



Diversity in durum wheat landraces to tackle drought

For more information about the 'Seeds for Needs' initiative, see:

- Factsheet 1
A participatory approach for landrace evaluation
- Factsheet 2
The crowdsourcing approach
- Factsheet 3
Strengthening the informal seed system through community seedbanks
- Factsheet 5
Molecular techniques to map farmer and breeder preferences – an innovative approach towards participatory plant breeding
- Factsheet 6
Improving Ethiopian durum wheat landraces through breeding

Eastern Africa and Ethiopia in particular, are known for their frequent exposure to drought that can cause severe damage and loss to crops and livestock. The latest drought in 2011-2012 threatened the livelihoods of almost 10 million people. Governments of affected countries and international institutions are working restlessly to prevent and manage the risks related to drought through various coping and adaptation strategies. Climate change will also exacerbate an already critical situation (IPCC 2014). We urgently need to find crops that can adapt to the harsh climates of the region.

In Ethiopia, our 'Seeds for Needs' initiative is examining durum wheat varieties to find drought-resistance traits. In the long term, this initiative could benefit millions of Ethiopian farmers and produce global benefits, if these traits are used for breeding drought-resistant varieties that can be used in other drought-prone areas – such as Central Asia, Middle East, North Africa and the USA.



Our partners

In 2011, with our partners in Italy (Scuola Superiore Sant'Anna) and Ethiopia (Mekelle University), we started screening local and traditional varieties (landraces) of durum wheat and evaluating their performance against drought conditions.

Our progress

An initial portfolio of 400 durum wheat varieties from the Ethiopian National Genebank were exposed to drought in the greenhouse for three weeks. After this test, the varieties were classified as completely dead, partially dead and full survivors. Random samples were taken from each of these three groups to form 64 samples (52 landraces and 12 improved varieties) that were then tested in the field. Each variety was exposed to drought during the whole reproductive cycle and we monitored soil moisture continuously to ensure that drought conditions were met. We also collected agronomic and morphological characters and asked farmers to evaluate the overall performance of the 64 varieties. Two stress-resistance mechanisms were

identified: a) drought escape (varieties that mature early and can escape drought if this happens at the end of the normal maturing cycle); and b) drought resistance (or 'stay green' throughout the drought). Farmers clearly preferred the 'stay green' mechanism, since crops have more time to develop and grow, producing higher yields and biomass (which is important as animal fodder).

The results were beyond expectation: 11 of the tested landraces (more than 20%) performed better than the 12 commercial varieties that were specifically improved for drought resistance. The difference in performance can be seen in the photos.

Looking ahead

We will test the most promising varieties in more drought-prone wheat growing areas. In the meantime, we will start the process of registering these varieties with official authorities so that they can be distributed to target areas within Ethiopia and possibly used beyond the country.



Cover Photo: Wheat varieties grown in a field trial in the Tigray Region, northern Ethiopia.
Credit: Bioversity International/C.Fadda



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