Lectotypification of Linnaean names in the genus *Amaranthus* L. (Amaranthaceae)

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Abstract The typification of the names *Amaranthus flavus* L., *A. mangostanus* L., *A. polygamus* L., *A. sanguineus* L. and *A. tristis* L. (Amaranthaceae) are discussed as well as their current recognition. Specimens from the Linnaean Herbarium (LINN) are designated as lectotypes for these four names. *Amaranthus mangostanus*, *A. polygamus* and *A. tristis* are treated as synonyms of *A. tricolor* L., while *A. flavus* and *A. sanguineus* are synonyms of *A. cruentus* L.

Keywords *Amaranthus*; Linnaean names; nomenclature; synonyms; typification

■ INTRODUCTION

Amaranthus L. is a genus of 60 to 70 species with worldwide distribution, about half of which are native to the Americas. Others are native to Asia, Australia, and Europe. Some taxa (e.g., *A. caudatus* L., *A. bouchonii* Thell.) have uncertain origins and are often considered worldwide weeds (Bojian & al., 2003; Mosyakin & Robertson, 2003; APG III, 2009; Palmer, 2009; Iamonico, 2012a). Linnaeus published 23 species names in *Amaranthus* (Linnaeus, 1753, 1755, 1759a, b, 1763, 1771), and modern circumscriptions of *Amaranthus* retain all names in *Amaranthus* (e.g., Costea & al., 2001a, b; Costea, 2003; Mosyakin & Robertson, 1996, 2003; Palmer, 2009; Iamonico, 2012a). Six names appear to be as yet untypified (a review of *A. gangeticus* is in preparation, while *A. lividus* L. was recently lectotypified by Reveal & Jarvis, 2009: 978), of which four are investigated here as part of the revision of the genus *Amaranthus* (and the family Amaranthaceae Juss.) in several projects, such as: the Euro+Med plantbase, the new edition of the Flora of Italy, the new Checklist of the Italian vascular flora, the Compendium Programme CAB International, etc. (see, e.g., Iamonico, 2008, 2009, 2010, 2011, 2012a, b, 2013a, b, in press, and in prep.; Iamonico & Jarvis, 2012; Iamonico & Sánchez del Piño, 2012; Iamonico & Verloove, 2013).

■ MATERIALS AND METHODS

The ongoing research on the genus *Amaranthus* has included field investigations (2006–2013), with the specimens collected by the author being preserved at HFLA. Specimens have been examined from European (AO, APP, AQUI, B, BI, BM, BOLO, BOZ, CAME, CAT, CLU, FI, G, GZU, K, LEC, LINN, LY, MRSN, MSMN, MSPC, P, PAD, PAL, PAV, PERU, PESA, PI, RO, ROV, S-LINN, TO, TR, TSB, URT, W, WU), and American (GH, MO, NY, PH, US) herbaria. Specimens from the following personal herbaria (all from Italy) have also been examined: A. Antonietti (Verbano-Cusio-Ossola), N. Ardenghi (Pavia), C. Argenti (Belluno), S. Ballelli (Camerino) M. Bovio (Aosta), G.V. Cerutti (Biella), E. Del Guacchio (Salerno), F. Giordana (Cremona), C. Lasen (Belluno), A. Soldano (Vercelli), A. Tisi (Alessandria), A. Truzzi (Mantova, Istituto Tecnico Agrario Statale Palidano).

■ TYPIFICATIONS

Amaranthus flavus

Linnaeus's protologue (Linnaeus, 1759a: 1269) consisted of a diagnosis, without synonyms and provenance. Subsequently, Linnaeus (1763: 1406) reported the provenance ("*Habitat in* India"), but again no synonyms were cited. *Amaranthus flavus* is one of the species described by Linnaeus as new (it was in fact intercalated between *A. retroflexus* L. and *A. hypochondriacus* L. carrying the letter "F"—see Jarvis, 2007: 43, 95).

Sauer (1967: 111) noted the existence of the specimen No. 1117.23 at LINN, but it was not explicitly treated as the type. This sheet includes Linnaeus's annotation "*flavus*" and bears a plant whose features correspond to the diagnosis. Moreover, a detailed drawing is present, showing one flower (with fruit) plus the five tepals and bracts, including measurements. I have been unable to trace any further original material in any of the other Linnaean and Linnaean-linked herbaria (see also Jarvis, 2007: 283). Since No. 1117.23 is the only extant original material, it is here designated as the lectotype of *A. flavus*.

Amaranthus flavus has rarely been recognized as a distinct species (e.g., Wilkes, 1810; Candolle, 1849: 258; Pal & Pandey, 1989; Wagstaff, 2008), it is more often being treated as a synonym of *A. hypochondriacus* L. (e.g., Carretero, 1990;

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Kerguélen, 1993; Costea & al., 2001a; Jarvis, 2007: 283; The Plant List, 2010; Janovská & al., 2012) or *A. cruentus* L. (D'Arcy, 1987; Zuloaga & al., 2008; Pinto & Velásquez, 2010). On the basis of the protologues (Linnaeus, 1753: 991, 1759a: 1269), *A. flavus* should be characterized by the "racemis … summo infimisque cernuis, fol. obovatis mucronatis", while *A. hypochondriacus* has "racemis … erectis, fol. oblongo-ovatis", and *A. cruentus* "racemis … compositis patulo-nutantibus, fol. lanceolato-ovatis". However, leaf shape and inflorescence structure have a low taxonomic value in *Amaranthus*, according to the current species concepts (e.g., Carretero, 1990; Akeroyd, 1993; Bojian & al., 2003; Mosyakin & Robertson, 2003). According to the classification proposed by Mosyakin & Robertson (1996), *A. flavus* can be placed into *Amaranthus* subg. *Amaranthus* sect. *Amaranthus* subsect. *Hybrida* Mosyakin & K.R.Robertson, which is characterized by the inflorescence in terminal spikes and flowers with five not spathulate tepals gradually narrowed into an acute apex. This subsection includes *A. hybridus* L., *A. cruentus*, *A. powellii* S.Watson s.l., *A. hypochondriacus*, and *A. quitensis* L. (see, e.g., Costea & al., 2001a; Iamonico, 2012a). These taxa can be distinguished mainly using the floral characters and, in particular, the structure of the bracts and their length in comparison with the tepals (see, e.g., Raus, 1997; Mosyakin & Robertson, 2003; Palmer, 2009). On the basis of the examination of the lectotype (LINN 1117.23), *A. flavus* has bracts awned, 2.6–2.8 mm long, with membranous borders abruptly interrupted at about the half, while the tepals are 2.1–2.3 mm long. These features well correspond to *A. cruentus*, especially for the structure of the bracts' membranous borders and the ratio bract length/tepal length (less than 1.5). Therefore, the name *A. flavus* should be synonymized with *A. cruentus*.

Amaranthus flavus L., Syst. Nat., ed. 10, 2: 1269. 1759 – **Lectotype (designated here):** Herb. Linn. No. 1117.23 (LINN!). [Image of lectotype available at http://www.linnean-online.org/11649/]

= ***Amaranthus cruentus*** L., Syst. Nat., ed. 10, 2: 1269. 1759.

Amaranthus mangostanus

Linnaeus's (1755: 32) protologue consisted of a diagnosis and description with the provenance ("*Habitat in* India"), without cited synonyms. At LINN there is a sheet (No. 1117.10) with the annotation "*mangostanus 3*", the "*3*" probably suggesting that Linnaeus had originally (1753) identified it with his *A. tristis* (number "*3*") but subsequently (1755) decided to recognise it as a new species. Jarvis (2007: 284) indicated the sheet No. 1117.10 (at LINN) as original material of both *A. mangostanus* and *A. tristis*: on the basis of the present study (see also the discussion under *A. tristis*) we can exclude this exsiccatum from the typification of the name *A. tristis*. The specimen matches the Linnaean diagnosis and description of *A. mangostanus* both in leaf (diagnosis: "foliis rhombeis obtusis"; description: "*Folia* rhombea, obtusissima, latiora quam longa, viridia, basi cuneiformia, longis *petiolis* insidentia, longioribus ipso folio, folia apice saepe parum emarginata") and in inflorescence features (diagnosis: "spicis triandris, glomeratis, sessilibus, axillaribus, terimnalibusque"; description: "*Flores* glomerati, viride, aristati, ad axillas & *Spicam* interruptam, terminalem"). Since No. 1117.10 is the only extant original material, it is here designated as the lectotype of *A. mangostanus*.

The name *A. mangostanus* was often cited as synonym of *A. tricolor* L. (native to tropical Asia) both in Asian (e.g., Townsend, 1974; Bojian & al., 2003) and in European (Akeroyd, 1993) Floras, where it is considered alien. *Amaranthus mangostanus* is a cultivated taxon in Asia and it is considered as a separate species in several works on plant physiology and agriculture management (e.g., Fan & Zhou, 2009). Based on the protologues (Linnaeus, 1753: 989; 1755: 32) and lectotypes (No. 1117.7, No. 1117.10) of *A. tricolor* and *A. mangostanus* these taxa differ in leaf shape and inflorescence structure. *Amaranthus tricolor* has leaves lanceolate, with blades longer than their width, acute at the apex and petiole shorter than the blade and an inflorescence that is comprised of axillary glomerules. *Amaranthus mangostanus* has leaves rhombic-ovate, with blades about as long as wide, emarginate at the apex and petiole longer than the blade, and an inflorescence that is comprised of axillary glomerules and a terminal spike. On the basis of these characters, Aellen (1959: 494–495) proposed *A. mangostanus* to be a subspecies of *A. tricolor*, *A. tricolor* subsp. *mangostanus* (L.) Aellen (Aellen also proposed *A. tristis* as subspecies of *A. tricolor*). On the basis of literature (see previously cited works) and personal observations, the leaf and inflorescence characters among *A. mangostanus*, *A. tricolor*, and *A. tristis* show continuous variability and do not permit the recognition of separate species or infraspecific taxa.

Amaranthus mangostanus L., Cent. Pl. I: 32. 1755 – **Lectotype (designated here):** Herb. Linn. No. 1117.10 (LINN!). [Image of lectotype available at http://www.linnean-online.org/11636/]

= ***Amaranthus tricolor*** L., Sp. Pl.: 989. 1753.

Amaranthus polygamus

Linnaeus's (1755: 32) protologue of *A. polygamus* consisted of a diagnosis, without synonyms, but including the provenance ("*Habitat in* India") and a detailed description. Subsequently, Linnaeus (1763: 1403) cited his republication of the protologue (1759c: 294) marked with an asterisk, indicating a good description for *A. polygamus* (see Jarvis 2007: 29), and one synonym from Rumphius (1747: 231). In the Linnaean Herbarium at LINN there is one sheet (no. 1117.9) with the annotation "*HU ~~gangeticus~~ polygamus*" indicating that Linnaeus described the species from a plant cultivated in the Hortus Upsaliensis. The plant mounted on this sheet agrees with the diagnosis both in vegetative characters ("foliis lanceolatis acutis") and in sexual ones (spicis diandris … sessilibus, axillaribus"). We have been unable to trace any further original material in any of the other Linnaean and Linnaean-linked herbaria (see also Jarvis, 2007: 284). As sheet no. 1117.9 is the only extant original material, it is here designated as lectotype of the name *A. polygamus*.

The name *A. polygamus* was cited as a separate taxon mainly in old works (e.g., Candolle, 1849: 272, as *Euxolus polygamus* (L.) Moq.; Boissier, 1879: 991, as *Albresia polygama* (L.) Boiss.), while in the 20th century it was often synonymized with *A. tricolor* (e.g., Townsend, 1974). Some authors (e.g., Burtt & Lewis, 1952: 352) have treated *A. polygamus* as a nomen confusum.

According to the revision by Mosyakin & Robertson (1996: 275–281), *A. polygamus* can be placed into *Amaranthus* subg. *Albersia* (Kunth) Gren. & Godr. sect. *Pyxidium* Moq., being characterized by axillary inflorescences, flowers with two tepals and dehiscent fruits. On the basis of the protologues and the lectotypes, *A. polygamus* can be referred to *A. tricolor* L. (lectotype: no. 1117.7 LINN, designated by Townsend, 1974: 14). This latter species is very variable morphologically and 4–5 infraspecific taxa have been described mainly on the basis of leaf shape and color, and inflorescence structure (see, e.g., Aellen, 1959: 495). The number of the stamens of *A. polygamus* (two) is indeed typical of a second species, *A. deflexus* L. However, the characters of the staminate flowers (the *Amaranthus* species have flowers unisexual) have a very low taxonomic value in the genus, since they are not constant (Mosyakin & Robertson, 1996). Therefore, the number of the stamens is not a good feature to identify the taxon. All things stated, we treat *A. tristis* as a synonym of a broadly circumscribed *A. tricolor*.

Amaranthus polygamus L., Cent. Pl. I: 32. 1755 – **Lectotype (designated here):** Herb. Linnaeus no. 1117.9 (LINN!). [Image of lectotype available at http://linnean-online.org/11635]
= ***Amaranthus tricolor*** L., Sp. Pl. 2: 989. 1753.

Amaranthus sanguineus

Linnaeus's (1763: 1407) protologue consisted of a diagnosis, with one synonym cited from Miller (1755: 15, t. 22), who provided an illustration that is original material. Sauer (1967: 122) stated that Linnaeus's description was "ambiguous", and concluded that the Miller illustration was *A. cruentus* and the sheet No. 1117.21, which bears Linnaeus's script "[*Amaranthus*] *sanguineus*", was *A. caudatus*. However, we do not believe that Miller's illustration can confidently be identified to any species, since there are no details of the flowers, which are critical for identification (e.g., Mosyakin & Robertson, 1996; Iamonico, 2012a). Furthermore, No. 1117.21 at LINN is not *A. caudatus*. *Amaranthus caudatus* differs from all other species in *A.* subg. *Amaranthus* (sensu Mosyakin & Robertson, 1996) in having a very long and drooping terminal spike as indicated in Linnaeus's (1753: 990) protologue ("racemis … pendulis longissimis") and the lectotype (Townsend, 1974) of *A. caudatus* (No. 1117.26 at LINN) has a very long terminal spike.

Sheet No. 1117.21 includes the Linnaean annotation "*sanguineus*" and bears a plant identifiable as *A. sanguineus* according to the Linnaean diagnosis. Moreover, a detailed drawing showing one flower, the tepals and the bracts (with measurements) was provided. No further original material in any of the other Linnaean and Linnaean-linked herbaria was found (see also Jarvis, 2007: 284). Since Miller's illustration cannot be identified to species with certainty, the specimen by Linnaeus is the only extant material and it is designated as lectotype of the name *A. sanguineus*.

Amaranthus sanguineus was rarely treated as separate taxon (e.g., Candolle, 1849: 257 as variety under *A. paniculatus*), while it is often considered as a synonym of *A. cruentus* L. (e.g., Costea & al., 2001a: 945; Jarvis, 2007: 284; The Plant List, 2010; Janovská & al., 2012: 461; Weldy & al., 2013). On the basis of the protologues, *A. sanguineus* should differ from *A. cruentus* in having the terminal spike erect, the lateral ones patent ("racemis … erectis: lateralibus patentissimis"; Linnaeus, 1763: 1407). However, the arrangement of the inflorescence branches is not used to distinguish *Amaranthus* species (e.g., Akeroyd, 1993; Mosyakin & Robertson, 2003). According to current concepts (e.g., Mosyakin & Robertson, 1996), *A. sanguineus* would belong to *A.* subg. *Amaranthus* sect. *Amaranthus* subsect. *Hybrida* Mosyakin & K.R.Robertson, having the inflorescences in terminal spikes and flowers with five tepals with acute apices. The bracts in *A. sanguineus* are awned, 2.5–2.8 mm long, with membranous borders abruptly interrupted near the midpoint. This latter feature morphologically distinguishes the aggregate *A. hybridus–A. cruentus* from other taxa included in subsect. *Hybrida* (that have borders thinning to the apex). In particular, *A. hybridus* differs from *A. cruentus* in having the bracts 1.6–2.0 times longer than the tepals (*A. cruentus* has the bracts 1 to 1.5 times longer than the tepals). Some authors propose the color of the inflorescence as diagnostic (green or greenish in *A. hybridus*, red in *A. cruentus*—see, e.g., Akeroyd, 1993), but others highlight that *A. cruentus* can be represented by plants with green spikes (e.g., Mosyakin & Robertson, 2003). Finally, other authors (e.g., Palmer, 2009) suggest the ratio fruit length/tepal length to separate the two taxa (ratio ≤1 for *A. hybridus*, or ≥1 for *A. cruentus*). The tepals of *A. sanguineus* are 1.6–1.8 mm long (bracts are about 1.5 times longer than the tepals), the fruits are about equal to the tepals, while the epithet chosen by Linnaeus ("*sanguineus*") suggests that the inflorescence is red coloured. So, we conclude that the name *A. sanguineus* can be considered a synonym of *A. cruentus*.

Amaranthus sanguineus L., Sp. Pl., ed. 2, 2: 1407. 1763 – **Lectotype (designated here):** Herb. Linn. No. 1117.21 (LINN!). [Image of lectotype available at http://linnean-online.org/11647/]
= ***Amaranthus cruentus*** L., Syst. Nat., ed. 10, 2: 1269. 1759.

Amaranthus tristis

Linnaeus's (1753: 989) protologue consisted of a diagnosis, with one doubtful quotation (marked with "?" after the page) from Van Royen (1740: 419) and included the provenance ("*Habitat in* China") and a description. Townsend (1985) incorrectly designated the specimen No. 1117.12 (LINN) as the lectotype for the name *A. tristis*. Indeed, this specimen cannot be considered part of the original material since it bears a plant referred to *A. mangostanus* (see discussion under this name). Also Jarvis (2007) stated "Townsend … incorrectly designated

1117.12 (LINN) as lectotype, a specimen with no very obvious link with this name, and which is not part of the original material". Therefore, Townsend's action should actually be considered a neotypification. However, since original material is in existence (see discussion below), the neotype cannot be accepted (Art. 9.19a, McNeill & al., 2012). In the Linnaean Herbarium at LINN there is one sheet with the Linnaean annotations "*3*" (at the base of the sheet) and "*indica H. Ups.*" (just below the plant) and a Smith determination (script "*tristis? YES*" at the bottom-right of the sheet). The number "*3*" explicity refers to that of the species account in Linnaeus's protologue, "*H. Ups.*" means Hortus Upsaliensis, indicating that the plant was cultivated, while "*indica*" was presumably added after 1753 (maybe when Linnaeus analyzed the *Herbarium amboinense* by Rumphius, 1747). The sheet bears a plant identifiable as *A. tristis* according to the Linnaean diagnosis, showing the leaves ovate with base obtuse to subcordate, inflorescence in short lateral spikes, flower with bracts awned and three tepals. Jarvis (2007: 284) also indicated the sheet No. 1117.10 (at LINN) as original material. However, this exsiccatum bears a plant whose features match the protologue of *A. mangostanus*, not of *A. tristis* and it was designated as the lectotype of *A. mangostanus* (see detailed discussion under *A. mangostanus*). All things stated, we designate No. 1117.11 at LINN as the lectotype of *A. tristis*.

Some authors have accepted *A. tristis* as a separate species (e.g., Ascherson & Graebner, 1919: 274; Aellen, 1959; Das, 2013), whereas others have treated it as a synonym of *A. tricolor* (e.g., Townsend, 1974; The Plant List, 2010). Mosyakin & Robertson (1996) recognized in *Amaranthus* subg. *Albersia* sect. *Pyxidium* Moq. an *A. tricolor* aggregate that included *A. tristis*. Like Townsend (1974), we treat *A. tristis* as a synonym of a broadly circumscribed *A. tricolor* (see discussion under *Amaranthus mangostanus*; for further discussion of the taxonomy of *A. tricolor*).

Amaranthus tristis L., Sp. Pl.: 989. 1753 – **Lectotype (designated here):** Herb. Linn. No. 1117.11 (LINN). [Image of lectotype available at http://linnean-online.org/11637/]
= ***Amaranthus tricolor*** L., Sp. Pl.: 989. 1753.

■ LITERATURE CITED

Aellen, P. 1959. *Amaranthus* L. Pp. 465–516 in: Hegi, G. (ed.), *Illustrierte Flora von Mitteleuropa*, 2nd ed., vol. 3(2). Munich: Parey.

Akeroyd, J. 1993. *Amaranthus* L. Pp. 130–132 in: Tutin, T.G., Burges, N.A., Chater, A.O., Edmondson, J.R., Heywood, V.H., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. (eds.), *Flora Europaea*, 2nd ed., vol. 1. Cambridge: Cambridge University Press.

APG III 2009. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Bot. J. Linn. Soc.* 161: 105–121. http://dx.doi.org/10.1111/j.1095-8339.2009.00996.x

Ascherson, P. & Graebner, P. 1919. *Synopsis der mitteleuropäischen Flora*, vol. 5(1). Leipzig: Gebr. Borntraeger. http://dx.doi.org/10.5962/bhl.title.35810

Boissier, E. 1879. *Flora orientalis*, vol. 4. Geneva, Basel: apud H. Georg.

Bojian, B., Clemants, S.E. & Borsch, T. 2003. Amaranthaceae. Pp. 415–429 in: Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.), *Flora of China*, vol. 9. Beijng: Science Press; St. Louis: Missouri Botanical Garden Press.

Burtt, B.L. & Lewis, P. 1952. On the flora of Kuweit: II. *Kew Bull.* 7(3): 333–352.

Candolle, A. de 1849. *Prodromus systematis naturalis regni vegetabilis*, vol. 13(2). Paris. http://dx.doi.org/10.5962/bhl.title.286

Carretero, J.L. 1990. *Amaranthus* L. Pp. 559–569 in: Castroviejo, S., Laínz, M., López Gonzáles, G., Montserrat, P., Muñoz Garmendia, F., Paiva, J. & Villar, L. (eds.), *Flora iberica*, vol. 2. Madrid: Real Jardín Botánico, CSIC.

Costea, M. 2003. The identity of a cultivated *Amaranthus* from Asia and a new nomenclatural combination. *Econ. Bot.* 57: 646–649. http://dx.doi.org/10.1663/0013-0001(2003)057[0646:NOEP]2.0.CO;2

Costea, M., Sanders, A. & Waines, G. 2001a. Preliminary results towards a revision of the *Amaranthus* hybridus complex (Amaranthaceae). *Sida* 19: 931–974.

Costea, M., Sanders, A. & Waines, G. 2001b. Notes on some little known *Amaranthus* taxa (Amaranthaceae) in the United States. *Sida* 19: 975–992.

D'Arcy, W.G. 1987. Flora of Panama: Checklist and index. Part 1: The introduction and checklist. *Monogr. Syst. Bot. Missouri Bot. Gard.* 17: 1–328.

Das, S. 2013. Infraspecific variability of *Amaranthus tricolor* (Amaranthaceae) in India with a new variety. *Phytotaxa* 88(2): 25–30. http://dx.doi.org/10.11646/phytotaxa.88.2.2

Fan, H.L. & Zhou, W. 2009. Screening of amaranth cultivars (*Amaranthus mangostanus* L.) for cadmium hyperaccumulation. *Agric. Sci. China* 8: 342–351. http://dx.doi.org/10.1016/S1671-2927(08)60218-7

Fernald, M.L. 1945. Botanical specialities of the seward forest and adjacent areas of south-eastern Virginia. *Rhodora* 47: 93–182.

Iamonico, D. 2008. Osservazioni sulla variabilità morfologica di *Amaranthus retroflexus* L. (Amaranthaceae) in Italia centrale. *Lagascalia* 28: 425–435.

Iamonico, D. 2009. 186. First record of *Amaranthus powellii* subsp. *powellii* (Amaranthaceae) in Lazio region (central Italy) with taxonomical, morphological, corologycal and ecological notes. *Acta Bot. Malac.* 34: 221–226.

Iamonico, D. 2010. Biology, life-strategy and invasiveness of *Amaranthus retroflexus* L. (Amaranthaceae) in central Italy: Preliminary remarks. *Bot. Serbica* 34(2): 137–145.

Iamonico, D. 2011. On the presence of *Amaranthus polygonoides* L. (*Amaranthaceae*) in Europe. *Phyton (Horn)* 50: 205–219.

Iamonico, D. 2012a. *Amaranthus powellii* S.Watson subsp. *cacciatoi* comb. & stat. nov. (Amaranthaceae). *Nordic J. Bot.* 30: 12–16. http://dx.doi.org/10.1111/j.1756-1051.2011.01080.x

Iamonico, D. 2012b. (2107) Proposal to reject the name *Gomphrena polygonoides* (*Amaranthaceae*). *Taxon* 61: 1326–1327.

Iamonico, D. 2013a. About the circumscription of *Celosia argentea* (Amaranthaceae) and the Linnaean related taxa. *Phytotaxa* 90(1): 61–64. http://dx.doi.org/10.11646/phytotaxa.90.1.3

Iamonico, D. 2013b. *Polycnemum verrucosum* (Amaranthaceae), first record for the Italian native flora and comparison with related species *P. arvense*. *Hacquetia* 12(1): 5–9. http://dx.doi.org/10.2478/hacq-2013-0001

Iamonico, D. In press. Lectotypification of the Linnaean name *Bosea yervamora* (Amaranthaceae). *Anales Jard. Bot. Madrid*.

Iamonico, D. & Jarvis, C.E. 2012. Lectotypification of two Linnaean names in the genus *Celosia* L. (Amaranthaceae). *Taxon* 61: 1101–1102.

Iamonico, D. & Sánchez Del Pino, I. 2012. *Alternanthera paronychioides* A.St.-Hil. in: Greuter, W. & Raus, T. (eds.), Med-Checklist notulae 31. *Willdenowia* 42: 288.

Iamonico, D. & Verloove, F. 2013. *Ptilotus spicatus* Benth. Pp. 153–154

in: Raab-Straube, E. von & Raus, T. (eds.), Euro+Med-Checklist notulae 1. *Willdenowia* 43: 152–153.

Janovská, D., Čepková, P.H. & Džunková, M. 2012. Characterization of the Amaranth genetic resources in the Czech gene bank. Pp. 457–478 in: Caliskan, M. (ed.), *Genetic diversity in plants*. Rijeka, Shanghai: InTech. http://www.intechopen.com/download/get/type/pdfs/id/31491

Jarvis, C. 2007. *Order out of chaos: Linnaean plant names and their types*. London: Linnean Society of London and the Natural History Museum.

Kerguélen, M. 1993. Index synonymique de la flore de France. http://www2.dijon.inra.fr/bga/fdf/am.htm (accessed: 8 Apr 2013).

Linnaeus, C. 1753. *Species plantarum*, vol. 2. Stockholm: Laurentius Salvius. http://dx.doi.org/10.5962/bhl.title.669

Linnaeus, C. 1755. *Centuria I. plantarum*. Uppsala: Reg. Acad. Typogr. http://dx.doi.org/10.5962/bhl.title.51985

Linnaeus, C. 1759a. *Systema naturae*, ed. 10, vol. 2. Stockholm: Laurentius Salvius. http://dx.doi.org/10.5962/bhl.title.542

Linnaeus, C. 1759b. *Plantarum jamaicensium pugillus*. Uppsala: G. Elmgren.

Linnaeus, C. 1763. *Species plantarum*, ed. 2, vol. 2. Stockholm: Laurentius Salvius. http://dx.doi.org/10.5962/bhl.title.11179

Linnaeus, C. 1771. *Mantissa plantarum altera*. Stockholm: Laurentius Salvius. http://dx.doi.org/10.5962/bhl.title.69083

McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, D.L., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Proud'Homme van Reine, W.F., Smith, J.F. & Wiersema, J.H. & Turland, N.J. (eds.) 2012. *International Code of Nomenclature for algae, fungi and plants (Melbourne Code)*. Regnum Vegetabile 154. Königstein: Koeltz Scientific Books.

Miller, P. 1755 ("1760"). *Figures of the most beautiful, useful and uncommon plants described in the Gardeners dictionary*. London: Printed by the author.

Mosyakin, S.L. & Robertson, K.R. 1996. New infrageneric taxa and combinations in *Amaranthus* (Amaranthaceae). *Ann. Bot. Fenn.* 33: 275–281.

Mosyakin, S.L. & Robertson, K.R. 2003. *Amaranthus* L. Pp. 410–435 in: Flora of North America Editorial Committee (eds.), *Flora of North America north of Mexico*, vol. 4. New York, Oxford: Oxford University Press.

Pal, M. & Pandey, R.M. 1989. Cytogenetics and evolution of grain-amaranths. *Aspects Pl. Sci.* 11: 323–336.

Palmer, J. 2009. A conspectus of the genus *Amaranthus* (Amaranthaceae) in Australia. *Nuytsia* 19: 107–128.

Pinto, W.C., & Velásquéz, G.O. 2010. Sinopsis del sugénero *Amaranthus* (*Amaranthus*, Amaranthaceae) en Venezuela. *Acta Bot. Venez.* 33(2): 329–356.

Raus, Th. 1997. *Amaranthus* L. Pp. 138–146 in: Strid, A. & Tan, K. (eds.), *Flora hellenica*, vol. 1. Königstein: Koeltz Scientific Books.

Reveal, J.L. & Jarvis, C.E. 2009. Typification of names of temperate North American plants proposed by Linnaeus. *Taxon* 58: 977–984.

Rumphius, G.E. 1747. *Herbarium amboinense*, vol. 5. Amsterdam: Apud Franciscum Chaguion, Hermannum Uytwerf. http://dx.doi.org/10.5962/bhl.title.569

Sauer, J.D. 1967. The grain amaranths and their relatives: A revised taxonomic and geographic survey. *Ann. Missouri Bot. Gard.* 54: 103–137. http://dx.doi.org/10.2307/2394998

The Plant List 2010. *Amaranthus flavus* L., *A. sanguineus* L., *A. tristis* L. Available from http://www.theplantlist.org/ (accessed 8 Apr 2013).

Townsend, C.C. 1974. *Amaranthaceae*. Pp. 1–49 in: Nasir, E. & Ali, S.I. (eds.), *Flora of west Pakistan*, vol. 71. Rawalpindi: Ferozsons Press.

Townsend, C.C. 1985. *Flora of tropical East Africa. Amaranthaceae*. Rotterdam: Balkema.

Van Royen, A. 1740. *Florae leydensis prodromus*. Leiden: Apud Samuelem Luchtmans. http://dx.doi.org/10.5962/bhl.title.693

Wagstaff, D.J. 2008. *International poisonous plants checklist—An evidence-based reference*. Boca Raton: CRC Press. http://dx.doi.org/10.1201/9781420062533

Weldy, T., Werier, D. & Nelson, A. 2013. New York Flora Atlas. Albany, New York: New York Flora Association. http://www.newyork.plantatlas.usf.edu/Plant.aspx?id=62&syn_name=Amaranthus+hybridus+subsp.+cruentus (accessed: 9 Apr 2013).

Wilkes, J. (comp.) 1810. *Encyclopedia Londinensis; or Universal dictionary of arts, sciences, and literature*, vol. 1. London: Printed for the proprietor.

Zuloaga, F.O., Morrone, O., Belgrano, M.J., Marticorena, C. & Marchesi, E. (eds.) 2008. Catálogode las plantas vasculares del Cono Sur (Argentina, Sur de Brasil, Chile, Paraguay y Uruguay). *Monogr. Syst. Bot. Missouri Bot. Gard.* 107: 1–983.