PHYTOCOENOLOGICAL STUDY REGARDING THE AQUATIC VEGETATION IN THE INFERIOR BASIN OF CRIŞUL NEGRU RIVER (BIHOR COUNTY, ROMANIA) *Lemno-Hydrocharitetum* (Oberdorfer) 1957 Passarge 1978

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Abstract

This work represents a phytocoenological study of the hydrophytic association Lemno-Hydrocharitetum (Oberdorfer) 1957 Passarge 1978, association classified from the coenotaxonomic point of view in the class Lemnetea O. de Bolós et Masclans 1955.

In the association table, a number of 5 land surveys have been recorded and analyzed, described from Homorog fishery, a drainage near Salonta locality and in a storage basin near Ianoşda village, in the meadowlands from the inferior basin of Crişul Negru river, all located in Bihor county, Romania.

Lemno-Hydrocharitetum (Oberdorfer) 1957 Passarge 1978 association was analyzed in terms of floristic composition, life forms spectrum, floristic elements spectrum, ecological indices and karyotype.

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

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). It 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).

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-Hydrocharitetum* association *(Oberdorfer) 1957 Passarge 1978* was classified in the following coenosystem:

Class: *Lemnetea* O. de Bolós et Masclans 1955
Order: *Hydrocharietalia* Rübel 1933
Alliance: *Hydrocharition* Rübel 1933

The study of *Lemno-Hydrocharitetum* association was made taking into consideration the phytosociological research method of the European Central School, based on the principles and methods elaborated by Tüxen R. (1955), 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 taxa identified in the field have been recognized 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).

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-Hydrocharitetum* association *(Oberdorfer) 1957 Passarge 1978* (*Fig. 1*) reveals that the composition includes thirty varied species (*Table1*).

Table 1

Lemno-Hydrocharitetum (Oberdorfer) 1957 Passarge 1978

L.f.	F.e.	U	T	S.r.	2n	No. Land Surveys	1	2	3	4	5	K	ADm
						Altitude (m.s.m.)	94	94	106	106	120		
						Area (m²)	4	10	4	8	6		
						The coverage of grass layer (%)	85	100	90	75	90		
Hh	Eua	6	3,5	3,5	P	As. *Hydrocharis morsus-ranae*	4	5	4	3	4	V	62,5
Hh	Cosm	6	0	0	P	As. *Lemna minor*	1	+	2	2	2	V	12,5
						Hydrocharition, Hydrocharietalia, Lemnetea							
Hh	Cosm	6	3	0	D	*Ceratophyllum demersum*	+	+	.	+	+	IV	0,4
Hh	Eua(M)	6	3,5	0	D,P	*Ceratophyllum submersum*	+	+	.	+	+	IV	0,4
Hh	Eua	6	4	4	D	*Stratiotes aloides*	+	.	+	.	+	III	0,3
Hh	Eua	6	3	3	D	*Salvinia natans*	.	+	+	.	+	III	0,3
Hh	Cosm	6	3,5	4	P	*Lemna gibba*	.	+	+	+	.	III	0,3
Hh	Cosm	6	3,5	0	P	*Spirodela polyrhiza*	.	+	+	.	+	III	0,3
						Potamogetonetea pectinati							
Hh	Cp-Bo	6	3,5	4	P	*Potamogeton nodosus*	1	+	+	.	+	IV	1,3
Hh	Cosm	6	3,5	4	P	*Potamogeton crispus*	+	+	.	+	+	IV	0,4
Hh	Cp-Bo	6	0	4,5	P	*Myriophyllum spicatum*	+	.	+	+	+	IV	0,4
Hh	Cosm	6	3	4,5	P	*Potamogeton pectinatus*	+	.	+	1	.	III	1,2
Hh	Eua	6	4,5	4,5	P	*Najas minor*	.	+	+	.	+	III	0,3
Hh	Cosm	6	2,5	4	P	*Potamogeton natans*	+	.	+	.	+	III	0,3
						Phragmitetea australis							
Hh	Eua	5,5	3,5	0	D	*Sparganium erectum* ssp. *neglectum*	+	.	+	+	+	IV	0,4
H(G)	Cp-Bo	4	3	4	P	*Stachys palustris*	+	.	+	+	+	IV	0,4
Hh	Cosm	6	0	0	D	*Alisma plantago-aquatica*	+	+	.	+	+	IV	0,4
Hh	Eua	6	3	0	D	*Oenanthe aquatica*	+	+	.	1	+	IV	1,3
Hh-H	Cosm	5	3	0	P	*Glyceria fluitans*	+	.	+	+	+	IV	0,4

Hh	Eua	5	3	0	P	*Myosotis scorpioides*	+	+	.	+	+	IV	0,4

Table 1 (continuance)

Hh-G	Eua	5	3	0	P	*Carex gracilis*	+	+	.	+	+	IV	0,4
Hh-G	Cosm	6	3	4	P	*Schoenoplectus lacustris*	+	.	+	+	.	III	0,3
G-Hh	E	5,5	0	0	P	*Iris pseudacorus*	+	.	+	+	.	III	0,3
Hh	Eua(M)	6	3	0	D,P	*Butomus umbellatus*	+	.	.	+	+	III	0,3
H-Hh	Cosm	4	3	0	P	*Lythrum salicaria*	.	+	+	.	+	III	0,3
H-Hh	Cp-Bo	5	0	4	D,P	*Veronica anagallis-aquatica*	+	.	+	+	.	III	0,3
						Variae Syntaxa							
H	Cp	5	3	5	D	*Alopecurus aequalis*	.	+	+	.	+	III	0,3
Th	Cosm	5,5	0	0	P	*Eleocharis acicularis*	+	.	+	+	.	III	0,3
G-Hh	Cp-Bo	5,5	0	0	P	*Polygonum hydropiper*	+	.	+	+	.	III	0,3
Th	Eua(M)	4,5	3	4	D	*Rumex aquaticus*	+	.	.	+	.	II	0,2

Place and date of surveys: 1 – 2 Drainage near Salonta (Bihor county) 29.06.2010; 3 – 4 Homorog fishery (Bihor county) 18.06.2011; 5 – Storage basin near Ianoşda village (Bihor county) 18.06.2011.

The phytocoenosis is dominated by *Hydrocharis morsus-ranae,* that realizes a vegetation covering of 62,5%, with a high constancy (V), and is accompanied by the characteristic species of the *Hydrocharition* alliance, *Hydrocharietalia* order, *Lemnetea* class, namely: *Ceratophyllum demersum, Ceratophyllum submersum, also* with a high constancy (IV), *Stratiotes aloides, Salvinia natans, Lemna gibba and Spirodela polyrhiza* with a constancy of III in the frame of association.

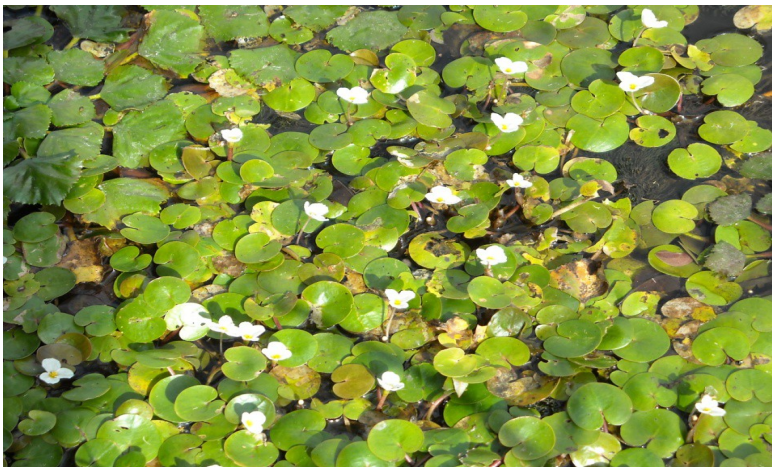

Fig. 1 – Association *Lemno-Hydrocharitetum* (Oberdorfer) 1957 Passarge 1978, storage basin, Ianoşda village, Bihor county.

The *Lemno-Hydrocharitetum* association table notifies the presence of transgressive species from *Potamogetonetea pectinati* class, from which we mention - *Potamogeton nodosus*, *Potamogeton crispus*, *Myriophyllum spicatum*, *Najas minor,* and transgressive species from *Phragmitetea australis* class, from which we mention - *Oenanthe aquatica*, *Myosotis scorpioides*, *Carex gracilis*, *Veronica anagallis-aquatica, Alisma plantago-aquatica*.

The analysis of the association on the aspect of the main ecological indices (*Fig. 2*) emphasize the dominant hydrophytic character (60%, U_6 = 18 species), followed by the hydrophilic character (30%, $U_{5-5,5}$ = 9 species). Depending to the temperature, the association has a micro-mesotherm character (66,66%, $T_{3-3,5}$ = 20 species), followed by thermic amphitolerant (23,33%, T_0 = 7 species). Considering the chemical reaction of the soil, it manifests a chemical amphitolerant character (50%, R_0 = 15 species), along with a slightly acid-neutrophile character (40%, $R_{4-4,5}$ = 12 species).

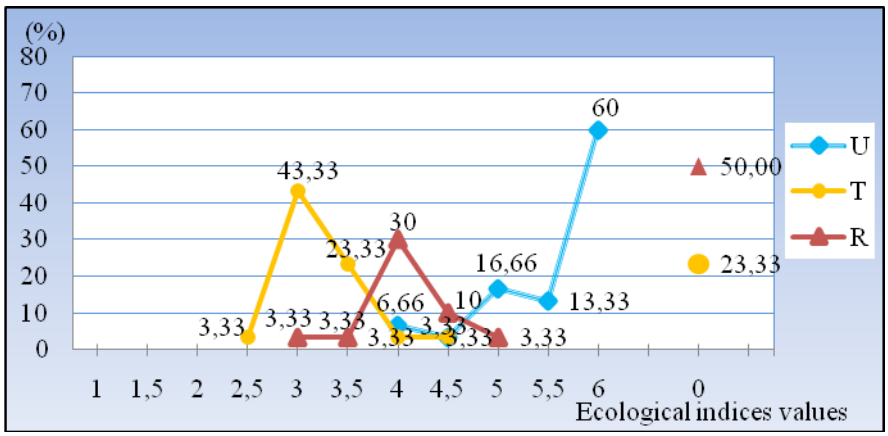

Fig. 2 – Diagram of ecological factors for the association *Lemno-Hydrocharitetum*, where: U – humidity, T – temperature, R – the chemical reaction of the soil.

The life forms spectrum (*Fig. 3*) is dominated by helohydatophytes (73,33%, Hh = 22 species), followed by hemicrypthopyte (13,33%, H = 4 species).

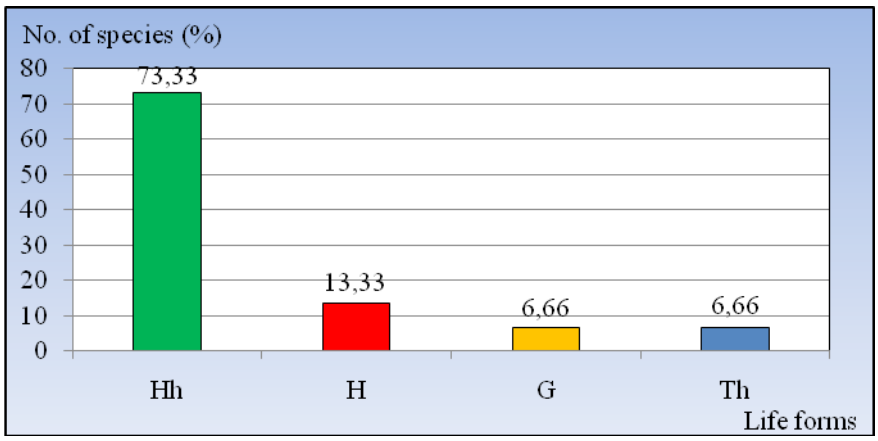

Fig. 3 – The life forms spectrum of association *Lemno-Hydrocharitetum*, where: Hh – helohydatophyte, H – hemicrypthopyte, G – geophyte, Th – annual therophyte.

The spectrum of the floristic elements (*Fig. 4*) is dominated by the cosmopolite species (Cosm = 40%), followed by eurasian species (Eua = 36,66%) and circumpolar species (Cp = 20%).

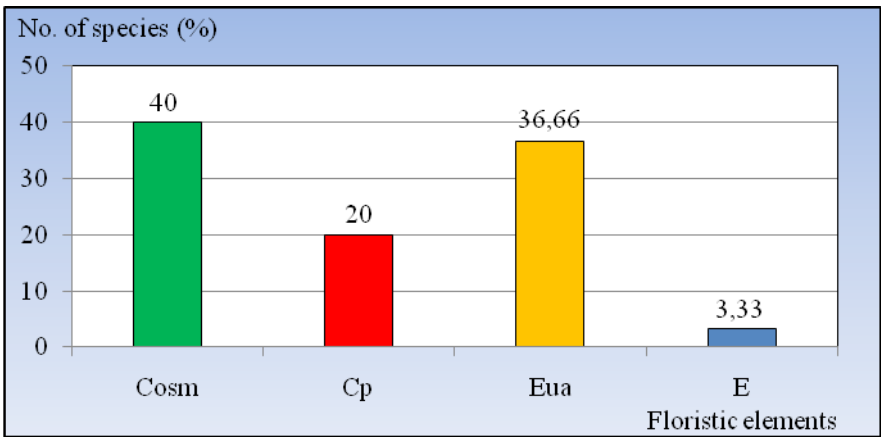

Fig. 4 – Floristic elements spectrum of the association *Lemno-Hydrocharitetum*, where: Cosm – Cosmopolitan, Cp – Circumpolar, Eua – Eurasian, E – European.

The polyploid species are dominant in the karyotype spectrum (*Fig. 5*) with a percentage of 63,33%, followed by the diploid species with a percentage of 26,66% and the diplo-polyploid species with 10%.

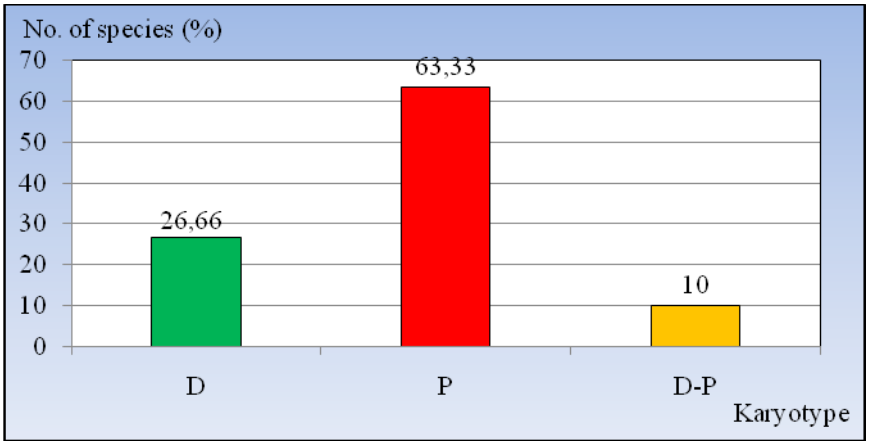

Fig. 5 – The karyotype spectrum of association *Lemno-Hydrocharitetum*, where: D – diploidy, P – polyploidy, D-P – diplo-polyploidy.

CONCLUSIONS

Lemno-Hydrocharitetum is a widespread and stable association, its phytocoenosis develop in deep waters (0,5-2 m) of lakes, ponds and marshes. The installation and development of this kind of hydrophytic phytocoenose is favored by stagnant waters with a slightly acidic chemical reaction, neutral to moderately alkaline.

The analysis results of the five surveys realized for the association *Lemno-Hydrocharitetum* notify the presence of rare and vulnerable species

like, *Stratiotes aloides, Salvinia natans, Najas minor, Oenanthe aquatica,* and 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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