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Research article

## BRYOFLORESTICAL DATA FROM THE GUTĂI MOUNTAINS (ROMANIAN EASTERN CARPATHIAN, TRANSYLVANIA)

*Andrea Sass-Gyarmati*

*Eszterházy Károly University, Institute of Biology, Department of  
Botany and Plant Physiology; Eger, Pf. 43, H-3301 Hungary;  
E-mail: sassgyarmati@gmail.com*

**Abstract:** The main aim of this study was to explore the bryophyte diversity and distribution patterns in the Gutăi Mountains. From our collections hitherto 52 bryophyte species were identified. The 12 Marchantiophyta and 40 Bryophyta species belong to 45 genera of 27 families. *Nardia scalaris* is new for the whole Gutăi Mountains. Among them the vulnerable *Grimmia muehlenbeckii* and the very rare *Riccardia palmata* are worth to be mentioned.

**Keywords:** bryoflora, rare species, Gutăi Mountains, Romania

**Rezumat:** Lucrarea prezintă distribuția speciilor de briofite din arealul Munților Gutăi. Din colecția recentă au fost identificate 52 specii de briofite. Cele 12 specii de Marchantiophyta și 40 de specii de Bryophyta aparțin la 45 de genuri și 27 de familii. *Nardia scalaris* este o semnalare nouă pentru Munții Gutăi. *Grimmia muehlenbeckii* este o specie vulnerabilă, iar *Riccardia palmata* este rară, ambele meritând a fi menționate.

**Cuvinte cheie:** brioflora, specii rare, munții Gutăi, Gutin, România

### INTRODUCTION

First bryological records of the Gutăi (Gutin) Mountains were published at the end of XIX<sup>th</sup> century (Juratzka 1882) and the investigations continues in the XX<sup>th</sup> century, which till now is far from complete (Pop 1942; Boros 1943, 1951; Boros and Vajda 1967; Rațiu and Moldovan 1972a, 1972b, 1974; Ștefureac 1974, 1976–1977; Mititelu and Dorca 1983; Coldea and Plămadă 1989). A very detailed floristical and vegetational study is given by Moldovan (1970) and one study was published on saxicolous

lichens from the Gutâi Mountains (Codoreanu 1972). Tamás Pócs with his wife visited and collected in the area during the summer of 1993.

Much less bryological investigations has been done in the past twenty years completing with additional floristical data (Jakab 1999, Ardelean *et al.* 2008). We started our work in 2018 and our aim is to continue bryological exploration of this area.

### **Study area**

The Gutâi Mountains are a mountain range within the Vihorlat – Gutâi area of the inner Eastern Carpathians. Igriş and Gutâi mountains are situated at the western and southern limit of Maramureş Land, they are the oldest sector of the volcanic range in Eastern Carpathians. Separated by mountain passes from the neighbouring units (Huta 587 m, Gutâi 984 m, Neteda 1039 m) they are two separate units distinguished by geoforms originating from different types of volcanic activity: Ignis mountains as andesitic plateau, mostly stratified, with small depressions, an end cliff and residual forms, named rocks (Piatra Săpânţei, Piatra Goală, Piatra Rea etc); Gutâi Mountains with pyroxene andesite, mostly vertical columns with a controversial neck – Creasta Cocoşului and cone shaped summits (*Figure 1*). On the northern limit of the mountains, a piedmont range forms contact with the Maramureş lowland, often associated with the mountain range due to the position of the settlements around the massifs (Ilies *et al.* 2017). The Gutâi Mountains have several higher regions: Gutâiul Mare (1443 m), Creasta Cocoşului (1395 m), Trei Apostoli (1398 m), Gutâiul Doamnei (1426 m) and Secătura (1390 m). Creasta Cocoşului is a protected area of national interest and is included in the Gutâi-Creasta Cocoşului Natura-2000 site it is a ridge formation about 200 metres in length and located at an average altitude of 1200 metres, surrounded by mixed forests, large beechwood and spruce areas, the peat bog at Tăul Chendroaiei (Chendroaia's Pond), juniper areas and mountain pastures. The climate of the SE Carpathians is colder and more continental than that of the NW Carpathians (Hajdú-Moharos 1996). The Firiza Lake was established in 1964, when 52 m high dam gates were closed to stem the Firiza water tributary of the Sasar at Baia Mare. The lake has a length of 3 km and a width of 1 km. Built for the Baia Mare city water supply, now the Firiza Lake is used for recreational and

leisure and is one of the favorite places of population in Baia Mare, the landscape is particularly special, with coniferous and deciduous forest around.



**Figure 1.** View from the Creasta Cocoşului summit (Photo: Róbert Sass-Gyarmati).

## MATERIAL AND METHODS

The byophytes enumerated below were collected from the Gutâi Mountains between 8-9 August 2018 by Andrea and Róbert Sass-Gyarmati and identified by Andrea Sass-Gyarmati and the species *Grimmia muehlenbeckii* identified by Peter Erzberger. The collection was made in various vegetation types: meadows, beech and spruce forests and subalpine belts. The Romanian distribution of mosses was established from Plămadă (1998) and Mohan (1998), while that of the liverworts from Ştefănuţ (2008). The nomenclature of liverworts follows Ştefănuţ (2008) modified by Söderström *et al.* (2016), nomenclature of mosses follows Hill *et al.* (2006), except *Racomitrium affine* which was recently included to *Bucklandiella* (F. Weber & D. Mohr) Bednarek-Ochyra & Ochyra (Ochyra *et al.* 2003). and *Racomitrium aquaticum* also recently included to *Codriophorus* (Brid. ex Schrad.) Bedn.-Ochyra & Ochyra,

Bednarek-Ochyra (2006). The classification of liverworts (Marchantiophyta) follows Söderström *et al.* (2016), while the classification of mosses (Bryophyta) follows Goffinet and Shaw (2009). The species in each family are arranged in alphabetical order. Species names are followed by the collecting site number, and by the substrate on which they were grown. The collected specimens are deposited in the Herbarium of Eger (EGR). The collecting sites are listed in the Appendix.

## RESULTS

### List of species

During the field study 52 bryophyte species were found in the investigated area. The 12 Marchantiophyta and 40 Bryophyta species belong to 45 genera of 27 families.

#### Marchantiophyta

##### Conocephalaceae

*Conocephalum conicum* (L.) Dumort. – 4: on irrigated rocks

##### Marchantiaceae

*Marchantia polymorpha* L. – 4: on irrigated rocks

##### Aneuraceae

*Riccardia palmata* (Hedw.) Carruth – 4: on decaying wood

##### Lophoziaceae

*Lophozia ventricosa* (Dicks.) Dum. – on decaying wood

##### Scapaniaceae

*Diplophyllum albicans* (L.) Dumort. – 5: on soil covered rocks

*Scapania undulata* (L.) Dumort. – 4: on irrigated volcanic rocks

##### Gymnomitriaceae

*Nardia scalaris* Gray – 5: on soil. It was collected also by S. & T. Pócs in 1993 (unpublished).

*Marsipella emarginata* (Ehrh.) Dumort. – 5: on soil

##### Radulaceae

*Radula complanata* (L.) Dumort. – 1, 4: bark of *Fagus*

Lophocoleaceae

*Chiloscyphus polyanthos* (L.) Corda – 4: on irrigated volcanic rocks

*Lophocolea heterophylla* (Schrad.) Dumort. – 1: on decaying wood

Plagiochilaceae

*Plagiochila porelloides* (Torrey, ex Nees) Lindenb. – 4: on soil

**Bryophyta**

Andreaeaceae

*Andreaea rupestris* Hedw. – 6: on volcanic rocks

Tetraphidaceae

*Tetraphis pellucida* Hedw. – 6: on decaying wood

Polytrichaceae

*Atrichum undulatum* (Hedw.) P. Beauv. – 1, 4: on soil

*Oligotrichum hercynicum* (Hedw.) Lam. & DC. – 3: on soil

*Pogonatum urnigerum* (Hedw.) P. Beauv. – 3: on soil

*Polytrichastrum alpinum* (Hedw.) G. L. Sm. – 5: on soil

*Polytrichastrum formosum* (Hedw.) G. L. Sm. – 2, 4: on soil

*Polytrichum juniperinum* Hedw. – 6: on rocks

Encalyptaceae

*Encalypta streptocarpa* Hedw. – 5: on soil

Grimmiaceae

*Grimmia muehlenbeckii* Schimp. – 6: on rocks

*Codriophorus aquaticus* (Brid.) Bednarek-Ochyra & Ochyra. Syn.:

*Racomitrium aquaticum* (Hedw.) Brid. – 4: on rocks

*Bucklandiella affinis* (F. Weber & D. Mohr) Bednarek-Ochyra & Ochyra. Syn.: *Racomitrium affine* (F. Weber et D. Mohr) Lindb. – 6: on soil

Ditrichaceae

*Ceratodon purpureus* (Hedw.) – 1: on disturbed soil

Dicranaceae

*Dicranella heteromalla* (Hedw.) Schimp. – 2, 5: on decaying wood

*Dicranoweisia crispula* (Hedw.) Milde – 4, 6: on volcanic rocks

***Dicranum flagellare*** Hedw. – 4: base of *Fagus*

***Dicranum scoparium*** Hedw. – 1: base of *Carpinus*

***Paraleucobryum longifolium*** (Hedw.) Loeske – 4: on soil covered rocks, 6: on rocks

Pottiaceae

***Bryoerythrophyllum recurvirostrum*** (Hedw.) P. C. Chen – 5: on soil covered rocks

***Didymodon fallax*** (Hedw.) R. H. Zander – 5: on soil

***Gymnostomum calcareum*** Nees & Hornsch. – 6: on vertical cliff

Bryaceae

***Bryum pseudotriquetrum*** (Hedw.) P. Gaertn. – 3: on irrigated rocks

Mniaceae

***Plagiomnium undulatum*** (Hedw.) T. J. Kop. – 4: on soil covered rocks

***Rhizomnium punctatum*** (Hedw.) T. J. Kop. – 2, 4: on soil

Leskeaceae

***Leskea polycarpa*** Hedw. – 4: on bark

***Pseudoleskeella nervosa*** (Brid.) Nyholm – 4: on bark

Amblystegiaceae

***Amblystegium serpens*** (Hedw.) Schimp. – 2, 4: on tree base

***Amblystegium subtile*** (Hedw.) Schimp. – 2: on tree base

***Sanionia uncinata*** (Hedw.) Loeske – 4: on tree base

Hylocomiaceae

***Pleurozium schreberi*** (Willd. ex Brid.) Mitt. – 13: on soil

Pterigynandraceae

***Pterigynandrum filiforme*** Hedw. – 4: on *Fagus* bark

Thuidiaceae

***Abietinella abietina*** (Hedw.) M. Fleisch. – 1: on soil

Brachytheciaceae

***Brachythecium rutabulum*** (Hedw.) Schimp. – 1: on soil

***Brachythecium rivulare*** Schimp. – 2: on wet soil

***Brachythecium salebrosum*** (Hoffm. ex F. Weber et D. Mohr.)

Schimp. – 1,4: on soil

Plagiotheciaceae

***Plagiothecium denticulatum*** (Hedw.) Schimp. – 1: on tree base

***Plagiothecium laetum*** Schimp. – 4: on tree base

Hypnaceae

***Ctenidium molluscum*** (Hedw.) Mitt. – 4, 5: on rocks

***Hypnum cupressiforme*** Hedw. – 1: on rocks

Lembophyllaceae

***Isothecium myosuroides*** Brid. – 1: on tree base

## DISCUSSION

The results of this study contributes to the knowledge of the biodiversity in Gutâi Mountains. The main reason for relatively high biodiversity is the variety of habitat types that can be found in this area.

***Nardia scalaris*** Gray – circumboreal, mountain taxon it is not known from the Gutâi Mountains. Based on Mohan checklist occurs in Maramureşului Mountains: Vl. Jâjla, Turcul and several localities from the romanian Carpathians: Iezer Păpuşa Mountains, Bihor Mountains, Bucegi Mountains, Retezat Mountains, Cibinului Mountains and Mlaştina turbăria Criştişor.

***Riccardia palmata*** (Hedw.) Carruth. – circumboreal, mountain species, it is reported only from one locality from Gutâi Mountains: Cheile Tătaru at Mara (Boros and Vajda 1967). Other reports from surroundings are from Borşa, Secului Valley, Sighet, Poiana Şarampoiului Forest, Mara, Runc Valley, Puzdra Mountain, (Boros and Vajda, 1967); between Tocila Valley and Băiuţ (Jakab 1999), well distributed in the Romanian Carpathians (Mohan 1998).

***Grimmia muehlenbeckii*** Schimp. – is treated as vulnerable (VU) in Romania (Ştefănuţ and Goia 2012), it is known just from few localities in the country: jud. Alba: Vl. Galbina, Mtele Găina; jud. Gorj: Mţii Parâng; pasul Surduc; jud. Harghita: Munţii Hargita; jud. Hunedoara: Deva; jud. Maramureş: Muntele Pietrosul Rodnei; jud.

Suceava: Mtele Ceardac. (Mohan 1998). These findings should enhance the knowledge of bryoflora, the results emphasizes the importance of further research in this highly valuable area.

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## REFERENCES

- ARDELEAN, A., KARACSONYI, C. & MOHAN, G. (2008). Studiul briofitelor din unele mlaștini din nord-vestul țării. *Analele Grădinii Botanice Universitare Macea* **2**: 7–15.
- BEDNAREK-OCHYRA, H. (2006). *A taxonomic monograph of the moss genus Codriophorus P. Beauv. (Grimmiaceae)*. Polish Academy of Sciences, Institute of Botany, Krakow, 276 pp.
- BOROS, Á. (1943). A Lápos és a Kapnik szurdokának flórája. *Scripta Botanica Musei Transilvanici* **2**: 141–149.
- BOROS, Á. (1951). Bryologische Beiträge zur Kenntnis der Flora von Ungarn und der Karpaten. *Acta Biologica Academiae Scientiarum Hungaricae* **2**(1-3): 369–409.
- BOROS, Á. & VAJDA, L. (1967). Bryologische Beiträge zur Kenntnis der Flora Transilvaniens. *Revue Bryologique et Lichénologique* **35**(1-4): 216–253.
- CODOREANU, V. (1972). Flora și vegetația lichenologică saxicolă de la Cheile Tătarului (Maramureș). *Contribuții Botanice*, Cluj-Napoca, 123–132.
- COLDEA, GH. & PLĂMADĂ, E. (1989). Vegetația mlaștinilor oligotrofe din Carpații românești (Cl. Oxycocco-Sphagnetes Br.-Bl. et Tx. 1943). *Contribuții Botanice*, Cluj-Napoca **29**: 37–43.
- GOFFINET, B. & SHAW, A.J. (eds.) (2009). *Bryophyte biology*. Cambridge University Press, Cambridge, 565 pp.
- HAJDÚ-MOHAROS, J. (1996). Az Északkeleti-Kárpátok. [The SE Carpathians.]. In: KARÁTSON D. (ed.): *Pannon Enciklopédia-Magyarország Földje. (Kitekintéssel a Kárpát-medence egészére)*. Keretek 2000 Kiadó, Budapest, pp. 371–373.
- HILL, M.O., BELL, N., BRUGGEMAN-NANNENGA, M.A., BRUGUÉS, M., CANO, M.J., ENROTH, J., FLATBERG, K.I., FRAHM, J.-P., GALLEGO, M.T., GARILLETI, R., GUERRA, J., HEDENÁS, L., HOLYOAK, D.T., HYVÖNEN, J., IGNATOV, M.S., LARA, F., MAZIMPAKA, V., MUÑOZ, J. & SÖDERSTRÖM, L. (2006). An annotated checklist of the mosses of Europe and Macaronesia. *Journal of Bryology* **28**: 198–267.  
<https://doi.org/10.1179/174328206x119998>
- ILIES, M., ILIES, G., HOTEA, M. & WEND, J.A. (2017). Geomorphic attributes involved in sustainable ecosystem management scenarios for the Igriș-Gutâi Mountains Romania. *Journal of Environmental Biology* **38**: 1121–1127.  
[http://doi.org/10.22438/jeb/38/5\(S1\)/GM-32](http://doi.org/10.22438/jeb/38/5(S1)/GM-32)



- JAKAB, G. (1999). Contributions to the knowledge of the bryophyte flora of the SE Carpathians (Romania). *Studia Botanica Hungarica* **29**: 49–57.
- JURATZKA, J. (1882). Die Laubmoosflora von Oesterreich-Ungarn. Handschriftlicher Nachlass Jakob Juratzka's zusammengestellt von J. Breidler und J. B. Förster. *K. k. zoologisch-botanischen Gesellschaft in Wien* 385 pp.
- MITITELU, D. & DORCA, M. (1983). Flora și vegetația a două rezervații botanice din Maramureș: "Lacul Morărenilor" și "Tăul de sub Gutii". *Analele științifice ale Universității "Al. I. Cuza" din Iași* **39**(2): 27–28.
- MOHAN, G. (1998). Catalogul briofitelor din România. *Acta Botanica Horti Bucurestiensis*. Ed. Univ. București, 432 pp.
- MOLDOVAN, I. (1970). *Flora și vegetația Muntelui Gutâi*. Universitatea „Babeș-Bolyai”, Teza de doctorat, Cluj Napoca.
- OCHYRA, R., ZARNOWIEC J. & BEDNAREK-OCHYRA H. (2003). Census Catalogue of Polish Mosses. Polish Academy of Sciences, Krakow, 372 pp.
- PLĂMADĂ, E. (1998). Flora briologică a României, Clasa Musci. Vol. I. Fasc. I. Sphagnales – Andreaeales – Tetraphidales – Buxbaumiales – Schistostegales – Polytrichales – Fissidentales – Archidiales – Seligeriales. Cluj-Napoca: Presa Universitară Clujană, 230 pp.
- POP, E. (1942). Contribuții la istoria pădurilor din nordul Transilvaniei. *Buletinul Grădinii Botanice Cluj* **22**(1-4): 101–177.
- RĂȚIU, O. & MOLDOVAN, I. (1972a). Considerații cenologice asupra vegetației mlaștinei Izvoarele (platoul vulcanic Gutâi-Oaș). *Contribuții Botanice*, Cluj **12**: 149–159.
- RĂȚIU, O. & MOLDOVAN I. (1972b). Vegetația cheilor Tătarului (munții Gutiiului). *Studia Univ Babeș-Bolyai, Seria Biol.*, Cluj (1): 3–9.
- RĂȚIU, O. & MOLDOVAN, I. (1974). Considerații cenologice asupra vegetației muntelui Igniș. *Contribuții Botanice*, Cluj **14**: 85–94.
- SÖDERSTRÖM, L., HAGBORG, A., VON KONRAT, M., BARTHLOMEW-BEGAN, S., BELL, D., BRISCOE, L., BROWN, E., CARGILL, D.C., COSTA, D.P., CRANDALL-STOTLER, B.J., COOPER, E.D., DAUPHIN, G., ENGEL, J.J., FELDBERG, K., GLENNY, D., GRADSTEIN, S.R., HE, X., HEINRICH, J., HENTSCHEL, J., ILKIU-BORGES, A.L., KATAGIRI, T., KONSTANTINOVA, N.A., LARRAÍN, J., LONG, D.G., NEBEL, M., PÓCS, T., PUCHE, F., REINER-DREHWALD, E., RENNER, M.A.M., SASS-GYARMATI, A., SCHÄFER-VERWIMP, A., MORAGUES, J.G.S., STOTLER, R.E., SUKKHARAK, P., THIERS, B.M., URIBE, J., VÁÑA, J., VILLARREAL, J.C., WIGGINTON, M., ZHANG, L. & ZHU, R.-L. (2016). World checklist of hornworts and liverworts. *PhytoKeys* **59**: 1–828. <https://doi.org/10.3897/phytokeys.59.6261>
- ȘTEFĂNUȚ, S. (2008). The Hornwort and Liverwort Atlas of Romania. Edit. Ars Docendi – Universitatea din București, București, 510 pp.
- ȘTEFĂNUȚ, S. & GOIA I. (2012). Checklist and Red List of Bryophytes of Romania. *Nova Hedwigia* **95**(1-2): 59–104. <https://doi.org/10.1127/0029-5035/2012/0044>
- ȘTEFUREAC, T. (1974). Semnificația unor noi și valoroase briofite și angiosperme în rezervațiile naturale din județul Suceava și din unele ținuturi învecinate. *Studii și Cercetări Biologice* **26**(3): 165–170.
- ȘTEFUREAC, T. (1976–1977). Noi contribuții la ecologia și corologia sfagnaceelor din România. *Studii și Comunicări*, Bacău 97–112.

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## APPENDIX

List of collecting sites from the Gutâi Mts:

1. Munții Gutâi (Gutin hegység), Maramureș County. Firiza Lake above Firiza village in acidophyllous *Fagus-Carpinus* forest at 5-600 m alt. 47°43'30.95"N, 23°35'54.45"E. Date: 08. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1801
2. Munții Gutâi (Gutin hegység), Maramureș County. Gutin Pas (Pasul Gutâi). Acidophyllous beech forest (*Luzulo-Fagetum*) at 980 m alt. N47°42'0.02", E23°47'33.77". Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1802
3. Munții Gutâi (Gutin hegység), Maramureș County. Spring bogs Poiana Boului (Ökörmező), NE from Baia Sprie (Felsőbánya), at 1055 m alt. N47°41'49.37", E23°48'13.03". Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1803
4. Munții Gutâi (Gutin hegység), Maramureș County. Subalpine beech forest below the forest line along the path to Creasta Cocoșului Peak summit between 1100-1200 m alt. N 47°42'14.42", E 23°50'28.66". Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1804
5. Munții Gutâi (Gutin hegység), Maramureș County. Subalpine *Vaccinium* dwarf bush on the Creasta Cocoșului (Kakastaréj) summit at 1400-1420 m alt. N47°42'14.22", E 23°50'30.55". Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1805
6. Munții Gutâi (Gutin hegység), Maramureș County. Volcanic rocks above forest line near Creasta Cocoșului (Kakastaréj) crest at 1400 m alt. N47°42'14.55", E23°50'30.53" Date: 09. Aug. 2018. Coll.: A. & R. Sass-Gyarmati No. 1806