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BETULA HUMILIS SCHRANK IN THE „CAŁOWANIE" FEN – DISTRIBUTION DYNAMICS, HABITAT CHANGES AND SURVIVAL CHANCES OF THE SPECIES IN DEGRADED PEATLAND

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Summary. *Betula humilis* has survived in the „Całowanie" fen in two sites: in the scrub in the degraded part of peatland and in an terrestrialised old peat cutting area. In the first one peat-forming vegetation almost does not occur. *B. humilis* is predicted to disappear there because of shading by the closed canopy of trees and shrubs. In the latter one peat-forming vegetation has survived. Most probably, this location came into being relatively recently through natural regeneration. In drained peatland old peat cutting areas provide refuge for peatland species, e.g. for *B. humilis*.

Key words: shrub birch, endangered species, fen, degraded peatland, peat cutting area, Central Poland

INTRODUCTION

Betula humilis is a small shrub associated with peatlands. The species is widely spread in north-eastern Europe, and reaches the south-western border of its range in Poland. Its localities have been reported mostly from eastern and northern Poland. It is included in the Polish Red Data Book as an endangered species (EN category) since it has disappeared from many sites [Załuski *et al.* 2001]. One of the facts that this can be attributed to is that the species is eliminated from its stands due to shading by the developing canopy of trees and shrubs.

The *B. humilis* stand in the „Całowanie" fen was discovered in 1956 [Podbielkowski 1959]. („Całowanie" fen, situated south of Warsaw, is one of the biggest peatlands of the Mazovian District). It was the subject of several phytosociological studies [Przybysz 1958, Nowak 1964]. Despite calls for protection the peatland was drained in the 1960's. Since the late 1980's the species had not been reported from the „Całowanie" fen. It was, therefore, assumed that it had become extinct [Załuski *et al.* 2001]. The presence of *B. humilis* was, however, proved in 1997. The species was found growing in the degraded

part of peatland covered largely by scrub and woodland in the once planned [Papis 1983] nature reserve „Brzoza niska – Biel". In 2001 further localities of the shrub were recorded in an old peat cutting area, which is completely overgrown by fen vegetation at present. It appears that the peat cutting area has been colonised by *B. humilis* quite recently.

The objectives of our study were to: 1) determine changes in the distribution of *B. humilis* on the „Całowanie" fen in the last 40 years (and approximate changes in distribution in the last 100 years); 2) analyse changes in its habitat; 3) assess survival chances of the species in the degraded peatland.

MATERIAL AND METHODS

In order to determine changes in plant communities with *B. humilis* in the „Całowanie" fen over the last 40 years, relevés were made in 2002 in all the (four) patches with *B. humilis*. The above relevés were compared with those recorded in the 1950's and 1960's from the scrub with *B. humilis* [Przybysz 1958, Nowak 1964]. The relevés analysed in this study were collected in a phytosociological table (containing only selected species).

The systematic group value D [Pawłowski 1972] was calculated for the following groups of relevés with *B. humilis*: 1) the former scrub, 2) the present scrub, 3) the old peat cutting area, for the groups of vascular plants belonging to the following classes: *Scheuchzerio-Caricetea nigrae*, *Phragmitetea*, *Querco-Fagetea*, *Artemisietea*, *Molinio-Arrhenatheretea* and *Alnetea glutinosae*. The phytosociological position of species follows that of Matuszkiewicz [2001].

RESULTS

At the beginning of the 20th century *Betula humilis* scrub covered several dozen hectares in the southern and middle part of the peatland. Since then the area covered by *B. humilis* shrank to include in the 1950's only one sizeable site and a few minor ones. The only locality where *B. humilis* has survived until present is the site in the degraded part of peatland covered largely by scrub and woodland.

Transformation of plant communities is manifested there by the absence of typical mire species (from the classes *Scheuchzerio-Caricetea nigrae*) and relatively high incidence of species associated with degraded peatlands (belonging to the classes *Artemisietea* and *Querco-Fagetea*). Vegetation of new localities of the shrub recorded in an old peat cutting area shows similarities to that of the peatlands containing *B. humilis* in the 1950's and 1960's (Tab. 1, Fig. 1).

DISCUSSION

The site in the degraded part of peatland covered largely by scrub and woodland where *B. humilis* has survived does not provide favourable conditions for the growth of the species. Unless protection measures are undertaken, the species will soon disappear due to shading by trees. The situation is slightly different on the terrestrialised peat cutting area. Old peat cutting areas are the only habitats where peatland species could survive over a longer period of time. However, the population of *B. humilis* on the old pe-

Table 1. Floristic composition of plant communities with *Betula humilis* in the „Całowanie" fen (selected species)

Tabela 1. Skład florystyczny zbiorowisk roślinnych z brzozą niską na Bagnie „Całowanie" (wybrane gatunki)

succesive number/kolejny numer	1	2	3	4	5	6
Ch. Cl. Querco-Fagetea, Artemisietea:						
Urtica dioica	II	2	3	3	.	r
Prunus padus	.	+	1	2	.	.
Ribes spicatum	.	2	+	+	.	.
Galium aparine	.	.	1	2	.	.
Solidago gigantea	.	.	2	+	.	+
Geranium robertianum	.	.	r	1	.	.
Ch. Cl. Scheuchzerio-Caricetea nigrae, Phragmitetea:						
Equisetum fluviatile	V	.	.	.	.	.
Parnasia palustris	IV	.	.	.	.	.
Epipactis palustris	III	.	.	.	.	.
Peucedanum palustre	III	.	.	.	.	.
Carex pseudocyperus	III	.	.	.	.	.
Pedicularis sceptrum-carolinum	II	.	.	.	.	.
Menyanthes trifoliata	II	.	.	.	.	.
Carex lasiocarpa	I	.	.	.	.	.
Carex appropinquata	III	.	.	.	1	4
Carex rostrata	III	.	.	.	2	2
Comarum palustre	III	.	.	.	3	1
Phragmites australis	IV	.	.	.	r	.
Eriophorum angustifolium	II	.	.	.	1	.
others/inne:						
Betula humilis	V	4	3	2	4	2
Salix repens subsp. rosmarinifolia	V	.	.	.	.	.
Valeriana officinalis	V	.	.	.	.	.
Dianthus superbus	II	.	.	.	.	.
Lythrum salicaria	V	.	.	.	+	1
Equisetum palustre	III	.	.	.	1	+
Lychnis flos-cuculi	V	+	.	.	r	.
Salix cinerea	V	+	.	.	3	+
Veronica longifolia	IV	+	.	.	+	+
Lotus uliginosus	II	1	.	.	.	+
Dryopteris cristata	I	1	1	.	.	.
Listera ovata	III	.	.	r	.	.
Ophioglossum vulgatum	.	.	.	.	.	+

Species associated with degraded peatlands are marked with the darkest grey; species associated with peat-forming vegetation, which were registered in the past and at present, are marked with semi-dark grey; species associated with peat-forming vegetation, but not recorded from peat cutting areas at present, are marked with light grey; 1 – a synoptic table created for the relevés recorded in the 1950's and 1960's [Przybysz 1958, Nowak 1964]; 2 – a relevé recorded in 1981 [Papis 1983]; 3 and 4 – relevés made in 2002 in the degraded part of peatland covered largely by scrub and woodland [Pawlikowski 2002, unpubl.); 5 and 6 – relevés made in 2002 on the terrestrialised peat cutting area [Pawlikowski 2002, unpubl.]

Gatunki wskazujące na zmurszenie i zdegradowanie torfowiska zaznaczono kolorem ciemnoszarym; gatunki związane z „żywym" torfowiskiem, notowane dawniej i obecnie, zaznaczono pośrednim odcieniem szarości; gatunki związane z „żywym" torfowiskiem, ale obecnie na potorfiu nie notowane zaznaczono kolorem jasnoszarym; 1 – tabela syntetyczna dla zdjęć z lat 50. i 60. [Przybysz 1958, Nowak 1964]; 2 – zdjęcie z roku 1981 [Papis 1983]; 3 i 4 – zdjęcia wykonane w 2002 roku w zaroślach na murszowisku [Pawlikowski 2002, unpubl.], 5 i 6 – zdjęcia wykonane w 2002 roku na potorfiu [Pawlikowski 2002, unpubl.]

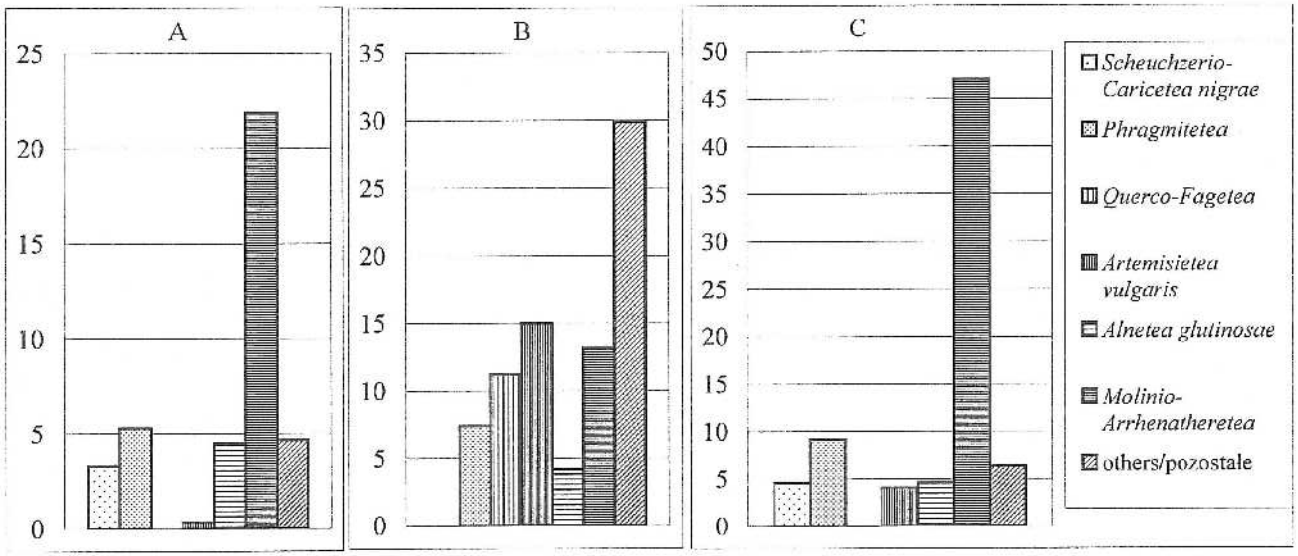

Fig. 1. Participation of species groups in plant communities with *Betula humilis* in the Całowanie fen; A – plant communities with *B. humilis* in the 1950's and 1960's; B – a plant community with *B. humilis* in 2002 – the locality in the degraded part of peatland covered largely by scrub and woodland; C – a plant community with *B. humilis* in 2002 – the new locality of *B. humilis* discovered on the old peat cutting area

Rys. 1. Udział poszczególnych grup gatunków w zbiorowiskach z brzozą niską na Bagnie Całowanie; A – zbiorowiska z brzozą niską z lat 50. i 60. XX w.; B – zbiorowisko z brzozą niską w 2002 roku – zarośla na murszowisku; C – zbiorowisko z brzozą niską w 2002 roku – potorfie

at cutting area is so small that it is in danger of becoming extinct. The implementation of active protection measures can increase its chances of survival (e.g. the introduction of new specimens, which would be obtained from shoots and seeds of *B. humilis* from the „Całowanie" fen using *ex situ* methods, to the local populations). At present initiatives are being taken to implement these actions by the members of the „Save Wetlands Association". In Poland similar measures have already been undertaken in the peatlands of Polesie [Chmielewski *et al.* 1996].

In the past few years *B. humilis* has also been reported from the anthropogenic habitats in other peatlands in Poland e.g. along drainage ditches, nearby peat cutting areas [Łuczycka-Popiel and Urban 1995, Kamiński *et al.* 2000, Falkowski 2002]. These observations suggest that the species tolerates, to some extent, changes in the peatland ecosystems induced by man.

It appears that *B. humilis* was less susceptible to habitat degradation than other rare mire species that used to grow in the „Całowanie" fen. In the 1950's and 1960's the following species which are now included in the „List of threatened plants in Poland", both vascular plants [Zarzycki and Szeląg 1992] and bryophytes [Ochyra 1992], coocurred with *B. humilis*: *Pedicularis sceptrum-carolinum*, *Epipactis palustris*, *Helodium blandowii*, and those absent in the analysed relevés are: *Liparis loeselii*, *Carex dioica* and *Tomentypnum nitens*. All the species mentioned above are no longer found in the „Całowanie" fen.

CONCLUSIONS

Since the 1950's *B. humilis* had retreated from the „Całowanie" fen, which was associated with the drainage of the peatland and cessation of farming operations which in turn lead to changes in habitat conditions and facilitated the invasion of trees and shrubs. Moreover, the species was eliminated as a result of exploitation of the peat. At present, in drained peatland old peat cutting areas provide refuge for a number of peatland species, including *B. humilis*. The species can have a better chance of survival provided that active protection measures are undertaken (removal of shrubs and trees, *ex situ* cultivation).

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BRZOZA NISKA *BETULA HUMILIS* SCHRANK NA BAGNIE „CAŁOWANIE" – ZMIANY W ROZMIESZCZENIU, PRZEMIANY SIEDLISK I SZANSE PRZETRWANIA GATUNKU NA ZDEGRADOWANYM TORFOWISKU

Streszczenie. *Betula humilis* przetrwała na bagnie Całowanie w dwóch miejscach: w zaroślach na murszowisku oraz w zarośniętym roślinnością bagienną potorfiu. W pierwszym niemal całkowicie brak gatunków związanych z „żywymi" torfowiskami, przy znacznym udziale gatunków łęgowych i ruderalnych. Brzoza wkrótce zaniknie tam wskutek zacieniania. W drugim, gdzie brzoza pojawiła się niedawno, roślinność ma charakter torfotwórczy. W warunkach osuszonego torfowiska zarośnięte potorfia stały się refugiami dla części gatunków torfowiskowych, w tym brzozy.

Słowa kluczowe: brzoza niska, zagrożone gatunki, torfowisko niskie, murszowisko, potorfie, Polska środkowa