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PHYTOCOENOLOGICAL STUDY CONCERNING THE GRASSLANDS FROM THE MIDDLE BASIN OF CRIȘUL NEGRU RIVER

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Abstract

This article presents a phytocoenological study of the association Medicagini-Festucetum valesiacae Wagner 1940, classified from the coenotaxonomic point of view in the class Festuco-Brometea Br.-Bl. et R. Tüxen in Br.-Bl. 1949. The phytocoenosis of this association were identified in the meadows near Ursad and Șoimi localities (Bihor county) located in the middle basin of Crişul Negru river.

Medicagini-Festucetum valesiacae association is presented from the point of view of the floristic composition and by analyzing the spectrum of the floristic elements, of the life forms, the karyotype and the ecological factors.

Key words: phytocoenoses, association, floristic composition, life forms, floristic elements.

INTRODUCTION

Chorology: the association is frequently widespread, being cited and described in our country from Oltenia (Răduţoiu, 2006); Moldova (Răvăruţ et al., 1956; Dobrescu, 1971; Mihai, 1971; Mihai et Sârbu, 1972; Dobrescu et al., 1973; Bârcă, 1975; Burduja et al., 1976; Chifu et al., 1978; Sârbu, 1984); Transilvania (Cristea et Csűrös, 1979; Cristea, 1981; Marian, 1998; Pop et al., 2002; Sămărghiţan, 2005); Dobrogea (Dihoru et al., 1965; Horeanu, 1976); Crișana (Pop, 1968; Pop et al., 1978; Oprea et Oprea Valeria, 1995; Groza, 2008).

From the floristic point of view, the researches carried out in the grasslands from the middle basin of the Crişul Negru River provide dissipated data on some limited areas of the territory, and in the case of phytocoenological studies, the vegetation of this area is also less well known. The complex study of flora and vegetation is absolutely necessary, especially in regions with less or no researches.

Type of habitat: Natural Habitat of Community interest whose conservation requires the designation of Special Areas of Conservation (ASC), Natura 2000: 6240* Sub-Pannonic steppic grasslands.

Code R3414 Ponto-Pannonian grasslands of *Festuca valesiaca* (Doniță et al., 2006; Gafta et al., 2008).

MATERIAL AND METHODS

The phytocoenosis of this association were identified in the meadows near Ursad and Șoimi localities (Bihor county) located in the middle basin of Crișul Negru river, being included in the Crișurilor Plain, which is the central compartment of the Western Plain.

Framing the association to the corresponding cenotaxonomic units – alliance, order and class was made according to the traditional ecological and floristic systems elaborated by Tüxen (1955), Braun–Blanquet (1964), Borza et Boşcaiu (1965), Soó (1964–1980), as well as on the basis of the most recent works belonging to Mucina (1997), Rothmaler (1994, 2000), Borhidi (1996, 2003), Coldea et al. (1997); Sanda et al. (2008).

The study of the vegetal cover in the meadowlands from the middle basin of Crișul Negru River was made taking into consideration the phytosociological research method of the European Central School, based on the principles and methods elaborated by Braun–Blanquet (1964) and adapted by Borza and Boşcaiu (1965) to the particularities of the vegetation carpet from our country.

The taxa identified in the field have been recognized by specialty catalogues "Romania's Illustrated Flora" (Ciocârlan, 2009), in conjunction with the information provided by the "International Code of Botanical Nomenclature" (Code de Tokyo, 1993).

The association synthetic table was structured after the methodology proposed by Braun–Blanquet (1964) and developed by Ellenberg (1974); 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 (°), area (m^2), coverage of grass layer (%).

At the end of the table, the last two columns included the synthetic phytocoenological indices, constancy (K) and abundance–dominance index (ADm).

The constancy highlights the extent of coenotic fidelity of each species to the phytocoenosis environment of the association, according to the Braun–Blanquet et Pavillard methodology (1928). The abundance and dominance highlights the percentage of average coverage achieved by phyto–individuals of a phytocoenosis.

Establishment of the values for ecological indices, life forms, floristic elements and karyotype were made after the synthesis works elaborated by Raunkiær (1937), Braun–Blanquet (1951), Meusel et Jäger (1992), Ellenberg (1974, 1979), Ellenberg et al. (1992), Soó (1964–1980), Májovsky et Murin (1987), Sanda et al. (1983, 2003), Pop (1977, 1982), Ciocârlan (2009), Cristea et al. (2004).

RESULT AND DISCUSSION

The phytocoenoses of this association are set up on arid lands with sunny exhibitions (E, SE and SV) on poorer, degraded, compact soil.

The association physiognomy is given by *Festuca valesiaca*, which is the dominant characteristic species with a general coverage of 55.5% ADm, maximum constancy and *Medicago minima*, a characteristic co-dominant species with a general 3.8% ADm coverage, and a high constancy (*Table 1*).

Table 1

Medicagini-Festucetum valesiacae Wagner 1940

L.f.	F.e.	W	T	S.r.	2n	No. Land Surveys	1	2	3	4	5	K	ADm
						Altitude (m.s.m.)	170	170	223	223	223		
						Exposition	E	SE	E	SV	SV		
						Slope (°)	5	6	5	8	5		
						Area (m²)	50	40	60	40	60		
						Coverage of grass layer (%)	70	70	75	75	70		
Th	Eua	1.5	4	4	D	As. *Medicago minima*	+	+	+	2	.	IV	**3.8**
H	Eua	1.5	4	4	D	As. *Festuca valesiaca*	3	4	4	3	4	V	**55.5**
						Festucion valesiacae, Festucetalia valesiacae							
H	P-M	2	4	4.5	D	*Stachys recta*	+	.	+	.	+	III	**0.3**
H	Eua	2	4	4	P	*Verbascum phoeniceum*	+	+	+	.	.	III	**0.3**
Th	Eua	1.5	5	3	P	*Dichanthium ischaemum*	+	.	.	+	.	II	**0.2**
H	E	2	4	3	D	*Fragaria viridis*	.	+	.	+	.	II	**0.2**
TH	E	0	0	0	P	*Centaurea micranthos*	.	.	+	.	+	II	**0.2**
H	Eua	2	4	5	D	*Inula hirta*	.	.	.	+	+	II	**0.2**
						Festuco-Brometea							
H	Eua	2.5	0	4	DP	*Plantago media*	+	+	.	.	+	III	**0.3**
Ch	Ppn	2	4	0	P	*Thymus glabrescens*	+	.	+	.	+	III	**0.3**
H	Mp	2	4	4	P	*Stachys germanica*	1	1	.	.	+	III	**2.1**
Ch	M	2	3	4	P	*Teucrium chamaedrys*	.	+	.	+	+	III	**0.3**
H	Ec	2	3	4	P	*Coronilla varia*	+	.	.	+	+	III	**0.3**
H	P	1	5	4	DP	*Eryngium campestre*	.	.	+	+	+	III	**0.3**
H	E	1.5	3	0	P	*Poa compressa*	.	1	.	.	+	II	**1.1**
H	Eua	0	0	0	P	*Potentilla recta*	.	.	+	+	.	II	**0.2**
H	Eua	2	3	4	DP	*Euphorbia cyparissias*	+	+	.	.	.	II	**0.2**
H	Eua	2.5	3	0	D	*Filipendula vulgaris*	.	+	.	+	.	II	**0.2**
H	E	2	5	5	D	*Dianthus carthusianorum*	+	.	.	+	.	II	**0.2**
Ch	E	0	3.5	0	DP	*Ononis spinosa*	.	.	+	.	.	I	**0.1**
TH	Eua	2	3	4	DP	*Echium vulgare*	.	.	+	.	.	I	**0.1**
Th	E	1.5	3.5	4	D	*Acinos arvensis*	.	.	+	.	.	I	**0.1**
TH	Eua	1.5	0	4.5	D	*Carduus nutans*	.	.	+	.	.	I	**0.1**
						Molinio-Arrhenatheretea							
H	Cp	0	0	0	P	*Agrostis capillaris*	.	+	.	.	+	II	**0.2**
H	Eua	0	0	0	DP	*Anthoxanthum odoratum*	.	+	.	.	+	II	**0.2**
Th	Eua	0	3	0	P	*Bromus hordeaceus*	.	.	+	.	+	II	**0.2**
H	Eua	0	0	0	D	*Plantago lanceolata*	.	.	+	.	.	I	**0.1**
H	Eua	0	3	0	DP	*Briza media*	.	.	.	+	.	I	**0.1**

						Variae syntaxa							
nPh	E	2	3	3	P	*Rosa canina*	.	.	+	.	+	II	**0.2**
H	Cosm	2	3	2	P	*Rumex acetosella*	.	.	.	+	+	II	**0.2**
H	E	2.5	0	0	DP	*Hieracium pilosella*	.	.	+	.	+	II	**0.2**
Th	Adv	2.5	0	0	D	*Conyza canadensis*	.	.	+	.	.	I	**0.1**

Phytocoenological table of *Medicagini-Festucetum valesiacae* Wagner 1940 association, where: L. f. - life forms; F. e. - floristic elements; W - soil wet; T - temperature; S. r. - chemical reaction of the soil; 2n - karyotype; K - constancy; ADm - abundance-dominance; H – Hemicryptophytes, TH – Biannual Therophytes, Th – Annual Therophytes, Ch – Chamaephytes, nPh – Nano-Phanerophytes, Eua – Eurasian, Cp – Circumpolar, Cosm – Cosmopolitan, Ec – Central European, Mp – Mediterranian-Pontic, E – European, Ppn – Ponto-Pannonian, M – Mediterranian, P – Pontic, Adv – Adventive, D – diploidy, P – polyploidy, DP – diplo-polyploidy.
Place and date of surveys: 1 – 2 Ursad locality (Bihor County) 02.08.2014; 3 – 5 Șoimi locality (Bihor County) 02.08.2014.

From the floristic point of view, the association brings together 32 cormophytes that are subordinated to the ***Festucion valesiacae*** alliance, ***Festucetalia valesiacae*** order: *Centaurea micranthos*, *Inula hirta*, *Stachys recta*, *Dichanthium ischaemum*, etc. and ***Festuco-Brometea*** class: *Teucrium chamaedrys*, *Stachys germanica*, *Thymus glabrescens*, *Acinos arvensis*, etc.

The floristic composition is penetrated by transgressive species of the ***Molinio-Arrhenatheretea*** class: *Briza media*, *Anthoxanthum odoratum*, *Bromus hordeaceus*, *Agrostis capillaris*, *Plantago lanceolata*.

The life forms spectrum (*Fig. 1*) illustrates the dominance of the hemicryptophytes (62.5%), followed by the annual therophytes (15.62%), respectively by chamaephytes and biannual therophytes (9.37%).

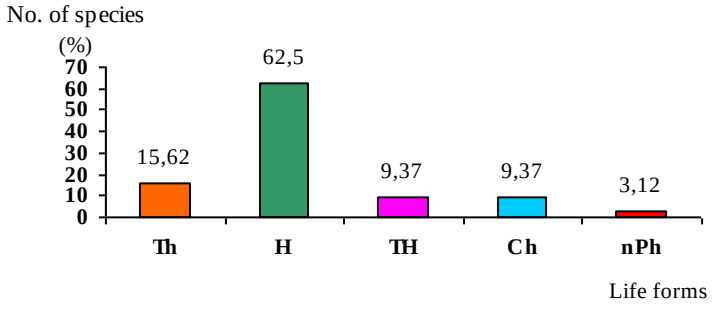

Fig. 1 – The life forms spectrum of ***Medicagini-Festucetum valesiacae*** association, where:
Th – annual therophytes, H – hemicryptophytes, TH – biannual therophytes,
Ch – chamaephytes, nPh – nano-phanerophytes.

The floristic element spectrum (*Fig. 2*) indicates the dominance of the Eurasian species (46.87%), followed by the European species (25%) and Pontic species (6.25%).

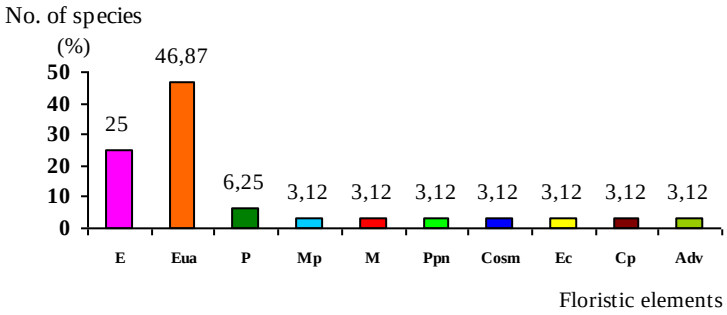

Fig. 2 – Floristic elements spectrum of the ***Medicagini-Festucetum valesiacae*** association, where:
E – European, Eua – Eurasian, P – Pontic, Mp – Mediterranian-Pontic,
M – Mediterranian, Ppn – Ponto-Pannonian, Cosm – Cosmopolitan,
Ec – Central European, Cp – Circumpolar, Adv – Adventive.

The chart of ecological indices (*Fig. 3*) shows that, in terms of moisture requirements, dominant are the xero-mesophile species (53.12%), followed by the humidity amphitolerant species (25%).

Depending on the temperature, the micro-mesothermal species (37.5%), followed by the thermic amphitolerant species (28.12%) and the moderate thermophiles (25%), have a higher share.

Chemical soil reaction favors the development of slightly acid-neutrophile and amphitolerant soil reaction species, each with 40.62%.

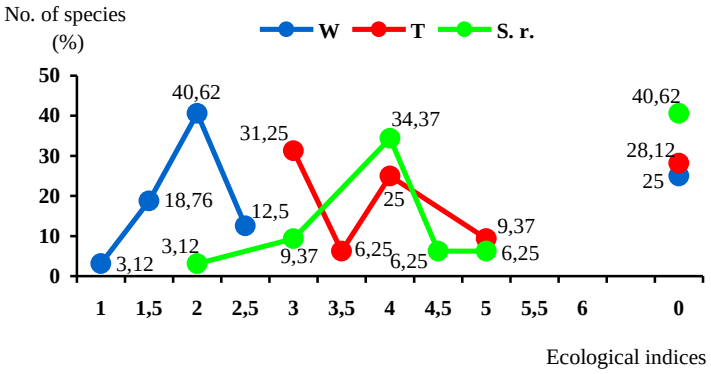

Fig. 3 – Diagram of ecological indices for the ***Medicagini-Festucetum valesiacae*** association, where: W – soil wet, T – temperature, S. r. – chemical reaction of the soil.

The karyotype spectrum (*Fig. 4*) illustrates the higher share of polyploid species (40.62%), followed by diploid (34.37%) and diplo-polyploid species (25%). The diploidy index is 0.84.

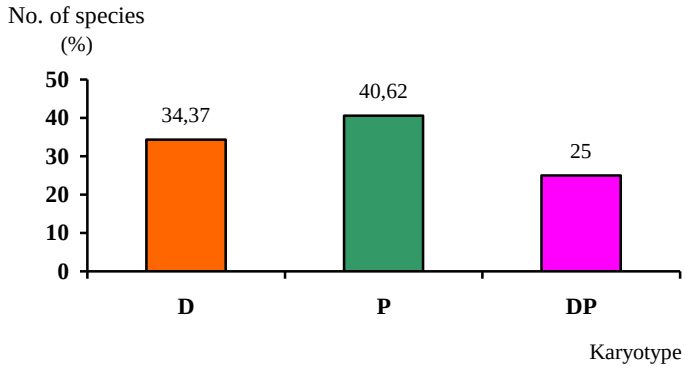

Fig. 4 – The karyotype spectrum of ***Medicagini-Festucetum valesiacae*** association, where: D – diploidy, P – polyploidy, DP – diplo-polyploidy.

CONCLUSIONS

By the succession point of view, *Medicagini-Festucetum valesiacae* association evolves to *Poterio-Festucetum valesiacae* phytocoenoses as a result of the decrease of soil moisture, in the areas with higher arid conditions and with the southern exhibition.

The life forms spectrum reveals the high share of hemicryptophytes (62.5%), the high percentage indicates that the researched area belongs to the temperate climate regions and the annual therophytes percentage (15.62%) indicates the zoo anthropogenic factor influences.

The floristic elements analysis expresses the dominance of Eurasian species (46.87%), with the genesis in ancient times, over which interfered in different phyto-historical periods the European species, Pannonian species, Mediterranian species, and so on.

In terms of moisture requirements, the dominant species are xero-mesophile (53.12%) which signifies the presence of habitats with arid microclimate during summer season; depending on the temperature prevail micro-mesothermal species (37.5%), microclimate which characterizes the high plain of the studied territory; chemical soil reaction favors the development of slightly acid-neutrophile and amphitolerant soil reaction

species, each with 40.62%, which means the plant species are adapted to the salty soils.

The karyotype spectrum illustrates the higher share of polyploid species (40.62%) that indicates the zoo anthropogenic factor, followed closely by diploid species (34.37%) those which provide favorable genetic potential for the future phyto-evolution.

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