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The genus *Arum (Araceae)* in the F.Y.R. Makedonija

Abstract

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Recent field investigations in the F.Y.R. Makedonija have led to the recognition of four *Arum* taxa within that country: *A. alpinum, A. orientale* subsp. *orientale, A. maculatum,* and *A. italicum* subsp. *italicum.* They differ principally in shape of tuber, shape of spathe and spadix, ratio of peduncle to petiole length, and chromosome number. *Arum alpinum* is mostly found in the western part of the country, while *A. orientale* is more frequent in its eastern part where it reaches the western limit of its distribution; *Arum maculatum* is less widespread in the country than was earlier believed, having usually been cited by confusion with *A. alpinum; A. italicum,* a Mediterranean species, is confined to the southern part of the country and to the river valleys with a Mediterranean climatic regime.

Introduction

In older literature (Engler 1920; Bornmüller 1927; Hayek & Markgraf 1933; Soška 1938-1939) only *Arum maculatum* L. and *A. italicum* Mill. have been recognized for "Macedonia". Recently, *A. alpinum* Schott & Kotschy and *A. orientale* M. Bieb. have been added to the record (Bedalov 1973, 1976, 1981).

In the years 1985-1986 we had the opportunity to visit some parts of the F.Y.R. Makedonija and study morphological characters and distribution of the taxa directly in the field. Corresponding herbarium specimens are deposited at NEU, with some duplicates at ZA; while live plants are kept in the associated botanic gardens of the University of Neuchâtel and of the Faculty of Science, University of Zagreb.

Results and discussion

The four species in the F.Y.R. Makedonija differ mostly in tuber shape, spadix shape, ratio of peduncle to petiole, and chromosome number.

Arum alpinum and *A. orientale* differ by their depressed-globose to discoid tuber shape from *A. maculatum* and *A. italicum,* which possess horizontal (rhizome-like) tubers.

Arum alpinum and *A. orientale* are diploids ($2n = 28$), while the other two species are polyploids: *A. maculatum* is a tetraploid ($2n = 56$) and *A. italicum* is a hexaploid ($2n = 84$) (Bedalov 1973, 1975, 1976, 1977, 1978).

In *Arum alpinum* the peduncle is usually about as long as, or slightly shorter or longer than, the petiole; in *A. maculatum* it equals about half the petiole length or a little more; while in *A. orientale* and *A. italicum* it is mostly less than half as long as the petiole.

The limb of the spathe in *Arum alpinum* is ovate-lanceolate and usually not more than three times as long as its basal tubular portion, while in the other species it is always more than three times as long as the tube, and usually wider. The limb is pale greenish and sometimes suffused with purple on the border in *A. alpinum*, more or less purplish on the whole surface in *A. orientale;* it is sometimes dark spotted in *A. maculatum,* and seldom also in *A. italicum.*

The spadix appendage of *Arum alpinum* is cylindrical throughout or somewhat widened at the top and never has a distinct stalk; in *A. maculatum* it is distinctly widened

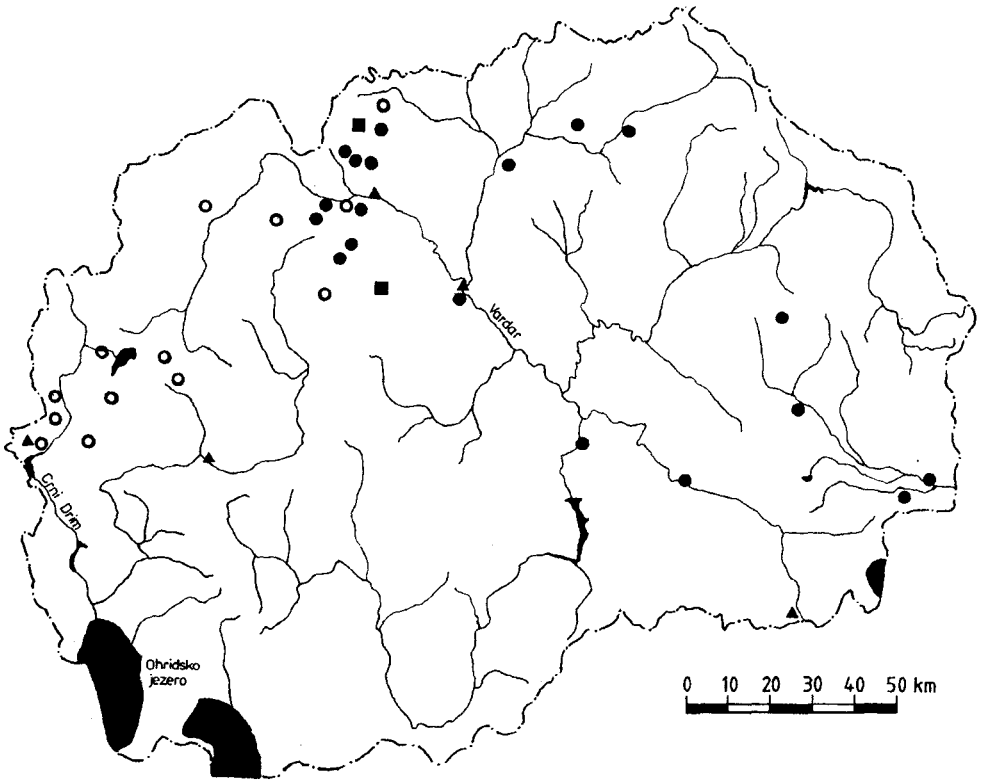

Fig. 1. Distribution of *Arum* species in the F.Y.R. Makedonija. ● *Arum orientale;* ○ *Arum alpinum;* ■ *Arum maculatum;* ▲ *Arum italicum.*

apically and tapers slightly into a stalk; while in *A. orientale* and *A. italicum* it is similarly widened but is usually clearly set off from the stalk.

The upper sterile flowers in *Arum alpinum* are usually arranged in 4-6(-8) whorls, while in other species they mostly form four whorls.

The leaves of *Arum alpinum* and *A. orientale* are uniformly green, in *A. maculatum* they are either concolorous or mottled with dark spots, and in *A. italicum* they are either uniformly green, or marked with lighter veins or spots, or seldom with dark spots (Bedalov 1975, 1976, 1977, 1981; Bedalov & Bronić 1989).

Arum alpinum was initially described as a species (in Schott 1851) but afterwards included in *A. maculatum* (Richter 1890, Beck 1903, Ascherson & Graebner 1904, Engler 1920, Hayek & Markgraf 1933, Riedl 1967). Terpó (1971, 1973) and Bedalov (1973, 1976) restored it to the status a separate species. Subsequently Riedl (1979) and Prime (1980) included it in *A. orientale*. Even more recently, Boyce (1989, 1993) again redeemed it as a separate species.

Formerly, *Arum alpinum* was thought to be more or less confined to the eastern part of Central Europe (Terpó 1973), but it has since been recorded from almost all Mediterranean countries of southern Europe (Beuret 1972, 1977; Bedalov 1976, 1978, 1980, 1981, 1983; Löve & Kjellqvist 1973; Greuter 1984; Bedalov & al. 1993a-b; Boyce 1994; Bedalov & Fischer 1995).

In the F.Y.R. Makedonija, *Arum alpinum* is mainly distributed in the western part, while *A. orientale* (represented by subsp. *orientale*) is mostly found in its eastern portion (Fig. 1). Here as well as in Serbia and Greece, *A. orientale* reaches the western limit of its distributional area. According to our observations, *A. maculatum* is less widespread in the F.Y.R. Makedonija than it would appear from the published record, having mostly been cited by confusion with *A. alpinum;* we found *it* only in a few localities (Fig. 1). *A. italicum,* a Mediterranean-Atlantic species here represented by subsp. *italicum,* is distributed in the southern part of the country and, following the Mediterranean climatic influence, penetrates into the continental portion along the valleys of the Vardar and some other rivers (Fig. 1).

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