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

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Abstract: The study of saxicolous lichens communities from Bistrita Mountains had as result the identification of two lichens associations: *Parmelietum conspersae* Felfödy 1941 and *Umbilicarietum cylindricae* Frey 1933, instaled on siliceous rocks, in 3 locations: Pietrosul Bistriţei, Zugreni and Cheile Barnarului. These two lichens communities presented in this paper are mentioned for the first time from Bistriţa Mountains territory and described by phytosociological tables and analyzed from the bioforms, floristic elements and ecological indices perspectives.

Key words: saxicolous lichens, associations, Bistriţa Mountains.

Introduction

The study area belongs to Bistriţa Mountains, that are localized in the central-northern part of the Eastern Carpathians, between Rarău and Giumalău Massifs to north, Giurgeului and Ceahlău Mountains to south, Suhardului and Călimani Mountains to west and Stânişoarei Mountains to the east. They have a complex structure, the geological substratum being represented by cristaline, porphyroid and calcareous rocks. The study of lichens communities from these mountains has been realized in 2004, during several field trips in various locations. The purpose of the field trips was to identify saxicolous lichens communities and to realize phytosociological relevées in order to characterize them.

Material and methods

The method of working adopted in this study of saxicolous lichens associations from Bistriţa Mountains is that established by Klement [9] in concordance with the principles of Central European phytosociology school, used and adapted to our country lichens vegetation by Ciurchea et al. [4]. Identification of these associations has been made on the basis of the characteristic species indicated in the literature [1], [2], [4], [7]. For each association, an analysis of bio-forms and floristic elements has been made. In text, we used the next abbreviations for the bio-forms [3] and floristic elements [3]:

- HE Pa – epiphyte hemicryptophyte lichens having an *Parmelia* thallus type;
- HE ex – epiphyte hemicryptophyte lichens presenting external crust;
- HE Um – epiphyte hemicryptophyte lichens having an *Umbilicaria* thallus type;
- arct.-mid.eur.-med.mo. – arctic – middle european – mediterranean montane;
- arct.-mid.eur. mo. – arctic – middle european montane;
- arct.-bor. mo. – arctic – boreal montane;
- arct.-bor.-med. – arctic – boreal – mediterranean;
- arct.-med. – arctic – mediterranean;
- bor.-med. – boreal – mediterranean;

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- bor.-med. mo. – boreal – mediterranean mountain;
- south bor.-atl.-med. – south boreal – atlantic – mediterranean;

An analysis (after Ellenberg [8]) of ecological indices (L-light, U-humidity, T-temperature, R-substratum pH), expressing the ecological requests of the associated lichens species has been also realized.

Results and discussions

Table 1

RHIZOCARPETEA GEOGRAPHICI Wirth 1972
ASPICILIETALIA GIBBOSAE Wirth 1972
Parmelion conspersae Čern. & Hadač 1944

1. Ass. *Parmelietum conspersae* Čern. & Hadač 1944

L	U	T	R	BF	FE	Substratum	saxicolous (siliceous rocks)					K
						Altitude (m)	1700	900	800	1750	800	
						Slope (°)	5	25	15	15	10	
						Coverage (%)	80	60	75	70	70	
						Aspect	NV	V	NV	N	NV	
						Plot area (m²)	0.5	0.5	0.5	0.5	0.5	
						Nr. of relevé	1	2	3	4	5	
Car. ass.												
9	3	5	4	HE Pa	Bor.-med.	Xanthoparmelia conspersa	3	3	3	4	4	V
6	5	4	3	HE Pa	Arct.-mid.eur.-med.mo.	Parmelia saxatilis	3	2	2	1	+	V
Aspicilietalia gibbosae												
9	0	0	3	HE ex	Arct.-bor.mo.	Rhizocarpon geographicum	+	+	+	-	-	III
9	0	0	5	HE ex	Bor.-med.mo.	Acarospora fuscata	+	+	1	-	-	III
6	5	4	3	HE ex	Bor.-med.mo.	Rhizocarpon obscuratum	+	-	-	-	-	I
5	4	5	3	HE Pa	Bor.-med.	Melanelia glabratula	-	-	-	+	1	II
Rhizocarpetea geographici												
8	0	0	8	HE Pa	Arct.-med.	Physcia caesia	-	+	1	+	-	III
Variae syntaxa												
7	3	0	3	HE Pa	Arct.-med.	Hypogymnia physodes	+	+	-	+	+	IV
8	3	4	2	HE Pa	Bor.-med. mo.	Pseudevernia furfuracea	+	-	-	-	+	II
7	3	5	7	HE Pa	Bor.-med.	Xanthoria parietina	-	-	+	+	+	III
7	6	5	6	HE ex	Mid.eur.-subatl.med.	Lecanora gangaleoides	-	+	-	-	-	I
7	3	0	6	HE Pa	Arct.-bor.-med.	Physcia tenella	-	-	+	-	-	I
9	7	2	3	HE Um	Arct.-mid.eur.-med.mo.	Umbilicaria cylindrica	-	+	-	-	-	I

Place and date of relevées: 1,2 - Pietosul Bistritei (14.09.2004); 3 - Cheile Barnarului (19.06.2004); 4,5 - Zugreni (14.09.2004)

Stations conditions and chorology: The *Parmelietum conspersae* association prefers the siliceous rocks, developing itself commonly in the place of *Aspicilietum cinereae* association, whose component species died under pressure of lichens presenting a *Parmelia* thallus type that dominates by their abundance. This association is easily outspreading due to the numerous isidious species that enter in the floristic composition. The association is described by five relevées. It grows on siliceous rocks, being identified in Pietrosul Bistritei, Zugreni and Cheile Barnarului, at altitudes of 800-1750m, on north, north-west and west oriented and gentle inclined slopes.

Floristic and phytosociological composition. The floristic composition is characterized by a reduced number of species (only 13) and an average of 7 species per relevée. The coverage degree varies from 60 to 80%. In the phytosociological composition the characteristic species, *Xanthoparmelia conspersa* and *Parmelia saxatilis* are dominating due of foliose thallus that populates the most part of plot area. Also, high constancy classes present species from *Aspicilietalia gibossae* (*Rhizocarpon geograficum*, *R. obscuratum*, *Melanelia glabratula* etc.) and *Rhizocarpetea geographici* (*Physcia caesia*). (**Table 1**).

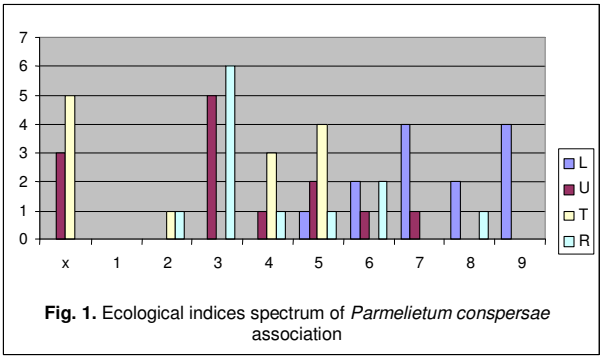

Fig. 1. Ecological indices spectrum of *Parmelietum conspersae* association

The ecological indices spectrum reveals that this association is developing itself well on sunny (L_9 – 31%, L_8 – 15%, L_7 – 31%) and dry siliceous rocks (U_3 – 38%). Most of the component species are eurythermic (T_x – 38%) and mesothermophylous (T_5 – 31%) and prefers as substratum acid siliceous rocks (R_3 – 45%) (**Fig. 1**).

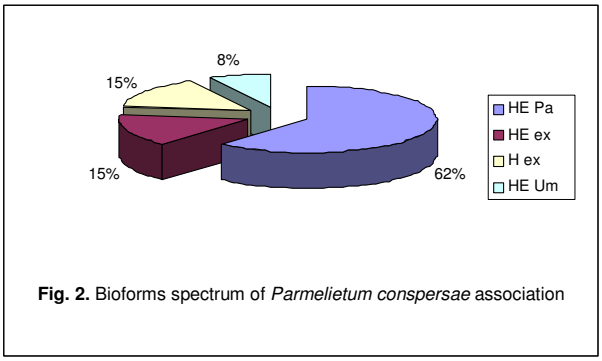

Fig. 2. Bioforms spectrum of *Parmelietum conspersae* association

The bioforms spectrum indicates the prevalance of epiphyte hemicryptophyte species presenting an *Parmelia* thallus type (HE Pa – 62%) and epiphyte hemicryptophyte species presenting an *Umbilicaria* thallus type (HE Um – 8%) that are growing on epiphyte hemicryptophyte lichens presenting external crust (HE ex – 15%, H ex – 15%) (**Fig. 2**).

The floristic elements spectrum presents the prevalance of boreal-mediterranean and boreal-mediterranean montane elements (each of these categories representing approximately 23%) and the presence in equal proportions (15%) the other floristic elements (arctic-middle european-mediterranean montane, arctic-boreal montane and arctic-mediterranean). The middle european-subatlantic-mediterranean element represent about 8% of the total (**Fig. 3**).

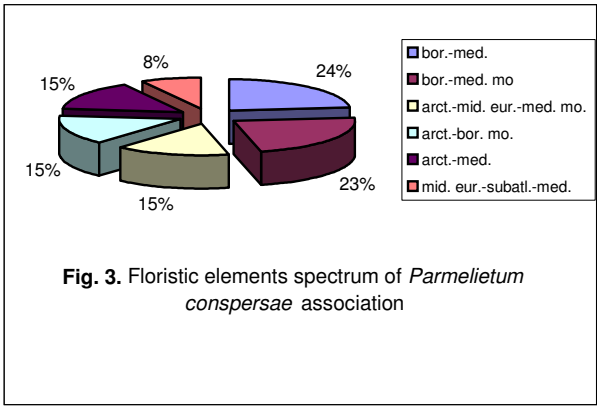

Fig. 3. Floristic elements spectrum of *Parmelietum conspersae* association

Table 2

RHIZOCARPETEA GEOGRAPHICI Wirth 1972
UMBILICARIETALIA CYLINDRICAE Wirth. 1972
Umbilicarion cylindricae Gams 1927
2. Ass. *Umbilicarietum cylindricae* Frey 1933

L	U	T	R	BF	FE	Substratum	saxicolous (siliceous rocks)					
						Altitude (m)	1700	1700	1750	1750	1750	
						Slope (°)	10	35	10	15	25	
						Coverage (%)	70	75	70	75	70	
						Aspect	N	NV	NV	N	NV	**K**
						Plot area	0,5	0,5	0,5	0,5	0,5	
						Nr. of relevé	1	2	3	4	5	
Car. ass.												
9	7	2	3	HE Um	Arct.-mid.eur.mo.	Umbilicaria cylindrica	3	4	3	4	3	V
Umbilicarion cylindricae												
9	7	3	4	HE Um	Arct.-bor.mo.	Umbilicaria deusta	2	1	2	1	3	V
8	7	2	3	HE Um	Arct.-bor.mo.	Umbilicaria proboscidea	1	1	1	1	+	V
-	-	-	-	HE Um	Arct.-bor.mo.	Umbilicaria crustulosa	+	-	-	-	-	I

Umbilicarietalia cylindricae												
9	0	0	3	HE ex	Arct.-bor.mo.	Rhizocarpon geographicum	1	1	+	1	+	V
6	5	4	3	HE Pa	Arct.-mid.eur.-med.mo.	Parmelia saxatilis	+	-	-	+	1	III
9	0	0	5	HE Pa	Bor.-med.mo.	Acarospora fuscata	+	+	+	-	-	III
9	3	5	4	HE Pa	Bor.-med.	Xanthoparmelia conspersa	-	-	1	+	-	II
Rhizocarpetea geographici												
5	7	4	4	HE Pa	South bor.-atl.-med.	Menegazzia terebrata	-	-	+	-	-	I
Variae syntaxae												
7	3	0	3	HE Pa	Arct.-med.	Hypogimnia physodes	-	-	+	+	-	II

Place and date of relevées: Pietrosul Bistritei (14. 09.2004)

Stations conditions and chorology: The *Umbilicarietum cylindricae* association has been identified on siliceous rocks, in the sub-alpine and alpine zones, at high altitudes (over 1200m) in Pietrosul Bistritei peak, on north, north-west oriented and gentle inclined slopes (10-35º).

Floristic and phytosociological composition: The floristic composition is characterized by a reduced number of species (only 10). The coverage degree vary from 70 to 75%. In the phytosociological composition the characteristic species, *Umbilicaria cylindrica* dominates. Also, high constancy classes present species from *Umbilicarion cylindricae* (*Umbilicaria deusta, U. proboscidea* etc.), *Umbilicarietalia cylindricae* (*Rhizocarpon geographicum, Parmelia saxatilis, Acarospora fuscata* etc.) and *Rhizocarpetea geographici* (*Menegazzia terebrata*). (**Table 2**).

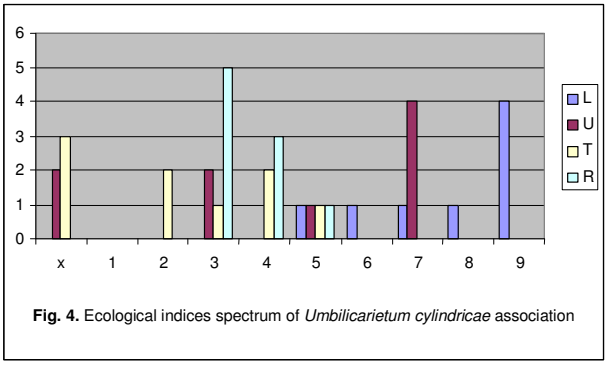

Fig. 4. Ecological indices spectrum of *Umbilicarietum cylindricae* association

The ecological indices spectrum shows the preponderance of light (photophylous) species (L_9 – 56%). Most of the component species are mesohygrophytes (U_7 – 45%), can tolerate large variations of temperature factor – eurythermic (T_x – 45%) and prefers acid rocks as substratum (R_3- 56%) (**Fig. 4**).

The bioform spectrum presents the dominance of epiphyte hemicriptophyte lichens with *Umbilicaria* thallus type (HE Um – 55%) and epiphyte hemicriptophyte lichens with *Parmelia* thallus type (HE Pa – 36%) that are growing on epiphyte hemicryptophyte lichens presenting external crust (HE ex – 9%) (**Fig. 5**).

The floristic elements spectrum indicates the prevalance of arctic-boreal montane species (40%) and arctic-middle european montane species (20%). Each of the other categories (boreal-mediterranean, boreal-mediterranean montane, arctic-mediterranean and south boreal-atlantic-mediterranean) represents approximately 10% (**Fig. 6**).

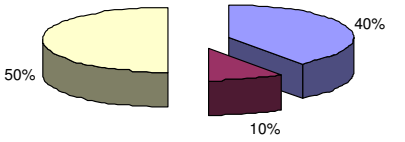

Fig. 5. Bioforms spectrum of *Umbilicarietum cylindricae* association

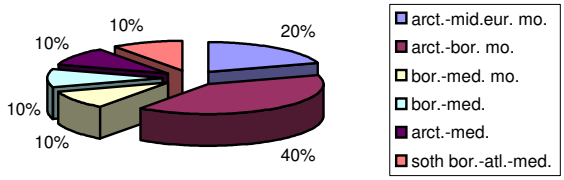

Fig. 6. Floristic elements spectrumspectrum of *Umbilicarietum cylindricae* association

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