



## **AGENT – Genebank Peer Review**

Genebank Reviewed: The Nordic Genetic Resource Center (NordGen), Alnarp, Sweden

Date: June 29-30, 2023

Participants NordGen: Lise Lykke Steffensen, Maria Sjöström, Anna Palmé, Jan Svensson, Pawel Chrominski, Johan Axelsson, Fredrik Kollberg, Kit Lundborg and other staff members

Reviewers: John Dickie (MSB, United Kingdom), Theo van Hintum (WR, CGN, The Netherlands)

### **Background**

In the H2020 project AGENT, an approach is tested to review the operations of European genebanks and guide their improvement through a system of reciprocal visits and support. The blueprint of a genebank monitoring system, as adopted by the European Genebank Integrated System (AEGIS), is tested by focusing on AGENT partners that manage germplasm collections. The managers/curators of eleven genebanks 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.

Two successful cycles of reviews, involving six genebanks were held in 2022. In the first cycle the genebanks of CRI (Czech Republic), NPPC (Slovakia) and IPK (Germany) were involved, in the second INIA (Spain), IPGR (Bulgaria) and WR (The Netherlands). The third cycle, to be held in 2023, would have involved the Russian partner institute VIR, however due to political reasons their participation in AGENT had to be terminated. NordGen, the genebank of the Nordic countries volunteered to take this place in the third cycle. This is the report of the review, of NordGen, the Nordic Genetic Resource Center in Alnarp, Sweden. The review was the first in the third cycle; and limited itself to the plant related activities of NordGen in Alnarp.

### **Visit/Organization**

The first visit in the third cycle of AGENT Genebank Peer Reviews was organized by NordGen. Although NordGen is an Associate Member of AEGIS, it had not yet submitted an Operational Genebank Manual. Lise Lykke Steffensen, the Executive Director of NordGen and staff at NordGen, coordinated the drafting of an Operation Genebank Manual, based on the template prepared by AGENT and ECPGR (as part of the quality management in AEGIS). This Manual gave the reviewers an excellent opportunity to prepare for the visit as it described the organization and procedures of the genebank. NordGen arranged the local logistics, including hotel, meals and transportation during the visit.

The agenda for the two-day review was sufficient for review and discussion of all aspects of the genebank. Visits to the facilities, conveniently located in and close around the new NordGen building, alternated with discussions with genebank staff members. The hosting genebank was completely open regarding its operations, challenges and achievements. The review proved a valuable learning experience for both the reviewers and for the hosts.

Prior to the Review, a 'pre-audit' was organized by NordGen, involving a former staff member, Jette Nydam Hansen, and resulting in a valuable list of observations and the identification of 'possible areas for improvement'. The reviewers used this list as input; but their report is based solely on their own observations and judgements.

### **Outcome of the Review**

The first and foremost outcome of the review was the exchange of thoughts about genebank management from the highest level (e.g., international ABS policies) to the lowest technical details (e.g., the number of seed bags packed and stored). Genebank staff rarely get the opportunity to discuss these issues with international peers.

In addition to this general outcome, additional observations were made, some of which can be translated into recommendations. The reviewers would like to stress that although the term 'recommendation' is used, the general level of the operations is such that the term 'suggestion' would be more appropriate. The recommendations/suggestions will be presented per topic.

### Management/Funding

NordGen is a well-organized genebank. The world could only wish all genebanks were operated like NordGen. The staff are well trained and completely 'on-top' of their tasks. The problem of the discontinuity of staff (formerly their contracts were terminated after two periods of four years) has been solved for most positions, which is a very good development since the genebank work requires a very specific expertise and network. NordGen suffered in the past from having to build up that expertise and network again and again. The fact that experienced staff members can now stay and harvest the fruits of the years of investment in their expertise and networks is very positive. Some roles however, including the Director, are still limited in time – this is a matter that should be reconsidered.

NordGen has implemented the basis of a quality management system (QMS). It consists of a set of well described procedures, working instructions and forms, reflecting most operations in the genebank. It has many advantages, and staff seemed to be positive about this system. However, the reviewers felt that there are possibilities to take it a step further, not aiming at ISO 9001 certification per se, but using elements that could improve the quality of the operations further.

### **Recommendation 1**

NordGen should seek possibilities to improve the current QMS using elements of the ISO9001 standard, especially regarding quality improvement and auditing.

NordGen receives core funding from the Nordic Council of Ministers; and adds to these funds by participating in additional projects that support the mandate of the genebank. It has been very successful in securing a role in these projects. Currently nearly 35% of its funds come from these additional projects. However, by their nature, the additional projects lack continuity, whereas genebank operations require continuity.

### **Recommendation 2**

NordGen should ensure that the core funding (from the NCM) covers the core genebank activities; having first defined the costs of the core activities that are required to run the genebank in its 'steady state'.

#### Acquisition and composition of the collections

NordGen has a well-defined mandate regarding the composition of its collections: Nordic material and material that is of 'Nordic relevance'. It currently holds more than 26 thousand accessions in its main collection (Active Core Collection) and in addition has nearly 7 thousand accessions available (but not maintained for the long-term). Activities in the last years were aimed at regenerating the material already available. This was successful, and NordGen is slowly moving into a phase where the collection and possibly the mandate can be expanded.

#### **Recommendation 3**

NordGen could mobilize the general public via mainstream and social media to: 1) identify uncollected landraces and collect them; 2) collect information (traditional knowledge) about Nordic landraces, and ;3) increase public awareness about bio-cultural heritage.

#### **Recommendation 4**

NordGen should extend agreements regarding the inclusion of plant genetic resources originating in Greenland and the Faroe Islands in the NordGen collection, assuring their conservation and availability.

Apart from the seed collection, NordGen maintains a very limited clonal potato collection (98 accessions) in a well-equipped *in vitro* facility.

#### **Recommendation 5**

NordGen should consider increasing the number of accessions in the potato collection, to better use the current *in vitro* capacity and better sample the Nordic potato diversity.

As the conservation of Crop Wild Relatives is increasingly under attention, and NordGen seems to be the perfect actor to develop activities in this field, a more active role should be anticipated.

#### **Recommendation 6**

NordGen could extend its mandate to coordinate the (black-box) backup of priority-CWR in Nordic countries (1) by maintaining inventories, (2) setting priorities and organising collecting and (3) act as liaison for potential users of CWR from Nordic origin.

#### Collection Management

NordGen's collection is very well maintained. This should be considered a considerable achievement, given the backlogs in collection management of only a few years ago. The recommendations below mainly concern the strategy and terminology that possibly could be made more focused. A genebank should obviously have a collection that it conserves for future generations and makes available to the current. NordGen has a collection it calls the 'Active Core Collection', which is the actual collection for long term conservation and access, but also material in the 'Active Not Core Collection' that is not regenerated, but accessible for as long as it lasts. Furthermore, its 'primary duplication site' in Denmark

is referred to as the 'Base Collection', although material in this collection is only stored and only used as back-up of the collection in Alnarp.

#### **Recommendation 7**

NordGen could create more clarity about the types of accessions and differences in objectives and procedures associate to these types; consider renaming to international standards (as far as these exist).

#### **Recommendation 8**

NordGen should consider introduction of special status for research collections, temporal collections and other material that is of value, but not managed as a regular genebank collection (i.e., managed to be fully available and conserved for future generations). At present, such material is conserved in the Active Not Core Collection; but the use of a separate special collection concept might be advantageous.

#### **Recommendation 9**

NordGen should consider the possibility of multiplying material for distribution only, avoiding having to replace the 'base sample' and thus extending the period between regenerations of the sample 'for conservation'.

NordGen stores its material in standing freezers in two laminated aluminium sealed bags, one for distribution and one for the rest of the seeds. The reason for this approach given by the staff at NordGen is threefold: 1. Optimisation of resources (avoiding creation of seed bags for accessions that are seldom ordered); 2. Customisation and flexibility (a single bag per accession allows NordGen to tailor seed quantities to meet specific customer orders); 3. Logistical efficiency (managing a diverse collection requires careful planning, and having multiple bags per accession increases complexity). The seeds for duplication in Denmark and Svalbard are also packed in these aluminium bags. However, the ones for Denmark are sealed under light vacuum, while all other bags are sealed at atmospheric pressure. The motivation given by NordGen staff is that vacuum packing for Denmark is done to maximize the number of accessions that can be stored per surface area and that the evidence regarding increased seed survival under vacuum conditions is too uncertain to conduct a cost-benefit analysis confidently. The reviewers do not agree with the reasoning regarding the number of bags and vacuum-sealing because they think that having more bags, possibly all under light vacuum, could increase efficiency and recommend that NordGen reconsiders their policy for pre-packing for distribution and germination testing as well as their policy for vacuum-sealing.

#### **Recommendation 10**

NordGen should reconsider the protocols for packing the seeds in terms of (1) vacuum sealing or not and (2) number of bags for various purposes.

#### **Documentation**

NordGen has adopted the open source genebank documentation system GRIN-Global to replace the in-house build system SESTO, a few years ago. It did so, accepting that GRIN-Global has not been created for NordGen and would require some flexibility and improvisations in its use. The reviewers

observed that it not always did what would be best for NordGen (“the computer says ‘no.’”). However, GRIN-Global provides the basis needed to run the genebank; and has the advantages of using the shared platform that it provides. However, the reviewers had the impression that at some point, especially regarding the (germplasm) user interface, some improvement would be welcome. Implementing these improvements should be given priority, even if this needs to be done via the ‘GRIN-Global organisation’.

#### **Recommendation 11**

NordGen should collect feedback from end-users of the collection about the web interface and use this feedback to improve the interface.

GRIN-Global provides the proper elements for documenting and reporting SMTA’s; however, only SMTA’s regarding Annex 1 material are reported to the IT-PGRFA Secretariate, whereas it should be considered important and relevant to also make the distribution of other material more visible.

#### **Recommendation 12**

NordGen could also report the SMTA’s regarding non-Annex 1 material to IT-PGRFA Secretariat.

#### Regeneration

One of the strong elements of NordGen is the excellent quality of its staff. This was very relevant to the regeneration activities, where the protocols and execution thereof appeared impressive.

#### **Recommendation 13**

Nordgen should create a versioning system for the regeneration protocols and link regeneration events to these versions of the protocols.

#### Other aspects

The reviewers saw many other activities, such as the germination testing, but did not feel the need to suggest or recommend changes in these.

The time spent on the visit did not allow a complete review of all genebank activities.

To avoid a list with 13 recommendations/suggestions, the reviewers want to express their appreciation for the current operation at NordGen with an additional last recommendation.

#### **Recommendation 14**

NordGen has an open and enthusiastic working environment that fosters a positive culture; it should continue nurturing and preserving this positive atmosphere!

Despite the welcome changes in Human Resources Management that allow longer careers for the staff members there, at the same time, any resulting tendency towards complacency and staleness must be prevented.

#### **Final conclusion**

NordGen is an excellent genebank, one of the best in Europe. If a certification system for genebanks is introduced NordGen will certainly be one of the first to deserve it.

**Final remarks**

The reviewers were grateful for the excellent preparation, positive atmosphere and complete transparency presented by the hosting genebank. As a result, the discussions were open and fruitful. This was very much appreciated.

July 7<sup>th</sup>, 2023

The reviewers: Theo van Hintum and John Dickie