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CONTRIBUTION TO THE KNOWLEDGE OF THE HALOPHILOUS VEGETATION OF THE SALONTA PLAIN (NORTH WESTERN ROMANIA)

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Abstract

The meadowlands from the Salonta Plain form an area with rich flora and vegetation suitable for a complex phytocoenological research and an ecologic and bio-economical study of the floor vegetation.

On the halomorphic soils of the meadows from the Salonta Plain, after conducting phytocoenological surveys, have been identified a number of eleven halophilic associations from which one is examined in this work – Puccinellietum limosae Rapaics ex Soó 1933, 1936 which is classified from the coenotaxonomic point of view in the class Puccinellio-Salicornietea Ţopa 1939.

Puccinellietum limosae association was analyzed in terms of floristic composition, life forms, floristic elements, ecological indices and karyotype.

Key words: phytocoenoses, halophilous vegetation, floristic composition, ecological indices.

INTRODUCTION

Chorology: the phytocoenosis of this association were mentioned in our country from Muntenia (Sanda et al., 1978; Sanda et Popescu, 1984); Banat (Grigore, 1969; Coste et al., 1993); Transylvania (Pop et al., 1983; Todor, 1948; Sămărghiţan, 2001); Dobrogea, including the Danube Delta (Popescu et Sanda, 1976, 1978; Sârbu et al., 1995, 2000); Crişana (Pop, 1968).

The territory chosen for research, had not been studied thoroughly by those who had floristic and phytocoenological concerns and were not made many scientific communications and publications about this area. Studies were found in the author paperwork's (Pop, 1959, 1968), (Popescu, 1963). The complex study of flora and vegetation is absolutely necessary especially in regions with less or no researches.

This study aims to analyze the phytocoenoses of the association *Puccinellietum limosae* Rapaics ex Soó 1933, 1936 from the point of view of the floristic composition and by analyzing the floristic elements, life forms, ecological factors and karyotype.

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.

Code R1521 Ponto-Sarmatian Communities of *Puccinelia limosa* and *Plantago maritima* (Doniță et al., 2006; Gafta et al., 2008).

MATERIAL AND METHODS

Salonta Plain is located North Western Romania, being surrounded by Crișul Negru Plain (south), Miersig Plain (east), Santău Plain (north) and by the Hungarian border west. The plain altitude is between 80 and 200 m, increasing gradually from west to east and reaching the maximum height adjacent to hills. It has a temperate continental moderate climate, the average annual air temperature distribution is +10,3º C.

On taking into consideration several papers in the specialty literature (Mucina, 1997; Coldea et al., 1997; Sanda et al., 1998; Sanda et al., 2008), the *Puccinellietum limosae* Rapaics ex Soó 1933, 1936 association was classified in the following coenosystem:

Class: ***Puccinellio-Salicornietea*** Țopa 1939

Order: ***Puccinellietalia limosae*** (Soó 1968) Géhu et Rivas-Martinez 1982

Alliance: ***Puccinellion limosae*** (Klika 1937) Wendelberger 1943

The study of this association 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 (m²), coverage (%).

Participation of each species to the association table was made with the help of the abundance–dominance index (ADm), according to the system developed by Braun-Blanquet (1964) and completed by Tüxen and Ellenberg (1937).

To the end of the table was registered and calculated the constancy (K), the phytocenotical index whose class is between I-V and expresses the coenetic fidelity degree of each species to the ambiance of the association's phytocoenoses (Braun-Blanquet et Pavillard, 1928).

Establishment of ecological index values, life forms, floral elements, and karyotype, were made after the work of synthesis developed by (Raunkiær, 1937), (Meusel et Jäger, 1992), (Ellenberg, 1974), (Májovsky et Murin, 1987), (Sanda et al. 1983), (Ciocârlan, 2009).

RESULT AND DISCUSSION

In the studied area, the *Puccinellietum limosae* association (*Fig. 1*) grows in salty meadows, in the neighborhood of Ciumeghiu, Mădăras, Salonta, Mărțihaz and Iermata Neagră localities.

The association phytocoenosis are stationed on saline land, with moisture excess during spring and arid during summer season. They develop on salty soils and marshy grounds, with the pH from neutral to alkaline. They occupy small areas, from 8-15 m^2 and the vegetation coverage is between 40-100%.

Fig. 1 – Association ***Puccinellietum limosae*** Rapaics ex Soó 1933, 1936
Salonta locality, Bihor County

Puccinellia limosa is the characteristic and dominant species, with overall coverage of 46,87%, and maximum constancy (V).

The floristic inventory of the association includes a total of 23 species, which highlights the halophile species belonging to the ***Puccinellion***

limosae alliance, ***Puccinellietalia limosae*** order and ***Puccinellio-Salicornietea*** class: *Artemisia maritima ssp. monogyna, Lepidium latifolium, Plantago maritima, Lepidium ruderale, Aster sedifolius, Achillea setacea, Iris halophila,* etc. (*Table 1*).

Within the association enter some transgressive species from ***Molinio-Arrhenatheretea*** class: *Festuca pseudovina, Lythrum salicaria, Trifolium repens, Festuca arundinacea*.

In a number of four phytocoenosis, *Artemisia maritima* ssp. *monogyna* asserts quantitatively forming a characteristic facies (surveys no. 5–8).

The life forms spectrum (*Fig. 2*) illustrates a high rate of hemicryptophytes (47,82%), followed by annual therophytes (30,43%), geophytes having value of 17,39%.

Table 1

Puccinellietum limosae Rapaics ex Soó 1933, 1936
– facies with ***Artemisia maritima* ssp. *monogyna*** (surveys no. 5–8)

L. f.	F. e.	W	T	S. r.	2n	No. Land Surveys	1	2	3	4	5	6	7	8	K	ADm
						Altitude (m.s.m.)	94	94	95	92	104	104	104	95		
						Area (m²)	10	8	12	15	10	8	10	8		
						The coverage of grass layer (%)	75	40	80	75	100	100	100	100		
H	Pn	3,5	0	5	P	As. *Puccinellia limosa*	4	3	3	4	3	3	3	4	V	46,87
						Puccinellion limosae, Puccinellietalia limosae, Puccinellio-Salicornietea										
Ch(H)	Eua(C)	2,5	4	0	D	*Artemisia maritima* ssp. *monogyna*	.	.	.	1	4	4	4	3	IV	28,75
H	Eua	4,5	3	5	P	*Lepidium latifolium*	+	.	.	+	.	.	.	.	II	0,12
H	Eua(M)	4	0	5	D	*Plantago maritima*	+	.	.	+	.	.	.	.	II	0,12
Th-TH	Eua	2	3,5	0	P	*Lepidium ruderale*	+	.	.	+	.	.	.	.	II	0,12
H	Eua(C)	4	3	2	P	*Aster sedifolius*	.	.	.	.	.	+	.	+	II	0,12
H	Eua(C)	2	3	5	D	*Achillea setacea*	.	.	.	.	.	+	.	.	I	0,06
G	Mp	3,5	3,5	4,5	P	*Iris halophila*	.	.	.	+	.	.	.	.	I	0,06
H(TH)	Eua	2,5	3,5	4,5	D	*Cichorium intybus*	.	.	.	.	+	.	.	.	I	0,06
H	Eua(M)	3,5	3	4	D	*Lotus tenuis*	+	.	.	.	.	.	.	.	I	0,06
Th	Eua(C)	3,5	3,5	5	P	*Plantago tenuiflora*	.	+	.	.	.	.	.	.	I	0,06
Th	Eua(C)	2	3	2	D	*Gypsophila muralis*	+	.	.	.	.	.	.	.	I	0,06
G	Cp-Bo	4,5	3	5	P	*Juncus gerardii*	+	.	.	.	.	.	.	.	I	0,06
Th	Cosm	2,5	0	3	P	*Polygonum aviculare*	.	.	+	.	.	.	.	.	I	0,06
Th	Eua(M)	4	3	3	D	*Pulicaria vulgaris*	.	.	.	.	+	.	.	.	I	0,06

						Molinio-Arrhenatheretea										
H	Eua(C)	2	4	4	D,P	*Festuca pseudovina*	1	+	.	.	.	.	.	.	II	0,68
H	Eua	4	3	4	P	*Festuca arundinacea*	+	.	.	+	.	.	.	.	II	0,12

Table 1 (continuance)

L. f.	**F. e.**	**W**	**T**	**S. r.**	**2n**	**No. Land Surveys**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**K**	**ADm**
H-Hh	Cosm	4	3	0	P	*Lythrum salicaria*	.	.	+	.	.	.	.	.	I	0,06
H-TH	Eua	3,5	0	0	P	*Trifolium repens*	.	.	3	.	.	.	.	.	I	4,69
						Variae syntaxa										
Th	Eua(M)	3	3,5	0	D	*Matricaria recutita*	.	.	.	+	.	.	.	.	I	0,06
Th	Eua	3,5	3,5	4	P	*Xanthium strumarium*	.	.	.	+	.	.	.	.	I	0,06
G	Ec-M	2	3	4	D,P	*Allium scorodoprasum*	.	.	.	+	.	.	.	.	I	0,06
G-H	Eua(C)	2	3,5	4	D,P	*Poa bulbosa*	.	.	.	+	.	.	.	.	I	0,06

Phytocoenological table of ***Puccinellietum limosae*** association Rapaics ex Soó 1933, 1936, 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, G – geophytes, Th – annual therophytes, Ch – chamaephytes, Eua – Eurasian, Cp – Circumpolar, Cosm – Cosmopolitan, Pn – Pannonian, Ec – Central European, Mp – Mediterranian-pontic, D – diploidy, P – polyploidy, D,P – diplo-polyploidy.

Place and date of surveys: 1 – 2 Salonta locality (Bihor County) 25.06.2014; 3 – Mărțihaz locality (Bihor County) 08.07.2014; 4 – Ciumeghiu locality (Bihor County) 27.06.2014; 5 – 7 Iermata Neagră locality (Arad County) 27.06.2014; 8 – Mădăras locality (Bihor County) 08.07.2014.

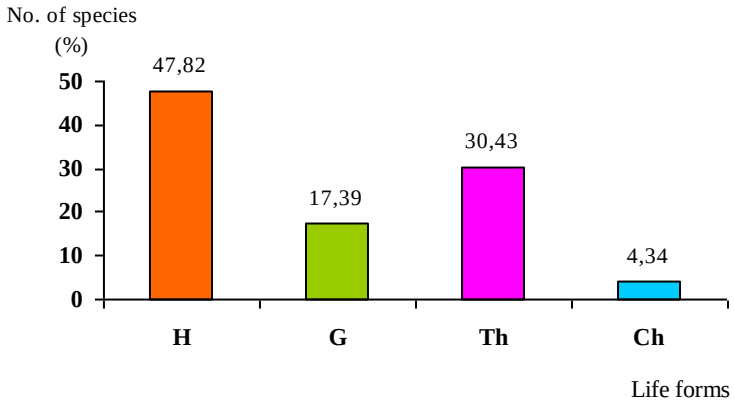

Fig. 2 – The life forms spectrum of ***Puccinellietum limosae*** association, where:
H – hemicryptophytes, G – geophytes, Th – annual therophytes, Ch – chamaephytes.

Diagram of ecological indices (*Fig. 3*) indicates that, depending on the humidity factor, the dominant species are xero-mesophile (39,12%), followed closely by mesophile species (30,42%). Depending on the temperature prevail micro-mesothermal species (73,9%), followed by the thermic amphitolerant species (17,39%).

Referring to the chemical reaction of the soil, it can be noted the high percentage of slightly acid-neutrophile species (34,77%), followed by neutro-basophile species (26,08%).

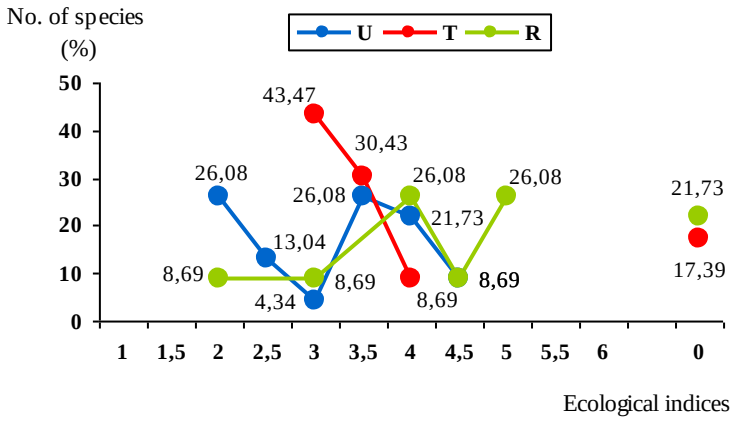

Fig. 3 – Diagram of ecological indices for the ***Puccinellietum limosae*** association, where: W – soil wet, T – temperature, S. r. – chemical reaction of the soil.

The spectrum of the floristic elements (*Fig. 4*) expresses the dominance of Eurasian species (73,91%), followed at long a distance by Cosmopolitan species (8,69%) and by Circumpolar, Pannonian, Central European and Mediterranian-pontic species, all with (4,34%).

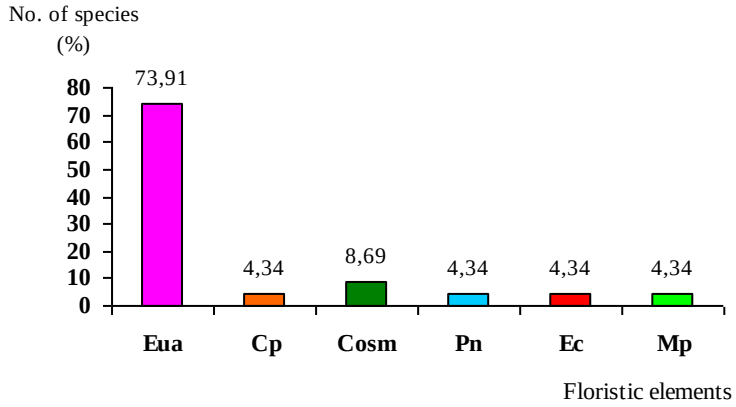

Fig. 4 – Floristic elements spectrum of the ***Puccinellietum limosae*** association, where: Eua – Eurasian, Cp – Circumpolar, Cosm – Cosmopolitan, Pn – Pannonian, Ec – Central European, Mp – Mediterranian-pontic.

The karyotype spectrum (*Fig. 5*) highlights the dominance of polyploid species (52,17%), followed by diploid species (34,78%) and the diplo-polyploid species (13,04%). The diploidy index has a value of 0,66.

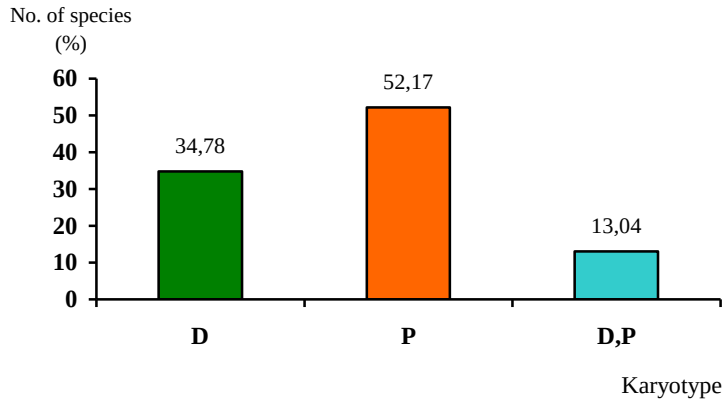

Fig. 5 – The karyotype spectrum of ***Puccinellietum limosae*** association, where: D – diploidy, P – polyploidy, D,P – diplo-polyploidy.

CONCLUSIONS

The presence of numerous halophile species expresses the accelerated salinisation of the soil and the evolution in time to phytocoenosis of *Artemisio-Festucetum pseudovinae*.

The results obtained from the life forms analysis reveal the high percentage of hemicryptophytes (47,82%), which are main components of the meadows grass layer, the high percentage indicates that the researched area belongs to the temperate climate regions; annual therophytes have a substantial participation (30,43%), their spread is correlated with the zoo-anthropic factor influences.

In terms of requirements for humidity, the dominant species are xero-mesophile (39,12%) which signifies the presence of habitats with arid microclimate during summer season; depending on the temperature prevail micro-mesothermal species (73,9%), microclimate which characterizes the low and high plain of the studied territory; regarding the chemical reaction of the soil it can be noted a higher percentage of slightly acid-neutrophile species (34,77%), followed by neutro-basophile species (26,08%), which means the plant species are adapted to the salty soils.

The floristic elements expresses the dominance of Eurasian species (73,91%), with the genesis in ancient times, over which interfered in different phyto-historical periods the Cosmopolitan, Central European, Circumpolar, Pannonian and Mediterranian-pontic species.

The karyotype spectrum highlights the dominance of polyploid species (52,17%), which are easily adaptable, indicates the zoo-anthropic pressure in the last decades, followed by diploid species (34,78%) those which provide favorable genetic potential for the future phyto-evolution.

Puccinellietum limosae is a rare association ranked in 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 – therefore we need to protect them for the preservation of their phytodiversity.

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