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Instructions to Authors

FIRST RECORDS FOR SEVEN SPECIES AND ONE HYBRID FOR THE FLORA OF THE REPUBLIC OF MACEDONIA

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ABSTRACT: Contribution to the knowledge of distribution ranges of several plant species is presented in this article. The following plant species were recorded in course of the botanical research during last several years and they represent new findings for the flora of the Republic of Macedonia: *Polypodium interjectum*, *Polypodium x mantoniae*, *Clematis recta*, *Salix repens* subsp. *rosmarinifolia*, *Lathraea rhodopea*, *Cirsium grecescui*, *Eleocharis mamillata* subsp. *austriaca* and *Arabidopsis arenosa*.

Keywords: Macedonia, flora, new records.

1 INTRODUCTION

The flora of the Republic of Macedonia is extraordinary rich in comparison with the territory of the country and taking into account that it is a landlocked country. According to recent data, 210 families, 920 genera and 3700 species comprise the flora of higher plants, angiosperms being the richest group with about 3200 species [28]. This makes the flora of the Republic of Macedonia one of the richest floras in the context of the whole European continent [43]. Diverse geological, geomorphological and climatic factors, as well as historic circumstances have contributed for such richness and diversity of vascular plants [28, 37]. As a result, the current Macedonian flora represents a mosaic of various floral elements – Tertiary relicts, Mediterranean, Greek-Asia Minor, Caucasian, arcto-alpine, middle-European, Eurasian, Holarctic and cosmopolitan [28]. Endemic taxons (Illirian, Scardo-pindic, Balcan etc.) represent a special characteristic and value of the Macedonian flora. Among them, 114 flowering plant species are Macedonian endemics [28, 40, 41]. Due to these floral values, 42 Important Plant Areas were recently identified across Macedonian territory [37].

The flora of the Republic of Macedonia has been intensively studied for more than one and a half century. The most extensive data can be found in [3, 4, 5, 6, 17, 30, 39]. Floristic contributions with new species and/or findings for the flora of Macedonia are regularly published as well, like for example in [10, 11, 12, 13, 26, 27, 29, 31, 32, 33, 34, 35, 42, 43]. In addition, several new plant species were described in the last ten years from the territory of the Republic of Macedonia: *Helianthemum marmoreum* Stevan., Matevski & Kit Tan [41], *Jurinea micevskii* Stevan., Matevski & Kit Tan [42], *Festuca jakupicensis* Kostadinovski [21], *Viola pseudaeolica* Tomović, Melovski & Niketić [44].

This paper represents the continuation of the floristic studies of vascular flora of the Republic of Macedonia. Data on seven new species and one new hybrid for the flora of Macedonia, collected at different localities throughout the country are presented in this paper.

2 METHODS

The study was based on fieldwork in the territory of the Republic of Macedonia during the last two decades and collected and stored plant material in Herbarium Melovskiorum (MKMEL!) [47], as well as in the Biology Students Research Society herbarium of the Faculty of

Natural Sciences and Mathematics in Skopje. Besides the field survey, relevant literature sources were used for supplementation of the distribution records.

The determination of species was done according to standard floras and related recent taxonomic articles. Identification of the two *Polypodium* taxa was performed with microscopic method by analysis of indurated cells per annulus and basal cells per sporangium as well as the proportion of sterile spores in sporangia [22].

We followed the nomenclature of the taxa used in Euro+Med Plant Base (<http://www2.bgbm.org/EuroPlusMed/query.asp>). The quotation of the distribution locations and habitats for all records in this article follows the MAKMEL data base pattern.

The regional division of Melovski *et al.* [38] was used to present the general geographic position of the localities.

3 RESULTS AND DISCUSSION

***Polypodium interjectum* Shivas** in J. Linn. Soc., Bot. 58: 28 (1961)

First chorological records in Macedonia

Mt. Belasica: above v. Smolare – Smolarski Vodopad, on the rock in chestnut forest, 550 m a.s.l., 15.09.2009, leg. S. Hristovski, det. Lj. Melovski (MKMEL! 04335-04339); Bistra: Lopusnik – Dolen Lopusnik, on limestone rocks in narrow dale with horse chestnut and beech forest, 900-1000 m a.s.l., 10.08.2010, leg./det. Lj. Melovski (MKMEL! 04341); Bistra: above v. Janče – lower part of the valley of Galička Reka, silicate rocks in mixed broadleaf forest next to the river, 800-900 m a.s.l., 29.07.2010, leg./det. Lj. Melovski (MKMEL! 04343-04347); Plačkovica: Zrnovska Reka – between Orlov Kamen and Ploča peaks, mixed broadleaf forest with linden, beech, *Carpinus betulus* and other trees, 600-700 m a.s.l., 4.09.2014, leg./det. Lj. Melovski (MKMEL! 08189); Plačkovica: v. Laki – Selska Reka valley (between Strumički Rid and Kartal - below and above the inflow of Lomska Reka), eroded stony site next to the road in beech forest, 950-1000 m a.s.l., 24.10.2014, leg./det. Lj. Melovski (MKMEL! 08190); Drimkol: Drenočka Reka – just above the inflow into Crn Drim, limestone stony site in mixed broadleaf forest in mesophilous ravine, 735 m a.s.l., 16.11.2014, leg./det. Lj. Melovski (MKMEL! 08191 and 08192).

P. interjectum grows in deep and humid forested dales and ravines and was found in several localities in Macedonia (Fig. 1). It is broadly distributed in Europe

[51] but its distribution in Balkan Peninsula was not well studied until recently when it was recorded in several Balkan countries [7, 21, 22]. This species was not mentioned in the Flora of the Republic of Macedonia Micevski [39]. The ecology of this species and its closely

related *P. vulgare* as well as the main taxonomic characteristics is described in Ivanova [22].

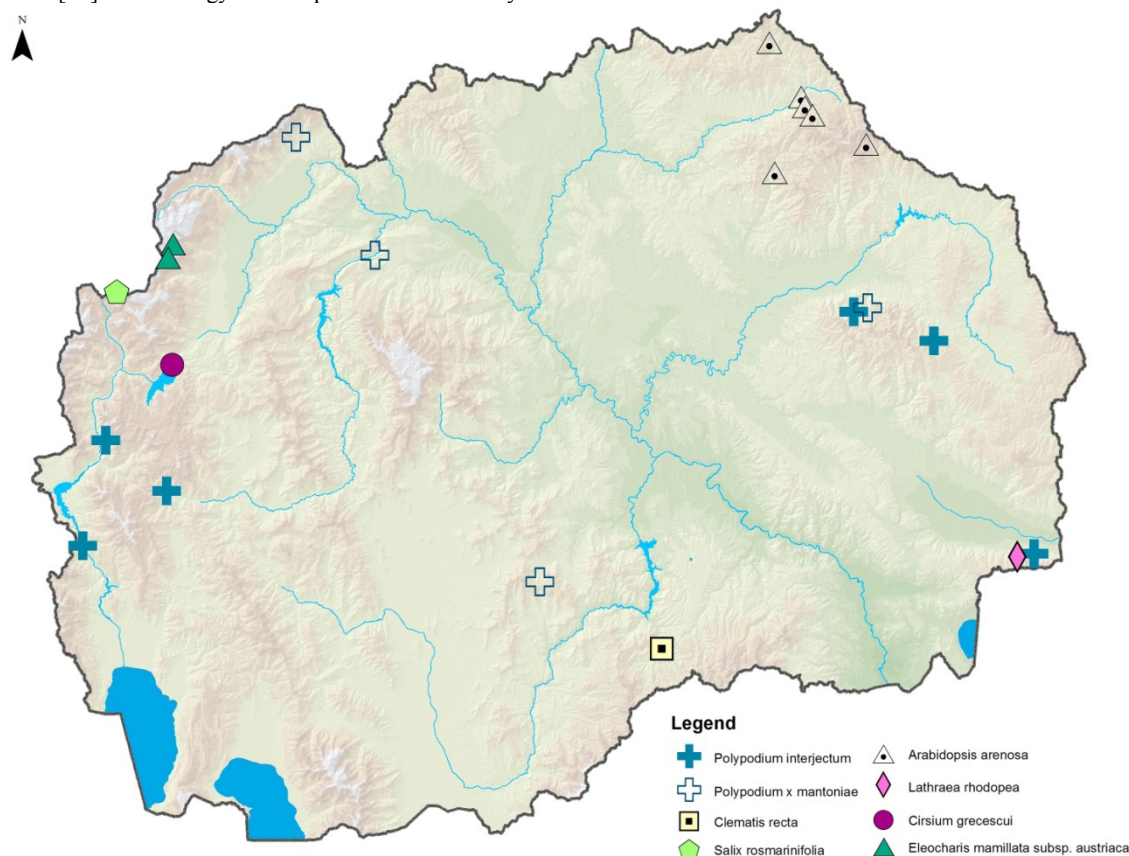


Figure 1: Distribution map of the first records of seven plant species and one hybrid in the Republic of Macedonia

***Polypodium x mantoniae* (Rothm.) Shivas** in Rothm. & U. Schneid., Kulturpflanze Beih. 3: 245 (1962) [*P. interjectum* Shivas x *P. vulgare* L.]

First chorological records in Macedonia

Treska canyon: Matka – near the cave "Krštalna", limestone stony ground, 320 m a.s.l., 04.09.2009, leg. S. Hristovski, det. Lj. Melovski (MKMEL! 04329-04333); Dren: below Ligurasa – toward Dlaboki Dol, on silicate rocks in shady and mesophilous dale, 950 m a.s.l., 28.04.2012, leg./det. Lj. Melovski (MKMEL! 04348); Šar Planina: Podgora – Petočko Vodiče (above v. Belovište), Silicate rocks next to the brook in beech forest, 920 m a.s.l., 12.09.2012, leg./det. Lj. Melovski (MKMEL! 04349-04351); Plačkovica: above v. Gradec – Next to Gradečka Reka (below Garvan), on silicate rocks in beech forest - mesophilous site, 870 m a.s.l., 30.11.2012, leg./det. Lj. Melovski (MKMEL! 04352).

This taxon was described in 1960-ties but its distribution is not well known. Only recently some papers appeared confirming its distribution in Balkan Peninsula [7, 19, 21, 22]. *P. x mantoniae* can be found together with the populations of its parent plant species but it also has well established populations in sites where one parent

plant is absent (Fig. 1). This may be result of lack of complete distribution data for both parent plants. It is also evident that *P. x mantoniae* populations are vigorous and effectively spread vegetatively [22].

***Salix repens* subsp. *rosmarinifolia* (L.) Andersson** in Sp. Pl. 1020 (1753) [syn.: *Salix rosmarinifolia* L.]

First chorological records in Macedonia

Šar Planina: Dolno Lukovo Pole – upper part, peat-bog/mire, 1730 m a.s.l., 24.05.2010, leg. Lj. Melovski & S. Hristovski, det. Lj. Melovski (MKMEL! 04313-04315); Šar Planina: Dolno Lukovo Pole – upper part, peat-bog/mire, 1730 m a.s.l., 10.07.2011, leg./det. Lj. Melovski (MKMEL! 04311 and 04312).

Only one locality of this willow species in north-western Macedonia (in the southern part of Šar Planina Mt.) is known so far (Fig. 1). Only one cluster of *Salix repens* subsp. *rosmarinifolia* (Fig. 2) was discovered in Dolno Lukovo Pole peat land (Fig. 3). This cluster of shrubs was partially burnt at the end of 2011. In the south and central Balkans it is known from Bulgaria [18] and Serbia [24].



Figure 2: *Salix repens* subsp. *rosmarinifolia* – habitus; (a) the whole cluster, (b) branches with leaves, (c) young branch with female flowers (Photo: S. Hristovski)

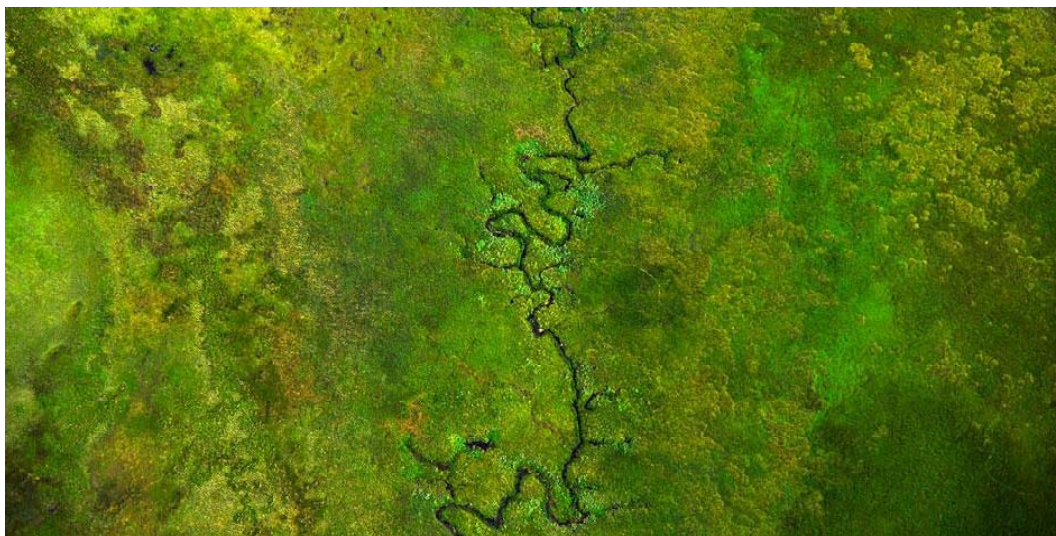


Figure 3: Dolno Lukovo Pole mires – *Salix repens* subsp. *rosmarinifolia* habitat (Photo: Lj. Stefanov)

***Clematis recta* L.** in Sp. Pl. 554 (1753)

First chorological records in Macedonia

Rožden region (Mariovo): v. Mrežičko – below Glavite, mixed broadleaf forest in mesophilous ravine on limestone ground – next to the stream, 600 m a.s.l., 30.05.2010, leg. Lj. Melovski & S. Hristovski, det. Lj. Melovski (MKMEL! 02961).

Clematis recta was found only on one locality close to v. Mrezhichko in Mariovo region (Fig. 1). This species is common in Central, South and East Europe [50].

***Arabidopsis arenosa* (L.) Lawalrée** in Bull. Soc. Rov. Bot. Belg. 42: 242 (1969). 1969 [syn.: *Cardaminopsis arenosa* (L.) Hayek]

First chorological records in Macedonia

Bilina Planina: v. Podržikonj, Zli Dol – below Mišinci, beech forest, 1000 m a.s.l., 15.05.2005, leg./det. Lj. Melovski (MKMEL! 05154); Osogovski Planini: Kriva Palanka – Varoški Rid, hornbeam forest with sessile oak, 700-750 m a.s.l., 15.05.2011, leg./det. Lj. Melovski (MKMEL! 05155); Osogovski Planini: Emirica – above the inflow of Emirička Reka into Zletovska Reka, eroded sandy site next to the road, 850 m a.s.l., 03.05.2008, leg./det. Lj. Melovski (MKMEL! 05156);

Osogovski Planini: Ruen – above Toranica mine, beech forest – close to the road, 1430 m a.s.l., 23.05.2009, leg./det. Lj. Melovski (MKMEL! 05157); Osogovski Planini: v. Stanci – in the village, grassy site next to the road and houses, 850 m a.s.l., 13.05.2007, leg. IDSB '07, det. Lj. Melovski (MKMEL! 05158); Osogovski Planini: v. Duračka Reka – next to Stanečka Reka, next to the road and houses, 700-750 m a.s.l., 13.05.2007, leg. IDSB '07, det. Lj. Melovski (MKMEL! 05159).

Arabidopsis arenosa is widespread species in Europe and in the neighbouring countries [2, 23, 27]. The species was cited by Hayek [20] for Ma (=Mazedonien) but it was not included in the flora of Macedonia by Micevski [39]. The term “Mazedonien” in Hayek [20] does not coincide with the present administrative territory of the Republic of Macedonia.

All of the presented records from Macedonia are from the north-east part of the country (Fig. 1).

***Lathraea rhodopea* Dingler** in Bot. Zeitung (Berlin) 35: 74 (1877)

First chorological records in Macedonia

Belasica: above v. Smolare – below Šarena Češma, mixed broadleaf forest with beech, 800-1100 m a.s.l., 17.05.2010, leg. Lj. Melovski & S. Hristovski, det. S. Hristovski & Lj. Melovski (MKMEL! 04316).

Lathraea rhodopea (Fig. 4) was found on Belasica Mt. (Fig. 1), which actually represents a continuation of the Rhodope massif and Slavyanka Mt. toward Macedonia. Up to now, this species was known from south Bulgaria and north-east Greece [1, 14].12]. The new finding extends its distribution range toward west.



Figure 4: *Lathraea rhodopea* from Belasica Mt. (Photo: S. Hristovski)

***Cirsium grecescui* Rouy** in Bull. Soc. Bot. France 37: 164 (1890)

First chorological records in Macedonia

Bistra-Šar Planina: Children's resort "Bunec" – below the resort, marshy site next to a small stream, 1250 m a.s.l., 25.08.2004, leg. Lj. Melovski & N. Angelova, det. Lj. Melovski (MKMEL! 00180).

Cirsium grecescui (Fig. 5) was found on the border between Shara Mt. and Bistra next to the wetland at the Bunec resort (Fig. 1). This record was already announced in Melovski & Matevski [36]. It was known from south and east Romania and north-east Serbia [8] although in the Flora of Serbia it is quoted as common plant, but without exact distribution localities [15]. However, it was recently reported from Sokolovica [49] and Rogozna mountains [44] in central and southwest Serbia which is the closest finding to the locality from Macedonia.



Figure 5: *Cirsium grecescui* from Bunec wetland – habitus (a) and inflorescence (b) (Photo: Lj. Melovski)

***Eleocharis mamillata* subsp. *austriaca* (Hayek) Strandh.** in Opera Bot. 9(2): 9 (1965) [Basionym: *Eleocharis austriaca* Hayek]

First chorological records in Macedonia

Šar Planina: Borislovec-Mala Smreka – Bogovinsko Ezero, sandy-gravelly place next to the lake, 1935 m a.s.l.,

08.09.2006, leg./det. Lj. Melovski (MKMEL! 01588); Šar Planina: Rudoka – above Crno Ezero, small pond, 2250 m a.s.l., 30.07.2008, leg. Lj. Melovski & N. Angelova, det. Lj. Melovski (MKMEL! 01590).

Eleocharis mamillata subsp. *austriaca* grows on Shar Planina next to the alpine lake Bogovinsko Ezero and above Crno Ezero (Fig. 1). This subspecies is known from Europe and Asia. Most of the European records come from the Alps but it is also known from Pyrenees, Carpathians and Pirin mountain in Bulgaria [16] and Tara Mt. in Serbia [52].

4 CONCLUSIONS

Seven plant species and one hybrid were recorded for the first time in the flora of the Republic of Macedonia: *Polypodium interjectum* Shivas, *Clematis recta* L., *Salix repens* subsp. *rosmarinifolia* (L.) Andersson, *Lathraea rhodopea* Dingler, *Cirsium grecescui* Rouy, *Eleocharis mamillata* (H. Lindb.) H. Lindb. subsp. *austriaca* (Hayek) Strandh., *Arabidopsis arenosa* (L.) Lawalrée and *Polypodium x mantoniae*. The discovery of these species was well expected, or not surprising for some of them, since they are known from neighbouring countries. The records of *Salix repens* subsp. *rosmarinifolia*, *Cirsium grecescui* and *Eleocharis mamillata* subsp. *austriaca* represent one of the southernmost localities in Europe. These three species were found in wetlands on the high mountains in west Macedonia. The Balkan endemic species *Lathraea rhodopea* was found in south-east Macedonia and this record extends its distribution range westwards.

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