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PHYTOCOENOLOGICAL RESEARCH CONCERNING THE GRASSLANDS FROM THE LOWER BASIN OF CRIȘUL NEGRU RIVER

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Abstract

This work represents a phytocoenological study of the halophilic association Pholiuro-Plantaginetum tenuiflorae (Rapaics 1927) Wendelberger 1943, which is classified from the coenotaxonomic point of view in the class Puccinellio-Salicornietea Ţopa 1939.

In the studied region, the phytocoenoses of the Pholiuro-Plantaginetum tenuiflorae association are installed in negative relief forms where the water stagnates until late spring, and during the summer they become dry, such as the meadows near Ciumeghiu, Salonta, Mădăras and Mărţihaz.

Pholiuro-Plantaginetum tenuiflorae association, was analyzed in terms of floristic composition, life forms spectrum, floristic elements, ecological indices and karyotype spectrum.

Key words: phytocoenoses, floristic composition, ecological indices, life forms, karyotype, floristic elements, halophilic vegetation.

INTRODUCTION

Chorology: the phytocenoses of this association have been described in our country from Oltenia (Cârţu, 1971); Muntenia (Şerbănescu, 1965; Popescu et al., 1984); Crişana (Pop, 1968); Banat (Grigore, 1969; Coste et al., 1993).

Type of habitat: Natural Habitat of Community interest whose conservation requires the designation of Special Areas of Conservation (ASC), Natura 2000: 1530* Pannonic salt-steppes and salt-marshes.

In the studied region, these phytocoenoses grow on sulfate or carbonate salts occupying sample areas between 20–40 m^2, the coverage of vegetation layer being 70–100%. They are installed in negative relief forms, where the water stagnates until late spring, and during the summer they become dry, such as the meadows near Ciumeghiu, Salonta, Mădăras and Mărţihaz.

Code R1516 West Pontic communities with *Pholiurus pannonicus* and *Plantago tenuiflora* (Doniță et al., 2006, Gafta, Mountford (coord.) et al., 2008).

MATERIAL AND METHODS

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 halophilic vegetation of the grasslands from the lower 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.), 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 highlight 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. (2003), Pop (1977, 1982), Ciocârlan (2009).

RESULT AND DISCUSSION

The characteristic species of the association are *Pholiurus pannonicus*, with a general coverage of 87.5% ADm, having the maximum constancy (K=V) and *Plantago tenuiflora* with a general coverage of 0.3% ADm, the constancy being high (K=III).

The floristic composition includes a number of 28 species, mostly halophilous (*Table 1*), which subordinate the association to the ***Puccinellion limosae*** alliance: *Puccinellia distans* ssp. *limosa*, *Hordeum hystrix*; ***Puccinellietalia limosae*** order and ***Puccinellio-Salicornietea*** class: *Lotus angustissimus*, *Juncus gerardii*, *Plantago tenuiflora*, *Gypsophila muralis*, *Achilea setacea*, etc.

Table 1

***Pholiuro-Plantaginetum tenuiflorae* (Rapaics 1927) Wendelberger 1943**

L.f.	F.e.	W	T	S.r.	2n	No. Land Surveys	1	2	3	4	5	K	ADm
						Altitude (m.s.m.)	92	94	94	95	95		
						Area (m²)	20	40	25	35	40		
						Coverage of grass layer (%)	100	90	95	80	95		
Th	Ppn	2	4	5	D	As. *Pholiurus pannonicus*	5	5	5	4	5	V	**87,5**
Th	Eua	3.5	3.5	5	P	As. *Plantago tenuiflora*	.	+	+	.	+	III	**0.3**
						Puccinellion limosae							
Th	Eua	2	4	4.5	DP	*Hordeum hystrix*	.	.	+	+	.	II	**0.2**
H	Eua	3.5	0	5	P	*Puccinellia distans* ssp. *limosa*	.	.	+	+	.	II	**0.2**
H	Eua	4	0	5	D	*Plantago maritima*	+	.	+	.	.	II	**0.2**
						Puccinellietalia limosae, Puccinellio-Salicornietea							
Th	Eua	2	3	2	D	*Gypsophila muralis*	+	.	+	.	+	III	**0.3**
H	Eua	2	3	5	D	*Achilea setacea*	.	.	+	+	.	II	**0.2**
Th	Eua	0	4	4.5	P	*Heleochloa schoenoides*	.	+	.	.	+	II	**0.2**
H	Eua	3.5	3	4	D	*Lotus tenuis*	.	.	+	.	+	II	**0.2**
Th	Mp	2	4	4	D	*Lotus angustissimus*	.	.	.	+	.	I	**0.1**
H	Eua	3	3	5	D	*Trifolium fragiferum*	+	.	.	.	.	I	**0.1**
Th	Eua	2	0	4	D	*Scorzonera laciniata*	.	.	.	.	+	I	**0.1**
Th	Eua	3.5	3.5	5	P	*Plantago tenuiflora*	.	.	.	.	+	I	**0.1**
H	Mp	2	4	4.5	D	*Scorzonera cana*	.	.	+	.	.	I	**0.1**
Th	Cosm	2.5	0	3	P	*Polygonum aviculare*	.	+	.	.	.	I	**0.1**
G	Cp-Bo	4.5	3	5	P	*Juncus gerardii*	.	.	.	1	.	I	**0.1**
						Molinio-Arrhenatheretea							
H	Cp-Bo	4	0	0	P	*Agrostis stolonifera*	+	.	.	1	.	II	**0.2**
H	Eua	2.5	4	4.5	D	*Lolium perenne*	.	.	+	.	+	II	**0.2**
H	Eua	3	0	0	P	*Achillea millefolium*	+	+	.	.	.	II	**0.2**
H	Eua	3.5	0	0	D	*Festuca pratensis*	1	+	.	.	.	II	**0.2**
H	Eua	3.5	0	0	P	*Trifolium repens*	.	.	+	.	1	II	**0.2**
H	Eua	3.5	0	0	D	*Ranunculus acris*	.	.	.	+	.	I	**0.1**
H	E	3.5	3	4	D	*Trifolium hybridum*	.	.	.	+	.	I	**0.1**
H	Eua	3	3	2.5	D	*Hypochoeris radicata*	+	.	.	.	.	I	**0.1**
						Variae syntaxa							
G	Cosm	2	3.5	0	DP	*Cynodon dactylon*	.	.	+	.	+	II	**0.2**
Th	Cosm	4	3	0	P	*Lythrum hyssopifolia*	.	.	.	+	.	I	**0.1**
Th	Eua	1	3.5	2	P	*Vulpia myuros*	.	.	.	+	.	I	**0.1**
H	Eua	2.5	3	4	P	*Agrimonia eupatoria*	+	.	.	.	.	I	**0.1**

Phytocoenological table of *Pholiuro-Plantaginetum tenuiflorae (Rapaics 1927) Wendelberger 1943* 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; Th – Annual Therophytes; H – Hemicryptophytes; G – Geophytes; Ppn – Ponto-Pannonian; Eua – Eurasian; Mp – Mediterranean-Pontic; Cosm – Cosmopolitan; Cp-Bo – Circumpolar-Boreal; E – European; D – diploidy, P – polyploidy, DP – diplo-polyploidy.
Place and date of surveys: 1 – Ciumeghiu locality (Bihor County) 28.07.2020; 2 – 3 Salonta locality (Bihor County) 28.07.2020; 4 – Mădăras locality (Bihor County) 29.07.2020; 5 – Mărțihaz locality (Bihor County) 29.07.2020.

The phytocoenoses of the association include transgressive species from the ***Molinio-Arrhenatheretea*** class, of which, with higher constancy, they are: *Agrostis stolonifera*, *Festuca pratensis*, *Achillea millefolium* (K=II), respectively *Ranunculus acris*, *Trifolium hybridum*, etc.

The life forms spectrum, for the *Pholiuro-Plantaginetum tenuiflorae* association (*Fig. 1*), indicates the dominance of hemicryptophytes species (53.57%), followed by annual therophytes (39.28%).

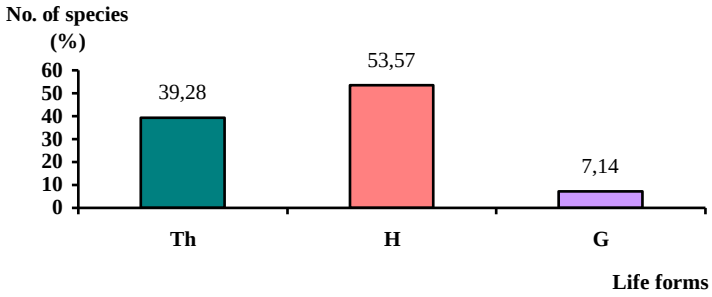

Fig. 1 – The life forms spectrum of ***Pholiuro-Plantaginetum tenuiflorae*** association, where: Th – annual therophytes, H – hemicryptophytes, G – geophytes.

The floristic elements spectrum (*Fig. 2*), expresses the dominance of Eurasian species (67.85%), followed by Cosmopolitan ones (10.71%); Mediterranean-Pontic and Circumpolar-Boreal, with an equal share, each with 7.14%.

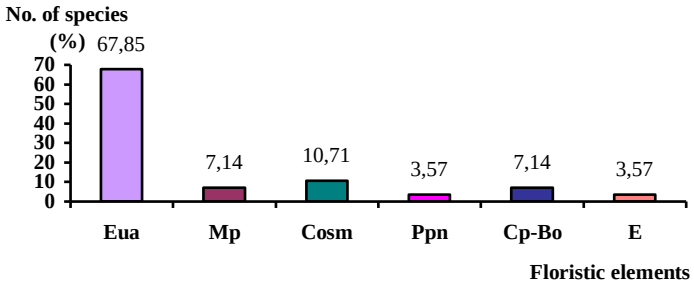

Fig. 2 – Floristic elements spectrum of the ***Pholiuro-Plantaginetum tenuiflorae*** association, where: Eua – Eurasian, Mp – Mediterranean-Pontic, Cosm – Cosmopolitan, Ppn – Ponto-Pannonian, Cp-Bo – Circumpolar-Boreal, E – European.

The diagram of ecological indices (*Fig. 3*) shows that, depending on the preferences for humidity, the xero-mesophile and mesophile species are codominant, each with 39.28%. Compared to the temperature factor, the largest share is held by micro-mesothermal species (46.42%), followed by eurytherms ones (32.14%). Regarding the chemical reaction of the soil, there is a high number of slightly acid-neutrophile species (32.13%), but also of the neutro-basophile (28.57%).

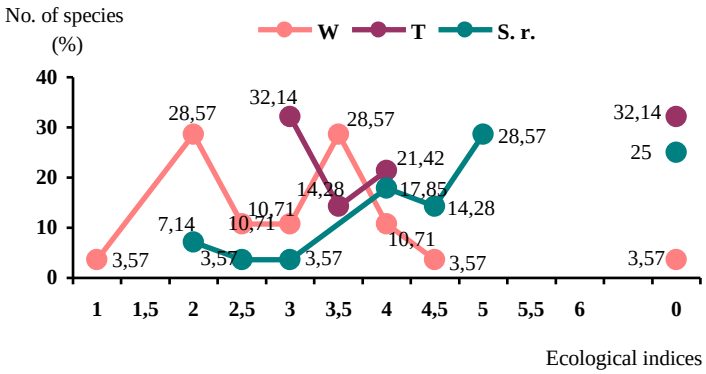

Fig. 3 – Diagram of ecological indices for the ***Pholiuro-Plantaginetum tenuiflorae*** association, where: W – soil wet, T – temperature, S. r. – chemical reaction of the soil.

The karyotype spectrum (*Fig. 4*) expresses the close share of diploid species (50%) and polyploid species (42.85%), followed by diplo-polyploid species (7.14%).

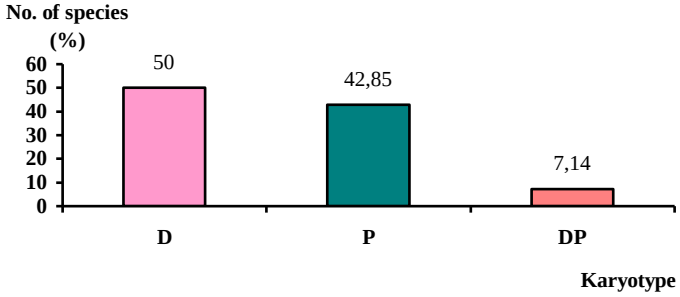

Fig. 4 – The karyotype spectrum of ***Pholiuro-Plantaginetum tenuiflorae*** association, where: D – diploidy, P – polyploidy, DP – diplo-polyploidy.

CONCLUSIONS

The results of the analysis for the association *Pholiuro-Plantaginetum tenuiflorae* indicate that it is well outlined, with a varied composition and structure, and our results are in line with the specialty literature.

The results obtained from the life forms analysis reveal the high percentage of hemicryptophytes (53.57%), which are main components of the meadows grass layer.

The floristic elements stock is dominated by Eurasian species (67.85%), with the genesis in ancient times.

In terms of requirements for humidity, the xero-mesophile and mesophile species are codominant, each with 39.28%, which signifies the presence of habitats with arid and moderate microclimate in the studied area; in relation to the temperature factor, species that are reflected in the general appearance of the flora are micro-mesothermal (46.42%); regarding the chemical reaction of the soil it reveals the slightly acid-neutrophile character (32.13%), followed by the neutro-basophile character (28,57%).

Phytocoenoses of halophilous grasslands dominated by *Pholiuro-Plantaginetum tenuiflorae* plant association, is a rare natural habitat of community interest whose conservation requires the designation within the

Special Areas of Conservation (ASC), Natura 2000: 1530* Pannonic salt-steppes and salt-marshes.

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