

THE SCREES VEGETATION OF THE HIGHER BASIN OF THE PRAHOVA RIVER

CLAUDIA D. BIȚĂ-NICOLAE^{1,*}

The paper presents the main screes associations noticed in Abruptul Prahovean Reserve: *Cerastio lerchenfeldiani-Papaveretum* Boșcaiu, Täuber et Coldea 1997, *Doronico carpatici Papaveretum* Coldea et Pânzaru 1986 [Syn. As. *Papaver pyrenaicum-Festuca violacea* Beldie 1967], *Acino-Galietum anisophylli* Beldie 1967, *Saxifragetum moschatae-aizoidis* Boșcaiu 1971, *Gymnocarpietum robertianae* Kuhn 1937, Tx. 1937, *Thymo comosi-Galietum albi* Sanda et Popescu 1999. It also emphasises the endemic, rare or threatened cormophytes of those associations. For each association there have been set synthetic tables and graphs with the bioforms, geoelements and karyologic spectrum, as well and their interpretation.

Key words: associations, endemic, rare or threatened cormophyte species, bioforms, geoelements, karyologic spectrum.

INTRODUCTION

The higher basin of the Prahova River is situated at the contact area between mountains the Bucegi and Baiului Mountains. From the geologic point of view, the Bucegi Mountains are represented by a large synclinal on north-south direction, with Mesozoic sedimentary deposit laid in transgression over a basis of crystalline schist [13].

These deposits are Jurassic calcareous, conglomerates of Bucegi and micaceous whetstone, mostly. To the western side of the mountains, in the lower slope of Prahovean Abrupt, the conglomerates of Bucegi are laid on formations of inferior cretacic flish with layers of Sinaia and deposit of marls and grit stones.

The variety of pedogenetic factors (climate, vegetation, lithologic substrate, relief) together with the absolute age of different soils brought about the forms of all genetic series of both the mountainous and alpine soils in the Bucegi Mountains.

The coming out of certain rocks had conditioned the formation of intrazonal soils. Therefore, on calcareous rocks rendzinic, lithomorphic soils had been constituted in both the forest and alpine belt.

In this territory we noticed the screes vegetation in the Abruptul Prahovean Reserve and we could affirm this is a representative screes vegetation for the whole territory studied [12]. There are many studies about screes vegetation from all

^{1,*} Institute of Biology, 296 Splaiul Independenței Str., RO-060031 Bucharest, Romania, e-mail: claudia.bită@ibiol.ro

around Romanian Carpathians but we noticed a synthesis paper of *Thlaspietea rotundifolii* class [7] and the few that are newer of Piatra Craiului and Făgăraș Mountains [6, 11]. There were also two older monographic studies in this area [1, 8], but without synthetic tables of vegetation or concerning the grassland.

On the other hand, in the studied area we also described the cormophytes and their ecological parameters.

MATERIAL AND METHODS

The studies had been effectuated in the summers 2000, 2002 and 2003 based on field observations, on the consultation of literature and of the herbarium from the Institute of Biology, Bucharest. The main method of study in the field was the Braun-Blanquet method. We composed the phytocoenotical tables for each association and we framed it in the appropriate class [4, 5, 9]. For each association it has been set synthetic tables and graphs with bioforms, geoelements and karyologic spectrum and also their interpretation [10].

RESULTS AND DISCUSSION

According to the found association it has been compiled the vegetation conspectus as below:

Cl. *Thlaspietea rotundifolii* Br.-Bl. 1926

Ord. *Thlaspietalia rotundifolii* Br.-Bl. 1926

All. *Papavero-Thymion pulcherrimi* I. Pop 1968

1. *Cerastio lerchenfeldiani-Papaveretum* Boșcaiu, Tauber et Coldea 1977

2. *Doronicum carpatici-Papaveretum* Coldea et Pânzaru 1986

3. *Acino-Galietum anisophylli* Beldie 1967

4. *Saxifragetum moschatae-aizoidis* Boșcaiu 1971

Ord. *Galio-Parietalia officinalis* Boșcaiu et al. 1966

All. *Stipion calamagrostis* Br.-Bl. 1918 (*Achnatherion calamagrostis* Boșcaiu 1971 nom. mut. propos)

5. *Gymnocarpietum robertianae* (Kuhn 1937) Tx. 1937

6. *Thymetum comosi* Pop et Hodișan 1963

Cl. *Thlaspietea rotundifolii* Br.-Bl. 1926

The associations of calcareous screes of the alpin belt are grouped in both *Papavero-Thymion pulcherrimi* and *Stipion calamagrostis* alliances. These are a first link in the vegetation installation on the aggregations of the broken cliffs. The phytocoenoses of this class contain saxicolous species: *Arabis alpina*, *Doronicum carpaticum*, *Thymus pulcherrimus*.

Ord. *Thlaspietalia rotundifolii* Br.-Bl. 1926

This order groups heliophilous associations that vegetate on calcareous screes of both the alpine and mountain belt. Among characteristic species, we noticed *Galium anisophyllum*, *Myosotis alpestris*, *Senecio squalidus*.

All. *Papavero-Thymion pulcherrimi* I. Pop 1968

This alliance gets together associations of alpine belt. In the studied territory we emphasize such species as: *Acinos alpinus*, *Cerastium arvense* ssp. *lerchenfeldianum*, *Papaver alpinum* ssp. *corona-sancti-stephani*.

1. ***Cerastio lerchenfeldiani-Papaveretum* Boşcaiu, Täuber et Coldea 1997** (Table 1).

On these screes consisting of small sketches and organic material aggregations, the vegetation increases in such species as: *Cerastium arvense* ssp. *lerchenfeldianum*, *Anthemis carpatica*, *Senecio squalidus*, *Saxifraga oppositifolia*, *Galium album*.

In the studied area we mentioned this association on Valea Seacă and on Valea Albă, at higher than 1 800 m.

Table 1

Cerastio lerchenfeldiani-Papaveretum Boşcaiu, Täuber et Coldea 1997

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	V	V	VE	VE	VE	
				Cover (%)	25	15	45	25	60	
				Slope (degree)	50	55	50	65	45	
				Surface (sq.m.)	25	25	25	4	4	
1	2	3	4	5	6	7	8	9	10	11
				Char.ass.						
				<i>Cerastium arvense</i>						
H	D-Balc	18	54	ssp. <i>lerchenfeldianum</i>	2	+	3	1	+	V
H	Carp	-	-	<i>Papaver alpinum</i> ssp. <i>corona-sancti-stephani</i>	1	1		2	3	IV
				Papavero-Thymion et Thlaspietalia						
H(G)	Alp-Carp	8	16	<i>Alyssum repens</i>		+	+	+	2	IV
H	Alp	8	16	<i>Arabis alpina</i>				+	+	II
				<i>Cardaminopsis arenosa</i>	+	+			+	III
H	Cosm	7	252	<i>Cystopteris regia</i>	+	+		+		III
Ch(H)	Alp-Carp	11	22	<i>Galium anisophyllum</i>	+	+	1	+		IV
H	Alp-Carp	7	14	<i>Poa molinerii</i>		+		+	+	III
Ch	Eur	8	16	<i>Sedum atratum</i>	+			+		II
Th	Alp-Carp	10	20	<i>Senecio squalidus</i>	+	+	+		+	IV
				Androsacetalia alpinae s.l.						
H	Circ	7	14	<i>Oxyria dygina</i>	+		+	+		III
Th	Circ	11	22	<i>Saxifraga adscendens</i>		1		+		II
				Artemisietalia petrosae						
Ch	Carp.Balc	8	16	<i>Draba lasiocarpa</i>				+	+	II

Table 1 (continued)

1	2	3	4	5	6	7	8	9	10	11
H	Carp	12	24	<i>Silene nutans</i> <i>ssp.dubia</i>	+		+	+	+	IV
				Seslerietalia						
H	Eua(Alp)	-	-	<i>Anthemis carpatica</i> <i>ssp.carpatica</i>		+	+		+	III
H	Euc	9	18	<i>Biscutella laevigata</i>			+		+	II
H	Eur(Alp)	5	30	<i>Carex sempervirens</i>	+		+		+	III
H	Alp-Carp	7	14	<i>Festuca versicolor</i> <i>Pedicularis</i> <i>verticillata</i>			+	+		II
H	Circ	6	12	Variae syntaxa <i>Dianthus glacialis</i> <i>ssp. gelidus</i>	+	+			+	III
H	Alp-Carp	15	30	<i>Saxifraga aizoides</i>	+	+		+		II
Ch	Eua	13	26				+		+	III

1 survey: 1: *Saxifraga paniculata* (Ch, Eua, 7,28); 2: *Poa alpina* (H, Circ, 7, 21); 3: *Rhodiola rosea* (Ch, Circ, 11,22) +, *Erigeron uniflorus* (H, Circ, 9,18) +, 4: *Thymus pulcherrimus* (Ch, Carp, 9, 56) +, *Silene pusilla* (Ch, Eur, 12, 24) +, 5: *Saxifraga oppositifolia* (Ch, Circ, 13, 26), *Helianthemum alpestre* (Ch, Alp-Carp, 11,22) +, *Myosotis alpestris* (H, Circ, 6,24) +, *Ranunculus oreophilus* (H, Carp-Balc, 8,16) +, *Sesleria coeruleans* (H, Carp-Balc, 7,28) +, *Taraxacum nigricans* (H, Carp-Balc, 8, 32). **The place and date of the surveys:** 1,2, V. Albă, 17.07.2002; 3,4,5, V. Seacă, 25.08.2003

In the described phytocoenoses of this association, the bioforms (Fig. 1a) are represented by hemicryptophytes – with a high percentage (61%), but also the chamephytes have a significant presence (30%), followed by annual (6%) and biannual (3%) therophytes.

Regarding to floristic spectrum (Fig. 1b), the circumpolar species are represented by 25% percentage circumpolars followed by alpino-carpathians (21%), carpathian-balkan species (12%), carpathians, eurasiatic and european species (9% each).

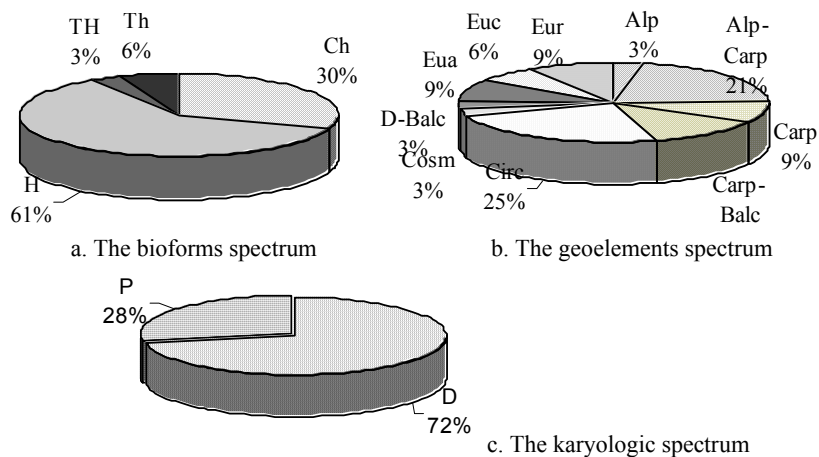


Fig. 1. The spectre of ass. *Cerastio lerchenfeldiani-Papaveretum*.

The diploid species are represented by a more taxa (72%) than those polyploid (28%) (Fig. 1c). The diploidy index is 2.57.

We noticed *Cerastium arvense* ssp. *lerchenfeldianum*, *Dianthus glacialis* ssp. *gelidus* as rare species, and *Draba lasiocarpa* as well.

2. *Doronico carpatici-Papaveretum* Coldea et Pânzaru 1986.

[Syn. As. *Papaver pyrenaicum-Festuca violacea* Beldie 1967] (Table 2).

This association grows on calcareous gravels and screes on shelves of rocky walls base. Although it is noticed on narrow areas, it has an important role at both fixation and consolidation of the land. We noticed this association on the Prahovean side of the Bucegi Mountains, on abrupt slopes of Coșților Morarului and Coștila Mountains.

The most frequent species seen are mentioned below: *Doronicum carpaticum*, *Oxyria digyna*, *Saxifraga moschata*.

Table 2

Doronico carpatici-Papaveretum Coldea et Pânzaru 1986

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	N	NV	NV	V	V	
				Cover (%)	10	20	10	10	25	
				Slope (degree)	20	40	30	45	35	
				Surface (sq. m.)	4	4	4	4	4	
1	2	3	4	5	6	7	8	9	10	11
				Char. ass.						
H	Carp-Balc	-	-	<i>Doronicum carpaticum</i>	+	+	+	1		IV
				<i>Papaver alpinum</i>						
				<i>ssp. corona-sancti-stephani</i>	1	2	1	1	2	V
				Papavero-Thymion et Thlaspietalia						IV
H	Alp	8	16	<i>Arabis alpina</i>	+	+	+	+		IV
Ch(H)	Alp-Carp	11	22	<i>Galium anisophyllum</i>		+		+		II
Ch	Carp	9	56	<i>Thymus pulcherrimus</i>		+	+		+	III
				Androsacetalia alpinae s.l.						
H	Circ	7	14	<i>Oxyria digyna</i>	+	+	+		+	IV
H	Circ	6	12	<i>Luzula spicata</i>			+	+		II
Ch	Eur	12	26	<i>Saxifraga bryoides</i>	+	+				II
Ch	Circ	12	26	<i>Saxifraga oppositifolia</i>	+		+	+		III
H	D-Balc	-	-	<i>Veronica baumgartenii</i>		+		+	1	III
				Artemisietalia petrosae						
Ch	Eua	7	28	<i>Saxifraga paniculata</i>	+		+			II
H	Alp-Carp	9	18	<i>Artemisia eriantha</i>	+	+	+			III
				Seslerietalia						
H	Alp-Carp	7	14	<i>Festuca versicolor</i>	+	+		+		III
H	Circ	6	12	<i>Pedicularis verticillata</i>		+	+	+		III
H	Euc	9	18	<i>Biscutella laevigata</i>			+		+	II
H	Carp	9	18	<i>Achillea schurii</i>		+		+		II
				<i>Saxifraga exerta</i>						
Ch	Eua	13	28	<i>ssp. moschata</i>				+	+	II
H	Circ	11	88	<i>Polygonum viviparum</i>		+	+	+	+	IV

Table 2 (continued)

1	2	3	4	5	6	7	8	9	10	11
				<i>Variae syntaxa</i>						
H	Carp-Balc	17	34	<i>Campanula kladniana</i>		+			+	II
H	Circ	12	24	<i>Silene acaulis</i>				+	+	II
				<i>Cerastium alpinum ssp.</i>						
Ch	Alp	9	72	<i>lanatum</i>	+		+			II
H	Eur(Alp)	-	28	<i>Geum montanum</i>		+		+	+	III
H	Eur	10	36,40	<i>Soldanella pusilla</i>	+			+		II

1 survey: 1: *Saxifraga aizoides* (Ch, Eua, 13, 26) +, *Myosotis alpestris* (H, Circ, 6, 24) +, *Festuca violacea* (H, Carp, 7, 14) 1, *Poa laxa* (h, Eua, 7,28) +; 2: *Ranunculus oreophilus* (H, Carp-Balc, 8, 16) +; 3: *Poa alpina* (H, Circ, 7, 21) +; 4: *Cystopteris fragilis*, (H, Cosm, 7, 252) +. **The place and date of the surveys:** 1-3, Colții Morarului, 17.07.2002; 4, 5, Coștila, 25.08.2003.

The bioforms that compose the association spectrum (Fig. 2a) are hemicyptophytes (73%) and chamephytes (27%), respectively.

The geoelements spectrum (Fig. 2b) is represented by circumpolar species (28%), endemic carpathian species and eurasiatic (13% each) and carpathian-balkan alpine-carpathian, european species (10% each), but the other species are insignificant.

The karyologic spectrum (Fig. 2c) is dominated by diploid species (69%), as time as polyploid species represent 31% only. The index of diploidy has the value 2.17.

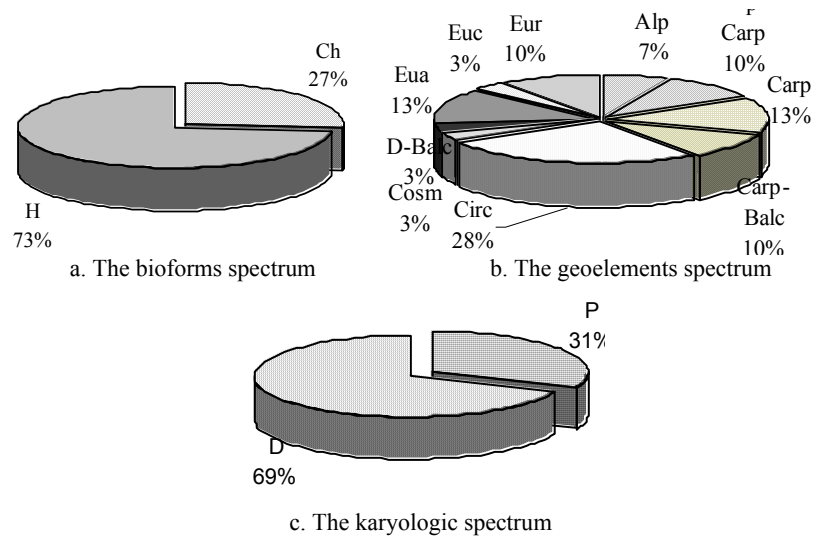


Fig. 2. The spectrum of ass. *Doronico carpatoci-Papaveretum*.

3. *Acino-Galietum anisophylli* Beldie 1967 (Table 3).

There is one of the most representative associations of calcareous screes. It vegetates on small screes on the rocky base but also on shelves and is consequent on *Seslerio bielzii-Caricetum semperviventis* association. This association has been

set off for the first time even from the Bucegi Mountains by Al. Beldie (2). According to this author, the association is found all around in the alpine belt area, on calcareous substratum. It grows on sunny slopes, especially. Besides two characteristic species, *Acinos alpinus* and *Galium anisophyllum*, with high fidelity we noticed: *Sedum atratum*, *Thymus pulcherrimus*, *Achillea schurii*, *Senecio squalidus*, *Ranunculus oreophilus*, *Poa alpina*.

Table 3
Acino-Galietum anisophylli Beldie 1967

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	NE	NE	NE	E	E	
				Cover (%)	35	25	40	60	25	
				Slope (degree)	15	20	20	25	15	
				Surface (sq.m.)	4	4	4	4	4	
1	2	3	4	5	6	7	8	9	10	11
				Opt. ass.						
H	Pont-Med	9	18	<i>Acinos alpinus</i>	2	1	3	2	2	V
Ch(H)	Alp-Carp	11	22	<i>Galium anisophyllum</i>	1	2	+	2	1	V
				Thlaspietalia						
H	Alp	8	16	<i>Arabis alpina</i>		+	+		+	III
H	D-Balc	-	-	<i>Doronicum carpaticum</i>		+	+			II
H	Circ	6	24	<i>Myosotis alpestris</i>				+	+	II
Th(TH)	Alp-Carp	10	20	<i>Senecio squalidus</i>				+	+	II
Ch	Carp	9	56	<i>Thymus pulcherrimus</i>	1				+	II
				Seslerietalia s.l.						
H	Eur(Alp)	5	30	<i>Carex sempervirens</i>	+		+		+	III
Ch	D-Balc	9	36	<i>Cerastium arvense</i>	1	+	+			III
				<i>Cerastium arvense ssp. lorchfeldianum</i>				2	+	II
Th	Eur(Alp)	11	44	<i>Euphrasia salisburgensis</i>	+		+			II
H	Alp-Carp	7	14	<i>Festuca versicolor</i>		+	+			II
H	Alp-Carp	17	34	<i>Polygala alpestris</i>		+				I
H	Alp-Carp	8	16	<i>Ranunculus oreophilus</i>			+	+		II
Th	Carp	-	-	<i>Thlaspi dacicum</i>	+					I
				Potentillo-Nardion						
H	Eua	11	44	<i>Cruciata glabra</i>	+	+				II
H	Circ	9	18	<i>Veronica alpina</i>				+	+	II
TH	Carp-Balc	10	80	<i>Campanula patula ssp. abietina</i>		+		+		II

Table 3 (continued)

1	2	3	4	5	6	7	8	9	10	11
H	D-Balc	-	-	<i>Potentilla aurea ssp. chrysocraspeda</i>		+	+			II
				<i>Festuco saxatilis-Seslerion bietzii</i>						
Th	Circ	11	22	<i>Saxifraga adscendens</i>				+	+	II
Ch	Eur	8	16	<i>Sedum atratum</i>				+	+	II
				<i>Festuco-Brometea</i>						
			104-							
H	Eur	8	110	<i>Alchemilla xanthochlora</i>		+		+	+	III
H	Eua	10	30	<i>Campanula glomerata ssp. glomerata</i>		+	+	+		III
				<i>Variae syntaxa</i>						
H	Eua	6	24	<i>Lotus corniculatus</i>		+		+		II

1 survey: 1: *Viola biflora* + (H, Circ, 6, 12), 2: *Poa alpina* + (H, Circ, 7, 21), *Luzula alpino-pilosa* + (H, Circ, 6, 12), 3: *Koeleria macrantha ssp. macrantha* + (H, Carp), 4: *Achillea schurii* + (H, Carp, 9, 18), *Minuartia verna* + (H(Ch), Alp, 12, 24), *Phleum alpinum ssp. alpinum* + (H, Circ, 7, 14), *Pedicularis verticillata* 1 (H, Eua, 8, 16).

The place and date of the surveys: 1-3, Colții Morarului, 17.07.2002; 4, Caraiman, 17.07.2002; 5, Coștila, 25.08.2003.

The bioforms spectrum (Fig. 3a) is dominated by hemicryptophytes (71%) and annual therophytes and chamephytes (13% each).

The geoelements with the greatest percentage are the circumplolars (25%); after that there are alpino-carpathians (19%) and europeans, euroasiatics and dacian (15% each) species (Fig. 3b).

From karyologic point of view (Fig. 3c), the most species are diploids (61%) followed by polyploids (27%); the diplo-ployploids species are in a very low percentage (12%). The value of index of diploidy is 2.28.

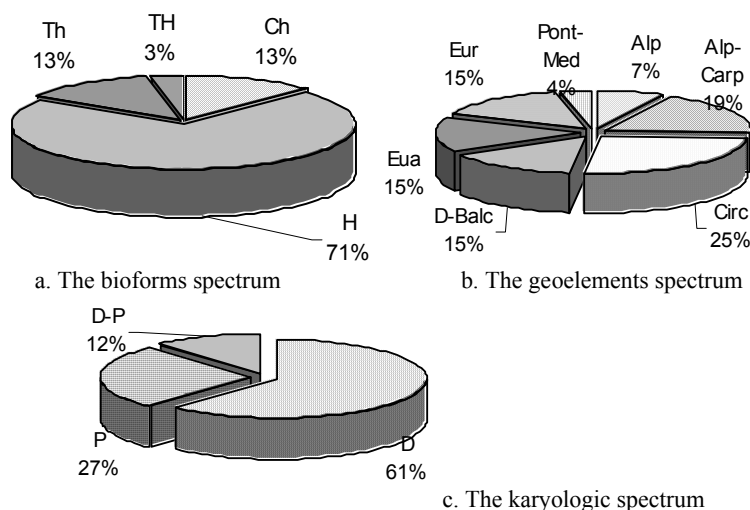


Fig. 3. The spectrum of ass. *Acino-Galietum anisophylli*.

We noticed *Cerastium arvense* ssp. *lerchenfeldianum*, *Thlaspi dasicum*, *Campanula patula* ssp. *abietina* as rare species, and also *Doronicum carpaticum* as endemic species for the Carpathian Mountains.

4. *Saxifragetum moschatae-aizoidis* Boşcaiu 1971 (Table 4).

The association is found on screes with low mobility but with high humidity of the alpine belt. In the frame of these phytocoenoses, the species mentioned below: *Saxifraga aizoidis*, *Cerastium lerchefeldianum*, *Galium anisophyllum* have a constant presence.

We noticed it in the alpine belt of Prahova's slopes of Bucegi Massif, on Caraiman Mountain and Colții Morarului Mountain, as well.

Table 4
Saxifragetum moschatae-aizoidis Boşcaiu 1971

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	V	V	VE	VE	VE	
				Cover (%)	25	25	20	65	40	
				Slope (degree)	25	15	15	20	35	
				Surface (sq.m.)	4	4	4	4	4	
1	2	3	4	5	6	7	8	9	10	11
				Opt.ass.						
Ch	Eua	13	26	<i>Saxifraga aizoidis</i>	2	1	1	3	3	V
				<i>Thlaspetalia rotundifolii</i>						
H	Alp	8	16	<i>Arabis alpina</i>	+	+				II
Ch	D-Balc	9	36	<i>Cerastium arvense</i>		+	+			II
				<i>Cerastium arvense</i> ssp. <i>lerchefeldianum</i>	+	1	+		+	III
Ch(H)	Alp-Carp	11	22	<i>Galium anisophyllum</i>	+	1	+		+	IV
				<i>Androsacion alpinae</i>						
H	Circ	7	14	<i>Oxyria digyna</i>		+	+			II
				<i>Seslerietalia Minuartia verna</i>						
H(Ch)	Alp	12	48	ssp. <i>verna</i>				+	+	II
H	Pont-Med	9	18	<i>Acinos alpinus</i>	+		+		+	III
				<i>Salicion herbaceae</i>						
				<i>Gnaphalium norvegicum</i>		+	+			II
Ch	Eur	8	16	<i>Sedum atratum</i>	+			+		II
				<i>Senecio squalidus</i>	+			+		II
Th	Alp-Carp	10	20	<i>Thymus pulcherrimus</i>	+		+		+	III
Ch	Carp	9	56		+		+		+	III

Table 4 (continued)

1	2	3	4	5	6	7	8	9	10	11
H	Circ	9	18	<i>Veronica alpina</i>	+	+				II
				Arabidion						
				coeruleae						
				<i>Saxifraga</i>						
Ch	Eua	13	128	<i>androsacea</i>	+	+				II
				<i>Taraxacum</i>						
H	Carp-Balc	8	32	<i>nigricans</i>		+	+		+	III
				Asplenietalia						
				ruta-murarie						
				<i>Artemisia</i>						
H	Alp-Carp	9	18	<i>eriantha</i>		+	+			II
				<i>Asplenium</i>						
H	Circ	9	72	<i>viride</i>	+		1			II
				<i>Cystopteris</i>						
H	Cosm	7	168,252	<i>fragilis</i>	+		+			II
				<i>Saxifraga</i>						
Ch	Eua	7	28	<i>paniculata</i>			+			II
				Variae syntaxa						
				<i>Campanula</i>						
H	Carp-Balc	17	34	<i>kladiana</i>	+		+		+	III
				<i>Festuca</i>						
				<i>airoides</i>		+	+			II
H	Circ	7	14							II
H	Circ	7	21	<i>Poa alpina</i>	+		+	+		III
Ch	Euc	11	66	<i>Primula minima</i>		+		+		II
Ch	Eur	12	24	<i>Silene pusilla</i>	+		+			II
H	Carp	-	18	<i>Achillea schurii</i>				1	+	II

1 survey: 1: *Rumex scutatus* (H, Alp-Carp, 10, 20) +, *Agrostis rupestris* + (H, Alp, 7, 21), *Sedum alpestre* (Ch, Eur, 12,24) +; 2: *Ranunculus oreophilus* (H, Alp.Carp, 8, 16) +, *Huperzia selago* (Ch, Cosm, -, 264, 272) +, *Saxifraga adscedens* (Th, Circ, 11,22), *Viola biflora* (H, Circ, 6,12), *Polygonum viviparum* (H, Circ, 11, 88); 3: *Chamorchis alpina* (G, Eua, 7, 42) +; 4: *Salix reticulata* (N, Circ, 19, 38) 2, *Saxifraga oppositifolia* (Ch, Circ, -, 26) +, *Dianthus glacialis* ssp. *gelidus* (H, Alp-Carp, 15, 30) +; *Parnassia palustris* (H, Circ, 9, 18). *Cystopteris regia* (H, Cosm, 7, 252) 1, *Cerastium alpinum* (Ch, Eua, 9, 54,72) +; 5: *Poa molinerii* ssp. *molinerii* (H, Alp.Carp, 7, 14) +.

The place and date of the surveys: 1-3, Colții Morarului, 17.07.2002; 4,5, Caraiman, 26.08.2003.

The bioforms are represented by a high percentage (59%) of hemicryptophytes along with chamephytes (32%) (Fig. 4a).

The best represented geoelementes are circumpolar species (31%), alpino-carpathians (19%) and those euroasiatic species (17%) (Fig. 4b).

Concerning the karyologic spectrum (Fig. 4c), the diploid species are dominant (56%) but a high percentage have the polyploid species (44%) as well. Hereby, the index of diploidy has the value 1.25.

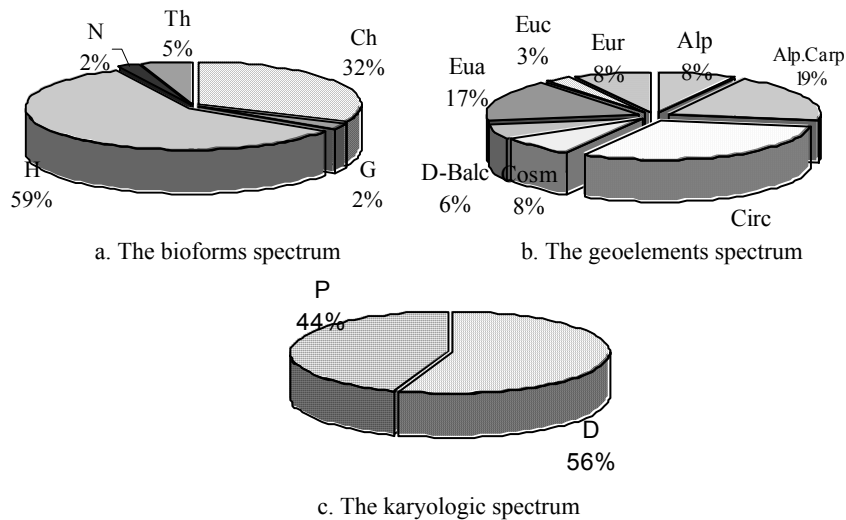


Fig. 4. The spectrum of ass. *Saxifragetum moschatae-aizoidis*.

We noticed *Cerastium arvense* ssp. *lerchenfeldianum*, *Dianthus glacialis* ssp. *gelidus*, *Artemisia eriantha* as rare species and also *Dianthus glacialis* ssp. *gelidus* as endemic species.

Ord. Galio-Parietalia officinalis Boşcaiu et al. 1966.

This order groups the phytocoenoses with south origin; they grow in xerotherm microclimate conditions.

All. Stipion calamagrostis Br.-Bl. 1918 (*Achnatherion calamagrostis* Boşcaiu 1971 nom. mut. propos)

This alliance contains petrophilous associations on sunny rocks with pioneer character but they have an important role as fixative of rocky places. Among characteristic species, we noticed: *Gymnocarpium robertianum*, *Senecio squalidus*, *Geranium robertianum*.

5. Gymnocarpietum robertianae Kuhn 1937, Tx. 1937 (Table 5).

This association is sporadic on calcareous semishaded rocky and screes at Saint Anna Reserve. The characteristic species are noticed below: *Valeriana montana*, *Poa nemoralis*, *Valeriana sambucifolia*, *Geranium robertianum*, etc.

Al. Beldie (1957) mentioned these groups are sporadic and characterized by a rare fern in Bucegi Massif, *Gymnocarpium robertianum* that forms almost itself thick clumps.

Table 5
Gymnocarpium robertianae Kuhn 1937, Tx. 1937

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	E	E	E	E	E	
				Cover (%)	65	65	90	60	55	
				Slope (degree)	35	45	30	30	35	
				Surface (sq.m.)	4	4	4	4	4	
1	2	3	4	5	6	7	8	9	10	11
				<i>Stipion calamagrostis et Thlaspietali Gymnocarpium robertianum</i>	3	3	3	3	3	V
G	Circ	10	160	<i>Senecio squalidus</i>	+					II
Th	Alp	10	20							
H	Circ	7	28	<i>Poa nemoralis</i>	+		+	+	-	III
				<i>Variae syntaxa</i>						
				<i>Valeriana montana</i>	2	2	3	+	2	V
H	Eur	8	32							
H	Eua	7	14	<i>Fragaria vesca Euphorbia amygdaloides</i>	+	+				II
Ch	Eur	9	18		+		+	+		III
H	Euc	9	18	<i>Veronica urticifolia</i>	+	+	+	+		IV
				<i>Melampyrum saxosum</i>	1	1	2		+	IV
Th	Carp	-	-							
				<i>Luzula luzuloides ssp. cuprina</i>	+	+			+	III
H	Eur	6	12							
H	Euc	8	56	<i>Valeriana sambucifolia</i>	+		+			II
				<i>Epipactis atrorubens</i>	+	+		1		III
G	Eua	10	40							
H	Euc	17	34	<i>Cirsium erisithales</i>	+		+	+		III
				<i>Hieracium rotundatum</i>	+			+	1	III
H	Carp	9	18							
				<i>Cnidium silajifolium</i>	+				+	II
Th	Med	-	-							

1 survey: 1: *Petasites albus* (G, Eua, 10, 60) +, *Geranium robertianum* (Th, Cosm, 8, 64) +, *Cystopteris fragilis* (H, Cosm, 7,168) +, *Campanula persicifolia* (H, Eua, 8, 16) +, *Astrantia major* (H, Eua, 7, 14) 2: *Achillea stricta* (H, Alp, 9,54) +, *Linum catharticum* (Th, Eur, 8,16) +, *Galium schultesii* (G, Euc, 11, 44) +, *Asplenium viride* (H, Circ, 9, 72) +, 4: *Mercurialis perennis* (H, Eur, 7, 42) 2, 5: *Saxifraga cuneifolia*, (Ch, Euc, 7, 28) +

The place and date of the surveys: 1-5, Stâncile Sf. Ana, 17.07.2000.

For bioforms spectrum (Fig. 5a) the hemicryptophytes contribute with 56%, annual therophytes with 20% and geophytes with 16%.

Concerning geoelements spectrum (Fig. 5b), this is dominated by central-european species (24%), european (20%), euroasiatic (16%) and circumpolars (12%), the others having a lower percentage.

The karyologic spectrum (Fig. 5c) is divided between diploid (47%) and polyploid (53%) species and the value of the Pignatti index is 0.88.

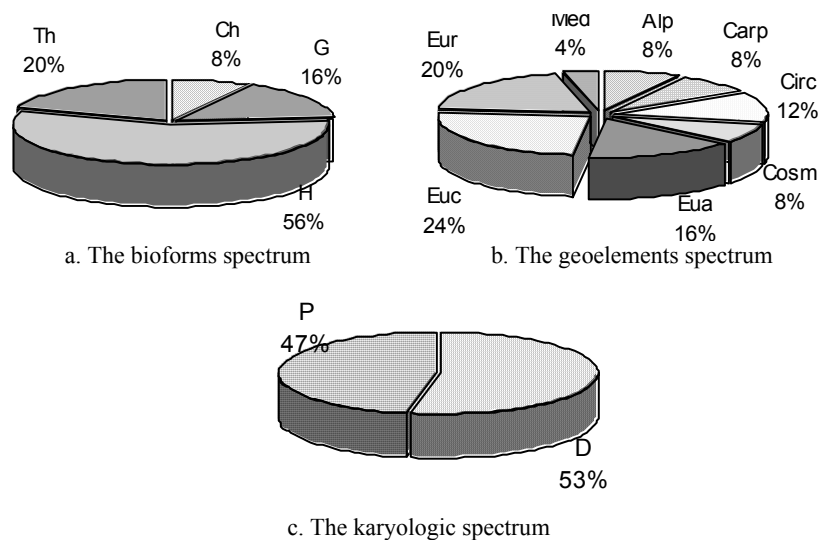


Fig. 5. The spectrum of ass. *Gymnocarpium robertianae*.

6. *Thymo comosi-Galietum albi* Sanda, Popescu 1999 (Table 6).

It grows on scree of rocks in the Reserve Saint Anna, where there is a high percentage of solidification.

The association groups pioneer phytocoenoses that are established on mobile scree on rocks bases. They have a large number of thermophile species, as well.

We noticed this association on scree of Saint Anna Reserve and we emphasized a few most frequent species: *Sedum hispanicum*, *Thymus comosus*.

The bioforms spectrum (Fig. 6a) is divided among hemicryptophytes (78%), annual therophytes and chamephytes (11% each).

The most geoelements are central-european (24%), eurasiatic (23%), european and carpathian (19% each) (Fig. 6b).

The karyologic spectrum (Fig. 6c) is represented by 38% diploid species and 62% polyploid species. The index of diploidy is 0.61.

Table 6
Thymo comosi-Galietum albi Sanda et Popescu 1999

Bioform	Geoelement	x	2n	No. survey	1	2	3	4	5	K
				Exposition	V	V	V	V	V	
				Cover (%)	85	95	90	45	55	
				Slope (degree)	35	35	25	30	30	
				Surface (sq.m.)	4	4	4	4	4	
1	2	3	4	5	6	7	8	9	10	11
				Char ass.						
Ch	Carp	7	28	<i>Thymus comosus</i>	2	3	3	1	3	V
				Stipion						
				calamagrostis et						
				Thlaspietalia						
H	Eur	11	44	<i>Galium album</i>	1	3	3	2	2	V
				<i>Vincetoxicum</i>						
H	Eur	11	22	<i>hirudinaria</i>	3	3	2	2	+	V
				<i>Origanum</i>						
H	Eua	15	30	<i>vulgare</i>	+	1	+			III
				Variae syntaxa						
H	Eua	7	14	<i>Sedum maximum</i>	+		+			II
				<i>Scabiosa</i>						
H	Eur	8	16	<i>columbaria</i>	+	+	+	+		IV
H	Euc	6	24	<i>Coronilla varia</i>	+	+	+	+	+	V
				<i>Cirsium</i>						
H	Euc	17	34	<i>erysithales</i>	+	+	+	+		IV
H	Eua	8	16	<i>Salvia glutinosa</i>	+					I
				<i>Bromus</i>						
H	Eua	7	28	<i>benekenii</i>	+		+			II
				<i>Bupleurum</i>						
				<i>falcatum ssp.</i>						
H	Alp	-	-	<i>cernuum</i>	+	+	+			III
				<i>Cnidium</i>						
Th	Med	-	-	<i>silifolium</i>	2	+		+	+	IV
				<i>Veronica</i>						
H	Euc	9	18	<i>urticifolia</i>	+		+			II

1 survey: 1: *Galium schultesii* (H, Euc, 11, 44), *Melampyrum saxosum* (H, Carp, -, -) +, *Lamiastrum galeobdolon* (H, Euc, 9, 36) +, *Primula elatior ssp. carpatica* (H, Carp, 11, 22) +; **2:** *Trisetum fuscum* (H, Carp, -, -) +, *Geranium robertianum* (Th, Cosm, 8, 64) +, *Euphorbia amygdaloides* (Ch, Eur, 9, 18) +; **4:** *Hypericum perforatum* (H, Eua, 8, 32) +, *Melica ciliata* (H, Euc, 9, 18) +.

The place and date of the surveys: 1-5, Stâncile Sf. Ana, 17.07.2000.

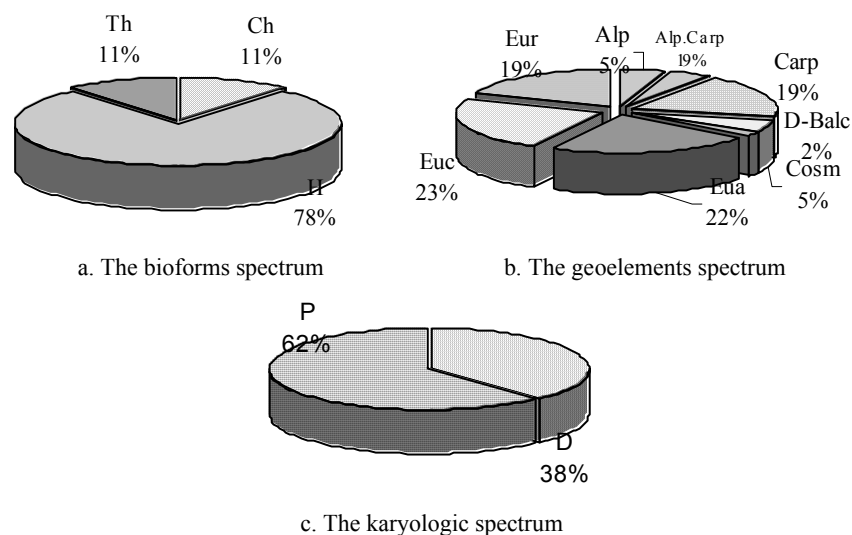


Fig. 6. The spectrum of ass. *Thymo comosi-Galietum albi*.

CONCLUSIONS

There are six associations of *Thlaspietea rotundifolii* described from the higher Prahova basin. Actually, the surveys were picked up in the Abruptul Prahovean Reserve, but they are characteristic for the whole studied area. In these associations, the presence of hemicryptophytes is appreciable. The next bioforms are chamephytes and therophytes.

The geophytes spectrum of the screes vegetation contains an estimable percent of circumpolars species but also alpico-carpathians, euroasiatic, european and Carpathian endemic species.

The karyologic spectrum is dominated by diploid species.

REFERENCES

1. Beldie Al., 1967, *Flora și vegetația munților Bucegi*, Edit. Acad. R.S.R., Bucuresti, pp: 527-545.
2. Biță D. Claudia, 1999, Characterisation of the Higher Prahova Basin Flora, *Proceedings of the Institute of Biology*, **II**, pp: 23-26.
3. Biță D. Claudia, 2002, Ecological Aspects of the Saxicole Flora of the Higher Basin of Prahova River, *Proceedings of the Institute of Biology*, **IV**, pp: 21-23.
4. Borza Al., Boșcaiu N., 1965, *Introducere în studiul covorului vegetal*, Edit. Acad. R.S.R. Bucuresti, pp: 98-143.

5. Cristea V., Gafta D., Pedrotti F., 2004, *Fitosociologie*, Presa Universitară Clujană, Cluj-Napoca, pp: 156-172.
6. Mihăilescu Simona, 2001, *Flora și vegetația masivului Piatra Craiului*. Editura Vergiliu, București.
7. Popescu A., Sanda V, 1990, Vegetația grohotișurilor și bolovănișurilor (clasa *Thlaspietea rotundifolii* Br.-Bl. 1926) din Carpații României. *Studii și Cerc. de Biol. Seria Biol. Veget.* **42**, 1, pp: 31-42.
8. Pușcaru D., et al., 1956, *Pășunile alpine din munții Bucegi*, Edit. Acad. R.P.R., Bucuresti, pp: 142-146
9. Sanda V., Popescu, A., Barabaș N., 1997, *Cenotaxonomia și caracterizarea grupărilor vegetale din Romania*, St. și Comunic., Biol.veg., Bacău, pp: 23-33.
10. Sanda V., Biță-Nicolae D. Claudia, Barabaș N, 2003, *Flora cormofitelor spontane și cultivate din România*, Ed. Ion Borcea, Bacău.
11. Stancu Ileana Daniela, 2005, *Flora și vegetația munților Râiosu și Buda, masivul Făgăraș*. Edit. Universității din Pitești. București.
12. Todor I., Culica S., 1967, Contribuții la studiul pășunilor din masivul Gârbova (Studiu geobotanic și de producție), *SSNG, Comunic. de Bot.*, **4**, pp: 23-55.
13. Vâlsan G., 1971, Morfologia văii superioare a Prahovei și a regiunilor vecine în: *Opere alese*, p. 427-455, Edit. Științifică, București.