



AGENT Project – Genebank Review

Place: Crop Research Institute (CRI), Prague

Date: May 12-13, 2022

Participants CRI: Dagmar Janovská, Ludmila Papoušková, Vojtěch Holubec, Miloš Faltus, further staff members

Reviewers: Pavol Hauptvogel (NPPC), Ulrike Lohwasser (IPK), Theo van Hintum (WR)

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 first genebank visited was CRI Genebank in Prague. Head of the Genebank Dagmar Janovská has organized the meeting with the reviewers Pavol Hauptvogel (NPPC) and Ulrike Lohwasser (IPK) as well as Theo van Hintum (WR). In preparation of the review, the CRI Genebank Manual which describes all activities and methods in a proper way, the "National Programme on Conservation and Utilization of Plant, Animal and Microbial Genetic Resources Improvement for Food and Agriculture for the Period 2018-2022" as well as statistical information about the genebank were provided. The genebank is certified according ISO 9001, the documents are in Czech language. Dagmar Janovská prepared a well-structured program starting with a presentation about the structure and the organization of the genebank.

The reviewers visited the genebank facilities, the lab for in vitro and cryo preservation as well as the storage rooms of the cryo tanks. A short field visit with wheat regeneration was included. Regeneration areas of cross pollinators could not be visited because all crops requiring isolation cages had not been sowed yet.

The genebank is central storage for all generatively propagated crops involved in the National programme, therefore it works together with partner institutions in 14 locations. Other locations could not be visited.

Outcome of the Review

Management/Funding

PGR Department of CRI was founded in 1951. The Czech Genebank started its work in 1988/9 with climatized chambers. In 1993, a national programme for PGRs was launched. Since 2003 a national legislation on PGR is available. Today, the structure, mission and aims are described in the National Programme 2018-2022 (<https://www.np-genetickezdroje.cz/legislative-and-documents/?lang=en>).

Legal regulations like CBD, ITPGRFA and Nagoya Protocol are well known and respected. Material is provided under the regulations of the SMTA. Regular trainings and informative meetings for all curators take place.

15 staff members are working permanently in the genebank, 5 scientists, 10 technicians.

The Genebank receives funding from the government ($\frac{1}{3}$), from the institute ($\frac{1}{3}$) and from external projects ($\frac{1}{3}$). Funding from the government is more or less stable, funding from the institute is also more or less stable, but depends on evaluation results, number of publications, impact factor, etc.; funding via national and international projects is critical and depends on availability of calls and successful fundraising. All in all, the basic funding for the maintenance of PGRs seems to be not high enough, a proper management of the genebank without project money is not possible.

Recommendation 1

Stable and long-term funding is needed to sustain PGRs. It would be helpful to increase the genebank's budget in a way that dependence on projects is no longer necessary and continuity can be guaranteed. (Nevertheless, projects are important for many reasons and should be undertaken.) The management and operation of the Gene Bank of the Czech Republic should have an increased share of funds in terms of tasks under the Action Plan of the National Program for the Conservation and Utilization of Genetic Resources of Plants, Animals, and Microorganisms Important for Food and Agriculture for the period 2018 - 2022.

Germplasm Management

43,500 accessions are maintained in the genebank. Cold rooms (-18°C) are used for storage of the seed material; seeds are in glass jars. Before storage seeds are cleaned and dried in a drying chamber (17°C, 14% RH). Material is safety duplicated in the Slovakian genebank in glass jars in the same way. Only AEGIS accessions are triplicated in Svalbard. A distinction is made between domestic material, AEGIS material and other material with consequences for the safety-backup and viability testing regime. Also, the maintenance of various seed samples for one accession created an undesirable complexity.

Recommendation 2

Splitting in an active and base sample as well as full safety duplication is suggested. For base samples and safety duplicates it is better to use aluminum bags under vacuum conditions. This needs lower amount of space and prolongs the seed longevity.

All samples/batches have barcodes. Some of the samples have three different barcodes on one glass. This is not really helpful.

Recommendation 3

Prepare a barcode strategy, which barcode is necessary, for what the barcode will be used later on. It would be more appropriate to rework the bar code with the sample line registered in the GRIN Czech system.

For regeneration of the material, the curators in the different partner institutions/locations are responsible. Regular inspection intervals (5 institutions per year) control the effectivity and successful regeneration. Not enough space or isolation capacities are available for cross pollinators. Backlogs exist especially for maize, tobacco and sunflower and partly beet. From the latter, only Czech and former

Czechoslovakian material is regenerated, material from other countries is only stored but not regenerated.

Recommendation 4

It should be checked whether all the material that is in the genebank can be regenerated and preserved. If this is not possible, a strategy should be developed as to which material is more important due to uniqueness, rare material, etc. For maize, a link to the EVA maize consortium could be helpful. Cooperation with breeding companies for regeneration should also be explored.

From the cereals, vouchers in the form of a spike collection are available.

Recommendation 5

It could be helpful to have also herbarium specimens and seed samples for the other crops as a reference collection.

Seed Lab/Germination Testing

Per year, 7,000 germination tests are done, 3 cabinets for testing are available. 100 seeds are tested in petri dishes on filter paper. 2 half-time staff are doing the tests. Germination rate is documented in GRIN Czech, the threshold is 85%, but depends on the crop and the biostatus.

Initial germination data are not available for all accessions. On the other hand, germination data of many batches of one accession exist, even from the same year.

Recommendation 6

Review the organization of germination testing and sample management; priority should be given to the 'base sample' of accessions without any viability data.

Documentation

GRIN Czech is used for all genebank documentation including characterization and evaluation data and reports. Data are online available; seed material can be ordered online. All partners are connected to the system. Once per year data are uploaded into EURISCO.

Recommendation 7

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

Plant Health

For plant health a visual inspection of the plants and the seeds during regeneration is done. In order to avoid problems a five-years crop rotation is managed. Weeding is done mechanically or manually to remove foreign plants; partly herbicides are sprayed. Before sowing the seeds are treated with a fungicide.

Deliveries outside EU are done with a phytosanitary certificate. A plant passport does not exist.

Recommendation 8

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

In Vitro-/Cryo Preservation

480 accessions of 18 species are conserved in cryo. The collection grows by about 30 samples every year. One permanent staff and 6-7 research people are handling the lab. The low number of permanent employees is a limiting factor for effective cryopreservation, given the cryobank's budget. Special protocols for each crop are available.

In Situ Monitoring

In situ monitoring is done for some threatened species like *Allium schoenoprasum* and *Hierochloe odorata* over many years.

Recommendation 9

From the monitored in situ samples a safety backup should be taken and stored in the genebank.

Final conclusion

The CRI genebank is an important facility holding a large germplasm collection in Europe. The staff is composed of committed and well-trained members. The operation is well organized, but, like any genebank, can be improved in several aspects.

Final remarks

The reviewers were positively impressed by the transparency given by the hosts during the review; all information was shared, everyone spoke openly. This was very much appreciated, as was the general hospitality and positive atmosphere during the visit.

May 18th, 2022

Ulrike Lohwasser, Pavol Hauptvogel, Theo van Hintum