

THE IMPORTANCE OF NATIONAL PROGRAM OF SLOVAK REPUBLIC FOR BIODIVERSITY CONSERVATION

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ABSTRACT

The Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (PGR) is implemented in the Slovak Republic (SR) by the National Program on Conservation Plant Genetic Resources for Food and Agriculture.

Conservation of Cultural Plant Gene Pool is funded and supported by the Ministry of Agriculture. Mandate for coordination was given in harmony with the law No. 215/2001 "Conservation of Plant Genetic Resources for Food and Agriculture" to the leading Research Institute of Plant Production (RIPP) Piestany. RIPP Piestany with another 18 co-solving workplaces from the whole Slovakia participates on this program.

By 31 December 2003 the number of all samples of cultural PGR for food and agriculture is 26 742 samples. The greatest part is formed by cereals (26%), fruit plants (16%) and grain legumes (19%).

In November 1996 in RIPP Piestany a new Gene Bank for SR started its operation. The gene bank has the storage capacity for 50 000 accessions of cultivated plant seeds, with possibility for medium and long term conservation.

Important and necessary part of activities concerning our genetic resources is their maintenance and development of information databases consisting of passport and description data. The program of activities in the Gene Bank also includes genotype identification by means of application of modern procedures of biomolecular techniques using the study of differences in storage proteins and in nucleic acid composition. This is of great importance in excluding duplicates, cultivars identification, and in the study of pedigree of conserved genotypes.

INTRODUCTION

We live in critical times for the world of plants and animals. It is universally agreed, that a catastrophic loss of biological diversity is occurring at the moment, with species and equally important, genes being lost forever. However the Biodiversity Convention at the Earth Summit in 1992 drew attention to the need to conserve and equitably utilize biological diversity for the benefit of all humankind. The convention placed emphasis on the need for a complementary approach to conservation that employed both *ex situ* and *in situ* techniques (Hawkes, Maxted, Ford-Lloyd 2000).

MATERIALS AND METHODS

National Program

The Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture is implemented in Slovakia by the National Program for Conservation of Plant Genetic Resources for Food and Agriculture. A National Program has been formally established in 1991. Plant genetic resources (PGR) in the Slovak Republic are coordinated at the national level. Conservation of Cultural Plant Gene Pool is funded and supported by the Ministry of Agriculture. Mandate for coordination was given with the law No. 215/ 2001 "Conservation of Plant Genetic Resources for Food and Agriculture ". There are 18 co-solving partners participating in PGR activities (Benediková et al. 2003).

Gene Bank

The Gene bank at the Research Institute of Plant Production Piestany (RIPP), which started operating in 1996, has national responsibility

ties for long-term genetic resources conservation in Slovakia. It is a specific facility for the conservation, particularly of seed species in full viability with elimination of their genetic injury. The capacity is planned for 50 000 samples of seed species. Basic seed collection of PGR for long-term conservation (-17°C) is stored as well as an active collection (5°C) serving for distribution, regeneration and evaluation of plant characteristic. Each sample from basic collection has also safety duplication. It is packed separately and stored abroad.

Ex situ conservation occurs mainly in gene banks that can be categorized into four principal types: seed gene banks, field gene banks, *in vitro* gene banks and cryo-preserved gene banks. In Europe, the existing different gene banks face a range of problems related to evaluation, characterisation, monitoring, regeneration, data management, storage and dissemination of available technical information.

Duplication of collections

The first step to find duplicates is a comparison of the plant morphology. For the analysis of the morphological and biochemical data we use multivariate statistical analysis. We investigated morphological diversity within cultivated triticale, lentil, grass pea, white clover, chick-pea, lupinus, safflower, alfalfa, bean landraces, barley and maize. 11–32 agro-morphological descriptors were evaluated, most of them are descriptors recommended by IPGRI. The association between the parameters was analyzed using cluster analysis with the unweighted pair-group (UPGMA) or Ward's method for combining clusters. Cluster analyses are made with SPSS software. The phenograms are constructed from these data using squared Euclidian distance matrix of similarity.

Morphological data

Morphological, biological and economic characters of crops are evaluated according to the morphological descriptor list, developed on the basis of IPGRI, UKSUP (Slovak Control and Testing Institute) and EVIGEZ Descriptor Lists. These databases are extra for each crop and they are not stored for all accessions. We prepared new structures of databases for morphological data of crops, where along with point data original quantitative data are also

maintained. Data from RIPP Piestany are recorded in this way.

Evaluation and utilization of the collection

Studies carried out on the germplasm include:

- collecting and conservation of the world collection: species, lines, breeding material, wild forms;
- evaluation according to standard descriptor list;
- analysis of the biological material (evaluation of wheat types for flour milling and bakery characteristics);
- providing information and research results to breeders and other research workers, and implementation of research results;
- computerization of data (Fox Pro).

RESULTS

National PGR inventory

The inventory database is created in RIPP Piestany. The number of PGR represents work collection, active collection and base collection. By the end of 2003 10 150 accessions in active collection were registered in Gene bank and 2 645 accessions in base collection. The total number of all accessions in National program is 26 742. The estimated proportion of *ex situ* accessions is more than 17, 0 thousands. These represent 190 plant species. The largest collections 26,1% are the cereals, followed by the grain legumes at 19,7%, fruits at 16,2%. Shares of other collections are lower than 6,0% (Table 1).

At present all PGR collaborating institutes use MS Excel or FoxPro for their self-evidence. They have only structure for passport data. All data are in electronic format. They have e-mail and Internet connection.

Gene Bank

Last year the activities of the Gene Bank were concentrated on conservation and documentation of samples. In this period over 1 500 genotypes were provided for breeding purposes, over 2 300 accessions for the research programmes. More than 400 accessions of plant genetic resources were sent abroad. All the work carried out in the Gene bank is registered in the form of databases. All the necessary forms for documentation and also various labels are printed in our own software.

Table 1. National Program PGR Slovak Republic (Date 31 12 2003)

Groups	Number of genotypes	%
Cereals	6981	26,1
Fruits	4320	16,2
Grain legumes	5273	19,7
Vineyards	1776	6,6
Grasses	1991	7,4
Maize	1705	6,4
Root crops	1127	4,2
Fodder crops	1273	4,8
Flowers	199	0,7
Industrial crops	820	3,1
Vegetable, Medical plants	812	3,0
Oilseed crops	465	1,7
TOTAL	26 742	100

If the received material is interesting to be included into our Gene Bank it is first documented on the basis of temporarily number-receipt number. Seeds are accepted only with protocol and passport data. After checking these data, samples are stored in paper bags in drying room. Conditions in this room are 20°C temperature and 15% relative humidity. The seeds are left in drying room until the content of moisture is 5–6%. We use germination test for each sample – 2 replicates, 100 seeds per replicate. Our samples are packed into glasses containers with twist caps 720 ml, 360 ml and 210 ml.

One method of plant genetic resources conservation is also *in vitro* conservation. It is a method when individual genotypes are cultivated on synthetic culture medium. This method is applied for the maintenance of those plant species that cannot be maintained as seeds. This method has been used for the maintenance of hop and some species of small fruit trees.

The program of our activities involves to genotype identifications by means of modern biomolecular techniques using the study of differences in storage proteins and in nucleic acid composition too. Therefore the list of research tasks solved in the Department of Plant Genetic Resources and Gene Bank includes creating

biochemical databases for strategic crops, image documentation and searching the duplicates and insufficiencies in the collections conserved in the gene bank. We started to fill in except the passport, morphological databases and biochemical databases, too. The first were databases for wheat, barley, maize and legumes. This work is very important for example for bean landraces. These seeds are compared to registered genotypes.

Safety duplication

The samples of Slovak basic collection are packed separately and stored in Gene Bank Prague the Czech Republic. The Gene Bank Prague has also safety duplication in Slovak Gene Bank.

International activities

Slovak Republic takes part in European Cooperative Program for Genetic Resources Network (ECP/GR) co-ordinated by IPGRI Rome. IPGRI is an international research institute with a mandate to advance the conservation and use of genetic diversity for the well-being of present and future generations. IPGRI works through local, national and international partners to harness the full potential of the Earth's plant genetic diversity.

Working groups Avena, Barley, Wheat, Forages, Grain legumes, Prunus, Malus/Pyrus, Potato, Alium, Brassica, Medicinal and aromatic Plants are the main fields of our international activities. Slovak databases of e.g. Barley, Prunus, Phaseolus, and Soybean were integrated into European Crop Databases (Benediková 1996, Benediková et al. 2003).

REFERENCES

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