

AGIES Project

Genebank Review of the National Centre for Biodiversity and Gene Conservation (NBGK), Hungary April 23-24 April 2025





AGIES Project – Genebank Review

<u>Genebank Reviewed</u>: National Centre for Biodiversity and Gene Conservation (NBGK), Hungary

Date: April 23-24 April 2025

<u>Participants NGBK</u>: Attila Simon, Csaba Péterfy, Bence Mala, Zoltán Áy, Adrienn Gyurkó, Józef Hegyesi, Balázs Horváth, Petra Kiss, Ferenc Sípos and Eszter Somogyi.

Reviewers: Sylvia Vogl (AGES, Austria) and Lise Lykke Steffensen (NordGen, Sweden)

Background

This peer review report is a delivery within a project under the European Genebank Integrated System (AEGIS) and is funded by the German Federal Ministry of Food and Agriculture, the project aims to strengthen AEGIS by improving quality and transparency in its Associate Member genebanks through the preparation of genebank manuals, publication of Standard Operating Procedures, development of agreed genebank metrics, and peer support. The project will also reinforce EURISCO by including dispersed phenotypic data from previous European projects.

This report is part of the genebank capacity building peer visits, where genebanks are visiting and reviewing each other's institutes contributes to improving the quality of genebanks. The first cycle of mutual visits began in 2019 and continues today.

The review concerns the organisation and operations of the genebank, and results in a report with recommendations for improvement.

This document reports on the peer review of the National Centre for Biodiversity and Gene Conservation (NBGK), Hungary that was undertaken the 23-24 April 2025.

Visit/Organization

The visit was organized by Attila Simon, Csaba Péterfy, Bence Mala from the National Centre for Biodiversity and Gene Conservation (NBGK), Hungary. They provided a draft of an Operation Manual, that will be completed after the review but already provided a basis of the review as it describes the organization and procedures of the genebank. Flights were arranged by the reviewers and all the rest was organised by the hosts; the genebank staff arranged transport from and to the airport/train station, the lodging was a nearby hotel, as well food and other needs to facilitate an optimal review work.

Based on an agenda for the two-day review, all operational aspects of the genebank including the facilities could be reviewed and discussed. The reviewers met and discussed with the staff touching all topics on the agenda and the Operational Manual.

The reviewers visited the large site, new and older genebank facilities, seed handling spaces, offices, drying room, the germination testing lab, the storage facilities, green house, in-vitro lab, genetic lab, chemical lab, regeneration sites and a farm nearby. At the end of the visit,



the reviewers presented a first draft of their impressions of the seed bank with the staff members.

The staff was very helpful, open and processes and facilities were presented in a transparent way. We felt a true spirit of a peer review.

Outcome of the Review

The first and most important outcome of the review was the exchange of views on approaches and insights regarding the conservation and use of PGRFA.

In addition to this general outcome, many observations were made, some of which could be translated into recommendations. These are presented below.

Organisation, management and funding

Facilities are great with lots of space and beautiful surroundings, well suited to the purpose, plenty of space, most of the facilities are recently built and well equipped in all functions. There is large capacity in facilities and human capital.

The genebank has been upgraded in recent years. The funding is judged to be sufficient for the activities at the current level. To be able to take the genebank to the next level, further funding might be necessary.

To be able to take the NGBK to the next level it will be absolutely necessary to build a comprehensive Quality Management System. Such a system would enable that knowledge and procedures around the management and operations are transparent, easy to transmit to new staff or colleagues on a high professional level. Today, the ISTA standards, KEW protocols and Hungarian standards are used in the seed lab and the chemical lab. All other functions lack procedures, standards and instructions in written form. It makes the functioning of the institute solely people dependent. When knowledge is only passed on from person to person, it bears a high risk of loosing that knowledge and does not give others easy access and overview of that knowledge.

Recommendations on management and funding

Recommendation 1

The NBGK seems to be well funded and with possibilities for further capacity building in the future. Leverage more from the fact that sections are working well and that the institute has well trained staff. Use this as a platform for taking the genebank to the next level.

Recommendation 2

Introduce a quality management system for NGBK which describes roles and responsibilities within the genebank, defines standard operating procedures and the management thereof and provides an auditing system.

Involve staff in writing to capture their knowledge and engagement into the processes and instructions.



Recommendation 3

Increase significantly the collaborations with third party stakeholders inside and outside the country to bring the knowledge and research at NBGK to the next level.

Germplasm Acquisition and Accessioning

We have seen a very comprehensive map of seed expeditions covering all of Hungary. The collection is huge and seems to cover a great part of Hungarian traditional agricultural crops and samples. The main part of the collection comes from own collection and private donors.

Most of the distribution of seeds goes to private users. Only as little as 79 accessions were sent to 10 users from Academia and the breeding industry in 2024. The distribution to private users is beneficial for the reputation and the public awareness of the genebank. However, this is not the main responsibility of a genebank distribution policy. As NGBK gathers a lot of information and has immense facilities to gather that information (C&E data, performance of the landraces, constituents, genetic data ...) there is a huge potential to expand collaboration and hereby also distribution of seeds to research, breeding and education.

The NBGK staff was very dedicated to handling germplasm acquisition and accessioning. As there is a lack of procedures and instructions it was not possible to judge if operations were in accordance with internal standards and procedures. Our recommendation is based on findings at site and should be seen as such.

Recommendation 4

Set up a strategy for future acquisitions of germplasm and ensure that this material is acquired legally. Consider acquisition also from former registered varieties used in Hungaria. Rethink storing duplicates acquired from other genebanks as the accessions will be stored there and it would only generate unnecessary additional costs and workload for NBGK.

Recommendation 5

Take precautionary actions to prevent phytosanitary risks when receiving incoming material. Consider having a restricted isolated area for incoming material to be stored and checked before coming into the new genebank building.

Recommendation 6

Separate the incoming materials from the outgoing materials and make more spaces for handling the seed packages to avoid unsuitable storage conditions and unreasonable working conditions for the staff. Consider controlling temperature and introduce procedures for seed handling in the handling rooms.



Collection Material Distribution and use

Recommendation 7

Significant increase the effort to distribute and make the germplasm better available for research, scientific and breeding purposes.

Provide as much as possible information of the accession to the recipients (e.g. characterization and evaluation data, as well as genetic data).

Recommendation 8

Consider using Easy-SMTA online (<u>International Treaty on Plant Genetic Resources for Food</u> and <u>Agriculture</u>). This makes documentation and reporting to the FAO much easier.

Security and safety of the collections and staff

Security and safety for the premisses and the collections are of outmost importance. The NBGK is situated in a rural and remote area which is known for stable geological conditions. There are more than 2000 public visitors to the site with rather free access to the facilities. The free access in combination with this open-door policy is regarded as a significant risk and could pose unwanted situations. The collections of germplasm are very valuable and represent collections from all of Hungary. Although, recognizing that most valuable orthodox seed duplicates have a safety back-up in a remote place inside Hungary, we judge that the collections are not sufficiently safety backuped. The *in-vitro* and the field collection does not even have a safety back-up.

Recommendation 9

Make a contingency plan to be prepared for any possible threat in the future.

Recommendation 10

Upgrade and strengthen significantly the current security measures of access to the entire site and important infrastructure. This includes implementation of restricted and secure access to the seed collections, including the *in-vitro* collection. Install fire alarms in all buildings and make sure someone gets a warning in case of fire.

Recommendation 11

Create a full duplicate safety back-up of the active collections. For the orthodox seeds start depositing for a 2nd safety duplicate back-up at the Svalbard Global Seed Vault.

Recommendation 12

Improve working conditions and safety for staff by using adjustable tables, better and good lighting, ear protection, heat and sun protection.

Further, consider training and involving staff to adapt to digitalization.

Recommendation 13



Consider equipment for handling smaller seeds.

Germplasm Management

NBGK has very suitable and well-kept premises for all genebank functions with well trained staff in basic functions for a genebank and sufficient capacity. It is easy to find the monitoring data of seed chambers and drying chambers. The seed chambers are numerous with plenty of space and capacity. Facilities are new and well equipped. A few observations were found which could improve germplasm management and storage.

Recommendation 14

Define, register and monitor thresholds of seed accessions in accordance with FAO Genebank Standards for all the genebank operations, including viability testing, minimum number of seeds conserved, minimum numbers of plants from donated and regenerated plants etc.

Consider setting the minimum germination rate to 85%, regardless of the initial germination level.

Recommendation 15

Improve the information on the condition for seed handling by introducing silica gel into the packages/glasses and regular cleaning between handling seeds.

Consider just one packaging form to optimize and get knowledge on your viability in different places

Recommendation 16

Introduce a Digital Objective Identifier (DOI) on labels to give easy access to information, transparency and have direct correspondence with the new data management system

Recommendation 17

Consider introducing and monitor the measurements of relative humidity (RH) in the seed chambers and bring the RH down to 60-65 % or lower to avoid icing in the cooling system and improve storage conditions for the seeds.

Recommendation 18

Make sure that seed chambers only store seed accessions and make frequent inspections of the seed chambers and check for lost labels on boxes inside.

<u>In-vitro</u>

New equipment and renovation of part of the lab for *in-vitro* cultures has been installed lately. It seems to be well suited for the purpose and a very good start for further improvements in the future.



We observed that there were no written protocols or written instructions in place on how to handle the *in-vitro* collection of potatoes and the recently introduced sweet potatoes. The logistics and infrastructure seem to be challenged as there are long distances between vital functions of the work with the cultures. We observed that sterilization take place in a far end corridor and media had to be carried through this long busy corridor before entering the room with preparation of new plants. The room for shifting media was a mix of working place and storage. We were informed that there had been problems with contamination and HEPA filters in the laboratory and the filters had recently been changed for this reason. Still mould and illness were seen widespread within the collection.

The active collection is placed in another building and far distance from all other important vital functions. Inside the room that stores the active collection of *in-vitro* cultures, we found plenty of irrelevant goods and unthreshed plant materials. The lightening in the room was judged to be poor. The cultures had problems with contamination and in many cases seemed unhealthy or dead and should have been renewed weeks ago.

We observed that low glasses might seemed unsuitable for the purpose and lightening placed wrongly to enable a regular and good growth of plants. The NGBK renew the cultures twice a year and the glasses where in some cases might not either be suitable for such a long cycle.

Recommendation 19

Immediately take action to improve the conditions for the *in-vitro* cultures and prioritize to get healthy plants. Take actions to improve healthy growth conditions and renewal of *in-vitro* plants as well as optimization of storage conditions.

Recommendation 20

Optimize logistics of functions to minimize the risk of contaminations and be able to work and monitor more effectively. Consider moving all functions of the process of *in-vitro* plants in conjunction to each other. Including the storage for the *in-vitro* plants as it is not regarded as suitable for the purpose. Consider not to change cultures inside the storages. Prioritize to have sterile conditions – sterile and in conjunction to the plants.

Regeneration

The farmland, plants and surroundings look very nice and healthy, everything is in great condition. The soil is of different types and very suitable for many different crops. The farmland is electronically fenced to keep out animals. NBGK is again well equipped and has enough and very enthusiastic staff. Daily observations are made concerning plant health, insects and pests, this seems to work well. All accessions are planted in 8 m rows with a minimum number of 20 plants based on traditions and not on standards or scientific practices. We found no written procedures or instructions on the management and operation for the field crops department.



Recommendation 21

Introducing instructions, protocols, checklist and procedures for the entire operation and management of the field area.

Recommendation 22

Rethink the set-up of the number of plants from 8 meter rows and find guidance in the FAO Genebank Standards on minimum number of plants regenerated per accession.

Recommendation 23

Use pollinators in isolation cabins to optimize pollination and production of seeds.

Documentation

Today there is no data management system to handle the data in the genebank. Information is stored in a comprehensive excel file which contains a lot of information and is well organized and searchable. The file contains data on sample level management, taxonomy, storage, viability data, etc. Today there is just one person using it and putting the data together on one computer. A data management system is ready for implementation and the management and operations of this system are sourced into the organization from the company that developed the system.

Recommendation 24

Consider having more people that can handle the excel file/ the future system and avoid that colleagues can overwrite the excel file to prevent that data get lost. Implement a back-up system.

Recommendation 25

When implementing the new data management system, do give high priority to having trained in-house staff to also manage the database system and train all staff in using the system in their functions.

Recommendation 26

Prioritize to get an ordering system and make available data about characterization, evaluation, genetic and chemical data as part of the new data management system in order to bring the collection into use for more professional partners. Make the collection attractive to others.

Final remarks

The reviewers were grateful for the preparation, kind reception, positive atmosphere and transparency presented by the hosts. Discussions were open and fruitful. This was very much appreciated.



Excellent situated genebank, well equipped and good facilities. High knowledge among highly engaged staff.

Large and relevant collections with high relevance for Hungary.

The institution is ready to take the next step towards increased collaboration with the universities, private breeding companies and other partners both inside and outside the country. It will though require significant changes towards more focus on professional users, implementation of a comprehensive Quality Management System and new database with ordering system and more data, increased communication (also in English) and start publishing and participation in outspoken activities.

Communicatation more to the inside and outside world about the work at NBGK could be an important first step.

Mai 2nd , 2025

The reviewers: Sylvia Vogl and Lise Lykke Steffensen