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Short Communication

Rare, threatened and relict species in flora of SNR Zasavica

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***Abstract*:**
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In group of biodiversity important plant species there are 23 taxa. 20 taxa are mentioned in „Preliminary Red List of flora of Serbia and Montenegro with IUCN 2001 Conservation Statuses" in following categories: two as critically endangered (*Aldrovanda vesiculosa* L. and *Hottonia palustris* L.), four as endangered (*Hippuris vulgaris* L.*, Lindernia palustris Hartm., Ranunculus lingua* L. and *Urtica kioviensis* Rogow.), five as vulnerable (*Achillea aspleniifolia* Vent., *Dryopteris carthusiana* (Vill.) H. P. Fuchs, *Leucojum aestivum* L. *subsp. aestivum*, *Stratiotes aloides* L. and *Thelypteris palustris (*Schott) *subsp.palustris*, while 9 are with indefinite categories (CR-VU), due to data deficient (DD). Special Nature Reserve „Zasavica" is the only habitat in Serbia for *Aldrovanda vesiculosa* L., which was until 2005. considered as extinct from Serbia.

Key words: distribution, European adder, *Vipera berus*, Vlasina plateau

Introduction

The first data on the flora and vegetation of North Mačva (Peripannonian Serbia), and therefore the site of today's Special Nature Reserve "Zasavica" give Josif Pančić (1867) and Ernest Dombrowski (1895). Then followed a period of over half a century of sporadic research by small groups and individual researchers. In 1995 an initiative to protect river and a Decree was adopted on the previous Protection (Official Gazette RS, 51/95). At the suggestion of the Institute for Nature Protection of Serbia Government of the 1997th The declared Special Nature Reserve "Zasavica (Official Gazette RS, 19/97). This paper aims to show the total value of the diversity of flora SRP "Zasavica. Zasavica area is included in the IPA region of Serbia Stevanović & Šinžar-Sekulić (2009).

Material and methods

Based on our field studies conducted on the territory of the Special Nature Reserve "Zasavica" and adjacent areas from 1997 to 2010. as well as on herbarium and literature sources, the distribution data of vascular plant taxa with great conservation value and some rare taxa were collected. Voucher specimens were deposited in Herbarium of Institute for Nature Protection of Vojvodina province, Herbarium BEOU, BEO, BUNS and Herbarium of Special Nature Reserve "Zasavica" in Sremska Mitrovica. Identification and revision of plant material were carried out according to Tutin et al. (1968-1980; 1996), Gajić & Karadžić (1991) and Jávorka & Csapody (1975). Threatened status of plant taxa is represented according to "Preliminary Red List of flora of Serbia and Montenegro with IUCN 2001 Conservation Statuses" Stevanović (2002). The floristic elements are given according to the classification of Gajić (1980).

Results and Discussion

In group of biodiversity important plant species there are 23 taxa. According to „ Proclamation & Regulation Act of Strictly Protected and Protected wild plant, animal and fungi species“ (Official Gazette RS, 36/09) 11 species are ranked as strictly protected and 46 as protected. Also, 20 taxa are mentioned in „Preliminary Red List of flora of Serbia and Montenegro with IUCN 2001 Conservation Statuses“ Stevanović (2002) in following categories: two as critically endangered (CR): *Aldrovanda vesiculosa* L., *Hottonia palustris* L.), four as endangered (EN): *Hippuris vulgaris* L., *Lindernia palustris Hartm.*, *Ranunculus lingua* L., *Urtica kioviensis* Rogow., five as vulnerable (VU): *Achillea asplenifolia* Vent., *Dryopteris carthusiana* (Vill.) H. P. Fuchs, *Leucojum aestivum* L., *Stratiotes aloides* L. and *Thelypteris palustris (*Schott) *subsp.palustris*, while 9 are with indefinite categories (CR-VU), due to data deficient (DD). Special Nature Reserve „Zasavica“ is the only habitat in Serbia for *Aldrovanda vesiculosa* L., which was until 2005. considered as extinct from Serbia (Janković & Stevanović 1999: 100; Stanković 2007: 35-37). On Appendix I of Convention on the Conservation of European Wildlife and Natural Habitats (Strictly Protected Flora Species) as well as on IPA Criterion A, threatened species List are 3 species (*Aldrovanda vesiculosa* L., *Lindernia palustris Hartm., Salvinia natans* (L.) All.). One species (*Galanthus nivalis* L.*subsp.nivalis*) is protected by CITES Convention (*Convention on International Trade in Endangered Species of Wild Fauna and Flora*, Appendix 2). According Turrill (1929) followt tertiary relicts of Balkan Peniusula are recorded: *Stratiotes aloides* L.*, Trapa natans agg., Butomus umbellatus* L., *Erythronium dens-canis* L. s*ubsp.dens-canis*, *Humulus lupulus* L., *Hydrocharis morsus-ranae* L., *Isopyrum thalictroides* L., *Loranthus europaeus* Jacq., *Tamus communis* L.*subsp.communis*, *Viscum album* L.*subsp.album, Aldrovanda vesiculosa* L. Some species observed in Zasavica Reserve inchude tertiary relicts of southern Europe wetlands as indicated by pollen analysis of peatbogs Diklić (1984) include *Nymphaea alba* L., *Nuphar lutea* (L.) Sibthorp. & Sm. s*ubsp.lutaea*, *Salvinia natans* (L.)Allioni i *Nymphoides peltata* (S.G.Gmelin) O. Kuntze.

Or *Hippuris vulgaris* is the only representative of genus *Hippuris* oligotips cirkumholoarctic in Europe, which includes two species in America and Asia. The sites in Serbia are on the southern border area of its kind in Europe. Vučković & Panjković (1999), while *Hottonia palustris* belongs oligotips relict genus *Hottonia* that includes more *H. inflata* Elliot. Butorac (1999). In the area of the reserve *Hippuris vulgaris* is in the process of withdrawal and *Hottonia palustris* and *Ranunculus lingua* show a tenddency to spread. By 2005. the largest population among the Zasavica relic species had *Stratiotes aloides*, which was covered with up to 90% of watercourses, and now appears with emerse belt, so that the steady increase in water level former caps (congestion) rivers have disappeared in many parts of Zasavica item. Floating reed islands inhabited by *Urtica kioviensis* Rogow. and *Schoenoplectus triqueter (L.) Palla* for which the Peri Serbian southern border area Branković et al. (1996), while *Achillea asplenifolia* Vent. Pannonian subendemic taxa found on the marshy meadows and are located on the southern border of its area. Soó (1970). Present *U. kioviensis* has riven range in eastern and central Europe with the southern limit of its range in the Pannonian Plain and the possibility of its occurrence in neoendem wetlands Pannonian Plain Branković et al. (1996). The patient was only present in Vojvodina part. This type tends to spread within the reserve. The period of glaciation with its interglacial had significantly poorer flora in relation to the warm Tertiary. By Engler (1905) after the first glaciation there was a steppe interglacial stage, where in Central Europe rather than form a steppe tundra vegetation and some of those plants in the period represented postglacial endemic steppe periods. During the upcoming second glaciation in central and southern part of Europe remained in part as glacial and partly as interglacial species *Ceratophyllum demersum* L.*subsp. demersum* Riparian forests are the habitat of relict species *Thelypteris palustris* Janković et al. (1997). Some species such as *Utricularia vulgaris, Sparganium erectum subsp. erectum,* the species *Myriophyllum spicatum*, which were very present in marsh interglacial flora in Europe, and still are widespread. Four relict species that grow on Zasavica are critically endangered species of flora of Serbia.

Conclusion

In group of biodiversity important plant species there are 23 taxa. According to „ Proclamation & Regulation Act of Strictly Protected and Protected wild plant, animal and fungi species“, 11 species are ranked as strictly protected and 46 as protected. Also, 20 taxa are mentioned in „Preliminary Red List of flora of

Serbia and Montenegro with IUCN 2001 Conservation Statuses" in following categories: two as critically endangered (CR) species, four as endangered (EN) species, five as vulnerable (VU) species, while 9 are with indefinite categories (CR-VU), due to data deficient (DD). Special Nature Reserve „Zasavica" is the only habitat in Serbia for *Aldrovanda vesiculosa* L., which was until 2005. considered as extinct from Serbia. On Appendix I of Convention on the Conservation of European Wildlife and Natural Habitats (Strictly Protected Flora Species) as well as on IPA Criterion A (Anderson, 2002, Anderson et al., 2005), threatened species list are 3 species. One species is protected by CITES Convention. To understand the importance of international protection Zasavica shows and its nominations for the 2005 IPA area as well received as a member of the Federation EUROPARK 2001 and the proclamation of the Ramsar Site in 2009.

Table 1. Plant species significant for biodiversity conservation

	TAXA	Preliminary Red List of flora of Serbia and Montenegro	Strictly protected	IUCN Conservation status	IPA Criterion	Bern Convention
1	*Achillea asplenifolia* Vent.	✓		VU		
2	*Aldrovanda vesiculosa* L.	✓	✓	CR	✓	✓
3	*Arum orientale* Bieb.	✓		VU-NT (DD)		
4	*Callitriche palustris* L.	✓	✓	EN-VU (DD)		
5	*Cyperus glomeratus* L.	✓		NT-LC (DD)		
6	*Dryopteris carthusiana* (Vill.) H. P. Fuchs	✓		VU		
7	*Erysimum cheiranthoides* L.	✓		VU-NT (DD)		
8	*Hesperis sylvestris* Crantz	✓		VU-NT (DD)		
9	*Hippuris vulgaris* L.	✓	✓	EN		
10	*Hottonia palustris* L.	✓	✓	CR		
11	*Leucojum aestivum* L.	✓		VU		
12	*Lindernia palustris Hartm*	✓		EN	✓	✓
13	*Lygia passerina* (L.) Fassano	✓		VU-NT (DD)		
14	*Nuphar lutea* (L.) Sibthorp. & Sm. s*ubsp.lutaea*		✓			
15	*Nymphaea alba* L.		✓			
16	*Ranunculus lingua* L.	✓	✓	EN		
17	*Salvinia natans* (L.) All.				✓	✓
18	*Scirpus triqueter* L.	✓	✓	CR-VU (DD)		
19	*Stratiotes aloides* L.	✓		VU		
20	*Thelypteris palustris (*Schott) *subsp. palustris*,	✓	✓	VU		
21	*Urtica kioviensis* Rogow.	✓	✓	EN		
22	*Utricularia australis* R. Br.	✓		EN-VU (DD)		
23	*Zannichellia palustris* L.		✓	VU-LC (DD)		

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