



Drought-tolerant maize for Africa: Better food security and livelihoods

Highlights of 2008

“Imagine there is drought and your maize crop suffers less. There is still enough to harvest to feed your family and maybe sell some grain or green cobs on the market ...”

“Imagine seeds of these varieties are available in your country and can be purchased near your farm ...”

“Imagine due to farmers growing such varieties there is less need for grain imports ...”

These are the dreams that a broad alliance involving CIMMYT and IITA, national research and extension programs, local seed companies, and non-governmental organizations – more than 50 partners in 20 nations of sub-Saharan Africa – wants to make a reality over the next 10 years. Part of this alliance is the Drought Tolerant Maize for Africa (DTMA) Project.

The DTMA Project’s work builds upon the early successes of these partners in developing and disseminating drought tolerant, high-yielding, locally-adapted maize varieties to farmers in sub-Saharan Africa. The aim is for farmers to be able to harvest a ton more of grain per hectare than with their current varieties, when drought hits their crop. With the added food and income, farmers are more food secure and they can also sow less maize and allocate land to cash crops or legumes, which provide protein for diets and improve soil fertility. The project hopes to benefit 30-40 million people within 10 years.

The work of the broad alliance is made possible with combined support from the Swiss Agency for Development and Cooperation, the Federal Ministry for Economic Cooperation and Development in Germany, the International Fund for Agricultural Development, the Bill & Melinda Gates Foundation, the Howard G. Buffet Foundation, USAID, Pioneer HiBred and the Eiselen Foundation.

Key activities

Finding and drawing on new sources of drought tolerance from global maize genetic resources

Maize contains a large amount of natural variation for drought tolerance. DTMA uses the best sources from among the world's maize genetic resources, tries to identify genes and alleles responsible for drought tolerance, and combines them together into new highly drought tolerant varieties that can be used by breeders world-wide to harden their own varieties. We are examining landraces, maize grown in temperate environments such as China and the USA and the best of CIMMYT's and IITA's germplasm.

Getting the seed to to farmers faster – capacity building and partnerships

“Researchers tell me that a new variety is available but I cannot get the seed” – This is a frequent concern of farmers in SSA. The DTMA Project strengthens the capacity of national agencies for rapid farmer-participatory varietal testing and release by promoting new skills and team work. Breeder seed is provided to seed companies and new seed companies supported with technical advice. Farmers, extension officers and NGO groups are made aware of the new varieties. In-country working groups ensure a coherent set of activities planned and executed by the countries' own people and institutions.

Developing drought tolerant open pollinated varieties (OPVs) and hybrids adapted to sub-Saharan Africa (SSA)

To be useful to farmers in SSA, drought tolerance needs to be built into locally adapted, high-yielding varieties, that do well under farmers' conditions and are popular with seed producers and consumers. The conditions and preferences are diverse across SSA. The collaboration among CIMMYT, IITA and national breeders will generate varieties suited to various countries and needs, while using and interchanging information about the best germplasm and methods.



State-of-the-art maize breeding: 39 maize breeders drawn from 15 African countries attended a three-week training course in Kenya

Developing the varieties faster - new technologies

The DTMA Project makes advanced technologies available to maize breeders working for Africa – precise drought sites for screening experimental varieties, molecular analysis platforms for identifying the right genetics, doubled haploids to develop inbred lines faster, software and information to make more appropriate selection. It is all about doing the job faster, more cost effectively, and more precisely. In addition to CIMMYT and IITA, Cornell University and the University of Hohenheim are important partners.

Generating impact – working with partners

The DTMA Project is looking for holistic solutions for farmers in drought affected areas. Guided by powerful GIS-based climatic analysis and community surveys, we are looking for partners among seed companies, government and NGOs that provide complementary technologies and services to make real differences in farmers' livelihoods.

2008 Highlights

Getting everyone involved: To increase farmers' adoption of improved drought tolerant (DT) maize varieties involves gathering feed-back from the farmers themselves and working with germplasm from both public and private sources. In 2008, maize germplasm submissions to regional trials were also made by public and private sector collaborators; 159 hybrids and open pollinated varieties (OPVs) in total made it into the regional maize trials where they are being characterized for yield, tolerance to drought and low soil fertility, and resistance to important diseases such as gray leaf spot, *Turicum* leaf blight, and maize streak virus. "In eastern and southern Africa, we have received 48 DT entries from both national agricultural research systems and private companies, who have realized the benefits of participating in these trials. For the national agricultural research systems, their best germplasm becomes much more widely known for uptake by the private seed sector; who in turn have an opportunity to assess suitability of their germplasm at regional level for wider marketing," says CIMMYT maize breeder Dan Makumbi.

Maize seed without borders: Farmers in similar agroecologies in sub-Saharan Africa (SSA) look for comparable traits in improved maize varieties, but often cannot access seed of improved varieties from neighboring countries due to restrictive cross-border trade regulations. With negative impacts of drought and potential climate change being harsh realities in Africa, it is now more important that new DT maize varieties rapidly reach farmers. There are widespread calls for reforming current policies to enhance the release, production, and marketing of new varieties. More than 60 senior policy makers met in Nairobi, Kenya, at a regional workshop organized by CIMMYT and IITA in July 2008 to agree on policy actions. Discussions were guided in part by recommendations from a comprehensive seed sector survey led by CIMMYT and conducted in 13 DTMA Project countries. "Specific actions and commitments by national governments include harmonization of regional seed regulations," suggests Ambassador Nagla El-Hussainy, COMESA Assistant Secretary General. "This will improve rates of variety release, lower costs in dealing with

regulatory authorities, increase trade in seed of improved varieties and, ultimately, adoption by farmers."

Partnerships in drought-screening: A large-scale drought screening facility jointly developed by CIMMYT, the Ministry of Agriculture and the Kenya Agricultural Research Institute (KARI) at Kiboko, Kenya, was commissioned by the Assistant Minister of Agriculture, Gideon Ndambuki in September 2008. "Farmers have seen the drought tolerant maize technology that will improve their agricultural productivity, and make food insecurity and reliance on relief food history," says Ndambuki. "I thank CIMMYT, KARI and the Bill & Melinda Gates Foundation for making this site a reality." Investments in developing precise large scale regional drought screening sites were also made in Nigeria and Zimbabwe. The Kiboko site will also be used as a training center for maize breeders, technicians, and students from African countries and beyond.

Building up indigenous seed enterprises: business unusual If seed of drought tolerant maize varieties does not reach farmers in drought-prone regions, then its inbuilt power will remain unrealized. Supporting small seed enterprises will catalyze their growth and sustainability in meeting farmers' seed requirements, many of whom are so far inadequately supplied. During 2008, CIMMYT and IITA project scientists provided technical backstopping to seed providers in eastern, southern and West Africa. Also 28 seed company executives were trained on various seed business management aspects. Through a four-module course, experts from CIMMYT, IITA and successful private sector seed enterprises in Africa provided hands-on training on how to manage various seed business aspects, including: human resources, finances, product development, seed production as well as strategic planning. "This course was exactly what I needed; I have now become an all-rounder after gaining insights into areas like resource and finance management which were not my core expertise," says Eunice Ombachi, Production Manager, Kenya Seed Company. "I liked the hands-on approach very much. I highly recommend this course!"



Kenya's assistant minister for agriculture, Gideon Ndambuki (2nd left) urged farmers to use the drought tolerant maize technology to achieve food self-sufficiency during the commissioning of the large scale precision drought screening site at Kiboko, Kenya.



Zimbabwe won the DTMA Best Technology Dissemination Team award; which was presented by CIMMYT DG Tom Lumpkin (3rd left)

Ethiopia does it again! In 2008, for the second year running, Ethiopian maize breeders won the DTMA Best Maize Breeding Team award for eastern Africa, awarded to Ethiopian Institute of Agricultural Research (EIAR) – Melkassa. In southern Africa, this award went to the Zambian maize program; while in West Africa it was won by the Institute of Agricultural Research, Ahmadu Bello University, Nigeria. The Best Technology Dissemination Team award was won by Uganda’s Nalweyo Seed Company (NASECO) and the National Crops Resources Research Institute (NaCRRI) in eastern Africa, while Zimbabwe won the award in southern Africa. These awards were in recognition of outstanding partnerships, team work, commitment, and excellence among the national agricultural research institutes and the private sector along the entire maize value chain, from breeding to getting improved DT varieties to farmers’ fields and ultimately to farmers’ tables. Says Dr. Adefris Teklewold, Crop Research Director at EIAR: “We are proud of our maize teams, who have shown that agricultural investments and development are worthwhile in Ethiopia. We will continue working with CIMMYT and other stakeholders to ensure that we get solutions to maize farmers’ problems.”

Towards data-driven breeding: In 2008, breeders moved towards data-driven breeding through use of the DTMA Project data management tools – “MaizeFinder” and “Fieldbook”. The applications help breeders accelerate breeding progress by better managing their pedigrees, data, and nurseries, as well as implementing improved design and spatial analysis techniques. The Fieldbook inventory is bar-code compliant, and users can efficiently manage seed inventories, print labels and link back to trial data. In the near future, breeders will be able to make their DT maize germplasm selections on the web through the International Maize Information System (IMIS) – a comprehensive database including phenotypic, molecular, and environmental data from CIMMYT and IITA.

Targeting for impact: “One size does not fit all” – Africa is a diverse continent and to reach millions of small-scale farmers with improved DT maize varieties, the Project teams need to carefully target their investments to mission-critical bottlenecks and effective scale-up strategies in the seed value chain. In 2008, the teams developed seed and impact road maps, consolidated geographical information systems (GIS) data and gained insights from household surveys executed with national economists in all DTMA countries. Drought, food insecurity and health featured among the most prominent concerns of surveyed farm families.

Innovative learning takes off: Through the Innovative Learning Platforms (ILePs) launched in Malawi and Nigeria in 2008, multiple stakeholders will work synergistically to ensure that farmers increase their incomes through access to maize production inputs (improved DT maize varieties, fertilizer, and credit) and to output markets. The ILePs are unique because they seek to rationalize and harmonize efforts of stakeholders at national, district, community and farm levels. Each of the stakeholders – ministries of agriculture, researchers, extension agents, seed producers, agro-dealers, marketing companies, non-governmental organizations, micro-financial institutions, and farmers – understand their role and how their efforts all fit in. Says Wilfred Mwangi, DTMA Project Leader: “The ILeP will bring drought tolerant maize closer to farmers by harnessing the synergies in the maize value chain.”

Capacity building for sustainability: The DTMA Project provides training for building sustainability into national programs – both private and public. Scientists from IITA, CIMMYT, national agricultural research systems and established seed companies worked closely together in designing and running the courses much to the satisfaction of course participants. For example, 39 maize breeders drawn from 15 African countries took part in a three-week training course on state-of-the-art maize breeding – with an emphasis on drought tolerance – organized by KARI, CIMMYT and IITA. Separately, 103 scientists and technicians from national agricultural research systems, NGOs and seed services improved their expertise in variety release approaches. Twenty economists were trained in econometric analysis, while 4 were trained in scientific writing. There were also on-going programs which supported 45 visiting scientists, 16 MSc and 12 PhD students. Complementing these efforts, training DVDs were reproduced in 2008 for wider dissemination.

Changes in Advisory Board: Dunstan Spencer, a Senior Partner with Enterprise Development Services Ltd, Sierra Leone, joined the DTMA Project Advisory Board in 2008 and will provide guidance in socio-economics. He replaces Derek Byerlee.

For more information
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