

# ***POLYCNEMUM VERRUCOSUM* (AMARANTHACEAE), FIRST RECORD FOR THE ITALIAN FLORA AND COMPARISON WITH RELATED SPECIES *P. ARVENSE***

Duilio IAMONICO<sup>1</sup>**Abstract**

*Polycnemum verrucosum* A. F. Láng is recorded for the first time for Italy (Lazio region, Central Italy). Morphological and ecological characteristics of this species, as compared with the related *P. arvense* L., are presented and discussed. Taxonomical notes are also provided.

**Key words:** distribution area, Italy, new record, *Polycnemum* L.

**Izvleček**

Vrsto *Polycnemum verrucosum* A. F. Láng smo prvič zabeležili na ozemlju Italije (regija Lazio, srednja Italija). Prikazali smo morfološke in ekološke značilnosti vrste v primerjavi s sorodno vrsto *P. arvense* L. Podali smo tudi taksonomske opombe.

**Ključne besede:** razširjenost, Italija, nova najdba, *Polycnemum* L.

## 1. INTRODUCTION

*Polycnemum* L. is a genus of 6–8 species distributed in Europe, central-western Asia, northern Africa and northern America (Ball 1993, Gelin et al. 2003, Greuter et al. 1984, Shultz 2004).

*Polycnemum* (and the related genera *Nitrophila* S. Watson and *Hemicroa* R. Brown) is included in Polycnemoideae Raf. Placement and rank of this taxon has long been controversial and it was included in the family of Amaranthaceae Juss. (e. g. Boissier 1879, Soriano 1944), Chenopodiaceae Vent. (e. g. Bentham & Hooker 1880, Kühn et al. 1993) or Caryophyllaceae Juss. (e. g. Moquin-Tandon 1837) or considered as morphological intermediates between Amaranthaceae and Chenopodiaceae (Volkens 1887) and between Paronocheae and Caryophyllaceae (Aellen 1960–1961). Recent phylogenetic studies (Kadereit et al. 2003) clearly shown the affinity of Polycnemoideae with the genera traditionally included in the Amaranthaceae (e. g. *Achyranthes*

L., *Amaranthus* L., *Gomphrena* L.). From the morphological point of view, Polycnemoideae and Amaranthaceae are characterized in having petaloid tepals (white or pigmented, scarious or papyraceous) and stame filaments united into a filament tube [in Chenopodiaceae s. s. tepals are sepaloid (green and herbaceous) and the filaments are not united into a filament tube]. Moreover, *Polycnemum* has one character of Gomphrenoideae Kostel. (absent in Chenopodiaceae): 2-locular anthers.

At present, 5 species are recorded in Europe: *Polycnemum arvense* L., *P. fontanesii* Durieu & Moq., *P. heuffelii* A. F. Láng, *P. majus* A. Brown, *P. verrucosum* A. F. Láng (Ball 1993, Uotila 2011), of which three (*P. arvense*, *P. majus* and *P. heuffelii*) are indicated for Italy (Conti et al. 2005, Conti et al. 2007, Iamonico 2011a).

In this paper *P. verrucosum* is reported for the first time for Italy (Lazio region). Taxonomical, morphological and ecological notes are provided as well as the delimitation in comparison with the related *P. arvense*.

<sup>1</sup> Department DATA, Section Environment and Landscape, University of Rome Sapienza, Via Flaminia 72, 00196-Rome, Italy. d.iamonico@yahoo.it

The work is part of a study carried out by the author on the family of *Amaranthaceae* s. l. in Italy (e. g. Iamonico 2010, 2011b, 2012a, 2012b, Iamonico & Jarvis 2012a, 2012b) and on the genus *Polyneum* in particular, for the New Italian Flora (editor S. Pignatti, in prep.).

## 2. MATERIAL AND METHODS

This paper is based both on the analysis of the relevant literature and the examination of the specimens (*P. arvense*, *P. verrucosum*) kept in the Herbaria BP, FI, LINN and RO.

The identification of both species were made using the protogues (Láng 1828, Linnaeus 1753) and the descriptions in the Flora Europaea (Ball 1993).

A morphological analysis of the *exsiccata*, based on 15 characters (12 quantitative and 3 qualitative – Table 1) was performed. The data matrix was processed by means of the software NCSS 2007 (Hintze 2007). The variability of the characters is illustrated by box plots and scatter plots.

**Table 1:** Characters measured (those labelled with an asterisk are qualitative).

**Tabela 1:** Merjeni znaki (zvezdica označuje kvalitativne značke).

- 1 habitus (prostrate or ascending)\*
- 2 stem hairness (glabrous or pubescent)\*
- 3 branching (very ramified or few ramified)\*
- 4 leaf length (mm)
- 5 laef width (mm)
- 6 bracteal leaf length (mm)
- 7 bract length (mm)
- 8 ratio 6/7
- 9 tepal length (mm)
- 10 ratio 6/9
- 11 ratio 7/9
- 12 fruit length (mm)
- 13 ratio 7/12
- 14 ratio 9/12
- 15 seed diameter (mm)

## 3. RESULTS AND DISCUSSION

The statistical analysis shows a clear separation between the species involved in the study, using the character No. 10 (see Table 1). The others ones have not statistical significance, showing partial (characters Nos. 6, 7, 8, 11, 13) or total overlap of

the measurements (characters Nos. 1, 2, 3, 4, 5, 9, 12, 14, 15) (Fig. 1).

***Polyneum verrucosum*** A. F. Láng, Syll. Pl. Nov. 1: 179 (1824).

= *P. arvense* L. var. *verrucosum* (A. F. Láng) Oborny, Fl. Mähr.: 334 (1885).

Annual (therophyte), to 50 cm. Stem ascendent (sometimes erect), branched, glabrous or slightly pubescent. Leaves linear (0.5–1.0 × 3.0–12.0 mm), plane-shaped, glabrous (sometimes slightly pubescent), pointed at the apex, usually glaucous. Inflorescence in terminal leafy spikes; bracteal leaves ovate-lanceolate (3–5 mm long) 2–3 times longer than the perianth, acute; bract of the flowers 2, with lateral membranous borders thinning to apex hyaline, white, 1.1–2 times longer than the perianth; tepals 5, ovate, acute or acuminate (1.5–1.8 mm long); fruit ellipsoidal (1 × 1.3 mm), subequal to the tepals, indehiscent; seeds lenticular (1–1.5 mm in diameter), black, fine sculptured.

Iconography: Aellen (1960–1961).

Chromosome number: unknown.

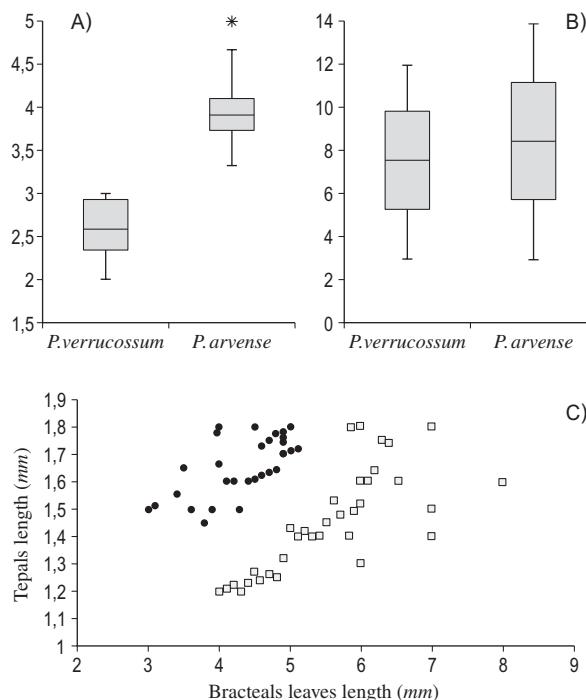
Taxonomical notes: *Polyneum verrucosum* was first described from Hungary in 1824 "... in platis arenosis, aridis, comitatus Pestensis, Cumaniae, Faszygiae" (Láng 1824). Moquin-Tandon (1840) quoted the genus *Halimocnemis* C. A. Mey. in which *Polyneum* was included, but the species *P. verrucosum* was not reported. De Candolle (1849) indicates the species in "... in arenosis Hungariae ..." and provided an extensive description. Oborny (1885) recognized the taxon at variety rank, under *P. arvense*. The comprehensive European floras (Greuter et al. 1984, Ball 1993) accepted *P. verrucosum* as separate species.

Ecology: Field, sandy and gravelly places (Ball 1993).

Flowering time: September to December.

General distribution: Austria, Czech Republic, Germany, Hungary, former Jugoslavia, Romania, Western and Eastern Russia, Turkey (Greuter et al. 1984, Jalas & Souminen 1980, Ball 1993) and Italy. The Italian record extends to south-western the distribution area of *P. verrucosum*.

Distribution in Italy: no former Italian floras reported *P. verrucosum* [from Bertoloni (1854) to Conti et al. (2005)]. The specimens examined represent the first records for Italy (Lazio region, Central Italy).



**Figure 1:** Box Plots (A: ratio bracteal leaves length/tepals length; B: leaves length) and scatter plot (C: bracteal leaves vs tepals; black circles for *P. verrucosum*, white squares for *P. arvense*) illustrating the variability of some characters.

**Slika 1:** Graf škatla z ročaji (A: razmerje braktealni list/dolžina tepala; B: dolžina lista) in razsevni diagram (C: braktealni listi proti tepalom; polni krožci za *P. verrucosum*, prazni kvadrati za *P. arvense*), ki prikazujejo variabilnost nekaterih znakov.

#### *Polycnemum arvense* L., Sp. Pl. 1: 35 (1753).

Annual (therophyte), to 50 cm. Stem ascendent (sometimes erect), branched, glabrous or verrucose. Leaves linear ( $0.5\text{--}1.3 \times 3.0\text{--}14.0$  mm), plane-shaped, glabrous, pointed at the apex, not glaucous. Inflorescence in terminal leafy spikes; bracteal leaves ovate-lanceolate (4.5–8 mm long) at least 3 times longer than the perianth, acute; bract of the flowers 2, with lateral membranous borders thinning to apex, hyaline, white, 1.1–2 times longer than the perianth; tepals 5, ovate-lanceolate, acute [1.2–1.7(–2) mm long]; fruit ellipsoidal ( $1 \times 1.5$  mm), subequal to the tepals, indehiscent; seeds lenticular (1–1.7 mm in diameter), black or brown, fine sculptured.

Iconography: Gutiérrez Bustillo (1990).

Chromosome number:  $2n = 18$  (Tomšovic 1990), 24 (Gutiérrez Bustillo 1990).

Taxonomical notes: *P. arvense* was first described from Europe in 1753 "... in Galliae, Italiae, Ger-

maniae arvis ..." (Linnaeus 1753). De Candolle (1849) accepted the species rank for this species, but he pointed out an high intraspecific variability, reporting five varieties:  $\alpha$  – *multi-caule* Wallr.,  $\beta$  – *roseum* De Not.,  $\gamma$  – *majus* (A. Brown) DC.,  $\delta$  – *recurvum* Gaudin,  $\varepsilon$  – *pumilum* (Hoppe ex Mert. & W. D. J. Koch) DC. The diagnostic features for these taxa are: *habitus*, shape and colour of the leaves, ratio bracts/tepals, ratio fruit/tepals. The variability of these characters seems to be continue, except for the ratio bract/tepals that clearly distinguish the var. *majus* [De Candolle (1849) reported "Bracteae calycem vix superantes"], now accepted at specific rank (*P. majus* A. Brown).

**Ecology:** Human made habitat, such as uncultivated land or cultivated field, on dry soil (personal observation), at 0–1000 m a.s.l.

**Flowering time:** July to October.

**General distribution:** Albania, Austria, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, former Jugoslavia, Romania, Russia, Spain, Switzerland and European Turkey (Greuter *et al.* 1984, Jalas & Souminen 1980, Ball 1993).

**Distribution in Italy** (Conti *et al.* 2005, Conti *et al.* 2007, Iamonico 2012c, Iamonico & Bovio 2012): Northern (old recorded in Valle d'Aosta region), Central and Southern Italy (Puglia excluded and old recorded in Campania and Calabria).

## 4. CONCLUSIONS

Extensive analysis of literature and careful Herbarium investigations allowed to record *P. verrucosum* in Italy for the first time, extending the distribution area of the species in Europe far to south-west, but it may represent an alien population the status of which is unknown so far and requires further investigations. The comparison with the related species *P. arvense* shows a clear separation between the two taxa on the basis of the ratio bracteal leaves length/tepals length.

## 5. ACKNOWLEDGEMENTS

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## 7. APPENDIX

### Specimina visa selecta.

*Polycnemum verrucosum* A. F. Láng – Hungary: Vas. In glareosis argillaceis ad pagum Ostfy, 20.IX.1916, Trautmann (BP); Vas. In agris pag. Perint, 30.IX.1922, 220 m a.s.l., A. Boros (BP); Zala. In agris ad vias ferrena prope opp. Nagykansea, 150 m a.s.l., 03.IX.1923, A. Boros (BP); Pest. Pest, in pascuis arenosis ad rivum Rákos ad Isaszeg, versus Gödöllő, 180 m a.s.l., 19.X.1930, A. Boros (BP); Fejér. Fejér, in argillosis proprter vias ad “Fatelep” prope Csákberény, 220 m a.s.l., 06.IX.1936, A. Boros (BP); Borsod-Abauj-Zemplén. Erdőbénye, Zemplén., in rupibus andesiticis, 17.X.1948, leg. et det. G. Andreánzsky, rev. L. Felföly, 28.V.1999 (BP). – Italy: Lazio. sub *Polycnemum* sp., Roma, Colli di Bravetta, 03.XII.1892, G. B. Canneva, rev. G. Lusina (sub *P. arvense* L.), rev. D. Iamonico, 07.IX.2011 (RO-HR); Trevignano, Monte Rocca Romana, 23.IX.1897, A. Pappi, rev. G. Lusina (sub *P. arvense* L.), rev. D. Iamonico, 07.IX.2011 (RO-HR); sub *Polycnemum arvense* L., Albano presso li Cappuccini, IX.1858, E. Rolli, rev. D. Iamonico, 07.IX.2011 (RO-HR); sub *Polycnemum arvense* L., all’Ospedaletto vicino Roma, 11.X.1859, E. Rolli, rev. D. Iamonico, 07.IX.2011 (RO-HR); *ibidem*; sub *Polycnemum arvense* L., presso la Macchia di Marco Simone, 26.X.1886, Mori, rev. D. Iamonico, 07.IX.2011 (RO-HR); Prov. di Roma, Monte Migliore fuori Porta San Paolo, 21.XI.1899, R. Pirotta et E. Chiovenda, rev. G. Lusina (sub *Polycnemum arvense* L.), rev. D. Iamonico, 07.IX.2011 (RO-HR).

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