

Pre-breeding

Harnessing the Power of the Wild



CWR project staff with partner and farmer evaluating finger millet in Western Kenya

What is pre-breeding?

Using crop wild relatives (CWR) in crop improvement is much more difficult than breeding with domesticated varieties. Pre-breeding aims to isolate desired genetic traits (e.g. disease resistance) from unadapted material like CWR and introduce them into breeding lines that are more readily crossable with modern, elite varieties.

Pre-breeding broadens the elite genepool by re-capturing lost beneficial genetic diversity.

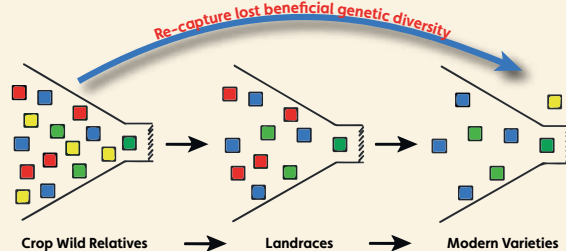


Figure based on Tanksley, S.D., McCouch, S.R. 1997. Seed banks and molecular maps: Unlocking genetic potential from the wild. Science 277: 1063–1066.

The CWR pre-breeding initiative

The initial phase of the initiative involves 19 projects focussed on creating new pre-bred materials derived from crop wild relatives.

In the current phase (2017–2020), the focus is on expanding the pre-breeding work and evaluating germplasm derived from CWRs. Newly developed pre-bred lines are being evaluated under field conditions in target environments with breeders and farmers. The project integrates promising materials into the breeding pipelines. Evaluation projects for 13 crops are supported.

The two phases of the initiative together involve nearly 100 national and international partners in 48 countries. All projects have strong capacity-building elements and always involve research partners in a CGIAR center or a university, as well as national partners in the developing world.

All key germplasm material produced will be made available to users with the standard material transfer agreement (SMTA) under the International Treaty for Plant Genetic Resources for Food and Agriculture.



Durum wheat pre-breeding, ICARDA Lebanon



Evaluation work with pigeonpea farmers in India

Where We Work

Sharing the data

The Project has teamed up with the James Hutton Institute to ensure that much of the Project's pre-breeding data is available on a common platform. Hutton has been developing software known as Germinate 3 which is specifically tailored to handle complex data associated with plant genetic resources collections. For more information, see <https://ics.hutton.ac.uk/get-germinate/>.



Reviewing finger millet pre-breeding data, ICRISAT Kenya

Target crops



Alfalfa
Drought tolerance



Banana
Drought tolerance



Barley
Drought and heat tolerance, disease and pest resistance



Bean
Heat, drought, waterlogging and root rot resistance



Carrot
Heat, salt and drought tolerance



Chickpea
Drought tolerance



Cowpea
Drought and heat tolerance



Eggplant
Drought, bacterial wilt, waterlogging



Finger millet
Drought, blast, Striga



Grasspea
Heat, toxicity, Orabanche



Lentil
Drought, Orabanche, Stemphyllium



Pearl millet
Heat tolerance and blast resistance



Pigeonpea
Salinity, pod borer, Phytophthora



Potato
Drought, heat, late blight, bacterial wilt



Rice
Drought tolerance



Sorghum
Heat, water-use efficiency, rust,



Sunflower
Drought tolerance, early flowering



Sweetpotato
Heat tolerance



Wheat (durum)
Yield potential, heat and drought tolerance, disease resistance

Examples of first promising pre-breeding materials becoming now available

Bean: Scientists at the International Center for Tropical Agriculture (CIAT) have identified two wild *Phaseolus acutifolius* accessions which can tolerate high night temperatures. They have been used as parents in breeding programs for improving heat tolerance. Our partners have also found that bean wild relatives have traits for tolerance to waterlogging and root rot pathogen.

Pigeonpea: Pre-breeder at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have selected a high-yielding line (ICPL 15028) which has resistance to multiple diseases (wilt, sterility mosaic disease and phytophthora). The line has been included in the national crossing program of India.

About Us

This work is part of the initiative *Adapting Agriculture to Climate Change: Collecting, Protecting and Preparing Crop Wild Relatives* which is supported by the Government of Norway. The project is managed by the Crop Trust and implemented in partnership with national and international genebanks and plant breeding institutes around the world. Keep up to date with project activities by visiting the project website at www.cwrdiversity.org or by following us on Twitter and Facebook @CropWildRelativ. For general inquiries, please contact crowildrelatives@croptrust.org.

