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CONTRIBUTIONS TO THE STUDY OF THE CLASS *PHRAGMITETEA AUSTRALIS* R. TÜXEN et PREISING 1942 IN THE LOWER BASIN OF CRIȘUL NEGRU RIVER

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Abstract

The grasslands from the lower basin of Crişul Negru river 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.

This work represents a phytocoenological study of the association Sparganietum erecti Roll 1938, which is classified from the coenotaxonomic point of view in the class Phragmitetea australis R. Tüxen et Preising 1942. The association was analyzed in terms of floristic composition, life forms, floristic elements, ecological indices and karyotype.

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

INTRODUCTION

Chorology: the phytocoenosis of this association were mentioned in our country from Moldova (Mititelu, 1971, 1975; Barabaș, 1974; Mititelu et Barabaș, 1972, 1974, 1975; Mititelu et al., 1994; Dobrescu, 1981; Turenschi et Zanoschi, 1971); Muntenia (Dihoru, 1975; Popescu et al., 1984); Maramureș (Gergely et Rațiu, 1980); Transilvania (Ularu, 1969; Erika Schneider-Binder, 1975; Șuteu, 1973); Banat (Grigore, 1971a, 1971b; Vicol, 1974); Crișana (Pop, 1962).

From the floristic point of view, the researches carried out in the meadowlands from the lower 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.

Type of habitat: Natural Habitat of Community interest whose conservation requires the designation of Special Areas of Conservation (ASC), Natura 2000: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation.

Code R5304: Danubian Communities with *Sparganium erectum, Berula erecta and Sium latifolium* (Doniță et al., 2005).

MATERIAL AND METHODS

The phytocoenosis of this association populate the edges of the dams with permanent water retention near Cefa locality and the collector channels in the area of Inand and Homorog localities in the lower basin of Crişul Negru river, being included in the Crişurilor 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. (2003), Pop (1977, 1982), Ciocârlan (2009).

RESULT AND DISCUSSION

The phytocoenoses edified by *Sparganium erectum* form compact, well-individualized groups that develop in standing or flowing waters, with depths between 20 and 40 cm and occupy sample areas between 15-30 m^2.

The characteristic and dominant species is *Sparganium erectum* ssp. *neglectum*, with a general coverage of 72.5 ADm and maximum constancy (V), along with species characteristic of the alliance *Sparganio-Glycerion fluitantis*, of the order *Nasturtio-Glycerietalia*: *Glyceria fluitans*, *Veronica anagallis-aquatica*, *Myosotis scorpioides*, etc. and the class *Phragmitetea australis*: *Glyceria maxima*, *Stachys palustris*, etc. (*Table 1*).

Table 1

Sparganietum erecti Roll 1938

L.f.	**F.e.**	**W**	**T**	**S.r.**	**2n**	**No. Land Surveys**	**1**	**2**	**3**	**4**	**5**	**K**	**ADm**
						Altitude (m.s.m.)	100	100	104	104	106		
						Area (m^2)	30	20	15	15	20		
						Coverage of grass layer (%)	95	75	85	90	75		
Hh	Eua	5,5	3,5	0	D	As. *Sparganium erectum* ssp. *neglectum*	5	4	4	5	4	V	**72,5**
						Sparganio-Glycerion fluitantis, Nasturtio-Glycerietalia							
Hh	Eua	5	3	0	P	*Myosotis scorpioides*	+	+	+	+	+	V	**0,5**
Hh-H	Cosm	5	3	0	P	*Glyceria fluitans*	+	.	.	+	+	III	**0,3**
H	Eua	4	3	3	P	*Epilobium hirsutum*	+	1	+	.	.	III	**1,2**
H-Hh	Cp-Bo	5	0	4	DP	*Veronica anagallis-aquatica*	+	.	+	.	+	III	**0,3**
Hh	Eua	6	3	4,5	P	*Glyceria plicata*	.	.	.	+	+	II	**0,2**
						Phragmitetea australis							
Hh	Cosm	6	0	0	D	*Alisma plantago-aquatica*	+	+	+	+	1	V	**1,4**
Hh-G	Cosm	6	3	4	P	*Schoenoplectus lacustris*	.	+	+	.	+	III	**0,3**
Hh	Cp	5	3	4	P	*Glyceria maxima*	+	1	.	.	.	II	**1,1**
G-Hh	E	5,5	0	0	P	*Iris pseudacorus*	.	.	+	.	+	II	**0,2**
H(G)	Cp-Bo	4	3	4	P	*Stachys palustris*	+	+	.	.	.	II	**0,2**
G-Hh	Cosm	5	0	4	P	*Eleocharis palustris*	+	.	.	+	.	II	**0,2**
Ch	Eua	4,5	3	4	P	*Solanum dulcamara*	+	.	.	.	.	I	**0,1**
H	Cp-Bo	4	3	4	P	*Scutellaria galericulata*	+	.	.	.	.	I	**0,1**
Hh	Cp-Bo	4,5	0	4	P	*Rumex aquaticus*	+	.	.	.	.	I	**0,1**
						Magnocaricetalia							
Hh	Eua	6	3	4	P	*Carex acutiformis*	.	+	2	+	.	III	**3,7**
Hh	Eua	5	4	4	P	*Carex riparia*	+	.	.	.	+	II	**0,2**
						Bidentetea tripartiti							
H	Cp	4	4	4	D	*Rumex conglomeratus*	+	.	+	.	.	II	**0,2**
Th	Eua	4	3	0	P	*Myosoton aquaticum*	.	.	.	.	+	I	**0,1**
Th	Eua	4,5	3	0	P	*Bidens tripartita*	.	.	.	.	+	I	**0,1**
						Molinio-Arrhenatheretea							
H-Hh	Cosm	4	3	0	P	*Lythrum salicaria*	.	.	.	.	+	I	**0,1**
H	Eua	4	4	4	D	*Juncus inflexus*	+	.	.	.	.	I	**0,1**
H-Hh	Eua	4,5	3,5	4	P	*Lythrum virgatum*	.	.	.	+	.	I	**0,1**
H	Cosm	4,5	3	3	P	*Juncus effusus*	.	.	.	+	.	I	**0,1**
H	Eua	4	3	0	P	*Symphytum officinale*	+	.	.	.	.	I	**0,1**
H	Cp-Bo	4	0	0	P	*Agrostis stolonifera*	.	+	.	.	.	I	**0,1**

Phytocoenological table of *Sparganietum erecti Roll 1938* 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; Hh – helohydatophytes; H – Hemicryptophytes, Th – Annual Therophytes, Ch – Chamaephytes, Eua – Eurasian, Cp – Circumpolar, Cosm – Cosmopolitan, E – European, D – diploidy, P – polyploidy, DP – diplo-polyploidy.

Place and date of surveys: 1 – 2 Dam with permanent water retention, Cefa locality (Bihor County) 11.08.2017; 3 – 4 Collector channel, Inand locality (Bihor County) 11.08.2017; 5 – Collector channel, Homorog locality (Bihor County) 11.08.2017.

An important cenotic role is played by the transgressive species from the *Bidentetea tripartiti* class: *Bidens tripartita*, *Rumex conglomeratus*, etc. and from the *Molinio-Arrhenatheretea* class: *Agrostis stolonifera*, *Juncus inflexus*, *Juncus effusus*, etc.

The life forms spectrum for the analyzed association (*Fig. 1*), attests the highest percentage of hemicryptophytes (42.3%), followed by helohidatophytes (38.46%), with annual geophytes and terophytes each having 7.69%.

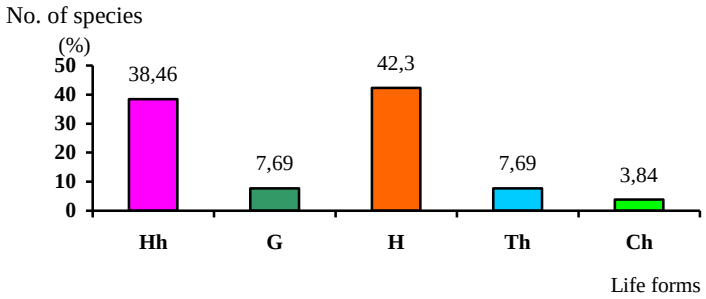

Fig. 1 – The life forms spectrum of ***Sparganietum erecti*** association, where:
Hh – helohydatophytes, G – geophytes, H – hemicryptophytes,
Th – annual therophytes, Ch – chamaephytes.

The spectrum of the floristic elements (*Fig. 2*), indicates the higher weight of the Eurasian species (46.15%), followed by the circumpolar ones (26.92%) and the cosmopolitan ones (23.07%).

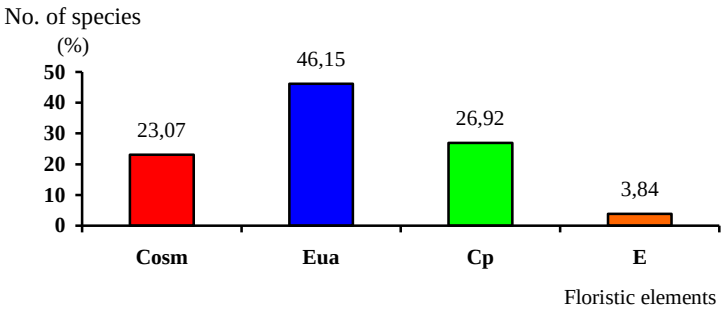

Fig. 2 – Floristic elements spectrum of the ***Sparganietum erecti*** association, where:
E – European, Eua – Eurasian, Cosm – Cosmopolitan, Cp – Circumpolar.

Analyzing the phytocoenoses of the association *Sparganietum erecti* from the point of view of the ecological indices (*Fig. 3*) it is found that, depending on the humidity factor, the mesohigrofile species (53.84%) predominate, followed by the hygrophilous ones (30.76%). In terms of temperature, micro-mesothermal species are dominant (61.53%), followed by euroterms (23.07%). Regarding the chemical reaction of the soil, the high percentage of the weak acid-neutrophil species (53.84%) is observed, followed by the euriionic ones (38.46%).

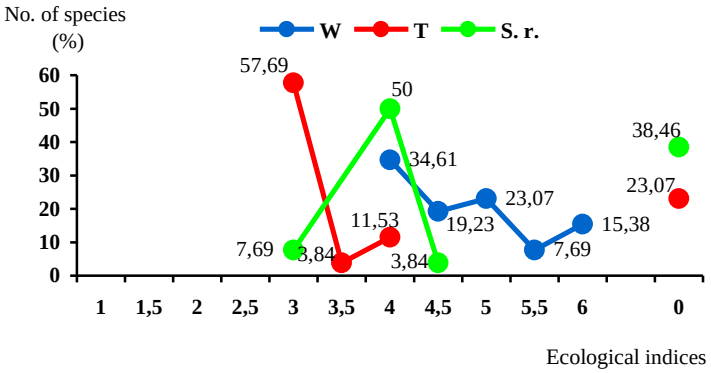

Fig. 3 – Diagram of ecological indices for the ***Sparganietum erecti*** association, where: W – soil wet, T – temperature, S. r. – chemical reaction of the soil.

The karyotype spectrum (*Fig. 4*) shows the dominance of the polyploid species (80.76%), followed by the diploids (15.38%) and the diplo-polyploids (3.84%), the diploidy index having the value of 0.19.

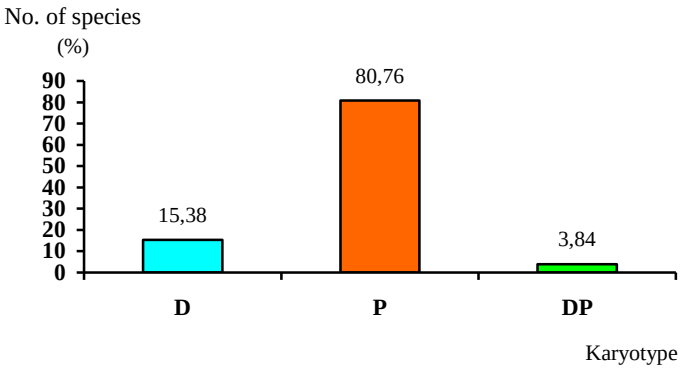

Fig. 4 – The karyotype spectrum of ***Sparganietum erecti*** association, where: D – diploidy, P – polyploidy, DP – diplo-polyploidy.

CONCLUSIONS

The analysis results of the 5 surveys realised for the *Sparganietum erecti* Roll 1938 association, in that concerning the life forms, floristic elements, ecological indices and karyotype, shows that the floristic and cenotic composition of the association are well shaped and varied and our results are according with specialty literature.

Sparganietum erecti is a rare association ranked in Natural Habitat of Community interest whose conservation requires the designation of Special Areas of Conservation (ASC), Natura 2000: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation, therefore we need to protect them for the preservation of their phytodiversity.

The evolution direction of the association is towards phytocoenoses of *Eleocharitetum palustris* and *Glycerietum fluitantis*.

REFERENCES

1. Barabaș N., 1974, Contribuţii la studiul vegetaţiei din bazinul Tazlăului. Studii şi Comunicări. Muzeul de Ştiinţe ale Naturii, Bacău. 7: 93-178.
2. Borhidi A., 1996, Critical revision of the Hungarian plant communities. Janus Pannonius University, Pécs.
3. Borhidi A., 2003, Magyarország növénytársulásai. Akadémiai Kiadó, Budapest.
4. Borza A., N. Boșcaiu, 1965, Introducere în studiul covorului vegetal. Editura Academiei R. P. Române, Bucureşti, 340 p.
5. Braun-Blanquet J., 1964, Pflanzensoziologie, Ed. III. Springer-Verlag, Wien-NY.
6. Braun–Blanquet J., 1951, Pflanzensoziologie, Grundzüge der Vegetationskunde, 2nd edition, Springer Verlag, Wien.
7. Braun-Blanquet J., J. Pavillard, 1928, Vocabulaire de sociologie végétale. Ed. III. Imprimerie Roumegous & Dehan, Montpellier.
8. Pop I., 1962, Vegetaţia acvatică şi palustră de la Salonta (reg. Crişana). Studii şi Cerc. De Biol. Cluj, 13(2): 191-216.
9. Ciocârlan V., 2009, Flora ilustrată a României. Pteridophyta et Spermatophyta, Edit. Ceres, Bucureşti, 1138 p.
10. Coldea G. H., 1972, Flora şi vegetaţia munţilor Plopiş, Rez. tezei de doct.. Univ. Babeş-Bolyai, Cluj.
11. Coldea G., V. Sanda, A. Popescu, N. Ştefan, 1997, Les associations végétales de Roumanie. Tome 1. Les associations herbaces naturalle. Presses Universitaires de Cluj, Cluj-Napoca.
12. Dihoru G., 1975, Învelişul vegetal din Muntele Siriu. Editura Academiei R. S. România. Bucureşti.
13. Dobrescu C., 1981, Aspecte floristice şi fitocenologice din complexele lacustre de interfluviu Poeniţa şi Georza (Dobrovăţ) din judeţul Iaşi, obiective ale ocrotirii naturii. Studii şi Com. de Ocrotire a Naturii, Suceava, 5: 383-393.
14. Ellenberg H., 1974, Zeigerwerte der Gefässpflanzen Mitteleuropas - Scripta Geobotanica, Göttingen, 9:1-97.
15. Ellenberg H., 1979, Zeigerwerte der Gefässpflanzen Mitteleuropas, 2nd edition – Scripta Geobotanica, Göttingen, 9:1–122.
16. Ellenberg H., E. H. Weber, R. Düll, V. Wirth, W. Werner, D. Paulissen, 1992, Zeigerwerte von Pflanzen in Mitteleuropa. Scripta Geobotanica, 2 Aufl. E. Goltze Verlag, Göttingen.
17. Gergely I., O. Rațiu, 1980, Asociaţiile ierboase din ″Ţara Oaşului″ (jud. Satu Mare) şi importanţa lor economică, Cont. Bot., Cluj-Napoca: 88-142.
18. Grigore Ș., 1971, Flora şi vegetaţia din interfluviul Timiş–Bega. Rez.tezei de doct. Institutul Agronomic, Iaşi.
19. Grigore Ș., 1971, Vegetaţia acvatică şi palustră din zona de interfluviul Timiş-Bega. Studii şi cerc. de Biol. seria Bot., Bucureşti, 23. (1): 13-45.
20. Májovsky J., A. Murin, 1987, Karyotaxonomicky prehl'ad flóry Slovenska. Veda vydavatel'stvo, Slovenskaj Académie Vied, Bratislava.
21. Meusel H., E. Jäger, 1992, Vergleichenden Chronologie der Zentraleuropäischen Flora, III, Gustav Fischer Verlag, Jena.
22. Mititelu D., 1971, Contribuţii la studiul vegetaţiei acvatice şi palustre din depresiunea Elanului şi luncile limitrofe (jud. Vaslui). Stud. şi Com., Muz. de Şt. Nat. Bacău: 157-142.
23. Mititelu D., 1975, Flora şi vegetaţia judeţului Iaşi. Stud. şi Com., Muz. de Şt. Nat. Bacău, 8: 67-162.
24. Mititelu D., N. Barabaş, 1972, Răspândirea unor asociaţii ierboase în lunca Prutului. Stud. şi Com., Muz, de Şt. Nat. Bacău, 5: 189-196.
25. Mititelu D., N. Barabaş, 1974, Vegetaţia Văii Trotuşului III (sectorul Dărmăneşti-Ghimeş). Stud. şi Com., Muz. de Şt. Nat. Bacău, 7: 75-92.
26. Mititelu D., N. Barabaş, 1975, Vegetația din lunca Prutului. Stud. şi Com., Muz. de Şt. Nat. Bacău, 8: 219-285.

27. Mititelu D., N. Barabaş, M. Bârcă, M. Costică, 1994, Contribuţii noi la cunoaşterea florei şi vegetaţiei judeţului Bacău. Stud. şi Com.. Compl. Muz. de Şt. Nat. ″I. Borcea″ Bacău. 1980-1993, 13: 81-108.
28. Mucina L., 1997, Conspectus of Classes of European Vegetation, Folia Geobot. Phytotax, Praha, 32:117-172.
29. Pop I., 1977, Biogeografie ecologică, Ed. Dacia. Cluj–Napoca. Vol. I.
30. Pop I., 1982, Plante spontane şi subspontane cu valoare economică din flora R. S. România. Contrib. Bot., Cluj–Napoca: 131–142.
31. Popescu A., V. Sanda, M. Doltu, I., G. A. Nedelcu, 1984, Vegetaţia Câmpiei Munteniei. Studii şi Comunicări. Şt. Nat., Muzeul Brukenthal Sibiu, 26: 173-241, 369-511.
32. Raunkiær C., 1937, Life-form, genus area, and number of species. Botaniske Studier, 5. Haefte (ed. C. Raunkiær), pp. 343–356. J. H. Schultz Forlag, København.
33. Rothmaler W., 1994, Exkursionsflora von Deutschland–Band 48 Anflage, Gustav Fischer Verlag Jena–Stuttgart.
34. Rothmaler W., 2000, Exkursionsflora von Deutschland, Band 3. Gefäßpfanzen: Atlasband. Spektrum Akademischer Verlag Heidelberg–Berlin.
35. Sanda V., N. C. Biță, N. Barabaș, 2003, Flora cormofitelor spontane și cultivate din România. Editura Ion Borcea, Bacău.
36. Sanda V., K. Öllerer, P. Burescu, 2008, Fitocenozele din România. Sintaxonomie, structură, dinamică şi evoluţie. Editura ARS Docendi, Universitatea din Bucureşti.
37. Schneider-Binder E., 1975, Flora şi vegetaţia depresiunii Sibiului şi a dealurilor marginale. Rez. tezei de doct., Univ. Babeş-Bolyai. Cluj-Napoca.
38. Soó R., 1964-1980, A magyar flóra és vegetáció rendszertani, növényföldrajzi kézikönyve, Akad. Kiadó, Budapest: 1-6.
39. Şuteu Ş., 1973, Vegetaţia mlaştinilor de pe Valea Mogoşului (jud. Alba). Contrib. Bot., Cluj: 167-170.
40. Turenschi E., V. Zanoschi, 1971, Contribuţii la cunoaşterea vegetaţiei din lunca Siretului. Stud. şi Com, Muz. Şt. Nat. Bacău: 785-790.
41. Tüxen R., 1955, Das System der Nordwestdeutschen Pflanzengesellschaften. Mitt. d. Flor. soz. Arbeit., n. Folge, 5:155-176.
42. Ularu P., 1969, Contribuţii la cunoaşterea vegetaţiei acvatice şi palustre din estul munţilor Perşani. Com. De Bot., S. S. N. G., București, 11:173-185.
43. Vicol E. C., 1974, Flora şi vegetaţia Piemontului Lugojului (jud. Timiş). Rez. tezei de doct. Univ. Babeş-Bolyai, Cluj-Napoca.
44. *** Code of Botanical Nomenclature (Tokyo, 1993). Boissiera, 49, Geneve, 1995: 1-85.