

Notes on *Agathophora* (Fenzl) Bunge and *Cornulaca* Del. Studies in the *Chenopodiaceae* of Arabia 5.*

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Summary. The monotypic genus *Agathophora* (Fenzl) Bunge is represented in Arabia by two varieties: *A. alopecuroides* (Del.) Fenzl ex Bunge var. *alopecuroides* and var. *papillosa* (Maire) Boulos, comb. nov. The genus *Cornulaca* Del. (6 species) is represented in Arabia by 5 species: *C. aucheri* Moq. (*C. leucacantha* Charif & Aellen, *synon. nov.*), *C. setifera* (DC.) Moq., *C. monacantha* Del., *C. amblyacantha* Bunge and *C. ehrenbergii* Aschers. Keys are provided to separate the taxa.

Agathophora (Fenzl) Bunge

The monotypic genus *Agathophora* (Fenzl) Bunge has been treated as a synonym of *Halogeton* C.A. Mey. in several floristic accounts of the *Chenopodiaceae* of Arabia and adjacent countries, e.g. lowland Iraq (Aellen & Hillcoat in Rechinger, 1964), Palestine (Zohary, 1966), Egypt (Täckholm, 1974), Saudi Arabia (Migahid, 1978), Qatar (Batanouny, 1981) and Kuwait (Daoud & Al-Rawi 1985). Botschantzev (1977), however, discussed in detail the differences between these two closely allied genera and gave enough evidence for their separation. He recognized 5 species in *Agathophora*. According to Botschantzev (1977) the genus *Agathophora* is represented in Arabia by 3 species: *A. alopecuroides* (Del.) Fenzl ex Bunge, *A. iraqensis* Botsch. and *A. postii* (Maire) Botsch. The remaining two species are *A. galalensis* Botsch. from Egypt and *A. algeriensis* Botsch. from Algeria and Morocco.

Botschantzev (1977) distinguishes *Agathophora postii* from *A. alopecuroides* by the “usually” longer, “very often” obtuse stem and floral leaves, the narrower base of the floral leaves and obtuse bracteoles. On the other hand, the type specimen of *A. galalensis* represents one of the many forms met with in the wide range of distribution of *A. alopecuroides* which extends from Morocco throughout North Africa to Egypt, Sinai, the Syrian Desert, Palestine, northern Arabia and southern Iraq to Pakistan.

The synonyms cited by Botschantzev (1977) for *A. iraqensis* are: ?*Halogeton alopecuroides* (Del.) Moq. var. *papillosus* Eig, and for *A. algeriensis*: *Halogeton alopecuroides* (Del.) Moq. var. *papillosus* Maire. This suggests that both of his new species were already recognized as varieties of *A. alopecuroides*, based on one and the same character – papillose-hispid leaves and young shoots.

The present author examined ample material of *Agathophora* from Arabia as well as from its entire geographical range and found that the differences between

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the 5 species as given by Botschantzev (1977) are difficult to recognize, as has been stated already by Freitag (1989). There are, however, two variants – one with papillose-hispid leaves and young shoots, and the other without. These variants grow together practically throughout the range of distribution of the species. Therefore, it is proposed here to treat the genus *Agathophora* (Fenzl) Bunge, as it was previously known, as a monotypic genus with two varieties.

***Agathophora alopecuroides* (Del.) Fenzl ex Bunge**, Mém. Acad. Sci. Pétersb. sér. 7, 4, 11: 92 (1862).

Salsola alopecuroides Del., Descr. Egypte, Hist. Nat. 200, t. 21, fig. 1 (1814). Type: Egypt, near [Giza] Pyramids, *Delile* s.n. (holotype MPU).

Halogeton alopecuroides (Del.) Moq., Chenop. Monogr. Enum.: 161 (1840).

Anabasis alopecuroides (Del.) Moq., in DC., Prodr. 13(2): 210 (1849).

a. var. ***alopecuroides***

Salsola postii Eig, Pal. J. Bot. Jerusalem Ser. 3(3): 131, fig. 4 (1945). Type: Syria, El-Jebach to El-Beida, 18 July 1890, *G. E. Post* s.n. (holotype HJ).

Aellenia postii (Eig) Aellen in Mouterde, Flora Djebel Druze: 87 (1953).

Agathophora postii (Eig) Botsch., Bot. Zhurn. 62(10): 1449 (1977).

Agathophora galalensis Botsch. Bot. Zhurn. 62(10): 1450 (1977). Type: S. Galala [Eastern Desert], Um Zenasir, 4200 ft, 7 December 1944, *P. H. Davis* 8044 (holotype K; isotypes E, KTUH); *synon. nov.*

DISTRIBUTION. Saudi Arabia.

North Africa, Sinai, Syrian Desert, Palestine, S Iraq to Pakistan.

b. ***Agathophora alopecuroides* var. *papillosa* (Maire) Boulos**, *comb. nov.*

Halogeton alopecuroides (Del.) Moq. var. *papillosus* Maire, Bull. Soc. Hist. Nat. Afr. Nord 34: 190 (1943). Type: Algeria: Sahara septentrional algérien: Ouargla à la Gara Krime, *Joly* s.n.; Oued Mzab, *Reboud* s.n.; Chebka du Mzabau S de Ghardaia, *Dubuis* s.n.; Oued el Kebrit, *Joly* s.n.; Er-Ralga, Pomel s.n. – Sahara occidental: Oulad Said, *Rolland* s.n. – Morocco: Missouri, *Humbert* s.n. (forme de transition à feuilles papilleuses, mais à tiges lisses. – Sahara central: Tadmait, *Chevalier* s.n. (syntypes MPU).

Halogeton alopecuroides var. *papillosus* Eig, Pal. J. Bot. Jerusalem Ser. 3 (3): 137 (1945). Type: Palestine: ca 30 km NW of el-Kuntilla [el-Quntilla], ca 500 m, 2 March 1936, *Eig, Zohary & Feinbrun*, s.n. (holotype HJ); *synon. nov.*

Agathophora iraqensis Botsch., Bot. Zhurn. 62 (10): 1451 (1977). Type: Iraq, nr. Shithatha (c. 8 km E.), c. 38 km W of Karbala, c. 40 m, 20 Nov. 1956, *E. Guest, A. Al-Rawi & K. H. Rechinger* 16168 (holotype K); *synon. nov.*

Agathophora algeriensis Botsch., Bot. Zhurn. 62 (10): 1452 (1977). Type: Algeria, Ouargla, 21 April 1967, *H. N. Le Houérou*, s.n. (holotype LE); *synon. nov.*

DISTRIBUTION. Saudi Arabia and Kuwait.

N Africa to Egypt, Sinai, Syrian Desert, Palestine, S Iraq to Pakistan.

The two varieties may be separated as follows:

Branches and leaves papillose-hispid var. **papillosa**
 Branches and leaves glabrous, not papillose-hispid var. **alopecuroides**

Cornulaca Del.

The genus *Cornulaca* Del. comprises 6 species of which the following 5 are represented in Arabia.

1. *Cornulaca setifera* (DC.) Moq. in DC., Prodr. 13 (2): 218 (1849).

Astragalus setiferus DC., Prodr. 2: 296 (1825). Type: Levant, de Bagdad à Alep, Olivier s.n. (holotype G, isotype P).

Cornulaca tragacanthoides Moq., Chenop. Monogr. Enum. 163 (1840). (Type as for *Astragalus setiferus* DC.).

DISTRIBUTION. Saudi Arabia.
 Syrian Desert, S Iraq.

2. *Cornulaca amblyacantha* Bunge, Mém. Acad. Sci. Pétersb. sér. 7, 4, 11: 88 (1862). Type: Persia [? SW Iran], *Aucher-Eloy* 5263 (holotype LE; isotypes BM, K, G-Boiss.).

DISTRIBUTION. Yemen (south), Oman (Dhofar).
 W Iran.

3. *Cornulaca ehrenbergii* Aschers. in Schweinf., Beitr. Fl. Aethiop. 184 (1867). Types: Near Mitsiwa [Massowa'], *Stuedner* s.n.; *Ehrenberg* s.n. (both B†).

DISTRIBUTION. Saudi Arabia (Farasan Islands, Red Sea).
 SE Egypt (Cap Elba and Islands), NE Sudan (Red Sea coast), Ethiopia (Eritrea, Red Sea coast), N Somalia (coastlines).

4. *Cornulaca monacantha* Del., Descr. Egypte, Hist. Nat. 206, t. 22, f. 3 (1814). Type: Egypt, Desert [Eastern] between Red Sea and the Nile, *Delile* s.n.; near Gyzeh [Giza] Pyramids and Saqqarah, *Delile* s.n. (syntypes MPU).

Cornulaca arabica Botsch., Kew Bull. 23: 439, fig. 1 (1969). Type: Saudi Arabia, Eastern Province, Al Hadidah meteoric craters, 21° 30' N, 50° 30' E on sand, 16 Oct. 1965, *J. P. Mandaville Jr.* 467 (holotype K); **synon. nov.**

DISTRIBUTION. Saudi Arabia, Yemen (N, S), Socotra, Oman, UAE, Qatar, Kuwait.

Chad, Niger, Mali, Mauritania, Morocco, Algeria, S Tunisia, Libya, N Sudan, Egypt, Sinai, S Iraq, Iran, SW Pakistan, (Baluchistan), SW Afghanistan.

Cornulaca monacantha is a desert shrub which grows in variable habitats within a vast geographical range (see distribution above) and is highly tolerant to extreme conditions of drought and heat; it is usually one of the last survivors when prolonged droughts hit an area in the Sahara. It shows substantial variations in habit and morphology. *Cornulaca arabica* Botsch. seems to be one of these

“forms” with reduced leaves. Botschantzev (1969) distinguishes it from *C. monacantha* as follows: “*Cornulaca arabica* Botschantzev, sp. nov. a *C. monacantha* Del. foliis subhorizontaliter amplexicaulibus, foliis floralibus apice breviter aculeatis bracteolis brevioribus et pilis axillaribus bracteolis brevioribus bene differt”. It is proposed here to consider *Cornulaca arabica* Botsch. as a synonym of *C. monacantha* Del.

5. *Cornulaca aucheri* Moq., Chenop. Monogr. Enum.: 163 (1840). Type: Iraq, in Assyriae desertis, *Aucher* 2801 (holotype G).

Cornulaca leucacantha Charif & Aellen, Verhandl. Naturfor. Ges. Basel 61: 161 (1950). Type: Persia, Salzlehmwüste beim Bahnhof ‘Kavir’ 88 km östl. von Teheran; ca 1000 m, 22 Aug. 1948, *P. Aellen* 362 (holotype BM); **synon. nov.**

DISTRIBUTION. E Arabia (E Saudi Arabia, Oman, Qatar, Bahrain, Kuwait). S Iraq, Iran, SW Pakistan (Baluchistan), SW Afghanistan.

Cornulaca aucheri was described from a small seedling from the Iraqi desert and has always been treated in floristic accounts as an annual. The closely allied species *C. leucacantha* was also described as an annual, though from a more developed specimen. In the spring of 1989, I observed some specimens of *C. leucacantha* in the desert of Kuwait with a woody base which indicates, without doubt, a perennial habit. In the spring of 1990, I visited several localities in Kuwait at intervals of 1–2 weeks after the rainy season and observed that the young specimens which are typical of *C. aucheri* show remarkable changes after a further 3–4 weeks when they were clearly identifiable as *C. leucacantha*. This made me realize that we are dealing with one and the same species – the seedlings and young specimens which have traditionally been identified as *C. aucheri* are indeed just young forms of *C. leucacantha*. It is therefore proposed here to treat *Cornulaca leucacantha* Charif & Aellen as a synonym of *C. aucheri* Moq.

In general, seedlings of *Cornulaca monacantha* Del. are easily confused with those of *C. aucheri*. This might explain the erroneous records of *C. aucheri* (most probably based on young specimens or seedlings) from Egypt (Täckholm 1974, Lebrun 1977), Libya and Niger (Lebrun 1977). The distribution of *C. monacantha* overlaps with that of *C. aucheri* in E Arabia to SW Afghanistan and SW Pakistan. The area from W Arabia to the Western Sahara in Mauritania and Morocco is occupied solely by *C. monacantha*.

Key to the species:

1. Leaves 2–3·5 cm long, developing conspicuous spines ... 2. ***C. setifera***
Leaves 0·2–1 cm long, spine-tipped or aristate 2
2. Herbaceous annual or short-lived perennial becoming woody at base, leaves 10 mm long 1. ***C. aucheri***
Medium-sized, dwarf or sprawling shrubs, leaves to 8 mm long 3
3. Shrubs to 80 cm high, stems usually with long internodes, leaves not decurrent 3. ***C. monacantha***

- Dwarf or sprawling shrubs to 35 cm high, stems with short internodes, leaves decurrent 4
4. Sprawling shrub to 35 cm high and 2 m wide, clasping leaf base 4–6 mm long; free part of leaf 2–3 mm long, broadly triangular to triangular-ovate, leathery, not white-margined 5. **C. ehrenbergii**
- Dwarf shrub to 20 cm high, clasping leaf base \pm 2 mm long, narrowly triangular-subulate, conspicuously white-margined . . 4. **C. amblyacantha**

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REFERENCES

- Allen, P. & Hillcoat, D. In: Rechinger, K. H. (1964). Flora of Lowland Iraq. J. Cramer. Weinheim.
- Batanouny, K. H. (1981). Ecology and Flora of Qatar. Alden Press, Oxford, U.K., for University of Qatar.
- Botschantzev, V. P. (1969). A new species of *Cornulaca* Del. (*Chenopodiaceae*) from Saudi Arabia. Kew Bull. 23: 439–440, fig. 1.
- Daoud, H. S. & Al-Rawi, A. (1985). Flora of Kuwait 1. KPI Ltd., London, and University of Kuwait.
- Freitag, H. (1989). Contributions to the Chenopod Flora of Egypt. Flora 183: 149–173.
- Lebrun, J.-P. (1977). Éléments pour un atlas des plantes vasculaires de l'Afrique sèche 1. Étude botanique 4. I.E.M.V.T. Paris.
- Migahid, A. M. (1978). Flora of Saudi Arabia, ed. 2, Vol. 1. Riyadh University.
- Täckholm, V. (1974). Students' Flora of Egypt, ed. 2. Cairo University.
- Zohary, M. (1966). Flora Palaestina 1. Israel Academy of Sciences and Humanities, Jerusalem.