Repatriation of Lost Old Grass Varieties to the Germplasm Collection of the Czech Republic

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Abstract: In former Czechoslovakia, grass breeding was located in the three distinct regions of Southern Bohemia and Northern Moravia during the 1920's; and later in Slovakia in the 1940's. This resulted in the development of 45 cultivars of 17 grass species which originated from local ecotypes and were named after the place of their breeding (*e.g.* Táborský, Větrovský, Rožnovský, and Levočský). Most of these historical cultivars were not preserved in any national germplasm collection, and the number of missing accessions amounted to 27 of the 34 deleted varieties. Using the findings about unpreserved materials of Czechoslovak origin in the European Central Crop Databases, as well as the EURISCO web catalogue, it was possible to repatriate 7 historical cultivars (*Arrhenatherum elatius* Větrovský, *Festuca pratensis* Větrovská, *Festuca rubra* Rožnovská, *Lolium perenne* Táborský, *Phleum pratense* Větrovský, *Poa nemoralis* Rožnovská, and *Poa pratensis* Levočská) from the gene banks of the neighbouring European countries. The accessions were regenerated, and their seed has been stored *ex situ* in the Gene Bank of the Crop Research Institute in Prague.

Keywords: cultivars; germplasm collection; grasses; repatriation

Landraces and obsolete cultivars belong to the cultural heritage of every country. In former Czechoslovakia, grass breeding was developed in three distinct regions: Southern Bohemia and Northern Moravia in the 1920's, and later in Eastern Slovakia in the 1940's. The breeding process of 17 grass species, based on the selection of local ecotypes, resulted in the development and cultivation of 45 cultivars which were named after the place of their breeding or the breeder. Old landraces were never officially tested nor registered. The first cultivars of grasses were registered in 1937, specifically Táborský(-á) and Větrovský(-á), which originated in Bohemia; and later, cultivars Rožnovský(-á) from Moravia in 1940, followed by Slovakian cultivars Levočský(-á) in 1949. Seed multiplication, a new branch of agriculture at that time, played an important role in the improvement of grasslands and increased the incomes of the farmers involved; especially in the economically poor mountainous and sub-mountainous regions. Unfortunately, most of these historical cultivars were not preserved in a national germplasm collection until systematic work on plant genetic resources began in the research institutes. The aim of this work was to identify potential foreign germplasm holders of lost cultivars, as well as to try to repatriate missing accessions.

MATERIAL AND METHODS

A review of historical Czech and Slovak grass breeding activity was carried out in the 1990's (Ševčíková 1992, Ševčíková & Teterová 1996) by studying historical prints and national lists of cultivars. An inventory of historical gene bank accessions, stored as seeds in the *ex-situ* national germplasm collection in the Gene Bank of the Crop Research Institute in Prague, was then compiled.

As the search for missing cultivars was not very successful with local breeders and institutions, the effort has been targeted at foreign germplasm holders. Relevant Internet sources of information were used; initially, the accessible European Central Crop Databases (ECCDBs) of the European Cooperative Programme for Plant Genetic Resources (ECPGR) Networks, and then the EURISCO Web Catalogue, which provides access to all of the *ex situ* plant genetic resource information in Europe. The European gene banks, which were identified as the holders of the relevant accessions of Czech and/or Slovak origin, were asked for the repatriation of those plant genetic resources. The regeneration process was started with the seed samples received, using a protocol for wind-pollinated, outcrossed species, in order to obtain a standard quantity of viable seed for the Gene Bank.

RESULTS AND DISCUSSION

The national inventory showed that 11 of the 45 historical cultivars were still registered, maintained, and stored in the National Gene Bank; however, the number of missing accessions amounted to 27 of the 34 deleted cultivars. Four of these have since been regenerated from seed found with local breeders, and conserved. Using the European Central Crop Databases in 1999; and later the EURISCO web catalogue in 2004, plus another four European gene banks, specifically: IPK – Gene Bank Außenstelle Nord, Malchow, Germany (institute code DEU271); the Research Centre for Agrobotany, Tápiószele, Hungary (HUN003); the Institute of Grassland and Environmental Research, Aberystwyth, United Kingdom (GBR016); and VIR, St. Petersburg, Russian Federation (RUS001). They were identified as the holders of nine of the 23 missing historical cultivars of Czech and/or Slovak origins. Seed samples of eight accessions were received from three institutes, while repeated requests to VIR has, so far, been unsuccessful. Except for one accession which had non-viable seed, the quality of seed in terms of germination varied from 3% to 90%; which enabled the cultivation of enough plants for seed multiplication in a regeneration plot, if necessary increased by vegetative propagation. The regeneration process was completed for seven accessions, and their seeds have been maintained in the Gene Bank of the Crop Research Institute in Prague under long-

Table 1. Status of regeneration process in cultivars found in European germplasm collections

Accession No.	Species	Cultivar	Donor institute code	Donor accession number	Germination of seed (%)		Seed in GB collection (g)		
					repatriated	regenerated	A	B	S
14G0700052	*Arrhenatherum elatius*	Větrovský	DEU271	GR 326	75	94	229	89	20
14G1500111	*Festuca pratensis*	Větrovská	HUN003	RCAT041214	25	97	111	60	3
14G1600169	*Festuca rubra*	Rožnovská	DEU271	GR 2289	47	93	240	80	10
–	*Festuca rubra*	Větrovská	RUS001	703432441	–	–	–	–	–
14G2000639	*Lolium perenne*	Táborský	DEU271	GR 3201	90	100	23	32	2
14G2400178	*Phleum pratense*	Rožnovský	GBR016	BD 2980	84	98	175	50	1
14G2903008	*Poa nemoralis*	Rožnovská	DEU271	GR 4228	42	92	44	28	5
–	*Poa palustris*	Větrovská	DEU271	GR 4248	0	–	–	–	–
14G2800242	*Poa pratensis*	Levočská	GBR016	BP 526	3	81	18	30	1

A – active collection; B – base collection; S – safety duplication (RIPP Piešťany, Slovakia)

term conservation conditions, in compliance with international standards (Table 1). Thus, OSEVA PRO Ltd., Grassland Research Station at Zubří, can be designated as the primary holder for these accessions, according to the procedure adopted by the Forages Network of ECPGR (Boller *et al.* 2006).

However, for the time being, 16 historical grass cultivars are considered as lost from the Czech germplasm collection. In 2009, the finding of *Alopecurus pratensis* Větrovská as accession PI 283176 was completed at the Germplasm Resources Information Network (GRIN) web server (USDA, ARS), and the request for a seed sample for repatriation has been submitted.

CONCLUSIONS

The effective location of, and access to, plant genetic resources in *ex situ* germplasm collections in Europe via on-line web catalogues allows the searching for, and the finding of, valuable accessions. By this means, thanks to international cooperation, seven "lost" cultivars of grasses have been rescued for the Czech germplasm collection. The practical availability and accessibility of seed has not always been in accord with the accession data in the web catalogues.

Acknowledgements. This work was supported by the Ministry of Agriculture of the Czech Republic, Project No. 1G46066, and the National Programme on Conservation and Utilization of Plant Genetic Resources and Agro-biodiversity.

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