

STUDY REGARDING THE ASSOCIATION *AGROSTIO-BECKMANNIETUM* (RAPAICS 1916) SOÓ 1933 IN THE MEADOWLANDS FROM THE INFERIOR BASIN OF CRIȘUL NEGRU RIVER

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Abstract

This work represents a phytocoenologic, ecological, bioeconomic and ecoprotectiv study on the vegetation of the meadowlands from the inferior basin of Crișul Negru river. The meadowlands from the inferior basin of Crișul Negru river form an area with rich flora and vegetation suitable for a complex fitocenological research and an ecologic and bio-economical study of the floor vegetation.

*This study aims to analyze the phytocoenoses of the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933 (class *Puccinellio-Salicornietea* Topa 1939) from phytocoenologic, floristic and economic points of view. Phytocoenoses association analysis present a scientific importance, with a total of twenty-four species, including some rare, vulnerable and endemic species that need to be protected.*

Key words: phytocoenologic study, vegetal association, phytocoenoses, life forms, floristic elements.

INTRODUCTION

The inferior basin of Crișul Negru river is located in NW Romania, being enclosed between the basin of Crișul Repede river in the north and the basin of Crișul Alb river to the south.

The plain of Crișul Negru is situated in the hydrographic basin of Tisa, the plain being watered by Crișul Negru, which has a general course in the direction east-west, and by its confluents. Crișul Negru springs from the northern flank of Curcubăta peak, from the altitude of 1460 m, near the springs of Arieșul Mic. Regarding the hydrological data of the river Crișul Negru we have: the length of the river – 560 km; the medium flow – Zerind 31,40 m³/s; the maximum registered flow – Zerind 648 m³/s; minimum registered flow – Zerind 0,47 m³/s.

The soils of the Crișul Negru Plain are characterized by diversity, their genesis being in close connection with the evolution of the Plain of Tisa. The region from the Plain of Crișul Negru is tessellated; the inter-region soils dominate (alluvial, swamp soil, gleic soil and pseudogley, salty soils).

On the Plain of Crișul Negru, the summers are hot and humid, and the winters are cold, sometimes accompanied with blizzards; in the winter, the periods of warming up are rare as the snow bed is thicker and more stable.

A part of the middle and inferior basin of the Crișul Negru River, being covered with primary herbaceous vegetation, has been broken up and used for agriculture. The meadows which hasn't been broken up, used by humans as pastures and meadows; as a result of canalizations and drainages these meadows suffered a saline progradation, and secondary halophile vegetation appeared, vegetation which is widely spread in this area.

MATERIAL AND METHODS

In the study of the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, in the meadowlands from inferior basin of Crișul Negru river, we used the phytosociological research method of Central European School based on the principles and methodology developed by Braun-Blanquet (1964) and adapted by Borza and Boșcaiu (1965) to the features of vegetation cover in our country.

In what the execution of surveys and notations on the analyzed fitocenoses' structure is concerned, both quantitative and qualitative criteria were considered, according to authors Al. Borza and N. Boșcaiu (1965). The quantitative criteria were abundance and dominance according to the combined system of J. Braun-Blanquet, J. Pavillard (1928), supplemented by R. Tüxen (1955) and H. Ellenberg (1963).

To realize this study, there were performed three local incursions and nine land surveys on the meadowlands near Ciumeghiu village (Bihar county), Ant village and Iermata Neagră village (Arad county) in the summer of year 2011. The sample surfaces, with their area between 8 and 100 m², homogeneous in floristic and physiognomic terms, were chosen from the studied natural meadowlands.

The synthetic table of association contains information on species from the floristic composition, the life forms, the floristic element, the ecological indices (moisture, temperature, chemical reaction of the soil), the serial number of surveys, altitude (m.s.m.), area (m²), and the coverage of grass layer (%). The quantitative assessment of the participation of each species in the tables of associations was made with the index of abundance-dominance. At the end of tables the constance (K) phytocoenotic synthetic index was calculated and noted, whose classes ranging from I-V expresses the degree of cenotic fidelity of each species to the phytocoenoses environment.

For the completion of the phytocoenologic and environmental study of the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, we have

represented graphically the diagram of ecological factors, the distribution of life forms, floristic elements and karyotype spectrum.

RESULT AND DISCUSSION

The phytocenosis of the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933 (Fig. 1), were identified in negative forms of relief with stagnant water, in the meadowlands near Ciumeghiu village (Bihor county) and Ant village, Iermata Neagră village (Arad county), respectively.

The phytocenosis of this association vegetate on moist soils, more or less saline, temporarily marshiness after grazing. The edifying species, *Beckmannia eruciformis* is frequently accompanied by the codominant species *Agrostis stolonifera* and the following elements: *Mentha pulegium*, *Carex melanostachya*, *Rorippa kernerii*, *Inula britannica*, etc.



Fig. 1 – Association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, meadow near Ciumeghiu village, Bihor county.

The association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933 (Table 1) totals twenty-four species. Characteristic and dominant species of this association are *Beckmannia eruciformis* with a medium abundance and dominance (mAD) of 60,83%, with maximum constancy (K) of V and *Agrostis stolonifera* with a general coverage of grass layer of 17,66%, having also a maximum constancy of V.

Beckmannia eruciformis and *Agrostis stolonifera* are both in the Poaceae (grass) family, used for animal feed, being classified as good fodder (Fr₃), in a scale between 1 and 4, where 1 (Fr₁) are poorly fodder and 4 (Fr₄) are very good fodder. Also we have fodder species like: *Festuca*

pratensis (Fr₄), *Puccinellia limosa* (Fr₂), *Poa palustris* (Fr₃), *Heleochoa schoenoides* (Fr₂).

Table 1

Agrostio-Beckmannietum (Rapaics 1916) Soó 1933

L.f.	F.e.	U	T	S.r.	2n	No. Land Surveys	1	2	3	4	5	6	7	8	9	K	Adm
						Altitude (m.s.m.)	92	90	92	90	92	89	89	89	89		
						Area (m ²)	10	10	8	100	50	100	100	100	100		
						The coverage of grass layer (%)	80	100	90	100	90	85	95	80	100		
H	Cp	4,5	3	4	D	As. Beckmannia eruciformis	4	5	2	2	4	4	5	4	5	V	60,83
H	Cp	4	0	0	P	As. Agrostis stolonifera	1	+	4	4	2	+	+	1	1	V	17,66
						Beckmannion eruciformis, Puccinellietalia limosae, Puccinellio-Salicornietea											
H	Eua(C)	5	4	4	P	Rumex stenophyllus	+	+	+	+	+	+	+	+	+	IV	0,38
H	Pan	4	3	4	P	Rorippa kernerii	+	+	+	+	+	1	+	+	+	III	0,77
H	Eua(C)	3,5	0	5	P	Puccinellia limosa	+	1	+	+	+	+	+	+	+	III	0,72
H	Eua	4	0	5	D	Plantago maritima	1	+	+	+	+	+	+	+	+	III	0,72
Th	Eua(C)	3,5	3,5	5	P	Plantago tenuiflora	+	+	+	+	+	1	+	+	+	II	0,66
H-Hh	Cosm	5	3	0	P	Glyceria fluitans	+	+	+	+	+	+	+	+	+	II	0,11
						Molinio-Arrhenatheretea											
H	Cosm	4,5	3	3	P	Juncus effusus	+	+	+	2	+	+	+	+	+	III	2,16
TH-H	Eua(M)	3	3	0	P	Inula britannica	+	+	+	+	+	+	+	+	1	III	0,72
H	Eua	4,5	3	4	P	Gratiola officinalis	+	+	+	+	+	+	+	+	+	II	0,16
Hh	Eua(C)	4	3	0	P	Carex melanostachya	+	+	+	+	+	+	+	+	+	II	0,16
H-Hh	Cosm	4	3	0	P	Lythrum salicaria	+	+	+	+	+	+	+	1	+	II	0,61
H	Eua	3,5	0	0	D	Festuca pratensis	+	+	1	+	+	+	+	+	+	II	0,61
H	Eua(M)	4	3	4	P	Mentha pulegium	+	+	+	+	+	+	+	1	+	II	0,66
						Phragmitetea australis											
Hh	Eua(M)	6	3	4	D-P	Rorippa amphibia	+	+	+	+	+	+	+	+	+	II	0,11
H	Cp	5	3	4	P	Poa palustris	+	+	+	+	1	+	+	+	+	II	0,61
Hh-G	Cosm	6	0	4,5	P	Bolboschoenus maritimus	+	+	+	+	+	1	+	+	+	II	0,61
H(G)	Cp	4	3	4	P	Stachys palustris	+	+	+	+	+	+	+	+	+	II	0,11
						Bidentetea tripartiti											
Th	Eua(M)	4,5	3	4	D	Polygonum hydropiper	1	+	+	+	+	+	+	+	+	II	0,66
H	E	4	3	0	P	Symphytum officinale	+	+	+	+	+	+	+	+	+	II	0,16
						Accompanying											
Th	Eua	0	4	4,5	P	Heleochloa schoenoides	+	+	+	+	+	+	+	+	+	II	0,16
Hh	Eua(C)	5	4	0	D	Typha laxmannii	+	+	+	+	+	1	1	+	+	II	1,16
Th	Eua	3,5	3,5	4	P	Xanthium strumarium	+	+	+	+	+	+	+	+	+	I	0,61

Place and date of surveys: 1-5 – Meadows near Ciumeşiu village (Bihor county) 28.07.2011; 6-8 – Meadows near Ant village (Arad county) 02.08.2011; 9 – Meadows near Iermata Neagră village (Arad county) 08.08.2011.

The analysis of the association on the aspect of the main ecological factors (Fig. 2) emphasize the dominant mezo-hydrophilic character (50%, $U_{4-4,5} = 12$ species). Depending to the temperature, the association has a micro-mezotherm character (66,6%, $T_{3-3,5} = 16$ species), and depending on the chemical reaction of the soil, it manifests a slightly acid-neutrophile character (50%, $R_{4-4,5} = 12$ species), followed by euriionic character (33,3%, $R_0 = 8$ species).

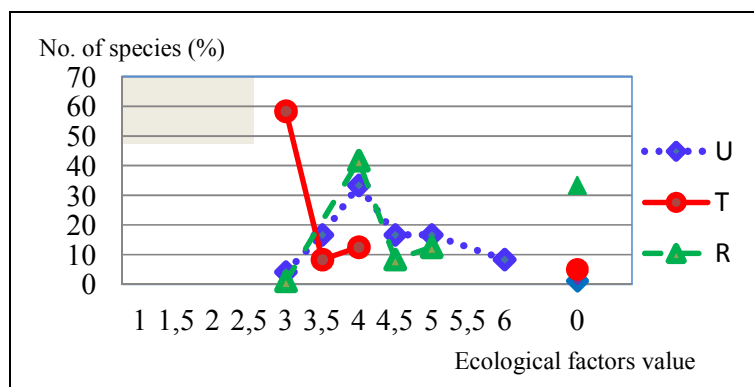


Fig. 2 – Diagram of ecological factors for the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, where:
U – humidity, T – temperature, R – the chemical reaction of the soil.

The life forms spectrum (Fig. 3) is dominated hemicryptophytes (50%, $H = 12$ species), followed by euterophytes species (16,66%, $Th = 4$ species), and helohidatophytes (12,5%, $Hh = 3$ species).

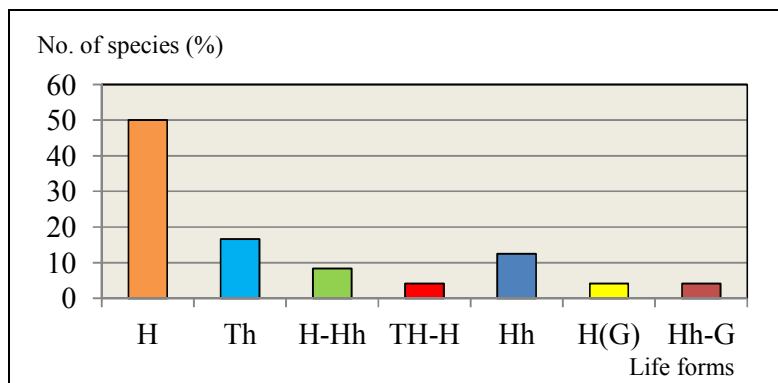


Fig. 3 – The life forms spectrum of association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, where:
H – hemicryptophyte, Th – annual therophyte, Hh – helohidatophyte,
TH – biannual therophyte, G – geophyte.

From the point of view of the floristic elements (Fig. 4), most of them are Eurasian (20,83%, Eua = 5 species) and Eurasian including continental species (20,83%, Eua(C) = 5 species), followed by Cosmopolite, Eurasian including mediterranean and Circumpolar species, all with four species, representing, each 16,66%.

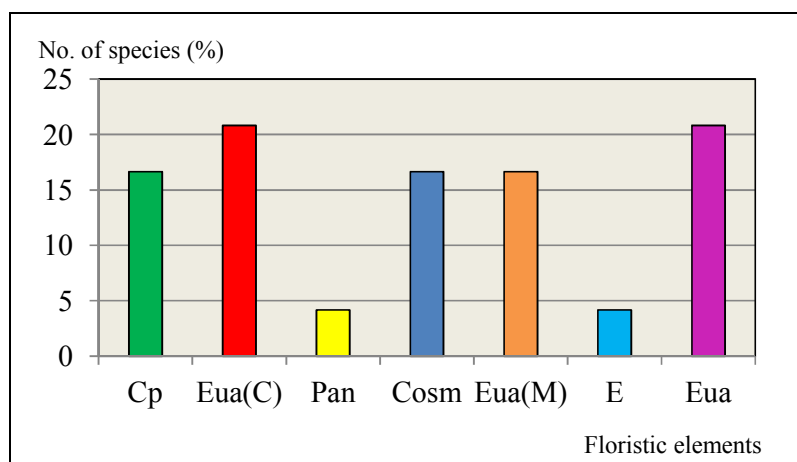


Fig. 4 – Spectrum of floristic elements of the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, where: Cp – circumpolar; Eua – eurasian; C – continental; Pan – pannonic; Cosm – Cosmopolitan; M – mediterranean; E – european.

The karyotype spectrum (Fig. 5) is dominated by the polyploid species (75%, P = 18 species) followed by diploid species (20,83%, D = 5 species) and the diplo-polyploid (4,16%, D-P = 1 species).

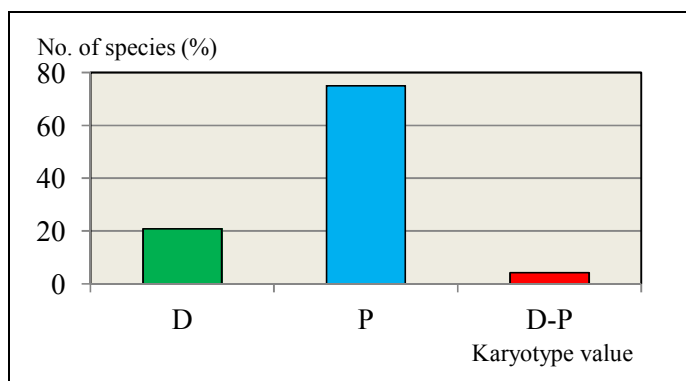


Fig. 5 – The karyotype spectrum of association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933, where: D - diploidy; P – polyploidy; D-P – diplo-polyploidy.

CONCLUSIONS

After the phytocoenological, bioeconomical and ecological study of the floor vegetation from the searched areas, the grasslands of this association give a high production of phytomass with good economic value. The species of this association have food values (*Mentha pulegium*), forage values (*Beckmannia eruciformis* Fr₃, *Agrostis stolonifera* Fr₃, *Festuca pratensis* Fr₄, *Puccinellia limosa* Fr₂, *Poa palustris* Fr₃, *Heleochoa schoenoides* Fr₂), medicinal values (*Lythrum salicaria*, *Gratiola officinalis*, etc.), melliferous values (*Lythrum salicaria* Me₂, *Mentha pulegium* Me₂, etc.) and industrial values (*Juncus effusus*).

In the association *Agrostio-Beckmannietum* (Rapaics 1916) Soó 1933 have been found six rare, endangered and endemic species (*Rorippa kernerii*, *Glyceria fluitans*, *Puccinellia limosa*, *Plantago maritima*, *Plantago tenuiflora*, *Typha laxmannii*) for which must be taken conservation measures in the studied ecosystem.

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