

The Climate Crisis and What Crop Diversity Has to Do With It

The climate crisis is all around us. Unprecedented heatwaves. Rivers that “ought” to flood once a century now burst their banks every couple of years. Droughts burn green landscapes dusty brown. While the direct effects on people are enormous, the indirect effects may be even greater, because humanity’s food supply, in the past, now and in the future, is tightly tied to climate. The climate crisis is global, but its exact effects differ from region to region. Fortunately, there is a global solution to many of the challenges, which is ideally suited to regional differences.

Genetic Diversity to the Rescue

Crop diversity is the variability *among* different crops – think a tomato versus a potato – and *within* families of crops – imagine blue corn versus corn used for popcorn.

The genetic characteristics that make a crop or variety suitable for a particular climate in a particular region – not to mention its flavor, nutritiousness, disease resistance and so on – exist because past farmers and plant breeders valued them. Now, and with an eye to the future, they can use crop diversity to adapt agriculture to meet the challenges of the climate crisis.

But only if they can get hold of it.

Genebanks, which gather and store crop diversity, along with information about it, play a crucial role in ensuring that it remains available for use by farmers, plant breeders and researchers, come what may. And the Crop Trust plays a crucial role in supporting genebanks.



Agronomist Alberto Salas examines the flowers of a potato crop wild relative. (Photo: Sara A. Fajardo/CIP)

Diversity Under Threat

Crop diversity is itself threatened, as climate change makes certain geographical areas unsuitable for particular species. That endangers the undomesticated wild relatives of crops, which may have much to offer their cousins to adapt to climate change.

As part of its Crop Wild Relatives (CWR) Project, the Crop Trust has been instrumental in working with partners to identify areas where threatened wild relatives of crops have not been collected, and doing something about it: putting them in genebanks, and using them to breed new varieties.

Adaptation

One of the biggest challenges that potato farmers face is late blight: every year, it costs potato farmers up to USD 10 billion in crop losses. That's the same devastating fungus that caused the Irish famine in the 19th century. And due to the warming climate, late blight is destroying crops in areas it had never previously been seen in before. Working together with farmers in Peru, the International Potato Center (CIP), with the Crop Trust's support, successfully combined the disease-resistant traits of potato wild relatives with the tasty, high-yielding qualities in domesticated potatoes. The result was a new variety called CIP-Matilde, which has just been released to farmers.



Alfalfa blooms at the Chilean Instituto de Investigaciones Agropecuarias (INIA). (Photo: Luis Salazar/Crop Trust)

Mitigation, Too

Varieties such as CIP-Matilde exemplify how genebanks help support agriculture's adaptation to climate change. But as it turns out, the diversity contained within their walls can also help *mitigate* the impacts of this crisis by reducing and preventing further emission of greenhouse gasses. From the dry, freezing winters of Kazakhstan, to the parched summers of central Chile, to the blistering heat of Australia, alfalfa is the go-to crop to provide livestock with nutritious food in challenging conditions. However, as our population increases and we need more space to thrive, livestock and forage production are being shifted to more marginal, less fertile agricultural soils.

CWR Project crop breeders found wild species of alfalfa that are adapted to a range of unfavorable environments, and used them to develop new alfalfa varieties that not only survive through extremes including drought, but actually grow rather well, all while helping to save water, add nitrogen to the soil and provide nutrients to livestock. These resilient new alfalfa varieties flourish in the fields of small-holder farmers when nothing else grows.

Emergency Support

Genebanks can help to meet the challenges of the climate crisis, but they are also sometimes threatened by extreme weather. In 2019, for example, floods knocked out seed drying facilities at the national genebank in the Philippines. The Crop Trust provided emergency support to set up a new drying room.

Mindful of the need, the Crop Trust, along with the International Treaty on Plant Genetic Resources for Food and Agriculture, launched an Emergency Reserve for Genebanks as part of BOLD (Biodiversity for Opportunities, Livelihoods and Development), a 10-year project funded by the Government of Norway. While the BOLD Project focuses on strengthening food and nutrition security worldwide by supporting the conservation and use of crop diversity, the Emergency Reserve specifically offers a rapid response to genebanks threatened by natural disasters, political crises, equipment failure and other emergencies.

Vitally Important

The genetic diversity in genebanks is vitally important to face the climate crisis. *Climate Change 2022*, the report from the Intergovernmental Panel on Climate Change, clearly recognizes the value of genebanks and the diversity they contain in improving agriculture:

"Further improvements would be difficult without in situ and ex situ conservation of plant genetic resources to maintain critical germplasm for breeding."

Climate Change 2022

BOLD is also continuing to harness the potential in crop wild relatives by building on the CWR Project's legacy and continuing to broaden the genetic base of alfalfa, barley, durum wheat, finger millet, grasspea, potato and rice. This work will call upon the support of farmers, who will test the varieties in their fields to make sure that BOLD is responding to real needs.

The Crop Trust exists to conserve crop diversity and enable people to make use of it, through its support of the global network of genebanks and research with its partners.

