

PHYTOCOENOLOGIC STUDY OF *AGROSTIS CAPILLARIS* WITH *ANTHOXANTHUM ODORATUM* GRASSLANDS IN CODRU-MOMA MOUNTAINS (NW ROMANIA)

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Abstract

This paper presents a phytocoenologic study of groups of plants belonging to the Anthoxantho-Agrostietum capillaris association Sillinger 1933 from Codru-Moma Mountains.

In this paper an analysis of the spectrum of floristic elements, of life forms and of ecological indices is presented and also an analysis of the of plants on economic categories of the phytocenoses belonging to the grasslands of Agrostis capillaris with Anthoxanthum odoratum of Codru-Moma Mountains.

Key words: grassland, floristic elements, life forms, ecological indices, economic categories.

INTRODUCTION

Unlike Piatra Craiului and Zărand Mountains that bind to the large mass of Apuseni Mountains with high mass insertions, Codru-Moma Mountains have a very weak connection, a sort of narrow bridge that connects them to Bihor Mountains. This makes them to be well defined, with conspicuous limits and almost detached from the central western part of the Apuseni Mountains, appearing as an island-like mountainous mass surrounded by depressions. Northward the limit is formed by Crișul Negru River with a segment from the middle flow. To the east, the limit of the mountains is at first striking, caused by the large Beiuș depression, a bay that is creeping among them and Bihor Mountains.

But to the southeast, an area of wooded hills links the two groups of mountains forming the “bridge” mentioned before; in fact, this is the watershed between the basins of two rivers, Crișul Negru and Crișul Alb.

To the west, the edge of the mountains is not visible because they slow down, on gentle hills to Crișurilor Plain.

MATERIAL AND METHODS

The study was conducted between 2008 and 2011. In the phytocoenologic study of *Anthoxantho-Agrostietum capillaris* association Sillinger 1933 the research methods of the European Central School were used being developed by J. Braun-Blanquet (Braun-Blanquet 1928). The description of the association was made with characteristic species,

enlightening species, dominant and differential species (Cristea et al., 2004). The sample surfaces adopted in the meadows were 100 square feet (Burescu, 2003). In drawing up the association table and floristic spectrum, some literature with more recent data was studied (Oroian, 1998; Ciocârlan, 2000; Pop et al., 2002; Chifu et al., 2006; Groza, 2008; Răduțoiu, 2008).

RESULTS AND DISCUSSION

The grasslands of *Agrostis capillaris* with *Anthoxanthum odoratum* occupy the land from slight to moderate sloping, with moist, mesobasic soil (Table 1). The most common species to be found in this phytocoenoses of association outside the edifying species are: *Trifolium repens*, *Achillea millefolium*, *Lotus corniculatus*, *Festuca pratensis*, *Plantago lanceolata*, *Prunella vulgaris*, *Euphorbia cyparissias*, *Hieracium pilosella*, *Rosa canina*. (Table 1).

In cenotaxonomic terms the association is classified as follows (Sanda et al., 2008):

Molinio-Arrhenatheretea class R. Tüxen 1937

Arrhenatheretalia order R. Tüxen 1931

Cynosurion alliance R. Tüxen 1947

Anthoxantho-Agrostietum capillaris association Sillinger 1933

In order to meet economic needs and to have a database following the recommendations concerning the recovery potential of plants of the phytocoenoses in this association, an analysis of plants on economic categories was made (Fig. 1).

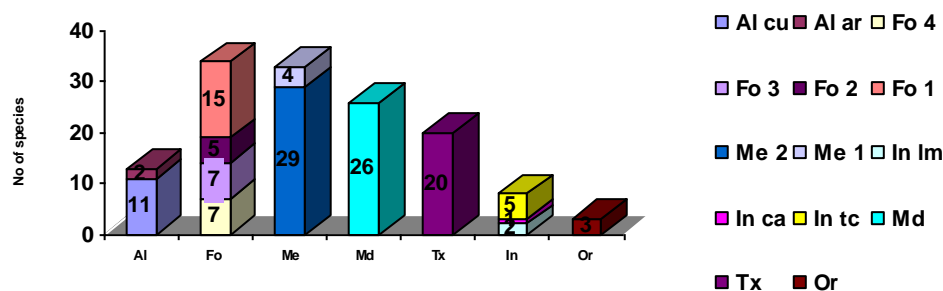


Fig. 1. The economic spectrum of the *Anthoxantho-Agrostietum capillaris* association Sillinger 1933

where: Al.-Alimentary species (Al. cu.-Culinary food species; Al. ar.-Aromatic food species); Fo.-Fodder species (Fo.4-With high nutritional value; Fo.3-With good nutritional value; Fo.2-Mediocre food value; Fo.1-With poor nutritional value); Me.-Melliferous species (Me.1-To share small beekeeping; Me.2-Weighted mediocre beekeeping); Md.-Medicinal species; Tx.-Toxic species; In.-Industrial species (In.lm- Species can be used the timber industry; In.ca.-Species can be used the domestic industry; In.tc.-Species can be used the chemical industry); Or.-Ornamental species.

Analyzing the economic spectrum of plants one can observe the large share of fodder species (34), followed by melliferous species (33) and those with medicinal use (26).

Table 1

Anthoxantho-Agrostietum capillaris association Sillinger 1933

L.f.	F.e.	U.	T.	R.	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	K
					Altitude (m.s.m.)	450	490	460	410	500	580	620	600	330	350	300	520	380	
					Vegetation cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	
					Exposure	SE	NV	SV	SV	SV	NV	S	E	N	-	SE	SE	-	
					Slope (°)	5	15	8	8	6	10	18	8	6	-	15	10	-	
					Area (m ²)	100	100	100	100	100	100	100	100	100	100	100	100	100	
H	Eua	0	0	0	<i>As. Anthoxanthum odoratum</i>	1	1	2	1	2	2	1	4	4	2	2	4	2	V
H	Cp(bor)	0	0	0	<i>As. Agrostis capillaris</i>	4	4	4	4	4	4	4	2	2	4	4	2	4	V
					Cynosurion														
H	E	3	2.5	0	<i>Bellis perennis</i>	+	·	+	+	+	·	·	·	·	·	·	·	·	II
H	Ec-M	2.5	0	0	<i>Carlina acaulis</i>	·	+	+	·	·	·	·	·	+	·	·	·	·	II
H	E	3	3	3	<i>Cynosurus cristatus</i>	+	·	·	·	+	·	·	·	+	+	+	·	+	III
Th	Ec	3	3	3	<i>Euphrasia officinalis</i>	·	·	·	·	·	·	·	·	+	·	·	·	·	I
H	Cp(bor)	3	0	0	<i>Festuca rubra</i>	·	·	·	·	+	·	·	+	·	+	+	+	·	II
H	Eua	3	3	4	<i>Gentiana cruciata</i>	·	·	·	·	·	+	+	·	·	·	·	·	·	I
H	E	3	3	2.5	<i>Hypochaeris radicata</i>	·	·	+	·	·	+	+	·	·	·	·	·	+	II
H	Eua	3	0	0	<i>Leontodon autumnalis</i>	+	+	·	1	+	·	·	+	+	·	·	·	·	III
H	Eua	3.5	0	0	<i>Phleum pratense</i>	+	+	+	+	·	·	·	·	·	·	·	·	·	II
H	Eua	3	0	0	<i>Plantago major</i>	·	+	+	·	·	·	·	·	·	+	·	·	·	II
H	Eua	3.5	0	0	<i>Trifolium repens</i>	·	+	+	·	+	+	·	+	+	+	+	+	+	IV
					Arrhenatheretalia														
H	Eua	3	0	0	<i>Achillea millefolium</i>	+	+	+	+	+	+	·	+	+	+	+	+	+	V
H-Ch	E	3.5	0	0	<i>Ajuga reptans</i>	·	·	·	·	·	·	·	·	+	·	·	·	·	I
H	Eua	0	3	0	<i>Briza media</i>	+	·	·	·	+	·	+	+	·	+	·	+	·	III
TH	Eua	3.5	3	3	<i>Carum carvi</i>	1	·	+	·	·	+	·	·	+	·	·	·	+	II
H	Eua	2.5	3	4	<i>Campanula glomerata</i>	·	·	+	·	·	·	·	·	·	·	·	·	·	I
H	Eua	3	0	4	<i>Dactylis glomerata</i>	+	+	+	·	·	·	+	·	·	·	·	·	·	II
TH-H	Eua	2.5	3	0	<i>Daucus carota</i> ssp. <i>carota</i>	·	1	+	+	·	·	·	·	·	·	·	·	·	II
H	Eua	3	0	3	<i>Galium mollugo</i>	+	·	·	·	·	+	+	+	·	·	·	+	+	III
H	Eua	3.5	3	0	<i>Holcus lanatus</i>	·	·	·	·	·	·	1	·	·	·	·	+	·	I
H	Eua	2.5	0	0	<i>Leontodon hispidus</i>	·	·	+	·	+	+	+	·	·	·	+	+	+	III

H	Eua	3	0	0	<i>Leucanthemum vulgare</i>	+	.	.	.	+	.	+	+	+	.	.	.	.	II
H	Eua	2.5	0	0	<i>Lotus corniculatus</i>	1	+	+	+	+	.	+	+	+	+	+	+	+	V
H	E	2.5	3	0	<i>Knautia arvensis</i>	.	+	+	.	.	.	+	+	.	.	.	.	.	II
Th-TH	Eua	2.5	3	4	<i>Medicago lupulina</i>	.	.	.	.	.	.	.	.	.	.	.	+	.	I
Th	E	3	0	0	<i>Rhinanthus minor</i>	.	.	.	.	.	.	+	.	.	.	+	.	.	I
H	Eua	2.5	2	3	<i>Stellaria graminea</i>	+	.	+	.	+	.	.	.	.	.	.	.	.	II
H	Eua	3	0	0	<i>Taraxacum officinale</i>	+	.	.	.	.	+	.	.	.	.	.	.	.	I
Ch	Ec	2.5	3	3	<i>Thymus pulegioides</i>	1	.	+	+	.	.	.	+	+	+	.	.	.	III
TH-H	Eua	3	3	4	<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>	.	+	.	.	.	.	.	.	.	.	.	+	.	I
Th-TH	E	3	3	0	<i>Trifolium campestre</i>	.	+	+	.	+	.	+	+	.	.	.	.	.	II
H-Ch	Eua	3	0	0	<i>Veronica chamaedrys</i>	.	.	.	.	.	+	.	+	.	.	.	.	.	I
Molinio-Arrhenatheretea																			
TH	E	3	2.5	3	<i>Campanula patula</i>	.	.	.	.	.	.	+	.	+	+	.	.	.	II
G	Eua	3	3	0	<i>Carex tomentosa</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	I
H	Ec	3	2.5	3	<i>Centaurea phrygia</i>	+	.	.	.	+	.	+	.	+	+	+	.	.	III
H	Ec	3.5	3	3	<i>Centaurea nigrescens</i>	+	+	.	1	.	.	.	.	.	.	.	+	.	II
Th	Eua	3	3	2	<i>Centaurium erythraea</i>	.	+	.	+	.	.	+	.	+	+	+	+	+	III
H-Ch	Cosm	3	0	0	<i>Cerastium holosteoides</i>	+	.	.	.	.	.	+	.	.	.	.	.	.	I
H-TH	Eua	2.5	3.5	4.5	<i>Cichorium intybus</i>	.	+	+	+	.	.	.	.	+	+	+	.	+	III
G	E-M	3.5	3	4	<i>Colchicum autumnale</i>	.	.	.	.	.	+	.	.	.	.	.	.	.	I
H-G	Cosm	0	0	0	<i>Convolvulus arvensis</i>	.	.	+	.	.	.	.	.	.	.	+	.	.	II
H	Eua	3.5	0	0	<i>Festuca pratensis</i>	1	1	+	1	.	+	.	+	+	.	.	.	1	IV
H	Eua	4.5	3	3	<i>Juncus conglomeratus</i>	.	.	.	.	.	.	.	.	+	+	.	.	+	II
H	Cosm	4.5	3	3	<i>Juncus effusus</i>	.	.	.	+	.	.	.	.	.	.	.	.	.	I
Th	E	3	2	4	<i>Linum catharticum</i>	.	.	.	.	.	.	.	.	.	.	.	+	.	I
H	Eua	0	0	0	<i>Plantago lanceolata</i>	+	.	+	+	.	+	+	+	+	+	.	+	.	IV
H	Cp	3	0	0	<i>Poa pratensis</i>	+	.	.	.	.	.	.	.	+	+	.	.	+	II
H	Eua	3	3	3	<i>Polygala vulgaris</i>	.	+	.	.	+	.	+	.	+	+	.	+	.	III
H	Cp(bor)	3	3	0	<i>Prunella vulgaris</i>	+	+	+	1	.	.	+	.	+	+	+	.	+	IV
H	Eua(cont)	2.5	3	3	<i>Ranunculus polyanthemus</i>	.	.	.	.	+	.	.	.	.	.	.	.	.	I
H	Cosm	3	3	0	<i>Rumex acetosa</i>	+	.	.	.	.	+	.	.	.	.	.	.	.	I
H	Eua	3	3	0	<i>Stachys officinalis</i>	.	+	.	.	.	.	+	.	.	.	.	+	.	II
H	E	3.5	3	4	<i>Trifolium hybridum</i>	.	.	.	+	+	.	+	+	.	+	.	.	.	II

H-TH	Eua	3	0	0	<i>Trifolium pratense</i>	+	.	.	.	+	.	.	+	.	.	+	.	.	II										
H	Eua	3	0	3	<i>Vicia cracca</i>	+	+	.	.	.	.	.	.	.	.	.	+	+	II		
TH	Eua	2.5	3	0	<i>Viola tricolor</i> ssp. <i>tricolor</i>	.	.	.	.	.	.	+	.	.	.	.	.	.	I		
Festuco-Brometea																													
Th-TH	E	1.5	3.5	4	<i>Acinos arvensis</i>	.	.	.	.	.	.	.	.	.	.	.	+	.	+	I	
H	Eua	2.5	3	4	<i>Agrimonia eupatoria</i>	.	+	.	.	.	.	.	.	.	.	.	+	+	+	+	II
H	E	2	0	4	<i>Anthyllis vulneraria</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	I
H	P-M	2	3.5	4.5	<i>Asperula cynanchica</i>	.	+	.	.	.	.	.	+	+	.	.	.	.	+	.	II
TH-TH	Eua	1.5	0	4.5	<i>Carduus nutans</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	II
TH-H	Eua	2	3	3	<i>Carlina biebersteinii</i>	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	II
TH-H	Eua	2.5	3.5	0	<i>Carlina vulgaris</i>	.	.	.	.	+	.	.	.	+	+	+	+	.	.	.	II				
H	E	2	5	5	<i>Dianthus carthusianorum</i>	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	I
H	Eua	1.5	5	3	<i>Dichanthium ischaemum</i>	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	I
H	P	1	5	4	<i>Eryngium campestre</i>	+	+	+	+	.	+	II							
H	Eua	2	3	4	<i>Euphorbia cyparissias</i>	.	1	+	+	.	+	+	+	+	+	+	IV							
Th	Ec	3	3	0	<i>Euphrasia stricta</i>	+	I							
H	E(cont)	2	4	3	<i>Fragaria viridis</i>	+	II						
H	Eua(cont)	1.5	4	4	<i>Festuca rupicola</i>	+	I							
H	Eua	2.5	2.5	0	<i>Galium verum</i>	.	.	1	+	+	+	+	III						
H	Eua	3	3	0	<i>Hypericum perforatum</i>	.	+	.	.	+	+	II						
H	E	0	3.5	0	<i>Ononis spinosa</i>	.	+	+	II						
H	Eua(cont)	1.5	3.5	4	<i>Potentilla recta</i>	+	+	+	+	II			
H	M-Ec	2.5	3.5	3	<i>Prunella laciniata</i>	+	I				
H	Eua(cont)	2	4	4	<i>Scabiosa ochroleuca</i>	+	I			
H	P-D	1.5	4	4	<i>Seseli osseum</i>	+	+	II		
Ch	M-Ec	2	3.5	4	<i>Teucrium chamaedrys</i>	+	+	II	
Ch	P-Pan	2	4	0	<i>Thymus glabrescens</i>	1	+	1	+	+	III
Nardo-Callunetea																													
G	Ec	3	2	3	<i>Dactylorhiza sambucina</i>	+	I
H	Atl-M-Ec	3	3	3	<i>Genistella sagittalis</i>	+	II
Ch-nPh	Eua	2.5	3	2	<i>Genista tinctoria</i> ssp. <i>tinctoria</i>	+	I
H	E	2.5	0	0	<i>Hieracium pilosella</i>	+	IV
H	Eua	4	3	2	<i>Hypericum maculatum</i>	+	+	I
H	E	3	0	3	<i>Luzula campestris</i>	+	I

H	E	0	0	1.5	<i>Nardus stricta</i>	.	.	.	.	+	.	+	.	.	.	+	.	.	II
H	Eua	0	0	0	<i>Potentilla erecta</i>	.	.	.	+	+	.	+	.	+	.	.	.	.	II
Ch	Eua	2	2	2	<i>Veronica officinalis</i>	.	.	.	+	+	.	.	+	.	.	.	.	.	II
Variae Syntaxa																			
mPh	E	2.5	3	3	<i>Crataegus monogyna</i>	.	.	.	+	+	.	+	.	+	+	.	+	+	III
mPh	Cp(bor)	2	0	0	<i>Juniperus communis</i>	.	.	.	.	+	.	+	.	+	.	+	.	.	II
mPh	E	3.5	3	4	<i>Malus sylvestris</i>	.	.	.	.	.	+	+	.	+	.	.	.	.	II
mPh	Eua	2	3	3	<i>Prunus spinosa</i>	.	.	.	+	.	.	.	.	.	+	.	.	+	II
mPh	E	2	3	4	<i>Pyrus pyraister</i>	.	.	.	.	.	+	+	.	+	.	.	.	+	II
nPh	E	2	3	3	<i>Rosa canina</i>	.	.	3	.	+	+	+	.	+	+	+	.	+	IV
nPh	Ec	3.5	3	2.5	<i>Rubus sulcatus</i>	.	.	.	+	+	.	.	.	+	+	+	.	+	III
H	Eua	2	3	0	<i>Calamagrostis epigeios</i>	.	.	.	+	.	.	.	.	.	+	+	.	.	II
TH	E	2	3	0	<i>Carduus acanthoides</i>	.	.	+	+	.	.	.	.	+	+	.	.	.	II
Th	Adv	4	0	4	<i>Erigeron annuus</i>	.	+	.	+	.	.	.	.	+	+	+	+	+	III
H	Eua	3	2.5	0	<i>Fragaria vesca</i>	.	1	.	.	+	.	.	.	.	+	.	.	.	II
H	E	4	3	4	<i>Hypericum tetrapterum</i>	.	.	.	.	.	.	+	.	.	.	.	.	+	I
H-Hh	Eua	5	0	0	<i>Lysimachia vulgaris</i>	.	.	.	.	.	.	.	.	.	+	.	.	.	I
G	Cosm	3	3	0	<i>Pteridium aquilinum</i>	.	.	.	+	+	.	.	+	.	.	.	.	.	II
Th	Cosm	2.5	4	0	<i>Setaria pumila</i>	.	.	.	+	.	.	.	.	.	+	.	.	.	I
Th	Eua	1	3.5	2	<i>Vulpia myuros</i>	.	.	.	.	.	.	+	.	.	+	1	.	.	II

where: L.f.-Life forms; mPh - Mezophanerophyte; nPh-Nanophanerophyte; Ch-Camephyte; H-Hemicryptophyte; G-Geophyte; TH-Biannual terophyte; Th-Annual terophyte.

F.e.-Floristic elements; Adv-Adventitious; M-Mediterranean; Atl-M-Ec-Atlantic-Mediterranean-Central European; Cosm-Cosmopolitan; P-Pan-Ponto-Pannonian; P-Pontic; Ec-Central European; E-European; Eua-Eurasian; Cp-Circumpolar; bor-boreal; cont-continental.

U-Humidity; T-Temperature; R-The chemical reaction of the soil.

Place and date of mapping: 1 – Brusturei Hill– Finiş (Bihor County) 17.07.2008; 2 – Morilor Valley (Bihor County) 17.08.2008; 3 – Pontului Valley (Bihor County) 21.08.2008; 4 – Tărcăiței Valley (Bihor County) 07.09.2008; 5 – Mălăiște – Călugări (Bihor County) 04.07.2010; 6 – Lungu Dealului – Briheni (Bihor County) 30.04.2011; 7 – Dosul Poienii, near Tăul Ponorului (Bihor County) 23.06.2011; 8 – Leurdeasa Hill (Bihor County) 03.07.2011; 9 – 10 Gropilor Hill – Șoimi (Bihor County) 26.07.2011; 11 – Fiziș Valley (Bihor County) 05.08.2011; 12 – Văratec Hill – Călugări (Bihor County) 05.08.2011; 13 – Hășmașului Hill (Arad County) 06.08.2011.

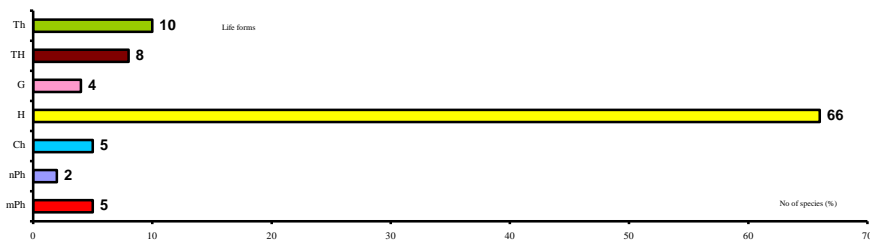


Fig. 2. The life forms spectrum of the *Anthoxantho-Agrostietum capillaris* association Sillinger 1933



Fig. 3. Spectrum of floristic elements of the *Anthoxantho-Agrostietum capillaris* association Sillinger 1933

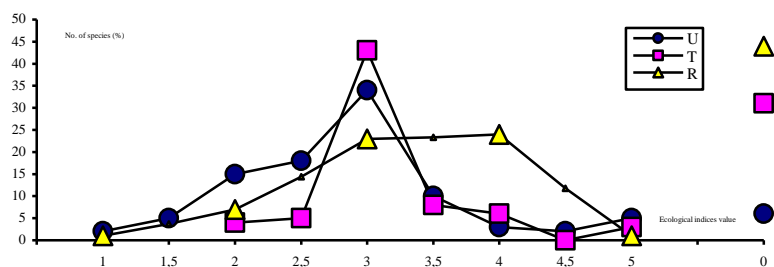


Fig. 4. Spectrum of ecological indices for the *Anthoxantho-Agrostietum capillaris* association Sillinger 1933

In this association the hemycryptophytes species predominate (66%), followed by the annual terophytes (10%) and the biannual terophytes (8%). The spectrum of floristic elements shows that the Eurasian species have the largest share (51%), followed by the European species (23%) and central European species (7%). The spectrum of ecological indices highlights the mezophyte species (44%) as majority and, in terms of temperature, the micro-mesothermophilous species (51%). Regarding the chemical reaction of the soil, the weak acid-neutrophyle species (24%) and acid-neutrophyle species (23%) are in greater numbers.

CONCLUSIONS

The *Anthoxantho-Agrostietum capillaris* association Sillinger 1933 is common in Codru-Moma Mountains at altitudes between 300-620 meters, on smooth surfaces or slopes to 18 degrees, more on sunny exposure.

The grasslands of *Agrostis capillaris* with *Anthoxanthum odoratum* are characterized by fairly wide ecological amplitude, occupying the area from the gentle slopes of the evergreen oak to the European beech floor.

The studied association is characterized as a group with moderate fodder, melliferous and medicinal value, and the assertion that they are toxic species is given by several medicinal herbs which are at the same time toxic species.

These grasslands can be alternatively used as pastures and meadows which would lead to an increase in their economic potential.

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