PHYTOCOENOLOGICAL RESEARCH CONCERNING THE GRASSLANDS OF LĂZĂRENI HILLS (NORTH-WESTERN ROMANIA)

Laura Mariana LACATOŞ*, Petru BURESCU**

* *University of Oradea, Faculty of Sciences, Biology Department, PhD Student, Oradea, Romania*
** *University of Oradea, Faculty of Environmental Protection, Department of Agriculture-Horticulture, Romania*
* *Corresponding author: PhD. Student Laura Mariana Lacatoş, University of Oradea, Faculty of Science, Department of Biology, Romania, tel. 0040747150811, e-mail: lauralacatos@yahoo.com*

Abstract. Association *Anthoxantho-Agrostietum capillaris* Sillinger (1933) [22], is now reported for the first time in Lăzăreni Hills. This study aims to analyze the phytocoenoses of the Association *Anthoxantho-Agrostietum capillaris* (Class *Molinio-Arrhenatheretea* Tüxen 1937) from phytocoenologic, floristic and economic points of view. Phytocoenoses association analysis present a scientific importance, with a total of 107 species, which is a very rich biodiversity, some species are rare, vulnerable, endemic and need to be protected. Meadows with Anthoxanthum odoratum and Agrostis capillaris is an important forage for both livestock grazing and harvesting land-mass hay. Meadows give this association a great phytomass production, but with low economic value. Because of human low biodiversity, flora and vegetation of these meadows have a natural character. Grassland maintain stable equilibrium and the ungrassed bush tend to phytocoenoses progress (Pruno spinosae – Crataegetum (Soó 1927) Hueck 1931).

Keywords: association, phytocoenoses, phytocoenologic study, floristic study, life form, ecological indexes.

INTRODUCTION

According to Pop (2005) [15], Lăzăreni Hills (Fig. 1) are located in western Romania, in the central-southern part of Bihor County, between north of Crişul Repede River and south of Crişul Negru River, in the west part of Pădurea Craiului Mountains and at east from Miersig Plain.

The altitude of relief increases slightly from east to west, so in contact with Miersig plain, the hills have an altitude of approximately 160 m and in contact with Craiului Forest, they recorded altitudes above 400 m [14]. The climate is moderate continental with average temperature of 1.9ºC in January and with summers warm temperate, with an average temperature of 20.6° C in July. Average annual precipitation varies between 680-700 mm [8]. The soils are brown forest and luvic ones [20].

Floristic and phytocoenologic systematic researches on grassland of Lăzăreni Hills have not been made until now. Dissipated data on small segments were find in the author's paperworks [6, 16, 18]. In their work the authors listed above were related to a larger space without having done thorough studies.

In our country, this association has been described: [11, 12], in Transylvania by [9, 17], in Moldova [7, 13] and the Oltenia Plain in the south [19].
in the northwest of the country [1, 2] in Craiului Forest

Beside association *Anthoxantho-Agrostietum capillaris*, in the studied territory we have identified other associations, such as: *Juncetum effusi* Soó (1931) 1949, *Filagini-Vulpietum* Oberdorfer 1938, *Lysimachio vulgaris-Filipenduletum ulmariae* Balátová-Tuláčková 1978, *Calamagrostietum epigei* Juraszek 1928, *Holcetum lanati* Issler 1936 em. Passarge 1964, *Angelico-Cirsietum cani* Burescu 1998, *Bidentetum cernui* (Kobendza 1948) Slavnić 1951, *Cyperetum flavescentis* Koch ex Aichinger 1933, *Caricetum ripariae* Knapp et Stoffer 1962, *Junco inflexi-Menthetum longifoliae* Lohmeyer 1953, *Glycerietum fluitantis* Eggler 1933, etc.

MATERIALS AND METHODS

To realize this study, there were performed a total of 14 local incursions, and about 150 phytocoenologic sampling on natural grasslands. The sample surfaces (Fig. 2), homogeneous in floristic and physiognomic terms, were chosen from the studied natural grasslands. Their size varies between 16-30 m^2.

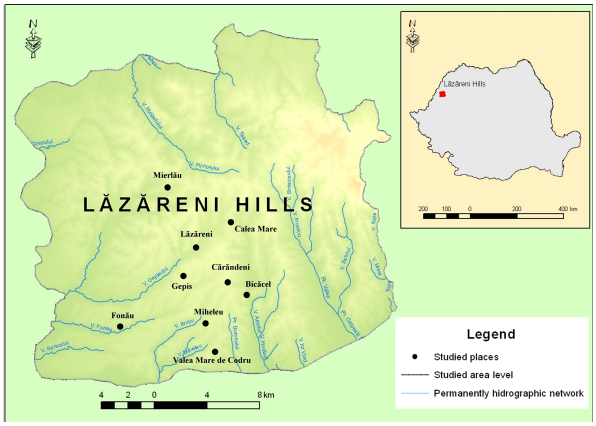

Figure. 1 Geographical location of Lăzăreni Hills [11] (modified).

Figure 2. *Anthoxantho-Agrostietum capillaris* (natural grasslands, north-east of Ghepiş-Bihor County).

The process used was phytocoenologic survey method drawn up by Braun-Blanquet [4].

Along with species recording, abundance and dominance (AD) were subscribed in relevées after Braun-Blanquet scale subsequently developed by Tüxen (1955) [24] and Ellenberg (1974) [10].

The association's synthetic table was structured after the methodology proposed by Braun-Blanquet (1964) [4] and developed by Ellenberg (1974) [10]; therefore, in the column header of the table for the association analyzed the following have been entered: the serial number of land surveys, altitude (m.s.m.), exposition, slope, surface (m²), coverage (%).

The following have been considered in the structure of the phytocoenologic table: illustrating or dominant species, characteristic species of the association, species for the recognition or differentiation of the sub-alliance, alliance, order, class and environmental significance [21].

Synthetic phytocoenologic indicex of constancy (K) whose classes are included between I-V values, that expresses the degree of coenotic fidelity compared to phytocoenoses environment of the association has been entered and calculate don the right of the table.

After Braun-Blanquet & Pavillard (1928) [5], the medium abundance and dominance (mAD) shows percentually the average coverage realized in the association's phytocoenoses by the phytoindividuals of each recorded specie.

Differential species allowed us to set limits in the association for the taxons that are hierarchically superior to the alliance, order and class. The association's phytocoenoses are analyzed and characterized physiognomically, coenologically and ecologically.

In this respect particular attention has been given to the analysis of life forms, floristic elements and ecologic indices (UTR) through their graphical representation.

RESULTS

The Association *Anthoxantho-Agrostietum capillaris* Sillinger 1933 was found in the following places: Bicăcel Village, Gepiş Village, Lăzăreni-Gepiş Piedmont, next to Lăzăreni Forest, Valea Mare de Codru Village, Miheleu Village, Văratic Hill-Mierlău Village, Forosig Village.

The association's phytocoenoses are located on flat terrains, as well as on heights of the hills and gently inclined slopes of Lăzăreni Hills. Soils specific to these phytocoenoses are brown soils, from humid-wet, wet, to dry soils.

Characteristic and dominant species of this associations are: *Anthoxanthum odoratum* L., with a medium abundance and dominance (mAD) of 22.5%, with maximum constancy (K) of V, *Agrostis capillaris* L., with a general coverage of 52.6%, having also a maxim constancy of V.

Anthoxanthum odoratum (sweet vernalgrass) is a *Poaceae* (grass) resembling a densely cespitose bush, with thin and high stems of 10-70 cm.

Agrostis capillaris (colonial bentgrass) is a *Poaceae* (grass) with short rhizomes and stolons with stem height of 6-70 cm, widespread in phytocoenoses both horizontally and vertically.

Phytocoenoses of the association *Anthoxantho-Agrostietum capillaris* are tristratified, so, synusia of upper layer is reprezented by species with size over 25 cm, such as *Anthoxanthum odoratum* L., *Agrostis capillaris* L., *Holcus lanatus* L., *Centaurea jacea* L., *Daucus carota* ssp. *carota* L., etc. The middle layer of phytocoenoses is constituted by species 15-25 cm waist such as *Trifolium pratense* L., *Lotus corniculatus* L., *Leontodon hispidus* L., *Sieglingia decumbens* (L.) Bernh, *Euphorbia cyparissias* L., *Eryngium campestre* L., *Sanguisorba minor* Scop., etc. The lower layer are small species under 15cm: *Potentilla reptans* L., *Trifolium repens* L., *Bellis perennis* L., *Trifolium campestre* Schreber, *Prunella vulgaris* L., *Prunella laciniata* L., *Cerastium holosteoides* Fries ampl. Hyl., *Polygalla vulgaris* L., *Trifolium arvense* L., *Viola arvense* Murray, *Vulpia myuros* (L.) C.C.Gmelin.

In the composition of the association (Table 1) 107 mesophilous and xero-mesophilous species are presented. Their subordination to the corresponding cenotaxons was made according the work of the authors [3,21,23].

Under a sindynamic aspect, the direction of succession of the association evolves to the setting up of shrub phytocoenoses *(Pruno spinosae-Crataegetum)*.

The analysis of the life forms (Fig. 3) shows the dominance of hemycryptophytes species with the highest percentage of 67.3%, following by euterophytes with a percentage of 20.6% and wood species MPh (3.72%) have a very small share in phytocoenoses.

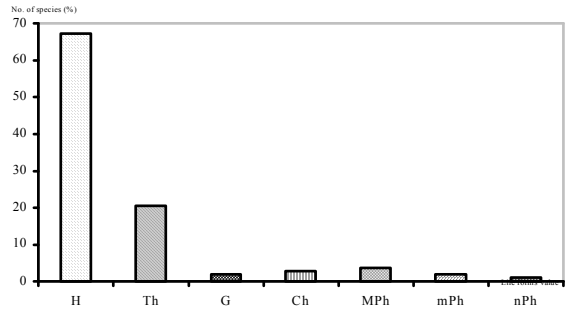

Figure 3. The life forms spectrum of association *Anthoxantho-Agrostietum capillaris* in Lăzăreni Hills-Bihor County, where: H-Hemicryptophytes; Th-Euterophytes; G-Geophytes; Ch-Chamaephytes; MPh-Megaphanerophytes; mPh-Mezophanerophytes; nPh-Nanophanerophytes.

As to floristic elements (Fig. 4) it can be noted the large share of Eurasian species (54.20%), followed by European species (24%). Species spread and encountered in almost all continents are Cosmopolites that can be also found in our country in a percentage of 7.47%.

The analysis of the main ecologic indices (Fig. 5) confirms that this association is dominated by the mesophilous species 35.54% (U3 = 29%, U3.5 =

6.54%), followed a short distance by xero-mesophilous species 34.57% (U2 = 18.69%, U2.5 = 15.88%).

Depending on temperature, most species from the association are micro-mesothermophil 56.06% (T3 = 46.72%, T3.5 = 9.34%), followed by amphitolerant species 24.29% (T0 = 24.29), specially adapted to a high amplitude of thermal variability. Soil chemical reaction numerically highlights followed by amphitolerant species weighting 42.05% (R0 = 42.05%), followed by acid-neutrophilous species with a percentage of 23.36% (R3 = 23.36%).

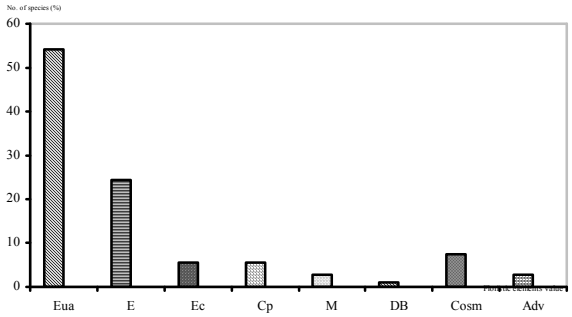

Figure 4. The spectrum of floristic elements of association *Anthoxantho-Agrostietum capillaris* in Lăzăreni Hills-Bihor County, where: Eua- Eurasian; E-European; Ec-Central European; Cp-Circumpolar; M-Mediterranean; DB-Dacian-Balkanic; Cosm-Cosmopolitan; Adv-Adventive.

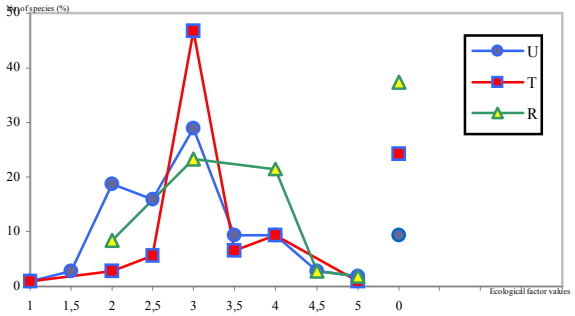

Figure 5. The diagram of ecologic indices of *Anthoxantho-Agrostietum capillaris* in Lăzăreni Hills-Bihor County, where: U – humidity, T – temperature, R – the chemical reaction of the soil

DISCUSSIONS

The grasslands of this association give a high production of phytomass, but it has low economic value. Because of the small anthropization degree, the floristic biodiversity and the vegetation of these meadows have a natural character. Grassland maintain its stable equilibrium, non-grazed grassland tends to the evolution of shrub phytocoenoses (*Pruno spinosae - Crataegetum*) and as it results from table 1, woody vegetation begins to settle.

Phytocoenoses of the association analised present a scientific significance, as they contain a great number of 107 species, which represent a very rich biodiversity out of which some species are rare, vulnerable, endemism and which need to be protected.

Anthoxanthum odoratum with *Agrostis capillaris* meadow occupies a relatively large area of Lăzăreni Hills area, having an forage importance for both livestock grazing and harvesting hay as the land-mass.

Forage value is given by Poaceae *(Anthoxanthum odoratum* L., *Agrostis capillaris* L., *Festuca pratensis* Hudson, *F. valesiaca* Schleicher ex Gaudin, *F. rupicola* Heuffel, *F. heterophylla* Lam., *F. pseudovina* Hackel, etc.), and good forage species of Fabaceae *(Trifolium campestre* Schreber, *T. repens* L., *T. pratense* L., *T. hybridum* L., *T. arvense, Medicago falcata* L., etc.)

Phytocoenoses of association have a relatively stable ecological balance being subjected to intensive grazing, except the least grazed or abandoned evolving towards woody vegetation hedges.

Grassland of *Anthoxantho-Agrostietum capillaris* identified and investigated by us from Lăzăreni piemonts differ both in terms of floristic composition and ecological characteristics to those described by Groza from Pădurea Craiului Mountains [11]. Comparing the association what we did investigated the one described by Groza from Pădurea Craiului Mountains we have the following differences:

-differences in life-forms give terophytes biennial species (TH = 5%) found in Pădurea Craiului Mountains which on the Lăzăreni Hills are missing. In the meadows of the Lăzăreni Hills megafanerophytes have a weight of 3.7% (MPh = 3.7%) and mezofanerophytes have a weight of 1.9% (mPh = 1.9%) missing in Pădurea Craiului Mountains.

-regarding to floristic composition of pastures from Lăzăreni Hills of Pădurea Craiului Mountains there are some similarity in that they share a total of 40 species.

-there are also some meadows disimillarities by the fact that from the Pădurea Craiului Mountains there are a number of 62 species not covered in grassland of Piedmont Lăzăreni, and respectively that a number of 67 species are not found in mountain meadows.

-to the temperature influence of grassland from Lăzăreni Hills are micro-mesothermal (56.06%) similar to those from Pădurea Craiului Mountains (67.2%).

-the chemical reaction of the substrate is emphasized by the weight of followed by amphitolerant species 42.05% in Lăzăreni piedmonts and weak acid-neutrophilous 23.5%, in Pădurea Craiului Mountains.

REFERENCES

[1] Ardelean, A., (1999): Flora şi vegetaţia din Valea Crişului Alb. University Vasile Goldiş Publishing House, Arad, 311. p.

[2] Ardelean, A., (2006): Flora şi vegetaţia judeţului Arad. Academiei Române Publishing House, Bucharest, 505. p.

[3] Borhidi, A., (2003): Magyarország növénytársulásai, Akadémiai Kiadó, Budapest, 212.

[4] Braun-Blanquet, J., (1964): Pflanzensoziologie, Spinger-Verlag, Wien-New York, 3, Aufl, pp. 12-24.

[5] Braun-Blanquet, J., Pavillard, J., (1928): Vocabulaire de Sociologie Végétale, 3th edition, Imprimérie Lemair-Ardres, pp. 15-18.

[6] Burescu, P., (2003): Flora şi vegetaţia zonelor umede din nord-vestul României, Academiei Române Publishing House, Bucharest, 474. p.

Table 1. The Ass. *Anthoxantho-Agrostietum capillaris* Sillinger 1933, (natural grassland north-eastern from Ghepiș, Bihor County).

L.f.	F.e	U.	T.	R.	Nr. Land Surveys	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	K
					Altitude (m.s.m.)	220	250	280	220	210	350	280	270	190	300	120	250	160	190	280	
					Exposition	SE	NE	S	NV	NV	NV	SE	E	E	E	NE	NE	S	NV	V	
					Slope	5	8	5	4	5	6	5	10	5	8	7	5	2	7	10	
					Surface (m²)	16	16	20	20	25	25	25	20	20	20	30	30	25	25	20	
					Coverage (%)	80	80	100	95	85	90	95	100	95	100	100	100	90	95	95	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
H	Eua	0	0	0	*Anthoxanthum odoratum*	3	4	5	2	1	1	1	1	2	+	2	1	3	2	2	V
H	Cp	0	0	0	*Agrostis capillaris*	1	1	1	4	4	4	4	4	4	5	4	5	3	4	4	V
					Cynosurion																
H	E	3	3	3	*Cynosurus cristatus*	.	.	+	.	+	+	.	.	.	+	+	.	+	+	.	III
Ch	Eua	3	3	2	*Veronica serpyllifolia*	+	.	.	+	.	1	.	.	.	.	.	.	+	.	.	II
H	Cosm	2	3	2	*Rumex acetosella*	.	.	.	+	.	+	+	+	.	.	.	.	.	.	.	II
H	Eua	3.5	0	0	*Trifolium repens*	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	I
Th	Ec	3	3	3	*Euphrasia rostkoviana*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I
Th	DB	3	4	0	*Rinanthus rumelicus*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	E(M)	3	2.5	0	*Bellis perrennis*	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	I
					Arrhenatheretalia																
H	Eua	3	0	0	*Achillea millefolium*	+	.	.	+	+	+	.	.	+	+	+	+	+	+	+	IV
H	Eua	3	0	0	*Lotus corniculatus*	+	.	+	+	.	+	+	+	+	+	.	.	+	+	+	IV
H	E	3	3	0	*Trifolium campestre*	.	+	+	+	.	.	+	+	+	+	.	.	.	.	+	III
H	Eua	2.5	0	0	*Leontodon hispidus*	.	.	.	+	.	.	+	+	+	.	+	.	+	+	+	III
H	E (M)	3	0	3	*Luzula campestris*	+	.	+	+	+	+	+	.	+	+	.	.	+	.	.	III
Th	Eua	3	0	0	*Rhinanthus minor*	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	I
G	E (M)	0	3	0	*Leucanthemum vulgare*	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	I
H	Eua(M)	2.5	2	3	*Stellaria graminea*	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	I
H	Eua	3.5	3	0	*Holcus lanatus*	.	1	.	.	.	.	.	.	+	.	.	.	+	.	.	I
					Molinietalia caeruleae																
H	Cosm	4.5	3	3	*Juncus effusus*	.	.	.	+	+	+	.	.	+	.	+	+	+	+	.	III
H	Eua	3.5	2.5	0	*Lychnis flos – cuculi*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
H	Eua	4	3	0	*Molinia caerulea*	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	I
H	Eua	3.5	3.5	4	*Lythrum salicaria*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	I
					Potentillo-Polygonetalia																
G	E (M)	0	3	0	*Carex hirta*	+	.	.	.	+	.	+	.	+	.	.	.	.	.	.	II
Th	Eua	5	0	0	*Lysimachia vulgaris*	.	.	.	.	+	+	.	.	.	.	.	.	+	+	.	II
H	Eua (C)	4.5	3.5	4	*Lythrum virgatum*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
H	Eua(M)	4	3	4	*Mentha pulegium*	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	I
H	Cosm	3.5	0	4	*Potentilla reptans*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	I
H	Eua (B)	4	2.5	3	*Carex leporina*	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I
					Molinio – Arrhenatheretea																
H	Eua	3.5	0	0	*Festuca pratensis*	1	.	.	+	+	+	1	+	.	+	+	+	.	+	+	IV
H	Eua	3	0	0	*Centaurea jacea*	.	.	.	+	+	+	.	.	.	.	+	.	+	+	+	III
H	Eua	0	0	0	*Potentila erecta*	.	.	.	.	+	+	+	+	+	.	.	+	+	.	+	III
H	Eua	3	3	0	*Plantago lanceolata*	.	.	.	+	+	+	.	+	+	+	.	.	+	+	+	III
H	Eua	3	0	0	*Veronica chamaedrys*	.	.	.	+	+	+	+	.	.	.	+	.	.	.	.	II
Ch	E	4	3	0	*Lysimachia nummularia*	.	.	.	+	+	+	.	.	.	.	.	.	.	+	.	II
H	Eua	2.5	3	3	*Ranunculus polyanthemos*	.	.	.	+	+	+	.	.	.	+	+	.	.	.	.	II
H	M	0	3	2	*Sieglingia decumbens*	.	.	+	+	.	.	1	.	+	.	+	.	.	.	+	II
H	Cp	3	3	0	*Prunella vulgaris*	.	.	.	.	.	.	.	.	.	+	+	.	+	+	+	II
H	Cosm	3	0	0	*Cerastium holosteoides*	.	.	.	+	+	+	+	+	+	.	.	.	.	.	.	II

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
H	Eua	3	3	3	*Polygalla vulgaris*	.	.	.	+	+	+	.	.	+	.	.	.	.	.	.	II
H	Cp	3	0	0	*Poa pratensis*	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	I
H	Cosm	0	0	0	*Convolvulus arvensis*	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	I
H	Eua	3	0	0	*Trifolium pratense*	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	I
H	Eua	3	0	3	*Vicia cracca*	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	E (M)	3.5	3	4	*Trifolium hybridum*	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	I
Th	Eua(M)	2.5	3	0	*Daucus carota ssp carota*	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	I
H	Cp	4	0	0	*Agrostis stolonifera*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	I
Th	E	3	2.5	3	*Campanula patula*	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	I
Th	Cosm	3	4	0	*Cichorium intybus*	.	+	.	.	.	.	.	.	.	.	+	.	.	+	.	I
H	Ec	3.5	3	3	*Centaurea nigrescens*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
H	Eua	3.5	3	0	*Carex panicea*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
H	Cosm	3	0	0	*Cerastium fontanum ssp trivale*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I
Th	Eua	3	3	2	*Centaurium umbellatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	I
H	Ec	2	3	4	*Centaurea pannonica*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	I
					Festuco – Brometea																
Th	Carp	2	3.5	4.5	*Thymus glabrescens*	1	+	.	+	+	+	+	+	+	+	.	.	.	.	+	IV
H	Eua	3	0	3	*Galium mollugo*	.	+	.	+	+	+	.	.	+	.	+	+	+	.	.	III
H	M	4	5	4	*Eryngium campestre*	+	.	+	.	.	.	+	2	+	+	.	.	.	.	+	III
H	Eua	2	3	4	*Euphorbia cyparissias*	+	+	.	.	+	.	+	+	+	+	.	.	.	.	+	III
H	Eua	2.5	2.5	0	*Galium verum*	.	.	.	+	.	+	+	.	+	.	+	+	+	.	.	III
H	E (M)	0	3.5	0	*Ononis spinosa*	.	.	.	.	.	.	+	.	.	.	+	.	+	+	.	II
H	Eua	2	4	2	*Potentilla argentea*	.	+	.	.	+	.	+	+	+	.	.	.	.	.	.	II
H	Eua (C)	2.5	3	4	*Ajuga genevensis*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	I
H	Eua	3	3	0	*Hypericum perforatum*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
H	Eua	2	3.5	4	*Sanguisorba minor*	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	I
H	Eua (C)	1.5	4	4	*Festuca rupicola*	1	.	.	.	.	.	.	.	.	.	+	.	.	.	.	I
H	Ec	2	3	3	*Achillea collina*	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	I
H	Eua (C)	1.5	4	4	*Festuca valesiaca*	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I
H	Ec	2	3	4	*Bromus erectus*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I
Th	Eua(M)	2.5	3.5	0	*Carlina vulgaris*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	Ec (M)	2	5	4	*Dorycnium herbaceum*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	I
H	M	2	4	4.5	*Onobrychis viciifolia*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I
H	Eua (C)	2.5	4	4	*Bromus inermis*	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	I
H	Cp	2	4	5	*Koeleria macrantha*	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	Eua(M)	2	3	5	*Medicago falcata*	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	Ec (M)	2.5	3.5	3	*Prunella laciniata*	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	I
					Koelerio – Corynephoretea																
H	E (M)	2.5	0	0	*Hieracium pilosella*	+	+	+	+	+	+	+	.	+	+	.	.	+	.	+	IV
Th	Eua(M)	1.5	3	4	*Trifolium arvense*	.	.	+	.	.	.	.	.	.	.	.	.	..	+	.	I
Th	Eua(M)	1	3.5	2	*Vulpia myuros*	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	I
					Querco – Fagetea																
mPh	E	2.5	3	3	*Crataegus monogyna*	.	+	.	+	+	+	+	+	.	+	+	.	+	.	+	IV
nPh	E	2	3	3	*Rosa canina*	.	+	.	+	+	+	+	+	.	.	+	.	+	+	+	IV
Ch	Eua	2	2	2	*Veronica officinalis*	.	.	+	+	+	1	.	.	.	+	+	+	+	.	.	III
mPh	Eua	2	3	3	*Prunus spinosa*	.	.	.	.	.	.	.	+	.	+	+	.	.	+	+	II
H	Eua	3	2.5	0	*Fragaria vesca*	.	.	.	.	+	+	.	+	.	+	.	+	+	.	.	II
MPh	E	3	3	3	*Carpinus betulus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
MPh	E	3	3	3	*Prunus avium*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
H	Eua	3.5	3	0	*Scrophularia nodosa*	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I
MPh	E	2	3	4	*Pyrus pyraster*	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	I

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MPh	Eua	3	2	2	*Populus tremula*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
H	Eua	3	3	0	*Trifolium medium*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	I
					Însoţitoare																
Th	Eua	4	3	4	*Rubus sulcatus*	.	+	.	+	1	+	+	+	+	+	+	.	+	+	+	IV
Th	E (M)	2	3	0	*Carduus acanthoides*	+	.	.	+	+	+	.	+	.	+	+	.	.	+	.	III
Th	Adv	4	0	4	*Stenactys annua*	+	.	.	+	+	.	+	+	+	+	+	.	.	.	.	III
Th	Eua(M)	2	3	3	*Carlina intermedia*	.	.	.	.	+	+	.	.	.	+	+	.	+	.	+	II
H	Adv	3.5	3	4	*Juncus tenuis*	.	.	+	.	.	.	.	.	+	.	+	+	+	.	.	II
H	Eua	2.5	3	4	*Agrimonia eupatoria*	.	.	.	.	.	+	.	.	.	+	+	.	.	+	.	II
Th	Cosm	3	3	4	*Verbena officinalis*	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	I
H	Cp	5	0	2	*Epilobium palustre*	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	I
H	Eua(C)	2	4	3	*Euphorbia virgata*	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I
Th	Eua	3.5	3	3	*Vicia tetrasperma*	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I
Th	E (M)	2.5	3	0	*Geranium pusillum*	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	I
Th	Adv	0	3	0	*Vicia sativa*	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Th	Eua	3	3	0	*Viola arvensis*	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	I
H	Eua	2.5	3	3	*Cruciata laevipes*	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	I
Th	Ec	2.5	4	4	*Centaurea micranthos*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
H	Eua(M)	4	3	0	*Eupatorium cannabinum*	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	I
H	E (M)	2.5	3	3	*Festuca heterophylla*	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
H	Eua(C)	2	4	4	*Festuca pseudovina*	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	I

Note: In a land survey there were identified: *Rosa galica, Matricaria inodora, Salix caprea, Prunus serotina, Pteridium aquilinum.*
Studied places: 1-2. Bicăcel Village (31.05.2009), 3. Gepiş Village (04.06.2009), 4. Lăzăreni-Gepiş, Piedmont (09.06.2009), 5. next to the Lăzăreni Forest (09.06.2009), 7-8. Calea-Mare, eastern to Holod (13.06.2009), 9. the Valley of Şuvearelor-Forău Village (13.06.2009), 10-11. Valea Mare de Codru Village (22.06.2009), 12. Miheleu Village (22.07.2009), 13-14. Văratic Hill-Mierlău Village (25.07.2009), 15. Forosig Village (22.07.2009), where : H-Hemicryptophytes; Ch-Chamaephytes; Th- Euterophytes; G-Geophytes; MPh-Megaphanerophytes; mPh-Mezophanerophytes; nPh-Nanophanerophytes; Eua- Eurasian; Eua(M)- Eurasian (Mediterranean), Eua(C)- Eurasian (Continental), Eua(B)- Eurasian (Balkan), Cp-Circumpolar; E(M)-European (Mediterranean); E-European ; Ec -Central European; Ec(M)-Central European (Mediterranean), DB-Dacian-Balkanic; Cosm-Cosmopolitan; M-Mediterranean; Carp-Carpathian; Adv-Adventive.

[7] Chifu, Th., Mânzu, C., Zamfirescu, O., (2006): Flora şi vegetaţia Moldovei. Vol. II, University Al. I. Cuza Publishing House, Iaşi, 698. p.
[8] Dragotă, C., (2006): Precipitaţiile excedentare în România, Academiei Române Publishing House, Bucharest, 174. p.
[9] Drăgulescu, C., (1995): Flora şi vegetaţia din bazinul Văii Sadului. Constant Publishing House, Sibiu, 355. p.
[10] Ellenberg, H., (1974): Zeigerwerte der Gefässpflanzen Mitteleuropas – Scripta Geobotanica, Göttingen, 9:1-97.
[11] Groza, Gh., (2008): Flora şi vegetaţia munţilor Pădurea Craiului. Risoprint Publishing House, Cluj-Napoca, 303. p.
[12] Mihăilescu, S., (2001): Flora şi vegetaţia Masivului Piatra Craiului. Vergiliu Publishing House, Bucharest, 400. p.
[13] Oprea, A., (2005): Lista critică a plantelor vasculare din România, University Al. I. Cuza Publishing House, Iaşi, 398. p.
[14] Posea, Gr., (1997): Câmpia de Vest a României (Câmpia Banato-Crişană), Fundaţia „România de Mâine" Publishing House, Bucharest, 235. p.
[15] Pop, Gr., (2005): Dealurile şi Câmpia de Vest, Universitatea din Oradea Publishing House, Oradea, 176. p.
[16] Pop, I., (1968): Flora şi vegetaţia Câmpiei Crişurilor, Interfluviul Crişul Negru-Crişul Repede, Academiei R.S.R. Publishing House, Bucharest, 272. p.
[17] Pop, I., Cristea, V., Hodişan, I., (2002): Vegetaţia judeţului Cluj (Studiu fitocenologic, bioeconomic şi ecoprotectiv). Contribuţii Botanice, 1999-2000, Cluj-Napoca, 35(2):5-254.
[18] Pop, I., Hodişan, I., (1972): Vegetaţia dealului Şomleu-Oradea (jud. Bihor), Contribuţii Botanice, Cluj-Napoca, pp. 247-258.
[19] Popescu, Gh., Costache, I., Răduţoiu, D., Gămăneci, G., (2001): Vegetaţia pajiştilor. În: Pajişti permanente din nordul Olteniei. Universitaria Publishing House, Craiova, 300.p.
[20] Sabău, N., Domuţa, C., Berchez, O., (2002): Geneza, degradarea şi poluarea solului. Universităţii Oradea Publishing House, Oradea, pp. 178-183.
[21] Sanda, V., Öllerer, K., Burescu, P., (2008): Fitocenozele din România, sintaxonomie, structură, dinamică şi evoluţie. Ars Docendi Publishing House, Bucharest, 570. p.
[22] Sillinger, P., (1933): Monograficka studie o vegetaci Nizkych Tater, Praha, 339. p.
[23] Soó, R., (1964-1980): A magyar flora és vegetacio rendszertani, növényföldrajzi kézikönyve, Akadémiai Kiadó, Budapest, pp. 1-6.
[24] Tüxen, R., (1955): Das System der nordwestdeutschen Pflanzengesellschaften, Mitt Floristic-Sociologie Arbeitsgen, n. Folge, 5: 155-176.

Submitted: 21 December 2009
Accepted: 25 Aprilie 2010

Analele Universităţii din Oradea – Fascicula Biologie
http://www.bioresearch.ro/revistaen.html
Print-ISSN: 1224-5119
e-ISSN: 1844-7589
CD-ISSN: 1842-6433