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Contributions to the paludal vegetation study from the Vaslui river basin

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Abstract. The paper presents four paludal associations in the Vaslui river basin: *Caricetum elatae* Koch 1926, *Caricetum vulpinae* Soó 1927, *Bolboschoenetum maritimi* Eggler 1933 and *Schoenoplectetum tabernaemontani* Soó 1947, association classified from the coenotaxonomic point of view in the class *Phragmiti – Magnocaricetea* Klika in Klika et Novák 1941. Each association is accompanied by a phytosociological table and an analysis of the bioforms, floristic elements and ecological indices.
Key Words: Phytosociology, paludal vegetation, bioforms, floristic elements, ecological indices.

Rezumat. Lucrarea prezintă patru asociaţii palustre din bazinul râului Vaslui: *Caricetum elatae* Koch 1926, *Caricetum vulpinae* Soó 1927, *Bolboschoenetum maritimi* Eggler 1933 şi *Schoenoplectetum tabernaemontani* Soó 1947, asociaţii care se încadrează din punct de vedere cenotaxonomic în clasa *Phragmiti – Magnocaricetea* Klika in Klika et Novák 1941. Fiecare asociaţie este însoţită de un tabel fitosociologic şi analiza bioformelor, elementelor floristice şi a indicilor ecologici.
Cuvinte cheie: Fitosociologie, vegetaţie palustră, bioforme, elemente floristice, indici ecologici.

Introduction.The Vaslui river basin is located between Iaşi in the North and Vaslui in the South, in the central area of the Moldavian Plateau.

On taking into consideration several papers in the specialty literature (Balátová-Tulácková et al 1993; Mucina 1997; Sanda et al 2001; Chifu et al 2006), the four vegetal associations were classified in the following coenosystem:

PHRAGMITI – MAGNOCARICETEA Klika in Klika et Novák 1941
MAGNOCARICETALIA ELATAE Pignatti 1953
MAGNOCARICION ELATAE Koch 1926
CARICENION ROSTRATAE (Bálátová-Tuláčková 1963) Oberd. et al 1967
Caricetum elatae Koch 1926

CARICENION GRACILIS (Neuhäusl 1959) Oberd. et al 1967
Caricetum vulpinae Soó 1927

BOLBOSCHOENETALIA MARITIMI Eggler 1933
CIRSIO BRACHYCEPHALI – BOLBOSCHOENION (Passarge 1978) Mucina in Grabherr & Mucina 1993

Bolboschoenetum maritimi Eggler 1933
Schoenoplectetum tabernaemontani Soó 1947

Material and Method. For the identification of plant associations, we used phytosociological research methods according to the Central-European school. The establishment of the bioforms and floristic elements was made on the basis of "Illustrated flora of Romania – Pteridophyta et Spermatophyta", by V. Ciocârlan (2000) and "Flora of

Romania – Illustrated book of vascular plants", by A. Beldie (1977). The ecological indices we noted having in mind the works of Ellenberg (1974).

Results and Discussion

Ass. ***Caricetum elatae*** Koch 1926

This association is easily recognised due to the fact it form compact and protruding shrubs, nipple-shaped, partial emersed that grows on peat-gleic soils with excessive humidity. The association has been found in Poeniţa lake.

The association *Caricetum elatae* has been recorded by Dobrescu (1978).

The characteristic and dominant species of association is *Carex elata*, besides there are the species in the superior coenotaxons (see Table 1).

Table 1

Ass. ***Caricetum elatae*** Koch 1926

Number of survey	1	2	3	4	5	
Altitude (m)	290	290	290	290	290	
Cover of the vegetation (%)	40	50	50	40	45	
Surface of survey (m²)	50	25	50	30	50	
Number of species	9	6	12	5	12	K
Association's characteristics						
Carex elata	3	3	3	3	3	V
Caricenion rostratae, Magnocaricion et Magnocaricetalia						
Scutellaria galericulata	+	+	-	-	+	III
Galium palustre	-	-	+	+	+	III
Lythrum salicaria	+	-	-	+	-	II
Carex riparia	-	+	-	-	-	I
Lysimachia vulgaris	-	-	-	+	-	I
Nasturtio-Glycerietalia						
Epilobium hirsutum	+	-	-	-	+	II
Phragmitetalia et Phragmiti-Magnocaricetea						
Phragmites australis	+	+	-	+	-	III
Alisma plantago-lanceolata	-	+	+	-	+	III
Lycopus europaeus	+	-	+	-	+	III
Typha angustifolia	+	-	-	-	+	II
Alisma lanceolatum	-	-	-	-	+	I
Mentha aquatica	-	-	+	-	-	I
Typha latifolia	-	-	+	-	-	I
Eleocharis palustris	-	-	-	-	+	I
Lemnetea						
Utricularia vulgaris	+	+	1	-	-	III
Lemna minor	-	1	-	-	-	I
Variae syntaxa						
Calamagrostis canescens	+	-	+	-	+	III
Salix cinerea	-	-	+	-	+	II
Agrostis stolonifera	-	-	-	+	1	II
Polygonum minus	-	-	+	-	-	I
Daucus carota	-	-	+	-	-	I
Dactylis glomerata	-	-	+	-	-	I

Place and date of the surveys: 1-5. Poeniţa Lake, 10.08.2004

Because of they form compact shrubs, the remaining spaces between them are occupied by some hydrophilic associations from which there are some different species diffused in *Caricetum elatae*.

After the analysis of the surveys undertaken, the following was noticed:

- the **spectrum of bioforms** it is noticed the predominance of the hemicryptophytes (50.02%) and geophytes (20.84%). Apart from them, there also hydrohelophytes (8.33%), hydrophytes (8.33%), terrophytes (4.16%), fanerophytes (4.16%) and hemiterrophytes (4.16%);

- the **spectrum of floristic elements** reveals the dominance of the Eurasian elements (33.33%) and circumpolar (33.33%), followed by the cosmopolite ones (20.83%) and European (12.51%);

- the **spectrum of ecological indices** shows us the predominance of heliophilous species (56.52%), amphitolerant to temperature (43.48%), with spreading area in Central Europe (39.13%), hydrophilic (34.78%), amphitolerant to the reaction of the soil (56.53%) and develop on soil with a low content of mineral nitrogen (30.43%).

Ass. ***Caricetum vulpinae*** Soó 1927

The association was encountered on flat land, as insular, with varying humidity, that presents drying trend during the summer. The association has been found between Protopopeşti and Tăcuta, in Vaslui, Dobrovăţ, Codăeşti and Bereasa.

Table 2

Ass. ***Caricetum vulpinae*** Soó 1927

Number of survey	*1*	*2*	*3*	*4*	*5*	*6*	*K*
Altitude (m)	350	94	194	310	310	320	
Cover of the vegetation (%)	90	95	100	85	80	90	
Surface of survey (m²)	15	10	10	20	20	10	
Number of species	9	10	7	8	9	6	
Association's characteristics							
Carex vulpina	5	4	5	4	4	5	V
Caricenion gracilis, Magnocaricion et Magnocaricetalia							
Lythrum salicaria	+	-	-	+	+	-	III
Ranunculus repens	+	-	-	-	+	-	II
Poa palustris	-	+	-	-	+	-	II
Mentha aquatica	-	-	+	-	-	+	II
Bolboschoenetalia							
Schoenoplectus tabernaemontani	-	+	-	-	-	-	I
Phragmitetalia et Phragmiti-Magnocaricetea							
Alisma plantago-aquatica	-	1	-	-	+	-	II
Typha latifolia	-	+	-	-	-	-	I
Glyceria notata	-	-	-	+	-	-	I
Bidentetea							
Mentha longifolia	+	-	+	-	-	-	II
Ranunculus sceleratus	+	-	-	+	-	-	II
Bidens tripartita	-	2	1	-	-	-	II
Echinochloa crus-galli	-	+	-	-	-	+	II
Bidens cernua	-	+	-	-	-	-	I
Polygonum hydropiper	-	+	-	-	-	-	I
Molinio-Arrhenatheretea							
Agrostis stolonifera	+	-	-	1	1	2	IV
Juncus inflexus	+	-	1	1	+	-	IV
Lotus corniculatus	+	-	-	+	-	-	II
Verbena officinalis	-	+	-	-	-	+	II
Mentha pulegium	+	-	-	-	-	-	I
Plantago major	-	+	-	-	-	-	I
Equisetum palustre	-	-	+	-	-	-	I
Ranunculus sardous	-	-	+	-	-	-	I
Carex distans	-	-	-	+	-	-	I

Place and date of the surveys: 1. Between Protopopeşti and Tăcuta, 11.06.2003; 2. Vaslui, 12.08.2003; 3. Dobrovăţ, 15.06.2003; 4,5. Codăeşti, 1.08.2003; 6. Bereasa, 1.08.2003

The association has been reported by C. Dobrescu (Dobrescu et al 1964) as being present in the Vaslui valley, but without giving specific locale, but specifying only a list of flora and by Mititelu (1975, 1995) without presenting a table of floristic surveys.

The characteristic and dominant species is *Carex vulpina* which is supporting the soil period drying, realizing a covering of 80-90%. The enlightened phytocoenoses by *Carex vulpine* switch to wet grassland meadow, so in addition to species of *Phragmiti-Magnocaricetea* class, *Bidentetea* class, appear and species of *Molinio-Arrhenatheretea* class (see Table 2).

After the analysis of the surveys undertaken, the following was noticed:

- the **spectrum of bioforms** reveals the predominance of the hemicryptophytes (60%), followed by terrophytes (24%), geophytes (12%) and hydrohelophytes (4%);
- the **spectrum of floristic elements** indicates the predominance of Eurasian elements (48%), followed by the circumpolar ones (36%), the cosmopolite (8%) and European (8%);
- the **spectrum of ecological indices** indicates the predominance of the species standing weakly the shadow (7-34.78%, 8-39.14%), mesothermal to amphitolerant species towards the temperature (5-34.78%, x-43.48%), with spreading area in Central Europe (30.44%), mesohydrophilic (7-21.74%, 8-21.74%) and develop on soils without preferences the reaction of reaction of the soil (52.17%) the trend toward neutrobasiphile (26.09%), rich in the mineral nitrogen (21.73%) or amphitolerant to the quantity of mineral nitrogen in the soil (21.74%).

Ass. ***Bolboschoenetum maritimi*** Eggler 1933

This association has been found in marshy places, eutrophic, with excess water in spring and dry, in summer and autumn, in Pribeşti, Satu Nou and between Vaslui and Moara Grecilor.

The association has been recorded in this area within a study by D. Mititelu (1975, 1995), but without presenting a table of floristic surveys.

The association consists of a few species, with the dominant species characteristic *Bolboschoenus maritimus* (see Table 3).

Even if the *Cirsio brachycephali – Bolboschoenion* alliance included phytocoenoses on soils low to moderate halophile, the floristic composition of the association identified by us meets any one species to indicate this.

After the analysis of the surveys undertaken, the following was noticed:

- the **spectrum of bioforms** indicates the presence of geophytes (40.91%), followed by hemicryptophytes (27.27%), terrophytes (22.72%), hydrophytes (4.55%) and hydrohelophytes (4.55%);
- the **spectrum of floristic elements** reveals the presence of Eurasian elements (36.36%), followed by cosmopolite ones (27.27%), circumpolar (13.63%), European (13.64%), Pontic (4.55%) and adventive (4.55%);
- the **spectrum of ecological indices** indicates the predominance of the species standing weakly the shadow (55.55%), amphitolerant to temperature (61.11%), hydrophilic (33.33%), amphitolerant to the reaction of the soil (55.55%) and develop on soil with a rich content of mineral nitrogen (7-27.77%, 8-22.23%).

Ass. ***Schoenoplectetum tabernaemontani*** Soó 1947

The association has been found in marshy places, whose soil is dry in summer, in Satu Nou and Vaslui.

The association has been recorded in this area within a study by D. Mititelu (1975), but without presenting a table of floristic surveys.

Beside the characteristic and enlightening species, *Schoenoplectus tabernaemontani*, we meet characteristic species of the alliance and order: *Bolboschoenus maritimus*, *Alisma plantago-aquatica*, *Lycopus europaeus* etc. (see Table 4).

Table 3

Ass. ***Bolboschoenetum maritimi*** Eggler 1933

Number of survey	*1*	*2*	*3*	*4*	*5*	*K*
Altitude (m)	160	160	94	280	280	
Cover of the vegetation (%)	70	75	80	85	85	
Surface of survey (m²)	10	10	10	10	10	
Number of species	7	8	6	8	5	
Association's characteristics						
Bolboschoenus maritimus	4	4	4	5	5	V
Cirsio brachycephali – Bolboschoenion et Bolboschoenetalia maritimi						
Schoenoplectus tabernaemontani	-	+	-	+	-	II
Phragmitetalia et Phragmiti-Magnocaricetea						
Phragmites australis	+	+	-	+	+	IV
Alisma plantago-aquatica	+	+	+	-	-	III
Typha latifolia	1	+	-	-	-	II
Lycopus europaeus	+	-	-	+	-	II
Eleocharis palustris	-	1	-	-	-	I
Carex melanostachya	-	-	+	-	-	I
Typha laxmannii	-	-	-	+	-	I
Veronica anagallis-aquatica	-	-	-	+	-	I
Bidentetea						
Rorippa austriaca	+	-	-	-	-	I
Potentilla reptans	-	+	-	-	-	I
Ranunculus sceleratus	-	-	+	-	-	I
Polygonum minus	-	-	2	-	-	I
Bidens tripartita	-	-	-	-	+	I
Lemnetea						
Lemna minor	-	-	-	-	+	I
Molinio-Arrhenatheretea						
Agrostis stolonifera	+	-	-	-	-	I
Trifolium repens	-	+	-	-	-	I
Variae syntaxa						
Ranunculus sardous	-	-	+	-	-	I
Cirsium arvense	-	-	-	+	-	I
Tussilago farfara	-	-	-	+	-	I
Echynocystis lobata	-	-	-	-	+	I

Place and date of the surveys: 1,2. Satu Nou, 25.08.2000; 3. between Vaslui and Moara Grecilor, 12.08.2003; 4,5. Pribeşti, 17.08.2002

After the analysis of the surveys undertaken, the following was noticed:

- the **spectrum of bioforms** shows the predominance of geophytes (46.67%), followed by hemicryptophytes (26.67%), terrophytes (20%) and hydrohelophytes (6.66%);
- the **spectrum of floristic elements** indicates the predominance of Eurasian elements (40%), followed by cosmopolite ones (33.33%), circumpolar (13.33%), European (6.67%) and SE European (6.67%);
- the **spectrum of ecological indices** indicates the predominance of the species standing weakly the shadow (53.84%), amphitolerant to temperature (38.46%), with spreading area in Central Europe (38.46%), hydrophilic (46.15%) amphitolerant to the reaction of the soil (69.24%) and develop on soil with a rich content of mineral nitrogen (7-30.76%, 8-30.76%).

Table 4

Ass. ***Schoenoplectetum tabernaemontani*** Soó 1947

Number of survey	*1*	*2*	*3*	*4*	*5*	*K*
Altitude (m)	160	94	94	94	94	
Cover of the vegetation (%)	70	75	70	70	80	
Surface of survey (m²)	10	10	10	10	10	
Number of species	4	8	5	6	9	
Association's characteristics						
Schoenoplectus tabernaemontani	4	4	4	4	5	V
Cirsio brachycephali – Bolboschoenion et Bolboschoenetalia maritimi						
Bolboschoenus maritimus	-	+	-	-	-	I
Phragmition, Phragmitetalia et Phragmiti-Magnocaricetea						
Lythrum salicaria	+	+	+	1	+	V
Alisma plantago-aquatica	1	+	+	+	-	IV
Lycopus europaeus	+	+	-	+	-	III
Carex vulpina	-	+	-	+	+	III
Eleocharis palustris	-	1	+	-	-	II
Typha laxmannii	-	+	-	-	-	I
Typha latifolia	-	-	-	+	-	I
Phragmites australis	-	-	-	-	+	I
Carex melanostachya	-	-	-	-	+	I
Bidentetea						
Bidens tripartita	-	-	1	-	-	I
Echinochloa crus-galli	-	-	-	-	+	I
Variae syntaxa						
Trifolium repens	-	-	-	-	+	I
Ranunculus sardous	-	-	-	-	+	I

Place and date of the surveys: 1. Satu Nou, 21.07.2001; 2-5. Vaslui, 15.08.2002

Conclusions. The floristic composition shows that these associations are poor in species. The spectrum of ecological indices reveals a predominance of species in need of a lot of light, mesothermal, with the distribution area in Central Europe, developing on humid to wet soils, neutral to the reaction of the soil and rich content of mineral nitrogen. The spectrum of bioforms indicates the predominance of the hemicryptophytes - H (in *Caricetum elatae* and *Caricetum vulpinae*) and the geophytes - G (in *Bolboschoenetum maritimi* and *Schoenoplectetum tabernaemontani*), specific plants in temperate climates and meadows regions, and also the thermal or hydric deficit during the year which provides the development of the species that belongs to these forms of life, to the detriment of hydrophilous and hydroheliophilous. The phytogeographical spectrum indicates the dominance of the Eurasian elements, choosingly for the temperate continental climates, denoted by the substantial predominance of the involved element.

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