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Aquatic and marsh plant communities of the Cerová vrchovina Mts. (Slovakia), the Karancs and Medves Regions (Hungary)

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Abstract: Aquatic and marsh vegetation was studied in the Cerová vrchovina Mts., Karancs and Medves Regions during vegetation seasons of 1997–2006 using traditional Zürich-Montpellier approach. Aquatic vegetation is relatively rare and only 3 plant communities from the *Charetea fragilis*, 2 from the *Lemnetea* and 4 from the *Potametea* were found. On the other hand, marsh vegetation (*Phagmito-Magnocaricetea*) is documented by 18 plant communities. The *Callitriche cophocarpa* comm. and *Phragmitetum vulgaris*, *Typhetum latifoliae*, *Caricetum acutiformis*, *Glycerietum nemoralis-plicatae* are the most frequently occurring communities of aquatic and marsh vegetation, respectively. Phytosociological relevés of *Glycerietum nemoralis-plicatae* are first time published from Hungary.

Keywords: phytosociology, *Charetea fragilis*, *Lemnetea*, *Potametea*, *Phragmito-Magnocaricetea*, *Bidentetea tripartiti*.

Introduction

Cerová vrchovina Mts., the Karancs and Medves Regions belong to distinctive and interesting Central-European volcanic mountains situated on the Slovak-Hungarian border (Fig. 1). Specific type of bedrock, soil types, geomorphology,

climatic characteristics, as well as historical and recent utilization of the landscape, have developed a peculiar flora and fauna in this area (BALÁZS et al. 2007, CSIKY et al. 2007, LANTOS et al. 2007). The unique character of the area in Slovakia and Hungary led to the declaration of the Protected Landscape Areas of the Cerová vrchovina Mts, Karancs-Medves Mts. and Tarnavideki Mts. Flora of vascular plants in this area is very heterogeneous and rich in species. In older literature, HOLUB & MORAVEC (1965) and HENDRYCH (1968) published almost 1000 and 1250 vascular plant taxa from the Cerová vrchovina Mts (Slovak part), respectively. The total number is obviously higher; only in the basalt part of the study area (within both countries) 1347 taxa of vascular plants have been found recently (CSIKY 2004). Vegetation of the studied area is mainly created by thermophilous and xerophilous plant communities (CSIKY 2003). Mountain-like and wetter communities are rare (BALÁZS 1996, CSIKY et al. 2001, CSIKY 2003, UJHÁZY et al. 2004, CSIKY et al. 2007). Wetland habitats have a restricted character (cf. CSIKY et al. 2007). In the last century, larger areas of these vegetation types occurred, mainly in the alluvia of streams (e.g. Gortva; MAGIC 1990). Since that time stream courses have been regulated, alluvia have become agriculturally exploited and fundamental parts of them do not exist anymore. Nowadays, the occurrence of wetland habitats is more or less fragmentary in stream valleys, e.g. in the vicinity of Dubno, Šurice or Hajnáčka villages and Salgótarján in the Gortva Valley. Artificial water reservoirs (Tachty, Gemerský Jablonec, Karancsberény, Salgótarján and Chrámec), as well as canalised stream courses (e.g. Gortva and Dobroda streams), provide the appropriate habitats for aquatic and marsh vegetation. Short characteristics of wetland vegetation were published by CSIKY et al. (2007), but detailed and comprehensive data supported by phytosociological relevés do not exist. Therefore, the main aim of this work is to give a detail characteristic of freshwater aquatic and marshland vegetation of the classes *Charetea fragilis*, *Lemnetea*, *Potametea*, *Phragmito-Magnocaricetea,* and marginally, the *Bidentetea tripartiti* within the study area.

Material and methods

Phytosociological relevés were sampled according to the Zürich-Montpellier approach. Aquatic and marsh vegetation (*Charetea fragilis*, *Lemnetea*, *Potametea* and *Phragmito-Magnocaricetea* classes) data were collected in 1997–2006 in the Cerová vrchovina/Cseres hegység Mts. and adjacent mountain parts, and in the Karancs and Medves Regions (further the “studied area” only; Fig. 1). Ninety-nine phytosociological relevés were carried out and analysed. All the relevés were stored in the TURBOVEG database (HENNEKENS & SCHAMINÉE, 2001) and exported using the JUICE software (TICHÝ, 2002). The CANOCO 4.5 for Windows package (ter BRAAK & ŠMILAUER, 2002) was applied for the detrended correspodence analysis (DCA). Percentage species data with square-root transformation were used; six relevés were omitted from the analysis (outliers in ordination; relevés from the class *Charetea fragilis* and *Ceratophylletum demersi*). For the ecological interpretation of major gradients of

the studied wetland vegetation types, the average non-weighted Ellenberg′s indicator values of vascular plant species (ELLENBERG et al., 1992) were plotted onto the DCA ordination diagram as supplementary variables.

The nomenclature of plants follows MARHOLD and HINDÁK (1998). The names of vegetation units are quoted with the author's name and the year of description.

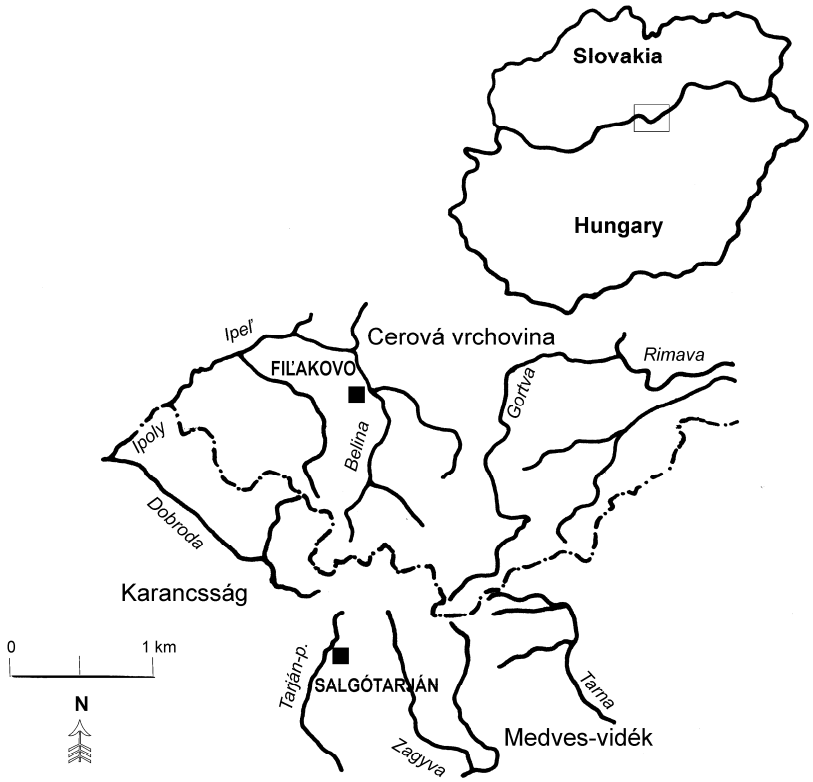

Fig. 1. Map of the studied area.

Results and Discussion

A survey of detected plant communities

Charetea fragilis Fukarek ex Krausch 1964
Charetalia hispidae Sauer ex Krausch 1964
Charion fragilis Krausch 1964 em. Van Raam et Schaminée in Schaminée et al. 1995

Charetum fragilis Fijałkowski 1960 (Tab. 1, rel. 1–3)
Charetum contrariae Corillion 1957 (Tab. 1, rel. 4)
Charetum tomentosae Corillion 1957 (Tab. 1, rel. 5)

Lemnetea O. de Bolós et Maslans 1955
Lemnetalia minoris R. Tx. 1955
Lemnion minoris R. Tx. 1955
Lemnetum minoris Oberd. ex Th. Müller et Görs 1960 (Tab. 1, rel. 7)
Hydrocharitetalia Rübel 1933
Hydrocharition morsus-ranae Rübel 1933 em. Westhoff et Den Held 1969 §
Ceratophylletum demersi Hild 1956 (Tab. 1, rel. 6)

Potametea Klika in Klika et Novák 1941
Potametalia Koch 1926
Polygonetum amphibii von Soó 1927 (Tab. 1, rel. 17)
Potamion pusilli Hejný 1978
Potametum pectinati Carstensen 1955 (Tab. 1, rel. 18–21)
Callitricho-Batrachietalia Passarge 1978
Ranunculion aquatilis Passarge 1964
Batrachietum rioinii Hejný et Husák 1978 (Tab. 1, rel. 22)
Callitriche cophocarpa comm. (Tab. 1, rel. 8–16)

Phragmito-Magnocariceta Klika in Klika et Novák 1941
Phragmitetalia Koch 1926
Phragmition australis Koch 1926
Phragmitetum vulgaris von Soó 1927 (Tab. 2, rel. 1–10)
Typhetum angustifoliae Pignatti 1953 (Tab. 2, rel. 11–13)
Typhetum latifoliae Lang 1973 (Tab. 2, rel. 14–24)
Sparganietum erecti Roll 1938 (Tab. 2, rel. 25–27)
Glycerietum aquaticae Hueck 1931 (Tab. 2, rel. 28–32)
Typhetum laxmanni Nedelcu 1968 (Tab. 2, rel. 33)
Iris pseudacorus comm. (Tab. 2, rel. 34–35)
Magnocaricion elatae Koch 1926
Caricetum acutiformis Eggler 1933 (Tab. 3, rel. 1–10)
Caricetum gracilis Almquist 1929 (Tab. 3, rel. 11–12)
Galio palustris-Caricetum ripariae Balátová-Tuláčková et al. 1993 (Tab. 3, rel. 13–15)
Phalaridetum arundinaceae Libbert 1931 (Tab. 3, rel. 16–17)
Nasturtio-Glycerietalia Pignatti 1953
Phalaridion arundinaceae Kopecký 1961
Caricetum buekii Hejný et Kopecký in Kopecký et Hejný 1965 (Tab. 4, rel. 1)
Sparganio-Glycerion Br.-Bl. et Sissing in Boer 1942
Glycerietum plicatae (Kułczyński 1928) Oberd. 1954 (Tab. 4, rel. 2–5)
Glycerietum nemoralis-plicatae Kopecký 1972 (Tab. 4, rel. 6–16)
Berula erecta comm. (Tab. 4, rel. 17–21)
Oenanthetalia aquaticae Hejný in Kopecký et Hejný 1965
Oenanthion aquaticae Hejný ex Neuhäusl 1959
Eleocharitetum palustris Ubrizsy 1948 (Tab. 5, rel. 1)
Butometum umbellati (Konczak 1968) Philippi 1973 (Tab. 5, rel. 2)
Phellandrium aquaticum comm. (Tab. 5, rel. 3)

Bidentetea tripartitae R. Tx. et al. ex von Rochow 1951
Bidentetalia tripartitae Br.-Bl. et R. Tx. ex Klika et Hadač 1944
Bidention tripartitae Nordhagen 1940 em. R. Tx. in Poli et J. Tx. 1960
Alopecuretum aequalis Th. Müller 1975 (Tab. 5, rel. 4)

Characteristics of detected plant communities

Charetea fraglis: We detected three associations, but only one of them (*Charetum fragilis*) is documented by more than one phytosociological relevé. Stands of macroscopic algae species of the *Chara* genus preferred shallow (1–10 cm), rarely deep stagnating waters. Bottom was created by fine-grained sediment (sand, fine inorganic material). In addition to dominant *Chara* species, true aquatic species (*Batrachium rioinii*, *Lemna minor*, *Potamogeton pectinatus*) in deep waters, as well as wet and marsh species in shallow waters (e.g. *Alisma plantago-aquatica*, *Juncus articulatus*, *Ranunculus sceleratus* or *Typha latifolia*), were found in these stands. Frequent short-time duration of this vegetation in habitats occurs due to their poor competitive abilities. Later, stonewort communities are being replaced by stronger competitors or more nutrient-demanding species and their communities (KRAUSE 1997). The *Charetum tomentosae* is an extremely rare community in Slovakia, documented by the phytosociological relevé only from one locality, near Konrádovce village (OŤAHEĽOVÁ 2001, HRIVNÁK et al. 2005). Similarly, the *Charetum contrariae,* which has recently been found in Hungary (HRIVNÁK & HUSÁK 2004) is rare and endangered in this region. The *Charetum fragilis* is relatively frequent in both countries (OŤAHEĽOVÁ 2001, HRIVNÁK et al. 2005, CSIKY ined.).

Lemnetea: Only two associations documented by two relevés are known from the vegetation of this class. It is very interesting that despite the fact that duckweed communities belong to the vegetation type with very good ability to colonize artificial biotopes, they are very rare in the studied area but the dominant *Lemna minor* is quite frequent in the region (CSIKY 2004).

Potametea: Typical aquatic communities of this class are similarly rare as duckweed communities. Numerous phytosociological data of the *Callitriche cophocarpa* comm. were recorded in the surroundings of Salgótarján, Litke and Hajnáčka, as well as the *Potametum pectinati* in water reservoirs of the Slovakian part. Stands with the dominance of *Callitriche cophocarpa* are very rare in Slovakia (HRIVNÁK 2002), they, however, are more frequent in Hungary (STETÁK 2003, CSIKY 2006). The *Potametum pectinati* is relatively frequent in stagnate or running eutrophic waters growing in shallow to deeper waters (OŤAHEĽOVÁ 1995b). Ecological conditions of the *Potametum pectinati* in the studied area are very similar. Stands of other two detected aquatic communities are rare there. The *Polygonetum amphibii* created large patches in the Gemerský Jablonec water reservoir and *Batrachietum rioinii* grew in the littoral zone of Chrámec water reservoir. The *Batrachietum rioinii* was described from Nesyt fishpond in South Bohemia in shallow alkaline water (HUSÁK & HEJNÝ 1978). In Slovakia, this community is known only from the Chrámec water reservoir and the lower part of the Hron Valley (KUBALOVÁ 2009). In Hungary,

Batrachium rionii is a typical species of shallow artificial lakes (e.g. gravel-pits). It was also found along *Potamogeton gramineus* in the Gortva Lake not far from the state border, in Salgótarján (CSIKY 2004).

Phragmito-Magnocaricetea: This is the most abundant group of communities within studied wetland vegetation. Typical littoral marsh communities of *Phragmition australis* are the most common; the *Phragmitetum vulgaris* and *Typhetum latifoliae* are frequent and very well documented in phytosociological relevés (cf. Tab. 2). From the studied *Phragmition australis* alliance, both mentioned communities seem to be relatively tolerant to a wide range of water levels manifesting good ability to colonize artificial waterbodies (BALÁTOVÁ-TULÁČKOVÁ et al. 1993, RODWELL et al. 1995, OŤAHEĽOVÁ et al. 2001). We have detected stands in the littoral zone of water reservoirs, and in various deep terrain depressions. They grew mainly in shallow water (10–30 cm), rarely in deeper water (70–80 cm). Other communities are relatively less frequent (*Glycerietum aquaticae*, *Typhetum angustifoliae* and *Sparganietum erecti*), or even rare (*Typhetum laxmanni* and *Iris pseudacorus* comm.) in the studied area. Within tall-sedge vegetation, the *Caricetum acutiformis* is the most common plant community. Stands with the dominance of *Carex acutiformis* grew in the alluvia of streams in deeper terrain depressions, or in the upper littoral zone of water reservoirs. They are relatively species rich comparing to other communities of the *Magnocaricion elatae*. Other tall-sedge communities (*Caricetum gracilis*, *Galio palustris-Caricetum ripariae*) and *Phalaridetum arundinacea* occur only in few localities, mainly in the alluvia of some streams (e.g. Grotva, Tarján) or in small terrain depressions (e.g. the Medves Plateau). Wetland vegetation of stream banks is documented by 4 plant communities. The *Caricetum buekii* is rare; its stands were found on the bank of a canalised stream. In last century, information about this community from Slovakia and Hungary was negligible. A significant change has come only few years ago. The *Caricetum buekii* was documented from many localities in southern part of Central Slovakia and northern part of Hungary (LÁJER 1998, HRIVNÁK 2000, HRIVNÁK et al. 2001). These changes were probably caused by the fail to detect the dominant species of the mentioned community in the past. *Glyceria*-species dominated stands (*Glycerietum plicatae* and *Glycerietum nemoralis-plicatae*) were sampled only in Hungarian part of the studied area, but they are distributed in the Slovakian part, too (CSIKY 2004). The habitats with *Glyceria plicata* are not rare in the region, but *Glyceria nemoralis* is very rare and only occurs in some places of the North Hungarian Mts. (KIRÁLY 2009). Most of stands can be found in shallow streams springs on the edge of the Medves Plateau. They represent the first published relevés of *Glycerietum nemoralis-plicatae* from Hungary. Stands with the dominance of *Berula erecta* grew in small and canalised streams with medium and high speed waters. Bottom is created mainly by stones, gravel or artificial blocks, which are sometimes covered by a layer of organic material or silt. HEGEDÜŠOVÁ et al. (2009) arranged phytosociological relevés from Slovakia, including the data from the Cerová vrchovina Mts., to the *Cardamino-Beruletum erecti* Turoňová 1985. However, in our opinion, the species composition of the

relevés from the Cerová vrchovina Mts. and those published by TUROŇOVÁ (1985) from North Czech is different. For the *Cardamino-Beruletum erecti* the occurrence of *Cardamine amara*, *Mentha aquatica* and *Myosotis scorpioides* agg. is typical, which are absent or rarely occur in the relevés from the studied site. Therefore, we arranged stands from Slovakian streams with dominance of *Berula erecta* to the *Sparganio-Glycerion,* as a community. On the other hand, there are stands with dominance of *Berula erecta* and subdominance of *Cardamine amara*, *Myosotis scorpioides* agg., or *Mentha aquatica* known from the Medves Region (CSIKY ined.). Therefore, this vegetation type has been classified into the spring vegetation (*Montio-Cardaminetea* Pawłowski in Pawłowski et al. 1928 class) in Hungary. Stands of periodically flooded the *Oenanthion aquaticae* habitats occur only rarely, and are documented poorly. All these communities were found in a shallow water of the water reservoirs' littoral.

Bidentetea tripartiti: We recorded only one association (*Alopecuretum aequalis*) in phytosociological relevé, which stand grew in exposed periodically flooded bottom in the margin of the Chrámec water reservoir (cf. OŤAHEĽOVÁ et al. 1998). There are only few distributional data about this community in the territory of Slovakia (JAROLÍMEK et al. 1997) and the nearest locality is situated in the Teplý vrch water reservoir, north from Rimavská Sobota (KLIMENT et al. 2000). In the studied area, *Alopecurus aequalis* is known from several localities (CSIKY 2004), but stands with the dominance of this species are classified into the *Potentillo-Polygonetalia* R. TX. 1947 order in Hungary. Meadow vegetation did not belong to the objects of our study. Vegetation of the *Bidentetea tripartiti* class is probably more frequent in the study area, but it pertained to our research only marginally. Additionally to the mentioned association, OŤAHEĽOVÁ et al. (1998) and CSIKY et al. (2007) reported the occurrence of other two communities in the studied area, namely the *Rumicetum maritimi* and *Bidenti-Polygonetum hydropiperis*.

Diversity of wetland vegetation and the main environmental gradient

The diversity of plant communities in the studied site is relatively high in view of the low number and small area of appropriate habitats, the regulation of water courses and agricultural utilization of the stream alluvia. Altogether, we have found 28 plant communities. Aquatic communities are less frequent (9). They were mainly found in the artificial habitats (water reservoirs or canalised water courses), and rarely in natural habitats (e.g. flooded terrain depression). Relatively more favourable situation is with marsh plant communities, where the diversity is higher (19). Analogous comprehensive published data on studied wetland vegetation from volcanic mountains in Slovakia and Hungary do not exist so far. The data from the adjacent limestone mountains show similar number of communities: Drienčanský kras Mts (20 plant communities; KLIMENT et al. 2000), Muránska planina Mts (30; HRIVNÁK et al. 2004). The comparison with the data from lowlands or basins are unjustified, because the diversity of aquatic vegetation is much higher there due to higher variability of relevant habitats (cf. OŤAHEĽOVÁ 1995a, b; OŤAHEĽOVÁ et al. 2001).

First two axes of DCA analyses explain 31.1 % of the species-environment relation. Out of the Ellenberg's indicator values, moisture is the main environmental gradient that explains variability of studied vegetation along the first DCA axis in the best possible way (Fig. 2). Samples are arranged along this axis from the aquatic plant communities of the classes *Lemnetea* and *Potametea* to the relatively least wet communities of stream banks of the alliances of the *Glycerio-Sparganion* and *Phalaridion arundinaceae*. Generally, natural hydroseries characterised by zonation from aquatic to marsh plant communities (*Potametea → Lemnetea → Phragmition communis → Magnocaricion elatae*) is typical for freshwater lentic ecosystems (e.g. BALÁTOVÁ-TULÁČKOVÁ et al. 1993, OŤAHEĽOVÁ et al. 2001). Light is the second most correlated environmental variable. Communities are arranged along this gradient from open biotopes to the communities of more or less shaded habitats.

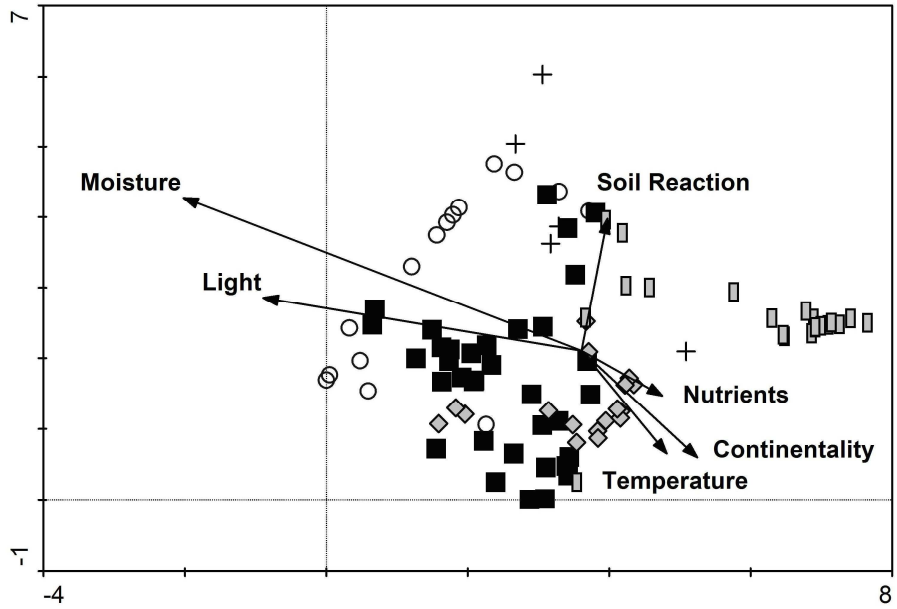

Fig. 2. Detrended correspondence components analysis (DCA) ordination diagram of relevés (lenght of gradient 7.652; eigenvalues of the first two axes are 0.831 and 0.701, total inertia 13.614). Average Ellenberg indicator values for relevés were plotted onto DCA ordination diagram as supplementary variables (cumulative percentage variance of species-environment relation for the first two axes are 28.8 % and 31.1 %). Correlation coefficients with the first two DCA axes: Light (-0.6167 and 0.0190), Temperature (0.1552 and -0.1365), Continentality (0.2147 and -0.1365), Moisture (-0.7619 and 0.1521), Soil reaction (0.0664 and 0.2003), Nutrients (0.1535 and -0.0512). Empty circle – aquatic plant communities; cross – *Oenanthion aquaticae* and *Bidention tripartiti*; full square – *Phragmition communis*, shaded rhomboid – *Magnocaricion elatae*; shaded box – *Glycerio-Sparganion* and *Phalaridion arundinaceae*.

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Tab. 1. Aquatic plant communities of the *Charetea fragilis*, *Lemnetea* and *Potametea* classes

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Dominant species of the *Charetea fragilis* plant communities																							
	Chara fragilis	**5**	**5**	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Chara contraria	.	.	.	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Chara tomentosa	.	.	.	.	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dominant species of the *Lemnetea* plant communities																							
	Ceratophyllum demersum	.	.	.	.	.	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Lemna minor	+	.	.	+	.	.	**5**	3	4	4	3	3	.	.	.	.	+	.	.	.	.	+
Dominant species of the *Potametea* plant communities																							
	Callitriche cophocarpa	.	.	.	.	.	.	.	**3**	**a**	**3**	**4**	**3**	**5**	**5**	**5**	**5**	.	.	.	.	.	.
	Persicaria amphibia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**4**	+	.	.	.	.
	Potamogeton pectinatus	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**4**	**5**	**5**	**5**	2
	Batrachium rionii	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	**5**
Other species																							
Pm	*Alisma plantago-aquatica*	r	3	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
	Algae fil.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.	+
Pm	*Typha latifolia*	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
	Juncus articulatus	+	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Veronica anagallis-aquatica*	1	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Bi	*Ranunculus sceleratus*	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bi	*Bidens tripartitus*	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Solanum dulcamara	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	.	.	.	.	.	.
Pm	*Lycopus europaeus*	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	+	.	.	.	.	.	.
Bi	*Persicaria hydropiper*	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	.	.	.	.	.	.

Legend: *Bi – *Bidentetea tripartitae*, Pm – *Phragmito-Magnocaricetea*

Species occurred only in one relevé:

Agrostis stolonifera (rel. 2: 2), *Alopecurus aequalis* (1: 2), *Butomus umbellatus* (13: 2), *Caltha palustris* (16: +), *Centaurium pulchellum* (2: +), *Cyperus fuscus* (2: 3), *Echinochloa crus-galli* (2: 1), *Epilobium hirsutum* (20: r), *Equisetum palustre* (2: 1), *Juncus bufonius* agg. (2: 1), *Lythrum hyssopifolia* (2: 1), *Phellandrium aquaticum* (20: 1), *Persicaria lapathifolia* (1: +), *Phalaris arundinacea* (13: +), *Phragmites australis* (2: +), *Potamogeton natans* (6: 1), *Potamogeton pusillus* (18: 1), *Potamogeton trichoides* (19: 1), *Sparganium erectum* (13: +), *Stachys palustris* (14: r), *Typha angustifolia* (20: r), *Typha laxmannii* (5: 1).

The relevés localities (for unpublished relevés – Country (HU – Hungary, SK – Slovakia); locality; altitude (m); type of water (S – stagnating, R – running); depth of water (cm); relevé area (m^2); cover; date; author(s) of relevé (EB – Eva Belanová, AC – Alžbeta Cvachová, RG – Rasťo Gális, JC – János Csiky, RH – Richard Hrivnák, IJ – Ivan Jarolímek, HO – Helena Oťaheľová, MV – Milan Valachovič) and in published relevés – reference).

1. SK; Tachty, water reservoir; 275; S; 1–10; 15; 100; 2. 7. 2003; RH.
2. HU; Karancsberény, Nagyaranyi-puszta; 250; S; 1–5; 1; 95; 15. 7. 2006; JC.
3. HU; Karancsberény, Nagyaranyi-puszta; 260; S; 100; 4; 100; 10. 7. 2006; JC.
4. HU; Mihálygerge, NE, near the way to the Komra-völgyi water reservoir, artificial pool; 167; S; 3–5; 85; 8. 9. 2000; RH; Hrivnák & Husák (2004).
5. SK; Konrádovce, WSW, stone-pit; 373; S; 10; 25; 85; 26. 10. 1995; RH, HO; OŤAHEĽOVÁ (2001).
6. HU; Salgótarján, Gortva-tó; 500; S; 40; 1; 100; 29. 7. 2005; JC.
7. SK; Chrámec, water reservoir, drainage outlet; 174; R; 40–60; 9; 100; 2. 7. 2003; RH.
8. HU; Salgótarján, Eresztvény; 450; S; 20–60; 4; 70; 25. 7. 2004; JC.
9. HU; Salgótarján, Eresztvény; 450; S; 20–60; 4; 75; 25. 7. 2004; JC.
10. HU; Salgótarján, Eresztvény; 450; S; 20–60; 4; 80; 25. 7. 2004; JC.
11. HU; Salgótarján, Eresztvény; 450; S; 20–60; 4; 50; 25. 7. 2004; JC.
12. HU; Salgótarján, Eresztvény; 450; S; 20–60; 4; 50; 25. 7. 2004; JC.
13. SK; Hájnačka, Gortva stream, ca 250 m up of the road bridge; 217; R; 25–35; 12; 95; 16. 7. 2004; EB, RH.
14. HU; Litke, Bükk-tető; 280; S; 0-1; 1; 100; 27. 7. 2005; JC.
15. HU; Litke, Bükk-tető; 280; S; 0-1; 1; 100; 27. 7. 2005; JC.
16. HU; Litke, Bükk-tető; 280; S; 0-1; 1; 100; 27. 7. 2005; JC.
17. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 150–200; 25; 65; 3. 7. 1997; RH.
18. SK; Tachty, water reservoir; 275; S; 10–30; 20; 85; 2. 7. 2003; RH.
19. SK; Tachty, water reservoir; 275; S; 10–20; 16; 100; 2. 7. 2003; RH.
20. SK; Chrámec, water reservoir; 176; S; 2–10; 14; 100; 2. 7. 2003; RH.
21. SK; Hostice, water reservoir, N margin; 193; S; 120–150; 15; 90; 18. 6. 2004; RH.
22. SK; Chrámec, water reservoir; 176; S; 25–50; 15; 100; 10. 6. 1997; RH; OŤAHEĽOVÁ et al. (1998, Fig. 3a).

Tab. 2. Reed plant communities of the *Phragmition communis* alliance

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Dominant species of the *Phragmition communis* plant communities																																				
Pm	*Phragmites australis*	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Typha angustifolia*	.	.	.	.	.	.	.	.	.	.	**5**	**4**	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.
Pm	*Typha latifolia*	.	.	.	+	.	.	.	1	.	.	.	2	.	**4**	**4**	**4**	**5**	**5**	**5**	**5**	**3**	**4**	**4**	**3**	.	.	.	+	+	.	.	.	.	1	.
Pm	*Sparganium erectum*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	**4**	**5**	**5**	.	.	.	.	.	.	.	.
Pm	*Glyceria maxima*	.	.	.	+	.	.	.	.	.	.	.	.	+	2	.	+	.	a	.	.	.	1	.	.	.	.	.	**5**	**5**	**5**	**4**	**5**	.	.	1
Pm	*Typha laxmannii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**5**	.	.
Pm	*Iris pseudacorus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	**4**	**4**
Other species																																				
Le	*Lemna minor*	.	+	.	.	.	+	.	+	.	2	+	.	.	4	3	1	.	+	.	.	.	+	3	2	.	r	.	4	1	.	+	5	.	+	.
Ma, Pm	*Lythrum salicaria*	.	.	+	.	.	.	.	+	+	.	.	+	.	.	.	2	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	1
	Calystegia sepium	a	.	3	2	+	.	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
Pm	*Carex riparia*	+	+	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	2	+	.	.	.	.	.	1	.	.	.	.
Pm	*Carex acutiformis*	.	.	.	.	2	.	.	1	.	.	.	.	.	.	.	3	.	.	.	3	.	.	.	.	.	.	.	.	.	+	.	.	.	2
Gu	*Urtica dioica*	+	.	2	1	.	.	+	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Equisetum palustre	+	.	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1
Pm	*Lycopus europaeus*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	2
Le	*Lemna trisulca*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	2	5	.	.	.	4	.	.	.	.	.	.	.
Pm	*Alisma plantago-aquatica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	r	.	.	.	.	.	+	.	.	.	.	1	.	+	.	.
Pm	*Phalaris arundinacea*	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	r	.	.	.	.	.	.	.	.
Po	*Potamogeton pectinatus*	.	.	.	.	.	3	.	.	.	1	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Epilobium hirsutum*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	r	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Pm	*Veronica anagallis-aquatica*	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Pm	*Galium palustre*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	+
	Echinocystis lobata	.	.	+	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Ma, Pm	*Symphytum officinale*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
	Solanum dulcamara	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.
Ma, Pm	*Lysimachia vulgaris*	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Persicaria amphibia	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1

Tab. 2. - cont.

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pm	*Berula erecta*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.
Ma	*Mentha longifolia*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Ma	*Poa trivialis*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	Eupatorium cannabinum	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ma	*Caltha palustris*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	Humulus lupulus	.	.	.	.	.	.	+	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Scutellaria galericulata*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Po	*Ranunculus rionii*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Equisetum fluviatile*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Ma, Mc	*Myosotis palustris* agg.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Bi, Pm	*Ranunculus sceleratus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Butomus umbellatus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
	Mentha arvensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+

Legend: *Bi – *Bidentetea-tripartitae*, Gu – *Galio-Urticetea*, Le – *Lemnetea*, Ma – *Molinio-Arrhenatheretea*, Mc – *Montio-Cardaminetea*, Pm – *Phragmito-Magnocaricetea*, Po – *Potametea*.

Species occurred only in one relevé:

Agrostis stolonifera (16: +), *Algae* fil. (12: +), *Alopecurus aequalis* (20: +), *Angelica sylvestris* (1: r), *Anthriscus sylvestris* (1: +), *Calamagrostis epigejos* (3: +), *Callitriche palustris* agg. (26: 1), *Carex* sp. (34: 1), *Carex vesicaria* (21: +), *Carex vulpina* (16: +), *Cirsium arvense* (1: +), *Cirsium canum* (3: +), *Dactylis glomerata* agg. (1: +), *Eleocharis palustris* (33: +), *Galium aparine* (1: +), *Chara tomentosa* (33: +), *Juncus articulatus* (33: +), *Myosoton aquaticum* (19: r), *Myriophyllum spicatum* (19: +), *Potamogeton pusillus* (6: +), *Salix cinerea* (23: r), *Salix purpurea* (33: +), *Scirpus sylvaticus* (16: +), *Scrophularia umbrosa* (19: +), *Stachys palustris* (25: +), *Utricularia australis* (15: 1).

The relevés localities (for unpublished relevés – Country (HU – Hungary, SK – Slovakia); locality; altitude (m); type of water (S – stagnating, R – running); depth of water (cm); relevé area (m^2); cover; date; author(s) of relevé (EB – Eva Belanová, AC – Alžbeta Cvachová, RG – Rasťo Gális, JC – János Csiky, RH – Richard Hrivnák, IJ – Ivan Jarolímek, HO – Helena Oťaheľová, MV – Milan Valachovič) and in published relevés – reference).

1. SK; Gemerský Jablonec, water reservoir, W margin; 239; -; 0; 25; 100; 3. 7. 1997; AC, RH.
2. SK; Hajnáčka, E of the railway station, alluvium of the Gortva stream; 213; S; 5–10; 25; 100; 28. 7. 1998; RH, HO, MV.
3. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; -; 0; 25; 100; 13. 8. 1999; RH; HRIVNÁK (2004a, tab. 1A: 6).
4. SK; Šíd, S, alluvium of the Čamovský potok stream; 200; S; 0–5; 25; 100; 13. 8. 1999; RH; HRIVNÁK (2004a, tab. 1A: 6).
5. SK; Hajnáčka, NNW, alluvium of the Gortva stream; 215; -; 0; 16; 100; 16. 7. 2004; EB, RH.
6. SK; Tachty, water reservoir; 275; S; 20–30; 16; 100; 2. 7. 2003; RH.

Tab. 2. - cont.

7. SK; Hostice, water reservoir, W margin; 193; -; 0; 25; 100; 7. 8. 2003; RH.
8. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 5–40; 20; 90; 30. 6. 2002; RH.
9. SK; Dubno, marsh in the NE margin of the village; 230; -; 0; 16; 95; 22. 6. 2005; RG, RH.
10. SK; Šurice, NE, terrain depression; 225; S; 15–20; 16; 100; 22. 6. 2005; RH.
11. SK; Chrámec, water reservoir; 176; S; 8–10; 25; 90; 10. 6. 1997; RH, MV.
12. SK; Tachty, water reservoir; 275; S; 0–20; 16; 95; 2. 7. 2003; RH.
13. SK; Hostice, water reservoir, W margin; 193; S; 40–80; 15; 90; 7. 8. 2003; RH.
14. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 10–30; 25; 90; 3. 7. 1997; AC, RH.
15. SK; Hajnáčka, E of the railway station, alluvium of the Gortva stream; 213; S; 20–25; 25; 90; 28. 7. 1998; RH, HO, MV.
16. SK; Gemerský Jablonec, ca 300 down the dike of the water reservoir, alluvium of the stream; 236; S; 10–30; 25; 85; 28. 7. 1998; RH, HO, MV.
17. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; S; 1–15; 25; 100; 13. 8. 1999; RH; Hrivnák (2004a, tab. 4A: 16).
18. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; S; 30–50; 25; 100; 13. 8. 1999; RH; HRIVNÁK (2004a, tab. 4A: 34).
19. SK; Rátka, W margin of the water reservoir; 229; S; 0–25; 21; 90; 13. 8. 1999; RH; Hrivnák (2004a, tab. 4A: 2).
20. SK; Tachty, water reservoir; 275; S; 0–20; 15; 95; 2. 7. 2003; RH.
21. SK; Hostice, water reservoir, W margin; 193; S; 10–30; 15; 70; 7. 8. 2003; RH.
22. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 10–50; 16; 75; 30. 6. 2002; RH.
23. SK; Petrovce, SE, Nature Reserve Fenek; 257; S; 20–30; 16; 85; 22. 6. 2005; EB, RH.
24. SK; Šurice, NE, terrain depression, canal; 225; S; 30–60; 15; 100; 22. 6. 2005; RH.
25. SK; Blhovce, Gortva stream, near the road-bridge; 198; R; 10–25; 15; 75; 28. 7. 1998; RH, HO.
26. SK; Hajnáčka, S margin of the village, 250 m up of the road-bridge in the Gortva canal; 216; R; 60–70; 20; 90; 16. 7. 2004; RH.
27. SK; Dubno, upper margin of the village, canal of the Gortva stream; 228; R; 1–5; 17.5; 100; 22. 6. 2005; RH.
28. SK; Gemerský Jablonec, water reservoir, W margin; 239; S; 5–30; 25; 100; 3. 7. 1997; AC, RH.
29. SK; Šíd, S, alluvium of the Čamovský potok stream; 200; S; 20–50; 25; 100; 13. 8. 1999; RH.
30. SK; Hostice, water reservoir, W margin; 193; S; 2–15; 18; 85; 7. 8. 2003; RH.
31. SK; Petrovce, SE, Nature Reserve Fenek; 257; S; 0–5; 16; 75; 22. 6. 2005; RH.
32. SK; Šurice, NE, terrain depression; 225; S; 10–15; 16; 100; 22. 6. 2005; RH.
33. SK; Konrádovce, WSW, stone-pit; 373; S; 20; 25; 85; 26. 10. 1995; RH, HO;
34. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 25–35; 6; 85; 21. 5. 1997; RH.
35. SK; Hajnáčka, NNW, alluvium of the Gortva stream; 215; -; 0; 12.5; 100; 16. 7. 2004; EB, RH.

Tab. 3. Tall-sedge dominanted plant communities of the *Magnocaricion elatae* alliance

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Dominant species of the *Magnocaricion elatae* plant communities																		
Pm	*Carex acutiformis*	**5**	**5**	**5**	**4**	**5**	**5**	**4**	**5**	**5**	**5**	.	1	.	.	+	.	.
Pm	*Carex acuta*	.	.	.	2	+	.	.	.	.	.	**5**	**5**	.	.	.	.	.
Pm	*Carex riparia*	+	.	.	.	.	.	.	.	.	.	.	.	**5**	**5**	**5**	.	.
Pm	*Phalaris arundinacea*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	**5**	**5**
Other species																		
Ma, Pm	*Lythrum salicaria*	+	2	1	+	.	+	r	+	+	+	+	+	.	+	.	1	+
	Equisetum palustre	1	+	.	2	+	3	.	1	1	.	.	1	.	.	.	2	.
Ma, Pm	*Symphytum officinale*	+	+	.	+	.	.	.	+	.	+	.	.	.	r	.	.	1
Ma, Pm	*Lysimachia vulgaris*	+	+	.	+	1	.	.	.	1	.	.	2	.	.	.	.	.
Pm	*Typha latifolia*	+	+	r	.	.	r	.	.	.	.	.	.	.	.	.	+	.
Pm	*Scutellaria galericulata*	.	1	.	.	+	.	.	2	+	.	.	1	.	.	.	.	.
Pm	*Iris pseudacorus*	.	.	.	.	+	.	2	.	.	1	+	.	.	+	.	.	.
	Persicaria amphibia	.	.	.	.	.	+	+	.	.	1	.	.	.	.	1	.	1
Pm	*Lycopus europaeus*	.	.	.	.	.	+	.	+	+	.	.	+	.	.	.	.	+
Le	*Lemna minor*	.	.	.	.	.	.	.	.	.	2	.	.	+	1	2	.	.
Ma	*Cirsium canum*	r	+	.	.	.	.	.	.	2	.	.	.	.	.	.	r	.
	Calystegia sepium	.	1	+	.	+	.	.	.	.	.	.	.	.	.	.	2	.
Ma	*Caltha palustris*	.	.	.	2	.	.	.	.	1	.	.	2	.	.	.	.	+
Pm	*Galium palustre*	.	.	.	1	.	.	.	.	+	.	.	1	.	.	.	.	.
Ma	*Lychnis flos-cuculi*	.	.	.	+	.	.	.	.	+	.	.	1	.	.	.	.	.
Ma	*Angelica sylvestris*	.	.	.	r	.	.	.	.	+	.	.	+	.	.	.	.	.
Pm	*Carex vulpina*	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Ranunculus repens	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
	Lysimachia nummularia	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
	Eupatorium cannabinum	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Ma	*Mentha longifolia*	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.
	Valeriana officinalis agg.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.
Ma	*Poa trivialis*	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.

Legend: * Bi – *Bidentetea-tripartitae*, Le – *Lemnetea*, Ma – *Molinio-Arrhenatheretea*, Pm – *Phragmito-Magnocaricetea*, Po – *Potametea*.

Species occurred only in one relevé:

Achillea millefolium (11: +), *Arctium* sp. (11: r), *Berula erecta* (11: r), *Calamagrostis epigejos* (11: +), *Carex otrubae* (12: +), *Cirsium arvense* (11: 2), *Cirsium oleraceum* (12: +), *Dipsacus fullonum* (11: +), *Epilobium hirsutum* (16: +), *Galega officinalis* (11: r), *Galium aparine* (11: +), *Galium mollugo* agg. (8: +), *Glyceria maxima* (15: 2), *Lemna trisulca* (15: 1), *Mentha arvensis* (4: 3), *Scirpus sylvaticus* (6: +), *Sonchus arvensis* (11: +), *Sonchus palustris* (8: +), *Stachys palustris* (17: +), *Utricularia australis* (14: +).

The relevés localities (for unpublished relevés – Country (HU – Hungary, SK – Slovakia); locality; altitude (m); type of water (S – stagnating, R – running); depth of water (cm); relevé area (m^2); cover; date; author(s) of relevé (EB – Eva Belanová, AC – Alžbeta Cvachová, RG – Rasťo Gális, JC – János Csiky, RH – Richard Hrivnák, IJ – Ivan Jarolímek, HO – Helena Oťaheľová, MV – Milan Valachovič) and in published relevés – reference).

1. SK; Gemerský Jablonec, water reservoir, NW margin; 239; -; 0; 25; 100; 3. 7. 1997; AC, RH.

2. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; -; 0; 25; 100; 13. 8. 1999; RH; HRIVNÁK (2004b, tab. 9A: 15).
3. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; -; 0; 25; 100; 13. 8. 1999; RH; HRIVNÁK (2004b, tab. 9A: 13).
4. SK; Hájnačka, NNW, alluvium of the Gortva stream; 218; -; 0; 16; 95; 16. 7. 2004; EB, RH.
5. SK; Hájnačka, NNW, alluvium of the Gortva stream; 218; -; 0; 16; 100; 16. 7. 2004; EB, RH.
6. SK; Tachty, water reservoir; 275; S; 0–5; 16; 100; 2. 7. 2003; RH.
7. SK; Chrámec, water reservoir; 176; -; 0; 16; 80; 2. 7. 2003; RH.
8. SK; Hostice, water reservoir, W margin; 193; -; 0; 20; 100; 7. 8. 2003; RH.
9. SK; Petrovce, SE, Nature Reserve Fenek; 257; -; 0; 16; 100; 22. 6. 2005; RH.
10. SK; Šurice, NE, terrain depression; 225; S; 1–10; 16; 100; 22. 6. 2005; RH.
11. SK; Chrámec, water reservoir; 176; -; 0; 25; 100; 10. 6. 1997; RH, MV.
12. SK; Petrovce, SE, Nature Reserve Fenek; 257; S; 0–2; 16; 100; 22. 6. 2005; RH.
13. SK; Gemerský Jablonec, water reservoir, NW margin; 239; S; 25–35; 30; 80; 21. 5. 1997; RH.
14. SK; Hajnáčka, E of the railway station, alluvium of the Gortva stream; 213; S; 15–20; 25; 95; 28. 7. 1998; RH, HO, MV.
15. SK; Šurice, NE, terrain depression; 225; S; 1–10; 16; 80; 22. 6. 2005; RH.
16. SK; Šíd, WSW, alluvium of the Čamovský potok stream; 200; -; 0; 25; 100; 13. 8. 1999; RH; HRIVNÁK & UJHÁZY (2003, tab. 1: 1).
17. SK; Hajnáčka, NNW, alluvium of the Gortva stream; 218; -; 0; 12; 100; 16. 7. 2004; EB, RH.

Tab. 4. Marsh plant communities from the banks of flowing waters of the *Phalaridion arundinaceae* and *Glycerio-Sparganion* alliances

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Dominant species of the *Phalaridion arundinacea* plant community																						
Pm	*Carex buekii*	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dominant species of the *Gylcerio-Sparganion* plant communities																						
Pm	*Glyceria notata*	.	**4**	**3**	**4**	**2**	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Pm	*Glyceria nemoralis*	.	.	.	.	.	**4**	**5**	**4**	**3**	**5**	**4**	**4**	**4**	**4**	**4**	**5**	.	.	.	.	.
Pm	*Berula erecta*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**3**	**5**	**4**	**5**	**5**
Other species																						
	Ranunculus repens	.	1	2	1	1	+	r	.	.	+	2	+	2	2	2	2	+	.	.	.	.
Pm	*Lycopus europaeus*	.	.	+	.	.	.	r	.	.	1	r	+	.	+	+	1	+	+	+	.	.
	Solanum dulcamara	.	1	.	.	.	r	r	.	+	1	r	2	.	+	+	.	.	.	.	.	.
	Eupatorium cannabinum	.	.	+	+	.	.	r	.	+	.	+	.	.	1	1	r	.	.	.	.	.
	Equisetum palustre	.	r	.	.	.	.	r	.	.	1	.	+	.	2	1	+	.	.	.	.	.
	Scrophularia umbrosa	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	1	r	+	r	.	.
Ma	*Mentha longifolia*	.	.	+	+	+	.	.	.	.	.	.	.	1	.	.	.	+	.	1	.	.
Bi	*Persicaria hydropiper*	.	3	2	+	1	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Mc	*Veronica beccabunga*	.	r	2	3	4	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
	Festuca gigantea	.	.	+	+	r	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.
	Epilobium roseum	.	.	.	.	.	r	r	.	.	.	.	.	r	1	1	.	.	.	.	.	.
	Calystegia sepium	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.
Ma	*Poa trivialis*	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
	Epilobium hirsutum	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	r	1	.	.
	Lapsana communis	.	.	.	r	r	.	.	.	.	.	.	.	r	r	.	.	.	.	.	.	.
Gu	*Urtica dioica*	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bi	*Bidens frondosus*	.	3	r	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pm	*Sparganium erectum*	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+
	Lysimachia nummularia	.	.	2	+	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.

Tab. 4. – cont.

*	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Salix fragilis	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.
Mc	*Carex remota*	.	.	.	1	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.
	Impatiens noli-tangere	.	.	.	r	+	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Ma	*Scirpus sylvaticus*	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	+	+	.
Ma, Pm	*Lythrum salicaria*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Bi	*Ranunculus sceleratus*	.	1	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ma, Mc	*Myosotis scorpioides* agg.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Ma	*Caltha palustris*	.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mc	*Chrysosplenium alternifolium*	.	.	+	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Epilobium species	.	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Tussilago farfara	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.
	Circaea lutetiana	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.
	Stachys sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.
	Dryopteris dilatata	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.
Pm	*Phalaris arundinacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.

Legend: *Bi – *Bidentetea-tripartitae*, Gu – *Galio-Urticetea*, Ma – *Molinio-Arrhenatheretea*, Mc – *Montio-Cardaminetea*, Pm – *Phragmito-Magnocaricetea*.

Species occurred only in one relevé:

Aegopodium podagraria (16: +), *Alnus glutinosa* (5: r), *Anthriscus sylvestris* (1: +), *Arrhenatherum elatius* (1: +), *Artemisia vulgaris* (1: +), *Carex riparia* (18: +), *Catabrosa aquatica* (2: 2), *Cirsium arvense* (1: +), *Dipsacus pilosus* (3: r), *Equisetum arvense* (1: +), *Galium aparine* (1: +), *Galium palustre* (17: +), *Glyceria maxima* (18: 1), *Humulus lupulus* (1: +), *Mentha arvensis* (17: 2), *Myosoton aquaticum* (16: r), *Phragmites australis* (18: 1), *Poa pratensis* (19: 1), *Ranunculus acris* (1: +), *Scutellaria galericulata* (17: +), *Symphytum officinale* (19: r), *Veronica anagallis-aquatica* (18: +), *Veronica anagalloides* (2: 1).

The relevés localities (for unpublished relevés – Country (HU – Hungary, SK – Slovakia); locality; altitude (m); type of water (S – stagnating, R – running); depth of water (cm); relevé area (m^2); cover; date; author(s) of relevé (EB – Eva Belanová, AC – Alžbeta Cvachová, RG – Rasťo Gális, JC – János Csiky, RH – Richard Hrivnák, IJ – Ivan Jarolímek, HO – Helena Oťaheľová, MV – Milan Valachovič) and in published relevés – reference).

1. SK; Chrámec, canalized stream between Chrámec and Drňa villages; ca 167; -; 0; 20; 95; 10. 6. 1997; RH, IJ, MV.
2. HU; Karancsberény; 280; R-S; 3; 4; 95; 10. 7. 2006; JC.
3. HU; Karancsberény; 250; R; 15; 8; 70; 21. 7. 2006; JC.
4. HU; Karancsberény; 255; R; 20; 10; 80; 21. 7. 2006; JC.
5. HU; Karancsberény; 260; R; 20; 10; 70; 21. 7. 2006; JC.
6. HU; Salgótarján, Gortva-tó; 505; R; 10; 4; 60; 27. 7. 2005; JC.
7. HU; Salgótarján, Gortva-tó; 505; R; 10; 4; 80; 27. 7. 2005; JC.
8. HU; Salgótarján, Gortva-tó; 505; R; 10; 4; 50; 27. 7. 2005; JC.
9. HU; Salgótarján, Gortva-tó; 505; R; 10; 4; 60; 27. 7. 2005; JC.
10. HU; Salgótarján, Gortva-tó; 505; R; 5; 4; 80; 27. 7. 2005; JC.
11. HU; Salgótarján, Gortva-tó; 505; R; 10; 4; 70; 27. 7. 2005; JC.
12. HU; Salgótarján, Gortva-tó; 505; R; 5; 4; 75; 27. 7. 2005; JC.
13. HU; Salgótarján, Petőfi-sétány; 450; R; 5; 4; 85; 27. 7. 2005; JC.
14. HU; Salgótarján, Gortva-tó; 500; R; 10; 4; 60; 26. 7. 2003; JC.
15. HU; Salgótarján, Gortva-tó; 500; R; 10; 4; 60; 26. 7. 2003; JC.
16. HU; Zagyvaróna, Buda-völgy; 345; R; 5; 8; 95; 20. 7. 2006; JC.
17. SK; Blhovce, Gortva stream, near the road-bridge; 198; R; 10–25; 10; 75; 28. 7. 1998; RH, HO, MV; HEGEDÜŠOVÁ et al. (2009, tab. 1: 4).

18. SK; Dubno, Gortva stream in S margin of the village, near the road-bridge; 228; R; 10–25; 6; 90; 28. 7. 1998; RH, HO, MV; HEGEDÜŠOVÁ et al. (2009, tab. 1: 8).
19. SK; Hajnáčka, Beležír, Gortva stream near the road-bridge; 215; R; 5–20; 9; 85; 3. 6. 2002; EB, RH.
20. SK; Hajnáčka, Gortva stream in S margin of the village, near the road-bridge; 219; R; 0–1; 9; 85; 16. 7. 2004; EB, RH; Hegedüšová et al. (2009, tab. 1: 9).
21. SK; Dubno, Gortva stream in S margin of the village, near the road-bridge; 228; R; 5–15; 10; 95; 18. 6. 2004; EB, RH; HEGEDÜŠOVÁ et al. (2009, tab. 1: 10).

Tab. 5. Marsh plant communities from periodically flooded habitats of the *Oenanthion aquaticae* and *Bidention tripartiti* alliances

*	Relevé number	1	2	3	4
Dominant species of the *Oenanthion aquaticae* plant communities					
	Eleocharis palustris	**5**	.	.	.
	Butomus umbellatus	.	**4**	.	.
	Oenanthe aquatica	.	.	**4**	1
Diagnostic species of the *Bidention tripartiti* plant community					
	Alopecurus aequalis	.	.	b	**4**
	Persicaria lapathifolia	.	.	.	**b**
	Chenopodium ficifolium	.	.	.	**b**
Other species					
Pm	*Alisma plantago-aquatica*	+	.	+	.
Ma	*Poa trivialis*	.	.	+	+

Legend: * Ma – *Molinio-Arrhenatheretea*, Pm – *Phragmito-Magnocaricetea*.

Species occurred only in one relevé:

Agrostis stolonifera (4: +), *Alopecurus geniculatus* (1: +), *Atriplex* sp. (4: +), *Batrachium rionii* (4: 1), *Berula erecta* (4: r), *Callitriche palustris* agg. (2: 2), *Glyceria fluitans* (1: 1), *Juncus bufonius* agg. (4: +), *Lycopus europaeus* (3: r), *Medicago sativa* (4: 2), *Persicaria mitis* (4: 1), *Polygonum arenastrum* (4: +), *Potentilla supina* (4: +), *Ranunculus sceleratus* (4: +), *Rorippa sylvestris* (3: +), *Sparganium erectum* (2: 1), *Trifolium repens* (4: +), *Tripleurospermum inodorum* (4: 1), *Veronica anagallis-aquatica* (4: +).

The relevés localities (for unpublished relevés – Country (HU – Hungary, SK – Slovakia); locality; altitude (m); type of water (S – stagnating, R – running); depth of water (cm); relevé area (m^2); cover; date; author(s) of relevé (EB – Eva Belanová, AC – Alžbeta Cvachová, RG – Rasťo Gális, JC – János Csiky, RH – Richard Hrivnák, IJ – Ivan Jarolímek, HO – Helena Oťaheľová, MV – Milan Valachovič) and in published relevés – reference).

1. SK; Gemerský Jablonec, water reservoir, NW margin; 239; -; 0; 12; 85; 30. 6. 2002; RH.
2. SK; Hájnačka, Gortva stream, ca 250 m up of the road bridge; 217; R; 15–30; 15; 70; 16. 7. 2004; EB, RH.
3. SK; Chrámec, water reservoir; 176; S; 0–2; 16; 80; 2. 7. 2003; RH.
4. SK; Chrámec, water reservoir, W margin; 176; -; 0; 30; 75; 10. 6. 1997; RH, MV; OŤAHEĽOVÁ et al. (1998, Fig. 3a).

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