Amaranthus emarginatus s.lat. (Amaranthaceae) in Italy

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Abstract - *Amaranthus emarginatus* belongs to the *Amaranthus blitum* complex, a critical taxonomic group. Within the variability of *A. emarginatus*, two taxa are often accepted, '*emarginatus*' and '*pseudogracilis*', which differ by habitus, synflorescence structure, and leaf size. However, their taxonomic value is debated, and *A. emarginatus* itself is sometimes included in *A. blitum* as subspecies. In this paper, molecular, morphological, phytogeographical, and ecological data are discussed to assess the most correct rank of these taxa. We conclude that *A. emarginatus* deserves specific distinctness from *A. blitum*, and *A. pseudogracilis* can be regarded as a subspecies of the former. This choice reflects both the molecular data and geographical distributions of *A. blitum* and *A. emarginatus*, i.e., Mediterranean area, Europe, and North Africa for the former *vs*. neotropics for the latter). Within *A. emarginatus*, in addition, to the different morphology, *A. emarginatus* var. *pseudogracilis* differs also on account of its ecological preferences, because it occurs in warm and humid areas, whereas *A. emarginatus* var. *emarginatus* is better adapted to cold and dry habitats. However, since molecular analyses cannot clearly separate the two taxa, we consider the subspecific rank as the most appropriate. We also found a further morphological difference in seed coat ornamentation, hitherto not pointed out: the shape of the peripheral cells is tetragonal in *A. emarginatus* subsp. *pseudogracilis*, but polygonal (cells with ≥ 5 sides) in subsp. *emarginatus*. Distributional maps and status assessment at regional level for the two taxa are provided. According to this revision, *A. emarginatus* subsp. *emarginatus* is to be regared as naturalized in central and southern Italy (Latium and Campania, respectively).

Key words: alien species, *Amaranthus*, distribution, taxonomy.

Riassunto - *Amaranthus emarginatus* s.lat. (Amaranthaceae) in Italia.

Amaranthus emarginatus è una specie inclusa nel complesso di *A. blitum*, un gruppo tassonomicamente critico. La variabilità di *A. emarginatus* è attualmente spiegata riconoscendo due taxa, i.e., '*emarginatus*' e '*pseudogracilis*', i quali differiscono tra loro per l'habitus, la struttura dell'infiorescenza e le dimensioni delle foglie. La scelta del loro rango è attualmente dibattuta e, talora, il taxon '*emarginatus*' viene considerato all'interno di *A. blitum* come sottospecie. In questo lavoro vengono discussi i dati molecolari, morfologici, fitogeografici ed ecologici per stabilire il rango migliore per questi taxa, concludendo che *A. emarginatus* merita quello specifico, mentre il taxon '*pseudogracilis*' quello sottospecifico. Tale decisione scaturisce sia dai dati molecolari che dalla distribuzione geografica dei taxa '*blitum*' ed '*emarginatus*' (area Mediterranea, Europa e Nordafrica *vs*. are tropicale del sud America). In aggiunta alle differenze morfologiche, il taxon '*pseudogracilis*' ha differenti preferenze ecologiche, crescendo in aree più calde ed umide, mentre il taxon '*emarginatus*' è meglio adattato a condizioni più fredde e aride. Tuttavia, date le poche differente molecolari, si ritiene che il rango di sottospecie sia il più appropriato. Abbiamo trovato un ulteriore carattere diagnostico tra i taxa '*pseudogracilis*' e '*emarginatus*', sinora mai evidenziato, ossia l'ornamentazione del seme: la forma delle cellule periferiche è tetragonale in '*pseudogracilis*', poligonale (cellule con almeno 5 lati) in '*emarginatus*'. Si riportano le carte di distribuzione e status di naturalizzazione a scala regionale per le due sottospecie. Sulla base della trattazione, *A. emarginatus* subsp. *emarginatus* è da considerare naturalizzata in Italia centro-meridianonale (Lazioe Campania region).

Parole chiave: *Amaranthus*, distribuzione, specie aliene, tassonomia.

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Received for publication: 28 October 2023
Accepted for publication: 5 April 2024
Online publication: 18 April 2024

INTRODUCTION

The genus *Amaranthus* L. (Amaranthaceae Juss.) includes about 70 mostly herbaceous species, of which approximately half are native to the Americas (Hernández-Ledesma *et al.*, 2015; Iamonico, 2015a). Several species spread out of their native distribution areas, sometimes negatively impacting both agricultural systems and natural vegetation (Costea *et al.*, 2001a; Iamonico, 2015a; Das, 2016).

Amaranthus is a taxonomically complex genus due to its high phenotypic variability and frequency of hybridization (Costea *et al.*, 2001a; Bayón, 2015; Iamonico, 2015a, 2017), which has resulted in the nomenclatural disorder and misapplication of names, mostly clarified by one of us (see, e.g., Iamonico, 2014a, 2014b, 2016a, 2020a; Iamonico & Palmer, 2020).

Among the critical groups of the genus, *Amaranthus blitum* complex comprises the following three species

(Iamonico & Das, 2014): *A. blitum* L. [with var. *blitum* and var. *oleraceus* (L.) Hook.f.], *A. emarginatus* Salzm. ex Uline & W.L.Bray [with var. *emarginatus* and var. *pseudogracilis* (Thell.) Iamonico], and the Indian endemic *A. bengalensis* Saubhik Das & Iamonico. The flora of Italy includes *A. blitum* subsp. *blitum* and *A. emarginatus* subsp. *emarginatus* (Bartolucci *et al.*, 2018; Galasso *et al.*, 2018; Portal to the Flora of Italy, 2024), whereas, at varietal rank (not considered in the Italian checklist), Iamonico (2015a) considered four taxa, i.e. var. *blitum* and var. *oleraceus* (L.) Costea for *A. blitum s.s.* and var. *emarginatus* and var. *pseudogracilis* (Thell.) Iamonico (see also Iamonico, 2016a) for *A. emarginatus sensu stricto*.

As part of the ongoing studies on the genus *Amaranthus* (see, e.g., Iamonico, 2015a, 2016b, 2016c, 2020b, 2023; Iamonico & El Mokni, 2017, 2018, 2023; Iamonico & Galasso, 2018; Sindhu *et al.*, 2020; Milani *et al.*, 2021; Iamonico *et al.*, 2022; Hassan *et al.*, 2022), we present here a note on taxonomy and Italian distribution of *Amaranthus emarginatus s.lat.*

MATERIAL AND METHODS

The work is based on field surveys carried out throughout Italy during the last 15 years, examination of specimens preserved at AO, FI, MSNM, P, PAD, PESA, RO, TO, and WU (codes according to Thiers, 2024+) and the personal collections (not listed in the *Index Herbariorum*) of Carlo Argenti (Herb. C. Argenti) and Cesare Lasen (Herb. C. Lasen); relevant literature was also analyzed.

Micro-morphological seed coat was examined by a scanning electron microscope SEM (JSM5910, 3kv voltage and secondary electron detector). Each seed sample was mounted on metallic stubs using double adhesive tape and coated with gold for 6 minutes in a sputtering chamber followed by observation under SEM.

The distribution is given as presence/absence and status in the 20 administrative regions of Italy by following Bartolucci *et al.* (2018) and Galasso *et al.* (2018).

The Articles cited throughout the text follow the *The International Code of Nomenclature for algae, fungi, and plants* (hereafter reported as "ICN": Turland *et al.*, 2018).

HISTORICAL BACKGROUND

Amaranthus emarginatus was validly described by Uline & Bray (1894: 319), who listed it with its synonym *Euxolus viridis* (L.) Moq. var. *polygonoides* Moq. and provided a comparison with *A. lividus* L. (currently accepted as *A. blitum* L.) and *A. viridis* L., which were considered as the related species.

Uline & Bray's taxon was accepted at different ranks during the time, from species to subspecies or variety under *Amaranthus blitum*. Muñoz Garmendia & Pedrol (1987: 599) proposed the recognition of *A. emarginatus* as subspecies of *A. blitum*, but no discussion was given for this choice. The same taxon was recognized at subspecies rank using Moquin-Tandon's name (*Euxolus viridis* var. *polygonoides*) by Pristzer [1953: 221, as *A. ascendens* subsp. *polygonoides* (Moq.) Thell. ex Priszter], Probst [1949: 74, as *A. blitum* subsp. *polygonoides* (Moq.) Probst], Carretero [1985: 276, as *A. blitum* subsp. *polygonoides* (Moq.) Carretero, isonym (Art. 6 Note 2 of the ICN)], and Maire [1962: 208, as *A. angustifolius* subsp. *polygonoides* (Moq.) Maire]. The following authors proposed new combinations at varietal rank: Lambinon [1993: 55, as *A. blitum* var. *emarginatus* (Moq.) Lambinon], Thellung [1912: 215, as *A. ascendens* var. *polygonoides* (Moq.) Thell.]. Finally, Thellung (1914: 321) published the name *A. lividus* proles *polygonoides* (Moq.) Thell., where "proles" are not currently considered an official rank and thise infraspecific name is to be regarded as unranked (Greuter, 1968).

Thellung (1914: 321), within *Amaranthus lividus* proles *polygonoides* (= *A. emarginatus*), described a new form (f. *pseudogracilis* Thell.), to distinguish plants with slender inflorescence ("Endständiger blütenstand stark verlängert and verzweigt, mit schlanken Aesten, Tracht daher stark an A. gracilis erinnernd" = Terminal inflorescence greatly elongated and branched, with slender branches, habit strongly reminiscent of *A. gracilis*). The other form (f. *axillaris* Thell.) referred to plants with flowers arranged in axillary clusters ("blütenknauel sammtlich blattachselstandig" = clusters of flowers all axillary to the leaves) and it would refer to *A. emarginatus sensu stricto* according to Thellung's concept. *Amaranthus lividus* f. *pseudogracilis* was differently treated by the subsequent authors, both at specific (Loos, 2010: 117) and infraspecific ranks, i.e., subspecies (Hügin, 1897: 463), variety [Lambinon (1993: 55, under *A. blitum*) and Iamonico (2016a: 523, under *A. emarginatus*], or subvariety (Thellung, 1914: 231).

The taxa '*blitum*', '*emarginatus*', and '*pseudogracilis*' are currently treated in different ways. For instance, Bayón (2015: 309, 312) recognized a single species (*Amaranthus blitum*) with four subspecies, i.e., subsp. *blitum*, subsp. *emarginatus*, subsp. *oleraceus* (L.) Costea, and subsp. *pseudogracilis* (Thell.) N.Bayón. In contrast, other authors (e.g., Iamonico, 2015a, 2015b; Info Flora, 2024) considered two separated species, i.e., *A. blitum* (with two varieties: var. *blitum* and var. *oleraceus*) and *A. emarginatus* (with two varieties: var. *emarginatus* and var. *pseudogracilis*).

RESULTS

The taxa '*blitum*' and '*ermarginatus*' have different origins: *A. blitum* is native to the Mediterranean area, Europe, and North Africa, whereas *A. emarginatus* is native to the Neotropics. Today these taxa are spread by man all over the world, and the original distribution ranges are blurred. So, to reflect the different evolutionary histories, recognizing taxa '*blitum*' and '*emarginatus*' at specific rank is the preferable choice (Th. Raus, pers. comm.; see also Iamonico 2015a). Note, moreover, that Waselkov *et al.* (2018) highlighted that the *Amaranthus blitum* group (a well-supported clade in their phylogenetic tree) is composed by two subclades (also well-supported), the first one including *A. blitum s.l.* (taxa '*blitum*' and '*oleraceus*'), the second one with the taxa '*emarginatus*' and '*pseudogracilis*'. Furthermore, *A. blitum* and *A. emarginatus* morphologically differ in both vegetative (leaves size) and, especially, sexual features (chiefly,

seed diameter; secondly, fruit length) (see, e.g., Costea *et al.*, 2001b; Walter & Dobes, 2004; Iamonico, 2015a; Dřevojan & Letz, 2016). All things considered, we agree in recognizing the taxa '*blitum*' and '*emarginatus*' as different species.

Morphological differences between *A. emarginatus* var. *emarginatus* and var. *pseudogracilis* regard both vegetative characters (habit and size of leaves) and sexual features (structure of the inflorescences and length of the terminal spike-like inflorescence) (see also Iamonico, 2015a). The autonymic taxon has ascending stem (*vs*. prostrate in subsp. *pseudogracilis*) and leaves smaller [(1.0-)2.0-3.0×(0.5-)1.0-1.5 cm *vs*. (2.0-)3.0-4.5(-5.5)×(1.2-)1.5-2.5 cm], In contrast, flowers are arranged mainly in axillary glomerules or (rarely) in short and thickened terminal spike-like, up to 2 cm long [*vs*. terminal long and slender spike-like (up to 12 cm long), often thin and flexuous (1.5-7.5 cm long) in subsp. *pseudogracilis*]. In addition, we highlighted a new diagnostic character (Fig. 1): the shape of the peripheral cells of the seeds are tetragonal (cells with 4 sides) in var. *pseudogracilis* and polygonal (cells with ≥ 5 sides) in var. *emarginatus* (see Costea *et al.*, 2001b: 987, Fig. 5B, sub *A. blitum* subsp. *emarginatus*). The seeds of taxon *pseudogracilis* was never studied in the past.

It is to be noted that, in addition to the morphological differences with *A. emarginatus* s.str. (corresponding to f. *axillaris* described by Thellung, 1914: 321), there are also different ecological preferences: *A. emarginatus* var. *pseudogracilis* grows in the warmest areas in Europe, whereas var. *emarginatus* is better adapted to the dry soils (pers. obs.; see also Walter & Dobes, 2004). The habit (prostrate in *A. emarginatus* var. *pseudogracilis*, ascending in var. *emarginatus*) and the size of the leaves (greater in var. *pseudogracilis*) might reflect the unequal capabilities to endure water stress by these two taxa and they are not necessarily genetically fixed. I In fact, larger leaves and ascending habit suffers more seriously from drought than the prostrate and small-leaved plants (see, e.g., Xu *et al.*, 2009; Brodribb *et al.*, 2014; Besnard *et al.*, 2018; Fletcher *et al.*, 2018).

Based on Waselkov *et al.* (2018), the molecular differences between *A. emarginatus* var. *emarginatus* and var. *pseudogracilis* are weak, not supporting their treatment as separate species. Accordingly, *A. emarginatus* var. *pseudogracilis* can be considered at the subspecific rank (as originally proposed by Hügin, 1987: 463; see also Raus, 2022: 342-343), being distinguished by its ecology (an "extramorphological" datum *sensu* Hamilton & Reichard, 1992).

TAXONOMIC TREATMENT

Amaranthus emarginatus Salzm. ex Uline & W.L.Bray, Bot. Gaz. 19(8): 319. 1894 subsp. ***emarginatus*** ≡ *Amaranthus blitum* L. subsp. *emarginatus* (Salzm. ex Uline & W.L.Bray) Carretero, Muñoz Garm. & Pedrol, in Anales Jard. Bot. Madrid 44(2): 599. 1987

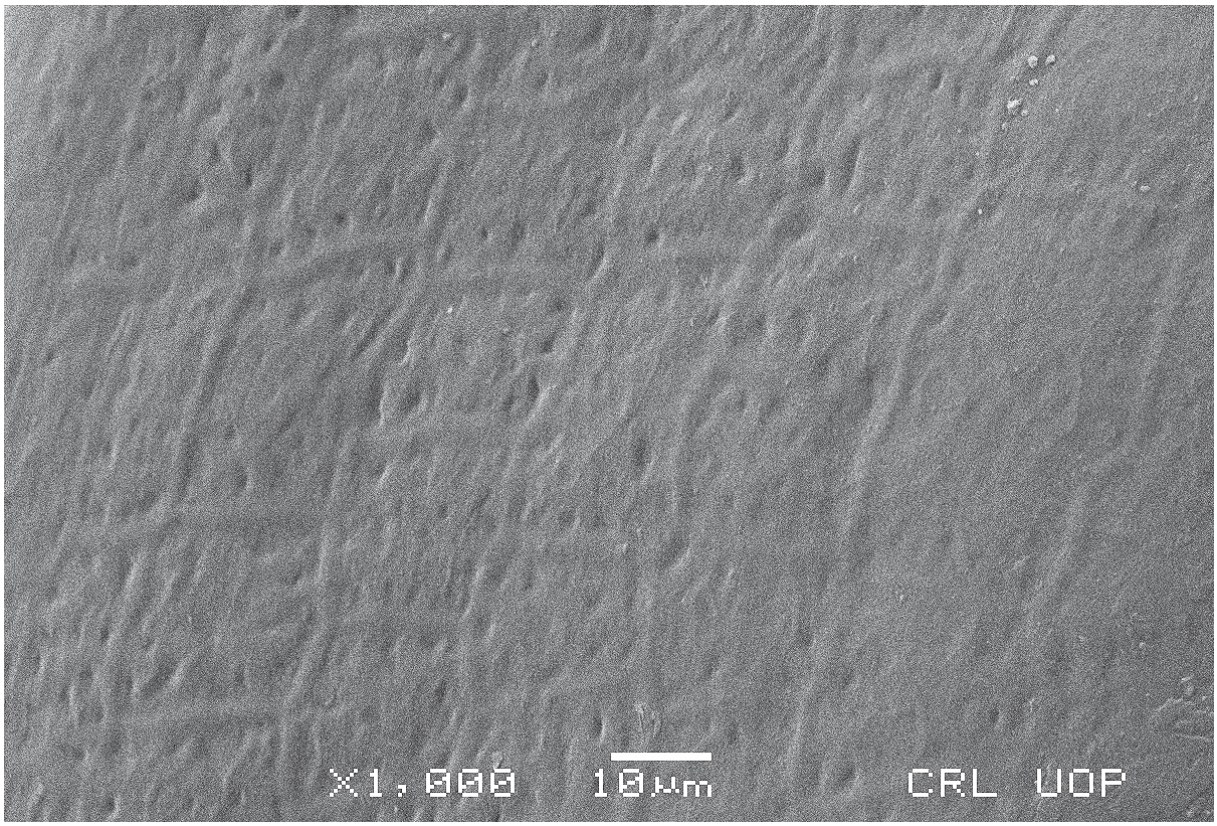

Fig. 1 - Peripheral cells of seed in *Amaranthus emarginatus* subsp. *pseudogracilis* (from a specimen collected by D. Iamonico on July 31, 2009, in Ciampino town, Lazio region, central Italy). / Cellule periferiche del seme di *Amaranthus emarginatus* subsp. *pseudogracilis* (da un esemplare raccolto da D. Iamonico il 31 luglio 2009 nella città di Ciampino, regione Lazio, Italia centrale).

≡ *Amaranthus blitum* L. var. *emarginatus* (Salzm. ex Uline & W.L.Bray) Lambinon, in Bull. Soc. Échange Pl. Vasc. Eur. Occid. Bassin Médit. 24: 55. 1993.

Type (lectotype designated by Hügin 1987: 461): [Doubtful origin] "Amaranthus polygonoides L.?", 1842−1844, *Zollinger 1646* (P!, isolectotype: G00098622!, image available at http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=119225&base=img&lang=en).

= *Euxolus viridis* (L.) Moq. var. *polygonoides* Moq., in A.P. de Candolle, Prodr. 13(2): 274. 1849 ≡ *Amaranthus ascendens* Loisel. var. *polygonoides* (Moq.) Thell., Fl. Adv. Montpellier: 215. 1912 [Jan 1912] ≡ *Amaranthus lividus* L. "proles" *polygonoides* (Moq.) Thell., in Ascherson & Graebner, Syn. Mitteleur. Fl. 5(1, 5): 320. 1914 ≡ *Amaranthus lividus* L. subsp. *polygonoides* (Moq.) Thell. ex Probst, Wolladventivfl. Mitteleur.: 74. 1949 ≡ *Amaranthus ascendens* Loisel. subsp. *polygonoides* (Moq.) Thell. ex Priszter, in Agrartud. Eget. Kert-Szologazdasagtud. Karanak Évk. 2: 221. 1953 ≡ *Amaranthus blitum* L. subsp. *polygonoides* (Moq.) Carretero, in Anales Jard. Bot. Madrid 41(2): 276. 1985.

= *Amaranthus lividus* f. *axillaris* Thell. in P.F.A.Ascherson & K.O.R.Graebner, Syn. Mitteleur. Fl. 5(1): 321. 1914.

– *Amaranthus emarginatus* Salzm. ex Moq., A.P. de Candolle, Prodr. 13(2): 274. 1849, nom. inval., pro syn. (Art. 36.1(b) of the ICN).

– *Amaranthus polygonoides* Zoll. ex Moq., [A. P. de Candolle], Prodr. 13(2): 274. 1849, nom. inval., pro syn. (Art. 36.1(b) of the ICN).

– *Amaranthus ascendens* Loisel. var. *polygonoides* (Moq.) Thell., Mém. Soc. Sci. Nat. Math. Cherbourg 38: 215. 1912 [post Jan 1912], isonym (Art. 6 Note 2 of the ICN).

Occurrence in Italy and status of naturalization per administrative region (Fig. 2a). Campania, (Musarella *et al*., 2024), Lombardy, Latium, Veneto, and Sicily (naturalized); Piedmont, Aosta Valley, Tuscany (see also Iamonico *et al*., 2013), Marche (see also Galasso *et al*., 2020), Umbria, Campania, and Sardinia (casual); no longer recorded in Abruzzo based on one specimen (preserved at RO) collected by A. Pappi in 1990 (see *Specimina Visa* below). The field surveys carried out during the last years (by DI) revealed that the populations of *Amaranthus emarginatus* subsp. *emarginatus* in Rome (Latium) remarkably increased in number and spreading; therefore, we here consider the subspecies as naturalized for the region, so changing the previously recorded casual status (Iamonico, 2015a; Galasso *et al*., 2018; Musarella *et al*., 2024).

Specimina visa. **ITALY. Abruzzo.** Lungo il fiume Liri presso Civitella Roveto, 5 Iun 1900, *A. Pappi s.n.* (RO!). **Campania.** dintorni di Napoli, *s.d.*, *coll. illeg. s.n.* (RO!); Marina di Camerota, bordi di vie, 11 Aug 2009, *D. Iamonico s.n.* (RO!); *ibidem*, zona porto, margini stradali, 15 Aug 2009, *D. Iamonico s.n.* (RO!). **Latium.** Formia, sul littorale di Castellone, Iun 1821, *E. Fiorini-Mazzanti s.n.* (RO!); Roma, 14 Iul 1954, *A. Cacciato s.n.* (RO!); *ibidem*, marciapiede in Via Giovanni Giolitti, pressi di Porta Maggiore, 20 Aug 1957, *A. Cacciato s.n.* (RO!); *ibidem*, Cinecittà, 12 Iul 1964, *A. Cacciato s.n.* (RO!); *ibidem*,

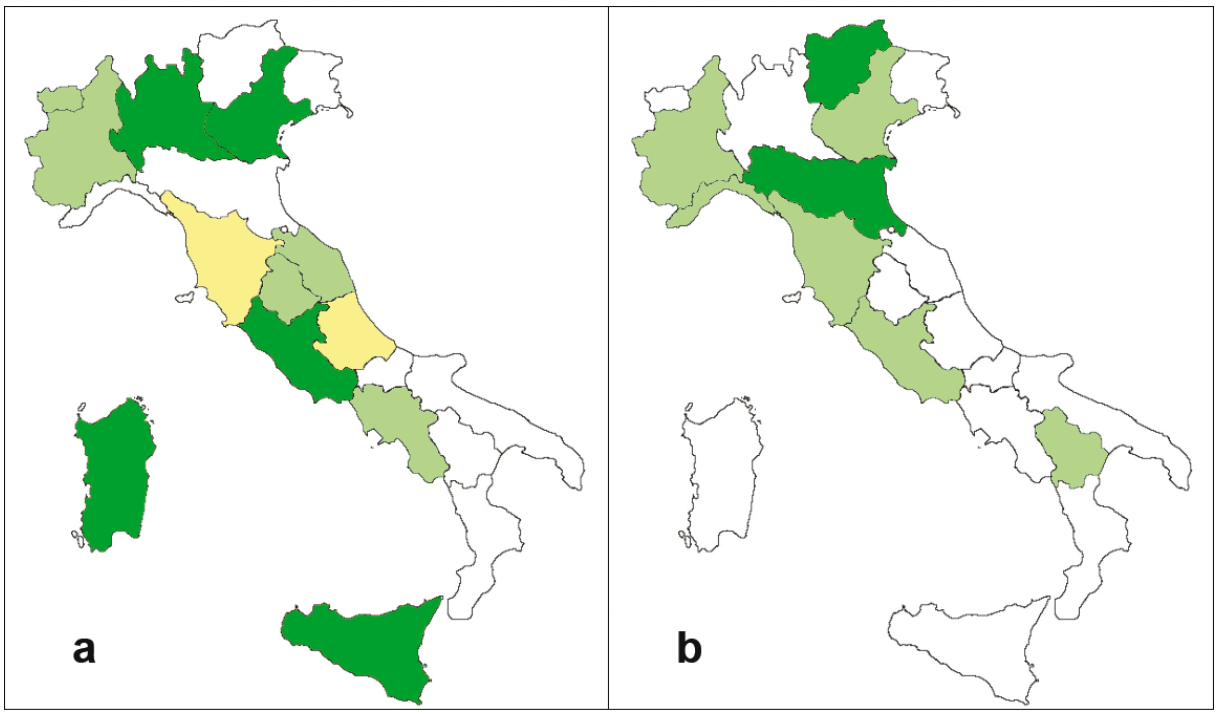

Fig. 2 - Occurrence of *Amaranthus emarginatus* subsp. *emarginatus* (a) and *A. emarginatus* subsp. *pseudogracilis* (b) in Italy (regional level). Status of naturalization: naturalized in green; casual in light green; formerly recorded in light yellow. / Presenza di *Amaranthus emarginatus* subsp. *emarginatus* (a) e *A. emarginatus* subsp. *pseudogracilis* (b) in Italia (livello regionale). Stato di naturalizzazione: naturalizzato in verde; casuale in verde chiaro; precedentemente segnalato in giallo chiaro.

tra le commessure del selciato su una scalinata del Tevere al Lungotevere Anguillara, 16 Iul 1964, *A. Cacciato s.n.* (RO!); Lago di Canterno (Fiuggi), 11-16 Sep 1978, *B. Anzalone s.n.* (RO!); Roma, quartiere appio Claudio, Via Arco di Travertino, bordi di vie, 40 m, 23 Iul 2007, *D. Iamonico s.n.* (RO!); Latina, Piazza B. Buozzi, bordi di via, 3 Nov 2022, *D. Iamonico s.n.* (RO!). **Lombardia.** Marmirolo (Mantova), Bosco Fontana, strada est lungo i prati della palazzina (UTM ED50: 32T 063.500), ca. 22 m, no exp., 30 Iul 1977, *R. Barini s.n.* (FI!); *ibidem*, limite dei prati al margine del bosco (UTM ED50: 32T 063.500), ca. 22 m, no exp., 4 Oct 1977, *R. Barini s.n.* (FI!). **Marche.** Ancona, lungo Via Cardeto nei pressi della Caserma Villarey, marciapiede, ca. 50 m, 9 Iul 2018, *N. Hofmann s.n.* (PESA!); *ibidem*, lungo Via Volterra nei pressi dei giardini del Passetto, marciapiede, 40 m, 21 Oct 2019, *N. Hofmann s.n.* (FI!). **Sardegna.** Olbia-Tempio, Oschiri-Berchidda, Balanotti, prati aridi e pietraie presso le sponde lacustri, 160-164 m, 6 Aug 2010, *G. Calvia s.n.* (FI!, RO!, *Herb. Calvia*!); Olbia-Tempio, Oschiri-Berchidda, Coguto, prati aridi e pietraie presso le sponde lacustri, 160-164 m, 6 Aug 2010, *G. Calvia s.n.* (FI!, RO!, *Herb. Calvia*!). **Siciliy.** Aci Castello (Catania), Aci Trezza, Via Lungomare dei Ciclopi, 10 m, fissure at base of sidewalk, 12 Iun 2015, *N. Ardenghi & P. Cauzzi* (FI!). **Toscana.** Firenze, Vallombrosa nel cortile dell'Istituto, 09/1902, *Adr. Fiori s.n.* (FI!); *ibidem* (FI!). **Piedmont.** Verbania (Verbano-Cusio-Ossola), a valle ponte 205, riva sbb. del Toce, 195 m, 22 Oct 2003, *A. Antonietti s.n.* (*Herb. Antonietti*!); *ibidem*, Feriolo, riva sin. Stronetta, sabbie, 4 Nov 2003, *A. Antonietti s.n.* (*Herb. Antonietti*!); Gravellona Toce (Verbano-Cusio-Ossola), foce T. Strona, alveo ciottoloso, 197 m, 20 Oct 2009, *A. Antonietti s.n.* (*Herb. Antonietti*!); Provinz Vercelli, ca. 6 km NW Vercelli, an der Straße nach Olcenengo, 140 m, Ruderalfluren, 26 Oct 1996, *R. Karl s.n.* (W0088567!). **Umbria.** Lungo la strada vicino a Bevagna, 27 Iul 1864, *sine coll. s.n.* (FI!); Lago Trasimeno, Isola Polvese, 7 km E Castiglione del Lago, lake shore, stoney, 13 Sep 2011, *J. Walter 4243* (W0188597!); Terni, via Gianbattista Vico, bordi di vie, 131 m, 3 Sep 2011, *D. Iamonico s.n.* (RO!). **Valle d'Aosta.** Pont-Saint-Martin (Aosta), sul ponte romano, 365 m, 15 Sep 1993, *M. Bovio s.n.* (AO!); Saint-Pierre (Aosta), nelle vigne del Mont Torrette, 840 m, 28 Sep 2006, *M. Bovio, N. Gerard & L. Poggio s.n.* (*Herb. M. Bovio*!). **Veneto.** Venezia (Venezia), 31 Ian 1928, *?. Salute s.n.* (FI!); Feltre (Belluno), loc. Mutten di Feltre (9937/2), 7 Sep 1978, *C. Lasen s.n.* (*Herb. C. Lasen*); Belluno (Belluno), Cavarzano (9839/1), ruderale, 7 Aug 2009, 400 m, *C. Argenti s.n.* (*Herb. C. Argenti*!); Venezia (Venezia), Campo Santa Margherita, ruderal, am Rande von Pflanzeneinfassungen, 0-1 m, 5 Aug 2022, *J. Walter 9431* (W0088564!).

Amaranthus emarginatus subsp. ***pseudogracilis*** (Thell.) Hügin, Willdenowia 16: 463. 1987 ≡ *Amaranthus lividus* f. *pseudogracilis* Thell. in P.F.A.Ascherson & K.O.R.Graebner, Syn. Mitteleur. Fl. 5(1): 321. 1914 ≡ *Amaranthus blitum* var. *pseudogracilis* (Thell.) Lambinon, in Bull. Soc. Échange Pl. Vasc. Eur. Occid. Bassin Médit. 24: 55. 1994 ≡ *Amaranthus pseudogracilis* (Thell.) G.H.Loos, in Jahrb. Bochum. Bot. Vereins 1: 117. 2010 ≡ *Amaranthus emarginatus* var. *pseudogracilis* (Thell.) Iamonico, in Pl. Biosystems 150: 523. 2014 ≡ *Amaranthus blitum* subsp. *pseudogracilis* (Thell.) N.Bayón, in Ann. Missouri Bot. Gard. 101: 312. 2015.

Type (lectotype designated by Iamonico, 2014: 523): Germany. Mecklenburg-Vorpommern, Botanischen Garten Strasburg, 8 August 1904, Ludwig 12130 (B10-0261513!, image available at https://herbarium.bgbm.org/object/B100261513).

– *Amaranthus blitum* L. var. *pseudogracilis* (Thell.) Costea in Costea *et al.*, Sida 19(4): 981. 2006, isonym (Art. 6 Note 2 of ICN).

Occurrence in Italy and status of naturalization per administrative region (Fig. 2b): Trentino-Alto Adige and Emilia-Romagna (naturalized); Piedmont, Veneto, Liguria, Tuscany, Latium, and Basilicata (casual).

Specimina Visa. **ITALY. Basilicata.** Maratea (Potenza), loc. Ondavo, margine della via principale (UTM: WE 61.27), lungo il marciapiede, 12 Aug 2008, *D. Iamonico s.n.* (RO!). **Emilia-Romagna.** Alfonsine (Ravenna), Strada Provinciale Destra Senio-Molinazza (S.P. 105), Riserva Naturale e SIC "stagno di Fornace Violani", lato NE, verso gli edifici della cooperativa muratori, prato umido a margine di stagno (ex cava d'argilla) e canneto, 14 Jul 2012, *Rossi s.n.* (FI!). **Latium**: Ciampino, via Guidoni, 31 Jul 2009, *D. Iamonico s.n.* (RO!). **Lombardy.** Marmirolo (MN), Bosco Fontana, strada est lungo i prati della palazzina (UTM ED50: 32T 063.500), ca. 22 m s.l.m., no exp., 30 Jul 1977, R. Barini (FI sub Loisel., rev. D. Iamonico 09/06/2009); *ibidem*, limite dei prati ai margini del bosco (UTM ED50: 32T 063.500), ca. 22 m s.l.m., no exp., 4 Oct 1977, R. Barini (FI sub *A. ascendens*, rev. D. Iamonico 09/06/2009); Castelnuovo Bocca d'Adda (LO), ca. 250 m a W di Cascina Costa (UTM ED50: 32T 0566260.4995311), 41 m s.l.m., no exp., stoppie di mais, a tratti copiosa, 16 Aug 2019, *Bonali s.n.* (MSNM!) **Liguria.** Bergeggi (Savona), lungo il litorale, 07 Aug 1970, *Catanzaro s.n.* (RO!). **Piedmont.** Verbania, 195 m a.s.l., terreno sabbioso, 22 Oct 2003, *A. Antonietti s.n.* (*Herb. Antonietti*!); Saluggia, Fraz. S. Antonio, bordo strada, 11 Aug 2008, *A. Tisi 186-4b* (TO!). **Tuscany.** Livorno, marciapiede, 14 m a.s.l., Aug 2011, *Lazzeri*, *V. Mazzoncini* et *F. Sammartino s.n.* (*Herb. Museo di Storia Naturale del Mediterraneo di Livorno*!). **Trentino-Alto Adige.** Südtirol, 6 km ESE Bruneck (Brunico), unmittelbar W v. Nasen, Straßenrand, Misthaufen, 06 Aug 1994, *A. Tribsch 2539* (W!). **Veneto.** Cusighe di Belluno, ruderale, 15 Aug 2008, *C. Argenti 9839/1* (*Herb. Argenti*!); Belluno, P.le Resistenza, selciato, 390 m a.s.l., 22 Aug 2009, *C. Argenti 9839/3* (*Herb. Argenti*!); Ospitale di Cadore, incolti, 540 m a.s.l., 23 Sep 2009, *C. Argenti 9639/4* (*Herb. Argenti*!); Sottocastello di Pieve di Cadore, orti, 700 m a.s.l., 14 Oct 2009, *C. Argenti 9540/3* (*Herb. Argenti*!).

Acknowledgements

Thanks to the directors and curators of all the quoted herbaria for their support in the visit or loan of specimens/images. Thanks to Carlo Argenti (Belluno) for giving in-

formation about the occurrence of *Amaranthus emarginatus* in Veneto and to allow the examination of his personal herbarium.

Project funded under the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.4 - Call for tender No. 3138 of 16 December 2021, rectified by Decree n.3175 of 18 December 2021 of Italian Ministry of University and Research funded by the European Union – NextGenerationEU. Project code CN_00000033, Concession Decree No. 1034 of 17 June 2022 adopted by the Italian Ministry of University and Research, CUP B83C22002950007, Project title "National Biodiversity Future Center - NBFC".

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