Project: 'Improving the prerequisites for a European rye collection'

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Introduction

Since there is no ECPGR working group on rye, an *ad hoc* group was gathered within the framework of the ECPGR-funded project 'Improving the prerequisites for a European rye collection'. The project was aiming to strengthen the network among European countries focusing on rye diversity preservation for future use. The project group was working on a common European strategy on rye germplasm conservation sharing insights at different gene banks into the questions on rye maintenance, securing the genetic integrity of accessions during conservation and regeneration, characterization and intra-accession population dynamics in the context of defining Most Appropriate Accessions in rye. The overall objective was to support conservation of rye germplasm in the European context of AEGIS. The quality system of AEGIS (i.e. AQUAS), aims at ensuring that AEGIS accessions are properly maintained in their respective gene banks. It is a prerequisite for establishing AEGIS that AEGIS partners can trust each other in that they follow agreed-upon standards in their gene bank operations. The other element of the AEGIS quality system is an operational gene bank manual developed by each of the participating gene banks (associated members of AEGIS member countries) and they will be made available on the AEGIS website (http://aegis.cgiar.org/). The specific procedures (minimum and recommended standards) for crop species collection management are developed by ECPGR working groups. One of the specific tasks of this project was to develop and approve the maintenance standards for rye and its wild relatives preserved at European gene banks. Other specific tasks were updating and making available descriptor list for rye characterisation/evaluation, developing first list of Candidate European Accessions list of rye AEGIS accessions and updating the European Secale Data Base.

Materials and methods

Workshop

During the first phase of the project a workshop 'Improving the prerequisites for European rye collections' was organised in collaboration with Plant Breeding and Acclimatisation Institute IHAR in Poland. There were 16 experts from countries bordering Baltic See working with rye conservation and characterisation participating in this workshop. During the first day of workshop presentations were given on status of various rye collections and of the European *Secale* Data Base (ESDB), as well as descriptors used in *Secale* and results from studies demonstrating genetic changes of rye due the long term conservation and field regeneration practices. After the presentations the potential improvements in documentation and characterisation of *Secale* material were discussed. The second day of the workshop was dedicated to discuss the approach for identification of candidate European Accessions (CEA) within *Secale* germplasm in European *ex situ* collections. Workshop minutes were presented in the status report, whereas program, participant list, presentations and main conclusions from discussions are presented at the website http://www.ihar.edu.pl/gene_bank/improving_the_prerequisites_for_a_european_rye_collection.php

Survey and call for descriptor list

A questionnaire on current maintenance practices for rye accessions (https://docs.google.com/spreadsheet/viewform?formkey=dDRUcGZuaXZLb1F2bzhFX3hfVnpaVFE6MQ) and a call for descriptors currently used at gene banks was distributed to experts working on rye conservation. The results of survey and the information received were used for developing the standards for maintenance and the descriptor lists.

Task groups

During workshop, participants agreed to form two task groups to work on:

1) updating descriptors for rye;
2) develop specific maintenance standards;

The AEGIS candidate accessions were prepared by national/regional gene banks and sent to ESDB manager.

Results

The maintenance or rye accessions

A discussion on good maintenance practices for rye was carried out at the workshop. During this meeting a draft maintenance procedure was developed and it was agreed to send out a questionnaire to gain a better overview of current practices for rye accession maintenance in Europe. After the survey was conducted, the necessary modifications in the draft were made, and the document was sent out for the final comments to the project group, the comments were incorporated and procedures presented at the ECPGR European *Secale* Database webpage. It should be noted that deviations from suggested maintenance procedures may take place when dealing with specific research material and genetic stocks. The document on *Secale* sp. maintenance is presented in the *Appendix 1* of this report

Descriptors for rye

The descriptor lists project task group assessed the descriptors currently used in the European gene banks and produced a proposal for an updated descriptor list. The descriptor list was circulated among experts and necessary amendments and corrections were made. The majority of amendments has been incorporated, however there were a few descriptors not included in current final list which are used by only one gene bank. These few descriptors might be included at a later stage, if approved by other gene banks. The descriptor list for cultivated rye is presented in the *Appendix 2* of this report and should be regarded as 'work in progress'.

List of candidate European Accessions

A procedure for candidate European Accessions (CEA) selection and criteria were agreed upon during the workshop. Criteria are listed below:

- Maintained in the "country of origin"
- A known origin (collection and/or bred; pedigree data)
- Comprehensiveness of passport information
- Number of regeneration/multiplication cycles
- Health status (i.e. is the germplasm disease free)
- Existence of morphological/molecular characterization data
- Existence of (agronomical) evaluation data
- Validated accession name (the same name can be attributed to different accessions; the history of individual accession is important; special attention to be paid to synonyms and homonyms)
- Adequate management procedures are followed
- Originality of sample

The lists of candidates of CEA were sent to manager of ESDB (M. Zaczyński) by curators of the national/regional gene banks. Duplication detection within countries was done by each country, in close collaboration between curators and database managers.

It was agreed that all accessions of wild species, landraces and cultivars released before 1950s will be included, whereas for cultivars released after 1950 the potential duplicates would be additionally screened for and detected by ESBD manager. It was also agreed that for the first CEA list we will await including the genetic stocks and breeding lines. The first CEA list contains accessions from gene banks from Austria, (AGES Linz - Austrian Agency for Health and Food Safety / Seed Collection), Czech Republic (Genebank Department, Division of Genetics and Plant Breeding, Research Institute of Crop Production), Estonia (Jõgeva Plant Breeding Institute), Germany (Leibniz Institute of Plant Genetics and Crop Plant Research), Latvia (Latvian Forestry Research Institute "Silava", LVA009), Nordic Countries (Nordic Genetic Resource Center), Poland (Plant Breeding and Acclimatization Institute, National Centre for Plant Genetic Resources) and Russia (N.I. Vavilov Research Institute of Plant Industry) (*Appendix 3*).

Recommendations

- The technical standards and list of descriptors were made based on current knowledge and research results on rye conservation and biology, however these documents might have to be updated within 5 – 10 years to ensure the best possible practice for rye maintenance and characterisation evaluation;
- The maintenance recommendations for wild *Secale* species to large extent follow the one for cultivated rye – since there is very little research on conservation of these specific species, the advice of the project group was based mainly on practical knowledge and if a scientific study in this area will be carried out, the results should be considered as well;
- The list of *Secale* candidate European Accessions contains only a fraction of European material that should be entering this category and further work should be carried out to include more accessions.