

Nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 10. What is *Amaranthus commutatus*?

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Abstract: The name *Amaranthus commutatus*, originally validated by Kerner for a plant taxon from Hungary and Slovakia, was studied as part of a series of contributions with the final aim to clarify the complicated nomenclature of the genus *Amaranthus*. On the basis of the protologue, the name *Amaranthus commutatus* cannot be associated with any European species, while out of Europe, Kerner's original data of *A. commutatus* may match the morphology of the Australian species *A. rhombeus*. Unfortunately, no original material has been traced so far and thus no lectotype can be designated (Arts. 9.3 and 9.4 of Shenzhen Code). Consequently, neotypification is desirable according to Art. 9.8. However no specimens of *Amaranthus* seen by Kerner have been traced and it was very difficult to understand Kerner's concept of that taxon. Having no suitable specimens available, I prefer to avoid the designation of a neotype, and the possible synonymization of *A. commutatus* with *A. rhombeus* based just on Kerner's data. Furthermore, the synonyms cited by Kerner in the protologue [*Amaranthus blitum* var. *polygonoides* (here lectotypified on a specimen preserved at K), and *A. blitum* var. *prostratus* (lectotype designated by Iamónico in 2016 on a Balbis' illustration)] refer to other species, i.e. *A. albus* (new proposed synonymy) and *A. deflexus*, respectively. The treatment of *Amaranthus commutatus* appears inconsistent but this fact is not ground for rejecting of the name since does not threaten any other name and there are no disadvantageous nomenclatural changes (Art. 56.1). Since the failure to properly designate a type, and the impossibility to reject *A. commutatus*, Kerner's name continues to be of ambiguous nature and is proposed as listed as a name *incertae sedis*.

Keywords: Bulgaria, Hungary, *incertae sedis*, nomenclature, new synonym, Slovakia, typification.

Introduction

Amaranthus L. (Amaranthaceae Juss.) comprises 70–75 (probably more) monoecious and dioecious species with almost worldwide distribution. Many species are known as naturalized or occasional aliens far beyond their native ranges. Approximately the half (or more) of the species are native to the Americas, and the remaining ones to other continents where some of them are also used as ornamentals, food, and medicals and are able to escape from cultivation causing mainly economic impact to the agricultural systems (Costea et al. 2001; Hernández-Ledesma et al. 2015; Iamónico 2015a; Das 2016).

Amaranthus is a taxonomically critical genus from due to its high phenotypic variability and partly hybridization that caused nomenclatural problems and misapplication of the names (see e.g., Mosyakin & Robertson 1996; Costea et al. 2001; Iamónico 2015a, 2016b, 2017; Iamónico & Galasso 2018).

The flora of Europe includes ca. 43 *Amaranthus* species (Iamónico 2015b). *Amaranthus commutatus* was recorded by Iamónico (2015b) in Bulgaria only, on the basis of data by Asayov & Petrova (2006) who reported the species in four floristic regions, i.e. Danubian Plain, The Predbalkan (West and East) (North-West of Bulgaria) and Thracian Plain (Central-South of Bulgaria). Moreover, Iamónico (l.c.) indicated *A. commutatus* as “Preliminary accepted”, so indicating the need for further studies.

As part of the ongoing nomenclatural investigations on all names published in *Amaranthus*, I present here the tenth contribution that refers to *A. commutatus* A.Kern. The previous nine papers were on Linnaean names (Iamónico 2014a, 2014b), names linked to the Italian flora (Iamónico 2016a), *Amaranthus gracilis* Desf. and related names (Iamónico 2016b), Moquin-Tandon’s names published in Candolle’s Prodrômus (Iamónico 2016c), names linked to the Australian flora (Iamónico & Palmer 2020), Willdenow’s names (Iamónico 2020a) the aggregate *Amaranthus polygonoides*/*A. anderssonii* (Iamónico 2020b) and Roxburgh’s names (Iamónico 2020c).

Materials and Methods

The research was carried out by examination of original material and other specimens and/or their digital images in the herbaria B, BM, FI, G, GH, HFLA, K, LINN, MO, MPU, NY, P, PH, RO, US, W, and WU (herbarium codes are given according to Thiers 2020 [continuously updated]). Relevant literature (protologues included) was also analyzed. The ICN articles cited in the text refer to the Shenzhen Code (Turland et al. 2018).

Results and discussion

Amaranthus commutatus was originally described by Kerner (1875: 194) who provided a nomenclatural and taxonomic discussion about some names, i.e. *A. blitum* var. *polygonoides* Moq., *A. blitum* var. *prostratus* Fenzl, *A. prostratus* sensu

Sadler, *A. blitum* L. s.str., and *A. viridis* L., and a morphological comparison with the latter three species; habitats and provenance were also reported (“On sandy, salt-incrusted places near stagnant water, along river banks and on ruderal places close to settlements near Muzsla, Pest, Soroksar, Monor, Pilis Nagy Körös. 95—250 Meter”, translated from German). Note that all these localities are not located in Bulgaria (the only country in which *A. commutatus* is currently recorded; Iamónico 2015b), but they are part of southern Slovakia (Muzsla [currently Mužla]) and Hungary (all the other cited sites). Thus, at the current state of knowledge, *A. commutatus* would occur in Bulgaria, Hungary, and Slovakia.

Kerner (1875) placed *Amaranthus blitum* var. *polygonoides* Moq., *A. blitum* var. *prostratus* Fenzl, *A. prostratus* sensu Sadler in the synonymy of *A. commutatus* that was proposed for the plants occurring in Eastern Europe identified by Sadler [1826: 354, not page 454 as erroneously reported by Kerner (l.c.) (probably an orthographic error)] as *A. prostratus* [“Die Diagnose...Sadler..., *A. prostratus*” (*A. commutatus* Kern)...”]. Sadler [1826: 354] given a description of *A. prostratus* Balb. reporting “Schult. Oest. Fl. I. 274”. Schultes (1814: 274-275), in turn, cited Balbis’s original reference of *A. prostratus* (“Balbis misc. Bot. t. 10”). Kerner (l.c.) stated that *A. prostratus* (a name that he considered to be a synonym of *A. deflexus* L.¹) is a ruderal plant of predominantly Mediterranean distribution that reaches in Western Europe to Angers and Paris but does not surpass the border of the Mediterranean region in Eastern Europe (up to the Austrian Hungary [former Austro-Hungarian Monarchy] at Canale in the Isonzo valley near Goerz, Triest and Fiume), while in Eastern Europe the species [as stated above, named by Sadler (1826) as *A. prostratus*], does not occur. Kerner (l.c.) indicated that what Sadler identified as *A. prostratus* is another species widely distributed in Southeastern Europe which is most closely related to *A. blitum* [a name that Kerner (l.c.) considered as synonym of *A. sylvestris* Desf.], from which *A. commutatus* differs in both vegetative [stem prostrate, leaves petioled, cuneate at the base, and wider] and generative (synflorescences leafless and arranged in terminal spikes, 3 tepals, and seeds with a blunt lateral keel) characters [(actually these morphological characters also occur in *A. deflexus* (= *A. prostratus* Balb.) (see e.g. Bayón 2015; Iamónico 2015a)]. Moreover, Kerner (l.c.) compared his new species with *A. viridis* [a name that Kerner (l.c.) referred to the Sadler’s *A. blitum*] highlighting that fruits in *A. commutatus* are dehiscent (vs. indehiscent in *A. viridis*). In conclusion, Kerner (l.c.) classified the Eastern Europe populations of *A. prostratus* sensu Sadler (1826: 354) as a different species which he named *A. commutatus*.

On the basis of the current concept in *Amaranthus* (e.g., Bao et al. 2003; Mosyakin & Robertson 2003; Bayón 2015; Iamónico 2015a), *A. commutatus* can be included in *Amaranthus* subgen. *Albersia* (Kunth) Gren. & Godr. (sensu Mosyakin & Robertson 1996; Iamónico 2015a). Concerning the European flora (Iamónico 2015b), the

¹ The name *A. prostratus* (= *A. deflexus*) was lectotypified by Iamónico (2016a: 527) on a Balbis’ illustration.

combination of the morphological characters of Kerner's species cannot be observed, for subgen. *Albersia*, in any species with 3 tepals, and fruits dehiscent (see Tab. 1).

Out of Europe, only one taxon belonging to subgen. *Albersia* shows the combination of characters indicated by Kerner (1875), i.e. the Australian species *Amaranthus rhombeus* R.Br. (see e.g., Palmer 2009; Bayón 2015).

Unfortunately, no original material that can be used for lectotypification purpose [note that no holotype (see Art. 9.1 of ICN) was indicated by Kerner 1875: 194] was traced, and a neotypification would be possible (Arts. 9.3, 9.4, and 9.8 of the ICN). However, since the morphological data provided by Kerner (l.c.) cannot be associated with any European species of *Amaranthus* subgen. *Albersia*, it is very difficult to understand Kerner's concept of *A. commutatus*. I have not been able to trace any specimen of *Amaranthus* that was seen by Kerner and labelled as *A. commutatus*. I found only a few exsiccata (at P, see

<https://science.mnhn.fr/institution/mnhn/collection/p/item/list?scientificName=Amaranthus+commutatus>) collected in Hungary and identified as *A. commutatus* but those actually refer to *A. blitum* s.l. (pers. obs.), a species with indehiscent fruits (see Iamónico 2015a), not dehiscent as stated by Kerner (1875) in the protologue of his *A. commutatus*. Moreover, no useful Sadler's specimen from E-Europe, which could be useful to understand the Kerner's concept of his *A. commutatus*, was traced.

About 30 years later than Kerner (1875), Beck (1909: 179) placed Kerner's taxon under *Amaranthus viridis* L., proposing the variety rank [as a new combination, i.e. *A. viridis* var. *commutatus* (A.Kern.) Beck]. However, Beck (l.c.) listed in synonymy the Moquin-Tandon's *A. blitum* var. *polygonoides* which, according to the below discussion, is actually to be referred to *A. albus*. The Beck's combination is to be considered as pro parte synonym of *A. commutatus* A.Kern.

Finally, Hayek (1956: 256–257) accepted the Kern's taxon at species rank reporting it as morphologically similar to *Amaranthus sylvestris* Desf. from which would differ by the structure of the synflorescence, spike-like (*A. sylvestris* has axillary glomerules only according to Hayek 1956). On the basis of the Hayek's diagnostic key, these two species are, in turn, different from *A. viridis* by the fruit (dehiscent vs. indehiscent in *A. viridis*) and the bracts (shorter than the perianth vs. as long as the tepals in *A. viridis*).

All in all, Kerner's concept of *Amaranthus commutatus* appears to be ambiguous.

A further fact that proves the difficult in understanding Kerner's *Amaranthus commutatus* concept is the cited synonym *A. blitum* var. *polygonoides* (Kerner 1875: 194). This variety (which name is still untypified; see Iamónico 2016c) was published by Moquin-Tandon (1849: 263), who provided a short diagnosis ("foliis minoribus obovatis obtusissimis"), the provenance ("In Hungaria prope Austriam ... India Orientali, Africa"), and references to herbarium specimens ["In Hungaria prope Austriam (DC!)"] (one or more Candolle's specimens), and "*Amaranthus polygonoides* herb. ampl. Cæt. Ind. Or. n. 6906, non Linn. (one Wallich's specimen related to his Numerical list – Wallich (1832)). These mentioned specimens are syntypes (Art. 9.6

of ICN) for Moquin-Tandon's name *A. blitum* var. *polygonoides*. I traced a specimen at K (barcode K000195197) that bears three complete plants (with roots), and four parts of plants (i.e. terminal or lateral synflorescences), and two original labels reporting the following annotations: “6096 *Amaranthus polygonoides* L. | Hb. Wight”, and “8th Nov 1826 | 6906 | *Fichionopoly* [an Indian locality according to Kew database (<http://apps.kew.org/herbcat/detailsQuery.do?barcode=K000195197>)]”. The characters of leaves of K000195197 match Moquin-Tandon’s diagnosis and the specimen (plants part of the single gathering; see Art. 9.17 of the ICN) is here designated as the lectotype of the name *A. blitum* var. *polygonoides*. Based on the current concept in *Amaranthus* (e.g., Bao et al. 2003; Mosyakin & Robertson 2003; Bayón 2015; Iamónico 2015a) *A. blitum* var. *polygonoides* [proposed by Carretero (1984: 276) at subspecies rank of *A. blitum*] can be synonymized with *A. albus* L., especially for the bracts which are awned and are longer than the perianth in K000195197. Since *A. albus* displays syflorescences in axillary glomerules, never arranged in terminal spikes (as would occur in *A. commutatus* according to the protologue by Kerner 1875: 194), Kerner’s synonymy with Moquin-Tandon’s names is most probably incorrect. Note that synonymy between *A. albus* and *A. blitum* var. *polygonoides* have never been proposed before.

Amaranthus albus L., Syst. Nat., ed. 10. 2: 1268. 1759.

Lectotype (designated by Raus 1997: 143): North America, in Philadelphiae maritimis, Herb. Linn. No. 1117.1 (LINN!, image of the lectotype is available at <http://linnean-online.org/11627/>).

= *Amaranthus blitum* var. *polygonoides* Moq., Prodr. [DC.] 13(1): 263. 1849 (syn. nov.) ≡ *A. blitum* L. subsp. *polygonoides* (Moq.) Carretero, Anales Jard. Bot. Madrid 41(2): 276. 1985.

Lectotype (here designated): India, 08.11.1826, sine coll. 6096 [Hb. Wight] (K000195197!, image of the lectotype is available at <http://www.kew.org/herbcatimg/701391.jpg>).

Finally, as regards another synonym cited by Kerner (1875: 194) — *Amaranthus blitum* var. *prostratus* — it was published by Fenzl (1851: 858) as a prostrate variety (β) of *A. blitum* with a short terminal synflorescences. Fenzl (l.c.) cited in synonymy “*Amaranthus blitum* LINN. ac auct. plum. partim”, “*A. blitum* var. α. (partim) β *polygonoides* et γ. *nanus* MOQ.-TAND. l. c. (lus. foliis majoribus, minoribus obtusissimis rotundatis ac minutis fere oblongis), and “*A. prostratus* BAST. Fl. Main. et Loir. p. 344”. While *A. blitum* is currently considered as a good and distinct species (see e.g., Mosyakin & Robertson 2003, Iamónico 2015a), *A. blitum* var. (γ) *nanus*, and *A. blitum* var. (β) *polygonoides* are treated as synonyms of, respectively, *A. blitoides* S. Watson (see Iamónico 2016c: 91) and *A. albus* (see just above in the present paper). Concerning “*A. prostratus* Bast.”, this citation would refer to Flore du département de Maine et Loire by Bastard (1809: 344). Bastard (l.c.) listed

Tab. 1 Morphological characters of European species with 3 tepals, and fruits dehiscent that belong to *Amaranthus* subgen. *Albersia*. Different characters, as compared to *A. commutatus*, are underlined.

	Stem	Leaves	Synflorescence
<i>A. commutatus</i>	Prostrate	Elliptic to rhombic	Terminal spike-like
<i>A. albus</i>	<u>Usually erect</u> (rarely prostrate)	<u>Ovate</u> , elliptic to <u>spathulate</u>	<u>Axillary glomerules</u>
<i>A. californicus</i>	Prostrate	<u>Linear to lanceolate</u> , <u>spathulate</u>	<u>Axillary glomerules</u>
<i>A. capensis</i>	Prostrate	<u>Obovate</u> to elliptic	<u>Axillary glomerules</u>
<i>A. dinteri</i>	<u>Decumbent to erect</u>	<u>Obovate</u>	<u>Axillary glomerules</u>
<i>A. graecians s.l.</i>	<u>Erect</u>	<u>Ovate-rhomboidal to lanceolate</u>	<u>Axillary glomerules</u> , and terminal spike-like*
<i>A. thunbergii</i>	<u>Decumbent to erect</u>	<u>Ovate</u> , elliptic to <u>spathulate</u>	<u>Axillary glomerules</u>
<i>A. tricolor</i>	<u>Erect</u>	<u>Ovate</u> , <u>lanceolate</u>	<u>Axillary glomerules</u> , and terminal spike-like

* Only the subsp. *aschersonianus* (Thell.) Costea *et al.*

A. prostratus citing “Decand. Synops. 2283. bis.” which refers to Lamarck & Candolle’s Synopsis Plantarum (Lamarck & Candolle 1806: 199, marked as “2283*”). Lamarck & Candolle (l.c.), in turn, did not report any synonym, so his *A. prostratus* would appear as a new species. However Candolle, in the 2nd Edition of *Synopsis Plantarum* (Candolle 1828: 394), cited “*A. prostratus* (Balb. misc. p. 44. t. 10.)”. As a consequence, I can hypothesize that Lamarck & Candolle (1806: 199) also referred to Balbis’ *A. prostratus*, and not consider this species, in the 1st Edition of *Synopsis Plantarum*, as new. The citation “*A. prostratus* Bast.” by Fenzl (1851: 858) so could be referred to Balbis’ *A. prostratus*, the Fenzl’s variety can be interpreted as a new combination of Balbis’ name [*Amaranthus blitum* var. *prostratus* (Balb.) Fenzl], and has the same type as the name proposed by Balbis (Tab. 10 in Balbis 1804; see Iamónico 2016a). *A. prostratus* is currently considered as a synonym of *A. deflexus* L. (Iamónico 2016a: 527).

***Amaranthus deflexus* L., Mant. Pl. Alt.: 295. 1771.**

Lectotype (designated by Aellen 1972: 7): Herb. Linn. No. 1117.18 (LINN!, image available at <http://linnean-online.org/11644/>).

= *Amaranthus prostratus* Bellardi ex Balbis, Misc. Bot.: 44. 1804 ≡ *Amaranthus blitum* var. *prostratus* (Balb.) Fenzl in Ledebour, Flora Rossica 3(2): 858. 1851, exl. syn. *A. blitum* var. (γ) *nanus* (= *A. blitoides* S. Watson), and *A. blitum* var. (β) *polygonoides* (= *A. albus*).

Lectotype (designated by Iamónico 2016a: 527): [Icon] Tab. 10 (Balbis 1804, image available at <http://bibdigital.rjb.csic.es/ing/Libro.php?Libro%44332>).

Conclusions

Amaranthus commutatus, a species currently recorded in Bulgaria only (Iamonico 2015b), was originally described by Kerner (1875: 194) from the territory of Hungary and Slovakia.

The combination of morphological characters provided by Kerner (1875: 194) to characterize *Amaranthus commutatus* (which clearly belongs to subgen. *Albersia* sensu Mosyakin & Robertson 1996) cannot be observed in any European species with 3 tepals, and fruits dehiscent (see Tab. 1), while out of Europe, it could be associated to the Australian *A. rhombeus* only (see e.g., Palmer 2009).

The synonyms cited by Kerner (1875: 194), i.e. *Amaranthus blitum* var. *polygonoides* Moq. and *Amaranthus blitum* var. *prostratus* (Balb.) Fenzl, refer, respectively, to *A. albus* (new synonymy proposed in the present paper) and *A. deflexus* (see Iamonico 2016a: 527), which are two currently accepted species that cannot be associated with *A. commutatus* based on Kerner's description (see Tab. 1 for *A. albus*, while *A. deflexus* differs from *A. commutatus* in having fruits indehiscent).

Amaranthus commutatus was very rarely cited in literature, and I found only a few references, most of which are the recent Databases [IPNI 2008+; Marhold & Hindák 2018 (sub *A. lividus* L. subsp. *ascendens* (Loisel.) Soó = *A. blitum*); Lucian et al. 2018; Tropicos 2018+]. Note that WCSP (2018), based on Govaerts (1995), listed *A. commutatus* as an accepted species native to Australia (Queensland). Palmer (2009) did not cite *A. commutatus* in his *Conspectus of Australian amaranths*, and she reported 18 taxa as occurring in Queensland [*A. blitum*, *A. caudatus* L., *A. centralis* J.Palmer & Mowat, *A. cochleitepalus* Domin, *A. cuspidifolius* Domin, *A. dubius* Mart. ex Thell., *A. graecizans* L. subsp. *silvestris* (Vill.) Brenan, *A. grandiflorus* (J.M. Black) J.M. Black, *A. hybridus* L., *A. interruptus* R.Br., *A. macrocarpus* Benth. S.la., *A. mitchellii* Benth., *A. retroflexus* L., *A. rhombeus* R.Br., *A. spinosus* L., *A. tricolor* L., *A. undulatus* R.Br., *A. viridis* L.], all being morphologically different from *A. commutatus* as described by Kerner (1875: 194) except *A. rhombeus*. It is not clear why WCSP (2018) reports *A. commutatus* as an accepted and Australian native species. Anyway, *A. rhombeus* was never recorded in Europe (see e.g., Iamonico 2015b) and it is unlikely that *A. commutatus* could be considered as an its heterotypic synonym. Unfortunately, just the Kerner's morphological data do not allow to verify this fact.

Note, however, that Kerner (1875: 194) considered *Amaranthus sylvestris* as synonym of *A. blitum*, a species that Kerner (l.c.) reported as the most closely related to his *A. commutatus*. The Desfontaines' *A. sylvestris* is a nomen nudum and not validly published (Arts. 38.1 and 38.2 of ICN) and it is actually referable to *A. graecizans* subsp. *silvestris* (Vill.) Brenan (see e.g., Iamonico 2015a). The nomenclatural history of the Linnaean *A. blitum* is very complicated (see e.g., Iamonico & Das 2014: 294-295) and various authors, especially in the past, considered the taxon *silvestris* as an its synonym—as made by Kerner l.c.—or, in other cases, as a variety (e.g., Hooker 1885: 721). The association *silvestris-blitum* by Kerner (l.c.) is a further example of the nomenclatural and taxonomic confusion

that is related to the *A. blitum* group. Anyway, even if we considered the Kerner's concept of *A. blitum* as the same of *A. graecizans* subsp. *sylvestris*, this latter taxon cannot be ascribed to *A. commutatus* (see Tab. 1).

All things considered, the treatment of *Amaranthus commutatus* appears inconsistent. However, this fact is not the reason for rejecting of the name since it does not threaten any other name [e.g., the possible synonymy with *A. rhombeus*, a species published earlier than *A. commutatus* (1810 vs. 1875) and so having nomenclatural priority] and thus no disadvantageous nomenclatural changes are expected (Art. 56.1 of the ICN). The failure to properly designate a lectotype or a neotype, and the impossibility to reject *A. commutatus* according to the ICN, causes the continued ambiguous nature of Kerner's name and results in listing it as an unresolved name of uncertain identity and affinity (a name incertae sedis).

Amaranthus commutatus A.Kern, Oesterr. Bot. Z. 25: 1268 (1759), nomen incertae sedis.

References

- Aellen P. L. (1972): *Amaranthaceae*. – In: Rechinger K. H. (ed): *Flora Iranica* 91, pp. 1–19. – Akad. Druck- und Verlagsanstalt, Graz.
- Asayov B. & Petrova A. (Eds.) (2006): *Conspectus of the Bulgarian Vascular Flora: Distribution Maps and Floristic Elements*, 3rd Ed. – Biodiversity Foundation, Sofia, 452 pp.
- Balbis G. B. (1804): *Miscellanea Botanica*. – Torino, 68 pp. + 11 Tab.
- Bao B., Clemants S. E. & Borsch T. (2003): *Amaranthus* L. – In: Wu Z. Y., Raven P. H. & Hong D. Y. (eds): *Flora of China* 5, pp. 415–429. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.
- Bastard M. T. (1809): *Essai sur la flore du département de Maine et Loire*. – V. Pavie et Fils, Angers, 58 pp.
- Bayón N. B. (2015): *Revision taxonomica de las especies monoicas de Amaranthus (Amaranthaceae): Amaranthus subg. Amaranthus y Amaranthus subg. Albersia*. – *Ann. Missouri Bot. Gard.* 101(2): 261–383.
- Beck G. Von Mannagetta (1909): *Amaranthus viridis* var. *commutatus*. – In: Reichenback L. & Reichenback H. G. (eds): *Icones Florae Germanicae et Helveticae simul terrarum adjacentium ergo Mediae Europae XXIV*, pp. Sumptibus Friederici de Zezschwitz, Lipsiae et Geræ.
- Candolle A. P. de (1828): *Synopsis plantarum in flora Gallica descriptarum*, ed. 2, 1. – V. Desrai, Paris, 544 pp.
- Carretero J. J. (1984) *Consideraciones sobre las Amarantáceas Ibéricas*. *Anales Jard. Bot. Madrid* 41(2): 271–286.
- Costea M., Sanders A. & Waines G. (2001): *Preliminary results toward a revision of the Amaranthus hybridus species complex (Amaranthaceae)*. – *Sida* 19: 931–974.
- Das S. (2016): *Amaranthus: A Promising Crop of Future*. – Springer Nature, Singapore, 207 pp.
- Fenzl E. (1851): *Amaranthaceae*. – In: Ledebour C. F. (ed): *Flora Rossica* 3(2), pp. 853–862. Schweizerbart, Stuttgart.
- Govaerts R. (1995): *World Checklist of Seed Plants* 1(1, 2). – MIM, Deurne, 483+529 pp.

- Hayek A. von (1956): Flora von Steiermark 2(2). Leonhardstrabe, Graz.
- Hernández-Ledesma P., Berendsohn W. G., Borsch T., Von Mering S., Akhiani H., Arias S., Castañeda-Noa I., Egli U., Eriksson R., Flores-Olvera H., Fuentes-Bazán S., Kadereit G., Klak C., Korotkova N., Nyffeler R., Ocampo G., Ochoterena H., Oxelman B., Rabeler R. K., Sanchez A., Schlumpberger B. O. & Uotila P. (2015): A taxonomic backbone for the global synthesis of species diversity in the angiosperm order Caryophyllales. – *Willdenowia* 45: 281–383.
- Hooker J. D. (1885): Flora of British India 4. – L. Reeve, London, 780 pp.
- Iamónico D. (2014a): Lectotypification of Linnaean names in the genus *Amaranthus* L. (Amaranthaceae). – *Taxon* 63(1): 146–150. <http://dx.doi.org/10.12705/631.34>
- Iamónico D. (2014b): *Amaranthus gangeticus* (Amaranthaceae), a name incertae sedis. – *Phytotaxa* 162(5): 299–300. <http://dx.doi.org/10.11646/phytotaxa.162.5.2>
- Iamónico D. (2015a): Taxonomic revision of the genus *Amaranthus* (Amaranthaceae) in Italy. – *Phytotaxa* 199: 1–84.
- Iamónico D. (2015b): Amaranthaceae Juss. In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [accessed 27 March 2020], URL: <http://ww2.bgbm.org/EuroPlusMed/RegionalTaxon.asp?PTNameFK=890&PTRefFK=7300000&Name=Amaranthus>.
- Iamónico D. (2016a): Nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 3. Names linked to the Italian flora. – *Pl. Biosyst.* 150(3): 519–531. <http://dx.doi.org/10.1080/11263504.2014.987188>
- Iamónico D. (2016b): Nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 4. Detailed questions arising around the name *Amaranthus gracilis*. – *Bot. Serb.* 40(1): 61–68.
- Iamónico D. (2016c): Nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 5. Moquin-Tandon's names. – *Phytotaxa* 273(2): 81–114. <http://dx.doi.org/10.11646/phytotaxa.273.2.1>
- Iamónico D. (2017): *Amaranthus xromanus* (Amaranthaceae), hybr. nov. – *Phytotaxa* 295(1): 89–91. <https://doi.org/10.11646/phytotaxa.295.1.9>
- Iamónico D. (2020a): A nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 7. Willdenow's names. – *Willdenowia* 50(1): 147–155. <https://doi.org/10.3372/wi.50.50114>
- Iamónico D. (2020b) Nomenclature survey of the genus *Amaranthus* (Amaranthaceae s.s.). 8. About *Amaranthus polygonoides* s.l. and *A. anderssonii*, two related taxa described from the tropical regions of America with notes on their taxonomy. – *Acta Bot. Mex.* 127: e1687. <https://doi.org/10.21829/abm127.2020.1687>
- Iamónico D. (2020c). A nomenclatural survey of the genus *Amaranthus* (Amaranthaceae) 9: names published by Roxburgh. Taiwania: in press.
- Iamónico D. & Galasso G. (2018): New nomenclatural changes for hybrids of *Amaranthus* (Amaranthaceae s. str.). – *Phytotaxa* 340(2): 196–196. <https://doi.org/10.11646/phytotaxa.340.2.11>
- Iamónico D. & Palmer J. (2020): Nomenclature survey of the genus *Amaranthus* (Amaranthaceae). 6. Names linked to the Australian flora. – *Aust. J. Bot.* 33: 169–173. <https://doi.org/10.1071/SB18062>
- IPNI (2008+): The International Plant Names Index. [accessed 27 March 2020], URL: <http://www.ipni.org>.
- Kerner A. J. von Marilaun (1875): Die Vegetations-Verhältnisse des mittleren und östlichen Ungarns und angrenzenden Siebenbürgens. – *Oesterr. Bot. Z.* 25: 194–199.

- Lamarck J. B. & Candolle A. P. de (1806): *Synopsis plantarum in flora Gallica descriptarum*. – H. Agasse & ex Typis J. G. A. Stoupe, Parisiis, 432 pp.
- Lucian D., Maria D., Stelian-Dorian P., Voichița T.-G. & Cristian O. (2018): *Amaranthus* plant – between myth and usage. – *Nat. Res. Sust. Develop.* 8(1): 9–16.
- Marhold K. & Hindák F. (eds) (2018): Checklist of Non-Vascular and Vascular Plants of Slovakia [accessed 27 March 2020], URL: <http://ibot.sav.sk/checklist/index.php?lang=sk&doc=result&id=1788>.
- Moquin-Tandon C. H. B. A. (1849): *Amaranthaceae*. – In: Candolle A. P. DE (ed): *Prodromus Systematis Regni Vegetabilis* 13(1), pp. 231–424. Sumptibus Victois Masson, Parisiis [Paris].
- Mosyakin S. L. & Robertson K. R. (1996): New infrageneric taxa and combinations in *Amaranthus* (Amaranthaceae). – *Ann. Bot. Fennici* 33: 275–281.
- Mosyakin S. L. & Robertson K. R. (2003): *Amaranthus* L. – In: Flora of North America Editorial Committee (eds): *Flora of North America North of Mexico (Magnoliophyta: Caryophyllidae, part 1)* 4, pp. 410–435. Oxford University Press, Oxford.
- Palmer J. (2009): A conspectus of the genus *Amaranthus* L. (Amaranthaceae) in Australia. – *Nuytsia* 19: 107–128.
- Raus Th. (1997): *Amaranthus* L. – In: Strid A. & Tan K. (eds): *Flora Hellenica* 1, pp. 138–146. Koeltz Scientific Books, Königstein.
- Sadler J. (1826): *Flora comitatus Pestiensis* 2. – Typis Nobilis Matthiae Trattner de Petróza, Pestini, 398 pp.
- Schultes J. A. (1814): *Österreichs Flora: ein Handbuch auf botanischen Excursionen, enthaltend eine kurze Beschreibung der in den Erbstaaten des österreichischen Kaiserthumes wildwachsenden Pflanzen*. – Schaumburg, Wien, 700 pp.
- The Plant List (2013): *Amaranthus commutatus* A.Kern. [accessed 27 March 2020], URL: <http://www.theplantlist.org/tpl/record/kew-2632784>.
- Thiers B. (2020 [continuously updated]): Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. [accessed 27 March 2020], URL: <http://sweetgum.nybg.org/ih/>.
- Tropicos (2018+): *Amaranthaceae* by Fenzl. - Tropicos.org, Missouri Botanical Garden. [accessed 27 March 2020], URL: <http://www.tropicos.org/NameSearch.aspx?name=Fenzl&commonname=>.
- Turland N. J., Wiersema J. H., Barrie F. R., Greuter W., Hawksworth D. L., Herendeen P. S., Knapp S., Kusber W.-H., Li D.-Z., Marhold K., May T. W., McNeill J., Monro A. M., Prado J., Price M. J., Smith G. F. (eds.) (2018): International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. – *Regnum Veg.* 159: 1–254. <https://doi.org/10.12705/Code.2018>
- Wallich N. (1832): Numerical list of dried specimens of plants in the Museum of the Honl. East India Company /which have been supplied by Dr. Wallich, superintendent of the botanic garden at Calcutta. – London, 306 pp.
- WCSP (2018): World Checklist of Selected Plant Families: *Amaranthus commutatus* A.Kern. Facilitated by the Royal Botanic Gardens, Kew. [accessed 27 March 2020], URL: <http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:59471-1>.

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