

PHYTOCOENOTIC SURVEYS ON SOME MESOTROPHIC – EUTROPHIC MARSHES IN EASTERN ROMANIA

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Summary: This study is a contribution to the knowledge of the vegetation of some mesotrophic - eutrophic marshes, of topogenic origin, which are located in the hilly area of Neamț county, namely: Unghi, Bahna Mare, Râșcolnița, Borșeni, and Borniș (Dragomirești commune). The vascular flora of these marshes is characterized by the presence of some fairly rare plant species, into the Romanian flora, e. g.: *Angelica palustris*, *Dactylorhiza incarnata*, *Ligularia sibirica*, and *Menyanthes trifoliata*. Among the plant associations identified in the field, the next ones are rather rare in the region: ass. *Caltho laetae* – *Ligularietum sibiricae* Ștefan et al. 2000, ass. *Salicetum cinereae* Zólyomi 1931, ass. *Carici flavae* – *Eriophoretum latifolii* Soó 1944, and so forth. The floristic and phytocoenologic richness of these marshes of Moldavia, their authenticity, their character not yet altered by the human activities, the surprising presence here of some rare relict species into the Romanian flora, are true reasons to promote all of these areas as protected ones, in the near future. Also, for the marshes of “Unghi” and “Bahna Mare”, we would like to make proposals as these to be included under the “Natura 2000” European network of protected areas.

Key words: mesotrophic - eutrophic marshes, vegetation, rare plant species, natural habitats, Eastern Romania

Introduction

This study is a new contribution over the vegetation of some marshes from Moldavia, namely: Unghi, Bahna Mare, Râșcolnița, Borșeni, and Borniș (Dragomirești commune, Neamț county) (Fig. 1). All of these marshes are located at the eastern limit of Neamț sub-Carpathians, in the hilly region of Neamț county, on the nemoral belt of vegetation, in oak and mixed forests altitudinal horizon (Vegetation Unit F 38b, according to [IVAN (coord.), 1992]).

The geographical coordinates of those investigated marshes are like the next:

- the marshes near Unghi village: N 47°02'14.2"/E 26°33'45.5"/348 m
- the marshes called “Bahna Mare” at Bălănești: N 46°58'6.58"/E 26°36'26.24"/254 m
- the marshes called “Râșcolnița” at Ghigoiești: N 46°57'53.3"/E 26°35'36.5"/322 m
- the marshes near Borșeni village: N 47°05'07.9"/E 26°34'41.4"/301 m
- the marshes near Borniș village: N 47°00'42.5"/E 26°35'59.7"/303 m (Fig. 1).

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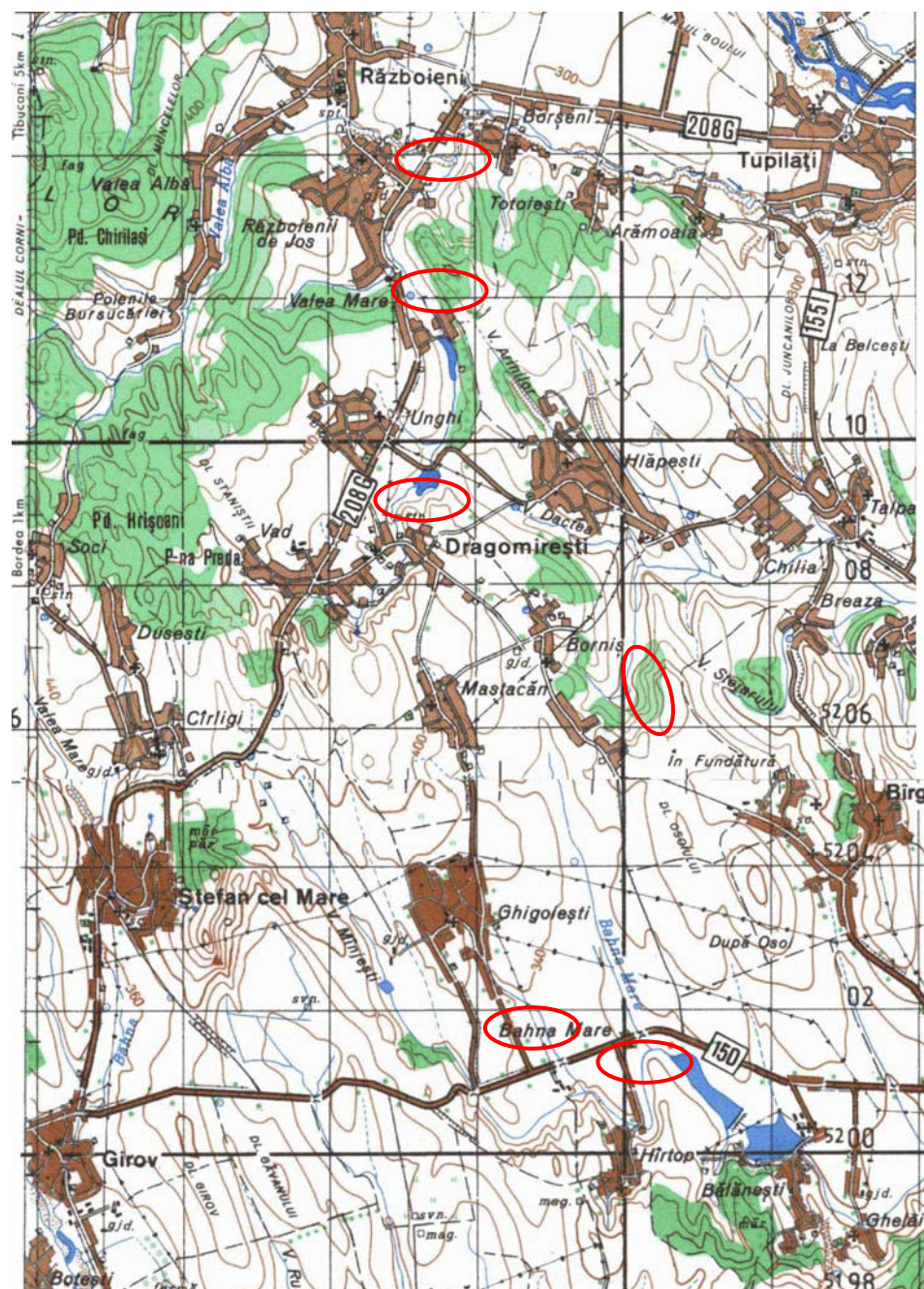


Fig. 1. Geographical location of the surveyed marshes in Neamț county

Among these marshes, the most significant ones are the first two of them, as surface, as well as from floristic and phytocoenotic points of view. The marshes of Unghi is situated in the south of forestry massif “Ghindăoani-Tupilați”. It is crossed by a small

stream (called “Valea Albă”) in its southern part, which runs toward the east, flowing into Moldova river, in the south of Tupilați village. The hills surrounding the investigated area are between 400 m and 600 m altitudes. Their slopes are affected by landslides, torrents, increased soil erosion, following an intense grazing almost all year around. The marshes of Bahna Mare (called also Bahna Negoiești) is situated in the north-west of Bălănești village, at south of the road between Roman and Piatra Neamț towns; it is fed by a small creek water (called “Bahna”).

All of these five marshes have a topogenic origin and from the trophicity point of view all of them are transition mires, of a mesotrophic – eutrophic type. They are lined by a fairly high level of table waters, being situated in the lowest part of relief, occurring in those places where flies sources. They are fed by waters from the water table, meteoric waters (snows, rains), etc., which runs on the nearby slopes, but also with the contribution of small streams, having short courses into the surveyed area (e. g. the marshes of Unghi and Bahna Mare) (Fig. 2 & 3).



Fig. 2. The marshes of Unghi – general view



Fig. 3. The marshes of Bahna Mare – Bălănești

This area is located at the limit between two geological units, Miocene (the sub-Carpathian unit in west) and Sarmatian (to east). Miocene is represented by marls mixed

with gypsum, having also some appearances of salts. The Sarmatian consists in sand horizons, having intercalations of clay, alternating with gravels. The soils are of hydromorphic type [BURDUJA & al., 1974].

Climate are moderately continental, with medium yearly precipitations of 550-700 mm, average yearly temperatures between 8.5 °C and 9 °C, the dominant winds being from north-west (20%). At the meteo station of Tg. Neamț town, the average yearly temperature is of 8.2 °C, the medium yearly amplitude is of 23.3 °C, the medium yearly precipitations being of 672 mm [BURDUJA & al., 1974].

History of botanical research. Some investigations over the marshes on this area have been made by [BURDUJA, 1948, 1954], [CHIFU & al., 1987], [LUPAȘCU, 1999]. Thus, from the marshes of “Bahna Mare” – Bălănești there were cited some species, as: *Angelica palustris*, *A. sylvestris*, *Betula pubescens* var. *vulgaris* f. *ovalis*, *B. verrucosa*, *Briza media*, *Caltha palustris*, *Carex distans*, *C. elata*, *C. ovalis* f. *robusta*, *Cirsium canum*, *Cuscuta* sp., *Dianthus superbus*, *Epilobium parviflorum* f. *apricum*, *Eriophorum latifolium*, *Filipendula ulmaria* subsp. *ulmaria* f. *pubescens*, *Geranium palustre*, *Holcus lanatus*, *Hypericum tetrapterum*, *Juncus articulatus*, *J. glaucus*, *Leucanthemum vulgare*, *Lotus corniculatus*, *Lycopus europaeus*, *Lythrum salicaria*, *Medicago lupulina* var. *glandulosa*, *Mentha aquatica*, *Odontites verna*, *Ononis arvensis*, *Parnassia palustris*, *Phleum pratense*, *Phragmites australis* subsp. *australis*, *Plantago lanceolata*, *Potentilla erecta*, *Prunella vulgaris*, *Rumex conglomeratus*, *Selinum carvifolia*, *Serratula tinctoria*, *Succisa pratensis*, *Taraxacum officinale*, *Trifolium dubium*, *T. hybridum*, *T. pratense*, *T. repens*, *T. fragiferum* [BURDUJA, 1954].

In an other paper [CHIFU & al., 1987], there are cited few other plant species from Bălănești-Bârgăoani, namely: *Lemna gibba*, *Ligularia sibirica*, *Nymphaea alba*, *Menyanthes trifoliata*, *Peucedanum palustre*, *Salix rosmarinifolia* and *Sparganium emersum*.

From the marshes of Ghigoiești there were cited the next plant species: *Alnus glutinosa*, *Agrostis stolonifera* subsp. *stolonifera*, *Carex vulpina*, *Epilobium parviflorum* f. *apricum*, *Filipendula ulmaria* subsp. *ulmaria*, *Galium palustre*, *Juncus articulatus*, *Leersia oryzoides*, *Mentha aquatica*, *Myosotis scorpioides*, *Odontites verna*, *Phragmites australis* subsp. *australis*, *Ranunculus lingua*, *Sium latifolium*, *Thelypteris palustris*, *Trifolium hybridum*, *T. dubium* [BURDUJA, 1954].

Some of these species are quite rare in the surveyed region, as well as in Moldavian region, namely:

Angelica palustris is a fairly rare glacial relict plant into the Moldavian flora, being cited so far from the Nature Reserve of Lozna – Dersca, Botoșani county [MITITELU & al., 1974], and from the marshes of Bahna Mare – Bălănești [BURDUJA, 1948, 1954]. This species has also been cited from other locations from the same Neamț county (but the name of localities are lacking at all in the cited paper [CHIFU & al. 1987]), from Nemira Mountains at “Apa Roșie” marshes [MITITELU & BARABAȘ, 1993], but this last location is not yet confirmed by herbarium sheets; and more than that, this marsh is situated in Harghita county, Transylvania region (!) (Fig. 4).



Fig. 4. *Angelica palustris* in the marshes of Bahna Mare – Bălănești

Ligularia sibirica – is also a glacial relict plant, that has been cited from the marshes of Bahna Mare – Bălănești, Neamț county [CHIFU & al., 1987]), as well as from Nemira Mountains [MITITELU & BARABAȘ, 1993], and from the Nature Reserve of Lozna – Dersca [MITITELU & al., 1974]; it is more frequent into the mountains region of Suceava county [personal observations]. *Ligularia sibirica* is registered under the Habitat Directive 92/43 of the European Union, having thereby a special protected status inside the “Natura 2000” network of Sites of Community Importance (SCI’s) in Europe. In the autumn of 2009 lot of seeds have been collected for the “Index Seminum et Sporarum” edited by the Botanic Garden “Anastasiu Fătu” from Iași and offered to the international exchange of seeds with other botanic gardens from all over the world [TĂNASE & OPREA, 2009] (Fig. 5).



Fig. 5. *Ligularia sibirica* in the marshes Bahna Mare – Bălănești

Menyanthes trifoliata is a glacial relict species into the Romanian flora and it has already cited from the Nature Reserve of Lozna – Dersca, Botoșani county [MITITELU & al., 1974], Osoi lake [GOREA, 2003] and Poiana Uzului – Bacău county [MITITELU & al., 1993], Iași city (!) [MITITELU & al., 1995], Vrancea county – frequently (!) [MITITELU & al., 1996], the marshes of Bahna Mare – Bălănești [CHIFU & al., 1987], Suceava county – frequently (!) [MITITELU & al., 1989], Cătușa pool – Galați county [MITITELU & al., 1993] (Fig. 6) .



Fig. 6. *Menyanthes trifoliata* – the marshes of Bahna Mare – Bălănești

Thelypteris palustris has been previously cited from the marshes of Bahna Mare – Bălănești [BURDUJA, 1954], afterwards from the nature reserves Ponoare-Bosanci and “Mlaștina Criștișor” (Suceava county) [MITITELU & al., 1989], as well as from Borșani (Bacău county) [MITITELU & al., 1993], the Nature Reserve of Lozna – Dersca [MITITELU & al., 1974] and Rogojești – Mihăileni (Botoșani county) [MITITELU & CHIFU, 1993]). This species has been also cited from the counties of Neamț [CHIFU & al., 1987], Vrancea [MITITELU & al., 1996] and Iași [MITITELU & al., 1995], but the exact locations and cross references are completely absent in the cited papers (Fig. 7) .



Fig. 7. *Thelypteris palustris* in the marshes near the village of Unghi

Concerning the vegetation, only four associations were already cited till now from one of the marshes surveyed by us, namely Bahna Mare – Bălănești. These associations are: ass. *Glycerietum maximae*, ass. *Caricetum ripariae*, ass. *Typhetum latifoliae*, and ass. *Typhetum angustifoliae*. The last two associations were reported together in the same phytocoenotic table, both associations being reported also in an other location (Dulcești – Bozieni), so no one do not know where exactly these associations are present, as a matter of fact [LUPAȘCU, 1999].

Methodology

The vegetation of all five marshes has been surveyed during the summer and fall of 2008 and in the spring and summer of 2009, using the principles of Central-European geobotanical school [BRAUN-BLANQUET, 1964]. The phytocoenologic framing of the vegetation units follow [COLDEA (ed.) & al., 1997] and [SANDA & al., 1997]. The syntaxonomic nomenclature is according to [MUCINA & al., 1993], whereas the nomenclature of vascular plants follows “Flora Europaea” [TUTIN T. G. & al. (eds.), 1964-1980 & 1993; <http://rbg-web2.rbge.org.uk/FE/fe.html>] and [SĂVULESCU T. & al., 1952-1976]. Conservation value of the identified associations was estimated through the values of Simpson's index of dominance (CRISTEA & al., 2004), considering also the presence of rare and endangered species from a romanian red list of vascular plants [OLTEAN & al., 1994] identified within the analyzed phytocoenoses. The framing of the natural habitats was made using the “Interpretation Manual of European Union Habitat” [*Interpretation Manual of European Union Habitat*/EUR 27/2007].

The geographic coordination of the investigated marshes were recorded using an eTrex Legend HCx GPS system, under the Stereo 70 geographic system.

Results & discussions

As a result of our field works, we can confirm the presence of some rare species as *Angelica palustris*, *Menyanthes trifoliata*, and *Thelypteris palustris*, in the marshes of Bahna Mare, from Bălănești-Bârgăoani. But we can not confirm, in the same marshes, the presence of some other species, as *Lemna gibba*, *Ligularia sibirica*, and *Nymphaea alba*, which were mentioned in the cited literature [CHIFU & al., 1987]. Instead, we found that *Ligularia sibirica* abundantly grows in the marshes situated near the village of Unghi. *Thelypteris palustris* is also frequently met in some phytocoenoses from these marshes. Other pretty rare plant species in the Romanian flora, and identified in the vegetation of the studied marshes, are the following ones: *Dactylorhiza incarnata* (Unghi and Bahna Mare), *Orchis laxiflora* subsp. *elegans* (Unghi), *Cirsium tuberosum* (Bahna Mare), *Cirsium oleraceum* × *C. tuberosum* (Bahna Mare), *Carex paniculata* (Unghi) etc.

The natural vegetation of the surveyed marshes includes a number of 16 plant associations. In addition, we also identified a type of vegetation of anthropogenic origin, which have the neophyte species *Aster lanceolatus* as a dominant one. All these syntaxa are framed in 11 alliances, 10 orders and 8 classes of vegetation.

The values of Simpson's index of dominance for each association are given into the Tab. 1.

Tab. 1. The values of Simpson's index of dominance (S) for each association

Association	Surface (m ²)	No. of rel.	S
<i>Salicetum cinereae</i> Zólyomi 1931	100	9	0,58
	50	1	0,67
<i>Stellario nemorum–Alnetum glutinosae</i> Lohmeyer 1957	200	2	0,66
<i>Salicetum purpureae</i> Wendelberger-Zelinka 1952	100	2	0,60
<i>Carici flavae–Eriophoretum latifolii</i> Soó 1944	70	3	0,53
	75	2	0,76
	80	3	0,42
	85	1	0,22
	90	2	0,22
<i>Scirpetum sylvatici</i> Ralski 1931	100	3	0,83
<i>Caltho laetae–Ligularietum sibiricae</i> Ştefan et al. 2000	50	4	0,26
	25	3	0,23
<i>Angelico–Cirsietum oleracei</i> R. Tx. 1937	50	3	0,39
<i>Deschampsietum cespitosae</i> Hayek ex Horvatic 1930	25	3	0,58
<i>Pastinaco sativae–Arrhenatheretum elatioris</i> Passarge 1964	25	2	0,75
<i>Caricetum ripariae</i> (Soó 1928) Knapp et Stoffer 1962 <i>typicum</i>	50	4	0,57
	25	4	0,70
	20	2	0,54
<i>Caricetum rostratae</i> Rübél 1912	20	2	0,86
<i>Phragmitetum vulgare</i> Soó 1927	50	2	0,62
	100	1	0,79
<i>Typhetum angustifoliae</i> Pignatti 1953	25	1	0,58
	50	1	0,47
	100	1	0,83
<i>Glycerietum maximae</i> Hueck 1931	4	1	0,92
	25	1	0,73
	50	1	0,90
<i>Galegetum officinalis</i> Dobrescu et Vişalariu 1981	25	1	0,77
Phytocoenoses of <i>Aster lanceolatus</i>	50	1	0,72
<i>Callitrichetum polymorphae</i> Soó 1947	1	2	0,90
	2	1	0,85

The species composition of the plant communities is given in the phytocoenotic tables (Tab. 2-9). Most of the identified natural plant communities are well preserved, unmodified or only slightly modified by the human activities.

We used the next framing of the plant communities, from the phytocoenotic point of view:

ALNETEA GLUTINOSAE Br.-Bl. et Tx. 1943

Alnetalia glutinosae Tx. 1937

Salicion cinereae T. Müller et Görs 1958

Salicetum cinereae Zólyomi 1931

QUERCO – FAGETEA Br.-Bl. et Vlieger in Vlieger 1937

Fagetalia sylvaticae Pawlowschi in Pawlowschi et al. 1928

Alno-Ulmion Br.-Bl. et Tx. 1943 em Müller et Görs 1958

Stellario nemorum – Alnetum glutinosae Lohmeyer 1957

SALICETEA PURPUREAE Moor 1958

Salicetalia purpureae Moor 1958

Salicion albae Soó 1930

- Salicetum purpureae* Wendelberger-Zelinka 1952
 SCHEUCHZERIO – CARICETEA FUSCAE R. Tx. 1937
 Caricetalia davallianae Br.-Bl. 1949
 Caricion davallianae Klika 1934
Carici flavae – Eriophoretum latifolii Soó 1944
- MOLINIO – ARRHENATHERETEA R. Tx. 1937
 Molinietaalia caeruleae Koch 1926
 Calthion palustris R. Tx. 1937
Scirpetum sylvatici Ralski 1931
Caltho laetae – Ligularietum sibiricae Ștefan et al. 2000
Angelico – Cirsietum oleracei R. Tx. 1937
 Deschampsion Horvatic 1930
Deschampsietum caespitosae Hayek ex Horvatic 1930
 Arrhenatheretalia R. Tx. 1931
 Arrhenatherion Koch 1926
Arrhenatheretum elatioris Scherrer 1925
- PHRAGMITI – MAGNOCARICETEA Klika in Klika et Novák 1941
 Magnocaricetalia elatae Pignatti 1953
 Magnocaricion elatae Koch 1926
 Caricion gracilis (Neuhäusl 1959) Oberd. et al. 1967
Caricetum ripariae (Soó 1928) Knapp et Stoffler 1962
 -*typicum*
 Caricion rostratae (Bálátová-Tuláčková 1963) Oberd. et al.
 1967
Caricetum rostratae Rübel 1912
 Phragmitetalia Koch 1926
 Phragmition communis Koch 1926
Phragmitetum vulgaris Soó 1927
Typhetum angustifoliae Pignatti 1953
Glycerietum maximae Hueck 1931
- GALIO – URTICETEA Passarge ex Kopecky 1969
 Convolvuletalia sepium R. Tx. 1950 em. Mucina 1993
 Senecion fluviatilis R. Tx. 1950
Galegetum officinalis Dobrescu et Vițalariu 1981
 Phytocoenoses of *Aster lanceolatus*
- POTAMETEA PECTINATI Klika in Klika et Novák 1941
 Callitricho – Batrachietalia Passarge 1964
 Ranunculion aquatilis Passarge 1964
Callitrichetum polymorphae Soó 1947

Following, there are discussed each of those 16 associations and phytocoenoses of *Aster lanceolatus*, from chorology and biotope features, as well as from phytocoenotical and ecological point of views.

Ass. *Salicetum cinereae* Zólyomi 1931

Chorology and biotope characteristics. In our study only relatively small surfaces of Bahna Mare, Unghi and Borşeni marshes were identified having phytocoenoses of *Salix cinerea*; these are placed either where the water layer does not exceed 15-30 cm in depth or on the wet soils. Grey willow made communities with coverages ranging between 65% and 100% of the ground surface.

Species composition and phytocoenotic structure. The characteristic species, *Salix cinerea*, is the dominant plant in all the phytocoenoses (Fig. 8). The characteristic species for the higher coenotaxa are less represented in all three marshes where it has been identified (Bahna Mare, Unghi, and Borşeni). In exchange, there are well represented some species originating from the marsh vegetation or the mesophyllous meadows nearby, as well as some species from the wet and megatrophic weeds. From *Phragmiti–Magnocaricetea* class there are present: *Carex riparia*, *C. acutiformis*, *Lythrum salicaria* etc. From the zonal meadows vegetation (*Molinio–Arrhenatheretea*) there are present: *Equisetum arvense*, *Ranunculus repens*, *Angelica sylvestris* subsp. *sylvestris*, *Caltha palustris*, *Cirsium oleraceum*, *Filipendula ulmaria* subsp. *ulmaria*, and so on. Finally, the *Galio–Urticetea* class is especially represented by *Eupatorium cannabinum*, *Calystegia sepium*, and *Galium aparine*. Among the rare plant species in our relevés, we can list some of them, as: *Angelica palustris*, *Carex paniculata*, *Ligularia sibirica*, and *Thelypteris palustris* (Tab. 2, rel. 1-10).

The taxonomy of this association has been discussed in an other paper of the same authors [OPREA & SÎRBU, 2009].



Fig. 8. Ass. *Salicetum cinereae* Zólyomi 1931 – the marshes of Bahna Mare – Bălăneşti

Ass. *Stellario nemorum – Alnetum glutinosae* Lohmeyer 1957

Chorology and biotope characteristics. The phytocoenoses with *Alnus glutinosa* represents those communities situated along the flooded meadows of rivers, on the plain and hilly regions of Romania [MITITELU & al., 1997; SANDA & al., 1997; SANDA & ARCUŞ, 1999 etc.]. The phytocoenoses are located in depressions, with an excess of humidity and the water table just under the soil surface.

Species composition and phytocoenotic structure. In the surveyed areas of Borşeni, Războieni, and Borniş marshes, the coverage of the tree stratum, edified by *Alnus*

glutinosa, vary between 70% and 90% (Fig. 9). The other species has different coverage indices of the soil surface (between 1% and 65%). Among the characteristic species for the higher coenotaxa, besides *Stellaria nemorum* (characteristic for association), there are present other ones, as: *Viburnum opulus*, *Humulus lupulus*, *Cerasus avium*, *Evonymus europaeus*, *Brachypodium sylvaticum*, *Cornus sanguinea*. One can remark the presence of many characteristic species to other classes, which are in nearby, as they are: *Alnetea glutinosae* (*Frangula alnus*, *Lysimachia vulgaris*), *Molinio–Arrhenatheretea* (*Angelica sylvestris* subsp. *sylvestris*, *Equisetum arvense*, *Filipendula ulmaria* subsp. *ulmaria*), *Phragmiti–Magnocaricetea* (*Carex riparia*, *Lycopus europaeus*), *Galio–Urticetea* (*Rubus caesius*, *Aegopodium podagraria*, *Urtica dioica*) etc. (Tab. 2, rel. 11-14).

Tab. 2. Ass. *Salicetum cinereae* Zólyomi 1931 (rel. no. 1-10); Ass. *Stellario nemorum* – *Alnetum glutinosae* Lohmeyer 1957 (rel. no. 11-14)

Consistency (%)											0.8	0.9	0.7	0.8	
Tree height (m)											10	10	9-10	10	
Tree diameter (cm)											5-20	5-25	5-25	5-25	
Shrub layer coverage (%)	70	80	100	65	75	85	90	90	100	100	K	1	5	65	1
Herbaceous layer coverage (%)	65	50	10	60	60	15	20	20	10	10		40	25	20	15
Surface of relevé (m ²)	100	100	100	100	100	100	50	100	100	100		200	200	100	400
No. of relevé	1	2	3	4	5	6	7	8	9	10		11	12	13	14
Salicion cinereae, Alnetalia glutinosae & Alnetea glutinosae															
Salix cinerea	4	5	5	4	4	5	5	5	5	5	V	+	-	-	-
Alnus glutinosa	-	-	-	+	+	+	+	+	-	-	III	5	5	4	5
Alnus glutinosa (juv.)	-	-	-	-	-	-	-	-	-	-		+	1	-	-
Lysimachia vulgaris	+	+	-	+	+	-	+	-	+	+	IV	+	+	+	-
Frangula alnus	-	-	-	+	-	+	-	-	-	-	I	+	+	+	+
Solanum dulcamara	-	-	+	-	-	-	-	-	+	-	I	-	-	-	-
Alno–Ulmion, Fagetalia sylvaticae & Quercu – Fagetea															
Stellaria nemorum	-	-	-	-	-	-	-	-	-	-		1	1	1	1
Betula pendula (juv.)	-	-	-	-	-	+	-	-	-	-	I	-	-	-	-
Brachypodium sylvaticum	-	-	-	-	-	-	-	-	-	-		-	-	+	+
Cerasus avium (juv.)	-	-	-	-	-	-	-	-	-	-		+	-	+	-
Clematis vitalba	-	-	-	-	-	-	-	-	-	-		-	-	+	-
Cornus sanguinea	-	-	-	-	-	-	-	-	-	-		-	+	-	+
Crataegus monogyna	-	-	-	-	-	-	-	-	-	-		-	-	+	-
Evonymus europaeus	-	-	-	-	-	-	-	-	-	-		+	+	-	-
Fragaria vesca	-	-	-	-	-	-	-	-	-	-		-	-	-	+
Geranium phaeum	-	-	-	-	-	+	+	-	-	-	I	-	-	-	-
Humulus lupulus	-	-	+	-	+	-	-	-	-	-	I	-	+	-	-
Populus tremula (juv.)	-	-	-	-	-	+	-	-	-	-	I	-	-	-	-
Rosa canina	-	-	-	-	-	-	-	-	-	-		+	+	-	-
Viburnum opulus	-	-	-	-	+	-	+	+	+	1	III	+	+	-	-
Molinio – Arrhenatheretea															
Agrostis stolonifera subsp. stolonifera	-	-	-	-	+	-	+	-	-	-	I	+	+	-	+
Angelica palustris	+	-	-	+	-	-	-	-	-	-	I	-	-	-	-
Angelica sylvestris subsp. sylvestris	+	+	-	+	-	+	+	-	+	+	IV	+	+	+	+
Caltha palustris	1	-	+	-	+	-	+	+	+	+	IV	+	+	-	-
Cardamine amara	-	-	-	-	-	-	-	-	-	-		+	-	-	-
Cardamine pratensis	-	-	-	-	-	-	-	-	-	-		+	+	-	-
Carex distans	-	-	-	-	-	-	-	-	-	+	I	-	-	-	-
Carex flava	+	-	-	-	-	-	-	-	-	-	I	-	-	-	-
Carex hirta	-	-	-	-	-	+	+	-	-	-	I	-	-	+	-
Cirsium canum	-	-	+	-	-	-	-	-	-	-	I	-	-	-	-
Cirsium oleraceum	-	-	-	+	+	+	+	-	+	+	III	+	1	-	+
Cirsium palustre	-	-	-	+	+	-	-	-	-	-	I	-	-	-	-
Cirsium rivulare	-	-	-	-	-	+	+	-	-	-	I	-	-	-	-

PHYTOCOENOTIC SURVEYS ON SOME MESOTROPHIC - EUTROPHIC MARSHES IN ...

Cirsium tuberosum	+	+	-	-	-	-	-	-	-	-	I	-	-	-	-
Dactylorhiza incarnata	-	-	-	-	-	+	+	-	-	-	I	-	-	-	-
Dactylorhiza maculata subsp. fuchsii	+	+	-	-	-	-	-	-	-	-	I	-	-	-	-
Deschampsia cespitosa subsp. cespitosa	+	1	-	-	-	-	-	-	-	-	I	-	-	-	-
Epilobium hirsutum	-	-	-	-	-	-	-	-	+	+	I	-	-	-	-
Equisetum arvense	1	1	+	+	+	+	+	-	+	+	V	1	+	1	-
Eriophorum latifolium	-	-	-	-	-	-	+	-	-	-	I	-	-	-	-
Festuca arundinacea subsp. arundinacea	-	-	-	-	-	-	-	-	-	+	I	-	-	+	-
Filipendula ulmaria subsp. ulmaria	1	-	-	+	1	+	+	-	+	-	III	+	1	+	+
Galium uliginosum	-	-	-	-	-	+	-	+	-	-	I	-	-	-	-
Geranium palustre	-	-	-	+	+	+	-	-	+	+	III	-	+	-	+
Hypericum tetrapterum	+	-	-	-	-	-	-	-	-	-	I	-	-	-	-
Juncus inflexus	+	-	-	-	+	-	-	-	-	-	I	+	-	-	-
Lathyrus pratensis	+	-	-	+	+	+	+	-	-	-	II	+	-	-	-
Ligularia sibirica	-	-	-	+	+	+	1	-	-	-	II	-	-	-	-
Lychnis flos-cuculi	+	-	-	-	-	-	-	-	-	-	I	-	+	-	-
Lysimachia nummularia	+	+	+	+	+	-	-	-	+	-	III	+	-	-	+
Lysimachia punctata	-	-	-	-	-	+	-	-	-	-	I	-	-	-	-
Mentha longifolia	-	+	+	-	+	-	-	-	+	+	II	-	-	-	+
Parnassia palustris	+	-	-	-	-	-	-	-	-	-	I	-	-	-	-
Peucedanum palustre	+	+	-	+	+	-	-	-	-	-	II	-	-	-	-
Plantago major	-	-	-	-	-	-	-	-	-	+	I	-	-	+	-
Poa palustris	-	-	-	-	-	-	-	-	-	-		-	+	+	-
Poa sylvicola	-	-	-	-	-	-	-	-	-	-		-	-	+	-
Potentilla anserina	-	-	-	-	-	-	+	1		+	I	+	-	-	-
Potentilla erecta	+	-	-	+	-	-	+	-	-	-	II	-	-	-	-
Potentilla reptans	+	-	-	+	-	-	-	-	-	+	I	+	-	-	-
Prunella vulgaris	+	-	-	-	-	-	-	-	-	-	I	+	-	+	-
Ranunculus acris	+	-	-	-	-	+	-	-	+	-	II	-	-	-	+
Ranunculus repens	+	+	+	+	+	-	+	+	-	-	IV	+	-	+	+
Rumex stenophyllus	-	-	+	-	-	-	-	-	-	-	I	-	-	-	-
Scirpus sylvaticus	+	-	+	-	-	-	-	+	-	+	II	-	-	-	-
Scrophularia umbrosa subsp. umbrosa	+	-	-	-	-	+	-	-	-	-	I	+	-	-	-
Selinum carvifolia	+	+	-	+	+	-	-	-	-	-	II	-	-	-	-
Succisa pratensis	+	-	-	+	-	-	-	-	-	-	I	-	-	-	-
Symphytum officinale subsp. officinale	+	+	+	-	-	-	-	+	-	-	II	-	-	-	-
Valeriana officinalis	-	-	+	+	-	-	+	-	-	-	II	-	-	-	-
Valeriana sambucifolia	+	+	-	-	-	-	-	-	-	+	II	-	-	-	-
Veronica beccabunga	-	-	-	-	-	-	-	-	-	-		-	-	-	+
Veronica chamaedrys	-	-	-	-	-	-	-	-	-	-		-	-	+	-
Vicia cracca	-	-	-	-	-	-	-	-	-	-		-	-	+	-
Phragmiti – Magnocaricetea															
Berula erecta	-	-	-	-	-	-	-	+	-	-	I	-	-	-	+
Carex acutiformis	1	2	-	1	1	-	+	1	-	-	III	-	-	-	-
Carex paniculata	-	-	-	-	-	-	+	-	-	-	I	-	-	-	-
Carex riparia	3	-	+	3	3	-	+	+	+	+	IV	1	+	+	-
Carex vulpina	+	-	-	-	-	-	+	-	-	-	I	-	-	-	-
Eleocharis palustris	-	-	-	-	-	-	-	+	-	-	I	-	-	-	-
Epilobium parviflorum	+	+	-	-	-	-	-	-	-	-	I	-	-	-	-
Equisetum fluviatile	-	-	+	-	+	-	+	-	+	-	I	+	-	-	-
Lycopus europaeus	+	-	+	-	-	+	+	+	+	+	IV	+	+	+	+
Lythrum salicaria	+	+	+	+	+	+	+	+	-	-	IV	+	-	-	-
Mentha aquatica	+	+	-	+	+	-	-	-	-	-	II	-	-	-	-
Phragmites australis subsp. australis	-	-	-	+	-	-	+	-	-	-	I	+	-	+	-
Scutellaria galericulata	+	-	+	+	+	-	-	-	-	-	II	-	-	-	-

<i>Sium latifolium</i>	-	-	-	-	+	-	-	-	-	-	I	-	-	-	-
<i>Sium sisarum</i> var. <i>lancifolium</i>	-	+	+	-	-	-	-	-	-	-	I	-	+	-	-
<i>Stachys palustris</i>	-	-	+	-	-	-	-	-	-	-	I	-	-	-	-
<i>Thelypteris palustris</i>	-	-	-	+	+	+	+	-	-	-	II	-	-	-	-
<i>Typha angustifolia</i>	-	-	-	+	+	+	-	+	-	-	II	-	-	-	-
<i>Typha latifolia</i>	-	-	-	-	-	-	-	-	+	-	I	+	-	-	-
Galio – Urticetea															
<i>Aegopodium podagraria</i>	-	-	-	-	-	-	-	-	+	+	I	+	+	+	+
<i>Aethusa cynapium</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Calystegia sepium</i>	+	+	+	+	-	-	+	-	-	+	III	+	+	-	-
<i>Chaerophyllum bulbosum</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Eupatorium cannabinum</i>	+	+	+	+	-	+	-	+	+	-	IV	+	+	+	-
<i>Festuca gigantea</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+
<i>Galeopsis speciosa</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+
<i>Galium aparine</i>	+	+	-	+	+	+	+	-	-	-	III	-	-	-	-
<i>Geum urbanum</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	+
<i>Glechoma hederacea</i>	-	-	-	-	-	-	-	-	-	-		-	+	-	+
<i>Lamium maculatum</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+
<i>Lapsana communis</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Rubus caesius</i>	-	-	-	-	-	+	+	1	-	-	I	+	+	4	+
<i>Silene dioica</i>	-	-	-	-	-	-	-	-	+	-	I	-	-	+	-
<i>Tussilago farfara</i>	-	-	-	-	-	-	-	-	+	+	I	+	-	+	-
<i>Urtica dioica</i>	-	-	-	-	-	-	-	-	-	-		+	+	+	1
Salicetea purpureae															
<i>Salix alba</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Salix fragilis</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	+
Aliae															
<i>Arctium lappa</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+
<i>Artemisia vulgaris</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Ballota nigra</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+
<i>Polygonum lapathifolium</i>	-	-	-	-	-	-	-	-	+	-	I	+	-	-	+
<i>Rumex conglomeratus</i>	-	-	-	-	-	-	-	-	-	-		-	-	+	-
<i>Sambucus nigra</i>	-	-	-	-	-	-	-	-	-	-		+	+	-	+
<i>Torilis arvensis</i>	-	-	-	-	-	-	-	-	-	-		-	-	-	+

Place and data of relevés: 1-3: The marshes of Bahna Mare, September, 21, 2008; 4-8: The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008; 9-10: The marshes of Borșeni, July, 18, 2009. 11-12: The marshes of Borșeni, July, 18, 2009; 13: Războieni, along the valley of Tita stream, July, 18, 2009; 14: at south of Borniș, July, 18, 2009



Fig. 9. *Ass. Stellario nemorum – Alnetum glutinosae* Lohmeyer 1957 – the marshes of Borșeni

Ass. *Salicetum purpureae* Wendelberger-Zelinka 1952

Chorology and biotope characteristics. The phytocoenoses of red willow, *Salix purpurea* subsp. *purpurea*, are spread along the lower river meadows, from Bahna Mare marshes, being there at the external limit of the Moldavian sub-Carpathians. On that marshes, the soil coverage with red willow is around 90%. This species establish often bushes on various surfaces, on alluvial soils, on minor bed of streams, nearby the surveyed area.

Species composition and phytocoenotic structure. The communities of *Salix purpurea* subsp. *purpurea* are relatively low structured from phytocoenotic point of view. Besides the edificator species, *Salix purpurea* subsp. *purpurea*, among the characteristic species for higher coenotaxa is present *Salix triandra* subsp. *triandra* only. The majority of the species in the species composition are from the wet meadows surrounding these phytocoenoses, namely zonal meadows (*Molinio-Arrhenatheretea*) or the wet vegetation (*Phragmiti-Magnocaricetea*) etc. (Tab. 3).

Tab. 3. Ass. *Salicetum purpureae* Wendelberger-Zelinka 1952

Surface of relevé (m ²)	100	100
Tree and shrub coverage (%)	90	90
Herbaceous layer coverage (%)	15	50
No. of relevée	1	2
Salicetalia & Salicetea purpureae		
Salix purpurea subsp. purpurea	5	5
Salix triandra subsp. triandra	+	+
Phragmiti – Magnocaricetea		
Berula erecta	+	-
Carex riparia	+	-
Epilobium parviflorum	+	-
Glyceria maxima	-	+
Lycopus europaeus	+	-
Mentha aquatica	-	+
Phragmites australis subsp. australis	-	+
Poa palustris	+	-
Scrophularia umbrosa subsp. umbrosa	+	+
Solanum dulcamara	+	+
Sparganium erectum subsp. erectum	+	-
Molinio – Arrhenatheretea		
Agrostis stolonifera subsp. stolonifera	+	+
Althaea officinalis	-	+
Angelica sylvestris subsp. sylvestris	-	+
Cirsium oleraceum	+	-
Cirsium oleraceum × tuberosum	-	+
Cirsium tuberosum	-	+
Epilobium hirsutum	+	+
Hypericum tetrapterum	+	-
Juncus effusus	+	-
Lysimachia vulgaris	+	-
Lythrum salicaria	+	+
Mentha longifolia	-	+
Potentilla anserina	+	-
Prunella vulgaris	+	-
Ranunculus acris	+	-
Symphytum officinale subsp. officinale	-	+
Taraxacum officinale	+	+
Galio – Urticetea		
Bilderdykia dumetorum	+	-
Calystegia sepium	+	+

Eupatorium cannabinum	+	+
Galium aparine	+	+
Glechoma hederacea	+	-
Urtica dioica	+	3
Artemisietea		
Arctium lappa	-	+
Artemisia vulgaris	-	+
Elymus repens subsp. repens	+	-
Tussilago farfara	+	+
Aliae		
Atriplex patula	+	-
Bidens cernua	+	-
Galeopsis tetrahit	-	+
Polygonum hydropiper	+	+
Rumex conglomeratus	+	-
Sambucus nigra	-	+

Place and data of relevés: 1-2. The marshes of Bahna Mare, September, 21, 2008

Ass. *Carici flavae* – *Eriophoretum latifolii* Soó 1944

Chorology and biotope characteristics. This association has been identified in the marshes of Unghi, Bahna Mare – Bălănești (Fig. 10), and Râșcolnița (Ghigoiești), on surfaces between 20 m² and 100 m². The soils are of swampy types, phytocoenoses being situated on flat lands or on slightly slopes, on weak acid toward neutral soils, and variable nutrient contents.

Species composition and phytocoenotic structure. The species composition of this association vary, with herbaceous layer coverages between 70% and 90%. Besides the edificator species (*Eriophorum latifolium*) and the characteristic one (*Carex flava*), the next species are characteristic for the higher coenotaxa (*Scheuchzerio* – *Caricetea fuscae* class): *Menyanthes trifoliata*, *Dactylorhiza incarnata*, *Carex paniculata* etc.

From the vegetation of wet places (*Phragmiti*–*Magnocaricetea*) there are present some species as: *Thelypteris palustris*, *Phragmites australis* subsp. *australis*, *Carex acutiformis* etc. Zonal meadows vegetation (*Molinio* – *Arrhenatheretea*) is present by some species, as they are: *Filipendula ulmaria* subsp. *ulmaria*, *Angelica sylvestris* subsp. *sylvestris*, *Cirsium rivulare*, *Potentilla erecta*, *Equisetum palustre*, *Succisa pratensis*, *Lathyrus pratensis*, *Selinum carvifolia*, *Ranunculus acris* etc.



Fig. 10. Ass. *Carici flavae* – *Eriophoretum latifolii* Soó 1944 in the marshes of Bahna Mare – Bălănești

Some of the phytocoenoses of this association, namely those from the marshes of Bahna Mare – Bălănești, are dominated by the glacial relict species into the Romania's flora, *Menyanthes trifoliata* (relevées no. 5-10) (Tab. 4). Other rare species in this association are *Carex paniculata* and *Ligularia sibirica*.

Tab. 4. Ass. *Carici flavae – Eriophoretum latifolii* Soó 1944

Surface of relevé (m ²)	20	20	20	20	100	50	50	50	20	20	25	
Coverage (%)	70	70	75	75	90	80	80	70	90	80	85	K
No. of relevée	1	2	3	4	5	6	7	8	9	10	11	
Caricion davalianae, Caricetalia davalianae & Scheuchzerio – Caricetea fuscae												
<i>Eriophorum latifolium</i>	4	4	4	4	3	1	3	2	2	1	3	V
<i>Carex flava</i>	+	+	+	+	+	+	+	+	-	-	+	V
<i>Carex paniculata</i>	-	-	+	-	1	+	+	2	+	1	+	IV
<i>Carex rostrata</i>	-	-	-	-	-	-	-	-	-	-	+	I
<i>Dactylorhiza incarnata</i>	+	-	-	-	+	-	+	+	+	+	-	III
<i>Ligularia sibirica</i>	+	-	+	+	-	-	-	-	-	-	-	II
<i>Menyanthes trifoliata</i>	-	-	-	-	2	3	2	2	2	4	-	III
Phragmiti – Magnocaricetea												
<i>Carex acutiformis</i>	-	+	+	+	+	-	+	1	+	+	-	IV
<i>Carex distans</i>	-	+	-	+	-	-	-	-	-	-	1	II
<i>Carex otrubae</i>	-	-	+	-	-	-	-	-	-	-	-	I
<i>Carex riparia</i>	-	+	+	-	1	5	1	-	+	-	-	III
<i>Eleocharis palustris</i>	-	-	-	-	-	-	-	-	1	-	+	I
<i>Lysimachia punctata</i>	-	+	-	-	-	-	-	-	-	-	+	I
<i>Myosotis scorpioides</i>	-	-	-	-	+	-	-	-	+	-	+	II
<i>Phragmites australis</i> subsp. <i>australis</i>	+	-	+	+	+	2	+	+	1	-	1	V
<i>Symphytum officinale</i> subsp. <i>officinale</i>	-	-	+	-	+	+	1	1	-	-	1	III
<i>Thelypteris palustris</i>	1	+	+	+	+	+	+	+	-	+	-	V
Molinio – Arrhenatheretea												
<i>Agrostis stolonifera</i> subsp. <i>stolonifera</i>	-	-	+	-	-	-	1	+	+	-	+	III
<i>Angelica sylvestris</i> subsp. <i>sylvestris</i>	+	+	-	-	+	+	+	+	+	+	+	V
<i>Caltha palustris</i>	-	-	+	+	+	+	1	-	2	-	1	IV
<i>Carex hirta</i>	-	+	+	+	-	-	+	-	+	-	-	III
<i>Cirsium canum</i>	-	-	-	-	-	+	-	-	+	+	+	II
<i>Cirsium oleraceum</i>	-	+	-	+	-	-	-	+	+	-	-	II
<i>Cirsium rivulare</i>	-	+	+	+	+	-	+	+	+	+	+	V
<i>Dactylorhiza maculata</i> subsp. <i>fuchsii</i>	+	-	-	-	-	-	-	-	-	-	-	I
<i>Equisetum arvense</i>	-	-	-	-	-	-	-	+	-	-	+	I
<i>Equisetum palustre</i>	+	+	+	-	+	+	-	+	1	+	-	IV
<i>Filipendula ulmaria</i> subsp. <i>ulmaria</i>	+	+	-	+	+	+	+	1	1	+	1	V
<i>Galega officinalis</i>	-	-	-	-	+	-	-	-	-	-	-	I
<i>Galium uliginosum</i>	-	+	-	-	-	-	-	-	+	-	+	II
<i>Geranium palustre</i>	-	-	-	+	-	-	+	+	-	-	+	II
<i>Lathyrus pratensis</i>	-	-	-	-	+	-	+	+	+	+	-	III
<i>Linum catharticum</i>	-	-	-	-	-	-	-	-	-	-	+	I
<i>Lychnis flos-cuculi</i>	-	-	-	-	+	-	+	+	+	+	+	III
<i>Lysimachia nummularia</i>	-	-	-	-	-	-	-	1	-	-	+	I
<i>Lysimachia vulgaris</i>	-	-	-	-	+	+	+	-	+	-	-	II
<i>Peucedanum palustre</i>	-	-	-	-	-	+	+	+	-	+	-	II
<i>Potentilla anserina</i>	-	-	-	-	-	+	1	-	-	-	+	II
<i>Potentilla erecta</i>	+	+	+	+	+	+	-	1	+	-	1	V
<i>Ranunculus acris</i>	-	+	+	-	+	-	-	+	-	+	+	III
<i>Ranunculus repens</i>	-	-	+	-	-	-	-	-	+	-	1	II
<i>Scirpus sylvaticus</i>	-	+	-	-	+	-	-	-	1	-	+	II
<i>Selinum carvifolia</i>	+	+	-	+	+	+	-	-	-	-	+	III
<i>Succisa pratensis</i>	+	+	+	+	+	-	-	-	-	-	+	III
<i>Trifolium pratense</i>	-	-	-	-	-	-	-	+	1	-	+	II

Valeriana officinalis	-	+	-	-	+	+	-	+	-	-	+	III
Aliae												
Eupatorium cannabinum	-	+	-	-	-	-	-	-	+	-	+	II
Geranium phaeum	-	+	+	+	-	-	-	+	+	-	-	III
Salix cinerea (juv.)	+	+	+	+	+	+	+	+	-	-	-	IV
Salix purpurea subsp. purpurea (juv.)	-	-	-	-	-	+	+	-	-	-	-	I

Place and data of relevés: 1-4. The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008; 5-10. The marshes of Bahna Mare-Bălănești, May, 24, 2009; 11. The marshes of Râșcolnița (Ghigoiești), May, 24, 2009

Ass. *Scirpetum sylvatici* Ralski 1931 (Syn.: *Scirpetum sylvatici* Schwickerath 1944; *Scirpetum sylvatici* Maloch 1935)

Chorology and biotope characteristics. The phytocoenoses of *Scirpetum sylvatici* association have been identified on the marshes near Borniș village, along the stream valley “Obârșia”, and in the marshes near Unghi village. These phytocoenoses are installed along the stream valleys or even on the stream banks in the surveyed area, on alluvial, pseudogleyic and gleyic soils, wet or low flooded.

Species composition and phytocoenotic structure. In species composition, the edificator species is *Scirpus sylvaticus*. From *Molinietalia* et *Molinio* – *Arrhenatheretea*, there are present about 68% of the total species, as: *Mentha longifolia*, *Angelica sylvestris* subsp. *sylvestris*, *Mentha arvensis*, *Agrostis stolonifera* subsp. *stolonifera*, etc. From the vegetation of wet zones (*Phragmiti* – *Magnocaricetea*), there are present about 19% of species in the species composition (*Mentha aquatica*, *Carex riparia*, *C. vulpina*, *Glyceria fluitans*, *Symphytum officinale* subsp. *officinale*, etc.) (Tab. 5, rel. 1-3).

Tab. 5. Ass. *Scirpetum sylvatici* Ralski 1931 (rel. 1-3); Ass. *Caltho laetae* – *Ligularietum sibiricae* Ștefan et al. 2000 (rel. 4-10); Ass. *Angelico* – *Cirsietum oleracei* R. Tx. 1937 (rel. 11-13); Ass. *Deschampsietum cespitosae* Hayek ex Horvatic 1930 (rel. 14-16); Ass. *Pastinaco sativae* – *Arrhenatheretum elatioris* Passarge 1964 (rel. 17-18)

Surface of relevé (m ²)	25	25	50	50	25	25	50	50	25	50	50	50	25	25	25	25	25			
Coverage (%)	100	100	100	95	85	90	80	95	85	90	K	95	75	75	100	100	100	100		
No. of relevée	1	2	3	4	5	6	7	8	9	10		11	12	13	14	15	16	17	18	
Calthion																				
<i>Scirpus sylvaticus</i>	5	5	5	-	-	-	+	-	-	+	II	-	+	-	-	-	-	-	-	
<i>Caltha palustris</i>	-	-	+	+	+	-	+	+	+	+	V	-	+	-	-	-	-	-	-	
<i>Cirsium oleraceum</i>	-	-	-	+	-	+	-	-	-	-	II	4	3	2	-	-	-	-	-	
<i>Juncus articulatus</i>	-	-	-	-	-	-	+	+	-	-	II	-	-	+	-	-	-	-	-	
Deschampsion																				
<i>Deschampsia cespitosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5	5	-	-	
subsp. <i>cespitosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Juncus effusus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	
Molinietalia																				
<i>Angelica palustris</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
<i>Angelica sylvestris</i> subsp. <i>sylvestris</i>	+	-	-	+	1	+	+	+	+	+	V	+	+	+	+	+	-	-	-	
<i>Cirsium rivulare</i>	-	-	-	-	-	+	+	+	+	+	IV	-	-	-	+	+	+	-	-	
<i>Epilobium hirsutum</i>	+	-	-	-	-	-	-	-	-	-	V	+	+	-	-	-	-	-	-	
<i>Equisetum palustre</i>	-	-	+	3	3	2	3	3	2	2	V	+	+	-	-	-	-	-	-	
<i>Galium uliginosum</i>	-	-	-	-	-	+	+	+	+	-	III	-	-	-	+	+	+	-	-	
<i>Myosotis scorpioides</i>	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	

PHYTOCOENOTIC SURVEYS ON SOME MESOTROPHIC - EUTROPHIC MARSHES IN ...

Arrhenatherion & Arrhenatheretalia																	
Arrhenatherum elatius subsp. elatius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5
Achillea millefolium	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+
Centaurea phrygia subsp. phrygia	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-
Galium mollugo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Heracleum sphondylium subsp. sphondylium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Holcus lanatus	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-
Leontodon autumnalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Trifolium pratense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Trifolium repens	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	+
Molinio – Arrhenatheretea																	
Agrostis stolonifera subsp. stolonifera	-	+	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-
Alopecurus geniculatus	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Carex distans	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex hirta	-	+	+	-	-	-	-	-	-	+	-	-	+	+	+	-	-
Centaurea jacea	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-
Cerastium fontanum	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chaerophyllum hirsutum	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Cirsium palustre	-	-	-	-	-	-	-	-	+	I	-	-	-	-	-	-	-
Cirsium tuberosum	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+
Coronilla varia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Cuscuta epithymum subsp. trifolii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Epipactis palustris	-	-	-	-	+	-	+	-	+	+	III	-	-	-	-	-	-
Equisetum arvense	-	+	-	-	-	-	-	-	+	I	+	+	+	+	+	1	+
Festuca arundinacea	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-
Festuca pratensis	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-
Filipendula ulmaria subsp. ulmaria	-	-	-	1	+	+	+	+	+	+	V	+	2	3	-	-	-
Galium palustre	-	-	-	-	+	-	-	-	-	-	I	-	-	-	-	-	-
Geranium palustre	-	-	-	+	+	+	-	-	+	-	III	+	-	+	-	-	+
Hypericum tetrapterum	-	-	+	-	-	-	-	-	+	+	II	-	+	-	-	-	-
Inula britannica	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-
Lathyrus pratensis	-	-	+	-	-	-	1	1	+	-	III	-	-	+	-	-	+
Leucanthemum vulgare	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Lotus corniculatus	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lychnis flos-cuculi	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lysimachia vulgaris	-	-	-	+	1	1	+	+	+	+	V	+	+	+	-	-	-
Lythrum salicaria	+	-	-	-	+	-	+	+	-	+	III	+	+	-	-	-	-
Lythrum virgatum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-
Mentha arvensis	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mentha longifolia	+	+	1	-	-	-	-	-	+	I	1	1	1	+	+	+	+
Mentha verticillata	-	-	-	+	-	+	+	+	-	+	IV	-	-	+	-	-	-
Myosoton aquaticum	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Odontites verna subsp. verna	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Phleum pratense subsp. nodosum	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-
Plantago major	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poa hybrida	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-
Potentilla anserina	-	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+	-
Potentilla erecta	-	-	-	-	-	-	-	+	-	-	I	-	-	-	-	-	-
Potentilla reptans	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	+	+
Ranunculus acris	-	+	+	+	+	-	+	+	-	+	III	+	+	-	-	-	+
Ranunculus repens	-	+	+	-	-	-	-	-	+	I	-	+	-	-	-	-	+
Rumex crispus	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Scutellaria galericulata	-	-	-	-	-	-	+	-	+	-	II	-	-	-	-	-	-	-	-
Selinum carvifolia	-	-	-	+	-	-	+	+	+	+	IV	+	+	-	-	-	-	-	-
Succisa pratensis	-	-	-	-	-	-	+	+	+	+	III	-	-	-	-	-	-	-	-
Taraxacum officinale	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Valeriana officinalis	-	-	-	+	+	-	+	+	+	+	V	-	-	+	+	+	+	-	-
Scheuchzerio – Caricetea fuscae																			
Ligularia sibirica	-	-	-	2	2	2	2	2	2	2	V	-	-	-	-	-	-	-	-
Carex flava	-	-	-	+	-	-	-	-	-	+	III	-	-	-	-	-	-	-	-
Carex paniculata	-	-	-	+	-	+	+	-	-	-	III	-	-	-	-	-	-	-	-
Dactylorhiza incarnata	-	-	+	+	+	-	-	-	-	+	III	-	-	-	-	-	-	-	-
Eriophorum latifolium	-	-	-	-	-	-	-	-	-	+	II	-	-	-	-	-	-	-	-
Phragmiti – Magnocaricetea																			
Berula erecta	-	-	-	-	-	-	-	-	-	+	I	-	-	-	-	-	-	-	-
Carex acutiformis	-	-	+	-	-	-	-	-	-	+	I	-	-	-	1	1	1	-	-
Carex riparia	-	+	+	2	1	2	-	2	3	3	V	+	+	+	-	-	-	-	-
Carex vulpina	-	+	+	-	-	-	-	-	-	+	I	-	-	-	-	-	-	-	-
Glyceria fluitans	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lycopus europaeus	-	-	-	-	-	-	-	-	-	+	I	-	-	-	+	+	+	-	-
Mentha aquatica	+	-	+	-	-	-	-	-	-	-	-	-	-	-	1	1	1	+	+
Phragmites australis subsp. australis	-	-	-	-	-	+	-	-	-	+	II	-	-	-	-	-	-	-	-
Rumex stenophyllus	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrophularia umbrosa	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Sium sisarum var. lancifolium	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Symphytum officinale	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-
Thelypteris palustris	-	-	-	1	1	1	1	1	1	+	V	-	-	-	-	-	-	-	-
Typha angustifolia	-	-	-	-	+	-	-	-	-	-	I	-	-	-	-	-	-	-	-
Alnetea glutinosae																			
Alnus glutinosa (juv.)	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Frangula alnus	-	-	-	-	-	+	+	-	-	-	II	-	-	-	-	-	-	-	-
Salix cinerea	-	-	-	1	+	+	+	+	+	+	V	-	-	-	+	+	+	-	-
Galio – Urticetea																			
Aegopodium podagraria	-	-	-	-	-	-	-	-	-	+	I	+	-	-	-	-	-	-	-
Bilderdykia dumetorum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Calystegia sepium	+	-	-	+	-	-	-	-	-	-	I	-	-	-	-	-	-	-	-
Eupatorium cannabinum	+	-	-	+	1	2	1	1	+	+	V	2	+	-	1	+	+	-	-
Galium aparine	-	-	-	+	+	-	-	-	-	-	II	+	+	+	-	-	-	-	-
Glechoma hederacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Urtica dioica	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-
Aliae																			
Arctium tomentosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Bidens tripartita	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Chaerophyllum aromaticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Cirsium arvense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Cirsium vulgare	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-
Daucus carota	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-
Erigeron annuus subsp. annuus	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Lavatera thuringiaca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Plantago lanceolata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-
Plantago media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Ranunculus polyanthemus subsp. polyanthemoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+
Rosa canina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Rumex conglomeratus	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Rumex obtusifolius subsp. sylvestris	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Salix triandra subsp. triandra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-



Fig. 11. Ass. *Caltho laetae* – *Ligularietum sibiricae* in marshes near Unghi village

Ass. *Angelico* – *Cirsietum oleracei* R. Tx. 1937

Chorology and biotope characteristics. The higrophyllous phytocoenoses of this association have been identified in the marshes of Borșeni (Fig. 12), along the stream valley called “Valea Albă”, on alluvial, pseudogleyic or even brown-acid soils, being wet or excess moistured (flooded sometimes), and rich in nutrients as a rule.

Species composition and phytocoenotic structure. The dominant characteristic species in our phytocoenoses is *Cirsium oleraceum*, while *Angelica sylvestris* subsp. *sylvestris* is only present (+) in those three relevées.

Besides those higro- and meso-higrophyllous species there are present other plants having the same ecological preferences, like the next ones: *Juncus articulatus*, *Mentha longifolia*, *Filipendula ulmaria* subsp. *ulmaria*, *Geranium palustre*, *Scirpus sylvaticus*, *Carex riparia*, and so on.



Fig. 12. Ass. *Angelico* – *Cirsietum oleracei* R. Tx. 1937 in the marshes of Borșeni

In the phytocoenotic structure of these association one can remark some characteristic species for *Calthion* (*Caltha palustris* and *Juncus articulatus*), *Molinieta* et *Molinio–Arrhenatheretea* (*Lysimachia vulgaris*, *Agrostis stolonifera*, *Selinum carvifolia*,

Carex hirta etc.) or from *Phragmiti – Magnocaricetea* (*Carex riparia*, *Sium sisarum* var. *lancifolium* etc.). The phytocoenoses are in contact with other plant communities, which explain the presence of species from other coenotaxa, as: *Galium aparine*, *Urtica dioica*, *Aegopodium podagraria* etc. *Eupatorium cannabinum* and *Filipendula ulmaria* subsp. *ulmaria* have important values of soil coverage in some of the phytocoenoses (up to 20%) (Tab. 5, rel. 11-13).

Ass. *Deschampsietum cespitosae* Hayek ex Horvatic 1930 (Syn.: *Deschampsietum cespitosae* Rübél 1911)

Chorology and biotope characteristics. Few phytocoenoses of this association have been identified in the marshes of Bahna Mare–Bălănești, located on microdepressions, on alluvial or pseudogleyic soils, being wet or excess moistured (flooded sometimes).

Species composition and phytocoenotic structure. The characteristic species, *Deschampsia cespitosa* subsp. *cespitosa*, achieve soil coverages between 75% and 100%, giving a typical aspect of these phytocoenoses.

Besides this, other species are characteristic for *Molinietalia* et *Molinio–Arrhenatheretea* (e. g. *Cirsium rivulare*, *Myosotis scorpioides*, *Galium uliginosum*, *Cirsium tuberosum*, *Equisetum arvense*, *Mentha longifolia* and so on). Other species are from *Phragmiti – Magnocaricetea*, indicating a high moisture or even flooded periods (e. g. *Carex acutiformis*, *Mentha aquatica*, *Lycopus europaeus* etc.), but also from other vegetation classes (Tab. 5, rel. 14-16).

Ass. *Arrhenatheretum elatioris* Scherrer 1925

Chorology and biotope characteristics. Two phytocoenoses of this association have been identified on the marshes of Bahna Mare – Bălănești, on small surfaces. Those phytocoenoses are installed on wet and fertile, brown soils, neutral to weak acids.

Species composition and phytocoenotic structure. *Arrhenatherum elatius* subsp. *elatius* is both a characteristic and a dominant plant in those two phytocoenoses, having a soil coverage up to 100%. Some of the companion species are from the meso-higrophyllous meadows in surroundings, belonging to *Arrhenatheretalia* order and *Molinio–Arrhenatheretea* class, e. g.: *Achillea millefolium*, *Leontodon autumnalis*, *Trifolium pratense*, *T. repens*, *Lathyrus pratensis*, *Angelica palustris*, and so forth. Other species are characteristics for the ruderal vegetation, especially from *Artemisietea* class, e. g.: *Arctium tomentosum*, *Erigeron annuus* subsp. *annuus* etc. The phytocoenoses of this association host some rare plant species in the Moldavia's flora, as *Angelica palustris* and *Cirsium tuberosum* (Tab. 5, rel. 17-18).

Ass. *Caricetum ripariae* (Soó 1928) Knapp et Stoffer 1962
– *typicum*

Chorology and biotope characteristics. This association has been identified in the marshes of Bahna Mare – Bălănești and on the marshes near the village of Unghi, on the stream valley “Valea Albă”. The phytocoenoses are developed on flat and swampy lands, having a humidity in excess during the spring or in autumn. The soils are weak acid to neutral ones.

Species composition and phytocoenotic structure. The characteristic species of this association, *Carex riparia* and *C. acutiformis*, cover the soil in rates ranging between 50% to 90%, respectively 5% to 20%. Though the number of species is fairly high, almost all of them have low indexes of AD (+ to 2).

Some of the species belong to *Caricenion gracilis* and *Magnocaricion elatae* (*Cirsium canum*, *Lythrum salicaria*, *Galium palustre*, *G. uliginosum*, *Thelypteris palustris*, *Peucedanum palustre*, *Carex rostrata*) indicating the acidity features of the soils. Other species belong to *Phragmiti – Magnocaricetea* class, indicating a humidity in excess of the soils (e. g.: *Lythrum salicaria*, *Phragmites australis* subsp. *australis*, *Mentha aquatica*, *Typha angustifolia*, *Symphytum officinale* subsp. *officinale*, and so on.). From the meso-higrophyllous vegetation in surroundings (*Molinio – Arrhenatheretea* class), often penetrate into these phytocoenoses some species, as: *Filipendula umaria* subsp. *ulmaria*, *Lysimachia vulgaris*, *Valeriana officinalis*, *Angelica sylvestris* subsp. *sylvestris*, *Caltha palustris*, *Selinum carvifolia*, *Cirsium rivulare* etc.). The main rare species into the Moldavia's flora, which are present in these phytocoenoses, are: *Angelica palustris*, *Carex paniculata*, *Ligularia sibirica*, *Menyanthes trifoliata*, *Thelypteris palustris*, and *Salix rosmarinifolia* (Tab. 6, rel. 1-10).

Ass. *Caricetum rostratae* Rübél 1912

Chorology and biotope characteristics. This association has been identified by two phytocoenoses only, in the marshes of Unghi, on the stream valley “Valea Albă”. Those two phytocoenoses are developed in microdepressions, on swampy places, on soils having a moderately acid pH.

Species composition and phytocoenotic structure. In the phytocoenotic structure there are present few species, the dominant and characteristic one being *Carex rostrata*. Other species, characteristics for wet places (*Magnocaricion elatae & Magnocaricetalia* and *Phragmiti – Magnocaricetea*), are the next ones: *Lythrum salicaria*, *Equisetum palustre*, *Typha angustifolia*, and *Mentha aquatica*. From the higo-mesophyllous meadows in surroundings there are present species belonging to *Molinio – Arrhenatheretea* class (e. g. *Ranunculus acris*, *Caltha palustris*, *Lysimachia vulgaris*, and so on) (Tab. 6, rel. 11-12).

Tab. 6. Ass. *Caricetum ripariae* (Soó 1928) Knapp et Stoffer 1962 *typicum* (rel. 1-10);
Ass. *Caricetum rostratae* Rübél 1912 (rel. 11-12)

Surface of relevé (m ²)	50	50	50	50	25	25	25	25	20	20	20	20	
Coverage (%)	75	85	100	100	90	100	100	85	100	70	K	95	85
No. of relevée	1	2	3	4	5	6	7	8	9	10		11	12
Magnocaricion elatae & Magnocaricetalia													
<i>Carex riparia</i>	3	4	5	5	5	5	5	4	5	3	V	-	-
<i>Carex acutiformis</i>	-	1	1	+	1	+	+	+	+	2	V	-	-
<i>Carex rostrata</i>	-	-	-	-	-	-	-	-	-	-		5	5
<i>Cirsium canum</i>	2	-	+	+	-	-	-	-	-	+	II	-	-
<i>Galium palustre</i>	-	-	+	-	-	-	-	-	-	-	I	-	-
<i>Galium uliginosum</i>	-	-	-	+	-	+	+	-	-	-	II	-	-
<i>Lythrum salicaria</i>	+	+	+	+	+	+	+	+	+	-	V	+	+
<i>Thelypteris palustris</i>	-	-	-	+	-	-	-	-	+	+	II	-	-
Phragmiti – Magnocaricetea													
<i>Berula erecta</i>	-	-	-	-	-	-	+	-	+	-	I	-	-
<i>Carex vulpina</i>	+	-	+	+	-	+	-	-	-	-	II	-	-
<i>Epilobium parviflorum</i>	+	-	-	-	+	-	-	-	-	-	I	-	-

PHYTOCOENOTIC SURVEYS ON SOME MESOTROPHIC - EUTROPHIC MARSHES IN ...

Equisetum palustre	+	+	+	+	-	+	-	+	-	+	IV	+	+
Lycopus europaeus	-	-	-	-	+	+	+	-	-	-	II	-	-
Mentha aquatica	+	-	+	-	+	+	-	+	+	-	III	+	+
Mentha arvensis	+	-	-	-	-	-	-	-	-	-	I	-	-
Mentha longifolia	+	+	-	-	-	+	+	-	+	-	III	-	-
Myosotis scorpioides	-	+	-	-	-	+	-	-	+	-	II	-	-
Phragmites australis subsp. australis	-	+	-	+	+	-	-	-	+	+	III	-	-
Sium sisarum var. lancifolium	+	-	-	-	-	-	-	-	-	-	I	-	-
Stachys palustris	-	+	-	+	-	-	-	-	-	-	I	-	-
Symphytum officinale subsp. officinale	-	+	+	-	-	-	-	-	-	-	I	-	-
Typha angustifolia	-	-	-	-	+	-	+	-	+	-	II	+	+
Veronica beccabunga	-	-	-	-	-	-	-	-	+	-	I	-	-
Molinio – Arrhenatheretea													
Agrostis stolonifera subsp. stolonifera	-	+	-	-	+	+	+	+	-	-	III	-	-
Angelica palustris	-	-	-	+	-	-	-	-	-	-	I	-	-
Angelica sylvestris subsp. sylvestris	+	+	+	+	+	-	+	+	-	+	IV	-	-
Caltha palustris	-	-	-	+	-	+	+	+	+	+	III	I	-
Cardamine amara	-	-	-	-	-	+	-	-	-	-	I	-	-
Carex distans	-	-	-	+	-	+	-	-	-	-	I	-	-
Carex echinata	-	-	-	-	-	-	-	-	+	-	I	-	-
Carex flava	-	-	-	+	-	-	-	-	-	-	I	-	-
Carex hirta	-	-	+	-	-	+	-	+	-	+	II	-	-
Carex vesicaria	-	-	-	-	-	-	-	-	+	-	I	-	-
Cirsium oleraceum	-	I	-	-	-	-	+	+	+	-	II	-	-
Cirsium rivulare	-	-	-	+	-	-	+	+	+	+	III	-	-
Cirsium tuberosum	-	+	-	-	-	-	-	-	-	-	I	-	-
Dactylorhiza maculata subsp. fuchsii	-	-	-	-	-	-	-	+	-	+	I	-	-
Deschampia cespitosa subsp. cespitosa	I	-	-	-	-	-	-	-	-	-	I	-	-
Equisetum arvense	-	-	-	-	I	+	+	-	-	-	II	-	-
Eupatorium cannabinum	-	+	-	-	+	+	-	-	-	-	II	-	-
Festuca pratensis	-	-	-	+	-	-	-	-	-	-	I	-	-
Filipendula ulmaria subsp. ulmaria	+	+	+	+	-	-	+	+	+	+	IV	-	-
Galium mollugo	-	+	+	-	-	-	-	-	-	-	I	-	-
Geranium palustre	-	-	-	+	-	-	-	+	-	+	II	-	-
Juncus articulatus	-	-	-	+	-	-	-	-	-	-	I	-	-
Juncus gerardi	-	-	-	+	-	-	-	-	-	-	I	-	-
Lathyrus pratensis	+	-	+	+	-	-	-	+	-	+	III	-	-
Linum catharticum	-	-	-	-	-	-	-	-	-	+	I	-	-
Lychnis flos-cuculi	-	-	+	-	-	+	+	-	+	+	III	-	-
Lysimachia nummularia	-	-	-	-	-	+	-	-	-	-	I	-	-
Lysimachia punctata	-	-	-	-	-	-	+	-	-	-	I	-	-
Lysimachia vulgaris	+	-	+	-	-	+	+	-	-	-	II	+	+
Molinia caerulea	-	-	-	+	-	-	-	-	-	-	I	-	-
Peucedanum palustre	-	-	-	+	-	-	-	-	+	-	I	-	-
Poa pratensis	-	-	+	-	-	-	-	-	-	-	I	-	-
Potentilla anserina	+	+	+	-	-	+	-	-	-	-	II	-	-
Potentilla erecta	-	-	-	-	-	-	-	-	+	+	I	-	-
Potentilla reptans	-	-	+	-	-	-	-	-	-	-	I	-	-
Ranunculus acris	-	-	-	+	-	+	+	-	+	+	III	+	+
Ranunculus repens	+	-	+	-	-	+	+	+	-	-	III	+	-
Ranunculus sceleratus	-	-	-	-	-	-	-	-	+	-	I	-	-
Rumex acetosa	-	-	+	-	-	-	-	-	-	-	I	-	-
Scirpus sylvaticus	-	+	+	+	-	+	I	-	-	-	III	-	-
Scrophularia umbrosa subsp. umbrosa	-	-	+	+	+	+	-	+	+	-	III	-	-
Selinum carvifolia	+	-	+	+	-	-	-	-	+	+	III	-	-
Serratula tinctoria	-	-	-	+	-	-	-	-	-	-	I	-	-
Succisa pratensis	-	-	-	-	-	-	-	-	+	-	I	-	-
Thalictrum lucidum	-	-	-	+	-	-	-	-	-	-	I	-	-
Trifolium hybridum	+	-	-	+	-	-	-	-	-	-	I	-	-
Valeriana officinalis	+	+	+	-	+	+	+	+	+	+	V	+	+

Valeriana sambucifolia	+	-	-	-	-	-	-	-	-	-	I	-	-
Vicia cracca	-	+	-	-	-	-	-	-	-	-	I	-	-
Vicia sepium	+	-	-	-	-	-	-	-	-	-	I	-	-
Scheuchzerio-Caricetea fuscae													
Carex paniculata	-	-	+	+	-	+	-	+	+	1	III	+	-
Dactylorhiza incarnata	-	-	+	-	-	+	+	+	+	-	III	-	-
Eriophorum latifolium	-	-	-	-	-	-	-	+	+	+	II	-	-
Ligularia sibirica	-	-	-	-	+	+	-	1	-	-	II	-	-
Menyanthes trifoliata	-	-	-	-	-	-	-	-	-	+	I	-	-
Aliae													
Calamagrostis epigejos	-	+	-	-	-	-	-	-	-	-	I	-	-
Calystegia sepium	+	+	-	+	-	-	-	-	-	-	II	-	-
Carex pairaei	-	-	-	+	-	-	-	-	-	-	I	-	-
Erigeron annuus subsp. annuus	-	+	-	-	-	-	-	-	-	-	I	-	-
Galium aparine	+	+	-	-	+	+	-	+	+	-	III	-	-
Galium verum	-	-	-	+	-	-	-	-	-	-	I	-	-
Polygonum hydropiper	-	+	-	-	-	-	-	-	-	-	I	-	-
Ranunculus polyanthemoides	+	-	-	-	-	-	-	-	-	-	I	-	-
Salix cinerea (juv.)	-	-	+	+	+	+	+	+	+	+	IV	+	+
Salix purpurea subsp. purpurea (juv.)	-	-	-	-	-	-	-	-	-	+	I	-	-
Salix rosmarinifolia	-	-	-	+	-	-	-	-	-	-	I	-	-

Place and data of relevés: 1-4: The marshes of Bahna Mare, 21.09.2008; 5-10: The marshes of Unghi, on the stream valley "Valea Albă", September, 21, 2008; 11-12: The marshes of Unghi, on the stream valley "Valea Albă", September, 21, 2008

Ass. *Phragmitetum vulgaris* Soó 1927 (Syn.: *Scirpo* – *Phragmitetum* Koch 1926; *Schoenoplecto* – *Phragmitetum communis* (Koch 1926) Egger 1961; *Scirpeto* – *Phragmitetum medioeuropaeum* (Koch 1926) R. Tx. in R. Tx. et Preising 1942; *Scirpo* – *Phragmitetum phragmitetosum* Soó 1957)

Chorology and biotope characteristics. Some surfaces with reed (*Phragmites australis* subsp. *australis*) are spread out in the marshes of Bahna Mare – Bălănești and in the marshes near the village of Unghi, on the stream valley called "Valea Albă", on flat lands, along the stream banks, the lands being most of the time flooded.

Species composition and phytocoenotic structure. The species composition is dominated by the characteristic species, *Phragmites australis* subsp. *australis*, which makes nearly pure stands in the surveyed area, achieving a soil coverage between 80% and 95%. Other characteristic species for the alliance *Phragmition* and order *Phragmitetalia* are the next ones: *Typha angustifolia*, *Lycopus europaeus*, *Berula erecta*, *Mentha aquatica*, *Scutellaria galericulata*, *Alisma plantago-aquatica*, *Eleocharis palustris*, *Galium palustre*, and *Stachys palustris*. From *Magnocaricion elatae* & *Magnocaricetalia* one can remark the next species: *Symphytum officinale* subsp. *officinale*, *Carex acutiformis*, but especially *Carex riparia* (this one achieving soil coverages between 5% and 20%). Other species are characteristics for the meso-hygrophillous vegetation in surroundings, *Molinio-Arrhenatheretea* class (e. g.: *Eupatorium cannabinum*, *Valeriana officinalis*, *Angelica sylvestris* subsp. *sylvestris*, *Galega officinalis*, *Filipendula ulmaria* subsp. *ulmaria*, *Caltha palustris*, *Agrostis stolonifera* subsp. *stolonifera* etc.). *Ligularia sibirica* is also present in this association, in a single relevée (Tab. 7, rel. 1-3).

Ass. *Typhetum angustifoliae* Pignatti 1953 (Syn.: *Typhetum angustifoliae* Soó 1927; *Typhetum angustifolio - latifoliae* Schmale 1939 p. p.)

Chorology and biotope characteristics. The phytocoenoses of this association are settled down on the marshes of Bahna Mare – Bălănești and the marshes near the village of Unghi, on the stream valley “Valea Albă”. The water layer has a more or less permanent feature.

Species composition and phytocoenotic structure. The soil coverage of the vegetation are ranging between 90% and 100% in our relevés. The characteristic species, *Typha angustifolia*, is the dominant one in the phytocoenoses, achieving coverage indices between 65% and 75%. Among the characteristics species for the higher coenotaxa one can remark *Carex riparia* and *C. acutiformis* (with coverage of 20-30%), and *Lycopus europaeus* (with a constantly presence into our relevés). The zonal meso-hygrophyllous vegetation of *Molinio – Arrhenatheretea* class is represented by the presence of the next species: *Lythrum salicaria*, *Cirsium oleraceum*, *Equisetum arvense*, *Angelica sylvestris* subsp. *sylvestris*, *Filipendula ulmaria* subsp. *ulmaria*, *Lysimachia vulgaris*, and so on (Tab. 7, rel. 4-6).

Ass. *Glycerietum maximae* Hueck 1931

Chorology and biotope characteristics. Some phytocoenoses of this association are installed on the marshes of Bahna Mare – Bălănești and the marshes of Unghi, along the stream valley “Valea Albă”. These communities are developed in still waters or, seldom, low running waters, rich in nutrients, being situated especially near the edge marshes, or in those soil microdepressions, with a low and fluctuating water level.

Species composition and phytocoenotic structure. The phytocoenotic composition is dominated by *Glyceria maxima*, with a soil coverage ranging between 75% and 95%. Other plant species belong to the wet vegetation (*Phragmiti-Magnocaricetea* class, namely: *Typhoides arundinacea*, *Alisma plantago-aquatica*, *Sium sisarum* var. *lancifolium*, *Mentha aquatica*, *Symphytum officinale* subsp. *officinale*, *Polygonum amphibium* f. *terrestre*, *Myosotis scorpioides* etc.). Some species are from the meso-hygrophyllous vegetation of the zonal meadows, namely *Molinio – Arrhenatheretea* class, e. g.: *Ranunculus repens*, *Dactylis glomerata* subsp. *glomerata*, and so on (Tab. 7, rel. 7-9).

Tab. 7. Ass. *Phragmitetum vulgaris* Soó 1927 (rel. 1-3); Ass. *Typhetum angustifoliae* Pignatti 1953 (rel. 4-6); Ass. *Glycerietum maximae* Hueck 1931 (rel. 7-9)

Surface of relevé (m ²)	50	100	50	50	100	25	25	50	4
Coverage (%)	90	95	100	90	70	85	95	90	85
No. of relevée	1	2	3	4	5	6	7	8	9
Phragmition									
Phragmites australis subsp. australis	4	5	5	-	-	-	-	-	-
Typha angustifolia	-	+	-	4	4	4	-	-	-
Glyceria maxima	-	-	-	-	-	-	5	5	5
Berula erecta	-	+	-	-	-	-	-	-	-
Lycopus europaeus	+	+	+	+	+	+	-	-	-
Sium sisarum var. lancifolium	-	-	-	+	-	-	+	-	-
Sparganium erectum subsp. erectum	-	-	-	-	-	+	-	-	-

Phragmitetalia									
Alisma plantago-aquatica	-	+	-	-	-	-	-	-	+
Eleocharis palustris	-	+	-	-	-	-	-	-	-
Galium palustre	-	+	-	+	+	-	-	-	-
Mentha aquatica	+	+	+	+	-	-	1	-	-
Scutellaria galericulata	+	-	+	+	-	-	-	-	-
Stachys palustris	-	+	-	-	+	-	-	+	-
Typha latifolia	-	-	-	-	-	-	-	+	-
Typhoides arundinacea	-	-	-	-	-	-	-	+	-
Phragmiti – Magnocaricetea									
Carex acutiformis	+	-	+	2	-	+	-	-	-
Carex riparia	2	-	1	1	+	2	-	-	-
Carex vulpina	+	-	-	-	-	-	-	-	-
Epilobium hirsutum	-	-	-	+	-	-	+	-	-
Myosotis scorpioides	-	-	-	-	-	-	-	-	+
Poa palustris	-	-	-	-	-	-	-	-	+
Polygonum amphibium f. terrestre	-	-	-	+	-	-	+	-	-
Scrophularia umbrosa subsp. umbrosa	-	+	-	+	+	-	+	+	-
Symphytum officinale subsp. officinale	+	+	-	+	+	-	+	+	-
Thelypteris palustris	-	-	+	-	-	-	-	-	-
Veronica beccabunga	-	-	-	-	-	-	-	-	+
Molinio – Arrhenatheretea									
Agrostis stolonifera subsp. stolonifera	-	+	-	-	-	-	-	-	-
Althaea officinalis	-	-	-	+	-	-	+	-	-
Angelica sylvestris subsp. sylvestris	+	-	+	+	-	-	-	-	-
Caltha palustris	-	+	-	-	+	-	-	-	-
Cirsium oleraceum	-	-	-	+	-	-	-	-	-
Cirsium palustre	-	-	+	-	-	-	-	-	-
Cirsium tuberosum	+	-	-	+	-	-	+	-	-
Dactylis glomerata subsp. glomerata	-	-	-	-	-	-	+	-	-
Epipactis palustris	-	-	+	-	-	-	-	-	-
Equisetum arvense	-	+	+	+	-	+	-	-	-
Filipendula ulmaria subsp. ulmaria	-	-	+	-	-	+	-	-	-
Galega officinalis	+	-	-	-	-	-	-	-	-
Geranium palustre	+	-	+	-	-	-	-	-	-
Juncus inflexus	-	-	-	-	-	-	-	-	+
Lysimachia vulgaris	+	+	+	+	+	+	-	-	-
Lythrum salicaria	-	-	-	+	-	+	-	-	-
Mentha arvensis	+	-	-	-	-	-	-	-	-
Mentha longifolia	+	+	+	-	-	-	+	-	-
Peucedanum palustre	-	-	+	-	-	-	-	-	-
Potentilla anserina	-	+	+	-	-	-	+	-	-
Potentilla erecta	-	-	+	-	-	-	-	-	-
Potentilla reptans	-	-	-	-	-	-	-	+	-
Ranunculus repens	-	-	-	-	+	-	-	+	+
Ranunculus sardous	-	-	-	-	-	-	-	-	+
Rorippa sylvestris	-	-	-	-	+	-	-	-	-
Selinum carvifolia	+	-	+	-	-	-	-	-	-
Succisa pratensis	-	-	+	-	-	-	-	-	-
Valeriana officinalis	+	+	-	-	+	-	-	-	-
Valeriana sambucifolia	+	-	-	-	-	-	-	-	-
Galio – Urticetea									
Calystegia sepium	+	+	-	+	-	+	+	+	-
Eupatorium cannabinum	+	+	+	-	-	-	+	-	-
Galeopsis speciosa	-	-	-	-	-	-	+	-	-
Galium aparine	+	+	-	+	-	+	+	-	-
Glechoma hederacea	-	-	-	-	-	-	+	-	-
Solanum dulcamara	-	+	-	+	-	-	-	+	-
Urtica dioica	+	+	-	+	+	-	+	-	-
Aliae									
Alnus glutinosa	-	-	+	-	-	+	-	-	-

PHYTOCOENOTIC SURVEYS ON SOME MESOTROPHIC - EUTROPHIC MARSHES IN ...

Arctium lappa	-	-	-	+	-	-	-	-	-
Ballota nigra	-	-	-	-	-	-	+	-	-
Cirsium arvense	-	-	-	-	-	-	+	-	-
Galium mollugo	-	-	+	-	-	-	-	-	-
Ligularia sibirica	-	-	+	-	-	-	-	-	-
Rumex sanguineus	-	-	-	-	-	-	+	-	-
Salix cinerea	-	-	+	-	-	+	-	-	-
Salix purpurea subsp. purpurea	-	-	-	-	-	-	-	+	-

Place and data of relevés: 1-2: The marshes of Bahna Mare, September, 21, 2008; 3: The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008; 4-5: The marshes of Bahna Mare, September, 21, 2008; 6: The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008; 7-8: The marshes of Bahna Mare, September, 21, 2008; 9: The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008

Ass. *Galegetum officinalis* Dobrescu et Vițalariu 1981

Chorology and biotope characteristics. This association has been described, for the first time, from Cîrc stream valley (Iași county) [DOBRESCU & VIȚALARIU, 1981].

Two phytocoenoses of this association have been identified, also, in the marshes of Bahna Mare – Bălănești, on microdepressions, nearby of the reed thickets, on wet and gleyic soils.

Species composition and phytocoenotic structure. The characteristic species of this association is *Galega officinalis*, achieving a soil coverage of over 90%. Besides this species, among the characteristic species for the higher coenotaxa, there are present *Eupatorium cannabinum* and *Calystegia sepium*. Other species belong to *Phragmiti–Magnocaricetea* class, as *Carex vulpina*, *C. riparia*, *C. acutiformis*, *Lythrum salicaria*, *Typha angustifolia*, *Lycopus europaeus* etc. The zonal meso-hygrophyllous meadows from *Molinio – Arrhenatheretea* class are also well represented in the plant composition, by the presence of the next species: *Mentha longifolia*, *Juncus effusus*, *Trifolium hybridum*, *Agrostis stolonifera* subsp. *stolonifera*, *Festuca pratensis*, *Lotus corniculatus*, *Succisa pratensis*, and so on (Tab. 8, rel. 1-2).

Phytocoenoses of *Aster lanceolatus*

Chorology and biotope characteristics. Two phytocoenoses edified by *Aster lanceolatus* were identified in the south of Borniș village, along the stream valley called “Obârșia”. *Aster lanceolatus* is escaping quite easily from the gardens where is cultivated as an ornamental plant [MORARIU & NYÁRÁDY, 1964, Romania’s Flora, t. IX], setting up frequently along the river valleys, where it can make nearly monodominant communities, as it is for instance in the eastern part of Transylvania (e. g. along the Târnava Mare, Târnava Mică, Niraj, Nico Alba, Mureș, Olt, Negru, and Baraolt river valleys) [KOVÁCS, 2004]. Also, along the Tisa river valley, *Aster lanceolatus* is one of the most frequent alien plant in Romania [OPREA & SÎRBU, 2006]. Into the flora of Moldovia, this species has been cited quite recently as an alien plant [SÎRBU & OPREA, 2010].

Species composition and phytocoenotic structure. In the south of Borniș village (Neamț county), *Aster lanceolatus* edify two large phytocoenoses, nearly monodominant, with mesophyllous features, along with other species, as: *Rubus caesius*, *Lapsana communis*, *Inula helenium*, *Eupatorium cannabinum*, *Angelica sylvestris* subsp. *sylvestris*, *Filipendula ulmaria* subsp. *ulmaria*, *Agrostis stolonifera* subsp. *stolonifera*, *Agrimonia eupatoria*, *Clinopodium vulgare*, *Artemisia vulgaris*, *Senecio erucifolius*, and so on. Following the local floristic interferences, into the floristic structure of those phytocoenoses there are present some characteristic species, both for the higher coenotaxa (*Senecion*

fluviatilis, *Convolvuletalia sepium* & *Galio-Urticetea*), but also for mesophyllous meadows in surroundings (*Molinio* – *Arrhenatheretea*), for the fringe vegetation (*Trifolio* – *Geranietea*), or for the perennial ruderal vegetation (*Artemisietea vulgaris*), etc., which gives to these phytocoenoses a pretty heterogeneous feature (Tab. 8, rel. 3-4). These phytocoenoses of *Aster lanceolatus* displace the natural communities from *Senecion fluviatilis* R. Tx. 1950, such as *Filipendulo ulmariae* – *Geranietum palustris* W. Koch 1926 and *Eupatorietum cannabini* R. Tx. 1937, within the investigated area.

Tab. 8. Ass. *Galegetum officinalis* Dobrescu et Vițalariu 1981 (rel. 1-2);
Phytocoenoses of *Aster lanceolatus* (rel. 3-4)

Surface of relevé (m ²)	25	25	50	50
Coverage (%)	95	95	100	95
No. of relevée	1	2	3	4
Senecion fluviatilis, Convolvuletalia sepium & Galio – Urticetea				
Galega officinalis		5	5	-
Aster lanceolatus	-	-	-	5
Calystegia sepium	-	+	-	-
Eupatorium cannabinum	+	+	+	+
Filipendula ulmaria subsp. ulmaria	-	-	+	+
Inula helenium	-	-	+	+
Lapsana communis	-	-	+	-
Rubus caesius	-	-	+	+
Senecio erucifolium	-	-	-	+
Phragmiti – Magnocaricetea				
Carex acutiformis	-	+	-	-
Carex riparia	-	1	-	-
Carex vulpina	+	-	-	-
Lycopus europaeus	-	+	-	-
Lythrum salicaria	-	+	+	-
Mentha aquatica	-	+	-	-
Typha angustifolia	-	+	-	-
Molinio – Arrhenatheretea				
Achillea millefolium	-	-	+	-
Agrostis stolonifera subsp. stolonifera	+	-	+	+
Angelica sylvestris subsp. sylvestris	-	-	+	+
Arrhenatherum elatius subsp. elatius	+	-	-	-
Bromus commutatus	-	-	+	-
Centaurea phrygia subsp. phrygia	-	-	+	+
Cirsium tuberosum	+	-	-	-
Dactylis glomerata subsp. glomerata	+	-	-	-
Deschampsia cespitosa subsp. cespitosa	-	+	-	-
Equisetum arvense	-	+	-	-
Festuca pratensis	+	-	-	-
Juncus effusus	+	-	-	-
Knautia arvensis	-	-	+	-
Lathyrus pratensis	+	-	-	-
Lotus corniculatus	+	-	-	-
Mentha arvensis	+	-	-	-
Mentha longifolia	+	+	+	+
Odontites verna subsp. verna	+	-	-	-
Poa pratensis	+	-	+	+
Potentilla anserina	+	-	-	-
Ranunculus acris	+	-	-	-
Rorippa sylvestris	+	-	-	-
Succisa pratensis	-	+	-	-
Tragopogon pratensis	-	-	+	+

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Trifolium hybridum	+	-	-	-
Valeriana sambucifolia	-	+	-	-
Vicia cracca	-	+	-	-
Artemisietea				
Artemisia vulgaris	-	-	+	+
Carduus acanthoides	-	-	+	+
Cirsium vulgare	+	-	-	-
Daucus carota	+	-	-	-
Elymus repens subsp. repens	+	-	-	-
Erigeron annuus subsp. annuus	+	-	-	-
Salvia verticillata	-	-	+	+
Tussilago farfara	-	-	+	+
Trifolio – Geranietea				
Agrimonia eupatoria	-	-	+	+
Clinopodium vulgare	-	-	+	+
Origanum vulgare	-	-	+	+
Peucedanum alsaticum	-	-	+	+
Aliae				
Achillea collina	+	-	-	-
Anthemis tinctoria	-	-	+	+
Cirsium arvense	-	-	+	-
Clematis vitalba	-	-	+	+
Conyza canadensis	-	-	+	+
Equisetum maximum	-	-	+	+
Euphorbia cyparissias	-	-	+	+
Juncus articulatus	+	-	-	-
Lathyrus tuberosus	-	-	+	+
Plantago lanceolata	+	-	-	-
Potentilla recta	-	-	+	+
Salix cinerea	+	-	+	-
Senecio vernalis	-	-	+	+
Sonchus arvensis	-	-	+	+

Place and data of relevés: 1-2: The marshes of Bahna Mare-Bălănești, September, 21, 2008; 3-4: Borniș, along the stream valley “Obârșia”, September, 21, 2008

Ass. *Callitricetum polymorphae* Soó 1947

Chorology and biotope characteristics. Three phytocoenoses of this association have been identified in the marshes nearby the village of Unghi, on the stream valley “Valea Albă” (Fig. 13). The phytocoenoses edified by *Callitriche cophocarpa* are developed in stagnant or ± running waters, clean and shallow in depth.

Species composition and phytocoenotic structure. The identified phytocoenoses are monostratified, the vegetation being dominated by the species *Callitriche cophocarpa*. The most accompanying species belong to *Phragmiti – Magnocaricetea* class, as: *Alisma plantago-aquatica*, *Typha shuttleworthii*, *Glyceria fluitans*, *Berula erecta*, *Veronica beccabunga*, and so on. Other several species from the neighbouring mesophyllous meadows infiltrate in the species composition of the phytocoenoses (e. g. *Agrostis stolonifera* subsp. *stolonifera* and *Juncus articulatus*) (Tab. 9).

Tab. 9. Ass. *Callitrichetum polymorphae* Soó 1947

Surface of relevé (m ²)	1	1	2
Coverage (%)	85	70	90
No. of relevée	1	2	3
Ranunculion aquatilis, Callitricho–Batrachietalia & Potametea pectinati			
Callitriche cophocarpa	5	4	5
Phragmiti–Magnocaricetea			
Alisma plantago-aquatica	+	+	+
Berula erecta	+	-	+
Carex riparia	-	+	-
Eleocharis palustris	-	+	-
Glyceria fluitans	+	+	-
Leersia oryzoides	-	-	+
Mentha aquatica	-	-	+
Ranunculus repens	+	-	+
Sparganium erectum	-	-	+
Typha shuttleworthii	+	-	+
Veronica beccabunga	-	+	+
Molinio–Arrhenatheretea			
Agrostis stolonifera subsp. stolonifera	-	+	+
Carex hirta	+	-	-
Juncus articulatus	-	-	+
Juncus inflexus	+	-	+
Poa hybrida	-	+	-
Scirpus sylvaticus	+	-	+
Aliae			
Bidens cernua	-	-	+
Cyperus fuscus	-	-	+
Polygonum hydropiper	-	-	+
Ranunculus sceleratus	+	-	-

Place and data of relevés: 1-3: The marshes of Unghi, on the stream valley “Valea Albă”, September, 21, 2008

**Fig. 13.** Ass. *Callitrichetum polymorphae* Soó 1947 in marshes near Unghi village

On the basis of the Simpson's index of dominance values (S) (Tab. 1), the greatest biodiversity is found within the next associations: *Carici flavae – Eriophoretum latifolii* Soó 1944 (S = 0.22-0.76), *Caltho laetae–Ligularietum sibiricae* Ștefan et al. 2000 (S=0.23-0.26) and *Angelico – Cirsietum oleracei* R. Tx. 1937 (S=0.39). The conservation value of

these three associations is also given by the presence of some rare and vulnerable species, such as: *Dactylorhiza incarnata*, *D. maculata* subsp. *fuchsii*, *Carex paniculata*, *Ligularia sibirica*, *Menyanthes trifoliata*, and *Thelypteris palustris*. Other associations include also some endangered plant species, such as: *Salicetum cinereae* Zólyomi 1931 (*Angelica palustris*, *Dactylorhiza maculata* subsp. *fuchsii*, *D. incarnata*, *Thelypteris palustris*), *Caricetum rostratae* Rübél 1912 (*Carex paniculata*), *Pastinaco sativae*-*Arrhenatheretum elatioris* Passarge 1964 (*Angelica palustris*), *Scirpetum sylvatici* Ralski 1931 (*Dactylorhiza incarnata*), *Caricetum ripariae* (Soó 1928) Knapp et Stoffer 1962 (*Angelica palustris*, *Carex paniculata*, *Dactylorhiza maculata* subsp. *fuchsii*, *D. incarnata*, *Ligularia sibirica*, *Menyanthes trifoliata*, *Thelypteris palustris*), *Phragmitetum vulgaris* Soó 1927 (*Ligularia sibirica*, *Thelypteris palustris*).

These 16 associations, from the surveyed marshes of the Neamț county, could be assigned to the next natural habitats (sensu Habitat Directive 92/43/EEC):

- 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation: ass. *Callitrichetum polymorphae* Soó 1947
- 6430 Hygrophilous tall herb fringe communities of plains and of the montane to alpine levels: ass. *Scirpetum sylvatici* Ralski 1931; ass. *Caltho laetae* – *Ligularietum sibiricae* Ștefan et al. 2000; ass. *Angelico* – *Cirsietum oleracei* R. Tx. 1937; *Deschampsietum caespitosae* Hayek ex Horvatic 1930; ass. *Caricetum ripariae* (Soó 1928) Knapp et Stoffer 1962; ass. *Phragmitetum vulgaris* Soó 1927; ass. *Typhetum angustifoliae* Pignatti 1953; ass. *Glycerietum maximae* Hueck 1931
- 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*): ass. *Arrhenatheretum elatioris* Scherrer 1925; ass. *Galegetum officinalis* Dobrescu et Vițalariu 1981
- 7140 Transition mires and quaking bogs: ass. *Caricetum rostratae* Rübél 1912
- 7230 Alkaline fens: ass. *Carici flavae* – *Eriophoretum latifolii* Soó 1944
- 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*): ass. *Salicetum cinereae* Zólyomi 1931; ass. *Stellario nemorum* – *Alnetum glutinosae* Lohmeyer 1957; ass. *Salicetum purpureae* Wendelberger-Zelinka 1952.

Given the presence of many rare plant species and some habitats of European Community importance in the marshes of Unghi and Bălănești (“Bahna Mare”), they would be proposed, in the near future, as “Natura 2000” sites of community interest (SCI’s) and later as nature reserves into the romanian network of protected areas.

Conclusions

- There are described 16 associations, from 11 alliances, 9 orders, and 6 classes of vegetation and other two phytocoenoses of *Aster lanceolatus* into this paper
- Some associations include fairly rare plant species into the Moldavian region of Romania, as the next one: *Angelica palustris*, *Carex paniculata*, *Dactylorhiza incarnata*, *Dianthus superbus* subsp. *superbus*, *Ligularia sibirica*, *Menyanthes trifoliata*, *Orchis laxiflora* subsp. *elegans*, *Salix rosmarinifolia*, *Thelypteris palustris*
- Natural habitats which framed the vegetation of the surveyed marshes in Neamț county are represented by phragments of 6 types; among these, one is priority to be preserved into the European Union, namely 91E0*

- It is necessary to protect as nature reserves the marshes nearby the villages of Unghi and Bălănești (Bahna Mare) and including these ones into the network of “Natura 2000” sites in Romania.

References

- BRAUN-BLANQUET J. 1964. Pflanzensozologie. Grundzüge der Vegetationskunde. Ed. 3. Wien – New York: Springer-Verlag, 865 pp.
- BURDUJA C. 1948. Contribution floristique et chorologique relative a la Moldavie. *Bull. de l'Ecole Polytechnique de Jassy*, **3**: 474-488.
- BURDUJA C. 1954. Note floristique relative la Moldova și Dobrogea (cu unele observațiuni asupra vegetației de dune). *Stud. Cerc. Ști., Acad. R. P. R.*, Fil. Iași, **V**(1-2): 337-361.
- BURDUJA C., MIHAI Gh. & SÂRBU I. 1974. Cercetări asupra florei și vegetației din Masivul “Ghindăoani-Tupilați” – Neamț. Piatra Neamț: *Stud. Cerc., Bot.-Zool.* **II**: 59-84.
- CHIFU T., MITITELU D. & DĂSCĂLESCU D. 1987. Flora și vegetația județului Neamț. *Memor. Sect. Ști., Acad. Română*, Ser. IV, **X**(1): 281-302.
- COLDEA Gh. 1991. Prodrome des associations végétales des Carpates du sud-est (Carpates Roumaines). Camerino: *Docum. Phytosoc. Nouv. Sér.*, **13**: 317-539.
- CRISTEA V., GAFTA D. & PEDROTTI F. 2004. *Fitosociologie*. Cluj-Napoca: Edit. Presa Universitară Clujeană, 394 pp.
- DOBRESCU C. & VIȚALARIU Gh. 1981. Contribuții fitocenologice din Moldova. Iași: *Analele Univ. “Alexandru Ioan Cuza”*, s. II- a Biol. veget., **XXVII**: 12-18.
- GOREA L. 2003. *Flora vasculară și vegetația bazinului Asău, Camenca și Târhaș*, Doctoral degree’ thesis. Iași: University “Alexandru Ioan Cuza”.
- IVAN Doina (coord.). 1992. *Vegetația României*. București: Edit. Tehnică Agricolă, 407 pp.
- KOVÁCS J. A. 2004. Syntaxonomical checklist of the plant communities of Szeklerland (Eastern Transylvania). Szombathely: *Kanitzia*, **12**: 75-150.
- LUPAȘCU Angela. 1999. *Studiu sinecologic comparativ în unele grupări vegetale higrofile din zona submontană a județelor Suceava și Neamț*. Iași: Edit. Corson, 221 pp.
- MITITELU D., BARABAȘ N. & HAJA S. 1974. Vegetația mlaștinei de la Lozna-Dersca (Jud. Botoșani). Bacău, *Stud. Com. Muz. Ști. Nat.*: 183-196.
- MITITELU D., CHIFU T. & PASCAL P. 1989. Flora și vegetația județului Suceava. *Anuar. Muz. Jud. Suceava*: 93-120.
- MITITELU D. & BARABAȘ N. 1993. Flora și vegetația Munților Nemira. Bacău: *Stud. Comunic. Muz. Ști. Nat./1980-1993*: 29-48.
- MITITELU D., BARABAȘ N., BÂRCĂ C. & COSTICĂ M. 1993. Contribuții noi la cunoașterea florei și vegetației județului Bacău. Bacău: *Stud. Comunic. Muz. Ști. Nat./1980-1993*: 81-108.
- MITITELU D. & CHIFU T. 1993. Flora și vegetația județului Botoșani. Bacău: *Stud. Comunic. Muz. Ști. Nat./1980-1993*: 109-126.
- MITITELU D., SÂRBU I., PĂTRAȘC Adriana, GOCIU Zoe & OPREA A. 1993. Flora și vegetația județului Galați. Iași: *Bul. Grăd. Bot. Univ. “Alexandru Ioan Cuza”*, **4**: 69-101.
- MITITELU D., CHIFU T., SCARLAT A. & ANIȚEI Liliana. 1995. Flora și vegetația județului Iași. Iași: *Bul. Grăd. Bot. Univ. “Alexandru Ioan Cuza”*, **5**: 99-124.
- MITITELU D., ȘTEFAN N., COROI Ana-Maria & DIACONU M. 1996. Flora și vegetația județului Vrancea. Piatra Neamț: *Stud. Cerc., Muz. Ști. Nat.*, **VIII**: 163-192.
- MITITELU D., BĂISAN Niculina, DUMITRAȘCU Dumitru. & PARINCU Mariana. 1997. Flora și vegetația a două rezervații forestiere din Jud. Tulcea. Constanța: *Analele Univ. „Ovidius”*, Ser. *Biol.-Ecol.* **I**(1): 85-92.
- MORARIU I. & NYÁRÁDY E. I. 1964. Genul *Aster* L., In SĂVULESCU T. et al. (red.), 1952-1976. *Flora R. S. România*, București: Edit. Acad. Române, **IX**: 187-212.
- MUCINA L., GRABHERR G. & ELLMAUER T. 1993. *Die Pflanzengesellschaften Österreichs. I. Anthropogene Vegetation*. Jena, Stuttgart, New York: Gustav Fischer Verlag.
- NYÁRÁDY E. I. 1964. Genul *Ligularia* Cass., In SĂVULESCU T. (red.), 1952-1976. *Flora R. S. România*, București: Edit. Acad. Române, **IX**: 587-590.
- OLTEAN M., NEGREAN G., POPESCU A., ROMAN N., DIHORU G., SANDA V. & MIHĂILESCU Simona. 1994. Lista roșie a plantelor superioare din România. București: *Stud., Sint., Doc. Ecol. Acad. Română*, Inst. Biol. **I**, 52 pp.

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26. OPREA Ad. & SÎRBU C. 2006. Research regarding alien flora from the left bank of the Tisa river, between Valea Vișeuului and Piatra (Romania). Szombately, *Kanitzia*, **14**: 45-56.
27. OPREA Ad. & SÎRBU C. 2009. The vegetation around Osoi lake (Bacău county). *J. Plant Develop.*, **16**: 69-80.
28. SANDA V., POPESCU A., DOLTU M. I. & DONIȚĂ N. 1983. Caracterizarea ecologică și fitocenologică a speciilor spontane din flora României. Sibiu, *Stud. Com., Muz. Brukenthal*, **25**: 1-126.
29. SANDA V., POPESCU A. & BARABAȘ N. 1997. Cenotaxonomia și caracterizarea grupărilor vegetale din România. Sibiu, *Stud. Com., Muz. Brukenthal*, **14**: 1-366.
30. SANDA V. & ARCUȘ Mariana. 1999. *Sintaxonomia grupărilor vegetale din Dobrogea și Delta Dunării*. Pitești: Edit. Cultura, 152 pp.
31. SĂVULESCU T. & al. (red.). 1952-1976. *Flora R. P. R/R. S. R., I-XIII*. București, Edit. Acad. Române.
32. SÎRBU C. & OPREA Ad. 2010. New and rare plants from the flora of Moldavia (Romania). Iași, *Cerc. Agron. Mold.*, **43**(1): 31-42.
33. ȘTEFAN N., SÂRBU I., OPREA Ad. & MÂNZU C. 2000. Contributions to the study of Romania's vegetation (IV). Iași: *Analele Univ. "Alexandru Ioan Cuza"*, s. II, a. Biol. veget., **XLVI**: 127-132.
34. TĂNASE C. & OPREA Ad. 2009. *Delectus Seminum et Sporarum*. Hortus Botanicus, Universitatis Iassiensis Romania. **LXXXV**. Edit. Univ. "Alexandru Ioan Cuza" Iași, 60 pp.
35. TUTIN T. G., HEYWOOD V. H., BURGESS N. A., MOORE D. M., VALENTINE D. H., WALTERS S. M. & WEBB D. A. (eds.). 1964-1980. *Flora Europaea*. Vol. **1-5** (Vol. 1 - 1964, Vol. 2 - 1968, Vol. 3 - 1972, Vol. 4 - 1976, Vol. 5 - 1980). Cambridge: Cambridge University Press.
36. TUTIN T. G., BURGESS N. A., CHATER A. O., EDMONSON J. R., HEYWOOD V. H., MOORE D. M., VALENTINE D. H., WALTERS S. M. & WEBB D. A. (EDS., ASSIST. BY J. R. AKEROYD & NEWTON M. E.; appendices ed. by R. R. Mill). 1996. *Flora Europaea*. 2nd ed., 1993, reprinted 1996. Vol. **1. Psilotaceae to Platanaceae**. Cambridge: Cambridge University Press, xlvi, 581 pp., illus. ISBN 0-521-41007-X (HB).
37. *** 2007. *Interpretation Manual of European Union Habitat/EUR 27/2007*. 142 pp.
38. *** 2009. *Flora Europaea* (<http://rbg-web2.rbge.org.uk/FE/fe.html>)