

# Genebank for Wild Plants for Nutrition and Agriculture (Genbank WEL)

## Overview

### 1. Objectives

The objective of this case study is to present an overview and analysis of the German Genebank for Wild Plants for Nutrition and Agriculture as an example of the *ex situ* conservation of crop wild relatives and other wild plant genetic resources.

### 2. Description of the case

The Genebank for Wild Plants for Nutrition and Agriculture (*Genbank für Wildpflanzen für Ernährung und Landwirtschaft*, or “*Genbank WEL*”) aims to secure the use of wild plant genetic resources in Germany, and to guarantee their availability as seed material through *ex situ* conservation.

Genbank WEL was initiated by the Botanical Garden Osnabrück, as a follow-up of the Loki Schmidt collection of wild plants. Genbank WEL was launched as a Model and Demonstration initiative (*Modell- und Demonstrationsvorhaben*), with funding from the *Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz* (BMELV) and the *Bundesanstalt für Landwirtschaft* (BLE) for five years (2009-2014). To ensure continuation after this five year period, a cooperation agreement was signed by the partners in 2014.

The Genbank WEL network consists of the Botanical Gardens Berlin, Karlsruhe, Osnabrück and Regensburg, and the Karlsruhe University of Education, and is coordinated by Osnabrück University. For the purpose of the project, the country was divided into four parts (northwest, northeast, southwest and southeast), with each of the four botanical gardens being responsible for a region. The Botanical Garden Osnabrück takes care of the north-western part of Germany. Collection was mostly done in the years 2010-2013, between July and November. The collected species included crop wild relatives as well as species with direct or potential benefit for consumers. In addition, endangered wild plant species and populations were collected.

For the selection of the species to be collected, criteria were developed, because it was not possible to include all the 4,000 wild species that exist in Germany. On the basis of these criteria the number of species was reduced from 4,000 to about 300. One of the criteria was

that the species should not be legally protected or be on the Red list, because it is very difficult to obtain permission for the collection of Red list species. Other criteria were that the species should have at least two potential uses, and that it should not have already been widely included in other German genebanks.

During the period 2009-2013, the four Botanical Gardens participating in Genbank WEL collected about 4,300 accessions of some 300 wild species (1,333 from the northwest, 949 from the northeast, 1,159 from the southwest and 901 from the southeast). The procedure for seed collection was to harvest from a maximum of 50 plants per population (even if there were more plants). Populations should be at least 20 km apart to be considered as separate populations. The collected seed samples and duplicates have been documented and stored in the collection-holding partners of the Genbank WEL. A safety back-up of all genebanks is stored in Osnabrück.

Seeds in the genebank are distributed for the purpose of breeding, research and education. For distribution, use is made of the Standard Material Transfer Agreement (SMTA) of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). The passport data of the accessions held in the Genbank WEL are included in the National Inventory of Plant Genetic Resources (PGRDEU), the central documentation system of *ex situ* collections of plant genetic resources in Germany<sup>1</sup>. Seeds can be ordered through the Genbank WEL website<sup>2</sup>.

## Analysis

### 3. Funding and support

In the period 2009-2014, Genbank WEL was very well supported by BLE. Initial funding was granted for 3 years, but after that an extension was granted. External funding stopped in 2014, however, and the project now has to be supported by the participating botanical gardens.

In the search for further funding for Genbank WEL, efforts have been directed at foundations, such as the Deutsche Bundesstiftung Umwelt (DBU), universities and private persons. A problem is that, although Osnabrück University provides the core-funding of the Botanical Garden Osnabrück, universities generally do not consider the conservation of genetic resources as a core task. According to project staff, the conservation of genetic resources is basically a government task, but the message that genebanks are important must reach the people at higher levels in ministries.

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<sup>1</sup> [pgrdeu.genres.de](http://pgrdeu.genres.de)

<sup>2</sup> [www.genbank-wel.uni-osnabrueck.de](http://www.genbank-wel.uni-osnabrueck.de)

No technical/scientific support was received for the establishment of the Genbank WEL project, but support was not necessary, as there were no technical problems. The Botanical Garden Osnabrück has had genetic resource collections since 1984. As a consequence, facilities (such as freezers) were already available at the start of the Genbank WEL project.

#### **4. Positioning at local or regional level**

The Genbank WEL is integrated in the supply chain to the extent that collected seeds have been distributed to breeding companies and research institutes in the EU, including Wageningen University and Research centre (WUR). There has been no distribution of seeds to countries outside the EU. It is too early to know if the genetic material distributed to breeding companies and research institutes has been incorporated into commercial crop varieties.

#### **5. Partnerships and networking**

Genbank WEL has not been strong in developing partnerships and networking activities. According to project staff, there has not been any contact with similar initiatives, although they think a network of similar initiatives would be useful. Furthermore, there has not been any cooperation with local or regional NGOs or universities. However, Genbank WEL has had good contact with the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) in Gatersleben, which has an internationally renowned genebank holding more than 150,000 accessions.

#### **6. Communication**

Communication activities included exhibitions in Botanical Gardens (e.g. in Osnabrück), meetings, workshops, open lectures and brochures. Target groups included the 'Friends of the Garden', students and children. More communication with breeders could have been useful in order to make the activities more demand-driven instead of supply-driven.

#### **7. Outputs and added value**

The outputs of the Genbank WEL project were in keeping with expectations. The main reason for this is that the structure set up for the collection activities was good. According to project staff, a lot has been achieved by the Genbank WEL project, with limited means. The seeds of about 4,300 accessions have been collected and stored.

A very important added value of the project, and other projects at Osnabrück Botanical Garden, is that people focusing on agriculture and people focusing on nature conservation were brought together, and started to exchange ideas. Thus, the project has contributed to the integration of the environmentalist view of genetic resource conservation, more focused on *in situ* conservation, and the agricultural view, more focused on *ex situ* conservation.

As for the added value of the project for the agriculture and food supply chain, no proof has been obtained to substantiate the usefulness of the collection of wild plants by Genbank WEL, as the distribution to breeding companies and research institutes was not followed up.

The main practical barrier that Genbank WEL encountered during its activities was to get permission for the collection and further distribution of genetic resources from nature conservation areas (*Naturschutzgebiete*). For this, permission was needed from regionally responsible persons (*Untere Naturschutzbehörde*, at the “Kreis“ or province level). Therefore, Genbank WEL had to seek permission from many different persons, which was time-consuming. Furthermore, it was very much dependent on the ideas and convictions of these persons, of whom some were opposed to having material from their area being collected for further distribution and use. It would have been much easier if the permission to collect and further distribute genetic resources from nature conservation areas would have had to have been obtained at a higher government level, e.g. at the Federal State or the national level, i.e. from one or only a few individuals. Outside nature conservation areas, genetic resources can be collected without an access permit. Therefore, from the over 4,000 accessions collected, only 3% were obtained from *Naturschutzgebiete*. However, the best and most diverse populations of wild plants are located within nature conservation areas.

Accessions in the Genbank WEL collection are distributed with a Standard Material Transfer Agreement (SMTA), which means they can be used for research as well as breeding. Accessions in the Loki Schmidt collection are only distributed for research purposes (not under SMTA). Therefore, it is easier to obtain permits to collect material for the Loki Schmidt collection from *Naturschutzgebiete*.

## 8. Sustainability

The sustainability of the Genbank WEL project is threatened by the lack of external funding. Although the Botanical Garden Osnabrück and the other partners in the Genbank WEL project are still active in WEL activities, for instance by collecting material as by-harvest in other activities, project staff have been assigned other duties, and no regenerations nor germination tests can be carried out. Thus, though the seeds are present now, their future availability, qualitatively and quantitatively, is not assured.

Currently the BG Osnabrück is more active in the WIPs-De project, aimed at the protection of endangered wild plant species. The project focuses on 15 species (‘Verantwortungsarten’) for which Germany is responsible. The project is funded by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, via the Federal Agency for Nature Conservation (*Bundesamt für Naturschutz*, BfN). The former seed expert of Genbank WEL is carrying out germination tests with the 15 species of the WIPs-De project. BLE also still supports separate projects at BG Osnabrück, for instance on the molecular analysis of *Apium*, in which the diversity within species in different areas is investigated.

## 9. Upscaling and out-scaling

Project staff would like to see the establishment of a European-wide network combining *in situ* and *ex situ* activities. The *ex situ* conservation of wild plants is considered as a necessary addition to *in situ* conservation, because many populations of wild plants are threatened and may become extinct. *Ex situ* activities should not only be aimed at collection,

but also at germination tests, regeneration and re-introduction. The time is thought to be right for environment-oriented people and agriculture-oriented people to combine resources.

The project's approach could be broadened, e.g. to the EU level. For instance, the system with criteria for selection of the species to be collected could be used (but not necessarily with the same criteria) for similar activities that could be undertaken elsewhere, e.g. EU-wide. Also, the project approach with different partners being responsible for different geographic areas could be up-scaled and out-scaled to areas beyond Germany. The regenerations and germination tests of collected wild plants could be carried out in an EU-wide effort, with each participating institute taking on a number of species. Standard procedures have already been developed by Genbank WEL.

## Conclusions

| <b>STRENGTHS</b>  | <b>WEAKNESSES</b>   |
|---|---|
| <p>The integration of environmental and agricultural views on genetic resource conservation;<br/>           Good funding (first five years);<br/>           Availability of facilities at the start of the project;<br/>           Nation-wide network of partners, with a geographic division of tasks;<br/>           Well thought-out methodology for the selection of the species to be collected;<br/>           Seeds of about 4,300 accessions collected and stored.</p> | <p>Limited sustainability;<br/>           Limited networking.</p>                                 |
| <b>OPPORTUNITIES</b>  | <b>THREATS</b>  |
| <p>Raised awareness because of the effects of climate change;<br/>           Network of partners could be extended to other countries, even EU-wide.</p>  | <p>Future availability of the collected seeds not assured (qualitatively and quantitatively).</p> |

The main strength of the Genbank WEL project is probably the integration of environmental and agricultural views on genetic resource conservation. Other strengths include good funding during the first five years, and the availability of facilities at the start of the project, due to earlier activities carried out by the Botanical Garden Osnabrück. Methodological strengths are the establishment of a nation-wide network of partners, with a geographic division of tasks among these partners, and the development of a well thought-out methodology for the selection of species to be collected, with a series of criteria. As a result, about 4,300 accessions were collected and stored in a relatively short period. The main weakness is the limited sustainability. The end of external funding after five years has resulted in project staff being assigned other duties, and the discontinuation of regenerations and germination tests. The long-term availability of financial means is essential for

conservation. More networking activities (with similar initiatives, NGOs and universities) would have been useful.

As for opportunities, the expected effects of climate change may lead to raised awareness in Ministries and other funding agencies on the importance of the *ex situ* conservation of wild plants. The project set-up, with different partners being responsible for a specific geographic region, could be broadened to areas beyond Germany, e.g. to the EU level. The main threat is that, because of the lack of financial means, the future availability of the seeds collected in the framework of the project is not assured, qualitatively (viability of the seeds) as well as quantitatively (number of seeds per accession).

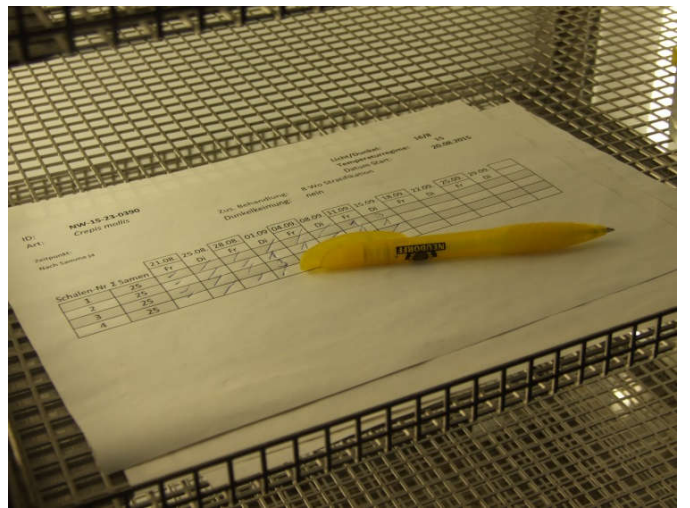
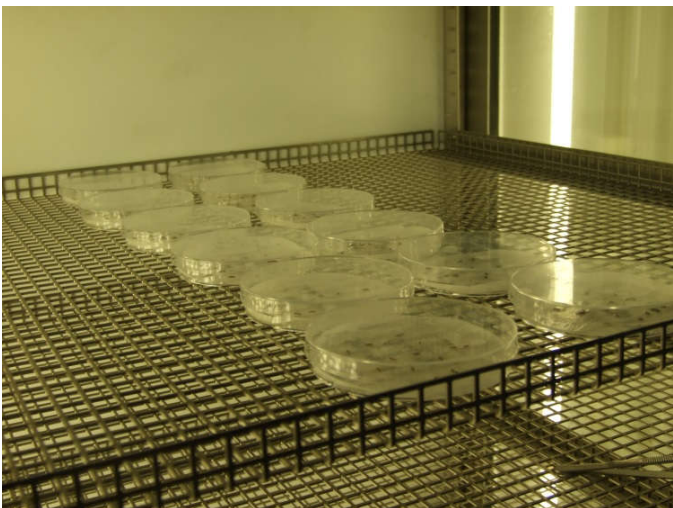
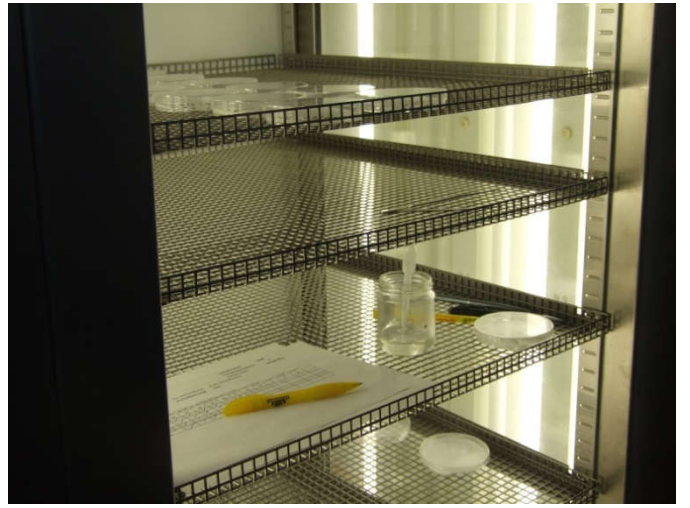
As for follow-up developments, the project's approach (with a range of partners, each with a geographic responsibility) could be broadened to areas beyond Germany, e.g. to the EU level. An establishment of a European-wide network combining *in situ* and *ex situ* activities would be even better. A very important added value of the project is its contribution to the integration of the environmental and agricultural views on genetic resource conservation. People focusing on agriculture (i.e. *ex situ* conservation) and people focusing on nature conservation (i.e. *in situ* conservation) were brought together.

Apart from playing a role in assuring the sustainability of projects such as Genbank WEL, public authorities have an important role to play in facilitating the access to genetic resources. In Germany, it proved difficult to obtain permits to collect and further distribute genetic resources from nature conservation areas, and it would be easier if permission had to be obtained at a higher government level, e.g. at the Federal State or national level.

To conclude, this case study has shown that the *ex situ* conservation of crop wild relatives and other wild plant genetic resources could be a useful addition to *in situ* activities. Through a cooperation project between various institutes, each responsible for a well-defined area, considerable amounts of wild plant genetic resources were collected from a large area within a relatively short time period, and these PGR have been documented and stored under proper conditions in genebanks. The intention to go beyond conservation and to make the collected material available for further use, however, has led to difficulties in accessing some material. Furthermore, the lack of continued external funding may threaten the future availability of the material collected.

## Figures from the field visit









## Annex 1 – List of interviewees

- Prof. Dr Sabine Zachgo, Director Botanical Garden Osnabrück, Head of Genebank WEL
- Dr Peter Borgmann, former coordinator of Genebank WEL
- Dr Nikolai Friesen, curator of the Botanical Garden Osnabrück, in charge of Genebank WEL affairs

## Annex 2 – List of references

Anonymous, 2014. Besammelte Wildpflanzen-Populationen 2009-2013 – getrennt nach Beprobungsraum. In: Poschlod, P., Borgmann, P., Listl, D., Reisch, C., Zachgo, S. & das Genbank WEL Netzwerk. Handbuch Genbank WEL. Verlag der Gesellschaft, Regensburg, Germany. pp. 175-332.

Borgmann, P., Oevermann, S., Friesen, N. & Zachgo, S., 2014. Die Genbank für Wildpflanzen für Ernährung und Landwirtschaft (WEL). In: Poschlod, P., Borgmann, P., Listl, D., Reisch, C., Zachgo, S. & das Genbank WEL Netzwerk. Handbuch Genbank WEL. Verlag der Gesellschaft, Regensburg, Germany. pp. 41-69.

Genbank für Wildpflanzen für Ernährung und Landwirtschaft (Genbank WEL). <[www.genbank-wel.uni-osnabrueck.de](http://www.genbank-wel.uni-osnabrueck.de)>

GENRES - Information System Genetic Resources. <[www.genres.de](http://www.genres.de)>

National Inventory on Plant Genetic Resources in Germany (PGRDEU). <[pgrdeu.genres.de](http://pgrdeu.genres.de)>