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CONTRIBUTIONS TO THE KNOWLEDGE OF LICHENS COMMUNITIES FROM BISTRITA MOUNTAINS (EASTERN CARPATHIANS)

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Abstract: This paper presents two lichens communities (*Parmelietum caperatae* Felf. 1941 and *Usneetum filipendulae* Hil. 1925) from *Physcietea* Tomaselli and Micheli 1957 and *Hypogymnietea physodes* Follm. 1974 classes, identified in Bistrita Mountains territory, in 5 locations: Arşita lui Macovei, Zugreni, Tulgheş, Barnar and Pârâul Văcăriei. These associations are analyzed from the bioforms, ecological requests and floristic elements perspectives.

Key words: lichens communities, Bistriţa Mountains, Romania.

Introduction

The study of lichens communities from Bistriţa Mountains has been realized in 2004 – 2005 years during several field trips in various locations of these mountains. The purpose of the field trips was to identify the lichens coenosis and to realize phytosociological relevés that have led us to the establishment of the lichens associations. The species that could not have been identified in field, have been collected and identified in laboratory (on the microscopic characters basis).

Material and methods

The study method adopted in this type of research of lichens associations from Bistrita Mountains is that established by Klement [7] in concordance with the principles of central European phytosociology school, used and adapted to our country lichens vegetation by Ciurchea et al. [2], Bartok [1] and other romanian researchers [5], [8], [9].

On international plan the "association" notion is unanimous accepted for the saxicolous lichens communities. The terricolous and corticolous groupings can have different cenotaxonomic values, some authors interpreting them as associations, other as synusia or microcenosis. In this paper, the presented corticolous groupings have been considered as associations. The identification of these associations has been made on the basis of the characteristic species indicated in the specialty literature [4], [10]. For each association, an analysis of bioforms and floristic elements has been made. In text, we used the next abbreviations for the bioforms [2]:

- HE Pa – epiphyte hemicryptophyte lichens having an *Parmelia* thallus type;
- HE Ra – epiphyte hemicryptophyte lichens having an *Ramalina* thallus type;
- HE Us – epiphyte hemicryptophyte lichens having an *Usnea* thallus type;
- HE hyp. – epiphyte hemicryptophyte lichens having an hypophloeodic thallus type;
- HE so. – epiphyte hemicryptophyte lichens having an sorediate crust thallus type.

The floristic elements abbreviations [2], [4] are:

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- bor.-med. – boreal – mediterranean;
- bor.-med. mo. – boreal – mediterranean mountain;
- bor.-submed. mo. – boreal – submediterranean mountain;
- bor.-mid.eur. – boreal – middle european;
- south bor.-med. – south boreal mediterranean;
- south bor.-mid.eur.-mo. – south boreal – middle european mountain;
- arct.-med. – arctic – mediterranean;
- mid.eur.-med. – middle european – mediterranean;
- mid.eur.-med. mo. – middle european – mediterranean mountain;
- arct.-bor.-med. – arctic – boreal – mediterranean;

An analysis (after Ellenberg [6]) of ecological indices (L-light, U-humidity, T-temperature, R-substratum ph), expressing the ecological requests of the associated lichens species has been realized. Also, the graphic representation followed by their interpretation and each association characterization have been realized.

The two associations described in this paper are mentioned for the first time in the Bistrita Mountains territory.

Results and discussions

The two lichens associations presented are subordinated to the next superior coenotaxa:

PHYSCIETEA Tomaselli and Micheli 1957

PHYSCIETALIA ADSCENDENDIS Hadac 1944 em. Barkm. 1958

Xanthorion parietinae Ochsner 1928

Parmelietum caperatae Felf. 1941

HYPOGYMNIETEA PHYSODES Follm. 1974

ALECTORIETALIA Dahl and Hadač 1944 (syntax. syn. Hypogymnietalia physodo – tubulosae Barkm. 1958)

Usneion barbatae Ochsner 1928

Usneetum filipendulae Hil. 1925

Tab.1 Ass. *Parmelietum caperatae* Felf. 1941

L	**U**	**T**	**R**	**BF**	**FE**	Tree species	Fagus sylvatica			Picea abies	Quercus petraea	**K**
						Altitude (m)	850	800	800	825	860	
						Coverage (%)	90	70	70	65	80	
						Aspect	S	SE	SE	S	SE	
						Plot area	0,5	0,5	0,5	0,5	0,5	
						Nr. of revelé	1	2	3	4	5	
Car. ass.												
6	4	6	4	HE Pa	Mid.eur.-med.	Flavoparmelia caperata	4	3	3	3	3	V
Xanthorion parietinae												
7	3	5	7	HE Pa	Bor.-med.	Xanthoria parietina	+	1	-	+	-	III
7	3	5	7	HE Pa	Bor.-med.	Physcia adscendentis	+	-	-	-	+	II
7	3	5	5	HE Pa	Bor.-med.	Melanelia exasperatula	-	-	+	1	-	II
7	3	0	6	HE Pa	Arct.-bor.-med.	Physcia tenella	-	+	-	-	+	II
5	4	5	3	HE Pa	Mid.eur. med. mo.	Melanelia glabra	-	-	+	-	2	II

Physcietalia adscendentis												
7	3	5	3	HE Ra	Bor.-med.	Evernia prunastri	1	-	1	1	+	IV
3	4	6	5	HE ex	mid.Eur.–med. mo	Pyrenula nitida	+	-	+	-	-	II
3	4	5	5	HE hyp.	South - bor.-med.	Graphis scripta	+	-	+	-	+	III
3	4	5	5	HE hyp.	South - bor.-med.	Arthonia radiata	+	-	+	-	-	II
3	5	7	6	HE hyp.	mid.eur – subatl.-med.	Opegrapha viridis	+	-	-	-	-	I
4	3	5	3	H so	Bor.-mid.eur.-med.	Lepraria incana	-	+	-	+	-	II
7	7	4	6	HE Pa	Bor.-med.	Melanelia glabratula	-	1	-	+	-	II
7	3	0	3	HE Pa	Bor.-med.	Hypogymnia tubulosa	-	-	-	+	+	II
Physcietea												
7	3	0	3	HE Pa	Arct.-med.	Hypogymnia physode	2	+	1	+	-	IV
7	3	0	5	HE Pa	Arct.-med.	Parmelia sulcata	+	1	-	1	+	IV
Variae syntaxa												
8	3	4	2	HE Pa	Bor.-med. mo.	Pseudevernia furfuracea	+	+	-	-	1	III

Place and date of relevées: 1- Arşiţa lui Macovei (18.06.2005); 2,3,4 – Zugreni (14.09.2004); 5 – Tulgheş (30.09.2005)

The *Parmelietum caperatae* association is characteristic to the hilly zone but also is frequently met in the sub-mountain and even mountain zones. In our study area it is wide spread, being identified at 800 – 900 m altitude on *Fagus sylvatica*, *Picea abies* and *Quercus petraea* trunks, having a general covering degree between 65 – 80% and prevalent southern and south-eastern aspects (**Table no. 1**). The characteristic and dominant species *Flavoparmelia caperata* is accompanied by other species, characteristic to the superior coenotaxa: *Xanthorion parietinae* (*Xanthoria parietina, Physcia adscendentis, Melanelia glabra*), *Physcietalia adscendentis* (*Evernia prunastri, Pyrenula nitida*) and *Physcietea* (*Hypogymnia physodes, Parmelia sulcata*).

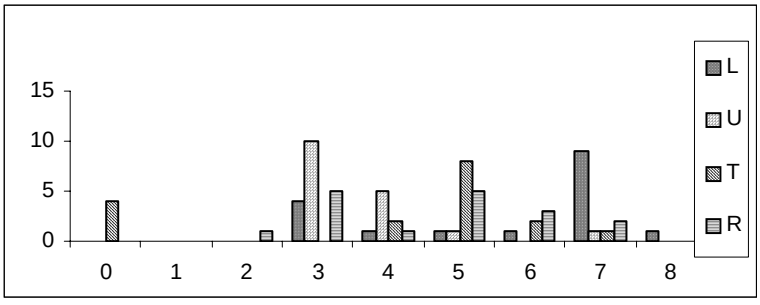

Fig. 1 Ecological indices spectrum of *Parmelietum caperatae* association

The ecological indices spectrum (**Fig. 1**) reveals that this association reunites moderate photophylous species, xero-mesophylous, meso-thermophylous, acidophylous and moderate acidophylous species, installed both on trees having smooth bark *(Fagus sylvatica*) and trees having wrinkled bark (*Quercus petraea*).

The bioforms spectrum (**Fig. 2**) indicates the prevalence of epiphyte hemicryptophyte species presenting a *Parmelia* thallus type (60%), followed by the lichens having hypophloeodic thallus (16%). The hemicryptophyte lichens with sorediate crust, that epiphyte hemicryptophyte with extern crust and also the lichens having *Usnea* or *Ramalina* types of thallus are present in reduced proportions.

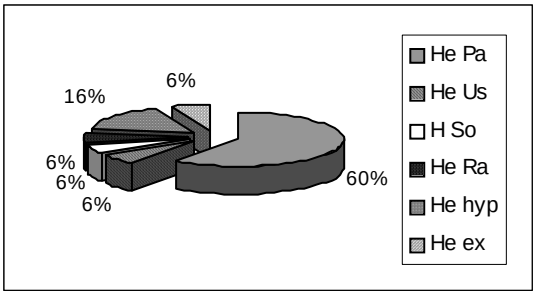

Fig. 2 Bioforms spectrum of *Parmelietum caperatae* association

The floristic elements spectrum (**Fig. 3**) presents the prevalence of boreal – mediterranean and arcto – mediterranean elements (11%).

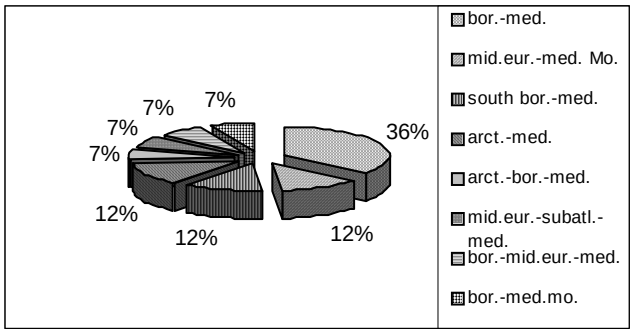

Fig. 3 Floristic elements spectrum *of Parmelietum caperatae* association

The others floristic elements (middle european – mediterranean, boreal – mediterranean mountain etc.) categories are present in equal proportions (7%).

Tab. 2 Ass. *Usneetum filipendulae* Hil. 1925

L	**U**	**T**	**R**	**BF**	**FE**	Tree species	Picea abies					**K**
						Altitude (m)	600	620	650	700	950	
						Coverage (%)	90	70	70	65	70	
						Aspect	NV	NV	N	NE	NV	
						Plot area (m^2)	0.5	0.5	0.5	0.5	0.5	
						Nr. of relevé	1	2	3	4	5	
Car. ass.												
7	6	4	3	HE Us	Bor.-med. mo.	Usnea filipendula	3	3	2	3	4	V
7	7	5	5	HE Us	Mid.eur.-med. mo.	Usnea florida	1	+	+	2	2	V
Usneion barbatae												
8	3	4	2	HE Pa	Bor.-med. mo.	Pseudevernia furfuracea	+	1	+	+	-	I V
6	7	3	3	HE Pa	Bor.-mid.eur.	Hypogymnia vittata	+	1	1	1	+	V
7	7	3	3	HE Ra	Bor.-submed.mo.	Evernia divaricata	-	-	+	+	-	II
6	7	3	3	HE Us	South bor.-mid.eur. mo.	Bryoria implexa	-	+	-	-	-	I
7	3	0	3	HE Pa	Bor.-med.	Hypogymnia tubulosa	+	-	-	+	-	II

7	5	4	3	HE Us	Bor.-mid.eur.	Usnea hirta	+	-	1	-	-	II
7	6	4	3	HE Us	Bor.-med. mo.	Bryoria fuscescens	+	-	+	-	-	II
Alectorietalia												
7	3	5	3	HE Ra	Bor.-med.	Evernia prunastri	1	+	1	+	+	V
7	3	5	5	HE Pa	Bor.-med.	Melanelia exasperatula	-	1	+	-	-	II
Hypogymnietea physodes												
7	3	0	3	HE Pa	Arct.-med.	Hypogymnia physodes	-	+	+	1	1	IV
7	3	0	5	HE Pa	Arct.-med.	Parmelia sulcata	1	-	1	+	-	III
Variae syntaxa												
4	4	5	5	H So	South bor.-med.	Chrysotrix candelaris	+	-	+	-	-	II
3	6	4	3	H So	South bor.-mid.eur.-med. mo.	Calicium abietinum	-	+	-	-	-	I
7	3	5	7	HE Pa	Bor.-med.	Xanthoria parietina	-	-	+	-	+	II
7	7	4	6	HE Pa	mid.eur.-med. mo.	Melanelia glabra	-	-	-	+	-	I

Place and date of relevées: 1,4 – Pârâul Văcăriei (18.06.2005); 5 – Barnar (19.06.2005)

The *Usneetum filipendulae* association could be met in the mountain zones presenting increased humidity, usually installed on the corona of coniferous trees but also on these trees trunks. The lichenocenosis of this association have been identified along the valleys of Pârâul Văcăriei and Barnar rivers on *Picea abies* trunks and branches, having a general covering degree between 65 and 90% and prevalent northern, north-western and north-eastern aspects (**Table no. 2**). The association is edified by *Usnea filipendula* and *Usnea florida*; besides these also *Hypogymnia vitatta*, *Pseudevernia furfuracea, Evernia prunastri, Hypogymnia physodes* are frequently met.

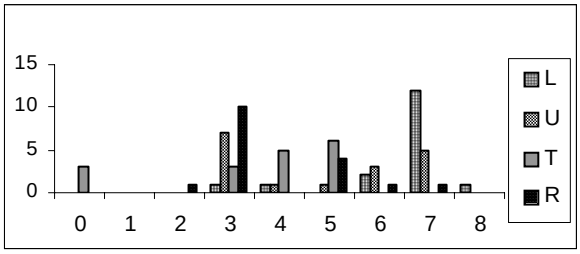

Fig. 4 Ecological indices spectrum of *Usneetum filipendulae* association

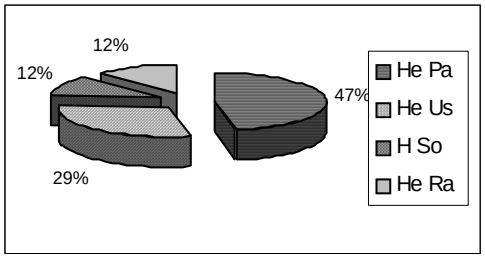

Fig. 5 Bioforms spectrum of *Usneetum filipendulae* association

The ecological indices spectrum **(Fig. 4**) shows that the most of the component species are moderate photophylous, xeromesophylous, micro-mesothermophylous and acidophilous species.

The bioforms spectrum (**Fig. 5**) presents the preponderance of the lichens epiphyte hemicryptophyte with *Parmelia* type thallus (47%), followed by the *Usnea* type thallus (29%). The lichens hemicryptophyte having sorediate crust and also the lichens with *Ramalina* thallus type are present in reduced proportion (12%).

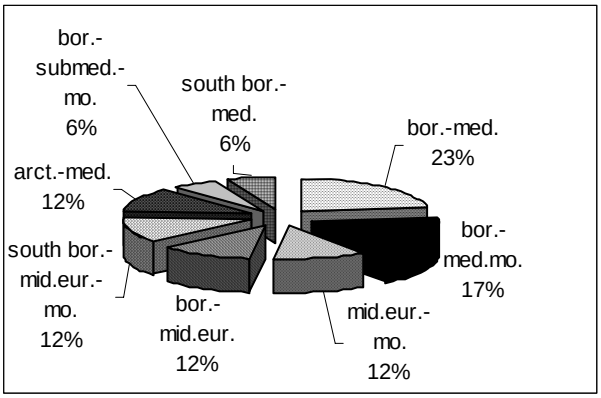

Fig. 6 Floristic elements spectrum of *Usneetum filipendulae* association

The floristic elements spectrum (**Fig. 6**) indicates the prevalence of the boreal–mediterranean elements (23%), followed by the boreal–mediterranean–mountain elements (17%). A equilibrate repartition is observed in the case of middle european-mountain, boreal–middle european, south–boreal–middle european and arcto–mediterranean elements, each of them present in a 12 % proportion.

Conclusions

The analysis of *Parmelietum caperatae* and *Usneetum filipendulae* lichens communities reveals that both prevalently have in composition moderate photophilous, xeromesophilous, mesothermophilous and acidophilous species. Also, floristic elements and bioforms spectrums are dominated by the boreal – mediterranean with a *Parmelia* thallus type species.

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