

# Studies on the genus *Atriplex* (Chenopodiaceae) in Italy. IX. *Atriplex mollis* and note on its occurrence in continental Europe

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**Abstract.** The typification of the name *Atriplex mollis*, validly published by R. L. Desfontaines in *Flora Atlantica*, is discussed. A specimen deposited at G (barcode G00386803) is designated as the lectotype of the name. The distribution in Europe of the species is also discussed. It was indicated for Sardinia only (Italy, Southern Europe) in a single locality (San Paolo pond, Cagliari Province). No specimen that proves the occurrence of the species in Sardinia is in extant. Moreover, the overlapping of a map published in 1912 and the current satellite images, allowed to verify that the area in which *A. mollis* grew up, including wetlands at the beginning of the XX century, is currently almost totally covered by buildings and commercial/industrial sites. In other words, the habitat where the species occurred was destroyed. As a consequence, at the current state of knowledge, the species is here assessed as extinct (EX) at national level according to the IUCN categories.

**Keywords.** *Atriplex lunulata*, extinct species, Sardinia, typification.

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## Introduction

The genus *Atriplex* L. (Chenopodiaceae Vent.) comprises about 260 species distributed in arid and semiarid regions of Eurasia, America, and Australia (Sukhorukov & Danin, 2009; POWO, 2024). According to Kadereit *et al.* (2010) the majority of *Atriplex* taxa are to be considered as part of a monophyletic clade, including the genera *Obione* Gaertn., *Teutliopsis* (Dumort.) Čelak., and other segregates.

As part of ongoing series of studies on the genus *Atriplex* in Italy (see e.g., Iamónico, 2010, 2011, 2012a, 2012b, 2013; Iamónico & Sukhorukov, 2014; Iamónico & Bovio, 2023; Iamónico & Domina, 2023), I here present the ninth contribution dealing with the name *Atriplex mollis* Desf. and its occurrence in Italy and Europe.

## Material and Methods

The paper is based on an extensive analysis of literature and searching/examination of the specimens preserved in the Herbaria CAG, G, LY, MPU, P, SASSA, and US (acronyms according to Thiers, 2024 [continuously updated]).

The articles cited throughout the text follow the *Shenzhen Code*, hereafter reported as “ICN” (Turland *et al.*, 2018).

*ArcMap* application was used to compare, by overlapping, the occurrence of the wetlands in Cagliari lagoon between 1912 and the present day. The map available for the year 1912 was drawn by Casu (1912) and it was here georeferenced using control points linking known positions of Casu’s map and satellite images available on Google Maps (last accession: December 1, 2023).

## Results and discussion

### *Typification of the name Atriplex mollis*

Desfontaines (1799: 391) validly published the name *Atriplex mollis* by providing a short diagnosis (“ATRIPLEX caule fruticoso, erecto; foliis lanceolatis, carnis, mollibus; calycibus fructûs rotundatis, integerrimis”) and a detailed description; the habitat (“in arenis deserti”) was also given. No detailed locality was specified but I noted that in other cases, the author reported “HABITAT Algeria” (e.g. for *Parietaria officinalis* L.; Desfontaines, 1799: 391) or “HABITAT in arenis prope Cafsam [currentyl Gasfa, a locality in central-west Tunisia]” (e.g., for *Tetrapogon villosum* Desf.). So, I deduce that *A. mollis* is more or less common in sandy desert of the whole study area, i.e. Algerian-Tunisian territories (see Valdés, 2021: 12).

According to HUH Index of botanists (2013), Desfontaines’ herbarium and types are mainly preserved

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at P, whereas duplicated can be found in other European herbaria. I traced at P just one sheet (barcode P04917827) bearing one little branch of *Atriplex mollis* (on bottom left corner of the sheet) collected by R. L. Desfontaines in “Barbarie” [the coastal region of North Africa bounded by Egypt (east), by the Atlantic (west), by the Sahara (south), and by the Mediterranean Sea (north), and now comprising Morocco, Algeria, Tunisia, and Libya] and part of the herbarium Webbium (“Herb-Webb.” is reported at bottom-right corner of the label); no further data is included in the original label. I consider this P specimen as useful for the lectotypification purpose since Desfontaines was director of the Muséum National d’Histoire Naturelle (Valdés, 2021: 12) and, therefore, he most probably seen P04917827.

Another specimen was found at G, barcode G00386803 (where further Desfontaines’ collections are deposited; see Valdés, 2021: 12) and it bears two branches of a plant and the following label: “R.-L. DESFONTAINES | HERBIER DE BARBARIE | *Atriplex mollis* Desf. | Loc.: in arenis deserti | Desf. Fl. Atl. II. p. 391, tab. /”; The label also includes a stamped script explaining the history of the specimen which was given by Desfontaines to Louis Guillaume Lemonnier, acquired in 1803 by B. Delessert, and reviewed by Desfontaines in the years 1828 and 1829 “pour servir à illustrer les types décrits dans la Flora Atlantica” (= to serve to illustrate the types of writings in the Flora Atlantica). G specimen is clearly as part of the original material for the name *Atriplex mollis*.

No further original material was traced. Among the two elements found, since P lacks fruits which as features have a high taxonomic value in the genus *Atriplex* (see e.g., Akeroyd, 1993; Sukhorukov & Danin, 2009; Iamonico, 2017), I here designate G00386803 (which includes many fruits) as the lectotype of the name *Atriplex mollis*. The lectotype matches the diagnosis and description by Desfontaines (1799: 391) and corresponds to the current concept of the species (see e.g., Akeroyd, 1993; Sukhorukov & Danin, 2009; Iamonico, 2017).

### *Chorology of Atriplex mollis*

*Atriplex mollis*, originally described from Algerian-Tunisian territories (Desfontaines, 1799: 391), is currently recorded as native also in Libya and Crete; its occurrence in continental Europe would refer to Italy only, were it is indicated as alien in Sicily by POWO (2023) [the species occurs also in Crete and Malta islands according to Uotila (2011)]. On the other hand, Uotila (2011) indicates *A. mollis* in Sardinia region (Italy) as “reported in error”, whereas no record appears for Sicily in *Euro+Med PlantBase*; in other words, Uotila (2011) excluded *A. mollis* from Europe, although he cited the first Checklist of the Italian vascular flora by Conti *et al.* (2005) where the species was reported as “no longer recorded” (which means “reliable historical record”) for Sardinia. Also, the recent Italian checklists (PFAI, 2024), as well as the last edition of *Flora d’Italia* (Iamonico,

2017: 251), indicate *A. mollis* as an historical record in Sardinia. Iamonico (2017: 251) added also “a Cagliari” (Cagliari is the major city of the island Sardinia), an information which I acquired from the first edition of *Flora d’Italia* by Pignatti (1982: 167). The previous Italian floras did not indicate the species in Italy, but just in Malta island (Fiori & Paoletti, 1896–1989: 307; Fiori, 1923: 414; Zangheri, 1976: 101). The first Italian flora (Bertoloni, 1854) did not cite anywhere *A. mollis* [Parlatore (1893) followed the treatment by Bertoloni (1854)]. Also, Moris (1858–1859: 384–390), in the 3<sup>rd</sup> volume of his *Flora Sardo*, did not cite *A. mollis*. Arrigoni (1983: 82) excluded the species from Sardinia by stating “ne donnee ne permet de confirmer la présence de cette espèce en Sardaigne” (= no data allows us to confirm the presence of this species in Sardinia), without further comments or any bibliographic citation. On the other hand, Bacchetta *et al.* (2009: 49) reported *A. mollis* as a naturalized alien in Sardinia, but no locality was cited. As a whole, citations of this species in Sardinia are rare and I found just the works by Corrias & Corrias (1983: 206), De Martis *et al.* (1983: 219), Barone (2022), and Bartolucci *et al.* (2024; as historical record) who indicated it as native. De Martis *et al.* (1983: 219) stated for *A. mollis* “in Falqui 1905, zona esterna”, a citation referring to an old contribution to the Sardinia flora by Falqui (1905: 18) who reported the species “Sull’orlo dello stagno a S. Paolo (Cagliari)” [= on the edge of the pond at S. [Saint] Paul (Cagliari)] without further data. Falqui’s record seems to represent the first one for Sardinia, Italy, and Europe.

San Paolo pond in Cagliari was a part of the eastern sector of Cagliari lagoon (Casu, 1912), one of the most important wetland sites of European Union (current area is 1500 ha according to Manca, 1996) and designated as such (in December 14, 1976) under Ramsar Convention (see <https://rsis.ramsar.org/rsis/134>). De Martis *et al.* (1983) stated that the halophytes originally occurring in the area they named “Bacino orientale” (= Eastern Basin), i.e. those ranging from San Pietro’s saltwork to S. Paolo and Scipione localities, are extinct because of the urban spread of the nearby settlement of Cagliari. The overlapping of the map published by Casu (1912) and the Google Maps satellite images allowed to verify that the “Bacino Orientale” (*sensu* Casu, 1912 and De Martis *et al.*, 1983) has substantially been reduced during the 20<sup>th</sup> century and the area occupied by S. Pietro, S. Paolo, and Scipione localities, which includes wetlands in 1912, are currently almost totally covered by buildings and commercial/industrial sites (Figure 1). In other words, the habitat in which *Atriplex mollis* occurred was destroyed. No specimen that proves the occurrence of the species in Sardinia is extant. At the current state of knowledge, *A. mollis* can be considered as extinct (EX) at national level according to the IUCN categories (IUCN, 2024).





Figure 1. A, Cagliari lagoon, South Sardinia; B, “Bacino Orientale” (*sensu* Casu 1912) with Casu’s map (white topographic lines, labels, and icons) overlapped to satellite image (part in red refers to San Paolo locality). Red rectangle in A is the zoomed area in B.

## Taxonomic treatment

*Atriplex mollis* Desf., Fl. Atl. 2: 391 (1799) ≡ *Cremnophyton molle* (Desf.) G.L.Chu, Gen. New Evol. System World Chenopod.: 148 (2017).

**Lectotype** (designated here): [North Africa], *in arenis deserti, s.d.*, *Desfontaines s.n.*, G (barcode G00386803! image of the lectotype available at <https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.g00386803>).

– “*Atriplex lunulata* Delile” Moquin-Tandon in A.P. de Candolle, Prodr. 13(2): 99 (1849), *nom. inval.* (Art 36.1b of ICN).

**Nomenclatural note.** Moquin-Tandon (1849: 99) published the name “*Atriplex lunulata* Delile!” as synonym of *A. mollis*. According to the Art. 36.1b of ICN, this name is not valid from the nomenclatural point of view. Moquin-Tandon (1849: 99) also stated that he seen a Delile’s specimen at P (“v. s. [*vidi sicco*] in h. Mus. Paris. Del.”) and I traced this specimen (barcode P05235104, image at <http://mediaphoto.mnhn.fr/media/1441395232737x0DFTfRAnkIf7Ss4>) which bears a fragment of a branch and the following Delile’s label: “*Atriplex lunulata* Del. mihi | *fruticosa, ramis divaricatis, diffusas* | *Cyrenaique* | 1826 | *Determinativ Delile*”; also, the a label “HERBARIUM MOQUINIANUM | *Atriplex mollis* Desf.” occurs on the sheet.

**Other specimens.** ALGERIA. Birsakra, in declivibus humidis inter “Ras Chicha” et “Chetma”, 09 November 1903, *Chevallier 619* (P05235187!); Vallée d’un oued, au Sud de Birska, 09 December 1958, *Simonneau s.n.* (P05047890!); Oum-Thiour, entre Ouled-Djellal et M’Raier, 26 March 1960, *Simonneau s.n.* (P05047889!). LIBYA. *Cyrenaique*, 1826, s.c. s.n., det. *Delile* sub *Atriplex lunulata* (P05235104!); Marmarica, Tobruk costa sud in collibus aridis saxosis, solo calcareo, alt. 2-20 m, 29 October 2012, *Vaccari 43* (US03554319!); *ibidem*, 28 August 1917, *Vaccari 667* (US03554318!). NORTH AFRICA. *Barbarie, s.d.*, *Desfontaines s.n.* (P04917827!, exiccatum on bottom left-corner of the sheet, image available at <http://mediaphoto.mnhn.fr/media/14413819087461c9QGx44NILp6Ca>). TUNISIA. Thyna, 03 November 1955, *Labbe s.n.* (MPU000872!); Oued Gourbata prés Gafsa, Novemebr 1899, *coll. illeg. s.n.* (P05157979!).

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## Author contribution

DI: conceptualization, searching and examining material and literature, preparing figure, writing.

## Conflict of interest

None.

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