

**CONTRIBUTIONS TO THE STUDY OF VEGETATION FROM THE
 DRANOV AND BELCIUG LAKES AREA
 (DANUBE DELTA BIOSPHERE RESERVE) II**

ȘTEFAN N. *, SÂRBU I. **, MÂNZU C. *

Resumé: The authors are presenting 21 associations from *Potamogetonetea pectinati* R.Tx. et Prsg. 1942, *Phragmitetea australis* R. Tx. et Prsg. 1942 and *Alnetea glutinosae* Br.-Bl. et Tx. ex Westhoff et al. 1946 Classes, identified in Dranov and Belciug Lakes area, in Danube Delta Biosphere Reserve.

Key words: Danube Delta Biosphere Reserve, Dranov Lake, Belciug Lake, aquatic vegetation, swampy vegetation, wooden vegetation.

Introduction

This paper continues presenting the 1996-2000 research results, done in Dranov Lake and Bleiciug Lake Area, from Danube Delta Biosphere Reserve.

About the 9 associations described in the previous paper [11], in the investigated area there were identified 21 more associations, 12 of them including aquatic phytocoenosis, 8 are included in swampy vegetation and 1 combines forestry phytocoenosis.

MATERIAL AND METHOD

Outlining the associations has been made using classic methods (Braun-Blanquet School), for describing of the associations being made phytocoenological tables on the characteristic, dominant and differential species. For making coenotaxonomical framing we used the works of Gh. Coldea et al. [8], V. Sanda et al. [2, 3, 4, 5].

RESULTS AND DISCUSSIONS

The 21 associations described in this paper can be included in the following coenosystem:

Potamogetonetea pectinati R. Tx. et Prsg. 1942

Potamogetonetalia pectinati Koch 1926

Potamogetion lucentis Rivas Martinez 1973

1. *Elodeetum canadensis* Eggler 1933; 2. *Ceratophyllo demersi* – *Elodeetum nuttallii* Ciocârlan et al. 1997; 3. *Najadetum marinae* (Oberd. 1957) Fukarek 1961; 4. *Potamogetonetum lucentis* Hueck 1931; 5. *Potamogetonetum trichoides* J. et R. Tx. in R.

* No. 20 A Carol I Bvd., „Al. I. Cuza” University of Iași, Faculty of Biology, Plant Biology Department

** No. 7-9 Dumbrava Roșie St., „Al. I. Cuza” University of Iași, „Anastase Fătu” Botanical Garden

Tx. 1965; 6. *Potamogetonum perfoliati* Koch 1926 em. Pass. 1964; 7. *Potamogetonum crispum* Soó 1927; 8. *Potamogetonum pectinati* Carsten 1955

Nymphaeion albae Oberd. 1957

9. *Nymphaeetum albo – candidae* Pass. 1957; 10. *Nymphaeetum albae* Vollmar 1947; 11. *Trapaetum natantis* V.Kárpáti 1963; 12. *Myriophyllo verticillati – Nupharetum luteae* Koch 1926

Phragmitetea australis R. Tx. et Prsg. 1942

Phragmitetalia Koch 1926

Phragmition Koch 1926

13. *Scirpo – Phragmitetum* Koch 1926; 14. *Thelypterido – Phragmitetum* Kuiper 1958; 15. *Typhetum angustifoliae* Pignatti 1953; 16. *Glycerietum maximae* Hueck 1931

Bolboschoenetalia maritimi Hejny in Holub et al. 1967

Cirsio brachycephali – Bolboschoenion (Pass. 1978) Mucina 1993

17. *Bolboschoenetum maritimi* Egger 1933

Oenanthetalia aquaticae Hejny ex Kopecky ex Hejny 1965

Oenanthion aquaticae Hejny ex Neuhäusl 1959

18. *Eleocharitetum palustris* Schennikov 1919; 19. *Oenantho – Rorippetum* Lohmeyer 1950

Magnocaricetalia Pignatti 1953

Magnocaricion elatae Koch 1926

20. *Caricetum elatae* Koch 1926

Alnetea glutinosae Br.-Bl. et Tx. ex Westhoff et al. 1946

Alnetalia glutinosae Tx. 1937

Alnion glutinosae Malcuit 1939

21. *Thelypteridi – Alnetum* Klica 1926

1. *Elodeetum canadensis* Egger 1933 (tab. 1 – I) – *Elodea canadensis*, the characteristic species is also the dominant one, having 70 – 90% coverage. This association's phytocoenosis are developing especially towards the riverbanks, at 70 – 85 cm depth. The phytocoenosis are relatively poor in species; at the surface of the water we can find also floating plants, which have no constant presence (*Potamogeton natans*, *Nuphar lutea*, *Lemna minor*, *Salvinia natans*, *Hydrocharis morsus-ranae*).

2. *Ceratophyllo demersi – Elodeetum nuttallii* Ciocârlan et al. 1997 (tab. 1 – II) – This associations has been described relatively recent (1), from the Rotund Lake area and also Cernovca River Island area. The phytocoenosis of this association are almost pure, with the dominance of *Elodea nuttallii*. From the submersed accompanying species *Ceratophyllum demersum*, *Potamogeton trichoides* are noticed. The presence of floating species (*Nuphar lutea*, *Trapa natans*, *Lemna minor*) is not strictly connected to the *Elodea nuttallii* communities. The association is developing in more eutrophic waters, with 95 – 130 cm depth.

3. *Najadetum marinae* (Oberd. 1957) Fukarek 1961 (tab. 1 – III) – The submerse phytocoenosis enlightened by *Najas marina* are developing in shallow waters (35 – 45 cm),

having a coverage of 55 – 60%. Along with the characteristic and dominant species, there can be found other submerse species (*Elodea canadensis*, *E. nuttallii*, *Potamogeton crispus*, *P. trichoides*, *P. pectinatus*, *Ceratophyllum demersum*). The floating vegetation is poorly represented (*Nuphar lutea*, *Nymphaea candida*, *Nymphoides peltata*, *Lemna minor*, *Salvinia natans*), having small coverage.

4. *Potamogetonnetum lucentis* Hueck 1931 (tab. 1 – IV) – The association is located towards the margin of the lakes, with the water depth of 120 – 150 cm. The characteristic species is also the dominant one, having coverage up to 70 – 75%. There are not too many species found in this association that includes some submerse plants (*Elodea nuttallii*, *Myriophyllum verticillatum*, *Potamogeton trichoides*, *Ceratophyllum demersum*), but also floating plants (*Lemna minor*, *Nymphaea alba*).

5. *Potamogetonnetum trichoides* J. et R. Tx. in R. Tx. 1965 (tab. 2 – I) – The characteristic and dominant species, *Potamogeton trichoides*, forms submerse phytocoenosis, having a 70 – 90% coverage. The phytocoenosis species number is relatively low, the most frequent of the submerse being *Elodea nuttallii*, *Potamogeton perfoliatus*, *P. pectinatus*, *Myriophyllum spicatum*. The floating species are *Nymphaea alba*, *N. candida*, *Lemna minor*, *Salvinia natans*.

6. *Potamogetonnetum perfoliati* Koch 1926 em. Pass. 1964 (tab. 2 – II) – The association that is developing in 110 – 130 cm depth water is dominated by *Potamogeton perfoliatus*. There are also other submerse species participating to the making up of those phytocoenosis, like *Elodea canadensis*, *Elodea nuttallii*, *Potamogeton trichoides*, *P. pectinatus*, *Ceratophyllum demersum*.

7. *Potamogetonnetum crispi* Soó 1927 (tab. 2 – III) – The phytocoenosis of this association have a 70 – 80% coverage and are relatively homogeneous, most of the species being characteristic for *Potamogetonetea pectinati* and *Lemnetea* classes. Important parts have also *Potamogeton pectinatus*, *Ceratophyllum demersum*, *Lemna minor*, along with the dominant and characteristic species, *Potamogeton crispus*.

8. *Potamogetonnetum pectinati* Carsten 1955 (tab. 2 – IV) – The phytocoenosis are located towards the bank of the lakes, in 100 – 150 cm depth of water. The submerse vegetation is almost pure, being dominated by *Potamogeton pectinatus*, while the floating vegetation is represented by species like *Nuphar lutea*, *Nymphaea alba*, *N. candida*, *Lemna minor*.

9. *Nymphaeetum albo – candidae* Pass. 1957 (tab. 3 – I) – The phytocoenosis of this association make a 70 – 85 % coverage, being dominated by *Nymphaea candida* and *Nymphaea alba*, accompanied more frequently by *Trapa natans*, *Elodea nuttallii*, *Ceratophyllum demersum*, *Potamogeton perfoliatus*, *P. trichoides*, *P. pectinatus*, *Lemna minor*, *Salvinia natans*.

10. *Nymphaeetum albae* Vollmar 1947 (tab. 3 – II) – The floating layer of this association's phytocoenosis is dominated by *Nymphaea alba*; at the 80 – 85 % coverage also participate *Trapa natans*, *Lemna minor*, *L. trisulca*, *Salvinia natans*. In the phytocoenosis structure also appear submerse species (*Myriophyllum verticillatum*, *Elodea nuttallii*, *Potamogeton trichoides*), and swampy species (*Phragmites australis*, *Cicuta virosa*, *Lycopus europaeus*, *Stachys palustris*).

11. *Trapaetum natantis* V. Kárpáti 1963 (tab. 3 – III) – Inhabiting waters having 120 – 200 cm of depth, the phytocoenosis are dominated by *Trapa natans*, which, along with *Nymphaea alba*, *N. candida*, *Potamogeton trichoides*, *Lemna minor*, *Salvinia natans*, are making a 70 – 90% coverage.

12. *Myriophyllo verticillati* – *Nupharetum luteae* Koch 1926 (tab. 3 – IV) – The floating layer of the association's phytocoenosis is dominated by *Nuphar lutea*, while the submerse layer is dominated by *Myriophyllum verticillatum*. The submerse species like *Elodea nuttallii*, *Potamogeton trichoides*, or floating plants (*Lemna minor*, *Salvinia natans*) have an important contribution to the association's physiognomy.

13. *Scirpo* – *Phragmitetum* Koch 1926 (tab. 4 – I) – The phytocoenosis of this hydrophilic association occupy the banks of the lakes, the vegetation coverage on the sample surfaces varying between 70 – 90%. The dominant species is *Phragmites australis*, accompanied by *Scirpus lacustris*, *Typha angustifolia*, *Ranunculus lingua*, *Iris pseudacorus*, *Carex elata*, *Carex riparia* etc.

14. *Thelypterido* – *Phragmitetum* Kuiper 1958 (tab. 4 – II) – The association inhabits the floating islands from the studied area. The characteristic species of the *Phragmitetea australis* class and of the subordinated coenotaxons (*Phragmitetalia* order, *Phragmition* alliance) are illustrating for this vegetation, with the dominance of *Phragmites australis*, which has 40 – 70% coverage. The association's characteristic is the presence of *Thelypteris palustris*, having a 10 – 30% coverage, which makes it the codominant species.

15. *Typhetum angustifoliae* Pignatti 1953 (tab. 4 – III) – At the edge of the reed thicket, this association forms a variable width strip, the vegetation coverage being 75 – 95%. Along with the dominant and characteristic species, *Typha angustifolia*, most of the species that outline the phytocoenosis physiognomy belong to the *Phragmitetea australis* class and to its inferior coenotaxons (*Phragmites australis*, *Oenanthe aquatica*, *Butomus umbellatus*, *Rorippa amphibia*, *Galium palustre*, *Stachys palustris*, *Carex acutiformis*, *C. riparia*, *C. elata*, *Cicuta virosa* etc.).

16. *Glycerietum maximae* Hueck 1931 (tab. 4 – IV) – Situated near the banks, the phytocoenosis of this association are dominated by *Glyceria maxima*; along this species there are others, hydrophilic or hygrophilic, characteristic for the *Phragmitetea australis* class: *Phragmites australis*, *Typha angustifolia*, *Sparganium erectum*, *Iris pseudacorus*, *Carex riparia* etc.

17. *Bolboschoenetum maritimi* Egger 1933 (tab. 5 – I) – The phytocoenosis of this association settle down on moist soils, poorly halophytic, making 80 – 95% coverage. Along the dominant species, *Bolboschoenus maritimus*, more frequent are *Juncus gerardi*, *Aster tripolium* ssp. *pannonicus*, *Phragmites australis* ssp. *humilis*, *Carex rostrata* etc.

18. *Eleocharitetum palustris* Schennikov 1919 (tab. 5 – II) – This association is encountered in small depressions or towards the banks, its phytocoenosis having 70 – 75% coverage. The dominant and characteristic species, *Eleocharis palustris*, is accompanied more frequently by *Bolboschoenus maritimus*, *Rorippa amphibia*, *Sparganium erectum*, *Galium palustre*, *Mentha aquatica*, *Myosotis scorpioides* etc.

19. *Oenanthe* – *Rorippetum* Lohmeyer 1950 (tab. 5 – III) – The association develops on easily flooded plots of land during spring, often on halophytic soils. The characteristic species, *Oenanthe aquatica* and *Rorippa amphibia*, are accompanied by some hydro – hygrophilic species, like: *Bolboschoenus maritimus*, *Carex elata*, *Butomus umbellatus*, *Scirpus lacustris*, *Typha angustifolia*, *Phragmites australis* ssp. *humilis*, *Alisma plantago-aquatica*, *Carex acutiformis*, *Galium palustre* etc.

20. *Caricetum elatae* Koch 1926 (tab. 5 – IV) – The dominant and characteristic species, *Carex elata*, taking a compact bush form on the higher ground surfaces, makes the so-called “islet of mush thicket”. The covering of the soil, up to 70 – 85%, is made in combination with: *Phragmites australis* ssp. *humilis*, *Carex rostrata*, *Galium palustre*, *Gratiola officinalis*, *Glyceria maxima* etc.

21. *Thelypteridi* – *Alnetum* Klica 1926 (tab. 6) – This type of phytocoenosis brings together phytocoenosis subjected to periodical floods. The tree layer is dominated by *Alnus glutinosa*, along with *Salix cinerea* or *Fraxinus angustifolius*. The characteristic species *Thelypteris palustris* has also an important coverage. Along with *Alnetea glutinosae* class characteristic species, at the floristic composition also participate an important number of species characteristic to the *Phragmitetea australis* class, situation that can be explained by the variable hydric character of these phytocoenosis.

Bibliography

1. CIOCĂRLAN V., SĂRBU I., ȘTEFAN N., MARIAN T., 1997 – *Elodea nuttallii* (Planchon) St. John – specie nouă în flora României, Bul. Grăd. Bot. Iași, **6** (1): 213 – 215
2. POPESCU A., SANDA V., OROIAN SILVIA, 1997 – Vegetația Deltei Dunării, Marisia, Muz. Jud. Mureș, Studii și materiale, **XXV** (Supl.): 10 – 30, 88 – 90
3. SANDA V., POPESCU A., BARABAȘ N., 1998 – *Cenotaxonomia și caracterizarea grupărilor vegetale din România*, Stud. și Comunic., Biol. veget., **14**, Bacău: 68 – 88, 225 – 228
4. SANDA V., POPESCU A., DOLTU M. I., NEDELICU G., 1979 – Conspectul vegetației acvatice și palustre din România, Stud. și Comunic., Șt. Nat., Muz. Brukenthal, Sibiu, **23**: 119-162
5. SANDA V., POPESCU A., STANCU DANIELA ILEANA, 2001 – *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*, Ed. Comphis: 20 – 31, 38 – 59, 266 – 267
6. SĂRBU I., ȘTEFAN N., OPREA AD., ZAMFIRESCU OANA, 2000 – Flora și vegetația Rezervației Naturale Grindul Lupilor (Rezervația Biosferei Delta Dunării), Bul. Grăd. Bot. Iași, **9**: 91 – 124
7. ȘTEFAN N., CHIFU T., HANGANU J., COROI M., 1995 – Cercetări fitocenologice asupra vegetației acvatice și palustre din Balta Somovei (Jud. Tulcea), Bul. Grăd. Bot. Iași, **5**: 133 – 152
8. ȘTEFAN N., COLDEA GH., 1997 – Classe *Potametea*, Classe *Phragmitetea*, in Coldea Gh. (edit.), Sanda V., Popescu A., Ștefan N. – *Les associations végétales de Roumanie*, **1**, *Les associations herbacées naturelles*, Presses Univ. de Cluj: 36 – 94
9. ȘTEFAN N., HANGANU J., COROI M., COROI ANA-MARIA, OPREA A., 1997 – The vegetation of Babina River Island, An. Șt. Univ. “Al. I. Cuza” Iași, t. **XLIII**, s II a, Biol. veget.: 79 – 96
10. ȘTEFAN N., OPREA AD., 2001 – Vegetația Ostrovului Cernovca (I), Bul. Grăd. Bot. Iași, **10**: 123 – 138
11. ȘTEFAN N., SĂRBU I., MĂNZU C., 2003 – Contributions to the study of vegetation from the Dranov and Belciug Lakes area (Danube Delta Biosphere Reserve) (I), Stud. și Cerc., Biol., **7**, Univ. Bacău (under press)
12. ȘTEFAN N., SĂRBU I., OPREA AD., ZAMFIRESCU OANA, 2001 – Contribuții la cunoașterea vegetației grindurilor Chituc și Saele-Istria, Bul. Grăd. Bot. Iași, **10**: 99 – 122

Table no. 1
Associations from *Potamogetion lucentis* Rivas Martinez 1973 alliance

Vegetal association	I		II			III		IV		
Survey number	1	2	3	4	5	6	7	8	9	10
Depth of water (cm)	70	85	130	95	120	45	35	120	120	150
Vegetation coverage (%)	90	70	70	75	80	60	55	75	70	85
Sample surface (m ²)	10	12	20	30	25	4	5	6	9	4
Potamogetion lucentis										
<i>Elodea canadensis</i>	5	4	-	-	-	+	-	-	-	-
<i>Elodea nuttallii</i>	-	+	4	4	4	-	+	-	1	+
<i>Myriophyllum verticillatum</i>	-	-	+	-	-	-	-	-	+	+
<i>Potamogeton perfoliatus</i>	-	-	-	+	-	-	-	-	-	-
<i>Potamogeton crispus</i>	-	+	-	-	-	+	+	-	+	-
<i>Najas marina</i>	-	-	-	-	+	3	3	-	-	-
Potamogetonalia pectinati										
<i>Potamogeton nodosus</i>	-	+	-	+	-	+	-	-	-	-
<i>Potamogeton lucens</i>	-	-	+	-	-	-	-	4	3	4
<i>Potamogeton trichoides</i>	+	-	-	+	1	+	1	-	+	1
<i>Potamogeton pectinatus</i>	+	-	+	-	-	1	+	+	-	-
<i>Potamogeton natans</i>	-	+	-	-	-	-	+	-	-	-
<i>Ceratophyllum demersum</i>	+	-	-	+	+	-	+	+	1	-
<i>Ranunculus trichophyllus</i>	-	+	-	+	-	-	-	-	+	-
<i>Vallisneria spiralis</i>	+	-	-	-	-	-	-	-	-	-
Potamogetonalia										
<i>Nuphar lutea</i>	+	-	-	-	-	+	-	-	-	-
<i>Nymphaea alba</i>	-	-	+	+	-	-	-	+	-	+
<i>Nymphaea candida</i>	-	-	-	+	-	-	+	-	-	-
<i>Nymphoides peltata</i>	-	-	-	-	-	+	-	+	-	-
<i>Polygonum amphibium</i>	+	-	-	-	-	-	+	-	-	-
<i>Trapa natans</i>	-	-	+	-	+	-	-	-	-	-
Lemnetea										
<i>Lemna minor</i>	+	+	+	+	+	-	+	+	-	+
<i>Spirodela polyrhiza</i>	-	+	-	-	-	+	-	-	+	-
<i>Wolffia arrhiza</i>	-	-	-	-	-	-	-	-	+	-
<i>Salvinia natans</i>	+	-	+	-	-	1	+	-	-	-
<i>Utricularia vulgaris</i>	-	-	-	-	-	+	+	-	-	-
<i>Stratiotes aloides</i>	-	-	-	-	+	-	-	-	-	-
<i>Hydrocharis morsus-ranae</i>	-	+	-	-	-	-	-	-	+	-
Phragmitetea										
<i>Phragmites australis</i>	-	-	+	-	-	+	+	-	-	+
<i>Typha angustifolia</i>	+	-	+	-	-	-	-	+	-	-
<i>Lythrum salicaria</i>	-	-	-	-	-	+	-	-	-	-
<i>Oenanthe aquatica</i>	-	+	-	-	-	-	-	-	-	-
<i>Carex pseudocyperus</i>	-	-	-	-	-	-	-	+	-	-
<i>Rorippa amphibia</i>	-	+	-	-	-	-	-	-	+	-
<i>Alisma plantago-aquatica</i>	-	-	-	-	-	-	+	-	-	-
<i>Mentha aquatica</i>	-	-	+	-	-	-	-	-	-	-
<i>Sparganium erectum</i>	-	-	-	-	+	-	+	-	-	-

Vegetal association: I – *Elodeetum canadensis* Eggler 1933; II – *Elodeetum nuttallii* Ciocărlan et al. 1997; III – *Najadetum marinae* (Oberd.1957) Fukarek 1961; IV – *Potamogetonetum lucentis* Hueck 1931
Sample's location: Zătonul Mic (1, 3, 5, 8, 9); Zătonul Mare (2); Belciug (4, 10); Meleaua Sf. Gheorghe (6, 7)

Table no. 2
Associations from *Potamogetion lucentis* Rivas Martinez 1973 alliance

Vegetal association	I				II		III			IV			
Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13
Depth of water (cm)	170	150	120	170	130	110	85	70	90	140	150	100	120
Vegetation coverage (%)	70	90	85	70	70	80	80	75	70	85	90	75	80
Sample surface (m ²)	10	6	20	15	6	4	2	4	6	8	8	10	15
Potamogetion lucentis													
<i>Elodea canadensis</i>	-	-	+	-	+	-	-	-	+	-	-	-	-
<i>Elodea nuttallii</i>	-	+	+	+	-	+	+	-	-	+	-	-	+
<i>Myriophyllum verticillatum</i>	-	-	-	-	-	-	+	+	-	-	-	-	-
<i>Potamogeton perfoliatus</i>	-	+	-	+	4	5	-	-	+	+	-	-	+
<i>Potamogeton crispus</i>	-	-	+	-	-	-	4	4	3	-	+	+	+
Potamogetonetalia pectinati													
<i>Potamogeton lucens</i>	-	-	+	-	-	-	+	+	-	-	-	-	+
<i>Potamogeton trichoides</i>	4	5	4	4	+	-	+	-	+	4	5	4	4
<i>Potamogeton pectinatus</i>	-	-	1	+	-	+	-	1	1	+	-	+	-
<i>Ceratophyllum demersum</i>	-	-	+	-	+	-	+	-	1	-	-	-	-
<i>Myriophyllum spicatum</i>	-	+	-	+	-	-	-	-	-	-	-	-	-
Potamogetonetalia													
<i>Nuphar lutea</i>	+	-	-	-	-	-	+	-	-	1	-	-	+
<i>Nymphaea alba</i>	+	+	-	-	-	+	-	-	+	-	1	1	+
<i>Nymphaea candida</i>	+	-	+	+	-	-	-	+	+	+	-	1	1
<i>Polygonum amphibium</i>	-	-	-	-	-	-	-	-	1	-	-	-	-
<i>Trapa natans</i>	-	-	+	-	-	-	-	-	1	-	-	+	-
<i>Hippuris vulgaris</i>	-	-	-	-	+	-	-	-	-	-	-	-	-
Lemnetea													
<i>Lemna minor</i>	-	+	+	+	+	-	1	+	1	+	+	+	1
<i>Spirodela polyrhiza</i>	+	+	-	-	-	-	-	+	-	+	-	-	-
<i>Salvinia natans</i>	+	+	-	-	+	-	-	+	-	-	-	+	-
<i>Utricularia vulgaris</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Stratiotes aloides</i>	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>Hydrocharis morsus-ranae</i>	-	-	-	-	+	+	-	-	-	-	-	-	-
Phragmitetea													
<i>Phragmites australis</i>	-	+	+	-	+	-	-	+	-	+	-	-	+
<i>Oenanthe aquatica</i>	+	-	-	-	-	-	+	-	-	-	-	-	-

<i>Cicuta virosa</i>	-	-	-	-	-	-	+	-	-	+	-	-	-	-
<i>Rorippa amphibia</i>	-	-	-	-	-	-	-	-	-	-	-	-	+	-
<i>Stachys palustris</i>	-	+	+	-	-	-	-	-	-	-	-	-	-	-
<i>Alisma plantago-aquatica</i>	-	-	-	-	-	+	-	-	-	-	-	+	-	-
<i>Sparganium erectum</i>	+	-	-	-	-	-	+	-	-	-	-	+	-	-

Vegetal association: I – *Potamogetonum trichoides* J. et R. Tx. in R. Tx. 1965; II – *Potamogetonum perfoliati* Koch 1926 em. Pass. 1964; III – *Potamogetonum crispum* Soó 1927; IV – *Potamogetonum pectinatum* Carsten 1955

Sample's location: Zătonul Mic (21); Zătonul Mare (12, 17, 19, 22); Belciug (11, 18, 20); Canal Crasnicol (13, 14, 23); Dranov (15, 16)

Table no. 3
Associations from *Nymphaeion albae* Oberd. 1957 alliance

Vegetal association	I				II		III					IV					
Survey number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Depth of water (cm)	140	120	110	180	210	230	200	120	120	170	160	190	200	220	110	150	100
Vegetation coverage (%)	85	75	80	70	80	85	80	90	80	75	90	70	65	75	70	75	80
Sample surface (m ²)	50	65	50	80	25	30	100	50	50	65	100	100	100	50	80	25	100
<i>Nymphaeion albae</i>																	
<i>Nymphaea alba</i>	1	1	2	2	4	5	1	-	+	1	+	-	+	-	-	-	-
<i>Nymphaea candida</i>	4	3	3	3	-	-	+	+	1	+	-	+	-	-	-	-	1
<i>Nuphar lutea</i>	-	-	-	-	-	-	-	+	-	-	+	3	3	4	3	4	2
<i>Nymphoides peltata</i>	-	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+
<i>Polygonum amphibium</i>	+	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	+
<i>Potamogeton natans</i>	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>Trapa natans</i>	-	+	-	+	+	+	4	5	4	4	5	-	+	-	+	+	+
<i>Potamogetonetea</i>																	
<i>Potamogeton perfoliatus</i>	+	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-
<i>Myriophyllum verticillatum</i>	-	+	-	-	+	+	-	-	-	+	-	2	1	1	2	1	3
<i>Elodea nuttallii</i>	+	-	-	+	+	+	-	-	-	-	-	-	1	+	-	+	-
<i>Ceratophyllum demersum</i>	+	-	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-
<i>Potamogeton trichoides</i>	-	+	-	+	+	-	-	+	+	+	+	+	1	+	1	+	-
<i>Potamogeton pectinatus</i>	-	-	+	+	-	-	+	-	-	-	+	-	-	-	-	+	+
<i>Potamogeton crispus</i>	-	-	+	-	+	-	-	-	-	+	-	-	+	-	+	-	-
<i>Polygonum amphibium</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Ranunculus rionii</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Lemnetea</i>																	
<i>Lemna minor</i>	+	2	+	+	1	+	+	-	+	+	-	1	1	+	+	+	1

<i>Aster tripolium ssp. pannonicus</i>	-	1	+	-	-	+	-	+	-	-	-	-	-	-	-
<i>Scirpus tabernaemontani</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>Eleocharis uniglumis</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Phragmites australis ssp. humilis</i>	+	1	1	-	+	-	+	+	+	-	+	+	+	+	1
Oenanthion aquaticae															
<i>Alisma plantago-aquatica</i>	+	-	-	+	-	+	-	+	+	1	+	-	+	-	-
<i>Alisma lanceolatum</i>	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Sagittaria sagittifolia</i>	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Magnocaricion															
<i>Carex rostrata</i>	1	1	+	-	-	+	-	+	+	-	+	-	+	1	1
<i>Carex acutiformis</i>	+	-	+	+	-	-	+	1	1	-	-	-	-	-	-
<i>Equisetum palustre</i>	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
<i>Galium palustre</i>	+	-	+	+	+	+	-	+	+	-	+	+	-	+	+
<i>Epilobium palustre</i>	-	+	-	-	-	-	+	-	+	-	-	-	+	-	-
<i>Senecio paludosus</i>	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-
<i>Scutellaria galericulata</i>	-	+	-	-	+	+	-	-	-	-	-	-	+	-	-
<i>Gratiola officinalis</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-
<i>Glyceria maxima</i>	+	-	-	-	-	+	-	-	+	-	-	-	+	-	+
<i>Solanum dulcamara</i>	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-
<i>Veronica beccabunga</i>	-	-	-	+	+	-	-	-	+	+	-	-	-	-	-
<i>Veronica anagalis-aquatica</i>	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<i>Lysimachia vulgaris</i>	-	+	-	-	+	-	-	-	-	+	-	-	-	-	-
<i>Myosotis scorpioides</i>	+	-	+	+	+	+	+	+	-	+	-	+	-	-	+
<i>Euphorbia palustris</i>	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-
<i>Calystegia sepium</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Cicuta virosa</i>	-	-	-	-	+	-	-	-	+	+	-	-	-	-	-
<i>Lythrum salicaria</i>	+	-	+	-	+	+	-	+	-	-	-	+	-	+	-
<i>Mentha aquatica</i>	-	+	-	+	-	1	1	+	1	+	-	-	+	-	-
<i>Stachys palustris</i>	+	-	-	+	+	+	-	-	-	+	+	-	-	+	+
<i>Epilobium parviflorum</i>	-	-	+	-	-	-	-	-	-	-	-	+	+	-	-
<i>Lathyrus palustris</i>	-	-	-	-	-	-	-	+	-	+	-	-	-	-	+
<i>Stum latifolium</i>	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-
<i>Iris pseudacorus</i>	+	-	-	+	+	+	-	-	+	+	-	-	-	-	-
<i>Rumex hydrolapathum</i>	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
<i>Symphytum officinale</i>	-	+	-	-	-	+	+	-	-	-	-	+	-	-	+
<i>Carex vulpina</i>	-	-	-	+	+	-	+	-	-	-	-	-	-	-	-
Companions															
<i>Salix cinerea</i>	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-

<i>Galega officinalis</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-
<i>Polygonum hydropiper</i>	+	+	-	-	+	-	-	-	-	+	-	-	-	-	-
<i>Polygonum lapathifolium</i>	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-
<i>Alopecurus ventricosus</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
<i>Carex distans</i>	+	+	+	-	+	+	-	-	-	-	-	-	-	-	-
<i>Samolus valerandi</i>	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Bidens tripartita</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-
<i>Pulicaria dysenterica</i>	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-
<i>Puccinellia convoluta</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Lythrum virgatum</i>	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-
<i>Althaea officinalis</i>	-	-	-	+	-	+	+	-	+	-	-	-	-	+	-
<i>Agrostis stolonifera</i>	1	1	+	+	+	-	+	-	-	-	-	+	-	+	+
<i>Vicia biennis</i>	-	-	-	-	-	+	-	+	-	-	-	-	+	-	-
<i>Mentha pulegium</i>	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<i>Rorippa sylvestris</i>	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-
<i>Carex distans</i>	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-

Vegetal associations: I - *Bolboschoenetum maritimi* Eggler 1933; II - *Eleocharitetum palustris* Schennikov 1919; III - *Oenanthe – Rorippetum* Lohmeyer 1950; IV - *Caricetum elatae* Koch 1926

Sample's location: Tărăța Channel (1, 5, 13, 14); Zătonul Mic (2, 8, 9, 12); Belciug Channel (3, 6, 7, 15); Zătonul Mare (4, 10, 11)

Table no. 6
Thelypteridi – Alnetum Klika 1926

Survey number	1	2	3	4
Covering of tree stratum (%)	25	40	45	50
Covering of grassy stratum (%)	70	65	50	50
Sample surface (m ²)	100	80	65	80
Sample's location	Belciug Lake			
Association's characteristics				
<i>Alnus glutinosa</i>	2	3	3	3
<i>Thelypteris palustris</i>	3	3	2	2
Alnion glutinosae				
<i>Solanum dulcamara</i>	+	-	+	+
<i>Symphytum officinale</i>	+	-	+	-
<i>Carex elongata</i>	-	+	-	-

<i>Humulus lupulus</i>	-	-	-	+
<i>Alnetea glutinosae</i>				
<i>Salix cinerea</i>	1	+	+	+
<i>Fraxinus angustifolius</i>	-	1	-	+
<i>Lycopus europaeus</i>	+	+	+	-
<i>Galium palustre</i>	-	-	+	-
Phragmitetea				
<i>Phragmites australis</i>	1	+	+	1
<i>Carex riparia</i>	2	+	1	+
<i>Carex elata</i>	-	1	2	2
<i>Berula erecta</i>	+	+	-	-
<i>Scutellaria galericulata</i>	-	+	+	-
<i>Mentha aquatica</i>	-	1	+	+
<i>Typha latifolia</i>	-	-	+	-
<i>Rumex hydrolapathum</i>	-	-	+	-
<i>Iris pseudacorus</i>	-	+	-	+
<i>Typha angustifolia</i>	-	-	-	+
Companions				
<i>Calystegia sepium</i>	+	-	-	-
<i>Urtica dioica</i>	-	+	+	+
<i>Bidens tripartita</i>	-	-	+	-
<i>Salix triandra</i>	-	-	+	-
<i>Eupatorium cannabinum</i>	-	-	-	+