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## **Farmer's Pride**

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

## **Improving access to *in situ* plant genetic resources**

## **Citation**

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## Key messages

Access to plant genetic resources that are maintained *in situ* (i.e., on-farm or in nature), is generally very low. To improve this situation a liaison between the *in situ* managers and the potential users should be created. This liaison would have three tasks:

1. Inform potential users about the available PGR by all available means, providing lists with CWR, landraces, organizations involved, and other relevant information, even if this is only available in the local languages.
2. Facilitate access to the available PGR by approaching holders, convincing them of the importance of, and opportunities connected to, making the PGR available and the possibilities to define the terms of use, stimulating them to think about procedures in case requests come in.
3. Mediate between user and holder by acting as a recipient of requests and supporting the process of reaching an agreement between requestor and holder of the PGR.

## Context

The H2020 project Farmer's Pride aims to "establish a network of stakeholders and conservation sites that effectively coordinates conservation actions to safeguard the wealth of Europe's *in situ* plant genetic resources (PGR) and integrates the user community to maximize their sustainable use."

One of the elements required to allow the sustainable use is awareness of where the resources are and how they can be obtained for use. Therefore, within the Work Package 3, where "the creation of an improved enabling environment for the conservation and sustainable use of LR and CWR" is established, Task 3.3 was included. This task "T3.3 Enhance use of *in situ* conserved PGR" was formulated in the Grant Agreement as follows: "Access to *in situ* conservation PGR limits their utilization. This generally has one of four reasons or a combination thereof: (a) the material is unknown to users (the existence), (b) the value, in terms of traits, of the material is unknown to users (the value), (c) the material is not accessible to users (the interface), (d) the material is not made available (the ownership). Activities in WP1–3 address (a) and (b), here (c) and (d) will be addressed by creating an infrastructure like that available to successful *ex situ* initiatives, to promote and facilitate access to *in situ* conserved diversity. This will involve: (a) An analysis of the difficulties of accessing *in situ* conserved diversity from the user perspective by interviewing potential users and key actors in the field of *in situ* conservation; (b) An interface will be established between the diversity conserved *in situ* and the potential users by creating a mechanism for the flow of information and germplasm. This will require (i) an interface for the information, i.e., a web site presenting and promoting the material, (ii) a point of entry for the user, i.e. a person who will act as liaison, (iii) protocols for gathering material from the *in situ* source and getting them to the user, (iv) a legal and phytosanitary framework to cover all aspects regarding ownership and safe movement of germplasm. This will be implemented in The Netherlands and Turkey; (c) In collaboration with WP5,

the interface created in element B will be showcased to the community of actors in both the *in situ* and *ex situ* domain.”

This Deliverable 3.4 is thus ‘just’ the tip of the iceberg, consisting of an infrastructure of PGR holders (nature organizations and on-farm NGOs) who are aware of the importance of providing access to their PGR, procedures for this access, and a liaison who can support both the holders of the PGR and the potential users thereof.

## Analysis of the factors influencing access to PGR conserved *in situ*

To properly analyze the issues involved in providing access to *in situ* PGR, an analysis was made. The results of this analysis were discussed at various occasions (including the Farmer’s Pride stakeholder workshops) and the outcome of these discussions were incorporated in the analysis. The results are presented in the appendix to this report.

## Building the infrastructure

Experiences with building the infrastructure needed for optimizing access to *in situ* managed PGR were, in the context of Farmer’s Pride, gained in The Netherlands and in Turkey.

In the Netherlands, conversations with the most important over-arching on-farm NGO, de Oerakker, were held. Their project ‘Erfgoedzaden’<sup>1</sup> shows the willingness of this NGO to think about providing access to important traditional material from The Netherlands and to act on it. Based on an inventory of old varieties grown in the Netherlands, a selection was made that is considered to be part of the Dutch bio-cultural heritage. The varieties in this selection are being made accessible to the wider public by describing them, and making sure that there is a channel via which they can be obtained by interested users, either via the specialized seed trade or via the NGO concerned. The NGOs involved can also deal with requests outside the scope of the Erfgoedzaden project, if necessary they can use Centre for Genetic Resources, The Netherlands (CGN) for assistance and advice on legal or phytosanitary issues.

On the nature side, several visits were made to, and conversations were held with, senior management of the two largest Dutch nature conservation organizations: Natuur Monumenten (NM) and Staats Bosbeheer (SBB). In the first case it was agreed that CGN can act as a liaison between the potential user and NM. This is announced in the website, managed by CGN, that provides the overview of Dutch crop wild relatives<sup>2</sup>. In the case of SBB, an internal process is still ongoing, hopefully resulting in a similar decision. In the case of these two organizations, it was decided not to define strict protocols for collecting or regarding the Material Transfer Agreement (MTA) to be used, as the anticipated frequency of use was low. The requests will be dealt with when they come. These requests can, in all cases be received by CGN, which can act as liaison between user and provider, has

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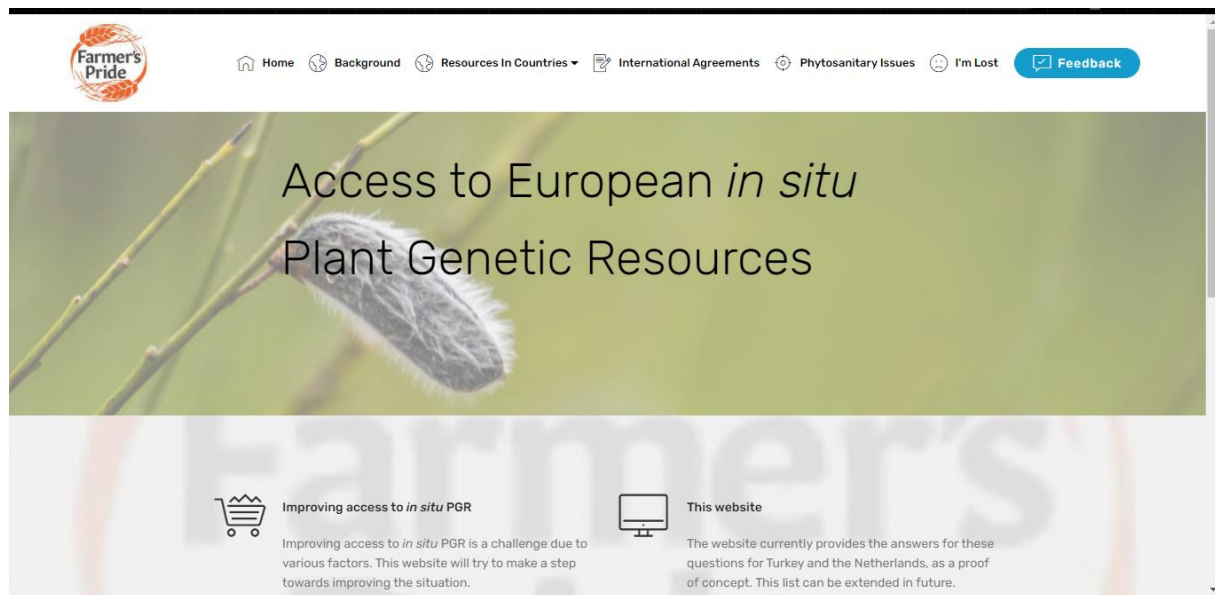
<sup>1</sup> Dutch term In English: Heritage Seeds, website (in Dutch): <https://www.deoerakker.nl/nl/oerakker/Erfgoedzaden-3.htm>

<sup>2</sup> Website: <https://www.cwrnl.nl/en/CWRnl-1.htm>

the knowledge regarding the actors, the legal and phytosanitary rules, and can help in agreeing the MTA. Furthermore it can keep the website showcasing the *in situ* PGR in The Netherlands up to date.

Since access to *in situ* conserved PGR material requires proper access to information about these PGR, a website was created to show how this could be done, but also to learn about the difficulties involved.

The website can be accessed here: <https://projects.cgn.wur.nl/farmerspride/index.html>



On the 'home page' the objective of the website is given, plus a link to the analysis of the issues involved in accessing *in situ* PGR. For the visitors interested in more information on this topic, a 'background page' is included, describing the origin of PGR and the methods used for conserving them. The actual resources in the two countries included in this task is provided on one page per country. Additionally, pages are included briefly presenting and discussing the relevant international agreements and phytosanitary issues. Finally, a navigation page, with a sitemap, and a feedback page were included.

The pages about the *in situ* conserved PGR in the countries show both the possibilities and the difficulties. On these pages, for the first time ever, an attempt was made to list all available sources of information about these resources. Having that overview creates much value. However, it can also be seen that these sources are not always that accessible. Either they are in a published form, and not accessible online, or they consist of paid services. Often only the organization that is known to be managing PGR is known, but no detailed information about the resources is available. Another major issue is the language. Since most NGOs will work in their own language, and there is no incentive to make information available in another, knowledge of the local language is often required for accessing the sources listed on the page. On-line translation tools, included in some browsers, resolve this issue already to some extent.

The screenshot shows a website header with navigation links: Home, Background, Resources In Countries, International Agreements, Phytosanitary Issues, I'm Lost, and Feedback. The main heading is 'The Netherlands' with a background image of a windmill. Below the heading, there is a note: 'The text on this page was compiled by the Centre for genetic Resources, The Netherlands (CGN) and last updated in September 2020.' A breadcrumb trail reads: 'Go to: Species occurring in the wild > Crops managed in garden / on farm > PGR exchange > Phytosanitary issues > Marketing of crops by small scale farmers/gardeners'. A blue banner contains the text 'Access to information about *in situ* conserved material'. Below this, a section titled 'Species occurring in the wild' features a magnifying glass icon and text: 'In the Netherlands, the organisation FLORON maintains an overview of all occurring wild plant species and their location. To quote their website:'. To the right, it states: 'Based on the data of FLORON, low resolution maps of all wild plant species occurring in The Netherlands are accessible via the Nationale Databank Flora en Fauna Verspreidingsatlas (National Database of Flora and Fauna Distribution Map)'. A 'Back to top' arrow icon is visible in the bottom right corner of the content area.

## Conclusions

Task 3.3, 'Enhance use of *in situ* conserved PGR' of the Farmer's Pride project provided much new insights regarding the topic of accessing *in situ* managed PGR.

First of all it showed that this is not a trivial issue that can be solved easily; it will involve awareness building (many *in situ* actors are not aware that their material might contribute to the solution of large global problems such as the adaptation to climate change), trust building (the distrust for certain potential corporate users is large in some circles), and the creation of an infrastructure.

Essential in this infrastructure is an organization acting as a liaison between PGR holder and the potential PGR user. This can be organized at a national level or at a smaller scale, such as region or province. It is important that this organization knows the organizations at a personal level, gains their trust and speaks their language. In the framework of Farmer's Pride, CGN acted as such in the Netherlands, and it plans to continue playing that role after the project.

The liaison should (1) inform potential users about the available PGR and (2) facilitate access to these resources and (3) mediate between user and holder. These points will be elaborated:

1. Inform potential users about the available PGR: Information about *in situ* PGR is collected and presented on the web and via other means. This includes lists with CWR, landraces, organizations involved, and other relevant information, even if this is only available in the local languages. Everything is presented in the most accessible way possible.
2. Facilitate access to the available PGR: Approach holders, convince them of the importance of, and opportunities connected to, making the PGR available and the possibilities to define the

terms of use in an MTA<sup>3</sup> (preferably those of the SMTA<sup>4</sup>), but organizations can in many cases also ask money for the PGR, restrict use to certain user groups, etc. Holders should also be stimulated to think about procedures in case requests come in: who can decide, who collects material (when relevant), etc. In case large demand is anticipated, the liaison might also increase the accessibility of the PGR by collecting and regenerating the PGR, or even, when it meets the criteria of the genebank, incorporate the PGR in a genebank collection for long term conservation and access.

3. Mediate between user and holder: When a request is received by the liaison, it looks for a way to meet the request, possibly by helping to reach an agreement concerning the conditions (drafting a MTA), by doing the collecting, organizing shipment, or whatever it takes. When necessary, costs can be charged to the requestor.

Once this connect between holder and potential user is established, possibilities arise to collect, translate, standardize and combine information from different organizations and countries, and create a database with *in situ* managed PGR. However, given the experiences in this Task, this is not a feasible option yet in most countries.

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<sup>3</sup> Issues to consider include: Will the recipient of the GR be entitled to further distribute the material to third parties? - Is the provider of the GR interested in receiving information on the results? If yes, must the provider treat the report confidentially? - Does the provider want to have access and using rights to the results? - May the recipient freely publish the results of research findings from the GR? - Does the provider of the GR want to keep all information related to the purpose and the material confidential? It could also be determined who signs an MTA. Normally the one signing the MTA will be the private land holder where the GR occurs unless there are other reasons.

<sup>4</sup> Standard Material Transfer Agreement, where all conditions are pre-defined. See: <http://www.fao.org/plant-treaty/areas-of-work/the-multilateral-system/the-smta/en/>



## Appendix: Access to the plants in the fields

A short analysis of factors influencing access to PGR conserved *in situ* (including in-nature and on-farm)

August 2020,  
Theo van Hintum  
Centre for Genetic Resources, The Netherlands (CGN)

### Introduction

Climate is changing and the world population is growing. This causes obvious challenges in terms of securing our future food security. To assure sufficient food can be produced in a sustainable way, farmers, agronomists and plant breeders need to contribute. In this context Plant Genetic Resources (PGR) play an important role.

PGR need to be accessible to be used. One could think that nothing is more accessible as a plant growing in the field, which is to a certain extent true. The plant is certainly more visible, touchable, aromatic and collectable than plants stored as seeds in a genebank in aluminium bags frozen in big freezers at -20°C behind the walls of research institutes. But if it comes to access in terms of availability for use in research or breeding by professional users all over the world, this is different. This user first needs to know that the plant exists, then (s)he needs to be able to assess the value of this plant for his/her research or breeding programme. If all this is known this user needs to get access to physical material of the plant (seeds or cuttings) with permission of the owner or custodian of the material. Usually all this is unclear for plants growing in the field: their existence, value, ownership and conditions for use.

In well-organised genebanks, providing access to PGR is part of the core business. The material is presented in various on-line databases, and can be requested and received under well-defined conditions. Healthy seed is readily waiting to be shipped with the required phytosanitary statements and other paperwork.

In this short analysis we will explore how the *in situ* community (including in-nature and on-farm) can benefit from the experience of the *ex situ* community, and how the *in situ* community could make use of the existing infrastructure of the *ex situ* community to improve access to the diversity conserved *in situ*?

### The *ex situ* ideal

The *ex situ* view on PGR conservation and use is relatively simple. The genetic diversity of the crop that is to be conserved is sampled, the diversity in terms of genetic diversity (allelic richness and other measures) is optimised and the value of the conserved material (current and future use-value) is anticipated. Once it is clear what material should be in the collection, the optimal conservation technique is selected (in terms of reliability and costs), and the material is collected on the basis of material acquisition agreements and prepared for storage. Once conserved, passport, phenotypic and genetic information about the material is collected and made available, and users can request the material on-line. Material is distributed to the requestors after signing a material transfer

agreement. Meanwhile, the health status of the material is monitored allowing also the provision of phytosanitary certificates regarding the distributed material.

Obviously not all *ex situ* genebanks are organised that way, actually many of them aren't. However, many of the larger genebanks such as those in the international network of the CGIAR, and some important national genebanks are well-organised. As a result, users such as crop scientists, plant breeders or non-governmental organizations (NGOs) can get quite good access to a wide variety of PGR from *ex situ* genebanks. Data about material in *ex situ* collections can be found in databases such as GENESYS, that presents (mainly) passport data of about four million accessions maintained in genebanks worldwide. Phenotypic and genetic data are more difficult to access. However, a recent initiative to identify genebank accessions with digital object identifiers (DOI's), supported by the International Treaty on PGRFA, can be expected to improve access to this kind of information as well.

### The *in situ* situation

The situation in the *in situ* community is less straightforward. First of all, the *in situ* community is less coherent, as it is composed of a very wide spectrum of semi-independent actors involved with an even wider spectrum of approaches and convictions. It includes large nature conservation organisations managing nature reserves that may harbour populations of wild species that are relatives to our cultivated crops. But the community also includes small local or regional NGO's bringing together enthusiasts who are growing old varieties of a certain crop in their home-garden and are exchanging seed and experiences. And not only the nature of the material conserved, and the conservation methods vary, also the actors involved often have quite different perspectives on the world, genetic diversity and the value thereof. Where the actors in the *ex situ* community generally have a scientific institutional background, and share an eco-modernistic worldview, the actors in the *in situ* community form a very diverse mixture including actors such as wealthy conservative land owners, environmentalists that believe we should all grow our own food, and small seed companies catering for hobby farmers.

As a result of this diversity in species, methods and actors, it is difficult to describe the specificities of the *in situ* community or the difficulties regarding access to the conserved PGR. However, it can be observed that access to the PGR conserved *in situ* and its subsequent use is very low, and that this is caused by the following factors:

- first of all, there is the lack of information about the diversity conserved: 'what is conserved where?',
- secondly the relative value of each population is rarely clear,
- thirdly, if a user would like to have access to material, it is not clear whether this material is available for utilisation, and if so, how to get access, where to go to, and who to approach, and
- finally, in case the appropriate person has been identified, often the conditions under which the material can be obtained and used are not clear to the potential user nor to the manager/owner/custodian.

These four elements will be discussed below.

### Access to information about *in situ* conserved material

The fact that information about the diversity conserved *in situ* is difficult to find doesn't mean it doesn't exist or have value. A first distinction should be made, as often when discussing *in situ* matters, between the crop wild relatives (CWR) occurring in nature and the diversity grown on farms (on-farm) and by hobby growers (in-garden). In the rest of the paper latter two terms (on-farm and in-garden) are collectively referred to as on-farm.

Regarding crop wild relatives, often information about the flora in a country is available in publications or databases with a local, regional or national scope and much of the digitally available information is compiled in the database of the Global Biodiversity Information Facility (GBIF). However, the information is scattered and very rarely presented in a context that serves the potential user of the PGR.

Regarding the diversity on-farms, the information is completely scattered. Sometimes lists of varieties conserved by a NGO can be found in published or grey literature or on the internet, and obviously there will be lists of materials on individual computers possibly shared amongst members of organisations. However, for an outsider, a potential user, it is very difficult to even get an impression of the diversity conserved and potentially available for use.

### Determining the value of *in situ* conserved material

Also, when discussing the value for use of *in situ* conserved diversity, a distinction between the crop wild relatives and the on-farm diversity should be made.

Regarding CWR, generally very little is known about their use-value. For the economically more important crops some knowledge is available about the 'relatedness' of the wild species with the crop species with implications for the ease of use in a plant breeding programme (referred to as the 'crop genepool' or 'taxon group' concepts). On the other hand, it is generally known that it is more difficult and costly to successfully breed with CWRs than with on-farm genetic resources and far more difficult than with elite material. The more related, the easier the crossing which may give the possibility of transfer of genes to the cultivated species. If less related, gene transfer may be difficult and the use of the CWR may require intermediate crossing parents, *in vitro* embryo rescue, and other expensive and time-consuming procedures. Not to mention the unwanted linkage drag that needs to be dealt with. Even more important is the question which species, populations or plants are the most likely to contain the traits, genes and alleles that are of value for the cultivated species. Mostly, such information is missing, only in rare cases the necessary data have been collected to determine the use-value of crop wild relatives or the occurrence of traits in populations in relation to their geographic distribution.

Regarding the value of diversity grown on-farm and with which there is no crossing barrier, generally much more is known since it often concerns landraces and old varieties that have been used and studied in the past (the well-studied varieties will often also be available in *ex situ* collections). However, this information is rarely properly documented nor made available. Often it is scattered in national languages over documents and web sites.

## Communication with the responsible authorities

In the rare cases where a potential user can make a choice regarding the *in situ* / on-farm material to obtain, getting in touch with the ones responsible for the management of the PGR is the next hurdle to take. For the CWR growing in-nature the user needs to find out the organisation or person managing the area that harbours the desired population, which is not easy but is generally feasible. For diversity occurring on-farm, this step may be quite straightforward as the document or website containing information about the PGR may generally be produced by the organisation managing it, or this organisation will be mentioned in the information. Nevertheless, it should be noted that such organisations may not answer requests for information and/or access and may even refuse to provide information or access outside the circle of their own members.

## Conditions for access and use in Europe

The final step in getting access to *in situ* conserved PGR is complicated since it not only involves agreement from the responsible authority (landowner, farmer, etc.), but also involves legal rules regarding 'access and benefit sharing', phytosanitary issues and potentially other obstacles (such as ownership/property matters etc.).

The first step in defining the conditions for use is the willingness to cooperate in making the PGR available to a user. If the responsible authority agrees, it will depend on the nature of the biological material how difficult it will be to make the material available. Access to crop seeds is relatively easy as in most cases seeds will be held in stock and samples can be made available or sold to the interested user. If it concerns wild relatives occurring in-nature, or cuttings of trees or shrubs either in-nature or on-farm, more elaborate agreements will have to be made to arrange the collecting and transfer of the biological material.

In addition to agreement by the responsible authority and logistic issues, also national laws and regulations have to be taken into account. Specific expertise in this field is required since the rules and their interpretation can be complex and may vary from country to country. As all European countries are party of the Convention on Biological Diversity (CBD) and most of the Nagoya Protocol Protocol; as well as to the International Treaty on plant genetic resources for food and agriculture (ITPGRFA), many of the rules have been defined in that context and have been, or are about to be, implemented into national law. Every party of the CBD and to the ITPGRFA is supposed to have a National Focal Point (NFP) and a Competent National Authority on Access and Benefit Sharing (CNA-ABS) which can inform the user on the national policy and corresponding rules concerning exchange of PGR. In this context also, the access and benefit sharing clearing house (ABSCH) website can be checked in which for many countries the laws and regulations concerning PGR exchange are supposed to be present. In addition, there can be phytosanitary requirements, that are also defined on EU level and implemented in national legislation under responsibility of national authorities. These laws and regulations are especially relevant when PGR is transferred over national borders (regional borders in some countries). However, under the Nagoya Protocol, they can also be relevant if subsequent use of the PGR requires proper documentation of the source of the PGR used (such as in commercial plant breeding). In addition, plant species may be legally protected in a country under

nature protection laws (CITES, Endangered Species Acts and other), which can mean that such plants may not be collected.

### Improving access to *in situ* PGR

Most of the difficulties regarding access to *in situ* conserved diversity are related to access to information. What material is conserved where, what is the use-value, under which conditions is it available and what should one do to get the material. Part of the answers to these questions often exists, but are not sufficiently accessible. Making these components better accessible, by digitising and translating them and connecting them via websites will increase access to *in situ* diversity substantially. It will also make clear which components are still lacking or are very weak, and thus need to be developed further.

Access to PGR, both *in situ* and *ex situ*, depends apart from the factors discussed, primarily on the existence of the PGR. In platinitudes: 'what is not there cannot be made accessible' and 'once lost is lost for ever'. Therefore, systematic, complementary conservation should be the first and main concern. Given the already significant loss of biodiversity due to various factors, including climate change, the effective and efficient organization of *in situ* conservation activities for CWR should be given a high priority, considering the dependence on the ecosystems in which they occur and the vulnerability of such systems to rapid changes.

Access to PGR can be considered of highest importance to farmers, plant breeders and crop scientists in order to assure sufficient and sustainable food production now and in the future. Therefore, all steps feasible should be taken to improve (the conservation and) the access of PGR and their wide utilisation wherever they occur.