

Dinaric Fir-beech Forests (*Omphalodo-Fagetum* (TREGUBOV 1957) MARINČEK et al. 1993) on Blegoš

Dinarski jelovo-bukovi gozdovi (*Omphalodo-Fagetum* (TREGUBOV 1957) MARINČEK et al. 1993) na Blegošu

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Abstract: An intrazonally extended dinaric fir-beech forest in the Prealpine region of Slovenia as the *Omphalodo-Fagetum* (Tregubov 1957) Marinček et al. 1993 *ranunculetosum platanifolii* subass. nova is described in this work.

Izvešček: Avtorja predstavljata intrazonalno razširjen dinarski jelovo-bukov gozd v predalpskem območju Slovenije kot *Omphalodo-Fagetum* (Tregubov 1957) Marinček et al. 1993 *ranunculetosum platanifolii* subass. nova.

1. Introduction

The dinaric fir-beech forests of the western part of the Illyrian floral province *Omphalodo-Fagetum* (Tregubov 1957) Marinček et al. 1993 have been relatively well studied and represented in the literature from the phytosociological point of view (Tregubov 1957, Puncer, Wojterski & Zupančič 1974, Puncer 1980, Marinček 1987, Kordiš 1993). Additionally, there are several elaborations on dinaric fir-beech forests, written according to the requirements of the Forestries of Kočevje and Ljubljana. According to the sources known so far, these forests are located in the dinaric region (Wraber 1969) and are a notion for the dinaric region in the phytosociological sense and the most reliable basis for their horological determination.

The phytosociological research on Blegoš, a remarkable mountain in the middle of the Prealpine region has shown that the dinaric fir-beech forests are spread also extrazonally in the Prealpine phytogeographical region (Marinček 1995).

Six phytosociological releves have been collected, on the basis of which the systematic classification of the afore-mentioned phytocoenoses on Blegoš have been determined by comparing them with similar associations. The values of Sørensen's coefficients were calculated and on their basis a dendrogram of similarities was drawn up.

The nomenclature is in accordance with the nomenclature by Trpin and Vreš (1995) for higher plants and with the one by Martinčič (1968) for mosses whereas the syntaxonomic nomenclature with the one by Marinček et al. (1993).

2. Results

2.1. Ecological circumstances

The phytocoenoses represented are located on the sunny sides of Blegoš (W, SW), from 1160 to 1250 m (fig.1) above sea level.

On Blegoš, the climatic characteristics of mountainous Prealpine region of Slovenia

Tab. 1: OMPHALODO-FAGETUM (Tregubov 1957) Marinček et al. 1993
ranunculetosum platanifolii ass. nova

Relevé no.	1	2	3	4	5	6
Altitude - m	1200	1250	1160	1170	1200	1200
Aspect	W	W	SW	SW	W	SW
Slope - degrees	25	25	30	30	25	25
Stoniness - %	1	2	1		2	20
Coverage - %						
trees	90	90	90	90	90	100
shrubs	1	2	5	2	10	10
herbs	70	50	80	70	80	50
mooses	1	1	1	2	1	10

CHARACTER SPECIES

<i>Abies alba</i>	A1	1	2	2	2	+	1	5	5	5	1	5
<i>Abies alba</i>	A2	1	1	2	2	2	1	5				
<i>Abies alba</i>	B	2						1	5	5		5
<i>Abies alba</i>	C	+	1					2	5	5		4
<i>Omphalodes verna</i>		1	+	1	1	2	1	5	5	5		1
<i>Cardamine trifolia</i>		1	+	+	+	1	1	5	5	5	3	5
<i>Aremonia agrimonioides</i>				+		+	1	3	5	5	4	1
<i>Calamintha grandiflora</i>				+	1	+		3	4	4		
<i>Rhamnus fallax</i>	B						+	1	4	5		1
<i>Festuca altissima</i>	C								5	4		4

DIFFERENTIAL SPECIES OF SUBASSOCIATION

<i>Polygonatum verticillatum</i>	1	1	+	+	1	+	5	5	1	5	4
<i>Adenostyles glabra</i>	1	+	+		+	+	5	5		2	3
<i>Ranunculus platentifolius</i>	+	+		+	+		4			3	2
<i>Veratrum album</i>	1				+	+	3			4	1
<i>Cicerbita alpina</i>	+						1				1

AREMONIO-FAGION s.la

[illegible]

[illegible]

Relevé no.	1	2	3	4	5	6	I	II	III	IV	V
<i>Petasites albus</i>										3	1
<i>Bromus ramosus</i>										2	
<i>Euphorbia dulcis</i>										1	
<i>Circaea lutetiana</i>										1	1
<i>Acer platanoides</i>										1	
<i>Dentaria pentaphyllos</i>									1		2
<i>Phyteuma spicatum</i>											1
<i>Neottia nidus avis</i>											1
<i>Melica nutans</i>											1
<i>Cephalanthera alba</i>											1
<i>Fraxinus excelsior</i>	B										1
<i>Aruncus dioicus</i>	C										1
<i>Gymnocarpium robertianum</i>											1
<i>Veronica montana</i>									5	5	
<i>Galeobdolon luteum</i>									4	3	
<i>Asperula odorata</i>											1
<i>Tilia platyphyllos</i>	A								1		
<i>Phyllitis scolopendrium</i>	C								2	3	
<i>Hordelymus europaeus</i>											

QUERCO-FAGETEA

<i>Anemone nemorosa</i>	1	+	1	1	1	1	5	3	5	3	5
<i>Galium laevigatum</i>		+		+	+		3				1
<i>Carex digitata</i>		+			+		2	2	3		4
<i>Clematis vitalba</i>	B		+				1		3		1
<i>Hepatica nobilis</i>	C					+	1		2	2	1
<i>Lonicera xylosteum</i>	B										
<i>Corylus avellana</i>	B									1	1
<i>Aegopodium podagraria</i>	C									1	
<i>Helleborus odoratus</i>										1	1
<i>Rosa arvensis</i>										1	
<i>Catharina undulata</i>	D							1			1
<i>Ostrya carpinifolia</i>	B										
<i>Euonymus verrucosa</i>	B								3		
<i>Carex pilosa</i>	C								2		

ADENOSTYLETALIA

<i>Aconitum vulparia</i>											2
<i>Anthriscus sylvestris</i>											2
<i>Myrrhis odorata</i>											1
<i>Aconitum paniculatum</i>											1
<i>Saxifraga rotundifolia</i>											2
<i>Ribes alpinum</i>	B										1
<i>Milium effusum</i>	C										1
<i>Adenostyles alliariae</i>									1		
<i>Saxifraga rotundifolia</i>											1
<i>Doronicum austriacum</i>		+						1	2	1	1

Relevé no.	1	2	3	4	5	6	I	II	III	IV	V
VACCINIO-PICEET ALIA s.lat											
<i>Gentiana asclepiadea</i>			+	+	+	+	4	1	2	3	2
<i>Picea abies</i> A		1	+			+	3	5	2	1	3
<i>Picea abies</i> B								5	3		3
<i>Picea abies</i> C								4	1	1	3
<i>Rosa pendulina</i> B		+	+			+	3	5	2	1	
<i>Valeriana tripteris</i> C		+		+			2		1	1	1
<i>Oxalis acetosella</i> 1		+					2	5	5	3	4
<i>Veronica urticifolia</i>		+		+			2			2	3
<i>Dicranum scoparium</i> D								5			1
<i>Dryopteris dilatata</i> C								4			
<i>Vaccinium myrtillus</i>							3	1			1
<i>Huperzia selago</i>							2	1			
<i>Rhytidiadelphus loreus</i> D							2				
<i>Lonicera nigra</i> B							2				1
<i>Hylocomium splendens</i> D							2				
<i>Homogyne sylvestris</i> C							2	2			2
<i>Maianthemum bifolium</i>							2	3			1
<i>Veronica officinalis</i>							2				1
<i>Lycopodium annotinum</i>							1				
<i>Rhytidiadelphus triquetrus</i> D							1				
<i>Luzula luzuloides</i> C										4	2
<i>Polytrichum attenuatum</i>									1		
<i>Hieracium sylvaticum</i>									1		2
<i>Dryopteris expansa</i>											1
<i>Luzula pilosa</i>								3	2		1
<i>Polytrichum formosum</i> D											1
<i>Larix decidua</i> A											1
<i>Luzula luzulina</i> C											1
<i>Dryopteris carthusiana</i>								1			1
<i>Gymnocarpium dryopteris</i>											1
<i>Hylocomium trisetum</i> D											1
<i>Orthilia secunda</i> C											1
<i>Phegopteris connectilis</i>											1
<i>Thelypteris limbosperma</i>											1
<i>Bazzania trilobata</i> D											1
<i>Rubus saxatilis</i> B								4	1		
<i>Peltigera aphthosa</i> D								3			
<i>Anium ortorrhynchum</i> D								2			
<i>Leucobryum glaucum</i> D								5	1		1
<i>Luzula sylvatica ssp. sylvatic</i> C								5		1	
<i>Polystichum lonchitis</i>											
OTHER SPECIES											
<i>Calamagrostis varia</i>			+	+	+	+	5			1	2
<i>Digitalis grandiflora</i>			+	+	+		3				2
<i>Carex flacca</i>			+		+		2		1	1	1
<i>Athyrium filix femina</i>		+				+	2	4	1	3	4

Relevé no.		1	2	3	4	5	6	I	II	III	IV	V
<i>Thalictrum aquilegifolium</i>				+		+		2			1	1
<i>Rubus idaeus</i>	B	+						1	5	4	3	1
<i>Rubus hirtus</i>	B			+				1		1		
<i>Carex alba</i>	C		+					1		1		2
<i>Aconitum ranunculifolium</i>		+						1				
<i>Cirsium erisithales</i>				+				1		3		1
<i>Betonica officinalis</i>					+			1				1
<i>Asplenium viride</i>									4	1	1	2
<i>Asplenium trichomanes</i>									4	2		1
<i>Polypodium vulgare</i>									3			1
<i>Ajuga reptans</i>									3	2		1
<i>Urtica dioica</i>									2			
<i>Platanthera bifolia</i>									2	2		
<i>Sorbus aucuparia</i>	A								2			
<i>Sorbus aucuparia</i>	B								2	1		2
<i>Sambucus racemosa</i>	B								2	1		1
<i>Fragaria vesca</i>	C									4	1	2
<i>Rubus sp.</i>	B										3	
<i>Epipactis atrorubens</i>	C										1	
<i>Betula verrucosa</i>											1	
<i>Melittis melisophyllum</i>											1	
<i>Melica uniflora</i>											2	
<i>Poa nemoralis</i>											1	1
<i>Labium alpinum</i>	B											1
<i>Cystopteris fragilis</i>	C								1			1
<i>Aquilegia vulgaris</i>												1
<i>Solidago virgaurea</i>										2		
<i>Laserpitium latifolium</i>										2		
<i>Geum urbanum</i>										2		
<i>Convalaria majalis</i>										1		
<i>Eupatorium cannabinum</i>										1		
<i>Fraxinus ornus</i>	A									1		
<i>Ilex aquifolium</i>	B									1		
<i>Moehringia muscosa</i>	C									1		
<i>Solanum dulcamara</i>										1		
<i>Sorbus aria</i>	A									1		
<i>Asplenium ruta muraria</i>	C								1			
<i>Hypericum maculatum</i>											1	

MOOSES

<i>Ctenidium molluscum</i>	D	+	+	+	+	+	1	5	5	5	3	4
<i>Isoetes myurum</i>		+	+	+	+	+	+	5	3	5		3
<i>Tortella tortuosa</i>		+		+	+	+	+	5	3	3		1
<i>Hypnum cupressiforme</i>		+						1			1	1
<i>Neckera crispa</i>					+		+	2	4	4		1
<i>Plagiochila asplenoides</i>		+					+	2	5		1	3
<i>Thuidium tamariacum</i>		+						1	2	2		1
<i>Fissidens taxifolius</i>		+						1	2	1	1	3

Relevé no.	1	2	3	4	5	6	I	II	III	IV	V
<i>Plagiothecium sylvaticum</i>				+			1				
<i>Grimia pulvinata</i>					+		1	4	1		1
<i>Cladonia rangiferina</i>								2			1
<i>Racomitrium canesaens</i>											1
<i>Metzgeria furcata</i>								1			1
<i>Bartramia pomiformis</i>											1
<i>Plagiothecium denticulatum</i>											1
<i>Camptothecium lutescens</i>								1	3		
<i>Mnium undulatum</i>								2	1		
<i>Cladonia pyxydata</i>								4	1		
<i>Mnium affine</i>								2	1		
<i>Plagiothecium platyphyllum</i>								3			
<i>Eurhynchium striatum</i>								1			
<i>Fegatella conica</i>								1			
<i>Mnium rostratum</i>								1			
<i>Rhynchostegium murale</i>								1			

- I..... Omphalodo-Fagetum (Tregubov 1957) Marinček et al. 1993 ranunculetosum platanifolii var. Hacquetia epipactis (6 relevés hoc loco)
 II..... Omphalodo-Fagetum adenostyletosum Puncer 1980 (10 relevés)
 III.... Omphalodo-Fagetum mercurialeetosum (Tregubov 1957) Puncer 1980 (13 relevés)
 IV.... Ranunculo platanifolii-Fagetum Marinček et al. 1993 hacquetietosum epipactis Marinček (mscr.) (7 relevés)
 V..... Homogyno sylvestris-Fagetum Marinček et al. 1993 typicum Marinček (mscr.) (16 relevés)

prevail, with fresh summers and cold winters. The precipitation is rather abundant ranging from 1500 to 2000 mm per year on the average and is relatively evenly distributed during the growth period. Snow remains also up to 100 days. The vegetation period takes about 5 months. In winter, stabilized cold period is from December to February when the average month temperatures are almost always under the zero. The temperature extremities are rather expressive (Marinček 1981). The slopes are moderately steep, with an inclination of 25° to 30°, smooth, mostly without surface stoniness. The geological bedrock is dolomite limestones and dolomites, where medium deep brown carbonate grounds with a rather thick layer of moder mull. The deeper the ground, the higher share of skelet can be found. The ground is well supplied with humidity all the vegetation period long. In some places they proceed to brown rendzinas. The

brown calcareous soils have the following structure of the soil section:

- A00 -hor. Layer of litter, mostly soft, in some places interrupted, it can also be dense and compacted.
 A1 -hor. It is somehow compacted, but brittle, fine-grained to thick lumpy. in some places rather fibroidly bound with roots of herb layers, clayey, skeletal to skeletoidal, moder mull to mull, seldom to densely rooted through, with individual earthworms, with a gradual proceeding to (B) hor.
 (B)-hor. Condensed, breakable to brittle, clayey to loamy, skeletal to very skeletal, seldom rooted through, with earthworms.

The soil is medium deep and medium fertile.

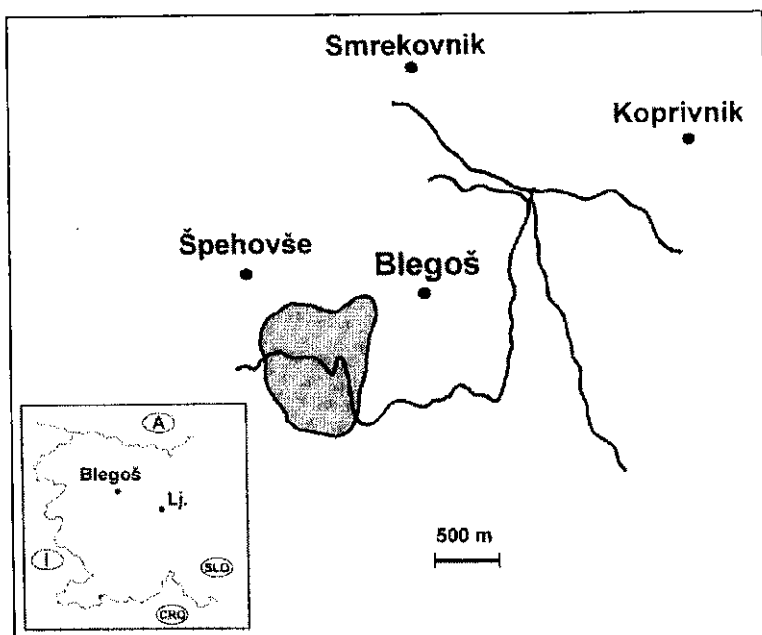


Fig. 1: Spreading of the subassociation in the Prealpine region of Slovenia
Sl. 1: Razširjenost subasociacije v predalpskem svetu

2.2. Structural and floristic composition

Within the tree layers the beech (*Fagus sylvatica*) and fir tree (*Abies alba*) dominate. The maple (*Acer pseudoplatanus*) appears only individually. In the recent time shelter felling prevailed. The expressive two-layer character of these forests today results from the clearings on large surface areas before and after the second world war. They are almost without any underbrush (fig.2). In the dominating layer the beech prevails over the fir tree in relation 4:1. In the lower tree layer the beech tree also prevails over the fir tree, however the relationship is rather more favourable for the fir tree, 2:1. The fir tree seedlings are seldom found what results, to a high degree, from the large population of the game, especially chamois and roe deers and unfavourable microclimate for the germinating of fir sproutings.

For the dinaric fir-beech forests a selecting structure of different forms is characteristic. For the limestone carst-like bedrock, prevailing in the Dinaric region, an exceptionally rugged mezzo and micro relief is characteristic. Ecological circumstances, an especially great hazard of erosion along the clearings, force somehow the proprietors of forests to apply the selection principle, which in connection with a high air humidity, characteristic of the Dinaric region, forms favourable conditions for germinating and growth of fir sproutings.

The two-layer fir-beech tree stand in the Dinaric region develops, as shown in the examples from the Idrija region, at the border of the area of the dinaric fir-beech forests (Marinček, n.p.). If these forests grow on small surfaces within the high altimontane beech forests, as it is the case on Blegoš, which were almost all without an exception grown accor-

ding to the shelter felling, the rejuvenescence of the fir tree cannot be realised. In addition to this, the dolomitic bedrock predominates on the sites of the fir-beech forests on Blegoš, which offers a little possibility for the forming of the microclimate which is agreea-

ble for the fir tree. As shown on the examples from the experience gained, a fair share of the fir tree can be preserved under such circumstances only, if forests are cultivated by means of selection.

The shrub layer is very badly developed.

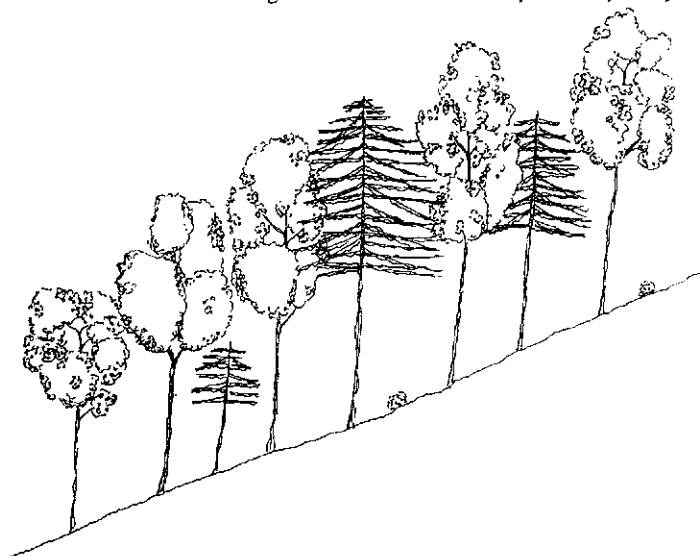


Fig. 2: Structure of fir-beech tree forests on Blegoš
Sl. 2: Struktura jelovo bukovih gozdov na Blegošu

Chiefly, only individual shrubberies of the species like *Daphne mezereum*, *Sambucus nigra* and *Rosa pendulina* are found.

The herb layer is well developed, for it covers from 50 to 80 percent of the ground. The basophilous-neutrophilous species predominate. Most of species are of the order *Fagetalia sylvaticae* (tab. 1). Also the species of the alliance *Aremonio-Fagion* are very well represented. Due to higher altitudes also the species of the order *Adenostyletalia* are present. In accordance with the mountainous climate the species of the class *Quercio-Fagetea* are more seldom. The acidophilous species of the order *Vaccinio-Piceetea* are completely missing. The moss layer is badly developed.

Nomenclatural type of the *Omphalodo-*

Fagetum (Tregubov 1957) Marinček et al. 1993 *ranunculetosum platanifolli* subass. nova is relevé 1 in tab. 1.

2.3. Character and differential species

The character and differential species of the association *Omphalodo-Fagetum* (Puncer 1980): *Omphalodes verna*, *Cardamine trifolia*, *Aremonia agrimonioides*, *Calamintha grandiflora*. The attention should also be paid to the great coverage property of the species *Omphalodes verna*, which is found in the Pre-alpine altimontane beech tree forests of the Illyrian region by chance. Similarly, the same also applies to the species *Calamintha grandiflora* and *Aremonia agrimonioides*. *Cardamine trifolia* appears permanently in all alti-

montane forests of the Illyrian floral province, however, it reaches its greatest constancy and coverage in the dinaric fir-beech forests. The *Rhamnus fallax*, for which a high constancy in the association is noticed, is found on Blegoš only as accidental species. *Festuca altissima*, the character species of the fir-beech forests throughout Europe, is completely missing.

The differential species of the subassociation *Omphalodo-Fagetum ranunculetosum platanifolii* are species of the order *Adenostyletalia* s. lat.: *Polygonatum verticillatum*, *Adenostyles glabra*, *Ranunculus platanifolius*, *Veratrum album* and *Cicerbita alpina*, which show an explicitly alpine character of the subassociation. Of the greatest diagnostic importance is the species *Ranunculus platanifolius*, which in the dinaric fir-beech forests hasn't been noticed yet.

In the fir-beech forests on Blegoš, there is a very interesting group of plant species: *Hacquetia epipactis*, *Digitalis grandiflora* and *Carex flacca*, which shows a definite warm effect, being dependent on the expressively sunny position and skeletal aerated ground above the dolomite bedrock.

3. Discussion

The phytocoenoses on Blegoš have transitional character among the dinaric fir-beech forests and altimontane beech forests in the Prealpine region of the Illyrian floral pro-

vince. The synsystematic classification of these phytocoenoses is therefore demanding task. This proves also the fact that V. Tregubov who had already known the beech forests on Blegoš (orally stated by M. Zupančič) avoided the discussion of these forests in the sixties. Only when the altimontane beech and fir-beech tree forests of the Prealpine region had been studied, their proper synsystematic classification was possible.

In order to establish a syntaxonomic position of the phytocoenoses dealt with on Blegoš, six collected relevés were compared which had been arranged in a phytosociological chart, with the following apparently similar associations, *Omphalodo-Fagetum* (Tregubov 1957) Marinček et al. 1993 *adenostyletosum* Puncer 1980 (Puncer 1980: tab. 7), *Ranunculo platanifolii-Fagetum* Marinček et al. 1993 *hacquetietosum* (Marinček mscr.), *Homogyno sylvestris-Fagetum typicum* Marinček et al. 1993 *typicum* (Marinček mscr.), *Omphalodo-Fagetum mercurialeetosum* (Puncer 1980: tab. 5).

The results of the similarity calculation among the afore-mentioned associations according to the Sørensen's coefficient were as follows (fig. 3). The most insignificant similarity 0.492 was established with the association *Omphalodo-Fagetum adenostyletosum*. It seems to be surprising, for it thrives at the highest altitudes within the framework of the association *Omphalodo-Fagetum*. However, a more detailed analysis (fig. 4) shows its

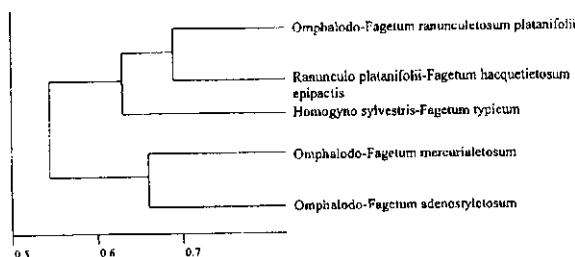


Fig. 3: Dendrogram of similarities according to Sørensen's coefficient
 Sl. 3: Dendrogram podobnosti po Sørensenovem koeficientu

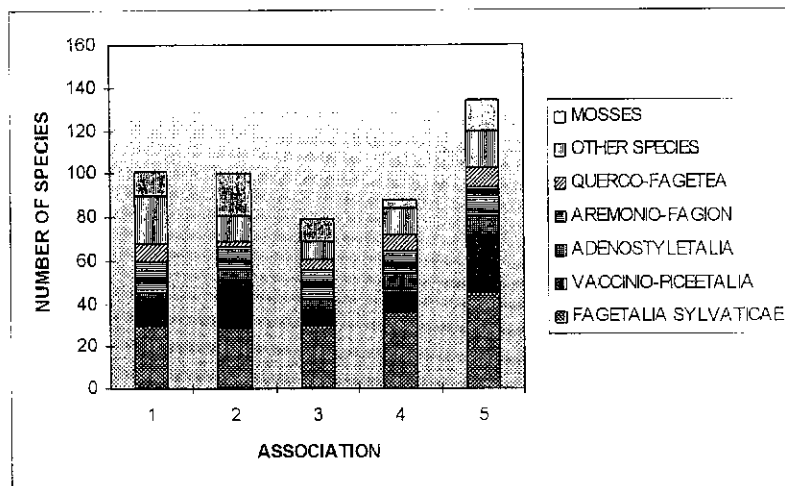


Fig. 4: Sociological structure of comparative associations

Sl. 4: Sociološka struktura primerjanih združb

explicitly acidophilous character resulting from expressively sunny positions on the limestone bedrock. Therefore, the synsystematic classification of the phytocoenoses into the subassociation *Omphalodo-Fagetum adenostyletosum* is a priori not possible.

A bigger similarity 0.643 is found with the association *Omphalodo-Fagetum mercurialetosum*, which thrives on moderately steep to steep sunny slopes, that means, under the very similar ecological circumstances as phytocoenoses on Blegoš, however, at somehow lower altitudes.

Almost the same similarity is found with the association *Homogyno sylvestris-Fagetum typicum* - 0.658. The closest similarity (0.694) is shown with the association *Ranunculo platanifolii-Fagetum hacquetietosum* thriving on Blegoš in the immediate vicinity of the phytocoenoses dealt with.

In spite of the closest similarity with the association *Ranunculo platanifolii-Fagetum hacquetietosum*, the phytocoenoses on Blegoš were classified into the association *Omphalodo-Fagetum*. It was taken into consideration that the most important basis of the Braun-Blanquet school is the principle of the character and differential species. With regard to the almost complete presence of the character and differential species of the association *Omphalodo-Fagetum* in the phytocoenoses on Blegoš, they were classified into this association.

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