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Sparganietum minimi in north-eastern Bohemia

***Sparganietum minimi* v severovýchodních Čechách**

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K e y w o r d s : *Sparganietum minimi*, phytosociology, north-eastern Bohemia

The community *Sparganietum minimi* occurs rarely in Czechoslovakia and its distribution decreases towards the east of the country along with increasing continentality. Phytosociological relevés from north-eastern Bohemia are presented and the floristic composition of the community is compared with that reported from other regions of Czechoslovakia and Germany.

Introduction

In 1975-81 a rare plant community, *Sparganietum minimi* Schaaf 1925, was found at several localities in NE Bohemia. In Czechoslovakia, this community has been known so far from the Třeboň Basin (Neuhäusl 1959, Hroudová, Dostálek et Zákravský 1984) and from the territory called Český ráj (Bohemian Paradise) (Slavík 1969). Generally, it is considered as a community of colline and submontane belts in the western part of Czechoslovakia (Hejný in Moravec et al. 1983). Hejný et Husák (1978) reported on its occurrence in S, N and NE Bohemia. The community colonizes shallow water bodies with 0-30(50) cm of water column, mostly on peaty and swampy soils. The relationships of the community to other aquatic macrophytes as well as its more detailed characterization from the territory of NE Bohemia were given by Černohous et Husák (1986).

Methods

The community was mostly investigated in the shallow water bodies on organic substrates of fishpond shores in NE Bohemia. The phytosociological relevés were taken using the Braun-Blanquet seven-grade scale (Braun-Blanquet 1964). The water depth was measured. The nomenclature follows Rothmaler (1976).

Localities investigated

(Numbers correspond to the numbers of phytosociological relevés in Table 1.)
(1-3) Shallow, muddy edges of the reed belt in the NE part of the fishpond Vidlák near the village Troskovice (270 m a.s.l.); (4) Pools in the loose stands of tall sedges along the E shore of the fishpond Žabakor near the village Březina, not far from Mnichovo Hradiště (230); (5-7) Pools among tussocks of tall sedges and reeds along the N shore of the fishpond Bohdanečský rybník near Pardubice (217); (8-10) Pools among reed stands along the NE shore of the fishpond Bohdanečský rybník near Pardubice (217); (11) Pools in loose reeds of the upper fishpond along the brook Havlický potok near Borohrádek (260); (12-13) Shallow depressions along the shore of the fishpond Pařezný rybník near Libáň, not far from Nasavrky (385).

Table 1. - *Sparganietum minimi* in north-eastern Bohemia

Relevé No	1	2	3	4	5	6	7	8	9	10	11	12	13	Const.
Date	22/8 1978	18/8 1980	18/8 1980	8/8 1981	17/7 1975	17/7 1975	9/7 1976	8/7 1976	8/7 1976	8/7 1976	30/7 1976	4/8 1976	4/8 1976	
Plot area (m^2)	6	1	9	1	2	3	5	4	6	5	2	4	4	
Total cover (%)	100	75	75	80	85	60	75	100	90	90	60	70	50	
Water depth (m)	0.2	0.15	0.15	0.1	0.15	0.2	0.05	0.03	0.05	0.03	0.1	0.15	0.15	
Number of species	4	8	9	9	4	7	7	14	11	12	4	7	4	
Sparganium minimum Wallr.	5	4	4	4	3	3	4	3	2	2	3	3	3	V
Utricularia minor L.	.	+	1	.	4	2	1	1	1	.	.	.	.	III
Potamogeton gramineus L.	.	.	.	.	1	1	.	.	.	.	.	1	.	II
Hydrocotyle vulgaris L.	.	.	.	.	.	.	.	1	.	+	.	.	.	I
Littorelletea														
Eleocharis acicularis (L.) R. et Sch.	.	1	2	.	.	.	.	1	1	2	.	.	.	II
Ranunculus flammula L.	.	.	.	.	.	.	1	2	2	3	.	.	.	II
Juncus bulbosus L.	1	.	.	.	.	.	.	1	1	.	.	.	.	II
Lemnetea et Potametea														
Utricularia australis R. Br.	2	.	+	1	.	.	.	.	.	.	3	1	2	III
Potamogeton obtusifolius Mert. et Koch	.	.	.	.	.	.	.	.	.	.	+	3	1	II
Lemna minor L.	.	+	+	+	.	.	.	.	.	.	.	.	.	II
Elodea canadensis Michx.	.	.	.	.	.	.	.	.	.	.	.	1	1	I
Lemna trisulca L.	.	.	.	2	.	.	.	.	.	.	.	.	.	I
Potamogeton natans L.	.	.	.	.	.	.	.	.	.	.	.	1	.	I
Myriophyllum spicatum L.	.	.	.	+	.	.	.	.	.	.	.	.	.	I
Batrachium trichophyllum Chaix	.	.	+	.	.	.	.	.	.	.	.	.	.	I

Phragmiti-Magnocaricetea

Phragmites australis (Cav.) Trin. ex Steud.	.	+	.	.	.	.	2	3	2	2	1	.	.	III
Eleocharis palustris s. l.	.	.	1	+	.	.	.	2	.	.	.	.	.	II
Typha latifolia L.	.	+	+	.	.	1	.	.	.	.	.	.	.	II
Carex gracilis Curtis	.	1	.	.	+	.	.	+	.	.	.	.	.	II
Equisetum fluviatile L. em. Ehrh.	1	.	.	.	.	+	.	.	.	.	.	.	.	I
Alisma plantago-aquatica L.	.	.	.	.	.	.	.	1	.	+	.	.	.	I
Ranunculus lingua L.	.	.	.	.	.	.	.	.	+	+	.	.	.	I
Caltha palustris L.	.	.	+	.	.	.	.	.	.	.	.	.	.	I
Sparganium erectum L. em. Rchb.	.	.	.	.	.	.	1	.	.	.	.	.	.	I
Lythrum salicaria L.	.	.	.	+	.	.	.	.	.	.	.	.	.	I

Molinio-Arrhenatheretea

Galium palustre L.	.	.	.	+	.	.	.	2	1	3	.	.	.	II
Juncus effusus L.	.	.	.	.	.	+	.	+	1	2	.	.	.	II
Myosotis palustris s. l.	.	.	.	.	.	.	.	3	2	1	.	.	.	II
Agrostis tenuis Sibth.	.	.	.	.	.	.	1	.	.	.	.	.	.	I
Ophioglossum vulgatum L.	.	.	.	.	.	.	.	.	.	+	.	.	.	I

Other species

Juncus articulatus L. em. Richter	.	.	.	.	.	+	1	2	2	1	.	.	.	II
Cardamine amara L.	.	.	.	1	.	.	.	.	.	.	.	.	.	I
Calla palustris L.	.	+	.	.	.	.	.	.	.	.	.	.	.	I
Chara sp.	.	.	.	.	.	.	.	.	.	.	.	2	.	

Description of the community

Syntaxonomy

Sparganietum minimi is at present classified in the class *Utricularietea intermedio-minoris* (Den Hartog et Segal 1964) Pietsch 1965, i.e. it is included among bladderwort communities occurring in shallow peat and swamp waters. Within the framework of this class, it belongs to the order *Utricularietalia intermedio-minoris* Pietsch 1965 and to the alliance *Sphagno-Utricularion* Th. Müller et Görs 1960. The community was formerly reported under various names, e.g. *Sparganium minimum-Utricularia intermedia*-Ass. Tx. 1937 (Neuhäusl 1959), and classified in the classes *Litorelletea* Br.-Bl. et Tx. 1943 and/or *Isoëto-Litorelletea* Br.-Bl. et Vlieger 1937 (Hejný in Holub et al. 1967).

Distribution

The community has a boreal-subatlantic distribution, with the centre located in northwestern and central Europe (Slavík 1969, Hejný et Husák 1978). In Czechoslovakia, it has been reported from the region of Český ráj (fishpond Šulců near the village Kacanovy - Slavík 1969, 1971) and from the Třeboň Basin (fishponds Vizír, Staré Jezero, Starý Kanclíř and Nový Hospodář - Neuhäusl 1959).

One of the species dominating the community, *Sparganium minimum*, is, however, known from other localities in Czechoslovakia. During the last two decades, the species (or its community without phytosociological relevés) has been reported from the following localities: Český ráj - village Žďár, fishpond Komárovský rybník (with *Carex paniculata*); ditches near the village Staré Splavy in the surroundings of Doksy (Černohous, unpublished data). In addition, some more localities of the species in N Bohemia are given in Hroudová, Dostálek et Zákravský (1984).

Floristic composition

The community is relatively poor in species, with the number of species in a relevé ranging from 4 to 14. There is a close floristic similarity between our relevés and the data of German authors (Passarge 1964, Oberdorfer 1977). *Utricularia intermedia* Hayne, being considered a characteristic species, does not penetrate to the NE Bohemia and is thus missing in our relevés. However, in phytosociological relevés presented by Neuhäusl (1959) from the surroundings of Třeboň, S Bohemia, *U. intermedia* shows the highest constancy class (V). Analogously, *Potamogeton polygonifolius* Pourret (syn. *P. oblongus* Viv.), mentioned by German authors, has not been found in Czechoslovakia. Some species are occurring with lower constancy in our community than in those reported by German authors, i.e. *Utricularia minor* and *U. australis*. *Utricularia vulgaris* is not present in the relevés; it is very rare in the territory under study, being known from only one locality. On the other hand, *Potamogeton gramineus*, occurring with the constancy II in the relevés from NE Bohemia, seems to be a vicarious species to *P. polygonifolius*.

Ecology

The community occurs in shallow pools, peaty and swampy wetlands; along shores of fishponds or other water bodies; in loose stands of reed and in pools among tall

sedges; in inundated depressions after extraction of peatbogs or fishpond bottoms; in shallow waters of inundated quarries and sandpits.

Concerning the soil properties, it occurs mostly on muddy, peaty as well as on sandy soils, poor in nutrients, of oligotrophic (dystrophic) to mesotrophic character. In some cases, however, it also grows in marshes that are richer in nutrients (fishpond Bohdanečský rybník, see also Carstensen 1955).

There are some data on the water chemistry from the fishpond Bohdanečský rybník as it was analyzed in 1973 by the District Hygienic Station, Pardubice, using standard procedures. The composition of the fishpond water was as follows (all values are given in $mg.l^{-1}$): pH - 7.2; $N\text{-}NH_4$ - 2.10; BOD_5 (biological oxygen demand) - 20.0; O_2 - 3.10; COD (chemical oxygen demand) - 14.5; Cl - 24.0; SO_4 - 38.0; PO_4 - 0.64; Ca - 50.0; Mg - 10.90; Fe - 0.50. The water sample, however, was not from the very site in which *Sparganietum minimi* was growing. From the Český ráj region, Slavík (1969) gives the pH of 6.0 from a water body where the community was occurring.

Dynamics

The conditions in which the community grows oscillate between the littoral ecophase in the spring and summer and the limosal ecophase at the end of summer and in autumn (sensu Hejný 1960). Floristic composition of the community is variable and changes considerably not only between years but also in the course of the same growing period, being sensitive even to small changes in ecological factors (fluctuations of water level, filling with mud etc.). Penetration of other species from surrounding communities is thus made easier and possible succession to new community types may be encouraged. From year to year, *Sparganietum minimi* can retreat considerably or even disappear from the site (cf. Pfeiffer 1951) but the colonization of adjacent areas was observed as well. In direction from dry land to water, *Sparganietum minimi* usually neighbours on communities of the classes *Potamogetonetea* or *Scheuchzerio-Caricetea fuscae*, whereas in the opposite direction it is in contact with those of the classes *Phragmiti-Magnocaricetea* and, possibly, wet *Molinio-Arrhenathheretea*.

Relevance to plant conservancy

In the Czech Republic, *Sparganietum minimi* is considered to be immediately threatened by human activities (group 2/a of the Red List published by Moravec et al. 1983), especially by draining of wetland sites and by mechanical removal of mud from the littoral parts of fishpond, so that there is an imminent danger of its complete extinction (Hejný in Moravec et al. 1983). Most species occurring in this community are also threatened by changes in water chemistry, namely by increasing contents of nutrients, especially nitrogen and phosphorus. Furthermore, the herbicides used for controlling the littoral reed stands simultaneously destroy *Sparganietum minimi*.

The persistence of the community in natural succession of vegetation is rather short; after approximately 8-10 years it is replaced by another community, mainly as a result of the gradual filling-up of the site. Attempts to maintain artificially the conditions suitable for the community development are thus needed. Such management would include the amelioration of the site (e.g. by removing the vegetation cover together with the underground organs of reeds and tall sedges) in order to induce favourable conditions for the development of initial stages of *Sparganietum minimi*. The water régime should be kept within the limits of 0-30 cm. A higher water column

(20-30 cm) is more favourable in the spring, whereas in the late summer and autumn, the depth of 0-20 cm is more suitable.

Souhrn

Práce přispívá k poznání relativně vzácného společenstva *Sparganietum minimi* Schaaf 1925 v Československu. Autoři se soustředili na oblast severovýchodních Čech, kde zjistili několik nových lokalit. Diskutují také jiné nálezy z posledních let v Československu a zabývají se synekologií, syndynamikou a předpoklady udržení tohoto společenstva v naší přírodě.

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