PLANT COMMUNITIES OF *JUNIPERO-PINETALIA MUGO* BOŞCAIU 1971 ORDER IN THE CĂPĂȚÂNII MOUNTAINS

ASOCIAȚII VEGETALE DIN ORDINUL *JUNIPERO-PINETALIA MUGO* BOŞCAIU 1971 ÎNTÂLNITE ÎN MUNȚII CĂPĂȚÂNII

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Abstract: *The territory under research is located in the Căpățânii Mountains, part of the Southern Carpathians. From the geo-morphological point of view, this area comprises two distinct units: the mountainous area, pertaining to the Capățânii Mountains and the Horezu SubCarpathian Depression, which is part of the SubCarpathian region of Oltenia. In this paper, we present 4 plant associations, within JUNIPERO-PINETALIA MUGO* Boşcaiu 1971 Order *because the human impact in this type of habitat are very increased and their generally conservation value is important: 1. Rhododendro myrtifolii - Pinetum* mugo Borza 1959 em. Coldea 1985, *2. Campanulo abietinae - Juniperetum* Simon 1966, *3. Campanulo abietinae - Vaccinietum* (Buia et al. 1962) Boşcaiu 1971, *4. Junipero - Bruckenthalietum spiculifoliae* Horv 1936.

Rezumat: *Teritoriul cercetat aparține M-ților Căpățânii, cuprinzând din punct de vedere geomorfologic două trepte de relief: zona montană și depresiunea subcarpatică Horezu. În urma cercetărilor geobotanice efectuate între anii 1997-2007, în M-ții Căpățânii au fost identificate un număr de 4 de asociații vegetale ce aparțin Ordinului JUNIPERO-PINETALIA MUGO* Boşcaiu 1971: *1. Rhododendro myrtifolii - Pinetum mugo* Borza 1959 em. Coldea 1985, *2. Campanulo abietinae - Juniperetum* Simon 1966, *3. Campanulo abietinae - Vaccinietum* (Buia et al. 1962) Boşcaiu 1971, *4. Junipero - Bruckenthalietum spiculifoliae* Horv 1936.

Pentru fiecare asociație vegetală se prezintă: corologia, ecologia, fizionomia și compoziția floristică, precum și importanța acesteia.

Key words: *plant association, class, ecology, chorology, floristic composition, phytosociological relevées, mountains*

Cuvinte cheie*: asociație vegetală, clasă, ecologie, corologie, fizionomia și compoziția floristică, Releveu fitosociologic, munți*

INTRODUCTION

The Căpățânii Mountains are part of the Southern Carpathians, ranging between the Olteț rivulet, to the East and the Olt River, to the West. The highest peaks in these mountains are: Ursu (2,124 m), Căpățâna (2,113 m), Balota (2,094 m) and Negoveanul (2,064 m).). These mountains are characterized by a complex petrographic structure. To the geo-morphological point of view, this area comprises two distinct units: the mountainous area, pertaining to the Capățânii Mountains, and the Horezu SubCarpathian Depression, which is part of Oltenia.

These mountains are characterized by a complex petrographic structure. The flora and the fauna in this region of the Carpathians are very rich and interesting. The richest flora can be noticed in the Buila-Vânturarița limestone catena, where we can find numerous rare and endemic species.

The present paper aims at presenting the plants associations of the ***JUNIPERO-PINETALIA MUGO*** Boşcaiu 1971 Order, identified in the Căpățânii Mountains. In the territory under research, there were identified 4 plants associations as being part of this order*:* ***1. Rhododendro myrtifolii - Pinetum mugo*** Borza 1959 em. Coldea 1985, ***2. Campanulo***

abietinae* - *Juniperetum Simon 1966, ***3. Campanulo abietinae* - *Vaccinietum*** (Buia et al. 1962) Boşcaiu 1971, ***4. Junipero* - *Bruckenthalietum spiculifoliae*** *Horv 1936.*

MATERIALS AND METHODS

For the study or the vegetal carpet we have used methods of phyto-sociologic research characteristic to the Central European phyto-sociologic School, which was based on the principles and methods elaborated by J. BRAUN-BLANQUET (1926). The association were identified and distinguished according to the characteristic, edifying, dominant and differential species. The name of the vegetal association was given taking into account the regulations stated by the Phytosociologic Nomenclature Code (2000).

As for the classification of the vegetal associations, we have used synthesis papers on the Romanian vegetation, elaborated by G. COLDEA (1986, 1991), D. IVAN – coordinator (1992), L. MUCINA, G. GRABHER & T. ELLMAUER (1993), J.S. RODWELL, J.H.J. SCHAMINÉE, L. MUCINA, S. PIGNATTI, J. DRING, D. MOSS (2002). We gave a special attention to the calculation of the quantitative index *Bray-Curtis* and to performing the dendrograms, by using the Group-Average method (UPGMA) in the program SYN-TAX 2000.

RESULTS AND DISSCUSSION

The present paper aims presenting the plant associations of the ***JUNIPERO* - *PINETALIA MUGO*** BOŞCAIU 1971 Order, meet at the in the Căpăţânii Mountains.

Ecology, chorology, floristic composition (species richness, life forms, phyto-geographical elements) as well as its economic importance for all these associations (characterised by 35 original phytosociological relevées) are analysed.

1. Ass. *Rhododendro myrtifolii* - *Pinetum mugo* Coldea 1985

(Syn. *Pinetum mugo carpaticum* auct. roman) (Table 1)

***Chorology*.** Juniper trees vegetate on the sub-alpine layer, at the upper limit of spruce firs, both on low and steep slopes. There must be noticed that in the Căpăţânii Mountains, *Pinus mugo* phytocoenoses can also be seen in the upper alpine layer, under spruce fir forests, up to a 1400 m altitude. This was noticed in the summer of 2003, at Izvorul Sec. In the studied area, *Pinus mugo* phytocoenoses are spreading from Şaua Funicelu, to Izvorul Sec, under Balota, Căpăţâna, Albu, Ştevioara, Vânturariţa and Vioreanu Peak. Regarding the extension of grazing areas, in the last decades, many spruce fir forests have been fired and cleared, especially in the Căpăţânii Mountains. The clearing of spruce fir forests at Şaua Funicelu and Izvorul Sec was done under the shape of transversal bands, which explains the present form of the spruce fir forests.

***Ecology*.** Taking into consideration the ecologic categories, mesophilic (34.48%), micromesothermic species (41.38%) and acidophyle species (27.59%) prevail.

***Physiognomy and floristic composition*:** The bush structure also includes, apart from the dominant species, *Pinus mugo*, the following: *Sorbus aucuparia*, *Juniperus communis* ssp. *alpina*, *Picea abies*. In the grassy area, the following are to be mentioned: *Vaccinium myrtillus*, *V. vitis-idaea*, *Soldanella hungarica* ssp. *major*, *Deschampsia flexuosa*, *Homogyne alpina*, *Bruckenthalia spiculifolia*. As a result of clearing, these phytocoenoses can turn into *Nardus stricta* or *Festuca nigrescens* grazes. Also, as a result of firing spruce fir forests, mountain peony and bilberry phytocoenoses developed.

Table 1

Ass. *Rhododendron myrtifolii - Pinetum mugo* Coldea 1985

No. of relevée	1	2	3	4	5	6	7	8	K
Altitude m.o.s. (x 10 m)	150	150	155	180	180	185	190	190	
Exposure	SE	SE	SE	E	SE	SE	S	S	
Inclination (in grades)	20	20	25	20	15	20	30	35	
Coverage (%)	100	100	100	100	100	100	100	100	
Area (m^2)	200	200	200	100	200	100	50	50	
Char. ass.									
Rhododendron myrtifolium	1	+	1	+	+	+	1	1-2	V
Pinus mugo	5	5	5	5	5	5	5	5	V
Pinion mugo									
Laserpitium krapfii	+	-	+	+	+	-	-	-	III
Bruckenthalia spiculifolia	-	+	-	+	+	-	-	-	II
Campanula patula ssp. abietina	+	+	+	-	+	-	-	-	III
Junipero – Pinetalia mugo et Vaccinio – Piceetalia									
Picea abies	-	+	+	+	+	-	-	-	III
Vaccinium myrtillus	1	1	1	1	+	+	+	+	V
Vaccinium vitis- idaea	-	+	-	+	+	-	+	-	III
Juniperus communis ssp. alpina	+	+	+	+	1	1	+	+	V
Doronicum austriacum	+	-	+	+	-	-	-	-	II
Homogyne alpine	+	+	+	-	+	+	-	-	IV
Soldanella hungarica ssp. major	+	+	+	-	+	-	-	+	IV
Calamagrostis arundinacea	+	-	-	+	-	-	-	-	II
Deschampsia flexuosa	+	+	+	+	+	+	+	+	V
Huperzia selago	-	-	-	-	-	-	+	+	II
Dryopteris dilatata	+	+	+	-	-	+	-	-	III
Epilobietea angustifolii									
Epilobium augustifolium	+	+	-	-	+	-	-	-	II
Variae Syntaxa									
Veratrum album	+	-	+	-	+	-	-	-	II
Oxalis acetosella	+	-	+	+	+	-	-	-	III
Geum montanum	+	-	+	-	+	+	-	-	III
Actaea spicata	+	-	-	+	-	-	-	-	II
Athyrium filix-femina	+	+	+	+	-	-	-	-	III
Nardus stricta	-	+	+	-	+	-	+	+	IV
Festuca airoides	-	-	-	-	-	-	+	+	II
Potentilla aurea ssp. chrysocraspeda	-	+	+	-	+	+	+	-	IV
Carex sempervirens	-	-	-	-	-	-	+	+	II
Cetraria islandica	-	-	-	+	+	-	+	+	III

Place and data of the relevés: 1, 2, 3 - Izvorul Sec, 6.VIII.2000; Şaua Funicelului, 12.VII.2002; 7, 8 - Balota Peak, 13.VII.2002

2. Ass. *Campanulo abietinae - Juniperetum alpinae* (Buia et al 1962) Boşcaiu 1971 (Syn. *Juniperetum nanane* Soo 1928, *Juniperetum sibiricae* Rațiu) (Table 2)

***Chorology*.** Short juniper dominant species vegetate in the alpine sub-layer and sub-alpine layer, on sunny and partly-sunny inclined slopes. This association is largely spread in the Căpățânii Mountains and can be seen in: Şaua Funicelu, Piatra Roşie Mountain, Ursuleţul Mountain, Dârjala Mountain, Buila-Vânturarița Mountains, Casariei Mountain, Văleanu Mountain, Albu Mountain, Oale Mountain, Bătrâna Sheepfold, Cernei Valley, La Colţul Marginii, under Balota and Căpățâna Peaks.

***Ecology*.** The analysis of the phtyocoenoses of this association, according to the main ecologic indexes points out the preponderant mesophilic character of the phtyocoenoses (40%). In comparison with the temperature requests, microhermic species prevail (45%), which are then followed by the eurithermic species (45%) and criophyle species (20%). Depending on the chemical reaction of soil, the share belong to the acidophile species (37.5%), followed by highly acidophyle species (20%).

***Physiognomy and floristic composition*:** Phytocoenosis structure, apart from the main species, i.e. *Juniperus communis* ssp. *alpina* and *Campanula patula* ssp. *abietina* also includes

the following: *Vaccinum myrtillus, V. vitis-idaea, Chamaenerion angustifolium, Rubus idaeus, Luzula luzuloides, Senecio ovatus, Bruckenthalia spuiculifolia, Rhododendron myrtifolium, Homogyne alpiae, Deschampsia flexuosa, Cetraria islandica*. The analysis can turn into *Nardus stricta* and *Festuca nigrescens* grazes.

Ass. *Campanulo abietinae - Juniperetum alpinae* Simon 1966 ***Table 2***

No. of relevée	1	2	3	4	5	6	7	8	9	K
Altitude m.o.s. (x 10 m)	180	180	185	180	190	190	195	182	190	
Exposure	E	E	SV	SE	S	S	SV	E	SE	
Inclination (in grades)	20	20	30	35	20	20	30	10	20	
Coverage (%)	100	100	100	95	95	95	100	100	100	
Area (m^2)	100	100	100	50	50	100	100	100	100	
Char. ass.										
Juniperus communis ssp. alpina	5	5	5	4-5	5	5	5	4-5	5	V
Campanula patula ssp.abientina	+	+	+	+	+	-	+	+	+	V
Rhodondendron – Vaccinion										
Rhodondrendron myrtifollium	-	-	+	-	+	+	+	-	+	III
Vaccinium gaultherioides	-	-	+	-	-	-	+	-	+	II
Bruckenthalia spiculifolia	-	+	-	+	-	-	-	+	+	III
Junipero – Pinetalia mugo et Vaccinio – Piceetalia										
Picea abies	+	+	-	+	-	-	-	+	-	III
Vaccinium myrtillus	+	+	+	+	-	+	+	+-1	+	IV
Homogyne alpine	+	-	+	+	+	-	-	-	+	III
Calamagrostis villosa	+	+	-	-	-	-	+	-	+	III
Deschampsia flexuosa	+	+	+	+	+	-	+	+	+	V
Dryopteris dilatata	+	+	-	-	-	-	-	+	+	III
Vaccinum vitis-idaea	-	+	-	-	-	+	-	+	+	III
Pinus mugo	+	-	+	-	-	-	+	-	-	II
Laserpitum krapfii	+	+	-	-	+	-	+	+	-	III
Caricetalia curvulae s.l.										
Pulsatilla alba	-	-	+	-	-	-	+	+	+	III
Festuca airoides	+	+	+	+	-	+	-	-	-	III
Cetraria islandica	-	+	-	-	-	-	+	-	+	II
Potentillo-Nardion										
Potentilla aurea ssp. chrysocraspeda	-	+	-	+	-	-	+	-	-	II
Nardus stricta	-	+	-	-	-	-	-	-	+	II
Viola declinata	+	-	-	-	-	-	-	+	-	II
Festuca nigrescens	+	+	-	-	+	-	-	+	+	III
Geum montanum	+	-	-	-	+	-	-	-	+	II
Antennaria dioica	+	-	+	-	-	-	-	-	+	II
Epilobietea angustifolii										
Chamaenerion angustifolium	+	+	-	1	-	-	1	1	+	III
Rubus idaeus	-	+	-	+	+	+	-	+	+	IV
Senecio ovatus	+	+	+	+-1	-	+	-	1	+-1	IV
Variae Syntaxa										
Hypericum richerii ssp. grisebachi	-	-	-	-	+	+	-	-	+	II
Oxalis acetosella	+	+	-	-	+	+	+	-	+	IV
Aconitum firmum	+	+	-	+	-	-	-	+	+	III
Luzula luzuloides	+	+	-	+	+	-	-	+	+	IV
Agrostis capillaries	+	+	-	+	+	-	-	+	+	IV
Thymus balcanus	-	+	+	+	+	+	-	-	-	III
Veratrum album	+	-	-	+	-	-	-	+	-	II
Athyrium filix-femina	-	+	-	+	-	+	-	+	-	III

Place and data of the relevés : 1, 2, 3 - Şaua Funicelului, 7.VII.2000; 4, 5, 6, 7 – Balota Sheepfold,13.VII.2002; 8- Piatra Roşie Sheepfold**;** 9- Dârjala Mountain, 18.VII.2003.

3. Ass. *Campanulo abietinae - Vaccinietum myrtilii* (Buia et al. 1962) Boşcaiu 1971 (Syn. *Vaccinietum myrtilii* Buia, *Junceto trifidi - Vaccinetum* Resmerita 1976)

***Chorology*.** Bilberry bushes vegetate on the upper limit of spruce fir forests, on sunny and partly sunny slopes. In the Căpăţânii Mountains, phytocoenoses of this association are spread Şaua Funicelul, Buila-Vânturariţa Mountains, Bistriţa Valley, Romani Valley, Cernei Valley, Văleanu Mountain, Albu Mountain, Otăsăului Valley, Piciorul Mărului, Vioreanu

Peak, Cheia Valley, Piatra Roşie Mountain, Dârjala Mountain, Ursuleţul Mountains, Blajului Valley, Piatra Tăiată, Comarnici Sheepfold and Izvorul Sec. These bushes developed on cleared areas of restricted forests.

Ecology. By analyzing the pytocoenoses of the association, from an ecologic aspect, there was noticed that most species are mesophilic (39.28%), microthermic species (46.42%), acidophile species (35.71%) and highly acidophile species (32.14%).

Physiognomy and floristic composition. The floristic structure also includes, apart from the dominant species *Vaccinium myrtillus* and *Campanula patula* ssp. *abietina*, the following: *Vaccinium vitis-idaea*, *Deschampsia flexuosa*, *Bruckenthalia spiculifolia*, *Rhododendron myrtifolium*, *Homogyne alpine*, *Cetraria islandica.* From a syndynamic point of view, blueberry phytocenoses vegetate on cut spruce fir forests and can turn into nards.

The dendrogram (fig. 1) points out the separation of two clusters: the formers includes ground surveys 1 and 2, and the latter, ground surveys 3, 8, 4, 9, 7, 5, 10 and 6. Ground surveys 1 and 2 are grouped taking into consideration the abundance - dominance criterion for the *Vaccinium vitis-idaea* species (2, 1-2); the Bray-Curtis index appears to be a quantitative one, with a value of 0, 30. The second cluster is divided into two sub-clusters: the former, has a quantitative Bray-Curtis index of 0.25, and the latter, in which only one cluster is divided, has a 0.30 value.

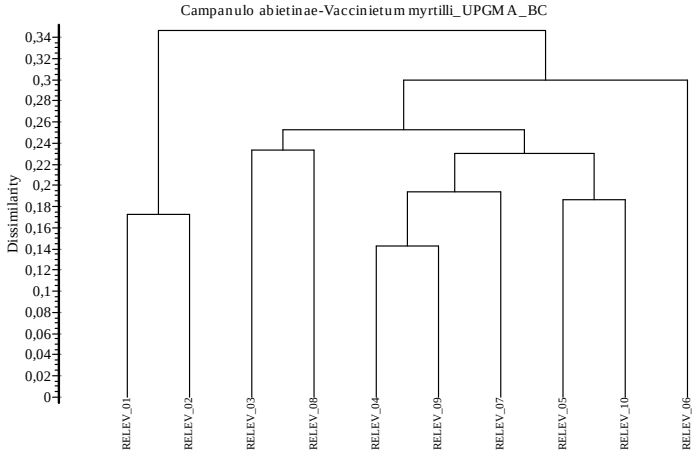

Fig. 1 Dendrogram: ass. *Campanulo abietinae - Vaccinietum myrtilii*
(BUIA et al. 1962) BOŞCAIU 1971

This cluster divides on the basis of the *Nardus stricta* species, which has the highest abundance-dominance value (1), comparing it to the other clusters. There was also noticed that the grouping of clusters 4, 9 and 7. This was explained by the high abundance-dominance value (2, and 1-2) of the *Vaccinium gaultherioides* species. The branches of the dendrology diagram are well individualized for each cluster group. The repartition of the values in the dendrology diagram concluded that the flower structure of phytocenosis is stable, even if the variation of the *Bray-Curtis* quantitative index is between 0.14 and 0.35.

4. Ass. *Junipero alpinae- Bruckenthalietum spiculifoliae* Horv. 1936

Chorology. Currant bushes and short juniper trees vegetate in the sub-alpine layer, on sunny, even or sloping areas, with podsol-type soils. In the Căpăţânii Mountains, the

phytocoenoses of this association are largely spread in: Piatra Rosie Mountain, Casariei Mountain, Şaua Funicelul, Ursu Sheepfold, Piatra Tăiată, Otăsăului Valley and Căpățâna Sheepfold, Văleanu Mountain, Bistrița Valley.

Ecology. The whole species complex gives the phytocoenoses of this association a mesophilic (36.11%), microthermic species (41.67%) and acidophil (36.11%) character.

Physiognomy and flower structure. There are 90-100% spread phytocoenoses. Within the flower structure of these phytocenoses, there are 36 species. They include, apart from *Juniperus communis* ssp. *alpina* and *Bruckenthalia spiculifolia* dominant species, the following: *Campanula patula* ssp. *abietina*, *Vaccinium myrtillus*, *V. vitis-iadea*, *Potentilla aurea* ssp. *chrysocrapeda*, *Homgyne alpina*, *Nardus stricta*, *Deschampsia flexuosa*, *Pulsatilla alba*, *Geum montanum*, *Genista tinctoria* ssp. *oligosperma*, *Atennaria dioica*. From a syndinamic respect, this phytocoenosoes are turning into nards.

CONCLUSIONS

On the occasion of certain vegetation research made in the Căpățânii Mountains (Oltenia County), between 1997-2007, we found 4 vegetal association as being part of ***JUNIPERO - PINETALIA MUGO*** Boşcaiu 1971 Order: ***1. Rhododendro myrtifolii - Pinetum mugo*** Borza 1959 em. Coldea 1985, ***2. Campanulo abietinae - Juniperetum*** Simon 1966, ***3. Campanulo abietinae - Vaccinietum*** (Buia et al. 1962) Boşcaiu 1971, ***4. Junipero - Bruckenthalietum spiculifoliae*** Horv 1936. As part of identified association description, referring to chorology, ecology, physiognomy and floral composition and to the importance of those association, too. The anthropic impact has a negative influence on the phytocoenoses, because of the decrease of the vegetal bio-mass and the number of fodder species. This association is very important, from the soil genetic, ecologic and economic point of view. Juniper has important phyto-pharmaceutical properties. Pseudo-fruits are used, for they have diuretic, carminative, anti-spasm and antiseptic properties for the urinary apparatus. Bilberry and red bilberry fruit can be used, both in alimentation and in medicine. The diuretic value of bilberries and red bilberries is acknowledged.

LITERATURE

1. BORHIDI, A., 1995, *Social Behaviour types, the naturalness and relative ecological indicator values of the higher plants in the Hungarian Flora*, *Acta Botanica Hungarica*, 39(1-2), Budapest, p. 81-97
2. COLDEA, G., 1991, *Prodrome des associations végétales des Carpates du Sud-Est (Carpates Roumaines)*, *Documents Phytosociologiques, N.S.*, 13, Camerino, p. 317-539
3. CRISTEA, V., GAFTA, D., PEDROTTI, F., 2004, *Fitosociologie*, *Ed. Presa Universitară Clujană,* Cluj
4. MUCINA, L., 1997, *Conspectus of Classes of European vegetation*, *Folia Geobot. Phytotax.*, Praha, 32: 117-172.
5. NICULESCU, M., 2006, *Flora and vegetation in the upper basin of the Luncavat River*, Ph.D. thesis, "Babes-Bolyai" University of Cluj-Napoca
6. OBERDORFER, E., 1992, *Süddeutsche Pflanzen – gesellschaften*, Teil IV: *Wälder und Gebüsche* 2, *Stark berabeilete Auflage Texband*, *Gustav Fischer Verlang*, Jena, New York
7. POPESCU, G., 1974, *Studiul floristic şi geobotanic al bazinului hidrografic al Bistriței Vâlcii,* teză de doctorat, Univ. Bucureşti
8. RĂDOI, T., 1984, *Flora şi vegetația bazinului Olăneşti Vâlcea*, Rez. tezei de doctorat, Univ. Bucureşti
9. ZOLYOMI, B. et al., 1966, *Einreihung von 1400 Arten der ungarischen Flora in okologischen Gruppen nach TWR - Zahlen*, *Fragmenta Bot. Mus. Hist. Nat.* Hung., IV, F. 1-4, Budapest.