

## CONTRIBUTION TO KNOWLEDGE OF THE BRYOPHYTE FLORA OF BAČKA (VOJVODINA, SERBIA)

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**Abstract** - A contribution to knowledge of the poorly known bryophyte flora of Bačka region in Serbia is given in the present paper. The total of bryophyte species recorded in the region is raised from seven to 46. Six nationally threatened and two species threatened on the European level are found in the investigated area.

**Key words:** Bryophytes, flora, red-listed species, Bačka, Vojvodina, Serbia

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### INTRODUCTION

The bryophyte flora of Serbia is generally little known (Sabovljević *et al.*, 2001). The region of Vojvodina is one of less pronounced bryological diversity owing to strong human influence (more than 80% of the area of Vojvodina is under crops) and relatively uniform geomorphology.

Pavlečić (1975) states that the flat northern parts of ex-Yugoslavia (Vojvodina, now in Serbia; and Slavonija, Baranja, and Medjumurje in Croatia) have been very poorly investigated in the bryological sense. Vojvodina consists of three regions: Srem, Banat, and Bačka. There have been some recent contributions for the region of Srem (Večić and Sabovljević, 2005) and Banat (Sabovljević, 2002; 2003), but Bačka remains a region with very sparse data on bryophytes and only seven recorded moss taxa. These are: *Aloina ambigua* (B. & S.) Limpr. (Gallé, 1974); *Aloina rigida* (Hedw.) Limpr. (Gallé, 1974); *Bryum argenteum* Hedw. (Gallé, 1974); *Enthostodon hungaricus* (Boros) Loeske (Boros, 1970; Guelmينو, 1970, 1972); *Hilpertia velenovskyi* (Schiffn.) Zander (Martinić, 1968; Guelmينو, 1972); *Ptygoneurum ovatum* (Hedw.) Dicks (Gallé, 1974); and *Syntrichia caninervis* Mitt (without precise locality, Tóth, 1986). Among them are two mosses of international conservation significance [*Hilpertia velenovskyi* (V = vulnerable) and *Enthostodon hungaricus* (R = rare, ECCB 1995)]. No hepatic species have to date been known to grow in Bačka.

Bačka is a part of the Great Panonian Plain, bounded by the rivers Danube and Tisa and the Serbian-Hungarian border in the north and having no hills, but with two interesting loess plateaus (Titel and Telečka), the later of which is larger. The Titel loess plateau is situated in the SE part of Bačka at the confluence of the Tisa and the Danube. Its slopes are extremely interesting bryologically, while the flat upper part is used agriculturally. We conducted bryological investigation on the Titel loess cliffs and their surroundings (including part of the city of Novi Sad). The results of this investigations are discussed in the present study.

The region has a mild continental and the Pannonian semiarid type (Kojić *et al.* 1999) with hot and dry summers, cold winters, and with very little precipitation. Geologically, the investigated area is loess.

### MATERIALS AND METHODS

Bryophyte material was collected during the period 1996-2001, and the collection is deposited in the BEOU herbarium.

The following localities were investigated (UTM coordinates are given after each locality):

1. Budisava, 34TDR21
2. Gardinovci, 34TDR30
3. Kać, 34TDR11
4. Kovilj, 34TDR20

5. Lok, 34TDR40
6. Mošorin, 34TDR41
7. Novi Sad, 34 TDR01/11
8. Šajkaš, 34TDR41
9. Titel, 34TDR40
10. Vilovo, 34TDR31



Fig. 1. Map of Vojvodina (Serbia) with area of investigated zones presented in blackish.

## RESULTS

List of species collected in Bačka:

Liverworts:

- Frullania dilatata* (L.) Dumort. - loc. 4, 7, 9  
*Pellia neesiana* (Gott.) Limpr. - loc. 9  
*Radula complanata* (L.) Dumort. - loc. 4, 7, 9

Mosses:

- Aloina aloides* (K. F. Schultz) Kindb - loc. 6, 10  
*Aloina ambigua* (B. & S.) Limpr. - loc. 6, 10  
*Aloina rigida* (Hedw.) Limpr. - loc. 6  
*Amblystegium serpens* (Hedw.) B. S. G. - loc. 6  
*Barbula unguiculata* Hedw. - loc. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10  
*Bryum argenteum* Hedw. - loc. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10  
*Bryum caespiticium* Hedw. - loc. 6, 10  
*Bryum capillare* Hedw. - loc. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10  
*Crossidium crassinerve* (De Not.) Jur. - loc. 6  
*Crossidium laxifilamentosum* Fray & Kürschner - loc. 6  
*Crossidium squamiferum* (Viv.) Jur. - loc. 6  
*Didymodon cordatus* Jur. - loc. 6  
*Didymodon insulanus* (De Not.) M. Hill - loc. 6, 10

- Didymodon vinealis* (Brid.) Zander - loc. 6  
*Enthostodon attenuatus* (Dicks.) Bryhn. - loc. 5  
*Eurhynchium praelongum* (Hedw.) B.S.G. - loc. 6  
*Grimmia anodon* Bruch & Schimp. - loc. 6  
*Grimmia orbicularis* Bruch ex Wils. - loc. 10  
*Hilpertia velenovskyi* (Schiffn.) Zamder - loc. 5, 6, 10  
*Homalothecium aureum* (Spruce) H. Rob. - loc. 6  
*Homalothecium lutescens* (Hedw.) H. Rob. - loc. 6  
*Hypnum cupressiforme* Hedw. - loc. 1, 2, 3, 4, 7, 8  
*Leskea polycarpa* Hedw. - loc. 6, 9, 10  
*Orthotrichum affine* Brid. - loc. 9  
*Phacum cuspidatum* Hedw. var. *piliferum* (Hedw.) Hook & Tayl. - loc. 6  
*Pottia caespitosa* (Bruch.) Müll. Hal. - loc. 6  
*Pottia lanceolata* (Hedw.) Müll. Hal. - loc. 6  
*Pseudocrossidium hornschuchianum* (Schultz) R.H. Zander - loc. 6, 10  
*Pseudocrossidium revolutum* (Brid.) R. H. Zander - loc. 6  
*Pterygoneurum lamellatum* (Lindb.) Jur. - loc. 6  
*Pterygoneurum ovatum* (Hedw.) Dixon - loc. 6  
*Pterygoneurum subsessile* (Brid.) Jur. - loc. 6  
*Syntrichia laevipila* Brid. - loc. 9  
*Syntrichia papillosa* (Wils.) Jur. - loc. 9  
*Syntrichia ruraliformis* (Besch.) Cardot - loc. 6  
*Syntrichia ruralis* (Hedw.) Web. & D. Mohr. - loc. 6  
*Tortula atrovirens* var. *gasilenii* (Venturi) Limpr. - loc. 6  
*Tortula muralis* Hedw. - loc. 6, 7  
*Trichostomum brachydontium* Bruch - loc. 6  
*Trichostomum crispulum* Bruch - loc. 6, 10  
*Weissia controversa* Hedw. - loc. 6

## DISCUSSION

This contribution gives 39 new records for the region of Bačka in Vojvodina (Serbia). Three liverworts (two leafy and one thallose) are recorded for the first time in Bačka. *Enthostodon hungaricus* and *Syntrichia caninervis* are not new recorded in the investigated area. The other five moss species previously known for Bačka are again reported. The specific ecology and unique position of the loess cliffs enable them to retain a very interesting moss flora that deserves special attention on account of its xerophytic, phytogeographic, and cenotic characteristics as well as the life strategy of its members. Some of these aspects have already been discussed in greater detail elsewhere (P ó c s, 1999; P ó c s *et al.*, 2004; S a b o v l j e v i ć, 2004a). An interesting disjunction with the dry moss flora of SE Spain is found (P ó c s

*et al.*, 2004; Sabovljević, 2004b). To judge from the national bryophyte red list (Sabovljević *et al.*, 2004), sites on the Titel plateau are of high conservation value. Six nationally and two internationally threatened species are found growing in the investigated area. These are: *Pterygoneurum lamellatum* (CR – critically endangered); *Hilpertia velenovskyi* (EN – endangered); *Pterygoneurum ovatum* (VU – vulnerable); and *Syntrichia pillosa*, *Crossidium crassinerve* and *Crossidium laxefilamentosum* (all species threatened but of LR – lower risk).

## REFERENCES

- Boros, A. (1970). Présence de *Funaria hungarica* Boros en Yougoslavie. *Revue Bryologique et Lichénologique* **37**, 28.
- Cvetić, T. and Sabovljević, M. (2005). A contribution to the bryophyte flora of Fruška Gora (Vojvodina, Serbia). *Phytologia balcanica* **11** (1), 35-43.
- ECCB, the European Committee for Conservation of Bryophytes, (1995). *Red Data Book of European Bryophytes*. Trondheim, 1-291.
- Gallé, L. (1974). Lichenológiai adatok a Jugosláviai vajdaság területéről. (Lichenologische Angaben vom Gebiet der Woiwodina (Jugoslawien). *Botanikai Közlemények* **61** (1), 37-41.
- Guelmino, J. (1970). Prva nalazišta mahovine *Funaria hungarica* Boros u Jugoslaviji. *Zbornik za prirodne nauke Matice Srpske* **40**, 176-178.
- Guelmino, J. (1972). Nova nalazišta dve malo poznate mahovine kod nas u Jugoslaviji (*Funaria hungarica* Boros i *Tortula velenovskyi* Schiffner). *Zbornik za prirodne nauke Matice Srpske* **42**, 106-109.
- Kojić, M., Mihajlov, M., Kišgeci, J. and Cvetković, M. (1999). *Likovite biljke Vojvodine*. Biografika, Subotica. 1-342.
- Martinčič, A. (1968). *Catalogus Florae Jugoslaviae*. Ljubljana. 1-102.
- Pavletić, Z. (1975). On the investigation of mosses in Yugoslavia. *Problems of the Balkan Flora and Vegetation Proceedings*: 132-135, Sofia.
- Pócs, T. (1999). A löszfalak virágtalan növényzete. I. Orografikus sivatag a Kárpátmedencében. Studies on the cryptogamic vegetation of loess cliffs. I. Orographic desert in the Carpathian Basin. *Ki-taibelia* **4**, 143-156.
- Pócs, T., Sabovljević, M., Puche, F., Segarra Moragues, J.G., Gimeno, C. and Kürschner, H. (2004). *Crossidium laxefilamentosum* Frey and Kürschner (*Pottiaceae*), new to Europe and to North Africa. Studies on the cryptogamic vegetation on loess cliffs, VII. *Journal of Bryology* **26**, 113-124.
- Sabovljević, M. (2002). Bryophytes of South Banat (Vojvodina, Serbia). *Bulletin of the Bryological Society* **79**, 37 – 38.
- Sabovljević, M. (2003). Bryophyte flora of South Banat. (Vojvodina, Yugoslavia) *Cryptogamie, Bryologie* **24** (3), 241 – 252.
- Sabovljević, M. (2004a). Life strategies of bryophytes on loess cliffs in Vojvodina (Serbia). *Archives of Biological Sciences* **56** (3-4), 127-130.
- Sabovljević, M. (2004b). Comparison of the bryophyte flora of the three Southern European mainlands: the Iberian, the Apennine, and the Balkan Peninsulas. *Braun-Blanquetia* **34**, 21- 28.
- Sabovljević, M., Ganeva, A., Tsakiri, E. and Štefanuț, S. (2001). Bryology and bryophyte protection in southeastern Europe. *Biological Conservation* **101**, 73 - 84.
- Sabovljević, M., Cvetić, T. and Stevanović, V. (2004). Bryophyte Red List of Serbia and Montenegro. *Biodiversity and Conservation* **13**, 1781-1790.
- Tóth, Z. (1986). A *Tortula* Hedw. sect. *rurales* De Not (Musci, Pottiaceae) redsertani reviziója és eleterjedése a Kárpátmedencében. *Abstracta Botanica* **10**, 145-185.

## ПРИЛОГ ПОЗНАВАЊУ ФЛОРЕ БРИОФИТА БАЧКЕ (ВОЈВОДИНА, СРБИЈА)

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У раду је дат прилог познавању бриофлоре Бачке (Србија). Број врста бриофита забележених у Бачкој је

46. Чак 39 врста је забележено по први пут за територију одакле је раније било познато свега 7 врста махо-

вина. Три јетрењаче су по први пут констатоване за територију Бачке. Међу забележеним врстама је и 6 ретких и угрожених врста (било на националном или међународном нивоу).

То су: *Pterygoneurum lamellatum*, *Hilpertia velenovskyi*, *Pterygoneurum ovatum*, *Syntrichia papillosa*, *Crossidium crassinerve* и *Crossidium laxifilamentosum*. Лесни одсеци тителског платоа су значајна станишта ових врста, те њихови потенцијални микрорезервати.