



AGENT Project – Genebank Review

Place: Research Institute of Plant Production, RIPP, NPPC Piešťany

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Background

Within the AGENT project a new approach is tested to review the operations of European genebanks (GB) and guide their improvement through a system of reciprocal visits and support. The blueprint of a GB monitoring system, as adopted by the European Genebank Integrated System (AEGIS), will be tested by focusing on the European collection holders of wheat and barley cooperating within AGENT. This will serve as an example for wider use within the European network. Curators of 11 GBs will visit each other's facilities and evaluate the efficiency of operations based on jointly prepared protocols. Reports will offer recommendations for improvement and will be used to approach suitable funding agencies for targeted capacity building. In the first cycle the genebanks of CRI (Czech Republic), NPPC (Slovakia) and IPK (Germany) are involved.

Visit/Organization

The last genebank visit scheduled for the peer review took place in Piešťany at the NPPC genebank. Pavol Hauptvogel, the head of the Research Institute of Plant Production (RIPP), which is part of the NPPC (Narodne Polnohospodarske a Potravinarske Centrum – National Agricultural and Food Centre), presented us with the programme for the two-day visit. The plan was to show all the facilities of the genebank, the genebank as such, the *in vitro* collections and the field trials (orchard) with fruit trees and medicinal/aromatic plants. In the first presentation, he introduced the structure of the NPPC as well as the RIPP and the genebank. A genebank manual was provided during the visit.

Outcome of the Review

Management/Funding

The Research Institute of Plant Production in Piešťany was established in 1951 in Borovce near Piešťany as a branch of the Research Institute of Plant Production in Praha - Ruzyně with responsibility for the whole of Slovakia and has been based in Piešťany since 1956. In the course of time, the institute was transformed in several ways until in 1989 it became a contributory organisation managed directly by the Ministry of Agriculture. In 2014, it became, together with additional 5 institutes without legal identity, part of the NPPC with a general headquarters in Lužianky.

There are 15 permanent employees in the Genebank Department, including 6 scientists, 4 workers and 5 technicians. There are also curators and other employees at other locations/Research and Breeding Stations (in Vígľaš, Malý Šariš, and Borovce). Not all crops are fully managed in the Genebank, only selected important collections are operated. Some collections are only regenerated when the amount of seeds is under agreed threshold or the germination rate is low.

Legal requirements such as CBD and its Nagoya Protocol and ITPGRFA with SMTA are followed. Material from the Genebank is provided with SMTA.

The Genebank receives funding from the NPPC (in 2021 it was 258 kEUR) and from external projects (in 2021 it was 662 kEUR).

Funding from the government via NPPC is low and insufficient to proper improvement and update all of the facilities in the genebank as well as of *in vitro* collection.

Recommendation 1

Regular trainings and informative meetings on ITPGRFA and Nagoya Protocol for all curators should take place. In the case of providing samples from working collection, the “shorter” version of SMTA is used. It should be renamed to MTA because it is not SMTA as such.

Recommendation 2

Stable and long-term funding for conservation and evaluation of PGRFA as it was via National Program would be the path for the improvement.

Germplasm Management

There are 20,196 accessions maintained in the genebank. The seeds are dried in a special chamber at 20°C and 10% RH to a final moisture content between 4 and 8% depending on the species. There is a difference between the storage conditions for the active collection (temperature in the chamber from 0 to 4°C, two chambers) and the base collection (-17°C, two chambers). The active collection is used to provide seed samples to users and for short-term storage (up to 10 years), while the base collection is used for long-term storage (more than 30 years). Seeds are stored in glass jars. Material of Slovak origin in the base collection is duplicated in the Czech Gene bank and about one fourth of it is triplicated in Svalbard, both as a black-box. Only samples for safety duplication in Svalbard have Barcodes.

Recommendation 3

For samples in the base collection and safety duplicates, it is better to use aluminium bags under vacuum conditions. These require less space and extend the longevity of the seed.

Recommendation 4

Only a quarter of the active collection is stored in the base collection. It would be better to have all the material in sufficient quantity in both collections.

Recommendation 5

The Barcode system for all samples and linkage to the information system would help to manage all accessions rationally.

Recommendation 6

In the chambers, all glass jars are labelled by paper sticks. This could be dangerous when handling samples or removing jars from lower temperatures and transferring them to a higher humid environment. Dewetting of the jars may cause the label to become illegible. We therefore recommend using thermostable plastic labels at least in the basic collection.

Voucher specimens

The spike collection serves as voucher collection for cereals. For medicinal plants, herbarium sheets are made. Their availability is limited, because currently they are in sole use by the curator.

Recommendation 7

It might be helpful to have herbarium vouchers and seed samples for the other crops as a reference collection and a medicinal plant herbarium as an official reference material of the gene bank.

Seed Lab/Germination Testing

In 2021, 1 657 germination tests were done. Two big climate chambers for germination are available. 2 x 100 seeds are tested in petri dishes on filter paper or in filter paper depending on the species. Germination rate is documented in the information system GRISS. These data are accessible in the system by the database administrator and curators. In the process of evaluation of germination rate, only visibly germinated seeds are counted. There is no information about hard /dormant seeds infected/moulded or abnormal germination.

Recommendation 8

It would help having all data on germination rate accessible also for curators of all collections in IS GRISS.

Recommendation 9

It would help to count also abnormalities in seed germination with respect to physiological abnormalities, infection/moulds, dormancy or seed hardness.

Documentation

The genebank uses the customised information system GRISS, which was created with similar requirements as the previously used systems EVIGEZ and then EVIDEN. The IS GRISS consists of an internal - non-public part and an external - public part. The internal part of the system includes passport data, C&E data, seed storage data, as well as data containing the entire data flow from germination testing, storage process, periodic monitoring, and material regeneration to providing samples to users. However, not all data are accessible to all curators(<https://kurator.vurv.sk/content/files/Metodicka-prirucka-pasporty.pdf>). The external part of the system includes publicly available data such as passport data and C&E data when available. The system is built on an MS SQL server running on MS Windows Server 2012 R2 6.3 in a virtualized environment on VMware vSphere 6.5.

Recommendation 10

In order to have unique identifiers for the accessions digital object identifiers (DOIs) should be implemented.

Recommendation 11

It would help to have also in vitro collection in the IS GRISS to offer the accessions to users. Also, safety duplication of accessions might be marked in the IS. In addition, the vegetative maintained material should be visible in EURISCO.

Plant Health

In field trials, pesticides are used in the case of attack by diseases or pests. The visual inspection of the plants as well as seeds during regeneration and evaluation is done. Field collection of trees (peach, apricots, apples, cherries) is at the end of its viability, there should be a plan for long-term sustainability of the collection. Deliveries of seed samples outside the EU are done with a phytosanitary certificate. A plant passport does not exist as well as the limitation of availability of *Capsicum* and *Lycopersicum* accessions due to quarantine diseases.

Recommendation 12

From our opinion, a plant passport is necessary; at least some relevant species are in the collection. Check with the plant health inspection office the necessity of a plant passport.

In Vitro Preservation

75 clones of 11 genotypes of hops of the Czech origin are preserved. The shoot cultures of virus free plants on modified MS medium (established from apical meristem treated by thermotherapy) are kept *in vitro*. The methodology is available in Slovak in web-site of RIPP. The glass baby food jars (205 ml) are used and for each accession there are 3 jars + 1 (backup jar) with 7-9 plants/jar.

590 genotypes of *Solanum tuberosum* and 9 other species of *Solanum* sp. Such as *S. brevidens*, *S. gourlayi*, *S. kurtzianum*, *S. maglia*, *S. phureja*, *S. sparsipilum*, *S. spegazzini*, *S. chacoense*, *S. andigenum* are preserved. The shoot cultures of virus free plants on modified MS medium (established from tuber eyes and treated by chemotherapy based on the methodology from former Potato Research and Breeding Institute in Veľká Lomnica accessible from the web-site of RIPP. All potato accessions are preserved in glass test tubes (17 x 160 mm); 4 tubes + 1 backup tube/accession.

Recommendation 13

The periodicity of passaging is 3 – 4 months which is really short. For prolonging of passaging intervals it is recommended to consider different media, or decreased temperature.

Final conclusion

The NPPC genebank is an important facility holding a valuable germplasm collections for Slovakia and neighbour countries in Europe.

Shortage in funding and non-existence of National Programme results in different levels of crop maintenance, e.g. some crops are only regenerated, without complex collection development. Furthermore, the stable funding should help to keep standards for long-term conservation of PGRFA and development of collections.

Final remarks

Although the genebank is underfunded, its basic functions are maintained. However, for its further development, it would be useful to have stable support from either the NPPC or the Ministry of Agriculture.

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