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CONTRIBUTION TO THE BRYOPHYTE FLORA IN BEECH FORESTS OF VIDLIČ MOUNTAIN (SERBIA)

ABSTRACT: The research was conducted during 2011 and 2012 in Vidlič Mountain in southeastern Serbia. The aim of this research was to determine species composition of mosses and liverworts in beech forests. A total number of 48 taxa (6 liverworts, 42 mosses) was recorded. According to the Red Data Book of European Bryophytes there is one species in rare category. Also, there is one species with *low risk* threat status in Bryophyte Red List of Serbia and Montenegro. This research is a contribution to Serbian bryophyte flora study.

KEYWORDS: mosses, liverworts, Vidlič Mt., *Fagus*, forest, red listed species

INTRODUCTION

Mosses and liverworts are groups of plants with a special role in ecosystem functioning [Hallingbäck and Hodgetts 2000]. In most cases, mosses and liverworts are perennials, growing in almost all habitats, except extremely saline soils and marine ecosystems. There have been several bryophyte checklists for Serbia [Pavletić 1955; Gajić *et al.*, 1991; Sabovljević 2000; Sabovljević and Stevanović 1999; Sabovljević and Natcheva 2006; Sabovljević *et al.*, 2008]. According to the latest checklists published for the Mediterranean [Ros *et al.*, 2007; Ros *et al.*, 2013] there are 119 liverworts and 569 mosses taxa growing in Serbia. Some regions have been studied more intensively, therefore there are no records of bryophytes for certain places. Also, there are surprisingly few studies that deal with bryophyte flora in forest ecosystems in Serbia, despite their important role in forest ecosystems, like in nutrient cy-

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cling [Glime 2007], forest succession, production, herbivory, etc. [Longton 1992]. The bryophyte flora of the Vidlič Mt. has never been surveyed. The nearest region with the data on bryophyte flora western Stara planina Mountain [Papp and Erzberger 2007].

The aim of this study was to determine the species composition and species richness of mosses and liverworts in beech forests in Vidlič Mt. This research is a contribution to the study of Serbian bryophyte flora and flora in general.

The investigated area

Vidlič is a trans-boundary mountain that stretches in Serbia and Bulgaria. In Serbia, Vidlič Mt. is located in southeastern part of the country (Figure 1), near the town of Pirot, between the rivers Nišava and Visočica. The highest peaks are Basarski Kamen, Velika Stena, Golemi Vrh and Smilovski Kamen, with altitudes of 1,377 m, 1,329 m, 1,371 m, and 1,348 m, respectively. Geologically, this is a very diverse area. The Early Paleozoic is represented by crystalline schist, gneiss, amphibolites, phyllite, quartzite, marbles, and slates. The higher mountain peaks are mostly made of Mesozoic limestone [Milovanović 2010].

The study site is located 1,200 m above the sea level in typical beech forest habitats. Beech forests in Vidlič extend to the elevation of 1,000 m. Soil testing in mono-dominant and poly-dominant mountain beech forests showed that in this area beech forests have been dominant for several thousand years [Marković 2013]. The northern part of Vidlič is characterized by the presence of Moesian beech forests, *Fagetum moesiaca montanum* Job. 1953 (non Rudski 1949) forming the old stands dominated by beech (*Fagus moesiaca*), which are in excellent condition.

Climate of this area is transitional humid-continental, between dry climate of Pirot region and humid climate of Stara Planina Mt. [Vidanović 1960]. In the higher parts there is a mountainous climate with short summers and long and cold winters, humid springs, and mild and long autumns [Marković 2013]. Considering that there is no weather station in Vidlič, climate observations can be obtained only from the nearest meteorological station in Pirot. The warmest month is July and the coldest month is January. The average annual temperature is 7.5 °C [Marković 2013]. Precipitation increases with altitude. An average precipitation in Vidlič at the altitude of 1,200 m is 946.5 mm [Marković 2013]. The highest precipitation is in May, June and December [Marković 2013].

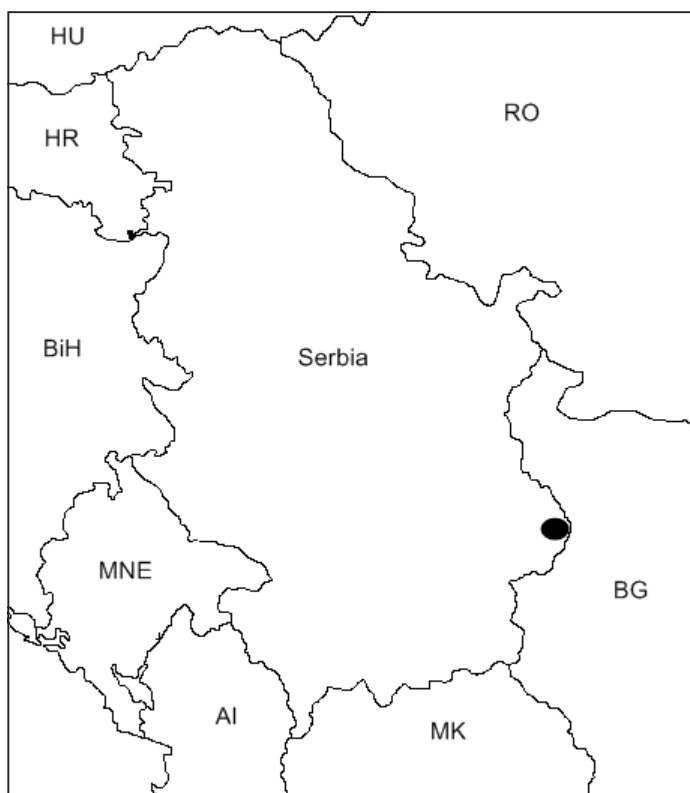


Figure 1. Position of Vidlič Mt. on the map of Serbia (HU – Hungary; RO – Romania; BG – Bulgaria; MK – Macedonia; Al – Albania; MNE – Montenegro; BiH – Bosnia and Herzegovina; HR – Croatia)

MATERIAL AND METHODS

This research was conducted during 2011 and 2012 in beech forest in Vidlič Mt. Specimens were collected along the transect line. The collection of plant material was performed in spring, summer and autumn in order to collect specimens from different parts of life cycle for easier and more accurate determination. Plant material was collected from tree bark, rotting trees, soil, rocks, etc. Specimens are deposited in BUNS (Herbarium of the Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad, Serbia). Species identification was performed with standard identification keys. Species nomenclature follows Hill *et al.* [2006] for mosses, Roskov *et al.* [2014] for liverworts, and for the genus *Metzgeria* nomenclature follows Grolle and Long [2000]. Classification is given according to Goffinet and Buck [2004].

RESULTS AND DISCUSSION

Total number of 48 taxa (6 liverworts, 42 mosses) was recorded.

Divisio Marchantiophyta

1. *Cephalozia* sp.
2. *Lophocolea heterophylla* (Schrad.) Dumort. 1835
3. *Jungermannia* sp.
4. *Marchantia polymorpha* L. 1753
5. *Metzgeria furcata* (L.) Dum. 1829
6. *Plagiochila porelloides* (Torr. ex Nees) Lindenb. 1840

Divisio Bryophyta

7. *Atrichum angustatum* (Brid.) Bruch & Schimp. 1844
8. *Atrichum undulatum* (Hedw.) P. Beauv. 1805
9. *Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen 2002
10. *Brachythecium geheebii* Milde 1869
11. *Brachythecium mildeanum* (Schimp.) Schimp. 1862
12. *Brachythecium rutabulum* (Hedw.) Schimp. 1853
13. *Brachythecium salebrosum* (Hoffm. ex F. Weber & D. Mohr) Schimp. 1853
14. *Ctenidium molluscum* (Hedw.) Mitt. 1869
15. *Dicranum scoparium* Hedwig 1801
16. *Didymodon fallax* (Hedw.) R.H. Zander 1978
17. *Encalypta streptocarpa* Hedw 1801
18. *Encalypta vulgaris* Hedwig 1801
19. *Eurhynchium striatum* (Hedw.) Schimp. 1856
20. *Fissidens taxifolius* Hedwig 1801
21. *Grimmia pulvinata* (Hedw.) Sm. 1807
22. *Homalothecium philippeanum* (Spruce) Schimp. 1851
23. *Hygroamblystegium tenax* (Hedw.) Jennings, 1913
24. *Hygrohypnum luridum* (Hedw.) Jenn. 1913
25. *Hypnum cupressiforme* Hedwig 1801
26. *Hypnum revolutum* (Mitt.) Lindb. 1867
27. *Isopterygiopsis pulchella* (Hedw.) Z. Iwats. 1987
28. *Isothecium alopecuroides* (Lam. ex Dubois) Isov. 1981
29. *Isothecium myosuroides* Brid. 1827
30. *Leptobryum pyriforme* (Hedw.) Wilson, 1855
31. *Leskea polycarpa* Hedwig 1801
32. *Leucodon sciuroides* (Hedw.) Schwägr. 1816
33. *Mnium spinosum* (Voit) Schwägr. 1816
34. *Mnium stellare* Reichard Ex Hedwig 1801
35. *Plagiomnium undulatum* (Hedw.) T.J. Kop. 1968
36. *Platygyrium repens* (Brid.) Schimp. 1851
37. *Polytrichastrum formosum* (Hedw.) G.L. Sm. 1971
38. *Pseudoleskeella catenulata* (Brid. ex Schrad.) Kindb. 1897
39. *Pseudoleskeella nervosa* (Brid.) Nyholm 1969
40. *Pterigynandrum filiforme* Hedwig 1801

41. *Pylaisia polyantha* (Hedw.) Schimp. 1851
42. *Sanionia uncinata* (Hedw.) Loeske 1907
43. *Schistidium* sp.
44. *Sciuro-hypnum starkei* (Brid.) Ignatov & Huttunen 2002 [2003]
45. *Syntrichia montana* Nees 1819
46. *Syntrichia ruralis* Weber & D. Mohr, 1803
47. *Tortella tortuosa* (Hedw.) Limpr. 1890
48. *Tortula subulata* Hedwig 1801

Among the recorded species, there is one species (*Brachythecium geheebii*) listed in Red Data Book of European Bryophytes [ECCB, 1995] in rare (R) category, and one species (*Leptobryum pyriforme*) listed in Bryophyte Red List of Serbia and Montenegro [Sabovljević *et al.*, 2004] in low risk (LR) category. Species *B. geheebii* can be found only at two other localities in Serbia: Šaronje in Golija-Studenica Biosphere Reserve [Papp and Erzberger 2005] and Babin Zub in Stara Planina Mt. [Papp and Erzberger 2007]. It is a sub-continental mountain species [Natcheva 2011] growing on shaded rocks in forests. Species *L. pyriforme* was found on logs in forest. This is a cosmopolitan species [Rykovsky and Maslovsky 2004] and it was recorded in Serbia for the first time in Beočin [Stoizner 1870]. Also, it was found in Kopaonik [Jurišić 1900], Golija-Studenica Biosphere Reserve [Papp and Erzberger 2005], Temska [Papp and Erzberger 2007], and Metode [Ilić 2012].

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ПРИЛОГ ПОЗНАВАЊУ ФЛОРЕ МАХОВИНА У БУКОВИМ ШУМАМА ПЛАНИНЕ ВИДЛИЧ (СРБИЈА)

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РЕЗИМЕ: Флора маховина букових шума планине Видлич истраживана је током 2011. и 2012. године. Циљ истраживања био је сачинити списак врста маховина које расту у буковим шумама планине Видлич. На истраживаном подручју, које је обухватало букове шуме на око 1.200 m надморске висине, пронађено је 48 врста маховина (шест врста јетрењача и 42 врсте маховина). Увидом у Црвену листу флоре маховина Европе, утврђено је да се једна врста налази у категорији „ретке“. Такође, након увида у Црвену листу флоре маховина Србије и Црне Горе, утврђено је да се на истраживаном подручју налази једна врсте која припада „мање угрожене“ категорији.

КЉУЧНЕ РЕЧИ: маховине, јетрењаче, Видлич, *Fagus*, шуме, Црвена листа флоре маховина