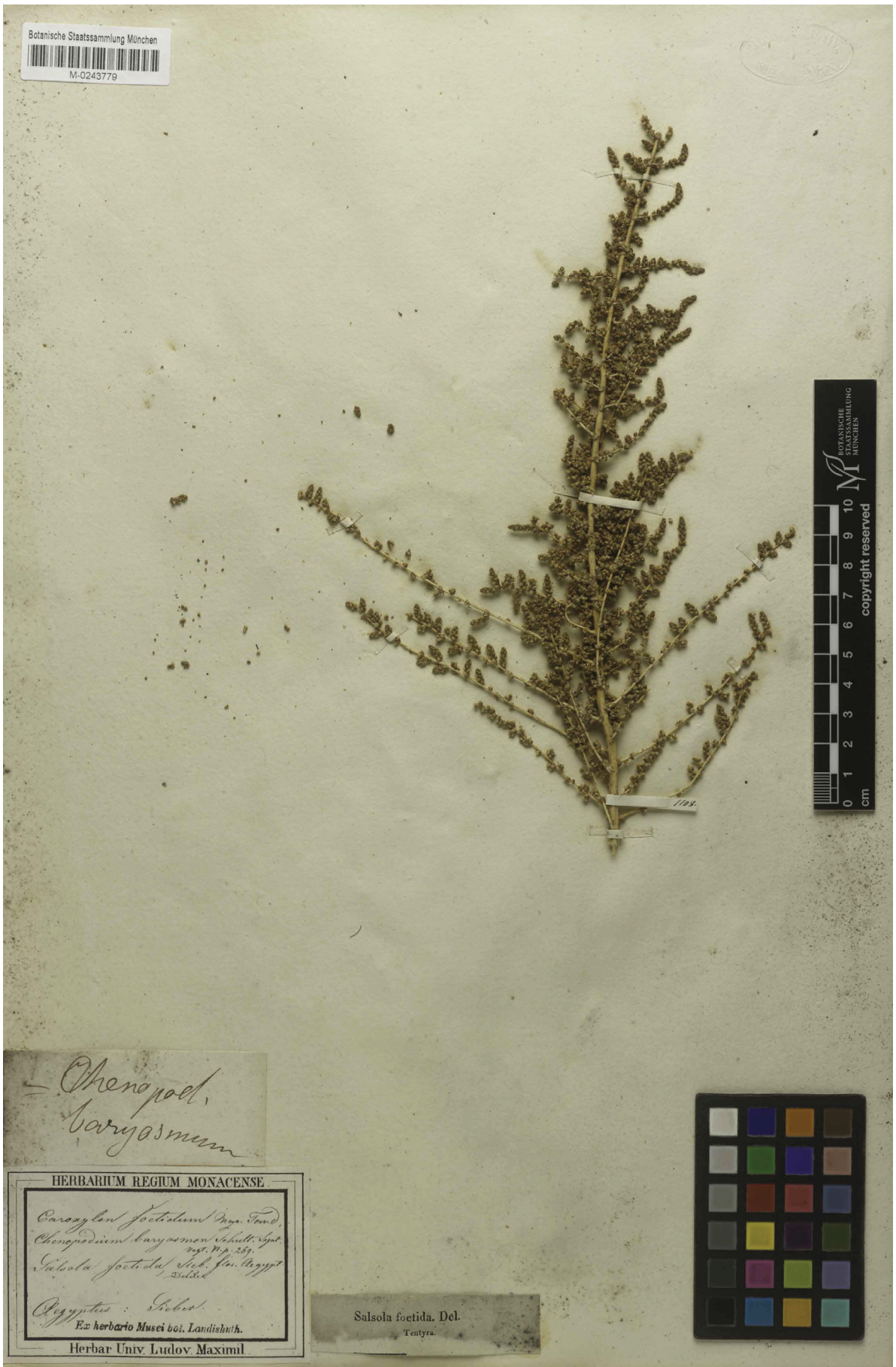


FIGURE 2. Isolectotype of *Chenopodium baryosmon* (\equiv *Salsola baryosma*), eventually the only actual specimen of the species seen by Schultes (by courtesy of the Bayerische Staatssammlungen München, M).

Salsola foetida var. *glabrescens*

Maire (1938: 446) proposed var. *glabrescens* from the Atlantic coast of the Southwestern Sahara. Botschantzev (1975: 167) listed it under *Salsola baryosma*; in SANBI (2012) it is mentioned under *Caroxylon imbricatum*. It might represent a distinct geographical race, but as no original material has become available, any decision about its rank and status must be left to later studies.

Salsola foetida var. *scopiformis*

This variety was originally described by Maire (1938: 446) from the Southwestern Sahara as a variety of *Salsola vermiculata* Linnaeus (1753: 223). Later Maire (1962: 158) transferred this taxon to *S. foetida*. SANBI (2012) also listed it under *Caroxylon imbricatum*. We have not succeeded in detecting any original material, but according to the protologue it comes closer to *S. vermiculata* or to *S. flavescens* Cavanilles (1796: 45), a questionable segregate of *S. vermiculata*. Further studies are required.

Salsola foetida var. *gaetula*

Maire (1933: 227) initially proposed “*Salsola gaetula*” for a species from Sub-Saharan (N-Africa). However, in that publication he explicitly marked *S. gaetula* as a provisional name [“ad interium”], and thus it was not validly published under Art. 36.1 of the ICN. However, later Maire (1936: 257) accepted that taxon as a variety (*Salsola foetida* var. *gaetula* Maire), and cited his earlier description effectively published in 1933, thus validating the variety name (Art. 38.1 of the ICN). Further nomenclatural combinations, such as *Salsola gaetula* (Maire) Botschantzev (1975: 254), *Salsola imbricata* subsp. *gaetula* (Maire) Boulos (1995: 24), *Caroxylon gaetulum* (Maire) Akhani & Roalson (in Akhani *et al.* 2007: 947), and *Nitrosalsola gaetula* (Maire) Theodorova (2015: 443), were based on the variety name validated by Maire in 1936 (but not on the invalid provisional species name initially proposed by Maire). It should be noted that Theodorova (2015), when proposing her new combination *Nitrosalsola gaetula*, correctly provided the main basionym information (title of the periodical, volume, page) but erroneously cited it as published in 1933; this error, however, does not make her combination invalid (Art. 41.6 of the ICN).

The species differs from *C. imbricatum* by its smaller stature, whitish indumentum, densely hairy tepals, and by its geographic range.

Regarding the type, there was some disagreement if the only collection from W-Morocco cited in Maire’s first publication should be considered as the holotype kept in MPU (Freitag 1989, Boulos 1991) or as a lectotype (Botschantzev 1978). Aside from one specimen preserved in LE, there are sheets at MPU and P (one sheet per herbarium). The original cardboards of these sheets, which later were mounted on new sheets, clearly show that they fit together as the lower (MPU) and the upper part (P) of one original sheet. Therefore, both are suited to serve as a lectotype. However, since MPU houses the overwhelming majority of Maire’s types, and as most likely the cut happened after Maire’s publication, we follow the designation by Botschantzev (1978) and consider the MPU specimen as the lectotype and the specimens at LE and P as isolectotypes.

Taxonomic treatment

Caroxylon imbricatum (Forssk.) Moquin-Tandon (1849: 177) var. *imbricatum* ≡ *Salsola imbricata* Forsskål (1775: 57).

Type (neotype, designated by Boulos 1991: 138):—YEMEN. Hodeidah, 09 September 1976, *Wood 1184* (K barcode K000899547! isolectotypes E barcode E00296913!, BM barcode BM000950594; the image of the neotype is available at <http://www.kew.org/herbcatimg/506618.jpg>).

= *Chenopodium baryosmon* Schultes (1820: 269) ≡ *Salsola baryosma* (Schult.) Dandy (in Andrew 1950: 111) ≡ *Nitrosalsola baryosma* (Schult.) Theodorova (2015: 443)

Type [lectotype, designated by Botschantzev (1975: 168) and specified here]:—EGYPT. Tentyra, *Sieber s.d., s.n.*, (BM barcode BM000793154, left-hand plant!) [Fig. 2], isolectotypes M barcode M0243779!, BM barcodes BM000793154!, BR barcode BR0000006967536, E!, G barcode G00441369!, K barcode K000899546!, LE, most of them available via JSTOR Global Plants).

= *Salsola foetida* Delile ex Sprengel (1824: 925), *nom. illeg.* (Art. 53.1 of the ICN), non Vest ex Schultes (1820: 238) ≡ *Salsola foetida* Delile ex Moquin-Tandon (1840: 143), *nom. illeg.* (Art. 52.2 of the ICN), non Vest ex Schultes (1820: 238) (Art. 53.1 of ICN) ≡ *Caroxylon foetidum* Moquin-Tandon (1849 : 178), *nom. illeg.*

Type (lectotype, designated here):—EGYPTE. [Theben] dans les ravins en allant aux tombeaux des rois, *s.d., Delile 310* (MPU barcode MPU310725 [Fig. 1]).

- *Salsola foetida* in Delile (1813: 57), *nom. inval.*, *nom. nud.* (Art. 38.2 of the ICN).
 – *Caroxylon imbricatum* in Akhani & Roalson (2007: 947), isonym (Ar. 6.3 Noe 2 of ICN)

Caroxylon imbricatum (Forssk.) Moquin-Tandon (1849: 177) var. ***hirtitepalum*** (Freitag) Falatoury, Freitag & Iamónico, *comb. nov.* ≡ *Salsola imbricata* Forssk. var. *hirtitepala* Freitag (2001: 160).

Type:—PAKISTAN. prov. Baluchistan, distr. Makran G-3 29 km W Ormara, road to Pasni, 50 m, Freitag & Kothe 18445 (holotype KAS!, isotypes KUH!, GOET!, W!).

Caroxylon gaetulum (Maire) Akhani & Roalson (2007: 947) ≡ *Salsola foetida* var. *gaetula* Maire (1936: 257) ≡ *Salsola gaetula* (Maire) Botschantzev (1975: 164) ≡ *Salsola foetida* subsp. *gaetula* (Maire) Boulos (1995: 24) ≡ *Nitrosalsola gaetula* (Maire) Theodorova (2015: 443).

Type (lectotype, designated by Botschantzev 1975: 165):—MOROCCO. In salsuginosis inter Ouarzazat et Skoura in valle flum. Dades, 1200 m, 13 May 1932, Maire s.n. (MPU barcode MPU003129, isolectotypes P barcode P00083259, LE barcode LE00011857, all available via JSTOR)

- “*Salsola gaetula*” in Maire (1933: 227), *nom. inval.*, *nom. provis.*
 – “*Salsola baryosma* subsp. *gaetula*” in Freitag (1989: 159), *nom. inval.*, *sine basion.*

Acknowledgements

The authors are most grateful to the curators of many herbaria who supported our search for original material. Particularly helpful were Hans-Joachim Esser (M) and Caroline Loup (MPU), who also provided images of newly designated types, but we also thank those colleagues who were not successful in detecting relevant specimens (e.g. B, BAS, HAL, Z). Very useful critical comments on the original manuscript were given by Sergei Mosyakin (KW, Kiev).

References

- Akhani, H., Edwards, G. & Roalson, E.H. (2007) Diversification of the Old World Salsolae s.l. (Chenopodiaceae): molecular phylogenetic analysis of nuclear and chloroplast data sets and a revised classification. *International Journal of Plant Sciences* 168: 931–956. <https://doi.org/10.1086/518263>
- Andrew, F.W. (1950) *The Flowering Plants of the Anglo-Egyptian Sudan, vol. 1*. T. Buncle & Co. Ltd., Arbroath, 237 pp.
- Boissier, E. (1879) *Flora Orientalis, vol. 4*. H. Georg, Geneve/Basel, 1276 pp.
- Botschantzev, V.P. (1975) Species subsectionis *Vermiculatae* Botsch. sectionis *Caroxylon* (Thunb.) Fenzl generis *Salsola* L. [In Russian: Виды подсекции *Vermiculatae* Botsch. секции *Caroxylon* (Thunb.) Fenzl рода *Salsola* L.]. *Novosti Sistematiki Vysshikh Rastenii* [In Russian: *Новости систематики высших растений*] 12: 160–194.
- Boulos, L. (1991) The identity, typification and distribution of *Salsola imbricata* Forsskål. *Kew Bulletin* 46: 137–140. <https://doi.org/10.2307/4110753>
- Boulos, L. (1995) *Flora of Egypt Checklist*. Al Hadara, Cairo, 283 pp.
- Boulos, L. (1999) *Flora of Egypt, vol. 1*. Al-Hadara Publishing, Cairo, 419 pp.
- Cavanilles, A.J. (1796) *Icones et descriptiones plantarum, quae aut sponte in Hispania crescunt, aut in hortis hospitantur, vol. 3*. Ex Regia Typographia, Matriti, 58 pp.
- Chaudhary, S.A. (1999) *Flora of the Kingdom of Saudi Arabia, illustrated, vol. 1*. Ministry of Agriculture and Water, Riyadh, 691 pp.
- Chaudhary, S.A. & Akram, M. (1986) The genus *Salsola* (Chenopodiaceae) in Saudi Arabia. *Proceedings of the Saudi Biological Society* 9: 57–89.
- Delile, F. (1813) *Florae Aegyptiacae illustratio. Flore d'Égypte*. Imprimerie impériale, Paris, 144 pp.
- Fennane, M. & Ibn Tattou, M. (2005) *Flore vasculaire du Maroc 1*. Travaux de l'Institut Scientifique Rabat, Série Botanique 37, 483 pp.
- Fenzl, E. (1851) Salsolaceae. In: Ledebour, C.F. (Ed.) *Flora Rossica, vol. 3 (2)*. Schweizerbart, Stuttgart, pp. 689–853.
- Forsskål, P. (1775) *Flora Aegyptiaco-Arabica. Sive Descriptiones Plantarum, quas per Aegyptum Inferiorem et Arabium felicem detexit, illustravit Petrus Forskål*. Möller, Kjöbenhavn, 220 pp.
- Forsskål, P. (1776) *Icones rerum naturalium quas in itinere orientali depingi curavit P. Forsskål post mortem auctoris ed. Carsten Niebuhr*. Möller, Kjöbenhavn [Copenhagen], 15 pp. 42 Ill.
- Freitag, H. (1989) Contributions to the chenopod flora of Egypt. *Flora* 183: 149–173. [https://doi.org/10.1016/S0367-2530\(17\)31550-5](https://doi.org/10.1016/S0367-2530(17)31550-5)

- Freitag, H., (2001) *Salsola*. In: Ali, S.I. & Qaiser, M. (Eds.) *Flora of Pakistan 204*. Department of Botany, University of Karachi & Missouri Botanical Press, St. Louis, pp. 127–178. [also available from: www.eFloras.org]
- Freitag, H. & Rilke, S. (1997) *Salsola*. In: Rechinger, K.H. (Ed.) *Flora Iranica 172*. Akademische Verlagsgesellschaft, Graz, pp. 154–255.
- Hepper, F.N. & Friis, I. (1994) *The Plants of Pehr Forsskål's Flora Aegyptiaco-Arabica*. Royal Botanic Gardens, Kew, 400 pp.
- Ijlin, M.M. (1936) Chenopodiaceae. In: Shishkin, B.K. (Ed.) *Flora SSSR [Флора СССР]*, vol. 6. Izdatel'stvo Akademii Nauk SSSR, Moskva/Leningrad, pp. 3–354. [Engl. edition (1985) *Flora of the U.S.S.R.* 6, B. Singh, Dehra Dun & Koeltz Scientific Books, Koenigstein]
- Jafri, S.M.H. & Rateeb, F.B. (1978) Chenopodiaceae. In: Jafri, S.M.H. & El-Gadi (Eds.) *Flora of Libya 58*. Al Faateh University, Faculty of Science, Dept. of Botany. Tripoli, 109 pp.
- Le Floc'h, E., Boulos, L. & Vela, E. (2010) *Flore de Tunisie. Catalogue synonymique commenté*. Banque Nationale de Gènes, Ministère de l'Environnement et du Développement Durable, Tunis, 500 pp.
- Linnaeus, C. (1753) *Species Plantarum, vol. 1*. Laurentii Salvii, Stockholm, 560 pp.
- Maire, R. (1933) Contribution à l'étude de la Flore de l'Afrique du Nord fascicule 20. *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, Algiers* 24: 194–232.
- Maire, R. (1936) Contribution à l'étude de la Flore de l'Afrique du Nord. *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, Algiers* 27: 239–338.
- Maire, R. (1938) Chenopodiaceae du Sahara occidental. *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, Algiers* 29: 444–450.
- Maire, R. (1962) *Flore de l'Afrique du Nord, vol. 8*. P. Lechevalier, Paris, 303 pp.
- 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: 1–274.
- Moquin-Tandon, C.B.H.A. (1840) *Chenopodearum Monographica Enumeratio*. P.-J. Loss, Paris, 182 pp.
<https://doi.org/10.5962/bhl.title.15484>
- Moquin-Tandon, C.H.B.A. (1849) *Caroxylon* Thunb. In: Candolle, A. de (Ed.) *Prodromus systematis naturalis regni vegetabilis, vol. 13 (2)*. Treuttel & Würtz, Paris, pp. 172–179.
- Quezel, P. & Santa, S. (1962) *Nouvelle Flore de l'Algérie, vol. 1*. Centre National de la Recherches Scientifique (CNRS), Paris, 565 pp.
- SANBI (2012) *Salsola imbricata* var. *gaetula* Maire. Available from: <http://www.ville-ge.ch/musinfo/bd/cjb/africa/details.php?langue=en&id=26517> (accessed 14 May 2017)
- Schultes, J.A. (1820) *Systema vegetabilium: secundum classes, ordines, genera, species. Cum characteribus, differentiis et synonymis. Editio nova, speciebus inde ab editione XV. detectis aucta et locupletata*, vol. 6, Sumtibus J.G. Cottae, Stuttgartiae [Stuttgart], lxxi + 852 pp.
- Sprengel, C.P.J. (1824) *Systema vegetabilium, ed. 16, vol. 1*. Dieterich, Göttingen, 992 pp.
- Taeckholm, V. (1974). *Student's Flora of Egypt, ed. 2*. Cooperative Printing Company, Beirut, 888 pp.
- The Plant List (2013) *The Plant List. A working list of all plant species*. Available from: <http://www.theplantlist.org/tpl1.1/record/kew-2481692> (accessed 14 May 2017)
- Theodorova, T.A. (2015) New nomenclatural combinations in *Nitrosalsola* (Chenopodiaceae). *Ukrayins'kyi Botanichnyi Zhurnal [Український ботанічний журнал]* 72: 442–445.
<https://doi.org/10.15407/ukrbotj72.05.442>
- Thiers, B. (2017) [Continuously update] *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/> (accessed 9 Novemebr 2017)
- Thunberg, C.P. (1782) *Nova genera plantarum, quorum partem primam, suffrag. exper. facult. med. Upsal. publice ventilandam exhibent praeses 2*. Joh. Edman, Uppsala, 35 pp.
- Tropicos (2017) Tropicos.org. Missouri Botanical Garden. <http://www.tropicos.org> (accessed 4 May 2017)
- Tzvelev, N.N. (1993) Notes on Chenopodiaceae of Eastern Europe [In Russian: Заметки о маревых Восточной Европы]. *Ukrayins'kyi Botanichnyi Zhurnal [Український ботанічний журнал]* 50 (1): 78–85.
- Ulbrich, E. (1936) Chenopodiaceae. In: Engler, A. & Prantl, K. (Eds.) *Die natürlichen Pflanzenfamilien, ed. 2, vol. 16c*. Duncker & Humblot, Berlin, pp. 379–584.
- Uotila, P. (2011) *Salsola* L. – Euro+Med Plantbase – the information resource for Euro-Mediterranean plant diversity. Available from: <http://ww2.bgbm.org/EuroPlusMed/PTaxonDetail.asp?NameId=78558&PTRefFk=7300000> (accessed 14 May 2017)
- Wikispecies, free species directory. (2017) Available from: https://species.wikimedia.org/wiki/Main_Page (accessed 10 May 2017)
- Zohary, M (1966) *Flora Palaestina, vol. 1*. Goldberg's Press, Jerusalem, 364 pp.