

# BETA WG REPORT FOR PHASE X (2019-2023)

Submitted to the 17th Steering Committee Meeting, Oeiras, Portugal, May/June 2023  
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Date of compilation: 31 March 2023

## 1. CONTRIBUTION TO ECPGR OBJECTIVES

### 1.1. Achievements and success stories

- *To efficiently conserve and provide access to unique germplasm in Europe through AEGIS and the European Collection*  
None
- *To provide passport and phenotypic information of actively conserved European PGRFA diversity ex situ and in situ through the EURISCO catalogue*  
The passport information is updated by each country's National Focal Point in the EURISCO catalogue.
- *To improve in situ conservation and use of crop wild relatives*  
Achieved through the implementation of the below-mentioned projects:  
In the framework of AKER project, the use of crop wild relatives was studied and improved.  
In the framework of Life Recover Nature, CASBio and ARDITI projects, the *in situ* conservation of *Beta patula* and other *Beta* spp. was studied.  
In the framework of the Farmer's Pride project, a proposal of a set of criteria for evaluating the efficiency of a network in securing and giving access to *in situ* landrace diversity was produced [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/MS4\\_Network\\_efficiency\\_criteria\\_for\\_LR\\_access.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/MS4_Network_efficiency_criteria_for_LR_access.pdf)
- *To promote on-farm conservation and management of European PGRFA diversity*  
Achieved through the implementation of the below-mentioned projects:  
In the framework of the Farmer's Pride project, a tool was produced for promoting landraces *in situ* conservation and included examples of *in situ* management practices and of adding value to landraces. This tool is for landrace maintainers or those considering the cultivation of landraces to diversify their crop production system. It provides access to evidence-based information on the benefits, opportunities and practices of landrace cultivation to help in decision-making and to promote their *in situ* maintenance as a means of conserving and diversifying plant genetic resources for food, nutrition and livelihood security <https://www.ecpgr.cgiar.org/in-situ-landraces-best-practice-evidence-based-database?qKey=c16578a182a7c8c8182c57974a802c70>.  
One of the case studies is *Beta vulgaris* L. var. *rapacea* Koch. (Fodder beet), Elvetham, which is cultivated in Denmark <https://www.ecpgr.cgiar.org/in-situ-landraces-best-practice-evidence-based-database/landrace?landraceUid=13537>.

Moreover, *Beta vulgaris* is among the species recorded in the 100 identified landrace hotspots in Europe [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/D1.4\\_Landrace\\_hotspots\\_identification\\_in\\_Europe.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/D1.4_Landrace_hotspots_identification_in_Europe.pdf).

Also, a list of crop species still cultivated as landraces and maintained *in situ* was prepared, where 72 *Beta* species were recorded from specific institutions in Denmark, Estonia, Great Britain, Greece, Italy, Portugal and Spain [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/06/D1.2\\_in\\_situ\\_PGR\\_in\\_Europe\\_landraces.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/06/D1.2_in_situ_PGR_in_Europe_landraces.pdf).

- *To promote use of PGRFA*  
Achieved through the permanent activities of the genebanks' curators. In the framework of the Farmer's Pride project *In situ* landrace propagation management and access guidelines were produced [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/09/D2.4\\_In\\_situ\\_landrace\\_propagation\\_management\\_guidelines.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/09/D2.4_In_situ_landrace_propagation_management_guidelines.pdf)

## 1.2. Gaps or constraints identified

- The COVID-19 pandemic caused a lot of constraints in the implementation of the activities of Phase X and difficulties to organize meetings that could help the close collaboration between Working Group members.
- Slow rate in the inclusion of accessions in the European Collection and also of C&E data in EURISCO.
- Pending issues with a previous Grant Scheme Activity and the final report's submission caused constraints in the submission of a new proposal.
- Considering time and money investment, other funding opportunities seem more tempting than the ECPGR Activity Grant Scheme Projects.
- Increasing institutional and national tasks and various priorities of WG members might not allow them extra time to dedicate to ECPGR obligations.

## 2. GRANT SCHEME ACTIVITIES, WG MEETINGS AND EVA ACTIVITIES

- **Grant Scheme proposals (submitted:0; approved:0)**
- **Total number of partners involved: n/a**
  - ECPGR-funded: n/a
  - Self-funded: n/a
- **Meetings held**  
None
- **Reports and related data**  
None
- **Funds mobilized**
  - ECPGR granted funds: n/a
  - Inputs in-kind declared in Grant activities: n/a

### 3. OTHER ACTIVITIES (CROSS-WORKING GROUP ACTIVITIES, LINKS WITH OTHER NETWORKS, INTERNATIONAL PROJECTS AND INITIATIVES)

- **Cross-Working Group activities:**  
Two virtual meetings were organized with all working group chairs:
  - Meeting of the Working Groups Chairs and the Executive Committee, 5-6 April 2022 (online)
  - Meeting of the Working Groups Chairs and the Executive Committee, 8-9 March 2023 (online)
  
- **Others: International Projects and Initiatives**
  - **AKER project** (<http://www.aker-betterave.fr/en>)  
The eight-year AKER programme launched in September 2012 and was supported by 11 partners, government agencies and private operators in the French sugar beet sector dealing with the management of genetic resources in the Genus *Beta*. The AKER project proposed to identify accessions that would contain rare alleles of interest to broaden the genetic diversity in elite germplasm. For this purpose, a set of *Beta* section *Beta* accessions of diverse geographic origin was ordered from genebanks around the world. Dense molecular mapping and sequencing were carried out to help core collection selection and monitor diversity in order to estimate and better exploit the available genetic diversity.
  
  - **Farmer's Pride project (H2020 – SFS-04-2017)** (<http://www.farmerspride.eu/>)  
The project 'Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources', funded by the Horizon 2020 Programme of the European Union started in 2017 and ended in 2021. The main objective of Farmer's Pride was to establish a network of stakeholders and conservation sites that effectively coordinates conservation actions to safeguard the wealth of Europe's *in situ* PGR and integrates the user community to maximize their sustainable use.
  
  - **LIFE Recover Natura project - LIFE12 NAT/PT/000195**  
This European project started in 2014, ended in 2019 and aimed to establish a genetic reserve for *Beta patula* and increase the protection and conservation status of the Nature Reserve areas of the Ponta de São Lourenço Peninsula and the Desertas islands in the Madeira Archipelago.  
To implement the species genetic reserve, it is essential to confirm the population size and evaluate its structure and dynamics, identify the dispersive strategies and the magnitude of the soil seed bank, as well as the spatial distribution of plant genetic variability. In the framework of this project many actions were taken that had to do with the evaluation of distribution and occurrence areas and population size of *Beta patula*, the implementation of measures promoting *in situ* and *ex situ* conservation of this species and the establishment of a monitoring line to assess the impact of implement action on *Beta patula* population.  
The species distribution and occurrence have been confirmed, the size and baseline of the species population in both islets have been determined, as well as the plant community and presence of other crop wild relatives showing that the population is most appropriate for the establishment of a genetic reserve.
  
  - **CASBio project**  
Programa Operacional Madeira 14–20, Portugal 2020, and the European Union through the European Regional Development Fund, grant number M1420-01-0145-

FEDER-000011. It is a regionally funded operational project that aims to monitor the impact of climate conditions on agrobiodiversity and has concluded at the beginning of 2023.

- **ARDITI project**

Agência Regional para o Desenvolvimento da Investigação, Tecnologia e Inovação, Portugal 2020 and the European Union through the European Social Fund, grant number M1420-09-5369-FSE000002.

- **BETBIO project**

The project was submitted for funding under the framework of the PSR 2014–2020 and was selected by the Executive Committee in October 2019. It aimed the implementation and validation of innovative plant protection methods to increase the environmental sustainability of organic sugar beet production.

- **PNNR | SPOKE 1 project**

This project was coordinated by CNR, Plant and animal genetic resources and adaptation to climate changes, TASK 1.2.4, Mechanisms underlying plant-microbial interactions beneficial for tolerance, Profiling plant-microbial associations and modulating these interactions by bio-stimulant treatments to enhance the ability of plants to cope with environmental stressors.

Members of the *Beta* WG coordinate or participate in the above projects. These actions establish close collaborations between the WG on *Beta* and other teams and allow for tuning the crop-specific activities and the ECPGR objectives with the overarching aims of these projects.

## 4. WORKING GROUP DOCUMENTS AND PUBLICATIONS

- **Working Group Documents**

None for Phase X

- **Publications**

- ✓ Ascarini, F., Freitas, G., Nóbrega, H.G.M., Leite, I.S., Ragonezi, C., Zavattieri, M.A. and Pinheiro de Carvalho, M.A.A. 2021. Assessing Diversity of Sea Beet (*Beta vulgaris* L. ssp. *maritima*) Populations. *Journal of Agricultural Science and Technology* 23(3), 685-698, J.40305-98-2, ISSN:1680-7073.
- ✓ Broccanello, C., Ravi, S., Deb, S., Bolton, M., Secor, G., Richards, C., Maretto, L., Lucia, M.C.D., Bertoldo, G., Orsini, E., Ronquillo-López, M.G., Concheri, G., Campagna, G., Squartini, A. and Stevanato, P. 2022. Bacterial endophytes as indicators of susceptibility to Cercospora Leaf Spot (CLS) disease in *Beta vulgaris* L. *Scientific Reports*, 12 (1), art. no. 10719.
- ✓ McGrath, J.M., Stevanato, P. 2019. 7402677681; 56962755700; Application of biotechnology, *Beta maritima*: The Origin of Beets, pp. 237-252.
- ✓ Nóbrega, H., Freitas, G., Pinheiro de Carvalho, M.Â.A. 2020. *Beta patula* Population Assessment from 2014 to 2018 in Madeira Archipelago, Portugal. Version 1.3. University of Madeira, Sampling event dataset, <https://doi.org/10.15468/i3qfk5>.
- ✓ Nóbrega, H., Freitas, G., Zavattieri, M.A., Lopes, C., Frese, L. and Pinheiro de Carvalho, M.A.A. 2021. Monitoring system and *in situ* conservation of endemic and

- threatened *Beta patula* Aiton populations in Madeira Region. Genet. Resour. Crop Evol. 68 (3), 939–956, [doi.org/10.1007/s10722-020-01035-x](https://doi.org/10.1007/s10722-020-01035-x).
- ✓ Nóbrega, H., Freitas, G., Zavattieri, M.A., Ragonezi, C. and Pinheiro de Carvalho, M.Â.A. 2021. Structure and floristic composition associated with an endangered species *Beta patula* Aiton (Amaranthaceae) in islands of Madeira Archipelago. Data Paper (Biosciences), Biodiversity Data Journal 9, e61091, 1-9, doi: 10.3897/BDJ.9.e61091.
  - ✓ Panella, L.W., Stevanato, P., Pavli, O. and Skaracis, G. 2019. Source of useful traits. *Beta maritima*, The Origin of Beets, pp. 167-218.
  - ✓ Raggi, L., Caproni, L. And Negri, V. 2021. Landrace added value and accessibility in Europe: what a collection of case studies tells us. Biodiversity and Conservation 30(4), 1031-1048, <https://doi.org/10.1007/s10531-021-02130-w>.
  - ✓ Raggi, L., Pacicco, C. L., Caproni, L., Álvarez-Muñiz, C., Annamaa, K., Barata, A. M., Batir-Rusu, D., Díez, M. J., Heinonen, M., Holubec, V., Kell, S., Kutnjak, H., Maierhofer, H., Poulsen, G., Prohens, J., Ralli, P., Rocha, F., Rubio Teso, M. L., Sandru, D., Santamaria, P., Sensen, S., Shoemark, O., Soler, S., Sträjeru, S., Thormann, I., Weibull, J., Maxted, N. and Negri, V. 2022. Analysis of landrace cultivation in Europe: A means to support *in situ* conservation of crop diversity. Biological Conservation, 267, 109460, <https://doi.org/10.1016/j.biocon.2022.109460>.
  - ✓ Ragonezi, C., Nóbrega, H.G.M., Leite, M.I., Freitas, J.G., Macedo, F.L. and Pinheiro de Carvalho, M.Â.A. 2023. Analysis of genetic diversity of *Beta patula* and its spatial distribution in the populations from Ilheu do Desembarcadouro and Ilheu Chão. Agriculture, 13(27), 1-15, <https://doi.org/10.3390/agriculture13010027>.
  - ✓ Stevanato, P., Chiodi, C., Broccanello, C. Concheri, G., Biancardi, E., Pavli, O. and Skaracis, G. 2019. Sustainability of the Sugar Beet Crop. Sugar Tech 21, 703–716, <https://doi.org/10.1007/s12355-019-00734-9>.
  - ✓ Farmer's Pride products:
    - Proposal of a set of criteria for evaluating the efficiency of a network in securing and giving access to *in situ* landrace diversity [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/MS4\\_Network\\_efficiency\\_criteria\\_for\\_LR\\_access.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/MS4_Network_efficiency_criteria_for_LR_access.pdf)
    - *In situ* landraces: best practice evidence-based database <https://www.ecpgr.cgiar.org/in-situ-landraces-best-practice-evidence-based-database>,
    - Landrace hotspots identification in Europe [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/D1.4\\_Landrace\\_hotspots\\_identification\\_in\\_Europe.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/10/D1.4_Landrace_hotspots_identification_in_Europe.pdf),
    - *In situ* PGR in Europe: landraces [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/06/D1.2\\_in\\_situ\\_PGR\\_in\\_Europe\\_landraces.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/06/D1.2_in_situ_PGR_in_Europe_landraces.pdf),
    - *In situ* landrace propagation management and access guidelines [https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/09/D2.4\\_In\\_situ\\_landrace\\_propagation\\_management\\_guidelines.pdf](https://more.bham.ac.uk/farmerspride/wp-content/uploads/sites/19/2020/09/D2.4_In_situ_landrace_propagation_management_guidelines.pdf),

## **5. EXPECTED ADDITIONAL ACHIEVEMENTS AND FUTURE ACTIVITIES THAT COULD CONTRIBUTE TO THE IMPLEMENTATION OF THE PGR STRATEGY FOR EUROPE**

The *Beta* WG could undertake the following activities proposed to be included in Phase XI that could contribute to the implementation of the objectives and targets of the PGR Strategy for Europe:

- Capacity-building services organized at different regional levels, considering different levels of genebanks characters and based on crop-specific features.
- Support to countries to identify and include material into AEGIS including regeneration and safety duplication.
- Develop a methodology to assess crop diversity required and gaps in the conservation system in cooperation with users.
- In collaboration with CWR and On-farm WGs, assess and remedy gaps in *ex situ* genebanks, including through collecting missions and coordinating the safety backup for selected species.