Contribuţii Botanice – 2018, LIII: 35-48 DOI: 10.24193/Contrib.Bot.53.4
Grădina Botanică "Alexandru Borza"
Cluj-Napoca

STUDIES ON PLANT COMMUNITIES IN TĂUL OBCIOAREI PEAT BOG – MARAMUREȘ MOUNTAINS

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Abstract: The paper presents a vegetation survey of a peat bog - Tăul Obcioarei, located in the north of Romania, in Moisei (Maramureș county), on the Obcioara Hill, at about 1050 m.a.s.l., in an inhabited area. The research was conducted during the period 2011-2012. The studied area is dominated by *Eriophoro vaginati-Sphagnetum recurvi* Hueck 1925 and *Sphagnetum magellanici* (Malcuit 1929) Kästner et Flößner 1933, covering about 70% of the peat bog. The *Molinietum caeruleae* W. Koch 1926 and *Scirpetum sylvatici* Ralski 1931, Maloch 1935 em. Schwick 1944 phytocoenoses develop at the eastern, southern and western limit of the peat bog. *Eriophoro vaginati-Sphagnetum recurvi* hosts the critically endangered species *Cephaloziella spinigera* and *Sphagnum papillosum,* both recorded for the second time from Romania. All the associations presented in the paper are documented by phytosociological tables, being accompanied by coenotaxonomic, phytogeographical, ecological analyses, with a view to evaluating their conservation status as the principal instrument in management decision making.

According to the Habitats Directive, habitat 7110* – Active raised bogs – is well developed, surrounded by habitat 6410 – *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), and habitat 6430 – Hydrophylous tall herb fringe communities of plains and of the montane to alpine level. The conservation status is unfavorable-inadequate for habitat 7110* and unfavoranle bad for the other two habitats, but changes in temperature and the precipitation amount and distribution, as well as occasional throwing of household waste into the water contribute to damaging these habitats.

Keywords: Romania, Tăul Obcioarei, peat bog vegetation, red listed species, habitats, conservation status

Introduction

Peat bogs are present in Romania in small areas, especially in the upper mountain belt [14]. They preserve the greatest number of glacial relicts in Romania and are a real phytohistorical archive. In this regard, sporopollinic analyses of a series of peat bogs, including Tăul Obcioarei [20, 3], demonstrate a later beech tree colonization compared to Central Europe, the beech trees colonizing the South-Eastern Carpathians coming from the areas north of the Danube through the Sloveno-Croato-Serbian mountainous passage, while the northern area was colonized with beech later.

The insular nature and the small surface area of peatlands are suitable arguments for focused efforts in order to preserve these habitats, the hosted species implicitly, and local paleobotanical heritage.

Although palynological studies have been conducted, but the vegetation of this peat bog

has not been so far studied.

In this study, we aimed to investigate the vegetation of this peat bog, to assess the quality of its habitats, to identify the main impact factors affecting the structure of these habitats.

Tăul Obcioarei peat bog is located in the north of Romania, in Moisei (Maramureș county), 7 km north of the road that traverses Moisei village, in an inhabited area. Geomorphologically, it belongs to the Obcioara Hill, about 1050 m.a.s.l. Since 2005, this area has been part of the Maramureș Mountains Nature Park [27]. Starting with 2007, ROSCI0124 Maramureș Mountains was created, which overlaps the area of the park and implicitly, of the studied peat bog [26]. According to the zoning included in the management plan, Tăul Obcioarei is integrated into the sustainable development area.

The peat bog area has a surface area of about 1.4 ha (Fig. 1), and the peat layer is about 7 m (60,000 m^2) deep [20]. On the eastern side, there are two small ponds [19].

From a geological point of view, the studied area can be characterized as belonging to the Transcarpathian or Pannonian Maramureş domain, well represented in two gulfs with paleogenic-neogenic deposits (Ruscova and Borşa) and on the south-western edge of the Maramureş crystalline massif.

The Maramureş Mountains are characterized by a moderate continental climate, being permanently subjected to the influence of the advection of western oceanic air masses, whose characteristics are reflected in the evolution of all climatic elements [26].

The mean annual precipitation is 900-1000 mm, and the mean annual temperature is 7°C [28].

Of the main groups of soils, acid brown soils occupy large areas; being poor in nutritive substances, they generate low natural fertility [26].

Material and Methods

The surveys were mainly conducted in Tăul Obcioarei peat bog between 2011-2012.

Thirty relevés were sampled according to the Braun-Blanquet method. The area of the samples was related to the size of the phytocoenoses, ranging from 16 m^2 to 40 m^2. Identification of plant communities was based on the diagnostic species, also taking into account the presence of the dominant species. The coenotaxonomic conspectus followed Coldea, 1991; Coldea et al., 1997.

Habitat identification was based on the characteristic phytocoenotaxa (associations, alliances, orders), as stated by the Romanian manual of habitats [9], in accordance with the European Union's Habitat Directive 92/43/EEC.

The vascular flora nomenclature is in accordance with *Flora Europaea* [25] and with some Romanian field identification books [22]. For bryophytes, the nomenclature follows Grolle and Long (2000) for liverworts and Hill et al. (2006) for mosses. The values of ecological indices were established using Sârbu et al. (2013) for vascular flora and Düll (1992b) for bryophytes. The phytogeographical analysis was performed based on the phytogeographical elements proposed by Popescu and Sanda (1998) for cormophytes and Düll (1984, 1985, 1992a) for bryophytes.

The dendrogram (with the constrained UPGMA algorithm and Bray-Curtis quantitative index) and ordination (NMDS) were performed using the PAST 3.17 program [12].

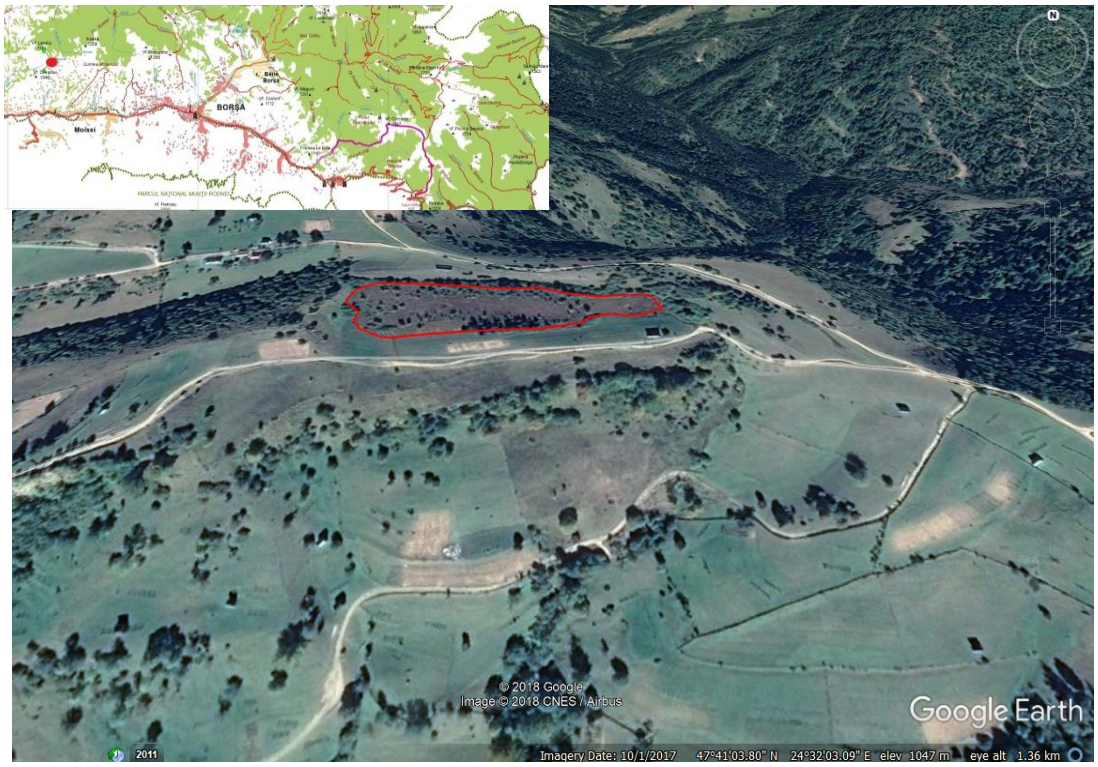

Fig. 1: Tăul Obcioarei located on the Obcioara Hill (from Google Earth & Mureșan et al., 2009, modified)

Results

Based on floristic composition, the identified phytocoenoses were assigned to four associations, belonging to 2 vegetation classes, 2 orders and 3 alliances.

Cl. Oxycocco-Sphagnetea Br. – Bl. Tx. 1943
Ord. Sphagnetalia magellanici (Pawl. 1928) Moore (1964) 1968
All. Sphagnion magellanici Kastner et Flossner 1933
Ass. *Sphagnetum magellanici* (Malcuit 1929) Kastner et Flossner 1933
Ass. *Eriophoro vaginati- Sphagnetum recurvi* Hueck 1925
Cl. Molinio-Arrhenatheretea Tx. 1937
Ord. Molinietalia caeruleae W. Koch 1926
All. Calthion palustris Tx. 1937
Ass. *Scirpetum sylvatici* Maloch 1935 em. Schwich. 1944
All. Molinion caeruleae W. Koch 1926
Ass. *Molinietum caeruleae* W. Koch 1926

Tăul Obcioarei develops from east to west, the central area being dominated by coenoses of the *Oxycocco-Sphagnetea* class. The *Eriophoro vaginati-Sphagnetum recurvi* association, compared to the *Sphagnetum magellanici* association, is distributed in lower and wetter areas (Fig. 2), preferring colder microstations (Fig. 3) and a more acid substrate (Fig. 4) which is evidenced by the higher distribution of hydrophilic, cryophilic, microthermal, and strongly acidophilic species. The extreme conditions also explain the more reduced floristic richness of

these phytocoenoses (Table 2) compared to those of the *Sphagnetum magellanici* association (Table 1). In fact, geoelement composition is also poorer, particularly in the case of the *Eriophoro vaginati-Sphagnetum recurvi* association, which presents only boreal and circumpolar elements (Fig. 5), while the composition of the *Sphagnetum magellanici* association includes Eurasian, European and cosmopolitan species.

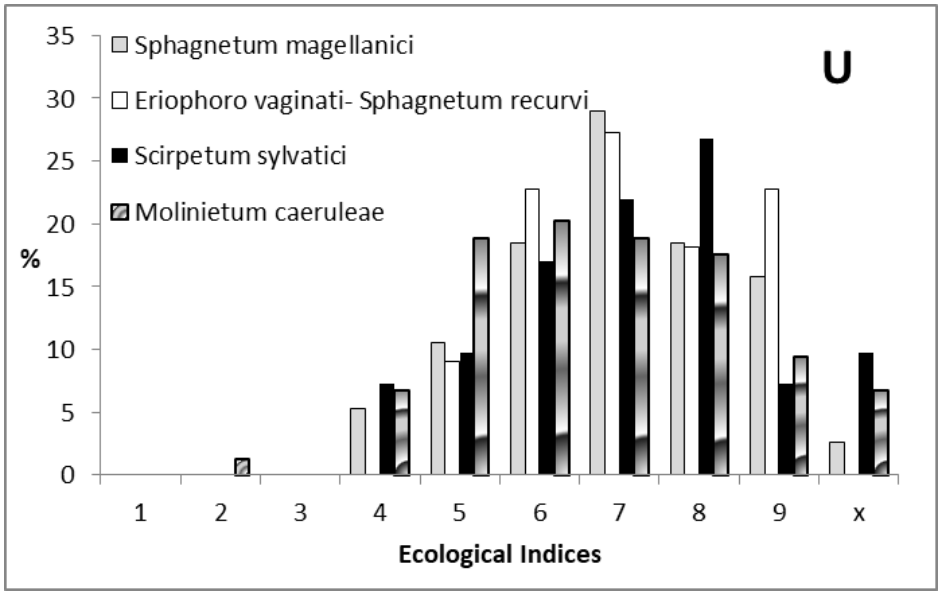

Fig. 2: The ecological spectrum for humidity of Tăul Obcioarei communities (1 = strongly xerophilic, 2,3 = xerophilic, 4 = xero-mesophilic, 5 = mesophilic, 6 = meso-hygrophilic, 7 = hygrophilic, 8 = hygro-hydrophilic, 9 = hydrophilic, x = euryhydrophilic)

Floristic composition is typical of these two oligotrophic communities, including the majority of the characteristic species of the *Sphagnetalia magellanici* order: *Eriophorum vaginatum*, *Vaccinium microcarpum, Andromeda polifolia, Drosera rotundifolia, Sphagnum fuscum, S. capillifolium, Polytrichum strictum, P. commune*. Among the characteristic species of the *Sphagnion magellanici* alliance, *Carex pauciflora, Sphagnum magellanicum* and *Sphagnum fallax* were found. The characteristic species of the class includes *Andromeda polifolia, Scheuchzeria palustris*; the latter was more consistently found in the *Eriophoro vaginati-Sphagnetum recurvi* association, being present on the edge of the two ponds.

This floristic structure led to the separation of this class into a distinct cluster, within which the 2 associations are delimited (Fig. 6).

In the marginal area, particularly towards the east, south and west, phytocoenoses of the *Molinio-Arrhenatheretea* class, which is represented in Tăul Obcioarei only by two associations, *Scirpetum sylvatici* (Table 3) and *Molinietum caeruleae* (Table 4), develop. Considering the preferences of the species for humidity, temperature and the chemical reaction of the substrate, the 2 associations have a wider spectrum, *Scirpetum sylvatici* occupying somewhat wetter stations, with a less acid chemical reaction of the soil (Figs. 2, 3, 4), which is also visible in the ordering along the first axis (Fig. 7). The phytocoenoses of both associations include euryhydric, eurythermal and euryionic species, these marginal associations having a buffer role given the fact that Tăul Obcioarei is surrounded by agricultural lands (Fig. 1).

Floristic richness is also reflected in the richness of phytogeographical elements, particularly, in the case of the *Molinietum caeruleae* association, alpine Carpathian-Balkan, Capathian and cosmopolitan species are found (Fig. 5). Although it occupies smaller surface areas, *Scirpetum sylvatici* has a coenotic structure representing more than half by characteristic species (Table 3).

The phytocoenoses of the two associations are grouped into a distinct cluster (Fig. 6). Floristic structure is strongly influenced by the characteristic species of the *Scheuchzerio-Caricetea fuscae* and *Oxycocco-Sphagnetea* class (Tables 3, 4).

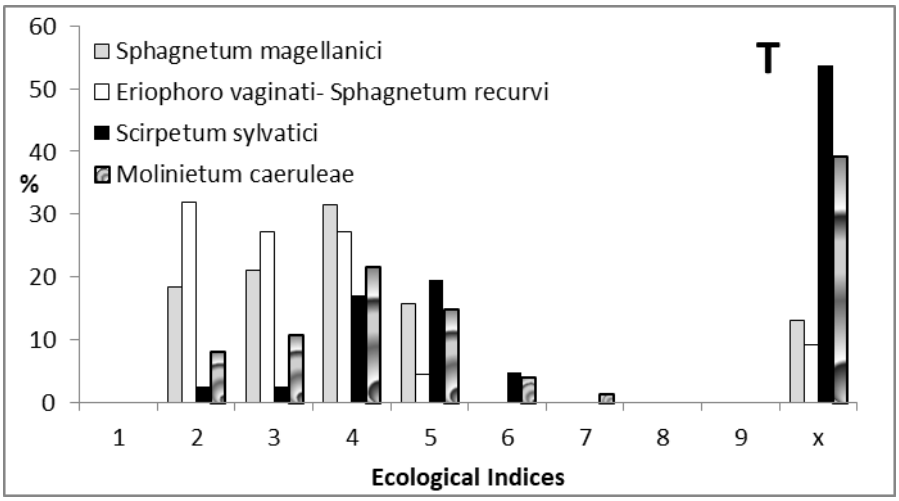

Fig. 3: The ecological spectrum for temperature of Tăul Obcioarei communities (1,2 = cryophilic, 3,4 = microthermal, 5,6 = micro-mesothermal, 7,8 = moderately thermophilic, 9 = thermophilic, x = eurythermal)

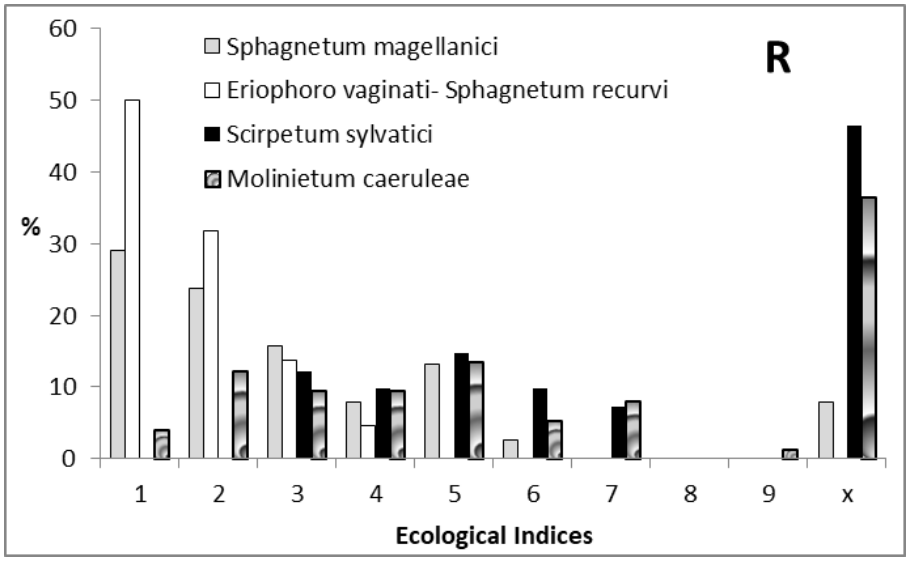

Fig. 4: The ecological spectrum for soil reaction of Tăul Obcioarei communities (1 = strongly acidophilic, 2,3 = acidophilic, 4,5 = moderately acidophilic, 6 = weakly acidophilic, 7 = weakly acid-neutrophilic, 8 = neutrobasophilic, 9 = basophilic/calciphilic, x = euryionic).

Table 1. Ass. Sphagnetum magellanici (Malcuit 1929) Kastner et Flossner 1933 from Tăul Obcioarei

Relevé code	Sm1	Sm2	Sm3	Sm4	Sm5	Sm6	Sm7	Sm8	Sm9	Sm 10	Sm 11	Sm 12	Sm 13
Elevation (m)	1046	1047	1056	1056	1056	1054	1054	1054	1054	1047	1046	1046	1046
Bryophyte layer (%)	65	65	75	90	70	45	50	30	45	80	70	60	70
Herbaceous layer (%)	20	50	40	25	50	55	70	75	70	40	20	20	40
Shrub layer (%)	20	-	10	-	-	5	-	-	-	5	20	60	30
Cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100
Area (m^2)	40	25	25	25	25	25	25	25	25	25	25	40	40
Sphagnum magellanicum	2	3-4	3-4	2	3	1-2	-	1	2	1	-	+	2-3
Sphagnum fuscum	-	-	1	1	-	-	-	-	-	-	-	-	-
Sphagnum rubellum			-	2	-	-	-	-	-	-	-	-	+-1
Sphagnum papillosum	+	+	+	1	-	-	1	-	+	-	-	+	-
Sphagnion magellanici													
Carex pauciflora	-	+	-	-	-	-	-	-	-	+	-	-	-
Sphagnum fallax	+	-	-	+	+-1	+	3	+	1	3	+	+	+-1
Sphagnetalia magellanici													
Andromeda polifolia	+	-	-	-	1	1	-	-	-	-	-	1	-
Drosera rotundifolia	+	+	1	1-2	1-2	-	1	+-1	+-1	1	+	+	+
Eriophorum vaginatum	1-2	2	3	2-3	3	3-4	1-2	2	2	3	2	1-2	3
Polytrichum strictum	2	1-2	1-2	1	2	1-2	1	+-1	-	2-3	1	2	1-2
Polytrichum commune			+-1	-	-	-	-	-	+	1-2	-	-	+
Sphagnum capillifolium	2-3	+	1	+	+	2	+	2	1	+	2	2-3	2-3
Vaccinium microcarpum	1-2	+	+-1	+	+	+	+	+	-	+-1	+	+	+
Oxycocco-Sphagnetea													
Scheuchzeria palustris	-	-	-	-	-	-	+-1	-	-	-	-	-	-
Scheuchzerio-Caricetea nigrae													
Sphagnum cuspidatum	-	-	-	+	+	-	-	-	-	+	-	-	-
Species with one occurrence: *Carex flava* +(Sm9); *Carex echinata*+(Sm9); *Dactylorhiza maculata* +(Sm8); *Epipactis palustris* +(Sm8); *Sphagnum palustre* +(Sm9); *Swertia perennis* +(Sm8)													
Molinio-Arrhenatheretea													
Molinia caerulea	1	3	-	-	-	+	3-4	3-4	3-4	+	+	1	1
Succisa pratensis	-	-	-	-	-	-	-	-	+	-	-	-	-
Aliae													
Betula pendula	-	-	+	-	-	-	-	-	-	-	-	1	-
Betula pubescens	1	-	-	-	-	-	-	-	-	-	-	-	1
Picea abies	2	-	+-1	-	-	-	-	-	-	-	-	2	1-2
Pleurozium schreberi	-	-	-	-	-	-	-	-	-	-	-	1	+
Potentilla erecta	-	-	-	-	-	-	1	1	+	-	-	-	-
Salix aurita	-	-	-	-	-	-	-	-	+	-	-	+	-
Sphagnum centrale	-	-	-	-	1	-	+	+	1-2	-	-	-	+
Sphagnum girgensohnii	-	-	-	-	-	-	-	-	-	-	-	+	+
Sphagnum quinquefarium	-	-	-	-	-	-	-	-	+	-	-	-	+
Sphagnum russowii	1	-	+	2	1-2	+	-	+	+	-	3-4	+	-
Sphagnum subnitens	-	-	-	2-3	-	-	-	-	-	-	-	2	-
Vaccinium myrtillus	2	-	1	-	-	+	-	-	-	1	2	2-3	2
Vaccinium vitis-idaea	1-2	-	1	-	-	1	-	-	-	+	1	2	1
Species with one occurrence: *Straminergon stramineum* +(Sm10); *Leptodictyum riparium*+ (Sm6)													

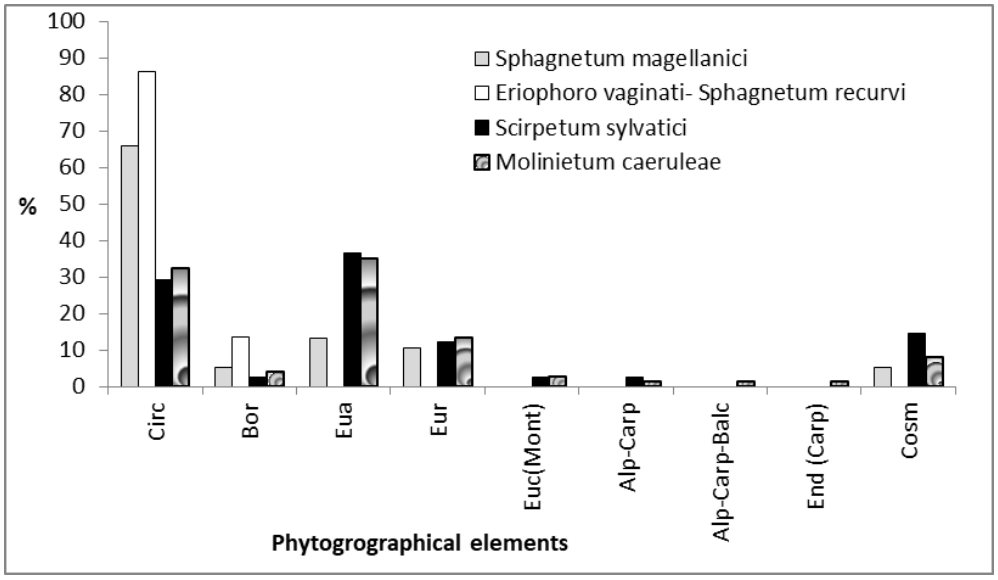

Fig. 5: The phytogeographical spectrum of the phytocoenosis in Tăul Obcioarei peat bog

Table 2: Ass. Eriophoro vaginati-Sphagnetum recurvi Hueck 1925 from Tăul Obcioarei

Relevé code	E_S1	E_S2	E_S3	E_S4	E_S5	E_S6	E_S7
Elevation (m)	1056	1056	1056	1056	1054	1054	1054
Bryophyte layer (%)	85	70	90	90	90	70	80
Herbaceous layer (%)	20	30	20	20	25	10	15
Shrub layer (%)	5	5	-	-	-	-	-
Cover (%)	100	100	100	100	100	75	95
Area (m^2)	25	25	25	10	25	16	10
Eriophorum vaginatum	1-2	2	+-1	+	1	+-1	1
Sphagnum fallax	+	-	-	3	3-4	-	+
Sphagnion magellanici							
Sphagnum magellanicum	2	1-2	3	3	3	2	1
Sphagnetalia magellanici							
Andromeda polifolia	1	1-2	1	1	1-2	+-1	+
Drosera rotundifolia	1	1	+-1	1	+	+	+
Sphagnum rubellum	1	2	-	-	-	-	-
Polytrichum strictum	1	2-3	1	+	+	-	-
Vaccinium microcarpum	+	+	+	+	1	+	+
Species with one occurrence: *Sphagnum fuscum* +(E_S2); *S. capillifolium* 2(E_S2)							
Oxycocco-Sphagnetea							
Scheuchzeria palustris	-	-	1-2	1-2	1	1	1-2
Aliae							
Calypogeia sphagnicola	+	-	-	-	-	+	-
Cephalozia pleniceps	-	-	-	-	-	+	-
Cephaloziella spinigera	-	-	-	-	-	+	-
Drepanocladus exannulatus	-	-	-	-	-	1	-
Sphagnum cuspidatum	-	-	3-4	2	1	3-4	4-5
Sphagnum papillosum	+	-	-	-	+	-	-
Sphagnum russowii	1	-	-	-	-	-	-
Sphagnum subnitens	3-4	-	-	-	-	-	-
Vaccinium myrtillus	1	1	-	-	-	-	-
Vaccinium vitis-idaea	+	-	-	-	-	-	-
Species with one occurrence: *Cephalozia pleniceps* + (E_S6); *Cephaloziella spinigera*+ (E_S6); *Drepanocladus exannulatus* 1 (E_S6); *Sphagnum russowii* 1 (E_S1)							

Based on the vegetation data, three types of habitats were identified, of which priority habitat 7110 – Active raised bogs – is the best represented. For a long time, local people threw household waste into the ponds, for fear that animals, occasionally left to graze, might get stuck there. At the time of the study, they did not know the importance of these habitats and avoided entering this area.

Table 3: Ass. Scirpetum sylvatici Maloch 1935 em. Schwich. 1944 from Tăul Obcioarei

Relevé code	Ss1	Ss2	Ss3
Elevation (m)	1054	1043	1043
Aspect	N	E	-
Slope (degrees)	2	1	0
Bryophyte layer (%)	3	-	-
Herbaceous layer (%)	95	100	100
Shrub layer (%)	2	-	-
Cover (%)	100	100	100
Area (m^2)	21	25	25
Scirpus sylvaticus	3-4	4-5	5
Calthion palustris			
Myosotis scorpioides	+	-	+
Deschampsion			
Agrostis capillaris	-	+	-
Festuca pratensis	-	-	+
Deschampsia caespitosa	-	+	1
Filipendulion			
Filipendula ulmaria	+	-	-
Molinietalia caeruleae			
Juncus effusus	+-1	1	+
Lysimachia vulgaris	-	+	+
Molinia caerulea	1-2	1	-
Succisa pratensis	1	1	+
Species with one occurrence: *Angelica sylvestris* +(Ss3); *Galium palustre* +(Ss1); *Lythrum salicaria* +(Ss1); *Valeriana officinalis* +(Ss1)			
Potentillo-Polygonetalia			
Agrostis stolonifera	+	-	-
Molinio-Arrhenatheretea			
Stellaria graminea	-	+	+
Species with one occurrence: *Anthoxanthum odoratum*+(Ss2); *Phleum pratense* +(Ss3); *Prunella vulgaris* +(Ss1); *Ranunculus acris* +(Ss1); *Centaurea jacea* +(Ss1);			
Scheuchzerio-Caricetea nigrae			
Carex nigra	+	+	+
Carex echinata	1	+	-
Species with one occurrence: *Carex distans* +(Ss2); *Carex flava*+-1(Ss1); *Dactylorhiza maculata* + (Ss1); *Eriophorum angustifolium* 1 (Ss1); *Parnassia palustris* + (Ss1); *Stellaria palustris* +(Ss2);			
Aliae			
Carex pallescens	-	+	+
Centaurea phrygia	-	+	+
Hypericum maculatum	-	+	+
Potentilla erecta	+	+-1	+
Species with one occurrence: *Alchemilla vulgaris* +(Ss3); *Aulacomnium palustre* +(Ss1); *Calliergonella cuspidata* +(Ss1); *Carex leporina*+(Ss3); *Danthonia decumbens* +(Ss1); *Hypnum cupressiforme* +(Ss1); *Luzula multiflora* +(Ss2); *Salix aurita* +(Ss1);			

Table 4: Ass. Molinietum caeruleae W. Koch 1926 from Tăul Obcioarei

Relevé code	Mc1	Mc2	Mc3	Mc4	Mc5	Mc6	Mc7
Elevation (m)	1054	1054	1048	1043	1043	1043	1043
Slope (degrees)	6	6	7	-	6	-	4
Bryophyte layer (%)	25	-	-	-	20	20	-
Herbaceous layer (%)	95	40	30	100	80	90	30
Shrub layer (%)	1	60	70	-	1	1	75
Cover (%)	100	100	90	100	100	100	100
Area (m^2)	16	35	50	25	25	25	35
Molinia caerulea	1	3	2	2	3	5	2
Filipendulion							
Epilobium parviflorum	-	-	-	-	+	-	-
Filipendula ulmaria	-	+	-	-	-	-	-
Deschampsion							
Festuca pratensis	-	-	-	+	-	-	-
Molinietalia caeruleae							
Angelica sylvestris	-	-	-	+	+	-	-
Juncus effusus	1	-	-	3	2	-	-
Lysimachia vulgaris	+	+	+	-	+	-	+
Succisa pratensis	+	+	-	+	-	-	-
Species with one occurrence: *Galium palustre* +(Mc5); *Lythrum salicaria*+(Mc1); *Valeriana officinalis*+(Mc1);							
Arrhenetheretalia							
Climacium dendroides	+	-	-	-	-	-	-
Molinio-Arrhenatheretea							
Anthoxanthum odoratum	+	-	-	+	-	+	-
Myosotis scorpioides	+	-	-	-	+	-	-
Species with one occurrence: *Centaurea jacea* +(Mc1); *Phleum pratense* +(Mc4); *Prunella vulgaris*+(Mc1);							
Oxycocco-Sphagnetea							
Eriophorum vaginatum	-	+	-	-	-	1	-
Polytrichum commune	-	-	-	-	2	2	-
Polytrichum strictum	-	-	-	-	-	+	-
Agrostis stolonifera	+	-	-	2-3	2	-	-
Species with one occurrence: *Drosera rotundifolia* +(Mc6); *Polytrichum strictum* +(Mc6); *Sphagnum capillifolium* 1(Mc6); *S. fallax* +-1(Mc5); *Vaccinium microcarpum* +(Mc6)							
Scheuchzerio-Caricetea nigrae							
Carex echinata	2-3	-	-	1	-	-	+
Carex flava	3-4	-	-	-	-	-	+
Carex nigra	+	-	-	+	-	-	-
Species with one occurrence: *Carex canescens* +(Mc1); *Carex distans*+(Mc4); *Carex magellanica* subsp. *irrigua* +(Mc1); *Dactylorhiza maculata* +(Mc1)							
Aliae							
Aegopodium podagraria	-	-	+	-	-	-	+
Betula pendula	-	-	+-1	-	+	-	1-2
Campanula serrata	-	-	-	+	-	-	+
Carex pallescens	+	-	-	+	-	-	-
Fragaria vesca	+	-	-	+	-	-	-
Frangula alnus	-	-	+	-	-	-	1
Hieracium maculatum	+	-	-	-	-	-	+
Jacobaea subalpina	-	-	+	-	-	-	+
Maianthemum bifolium	-	-	+	-	-	-	+-1
Potentilla erecta	+	+	-	+	+	+	-
Salix aurita	+	4	4	-	+	-	4
Scirpus sylvaticus	+						
Vaccinium vitis-idaea	-	-	+	-	-	+	-

Species with one occurrence: *Abietinella abietina* +(Mc1); *Alchemilla vulgaris* +(Mc4); *Asarum europaeum* +(Mc3); *Astrantia major* +(Mc7); *Calliergonella cuspidata* +(Mc1); *Calliergonella lindbergii* +(Mc1); *Campylophyllum halleri* 2(Mc1); *Carex leporina*+(Mc4); *Cirriphyllum piliferum* +(Mc1); *Corylus avellana* +(Mc3); *Crepis paludosa*+(Mc3); *Drepanocladus exannulatus* +(Mc1); *Galeopsis speciosa* +(Mc3); *Gentiana asclepiadea* +(Mc7); *Gladiolus imbricatus* +(Mc1); *Homogyne alpina* +(Mc3); *Listera ovata* +(Mc3); *Paris quadrifolia* +(Mc3); *Picea abies* +(Mc3); *Poa nemoralis* +(Mc3); *Rosa canina* +(Mc3); *Rubus caesius* +(Mc3); *Rumex arifolius* +(Mc7); *Silene vulgaris* +(Mc7); *Sorbus aucuparia* 1(Mc3); *Sphagnum centrale* +-1(Mc1); *S. russowii* +(Mc6); *Straminergon stramineum* +(Mc1); *Vaccinium myrtillus* +(Mc7)

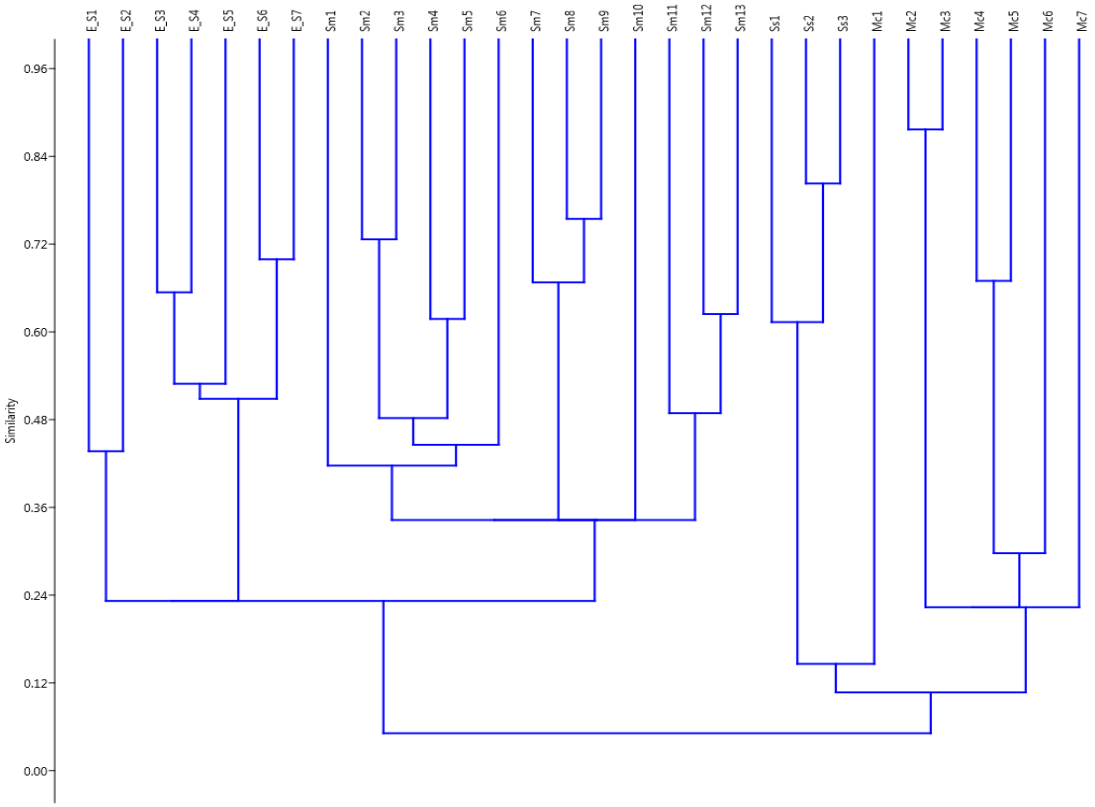

Fig. 6: Cluster analyses of the phytocoenosis in Tăul Obcioarei peat bog (constrained UPGMA algorithm and Bray-Curtis quantitative index)

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) - habitat 6410 - form an obvious border on the western, southern and eastern side of the peat bog. Habitat 6430 - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels - has an insular representation, through the *Scirpetum sylvatici* association, in the west and south of Tăul Obcioarei peat bog.

Discussions

Despite the small surface area of Tăul Obcioarei, oligotrophic communities are well represented. Certainly, an important role in this regard is played by the thickness of the peat layer (about 7 m deep) [20], the extreme ecological conditions required for the existence of this

community being met. In the phytocoenoses of the *Sphagnetum magellanici* association, unlike other phytocoenoses of this association in Romania [2], we report a higher distribution of *Sphagnum rubellum* and *Sphagnum papillosum* species, while *Sphagnum fuscum* is present, but not dominant.

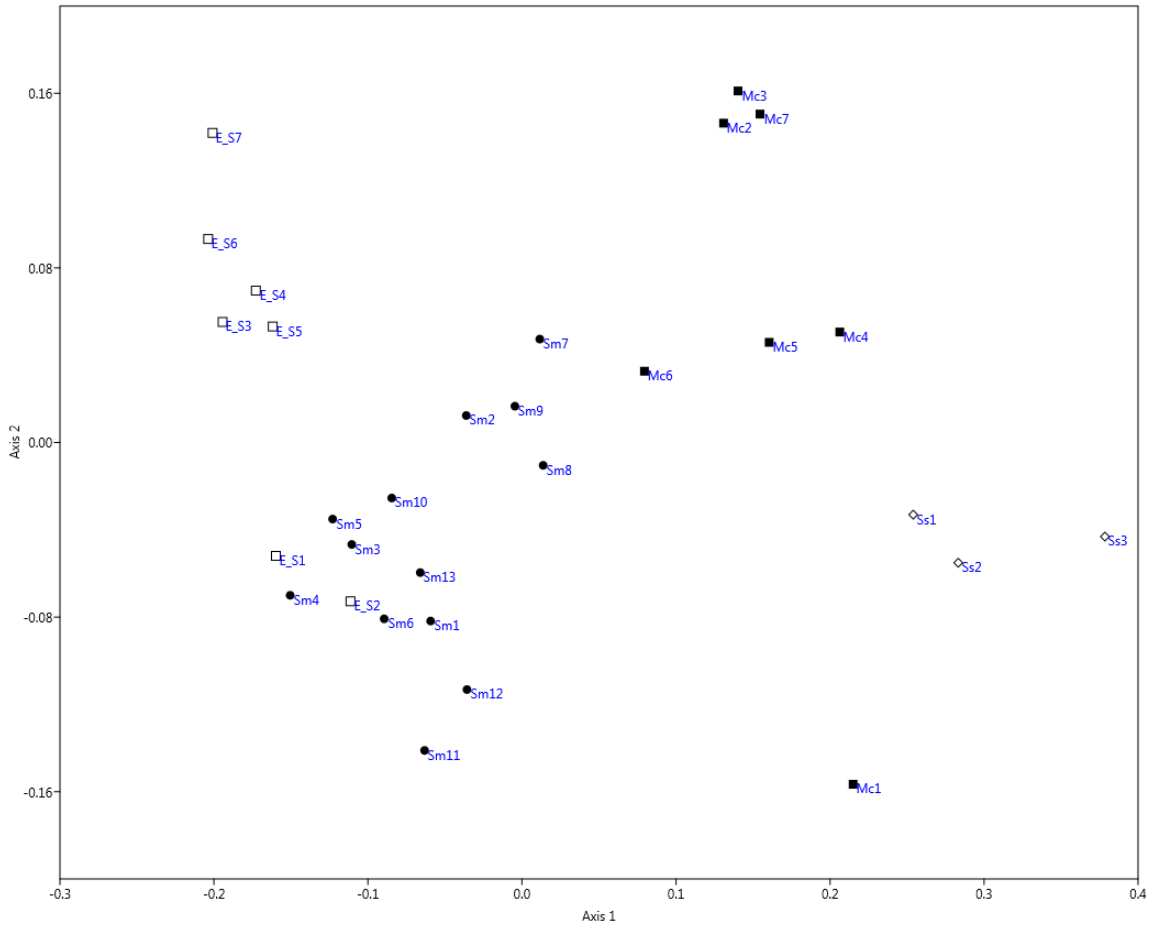

Fig. 7: NMDS ordination of the phytocoenosis in Tăul Obcioarei peat bog

The reduced surface of the peat bog, the contact in its lower areas, particularly in its southern part, with the other 2 associations, *Scirpetum sylvatici* and especially *Molinietum caeruleae*, are reflected in floristic composition, mainly through the presence of species characteristic of the *Scheuchzerio-Caricetea nigrae* class or the massive penetration of the *Molinia caerulea*, characteristic of the *Molinio-Arrhenatheretea* class. These influences are not observed in the case of the *Eriophoro vaginati-Sphagnetum recurvi* association. In Tăul Obcioarei, most of the characteristic species of the *Sphagnetalia magellanici* order and *Sphagnion magellanici* alliance are found [2]. The reduced surface can probably explain the absence of the *Empetrum nigrum*, a species characteristic of this alliance, otherwise present in the Maramureș Mountains peat bogs [18]. Consequently, only the small surface of the two associations that define habitat 7110 and the throwing of waste into the two ponds led us to estimate that the conservation status of this habitat is unfavorable-inadequate.

In any case, in the phytocoenoses of the *Eriophoro vaginati-Sphagnetum recurvi* association, the critically endangered species - *Cephaloziella spinigera* was identified [24], which was reported in Romania only from Săpâncioara [15]. *Calypogeia sphagnicola* was reported here for the first time in Maramureș Mountains [23]. *Sphagnum papillosum,* another critically endangered species, is present in both oligotrophic associations in Tăul Obcioarei. This species is known in Romania only from Călățele [11].

In the case of the other two habitats: 6430 - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels and 6410 - *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils, which represent the area of contact with grasslands, due to the floristic structure strongly influenced by the *Scheuchzerio-Caricetea nigrae* and *Oxycocco-Sphagnetea* class communities and to the narrow surface occupied, the conservation status of these habitats was assessed as unfavorable-bad. However, *Carex magellanica* subsp. *irrigua,* a glacial relict known in Maramureș Mountains only from the peat bog of the Dragomirești forest district (UP VIII Tibau) [26], is reported as part of the *Molinietum caerulae* association. According to the red list of Oltean et al. (1994), *Carex magellanica* subsp. *irrigua* has the status of rare species.

Conclusions

The structure of oligotrophic communities identified in Tăul Obcioarei is surprisingly well preserved despite the reduced surface area (1.4 ha). There is a direct transition from grasslands to oligotrophic communities in the north of Tăul Obcioarei, and only in the south, south-east and south-west, a wet meadow border belonging to the *Molinio-Arrhenatheretea* class develops. The conservation of the identified habitats remains under the pressure of use of the neighboring lands. We consider that maintaining the current use would allow conservation of these habitats, if the accumulated waste is removed, but ensuring a buffer area forested with spruce trees would contribute to more effective protection, especially regarding the hydric regime and water chemistry, as well as to an improvement in the conservation status of the habitats identified on the occasion of this study. On the other hand, monitoring of the three red listed species: *Cephaloziella spinigera, Sphagnum papillosum, Carex magellanica* subsp. *irrigua* should become a target for the administration of the Maramureș Mountains Nature Park, all the more so as there are only two localities in Romania known for the two moss species.

Acknowledgements: The authors are grateful to the administration of the Maramureș Mountains Nature Park, for their help during the fieldwork. Special thanks to Ioan Pop, who guided us in the field.

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STUDIUL COMUNITĂȚILOR DE VEGETAȚIE DIN TINOVUL TĂUL OBCIOAREI

(Rezumat)

Studiul de față reprezintă o investigare a vegetației din tinovul Tăul Obcioarei, localizat în nord-vestul Romaniei, în Moisei (județul Maramureș) pe culmea Obcioarei, la cca 1050 m.s.m., într-o zonă locuită. Studiul a fost efectuat între anii 2011-2012. Tinovul este dominat de asociațiile *Eriophoro vaginati-Sphagnetum recurvi* Hueck 1925 și *Sphagnetum magellanici* (Malcuit 1929) Kästner et Flößner 1933, care reprezintă cca 70% din aria investigată. Fitocenozele asociațiilor *Molinietum caeruleae* W. Koch 1926 și *Scirpetum sylvatici* Ralski 1931, Maloch 1935 em. Schwick 1944 se dezvoltă din est, spre sud și vestul tinovului. *Eriophoro vaginati-Sphagnetum recurvi* găzduiește speciile critic periclitate *Cephaloziella spinigera* și *Sphagnum papillosum,* ambele specii fiind semnalate pentru a doua oară din România. Toate asociaţiile prezentate în lucrare sunt documentate prin tabele fitosociologice, fiind însoţite și de analize cenotaxonomice, fitogeografice, ecologice în scopul evaluării stării de conservare a acestora, ca principal instrument în luarea deciziilor manageriale.

Conform Directivei Habitate, habitatul 7110* – Tinoave bombate active – este bine dezvoltat, înconjurat de habitatul 6410 – Pajiști cu *Molinia* pe soluri carbonatice, turboase sau luto-argiloase (*Molinion caeruleae*) și habitatul 6430 – Comunităţi de lizieră cu ierburi înalte higrofile de la câmpie şi din etajul montan până în cel alpin. Starea de conservare este nefavorabilă-inadecvată pentru habitatul 7110* si nefavorabilă rea pentru celelalte două habitate, dar modificările de temperatură, ale cantității și distribuției precipitațiilor, precum și aruncarea ocazională a deșeurilor menajere în apă contribuie la deteriorarea acestor habitate.

Received: 10.12.2018; Accepted: 27.12.2018.