



## NOTE

## A nomenclatural survey of the genus *Amaranthus* (Amaranthaceae) 9: names published by Roxburgh

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**ABSTRACT:** A nomenclatural study of the names in *Amaranthus* published by W. Roxburgh was carried out. Seven names appear to have been published by the author, three being not valid from the nomenclatural point of view (*Amaranthus atropurpureus*, *A. fasciatus*, and *A. lanceofolius*, nomina nuda, Arts. 38.1 and 38.2 of ICN). The remaining four names are valid and they are typified by illustrations included in “The Roxburgh Collection” at the library of the Royal Botanic Garden of Kew [Nos. 447 (lectotype of *A. fasciatus*), 1676 (lectotype of *A. lanceolatus*), and 1677 (lectotype of *A. frumentaceus*)] or included in the *Seikei Zusetsu Agricultural Catalog* (neotype of *A. atropurpureus*).

**KEY WORDS:** *Amaranthus*, herbarium, *nomen nudum*, nomenclature, synonymy, typification, valid publication.

### INTRODUCTION

*Amaranthus* L. (Amaranthaceae Juss.) is a genus that includes 70–75 species, of which approximately half are native to the Americas (see e.g., Mosyakin and Robertson, 2003; Iamónico, 2015). Several species native to the Americas are used as ornamentals, food, and medicines, and could be agricultural weeds, mainly impacting agricultural systems economically with reduction in productivity and crop quality (Costea *et al.*, 2001; Hernández-Ledesma *et al.*, 2015; Iamónico, 2015; Das, 2016). The genus is critical from the taxonomical point of view due to its high phenotypic variability, which led to nomenclatural disorders and misapplication of names (Mosyakin and Robertson, 1996; Costea *et al.*, 2001; Bayón, 2015; Iamónico, 2015). No comprehensive molecular study has been published at present yet (the most recent paper is that by Waselkov *et al.*, 2018), whereas, on the basis of morphological and chorological data, Mosyakin & Robertson (1996) proposed a classification of *Amaranthus* into three subgenera, i.e. subgenus *Acnida* (L.) Aellen ex K.R. Robertson, subgenus *Albersia* (Kunth) Gren. & Godr., and subgenus *Amaranthus*.

Concerning India, a comprehensive taxonomic study of *Amaranthus* is lacking, although some papers of new species have been recently published by Das (2014) and Das & Iamónico (2014) from West Bengal (northeast India) and Arya *et al.* (2019) and Sindhu *et al.* (2020) from the Kerala region (southwest India). The first author who studied Indian amaranths was William Roxburgh (Ayrshire, 29 June 1751 – Ayrshire, 10 April 1815). He was a Scottish botanist (student of Dr. John Hope, professor of botany and *materia medica*) and

surgeon (student of Dr. Alexander Monro at the University of Edinburgh). After joining the East India Company as an Assistant Surgeon, he joined the staff of the general hospital at Madras (currently an area of the center of the city Chennai, located in southwest India). However, he was soon a Company Naturalist, describing many new species which inspired some beautiful watercolour drawings by Indian artists, copies of which were sent to the Court of Directors of EIC in London. He was appointed the first paid Superintendent of the Calcutta Botanic Garden in 1793, where he continued his work as a naturalist. In addition, Roxburgh looked for ways to improve the life condition of the native workers (e.g. by reducing the impact of frequent famines) and introducing suitable plants that could be used for food. Roxburgh's additional scientific interests were in meteorology, zoology, and geology. Concerning botany, Roxburgh extensively worked in India, he is considered the founding father of Indian botany, and he is often referred to as “the Linnaeus of India”. Obituaries referred to him as the “greatest botanist since Linnaeus” (Robinson, 2008).

Roxburgh's contribution to the knowledge of the family *Amaranthaceae* Juss. (*sensu* Hernández-Ledesma *et al.*, 2015) and the genus *Amaranthus* L. was important, especially the taxonomic treatment in his *Flora Indica* (Roxburgh, 1832) which represents the first taxonomic treatment of this genus in the Indian subcontinent, with 16 species recognized.

As part of ongoing nomenclatural investigations into all published names of *Amaranthus*, I present here the ninth contribution, concerning the names proposed by W. Roxburgh. The eight previous or under submission papers were on the Linnaean names (Iamónico, 2014a,



2014b), the names linked to the Italian flora (Iamonico, 2016a), *Amaranthus gracilis* Desf. and related names (Iamonico, 2016b), Moquin-Tandon's names (Iamonico, 2016c), names linked to the Australian flora (Iamonico and Palmer, 2019), Willdenow's names (Iamonico, 2020a), and *Amaranthus polygonoides* L. s.l. (Iamonico, 2020b). The study of nomenclature, which can be defined as the system of scientific names for taxa and their ranks (species, genus, family, etc.) and the rules and conventions for the formation, treatment, and use of those names, is very important in taxonomy (especially for critical groups such as *Amaranthus*) since, through the designation of the types, nomenclature regulates how names are used to communicate taxonomic hypotheses. Nomenclature has been providing classification systems of biodiversity for centuries and has been continuing to accommodate new knowledge in botany (see Thomson *et al.*, 2018).

## MATERIALS AND METHODS

The work is based on analysis of relevant literature (protologues are included) and examination of specimens preserved in the following herbaria: B, BM, BR, E, FI, G, K, LINN, NY, OXF, P, and PH (codes according to Thiers, 2020 [continuously updated]). The names published by Roxburgh, searched in the main online plant nomenclature databases (IPNI, 2006+a; The Plant List, 2013a; Tropicos, 2020), are listed alphabetically. Currently accepted names are given in boldface.

The Articles of the *International Code of Nomenclature for algae, fungi, and plants* cited in the text (e.g. as "Art. 38.1 of ICN") follow the current edition, i.e. the *Shenzhen Code* (Turland *et al.*, 2018).

## RESULTS AND DISCUSSION

Two Roxburgh's works include new species of *Amaranthus*: volume 3 of *Flora Indica* (Roxburgh, 1832) and *Hortus Bengalensis* (Roxburgh, 1814). On the basis of the online databases of plant names (IPNI, 2006+a; The Plant List, 2013a; Tropicos, 2020) thirteen names have been ascribed to Roxburgh. However, after checking Roxburgh's works, this is not true for eight of these names. In fact, "*A. caturus* Roxb." is erroneously reported in the above-mentioned databases as published in Wallich's *Numerical List* (Wallich, 1932: 231). However, Wallich (l.c.) associated the name *A. caturus* not to Roxburgh but to "*Hb. Mad.*", which means "Herbarium Madras" (code MH according to Thiers, 2020 [continuously updated]) where Roxburgh's collection is not deposited (see HUH Index of Botanists, 2013 onwards). Of the other seven misattributed names, six ("*Amaranthus tenuifolius* Roxb.", "*Amaranthus lividus* Roxb.", "*Amaranthus oleraceus* Roxb.",

"*Amaranthus polygamus* Roxb.", "*Amaranthus cruentus* Willd. ex Roxb.", and "*Amaranthus polygonoides* Roxb."), as listed in the online databases, were not actually described by Roxburgh (1832) in his *Flora Indica*, where the author clearly referred to the 4<sup>th</sup> volume of Willdenow's edition (ed. 4) of *Species plantarum* (Willdenow, 1805). The seventh name (*Amaranthus farinaceus*) was actually published by Moquin-Tandon (1849: 348) who in turn ascribed the name to Roxburgh [this name was investigated by Iamonico (2016: 84), who correctly stated that it was not validly published under the Arts. 38.1 and 38.2 of ICN, making it *nomen nudum*].

The remaining five *Amaranthus* names [plus two not listed in the online databases, i.e. *A. atropurpureus* Roxb. and *A. fasciatus*, published in *Hortus Bengalensis* (Roxburgh, 1814: 67)] were really published by Roxburgh (1814, 1832). Three of these seven names ["*A. atropurpureus*", "*A. fasciatus*", and "*A. lanceifolius*", published in *Hortus Bengalensis* (Roxburgh, 1814: 67)] were not validly published, being *nomina nuda* according to the Arts. 38.1 and 38.2 of ICN (concerning the nomenclature of the names published in *Hortus Bengalensis*, see the discussions by Robinson, 1912 and Turner, 2010), whereas the other four names were validly published by Roxburgh (1832) and they are still not typified.

Most of Roxburgh's botanical collection, in which types could be searched for, is currently deposited at the Kew Herbarium (code: K), mainly included in the Wallich herbarium. Sets of specimens occur also at various other herbaria (see Stafleu and Cowan, 1983: 954; HUH Index of Botanists, 2013 onwards). Further original material is represented by drawings (of plants or specimens) made by Indian artists and linked with Roxburgh's descriptions of new species published in both the 1<sup>st</sup> and 2<sup>nd</sup> Editions of his *Flora Indica* (Roxburgh, 1820–1824, 1832<sup>Note 1</sup>) as clarified by Sealy (1956; see also Forman, 1997; Chakrabarty, 2019). I traced these drawings at the library of the Royal Botanic Garden of Kew in "The Roxburgh Collection" (Sealy, 1956; Royal Botanic Garden, Kew, 2006). Sealy (1956: 279) also highlighted that about four hundred of Roxburgh's copied drawings were published by Wight (1838–1853) in *Icones Plantarum India Orientalis*, where they were marked as "Roxburghianae" (see <https://www.biodiversitylibrary.org/bibliography/92#/summary>).

### *Amaranthus atropurpureus*

Roxburgh (1832: 608) provided just a diagnosis for *Amaranthus atropurpureus* without a detailed provenance; moreover, he stated: "It appears to me to be a well-marked, very distinct species, which I have not found altered by change of soil".

No drawings that are part of the original material for



*Amaranthus atropurpureus* were made according to Sealy (1956: 307) and, unfortunately, no specimens useful for the purpose of lectotypification were traced during the present research. According to the Art. 9.9 of ICN, a neotypification is required.

The choice of a neotype for this Roxburgh name is not, however, a simple issue. In fact, most of the characters reported in the Roxburgh description [habit (“Erect, ramosus”), height of plant (“from three to six feet high [= 91.44–182.88 cm]”), leaves (“Leaves lanceolar, of a deep liver colour, above of a shining crimson, underneath purple”), and structure of the synflorescences (“Glomerules axillary, as well as glomerate terminal spikes”)] can be ascribed to many *Amaranthus* species (see e.g., Bao *et al.*, 2003; Mosyakin and Robertson, 2003; Iamonico, 2015). More interesting are instead the characters of the flowers, which were reported by Roxburgh (1832: 608) by the following sentence: “Calyx three or five-leaved, cuspidate, and longer than the rugose capsule”. The term “Calyx ... -leaved” clearly refers to “tepals”<sup>Note 2</sup>. The term “cuspidate” refers, instead, to the apex of the tepal and it was defined during the last centuries in the same way as today, i.e. as a structure “terminating in a Point like a Spear” by Lee (1788: 386), or “terminating in a sharp point” by Nicholson (1819: without page), or “terminated suddenly by a bristly point” by Comstock (1836: 58, Fig. 73), or “Tipped with a sharp and rigid point, or cusp, especially if lance or spear shaped” by Dayton (1950: 10, Fig. 25A), or “ending rather abruptly in a sharp point” by Hickey *et al.* (2000: 11). Note finally that Roxburgh (l.c.) included *A. atropurpureus* in his “SECT. I. *Triandrous*” so considered this species as having male flowers with 3 stamens.

All things considered, *Amaranthus atropurpureus* would be a species displaying stems erect (91.44–182.88 cm high) and branched, leaves lanceolate and red to purple coloured, synflorescences arranged in axillary glomerules and terminal spike-like structures, flowers with 3 to 5 awned tepals, 3 stamens, and capsules rugose and shorter than the perianth. On the basis of the current concept of *Amaranthus* (see e.g., Bao *et al.*, 2003; Mosyakin and Robertson, 2003; Bayón, 2015; Iamonico, 2015), just one species has all these characters, i.e. *A. tricolor* L. [subgen. *Albersia* (Kunth) Gren. & Godr. *sensu* Mosyakin and Robertson (1996)]. Note that Roxburgh (1832: 608) listed *A. tricolor* (no. 11 in *Flora Indica*) just after *A. atropurpureus* (no. 10 in *Flora Indica*). By examination of Roxburgh's descriptions of *A. atropurpureus* and *A. tricolor*, differences between these two species would have the height of plants (3–6 feet for *A. atropurpureus* vs. 2–4 feet for *A. tricolor*), the synflorescence (axillary glomerules and terminal spikes in *A. atropurpureus* vs. only axillary glomerules in *A. tricolor*), and the number of tepals (3–5 in *A. atropurpureus* vs. only 3 in *A. tricolor*). However, these

characters cannot be considered useful to separate *A. atropurpureus* as a different species (as reported, e.g., by POWO, 2020a-onward). In fact, *A. tricolor* is a very variable species from the morphological point of view, both in vegetative characters (stem branching and leaf blade shape and colour) and in sexual characters (structure of the synflorescence, number of tepals which vary from 3 to 5) (see e.g., Bao *et al.*, 2003; Mosyakin and Robertson 2003; Iamonico, 2015). This high phenotypic variability originally led Linnaeus (1753, 1755, 1759) to recognize several species, all from India (*A. gangeticus* L., *A. mangostanus* L., *A. melancholicus* L., *A. polygamus* L., and *A. tristis* L.), and these taxa were later reduced by Aellen (1959) to subspecies. The detailed study by Iamonico (2014a) on the Linnaean types showed that all the Linnaean names are to be treated as synonyms (the currently accepted name is *A. tricolor*), whereas *A. gangeticus* was considered as a name incertae sedis (Iamonico, 2014b). Roxburgh (1832) recognized for India *A. tristis* (species no. 4 in the 2<sup>nd</sup> edition of *Flora Indica*), *A. gangeticus* (no. 8), *A. tricolor* (no. 11), and *A. melancholicus* (no. 12) citing, under each name, volume 4 of the 4<sup>th</sup> edition of Willdenow's (1805) *Species Plantarum*.

In conclusion, *Amaranthus atropurpureus* appears to be an additional form of the *A. tricolor* aggregate, and its morphology is a mixture of the features reported by Linnaeus (1753, 1755, 1759) for the species that have since been synonymized with *A. tricolor*, i.e. *A. tristis* and *A. mangostanus* (terminal syflorescence), or *A. tricolor*, *A. melancholicus*, and *A. polygamus* (lanceolate leaves). I here considered the morphology of *A. atropurpureus* as included in the variability of *A. tricolor*. Since one of the diagnostic characters of *A. atropurpureus* reported by Roxburgh (1832: 608) was the colour of the leaves and this character tends to change during drying (personal observations), I prefer to avoid the selection of an exsiccatum as the neotype of this name, and instead affix Roxburgh's name to a coloured illustration. A good iconography of a plant, the morphology of which completely matches Roxburgh's description, is that of *A. tricolor* included in volume 23 (page 24) of the *Seikei Zusetsu Agricultural Catalog* (see Chatterjee and van Andel, 2019 for details about the rare Japanese agricultural encyclopedia). The *Seikei Zusetsu*'s illustration is here designated as the neotype of the name *A. atropurpureus* (= *A. tricolor*).

*Amaranthus atropurpureus* can also be associated with the *A. tricolor* cultivar named as “Red Army” (Biggs, 2018: 80; McVicar, 2019: 29).

### *Amaranthus fasciatus*

This name (sub *Amaranthus* “*fasciatus*”, see discussion below) was validly published by Roxburgh (1832: 609) who provided a description only plus the statement “A common weed,” which would indicate that



this species occurs in human-made habitat. Note that Roxburgh (1814: 67), in his *Hortus Bengalensis*, published the invalid name "*Amaranthus fasciatus*" (*nomen nudum* according to the Arts. 38.1 and 38.2 of ICN). We suppose that Roxburgh's epithet "*fasciatus*" in *Flora Indica* (Roxburgh, 1832: 609) was an orthographic error. As a consequence, according to the Art. 60.1 of ICN, the epithet "*fasciatus*" should be corrected to "*fasciatus*".

A drawing of *Amaranthus fasciatus* (No. 447) is included in "The Roxburgh Collection" at the library of the Royal Botanic Garden of Kew and it is here designated as the lectotype of the name (no specimen was traced). This illustration represents the species by showing: 1) the terminal part of a plant with leaves and synflorescences, 2) the root, and 3) the magnification of the male and female flowers, one fruit, and one seed. A description based on this illustration, which matches the morphological characters given by Roxburgh (1832: 609) in the protologue, follows: annual herb; stem erect, glabrous, branched, and light-green coloured; leaves petioled, ovate to deltoid with apex obtuse, green-coloured (some blades with one curved white band or three curved black-white-black bands); flowers mostly arranged in terminal spike-like synflorescences (few glomerules in the basal and middle parts of the stem); male flowers with 3 ovate and acute tepals and 3 stamens longer than the perianth; female flowers with 3 ovate and subacute tepals and ovary with 3 styles as long as the ovary; fruit indehiscent, slightly wrinkled including one black and ovoid seed. This morphology completely matches that of the currently accepted species *A. blitum* L. s.str. (see e.g., Bayón, 2015: 308–309; Iamónico, 2015: 27) and *A. fasciatus* can be considered as a heterotypic synonym of the Linnaean name.

Note that the online sources of plant names in which this Roxburgh's name is listed (IPNI, 2006+b; The Plant List, 2013b; POWO, 2020a-onward) rightly correct the specific epithet as "*fasciatus*" as published in Roxburgh's *Flora Indica* (Roxburgh, 1832: 609), not in Roxburgh's *Hortus Bengalensis* (Roxburgh 1814: 67, see discussion at the beginning of the present paragraph). However, these databases incorrectly treat Roxburgh's name as a heterotypic synonym of *A. viridis* L. (this latter species differs from *A. blitum* s.l. in having the synflorescences slender and thinner and the fruit strongly rugose, all characters that are not displayed by the lectotype of *A. fasciatus*; see e.g., Iamónico, 2015).

### *Amaranthus frumentaceus*

Roxburgh (1832: 609–610) provided a diagnosis and a detailed description for *Amaranthus frumentaceus*, as well as the collector ("*Buchanan*", whose name was also reported after the binomial), the provenance ("...hills between the Mysore and Coimbatore countries"), and the flowering time ("June...September").

Hunziker (1952: 68, footnote no. 53) quotes a letter from Sir E.J. Salisbury in June 1951 (Salisbury was the Director of the Royal Botanic Gardens Kew at the time) that mentions: "fragment of a specimen that can be probably regarded as a type specimen of *Amaranthus frumentaceus*. BUCH.-HAM. ex ROXBURGH". Given that neither Salisbury nor Hunziker definitely indicated the specimen as type, this does not constitute effective lectotypification according to the Art. 9.10 of the ICN.

I found specimens at BR (barcode BR0000006950781, label: "*Amaranthus frumentaceus* Roxb. | Herb. Guil. Roxburgh | Communic. ... 1863 | HERBARIUM MARTII"; image available at [www.br.fgov.be/research/COLLECTIONS/HERBARIUM/zoomifyimaging.php?filename=0000006950781&herbarium=BR](http://www.br.fgov.be/research/COLLECTIONS/HERBARIUM/zoomifyimaging.php?filename=0000006950781&herbarium=BR)) and K (barcode K000195017, plant on the top left-hand side, label: "*Amaranthus frumentaceus* Hb. Roxb."; image available at <http://apps.kew.org/herbcat/getImage.do?imageBarcode=K000195017>). However, neither of them can be considered as part of the original material, since neither reference to "*Buchanan*" (the collector of the species according to the protologue; Roxburgh, 1832: 609), nor the original localities were annotated on these specimens. As a consequence, BR and K specimens are not eligible as lectotypes according to the Arts. 9.3 and 9.4 of ICN.

A drawing of *Amaranthus frumentaceus* (No. 1677) is included in "The Roxburgh Collection" at the library of the Royal Botanic Garden of Kew and it is here designated as the lectotype of the name. This illustration displays: 1) the terminal part of a plant with leaves and synflorescences, 2) a middle section of the stem showing the large diameter of the main axis in comparison with that of the branches, and 3) the magnification of one male flower, two fruits, and two seeds (at different phases of development). A description of this illustration follows: stem erect, glabrous, branched, red coloured, ribbed; leaves petioled, ovate-lanceolate with base cuneate and apex acute, green to red coloured; flowers arranged in terminal or axillary spike-like synflorescences; male flowers with 5 ovate-lanceolate and cuspidate tepals and 3 stamens slightly shorter than the perianth; ovary with 3 stigmas; fruit dehiscent (the line of dehiscence was highlighted, in the illustration, by two different colours of the fruit surface, i.e. white-creamy for the basal part, light orange-red for the distal part), rugose and including one discoidal seed. Unfortunately, this illustration does not show the pistillate flowers whose features (mainly the number of the tepals and the shape of the bracts) are important for a correct identification of *Amaranthus* at species rank (see e.g., Bao *et al.*, 2003; Mosyakin and Robertson 2003; Bayón, 2015; Iamónico, 2015). Moreover, the detailed original description by Roxburgh (1832: 610) does not provide any data about the tepals and bracts of the pistillate flowers. Therefore, I considered the specimens



traced at BR and K (see discussion above) to clarify the concept of *A. frumentaceus* in the light of the current species recognition in the genus *Amaranthus*. In fact, both these specimens, being part of Roxburgh's herbarium, would have been seen by him. The pistillate flowers of both these two specimens have 5 lanceolate tepals and bracts longer than the perianth and with membranous borders abruptly interrupted at about the halfway point. These characteristics, together with the other ones visible in the illustration No. 1677 included in "The Roxburgh Collection" (see discussion above), morphologically match the Linnaean species *A. hybridus* L. (see e.g., Bayón, 2015: 308–309; Iamónico, 2015: 27). *A. frumentaceus* is here considered to be a heterotypic synonym of *A. hybridus*, the latter name having nomenclatural priority.

Note that *Amaranthus frumentaceus* has previously been synonymised both with *A. hypochondriacus* L. (e.g., The Plant List, 2013c), or with *A. hybridus* L. s.str. (e.g., Townsend, 1974).

### *Amaranthus lanceolatus*

Roxburgh (1832: 607) described *Amaranthus lanceolatus* by providing a short diagnosis and a detailed description, as well as the phenology ("Flowering time the rainy season") and the provenance ("A native of Bengal").

A drawing of this species (No. 1676) is included in "The Roxburgh Collection" at the library of the Royal Botanic Garden of Kew, and it represents the species by showing: 1) the terminal part of a plant with leaves and synflorescences and 2) the magnification of one male flower, one female flower, and one opened fruit with visible seed.

Three specimens, identified in the online database as *Amaranthus lanceolatus*, were traced at K [barcodes K001126085 (Herbarium Roxburgh, image available at <http://specimens.kew.org/herbarium/K001126085>), K001126086 and K001126087 (both Herbarium Madras), the latter two mounted on the same sheet; images available at "<http://specimens.kew.org/herbarium/K001126086> and <http://specimens.kew.org/herbarium/K001126087>"], and one specimen was traced at BR [barcode BR0000006951108, image available at [www.br.fgov.be/research/COLLECTIONS/HERBARIUM/zoomifyimaging.php?filename=0000006951108&herbarium=BR](http://www.br.fgov.be/research/COLLECTIONS/HERBARIUM/zoomifyimaging.php?filename=0000006951108&herbarium=BR)]. All these four exsiccata (original material) are each represented by a terminal part of one plant with leaves and synflorescences. These exsiccata cannot be however considered for the lectotypification purpose, since one character they exhibit is clearly in contrast with Roxburgh's diagnosis and description, i.e. the synflorescence structured in a terminal spike-like, whereas the protologue reports "*glomerules ... axillary*" (diagnosis) and "*Glomerules axillary, never any thing like a terminal spike*" (description).

All things considered, the Roxburgh Collection illustration appears to be the only extant original material which matches the Roxburgh's (1832: 607) protologue and it is here designated as the lectotype of the name *Amaranthus lanceolatus*.

Concerning the identity of *Amaranthus lanceolatus*, a description based on Roxburgh's illustration follows: stem erect, glabrous, simple, light-green coloured, slightly ribbed; leaves petioled, lanceolate with base cuneate and apex obtuse and mucronate, green coloured; flowers arranged in axillary glomerules; male flowers with 3 lanceolate and cuspidate tepals and 3 stamens about as long as the perianth; female flowers with 3 cuspidate tepals and ovary with 3 stigmas; fruit dehiscent, shiny, including one black seed. This morphological configuration would correspond to the Linnaean *A. polygamus* (type designated by Iamónico, 2014a: 148), which is a name currently considered as a synonym of *A. tricolor* according to the current concept in *Amaranthus* (see e.g., Bao *et al.*, 2003; Mosyakin and Robertson 2003; Bayón, 2015; Iamónico, 2015).

In conclusion, *Amaranthus lanceolatus* is a heterotypic synonym of *A. tricolor*.

## TAXONOMIC TREATMENT

*Amaranthus atropurpureus* Roxb., Fl. Ind. 2<sup>nd</sup> Ed. 3: 608. 1832. **Neotype** (designated here): [Icon] *Amaranthus tricolor* (image on the left) in *Seikei Zusetsu Agricultural Catalog* 23: 24. 1800 (image available at [https://digitalcollections.universiteitleiden.nl/view/item/938336?solr\\_nav%5Bid%5D=37e9aacc2ae51a17cc89&solr\\_nav%5Bpage%5D=0&solr\\_nav%5Boffset%5D=0](https://digitalcollections.universiteitleiden.nl/view/item/938336?solr_nav%5Bid%5D=37e9aacc2ae51a17cc89&solr_nav%5Bpage%5D=0&solr_nav%5Boffset%5D=0)).

= *Amaranthus tricolor* L., Sp. Pl. 2: 989. 1753. **Lectotype**: (designated by Townsend 1974: 14): Habitat in India, Herb. Linn. No. 1117.7 (LINN!). Image of the lectotype available at <http://linnean-online.org/11633/>

– *Amaranthus atropurpureus* Roxb., Hort. Bengal.: 67. 1814, *nom. nud.* (Arts. 38.1 and 38.2 of ICN).

*Amaranthus fasciatus* Roxb., Fl. Ind. 2<sup>nd</sup> Ed. 3: 609. 1832. **Lectotype**: (designated here): [Icon] *Amaranthus fasciatus* (No. 447) in "The Roxburgh Collection" at library of the Royal Botanic Garden of Kew. Image available at <http://apps.kew.org/floraindica/img/illustration/large/62657.jpg><sup>Note3</sup>.

= *Amaranthus blitum* L., Sp. Pl. 2: 989. 990 subsp. *blitum* var. *blitum*. **Lectotype** (designated by Filias *et al.*, 1980: 149–150): Europe, *Habitat in Europa temperatiore*, Herb. Linn. No. 1117.14 (LINN!). Image of the lectotype available at <http://linnean-online.org/11640/>

– *Amaranthus fasciatus* Roxb., Hort. Bengal.: 67. 1814, *nom. nud.* (Arts. 38.1 and 38.2 of ICN).

*Amaranthus frumentaceus* Buch.-Ham. ex Roxb., Fl. Ind. 2<sup>nd</sup> Ed. 3: 609–610. 1832. **Lectotype** (designated here): [Icon] *Amaranthus frumentaceus* (No. 1677) in "The Roxburgh Collection" at library of the Royal Botanic Garden of Kew. Image available at



<http://apps.kew.org/floraindica/img/illustration/large/62656.jpg><sup>Note 3</sup>.

= *Amaranthus hybridus* L., Sp. Pl. 2: 989. 991. *Lectotype* (designated by Townsend, 1974: 19): U.S.A.. *Habitat in Virginia*, Herb. Linn. No. 1117.19 (LINN!). Image of the lectotype available at <http://linnean-online.org/11645/>

*Amaranthus lanceolatus* Roxb., Fl. Ind. 2<sup>nd</sup> Ed. 3: 607. 1832. *Lectotype*: (designated here): [Icon] *Amaranthus lanceolatus* (No. 1676) in “The Roxburgh Collection” at library of the Royal Botanic Garden of Kew. Image available at <http://apps.kew.org/floraindica/img/illustration/large/62655.jpg><sup>Note 3</sup>.

= *Amaranthus tricolor* L., Sp. Pl. 2: 989. 1753. *Lectotype*: (designated by Townsend 1974: 14): *Habitat in India*, Herb. Linn. No. 1117.7 (LINN!). Image of the lectotype available at <http://linnean-online.org/11633/>

## CONCLUSIONS

The results obtained in the present work highlight how many *Amaranthus* species, especially in the past, were described on the basis of morphological characters that have low or no taxonomic value [see also e.g., Iamónico, 2016c (Moquind-Tandon names), or Iamónico, 2020a (Willdenow’s names)], namely habit, plant height, stem colour, leaf shape and colour, synflorescence structure, and features of the male flowers. While some of these characters (leaf shape and synflorescence structure) could be used to help identify *Amaranthus* taxa, the characters of the female flowers have a higher taxonomic value and must therefore be properly considered.

## NOTES:

- Note that all editions of *Flora Indica* were published posthumously, but represent Roxburgh’s complete botanical work in India, except cryptogams (Chakrabarty, 2019).
- Note that in the description of the genus *Amaranthus* (Roxburgh, 1832: 601), it was reported “*Corol.* [corolla] none”. As a consequence, the term “*Calyx*” refers to a perianth.
- Wight’s (1843) images of copied drawings at CAL (nos. 716, 717 and 720) are available at the following URL: <https://www.biodiversitylibrary.org/item/1857#page/444/mode/1up>

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