**Analele Universităţii din Oradea, Fascicula: Ecotoxicologie, Zootehnie şi Tehnologii de Industrie Alimntară, Vol. XIV B, 2015**

# STUDY REGARDING THE PALUDAL VEGETATION FROM THE MIDDLE BASIN OF CRISUL NEGRU RIVER

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***Abstract***

*This paper presents the paludal association Eleocharitetum palustris Schennikov 1919, on the grasslands from the middle basin of Crişul Negru River, which is classified from the coenotaxonomic point of view in the alliance Oenanthion aquaticae Hejný ex Neuhäusl 1959, order Oenanthetalia aquaticae Hejný in Kopecký 1961 ex Hejný 1965, class Phragmitetea australis R. Tüxen et Preising 1942.*

*In the studied region, the phytocoenosis of Eleocharitetum palustris association are stationed on the outskirts of lakes, ponds and marshes, located in the grasslands near Cărăsău, Olcea, Râpa, Tinca and Belfir localities.*

*Eleocharitetum palustris association was analyzed in terms of floristic composition, life forms, floristic elements, ecological indices and karyotype.*

**Key words:** phytocoenoses, paludal vegetation, ecological indices, floristic elements, life forms.

## INTRODUCTION

This association was mentioned in our country from Dobrogea (Ştefan et al., 1995); Muntenia (Nedelcu, 1972; Nedelcu, 1973; Popescu et al., 1971, 1984; Dihoru, 1975; Sanda et al., 1977; Ştefan, 1980); Oltenia (Raclaru et Alexan, 1973); Moldova (Mititelu, 1973; Lupaşcu, 1999; Chifu et al., 2006); Transilvania (Cristea 1981; Pop et al., 1983; Drăgulescu, 1995); Banat (Grigore, 1971; Dihoru et al., 1973); Maramures (Gergely et al., 1977; Gergely, Raţiu, 1980); Crisana (Burescu, 2003). In Hungary, it was mentioned nearby Tisza River (Borhidi, 2003).

This study aims to analyze the phytocoenoses of the association *Eleocharitetum palustris* Schennikov 1919 in terms of floristic composition and by analyzing the floristic elements spectrum, the life forms spectrum, the karyotype spectrum and the ecological factors.

Type of habitat: Meso-hygrophile Danubian Communities with *Eleocharis palustris*, code R5302 (Donită et al., 2006).

## MATERIAL AND METHODS

The middle basin of Crişul Negru River is located in North Western Romania. From the climate perspective (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 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, gley soil and pseudogley, salty soils).

In order to perform the research on the grasslands from the middle basin of Crişul Negru River, we made numerous field trips to capture the development of the paludal vegetation.

On taking into consideration several papers in the specialty literature (Tüxen, 1955; Braun-Blanquet, 1964; Borza et Boşcaiu, 1965; Mucina, 1997; Borhidi, 2003; Sanda et al., 2008), *Eleocharitetum palustris* Schennikov 1919 association is classified, from the coenotaxonomic point of view, as following:

Class: ***Phragmitetea australis*** R. Tüxen et Preising 1942

Order: ***Oenanthetalia aquaticae*** Hejný in Kopecký 1961 ex Hejný 1965

Alliance: ***Oenanthion aquaticae*** Hejný ex Neuhäusl 1959

The study of *Eleocharitetum palustris* Schennikov 1919 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 et 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 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 ($m^2$), 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 region, the phytocoenosis of *Eleocharitetum palustris* Schennikov 1919 association (*Fig. 1*) are stationed on the outskirts of lakes, ponds and marshes, located in the grasslands near Cărăsău, Olcea, Râpa, Tinca and Belfir localities.

Phytocoenosis of this association occupies surfaces between 8-20 $m^2$, where the soil presents high moisture content, and the water level is not too high, between 20-25 cm.

*Fig. 1 –* ***Eleocharitetum palustris*** *Schennikov 1919, Olcea locality, Bihor County.*

Physiognomy of the analyzed association, is given by *Eleocharis palustris*, dominant and characteristic species, with an overall coverage of 75% ADm and maximum constancy (K=V).

Together with the enlightening species, in the analyzed phytocoenosis were identified a series of hygrophilous and hydrophilic species, which

subordinate the association to the ***Oenanthion aquaticae*** alliance, ***Oenanthetalia aquaticae*** order and ***Phragmitetea australis*** class: *Rorippa amphibia, Sagittaria sagittifolia*, *Mentha aquatica*, *Lycopus europaeus*, *Stachys palustris*, *Glyceria fluitans*, etc. (*Table1*).

Being an association that makes the transition from the paludal vegetation to the vegetation of mesophilic meadows, within phytocoenoses there are species with wider variety concerning their moisture requirements, from ***Molinio-Arrhenatheretea*** class: *Juncus effusus*, *Epilobium palustre*, *Mentha longifolia*, *Prunella vulgaris*, *Juncus articulatus*, etc. and from ***Bidentetea tripartiti*** class: *Bidens tripartita*, *Rorippa austriaca*, *Echinochloa crus-galli*, *Polygonum hydropiper*.

*Table 1*

***Eleocharitetum palustris*** Schennikov 1919

| L.f. | F.e. | U | T | S.r. | 2n | No. Land Surveys | 1 | 2 | 3 | 4 | 5 | 6 | K | ADm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Altitude (m.s.m.) | 155 | 155 | 184 | 120 | 110 | 116 | | |
| | | | | | | Area (m²) | 10 | 8 | 12 | 20 | 10 | 12 | | |
| | | | | | | The coverage of grass layer (%) | 95 | 80 | 90 | 95 | 95 | 95 | | |
| G-Hh | Cosm | 5 | 0 | 4 | D,P | As. *Eleocharis palustris* | 5 | 4 | 4 | 5 | 4 | 5 | V | 75 |
| | | | | | | ***Oenanthion aquaticae, Oenanthetalia aquaticae, Phragmitetea australis*** | | | | | | | | |
| Hh | Eua(M) | 6 | 3 | 4 | D,P | *Rorippa amphibia* | . | 1 | + | + | 1 | + | V | 1,91 |
| Hh | Eua(M) | 6 | 3 | 4 | D | *Sagittaria sagittifolia* | + | . | + | + | + | + | V | 0,41 |
| Hh-H | Eua | 5 | 3 | 0 | P | *Mentha aquatica* | + | + | + | + | . | + | V | 0,41 |
| Hh | Eua | 5 | 3 | 0 | D | *Lycopus europaeus* | . | + | 2 | + | + | + | V | 3,25 |
| H(G) | Cp | 4 | 3 | 4 | P | *Stachys palustris* | + | . | + | . | 1 | + | IV | 1,08 |
| Hh | Cosm | 5 | 3 | 0 | P | *Glyceria fluitans* | + | + | . | + | + | . | IV | 0,33 |
| H-Hh | Cp | 5 | 0 | 4 | D,P | *Veronica anagallis-aquatica* | . | + | + | . | + | + | IV | 0,33 |
| Hh | Cosm | 6 | 0 | 0 | D | *Alisma plantago-aquatica* | . | + | . | + | 1 | . | III | 1 |
| Hh | Eua | 6 | 0 | 4 | D | *Alisma lanceolatum* | + | . | . | + | + | . | III | 0,25 |
| | | | | | | ***Molinio-Arrhenatheretea*** | | | | | | | | |
| H | Cp-Bo | 5 | 0 | 2 | P | *Epilobium palustre* | . | + | + | + | + | + | V | 0,41 |
| H(G) | Eua(M) | 4,5 | 3 | 0 | P | *Mentha longifolia* | + | + | + | + | . | + | V | 0,41 |
| H | Cp-Bo | 3 | 3 | 0 | P | *Prunella vulgaris* | + | + | + | + | . | + | V | 0,41 |
| H | Cosm | 4,5 | 3 | 3 | P | *Juncus effusus* | . | + | + | + | + | + | V | 0,41 |
| H | Cp | 5 | 2 | 0 | P | *Juncus articulatus* | + | + | + | + | + | . | V | 0,41 |
| H | Eua | 3,5 | 0 | 0 | P | *Trifolium repens* | + | + | + | + | 1 | + | V | 1,25 |
| H | Eua(M) | 3,5 | 0 | 0 | D | *Ranunculus acris* | + | + | + | . | + | + | V | 0,41 |
| H | Cp-Bo | 4 | 0 | 0 | P | *Agrostis stolonifera* | + | . | + | . | + | + | IV | 0,33 |
| G | E | 0 | 3 | 0 | P | *Carex hirta* | . | 1 | . | + | 1 | + | IV | 1,83 |
| | | | | | | ***Bidentetea tripartiti*** | | | | | | | | |
| Th | Eua | 4,5 | 3 | 0 | P | *Bidens tripartita* | + | + | + | + | . | + | V | 0,41 |
| H-G | Ec | 4 | 3,5 | 4 | D | *Rorippa austriaca* | + | + | + | + | + | . | V | 0,41 |
| Th | Cosm | 4 | 0 | 3 | P | *Echinochloa crus-galli* | + | + | + | + | . | + | V | 0,41 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G-Hh | Cp-Bo | 5,5 | 0 | 0 | P | *Polygonum hydropiper* | + | + | + | . | + | + | V | 0,41 |

**Place and date of surveys:** 1 – 2 Cărăsău locality (Bihor County) 16.06.2013; 3 – Olcea locality (Bihor County) 02.07.2013; 3 – Râpa locality (Bihor County) 16.06.2013; 5 – Tinca locality (Bihor County) 05.07.2012; 5 – Belfir locality (Bihor County) 08.07.2013.

The life forms spectrum for the *Eleocharitetum palustris* association (*Fig. 2*), is dominated by hemicryptophytes (47,82%), followed by helohydatophytes (30,43%) and geophytes (13,04%).

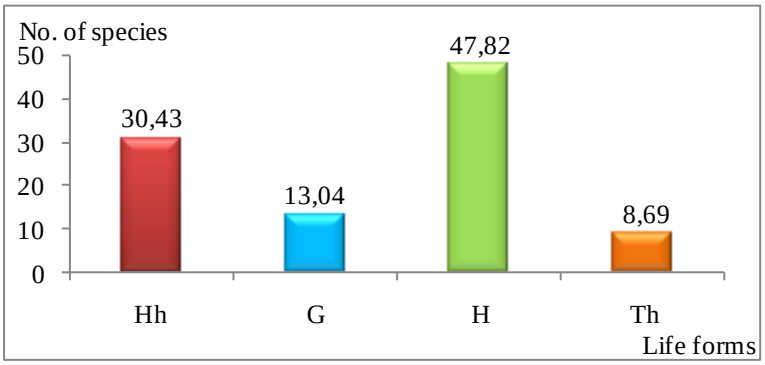


*Fig. 2 – The life forms spectrum of* ***Eleocharitetum palustris*** *association, where: Hh – helohydatophyte, G – geophyte, H – hemicryptophyte, Th – annual therophyte.*

Diagram of ecological indices (*Fig. 3*) illustrates that, in terms of humidity requirements, the hygrophilous species have a higher share (34,77%), followed by meso-hygrophilous species (30,43%). Depending on the temperature the higher share belongs to micro-mesothermal species (52,16%), followed by the thermal amphitolerant species (43,47%). The chemical reaction of the soil favors the development of amphitolerant species (56,52%), followed by slightly acid-neutrophile species (30,43%).

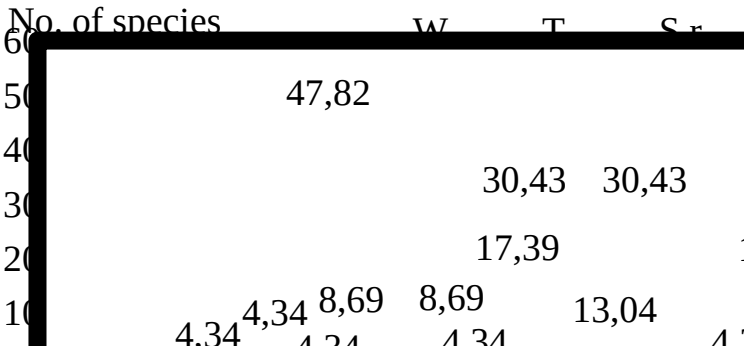


*Fig. 3 – Diagram of ecological indices for the* ***Eleocharitetum palustris*** *association, where: W – soil wet, T – temperature, S.r. – chemical reaction of the soil.*

The spectrum of the floristic elements (*Fig. 4*) shows the preponderance of the Eurasian species (39,13%), followed by Circumpolar species (30,43%) and the Cosmopolitan species (21,73%).

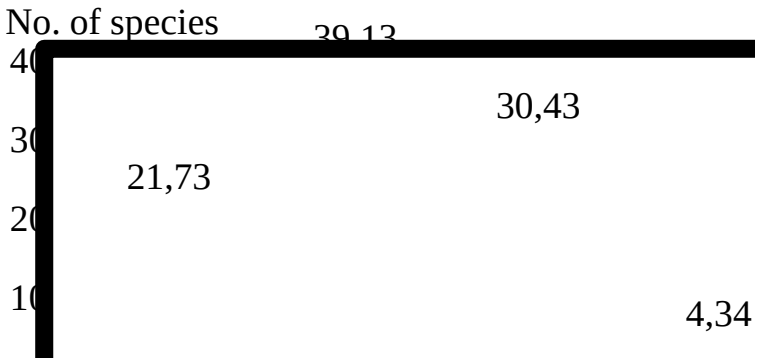


*Fig. 4 – Floristic elements spectrum of the **Eleocharitetum palustris** association, where: Cosm – Cosmopolitan, Eua – Eurasian, Cp – Circumpolar, E – European, Ec – Central European.*

The karyotype spectrum (*Fig. 5*) certifies the dominance of polyploid species (60,86%), followed by the diploid species (26,08%) and the diplo-polyploid species (13,04%). The diploidy index has the value of 0,42.

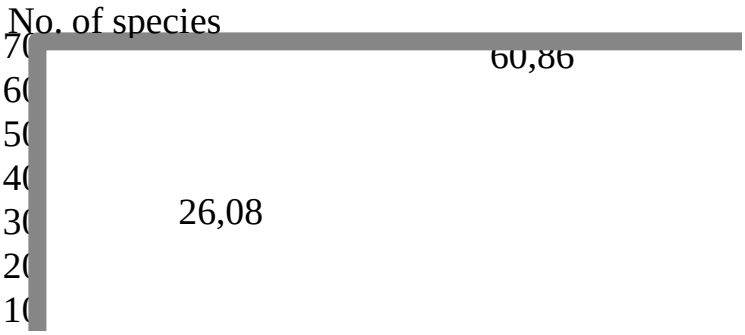


*Fig. 5 – The karyotype spectrum of **Eleocharitetum palustris** association, where: D – diploidy, P – polyploidy, D,P – diplo-polyploidy.*

**CONCLUSIONS**

The life forms analysis highlights the percentage of hemicryptophytes (47,82%), the high percentage indicates that the researched zone belongs to the temperate climate regions, followed by helohydatophytes (30,43%),

which are closely related to the existence of lakes, sewers, swamps and marshes.

In relation to the humidity factor, hygrophilous species have a higher share (34,77%), which develops under high humidity, inhabiting the sewers under warping and edges of ponds. Regarding the temperature factor, the higher share belongs to micro-mesothermal species (52,16%), which characterizes the microclimate of the low and high plain of the studied territory. The chemical reaction of the soil favors the development of amphitolerant species (56,52%), followed by slightly acid-neutrophile species (30,43%), expressing full compliance with the soil types and favors floral diversity.

The floristic elements stock is dominated by Eurasian species (39,13%), with the genesis in ancient times, over which interfered in different phyto-historical periods the Circumpolar elements (30,43%), which are characteristic for a breezy and damp climate, and Cosmopolitan species (21,73%) with a wide geographic spread.

The karyotype spectrum illustrates the dominance of polyploid species (60,86%), which are easily adaptable and indicates the zoo-anthropic pressure in the last decades, followed by the diploid species (26,08%) which provide favorable genetic potential for the future phyto-evolution.

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