Background

Potato is an ideal food security crop to grow in challenging conditions, since it is highly efficient in transforming water into calories, has a short maturity period, and can be harvested over a relatively long period of time. However, viruses and diseases can build up over successive years, adversely affecting crop productivity. Scientists at the International Potato Center (CIP) have been working on new sources of disease resistance for several years and have already incorporated genes from wild relatives of potato into their breeding programs. But there is an ongoing need to identify new resistance genes to deal with evolving viruses and diseases, especially in the face of likely warmer conditions due to climate change.

The first phase of this project generated a collection of potato clones with a relatively high tolerance for heat and drought and with good resistance to late blight disease—the world’s most devastating potato disease costing developing countries USD 6.7–15 billion a year. It also built strong partnerships to support the exchange and evaluation of breeding lines among scientists in Brazil, Ethiopia, Kenya, Peru and Uruguay. The second phase aims to evaluate promising pre-bred materials in target environments, with decisions made by breeders, farmers and other partners for incorporation into breeding programs. The best-performing varieties will then be made available for release to communities that are particularly vulnerable to the impacts of climate change, initially in Peru.

Objectives

1. Selection of promising pre-bred materials for traits required by farmers for incorporation into breeding programs and variety development pipelines; and
2. Validation and introduction of sources of tolerance to drought and resistance to late blight disease into breeding populations.

Approach

The project introduces a new and potentially more efficient breeding strategy exploring the crossbreeding of diploid cultivated and diploid wild potatoes known as diploid hybridization. This is considered easier from a breeding perspective as diploid potatoes have two sets of 12 chromosomes as opposed to more genetically complex common tetraploid potatoes which have four sets of 12 chromosomes. This process improves the ability of breeders to explore and use the genetic variability present in potato wild relatives and could lead to faster development and dissemination of new, resistant varieties.

Scientists will adopt a participatory approach to select the varieties that have the best traits, as expressed by the farmers themselves, based on the pre-bred materials identified in phase I. This includes evaluating the clones in farmer field conditions. The project also includes awareness activities to increase the likelihood of adoption of the new varieties, with particular emphasis on gender equality in decision-making.

Wild relatives of staple crops often have useful traits that can be bred into the more productive varieties to sustain yields when the plants are subject to challenging growing conditions. This project aims to improve farmers’ climate resilience by identifying useful genes in wild relatives of potato and breeding new strains with good resistance to drought and late blight disease.

Improved potatoes to boost climate resilience in Kenya and Peru
**Expected outcomes**

The main outcome is to make available new, stable, resilient potato clones and varieties to national programs, NGOs and farmers in Peru and Kenya as a means of maintaining productivity under likely climate change scenarios. By using wild potato sources, scientists hope to speed up the delivery of new diversity to vulnerable farming communities.

In Kenya, 400 genotypes will be screened for resistance to late blight disease and tested in the field with farmers. In Brazil, 11 genotypes selected phase I will be evaluated in field trials for yield and disease resistance. In Peru, the team will also perform evaluations for drought tolerance. To disseminate results and build capacity among African scientists, the project will include a workshop focused on initiating an East African breeders’ network as well as holding additional meetings and developing outreach materials.

**Key outcomes**

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<th>Outcomes</th>
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<td>1. Bacterial wilt resistance of pre-breeding clones validated in on-farm trials and the incorporation of materials in the breeding pipeline in Kenya based on the traits preferred by farmers.</td>
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<td>2. Pre-bred clones derived late blight resistant-crop wild potatoes selected by Peruvian farmers through a participatory varietal selection process in phase I confirmed and at least one registered for use in the Andean region.</td>
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<td>3. The capacity of the breeders in East Africa has been raised so that they are able to use crop wild relatives in their pre-breeding initiatives.</td>
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<td>4. Crop-wild relative sources of drought tolerance have been validated and introduced into diploid potato hybrids which can be used for subsequent breeding.</td>
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**Duration**

May 2018–September 2020

**Budget**

USD 430,000

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