AGENT Project – Genebank Review

Genebank Reviewed: Centro Nacional de Recursos Fitogenéticos (CRF), Madrid, Spain

Date: July 7-8, 2022

Participants CRF: Luis Guasch, Isaura Martin, Lucia de la Rosa, Magdalena Ruíz and other staff members

Reviewers: Katya Uzundzhalieva & Gergana Desheva (IPGR, Bulgaria), Theo van Hintum (WR, The Netherlands)

Background

Within the AGENT H2020 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, in the second INIA (Spain), IPGR (Bulgaria) and WR (The Netherlands). This report reports on the first review in the second cycle: that of the Centro Nacional de Recursos Fitogenéticos (CRF), part of Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria (INIA-CSIC) in Alcala de Henares, Madrid, Spain.

Visit/Organization

The first visit in the second cycle was organized by CRF. Isaura Martin, the head of the conservation unit of CRF, had drafted with her colleagues an Operation Manual on the basis of the template prepared by AGENT and ECPGR (the Operation Manual has already been published on the ECPGR website as one of the requirements for AEGIS (A European Genebank Integrated System) membership; Spain is the last European country to sign the AEGIS-MoU with ECPGR). This Manual gave the reviewers an excellent opportunity to prepare for the visit as it described the organization and procedures of the genebank. In contact with the CRF staff the hotel and the flights were arranged by the reviewers, the genebank staff arranged transport from and to the hotel.

Based on an agenda for the two day review, all aspects of the genebank could be reviewed and discussed. Presentations on 'CRF-INIA: Organisation, Management and Funding', 'Germplasm Acquisition and Collecting Missions', 'Material Distribution', 'Regeneration', 'Information System', and visits to the conservation facilities (cleaning room, drying chambers, cold chambers including the skeleton of the new cold chamber that is currently being build, and the germination lab) and the spike collection and other labs, provided the basis for vivid

discussions regarding various aspects of the CRF policies, protocols and approaches. The hosting genebank was completely open regarding its challenges (and achievements).
The first review in the second cycle proved a valuable learning experience for both the reviewers as for the hosts.

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. inclusion of the seed lot concept in the documentation system). Rarely genebank staff gets the opportunity to discuss these issues with international peers.

In addition to this general outcome, a number of observations were made, some of which can be translated into recommendations. These will be presented per topic.

Management/Funding

CRF is a competent group of people, fully aware of all issues surrounding their field of operation: Plant Genetic Resources Conservation and Sustainable Use. Their task is long-lasting and requires continuity, conservation can not be suspended for a few years and the expertise and network required to do the job well takes many years to build. However, given the type of funding in the past, many activities are organized on an opportunistic basis, as if it concerned projects. As a result the sense of continuity, 'steady state', is lacking. Therefore several improvements were proposed regarding proper definition of the collections and definition of the procedures. Once these would be established, the cost required to run the genebank in a 'steady state' would become more clear and appropriate funding could become possible and justifiable, as it concerns a governmental responsibility, based on national and international commitments, deserving public funding.

Recommendation 1

Formalize procedures, formulate Standard Operating Procedures (SOP), and work toward a proper quality management system (such as ISO 9001, the CGIAR Genebank Quality Management System, or an alternative).

Recommendation 2

Define what material is part of the active and what material is part of the base collection (and thus what material should be excluded from the physical storage and the management under SOP), and assure that SOP's are formulated for both categories.

These SOP's need to be applied to all the material in the relevant categories (base and active collections). The conservation of, and access to material in these collections should be guaranteed, i.e., completely safety duplicated, properly viability monitored, sufficient material available, etc., and comply to international standards. Other material stored in the genebank such as breeding lines, wild material not defined as crop wild relatives or others could be removed or maintained as additional collections, outside the main objective and SPO's of the genebank.

Recommendation 3

Highlight to the relevant authorities the importance of permanent funding for the operations covered by the quality management system on the basis of the assurance that the material covered by the system will be available to current and future generations PGR users.

Germplasm Management

The current procedures for the management of the germplasm are working fairly well, CRF has a good overview of the material, seed amounts and viability and most material can be made available on requests.

CRF acts as a base collection, and thus safety backup of the other active genebanks in Spain, however did not safety backup its own active collection (both collection are placed in the same building, in cold chambers that are next to each other so can not be considered safety backups of each other). Now, very slowly, material is backed up in Svalbard.

Recommendation 4

Speed up the safety backing up of the active collection, for example by routinely putting aside a sample every time a jar of seeds from the active collection is opened.

The material of the active collection is currently stored at -4C, which is not optimal as was confirmed by an analysis of CRF's own viability data. Genebank standard for this type of long term storage is -18C. The planned new storage facilities, initially intended for the base collection only, will comply to this standard. The active collection should however, possibly with more urgency, also be stored at –18C to avoid loss of viability and as a result huge costs of regeneration and the unavoidable loss of genetic diversity due to contamination, genetic drift and shift.

Recommendation 5

Store the active collection at -18C. The current -4C is not cold enough to prevent premature loss of viability, especially in some species.

Connected to this recommendation, although there is a generator in case of problems of power supply, the observation that there is no backup compressors in case of failure of the cooling systems in the current storage rooms was very disconcerting. Luckily the building of new facilities, that will be much more secure, has started.

Recommendation 6

Assure that the building activities of the new storage facilities proceed since these new facilities are urgently needed to assure the conservation of the CRF collections.

The management of the logistics of the seed storage will improve considerably with the move to the new facilities. Introduction of QR-codes (or bar-coding) to reduce mistakes in the location and distribution of seeds is important and planned. The use of RFID codes (in addition to the QR codes) is new for the international genebank community and could have a large innovative impact on the entire community.

Germination Testing

The germination testing is in good hands. Facilities (incl. an X-ray machine) look good and the expertise seems up to par. Annually about 5000 tests are done, using protocols based on the ISTA protocols.

Apart from the percentage germination, also other statistics are recorded (such as number of abnormal plants), however this information is only incidentally used where it could improve the quality regarding the decisions about the need of regeneration. Furthermore, the reviewers got the impression that the prioritization of germination tests could be improved, for example by introducing the concept of seed lot (seeds resulting from one regeneration – germination results relate to such a seed lot and not the accession).

Recommendation 7

Reconsider the storage and processing of the information resulting from the germination tests to improve the prioritization of future germination testing and, more importantly, regeneration of accessions loosing viability.

Regeneration

The CRF capacity for regeneration is quite limited; although the expertise regarding regeneration is present in the organization, facilities are basic and the location for regeneration is prone to difficulties caused by pests, rodents, birds, drought and other factors. Furthermore the number of staff is insufficient (due to difficulties in finding and keeping new staff members) to reach the numbers of regenerations required in the 'steady state'.

Recommendation 8

Possibilities to outsource regenerations, as much as necessary, to other PGR actors should be explored and used. These actors could be colleague genebanks in the Spanish PGR Network, but could also be breeders or farmers provided that the minimum quality levels for the regenerations are maintained.

Documentation

The documentation system in use by CRF is effective but rather basic. For example, the storage of phenotypic data makes an effective analysis of these data difficult and makes the addition of small datasets of deviating descriptors difficult.

Recommendation 9

Given the importance of information to management of a genebank, active further improvement of the documentation system should be high on the agenda, possibly resulting in a migration to another system (e.g. GRIN-Global) in due time.

Phytosanitary issues

The reviewers had the impression that the CRF staff has a blind spot for the increasing stringent phytosanitary rules in the EU. Although the crops in the active collections might not cause difficulties, the crops in the base collection do. CRF might also play a role in channeling relevant information to the members of the Spanish genebank network.

Recommendation 10

To avoid potential problems regarding EU phytosanitary issues, assure that contact with the Spanish national plant protection organization (NPPO) is established and a mechanism is created that allows the proper flow of information regarding the crops of the CRF collections.

Spanish PGR Network

The Spanish PGR network consists of 35 genebanks, CRF has a coordinating responsibility and maintains the base collection. However, the responsibilities of the genebanks in this network are not clearly defined, and as result the role CRF as coordinator in this network is not clear either. E.g., if CRF is to monitor the viability of the base-collection, what should it do if this viability drops below the pre-defined threshold?

Recommendation 11

Based on respect for the relative autonomy of the genebanks in the Spanish PGR network, clear agreements should be made regarding the role and responsibilities of these genebanks allowing the network to become an effective instrument in the conservation and sustainable use of PGR.

Final conclusion

The CRF is a strong organization and good genebank, with well educated and dedicated staff. It only needs to take a few steps for becoming a first class genebank, ready for European certification, once this is introduced.

Final remarks

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

July 19th, 2022

The reviewers: Theo van Hintum, Katya Uzundzhalieva and Gergana Desheva