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RESCUE OF THREATENED GRASS SPECIES IN THE CZECH REPUBLIC

Ochrona zagrożonych gatunków traw w Republice Czeskiej

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ABSTRACT

The seed or vegetative samples of 33 accessions of 20 threatened grass species were collected at 26 localities in the Czech Republic in 1995–2000. Viable accessions were grown as spaced plants, characterised for morphology and phenology and studied for reproductive cycle and seed productivity in the Grassland Research Station at Zubří during 2001–2002. Only 9 accessions had high enough seed productivity to store their multiplied seed in the gene bank. Re-introduction of some species or enlarging of populations is proposed in the original native locations.

INTRODUCTION

In the Czech flora, there are 63 threatened grass species belonging to xerophytic, psammophytic, halophytic, alpine and subalpine, marsh and riparian, wetland, forest and anthropogenic communities; 23 of them are registered in the Red Data Book, 6 species are registered in the Black List of Extinct Species (Čeřovský et al. 1999, Dostál 1989; Moravec 1995) and 27 critically and severely endangered species are protected by law (Regulation 395/1992). This fact led to submit a project on mapping, collecting and conservation of endangered and rare germplasm of plant species on the territory of the Czech Republic (CR). The project has been co-ordinated by the Gene Bank of Research Institute of Crop Production (RICP) in Praha with the co-operation of specialised institutes dealing with fruits, fodder plants, grasses, vegetables, condiments and medicinal plants. In grasses, the objectives were collecting seed or vegetative samples, their regeneration and characterisation in Grassland Research Station at Zubří (GRS) and finally seed conservation in the gene bank or proposal for *in situ* conservation.

MATERIALS AND METHODS

During joint and individual collecting missions 30 localities in Bohemia and Moravia (CR) were monitored for the supposed presence of endangered and rare grass species in 1995–2000. Site co-ordinates were obtained using the GPS Garmin satellite navigation system and mapped into the digital map of the Czech Republic 1:100 000 using Geobase 2.8 Professional programme. The seed or vegetative samples of 33 accessions were collected with the permission of nature conservation institutions. The collected samples were tested for seed quality, i.e. 1000 seed weight (TSW) and germination (Germ), and 24 viable accessions were grown as spaced plants in the regeneration plots in GRS at Zubří (345 m a.s.l.). The number of plants per accession within a regeneration plot varied from 1 to 44, depending on the germination of original seed or the successful division of vegetative samples. The accessions were characterised for morphology and phenology and studied for reproductive cycle and seed productivity during 2001–2002.

Fig. 1. Collecting sites of endangered and rare species in the Czech Republic.

RESULTS

The seed or vegetative samples of 33 accessions of 20 threatened grass species (*Bromus arvensis*, *B. secalinus*, *Agrostis alpina*, *A. rupestris*, *Danthonia alpina*, *Festuca drymeja*, *F. supina*, *F. vaginata*, *F. versicolor*, *Helictotrichon planiculme*, *Hierochloë odorata*, *H. repens*, *Lolium temulentum*, *Poa alpina*, *P. laxa*, *P. remota*, *P. riphaea*, *Stipa borysthenica*, *S. capillata* and *S. tirsa*) were collected at 26 localities. The collecting sites of Southern Moravia (Dyje-Morava Floodplain, National Nature Monuments Váté písky), South-Eastern Moravia (White Carpathians Mts.), Northern Moravia (Jeseníky Mts., Beskydy Mts.), Central Bohemia (Labe Floodplain), North-Western Bohemia (České středohoří Mts.) and Northern Bohemia (Krkonoše Mts.) are shown on the map (Fig. 1). The numbers indicate the collection sites of accessions cited in the paper.

Only 19 accessions were fertile in 2001–2002 and seed could be collected in the regeneration plots. Characteristics of seed productivity some of regenerated species are given in Table 1. Among the alpine species *Poa riphaea* gave a high seed yield, especially in the first harvest year (Fig. 2). The seed yield in *Festuca supina* varied depending on collecting site. *Agrostis alpina*, *Poa alpina* and *Helictotrichon planiculme*, the species of vigorous vegetative habit, had low abundance of inflorescences and zero or low seed production.

The multiplication of the thermophilic grasses was successful in *Festuca vaginata* and *Stipa capillata*, as well as in annual weedy species *Bromus arvensis* and *Lolium temulentum*. The regeneration of other thermophilic grasses has not succeeded yet. The accessions of *Hierochloë* spp. grew very aggressively and spread by rhizomes from few original plants in the plot and produced numerous inflorescences but with undeveloped seed. The plants of *Festuca drymeja* and *Danthonia alpina* grew weakly in the climate conditions of Northern Moravia and produced only a few seed which did not germinate. Plants of *Stipa borysthenica* died out after the first winter.

DISCUSSION

The monitoring of several threatened grass species has been reported also in Poland, e.g. by Ciosek and Skrzyczynska (1997), Kwiatkowski (1997, 2001), Szczesniak (2001). The monitor-

Table 1. Characteristics of seed productivity in regenerated endangered grasses

Species	Map no.	Altitude m a.s.l.	Plants in regeneration no.	Heading date days from 1.4.	Abundance of inflorescences 1 = low 9 = high	Seed yield g/plant	TSW g	Germ %
Agrostis alpina	8	1280	14	41	3	0,002	–	–
Bromus arvensis	2	350	30	74	7	4,20	3,093	100
Danthonia alpina	6	433	6	48	4	0,17	2,609	0
Festuca drymeja	1	330	6	41	3	0,03	0,150	2
Festuca supina	7	1430	20	31	9	0,25	0,849	94
Festuca vaginata	5	195	18	30	9	4,33	0,457	90
Helictotrichon planiculme	8	1260	5	56	1	0,00	–	–
Hierochloë odorata	10	175	13	– 2	9	0,00	–	–
Hierochloë repens	4	155	1	– 1	7	0,00	–	–
Lolium temulentum	3	480	30	93	7	0,20	4,194	92
Poa alpina	8	1380	44	40	4	0,08	0,308	95
Poa riphaea	8	1430	32	60	9	0,13	0,299	95
Stipa capillata	9	340	11	67	9	1,09	5,350	90

Fig. 2. *Poa riphaea* (Asch. et Gr.) Fritsch in a regeneration plot at Zubří

ing carried out during collecting activity in the CR confirmed the presence of 20 endangered grass species to date. Their growing and regeneration *ex situ* were possible, but seed production was not always sufficient, depending probably on adaptability of species to different climate and soil conditions. The regeneration of 9 accessions was successful from a seed quality and quantity point of view and seed was stored in the genebank. Some accessions (e.g.

Hierochloë spp., *Helictotrichon planiculme*) are maintained vegetatively *ex situ*.

The results provide information for assessment of needs for future *in situ* conservation. Our effort already contributed to the rescue of critically threatened species *Poa riphaea*, endemic to Jeseníky Mts. (Fig. 3). Seedlings were transferred to the botanists of the Protected Landscape Area of Jeseníky Mts., to be increased in the original area before re-introduction *in situ*.

Fig. 3. *Poa riphaea* (Asch. et Gr.) Fritsch in the rock of Petrovy kameny

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STRESZCZENIE

Nasiona lub sadzonki 33 form 20-tu ginących gatunków traw zebrano z 26-ciu miejsc w Republice Czeskiej w latach 1995–2000. Zebrane gatunki obserwowano pod kątem morfologicznym i fenologicznym, a także badano zdolności reprodukcyjne i żywotność nasion w stacji Grassland Research Station w Zubri w latach 2001–2002. Tylko 9 form wiązało wystarczającą ilość nasion dla celów zachowania w banku nasion. Proponuje się podjęcie próby reintrodukcji niektórych gatunków na stanowiskach naturalnych.

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