New-AEGIS Genebank Peer Review

Genebank reviewed:	Latvian Gene Bank (LGB), Genetic Resource Centre, Latvian State Forest Research Institute ”Silava”, Salaspils, Latvia.
Date:	8-9.04.2025
Participants LGB:	Agnese Gailīte (Genetic Resource Centre); Dainis Ruņģis (Genetic Resource Centre)
Reviewers:	Erik Wijnker (Centre for Genetic Resources, the Netherlands (CGN, Wageningen, Netherlands); Ana Maria Barata (Banco Português de Germoplasma Vegetal (BPGV), Braga, Portugal).

BACKGROUND

The "Reinforcement of the AEGIS Quality System and EURISCO Data Coverage" (New AEGIS) project aims to enhance the European Genebank Integrated System (AEGIS) and improve the accessibility of plant genetic resource (PGR) data through the EURISCO database. This initiative aligns with the priorities of the European Cooperative Programme for Plant Genetic Resources (ECPGR), focusing on the sustainable conservation of unique European germplasm and the efficient sharing of related data. As part of the AEGIS quality system (AQUAS), peer reviews are conducted to ensure transparency, promote mutual support, and provide valuable feedback on genebank practices. These reviews foster continuous improvement, ensuring that genebanks uphold high operational standards and contribute to a robust, accessible European Collection. Reciprocal peer reviews are carried out by groups of three genebanks, and this report is the result of a review conducted by a group including the Latvian Genetic Resource Centre, the Centre for Genetic Resources in the Netherlands, and the Banco Português de Germoplasma Vegetal in Braga, Portugal.

VISIT ORGANISATION

The third visit in this peer review cycle was organized by the Genetic Resource Centre (GRC), which is part of the Latvian State Forest Research Institute “Silava” located in Salaspils, just outside Riga. The GRC is responsible for coordinating all Latvian genetic resource activities (including crops and fruit species, vegetables, aromatic and medicinal plants, forestry, animal and fish genetic resources. The GRC -onsite- comprises the Latvian gene bank (LGB, for plant genetic resources), the central database and a laboratory for genetic/genomic analyses. The LGB holds is responsible for conserving plant genetic resources of Latvian origin, ranging from land races, (heritage-) varieties to breeding lines and crop wild relatives. Work on PGR conservation started shortly after Latvia regained its independence in 1990. This led to the placement of PGRs in a genebank collection in 1999, which were transferred in 2006 to the GRC at Silava, and as such placed under the responsibility of the Ministry of Agriculture. The LGB currently holds approximately 1878 accessions (EURISCO), of which the major crops comprise cereals (47%); forages (32%); oil and fiber crops (flax and hemp, 7%); legumes (7%) and sugar beet (5%).

The current director, Dainis Ruņģis, provided an Operational Genebank Manual (OPG) based on the AEGIS template, which served as a helpful starting point. Reviewers arranged their own travel to a hotel in Riga, after which Dainis Ruņģis provided transport to and from the Institute.

The visit was structured around the five main elements of the Genebank manual (OPG), by which details were provided through the hosts using PowerPoint slides that provided background and structure for explanations and questions. During the sessions there was ample opportunity for the reviewers to ask questions and discuss Genebank operations. The review began on Tuesday morning with an introduction by Dainis Ruņģis, explaining the history, organizational structure and funding basis of the Genebank (topic 0; OPG), followed by discussions on topics 1 (Acquisitioning and Accessioning) and 2 (Security). After lunch Agnese Gailīte presented the main elements of topic 3 (germplasm management), after which a tour allowed the reviewers to inspect the seed storage, seed processing lab, the drying chamber and the Genomics laboratories). The reviewers compared notes and observations in the late afternoon of the first day. The second day started with remaining questions about topics discussed on day one, followed by a presentation/discussion of the LGBs documentation system (GeNBIS) that is based on the GRIN-Global documentation system) by Dainis Ruņģis (OGM topic 4). Following a brief visit to the Silava *in-vitro* lab and lunch, reviewers completed their preliminary observations, and presented their observations and recommendations to the LGB staff. The day was concluded with an animated discussion on the lessons learned from the conducted reviews, and challenges ahead for European genebanks.

REVIEW

The LGB has a clearly defined mandate to conserve PGRs of Latvian origin. Its collection is relatively small, but its regional, historical collections is of significant interest in capturing natural variation that is not available elsewhere. Counting two employees the LGB staff is notably small, but knowledgeable, well qualified and enthusiastic.

Organization, management and funding

The embedding of the Genetic Resource Centre in Silava has led to a stable integration in the forest research institute since 2006. The Genetic Resource Centre collaborates -among others- in genomic research on diseases in forest tree species, monitoring of large carnivores and other non-model species.

In the functioning of the LGB, the Genetic Resource Council, which consists of different stakeholders plays an important role. This is an advisory body that approves and supports major management decisions within the genebank like budgeting, the conditions for PGR distribution, and the admission of new material to the Genebank collection.

The genebank does not perform all Genebank operations at their facilities, but rather functions as an “integration hub” in which the conservation and management of PGRs is coordinated LGB staff, with significant, essential support from collaborating institutes. The LGB is responsible for coordination, conservation, curation, viability monitoring / regeneration decision, documentation and handling requests. The tasks of regeneration, characterization, evaluation, acquisition and collection of new material lie with different crop-experts at partner institutes, which also hold essential expertise on assessing the (added) value of accessions to the LGB collection.

While institutionally stable, (i.e. the LGB has been integrated in Silava since 2006), funding of the LGB has remained tight since the financial crisis in 2009 led to a halving of the budget, with a 30% increase only in 2023. Funding is just sufficient for current operations, and relies on in-kind contributions of partner organizations. The tight funding and organization structure result in a small staff (of two), in whom all genebank expertise is concentrated. This is a potential vulnerability for Genebank operations.

- **Recommendation 1 –** Consider expanding staff. The concentration of essential knowledge in just two staff members is a vulnerability for the continuity in Genebank operations.

The genetic resource collection

The Latvian collection LGB currently holds approximately 1878 accessions (EURISCO) of which the major crops comprise cereals (47%); forages (32%); Oil and fiber crops (Flax and hemp (7%); Legumes (7%) and sugar beet (5%). The Building security is in order, with conservation conditions of high standard. Material is stored at -20 °C in laminated aluminum bags. While on-site conditions are favorable, safety duplication is of high importance. It was noted that safety duplicates exist for some accessions at NordGen and SGSV, but this covers less than 12 % of the actual LGB collection.

- **Recommendation 2 –** Back-up the entire collection to NordGen / Svalbard a.s.a.p.

The current collection is divided in “priority groups”, which prescribe that safety-duplicates are only to be made for specific accessions (those accessions in “priority group 1”). This also prescribes that different amounts of seeds are to be kept for different accessions. This division in “important’ and “less-important” accessions serves an unclear purpose. More seeds does not necessarily imply better preservation. For some accessions, base sample sizes are currently large, and can likely be adjusted (decreased) without affecting conservation quality.

- **Recommendation 3 –** Have a uniform (best practice) policy for conservation. This can be done by creating a collection in which all accessions deemed worthy of preservation are preserved (and backed-up) under similar (i.e. good) conditions with adequate base sample sizes to ensure indefinite conservation. It may be considered to create an “archive” in which seed accessions of uncertain status are “parked”, without being part of the actual collection

Monitoring results suggest that seeds survive well under these conditions. The current prescribed time between monitoring intervals (the first monitoring test after 10 years, and then after 5-10 years depending on previous test results) is relatively short and could likely be lengthened without loss of accessions. Viability monitoring is done by testing viability of 200 seeds in two consecutive experiments (of 100 seeds per test). The standard of testing: the execution of two separate viability tests for each accession has an unclear base. Statistically, the final viability would be calculated as the percentage of viable seeds in the total of 200 seeds, and therefore the need for testing in two batches is unclear. Furthermore, it was indicated that the second test in practice never leads to different test-outcome.

- **Recommendation 4 –** Rationalize the viability testing procedure. Viability monitoring intervals may be lengthened without a loss of certainty that accessions are safe. It is also recommended to change monitoring to a single-test procedure (with a possible second test in case of uncertainty on the viability status of the seed batch).

Currently, most viability tests are initial viability tests on newly regenerated/acquired material. The seeds are not frozen prior to viability testing. Freezing seeds prior to viability testing would better mimic the viability of the accession.

- **Recommendation 5 –** Freeze seeds prior to initial viability testing.

Many of the above described genebank processes have been described in working protocols, but they are in need of revision and need updating.

- **Recommendation 6 –** Update the Genebank working protocols.

A genebank that sustainably preserves its collection should seek to achieve a "steady state", in which viability monitoring- and regeneration capacity match collection size. Regeneration of seed batches because of deteriorating seed samples is not currently an issue at the LGB, because not enough time has passed for seeds to actually deteriorate. This suggests that the future workload of the LGB may increase when regeneration because of a loss of viability becomes standard practice at the LGB.

Currently, between 60-80 viability monitoring tests are performed each year. With a current collection size of 1878 and a current testing frequency of once every 5-10 years, one would expect a minimum of about 180 viability tests per year. Even though viability tests will occur in batches, current testing frequency suggests a backlog in testing.

Achieving this steady state under a uniform (best practice) policy for conservation can best be achieved when working cost-efficiently. Several of the above indicated recommendations will allow a reduction in workload (i.e. adjusting base sample size, lengthening testing intervals, etc.).

Because the LGB stores its seeds in laminated aluminum bags, demand for regeneration because of deteriorating seed samples is low. Nevertheless, the need for regeneration may increase in the future.

The team dedicates most effort to maintaining the collection in good conditions, ensuring that all accessions are of high quality and available. Only few accessions currently await regeneration. Nevertheless, there are about 350 accessions that are currently not available. For these there are either no immediate distribution plans, of the accessions await a curation decision (for which a curator is currently not available).

- **Recommendation 1 (repeated) –** Even though there are possibilities for increasing efficiency, the backlog in testing, generation of a back-up and the revision of monitoring protocols and rationalizing the collection all suggest that extra hands are welcome.

- **Recommendation 7 –** If possible, it should be considered to formalize outsourced genebank operations, such that a budget is allocated for curation, regeneration and C&E.

- **Recommendation 8 –** Aim to reach a steady state.

- **Recommendation 9 –** Record historical and initial accession sizes in GeNBIS.

Documentation and information

The LGB staff uses GeNBIS, the documentation system of Nordic and Baltic countries with the support of Nordgen. Since the LBG joined GeNBIS, the distribution of accessions rose significantly to ~10% of the total collection. It is based on the GRIN-global user interface. GeNBIS currently lists of vegetatively propagated potato species, are maintained by a partner institute, and do not fall under LGB responsibility. It seems logical that the partner institute should be added as a partner in GeNBIS, so they can take curate this collection and take care of handling their own requests.

It was noted that there are historical errors in the GeNBIS database that require adjusting (data quality) and available phenotype data need to be uploaded into the database. Management reports (e.g. summary lists of genebank metrics) cannot currently be drawn from the database. Such reports could potentially be very helpful in creating standardized and up-to date overviews on the collection status and -for example- insight into the expected future requirements for viability monitoring tests.

- **Recommendation 10 –** Consider to add the Institutions that currently manage vegetatively propagated species as partners in GeNBIS.

- **Recommendation 11 –** Consider making phenotype data available through GeNBIS.

- **Recommendation 12 –** Consider automatically generating management reports automatically from GeNBIS.

CONCLUSION

The LGB is run by dedicated, enthusiastic staff and seems well integrated in the Latvian State Forest Research Institute "Silava". Equipment us up-to date, and the collection is kept under very good conditions. It is nevertheless strongly advised to send material elsewhere to maximize the current collection being maximally safe.

The concentration of genebank expertise is in two genebank staff members poses a potential vulnerability for the continuity of the genebank. This concentration of knowledge is a result of tight funding. In addition, genebank functioning relies significantly on in-kind contributions of partner organizations, including crucial expertise for curation, regeneration and C&E. The tight funding (and resulting few staff members) means that a number of desired genebank operations are under continuous pressure or are being delayed (see recommendations above). Expanding genebank staff should be considered.

Nevertheless, the genebank may not be far from reaching a "steady state". However, the extra effort required to reach a steady state will be at a cost to other work. Efficiency may be increased by rationalizing the collection (i.e. accessions of uncertain status can be archived; lowering frequencies and sample sizes for viability tests). This will reduce the workload somewhat, and may contribute to reaching a steady state.

ACKNOWLEGEMENT

The reviewers would like to thank the LGB staff for their availability and their willingness to present the genebank's activities in a positive and open way. The reviewers experienced a welcoming environment and appreciated the warm hospitality.