Thiago Mendes of CIP examines trials of CWR-derived potatoes for late blight resistance at Oxapampa, Peru. (Photo: Michael Major/Crop Trust)

Over a Decade of Wild Diversity

Looking Back on the Crop Wild Relatives Project (2011–2021)

Crop wild relatives are the cousins of our food crops that still grow in nature. Many have evolved to survive tough conditions, such as extreme heat, flooding, high temperatures and poor soils. This means that they can be a source of new beneficial genetic diversity – diversity that plant breeders can tap into to develop more resilient food crops.

But the existence of crop wild relatives is being threatened by deforestation, the expansion of cities and agriculture and climate change. If they disappear from the wild, the valuable genes they contain will be lost forever.

For a decade, the Crop Wild Relatives (CWR) Project, funded by the Government of Norway, brought together institutions, researchers, plant breeders, farmers and industry to collect, conserve and use the wild relatives of priority crops to help future-proof the world's food supplies.

Pre-breeding partners discuss use of CWR-derived alfalfa to restore a paddock in Chile. (Photo: Luis Salazar/Crop Trust)

Taking a Walk on the Wild Side

More than 100 scientists from 25 countries, across five continents, took part in a six-year quest to collect 4,587 seed samples of more than 350 wild relatives of 25 key crops – diversity that might otherwise have been lost forever.

In some cases, such as for three wild potato relatives, the seed samples collected under the project are the only examples held in any genebank.

Taming the Wild Genes

But the CWR Project was not just about conservation. Another component focused on pre-breeding, or crossing wild relatives with domesticated varieties to transfer genes for useful traits such as disease and pest resistance, and heat and drought tolerance. The resulting seeds can be further developed by breeders or, in some cases, taken up directly by farmers.

By 2021, 19 pre-breeding projects in 50 countries, with 101 partners had developed new pre-breeding materials adapted to climate change, with much of the work being carried out in collaboration with farmers (and potential consumers) to ensure that the resulting crops met local needs and growing conditions.

Uncovering Useful Traits

The project's evaluation studies have assessed the performance of the crop wild relative-derived materials under a range of conditions and climates in different countries. The pre-breeding projects have generated more than 14,000 pre-bred lines (see https://bit.ly/CWRlines) that researchers and breeders can access from the genebanks where they are conserved, through the Standard Material Transfer Agreement according to the rules of the International Plant Treaty.

Sharing the Data

The project has worked with the James Hutton Institute, UK, to make information from the projects widely available through 15 crop-specific databases on Germinate, the platform for distributing data from the CWR Project's pre-breeding programs and crop evaluation trials.

Such data are invaluable to researchers and plant breeders seeking to develop improved varieties to meet current and future needs of farmers and consumers because they help identify possible sources of desired traits.

On-farm durum wheat trials in Morocco. (Photo: Michael Major/Crop Trust)

Building Future Capacity

Finding and collecting seeds of crop wild relatives is no easy task, and neither is ensuring that they are properly documented and conserved in genebanks. Utilizing wild relatives in improvement programs is also a new frontier for many breeders.

The CWR Project addressed these challenges and others through training and capacity building as well as IT assessments and upgrades for genebanks. IT assessments were carried out for 37 national and regional genebanks, while 27 received IT upgrades.

The Project provided training and capacity building programs to 12,686 people – including more than 10,000 farmers – from 124 institutions in 70 countries participated in training and capacity building programs. The CWR Project also supported 211 post-doctoral researchers, graduate students (PhD and MSc) and undergraduate students.

Farmers from Colpar, central Peru, share their preferences for potatoes with researchers. (Photo: Michael Major/Crop Trust)

Crop wild relative-derived crops in farmers' hands

The CWR Project ensured that farmers were involved in selecting and evaluating improved material from an early stage. Thus, farmers were effectively integrated within the pre-breeding process and gained knowledge and awareness of the value of the pre-bred material.

Salt-tolerant rice lines adopted by Vietnamese farmers

Increasing salinity of soil and water is a major problem affecting rice production in the coastal zone of the Mekong Delta in Vietnam. Breeders at Can Tho University, Vietnam, working with local farmers, have developed salt-tolerant rice lines incorporating genes from rice wild relatives.

Disease-resistant potato clone released in Peru

Late blight – the disease that caused the Irish potato famine in the 1800s – is a major problem for potato farmers around the world. The International Potato Center in Peru used potato wild relatives to breed *CIP-Matilde*, a late-blight-resistant potato that's tasty and much liked by local farmers. The variety was released to Peruvian farmers in August 2022.

Drought-tolerant durum wheat variety released in Morocco

A drought-tolerant variety of durum wheat named *Jabal* was developed by scientists of the International Center for Agricultural Research in the Dry Areas in partnership with farmers and was released in July 2022 in Morocco. *Jabal* was made by crossing cultivated durum wheat with one of its wild relatives collected in Syria.

Hardy alfalfa variety widely adopted in Kazakhstan and Inner Mongolia

An alfalfa variety incorporating genes for cold tolerance from wild relatives, Zhongcao No.3, was developed by the Grasslands Research Institute, Chinese Academy of Agricultural Sciences. It is being widely adopted by farmers across Inner Mongolia, China and northern Kazakhstan, boosting livestock productivity.