



## A critical inventory of the family Amaranthaceae s.str. in Saudi Arabia

WALAA A. HASSAN<sup>1,4</sup>, NAJLA A. AL-SHAYE<sup>2,5</sup> & DUILIO IAMONICO<sup>3,6,\*</sup>

<sup>1</sup> Botany and Microbiology Department, Faculty of Science, Beni-Suef University, Beni-Suef, Egypt

<sup>2</sup> Department of Biology, College of Science, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia

<sup>3</sup> Department of Environmental Biology, University of Rome Sapienza, 00185 Rome, Italy

<sup>4</sup> [azmeyw@gmail.com](mailto:azmeyw@gmail.com); <https://orcid.org/0000-0001-7605-9058>

<sup>5</sup> [naaalshaye@pnu.edu.sa](mailto:naaalshaye@pnu.edu.sa); <https://orcid.org/0000-0002-0447-8613>

<sup>6</sup> [duilio.iamonico@uniroma1.it](mailto:duilio.iamonico@uniroma1.it); <https://orcid.org/0000-0001-5491-7568>

\*Author for correspondence

### Abstract

The aims of the present study are to assess and update the floristic diversity of Amaranthaceae s.str. in Saudi Arabia. A total number of 33 taxa were indentified including 28 species, 4 subspecies, and 7 varieties. The richest genus is *Amaranthus* with 16 taxa (12 species); *Aerva* and *Alternanthera* have 3 species each; *Achyranthes* and *Celosia* 2 species each; 6 genera (*Digera*, *Gomphrena*, *Nothosaerva*, *Psilotrichum*, *Pupalia*, *Saltia*) include just one species each. Most of the taxa are native (18, 54.55%), 14 (42.42%) are aliens (6 casual taxa, 5 naturalized, and 1 invasive), one (*Alternanthera sessilis*) is here considered as doubtfully native, two (*Amaranthus tricolor*, *Gomphrena globosa*) are found only in cultivation. Two species (*Amaranthus tortuosum*, *Pupalia lappacea* var. *lappacea*) are excluded from the national flora. Diagnostic keys at genus, species, and infraspecific ranks are provided. The following names are lectotypified: *Achyranthes argentea* var. *obovata* (G; isoelectotype at HBG), *Achyranthes fruticosa* var. *pubescens* (G), *Achyranthes papposa* (C; isoelectotypes at C and BM), *Achyranthes polystachya* (BM), *Aerva javanica* var. *bovei* (FI), *Achyranthes lanata* (illustration by Burman), *Digera arvensis* (C; isoelectotype at C), *Psilostachys gnaphalobryum* (TUB; isoelectotypes at GOET, HBG, HEID, JE, MEL, MPU, P, and TUB), *Telanthera betzickiana* (LE).

**Key words:** Aliens, Asia, flora, morphology, new record, typification

### Introduction

Amaranthaceae Juss., in the strict sense (not including Chenopodiaceae Vent.; see Hernández-Ledesma *et al.* 2015), is a family comprising 79 genera and about 900 species, distributed mainly in tropical and subtropical regions of the world (Kadereit *et al.* 2003, Robertson & Clemants 2003). The family includes annual and perennial herbs or subshrubs (Townsend 1993, Robertson & Clemants 2003). Many wild taxa are cultivated and used as ornamental, food, or medicinal plants, and some of them tend to escape from cultivation, thereby often impacting agricultural systems economically by reduction in productivity and crop quality (e.g., Robertson & Clemants 2003, Iamónico 2015a, Das 2016).

Floristic studies in Saudi Arabia are not so common, and the last comprehensive Flora was published 25 years ago by Chaudhary (1998) who accepts 24 taxa in Amaranthaceae. Floristic additions, subsequent to Chaudhary's work, are rare (e.g., *Amaranthus dubius* Mart. ex Thell. by Hassan *et al.* 2022).

As part of ongoing studies on the taxonomy and nomenclature of the family Amaranthaceae s.str. (see, e.g., Iamónico 2011, 2016a, 2020, Iamónico & Das 2014, Iamónico & El Mokni 2017, Iamónico & Palmer 2020, Sindhu *et al.* 2020, 2021a) and of the investigation of the flora of Saudi Arabia (see, e.g., Hassan *et al.* 2022), we here present a critical, contemporary inventory of the family Amaranthaceae s.s. in Saudi Arabia. Given the importance of types for the correct identification of taxa (see e.g., Wagensommer *et al.* 2016, Nobis *et al.* 2022, Zhang *et al.* 2023), ten names are typified in the present work.

## Material and methods

The research is based on field surveys (period 2020–2023), examination of specimens deposited at the Herbaria PNUH and RO, analysis of relevant literature (protologues included) and online databases, as well as online herbaria (B, BM, BOLO, E, FI, G, GOET, GH, HAL, HBG, HEID, IND, K, LE, L, LINN, M, MEL, MPU, P, S, and TUB; acronyms according to Thiers 2023).

The taxa are arranged alphabetically and the classification following POWO (2023). At family rank, we first considered to follow APG IV (2016) in recognizing the family Chenopodiaceae Vent. as included in Amaranthaceae Juss. However, Hernández-Ledesma *et al.* (2015: 303, 332 and literature therein) offer convincing arguments to keep Chenopodiaceae Vent. as a separate family. At genus rank, *Ouret* Adans. is accepted by POWO (2023) with 8 species, of which 6 were originally described under *Aerva* L. We prefer to include *Ouret* in *Aerva* in the present research, according to Hernández-Ledesma *et al.* (2015: 303).

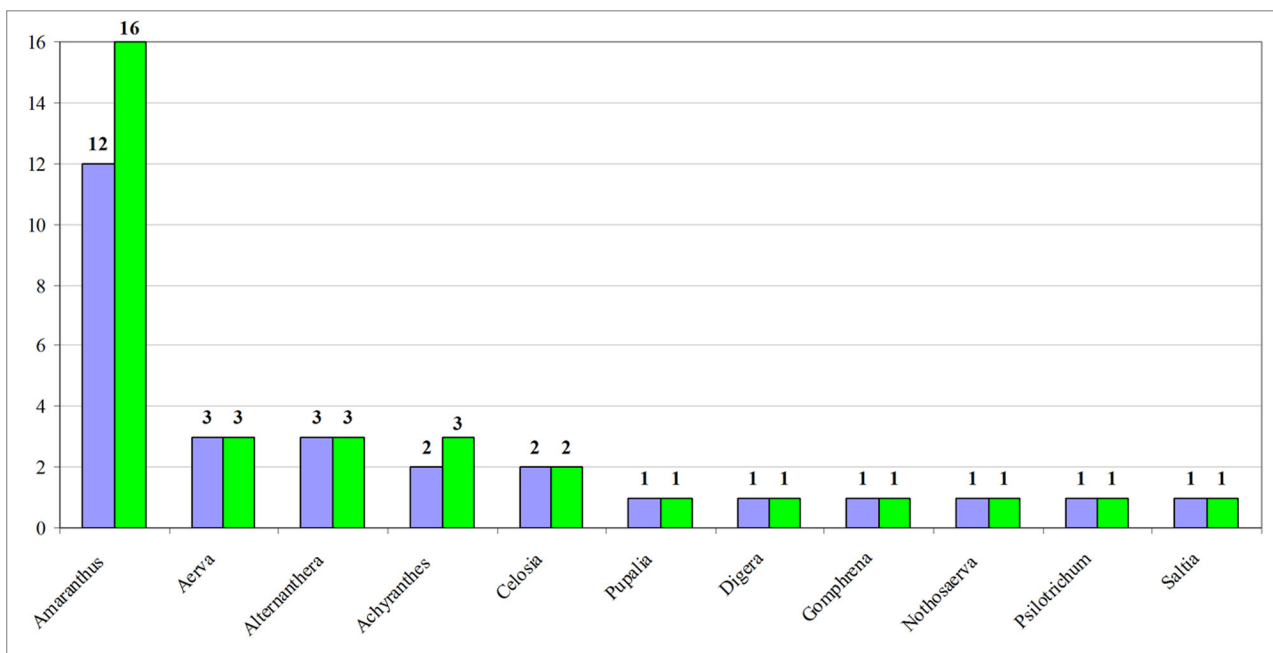
At species rank, *Achyranthes aspera* L. is considered to include three varieties in POWO (2023), viz., var. *aspera*, var. *pubescens* (Moq.) M.Gómez, and var. *sicula* L., but we prefer to follow Iamónico (2014, 2017) who recognized Linnaeus' taxon *sicula* at species rank [*A. sicula* (L.) All.].

For each species, the geographical distribution in Saudi Arabia is given (at the Region level) with respective reference sources given. Concerning the status of invasiveness or naturalization of alien species, we follow Pyšek *et al.* (2004) and Richardson *et al.* (2006).

Concerning the typification of names, articles the *International Code of Nomenclature for algae, fungi, and plants*, are hereafter referred to as "ICN" (Turland *et al.* 2018).

## Results and discussion

A total of 33 Amaranthaceae s.l. taxa (28 species, 4 subspecies, and 7 varieties) belonging to 11 genera are known to occur in Saudi Arabia (Fig. 1, Table 1). *Amaranthus* L. is the genus richest in species (12); *Aerva* Forssk. and *Alternanthera* Forssk. have 3 species each; *Achyranthes* Forssk. and *Celosia* L. comprise 2 species each; 6 genera include just one species.



**FIGURE 1.** Richness of Amaranthaceae s.s. genera occurring in Saudi Arabia. Blue columns: number of species; green columns: number of taxa.

**TABLE 1.** Checklist of Amaranthaceae taxa occurring in Saudi Arabia. When occurrences derive from POWO (2023) only (no province or locality were given), it is reported “Not specified” (column “Occurrence in Saudi Arabia”).

	<b>Name (synonyms)</b>	<b>Reference for nomenclature</b>	<b>Native/Alien</b>	<b>Occurrence in Saudi Arabia</b>
1	<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Townsend (1974)	Native	Jazan and Makkah
2	<i>Achyranthes aspera</i> L. var. <i>pubescens</i> (Moq.) M.Gomez. ≡ <i>Achyranthes fruticosa</i> var. <i>pubescens</i> Moq.	Townsend (1974)	Native	‘Asīr, Jazan, Makkah
3	<i>Achyranthes sicula</i> (L.) All. ≡ <i>Achyranthes aspera</i> var. <i>sicula</i> L.	Iamónico (2014a)	Native	Al-Madīnh, ‘Asīr, Jazan, Makkah
4	<i>Aerva bovei</i> (Webb.) Edgew. ≡ <i>Aerva javanica</i> var. <i>bovei</i> Webb.	Thiv <i>et al.</i> (2006)	Native	Makkah
5	<i>Aerva javanica</i> (Burm.f.) Juss. ex Schult. ≡ <i>Iresine javanica</i> Burm.f. = <i>Aerva tomentosa</i> Forssk.	Iamónico & Friis (2017)	Native	Al-Bahah, Al-Madīnah, Rīyadh, ‘Asīr, Ha‘īl, Jazan, Makkah, Tabuk
6	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Iamónico (2014a)	Native	‘Asīr, Ha‘īl, Jazan, Makkah
7	<i>Alternanthera bettzickiana</i> (Regel) G.Nicholson ≡ <i>Telanthera bettzickiana</i> Regel	POWO (2023)	Alien	Makkah
8	<i>Alternanthera pungens</i> Kunth = <i>Alternanthera repens</i> (L.) Link	Iamónico (2014a), Iamónico & Del Pino (2016)	Alien	Al-Baha, ‘Asīr, Makkah
9	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	POWO (2023)	Alien	Al hudud ash Shamaliyah, Jazan
10	<i>Amaranthus albus</i> L.	POWO (2023)	Alien	Jizan, Qassim, Makkah, Tabuk, Taif
11	<i>Amaranthus blitoides</i> S.Watson var. <i>blitoides</i>	Hassam <i>et al.</i> (2022)	Alien	Jazan
12	<i>Amaranthus blitoides</i> S.Watson var. <i>nanus</i> (Moq.) Iamónico	Hassam <i>et al.</i> (2022)	Native	Makkah
13	<i>Amaranthus blitum</i> L. subsp. <i>blitum</i> var. <i>blitum</i> = <i>A. lividus</i> L.	Iamónico (2015)	Alien	Ha'il, Makkah, Rīyhad
14	<i>Amaranthus blitum</i> L. subsp. <i>blitum</i> var. <i>oleraceus</i> (L.) Hook.f. ≡ <i>Amaranthus oleraceus</i> L.	Iamónico (2015)	Alien	Not specified
15	<i>Amaranthus caudatus</i> L.	Iamónico (2023)	Alien	Makkah
16	<i>Amaranthus cruentus</i> L.	POWO (2023)	Alien	Jazan
17	<i>Amaranthus dubius</i> Mart. ex Thell.	POWO (2023)	Alien	Jazan

...continued on the next page

**TABLE 1.** (Continued)

	<b>Name (synonyms)</b>	<b>Reference for nomenclature</b>	<b>Native/Alien</b>	<b>Occurrence in Saudi Arabia</b>
18	<i>Amaranthus graecizans</i> L. subsp. <i>graecizans</i> = <i>Amaranthus angustifolius</i> Lam., nom. illeg. (Art. 52.2 of ICN)	POWO (2023)	Native	Al-Javf, 'Asīr, Jizan, Makkah, Riyadh
19	<i>Amaranthus graecizans</i> L. subsp. <i>sylvestris</i> (Vill.) Brenan ≡ <i>Amaranthus sylvestris</i> Vill.	POWO (2023)	Native	Jizan, Makkah
20	<i>Amaranthus graecizans</i> L. subsp. <i>thellungianus</i> (Nevski) Gusev ≡ <i>Amaranthus thellungianus</i> Nevski	POWO (2023)	Native	Not specified
21	<i>Amaranthus hybridus</i> L.	POWO (2023)	Alien	Al-Baha, Bisha, Makkah, Tabuk, Taif
22	<i>Amaranthus spargancephalus</i> Thell.	Hassam <i>et al.</i> (2022)	Native	Jazan
23	<i>Amaranthus spinosus</i> L.	Iamonico & El Mokni (2019)	Alien	Bisha, Jazan
24	<i>Amaranthus viridis</i> L. – <i>Amaranthus gracilis</i> Desf., nomen ambiguum	Iamonico (2016b)	Alien	Al hudud ash Shamaliyah, Bisha, Jizan, Makkah, Taif
25	<i>Amaranthus tricolor</i> L.	Das (2013)	Alien	Not specified
26	<i>Celosia polystachya</i> (Forsk.) C.C.Towns.	POWO (2023)	Native	Jazan
27	<i>Celosia trigyna</i> L.	POWO (2023)	Native	Al-Baha, Al-Madinah, Jazan, Makkah
28	<i>Digera muricata</i> (L.) Mart. subsp. <i>muricata</i> = <i>Digera arvensis</i> Forssk.	Townsend (1973)	Native	Makkah
29	<i>Gomphrena globosa</i> L.	POWO (2023)	Native	Not specified
30	<i>Nothosaerva brachiata</i> (L.) Wight ≡ <i>Achyranthes brachiata</i> L.	POWO (2023)	Alien	Jazan
31	<i>Psilotrichum gnaphalobryum</i> (Hochst.) Schinz ≡ <i>Psilotrichum cordatum</i> (Hochst.) Moq.	POWO (2023)	Native	Jazan, Makkah
32	<i>Pupalia lappacea</i> (L.) Juss. var. <i>velutina</i> (Moq.) Hook.f. ≡ <i>Pupalia velutina</i> Moq.	Townsend (1974), POWO (2023)	Native	'Asīr
33	<i>Salvia papposa</i> (Forssk.) Moq. ≡ <i>Achyranthes papposa</i> Forssk.	POWO (2023)	Native	Doubt in Makkah

Seventeen taxa are native (51.52% of the total), whereas 15 (45.45%) are aliens (6 casual taxa, 5 naturalized, and 1 invasive); one species [*Alternanthera sessilis* (L.) DC.] is considered as doubtfully native; two (*Amaranthus tricolor* L. *Gomphrena globosa* L.) are found only in cultivation.

Two taxa (*Amaranthus tortuosus* Hornem. and *Pupalia lappacea* (L.) Juss. var. *lappacea*) are to be excluded from the national flora.

### Diagnostic keys

Diagnostic keys for species and infraspecific taxa of *Achyranthes*, *Aerva*, *Alternanthera*, and *Celosia* occurring in Saudi Arabia are given hereafter. A determination key for the genus *Amaranthus* in Saudi Arabia was provided by Hassan *et al.* (2022: 137) and is not repeated here. Monospecific genera or genera occurring with only one taxon in Saudi Arabia are included in the key of the genera.

### Diagnostic key for genera of Amaranthaceae s.str. occurring in Saudi Arabia

1. Leaves alternate .....2
2. Flowers unisexual .....3
3. Each fertile flower subtended by two modified sterile flowers..... *Digera muricata* subsp. *muricata*
3. Fertile flower never subtended by modified sterile flowers..... *Amaranthus*
2. Flowers hermaphrodite .....4
4. Fruit including one seed; stigma 1, capitate .....5
5. Annual herb; tepals 1.00–1.25 mm long .....*Nothosaerva brachiata*
5. Perennial herb; tepals 3.25–4.00 mm long .....*Saltia papposa*
4. Fruit including 2 or more seeds; stigmas 2–3, linear ..... *Celosia*
1. Leaves opposite .....6
6. Synflorescence in axillary glomerules and/or terminal heads (no terminal spike- or panicle-structures) .....7
7. Stigma 1, capitate ..... *Alternanthera*
7. Stigmas 2, linear ..... *Gomphrena globosa*
6. Synflorescence in terminal spike- or panicle-structures and/or terminal heads .....8
8. Sterile flowers present .....*Pupalia lappacea* var. *velutina*
8. Sterile flowers absent .....9
9. Synflorescence in terminal heads; pseudostaminoids absent .....*Psilotrichum gnaphalobryum*
9. Synflorescence in terminal spike-structures; pseudostaminoids present.....10
10. Stigmas 2, linear ..... *Aerva*
10. Stigma 1, capitate .....11
11. Pseudostaminoids not fringed.....*Psilotrichum gnaphalobryum*
11. Pseudostaminoids fringed.....*Achyranthes*

### Diagnostic key for *Achyranthes* taxa occurring in Saudi Arabia

1. Main stem usually glabrous or glabrescent; abaxial surface of leaves villous, whitish ..... *Achyranthes sicula*
1. Main stem pubescent; abaxial surface of leaves glabrous or pubescent (not villous), green.....2
2. Leaf blades rounded to obovate-orbiculate, obtuse to slightly retuse (sometimes abruptly apiculate); tepals 3–4 mm long.....  
..... *Achyranthes aspera* var. *aspera*
2. Leaf blades ovate, acuminate; tepals 6–7 mm long ..... *Achyranthes aspera* var. *pubescens*

### Diagnostic key for *Aerva* species occurring in Saudi Arabia

1. Plant monoecious (flowers hermaphrodite); outer two tepals 0.75–1.25 mm long, abruptly contracted at the tip to a distinct mucro formed by the excurrent nerve; style and stigmas 2, about as long as the ovary at anthesis..... *Aerva lanata*
1. Plant dioecious (flowers unisexual); outer two tepals (female flowers) 2–3 mm long, with the midrib not excurrent in a distinct mucro; style shorter than the ovary at anthesis; stigma 1, rudimentary .....2
2. Leaves oblong to subcircular, more than 6 mm in wide; outer tepals > 2 mm long (up to 3 mm) ..... *Aerva javanica*
2. Leaves linear to linear-oblong, up to 6 mm in wide; outer tepals about 2 mm long..... *Aerva bovei*

### Diagnostic key for *Alternanthera* species occurring in Saudi Arabia

1. Leaves lanceolate (ratio length/width: 4–5) .....*Alternanthera sessilis*
1. Leaves ovate to obovate (ratio length/width: 1–2) .....2
2. Leaves obtuse to rounded; tepals 5.0–7.0 mm long, obtuse; fruit 1.5–1.8 mm long.....*Alternanthera pungens*
2. Leaves acute to acuminate; tepals 2.0–2.5(–3.5) mm long, acute to acuminate; fruit 1.8–2.2 mm long..*Alternanthera bettzickiana*

### Diagnostic key for *Celosia* species occurring in Saudi Arabia

1. Tepals mucronate (excurrent nerve) .....*Celosia trigyna*
2. Tepals not mucronate (nerve ceasing below the apex)..... *Celosia polystachya*

## Taxonomic treatment

### 1. *Achyranthes* L., Sp. Pl. 1: 204. 1753.

Conserved type (Jarvis 1992: 555, Barrie 2006: 795–796):—*Achyranthes aspera* L. var. *aspera* L.

#### 1.1. *Achyranthes aspera* L., Sp. Pl. 1: 204. 1753.

Lectotype (designated by Townsend 1974: 35):—Herb. Hermann 2: 69, No. 105 (BM000621744!, image of the lectotype available at <https://data.nhm.ac.uk/object/6d6f830b-df54-4834-a110-f337b076da24/1691020800000>).

##### 1.1a. *Achyranthes aspera* var. *aspera* L., Sp. Pl.: 204. 1753.

**Chorology:**—A pantropical species, native to central and southern Africa, Arabian Peninsula, and south Asia (Iamónico 2017, POWO 2023).

**Occurrence in Saudi Arabia:**—Jazan and Makkah (Miller & Cope 1996, Collenette 1999).

**Specimina visa selecta:**—SAUDI ARABIA. *s.l.*, 1856, *Fischer 9* (BR0000013457303!); Makkah, *In palmetis vallis Fatme, s.d.*, *Fischer 91* (M0241525!).

#### 1.1b. *Achyranthes aspera* var. *pubescens* (Moq.) M.Gómez, Noc. Bot. Sist.: 58. 1893 ≡ *Achyranthes fruticosa* var. *pubescens* Moq. in A.P.de Candolle, Prodr. [A. P. de Candolle] 13(2): 314. 1849.

Lectotype (designated here):—MEXICO. *Tampico de Tamaulipas, 1827, Berlandier 79-104-105* (G00236794!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.g00236794?loggedin=true>).

**Typification of the name *Achyranthes fruticosa* var. *pubescens*:** Moquin-Tandon (1849: 314) validly published this variety by providing a short diagnosis (“ramulis subtetragonis, foliis pubescentibus mollibus”); the following syntypes were also cited: “In Cuba prope Haynam (Sagra! N. 177), in Mexico prope Tampico de Tamaulipas (Berland.! N.79, 104, 105)”. We traced these syntypes at G (G00236794) and P (P00610530). Both the G and P sheets bear a terminal part of one plant with leaves and flowers. However, G00236794 has more flowers which are important in the identification of *Achyranthes* taxa (see e.g., Townsend 1974, Robertson 2003, Iamónico 2017). Therefore, we here designate G00236794 as the lectotype of *Achyranthes fruticosa* var. *pubescens*. The lectotype matches both Moquin-Tandon’s diagnosis and the current concept of the taxon (see Townsend 1974), which is currently accepted as a variety of *A. aspera* (POWO 2023). P00610530 remains a syntype.

**Chorology:**—A species native to eastern Africa, Arabian Peninsula, and Pakistan to western Himalaya (POWO 2023).

**Occurrence in Saudi Arabia:**—‘Asīr (Alwadie 2005), Jazan and Makkah (Miller & Cope 1996). Alwadie (2005: 56, Fig. 3D) did not specify the infraspecific taxon, but a description and the photo and a specimen were given; based on these data, we can ascribe *Achyranthes aspera* reported by Alwadie (2005) to var. *pubescens*.

**Selected specimens seen:**—SAUDI ARABIA. Makkah, *In palmetis vallis Fatme, s.d.*, *Fischer 95* (BR0000013457310!).

#### 1.2. *Achyranthes sicula* (L.) All., Auct. Syn. Meth. Stirp. Hort. Regii Taur.: 41. 1773 ≡ *Achyranthes aspera* var. *sicula* L., Sp. Pl.: 204. 1753.

Lectotype (designated by Iamónico 2014: 406):—Herb. Linn. No. 287.1 (LINN!, image of the lectotype available at <https://linnean-online.org/2873/>).

= *Achyranthes argentea* Lam., Encycl. 1: 545. 1785 ≡ *Achyranthes aspera* var. *argentea* (Lam.) Boiss., Fl. Orient. 4: 993. 1879.

Lectotype (designated by Raus 2022: 337): FRANCE. H[ortus] R[egius] Parisiensis (SEVH4073!, image of the lectotype available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.sev-h4073>).

= *Achyranthes argentea* var. *obovata* Moq., Prodr. [A. P. de Candolle] 13(2): 316. 1849.

Lectotype (designate here):—SAUDI ARABIA, Mekkah, Locis cultis ad pagum Madara vallis Fadme prope Meccam, 24 november 1835, *Schimper 944* (G00688924!, image available at <http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=668392&base=img&lang=en>); isolectotype at HBG503188! (image of the isolectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.hbg503188!>).

**Typification of the name *Achyranthes argentea* var. *obovata*:**—Moquin-Tandon (1849: 316) proposed this new variety to distinguish forms of *Achyranthes argentea* (currently a heterotypic synonym of *Achyranthes sicula*: see Raus 2022) with leaves circular-ovate and abaxially villous; a syntype (“Prope Meccam (Schimp.! 914, in h. DC)”) was cited. We found this specimen at G (barcode G00688924) and it is here designated as the lectotype of Moquin-Tandon’s varietal name. According to the current concept in *Achyranthes* (see e.g., Tutin 1993, Robertson 2003, Iamónico 2017), *A. argentea* var. *obovata* is a heterotypic synonym of *A. sicula*. An isolectotype is deposited at HBG (HBG503188).

**Chorology:**—A species native to the south-eastern Mediterranean region, most of African countries, and Arabian Peninsula (Iamónico 2017, POWO 2023).

**Occurrence in Saudi Arabia:**—Al-Madinah, ‘Asir, Jazan, and Makkah (Miller & Cope 1996, Collenette 1999).

**Specimina visa selecta:**—SAUDI ARABIA. Makkah, *Locis cultis ad pagum Madara vallis Fadme prope Meccam*, 24 november 1835, *Schimper 944* (M0241524!).

## 2. *Aerva* Forssk., Fl. Aegypt.-Arab.: 170. 1775.

Type (Forsskål 1775: 170):—*Aerva tomentosa* Forssk. [= *Aerva javanica* (Burm.f.) Juss.; see Iamónico & Friis 2017: 1209–1210].

2.1. *Aerva boveii* (Webb) Edgew., J. Proc. Linn. Soc., Bot. 6: 206. 1862 ≡ *Aerva javanica* var. *bovei* Webb, in W.J.Hooker, Niger Fl.: 173. 1849.

Lectotype (designated here):—EGYPT. Kenné, in desertis, september 1826, *Sieber s.n.* (FI011269!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.fi011269>).

**Typification of *Aerva javanica* var. *bovei*:**—Webb (1849: 173) published the var. *bovei* to distinguish forms of *Aerva javanica* with leaves narrower (“foliis lineari-lanceolatis”) and flowers smaller (“floribus minoribus”); two syntypes were also cited (“Habitat in Arabiae mente Sinai (*Bové*), Kenneé in desertis, (*Sieber*)”, both referring to Egypt. We traced these syntypes at FI [FI011268 (*Bové*’s specimen; image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.fi011268>) and FI011269 (*Sieber*’s specimen)]. Since FI011269 includes more leaves and flowers which features are important in the identification of *Aerva javanica* s.l., we designate it as the lectotype of the name *Aerva javanica* var. *bovei*. FI011268 remains a syntype.

**Notes:**—Var. *bovei* is recognized by POWO (2023) as originally proposed by Webb (1849: 173). However, as shown by Thin *et al.* (2006), Webb’s taxon forms a well supported clade sister to *Aerva javanica* (bootstrap: 100%). Accordingly, we here recognize Webb’s var. *bovei* at species rank.

**Chorology:**—Native to an area ranging from the Sahara region to north-western India (POWO 2023).

**Occurrence in Saudi Arabia:**—*Aerva bovei* is not reported to occur in Saudi Arabia by POWO (2023). However, Chaudhary (1998: 240) stated that “It [*Aerva javanica*] is found as two varieties in Saudi Arabia – the more common var. *javanica* and the var. *bovei* Webb (1849)”. Unfortunately, he did not specify any locality in which var. *bovei* occurs. Our findings confirm the presence of this taxon in Saudi Arabia at Makkah. Miller & Cope (1996) recorded the species at Tabuk, Al-Madinah, and Makkah.

**Specimina visa selecta:**—SAUDI ARABIA. Riyadh, Yarmok, 26 june 2016, leg. *Mohamed 3985* det. *Alshaye & Thomas* (PNUH!); Jazan, 12 february 2016, *Mohamed 3832* (PNUH!); Ha’il, 24 september 2008, leg. *Ahrashedy 854* det. *Alshaye & Thomas* (PNUH!); Taif, 24 september 2008, leg. *Alharby 1083* det. *Alshaye & Thomas* (PNUH!); Arabia (s.l.), 1866, *Fischer 6* (BR0000013457259!); Jeddah, *Ad colles sabulosus visternarum Geddae, s.d., Fischer 14* (M0241440!); Makkah, *In arvis et sabulosus vallis Fatme, s.d., Fischer 13* (M0241439!).

2.2. *Aerva javanica* (Burm.f.) Juss., Ann. Mus. Natl. Hist. Nat. 2: 131. 1803 var. *javanica* ≡ *Iresine javanica* Burm.f., Fl. Indica: 212. 1768 ≡ *Illecebrum javanicum* (Burm.f.) L., Syst. Veg., ed. 13: 206. 1774.

Lectotype (designated by Iamónico & Friis 2017: 1210):—[icon] “*Iresine javanica*” in Burman (1768: t. 65, fig. 2; image of the lectotype available at <http://bibdigital.rjb.csic.es/spa/Libro.php?Libro=1498&Pagina=286>).

= *Aerva tomentosa* Forssk., Fl. Aegypt.-Arab.: CXXII, No. 584; LXXVII, No. 538; 170. 1775.

Lectotype (designated by Townsend 1985: 84): Egypt, Cairo [more likely Yemen], Forsskål 918 (C10001593!, image of the lectotype available at <https://plants.jstor.org/stable/10.5555/al.ap.specimen.c10001593>).

**Chorology:**—Native to north, central, and eastern Africa and south/south-western Asia (POWO 2023).

**Occurrence in Saudi Arabia:**—Al-Bahah (Miller & Cope 1996), Al-Madinah (Miller & Cope 1996), Riyadh (Miller & Cope 1996, Collenette 1999), ‘Asir (Miller & Cope 1996, Alwadie 2005, Al-Namazi *et al.* 2022), Ha’il (Miller & Cope 1996), Jazan (Miller & Cope 1996), Makkah (Miller & Cope 1996, Al-Eisawi & Al-Ruzayza 2015), Tabuk (Miller & Cope 1996).

**Specimina visa selecta:**—SAUDI ARABIA. Ha'il, 11 may 2012, *s.c.* KSUF596 (PNUH!); Ha'il, 24 september 2009, leg. *Alshahry* 1979 det. *Alshaye & Thomas* (PNUH!); Jazan, Wadi deli, between Abha and Al-Darb, 20 september 1999, *Miyazaki* 990920WD I 14 (E00634635!); Makkah, On the Christian by-pass, near the junction with the mecca road, 22 january 1980, *Collenette* 1582 (E00687221!), About half way down escarpment Taif-Jeddah road, 17 january 1980, *Collenette* 1560 (E00687222!), About 200 m north of wet marshy area in front of old king's palace, ca 89 km north of Taif, 04 may 1978, *Huumbles* 10162 (E00687223!); Riyadh, Bei salbukh NW von Riyadh, 26 march 1981, *Frey et al.* VO 6425 (E00313247!).

2.3. *Aerva lanata* (L.) Juss. ex Schult. in Roemer & Schultes, Syst. Veg. 5: 564. 1819 ≡ *Achyranthes lanata* L., Sp. Pl.: 204. 1753 ≡ *Illecebrum lanatum* (L.) L., Mant. Pl.: 344. 1771 ≡ *Ouret lanata* (L.) Kuntze, Revis. Gen. Pl. 2: 544. 1891.

Lectotype (designated here):—[icon] “*CHENOPODIUM incanum racemosum, folio majore, minori opposito*” in Burman 1737: t. 26, fig. 1 (image of the lectotype available at <https://www.biodiversitylibrary.org/item/14648#page/105/mode/1up>).

**Revised typification of *Achyranthes lanata*:**—Iamónico (2014: 406) described the protologue of the Linnaean name *Achyranthes lanata* by citing correctly Burman's reference to the illustration “t. 26, f. 1” (Burman 1737, Linnaeus 1753: 204). However, in the taxonomic treatment, Iamónico (2014: 407) indicated Burman's “*AMARANTUS spicatus Zeylanicus, foliis obtusis, &c* in Burman 1737: t. 5, fig. 3” as the lectotype of the name (also publishing a figure; Iamónico 2014: Fig. 1; image available at <https://www.biodiversitylibrary.org/item/14648#page/31/mode/1up>). This latter Burman's polynomial, however, is part of the original for *A. aspera* L. var. *indica* L. (Iamónico 2014: 405). Burman's “t. 26, f. 1”, reported by Linnaeus (1753: 204) for *A. lanata*, actually refers to “*CHENOPODIUM incanum racemosum, folio majore, minori opposito*” which relevant illustration is designated here as the lectotype of *A. lanata*, thereby revising the inadvertently wrong typification by Iamónico (2014: 407).

**Chorology:**—Native to tropical Africa and Asia, and the Arabian Peninsula (POWO 2023).

**Occurrence in Saudi Arabia:**—Asīr (Miller & Cope 1996, Alwadie 2005, Al-Namazi *et al.* 2022), Jazan and Makkah (Miller & Cope 1996), Riyadh (Collenette 1999).

**Specimina visa selecta:**—SAUDI ARABIA. Jazan, Fayfa, 06 march 2012, *s.c.* KFSU331 (PNUH!).

3. *Alternanthera* Forssk., Fl. Aegypt.-Arab.: 28. 1775.

Lectotype (designated by Melville 1958: 172):—*Alternanthera sessilis* (L.) DC.

3.1. *Alternanthera bettzickiana* (Regel) G.Nicholson, Ill. Dict. Gard. 1: 59. 1884 ≡ *Telanthera bettzickiana* Regel, Index Seminum (LE, Petropolitanus): 28. 1862.

Lectotype (designated here):—Ex horto bot. Petropolitano, *s.d.*, *Regel* 619 (LE00012018!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.le00012018?loggedin=true>).

**Typification of the name *Telanthera bettzickiana*:** Regel (1862a: 28) validly published *Telanthera bettzickiana* by a detailed description; a doubtful provenance (“Patria Brasilia (?)”) was also given, as well as (“Rgl.”) which means that Regel collected at least one specimen (syntype according to the Art. 9.6 of ICN). Note that the same description was published few months later than Regel's Index Seminum (may vs. january) by Regel himself in the volume no. 11 of his Gartenflora (Regel 1862b: 178). There is a specimen at LE (LE00012018), where Regel's herbarium and types are mainly preserved (HUH Index of Botanists 2013a), bearing two branches of a plant with flowers and leaves, labelled “Ex horto bot. Petropolitano 619 | *Telanthera Bettzickiana* | Rgl [Regel]”. This specimen, which matches Regel's original description, is here designated as the lectotype of the name *Telanthera bettzickiana*.

**Alien status:**—Neophyte, native to South America (POWO 2023); it can be considered as casual in Saudi Arabia [see Miller & Cope (1996) who stated that it was “only collected once in Arabia”].

**Occurrence in Saudi Arabia:**—POWO (2023) reports *Alternanthera bettzickiana* for Saudi Arabia, but no pertinent literature is cited; the only reference to the Arabian Peninsula is that by Patzelt *et al.* (2020: 427) who, however, refers to the sultanate of Oman (Western Hajar Mountains, Misfat Al Abriyyin). The species was not recorded by Chaudhary (1998). We traced only two references in which this species was reported, viz. Al-Eisawi & Al-Ruzayza (2015) and Miller & Cope (1996), both at Makkah. No specimen was traced by us.



3.2. *Alternanthera pungens* Kunth, Nov. Gen. Sp. (quarto) 2(7): 206. 1818.

Neotype (designated by Iamónico & Del Pino 2016: 338):—VENEZUELA. Crescit in ripa Orinaoci prope nobilem cataractam Maypurensium, sine die, Bonpland s.n. (P00136008!, image of the neotype available at <http://science.mnhn.fr/institution/mnhn/collection/p/item/p00136008>).

**Alien status:**—Neophyte, native to South America (Iamónico & Sánchez Del Pino 2016: 338); naturalized in Saudi Arabia (see also Chaudhary 1998).

**Occurrence in Saudi Arabia:**—Al-Baha (Aljeddani *et al.* 2021), ‘Asīr (Al-Namazi *et al.* 2022), Jazan, Makkah (Al-Eisawi & Al-Ruzayza 2015).

**Specimina visa selecta:**—SAUDI ARABIA. Jazan, Wadi Arub, 27 february 2000, *Al Turki et al. 11943* (KSU); ‘Asīr, Raida, 21 may 1998, *Alfarhan & Thomas 5970* (KFU!); ‘Asīr, Wadi Al Uss on west side of jebel Sawdah (Abha) near Police Post, In wooded ravine - under *Zizyphus* tree, 15 may 1981, *Collenette 2685* (E00692533).

3.3. *Alternanthera sessilis* (L.) DC., Cat. Pl. Horti Monsp.: 77. 1813 ≡ *Gomphrena sessilis* L., Sp. Pl. 1: 225. 1753.

Type (lectotype designated by Mears 1980: 89):—Herb. Hermann 2: 9, no. 116 (BM000621528!, image of the lectotype available at <https://data.nhm.ac.uk/object/62000d75-9129-4926-8676-27aad2d9c69a/1691020800000>).

**Alien status:**—Neophyte, native to Mexico, Central and South America, Africa, and Asia, according to Clemants (2003), whereas POWO (2023) indicates it as alien in Africa. The native distribution area of *Alternanthera sessilis* needs further investigations. Concerning Saudi Arabia, we prefer to avoid a definitive state and precautionary consider the species as doubtfully native (as defined in Iamónico 2023). Note that Chaudhary (1998) stated “Recorded from the Southwest. Maybe more widespread”, whereas Alfarhan *et al.* (2021) indicated the species as invasive (thus not autochthonous).

**Occurrence in Saudi Arabia:**—Al hudud ash Shamaliyah (Osman & El-Ameid Abedin 2019), ‘Asīr (Collenette 1999), Jazan (Miller & Cope 1996, Collenette 1999).

**Specimina visa selecta:**—SAUDI ARABIA. Jazan, Head of dam, Abu Arish, In cornfield, 14 october 1983, *Collenette 4655* (E00692536).

4. *Amaranthus* L., Sp. Pl. 2: 989. 1753.

Type (lectotype designated by Green 1929: 188):—*Amaranthus caudatus* L.

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

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

**Alien status:**—Neophyte, native to North America; it can be considered as invasive in Saudi Arabia (see Aljeddani *et al.* 2021, Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Jizan, Qassim (El-Ghazali & Al-Soqeer 2013), Makkah (Al-Eisawi & Al-Ruzayza 2015), Tabuk (Miller & Cope 1996, Collenette 1999), Taif (Aljeddani *et al.* 2021).

4.2. *Amaranthus blitoides* S.Watson, Proc. Amer. Acad. Arts 12: 273. 1877.

Lectotype (designated by Fernald 1945: 139):—*U.S.A. Iowa: Ames, gravelly or sandy soils especially around buildings and along roads, Bessey s.n.* (GH00036983!, image of the lectotype available at [https://kiki.huh.harvard.edu/databases/specimen\\_search.php?mode=details&id=58020](https://kiki.huh.harvard.edu/databases/specimen_search.php?mode=details&id=58020)).

4.2a. *Amaranthus blitoides* var. *blitoides*.

**Alien status:**—Neophyte, native to North America; it can be considered as casual in Saudi Arabia (Hassan *et al.* 2022: 146).

**Occurrence in Saudi Arabia:**—Jizan (Hassan *et al.* 2022: 146), Makkah (Collenette 1999: 35, sub *A. graecizans* subsp. *graecizans*).

**Specimina visa selecta:**—SAUDI ARABIA. Jizan, human-made habitat (coastal plain), 5–15 m, 17 Feb 2021, leg. *Masrhai et Al-shaye*, det. *Masrhai*, rev. *Iamónico* (PNUH!, RO!); *ibidem* (PNUH!, RO!); *ibidem* (PNUH!, RO!).

4.2b. *Amaranthus blitoides* var. *nanus* (Moq.) Iamónico in Hassan *et al.*, *Phytotaxa* 576(2): 147. 2022 ≡ *Amaranthus blitum* var. *nanus* Moq., *Prodr.* [A. P. de Candolle] 13(2): 263. 1849.

Lectotype (designated by Iamónico 2016c: 91):—SAUDI ARABIA. Ad cisternas Dschedda Arab. Felic., 02 Jan 1836, *Schimper* 857 (MPU022388!, image of the lectotype available at <https://herbier.umontpellier.fr/zoomify/zoomify.php?fichier=MPU022388>); isolectotypes at HAL0140219 (image of the isolectotype available at [http://141.48.4.202/djatoka/jacq-viewer/viewer.html?rft\\_id=hal\\_0140219&identifiers=hal\\_0140219](http://141.48.4.202/djatoka/jacq-viewer/viewer.html?rft_id=hal_0140219&identifiers=hal_0140219)), M0241403! (image at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.m0241403?loggedin=true>) and M0241404! (image at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.m0241404>).

**Chorology:**—Native (probably endemic) to Saudi Arabia (Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Mekkah (Iamónico 2016c: 91–92).

**Specimina visa selecta:**—SAUDI ARABIA, Mekkah, Dschedda Arab. Felic. ad cisternas, 02 Jan 1836, *Schimper* 857 (MPU022388!); Circa cisternas Dscheddenses, 1837, *Schimper* 857 (MO247463!).

4.3. *Amaranthus blitum* L., *Sp. Pl.* 2: 990. 1753.

Lectotype (designated by Filias *et al.* 1980: 149–150):—Herb. Linn. No. 1117.14 (LINN!, image of the lectotype available at <http://linnean-online.org/11640/>).

= *Amaranthus lividus* L., *Sp. Pl.* 2: 990. 1753, *nom. rej.* (see Filias *et al.* 1980: 149–150) ≡ *Amaranthus lividus* proles *lividus* (Loisel.) Thell. in Asch. & Graebn. *Syn. Mitteleur. Fl.* [Ascherson & Graebner] 5: 274. 1914.

Lectotype (designated by Reveal & Jarvis 2009: 978):—[Icon] “*Blitum pulchrum rectum magnum rubrum*” in Bauhin & Cherler (1651: 966); image of the lectotype available at <https://www.biodiversitylibrary.org/item/246944#page/1004/mode/1up>.

= *Amaranthus ascendens* Loisel., *Not. Fl. France* 141. 1810 ≡ *Amaranthus blitum* var. *ascendens* (Loisel.) DC., *Cat. Pl. Horti Monsp.* 4. 1813 ≡ *Amaranthus lividus* proles *ascendens* (Loisel.) Thell. in Asch. & Graebn. *Syn. Mitteleur. Fl.* [Ascherson & Graebner] 5[1(5)]: 321 (v-322). 1914 ≡ *Amaranthus lividus* subsp. *ascendens* (Loisel.) Heukels, *Geïllustreerde Schoolflora voor Nederland*: 169. 1934.

Neotype (designated by Iamónico 2016a: 520):—[Icon] “*Blitum majus*” from Dodoens (1616: 617); image of the lectotype available at <https://bibdigital.rjb.csic.es/viewer/11145/?offset=#page=633&viewer=picture&o=bookmark&n=0&q=>.

4.3a. *Amaranthus blitum* subsp. *blitum* var. *blitum*

**Alien status:**—Archeophyte native to the Mediterranean area, and other parts of Europe;; it can be considered as naturalized in Saudi Arabia (see also Chaudhary *et al.* 1981).

**Occurrence in Saudi Arabia:**—Hail (El-Ghanim *et al.* 2010), Makkah (Al-Eisawi & Al-Ruzayza 2015), Riyadh (Hassan *et al.* 2022).

**Specimina visa selecta:**—SAUDIA ARABIA, Riyadh, sandy soil, 623 m, 11 Feb-2021, leg. *Hassan et Alali*, det. *Iamónico* (PNUH!); *ibidem* (RO!).

4.3b. *Amaranthus blitum* subsp. *blitum* var. *oleraceus* (L.) Hook.f., *Fl. Brit. India* [J.D. Hooker] 4: 721. 1885 ≡ *Amaranthus oleraceus* L., *Sp. Pl.*, ed. 2. 2: 1403. 1763 ≡ *Amaranthus lividus* proles *oleraceus* (L.) Thell. in Asch. & Graebn., *Syn. Mitteleur. Fl.* [Ascherson & Graebner] 5(1(5)): 321. 1914 ≡ *Amaranthus blitum* subsp. *oleraceus* (L.) Costea in Costea & al., *Sida* 19(4): 984. 2001.

Lectotype (designated by Filias *et al.* 1980: 150):—Herb. Linn., No. 1117.13 (LINN!, image of the lectotype available at <http://linnean-online.org/11639/>).

**Alien status:**—The origin of this taxon is uncertain at present. It probably originated from a selection of the var. *blitum* which was used as cultivated vegetable (see e.g., Costea *et al.* 2001). However, it does not appear to have been used for this purpose in Saudi Arabia. We consider var. *oleraceus* as casual in Saudi Arabia (Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Doubtfully in Saudi Arabia (Hassan *et al.* 2022: 140). No specimen was traced.

4.4. *Amaranthus caudatus* L., *Sp. Pl.* 2: 990. 1753.

Lectotype (designated by Townsend 1974: 10):—Herb. Linn. No. 1117.26 (LINN!, image of the lectotype available at <http://linnean-online.org/11652/>).

**Alien status:**—Neophyte, native to South America (Argentina, Bolivia, Ecuador, Peru); it can be considered as casual in Saudi Arabia (Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Makkah (Hassan *et al.* 2022: 149).

**Note:**—According Iamonico (2023) and the description of this species given by both Chaudhary (1998: 236–237) and Miller & Cope (1996: 288), Saudi Arabian material refers to *Amaranthus caudatus* s. str.

**Specimina visa selecta:**—SAUDI ARABIA, Makkah, about 5 km N of Taif, dry, rocky hillside, military base, 1720 m, 11 February 1977, leg. *Humbles 100032*, det. *Johnson* (IND0088369!).

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

Lectotype (designated by Townsend 1974: 12):—Herb. Linn. No. 1117.25 (LINN!, image of the lectotype available at <http://linnean-online.org/11651/>).

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

Lectotype (designated by Iamonico 2014a: 147):—Herb. Linn. No. 1117.23 (LINN!, image of the lectotype available at <http://linnean-online.org/11649/>).

= *Amaranthus paniculatus* L., Sp. Pl., ed. 2. 2: 1406. 1763.

Lectotype (designated by El Hadidi & El Hadidy 1981: 37):—Herb. Linn. No. 1117.20 (LINN!, image of the lectotype available at <http://linnean-online.org/11646/>).

= *Amaranthus sanguineus* L., Sp. Pl., ed. 2. 2: 1407. 1763.

Lectotype (designated by Iamonico 2014a: 148):—Herb. Linn. No. 1117.21 (LINN!, image of the lectotype available at <http://linnean-online.org/11647/>).

**Alien status:**—Neophyte, native to Central America; it can be considered as naturalized in Saudi Arabia (Chaudhary 1998, Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Hassan *et al.* (2022: 153) refers the occurrence in Saudi Arabia of *Amaranthus cruentus* by citing Chaudhary's *Flora of the Kingdom of the Saudi Arabia* (Chaudhary 1998). Miller & Cope (1996: 288, 538) reported this species in Jazan nu with doubt. No specimen was traced by us. The species remains doubtful as a member of the national flora.

#### 4.6. *Amaranthus dubius* Mart. ex Thell., Fl. Adv. Montpell.: 203. 1912.

Neotype (designated by Townsend 1974: 471–472):—GERMANY. Herbarium Monacense, *ex horto Erlangensis, s.d., s.c. s.n.* (M0107382!, image of the neotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.m0107382?loggedin=true>).

= *Amaranthus tristis* var. *xanthostachys* Moq., Prodr. [A. P. de Candolle] 13(2): 260. 1849 ≡ *Amaranthus dubius* var. *xanthostachys* (Moq.) Thell. in Asch. & Graebn., Syn. Mittel-Eur. Fl. 5: 266. 1914.

Neotype (designated by Iamonico 2016c: 104):—UNKNOWN ORIGIN. Herbarium Requier, *s.d., s.c. s.n.* (P04021942!, image of the neotype available at <http://mediaphoto.mnhn.fr/media/14494899601942MO7c2qCCiZJWunt>).

**Alien status:**—Neophyte, native to South America; it can be considered as casual in Saudi Arabia (Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Jizan (Hassan *et al.* 2022, : 150).

**Specimina visa selecta:**—SAUDI ARABIA, Jizan, human-made habitat (coastal plain), 5–15 m, 17 Feb 2021, leg. *Masrhah et Al-shaye*, det. *Masrhah*, conf. *Iamonico* (PNUH!, RO!); *ibidem* (PNUH!, RO!); *ibidem* (PNUH!, RO!); *ibidem* (PNUH!, RO!).

#### 4.7. *Amaranthus graecizans* L., Sp. Pl. 2: 990. 1753.

Lectotype (designated by Fernald 1945: 139):—Herb. Clayton No. 442 (BM000051563!, image of the lectotype available at <https://data.nhm.ac.uk/object/ca635ca9-9252-42a3-9082-60ec097bc2d6/1641427200000>).

= *Amaranthus angustifolius* Lam., Encycl. [J. Lamarck & al.] 1: 115. 1783, *nom. illeg.* Art. 52.2 of the ICN (Turland *et al.* 2018).

**Chorology:**—*Amaranthus graecizans* s.l. is native to Europe, Central and Western Asia, and Northern Africa and considered as introduced in some European countries, North America, South Africa, and Australia (Iamonico 2015a). It is native in Saudi Arabia (Hassan *et al.* 2022).

At subspecific rank two main distribution areas can be highlighted, one ranging from Central to southern Europe plus North Africa [subsp. *graecizans* and subsp. *sylvestris* (Vill.) Brenan], the second one in eastern Europe (Russia and adjacent territories) plus Central and southern Asia [subsp. *aschersonianus* (Thell.) Costea and subsp. *thellungianus* (Nevski) Gusev] (see Iamonico 2015a: 34).

4.7a. *Amaranthus graecizans* L. subsp. *graecizans*

**Occurrence in Saudi Arabia:**—Al-Javf, 'Asīr and Riyadh (Miller & Cope 1996), Jizan, Makkah (Miller & Cope 1996).

**Specimina visa selecta:**—SAUDI ARABIA, Jizan, human-made habitat (coastal plain), 5–15 m, 17 Feb 2021, leg. *Masrhai et Al-shaye*, det. *Masrhai*, conf. *Iamónico* (RO!).

4.7b. *Amaranthus graecizans* L. subsp. *sylvestris* (Vill.) Brenan, *Watsonia* 4: 273. 1961 ≡ *Amaranthus sylvestris* Vill., *Cat. Pl. Jard. Strasb.* 111. 1807 ≡ *Amaranthus sylvestris* Desf. ex Poirlet, *Tabl. École Bot.*: 44. 1804, *nom. nud.*, *nom. inval.* (Art. 38.2 Ex.1 of the ICN) ≡ *Amaranthus graecizans* var. *sylvestris* (Desf.) Asch., *Beitr. Fl. Aethiop.*: 176. 1867, *comb. illeg.* ≡ *Amaranthus graecizans* subsp. *sylvestris* (Vill.) O.Bolòs & Vigo, *Butl. Inst. Catalana Hist. Nat., Secc. Bot.* 38(1): 89. 1974 ≡ *Amaranthus angustifolius* proles *sylvestris* (Vill.) Thell., *Syn. Mitteleur. Fl.* [Ascherson & Graebner] 5(1(5)): 300. 1914 ≡ *Amaranthus angustifolius* subsp. *sylvestris* (Vill.) Heukels, *Geïllustreerde Schooflora voor Nederland*: 170. 1934.

Lectotype (designated by Townsend 1985: 31):—Herb. Tournefort 1849 (P!).

Occurrence in Saudi Arabia:—Jizan and Mekkah (Miller & Cope 1996, Collenette 1999).

**Specimina visa selecta:**—SAUDI ARABIA, Mekkah, Jeddah, *s.d.*, *Kruijt 48* (L1684182!); Jizan, human-made habitat (coastal plain), 5–15 m, 17 Feb 2021, leg. *Masrhai et Al-shaye*, det. *Masrhai*, conf. *Iamónico* (PNUH!, RO!).

4.7c. *Amaranthus graecizans* L. subsp. *thellungianus* (Nevski) Gusev, *Bot. Zhurn. (Moscow & Leningrad)* 57(5): 462. 1972 ≡ *Amaranthus thellungianus* Nevski, *Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast.* 4: 311. 1937.

Holotype:—TURKMENISTAN. In angustiis Bulak-Dara ad pedem montium Kuhitang supra pagum Karluk, 11 August 1931, Nevski 730 [LE *fide* Townsend (1985), *non vidi*; photo of the isotype at K000814926!, image of the photo of the isotype available at <http://apps.kew.org/herbcat/getImage.do?imageBarcode=K000814926>).

**Occurrence in Saudi Arabia:**—Doubtfully in Saudi Arabia, according to Hassan *et al.* (2022: 143). No specimen was traced.

4.8. *Amaranthus hybridus* L., *Sp. Pl.* 2: 990. 1753.

Lectotype (designated by Townsend 1974: 19):—U.S.A. Habitat in Virginia, Herb. Linn. No. 1117.19 (LINN!, image of the lectotype is available at <http://linnean-online.org/11645/>).

= *Amaranthus chlorostachys* Willd., *Hist. Amaranth.*: 34. 1790.

Lectotype (designated by Iamónico 2016a: 521):—UNSPECIFIED LOCALITY, *Hermes s.n.* (B-W17521!, image of the lectotype is available at <https://herbarium.bgbm.org/object/BW17521000>).

= *Amaranthus patulus* Bertol., *Comment. Itin. Neapol.* 19. 1837.

Lectotype (designated by Iamónico 2016a: 525):—ITALY. *Campania: Napoli al Pasconcello*, Sep 1834, *Bertoloni s.n.* (BOLO!, image of the lectotype in Iamónico 2016a: Figure 3).

= *Amaranthus hybridus* L. subsp. *hybridus* var. *erythrostachys* Moq., *Prodr.* [A.P. de Candolle] 13(2): 259. 1849.

Lectotype (designated by Iamónico 2016a: 522):—FRANCE. “*Hort. Tol.*”, 1844, *s.c. s.n.* (G147762/1!, image of the lectotype available at <http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=138993&base=img&lang=en>).

**Alien status:**—Neophyte, native to tropical areas of North and Central America; it can be considered as naturalized in Saudi Arabia (Chaudhary 1998, Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Al-Baha, Makkah (Miller & Cope 1996, Al-Eisawi & Al-Ruzayza 2015), Tabuk (Miller & Cope 1996, Aljieddani *et al.* 2021), Bisha (Abbas *et al.* 2020), and Taif (Abdullah *et al.* 2017). No specimen was traced.

4.9. *Amaranthus sparganicephalus* Thell. in Ascherson & Graebner, *Syn. Mitteleur. Fl.* 5: 312. 1914.

Neotype (designated by Hassan *et al.* 2022: 144):—OMAN. Dhofar, J. Qara, nr. Aqarnahawat, *Acacia* hollow, 880 m, 19 Sep 1985, *Miller 7693* (E00687024!, image of the neotype available at <https://data.rbge.org.uk/herb/E00687024>).

**Chorology:**—A species native to eastern tropical Africa (Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, Tanzania), the Arabian Peninsula (Saudi Arabia, Yemen, Oman), and Socotra (see Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Jazan (Miller & Cope 1996), Riyadh.

**Specimina visa selecta:**—SAUDI ARABIA. Raidah Village near base of scarp. 25 km NNW of Abha, waste ground in village, 07 April 1995, *Collenette 9337* (E00121397!).

4.10. *Amaranthus spinosus* L., Sp. Pl. 2: 991. 1753.

Lectotype (designated by Fawcett & Rendle 1914: 103):—Herb. Linn. No. 1117.27 (LINN!, image of the lectotype available at <http://linnean-online.org/11653/>).

**Alien status:**—Neophyte, native to Neotropics; it can be considered as casual in Saudi Arabia (see Chaudhary 1998, Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Bisha (Abbas *et al.* 2020), Jizan (Miller & Cope 1996, Collenette 1999, Al-Turki *et al.* 2000, Aljieddani *et al.* 2021). No specimen was traced.

4.11. *Amaranthus tricolor* L., Sp. Pl. 2: 989. 1753.

Lectotype (designated by Townsend 1974: 14):—Herb. Linn. No. 1117.7 (LINN!, image of the lectotype available at <https://linnean-online.org/11633/>).

= *Amaranthus melancholicus* L., Sp. Pl. 2: 989. 1753. ≡ *Amaranthus tricolor* var. *melancholicus* (L.) Lam. & Monnet, Encycl. [J. Lamarck & al.] 1: 115. 1783.

Lectotype (designated by Townsend 1994: 11):—Herb. Linn., No. 1117.4 (LINN!, image of the lectotype available at <http://linnean-online.org/11630/>).

= *Amaranthus tristis* L., Sp. Pl. 2: 989. 1753. ≡ *Amaranthus tricolor* var. *tristis* (L.) Thell. in Asch. & Graebn., Syn. Mitteleur. Fl. [Ascherson & Graebner] 5: 274. 1914. ≡ *Amaranthus tricolor* subsp. *tristis* (L.) Aellen in Hegi, Ill. Fl. Mitt.-Eur. 3(2): 495. 1959.

Lectotype (designated by Iamónico 2014b: 149):—Herb. Linn., No. 1117.11 (LINN!, image of the lectotype available at <http://linnean-online.org/11637/>).

= *Amaranthus mangostanus* L., Cent. Pl. I. 32. 1755. ≡ *Amaranthus tricolor* var. *mangostanus* (L.) Thell. in Asch. & Graebn. Syn. Mitteleur. Fl. [Ascherson & Graebner] 5: 274. 1914. ≡ *Amaranthus tricolor* subsp. *mangostanus* (L.) Aellen, in Hegi, Ill. Fl. Mitt.-Eur. 3(2): 495. 1959.

Lectotype (designated by Iamónico 2014b: 147):—Herb. Linn., No. 1117.10 (LINN!, image of the lectotype available at <http://linnean-online.org/11636/>).

= *Amaranthus polygamus* L., Cent. Pl. I. 32. 1755. ≡ *Amaranthus tricolor* subsp. *tristis* var. *polygamus* (L.) Aellen in Hegi, Ill. Fl. Mitt.-Eur. 3(2): 495. 1959.

Lectotype (designated by Iamónico 2014b: 148):—Herb. Linn., No. 1117.9 (LINN!, image of the lectotype available at <http://linnean-online.org/11635/>).

**Alien status:**—Neophyte, native to Tropical Asia (Iamónico 2015a).

**Occurrence in Saudi Arabia:**—In Saudi Arabia only cultivated, according to Miller & Cope (1996: 291), Chaudhary (1998: 238), and Hassan *et al.* (2022: 140). No specimen was traced.

4.12. *Amaranthus viridis* L., Sp. Pl., ed. 2. 2: 1405. 1763.

Lectotype (designated by Fawcett & Rendle 1914: 131):—Herb. Linn. No. 1117.15 (LINN!, image of the lectotype available at <http://linnean-online.org/11641/>).

**Alien status:**—Neophyte, native to South America; it can be considered as naturalized in Saudi Arabia (see Chaudhary 1998, Hassan *et al.* 2022).

**Occurrence in Saudi Arabia:**—Al hudud ash Shamaliyah (Osman & El-Ameid Abedin 2019), Bisha (Abbas *et al.* 2020), Jizan and Makkah (Miller & Cope 1996), Taif (Abdullah *et al.* 2017).

**Specimina visa selecta:**—SAUDI ARABIA, Jizan, human-made habitat, (coastal plain) 5–15 m, 17 Feb 2021, leg. *Masrhai et Al-shaye*, det. *Masrhai*, conf. *Iamónico* (RO!).

5. *Celosia* L., Sp. Pl. 1: 205. 1753.

Type (designated by Hitchcock 1929: 135):—*Celosia argentea* L.

5.1. *Celosia polystachya* (Forssk.) C.C.Towns., Hooker's Icon. Pl. 38(2): 23. 1975 ≡ *Achyranthes polystachya* Forssk., Fl. Aegypt.-Arab.: 48. 1775.

Lectotype (designated here):—YEMEN. Wadi Surdud, *s.d.*, *Forsskål s.n.* (BM00095055!, image of the lectotype available at <http://linnean-online.org/11651/>).

**Typification of the name *Achyranthes polystachya*:**—Forsskål (1775: 48) published *Achyranthes polystachya* by giving a short diagnosis (“*spiculis axillaribus confertis, brevibus, albis; caule decumbente*”) and a description; the provenance [“*Surdud*”, which refers to Wadi Surdud, sedimentary basin situated in W-Yemen] is reported [see also Forsskål (1775: CVII) who indicated “*Ph.*” as provenance of *A. polystachya*, meaning “*Planites argillacea humida, montibus proprios*” (Forsskål 1775: CI)]. No specimen which can be considered as part of the original material for *A. polystachya* was found at C (see also Hepper & Friis 1994), where Forsskål's Herbarium and types are mostly preserved (HUH Index of Botanists 2013b). Fortunately, we traced a further specimen at BM (barcode BM00095055). This specimen has one of the rather rare of Forsskål's original field labels and the vernacular name “*Suaed*” and has come to BM via the herbarium of E. F. Nolte, who was professor at the University of Kiel (then the second university under the Danish monarchy; I. Friis, pers. comm.). BM00095055 can be considered for the lectotypification purpose (see also Hepper & Friis 1994) and it is here designated as the lectotype of the name *A. polystachya*.

**Note:**—Ghazanfar (2023 onwards) listed *Celosia argentea* L. for *Plants of the Middle East* as “A pantropical weed of cultivation. Bahrain ... Saudi Arabia ... Yemen” and cited in synonymy *Celosia polystachya* and *Achyranthes polystachya*. However, *C. polystachya* is a different species (see e.g., Thomas 2011+, POWO 2023) and Ghazanfar's record of *C. argentea* for Saudi Arabia is to be referred to *C. polystachya*.

**Chorology:**—Native to an area ranging from North-Eastern Tropical Africa to Kenya and the Arabian Peninsula (POWO 2023).

**Occurrence in Saudi Arabia:**—‘Asīr (Collenette 1999), Jazan (Miller & Cope 1996).

**Specimina visa selecta:**—SAUDI ARABIA. ‘Asīr, 44 km SSE of Abha, Wadi Sud'r, 11 november 1983, *Collenette 4670* (E00686978!); Wadi al USS, between Jabal Sawdah and Mukaylah, 27 sep 1982, *Collenette 3886* (E00686979!).

5.2. *Celosia trigyna* L., Mant. Pl. Altera: 212. 1771.

Lectotype (designated by Townsend 1975: 30):—Herb. Linn. No. 102.19 (S-G-10422!, image of the lectotype available at <http://linnaeus.nrm.se/botany/fbo/c/celos/celotri2.html.en>).

**Chorology:**—A species native to Tropical & South Africa, and the Arabian Peninsula; introduced in Florida (POWO 2023).

**Occurrence in Saudi Arabia:**—Al-Baha, Al-Madinah (Miller & Cope 1996), Makkah (Miller & Cope 1996), Jazan (Miller & Cope 1996, Collenette 1999, Abbas *et al.* 2020).

**Specimina visa selecta:**—SAUDI ARABIA. Al-Baha, 06 september 2012, *s.c. KSUF562* (PNUH!).

6. *Digera* Forssk., Fl. Aegypt.-Arab.: 65. 1775.

Type (Forsskål 1775: 65):—*Digera arvensis* Forssk. [= *Digera muricata* (L.) Mart. subsp. *muricata*].

6.1. *Digera muricata* (L.) Mart., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 13: 285. 1826 subsp. *muricata* ≡ *Achyranthes muricata* L., Sp. Pl., ed. 2. 1: 295. 1762.

Lectotype (designated by Townsend 1974: 23):—Herb. Linn. No. 287.6 (LINN!, image of the lectotype available at <https://linnean-online.org/2889/#?s=0&cv=0>).

= *Achyranthes muricata* L., Sp. Pl., ed. 2. 1: 295. 1762.

Lectotype (designated by Townsend 1985: 37):—Herb. Linn. No. 287.7 (LINN!, image of the lectotype available at <https://linnean-online.org/2890/>).

= *Digera arvensis* Forssk., Fl. Aegypt.-Arab.: 65. 1775.

Lectotype (designate here):—YEMEN. Wadi Mawr and Wadi Surdud, february 1763, *Forsskål 1229* (C10002189!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.c10002189>); isolectotype: C10002188!, image of the isolectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.c10002188?page=1>.

**Typification of *Digera arvensis*:**—Forsskål (1775: 65) published *Digera arvensis* by giving a long and detailed description and the provenance “*Surdud*”, which refers to Wadi Surdud, a sedimentary basin situated in W-Yemen [see also Forsskål (1775: CVI) who indicated “*Ph.*” as provenance of *D. arvensis*, where “*Ph.*” means “*Planites argillacea*”

humida, montibus proprios” (Forsskål 1775: CI)]. There are two specimens at C (C10002188, C10002189) bearing a plant collected in Wadi Mawr and Wadi Surdud in february 1763 which are part of the original material used to describe *D. arvensis* (see also Hepper & Friis 1994). We here designate C10002189 (which exhibits more flowers than C10002188) thus matching Forsskål’s description, as the lectotype of the name; the morphology of C10002189 corresponds to that of *Digera muricata* subsp. *muricata* (see Townsend 1973). C10002188 is a isolectotype.

**Notes:**—Two subspecies are currently recognized under *Digera muricata*, i.e. subsp. *muricata* and subsp. *trinervis* C.C.Towns. which differ by the shape of the leaves (ovate vs. linear) and the number of nerves of the outer tepals (7–12 vs. (1–)3).

The specimen, as well as the illustration (Chaudhary 1998: 247, Plate 130) we traced for *Digera muricata* allow to confirm the occurrence in Saudi Arabia of subsp. *muricata*.

**Chorology:**—*Digera muricata* subsp. *muricata* is native to some countries of north-eastern Africa, Madagascar, the Arabian Peninsula, and south Asia (POWO 2023).

**Occurrence in Saudi Arabia:**—Chaudhary (1998: 239) stated that *Digera muricata* occurs in the “western-southwestern region”. We verified its presence only at Makkah (see also Collenette 1999, Ghazanfar & Fisher 2013), whereas Miller & Cope (1996) and Abbas *et al.* (2020) reported the species in Jazan.

**Specimina visa selecta:**—SAUDI ARABIA. Makkah, *In palmetis vallis arabicae Fatme prope Unsert*, 12 february 1836, *Schimper 830* (HBG503178!); *ibidem* (HBG503179!); *ibidem* (P00606396!); *ibidem* (MEL2462529!); *ibidem* (TUB000301!); *ibidem* (TUB000302!); *In valle Fatme, s.d., Fischer s.n.* (M0241424!); *ibidem, Fischer 42* (M0241423!); *In cultis et palmetis vallis Fatme, s.d., Fischer 42* (M0241422!).

## 7. *Gomphrena* L., Sp. Pl. 1: 224. 1753.

Type (designated by Hitchcock 1929: 137):—*Gomphrena globosa* L.

### 7.1. *Gomphrena globosa* L., Sp. Pl. 1: 224. 1753.

Lectotype (designated by Townsend 1974: 46):—Herb. Linn. No. 319.1 (LINN!, image of the lectotype available at <https://linnean-online.org/3568/>).

**Alien status:**—Neophyte species native to Mexico, Central America, and north and central South America, whereas it is alien in East Europe, central and south Africa, regions of South Asia, and Australia (POWO 2023). Cultivated in Saudi Arabia.

**Occurrence in Saudi Arabia:**—According to Chaudhary (1998: 243) this species is only cultivated in Saudi Arabia (as an ornamental plant) (see also Miller & Cope 1996). Further surveys are needed to verify its occurrence as an escaped alien (probably casual).

## 8. *Nothosaerva* Wigth, Icon. Pl. Ind. Orient. 6: 1. 1853.

Type (Wigth 1853: 1):—*Nothosaerva brachiata* (L.) Wight.

### 8.1 *Nothosaerva brachiata* (L.) Wight, Icon. Pl. Ind. Orient. 6: 1. 1853 ≡ *Achyranthes brachiata* L., Mant. Pl.: 50. 1767.

Lectotype (designated by Townsend: 32. 1974, as holotype; corrected by Iamonico & Friis 2017: 1209):—Herb. Linn. No. 290.1 (LINN!, image of the lectotype available at <http://linnean-online.org/2915/>

**Chorology:**—A species native to Tropical and south Africa, Saudi Arabia, the Indian subcontinent to Myanmar, and south-eastern Borneo (POWO 2023).

**Occurrence in Saudi Arabia:**—Jazan in Farasan island only (see e.g., Collenette 1999, Atiqur Rahman *et al.* 2002, Hall *et al.* 2010). Farasan Al-Kabir (the largest island of Farasan Archipelago) is the only Saudi Arabian locality where *Nothosaerva brachiata* occurs and it is assessed by Hall *et al.* (2010: 197) as a threatened species based on IPAs criteria. The species deserves monitoring and actions for its conservation.

**Specimina visa selecta:**—SAUDI ARABIA. Farasan island, 18 July 1996 [sub “1417” which is the year of Hijri calendar], *Basehi 3175* (KFU); *ibidem, Basehi 3174* (KFU).

## 9. *Psilotrichum* Blume, Bijdr. Fl. Ned. Ind.: 544. 1826.

Type (Blume 1826: 544):—*Psilotrichum trichotomum* Blume.

9.1. *Psilotrichum gnaphalobryum* (Hochst.) Schinz., Vierteljahrsschr. Naturf. Ges. Zürich 57: 550. 1912 ≡ *Psilostachys gnaphalobryum* Hochst., Flora 27(1 Beibl.): 6. 1844 ≡ *Psilotrichum cordatum* Moq., Prodr. [A. P. de Candolle] 13(2): 280. 1849.

Lectotype (designated here):—YEMEN. *Hedschas, In rupibus montis Gesser in Arabiae felicis*, 26 feb 1836, Schimper 785 (TUB000386!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.tub000386?loggedin=true>); isolectotypes: E00641651 (image available at <https://data.rbge.org.uk/herb/E00641651>), E00641652 (image available at <https://data.rbge.org.uk/herb/E00641652>), E00641653 (image available at <https://data.rbge.org.uk/herb/E00641653>), GOET005661 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.goet005661>), HEID701185 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.heid701185>), HBG503193 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.hbg503193>), HBG503194 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.hbg503194>), JE00026006 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.je00026006>) MEL2458533 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.mel2458533>), MPU007236 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.mpu007236>), P00606391 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.p00606391>), P00606392 (image available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.p00606392>), P05003915 (image available at <http://mediaphoto.mnhn.fr/media/1441382299466oPQDjdm1b9ICLsXv>), P05003921 (image available at <http://mediaphoto.mnhn.fr/media/14413822995820QcE9jvO3GzATTBS>), P05003924 (image available at <http://mediaphoto.mnhn.fr/media/1441382299642CZm9mskwhFs7R3Kl>), P05003925 (image available at <http://mediaphoto.mnhn.fr/media/1441382299661UlfvGuKOFRX4GqGd>), P05003926 (image available at <http://mediaphoto.mnhn.fr/media/1441382299680n3oD9qRyBlg8fZcH>), P05003928 (image available at <http://mediaphoto.mnhn.fr/media/1441382299719hQcTeKtIIng14vaFwM>), P05003929 (image available at <http://mediaphoto.mnhn.fr/media/1441382299739Vr03gqx7K8kSkFpm>), P05003930 (image available at <http://mediaphoto.mnhn.fr/media/1441382299759TKc3wHVKns66FkPf>), P05003932 (image available at <http://mediaphoto.mnhn.fr/media/1441382299798Pav6UJ9ra99FQqK>), TUB000387, image available at (<https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.tub000387?loggedin=true>).

– *Achyranthes cordata* Hochst., Flora 27(1 Beibl.): 6. 1844, *nom. inval.* (Art. 36.1b of ICN).

**Typification of the name *Psilostachys gnaphalobryum*:**—Hochstetter (1844: 6) validly published *Psilostachys gnaphalobryum* by providing a detailed description; the following syntype was also reported: “Ad rupes montis Gesser in Arabiae provincia Hedschas d. 27. Febr. 1836, nec non in Abyssiniae provincia Modat Aprili 1839 legit: W. Schimper ...”. Moreover, Hochstetter (1844: 6) reported, after the name, “(*Achyranthes cordata* Hichst. et Steud. In pll. exsicc. Un. it. Arabicis nr. 785)”. Since “*Achyranthes cordata*” was published here for the first time and it was placed in synonymy, it is not validly published according to the Art. 36.1b of ICN.

We traced fourteen specimens, at E (E00641651, E00641652, E00641653), GOET (GOET005661), HEID (HEID701185), HBG (HBG503193, HBG503194), JE (JE00026006), MEL (MEL2458533), MPU (MPU007236), P (P00606391, P00606392), and TUB (TUB000386, TUB000387) bearing plants collected “In rupibus montis Gesser in Arabiae felicis” in february, 26 1836 by W. Schimper and numbered as “785”. These specimens are clearly original material for *Psilostachys gnaphalobryum* and all match Hochstetter’s description. Since TUB000386 includes more leaves and flowers, which are important taxonomic characters in the genus *Psilostachys* (see Townsend 1980, Bao *et al.* 2003), we here designate it as the lectotype of the name. GOET005661, MEL2458533, MPU007236, and TUB000387 are the isolectotypes; further isolectotypes occur at P (see below under “Notes on the name *Psilotrichum cordatum*”).

**Notes on the name *Psilotrichum cordatum*:**—Moquin-Tandon (1849: 280) listed *Psilotrichum cordatum* reporting as synonyms “*Achyranthes cordata* Hochst. et Steud. In Schimp. It. n. 785. *Phylostachys gnaphalobryum* Hochst. l.c. [loco citato] t. 4”. As stated above, “*Achyranthes cordata*” is an invalid name. Therefore, Moquin-Tandon’s *P. cordatum* should be written as *Psilotrichum cordatum* Moq. (as correctly reported by IPNI 2023), not “*Psilotrichum cordatum* (Hochst.) Moq.” as reported, e.g., by POWO (2023). However, since the valid and legitimate name *Gnaphalobryum* is cited by Moquin-Tandon (1849: 280) as synonym, his *Psilotrichum cordatum* is a superfluous and illegitimate name according to Art. 52.2 of ICN. Note also that Moquin-Tandon (1849: 280), by citing Schimper’s specimen no. 785, did not excluded the type of *Phylostachys gnaphalobryum*. In fact, we traced nine specimens at P (P05003915, P05003921, P05003924, P05003925, P05003926, P05003928, P05003929, P05003930, P05003932) identified as “*Achyranthes cordata*” and collected in “rupibus montis Gesser in Arabiae felicis” by W. Schimper (collection number: 785), according to the labels. These specimens are those cited by Moquin-Tandon (1849: 280) under *P. cordatum* and correspond to Schimper’s collections of *P. gnaphalobryum*, thus being original material for theis latter name (see above). Therefore, *Psilotrichum cordatum* can be considered as a homotypic synonym of *Phylostachys gnaphalobryum*.



**Chorology:**—A species native to north-eastern Tropical Africa, extending to Kenya and the Arabian Peninsula (POWO 2023).

**Occurrence in Saudi Arabia:**—‘Asīr (Collenette 1999), Jazan and Makkah (Miller & Cope 1996).

**Specimina visa selecta:**—‘Asīr, Raida, 21 may 1998, *Alfahran & Thomas 6015* (KFU!).

**10. *Pupalia*** Juss., Ann. Mus. Natl. Hist. Nat. 2: 132. 1803

Type (Jussieu 1803: 132):—*Pupalia lappacea* (L.) Juss.

10.1 *Pupalia lappacea* (L.) Juss., Ann. Mus. Natl. Hist. Nat. 2: 132. 1803 ≡ *Achyranthes lappacea* L., Sp. Pl. 1: 204. 1753.

Lectotype (designated by Townsend 1979: 135):—Herb. Hermann 1: 2, No. 103 [BM000621230! (lower specimen), image of the lectotype available at <https://data.nhm.ac.uk/object/ef4647f3-8c75-4c8b-9ed2-1f4d6eb7c112/1691020800000>].

**Infraspecific variation of *Pupalia lappacea*:**—This species is highly variable from the morphological point of view and five varieties are currently accepted, viz. var. *argyrophylla* C.C.Towns., var. *glabrescens* C.C.Towns., var. *lappacea*, var. *orbiculata* (B.Heyne ex Wall.) C.C.Towns., and var. *velutina* (Moq.) Hook.f. The taxa differ from each other on habit, leaf shape, indumentum, and number of setae in the sterile flowers (Townsend 1979). The flora of Saudi Arabia includes one variety only, var. *velutina* (Moq.) Hook.f.

10.1a. *Pupalia lappacea* L. var. *velutina* (Moq.) Hook.f., Fl. Brit. India 4: 724. 1885 ≡ *Pupalia velutina* Moq. in A.P.de Candolle, Prodr. [A. P. de Candolle] 13(2): 332. 1849.

Lectotype (designated by Townsend 1979: 138, here corrected according to Art. 9.10 of ICN):—INDIA. Herbarium Wallich List no. 6935 (K000814943!, image of the lectotype available at [https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.k000814943?logge\\_din=true](https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.k000814943?logge_din=true)).

**Typification of the name *Pupalia velutina*:**—Moquin-Tandon (1849: 332) cited, after the description, a syntype (“In India ad ripas Irrawaddi (Wall!). Desmochaeta velutina Wall.! list n. 6935”). The name “Desmochaeta velutina” appears in Wallich’s (1829) *Numerical list* as a *nomen nudum* and, therefore, it is invalid according to Arts. 38.1 and 38.2 of ICN. Townsend (1979: 138) reported for var. *velutina* “Type: Burma, Wallich 6935A (holotype W n.v. [non vidi]; isotype K-W)”. However, not only Moquin-Tandon (1849: 332) did not cite a holotype (but a syntype according to Art. 9.6 of ICN); Wallich’s original material is deposited at K with duplicates in many other herbaria, W included (HUH Index of Botanists 2013c). According to Art. 9.10 of ICN, Townsend’s use of the term isotype for the K specimen is an error, to be corrected to the term lectotype. We traced Wallich’s specimen (no. 6835) at K (K000814943).

**Chorology:**—Native to Africa (most of the countries), the Arabian Peninsula, India, and some islands of south-eastern Asia (POWO 2023).

**Occurrence in Saudi Arabia:**—‘Asīr (Alwadie 2005), Jazan (Collenette 1999), Makkah.

**Specimina visa selecta:**—SAUDI ARABIA. Jazan, Fayfa, 06 march 2012, s.c. *KFSU329* (PNUH!); Makkah, Inter lapides et rupes montis Sedder Arab. Felicis, 28 february 1836, *Schimper 901* (HBG503191!); *ibidem* (HBG503150!); *ibidem* (TUB000282!); *ibidem* (G00689213!).

**11. *Saltia*** R.Br. ex Moq., Prodr. 13(2): 325. 1849.

Type (Moquin-Tandon 1849: 325):—*Saltia papposa* (Forrsk.) Moq.

11.1 *Saltia papposa* (Forrsk.) Moq., Prodr. [A. P. de Candolle] 13(2): 325. 1849 ≡ *Achyranthes papposa* Forrsk., Fl. Aegypt.-Arab.: 48. 1775.

Lectotype (designate here):—YEMEN. Zabid, s.d., *Forsskål 205* (C10001569!, image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.c10001569?page=1>); isolectotypes: C10001570! (image of the isolectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.c10001570?page=1>) and BM000950560! (image of the isolectotype available at <https://data.nhm.ac.uk/object/c634a45c-983a-42f3-9c4d-1d1b06f5f88b/1691539200000>).

**Typification of the name *Achyranthes papposa*:**—Forsskål (1775: 48) published *Achyranthes papposa* by giving a short diagnosis (“*foliis alternis; crassiusculis; lineari-cuneatis, obtusis*”) and a detailed description; the provenance [“*Zebid*” (currently Zabid), a city of W-Yemen] is reported [see also Forsskål (1775: CVII) who indicated “*Mi.*” as provenance of *A. papposa*, “*Mi.*” meaning “*Montium Regionis Inferior*” (Forsskål 1775: CI)]. We traced two

specimens at C, where Forsskal's herbarium and types are mostly preserved (HUH Index of Botanists 2013c), i.e. viz. C10001569 and C10001570, both collected at Zabid; a further specimen is kept at BM (BM000950560) and it was annotated by Frank Nigel Hepper as an isotype. These three specimens are part of the original material for *A. papposa* (see also Hepper & Friis 1994). C10001569 bears a branch of a plant with more flowers than in C10001570. Since the morphology of the flowers is important to identify *Saltia papposa* (Townsend 1993), we here designate C10001569 as the lectotype of *A. papposa*. C10001570 and BM000950560 are isolectotypes.

**Chorology:**—Endemic to the Arabian Peninsula (Saudi Arabia and Yemen; POWO 2023).

**Occurrence in Saudi Arabia:**—Doubtfully in Makkah (Miller & Cope 1996). We did not trace any specimen collected in Saudi Arabia, but it is not impossible that *Saltia papposa* occurs in the country, probably in the south-eastern coastal area (Jazan?) (see also Ghazanfar & Fisher 2013: 178–179).

## Species to be excluded

### *Amaranthus tortuosus*

POWO (2023) reports *Amaranthus tortuosus* Hornem. as an alien species in Saudi Arabia, but no relevant literature source is listed. Note that neither Chaudhary (1998) in the most recently published *Flora of the Kingdom of the Saudi Arabia*, nor Thomas (2011+) in the continuously updated *Checklist of the Flora of Saudi Arabia*, and Hassan *et al.* (2022) in their taxonomic revision of Arabian amaranths, listed this species among the *Amaranthus* taxa occurring in the country. We did not trace any work, referring to Saudi Arabia, in which *A. tortuosus* was reported, and did not find this species in field.

Hornemann (1819: 107) published *Amaranthus tortuosus* from plants cultivated in *Hortus regius botanicus Hafniensis* (what is now the Botanical Garden of Copenhagen) from seed collected in Saint Croix Island (Virgin Islands, U.S.A.) as reported in the protologue (“*Hab.* in Ins. St. Cru. [Habitat in Insulis Sanctus Crucis] ... *C. intr.* [Planta Caldari introducta] 1816”; see Hornemann 1819: IX). In fact, according to POWO (2023), *A. tortuosus* is a species native to Mexico, Central America, the Caribbean, and north-western tropical regions of South America. Among the listed synonyms in POWO (2023), there is *A. dubius* Mart. ex Thell., a species accepted by many authors as distinct (e.g., Mosyakin & Robertson 2003, Iamónico 2015b, Sindhu *et al.* 2021b, Hassan *et al.* 2022) and recently discovered in Saudi Arabia (Hassan *et al.* 2022: 149–150). However, based on a preliminary check of the protologue of *A. tortuosus* (Hornemann 1819: 107) as well as the examination of original material by one of us (DI), *A. tortuosus* cannot be ascribed to *A. dubius* but likely to *A. hybridus*. Note also that, among the synonyms of *A. tortuosus* listed in POWO (2023), there are two varieties of *A. tristis* L., viz. var. *xanthostachys* Moq. (= *A. dubius* according to Iamónico 2016c: 104–105) and *A. tristis* L. var. *flexuosus* Moq. (possibly *A. dubius* according to Iamónico 2016c: 103–104). A complete study of Hornemann's name is in preparation by DI.

All details considered, we exclude *Amaranthus tortuosus* from the flora of Saudi Arabia.

### *Pupalia lappacea* var. *lappacea*

This taxon, native to Africa south of the Sahara and some countries of southern Asia (POWO 2023), is indicated in this web-database as occurring also in Saudi Arabia, based on Miller & Cope (1996). However, Miller & Cope (1996: 294) clearly stated that “All the Arabian material is referable to var. *velutina* (Moq.) Hook.f., Fl. Brit. Ind. 4: 724 (1885), characterized by its lanate tepals and sterile flowers with straw-coloured spines”. Chaudhary (1998: 239–240) did not specify any infraspecific taxon under *P. lappacea* but, according to the description and the illustration given (Plate 131), he referred to var. *velutina*. We did not find any plants identifiable as var. *lappacea*, neither in the field nor in herbaria. Moreover, no published source was found indicating *P. lappacea* s.str. in Saudi Arabia. Therefore, we here exclude *P. lappacea* var. *lappacea* from the Flora of Saudi Arabia.

## Conclusion

Floristic lists play an important role in botany by representing the basic data about the plant biodiversity of a territory (Borsch *et al.* 2020). Their nomenclatural and taxonomical updating, based on current field work, is a crucial precondition for being accepted by the responsible administrative bodies as well as the scientific public (see Weinmann *et al.* 2002

onwards, Lorite 2016, Govaerts *et al.* 2021). The knowledge of the regional biodiversity is, in turn, essential for further investigations on nature conservation (see e.g., Wagensommer 2023), in particular the protection of endemic species (Peruzzi *et al.* 2015) and the eradication management on noxious aliens (Lambdon *et al.* 2008).

The last Flora of Saudi Arabia (Chaudhary 1998) was published 25 years ago. The Amaranthaceae list presented here is a nomenclatural and taxonomic updating of the Saudi Arabian taxa and represents a new starting point for future studies on this family in the country, both for conservation purposes regarding native species and for a continuous monitoring of the populations of alien taxa.

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