Disentangling the taxonomy of the Cleome africana species complex (Cleomaceae) in North Africa

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Disentangling the taxonomy of the Cleome africana species complex (Cleomaceae) in North Africa

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Abstract

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We propose to revisit the taxonomy of *Cleome africana* Botsch. (*Cleomaceae*) in North Africa. The taxonomic circumscription of this species has been problematic over time leading to numerous confusions and misidentifications in most floras from this region. In North Africa, we propose to accept a single species, i.e., *C. amblyocarpa* Barratte & Murb. with two subspecies. *Cleome africana* Botsch., described as a replacement name for *Siliquaria glandulosa* Forssk., is accepted at subspecific rank under *C. amblyocarpa* as *C. amblyocarpa* var. *glandulosa* (Forssk.) Botsch. We consider that *C. arabica* L. only occurs in the Middle East. An identification key is provided for the *C. africana* complex.

Résumé

LEMMEL, C. & C. CHATELAIN (2024). Élucider la taxonomie du genre Cleome (Cleomaceae) en Afrique du Nord. *Candollea* 79: 277–281. En anglais, résumés anglais et français. DOI: http://dx.doi.org/10.15553/c2024v792a4

Nous proposons de revisiter la taxonomie de *Cleome africana* Botsch. (*Cleomaceae*) en Afrique du Nord. La circonscription taxonomique de cette espèce a été problématique au fil du temps, ce qui a conduit à de nombreuses confusions et erreurs d'identification dans la plupart des flores de cette région. En Afrique du Nord, nous proposons d'accepter une seule espèce, à savoir *C. amblyocarpa* Barratte & Murb. avec deux sous-espèces. *Cleome africana* Botsch., désigné comme nom de remplacement pour *Siliquaria glandulosa* Forssk., est accepté au rang de sous-espèce de *C. amblyocarpa* en tant que *C. amblyocarpa* var. *glandulosa* (Forssk.) Botsch. Nous considérons que *C. arabica* L. n'est présent qu'au Moyen-Orient. Une clé d'identification est fournie pour le complexe *C. africana*.

Keywords

CLEOMACEAE – *Cleome africana* – *Cleome arabica* – Africa – synonymy – taxonomy

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Introduction

The name *Cleome arabica*, originally described by Linnaeus (1755) on the basis of a Hasselquist specimen, was subsequently ascribed to two different taxonomic entities in several publications by Linnaeus himself (1755, 1759, 1763, 1767) and Linnaeus f. (1767), which rendered numerous misinterpretations by posterior botanists. The original material used by Linnaeus (1755: 20) to describe *C. arabica* in *Centuria I. Plantarum* was collected by Fredrik Hasselquist (1722–1752) in Egypt in 1750–1752. This specimen corresponds to a taxon with unifoliolate leaves. The same diagnosis was also included in the *Amoenitates academicae* (1759: 281). In the second edition of *Species plantarum*, Linnaeus (1763: 937–940) listed 15 species of *Cleome*, including *C. arabica* based on Hasselquist specimen.

The confusion arose when young Linnaeus redescribed *C. arabica* in *Plantarum rariorum horti upsaliensis fasciculus primus* (Linnaeus f., 1767). He referred to the description of his father based on the specimen of Hasselquist as "foliis simplicibus subrotundo-ovatis" (Linnaeus f., 1767: 15), but provided a copper engraving based on a cultivated plant in the Upsala Botanical Garden originating from seeds collected by Peter Forsskål (1732–1763) in Egypt in 1760–1762 (Linnaeus f., 1767: tab. VIII). This engraving depicted a plant with trifoliolate leaves. The same year, Linnaeus (1767: 448) in the twelfth edition of his *Systema naturae* also referred to the latter engraving when describing his *C. arabica* with unifoliolate leaves.

Carten Niebuhr (1733–1815) posthumously published the work of Forsskål as *Flora Aegyptiaco-Arabica: sive descriptiones plantarum* (Forsskål, 1775) with an additional volume of engravings entitled *Icones rerum naturalium* (Forsskål, 1776). *Siliquaria glandulosa* Forssk. was described in the *Flora Aegyptiaco-Arabica* (Forsskål, 1775: 78) and illustrated it in the *Icones* (Forsskål, 1776: tab. XVI). Furthermore, Forsskål (1776: 6) included the text "*Cleome arabica*. L. S. N. Tom. II. pag. 448. n. 11". Forsskål's *Siliquaria glandulosa* clearly represents the species with trifoliolate leaves depicted in Linnaeus f. (1767: tab. VIII) and cited by his father the same year. Since then, Forsskål's name was inaccurately included in the synonymy of *Cleome arabica*.

In the beginning of the XXth century, Murbeck (1905) described a new species of *Cleome* from Algeria, *C. amblyocarpa* Barratte & Murb., and compared it with *C. arabica* in the sense of the trifoliolate species [hereafter as "auct."]. Among other characters, *C. amblyocarpa* differs from *C. arabica* auct. by having seeds with shorter trichomes. Botschantzev (1964) published *C. africana* Botsch. as a replacement name for *Siliquaria glandulosa* [non *C. glandulosa* Ruiz & Pav. ex DC., 1824] for a broad concept species including *C. arabica* auct. At that time, Botschantzev overlooked *C. amblyocarpa*. In 1968, when he realised about its existence (Botschantzev, 1968), accepted it as a distinct taxon and proposed the variety *glandulosa* (Forssk.) Botsch. to keep the concept of his *C. africana*. At the same time, he redefined the "genuine" *C. arabica* L. [in the sense of the unifoliolate species] retrieving the name *C. trinervia* Fresen., which has no priority over Linnaeus's name.

Hedge & Lamond (1970) appeared to be well-aware of all this confusion when publishing the *Cleome* treatment for *Flora iranica*. On one hand, they retained the name *C. amblyocarpa* (with *C. arabica* auct. in the synonymy) for Africa and the Middle East region. On the other hand, restricted the "genuine" *C. arabica* to the Middle East region.

More recently, Roalson (2021) recognised only one taxon for North Africa, *C. amblyocarpa*, placing *Siliquaria glandulosa* and Botschantzev's replacement name *C. africana* in the synonymy. This taxonomic criterion is not accepted in the present treatment, where two taxa around *C. amblyocarpa* are recognised. Concerning the "genuine" *C. arabica*, Roalson restricted it to Middle East.

In such a situation, in part originating by the misinterpretation of the original concept of *C. arabica* but also the ambiguous concept behind the replacement name *C. africana*, the treatments proposed around those names in North Africa have been disparate over time (e.g. Maire, 1965; Zohary, 1966; Boulos, 1999; Fennane et al. 1999; POWO, 2024). Facing that, we propose (1) to accept *C. amblyocarpa* var. *amblyocarpa* to circumscribe the taxon with seeds covered by short trichomes; (2) to retain the original concept of *Siliquaria glandulosa* under the name *C. amblyocarpa* var. *glandulosa* (Forssk.) Botsch. as proposed by Botschantzev (1968) for the taxon with seeds covered by long trichomes; and (3) to keep the name *C. arabica* for the species originally described by Linnaeus and characterized by having unifoliolate leaves.

Key to the Cleome africana complex in North Africa

1. Leaves simple, trinerved, lanate at maturity ... ***C. arabica***
1a. Leaves trifoliolate, linear to elliptic, covered with glandular hairs sticking to sand, but sometimes with glandular hairs only on stem 2
2. Petals clawed, entirely purple (also when dried) a little longer than wide, with hairs on seeds (< ⅔ diameter of seed), inner part of pod without reticulate veins ..... ***C. amblyocarpa*** var. ***amblyocarpa***
2a. Petals clawed, purple at tip and white at base (also when dried), longer than wide, with very long hairs on seeds (> diameter of seed) ..... ***C. amblyocarpa*** var. ***glandulosa***

Taxonomy

Cleome amblyocarpa Barratte & Murb. in Acta Univ. Lund., ser. 2, 1(4): 25. 1905.

Lectotypus (first step designated by Botschantzev, 1968; second step designated by Roalson, 2021: 58): **Morocco:** Oasis d'Akka, 1873, *Mardochée s.n.* (P [P05328491]!; isolecto-: LE [LE00013126] image!, P [P05328488, P05328490, P05328493]!).

– *Cleome arabica* subsp. *amblyocarpa* (Barratte & Murb.) Ozenda, Fl. Sahara Sept. Centr.: 247. 1958 [comb. inval.].

Cleome amblyocarpa var. ***amblyocarpa*** (Fig. 1A, C, D).

Distribution. – Morocco to Algeria (Fig. 2).

Additional specimens examined. – **Morocco:** Oasis d'Akka, 1873, *Mardochée* (G [G00628015]); Taroudant, 12 km ESE of Talouine, 17.IV.1986, *Podlech 40979* (G [G00628010]); Drâa-Tafilalet, col du Itiz-n-Tinfift, 14.IV.1986, *Podlech 41037* (G [G00628009]); Drâa-Tafilalet, Ayachi, cirque de Jaffar, 10.VI.1992, *Achhal et al. 6/272* (G [G00433761]).

Algeria: Biskra, Sahara env. Biskra, 15.IV.1903, *Murbeck s.n.* (LD [LD1221985]); Biskra, col de Sfa, au N de Biskra, 4.V.1906, *Romieux s.n.* (G [G0043377]).

Cleome amblyocarpa var. ***glandulosa*** (Forssk.) Botsch. in Novosti Sist. Vyssh. Rast. 5: 237. 1968 (Fig. 1B–D).

≡ *Siliquaria glandulosa* Forssk., Fl. Aegypt.-Arab.: 78. 1775 [non *C. glandulosa* Ruiz & Pav. ex DC., 1824]. ≡ *Cleome africana* Botsch. in Novosti Sist. Vyssh. Rast. 1: 130. 1964 [nom. nov., excl. syn.].

– *Cleome siliquaria* R. Br. in Salt, Voy. Abyss., App.: lxv. 1814 [nom. illeg. superfl.].

Lectotypus: (designated by Roalson, 2021: 58): **Egypt:** "ad Birket el hádgi prope Káhiram", 1762, *Forsskål 640* (C [C10003078] image!; isolecto-: C [C10003079] image!).

– *Cleome arabica* sensu Linnaeus (1767).

– *Cleome arabica* sensu Linnaeus f. (1767).

– *Cleome arabica* subsp. *arabica* sensu Ozenda (1958).

– *Cleome arabica* sensu Maire (1965).

– *Cleome arabica* sensu Zohary (1966).

– *Cleome amblyocarpa* sensu Hedge & Lamond (1970).

– *Cleome amblyocarpa* sensu Ali & Jafri (1976).

– *Cleome africana* sensu Fennane et al. (1999).

– *Cleome amblyocarpa* sensu Boulos (1999).

– *Cleome africana* sensu Roalson (2021).

– *Siliquaria glandulosa* sensu Roalson (2021).

Distribution. – From Morocco to Egypt, Sinai, Palestine to Iraq (Fig. 2).

Notes. – Herbarium specimens filed under *Cleome arabica* in most herbaria correspond to *C. amblyocarpa* var. *glandulosa* (Forssk.) Botsch., with a few exceptions.

Additional specimens examined. – **Algeria:** Biskra, 17.IV.1853, *Balansa 823* (G [G00628020]); M'Sila, Bou Saada, 1.IV.1890, *Battandier & Trabut 512* (G [G00417548]); Tamanrasset, Pic Laperrine, 23.X.2019, *Chatelain et al. CM807* (ENSA, G); Tamanrasset, Tifokraouin, au SW de Idles, Tefedest, 25.X.2019, *Chatelain et al. CM936* (ENSA, G); Tamanrasset, Irharar Kecherouet, 29.IX.2022, *Chatelain et al. CM2220* (G); Tamanrasset, Ouest Tazerouk, 2.IX.2022, *Chatelain et al. CM2340* (G); Naâma, Djebel Aissa, 20.III.2016, *Chatelain CC3790* (G); Biskra, 7.IV.1896, *Chevallier 13* (G [G00417546]); M'Sila, Biskra, IV.1888, *Girod s.n.* (G [G00628014]); Naâma, Aïn Sefra, 14.V.1901, *Hochreutiner 192* (G [G00628017]); Biskra, 27.IX.1851, *Jamin 258* (G [G00628019]); M'Sila, Baniou, près de Bou Saada, 1.III.1869, *Meyer 53* (G [G00417547]).

Egypt: Arabia Petraea, III.1864, *Boissier s.n.* (G-BOIS [G00797584]); Sinaï, 1839, *Bové s.n.* (G-BOIS [G00797513]); Sinaï, désert et l'isthme, Wadi el Arysch, 31.III.1891, *Defflers 165* (MPU); sine loco, 1799, *Delile s.n.* (MPU, herb. Delile); "Inter Cairo et Suez, in arvensis deserti", 8.III.1855, *Kotschy s.n.* (G-BOIS [G00797514]); "Aegyptische Küste zwischen Kosser und Ras-Benass", 25.II.1865, *Schweinfurth 1213* (G-BOIS [G00797502, G00797504]); "Flora des Ssoturba-Gebirges an der Nubischen Küste", 5.III.1865, *Schweinfurth 1215* (G-BOIS [G00797583]).

Morocco: Laâyoune, Smara, 23.III.2015, *Chatelain CC3470* (G); Ouad Eddahab, Garet Ouchfget, 27.III.2017, *Chatelain CC4180b* (G); Boujdour, Zemmour, Agalmim Al Maghdar, 2.IV.2017, *Chatelain CC4384* (G); Drâa-Tafilalet, Djebel Saghro, 3.VI.2019, *Chatelain & Mombrial CM208* (G); Errachidia, N de Tazzarine, 2.VI.2019, *Chatelain & Mombrial CM220* (G); Dakhla, Djebel Negjyr (Nagjir), 29.XII.2017, *Garcin s.n.* (G); Laâyoune, Zemmour, 9.I.2018, *Garcin s.n.* (G [G00394332]).

Tunisia: Kebili, Douz, Kebili, 4.IV.2014, *Chatelain CC2360* (G); Gafsa, Moularès, VI.1944, *Cuénod s.n.* (G [G00433763]); Gafsa, Délégation de Gafsa, 13.IV.1896, *Murbeck s.n.* (G [G00628021]); Sfax, IV.1907, *Pitard 40* (G [G00628013]); Gafsa, 12.IV.1904, *Romieux 22* (G [G00628022]); "in Regno Tunetano", s.d., *Vahl s.n.* (G).

Cleome arabica L., Cent. Pl. 1: 20. 1755.

Lectotypus (first step designated by Hedge & Lamond, 1970: 27; second step designated by Roalson, 2021: 58): **Egypt:** "Arabia", s.d., *Hasselquist s.n.* (SBT [2.2.3.2] image!; isolecto-: SBT [2.2.3.1] image!, S-LINN [S09-24947] image!).

= *Cleome trinervia* Fresen. in Mus. Senckenberg. 1: 177. 1834. **Lectotypus** (designated by Roalson 2021: 58): [icon] Fresenius in Mus. Senckenberg. 1: tab. XI.1834.

= *Cleome aschersoniana* Pfund in Flora 57: 413. 1874. **Typus:** "in monte Atakka prope Suez" (not found).

Distribution. – Egypt (Sinai), Israel, Palestine, Saudi Arabia to S Iran (Fig. 2).

Additional specimens examined. – **Jordan:** Aqaba, 13.III.1974, *Boulos 137* (G [G0043374]).

Egypt: Assaka, region de Suez, 10.III.1904, *Kneucker 2497* (G).

Fig. 1. – A. Flowers of *Cleome amblyocarpa* Barratte & Murb. var. *amblyocarpa*; **B.** Flowers of *C. amblyocarpa* var. glandulosa (Forssk.) Botsch.; **C–D.** Fruits of *C. amblyocarpa* var. *amblyocarpa* (up) and *C.* var. *glandulosa* (Forssk.) Botsch. (down).
[Photos: C. Lemmel]

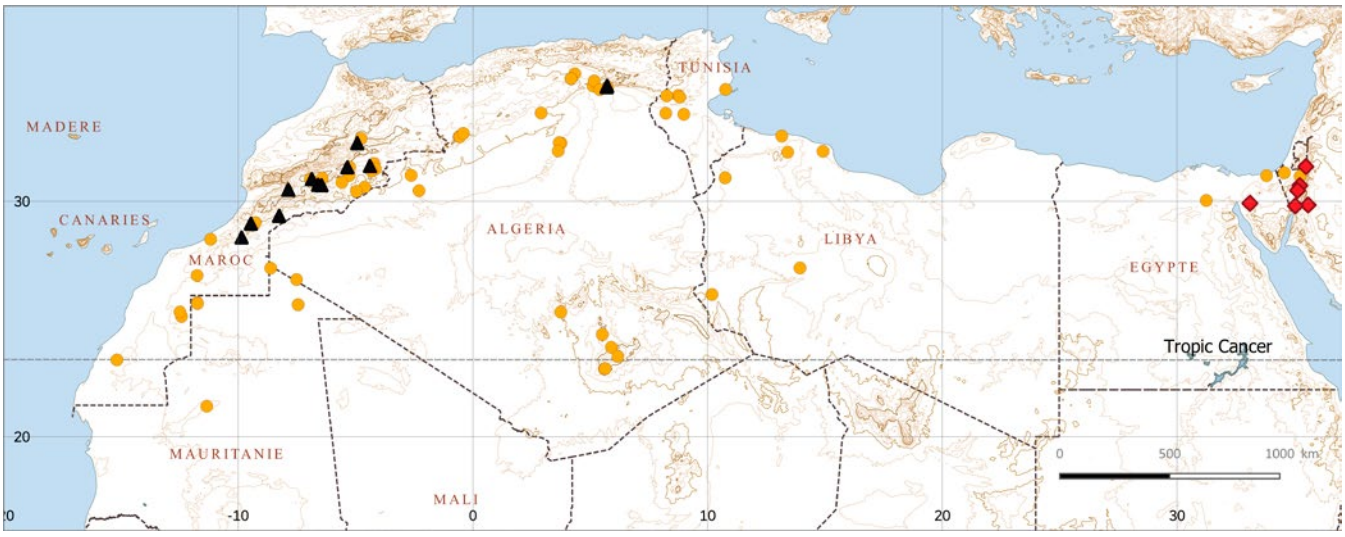

Fig. 2. – Distribution map of *Cleome arabica* L. (red), *C. amblyocarpa* Barratte & Murb. var. *amblyocarpa* (black), and *C. amblyocarpa* var. *glandulosa* (Forssk.) Botsch. (orange) in North Africa and neighbouring countries. All data based on specimens examined. [available on https://efloramaghreb.org (except for Libya)]

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