



A European Genebank Integrated System

AEGIS PLUS GENE BANK PEER REVIEW

*Review of the Institute of Plant Genetic Resources (IPGR)
of the Agricultural University of Tirana (AUT), Tirana,
Albania*

Date: 20 -21 April 2026

Participants IPGR: Valbona Hobdari, Nertila Lila, Aridon Ramaj, Bledar Pepa, Hysen Kokiçi, Hajdar Kuçi, Flutur Terpo, Antoneta Brahushi, Ndoc Faslia.

Reviewers: Domenico De Paola (Institute of Biosciences and Bioresources, National Research Council of Italy (CNR-IBBR), Bari, Italy); Erik Wijnker (Centre for Genetic Resources, the Netherlands (CGN, Wageningen, Netherlands)



Federal Ministry
of Agriculture, Food
and Regional Identity

This peer review was carried out within the framework of the ECPGR AEGIS Plus project and received financial support from the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH)

AEGIS PLUS GENE BANK PEER REVIEW

Review of the Institute of Plant Genetic Resources (IPGR) of the Agricultural University of Tirana (AUT), Tirana, Albania

Background

The AEGIS PLUS project is coordinated by the European Cooperative Programme for Plant Genetic Resources (ECPGR) Secretariat and was funded by the German Federal Ministry for Agriculture, Food and Regional Identity to enhance the European Genebank Integrated System (AEGIS) and improve access to plant genetic resources (PGR). This initiative aligns with the priorities of 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. During the peer reviews, colleague genebank managers and experts visit each other to review genebank management – and operational procedures. By providing transparency on genebank procedures, and formulating feedback on these, participating genebanks can improve and this helps ensure 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 Institute of Plant Genetic Resources (IPGR), in Tirana, Albania, the Centre for Genetic Resources, the Netherlands (CGN) in Wageningen, Netherlands, and the Institute of Biosciences and Bioresources (CNR-IBBR) in Bari, Italy.

Review planning and execution

The IPGR Operational Genebank Manual (OGM) was published on the ECPGR AEGIS website in April 2025 (link: <https://www.ecpgr.org/aegis/aquas/genebank-manuals>). This served as a starting point for the review, which was guided by the AEGIS PLUS protocol for Peer Review of genebanks. Travel and accommodation suggestions were shared by the hosting genebank in advance of the review, as well as an agenda. Reviewers arranged their own travel to a hotel in Tirana, at walking distance from IPGR. At the start of the review, it was agreed to make a change to the agenda in which the inspection of the genebank facilities and experimental fields (initially planned for Monday and Tuesday) were reversed because of the weather forecast for Tuesday (rain). The review started at the genebank on Monday morning, 20th April, with an introduction by Valbona Hobdari and Nertila Lila, introducing the historical background, organizational structure and organization of operational procedures of IPGR using a PowerPoint presentation. This allowed the reviewers to address and review the “Organization, management and funding basis” of the genebank (topic 0 of the genebank manual). This presentation already allowed the group to discuss various other aspects of genebank operations like the back-up strategy (topic 2; security) and various aspects of germplasm management (topic 3). Around 11:00 all participants left to visit the experimental fields, which gave ample time to discuss regeneration practices, inspect the

collection of trees (~23% of genebank holdings), discuss maintenance of the tree collection, and get a good understanding of the daily work of the three researchers that accompanied us (and curate the collections of fruit trees, medicinal plants and vegetables). We returned to Tirana around 14:30 for a late lunch. The reviewers compared notes and observations in the late afternoon/early evening of the first day and identified topics for further discussion using the review checklist.

The second day started at 9:00, discussing several questions that the reviewers identified and raised after day one. This was followed at ~10:30 by an inspection of the laboratory, the freezers and cold room of the base collection (-18°C) and the room that holds the working, active collection (held at +5°C). The reviewers were accompanied by at least five IPGR genebank researchers throughout the discussions on both days and the final presentation, which underlines the engagement of staff during the review. A last round of discussions and questions followed from ~12:00 to 13:00. This last discussion included reviewing the IPGR documentation system on a computer (topic 4), after which the reviewers compiled their (preliminary) conclusions in a presentation, and presented these to the genebank staff (14:00-15:00). The visit to the genebank was concluded with a lunch at 16:00 with the ECPGR national coordinator, Prof. Ndoc Faslja.

Background details on IPGR

The first visit in this peer review cycle was organized by the Institute of Plant Genetic Resources (IPGR), a unit of the Albanian University of Tirana, in Tirana, Albania. The primary task of the IPGR is to promote the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA) in Albania. The genebank is relatively young and was established in 1998 and recognized as a scientific research institution of national importance in 2001 by law. In July 2006, governance of the genebank was passed from the Ministry of Agriculture and Rural Development to the Agricultural University of Tirana (AUT). In 2008, AUT established a Genetic Resources Centre, with the responsibility of managing the genebank. The genebank has remained within AUT since then. In 2015, the name of the governing institute (Genetic Resources Centre) was changed to the “Institute of Plant Genetic Resources” (IPGR).

The IPGR collections were largely derived from several of the Agricultural Technology Transfer Centres (ATTCs) that existed before 1998: research and breeding institutes under the administration of the Ministry of Agriculture that specialized in breeding activities of specific crop and tree species. IPGR currently maintains an *ex situ* seed collection of 4,121 accessions, and 749 accessions as a field collection. A further 365 accessions of trees, that are considered part of the national genebank holdings, are still being maintained at the site of origin by the ATTCs of Vlora & Korca. The *ex situ* national inventory represents 5,222 accessions, of 205 different plant species and 101 genera. Of all accessions conserved *ex situ*, 30% are cereals, 14% vegetables, 8% legumes, 11% medicinal plants, 5% fodder plants, 8% industrial plants and 23% fruit trees, olives and vines.

Review

Organization, management and funding

The genebank has a clear focus on the conservation of material of autochthonous Albanian origin, and has the aim to promote the conservation and sustainable use of PGRFA in Albania. The IPGR genebank is embedded in the agricultural University of Tirana (AUT), and is an institute that (albeit smaller) has a status that is comparable to the five other AUT faculties. The AUT director is responsible for the appointment of staff, but will typically be advised by members of IPGR. Expenses for accommodation, salaries, laboratories, genebank equipment, and maintenance of field collections are covered by AUT.

However, it was observed that not all expenses for genebank operations are covered by the university: a (very) small budget is available for activities like regeneration and collection missions. Because of this, the genebank staff decides (on a yearly basis) what extra activities can be performed. This year's additional budget was being used for regeneration material that had been collected during a recent collecting mission (largely funded by AUT). A recent regeneration project in which – within a few years – 1,900 accessions were regenerated and backed-up to the Svalbard Seed Vault) was funded externally by the Crop Trust. This project had a big, positive impact on the back-up status of the collection. In general, AUT support seems sufficient to enable research and maintenance of field collections. However, the dependence on external funding for regeneration (back-up) suggests that the genebank has difficulties performing basic and critical genebank tasks that are pivotal for ensuring lasting access to valuable PGR.

Because of the placement of IPGR within AUT, genebank staff are appointed as research staff and technicians, in which the career path is similar to that of university employees: MSc, PhD, researcher and (associate) professor. Staff are required to spend 30% of their time on teaching duties, but this may vary over time. It was observed that especially for younger staff, this percentage may be less. Teaching duties comprise lecturing and guidance of students during research activities. The genebank staff currently comprises eight full-time researchers, and two research technicians dedicated to work in the genebank laboratory. The genebank staff receive further support (~2 persons) to maintain the experimental fields and field collections, which is likely sufficient for maintenance of the collection.

The government is about to construct a new genebank building. The new location is adjacent to the experimental fields, and construction has just begun. The inclusion of IPGR in the new building suggests that AUT is committed to continuous support for the genebank.

Recommendation 1

Clearly define the need (and operational costs) for yearly regeneration costs, costs for backing-up, collecting missions, documentation and other core genebank activities and work towards stable funding and budgeting of these.

The genebank has a clear mandate to conserve autochthonous Albanian materials. The propagation of newly collected material was in progress during the review, and indicates that the genebank was able to acquire new materials. However, it was noted that no formal protocols exist for accessioning new materials, and the criteria for deciding which materials to include in the collection are not explicitly defined.

Recommendation 2

Develop and implement formal accessioning protocols, including explicit criteria for the inclusion of new materials in the collection. Considering recent activities, a long-term strategy for collection expansion is particularly important, as it would provide a framework consistent with the genebank's core mandate. This is especially relevant given the considerable international interest in these materials, as demonstrated by joint collection missions with foreign partner institutions: interest that underscores the unique and irreplaceable value of the Albanian germplasm held by the IPGR.

Security

The IPGR preserves the seeds of 4,121 accessions: all are held in the “base collection” that is stored at -18°C, either in laminated aluminium bags or in plastic ziplock bags. The base collection is on the first floor of a building. In addition to the base collection, an “active collection” is being maintained, that holds duplicates of ~900 accessions that are also present in the base collection. The active collection is held under less favourable conditions at 5°C, on the third floor of the same building. The building is situated in Tirana, with the highest risk for disaster posed by earthquakes, the occurrence of which is not negligible. The current building cannot withstand an earthquake exceeding 7 on the Richter scale. The observation that the collection will be moved to new facilities within the next one or two years, suggests that the safety of the collection will increase significantly in the short term.

On-site conditions (a cold room and standing freezers) are old but functional. Monitoring of freezing conditions is manual, with clear records being held of daily inspections. Safety duplication is of the highest importance for any PGR collection. Safety duplicates exist for 1,900 of the “most valuable” accessions (of which back-up material was duplicated to the Svalbard Seed Vault (as recently as 2022). It was observed that following the back-up of this most valuable material (46% of the collection), no further steps have been taken since to back up the remaining 2,200 accessions curated by the genebank.

Recommendation 3

Back-up the entire collection to Svalbard/a colleague genebank a.s.a.p. The formulation of a policy in which this is achieved in a stepwise manner is encouraged.

Recommendation 4

Implement a uniform (best practice) policy for conservation, by creating a collection in which all accessions deemed worthy of preservation are preserved (and backed up) under similar (i.e. best) conditions with adequate base sample sizes to ensure long-term conservation and availability.

Recommendation 5

If some accessions currently held by IPGR may not be in line with (newly formulated) accessioning guidelines (see **Recommendation 2**), it may be considered to create an “archive” in which seed accessions of uncertain status may be kept, without being part of the actual genebank collection.

Germplasm management – Viability

The IPGR genebank laboratory is well organized and clean, and staff are knowledgeable of best practices in seed handling. Formal viability testing protocols are in place, and the overall capacity for viability testing is considered sufficient to meet the current needs of the collection.

It was observed that the number of seeds used per viability test (4×50 seeds) is relatively high (with 4 replicates) and that the interval adopted for the first viability test of base collection material (10 years) is shorter than typically recommended for material stored under optimal long-term conditions. Both the active and base collection are being monitored for seed viability. While these testing strategies reflect a diligent approach by IPGR, too extensive testing may place an unnecessary burden on seed stocks, particularly for accessions for which (currently) little material is available.

Recommendation 6

Consider revising the intervals used for viability testing. The number of seeds tested could possibly be revised down (e.g. to 100 seeds) without losing much certainty about the viability of accessions. Optimizing these parameters would reduce unnecessary consumption of seed material and save time while ensuring that viability monitoring remains effective and proportionate to the collection.

Recommendation 7

Consider distributing from a base collection, without maintaining a working collection within the genebank. If a working collection is required to support AUT research activities, this working collection could – of course – be maintained as part of the research activities within AUT.

Germplasm management – Storage conditions

Storage conditions are fair within the IPGR genebank. Freezers are functional, and freezer space is sufficient to accommodate the current collection. The building is old but the planned relocation to a new facility in the near future is expected to significantly improve the storage conditions.

Genebank protocols specify target seed numbers of 2,500–3,000 seeds per accession, in which regeneration is triggered when stocks fall below 1,000 seeds. However, storage conditions are not uniform across the collection: some accessions are stored in laminated aluminium bags under vacuum, while others are kept in plastic bags, in both the base and working collections.

It was observed that old seed stocks are retained after regeneration without a clear policy for their management or disposal. No explicit minimum seed number thresholds appear to be defined for different categories of material.

The observation that – at least a part of the collection – was designated as “most valuable” indicated that collection, as is, comprises at least some material of which the perceived value is “less”.

Recommendation 8

Rationalize seed numbers across the collection, ensuring consistency between the quantities allocated for conservation, viability testing and distribution.

Recommendation 9

Uniform storage conditions should be achieved by transitioning the entire collection to hermetically sealed, laminated aluminium bags, in line with best practice for long-term seed conservation.

Recommendation 10

A clear policy for the management of old seed stocks following regeneration should also be established.

Germplasm management – Regeneration

Regeneration protocols are present that are based on guidelines and recommendations by ECPGR Working Groups.

Recently, a large-scale regeneration effort was undertaken in which 1,900 accessions were processed and backed up to the Svalbard Seed Vault. This demonstrates that the operational capacity for regeneration is in place, but as indicated above, support for regeneration is limited under basic funding.

It was noted that material from the base collection is not readily available for distribution. Availability is assessed on a case-by-case basis, and it was indicated that material may be made available under the condition that the user regenerates requested accessions in exchange for use. These are severe access restrictions that could be alleviated through regeneration.

Recommendation 11

Regeneration of accessions in the base collection (that are not currently freely available) is desired to improve the accessibility status of the collection as a whole.

Germplasm management – Seed processing

The laboratory environment was well organized, and the overall workflow appeared structured and efficient. Staff were familiar with standard procedures, which were clearly displayed and easily accessible in the laboratory, indicating a well-established routine.

Germplasm management – Availability

The genebank maintains an active collection of approximately 900 accessions available for distribution. The base collection holds a total of 4,121 accessions (including samples of the active collections). Material from the base collection is potentially accessible upon request, but may require regeneration by the user in order to be distributed. This conditional availability (of 3,220 accessions) is not clearly communicated to users. The tree collection, comprising approximately 1,100 accessions, is primarily a research collection, from which material is not freely distributed. Access to these accessions is subject to considerable restrictions (i.e. typically only accessible through research collaborations), which severely limits usage by external users. IPGR holds eight AEGIS *Vitis* accessions which are available upon request. Crop wild relative material conserved *in situ* (as is listed on the IPGR website) is not available for distribution.

It was observed that distribution to external and international users is low, estimated at approximately 100 samples per year. It was reported that seed distribution is not impaired by export regulations posed by the EU.

IPGR recently implemented a new website, which makes it much easier for users to find and contact the IPGR genebank. The new genebank website does not yet provide clear information for users on request procedures, nor is it clear what portion of the collection is available for distribution, or under what conditions material is available.

Recommendation 12

As a priority, the genebank website should be updated to provide explicit information on access procedures and the availability status of the different collections. Improved communication (through the website) on the availability of material could increase usage.

Recommendation 13

The tree/field collections, which represent a valuable resource with considerable potential interest for both research and practical applications, would benefit by improving the current (restrictive) access conditions that are limited to research collaborations.

Recommendation 14

The seed collection, with its high proportion of local varieties and medicinal and aromatic plants, has strong potential to attract a wider user community. It is highly recommended to work towards the unconditional availability of all 4,120 accessions in the collection, rather than the 900 that are currently held in the active collection.

Documentation and information

IPGR maintains passport data for its collections and demonstrates a commendable level of engagement with the international documentation infrastructure, with EURISCO records being very well updated. However, the internal documentation system has profound limitations. Collection data are currently dispersed across multiple MS Excel files, which provide little overview of the current status of the collection.

Data backup relies on local computers and hard drives, a practice considered vulnerable and insufficient for the long-term security of the documentation. Characterization and evaluation (C&E) data are currently accessible for 698 accessions on EURISCO.

Recommendation 15

The data backup system should be improved as soon as possible to ensure long-term security of the collection documentation, adopting solutions that go beyond local storage.

Recommendation 16

Implement a database, and invest in capacity building for database management to streamline genebank operations. Genebank staff are aware of this urgent matter and are strongly encouraged to further pursue a transition from the current Excel-based system to a dedicated database. The adoption of GRIN-Global (an open-source database solution) should be considered, as this would simultaneously facilitate data sharing and promote germplasm usage. This implementation is an urgent and key step that could improve collection management and maintenance at all levels in the genebank.

Research vs genebank tasks

Current activities and priorities of IPGR include C&E for research purposes, reflecting the focus of a genebank located within Tirana University. These activities are important for a genebank and contribute to the valorization of the collections. However, from an AEGIS perspective in which genebanks can be evaluated as part of a decentralized European Collection, it was noted that core genebank tasks like conservation, documentation, sharing of C&E data and providing unconditional access to accessions can be significantly improved. The formulation of a set of objectives for the genebank – defining priorities for the coming years – appears to be the most impactful step IPGR could take to strengthen its long-term goals.

Recommendation 17

Formulate explicit, SMART development objectives for strengthening core genebank tasks, addressing the following priorities:

- 1) Completion of safety duplication of the entire collection to Svalbard or a partner genebank
- 2) Establishment of a dedicated documentation system and database
- 3) Improvement of user access to the various collections and improve communication on collection availability

- 4) Re-balance research activities and other genebank tasks, bringing stronger focus onto activities directed towards conservation and user access
- 5) Development and formalization of operational protocols (accessioning)
- 6) Definition of a long-term strategy for collection expansion (mainly within Albania).

Conclusion

The IPGR collections are of national and international interest, as these represent local varieties that are not otherwise represented in international collections. The international interest in these materials, as demonstrated by joint collection missions with foreign partner institutions, confirms their unique and irreplaceable value.

Current facilities are old, but this is likely to change in the near future when the genebank moves to a new university building, adjacent to the experimental fields. There is sufficient staff to maintain the collections, and capacity for regeneration – and viability testing seems sufficient to maintain current holdings. FAO protocols are followed (e.g. during viability testing and regeneration) indicating that procedures are in place to ensure proper processing of materials at the genebank.

The recent completion of a large-scale effort resulted in the backup of 1,900 accessions to the Svalbard Seed Vault. Together with the consistent updating of EURISCO records, the recent development of a new institute website are all commendable achievements that demonstrate the operational capacity and international engagement of the genebank. The lively discussions with the IPGR staff suggest the genebank is in the hands of engaged, knowledgeable and highly dedicated staff.

The embedding of IPGR within the university, with research staff appointed, results in a strong focus on research and lower prioritization of conservation and distribution in the genebank. Shifting focus towards conservation and distribution (and separating these core genebank tasks from research activities) is where IPGR can likely make quick and significant improvements in its genebank operations. But this is also where IPGR is in need of additional support: to increase seed stocks of base collections (regenerations); back-ups to Svalbard; collection missions and support to set up a documentation system.

This review was aimed at strengthening the international position of IPGR, and improve the (lasting) availability of the valuable accessions in its care. Our review suggests that IPGR is, given its staff, current operations, institutional support and holdings, very well positioned to improve its international position. Strengthening the core genebank tasks will significantly improve IPGR's contribution to the European effort to conserve and provide access to PGR.

Acknowledgement

The reviewers would like to thank the IPGR staff for the warm reception, the lively discussions and the opportunities to discuss genebank operations in all openness.