Farmer's Pride

Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources

In situ plant genetic resources conservation information management tools

Acknowledgements

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1.0 Introduction

To support and promote *in situ* conservation and sustainable use of plant genetic resources (PGR), the Farmer's Pride project collaborators have developed and published several tools and standards for the management of data associated with *in situ* PGR conservation and sustainable use. These practical tools and associated standards are freely available to all stakeholders, including farmers, protected area managers, plant breeders, and researchers. The tools and standards are summarized here with links to the resources.

2.0 *In situ* PGR conservation information management tools

2.1 CAPFITOGEN tools for crop wild relative and landrace conservation planning

capfitogen.net/

CAPFITOGEN3 is the new iteration of the CAPFITOGEN toolbox, developed to provide support to the global PGR conservation and sustainable use community by providing software tools designed to perform spatial and ecogeographic diversity analyses to facilitate more efficient and effective PGR conservation and sustainable use planning. The new version is composed of 15 tools usable either directly on a server via an online portal, or downloadable and used in local mode on a computer hard drive. In addition to deploying the CAPFITOGEN tools on a server, a new tool for undertaking predictive characterization has been developed, and a number of other tools in the suite completed, tested and optimized for use on the server. CAPFITOGEN3 is currently available on the server until June 30 2022, and in the meantime, opportunities for a permanent host for the server application are being explored.

Context: To successfully plan PGR conservation requires detailed knowledge of where in the wild or on-farm CWR or landrace diversity exists and which combination of populations can most effectively maximize genetic diversity conservation. To be able to establish this best mixture of targeted actions requires the collation of extensive ecogeographic data and its analysis with advanced Geographic Information Systems. CAPFITOGEN3 is the one such software package, initially developed by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) within the Food and Agriculture Organization of the UN to undertake ecogeographic data and identify priority conservation actions.

Uses: As part of the suite of CAPFITOGEN3 tools, originally designed for *ex situ* conservation planning, it will now facilitate the analysis of ecogeographic data for *in situ* conservation planning.

Potential users: All planners and implementers of PGR conservation, though it has potential for broader biodiversity conservation as well.

2.2 Extension of EURISCO for *in situ* crop wild relative and on-farm landrace data

farmerspride/wp-content/uploads/sites/19/2021/09/D2.5_EURISCO_in_situ_extension_concept.pdf

The European Search Catalogue for Plant Genetic Resources (EURISCO[1] is currently limited to germplasm accessions maintained *ex situ*—primarily in genebanks. However, to allow access to a greater breadth of genetic diversity and meet users' requirements, it is critical that germplasm is equally accessible whether it is held *ex situ* in a genebank or *in situ*—either on-farm or in nature. This document constitutes a first proposal for an extension of the EURISCO descriptors to allow *in situ* crop wild relative (CWR) and on-farm landrace data to be included in EURISCO in the future. The decision as to when this extension will be practically implemented lies with the EURISCO Advisory Committee.

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[1] eurisco.ecpgr.org

Context: EURISCO was initially conceived as a search engine for promoting access to *ex situ* conserved genetic diversity. The new data structure will now facilitate access to *in situ* conserved PGR diversity as well as *ex situ* diversity conserved in genebanks.

Uses: Facilitates access to *in situ* conserved PGR diversity for potential users (farmers and breeders).

Potential users: All planners, managers and users (farmers and breeders) of *in situ* (in nature and on-farm) PGR conserved diversity.

2.3   *In situ* crop wild relative population look-up tool

ecpgr.cgiar.org/cwr-tool

Based on extensive data collated of *in situ* population occurrences of priority CWR taxa in Europe (D1.2_In_situ_PGR_in_Europe_crop_wild_relatives.pdf) and subsequent analysis of their occurrence in the Natura 2000 network (MS19_Crop_Wild_Relatives_in_the_Natura_2000_Network.pdf), a tool was developed to promote the active *in situ* conservation of CWR within existing protected areas throughout the region. This searchable database facilitates the identification of which CWR are present in which protected areas, and allows users to search by a species name, a country, a protected area, or habitat type, as well as allowing searches on multiple fields. The tool is published in the website of the European Cooperative Programme for Plant Genetic Resources (ECPGR) to ensure its long-term maintenance and availability, and to facilitate future updates.

Context: An element of promoting CWR conservation is to identify which CWR populations are found in existing protected areas. Europe has a unique network of protected areas for biodiversity conservation – the Natura 2000 network. Raising awareness of the value of CWR diversity and promoting all Natura 2000 sites to promote CWR conservation would undoubtedly add to and complement more target CWR conservation actions.

Uses: Informs protected area managers of CWR presence in Natura 2000 sites and promotes more active CWR conservation.

Potential users: All planners, managers and implementors of *in situ* (in nature) CWR diversity conservation in protected areas.

2.4   Crop wild relative *in situ* population management guidelines: online toolkit

cwrpopulation-toolkit.cropwildrelatives.org/

These web-enabled guidelines provide protected area managers, conservation practitioners, farmers and any other professionals or volunteers responsible for the conservation of CWR populations with access to a user-friendly platform giving practical step-by-step guidance for the management of CWR populations and the genetic reserves where they are being conserved. The guidelines provide a quick and accessible tour to all the elements that one should consider for the design and implementation of a management plan, including habitat characterization, population threat assessment, management interventions, monitoring schemes, management of information and legislative requirements, among other issues.

The guidelines contemplate the different situations in which a CWR genetic reserve can be established and provide specific management tips to consider when reviewing their placement either within or outside protected areas, in farmlands and other types of publically or private owned property. Furthermore, considerations are also provided concerning the management needs to address climate change. Finally, the essential coordination needs with CWR *ex situ* conservation activities are detailed, connecting with the stakeholders that can be the end users of these plant genetic resources. The toolkit is available in the CWR Global Portal to ensure its long-term maintenance and availability, and to facilitate future updates.

Context: One of the key objectives of Farmer's Pride was to enhance the population management and best practices for *in situ* conservation of CWR populations. The guidelines were developed to provide a clear understanding to the site managers (protected area managers, field technicians, private owners) of how the population level diversity of CWR species might be most effectively managed, documented, secured and made available to diverse user groups. The scope was to expand the capacities of site managers who previously may not have encountered CWR or genetic conservation, to manage the wild populations of CWR in a more dynamic and participatory way. It is meant to serve as a 'how to do' *in situ* population management for CWR species.

Uses: Promotes the active conservation of CWR diversity *in situ*, whether inside or outside of existing protected areas.

Potential users: All planners, managers and implementors of *in situ* (in nature) CWR diversity conservation.

2.5   Descriptors for crop wild relative diversity management

CWR Global Portal – cropwildrelatives.org/).

Awareness of the value of CWR for adapting crops to the environmental impacts of climate change, and knowledge of the diversity that exists in the wild and in genebanks, has increased substantially since the beginning of the 21st century. At the same time, there has been a growing number of national, regional and global strategies and initiatives for the conservation and sustainable use of CWR diversity. This increasing focus on the identification and management of important CWR resources has called for improved management of information associated with their conservation and sustainable use.

In the context of the Farmer's Pride project, previously drafted descriptors for CWR population monitoring, as well as for strategies and action plans, have been reviewed and updated, and published in combination with existing descriptor sets and data recording templates for CWR checklists and inventories. Thus, practitioners dealing with all aspects of CWR conservation planning, the development and implementation of national and regional strategies and action plans, including ongoing population monitoring, have access to a one-stop shop for the management and exchange of the associated data at all levels. The descriptors will be made available via the CWR Global Portal to ensure easy access and long-term availability to user community.

Context: In several past collaborative projects—notably those funded by the EU Framework Programmes, the Global Environment Facility and the UK government—descriptors for the management, monitoring and exchange of information related to CWR conservation and sustainable use have been developed and published. However, gaps remain in these descriptor sets (mainly related to monitoring CWR populations *in situ*) and the publication of the various descriptor sets and associated data recording templates are somewhat dispersed. The descriptors published fill these gaps and provide an additional tool for effective *in situ* CWR management.

Uses: Facilitates management of data associated with *in situ* conservation of CWR diversity by population managers.

Potential users: Managers of *in situ* (in nature) CWR conserved diversity.

2.6   Landrace repatriation tool

Prototype prepared and web-enabling in progress (to be published on the web page of the ECPGR On-Farm Conservation and Management Working Group – ecpgr.cgiar.org/working-groups/on-farmconservation).

The landrace repatriation tool allows users (e.g., farmers and gardeners) who would like to cultivate crop landraces with a bio-cultural connection to the area in which they are growing their crops, to search for

these varieties by entering the crop species and their location, and retrieving a list of qualifying varieties and how to obtain reproductive material from commercial producers or conservation collections. As a proof of concept, a stand-alone Excel-based interactive tool was constructed that allows searches for old Dutch apple varieties based on a location. The landrace repatriation tool extends this proof of concept to a range of crops and countries in Europe. With an increasing range from very local to regional, varieties are listed with a description, information of where to obtain them, and when available, a story elaborating why this variety is connected to the location. The landrace repatriation tool will be available in the ECPGR website to ensure its long-term maintenance and availability, and to facilitate future updates.

Context: Landraces are the most vulnerable element of biodiversity to extinction, because: a) we have no idea how many landraces exist; b) landrace maintainers are almost always older and their number is dwindling each year; c) most farmers who maintain landraces have a commercial interest – they grow what yields the highest economic return and may switch to higher yielding modern cultivars if the landrace does not perform well; d) seed companies, breeders and government agencies are actively promoting modern cultivar replacement of landraces; e) in most countries no agency has direct responsibility for landrace conservation; and f) no country yet has a comprehensive inventory of extant landraces. Yet some farmers still continue to prefer to grow landraces, to sustain historic resources, to meet a niche market demand or because landraces in their cultivation environment still outperform modern varieties.

Uses: Enables farmers to know which landraces were historically or are grown in their vicinity and where they can obtain seed of those landraces, thus promoting landrace cultivation and sustainability.

Potential users: Farmers or other landrace growers.

2.7   Best practice landrace evidence-based database: a tool for promoting landrace

ecpgr.cgiar.org/in-situ-landraces-best-practice-evidence-based-database

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 best practices of landrace cultivation to help in decision-making and to promote their *in situ* maintenance as a means of conserving and diversifying PGR for food, nutrition and livelihood security. It includes 105 examples of *in situ* management practices and of adding value to landraces of a range of different crops and in different socio-cultural, environmental and economic contexts from 14 European countries. This information can help to enhance landrace cultivation and make it sustainable and profitable at the same time, while conserving biodiversity for future generations. The tool is published in the ECPGR website to ensure its long-term maintenance, and to facilitate future updates.

Context: 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.

Uses: Identification of evidence-based information on the benefits, opportunities and practices of landrace cultivation that may promote greater uptake and cultivation of landraces.

Potential users: Landrace maintainers or those considering the cultivation of landraces.