

***Inulo-Stachyetum Horvaticii*, THE NEW ASSOCIATION IN THE VALLEY OF THE RIVER PČINJA**

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ABSTRACT

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The specific vegetation which belongs to the alianse *Ramondion nathaliae* Horvat 1935, to order *Potentilletalia caulescentis* Br.-Bl. 1926 and the class *Asplenieta rupestris* Br.-Bl. 1934 grows on limestone rocky grounds and boulders in the valley of the river Pčinja (Bislimska gorge) and we propose the new name for it, *Inulo-Stachyetum horvaticii*. The characteristic species of this association are: *Inula verbascifolia* ssp. *aschersoniana*, *Stachys horvaticii*, *Alchillea fraasii* i *Satureja fukarekii*. Except them, the next species are significant also for alianse: *Ramonda nathaliae*, *Erynssimum comatum*, *Minuartia glomerata*, *Cerastium banaticum*, *Draba lasiocarpa*, *Silene flavescens*, *Achillea serbica*, *Scabiosa fumarioides*, *Dianthus gracilis*, *Minuartia glomerata* etc.

This association belongs to the group of similar associations in area of Mezian phytocenologic province where endemic-relict species of genus *Ramonda* (*R. serbica* and *R. nathaliae*) can be found. These are *Erysimoramondietum nathaliae* R. Jov. 1953 on Suva mountain near Nish and *Cetero-Ramondietum serbicae* R. Jov. 1953. on mountain Rtanj near Sokobanja. Similar associations can be found on the other terrains in species areal of genus *Ramonda*, in Kosovo, Western Serbia and Central Macedonia.

Introduction

On the rocks of Bislimska and Katlanovska gorge, which breached through the river Pčinja, the steep canyonlike 200 m high segments are made there, where the specific vegetation of rocky grounds are developed, on geological base made by mezosoic dolomite marbles. It is about specific vegetation, which members descend from tertiary, with some tropic representatives which survive all climate changes and today, they do not vegetate only, but they blossom and gainfull successfully. This is association *Inulo-Stachyetum horvaticii*, the new endemic association of limestone rockygrounds of Balkan peninsula.

Methodology

The studying of rock vegetation in Bislimska gorge was done according to Zürich-Monpellier methodology (Brown-Blanquet, 1964.), which was ap-

plied in Balkan peninsula firstly by I. Horvat (1949., 1962.), S. Horvatic (1963.), Lj. Ilijanic (1959.), M. Janković (1971), K. Micevski (1976, 1985-2001) etc. The Life Forms are done according to Rankier, and Flora Elements according to Асьов et all. (2002.). In phytocenologic table, the habitat no.9 is considered for holotypus.

The floristic structure of association

Until now, we determined 46 plant taxa, which populate this association habitat, that is opened not only for population of plants from rock rifts, but for species from nearby steppe formations also. The characteristic species of this association are: *Inula aschersoniana*, *Achillea fraasii*, *Satureja fukarekii* and *Stachys horvaticii*. These species are basically endemic species of Macedonia and nearby provinces also.

Characteristic species of alianse, order and class are: *Achillea serbica*, *Asplenium ruta-muraria*,

Tab. 1. The association *Inulo-Stachyetum horvaticii*, ass. nova

Altitude /m		220	225	230	240	250	250	300	300	300	300			
Area /m ²		16	100	800	25	100	50	10	300	200	50			
Location		Pčinja									Bislim			
Geologic base		L i m e s t o n e s												
No.	habitats	1	2	3	4	5	6	7	8	9	10	L.F.	Fl. elem.	
	Plant species													
Characteristic species of association:														
1	<i>Stachys horvaticii</i> Mic.	2,3	2,2	1,2	1,2	2,2	2,2	2,2	2,2	2,2	2,2	h	Mac-End	
2	<i>Inula aschersoniana</i> Janka	2,2	2,2	1,2	1,2	2,2	2,2	.	3,3	3,2	2,2	h	Mac-Trac-End.	
3	<i>Satureja fukarekii</i> Šilić	.	1,2	.	.	1,2	.	1,2	.	1,2	.	ch	Mac-End	
4	<i>Achillea frasioi</i> Sultz.-Bip.	.	.	.	.	.	.	.	1,2	1,2	.	ch	Wmez-NSc-Pind-End.
Characteristic species of alianse, orded and class:														
5	<i>Achillea serbica</i> Nym.	1,2	1,2	1,2	1,2	1,2	1,2	.	2,2	1,2	.	h	Mez-End	
6	<i>Ramonda nathaliae</i> Panč. et. Petr.	.	1,1	1,1	.	2,2	1,1	1,1	2,2	2,1	.	h	Mez-End	
7	<i>Silene flavescens</i> Andrews	.	1,2	1,2	1,2	1,2	1,2	.	2,2	1,2	.	h	Carp-Bal	
8	<i>Allium flavum</i> L.	.	+	.	+	+	+	+	+	.	+	g	Med	
9	<i>Minuartia glomerata</i> (M.B.) Deyen	1,1	+	.	.	.	+	+	.	1,1	1,1	t	Eur-Med	
10	<i>Campanula versicolor</i> Andrews	.	+	+	1,1	1,1	.	.	1,1	1,1	.	h	Eur-Med	
11	<i>Ceterah officinarum</i> DC	.	+	+2	.	+	+	+	1,1	.	.	h	subMed	
12	<i>Alyssum saxatile</i> L.	.	2,2	.	+	1,2	.	.	3,2	2,2	2,2	ch	Eur-subMed	
13	<i>Euphorbia myrsinites</i> L.	1,1	+2	.	.	.	+	.	1,1	+	+	h	subMed	
14	<i>Asplenium ruta-muraria</i> L.	.	+	.	1,1	+	+	.	1,1	.	.	h	Boreal	
15	<i>Cerastrium banaticum</i> (Roch.) Heuff.	.	1,2	1,2	.	1,2	.	.	1,2	1,2	.	h	subMed	
16	<i>Asperula purpurea</i> (L.) Ehrend.	+	1,2	+	1,1	.	.	.	.	.	+	h	subMed
17	<i>Minuartia viscosa</i> (Schreb.) Schinz. & Thell.	1,1	+	.	.	.	+	+	.	.	.	h	Eur-Med	
18	<i>Bupleurum apiculatum</i> Friv.	.	.	.	r	1,1	.	+	.	1,1	.	t	Mez-End	
19	<i>Asperula aristata</i> L.	.	.	.	.	2,2	1,2	.	1,2	1,2	.	h	subMed
20	<i>Galium album</i> Mill.	+2	+	.	.	.	.	.	.	.	.	h	Eur-As
21	<i>Dianthus gracilis</i> Sm.	.	.	.	.	.	.	.	1,2	.	+	h	ScPind-End
22	<i>Draba lasiocarpa</i> Rochel	.	.	+	.	.	.	.	1,1	.	.	h	Eur-Med
23	<i>Sedum desyphyllum</i> L.	.	.	.	1,2	.	.	.	.	1,1	.	h	Eur-As
24	<i>Centaurea diffusa</i> Lam.	.	.	1,1	.	.	.	.	.	.	.	t	Pont-Med
25	<i>Euphorbia taurinenses</i> All.	.	.	.	.	.	.	+	.	.	.	t	subMed
26	<i>Salvia ringens</i> Sm.	.	.	.	.	+	.	.	.	.	.	h	Bal
27	<i>Pteroccephalum papposus</i> (L.) Contt.	.	.	.	.	.	.	.	.	+	.	t	Med
28	<i>Allium margaritaceum</i> Sibith. et. Sm.	.	.	.	.	.	.	.	.	.	+	g	subMed
29	<i>Allium rotundum</i> L.	.	.	.	.	.	.	.	.	+	.	g	Eur-OT
30	<i>Asperula longiflora</i> W.K.	.	.	.	.	.	.	.	+	.	.	h	SBal
31	<i>Asyneuma limonifolium</i> (L.) Jauch.	.	.	.	.	.	.	.	.	.	+	h	Ap-Bal
32	<i>Crucianella oxylaba</i> Janka	.	.	.	.	.	.	.	.	.	+	t	subMed
33	<i>Echinops banaticus</i> Roch.	.	.	.	.	.	.	.	.	.	+	h	subMed
34	<i>Hippocrepis ciliata</i> Willd.	.	.	.	.	.	.	.	.	.	+	t	subMed
No.	habitats	1	2	3	4	5	6	7	8	9	10	L.F.	Fl. elem.	
	Plant species followers													
35	<i>Sedum sartoriacum</i> Boiss.	2,2	2,2	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	t	Eur	
36	<i>Melica ciliata</i> L.	.	1,2	1,2	1,2	1,2	1,2	1,2	2,2	2,2	1,2	h	Eur-subMed	
37	<i>Petrorhagina saxifraga</i> (L.) Link.	1,1	1,1	+	+	1,2	1,1	1,1	1,1	.	.	ch	subMed	
38	<i>Rhammus saxatilis</i> Jacq.	.	+2	.	+	+	r	r	+	r	r	ch	Alp-Bal	

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39	<i>Galium divaricatum</i> Pourr. ex Lam.	+	+	+	+	+	+	+	.	.	.	t	Med
40	<i>Poa bulbosa</i> ssp. <i>concina</i> (Gand.) Hay	1.2	2.2	1.2	1.2	1.2	1.2	+	.	.	.	t	Alp-Bal
41	<i>Cruciata pedemontana</i> (Bell.) Ehrend.	1.1	.	.	+	+	+	+	+	+	.	t	Med-CAs
42	<i>Thymus striatus</i> Vahl.	+2	.	.	+2	1.2	+	+2	1.2	.	.	ch	subMed
43	<i>Festuca dalmatica</i> (Hack.) K. Richt.	.	+2	+2	+	1.1	+2	.	1.2	.	.	h	subMed
44	<i>Alyssum montanum</i> L.	+	1.2	.	+	1.1	+	.	.	.	+	h	Eur-Med
45	<i>Thesium dollineri</i> Murb.	+	+	.	1.1	+	+	+	.	.	.	t	Pont
46	<i>Medicago minima</i> L.	1.1	+	.	r	+	+	+	.	.	.	t	Med
47	<i>Acinos arvensis</i> (Lam.) Dandy	1.1	.	+	.	.	+	.	+	.	1.2	t	Eur-Med
48	<i>Koeleria macrantha</i> (Ledeb.) Schultes	1.2	.	.	1.2	.	1.2	.	2.2	.	.	h	Eur
49	<i>Melilotus neapolitana</i> Ten.	.	1.1	1.1	.	.	.	.	.	1.1	2.1	t	subMed
50	<i>Scabiosa fumarioides</i> Vis. et. Panč.	.	.	.	.	+	.	+	+	+	.	t	Wmez-End.
51	<i>Stipa pennata</i> L.	.	1.2	1.2	.	.	.	.	+2	.	3.2	h	Eur
52	<i>Crepis pulchra</i> L.	.	+	.	r	.	.	+	.	.	3.2	t	Eur-Med
53	<i>Hypericum rumelicum</i> Boiss.	.	1.1	.	.	1.1	+	.	.	.	1.1	ch	Bal
54	<i>Pistacia terebintus</i> L.	.	.	+	.	.	.	+	+	.	+	ch	Pont-Med
55	<i>Medicago falcata</i> L.	.	+	.	.	.	+	.	.	+	+	h	Eur-As
56	<i>Teucrium polium</i> L.	.	+	+	.	.	.	+	.	.	.	ch	Pont-Med
57	<i>Trigonella gladiata</i> Stev. ex Bieb.	1.1	+	.	+	.	.	.	.	.	.	t	subMed
58	<i>Bromus mollis</i> L.	+	+	.	.	.	.	.	.	.	+	t	Boreal
59	<i>Convolvulus canthabrica</i> L.	.	+	.	.	1	2	.	.	.	.	ch	Pont
60	<i>Sanquisorba minor</i> Scop.	.	+	+	.	.	+	.	.	.	.	h	subBoreal
61	<i>Leontodon hispidus</i> L.	.	+	+	.	.	.	1.1	.	.	.	h	Eur-Med
62	<i>Ajuga chamaepytis</i> (L.) Schreb.	+	+	.	.	.	.	.	.	.	2.2	t	Pont-Med
63	<i>Xeranthemum annuum</i> L.	.	+	.	.	.	+	.	.	.	.	t	subMed
64	<i>Sedum ochroleucum</i> Chaix.	.	.	.	.	.	+	.	.	+	.	h	Pont-Med
65	<i>Phyllirea latifolia</i> L.	.	+2	.	.	.	.	.	.	.	+	ch	Med
66	<i>Ficus carica</i> L.	.	+2	.	.	.	.	.	.	.	+	ch	Med
67	<i>Lamium garganicum</i> L.	.	.	+	.	.	.	.	.	+	.	h	Med
68	<i>Erodium cicutarium</i> (L.) L'Herit	+	.	.	.	.	.	.	.	.	1.1	t	subBoreal
69	<i>Veronica verna</i> L.	+	.	.	.	.	.	.	.	.	+	t	Eur-Sib
70	<i>Goniolimon tataricum</i> (L.) Briss.	.	.	.	.	.	.	.	+	.	.	h	Pont-Med
71	<i>Nigella damascena</i> L.	.	.	.	.	.	.	.	.	.	+	t	subMed
72	<i>Parietaria lisutanica</i> L.	.	.	.	.	.	.	.	.	+	.	t	SEur
73	<i>Goniolimon dalmaticum</i> (C.Pred) Rchb.	.	.	.	.	.	.	.	.	.	+	h	Bal
74	<i>Fumaria officinalis</i> L.	+	.	.	.	.	.	.	.	.	.	t	Eur-Sib
75	<i>Pheum phleoides</i> (L.) Karst	.	+	.	.	.	.	.	.	.	.	t	Eur-As

Cerastium banaticum, Ceterach officinarum, Campanula versicolor, Draba lasiocarpa, Goniolimon dalmaticum, Minuartia glomerata, Minuartia viscosa, Ramonda nathaliae, Sedum dasyphyllum, Silene flavescens and Salvia ringens. The species of higher systematic categories are mostly endems of Balkan peninsula or the species which are widened on the ledge of Aegean Mediterranean and so they belong to Submediterranean species.

The spectrum of flora elements of this association is very interesting. The Submediterranean flora elements in the broader sense of word predominate and there are totally 35, and these are: Submediterranean (17), Euromediterranean (8), Pontmediterranean (6), Mediterranean (7) and Eurosubmediterranean (2). The second group of flora elements is consisted of endemic (9) and Balkanian (8) flora elements. These two groups of flora elements which have prevalence in Aegean Mediterranean are consisted of even 52 species or over 2/3 of all flora elements in this association. On the basis of that we conclude that this is association which have center of widespreading in Aegean Mediterranean and it is developing in condition of Submediterranean climate that reaches to Kumanovo through the valley of Vardar and Pčinja and goes to the north. This association is situated on the ledge of southmesian province and we can found the influence of Macedono-Trakian and Scardo-Pindian provinces there. On the basis of number of flora elements we conclude that this is Submediterranean association of limestone rockygrounds where Mezian, Macedono-Trakian and Scardo-Pindian endems found their own place, which is determined by phytogeographic aspect of this part of valley of the river Pčinja also.

The spectrum of life forms confirms previous statement about conditions that taxons live in habitat of this association. So, there is 33 *Hemicriptophyta*, 27 *Terophyta*, 12 *Chamaephyta* and 3 *Geophyta*. On the basis of that we conclude that the Continental and Mediterranean life condition are dominated, and this association located at zone of hornbeam and oak forests is extremely xerothermic.

The succession of association goes to overgrowing of this area to the steppe-like pastures and meadows, and through next succession into low forests *Quercus-Carpinetum orientalis macedonicum*, and then into low oak-medunac forests *Orno-Quercetum pubescentis macedonicum* and in the end into macedonian forests of oak-sladun and cerris - *Quercetum frainetto-cerris macedonicum*.

In **sintaxonomic meaning**, this association belongs to endemic balkanian alianse *Ramondion nathaliae* Ht. 1935, to the order *Potentilletalia caulescentis* Br.-Bl. 1926 and to the class *Asplenietea rupestris* Br.-Bl. 1934.

Conclusion

On the basis of previous showed analysis of life forms, conditions of prevalence and floristic structure of association *Inulo-Stachyetum horvaticii* we can determine that:

- this is endemic association of limestone rockygrounds (End- 9; Bal- 6);
- it is situated in Submediterranean region of Pčinja (Med- 25, T- 12);
- the presence of Balkanian endems and Balkanian flora elements gives this association the character of Balkanian endemic vegetation;
- it belongs to endemic alianse *Ramondion nathaliae*, to the order *Potentilletalia caulescentis* and to the class *Asplenietea rupestris*;
- the center of areal has in Macedono-Aegean-Submediterranean.

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***Inulo-Stachyetum Horvaticii*, ASS. NOVA DOLINE REKE PČINJE**

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Summary

Na krečnjačkim kamenjarima i stenama doline reke Pčinje (Bislimska klisura) raste specifična vegetacija koja pripada svezi *Ramondion nathaliae* Horvat 1935, redu *Potentilletalia caulescentis* Br.-Bl. 1926 i razredu *Asplenietea rupestris* Br.-Bl. 1934 a za koju predlažemo novo ime *Inulo-Stachyetum horvaticii*. Karakteristične vrste ove asocijacije su: *Inula aschersoniana*, *Stachys horvaticii*, *Alchillea fraasii* i *Satureja fukarekii*. Osim njih za svezu su značajne i sledeće vrste: *Ramonda nathaliae*, *Erysimum comatum*, *Minuartia glomerata*, *Cerastium banaticum*, *Draba lasiocarpa*, *Silene flavescens*, *Achillea serbica*, *Scabiosa fumarioides*, *Dianthus gracilis*, *Minuartia glomerata* i dr.

Ova zajednica pripada grupi sličnih zajednica na području Mezijske fitocenološke provincije u kojima se nalaze endemo-reliktne vrste roda *Ramonda* (*R. serbica* i *R. nathaliae*) i to *Erysimo-Ramondietum nathaliae* R. Jov. 1953 na Suvoj planini kraj Niša i *Cetero-Ramondietum serbicae* R. Jov. 1953. na planini Rtanj kraj Sokobanje. Slične zajednice se sreću na ostalim terenima u arealu vrsta roda *Ramonda*, na Kosovu, Zapadnoj Srbiji i Centralnoj Makedoniji.