

***Scirpetum radicans* HEJNÝ in HEJNÝ et HUSÁK 1978 in Poland**

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Abstract: The paper presents distribution, floristic composition and ecological requirements of rush community *Scirpetum radicans* in Poland. The association was classified to the *Phragmitetea* class. *Scirpetum radicans* is considered to be a very rare and endangered plant community in Europe.

Keywords: rush community, *Scirpetum radicans*, *Phragmitetea* class, distribution, phytosociology, Poland, endangered associations.

Introduction

Scirpetum radicans HEJNÝ in HEJNÝ et HUSÁK 1978 was first recognized in the south of the Czech Republic in the littoral zone of fishponds (HEJNÝ & HUSÁK 1978). Subsequently, it was found in Germany (ZÄHLHEIMER 1979, 1981, SCHUBERT et al. 1995), Latorica and the Danube valley in Slovakia (SUĤÁ 1992, OĤÄHEL'OVA et al. 1995) and in Austria (BALÄTOVÄ-TULÄĤKOVÄ et al. 1993). This association occupies clayey and sandy soils in mesotrophic fishponds, usually abundant in peat sediments in the littoral (HEJNÝ & HUSÁK 1978). In Germany it was recorded on fertile and muddy river banks of the Odra and old Danube riverbeds (ZÄHLHEIMER 1979, 1981, SCHUBERT et al. 1995). In Slovakia *Scirpetum radicans* is reported from standing waters or periodically inundated areas with clayey basement (OĤÄHEL'OVA et al. 2001). In Poland *Scirpetum radicans* was known from one locality (Fig. 1). It was discovered in fishponds near Olesno in south-western Poland in Silesia (SPAŁEK & NOWAK 2003).

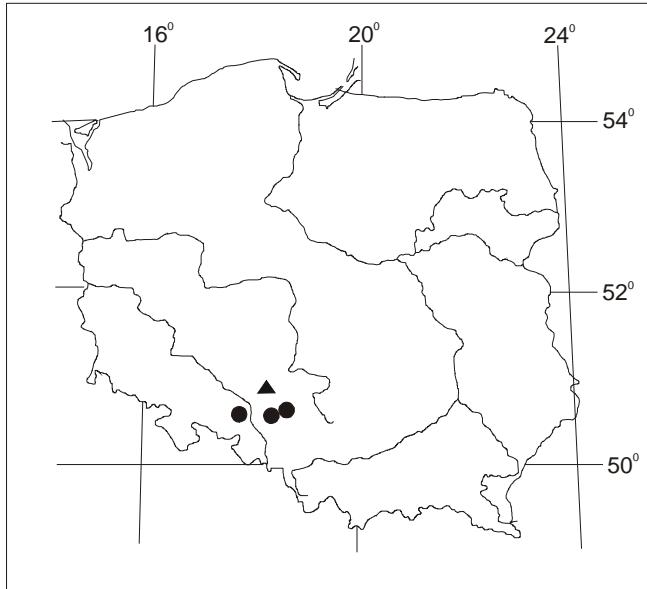


Fig. 1. Distribution of *Scirpetum radicans* in Poland. ● – new locality, ▲ – locality from the literature.

Scirpetum radicans is a pioneer helophyte plant association developing in old riverbeds and oxbow lakes. According to ZAHLHEIMER (1979) it apparently belongs to rush communities of the *Phragmitetea* class, because of the community structure and occurrence on the water outskirts. From the water side it is contiguous mostly to the *Potametea* assemblages and towards the terrestrial side it borders *Oenanthion*, *Phragmition* and *Magnocaricion* associations (OŤAHEL'OVA et al. 2001). Occasionally it forms a mosaic of communities of *Sagittario-Sparganietum*, *Eleocharitetum acicularis* or *Typhetum latifoliae* (OŤAHEL'OVA 1995). *Scirpetum radicans* needs shallow water habitats falling regularly dry (ZAHLHEIMER 1979). It often occurs ephemerally during hot summer periods with the low water level. The community requires wet grounds and temporary emerged bottom (OŤAHEL'OVA et al. 2001). The species characteristic and dominant for *Scirpetum radicans* is *Scirpus radicans*. Differential species for these associations are: *Alisma plantago-aquatica* and *Eleocharis palustris* (HEJNÝ & HUSÁK 1978, BALÁTOVÁ-TULÁČKOVÁ et al. 1993). The association is considered to be poor in species and consists of about 3-8 taxa on the average (ZAHLHEIMER 1979, OŤAHEL'OVA 1995, SPAŁEK & NOWAK 2003). Species such as *Rorippa amphibia*, *Polygonum hydropiper* and *Rumex maritimus* (OŤAHEL'OVA 1995) attain higher constancy index. This rush plant community is recognized as endangered at both regional and Central European scale (BALÁTOVÁ-TULÁČKOVÁ et al. 1993, SCHUBERT et al. 1995, RENNWALD

2000, OŤAHEL'OVA et al. 2001, SPAŁEK & NOWAK 2003, ZAHLHEIMER unpubl. data).

This paper describes the *Scirpetum radicans* community in Poland. The phytosociological Table is given and floristic composition and ecological requirements are discussed.

Material and method

The fieldwork was conducted during vegetation seasons 2002-2003. *Scirpetum radicans* community was studied following the Zürich-Montpellier School of Phytosociology (BRAUN-BLANQUET 1964). Phytosociological nomenclature and syntaxonomical attachment are based on MATUSZKIEWICZ (2001). Species names are given according to MIREK et al. (2002). Chlorion concentration was assessed using Mohr's method according to the Polish state standard PN-75/C-04617. Electrolytic conduction was measured with microcomputer conductivitymeter CC-315 and hydrogen ion concentration with Elmetron pH microcomputer CP-315.

Results

Distribution and ecology

During geobotanical investigations carried out in south-western Poland three new localities of *Scirpetum radicans* were discovered. These localities are situated on the bank of the fishponds west from Opole near village Tułowice, east from Dobrodzień near village Bąki and west from Częstochowa near village Ciasna (Fig. 1). The total coverage of the community in 2003 was up to 0.5 ha in the locality near Tułowice, 0.2 ha near Bąki and 0.25 ha near Ciasna. *Scirpus radicans* phytocoenoses developed on these localities in the rush zone adjacent to the open water on muddy, but also sandy soil. The water's depth during vegetation period was between 0 and 50 cm. According to the literature (ZAHLHEIMER 1979) it could be suspected, that during a dry period, i.e. with the low water level, the species composition could change. In such a case, the floristic character of the association as well as its physiognomy may present some similarities to rush associations connected with areas of changeable water level or even to *Isoëto-Nanojuncetea* assemblages, especially in its juvenile expanding stadium. Nevertheless, during observation period developed typical rush community characteristic for shallow waters. There was no evidence of *Isoëto-Nanojuncetea* class species while the amount of *Phragmitetea* class taxa was considerable. *Scirpetum radicans* built a micro-mosaic complex with *Typhetum latifoliae* and *Phragmitetum australis* associations communities along southern edges of the pond. The physico-chemical characteristics of the water from the ponds are shown in the Table 1. *Scirpetum radicans* is a community poor in species and mostly one-layered. Only exceptionally it has two-layers with evident *Scirpus radicans* domination and additional occurrence of *Phragmites australis* and *Alisma plantago-aquatica* (Tab. 2). However, the newly discovered

localities are characterized by higher number of species in comparison to communities described until present. The average species number in the relevé equals 6. There is apparently no *Rorippa amphibia* subdomination (ZÄHLHEIMER 1979). *Rorippa amphibia* occurs within south-western Poland almost exclusively on river banks, in oxbow lakes and abundantly in inundation backwater zones of large dam reservoirs. It has been observed in fishponds only occasionally. The only subdominant species observed during the field works were *Phragmites australis* and *Typha latifolia* (Tab. 1, relevés 2, 8). Similarly as in the localities in the Czech Republic (HEJNÝ & HUSÁK 1978) and in Poland (SPAŁEK & NOWAK 2003), only non-flowering individuals of *Scirpus radicans* in the study area in 2002 were observed. In 2003, the population consisted of both flowering and non-flowering plants. Also the viviparous rosettes were noted.

Succession

In natural succession processes phytocoenoses of *Scirpetum radicans* most often transforms into *Caricetum gracilis*, *Phragmitetum australis* and other rush associations (ZÄHLHEIMER 1979). On the newly found localities in Poland phytocoenoses of *Scirpetum radicans* occurs in close contact with *Phragmitetum australis* and *Typhetum latifoliae* phytocoenoses. Some patches display intermediate character (Tab. 1, relevés 2, 8), so it is quite likely, that on this location the next succession stadium will be *Phragmitetum australis* or *Typhetum latifoliae*. Of course, in the case of intensive fishpond farming, the rush communities could be completely wiped out.

Conservation

The new localities of *Scirpetum radicans* deserve a special protection. The local conservation strategy of Opole, Dobrodzień and Częstochowa commune mentions that the fishponds should be protected as a Nature-Landscape Complex – a special form of nature conservation based on the Polish Nature Conservation Act.

During the fieldwork, basic threats to plant communities of the ponds were identified. The most harmful seems to be the restoration of the productive surface of fishponds as a consequence of the program of production intensification. As a result, deteriorating use of ponds is implemented including regular mowing of the rush zone and frequent deepening of pond. The significant factor allowing *Scirpetum radicans* to develop is temporary drying up of the ponds. If the fishery management will cause the permanent water fulfillment of the pond basin, the researched association could be probably endangered.

The complete phytosociological and habitat characteristics as well as the present distribution of *Scirpetum radicans* in Poland should be a subject of further botanical investigations.

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Tab. 1. The physico-chemical characteristics of the ponds water.

Locality	Cl [mg/l]	Electrolytic conductivity [$\mu\text{S}/\text{cm}^2$]	pH H ₂ O	BOD ₅ [mgO ₂ /l]	O ₂ Dissolved oxygen [mg/l]	PO ₄ Phosphates [mg/l]	Na [mg/l]	Nitrate nitrogen [mg/l]	Ammonium nitrogen [mg/l]	Nitrite nitrogen [mg/l]
Bąki	36	371	6,8	1,57	13,1	0,03	4,15	0,12	0,18	0,010
Ciasna	35	368	7,1	1,54	12,7	0,04	4,03	0,14	0,20	0,010
Tułowice	35	372	6,9	1,59	12,8	0,03	4,03	0,16	0,19	0,012

Tab. 2. *Scirpetum radicans* HEJNÝ in HEJNÝ et HUSÁK 1978.

Relevé number	1	2	3	4	5	6	7	8	9	10	C
Date: year	02	02	02	02	02	02	02	03	03	03	
month	07	07	07	07	08	08	07	07	07	07	
day	11	11	11	11	04	04	16	16	16	16	
Locality	Ca	Ca	Ca	Ca	B	B	B	T	T	T	
Cover of herb layer [%]	85	80	85	80	80	65	80	80	85	80	
Cover of moss layer [%]	-	-	-	-	-	-	-	-	+	+	
Area of relevé [m ²]	100	100	100	100	100	100	80	100	100	100	
Number of species in relevé	5	8	6	6	4	6	4	9	6	8	
Ch. & D. * <i>Scirpetum radicans</i>											
<i>Scirpus radicans</i>	5	4	5	5	5	4	5	4	5	5	V
<i>Alisma plantago-aquatica</i>*	.	+	+	+	.	.	.	.	+	+	III
Ch. <i>Phragmitetea</i>											
<i>Phragmites australis</i>	1	+	.	.	.	+	+	2	.	+	III
<i>Typha latifolia</i>	.	2	.	+	+	.	.	+	.	.	II
<i>Glyceria maxima</i>	.	.	.	.	.	+	+	+	.	+	II
<i>Sagittaria sagittifolia</i>	.	+	+	.	.	.	.	+	.	+	II
<i>Cicuta virosa</i>	+	.	.	+	.	+	.	.	.	.	II
<i>Oenanthe aquatica</i>	.	+	.	.	+	.	.	.	+	.	II
<i>Sparganium erectum</i>	.	.	.	+	.	+	.	.	.	+	II
<i>Carex acutiformis</i>	.	.	.	.	.	+	+	.	.	.	I
Ch. <i>Potametea</i>											
<i>Nuphar lutea</i>	+	.	+	.	.	.	.	.	.	+	II
<i>Potamogeton natans</i>	.	+	.	.	.	.	.	+	+	.	II
<i>Myriophyllum verticillatum</i>	.	.	+	.	+	.	.	.	.	.	I

<i>Hydrocharis morsus-ranae</i>	.	.	.	+	.	.	.	+	.	.	|	
<i>Nymphaea alba</i>	.	.	.	.	.	.	.	+	+	.	|
Ch. Lemnetea minoris												
<i>Ricciocarpus natans</i>	d	+	+	

Sporadic species: Phragmitetea: *Scutellaria galericulata* + (2). **Lemnetea minoris:** *Utricularia vulgaris* + (8). **Accompanying species:** *Juncus effusus* + (1).

Explanation: Ca – Ciasna, B – Bałków, T – Tułowice, Ch. – characteristic species, D. * – differential species, d – moss taxa, C – constancy.