



AGENT Project – Genebank Review

Place: CREA – Research Center for cereal and industrial crops, CREA-CI, Vercelli, Italy

Date: September 23 - 24, 2024

Participants CREA-CI: Patrizia Vaccino

Reviewers: Maia Boczkowska (IHAR), Beate Schierscher-Viret (WBF Agroscope)

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 first genebank visit scheduled for the fourth cycle peer review took place in Vercelli at the CREA-CI genebank. Patrizia Vaccino, the responsible of the CREA-CI Vercelli unit, which is part of the CREA (Council for Agricultural Research and Economics) introduced us the staff and let us visit all the facilities and laboratories, and the field trials with rice at maturity.

She presented the structure of CREA, with its twelve Research Centers, and provided us with the Genebank Manual.

Organization, Management and Funding

The Research Centre in Vercelli was founded in 1908 as “Stazione sperimentale di risicoltura” (“Rice Research Station”) and quickly became a center of excellence for rice research and breeding, being a pioneer in Italy in several fields, e.g., performing the first hybridization between two rice varieties (1925), and the first experiments of mutation through white light (1934). In 2015 it became part of CREA, a country-wide institution supervised by the Italian Ministry of Agriculture <https://www.crea.gov.it/en/about-crea>.

The organization foresees 12 research centers (6 related to specific supply chains and 6 dedicated to horizontal topics) which are forming a capillary network of structures throughout the country. In CREA there isn't a central collection, but several germplasm collections spread in the different units in which the 12 Research Centers are articulated. The Vercelli seat is a part of the Research Center for Cereal and Industrial Crops and holds a collection of rice and bread wheat. There are 5 permanent employees in the CREA-CI of Vercelli, including 1 scientist, 2 technicians and 2 administratives, plus 4 employees with a temporary contract (1 PhD, 1 researcher, 1 fellow, 1 field worker). The Director of CREA-CI is Nicola Pecchioni.

CREA-CI does not receive any money for the genebank but the funds from the RGV-FAO Program, by the Ministry of Agriculture, Food Sovereignty and Forestry (MASAF) are used to regenerate the materials and help to cover part of the maintenance costs of the plant. The Program lasts since 2004 and is constantly renewed. The costs for the collection maintenance are estimated yearly. Costs are specified and funds received from the Ministry upon reporting the activities. Funding from the government is low and insufficient to proper improvement and update all of the facilities in the genebank. Other funds are received from external projects, e.g. the AGENT project.

There are problems with staffing, both for money scarcity and lack of permanent positions; for permanent positions, agreement from Head Quarter of CREA in Rome is necessary. No permanent position is available at present.

Recommendation 1

Stable and long-term funding for conservation and evaluation of PGRFA as it is via RGV-FAO National Program would be the path for the improvement.

Germplasm Management

The genebank of CREA-CI in Vercelli conserves and makes available 4,938 bread wheat (*Triticum aestivum*) and 708 rice (*Oryza sativa*, *O. glaberrima* and *O. rufipogon*) accessions. Wheat is harvested by hand at 11-12% RH. After threshing, seed samples are stored in polypropylene jars (220 mL capacity), with screw cap. Each jar has a thermostable plastic label containing the following information: genus, species, ACCNAME, ACCENUMB, INSTCODE and a QR code linked to EURISCO. The jars are placed in stakable plastic boxes (each containing 50 jars in a single layer). Rice is harvested by hand at 16-18% RH and dried in a drying container to 11-12% RH. Then panicles are threshed, and seeds stored as described for wheat. Seed samples are stored at a temperature of +5°C, and 30 % RH. All the accessions got a DOI.

Until now only the active collection is realized. The creation of the base collection is at its very beginning: a vacuum machine and the aluminium bags were bought, and the sealed bags are being prepared.

Wheat: 450-500 accessions are regenerated every year. In this way, all the collection is regenerated every ten years. In this time span we never registered viability loss.

Rice: 150-300 accessions are regenerated every year. In this way, all the collection is regenerated every five years. In this time span we never registered viability loss.

Recommendation 2

Silica gel bags with humidity indicator should be added to each jar in order to keep and check the moisture content.

Recommendation 3

We recommend to keep a small amount of the previous regeneration cycles in the jar when replacing materials after regeneration.

Recommendation 4

We encourage urgently to continue creating the base collection and thinking about the safety duplicates. For the base collection, we suggest to put labels both inside and outside the bag, and to store a proper amount of seeds according to the following: at least double amount of seeds usually

used for one regeneration.

Recommendation 5

We encourage to test seed viability before packing base, active and safe duplicated collections, and to collect the data. It would help to register also abnormalities in seed germination (ISTA documentation) with respect to physiological abnormalities, infection/moulds.

Documentation

The documentation system is based on MS Excel. The registered data are: passport and characterization data. Passport data are published in EURISCO and are updated twice a year through the National Focal Point. All of the accessions have got the DOIs. For field data acquisition, a dedicated mobile application, Field Book (*Rife and Poland, Crop Sci 54:1624*), is used in parallel with paper sheets. We are planning to permanently decommission the paper sheets. Data base construction is in progress.

Recommendation 6

We encourage to create and use the database.

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.

Recommendation 7

We recommend to prepare SOPs for all the procedures related to the genebank.

Final conclusion

The CREA-CI genebank is a small but important facility holding a valuable and unique wheat and rice germplasm collection for Italy. It is crucial to invest in the plant security equipment, with regards to emergency equipment to ensure permanent electricity and cooling.

Shortage in funding results in difficulties in staffing.

Final remarks

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

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Maia Boczkowska, Beate Schierscher-Viret