

INFORMATION

The Czech Bank of Potato Genetic Resources

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Potato Research Institute, Ltd., in Havlíčkův Brod (PRI) is an organisation working in the framework of the National Programme of Conservation and Utilization of Plant Genetic Resources, responsible for the activities associated with potato (*Solanum* spp.) genetic resources. Working with potato germplasm has had a long tradition in this organisation, then it has been performed since 1952, without interruption, and Potato Research Institute is the only institution aimed at this objective in the Czech Republic. The mission of the potato genetic resource bank is the collection, evaluation, documentation, maintenance and delivery of potato accessions. For the collection, new materials are directly derived from breeders or distributors through the Central Institute for Supervising and Testing in Agriculture, Division in Lída, they are chosen from catalogues of foreign gene banks and derived as a result of research projects. The collection of potato genetic resources is long-term stored and regenerated in an *in vitro* culture. *In vitro* cultivation, allowing time-unlimited storage of accessions without risk of virus re-infections, with minimal requirements for storage rooms, has replaced the original classical way of field management since 1986. The shift to the maintenance in tissue cultures has significantly increased the possibility of active recovery from virus infection, including virus detection. An international material exchange has been substantially simplified as well. The

technique of the long-term conservation consists in developing the conditions for slow growth and induction of *in vitro* tuberisation. It is carried out in culturing on three specifically modified MS (Murashige & Skoog) media, free of growth regulators, at lower vital temperature (10°C), 10 h photoperiod and 3000 lux illumination. Chitting microtubers after dormancy or surviving stem segments are subjected to regeneration subculturing onto new media in 14–18 months. The stored collection of *Solanum* genus involves 2045 genetic resources, divided according to the characteristics of maintained materials to six sub-collections: *Solanum tuberosum* varieties, *Solanum tuberosum* tetraploid hybrids, dihaploids and diploids, cultivated species of *Solanum* genus, wild species of *Solanum* genus, interspecific hybrids of *Solanum* genus. The sub-collection “*Solanum tuberosum* varieties” comprises 1111 varieties originating from breeding of 35 countries of the world. The collection of the Czech varieties has an outstanding position, involving 103 original varieties from domestic breeding. It represents 85.83% of all varieties bred in this country until now. The whole collection of domestic breeding was subjected to a comprehensive recovery from virus infection and at present it is free of common viruses and it is screened for quarantine potato pests. The sub-collection “Tetraploid hybrids” consists of 296 genotypes of foreign origin and genotypes derived from research realisation of genetic and

breeding tasks in PRI and also materials from clonal selection. The sub-collection "Dihaploids" is a unique set of 249 induced primary and secondary dihaploids, interspecific hybrids and regenerants of pollen embryos. These materials were mostly developed in genetic and breeding research of PRI. The sub-collection "Cultivated species of *Solanum* genus" includes a set of five tuber-bearing primitive cultivated potato species with various ploidy levels. The materials were received from international gene banks as *in vitro* plantlets of seed populations. The sub-collection "Wild species of *Solanum* genus" comprises a set of 23 tuber-bearing and 1 non-tuber-bearing species. They were derived from the international collections of potato genetic resources and are used as the sources of resistances to important potato pests and diseases and abiotic stress. They are potential donors of resistances to fungal diseases (*Phytophthora infestans*, *Synchytrium endobioticum*, *Streptomyces scabies*), bacterial diseases (*Pseudomonas solanacearum*, *Erwinia carotovora*), viral diseases and viroids (PVX, PVY, PLRV, PSTVd), nematodes (*Globodera rostochiensis*, *Globodera pallida*, *Meloidogyne inkognita*), insect (*Leptinotarsa decemlineata*, *Myzus persicae*) and physiological stress (frost, heat and drought). In the sub-collection "Interspecific hybrids" 96 entries are maintained, the material has only foreign origin, consisting primarily of hybrids with genes of horizontal resistance to potato late blight received from CIP Peru as seed populations. New materials are especially studied; they are described and evaluated on the basis of "Descriptor list genus *Solanum* L". Forty-four morphological and 12 agronomic traits and characteristics are evaluated on a 9-point scale and the levels of resistances to 12 pests and diseases are described. The results of the evaluation are published in two surveys "Potato germplasm – one-year informative results of the field study collection of potato germplasm – multiplication and working plot Valečov" and "Field study collection of potato germplasm". Multiple-year data of varieties are summarised and published in the publication entitled "Card indices of world assortment potato varieties of the PRI collection", of that XVIIth volumes have been published so far. The automated evidence system EVIGEZ is used for potato germplasm evidence. This system is running under Research Institute of Crop Production Prague-Ruzyně as the coordinator of the National Programme of Conserva-

tion and Utilisation of Plant Genetic Resources and Agro-biodiversity. Passport data and descriptive data (following three-year evaluation of genotypes) are stored in this national database. At present, 2045 passport data and 995 descriptive ones are evidenced. Information about potato genetic resources maintained in the potato gene bank of PRI Havlíčkův Brod is a part of the database of passport data on genetic resources maintained in the Czech Republic, found on the Internet site <http://www.genbank.cz/genetic/resources>. The data are also accessible in the European database on the web site <http://www.europotato.org>. During 1994 and 2004 3155 accessions as *in vitro* plantlets or tubers from the field study collection were delivered to domestic and foreign users, 549 accessions were delivered to breeders, 2477 accessions were delivered to research institutions and schools and 149 accessions were delivered to foreign users. The organisation takes part in the Potato Working Group within the ECP/GF programme and regularly delivers passport and descriptive data to "The European Cultivated Potato Database" and "The Database for Related *Solanum* species". Based on the signed agreement with Institute for Potato Research and Breeding in Velká Lomnice, safety duplication collections of valuable materials of own breeding are reciprocally maintained in an *in vitro* culture. Since 2001 the programme of revitalisation and valorisation has been realised in the potato gene bank, which resulted from the need to implement EU directives for material storage. It is Commission Directive 95/44/EC, amended by Commission Directive 97/46/EC, requiring the screening of maintained materials in addition to common viruses also for the presence of a set of quarantine harmful organisms, at least prior to material delivery to users, especially breeders. Testing for quarantine viruses, viroids and bacteria is performed in the diagnostic reference laboratory for potato virus and virus-like organisms and in the laboratory centre of PRI Havlíčkův Brod. Used determination procedures fully comply with the procedures set in FAO/IPGRI Technical Guidelines. Until now, 605 entries have been tested and no positive result of any tested harmful organism has been recorded. A part of the programme is the gradual elimination of common potato viruses in infected accessions, using procedures of active recovery in an *in vitro* culture (chemotherapy, thermo-

therapy, meristem isolation). The eradication programme of potato gene bank supposes removal of viral infection in all materials stored in an *in vitro* culture and recovery of all recent genetic resources over several years. The number of genotypes free of common viruses has been increased from original 59.1% to current 78.4% accessions and the elimination still continues. Considering the extent of the maintained material, the *in vitro* gene bank of PRI Havlíčkův Brod is comparable to foreign collections and comprises a wide biodiversity of *Solanum tuberosum* ssp. *tuberosum* varieties, *S. tuberosum* tetraploid hybrids, dihaploids, cultivated and wild potato

species. The materials are available for research, breeding and education in accordance with Act No. 148/2003 on Conservation and Utilization of Plant Genetic Resources and Microorganisms, and they can be chosen as donors of valuable breeding and agronomic characters for experimental work and practical breeding. The realised programme of valorisation and revitalisation will enhance the quality of the Czech *in vitro* potato gene bank comparable to similar gene banks in the world and will improve and fasten the possibility of delivering accessions required from foreign users.

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