

## RESEARCHES ON THE MEADOWS FROM *CYNOSURION CRISTATI* Br.-Bl. et Tx. 1943 IN THE BISTRIȚA-VĂRATEC VALLEY (GORJ COUNTY, ROMANIA)

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### ABSTRACT

The territory that we have been studying (since 2007) is situated in the Bistrița-Văratec Valley, a tributary of the Tismana River and it covers a surface of approximately 500 km<sup>2</sup>. According to the research carried out between 2007-2011, in the upper basin of the Bistrița-Văratec, there were identified 4 plant communities, within alliance *Cynosurion cristati* Br.-Bl. et Tx. 1943: ***Anthoxantho-Agrostetum capillaris*** Sillinger 1933, Jurko 1969, ***Lolio-Cynosuretum*** Br.-Bl. 1936 em Tx. 1937 (Syn. ***Lolietum perennis*** Safta 1943), ***Festuco rubrae-Agrostetum capillaris*** Csűrös-Káptalan 1964 (Syn. *Festucetum rubrae-Agrostietum capillaris* Horv. 1951; *Festuco rubrae-Cynosuretum auct. roman.*, *Festucetum rubrae et Agrostis capillaris auct. roman.* and ***Rumici (acetosellae)-Agrostietum tenuis*** Sanda et Popescu 1981 (Syn. *Agrostetum tenuis biharicum* Resmeriță 1965, 1970). Ecology, chorology, floristic composition (species richness, life forms, phytogeographical elements) as well as its economic importance for all these plants communities (characterised by 40 original phytosociological relevés) are analysed in this paper.

### INTRODUCTION

Referring to the geo-morphological aspect, the Bistrița-Văratec Valley comprises two distinct, well defined relief types: the mountainous area, pertaining to the Oslea Mountains (part of the Vâlcan Mountains), in the Meridional Carpathians and the Peștișani Subcarpathian valley (fig. 1), which is part of the Subcarpathian area of Oltenia.

The most important crests and ridges of these mountains, belonging to the upper basin of the Bistrița-Văratec, are the following: *Oslea Peak* (1,946 m) and *Coadă Oslei* (1,899 m). After the physico-geographic division in sectors, the mountainous level pertains to the central-European province, the Carpathian sub-province, the land of the *Meridional Carpathians*, the *Western District (Godeanu-Parâng)*. The Oslea Mountain are part of the Vâlcan Mountains (Romanian Carpathians). The flora and vegetation of the Oslea Mountain is characteristic to the Carpathians. There are some particularities, given by the relief, altitude, climate, nature of rocks and soil. The diversity of the species of plants and animals, some of them being rare and endemic, involves the necessity of their protection and reduction of the anthropic factors which represent a real danger to the ecosystem integrity and of the biodiversity preservation (M. Niculescu, 2009).

In this paper, we present 4 plant communities, within alliance *Cynosurion cristati* Br.-Bl. et Tx. 1943: ***Anthoxantho-Agrostetum capillaris*** Sillinger 1933, Jurko 1969, ***Lolio-Cynosuretum*** Br.-Bl. 1936 em Tx. 1937 (Syn. ***Lolietum perennis*** Safta 1943), ***Festuco rubrae-Agrostetum capillaris*** Csűrös-Káptalan 1964 (Syn. *Festucetum rubrae-Agrostietum capillaris* Horv. 1951; *Festuco rubrae-Cynosuretum auct. roman.*, *Festucetum rubrae et Agrostis capillaris auct. roman.* and ***Rumici (acetosellae)-Agrostietum tenuis***

Sanda et Popescu 1981 (Syn. *Agrostetum tenuis biharicum* Resmeriță 1965, 1970). For each vegetal association the corology, ecology, aspect physiognomy and floristic composition as well as their importance are taken into consideration.



Fig. 1. Aspect from the Bistrița-Văratec Valley (Gureni)

## MATERIALS AND METHODS

The research in the field was done between 2007, in all seasons and on planned itineraries. The studies on the field involved a good bibliographic documentation regarding the physical-geographical frame: the relief, the geology-lithology, the types of rocks, the hydrographic network, the soils and the general and local climate. The main materials which were necessary for the recognition were the topographic, geologic, and pedological maps. For the study of the vegetation in this area, we have used the methods of phytosociologic research characteristic to the Central European phytosociologic School, which were based on the principles and methods elaborated by J. Braun-Blanquet (1926). The associations 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). The synthetic tables of the described vegetal associations contain information referring to: number of relevés, altitude (m.s.m), exposure, inclination (in grades), the completion of the crowing (where it is the case), vegetation level of covering (%) and the analyzed surface (m<sup>2</sup>). The vertical arrangement of the phytosociological tables was done according to the coenotaxonomic criterion. The quantitative assessment of the participation of every species to the vegetal association was performed with the help of the abundance-dominance index, according to the Braun-Blanquet scale. We have noted the constancy of the species (K) in the case of the association characterized on the basis of minimum 5 relevés.

## RESULTS AND DISCUSSIONS

Ecology, chorology, floristic composition (species richness, life forms, phyto-geographical elements) as well as its economic importance for all these plant communities

(characterised by original phytosociological relevées) are analysed in this paper.

**Ass. 1. Anthoxantho-Agrostetum capillaris** Sillinger 1933. Jurko 1969 (Table 1)

**Chorology.** Seet vernal grass meadows are usually placed on grubbed areas that are plain or bent from the cliff or mountain layer. They are usually placed on typical eutricambosols and luvosols. Such phytocoenoses have been found on the Bistrița-Văratec Valley, in Gureni, Topești and Bisticioara (Boroșteni) Valley, at 350-550 m altitude.

**Physiognomy and floristic composition.** In the phytocoenotic composition of this plant community, apart from species *Anthoxanthum odoratum* and *Agrostis capillaris*, there are also constant many species that belong to the **Molinio-Arrhenatheretea** class, such as: *Dactylis glomerata*, *Briza media*, *Trifolium repens*, *T. pretense*, *Luzula campestris*, *Vicia cracca*, *Poa pratensis*, *Holcus lanatus*, *Medicago lupulina*.

In the phytocoenotic composition of this plant community, beside the dominant species, there are also: *Festuca rupicola*, *Galium verum*, *Thymus pulegioides*, and *Dianthus carthusianorum*. This species apart from **Festuco-Brometea** class. (Table 1).

The dominant bioforms are the hemicryptophytes, followed by biannual terophytes and camephytes.

The prevailing floristic elements are the Euro-Asians species.

From the caryologyc point of view, the highest percentage is represented by the diploid species.

Sindinamic this plant community can develop into *Festuco rubrae-Agrostetum capillaris* Csürös-Káptalan 1964 plant community. As a result of intense grazing, meadows depreciate and turn into *Dichanthium ischaemum* meadows.

Importance. In the floristic structure of this plant community there are fodder-like species. These meadows have a high fodder value and a high productivity, too. They are especially used as hay-stacks, and less as cattle meadows. Some species have a honey-bearing and medicinal value.

Ass. *Anthoxantho-Agrostetum capillaris* Sillinger 1933. Jurko 1969

**Table 1**

No. of relevée	1	2	3	4	5	6	7	K
Altitude m.o.s. (x 10 m)	35	40	45	45	50	50	50	
Exposure	-	-	E	E	-	SE	SE	
Inclination (in grades)	-	-	15	15	-	10	10	
Coverage (%)	100	100	100	100	100	100	100	
Area (m <sup>2</sup> )	100	100	100	100	100	100	100	
<b>Char. ass.</b>								
<i>Anthoxanthum odoratum</i>	3-4	3	2	2	1-2	1-2	2	V
<i>Agrostis capillaris</i>	3	3-4	4	4	4	4	4	V
<b>Molinietalia &amp; Molinio-Arrhenatheretea</b>								
<i>Agrostis stolonifera</i>	+	-	-	+	-	-	-	II
<i>Alopecurus pratensis</i>	+	-	-	-	-	+	-	II
<i>Holcus lanatus</i>	-	-	+	+	+	+	+	IV
<i>Poa pratensis</i>	+	+	-	+	-	+	-	III
<i>Trifolium pretense</i>	+	+	+	-	+	+	-	IV
<i>Trifolium repens</i>	+	+	-	+	-	+	+	IV
<i>Vicia cracca</i>	1	+	+	+	+	1	+	V
<i>Medicago lupulina</i>	+	-	-	-	-	-	-	I
<i>Festuca pratensis</i>	-	+	+	+	+	-	-	III
<i>Centaurea austriaca</i>	+	+	-	-	-	+	-	III
<i>Ranunculus acris</i>	-	+	-	+	+	-	+	III
<i>Dactylis glomerata</i>	+	+	-	+	-	+	-	III
<i>Stellaria graminea</i>	-	+	+	+	-	+	+	IV
<i>Luzula campestris</i>	+	+	-	+	-	+	+	IV
<i>Polygala vulgaris</i>	+	-	+	-	+	+	+	IV

<i>Lychnis flos-cuculi</i>	+	-	+	-	-	+	+	III
<i>Achillea millefolium</i>	+	+	+	-	+	-	-	III
<i>Leontodon autumnalis</i>	+	+	-	-	-	+	+	III
<i>Leucanthemum vulgare</i>	+	+	+	+	-	-	+	IV
<i>Thymus pulegioides</i>	+	+	-	-	-	+	-	III
<i>Cerastium fontanum</i>	-	+	-	+	+	-	+	III
<i>Ononis arvensis</i>	+	+	-	+	-	+	-	III
<i>Centaurea jacea</i>	+	-	-	+	-	-	-	II
<b>Arrhenatheretalia</b>								
<i>Cynosurus cristatus</i>	+	+	+	+	1	1	+	V
<i>Rhinanthus rumelicus</i>	+	+	+	-	+	+	+	IV
<i>Carum carvi</i>	+	-	+	-	-	+	-	III
<i>Festuca rubra</i>	1	+	+	+	+	+	+	V
<b>Festuco-Brometea</b>								
<i>Medicago falcata</i>	+	+	-	-	-	+	-	III
<i>Carex caryophylla</i>	-	+	-	+	+	-	+	III
<i>Festuca rupicola</i>	+	-	-	+	-	-	-	II
<i>Medicago falcata</i>	+	-	-	+	-	-	-	II
<i>Galium verum</i>	+	+	-	-	-	+	-	III
<i>Danthonia provincialis</i>	-	+	-	+	+	-	+	III
<i>Dianthus carthusianorum</i>	+	+	-	+	-	-	+	III
<i>Thymus pulegioides</i>	+	-	+	-	+	+	+	IV
<i>Potentilla argentea</i>	-	+	-	-	-	+	-	II
<i>Prunella laciniata</i>	-	+	-	+	-	-	-	II
<i>Galium mollugo</i>	+	-	-	+	-	-	-	II
<i>Coronilla varia</i>	+	+	-	-	-	+	-	III
<i>Hypericum perforatum</i>	-	+	-	+	+	-	+	III
<i>Pimpinella saxifraga</i>	+	-	-	+	-	-	-	II
<i>Peucedanum oreoselinum</i>	+	+	-	-	-	+	-	III
<b>Variae Syntaxa</b>								
<i>Veronica chamaedrys</i>	-	+	-	+	-	-	-	II
<i>Vicia sativa</i>	+	+	-	+	-	-	-	III
<i>Rorippa sylvestris</i>	+	-	+	-	-	+	-	III
<i>Cirsium arvense</i>	-	+	-	-	+	-	-	II
<i>Potentilla reptans</i>	-	-	+	-	+	+	+	III
<i>Prunella vulgaris</i>	+	-	-	-	-	+	+	II
<i>Rumex crispus</i>	-	+	-	+	-	-	+	II
<i>Betonica officinalis</i>	+	+	-	+	-	-	+	III
<i>Viola collina</i>	+	+	-	+	-	-	+	III
<i>Gentiana cruciata</i>	+	+	-	+	-	+	+	IV
<i>Valerianella locustris</i>	+	+	-	+	-	+	-	III
<i>Bryophytes different species</i>	+	+	+	+	+	+	+	V

**Place and data of the relevés:** 1, 2, 3, 4 - Bistrița-Văratec Valley, 6.VIII.2009; 5, 6, 7 - Bistricioara (Boroșteni) Valley, 7.VIII.2009

**Ass.2. *Lolio-Cynosuretum* Br.-Bl. 1936 em Tx. 1937 (Syn. *Lolietum perennis* Safta 1943)**

**Corology.** In the study area, these phytocoenoses were identified on the Bistrița-Văratec Valley. In the southern part of the country this plant community was quoted of the Tarcu, Godeanu and Cernei Mountains (N. Boșcaiu, 1971) and of the Motru Valley (C. Maloș, 1977).

**Physiognomy and floristic composition.** In the phytocoenotic composition of this plant community, apart from species *Lolium perenne* and *Cynosurus cristatus*, there are also constant many species that belong to the **Molinio-Arrhenatheretea** class and to **Arrhenatheretalia** order. There are constantly species as: *Carum carvi*, *Dactylis glomerata*, *Trifolium repens*, *T. pretense*, *Achillea millefolium*, *Lotus corniculatus*, *Leucanthemum vulgare*, *Prunella vulgaris*, *Plantago lanceolata*, *Ranunculus acris*, *Vicia cracca*, *Holcus*

*lanatus*, *Poa pratensis*, *Rumex acetosa*, *Rhinanthus minor*. Sindinamic this plant community can develop also into *Festuco rubrae-Agrostetum capillaris* Csürös-Káptalan 1964 plant community.

**Ass. 3. *Festucetum rubrae-Agrostietum capillaris***, Csuros-Káptalan 1964 (Syn. *Festucetum rubrae-Agrostietum capillaris* Horv. 1951; *Festuco rubrae-Cynosuretum* auct. roman., *Festucetum rubrae et Agrostis capillaris* auct. Roman.)

**Corology.** In the studied area this plant community we can be found at Bistrița-Văratec Valley and Boroșteni Valley. They are usually placed on typical eutricambosols.

**Physiognomy and floristic composition.** The analyzed phytocoenoses cover the vegetation demand up to 100%. Apart from the mentioned species of the association, there are to be mentioned species that belong to the **Moinio-Arrhenatheretea** class and **Arrhenatheretalia** order, such as: *Dactylis glomerata*, *Briza media*, *Trifolium repens*, *T. pretense*, *Anthoxanthum odoratum*, *Betonica officinalis*, *Cerastium fontanum*, *Polygala vulgaris*, *Leontodon autumnalis*, *Leucanthemum vulgare*, *Centaurea phrygia*, *Luzula campestris*, *Vicia cracca*, *Poa pratensis*, *Holcus lanatus*, *Medicago lupulina*, *Rhinanthus rumelicus*, *Cynosurus cristatus*, *Carum carvi*, *Trifolium dubium*, *Campanula patula* ssp. *patula*, *Arrhenatherum elatius*. We must also mention the species in the **Festuco-Brometea** class: *Thymus pulegioides*, *Lotus corniculatus*, *Helianthemum nummularium*, *Dianthus carthusianorum*, *Potentilla argentea*, *Pimpinella saxifraga*, *Galium verum*, *Carex caryophylla*.

The dominant bioforms are the hemicryptophytes and the prevailing floristic elements are the Euro-Asians species.

From the caryology point of view, the highest percentage is represented by the polyploid species.

As a result of intensive grazing, meadows degrade and turn into *Festuca rupicola*, *Nardus stricta* or *Dichanthium ischaemum* meadows.

**Importance.** Hair grass and spear grass meadows have an important contribution to the economy, for they provide green and dried grazing

**4. Ass. *Rumici (acetosellae)-Agrostietum tenuis*** Sanda et Popescu 1981 (Syn. *Agrostetum tenuis biharicum* Resmeriță 1965, 1970).

**Corology.** In the Bistrița-Văratec Valley these phytocoenoses were identified in Gureni, Vâja Lake, Brădiceni, Galbenul Valley and Bistricioara (Boroșteni) Valley at 250-450 m.s.m. From this area this plant community was quoted of the Motru Valley (C. Maloș, 1977).

**Physiognomy and floristic composition.** It is a secondary meadow where the dominant species are part of the **Moinio-Arrhenatheretea** class. Very well represented are the species of the **Festuco-Brometea** class: *Thymus pulegioides*, *Lotus corniculatus*, *Dianthus carthusianorum*, *Potentilla argentea*, *Dorycnium herbaceum*, *Medicago falcata*, *Prunella laciniata*, *Hypericum perforatum*.

This plant community have been analyzed and characterized from the chorological, ecological, phytosociological point of views.

## CONCLUSIONS

According to the research carried out between 2007-2011, in the upper basin of the Bistrița-Văratec, there were identified 4 plant communities, within alliance **Cynosurion cristati** Br.-Bl. et Tx. 1943: ***Anthoxantho-Agrostetum capillaris*** Sillinger 1933, Jurko 1969, ***Lolio-Cynosuretum*** Br.-Bl. 1936 em Tx. 1937 (Syn. ***Lolietum perennis*** Safta 1943), ***Festuco rubrae-Agrostetum capillaris*** Csürös-Káptalan 1964 (Syn. *Festucetum rubrae-Agrostietum capillaris* Horv. 1951; *Festuco rubrae-Cynosuretum* auct. roman., *Festucetum rubrae et Agrostis capillaris* auct. roman. and ***Rumici (acetosellae)-Agrostietum tenuis*** Sanda et Popescu 1981 (Syn. *Agrostetum tenuis biharicum*



Resmeriță 1965, 1970). Ecology, chorology, floristic composition (species richness, life forms, phyto-geographical elements) as well as its economic importance for all these plants communities (characterised by original phytosociological relevés) are analysed in this paper.

Taking into account the order for “the actualization of the annexes no. 2, 3, 4 and 5, in the *Emergency Ordinance of the Romanian Government*, no. 236/2000, regarding the status of protected areas, their conservation and the preservation of wild flora and fauna, approved with changes and completions, by the Law no. 462/2001, in the *Official Gazette*, part 1, no. 1097/6.12.2005 and *Romanian Manual for Interpretation of Natura 2000 Habitats in Romania* (2008), there can be noticed that the habitat in the Bistrița-Văratec Valley is mentioned **6520 Fânețe montane** [Mountain hay meadows] CLAS. PAL.: 38.31

Intense grazing has a negative influence on the phytocoenoses in the *Cynosurion cristati* Br.-Bl. et Tx. 1943 Alliance, for they cause the decrease of the vegetal bio-mass and the number of fodder species.

### BIBLIOGRAPHY

- Boșcaiu, N.** - 1971, *Flora și vegetația Munților Țarcu, Godeanu și Cernei*, Ed. Acad., București
- 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
- Borhidi, A., Keverly, B.** – 1995, *A annotated check list of the Hungarian Plant communities II*, *Acta Botanica Hungarica*, p. 95-138
- Coldea, G.** - 1991, *Prodrome des associations végétales des Carpates du Sud-Est (Carpates Roumaines)*, *Documents Phytosociologiques*, N.S., 13, Camerino, p. 317-539
- Cristea, V., Gafta, D., Pedrotti, F.** – 2004, *FITOSOCIOLOGIE*, Ed. Presa Universitară Clujană, Cluj Napoca.
- Gafta D., Owen Mountford (coord.)** – 2008, *Manual de interpretare a habitatelor Natura România*, Ed. Risoprint, Cluj-Napoca
- Mucina, L.** – 1997, *Conspectus of Classes of European vegetation*, *Folia Geobot. Phytotax.*, Praha, 32: 117-172.
- Niculescu, M. et al.** – 2009, *Contributions regarding the study of the Potentilletalia caulescentis Br.-Bl. 1926 Order in the Oslea Mountain (Romanian Carpathians)* Analele Universității din Craiova, seria Agricultură – Montanologie – Cadastru Vol. XXXIX 2009, <http://agronomie.administrativ.ucv.ro/aamc/index.php/aamc/article/view/325/301>
- Oberdorfer, E.** - 1992, *Süddeutsche Pflanzen – gesellschaften*, Teil IV: *Wälder und Gebüsche 2*, Stark berabeilete Auflage Texband, Gustav Fischer Verlag, Jena, New York
- Resmeriță, I.** - 1970, *Flora, vegetația și potențialul productiv pe masivul Vlădeasa.*, Editura Academiei, București
- Roșu, A.**, - 1980, *Geografia fizică a României*, Ed. Did. Și Ped., București
- Sanda, V., Popescu, A., Barabaș, N.**, 1998 - *Cenotaxonomia și caracterizarea grupărilor vegetale din România*, St. Com., Muz. Șt. Nat. Bacău, 14: 5-366.
- Sanda, V., Popescu, A., Arcuș, Mariana**, 1999 - *Revizia critică a comunităților de plante din România*, Ed. Tilia Press International, Constanța
- XXX-** 1964-1980, *Flora Europaea*, vol.I-IV, *University Press*, Cambridge
- XXX-**1952-1976, *Flora României*, vol. I-XIII, Ed. Acad. Române, București