

# Drought Tolerance In Action – **WEMA**



## *The Problem*

Drought is becoming an increasingly common reality for farmers on every continent and the situation is expected to worsen in the coming years. In 2013, leaders of the World Meteorological Organization (WMO), the Food and Agriculture Organization (FAO) and the UN Convention to Combat Desertification (UNCCD) called on countries to urgently and proactively adopt strategies to make them more resilient to drought. Among other recommendations, they urged farmers to do their part by employing practices such as planting drought-resistant crops and boosting soil fertility in order to improve productivity and sustainability in drought-prone regions of the world.

Sub-Saharan Africa is at particular risk for drought. Nearly three-quarters of the world's most severe droughts over the past decade have occurred in Africa, where maize is a staple crop. More than 300 million Africans depend on maize as their primary food source – a risky proposition when an estimated 24 million tons of maize are lost to drought each year. However, this risk can be mitigated and hunger and malnutrition averted for millions of people through the adoption of new technologies and

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improved farming techniques. Such is the premise behind the Water Efficient Maize for Africa (WEMA) initiative, a ground-breaking public-private partnership whose goal is to enhance drought resiliency and food security in sub-Saharan Africa through the development and dissemination of high-yielding, locally adapted drought-tolerant maize varieties.

## *The Invention*

Researchers have been working to develop drought tolerant crops for decades, and they've seen great success in recent years. Today, both conventionally bred and genetically modified drought-tolerant corn varieties have been developed by private companies for the North American market. Through the WEMA project, the African Agricultural Technology Foundation and its public and private partner organizations are taking these promising commercial developments and translating them for humanitarian purposes – to benefit smallholder farmers and improve food security in the drought-prone regions of Tanzania, Kenya, Mozambique, Uganda and South Africa.

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Making sense of intellectual property

WEMA is harnessing the twin engines of conventional breeding and genetic modification to deliver drought tolerant maize varieties. Using a conventional breeding approach, researchers have used genetic markers identified and patented by both private companies and public researchers and high-throughput analysis to screen vast germplasm libraries for promising leads to cross breed into maize lines with drought-tolerant characteristics and local adaptation.

The parallel approach to conventional breeding applies genomics, biotechnology and genetic modification to the breeding process. A patented gene inserted into the maize plant not only helps plants cope with cold but also drought stress by triggering changes in the plant's structures that reduce respiration and water loss. Rather than withering and dying under drought as would typically occur, the genetically modified plant goes into "survival mode" whereby it conserves energy and water to enable the plant and its fruit to withstand lengthy periods of moderate drought.

## Results

The benefits these improved varieties will deliver will be significant and are just around the corner. The first conventional drought-tolerant varieties have been licensed to seed companies in Kenya, and will be available to

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farmers in time for the rainy season of 2013. Smallholder farmers are expected to benefit greatly, as field trials have shown yield improvement of up to 18 percent over typical varieties. The genetically modified maize is expected to come to market later in the decade, and researchers believe that those varieties will deliver even greater yield benefits than the conventionally improved maize – potentially between 20-35% higher yields than

current varieties under moderate drought conditions. This not only means more abundant harvests, but also more reliable harvests, enabling smallholder farmers to better feed their families, and potentially produce a surplus that they can then sell into the marketplace. Collectively, WEMA estimates that improved varieties could produce an estimated 2 million tons of corn annually – enough to feed more than 15 million people.

## A PUBLIC PRIVATE PARTNERSHIP FOR THE GREATER GOOD

WEMA brings together several partners in the public sector as well as Monsanto, which contributed its commercial drought-tolerance trait, insect-resistance trait and maize germplasm to the project royalty-free. The international



maize and wheat research organization CIMMYT is also contributing its extensive germplasm resources to the effort, and national agricultural research and extension programs, seed companies and NGOs are contributing funding and other resources to the project as well. WEMA will license all new varieties widely to local seed companies under the condition that they are made broadly available to smallholder farmers at an affordable cost.

While drought-tolerant maize will not be a sole solution to the challenge of food security in Africa, it promises to be a significant advancement which, when paired with other new technologies and improved farm management practices, will provide a valuable tool to fight against drought stress, reduce harvest losses and improve the livelihoods of some of the world's poorest farmers.

With continued investment in research, development and intellectual property to drive such important innovations, the future of sustainable agriculture in Africa and around the globe is looking up.

### Sources:

UN High-Level Meeting on National Drought Policy, <http://www.hmndp.org/node/332>  
Water Efficient Maize for Africa, <http://wema.aatf-africa.org/>