CONTRIBUTION TO THE KNOWLEDGE OF THE AQUATIC VEGETATION IN THE INFERIOR BASIN OF CRIŞUL NEGRU RIVER

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Abstract

The paper presents the hydrophytic association Lemno - Salvinietum natantis Miyavaki et. Tüxen 1960, association classified from the coenotaxonomic point of view in the class Lemnetea O. de Bolós et Masclans 1955. The phytocenosis of this association were identified at Rădvani fishery, Cefa village (Bihor county) and in a drainage near Salonta locality, also Bihor county in the meadowlands from the inferior basin of Crişul Negru river.

The Lemno - Salvinietum natantis association Miyavaki et. Tüxen 1960 is presented from the point of view of the floristic composition and by analyzing the spectrum of the floristic elements, the life forms spectrum, the karyotype spectrum and the ecological factors.

Key words: aquatic vegetation, ecological factors, vegetal association, floristic elements. life forms.

INTRODUCTION

The basin of Crişul Negru river, about 3820 km^2, is located between geographic coordinates 46°22′ and 47°00′ north latitude, respectively 21°24′ and 22°45′ eastern longitude (in WGS 84 coordinate).

The basin of Crişul Negru river is surrounded by the Crişul Repede basin in the north and in the south by the basin of Crişul Alb river. Western limit of the basin is formed by the state border with the Republic of Hungary and the east limit with the basin of Someşului river. Except for the area occupied by the basin of Teuz valley, the basin of Crişul Negru river extends entirely across the Bihor county, representing 60% of its territory.

From the climate perspective, the basin of Crişul Negru river, as part of Crişurilor basin, falls within the Pannonian climate with wide variety of overtones, depending on the complexity and fragmentation of the landscape. The arrangement of the relief steps is in ascending order from west to east, making the whole basin to be under the influence of oceanic air masses from the west and those subtropical wet, especially in winter, on slopes facing southwest.

The soils of the Crişul 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 Crişul Negru is tessellated; the inter-region soils dominate (alluvial, swamp soil, gleic soil and pseudogley, salty soils).

A part of the middle and inferior basin of the Crişul 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

On taking into consideration several papers in the specialty literature (Sanda V., A. Popescu, N. Barabaş, 1998; Sanda V., K. Öllerer, P. Burescu, 2008), the *Lemno - Salvinietum natantis* association Miyavaki et. Tüxen 1960 was classified in the following coenosystem:

LEMNETEA O. de Bolós et Masclans 1955

LEMNETALIA MINORIS O. de Bolós et Masclans 1955

Lemno-Salvinion natantis Slavnić 1956

For the study of *Lemno - Salvinietum natantis* association from the inferior basin of Crişul Negru river, I used the phytosociological research method of the European Central School, based on the principles and methods elaborated by Braun-Blanquet J., (1964) and adapted by Borza A., Boşcaiu N., (1965) to the particularities of the vegetation carpet from our country.

After the field research the list of species is drawn up grouped by classes, order, families and ranges alphabetically, specifying the place and habitat where they vegetate, the locality and an ecological summary (bioforms, geo-elements, ecological clues and economic importance). The taxons identified in the field have been identified by specialty catalogues (acc. to the volumes "Flora României"/Romania's Flora 1952-1976 and "Flora ilustrată a României"/Romania's Illustrated Flora 2003 by V. Ciocârlan, etc.).

The association's synthetic table was structured after the methodology proposed by Braun-Blanquet J. (1964) and developed by Ellenberg H. (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 index of abundance–dominance after the evaluation system of J. Braun-Blanquet and J. Pavillard (1928). 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.

RESULT AND DISCUSSION

The floristic and phytocoenological characterization of *Lemno - Salvinietum natantis* association Miyavaki et. Tüxen 1960 reveals that the composition includes sixteen varied species. The phytocoenosis is dominated by *Salvinia natans,* that realizes a covering of vegetation of 51%, with a high constancy (V), and is accompanied by the characteristic species *Lemna minor* with a covering of vegetation of 20,6% and a high constancy (V), *Spirodela polyrrhiza* and *Ceratoplyllum demersum* with a high constancy (IV), respectively (III) in the frame of association.

The hydrophytic touch of the association *Lemno - Salvinietum natantis* (Fig. 1) is reflected in the big percentage of species with ecological index of humidity U_6 = 75% of the species, also the hydrophilic character $U_{5\text{-}5,5}$ = 18,75%.

Fig. 1 – Association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, Rădvani fishery, Cefa village, Bihor county.

We notice the presence of transgressive species from *Potamogetonetea* class from which we mention - *Potamogeton nodosus*, *Potamogeton crispus*, *Hydrocharis morsus-ranae*, and transgressive species from *Phragmitetea* class from which we mention - *Mentha aquatica*, *Lycopus europaeus*, *Sagittaria sagittifolia*, *Alisma plantago-aquatica*.

The phytocenosis of this association were identified at Rădvani fishery, Cefa village (Bihor county), and a drainage near Salonta locality (Bihor county).

Table 1

Lemno - Salvinietum natantis Miyavaki et. Tüxen 1960 – facies with Lemna minor (survey no. 3)

L.f.	F.e.	U	T	S.r.	2n	No. Land Surveys	1	2	3	4	5	K	ADm
						Altitude (m.s.m.)	100	94	100	94	100		
						Area (m²)	4	5	8	16	4		
						The coverage of grass layer (%)	90	80	80	90	80		
Hh	Eua	6	3	3	D	*As. Salvinia natans*	4	4	1	4	4	V	51
Hh	Cosm	6	0	0	P	*As. Lemna minor*	2	+	4	2	1	V	20,6
						Lemnion, Lemnetalia, Lemnetea							
Hh	Cosm	6	3,5	0	P	*Spirodela polyrrhiza*	+	.	+	+	1	IV	1,3
Hh	Cosm	6	3	0	D	*Ceratoplyllum demersum*	1	.	.	1	+	III	2,1
Hh	Cosm	6	0	4	P	*Lemna trisulca*	.	+	.	.	.	I	0,1
						Potamogetonetea							
Hh	Cp	6	3,5	4	P	*Potamogeton nodosus*	.	.	1	+	+	III	1,2
Hh	Cosm	6	3,5	4	P	*Potamogeton crispus*	+	+	+	.	.	III	0,3
Hh	Eua	6	3,5	3,5	P	*Hydrocharis morsus-ranae*	+	1	.	+	1	IV	2,2
Hh	Eua(M)	6	4	4	D-P	*Trapa natans*	+	1	1	.	.	III	2,1
Hh	Eua(M)	6	0	3,5	D	*Nuphar lutea*	.	.	.	.	+	I	0,1
						Phragmitetea							
Hh-H	Eua	5	3	0	P	*Mentha aquatica*	+	1	.	+	+	IV	1,3
Hh	Eua	5	3	0	D	*Lycopus europaeus*	.	+	+	.	.	II	0,2
Hh	Eua(M)	6	3	4	D	*Sagittaria sagittifolia*	.	+	.	+	.	II	0,2
Hh	Cosm	6	0	0	D	*Alisma plantago-aquatica*	.	.	+	+	.	II	0,2
G-Hh	E	5,5	0	0	P	*Iris pseudacorus*	+	.	+	.	.	II	0,2
Hh	Cp	4,5	0	4	P	*Rumex aquaticus*	.	.	.	+	+	II	0,2

Place and date of surveys: 1, 2 – Rădvani fishery, Cefa village, Bihor county, 25.08.2010;
3, 4, 5 – Drainage, Salonta locality, Bihor county, 25.08.2010.

The analysis of the association on the aspect of the main ecological factors (Fig. 2) emphasize the dominant hydrophytic character (75%, U_6 = 12 species) followed by the hydrophilic character (18,75%, $U_{5-5,5}$ = 3 species). Depending to the temperature, the association has a micro-mesotherm character (56,25%, $T_{3-3,5}$ = 9 species), followed by thermic amphitolerant (37,5%, T_0 = 6 species), and considering the chemical reaction of the soil, it manifests a chemical amphitolerant character (43,75%, R_0 = 7 species) along with a slightly acid-neutrophile character (37,5%, $R_{4-4,5}$ = 6 species).

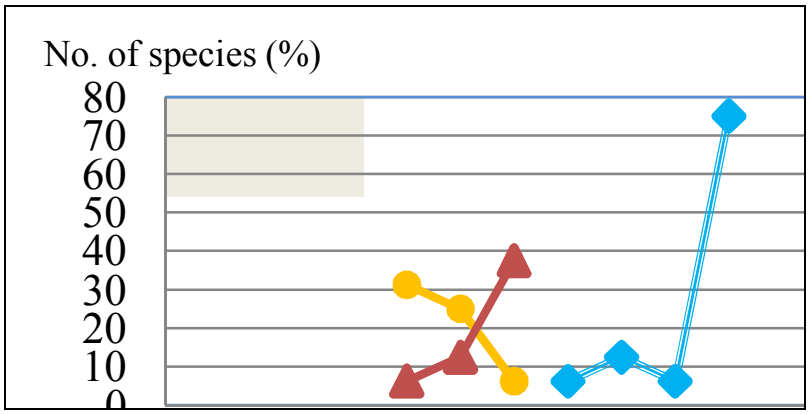

Fig. 2 – Diagram of ecological factors for the association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, where: U – humidity, T – temperature, R – the chemical reaction of the soil.

The life forms spectrum (Fig. 3) is dominated by helohydatophytes (87,5%, Hh = 14 species).

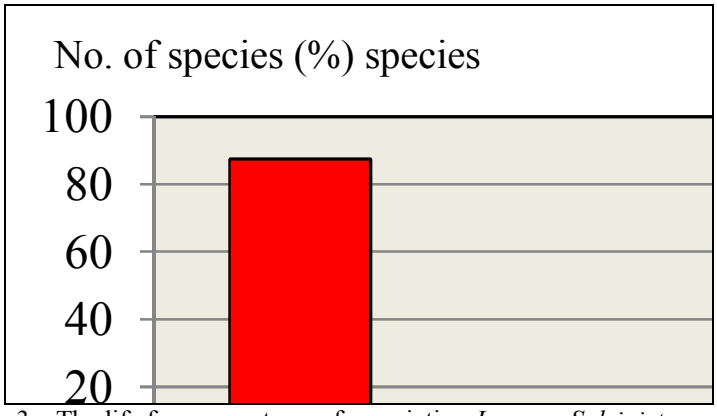

Fig. 3 – The life forms spectrum of association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, where: Hh – helohydatophyte, H – hemicrypthopyte, G – geophytes.

The spectrum of the floristic elements (Fig. 4) is dominated by the Cosmopolite species (Cosm = 37,5%), followed by Eurasian species (Eua = 25%) and Eurasian including mediterranian species (Eua(M) = 18,75%).

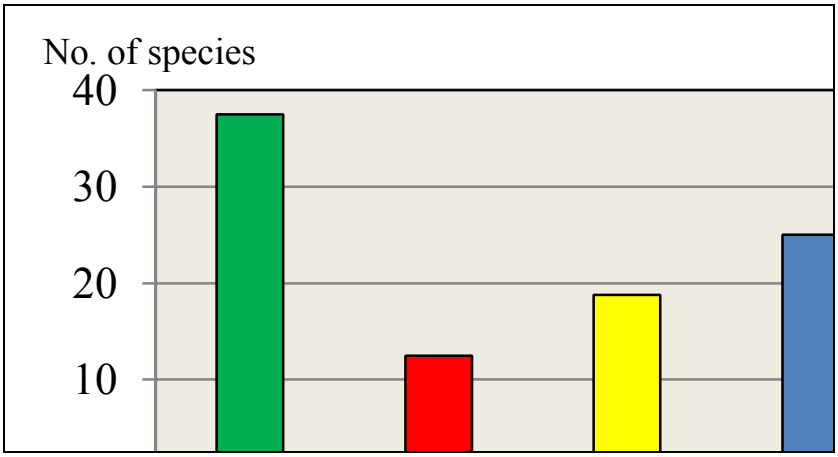

Fig. 4 – Spectrum of floristic elements of the association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, where: Cosm – Cosmopolitan; Cp - Circumpolar; E – European; M – Mediterranian; Eua – Eurasian.

The polyploid species are dominant in the karyotype spectrum (Fig. 5) with a percentage of 56,25%, followed by the diploid species with a percentage of 37,5% and the diplo-polyploid species with 6,25%.

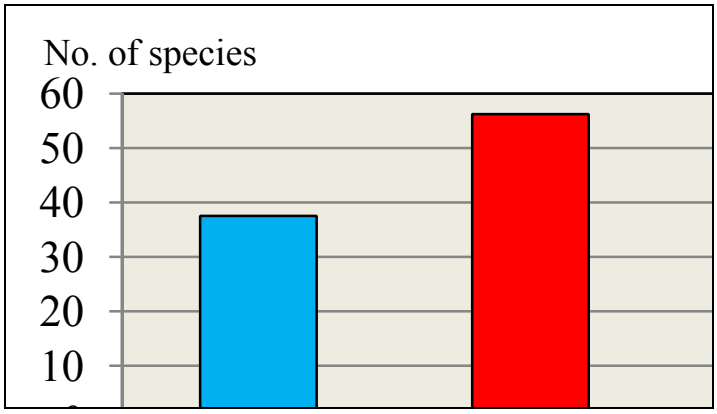

Fig. 5 – The karyotype spectrum of association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, where: D - diploidy; P – polyploidy; D-P – diplo-polyploidy.

CONCLUSIONS

The installation and development of this kind of hydrophytic phytocoenose is favorised by stagnant waters (drainages, pools, ponds) with good mineral trophicity and a weak alkaline to moderately alkaline chemical reaction.

The analysis results of the five surveys realised for the association *Lemno - Salvinietum natantis* Miyavaki et. Tüxen 1960, in that concerning the bioforms, floristic elements and ecological indices, shows that our results are according with specialty literature and the floristic and phytocoenological composition of this association is varied.

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