

Amaranthus tamariscinus Nutt. (Amaranthaceae): taxonomical notes on the species and its presence in Italy

Duilio IAMONICO

Via dei Colli Albani 170, IT-00179 Roma, Italia; e-mail: duilio76@yahoo.it

Abstract. Based on a historical-nomenclatural study and examination of type material and Italian specimens, *Amaranthus tamariscinus* Nutt. is to be considered a casual alien species for Friuli-Venezia Giulia and Italy. The identity of the species is also discussed.

Keywords: *Amaranthus* L., Friuli-Venezia Giulia, Italy, sterile hybrid

Izveček. AMARANTHUS TAMARISCINUS NUTT. (AMARANTHACEAE): TAKSONOMSKI ZAPISKI O VRSTI IN NJENO POJAVLJANJE V ITALIJI – Na osnovi zgodovinsko-nomenklaturne študije ter pregleda tipskega gradiva in italijanskih primerkov je mogoče povzeti, da je *Amaranthus tamariscinus* Nutt. v Furlaniji – Julijski krajini in drugod po Italiji naključna tuja vrsta. Avtor članka razpravlja tudi o identifikaciji vrste.

Ključne besede: *Amaranthus* L., Furlanija – Julijska krajina, Italija, neplodni hibrid

Introduction

Amaranthus L. is a genus consisting of about 70 species, over 50 % of which are native to America, while the remaining ones inhabit other continents as well (Costea et al. 2001).

This genus is considered critical in Italian, European and worldwide floras both for its taxonomy and for morphological variability and hybridization (Mosyakin & Robertson 1996, Costea et al. 2001, Iamónico 2010).

Based on the careful revision by Mosyakin & Robertson (1996), *Amaranthus* includes 3 subgenera: Subgen. *Acnida* (L.) Aellen ex K. R. Robertson, Subgen. *Albersia* (Kunth) Gren. & Godr. and Subgen. *Amaranthus*. Special attention was given to subgenus *Acnida* that was revalued by the authors according to Robertson (1981) [the latter referring to the illegitimate proposal by Aellen (1959)].

Subgenus *Acnida* differs from other subgenera since it includes only dioecious species (Mosyakin & Robertson 1996).

Currently, 21 species (23 taxa if species and subspecies are considered) are reported for the Italian flora (Conti et al. 2005, Iamónico 2008a, Iamónico 2008b, Celesti-Grappo et al., 2009a), 2 of which [*Amaranthus tuberculatus* (Moq. ex DC.) J.D. Sauer (= *A. rudis* Sauer) and *A. tamariscinus* Nutt.] are included in Subgen. *Acnida*.

The aim of this work is to specify the taxonomical status and the presence of *A. tamariscinus* in Italy.

Material and methods

The study was carried out in the following steps:

- examination of type material (isotype) (kept in NY!);
- examination of the specimens collected in the Friuli-Venezia Giulia region (kept in GZU!);
- checking of the following Italian Herbaria: APP, AQUI, BI, BOZ, CAME (*Herb. Ballelli*), CAT (<http://www.dipbot.unict.it/>), FI, IS, LEC, MRSN, MSNM, NAP, RO, ROV, PAD, PAL, PERU (*Herb. Cicioni*), PESA, PI, TO, TSB, URT;
- analysis of specialized literature (Nuttall 1837, Gray 1865, Gray 1876, Wood 1877, Uline & Bray 1985, Sauer 1955, Sauer 1957, Sauer 1972, Aellen 1959, Pratt & Clark 2001, Costea & Tardif 2003).

Results and discussion

Amaranthus tamariscinus was first described from Arkansas (USA) in 1837 (Nuttall 1837); no holotype was reported. Based on the character of circumscissile fruit, Gray (1865) revalued the genus *Montelia* Moq. and the new combination *Montelia tamariscina* (Nutt.) A. Gray was proposed. This choice was confirmed few years later (Gray 1876). Wood (1877) suggested the name *Acnida tamariscina* (Nutt.) Wood in order to characterize the plants with dehiscent fruits; once more, the holotype was not reported. The proposal by Wood (1877) was accepted by Uline & Bray (1985). Moreover, for the first time, the holotype was reported (which is kept in the Herbarium of Columbia College). These authors specified that the type specimen was represented by a part of plant »very immature, but the locality, the slender acuminate spikes, and the spinulose bracts enable us to determine its place with reasonable certainty«. The variability of the species was also shown and 3 varieties were included [var. *tuberculata* (Moq.) Uline & Bray, var. *concatenata* (Moq.) Uline & Bray, var. *prostrata* Uline & Bray]. According to these authors, Sauer (1955, 1957) accepted the species *A. tamariscinus* specifying that it differs from others in having dehiscent fruits and one well developed tepal. Only in the 1970's, the situation of this taxon was made clear. The actual holotype of *A. tamariscinus* was found by Sauer (1972) in the British Museum of Natural History (BM). The label of the specimen reads »*Amaranthus* **tamariscinus*, Arkansas, Herb. T. Nuttall.«; asterisk is the standard symbol used by Nuttall for new species, which he also used in the protologue (Nuttall 1835). A careful examination of the exsiccatum allowed Sauer (1972) to establish that the plant was a sterile hybrid, not an immature one as reported by Uline & Bray (1985). In particular, based on the inflorescence structure (very branched) and on the comparison with the exsiccata of Murray's collection (Murray 1940), Sauer hypothesized the parents to be *A. tuberculatus* and a monoecious species (possibly *A. hybridus* L.). Recently, Pratt & Clark (2001) agreed with Sauer (1972) in considering *A. tamariscinus* a sterile hybrid. Costea & Tardif (2003) proposed the recognition of *A. rudis* at varietal level of *A. tuberculatus* [*A. tuberculatus* var. *rudis* (Sauer) Costea & Tardif].

The examination of the isotype of *A. tamariscinus* (kept in NY, New York Botanical Garden; Fig. 1) allow to confirm the suggestions by Sauer (1972) and Pratt & Clark (2001).

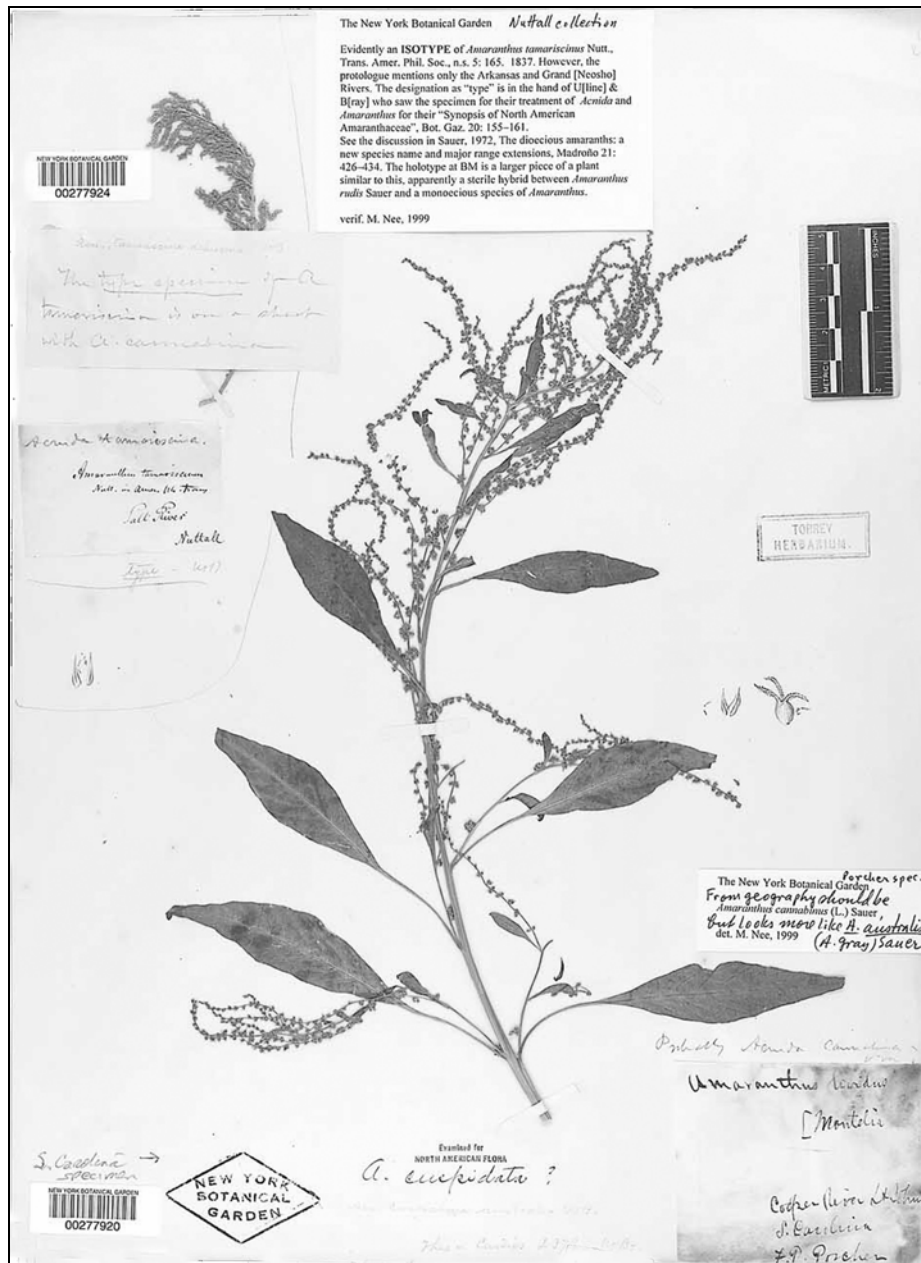


Figure 1. Isotype of *Amaranthus tamariscinus* Nutt. (NY) (from The C. V. Starr Virtual Herbarium of the New York Botanical Garden 2009).

Slika 1. Izotip vrste *Amaranthus tamariscinus* Nutt. (NY) (iz herbarija C. V. Starr Virtual v Newyorškem botaničnem vrtu 2009).

As regards Italy, *A. tamariscinus* was indicated neither by Bertoloni (1854) nor Caruel (1893), Cesati et al. (1884), Arcangeli (1894), Fiori & Paoletti (1900-1902), Béguinot & Mazza (1902), Saccardo (1909), Fiori (1923), Zangheri (1976) and Pignatti (1982). The first record of the species has been reported for the Friuli-Venezia Giulia region (in Pieris and Monfalcone) by Melzer & Bregant (1989). Based on floristic surveys, Poldini (1991) reported *A. tamariscinus* in two quadrants of his Atlas (n. 10146 and n. 10247) and confirmed the localities cited by Melzer & Bregant (1989). Poldini et al. (2001) and Poldini (2002) refer to Poldini (1991) for this species. Conti et al. (2005) reported *A. tamariscinus* for Friuli-Venezia Giulia only. Conti et al. (2007) do not quote the species at all. More recently, Celesti-Grapow et al. (2009a, 2009b) indicated the only dioecious species *A. tuberculatus*, while *A. tamariscinus* was reported as *Name in previous floras*.

No specimens of *A. tamariscinus* can be found in Italian Herbaria, including TSB (Herbarium of the University of Trieste, Italy). The only exsiccata collected in Friuli-Venezia Giulia (and, consequently, in Italy) are kept in GZU (Herbarium of the Karl-Franzens University of Graz, Austria) and refer to Melzer & Bregant (1989).

The examination of these exsiccata (Fig. 2) and the comparison with type material allowed to confirm the determination as *A. tamariscinus*. Moreover, populations of *A. hybridus* and *A. tuberculatus* var. *rudis* are certainly present in the Friuli-Venezia Giulia region (Poldini 1991, Conti et al. 2005, Celesti-Grapow et al. 2009b) and this may support the hypothesis of hybrid origin of the Italian population. According to Sauer (1972), these are to be considered sterile hybrids.

The name *A. tamariscinus* therefore refers to sterile hybrids between *A. hybridus* and *A. tuberculatus* var. *rudis* and cannot be considered a synonym of *A. tuberculatus* (W. Greuter, *in verbis*); according to art. 11.4 of ICBN, the latter name is a synonym of *A. rudis*.

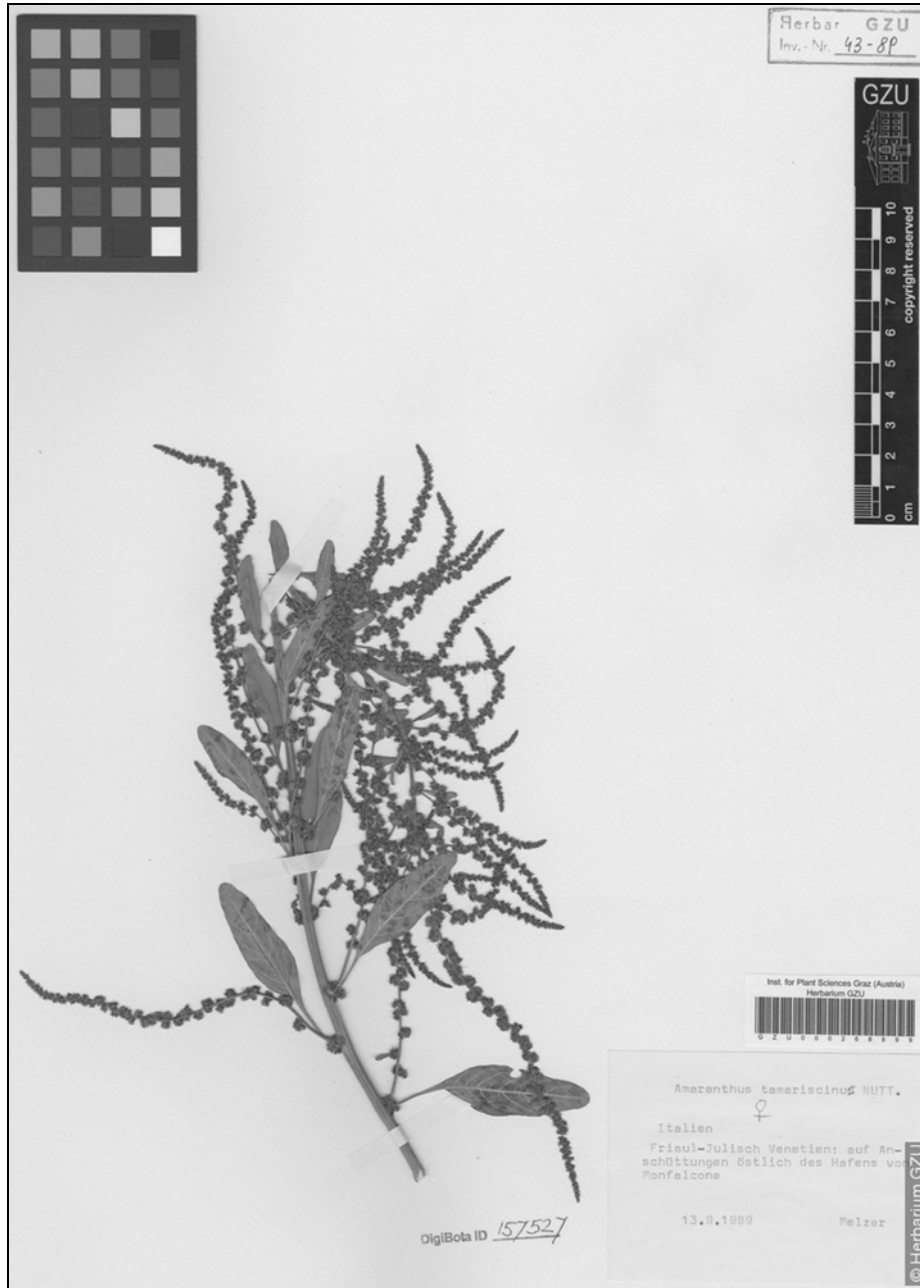


Figure 2. Italian specimen of *A. tamariscinus* Nutt. (n. 157522 – GZU) (from Herbarium WU 2009).

Slika 2. Italijanski primerek vrste *A. tamariscinus* Nutt. (n. 157522 – GZU) (iz herbarija WU 2009).

Conclusion

A. tamariscinus was considered a good species until the 1960's. Based on the careful examination of the holotype, Sauer (1972) hypothesized that the species was a sterile hybrid between *A. rudis* and a monoecious species (possibly *A. hybridus*). I agree with Sauer (1972), after the analysis of the isotype.

The only Italian specimens of *A. tamariscinus* have been collected in the Friuli-Venezia Giulia region and are kept in GZU. The comparison with type material and the presence of both parents in the region supported the hypothesis of hybrid origin of the Italian population. We can therefore argue that *A. tamariscinus* can be considered a casual alien species for Friuli-Venezia Giulia and for Italy as a whole. Moreover, the binomial reported as *Name in previous floras* in the tab of *A. tuberculatus* (Celesti-Grapow et al. 2009b) has to be corrected and replaced with *A. rudis*.

Acknowledgements

I am grateful to Directors and Curators of all quoted *Herbaria* for the technical support provided during my visits, loan of specimens/photographs or request of information. In particular, thanks are due to Dr. M. Vidali (University of Trieste) for information on Friulian specimens of *Amaranthus tamariscinus* Nutt., to Prof. W. Greuter (University of Palermo) for nomenclatural comments, and to Dr. A. Drescher (University of Graz) and Dr. B. M. Thiers (New York Botanical Garden) for their permission to use and publish the images of Italian specimens and isotype.

Literature

- Aellen P. (1959): *Amaranthus* L. In: Hegi G. (Ed), *Illustrierte Flora von Mitteleuropa* 2 Bd.3 T.2. Carl Hanser Verlag, München, pp. 465-516.
- Arcangeli G. (1894): *Flora italiana*. Tipografia Vincenzo Bona, Torino, pp. 588-589.
- Béguinot A., Mazza O. (1916): *Le avventizie esotiche della flora italiana e le leggi che ne regolano l'introduzione e la naturalizzazione*. *Nuovo Giornale Botanico Italiano* n.s. 23: 403-465.
- Bertoloni A. 1854: *Flora italica, sistens plantas in Italia et in insulis circumstandibus sponte nascentes* 3. Ex Typographaeo Haeredum Richardi Masii, Bologna, pp. 186-194.
- Caruel T. (1893): *Flora italiana, ossia descrizione delle piante che crescono spontanee o vegetano come tali in Italia e nelle isole ad essa aggiacenti, disposte secondo il metodo naturale* 10. Stabilimento Tipografico Fiorentino, Firenze, pp. 191.

- Celesti-Grapow L., Alessandrini A., Arrigoni P.V., Banfi E., Bernardo L., Bovio M., Brundu G., Cagiotti M.R., Camarda I., Carli E., Conti F., Fascetti S., Galasso G., Gubellini L., La Valva V., Lucchese F., Marchiori S., Mazzola P., Peccenini S., Poldini L., Pretto F., Prosser F., Siniscalco C., Villani M. C., Viegi L., Wilhelm T., Blasi C. (Eds.) (2009a): Inventory of the non-native flora of Italy. *Plant Biosystem* 143(2): 386-430.
- Celesti-Grapow L., Pretto F., Carli E., Blasi C. (Eds.) (2009b): Non-native flora of Italy. In: *Plant invasion in Italy – an overview*. Palombi & Partner, Roma, CD-ROM.
- Cesati V., Passerini G., Gibelli G. (1884): *Compendio della Flora italiana*. Vallardi, Milano, pp. 266-267.
- Conti F., Abbate G., Alessandrini A., Blasi C. (Eds.) (2005): An annotated checklist of the Italian vascular flora. Palombi & Partner, Roma, pp. 51.
- Conti F., Alessandrini A., Bacchetta G., Banfi E., Barberis G., Bartolucci F., Bernardo L., Bonacquisti S., Bouvet D., Bovio M., Brusa G., Del Guacchio E., Foggi B., Frattini S., Galasso G., Gallo L., Gangale C., Gottschlich G., Grünanger P., Gubellini L., Iiriti G., Lucarini D., Marchetti D., Moraldo B., Peruzzi L., Poldini L., Prosser F., Raffaelli M., Santangelo A., Scassellati E., Scortegagna S., Selvi F., Soldano A., Tinti D., Ubaldi D., Uzunov D., Vidali M. (2007): Integrazioni alla checklist della flora vascolare italiana. *Natura Vicentina* 10(2006): 5-74.
- Costea M., Sanders A., Waines G. (2001): Preliminary results towards a revision of the *Amaranthus hybridus* complex (Amaranthaceae). *Sida* 19: 931-974.
- Costea M., Tardif F.J. (2003): Conspectus and notes on the genus *Amaranthus* (Amaranthaceae) in Canada. *Rhodora* 105: 260–281.
- Fiori A. (1923): *Nuova Flora Analitica Italiana* 1(3). Ed. M.Ricci, Firenze, pp. 431-435.
- Fiori A., Paloetti G. (1900-1902): *Flora analitica d'Italia* 2. Tipografia del Seminario, Padova, pp. 320-323.
- Gray A. (1865): *Manual of the botany of the northern United States including Virginia, Kentucky, and all east of the Mississippi*, 370. Ivison, Phinney, Blakeman & Co., New York, S.C. Griggs & Co., Chicago, pp. 369-370.
- Gray A. (1876): Notes on *Acnida*. *The American Naturalist* 10: 487-489.
- Herbarium WU (2009): Herbarium WU - Virtual Herbaria. Institute of Botany, University of Vienna. <http://herbarium.univie.ac.at/index.htm>
- Iamonico D. (2008a): Notulae 1522-1523. 1522. *Amaranthus powellii* S. Watson subsp. *powellii*. 1523. *Amaranthus powellii* S. Watson subsp. *bouchonii* (Thell.) Costea & Carretero (Amaranthaceae). *Notulae alla Checklist della flora italiana*: 6. *Informatore Botanico Italiano* 40(2): 263.
- Iamonico D. (2008b): Sulla presenza di alcune entità del genere *Amaranthus* L. (Amaranthaceae) nel Lazio. *Informatore Botanico Italiano* 40(1): 23-26.
- Iamonico D. (2010): Il genere *Amaranthus* L. in Italia: stato attuale delle conoscenze. *Ann. Bot. (Roma)*, Quaderni: 149-154.
- Melzer H., Bregant E. (1990): Neues zur Flora von Friaul-Julisch Venetien, Slowenien und Kroatien. *Gortania* 11(1989): 161-176.

- Mosyakin S.L., Robertson K.R. (1996): New infrageneric taxa and combination in *Amaranthus* (Amaranthaceae). *Annales Botanici Fennici* 33: 275-281.
- Murray T. (1940): The genetic of sex determination in the family Amaranthaceae. *Genetics* 25: 409-431.
- Nuttall T. (1837): Collections towards a Flora of the Territory of Arkansas. Transaction of the American Philosophical Society held at Philadelphia, for promoting useful knowledge n.s. 5(2): 165.
- Pignatti S. (1982): Flora d'Italia 1. Edagricole, Bologna, pp. 178-182.
- Poldini L. (1991): Atlante corologico delle piante vascolari nel Friuli-Venezia Giulia. Inventario floristico regionale. Reg. Auton. Friuli-Venezia Giulia Direz. Region. Foreste e Parchi, Univ. Studi Trieste Dipart. Biol., Udine, pp. 134-136.
- Poldini L. (2002): Nuovo Atlante corologico delle piante vascolari nel Friuli Venezia Giulia. Reg. Auton. Friuli-Venezia Giulia Azienda Parchi e Foreste regionali, Univ. Studi Trieste, Dipart. Biol., Udine.
- Poldini L., Oriolo G., Vidali M. (2001): Vascular flora of Friuli-Venezia Giulia. An annotated catalogue and synonymic index. *Studia Geobotanica* 21: 3-277.
- Pratt D.B., Clark L.G. (2001): *Amaranthus rudis* and *A. tuberculatus* - one species or two? *The Journal of the Torrey Botanical Society* 128: 282-296.
- Robertson K.R. (1981): The genera of Amaranthaceae in the Southeastern United States. *Journal of the Arnold Arboretum* 62: 267-313.
- Saccardo P.A. (1909): Cronologia della flora italiana. Tipografia del Seminario, Padova.
- Sauer J.D. (1955): Revision of the dioecious amaranths. *Madroño* 13: 5-46.
- Sauer J.D. (1957): Recent migration and evolution of the dioecious amaranths. *Evolution* 11: 11-31.
- Sauer J.D. (1972): The dioecious Amaranths: a new species name and major range extension. *Madroño* 21: 426-434.
- The C. V. Starr Virtual Herbarium of the New York Botanical Garden (2009): The C. V. Starr Virtual Herbarium of the New York Botanical Garden - Online Catalogue of Vascular Plants. <http://sciweb.nybg.org/science2/VirtualHerbarium.asp>
- Uline E.B., Bray W.L. (1895): Synopsis of North American Amaranthaceae. *Botanical Gazette* 20: 155-161.
- Wood A. (1877): *The American Botany and Florist: including lesson in the structure, life, and growth of plants; together with a simple analytical flora*, 289. A.S. Barney & Company, New York and Chicago, pp. 289.
- Zangheri P. (1976): *Flora Italica* 1. Ed. Cedam, Padova, pp. 105-106.