



Report of the Peer Review of the IHAR-PIB Genebank

(April 16th and 17th 2019, Radzików, Poland)

Introduction

To assure sufficient food supply to the growing world's population, Plant Genetic Resources (PGR) need to be conserved and made available to crop research, plant breeding and farmers, now and in the future. The UN Sustainable Development Goal (SDG) 2.5 recognises this in calling for the maintenance of genetic diversity.

But the task of conserving and providing access to PGR is huge, and no single genebank or country can do it alone. Instead, it is a Global Effort in which different actors have to contribute. Many research institutions related to plant breeding started genebanks, and most countries have a national genebank or network of genebanks often in connection with national breeding programmes. To be considered part of the Global Effort a genebank should have adopted two principles: 1 – the material should be properly conserved and 2 – the material should be accessible.

Within Europe, genebanks are supported to implement these principles by the European Cooperative Programme for Plant Genetic Resources (ECPGR) and more specifically its initiative AEGIS, that tries to create a network of collections and facilities that together optimally conserves PGR in Europe and make it available to users. To streamline the conservation activities in Europe over different domains (plant, animal and forest) ECPGR cooperates in the EU GenRes Bridge project, that also looks for ways to support GR conservation, either by policies or protocols.

In the framework of ECPGR/AEGIS, and with the support of Genres Bridge, a system of peer review has been set up aiming at improving the quality of European genebanks by simply having the experts of these genebanks visit each other in their genebanks, giving full transparency about the facilities and protocols, and having discussions about these.

A pilot of these Genebank Peer Reviews is being organised in the first half of 2019, involving the genebanks of COMAV (Valencia, Spain), IHAR (Radzikow, Poland) and WUR-CGN (Wageningen), focussing on the seed collections.

The third review was held from 16th to 17th April in Radzików, Poland.

Organisation

The review was organised by Wieslaw Podyma, manager of the Genebank of IHAR-PIB, Radzików, Poland, who arranged accommodation, meeting rooms, local transportation and everything else to allow a soft running of the review process. He provided previously to the meeting the AEGIS Genebank Manual, based on the template approved by the AEGIS Steering Committee.

The reviewers, Theo van Hintum (CGN genebank, Wageningen, The Netherlands) and María José Díez and José Vicente Valcárcel (respectively the director and curator of the COMAV genebank) arrived on April 15th and the review took place on Tuesday 16th and Wednesday 17th. The visit consisted of several presentations made by members of the staff, who participated in all sessions of the review process. The first presentation was made by Wieslaw Podyma, the manager of the genebank, followed by the one of Grzegorz Gryziak, head of storage, Denise Fu Dostatny, head of collecting expeditions of Crop Wild Relatives, and Marcin Zaczynski head of documentation.

Magdalena Malecka, documentation assistant, and the assistant Sylwia Włodarczyk attended all sessions of the peer review meeting. The reviewers visited the genebank facilities, and talked to the genebank staff members. At the end of Wednesday morning the reviewers prepared a draft report that was presented and discussed in the afternoon with the manager of the genebank (Wiesław Podyma) and the heads of storage, collecting expeditions and documentation and the documentation assistant.

Observations, conclusions and recommendations

Main impression

The genebank of Radzików is the most important facility on Plant Genetic Resources in Poland, holding a large collection of valuable material, often collected long ago. It has a dedicated and well trained staff and good facilities to conserve the valuable collection as seed, *in vitro* and cryo-conservation modalities.

However, there are several aspects that could be improved. In terms of conservation, the collection is conserved at 4°C and only a small part at -18°C. There are no safety duplicates and the control of the relative humidity is not monitored inside jars. Curators belong to different institutions, and the genebank must rely on them regarding regeneration protocols and descriptors used for characterization. Approximately half of the collection can not be released with the Standard Material Transfer Agreement, blocking use of the germplasm.

Organisation

The genebank of Radzików is part of the Plant Breeding and Acclimatization Institute (IHAR), which has become a National Research Institute (PIB) in 2010. The IHAR-PIB is subordinate to the Ministry of Agriculture and Rural Development and is one of the branch Institutes that, together with the Universities and the Polish Academy of Science, constitute the base of the Structure of Research in Poland. The genebank of Radzików collaborates with several genebanks and institutions for regeneration and characterization activities, and holds seeds in long-term storage. Seeds are delivered from Radzików, and Institute of Horticulture at Skierniewice and other institutions, which hold the vegetable collection, deliver vegetatively propagated accessions. Curators belong to different institutions (breeding companies, researchers, etc.) and coordinate the activities of regeneration and characterization of the different crops. Radzików maintains a seed collection of about 75000 accessions; the potato collection is maintained *in vitro* and is partly cryopreserved. This peer review will focus on the seed collections only.

The genebank operates under multiyear programmes, the current one is the 2015-2020 Programme: 'Creation of scientific basis for improvement and conservation of Plant Genetic Resources'. Main part of the funding of the genebank is obtained from this programme, however at the time of the review the funding for year 2019 was uncertain, showing the vulnerability of the genebank.

The staff of the genebank consists of 39 members, 32 of them working at the premises of Radzików.

Recommendation 1: Current financial crisis indicates the vulnerability of the genebank. Core activities for keeping the collection available should be defined and prioritised, avoiding loss of conserved material when accommodating to financial fluctuations.

Recommendation 2: The dependence on curators that belong to other organization is not desirable, however in this situation clear Standard Operation Procedures (SOPs) for curators should be defined and used, and the links to the curators should be strengthened.

Legal basis

Conservation of genetic resources in Poland started in 1979 with the Inter-ministerial agreement on the protection of genetic resources. In 1981 Poland accessed to the European Cooperative Program for the Conservation of Genetic Resources. In 2001 signed the International Treaty on Plant Genetic Resources for Food and Agriculture and in 2010 joined the Nagoya Protocol on Access and Benefit Sharing (the ABS Protocol). From 2004 to 2020, there have been multiyear programs, which constitute the main source of funds of the genebank. The last one "Creation of scientific basis for biological improvement and conservation of plant genetic resources as source of innovation and support of sustainable agriculture and national food security" runs from 2015 to 2020. Major partners are: IHAR-PIB Radzików and InHort Skierniewice.

Recommendation 3: The legal basis of the genebank is formulated in a formal agreement from 1979. In the light of assuring continuity, the possibility of renewing this legal basis should be considered.

Facilities and maintenance of the collection

The Radzików genebank has good seed storage facilities with five cooling chambers for the conservation of the active collections and three freezing chambers for the base collection. In total, the capacity is about 750 m³. Security measures are sufficient to ensure proper conservation of the collection. A barcode system is used allowing identification and localization of every single accession stored in the genebank.

Only a 5% of the conserved material is in the long-term storage. There is no safety-backup of the material. The relative humidity in jars and the current germination are largely unknown. Protocols used for germination test only allow to know if the seeds are alive, not the hypothetical abnormal development of seedlings.

Recommendation 4: Long term conservation should be increased rapidly. Even if the current germination is not known, the material should be packed and moved to the -18°C storage rooms.

Recommendation 5: Reconsider the storage protocols, i.e., switching to silica gel as drying agent would allow a permanent knowledge of the relative humidity of the samples, and other viability testing methods such as proper germination testing might show aging of the seeds that is not observable with the current methods

Collection management

The current capacity for regeneration is for c. 700 accessions per year. Given the current collection of c. 75000 accessions, this would allow one regeneration every 107 years, and that is obviously not sufficient to keep the collection alive and available.

The descriptors used for characterization have been developed by the genebank itself, and do not include the Minimum Descriptors Lists developed by the ECPGR Working Groups, which allow harmonization and comparison of data among genebanks.

The genebank has good molecular laboratories facilities and a relatively large well educated staff. This provides the possibility to do all kinds of genebank molecular related studies. However, this capacity should be used more specifically for genebank management needs. It does not make sense to use the molecular laboratory for pre-breeding activities (unless funded by other programmes). Bioinformatics capacity is limited, preventing a complete and deep analysis of the generated data.

Recommendation 6: Consider adjusting the regeneration capacity to a level that can sustain the collection in the long term.

Recommendation 7: Consider including the minimal ECPGR descriptors in the content of the descriptor-lists used for characterisation of accessions.

Recommendation 8: Actively search for collaborative molecular projects with other genebanks focused on seed management needs.

Recommendation 9: Given the need for bioinformatics capacity, staff should be trained or collaboration with other groups should be set up. Consider, on the long run, moving from generating data to analysing data.

The staff is knowledgeable and experienced, but since there are no written protocols available, the vulnerability is high. Furthermore, having written protocols has several other advantages in terms of quality and stability.

Recommendation 10: Consider creating written protocols for the genebank procedures (Standard Operating Procedures) to improve quality and stability.

Seed distribution

On average 1500 accessions are sent to 40 requestors annually, with large variation over years. This is a rather low utilization of the genebank given its size (75000 accessions). Germplasm is distributed to scientist, breeders, educational institutions, genebanks, botanical gardens and private individuals (mainly small farmers or hobbyists). About half of the samples go to private individuals and about 80% stay in Poland. Only half of the collection is available through the Standard Material Transfer Agreement, this means that the other half is not used at all. The genebank regenerates materials to provide high quantity of seeds to farmers.

Recommendation 11: Only half of the material is available under SMTA, this should be improved with high priority.

Recommendation 12: Consider the possibility of introducing handling fees to reduce the requests hobby growers (ref. IPK) as the genebank seeds are too expensive to distribute to that category.

Documentation

There is a state-of-the-art on-line querying and ordering system, but the main system EGISET seems to be difficult to manage with the available capacity (IT staff, hardware). The completeness of data should be improved, e.g., characterization data of the vegetable collection held in Skiernewice is not available from the EGISET system and the percentage of filling of some passport descriptors can be improved.

Recommendation 13: Try adding as much information to the documentation system as possible, for example the characterization data on vegetables

Recommendation 14: The link between the documentation system and the seed conservation activity seems weak or absent. Consider ways of improving this situation benefitting the seed conservation unit.

Recommendation 15: Consider presenting the accession numbers following the recommendations made by Painting et al. (1995)¹, which indicates that a numeric system sequential in operation should be preceded by a genebank acronym, being usually made of three letters.

Final conclusion

The Radzików genebank is an important facility holding the largest germplasm collection in Poland and one of the largest of Europe. The staff is composed of committed and well trained members. The operation can be improved in several aspects, mainly the conservation in freezing chambers, the implementation of safety duplicates, a stronger contact with curators and the availability of all materials under the SMTA.

Final remarks

The commitment and transparency of the genebank staff participating in the peer review process were complete and acknowledged by the reviewers. Every person was open and explained everything with detail and clarity. The reviewers were positively impressed by the whole visit, the general hospitality and the positive atmosphere during the stay in Radzików.

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¹ Painting, K.A., M.C. Perry, R.A. Denning and W.G. Ayad. 1995. Guidebook for genetic resources documentation. International Plant Genetic Resources Institute, Rome.