

A short note on the progress of the ECPGR Forages Working Group during the first part of Phase IX (2014-2015)

During this period a change in chair person has taken place. During 2014 Merja Veteläinen was chair and during 2015 Anna Palmé.

ECPGR project applications

In 2014 an application for the project “ECPGR Working Group for Forages towards 2020” (Forages 2020) was sent in and approved by the ECPGR. This project has three main aims: 1) improving the European forage collection in accordance with the AEGIS goals; 2) inventory of evaluation and characterization data on European forage accessions; and 3) development of a new work plan for the ECPGR Forages Working Group. Aim one and two are targeted at meeting the objectives specified by the ECPGR Phase IX under outcomes 1 and 2, while the work plan (aim three) targets outcomes 1, 2 and 3. The final report of Forages 2020 was submitted end December 2015 and will be made available online from the [Forages 2020 webpage](#).

In 2015 an application named “AEGIS progress and development of EURISCO and the European Crop Specific Databases for forages” was submitted. It was not accepted in the present form but resubmission after modifications was encouraged. The plan is to submit a new version during 2016.

AEGIS-related tasks

Within the context of the Forages 2020 project, work was conducted to encourage collection holders to initiate the process of recommending accessions for flagging in the European collection. During the project the number of forage accessions flagged as AEGIS increased. The Netherlands and the Czech Republic had flagged forage accessions in EURISCO before the project started and Germany, the Nordic Countries and the UK flagged accessions during the preparatory phase. By the 1st of November 2015, 7024 forage accessions were flagged in EURISCO within the most important forage genera. In addition, at least five countries have started their selection process.

The development of crop-specific gene bank standards for forage crops was discussed during the workshop held within the Forages 2020 project 2015. It was agreed that the crop-specific standards would be developed during the beginning of 2016.

Crop conservation work plan

Within the Forages 2020 project, a work plan for phase IX was also developed. It was circulated for comments from the whole working group (WG) during December 2015. The Forage WG plans to work towards establishing the European Forage Collection (EFC), improving the quality and quantity of data in EURISCO and developing the *in situ* conservation of forage PGR in Europe (see Appendix 1, Workplan for 2015-2018 of Phase IX and ideas for future work).

Characterisation and evaluation

Within the context of the Forages 2020 project, a survey was performed on available characterisation and evaluation (C&E) data on forages in Europe. The conclusion is that there is broad range of C&E

data sets available. This represents a great potential for the use of such data when selecting PGR material for use in for example breeding and pre-breeding. However, there is a need to make this data publically available and readily downloadable. Plans were made to use some of the forage data sets as test cases for the C&E extension of EURISCO in co-operation with the EURISCO coordinator S. Weise.

Workshop

Within the context of the Forages 2020 project, a workshop was arranged in November 2015 in Alnarp, Sweden. In total 18 people took part in the meeting in person and an additional eight people took part in some of the sessions open for on-line participation. The workshop was divided into four specific sessions: 1) AEGIS, 2) Crop wild relatives, 3) Characterization and evaluation and 4) work plan development. The results of the workshop are described under the headings above and in the recommendation in the paragraph below.

Recommendations and comments

At the workshop it was concluded that the forage accessions flagged today represents only a small subset of the variation conserved at gene banks in Europe. Further work is needed to include accessions into the European Forage Collection and to this end it is recommended that the reason why accessions are not flagged is evaluated and that targeted actions are arranged subsequently. It is likely that lack of resources in many gene banks excludes basic tasks such as germination testing and regeneration. A challenge for the future will be to include PGR conservation high on the political priority list, establish a proper legal and organisational framework for *ex situ* as well as *in situ* conservation and to assure adequate national and European efforts to safeguard our important genetic resources.

At the workshop in 2015 also C&E data was discussed. It is clear that there is a wealth of such data on European PGR accessions. Unfortunately, this data is often difficult to access. It is stored in many different gene banks and research institutes and the data is often not published in international journals. The progress made with creating a system for storing of C&E data in EURISCO shows great promise to be the central hub where such data can be overviewed and downloaded. The forage WG will provide test data to facilitate the development of the C&E module in EURISCO.

Appendix I. Workplan for 2015-2018 and ideas for future work (updated 12 February 2016)

Detailed plan 2015-2018

Activity	Carried out by (leader underlined)	Time frame
Establishing the European Forage Collection (EFC) in line with the goals of AEGIS		
Preparatory work on selection of AEGIS candidates in individual countries before the Forages 2020 workshop.	<u>Petter Marum</u> , Evelin Willner, Valentin Maya Blanco, Bartosz Tomaszewski, Ian D. Thomas, Lajos Horvath, Anna Palmé	2015 (Project Forages 2020)
Evaluation of progress on the selection of AEGIS accessions and of future approaches on this task. Performed at the Forages 2020 workshop.	<u>Petter Marum</u> , Evelin Willner, Valentin Maya Blanco, Bartosz Tomaszewski, Ian D. Thomas, Lajos Horvath, Anna Palmé	2015 (Project Forages 2020)
Evaluate if new features in EURISCO could be developed to facilitate the AEGIS process	<u>Stephan Weise</u> , <u>Petter Marum</u> , Anna Palmé, Evelin Willner, Bartosz Tomaszewski, Wilhelm Graiss, Ian D. Thomas, Valentin Maya Blanco, Lajos Horváth, Kjell-Åke Lundblad, Maria Stamatova	2016 (ECPGR application ForageDB)
Development of crop-specific genebank standards for forages (AQUAS)	<u>Anna Palmé</u> , Ian D. Thomas, Evelin Willner (at a later stage all WG members will be consulted)	2016
EFC flagging of perennial ryegrass accessions identified as representative of European diversity in the GrassLandscape project	<u>Jean-Paul Sampoux</u> , Evelin Willner, An Ghesquiere, Anna Palmé, Maria Stamatova, Ian D. Thomas	2017-2018

Activity	Carried out by (leader <u>underlined</u>)	Time frame
<p>Evaluation of progress of EFC (AEGIS)</p> <ul style="list-style-type: none"> • Continue the evaluation of progress of the selection of AEGIS candidates • Conduct an in-depth study focused on a few selected collections to identify the reason behind non-inclusion • Evaluate the reason for no/little progress (for example need for capacity building) with a survey from collection holders • Based on the two actions above, evaluate what would be needed to increase the number of AEGIS accessions • Plan actions targeted at increasing the number of AEGIS accessions. 	<p><u>Petter Marum and Anna Palmé</u>, Evelin Willner, Bartosz Tomaszewski, Wilhelm Graiss, Aurélia Priet, Maria Stamatova</p>	<p>2016-2017 (partly included in the ECPGR application ForageDB)</p>
<p>Targeted activities aimed at increasing the number of forage accessions in the EFC. Exact plans made after evaluation described above.</p>	<p><u>Anna Palmé</u>, Petter Marum, Merja Veteläinen, Evelin Willner, Aurélia Priet</p>	<p>2017-2018</p>
Quantity and quality of data in EURISCO		
<p>Use data in the ECCDBs to identify potential gaps in EURISCO and inform the National Focal Points of these gaps</p>	<p><u>Stephan Weise</u>, Anna Palmé, Evelin Willner, Petter Marum, Bartosz Tomaszewski, Wilhelm Graiss, Ian D. Thomas, Valentin Maya Blanco, Bartosz Tomaszewski, Lajos Horváth, Kjell-Åke Lundblad, Maria Stamatova</p>	<p>2016 (ECPGR application ForageDB)</p>
<p>Improve the quality of data on forage accessions in EURISCO</p> <ol style="list-style-type: none"> 1. Identify errors in genus, species, crop name, variety names, latitude and longitude 2. Identify duplicates 	<p><u>Ian D. Thomas</u>, Petter Marum, Anna Palmé, Christoph Grieder, Maria Stamatova, other collection holders</p>	<p>2016-2017</p>

Activity	Carried out by (leader <u>underlined</u>)	Time frame
<p>Include forage-specific descriptors into EURISCO</p> <ol style="list-style-type: none"> 1. Extract the fields from the Crop Databases that are not in EURISCO and make a separate table 2. Discuss with the Forages WG, the ECPGR and EURISCO about how this information can be conserved in EURISCO. 	<p><u>Ian D. Thomas</u>, Petter Marum, Anna Palmé, Christoph Grieder, database managers, collection holders</p>	<p>2016-2017</p>
<p>Develop a crop portal for forages (gateway). Set up a crop portal presenting data on the forage accessions in EURISCO and also information on, and links to, the European forage collections.</p>	<p><u>Ian D. Thomas</u>, Petter Marum, Anna Palmé, Stephan Weise, Maria Stamatova</p>	<p>2016-2018 (initiated within the ECPGR application ForageDB)</p>
<p>Evaluate the possibility to flag several different levels of core collections in EURISCO, based on different phenotypic and genotypic traits. Data from the GrassLandscape project would be used to define core collection in perennial ryegrass as a first step.</p>	<p><u>Jean-Paul Sampoux</u>, Evelin Willner, Stephan Weise, Maria Stamatova, Ian D. Thomas</p>	<p>2017-2018</p>
Characterization and evaluation (C&E) data		
<p>Facilitating access to European C&E data</p> <ul style="list-style-type: none"> • Survey on existing C&E data • Presentation and evaluation of the survey results at the ECPGR workshop 2015 • Preparation of a plan for inclusion of the C&E data in EURISCO • Publication of the C&E survey on the Forages 2020 webpage 	<p><u>Evelin Willner</u>, Ian D. Thomas, Photini Mylona</p>	<p>2015 (Project Forages 2020)</p>
<p>Entering C&E data of forage accessions into EURISCO</p> <ol style="list-style-type: none"> 1) Development of a <ol style="list-style-type: none"> a) Demo version for C&E data in EURISCO (tested with forage data sets from different genebanks) b) Procedure for data flow (technical and legal aspects) 2) “Official procedure test” 	<p><u>Evelin Willner and Stephan Weise</u> Partners providing data: NordGen (Anna Palmé, Kjell-Åke Lundblad), IPK (Evelin Willner), CGN, Agroscope (Beat Boller, Christoph Grieder), IBERS (Ian D. Thomas), data from GrassLandscape project (Jean-Paul Sampoux), IPGR (Maria Stamatova)</p>	<p>2016 (the ECPGR application ForageDB)</p>

Activity	Carried out by (leader underlined)	Time frame
<p>Development of a trait short-list for characterization implemented during regeneration</p> <p>AIM: To have standardized basic characterization data for AEGIS accessions (AQUAS)</p> <ol style="list-style-type: none"> 1. Development of recommended list of traits with reference varieties 2. Review of the list 3. Development of final list 	<p><u>Evelin Willner</u>, Beat Boller, All WG members consulted</p>	<p>2016</p>
<i>In situ</i> conservation of forage crops		
<p>Put together an application on practical <i>in situ</i> management problem resolution</p> <ul style="list-style-type: none"> • Impact of inbreeding / outcrossing, wind and insect pollination on conservation for different forage species • How to promote <i>Lolium perenne</i> and clover persistency in grassland (3-5 yr study) • Review of different kinds of reseeded and potential loss of diversity 	<p><u>Susanne Barth</u>, Anna Palmé, Maria Stamatova</p>	<p>2016-2018</p>
<p>Marie Curie application for a PhD project: "Improving the use of forage CWR diversity in cultivar production"</p>	<p><u>Nigel Maxted</u>, Petter Marum, Anna Palmé</p>	<p>2016</p>
<p>Grassland ecotype diversity assessment</p> <ul style="list-style-type: none"> • Inventory of different types and locations of grasslands in Europe 	<p><u>Anna Palmé</u>, Juozas Labokas, Valerijus Rasomavicius, Egle Norkeviciene, Susanne Barth, Maria Stamatova</p>	<p>2017-2018</p>
<p>Drafting and developing of policy and practical standards for <i>in situ</i> management of forages. Forages are different from many CWRs since many species can be conserved on managed grassland.</p>	<p><u>Susanne Barth</u>, Anna Palmé</p>	<p>2016-2018</p>
<p>In cooperation with the GrassLandscape project, develop a number of genetic pools adapted to future climatic conditions in different regions of Europe according to several climate change scenarios. The aim would be to make these seeds available for reseeded meadows damaged by climate change.</p>	<p><u>Jean-Paul Sompoux</u>, Evelin Willner, Maria Stamatova, Ian D. Thomas, Dionysia Fasoula</p>	<p>2017-2018</p>
<p>Joint workshop between the ECPGR WG on Forages and the WG on Wild Species Conservation in Genetic Reserves</p>	<p><u>Nigel Maxted and Anna Palmé</u></p>	<p>2018</p>

Future plans

Listed below are a number of suggested activities and ideas that do not fit into the workplan for the current period. The reason for not including them in the workplan is generally that there is not enough time, or that they are not appropriate to perform within the given timeframe and/or that there are no WG members willing to take on this task at this time. These activities will most likely be actualized after 2018 or earlier if new partners are interested or if funding opportunities are made available.

- Conduct a gap analysis on the EFC and evaluate what actions are needed to fill the gaps (after most countries have gone through the process of flagging AEGIS accessions).
- Apply for funding for collecting missions to fill gaps in the AEGIS collection (identified in the task above).
- Evaluate the conservation standards (for example duplication), regeneration standards and availability of accessions in the EFC.
- Arrange a workshop on quality assurance in PGR conservation in cooperation with other ECPGR WGs.
- Collect information on species-specific *ex situ* management protocols for forage CWRs.
- Evaluate what traits that would be most central to evaluate in the EFC accessions. Contact breeders and pre-breeders to collect this information. Focus on traits of importance for agriculture and breeding.
- Apply for external funding for evaluation of accessions in the EFC of a certain species. Focus on agriculturally relevant traits. Start with a survey on what traits are of interest in the focus species.
- Grassland ecotype reference sites: establishment of a range of provenance sites for grassland ecotypes, within country and regionally across Europe.
- Forage threat and threat assessment: estimation of levels of threat to distinct ecotypes identified using ELC maps and genetic diversity and distance analysis; likely threats are grazing intensification (necessitating reseeding) and land abandonment.