



AGENT Project – Genebank Review

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Participants AGROSCOPE: Beate Schierscher-Viret, Boulos Chalhoub

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Background

Within the AGENT 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 fourth cycle the genebanks of CREA-CI (Italy), WBF Agroscope (Switzerland) and IHAR (Poland) are involved.

Visit/Organization

The second genebank visit scheduled for the fourth cycle peer review took place in Changins at the Swiss National genebank, Agroscope. Beate Schierscher-Viret, Agroscope genebank manager, introduced us the staff and let us visit all the facilities and laboratories, the greenhouses and part of the field trials.

She presented the structure of Agroscope, and provided us with the Genebank Manual.

Organisation, Management and Funding

The conservation of genetic resources in Switzerland began in 1900, when researchers at the Federal Research Station in Mont Calme, Lausanne, collected local varieties of wheat and barley. From these populations, they selected the most productive plants. These varieties are still preserved in the genebank and remain accessible today.

Since January 1st, 2017, Agroscope has been structured into three Competence Divisions, Research, Technology, and Knowledge Exchange, along with seven Strategic Research Divisions and a Resources Unit. The Competence Divisions focus on practical applications, working closely with farmers, businesses, and agricultural advisors. Meanwhile, the Research Divisions maintain strong connections with universities, research institutes, and the broader scientific community.

The genebank is part of the "Plant Breeding" Research Division, which is organized into several units. Specifically, it falls under the "Field Crop Breeding and Genetic Resources" unit, headed by Boulos Chalhoub, who participated to the discussion.

The Agroscope genebank is staffed by two permanent employees: one scientist and one technician, with the addition of one part-time technician on a temporary contract.

The genebank is primarily funded through the regular budget of the "Plant Breeding" Research Division. However, government funding does not fully cover the genebank needs, so additional support comes from external projects, such as the AGENT project. In addition, some NGO-oriented funding from the Federal Office of Agriculture provides for seed multiplication. The seeds are checked for quality and quantity before they are returned to the genebank.

Staffing is a challenge due to the limited number of permanent positions. Currently, no additional permanent position is available.

Recommendation 1

It would be good to have a defined budget for the genebank.

Germplasm Management

The Swiss National Genebank Agroscope conserves and provides access to a diverse collection of crop varieties. This includes 6,852 accessions of wheat, 2,284 of spelt, 1,461 of triticale, 866 of barley, 169 of durum wheat, 82 of emmer wheat, 38 of Poulard wheat, 17 of einkorn wheat, 20 of club wheat, 37 of *Aegilops*, and 53 from other *Triticum* species. Additionally, the collection holds 429 accessions of maize, 896 of vegetables, 317 of medicinal and aromatic plants, 54 of soybeans, 87 of buckwheat, 48 of poppy, 50 of faba beans, and several other industrial plants. In total, the genebank contains 14,031 accessions.

Each species is maintained in an active collection, stored at 4°C in paper bags, except for some vegetable species, which are stored in aluminum bags. Each bag features a label containing key details: species, accession number, accession name, and harvest year. The base collection, available for all species, is stored under vacuum in sealed aluminum bags at -18°C, with the same labeling format.

In addition, 90% of the collection has been duplicated and securely stored in the Svalbard Global Seed Vault.

Every year, around 1,100 accessions are regenerated, including about 1,000 cereal accessions. Germination tests are conducted on all accessions before storage to ensure quality, and the results are recorded in the genebank database.

Recommendation 2

We encourage to perform germination tests regularly on vegetable crops, every 5 years.

Recommendation 3

The regeneration and characterization of key crops, such as maize, industrial crops, and vegetables, cannot be treated as secondary tasks. These activities should be prioritized and supported with additional personnel to ensure their proper execution.

Recommendation 4

The increasing seed demand is causing an increase in costs: we recommend to plan additional funds to be able to reply to all demands.

Documentation

In Switzerland all data on conservation and evaluation of genetic resources are available on Internet. The database PGRFA-NIS (www.pgrel.admin.ch), maintained by the Federal Office of Agriculture, describes the plant genetic resources, which are preserved as a part of the national PGRFA gene bank of Switzerland. The following data is made publicly available: data produced by the projects financed by the Federal Office for Agriculture within the framework of the National Plan of Action of NPA-PGRFA, data from the genebank and the conservation collections of Agroscope, data concerning PGRFA, published from privates. The varieties of the PGRFA National genebank can primarily be ordered for their sustainable use for food and agriculture such as research, breeding, seed multiplication, etc. They are usually made available under the standardised material transfer agreement (SMTA) of the International Treaty, but the process to obtain accessions is not very clear. Moreover, the help page is not available in English.

The national genebank inventory is present in www.swissnationalgenebank.ch and allows to manage the quantity, the passport data and the characterization data related to each accession present in the genebank. The accessions request is not foreseen.

Passport data are published in EURISCO and their update is regularly carried out by the Federal Office of Agriculture.

Recommendation 5

We encourage to get DOIs for all the accessions.

Recommendation 6

We encourage to have the 'help page' in PGRFA-NIS (www.pgrel.admin.ch) available in English.

Recommendation 7

We encourage that all accessions from the genebank can be ordered in www.pgrel.admin.ch.

Recommendation 8

We encourage to strengthen and expand the documentation of the accessions, including the addition of photos and more passport data for all crop varieties.

Plant Health

In field trials, pesticides are only applied in response to disease or pest infestations. During the regeneration process, visual inspections of the plants and seeds are conducted to ensure their health and quality. In order to comply with international plant health standards, seed shipments outside the EU are accompanied by a phytosanitary certificate.

Final conclusion

The Agroscope genebank, with over a century of history, houses an extensive and unique collection of cereals, vegetables, industrial, and medicinal crops. These invaluable genetic resources are available to anyone upon request, governed by the Standard Material Transfer Agreement (SMTA). Modern conservation techniques enable the long-term preservation of a wide variety of species. For seed-propagated species, backup storage is maintained at the Svalbard Global Seed Vault in Norway, ensuring their safety and availability for future generations.

However, the genebank faces challenges due to insufficient funding, which has led to staffing shortages. Many historical records related to the collections, stored in the institute's archives, remain undigitized and have yet to be entered into the database.

To ensure the continued relevance and accessibility of the genebank, it is crucial to invest in the modernization of infrastructure and the digital documentation of accessions. Forward-looking strategies must be implemented to secure the future of this important genetic repository, both in terms of technology and data management.

Final remarks

In conclusion, all recommendations given here could be realized if adequate additional funds are provided.

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