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COMMUNITIES OF THE SUBALLIANCE CARICENION GRACILIS IN THE BORSKÁ NÍŽINA LOWLAND

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Súhrn: *Spoločenstvá podzväzu* Caricenion gracilis *na Borskej nížine*. Na Borskej nížine bolo nájdených päť spoločenstiev podzväzu *Caricenion gracilis*: *Caricetum gracilis*, porasty s *Carex vesicaria*, *Galio palustris-Caricetum ripariae*, porasty s *Carex vulpina* a porasty s *Phalaroides arundinacea*. Podľa návrhu kritérii pre pripravovanú Červenú knihu vzácnych a ohrozených rastlinných spoločenstiev Slovenska patria medzi zraniteľné spoločenstvá na prirodzených biotopoch. Spoločenstvá *Caricetum gracilis*, *Galio palustris-Caricetum ripariae* a porasty s *Phalaroides arundinacea* sa dobre uplatňujú na antropogénnych stanovištiach. V súčasnosti sú porasty podzväzu ohrozené najmä prienikom synantropofytov.

Key words: Slovakia, tall-sedges, *Caricetum gracilis*, stands with *Carex vesicaria*, *Galio palustris-Caricetum ripariae*, stands with *Carex vulpina* and stands with *Phalaroides arundinacea*

Introduction

The works of Balátová-Tuláčková (1968, 1976) and Bosáčková (1970, 1975) belong to the important treatises which have contributed to the knowledge of the suballiance *Caricenion gracilis* in the Borská nížina Lowland.

Balátová-Tuláčková (1968) studied the associations *Caricetum gracilis*, *Caricetum vesicariae* and *Galio palustris-Caricetum ripariae*. She published a detailed study of the suballiance *Caricenion gracilis* also in the work of Balátová-Tuláčková (1976).

Bosáčková (1970) performed the detailed research of vegetation of the Abrod Nature Reserve. The first results she published year earlier (Bosáčková 1969). The latest publication (Stanová 2002, 2003) summarised the recent knowledge of the Abrod Nature Reserve. Phytocoenological synthesis of fen meadows in the Borská nížina Lowland was published by Bosáčková (1975).

Zlinská, Oťaheľová (1992); Oťaheľová et al. (1993, 1994, 1995); Oťaheľová, Banásová (1995); Oťaheľová (1996) and Zlinská (1999) found the associations in the Morava River floodplain recently.

The aim of the work is to present new knowledge about spreading of the communities of the suballiance *Caricenion gracilis* in the Borská nížina Lowland.

Study area

The Borská nížina Lowland is situated in Western Slovakia, it is a part of the Vienna Basin (Lukniš, Plesník 1961). The Borská nížina Lowland is bordered by the Morava River in the west, Malé Karpaty Mountains in the east and Myjava River in the north. The study area belongs to a lower part of the Morava River basin. The mean temperature of the coldest month (January) is - 1,5 – - 1,9 °C, the mean temperature of the warmest

month (July) is 19,8 – 20,0 °C, and the mean yearly temperature is 9,5 °C. Mean yearly precipitation is ca. 600 mm (Plesník 1981). Phytogeographicaly this area is characterized by the Eupannonian xerothermic flora (Futák 1966, 1984).

Material and methods

In the years 1999 and 2000 the phytocoenological relevés were made. The methods of Zurich-Montpellier School (Braun-Blanquet 1964) were used during the field research of plant communities and the data processing. The seven-degree Braun-Blanquet's scale was used to estimate the abundance and dominance of the plant species.

Each vegetation unit is characterized by diagnostic taxa combination. The diagnostic taxa combination includes the characteristic and constant taxa.

The data were put into the central database of phytocoenological relevés in the program TURBOVEG (Hennekens 1996a). The relevés were classified by the divisive polythetic method (TWINSPAN, Hill 1979). The program NCLAS (Podani 1993) was used for the creation of clusters of similar relevés in the phytocoenological table as a part of the packet SYNTAX 5.0 (Podani 1993). The Růžička's coefficient of similarity and the β-flexible method of clustering (β = - 0,25) were used.

The phytocoenological table was edited in the program MEGATAB (Hennekens 1996b). The resulting phytocoenological table is arranged in accordance with dendrogram clusters and with decreasing species constancy (values).

The names of the plants are in accordance with the Checklist of non-vascular and vascular plants of Slovakia (Marhold, Hindák 1998). The names of the plant communities from the class *Phragmito-Magnocaricetea* are presented according to Oťaheľová et al. (2001). The categories of threat and rareness for the vascular plants are stated by the review of Feráková et al. (2001). Ruderal species are stated by the work of Jurko (1990).

Results and discussion

Syntaxonomical survey of plant communities
Class : *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941
Order: *Phragmitetalia* Koch 1926
Alliance: *Magnocaricion elatae* Koch 1926
Suballiance: *Caricenion gracilis* (Neuhäusl 1959) Oberd. et al. 1967

1. as.: *Caricetum gracilis* Almquist 1929
2. stands with *Carex vesicaria*
3. as.: *Galio palustris-Caricetum ripariae* Balátová-Tuláčková et al. 1993
4. stands with *Carex vulpina*
5. stands with *Phalaroides arundinacea*

1. ***Caricetum gracilis***

Stands of community occur in eulittoral and supralittoral zones of natural and anthropogenic water areas and in deeper terrain depressions of the studied area. The average cover of the stands is 97 %. The average number of species in the relevé is 11.

The community is built on dominancy of the species *Carex gracilis* and on the diagnostic species of the class *Phragmito-Magnocaricetea*, the order of *Molinietalia* Koch 1926, the alliance of *Calthion* R. Tx. 1937 em. Bal.-Tul. 1978, the suballiance of *Filipendulenion* (Lohmeyer in Oberd. et al. 1967) Bal.-Tul. 1978 and less on the species

of the class *Scheuchzerio-Caricetea fuscae* R. Tx. 1937 (Tab. 1).

The following lower risk taxon was recorded in the stands of the community: *Peucedanum palustre* (LR: nt).

The species such as *Bidens tripartita*, *Calystegia sepium*, *Cirsium arvense*, *Elytrigia repens*, *Potentilla anserina* and *Solidago gigantea* penetrate into the stands from ruderal habitats.

Klika (1958); Balátová-Tuláčková (1968, 1976); Bosáčková (1970, 1975); Balátová-Tuláčková et al. (1983); Oťaheľová (1996); Oťaheľová, Banásová (1995); Oťaheľová et al. (1993, 1994, 1995); Posltová (1997) and Zlinská (1999) found the *Caricetum gracilis* in the Borská nížina Lowland. This community was more spreaded in 1970's, recently only a few continuous stands have been recorded in the Abrod Nature Reserve (Posltová 1997, Malovcová-Staníková 2001).

The association is included within vulnerable communities in natural biotops in the proposal of criteria for the coming red book of rare and endangered plant communities of Slovakia (Valachovič 2001).

Relevés are in the Table 1.

Tab. 1. *Caricetum gracilis* in the Borská nížina Lowland

The number of the relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	S
The area (m^2)	25	25	25	20	00	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
Phragmito-Magnocaricetea, Phragmitetalia, Magnocaricion elatae																				
Lythrum salicaria	+	+	.	1	+	.	1	.	+	.	.	.	+	+	2	1	+	+	.	IV
Lysimachia vulgaris	.	.	.	.	.	2	.	1	1	.	1	1	2	2	1	.	.	1	2	III
Galium palustre	+	+	.	.	.	2	+	.	.	.	.	1	.	+	1	.	.	.	.	II
Iris pseudacorus	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	.	1	3	1	II
Carex acutiformis	.	.	.	.	.	1	.	.	+	.	.	+	.	1	.	+	.	.	.	II
Glyceria maxima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	I
Schoenoplectus lacustris	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	I
Eleocharis palustris	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	I
Scutellaria galericulata	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Mentha aquatica	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I
Phellandrium aquaticum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	I
Caricenion gracilis, Caricetum gracilis																				
Carex acuta	5	5	5	5	4	5	5	5	4	5	5	4	5	5	5	4	5	5	5	V
Carex vesicaria	.	.	.	1	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	I
Phalaroides arundinacea	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	+	I
Carex riparia	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I
Carex vulpina	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	I
The transgressive characteristic taxa of the *Caricenion rostratae*																				
Peucedanum palustre	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.	I
Carex rostrata	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	I
The transgressive characteristic taxa of the *Scheuchzerio-Caricetea fuscae*																				
Agrostis canina	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Carex panicea	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	I

Tab. 1. continuation *Caricetum gracilis* in the Borská nížina Lowland

The number of the relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	S
The area (m^2)	25	25	25	00	00	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
The transgressive characteristic taxa of the *Molinietalia* and of the *Calthion* and *Filipendulenion*																				
Juncus effusus	.	2	.	2	2	2	+	1	.	2	+	1	.	1	.	.	.	.	.	III
Symphytum officinale	2	.	+	.	.	.	.	1	.	.	.	+	.	.	.	1	.	1	1	II
Deschampsia cespitosa	2	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Filipendula ulmaria	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	I
Scirpus sylvaticus	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Mentha longifolia	.	.	1	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	I
Equisetum palustre	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	I
Sanguisorba officinalis	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I
The constant taxa																				
Ranunculus repens	1	+	.	.	.	2	2	1	1	1	.	1	.	.	.	.	.	.	.	III
Other taxa																				
Poa trivialis	.	.	+	2	.	.	.	1	+	1	.	.	.	.	.	.	.	.	1	II
Persicaria amphibia	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	2	2	2	II
Potentilla anserina	.	.	.	.	.	2	2	.	.	r	+	+	.	.	.	.	.	.	.	II
Cirsium arvense	.	.	.	.	.	.	.	1	.	.	1	.	.	.	2	.	.	+		II
Glechoma hederacea	.	.	+	.	.	.	.	+	+	2	.	.	.	.	.	.	.	.	.	II
Lysimachia nummularia	.	.	.	.	2	.	1	.	.	1	.	.	.	.	.	.	.	.	.	I
Rumex crispus	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	1		I
Calystegia sepium	.	.	.	2	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	I
Solidago gigantea	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	2	.	.	.	I
Bidens tripartita	.	.	.	1	.	.	.	.	.	.	.	.	.	+	.	.	.	1		I
Agrostis stolonifera	.	.	.	+	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	I
Calamagrostis epigejos	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	I
Carex hirta	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	I
Ranunculus acris	.	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	I
Persicaria maculosa	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	I
Aegopodium podagraria	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	+	.	.	.	I
Potentilla reptans	+	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Glyceria declinata	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Equisetum arvense	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	I
Galium aparine	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	I
Juncus articulatus	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	I
Lythyrus pratensis	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	I
Lychnis flos-cuculi	.	.	.	.	.	.	.	.	1	r	.	.	.	.	.	.	.	.	.	I
Holcus lanatus	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	I
Urtica dioica	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	I
Eo																				
Drepanocladus aduncus	.	.	.	.	.	2	.	.	.	.	.	.	.	2	.	.	.	.	.	I

Appendix 1:
Tab. 1. Species found only in one relevé:
Acetosa pratensis - + (9); *Ajuga reptans* - + (8); *Alopecurus aequalis* - 1 (4); *A. pratensis* - + (10); *Calamagrostis canescens* - 1 (15); *Cardamine pratensis* - + (7); *Cirsium oleraceum* - 2 (9); *Elytrigia repens* - 1 (12); *Epilobium ciliatum* - + (4); *Eupatorium cannabinum* - 3 (16); *Festuca pratensis* - + (10); *Frangula alnus* (juv.) - + (5); *Galeopsis speciosa* - + (12); *Juncus conglomeratus* - 1 (4); *Poa pratensis* - + (11); *Ranunculus flammula* - + (4); *Solanum dulcamara* - + (14); *Tripleurospermum perforatum* - + (19); *Veronica chamaedrys* - 2 (10); *Vicia cracca* - 1 (1).
E_0: *Calliergon cordifolium* - 2 (5); *Calliergonella cuspidata* - 2 (6); *Drepanocladus sendtneri* - 2 (7).

Localities of the relevés and other information about the phytocoenological relevés:
(relevé number, village/town, locality, cover herb layer, cover moss layer, date)
1. Senica, west of the settlement of Vyrúbaná; E_1 100 %; August 23, 2000
2. Plavecký Mikuláš, northwest of the village, ca. 900 m north of the gamekeeper's cottage Haluška; E_1 100 %; June 30, 1999
3. Studienka, south of the village ca. 800 m, near the Rudava River; E_1 100 %; August 3, 2000
4. Veľké Leváre, the depression on the southeast outskirts of the village, under manor's park; E_1 95 %; July 4, 2000
5. Malacky, near km 3 in the direction of Studienka, to the right from a road; E_1 85 %; E_0 5 %; August 1, 2000
6. Bílkové Humence, ca. 1 km east of the village; E_1 100 %; E_0 10 %; August 14, 2000
7. Bílkové Humence, ca. 1 km east of the village; E_1 95 %; E_0 5 %; August 14, 2000
8. Plavecký Mikuláš, northwest of the village, ca. 900 m north of the gamekeeper's cottage Haluška; E_1 100 %; June 15, 2000
9. Dolné Valy, east of the settlement near Lakšársky potok Brook; E_1 100 %; June 9, 1999
10. Studienka, southeast of the village, under the settlement of Juríkovci behind Rudava River; E_1 100 %; August 3, 2000
11. Plavecký Mikuláš, northwest of the village, ca. 900 m north of the gamekeeper's cottage Haluška; E_1 95 %; July 21, 1999
12. Rohožník, west of the village, in the depression; E_1 100 %; June 29, 1999
13. Pernek, southwest of the village, a pond; E_1 95 %; July 22, 1999
14. Senica, ca. 800 m south of the gamekeeper's cottage Dolný Šranek; E_1 100 %; July 28, 1999
15. Veľké Leváre, the Abrod Nature Reserve; E_1 100 %; E_0 5 %; July 4, 1999
16. Lakšárska Nová Ves, ca. 700 m west of the village, near the Lakšársky potok Brook; E_1 95 %; July 26, 1999
17. Lakšárska Nová Ves, the Zelienka Nature Reserve, east in the meadow's complex; E_1 100 %; August 15, 2000
18. Gajary, west of the village, ca. 1 km; E_1 100 %; June 29, 2000
19. Brodské, northwest of the village, the depression in the field; E_1 90 %; July 27, 2000

2. Stands with *Carex vesicaria*

The stands of community occur in a littoral zone of the natural and anthropogenic water areas of the studied area. The average cover of the stands is 96 %. The average number of species in the relevé is 16.

The community is built on diagnostic species of the classes *Phragmito-Magnocaricetea*, *Scheuchzerio-Caricetea fuscae*, the order of *Molinietalia*, and species of the alliance *Calthion* and suballiance *Filipendulenion* (Tab. 2).

The recorded rare and endangered species are *Hottonia palustris* (VU), *Hydrocotyle vulgaris* (CR), *Peucedanum palustre* (LR:nt) and *Thalictrum flavum* (VU).

The species *Bidens tripartita* and *Potentilla anserina* penetrate into the stands from ruderal habitats.

Balátová-Tuláčková (1968, 1976), Oťaheľová et al. (1994), Oťaheľová (1996) and Staníková (1998) found the association *Caricetum vesicariae* Chouard 1924 in the Borská nížina Lowland. The observed stands are not included into the association *Caricetum vesicariae* because the characteristic species composition is absent. The stands of the association *Caricetum vesicariae* were not frequent even at past. At present most of the original habitats are vanishing because of draining .

The association belongs to the vulnerable communities in natural biotops (Valachovič 2001).

Relevés are in the Table 2.

Tab. 2. Stands with *Carex vesicaria* in the Borská nížina Lowland

The number of the relevé	1	2	3	4	5	6	S
The area (m^2)	20	25	25	25	25	20	
Phragmito-Magnocaricetea, *Phragmitetalia*, *Magnocaricion elatae*							
Lysimachia vulgaris	.	2	1	.	2	2	IV
Lythrum salicaria	.	1	2	1	1	.	IV
Carex acutiformis	.	+	1	1	.	.	III
Galium palustre	.	.	.	+	1	1	III
Mentha aquatica	.	.	.	1	2	.	II
Scutellaria galericulata	.	.	.	.	1	1	II
Eleocharis palustris	2	.	.	.	.	.	I
Iris pseudacorus	.	.	2	.	.	.	I
Caricenion gracilis, community with *Carex vesicaria*							
Carex vesicaria	4	4	4	5	4	4	V
The transgressive characteristic taxa of the *Caricenion rostratae*							
Peucedanum palustre	.	.	.	.	2	.	I
The transgressive characteristic taxa of the *Scheuchzerio-Caricetea fuscae*							
Carex nigra	.	.	.	1	.	1	II
Carex echinata	.	.	.	.	.	+	I
Carex panicea	.	.	.	.	+	.	I
Valeriana dioica	.	.	.	.	+	.	I
The transgressive characteristic taxa of the *Molinietalia*, the alliance of *Calthion* and the suballiance of *Filipendulenion*							
Juncus effusus	2	.	2	+	.	2	IV
Caltha palustris	.	.	1	.	2	.	II
Filipendula ulmaria	.	+	+	.	.	.	II
Lychnis flos-cuculi	.	.	+	+	.	.	II
Myosotis palustris agg.	.	.	.	.	2	.	I
Equisetum palustre	.	.	.	.	1	.	I
Galium uliginosum	.	.	.	1	.	.	I
Molinia caerulea agg.	.	.	.	.	.	1	I
Cirsium rivulare	.	.	.	.	+	.	I
Sanguisorba officinalis	.	+	.	.	.	.	I
Scirpus sylvaticus	.	+	.	.	.	.	I
Thalictrum flavum	.	.	.	.	+	.	I
The constant taxa							
Ranunculus repens	3	+	2	1	2	.	V
Lysimachia nummularia	.	.	+	1	1	.	III
Poa pratensis	+	.	1	1	.	.	III
Acetosa pratensis	+	.	+	+	.	.	III

Tab. 2. continuation Stands with *Carex vesicaria* in the Borská nížina Lowland

The number of the relevé	1	2	3	4	5	6	S
The area (m^2)	20	25	25	25	25	20	
Other taxa							
Agrostis stolonifera	.	.	.	2	.	1	II
Poa trivialis	.	.	2	+	.	.	II
Ranunculus flammula	.	.	.	2	.	+	II
Holcus lanatus	.	+	.	+	.	.	II
Potentilla anserina	+	.	.	+	.	.	II

Appendix 2:
Tab. 2. Species found only in one relevé:
Aegopodium podagraria - r (5); *Alnus glutinosa* (juv.) - 2 (5); *Bidens tripartita* - 1 (1); *Calamagrostis canescens* - 2 (6); *C. epigejos* - 1 (5); *Carex elongata* - + (6); *C. lachenalii* - + (4); *Eupatorium cannabinum* - r (2); *Frangula alnus* (juv.) - + (6); *Galium mollugo* - + (5); *Glyceria declinata* - + (6); *Hottonia palustris* - 1 (6); *Hydrocotyle vulgaris* - 1 (6); *Juncus conglomeratus* - 1 (6); *Lathyrus pratensis* - 1 (3); *Lycopus europaeus* - 2 (6); *Persicaria amphibia* - 2 (1); *Ranunculus acris* - 1 (4); *Stellaria graminea* - 1 (3); *Veronica chamaedrys* - 1 (4); *Viola species* - 1 (2).
E_0: *Calliergonella cuspidata* - 2 (4); *Drepanocladus aduncus* – 2 (4); *Riccia fluitans* - 2 (6).

Localities of the relevés and other information about the phytocoenological relevés:
(relevé number, village/town, locality, cover herb layer, cover moss layer, date)
1. Prievaly, southwest of an extracted peat bog, the depression near a field road; E_1 100 %; June 6, 2000
2. Dolné Valy, near the Lakšársky potok Brook; E_1 100 %; August 16, 2000
3. Dolné Valy, east of the settlement, near the Lakšársky potok Brook; E_1 95 %; June 9, 1999
4. Lakšárska Nová Ves, the Červený rybník Nature Reserve; E_1 100 %; E_0 10 %; June 1, 1999
5. Plavecký Peter, south of the gamekeeper's cottage Dolný Olšovský Mlyn; E_1 90 %; June 6, 2000
6. Malacky, 4 km northeast, north of the gamekeeper's cottage Červený kríž; E_1 95 %; E_0 5 %; July 28, 2000

3. *Galio palustris-Caricetum ripariae*

Stands of community occur in deeper terrain depressions of the alluvium of brooks and rivers. This community is very well adapted to secondary habitats, it grows in the littoral zone of the anthropogenic water areas and canals. The average cover is 98 %. The average number of species in the relevé is 10.

The community consists of the diagnostic species of the classes *Phragmito-Magnocaricetea* and *Molinio-Arrhenatheretea* R.Tx. 1937 em. R. Tx. 1970 and their lower syntaxa (Tab. 3).

The community is characterized by rare and endangered species and their sporadic occurrence: *Bolboschoenus maritimus* s.s. (EN), *Peucedanum palustre* (LR:nt), *Teucrium scordium* (VU), *Thalictrum flavum* (VU) and *Veronica scutellata* (LR:nt).

The species *Calystegia sepium*, *Cirsium arvense*, *Elytrigia repens*, *Potentilla anserina* and *Solidago gigantea* penetrate into the stands from ruderal habitats.

Balátová-Tuláčková (1968, 1976); Bosáčková (1975); Oťaheľová (1996); Oťaheľová, Banásová (1995) and Zlinská (1999) found this community in the Borská nížina Lowland.

Relevés are in the Table 3.

Tab. 3. *Galio palustris-Caricetum ripariae* in the Borská nížina Lowland

The number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	S
The area (m^2)	20	25	25	25	25	25	25	25	25	25	25	25	25	25	25	20	25	25	25	25	
Phragmito-Magnocaricetea, *Phragmitetalia*, *Magnocaricion elatae*																					
Iris pseudacorus	1	2	2	2	.	.	2	.	2	1	.	.	.	1	.	1	1	.	.	.	III
Lythrum salicaria	+	.	+	1	+	.	.	.	.	+	1	1	+	1	.	.	.	.	.	.	III
Lysimachia vulgaris	1	.	.	2	1	.	.	.	2	2	.	.	2	1	.	.	.	+	.	.	II
Galium palustre	.	.	r	1	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	I
Phragmites australis	.	1	.	.	.	.	.	.	+	.	.	.	.	.	2	.	.	.	.	.	I
Carex acutiformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	I
Scutellaria galericulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	I
Caricenion gracilis, *Galio palustris-Caricetum ripariae*																					
Carex riparia	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	V
Phalaroides arundinacea	.	.	.	.	.	.	2	.	1	2	2	+	.	1	.	+	.	.	.	.	II
Carex acuta	.	.	.	.	.	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	I
The transgressive characteristic taxa of the *Phragmitetalia*																					
Bolboschoenus maritimus	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	+	.	.	I
Glyceria maxima	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	I
Spagranium erectum	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	I
Schoenoplectus lacustris	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I
Typha latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	I
The transgressive characteristic taxa of the *Molinietalia*, the alliance of *Calthion* and the suballiance of *Filipendulenion*																					
Symphytum officinale	+	2	2	.	.	1	1	1	1	2	1	.	.	1	.	.	+	.	.	.	III
Deschampsia cespitosa	.	.	1	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	I
Juncus effusus	.	.	.	1	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	I
Equisetum palustre	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	I
Cirsium canum	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	I
Filipendula ulmaria	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	I
Thalictrum flavum	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	I
The constatnt taxa																					
Persicaria amphibia	.	.	.	1	.	.	1	1	.	1	.	1	+	+	.	.	.	1	2	2	III
Other taxa																					
Urtica dioica	.	.	.	.	.	+	.	.	.	.	.	+	+	2	2	1	+	.	.	+	II
Cirsium arvense	.	.	.	.	.	+	.	.	.	.	.	.	+	1	1	.	1	.	+	2	II
Calystegia sepium	.	.	.	.	.	+	+	2	2	.	.	2	.	.	+	.	.	.	.	.	II
Lycopus europaeus	+	+	.	+	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	II
Rubus species	.	.	.	.	.	.	.	.	2	.	.	.	1	.	.	+	2	.	.	.	I
Galium aparine	.	.	.	.	.	.	+	.	.	+	.	.	.	1	+	.	.	.	.	.	I
Calamagrostis epigejos	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.	.	.	I
Humulus lupulus	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2	+	.	.	.	I
Poa trivialis	.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	+	.	.	.	.	I
Elytrigia repens	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	I
Vicia cracca	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I
Solidago gigantea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	I
Teucrium scordium	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I

Appendix 3:
Tab. 3. Species found only in one relevé:
Agrostis stolonifera - + (13); *Alopecurus aequalis* - + (12); *Arrhenatherum elatius* - + (15); *Calamagrostis canescens* - + (5); *Carex hirta* - 2 (15); *C. pseudocyperus* - + (17); *Equisetum arvense* - + (4); *Fallopia dumetorum* - + (17); *Frangula alnus* (juv.) - r (5); *Galeopsis speciosa* - + (17); *Galium rivale* - + (17); *Geum urbanum* - + (16); *Glechoma hederacea* - 1 (16); *Hypericum tetrapterum* - + (13); *Impatiens noli-tangere* - + (16); *Juncus articulatus* - + (13); *Lathyrus pratensis* - + (10); *Persicaria maculosa* - + (7); *Peucedanum palustre* - r (5); *Poa angustifolia* - 1 (15); *Potentilla anserina* - + (13); *P. reptans* - + (14); *Rumex crispus* - + (13); *Salix cinerea* (juv.) - + (3); *Solanum dulcamara* - 2 (17); *Tithymalus esula* - 1 (9); *Veronica scutellata* - r (14).
E_0: *Brachythecium rutabulum* - 1 (16); *Drepanocladus aduncus* - 2 (11); *Eurhynchium hians* - 1 (16).

Localities of the relevés and other information about the phytocoenological relevés:
(relevé number, village/town, locality, cover herb layer, cover moss layer, date)
1. Moravký Sv. Ján, 2 km south of the village, southwest of the gamekeeper's cottage Ciglad; E_1 100 %; August 29, 2000
2. Jakubov, southwest of the village, in a silting river oxbow; E_1 100 %; June 28, 2000
3. Senica, west of the settlement of Vyrúbaná; E_1 100 %; August 23, 2000
4. Lakšárska Nová Ves, a north border of a meadow east of the water reservoir of the Zelienka Nature Reserve; E_1 100 %; August 15, 2000
5. Malacky, 4 km northeast, near the gamekeeper's cottage Červený kríž; E_1 100 %; July 28, 2000
6. Borský Jur, northwest of the village, the depression behind the railway track; E_1 100 %; July 11, 2000
7. Brodské, northwest of the village, the depression in the field; E_1 100 %; July 27, 2000
8. Závod, southeast of the village, a late pond; E_1 100 %; July 6, 2000
9. Kúty, southeast of the village, near the railway track; E_1 100 %; July 18, 2000
10. Gajary, west of the village, ca. 900 m; E_1 90 %; June 29, 2000
11. Brodské, northwest of the village, the depression in the field; E_1 100 %; E_0 5 %; July 27, 2000
12. Láb, southwest of the village, a east the border of the Mokrý les; E_1 100 %; June 22, 2000
13. Závod, ca. 1 km southeast of the village, the depression in the field; E_1 95 %; July 6, 2000
14. Bílkove Humence, 850 m southeast of the settlement of Habány; E_1 95 %; August 10, 2000
15. Gajary, under the road to Dürnkrut; E_1 95 %; June 29, 2000
16. Hlboké, the depression near the railway station; E_1 90 %; E_0 5 %; August 23, 2000
17. Sekule, west of the village, the river oxbow near Malolevársky kanál Channel; E_1 95 %; August 29, 2000
18. Závod, southeast of the village, the late pond; E_1 100 %; July 6, 2000
19. Kúty, east of the railway station, ca. 140 m north of a main road to Čáry; E_1 100 %; July 12, 2000
20. Jakubov, west-southwest of the crossing Jakubov-Láb; E_1 100 %; June 28, 2000

4. Stands with *Carex vulpina*

The stands of community occur in shallow terrain depressions of the fields in the studied area.

Balátová-Tuláčková (1976) and Zlinská (1999) published the association *Caricetum vulpinae* von Soó 1927 from the studied area. The observed stands are not included into the association *Caricetum vulpinae* because the characteristic species composition is absent. The stands of the association were not frequent even at past.

Relevé No. 1: Zohor, east of the village behind a railway track; the sampled area of 25 m^2; the cover of E_1 100 %, E_0 5 %; June 20, 2000: *Carex vulpina* 4, *C. acutiformis* 2, *Equisetum palustre* 2, *Juncus inflexus* 2, *Lythrum salicaria* 2, *Persicaria amphibia* 2, *Poa pratensis* 2, *Scrophularia umbrosa* 2, *Symphytum officinale* 2, *Calamagrostis epigejos* 1, *Galium aparine* 1, *Hypericum tetrapterum* 1, *Mentha longifolia* 1, *Poa trivialis* 1, *Solidago gigantea* 1, *Epilobium hirsutum* +, *Vicia cracca* +.

E_0: *Brachythecium rutabulum* 2.

5. Stands with *Phalaroides arundinacea*

The stands of community occur in the littoral zone of the natural and anthropogenic water areas and in the shallow terrain depressions of the studied area.

Balátová-Tuláčková (1976) published the association *Phalaridetum arundinaceae* Libbert 1931 from the studied area. Oťaheľová (1996); Oťaheľová et al. (1994); Zlinská, Oťaheľová (1992) and Zlinská (1999) found this association in the Morava River floodplain at present.

Relevé No. 1: Brodské, northwest of the village; the sampled area of 25 m^2; the cover of E_1 100 %; July 27, 2000: *Phalaroides arundinacea* 5, *Poa trivialis* 2, *Stachys palustris* 2, *Symphytum officinale* 2, *Carex vulpina* 1, *Lythrum salicaria* 1, *Carex riparia* +, *Lycopus europaeus* +, *Lysimachia vulgaris* +.

Relevé No. 2: Gajary, ca. 1 km west of the village; the sampled area of 25 m^2; the cover of E_1 100 %; June 29, 2000: *Phalaroides arundinacea* 5, *Lysimachia vulgaris* 2, *Persicaria amphibia* 2, *Schoenoplectus lacustris* 1, *Symphytum officinale* 1, *Cirsium arvense* +, *Poa trivialis* +, *Lythrum virgatum* r.

Relevé No. 3: Studienka, southeast of the village under the settlement of Juríkovci, near the Rudava River; the sampled area of 25 m^2; the cover of E_1 100 %; August 3, 2000: *Phalaroides arundinacea* 5, *Solidago gigantea* 2, *Urtica dioica* 2, *Calystegia sepium* 1, *Cirsium arvense* 1.

Conclusion

The following communities of *Caricetum gracilis*, stands with *Carex vesicaria*, *Galio palustris-Caricetum ripariae*, stands with *Carex vulpina* and stands with *Phalaroides arundinacea* were distinguished within the suballiance of *Caricenion gracilis* in the Borská nížina Lowland. They occur in the littoral zone of the natural and anthropogenic water areas and in the terrain depressions of the alluvium of the brooks and rivers and of the fields in the studied area. These communities belong to vulnerable by the proposal of criteria for the coming red book of rare and endangered plant communities of Slovakia in natural habitats. In natural habitats of the studied area I treat them as endangered communities. Stands with *Carex vesicaria* and *Carex vulpina* are rare communities in the Borská nížina Lowland.

The communities consist of the diagnostic species of the class *Phragmito-Magnocaricetea*, the order of *Molinietalia*, the alliance of *Calthion*, the suballiance *Filipendulenion* and less of the species of the class of *Scheuchzerio-Caricetea fuscae*. The communities are characterized by relatively high number of rare and endangered species, such as *Bolboschoenus maritimus* s.s. (EN), *Hottonia palustris* (VU), *Hydrocotyle vulgaris* (CR), *Peucedanum palustre* (LR:nt), *Scrophularia umbrosa* (LR:nt), *Teucrium scordium* (VU), *Thalictrum flavum* (VU) and *Veronica scutellata* (LR:nt).

At present the lasting stands of the communities are endangered especially by the penetration of species, such as *Bidens tripartita*, *Calystegia sepium*, *Cirsium arvense*, *Elytrigia repens*, *Potentilla anserina* and *Solidago gigantea*.

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Fig. 1. The association *Caricetum gracilis* near the Lakšársky potok Brook, 28.6.1999
(Photo: Author)

Fig. 2. Stand with *Carex vesicaria* near the settlement of Šišoláky, 26.6.2000
(Photo: Author)