CIMMYT International Maize and Wheat Improvement Center | IITA Research to Nourish Africa

The Drought Tolerant Maize for Africa (DTMA) Project is being implemented jointly by CIMMYT and the IITA, and is funded by the Bill & Melinda Gates Foundation and the Howard G. Buffett Foundation. The project is part of a broad partnership also involving national agricultural research and extension systems, seed companies, non-governmental organizations (NGOs), community-based organizations (CBOs), and advanced research institutes, known as the Drought Tolerant Maize for Africa (DTMA) Initiative. Its activities build on longer-term support by other donors, including the Swiss Agency for Development and Cooperation (SDC), the German Federal Ministry for Economic Cooperation and Development (BMZ), the International Fund for Agricultural Development (IFAD), and the Eiselen Foundation. The project aims to develop and disseminate drought tolerant, high-yielding, locally-adapted maize varieties and to reach 30-40 million people in sub-Saharan Africa with these varieties in 10 years.

Highlights of 2009

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

"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.

Partner involvement on the up and up: In 2009, all project teams, national agricultural systems (NARS) breeders, economists and private sector representatives worked in closer collaboration with the increased synergy resulting in more project outputs. This was most evident during the DTMA annual review and planning meeting held in Masvingo, Zimbabwe in September where results of activities throughout the region were shared and discussed. In eastern Africa, teams reported substantial changes in the rate and intensity of adoption of improved maize varieties; with female farmers more actively cultivating improved maize varieties. In southern Africa, there is a high need for drought tolerant (DT) maize varieties, and the production of foundation seed will be doubled to cope with this need. In West Africa, the partnerships within the project countries have been established and are running well. "Today, we're here working on a noble project to develop drought tolerant varieties that will change the lives of the poor. Let us make Africa the bread basket of the world," said Thomas Lumpkin, CIMMYT Director General.

Recognizing excellence: In southern Africa, the 2009 DTMA excellence team award for technology development and dissemination went to Malawi, while Zimbabwe received the prize for breeding. These presentations were made by Thomas Lumpkin, CIMMYT Director General in September. In West Africa, Ghana won the breeding award, while the prize for technology dissemination went to Mali. The awards were presented to the proud winners by Paula Bramel, Deputy Director General (Research), IITA in March 2009.

Staff changes: In October 2009, Marianne Bänziger became CIMMYT's new Deputy Director General for research and partnerships, while Wilfred Mwangi became Associate Director, of CIMMYT's Global Maize Program (GMP). Previously, Bänziger was the GMP Director. Mwangi remains the DTMA Project Leader. Both will continue to provide leadership to the DTMA project, and the project congratulates them on the promotions.

Training in communications: The B&MGF sponsored the Global Development Communications Training held between 21 and 23 October in New York, USA. The focus of the training was repackaging and summarizing project core activities into effective communication products. The highly interactive sessions were particularly engaging; covering topics such as 'crafting the elevator speech' and 'story telling'. There were also useful sessions on working with the media, opposition messaging and engaging policymakers. This training was attended by DTMA's Wilfred Mwangi and Anne Wangalachi.

Bill Gates meets with DTMA and WEMA leaders: On 16 October 2009, Bill Gates, Co-Chair and Trustee of the Bill & Melinda Gates Foundation (B&MGF), chaired a meeting on drought stress work supported by the foundation in Africa attended by CIMMYT's Thomas Lumpkin, Marianne Bänziger and Wilfred Mwangi, together with representatives from the African Agricultural Technology Foundation (AATF), Monsanto and the B&MGF in Des Moines, Iowa, during the World Food Prize meeting. The two main projects are the DTMA and Water Efficient Maize for Africa (WEMA) projects. Both projects are collaboratively developing maize varieties with significantly increased drought tolerance and yields through complementary technologies, approaches and expertise.

In December 2009, Gates was in Nairobi to meet with CIMMYT's Bänziger, Mwangi, Dan Makumbi, and Stephen Mugo. Mugo is the CIMMYT WEMA lead, while Makumbi is a maize breeder with the DTMA. Dr. Daniel Mataruka, Executive Director of the AATF, which coordinates the WEMA project, hosted the group. During the meeting, the progress made in developing DT maize varieties through both projects was reviewed, and CIMMYT displayed ears of some of the most promising hybrids developed so far under the DTMA project, explaining their potential for improving small-scale resource-poor farmers' food security and livelihoods in sub-Saharan Africa, which this year experienced one of the worst droughts in years.

The Howard G. Buffett Farm—Boosting African seed production: Availability of foundation seed is a key constraint to many start-up seed companies. Through the DTMA project, CIMMYT has begun to produce significant quantities of foundation seed of new DT maize varieties at a farm supported by the Howard G. Buffett Foundation. The seed boosts emerging local seed companies' capacities to more rapidly scale up seed production and establish a sustainable seed business in a shorter time period. The seed farm was set up in 2008, and in 2009, it produced 120 tons of basic seed from 65 hectares. The DTMA project does not intend for this initiative to be a long-term continuous supply of foundation seed to the same companies, but rather as one-time production of particular parents for particular varieties to accelerate the scale-up and delivery of new varieties to farmers.

Presidential endorsement of ZM 309: In September 2009, Malawi's President Dr. Bingu wa Mutharika placed his stamp of approval on ZM 309—a new drought tolerant (DT) maize variety officially released in the country in March 2009. This was during the presentation of a 10-ton consignment of this seed at State House in Lilongwe by Wilfred Mwangi, and Peter Setimela, maize breeder. "The new maize variety, ZM 309, released under the auspices of the DTMA project, will give Malawi farmers an advantage because it is high yielding and drought tolerant," said the President. "We welcome this research because it will help Malawi cope with climate change and improve food security." ZM 309—locally known as '*msungabanja*' (Chichewa for 'that which takes care of the family')—is an open-pollinated maize variety (OPV) meaning farmers in the country's drought-prone areas have the option to save seed to plant in subsequent seasons with minimum yield loss. ZM 523 is DT maize OPV that was also officially released in March. Both varieties were developed through joint efforts by CIMMYT, Malawi's Ministry of Agriculture and Food Security, and the Chitedze Research Station. They are also resistant to maize streak virus, gray leaf spot, and other diseases, and can tolerate low soil fertility. The two varieties were developed and promoted as part of the DTMA project's Innovative Learning Platform (ILeP)—an initiative that involves public and private sector partners and NGOs in developing and promoting DT maize varieties to increase farmer adoption. ZM 309 and ZM 523 information leaflets in Chichewa have been distributed to farmers.

Supporting national variety release efforts: More than 20 researchers and members of the Agricultural Technology Clearing Committee (ATCC) in Malawi took part in a workshop on variety testing and release awareness, in Lilongwe in February 2009. They learnt about the variety release procedures and guidelines in selected sub-Saharan Africa (SSA) countries. "One main obstacle in SSA is the lack of an effective variety release system," said Peter Setimela. "Seed companies exist to market good quality seed of improved varieties to farmers. To succeed, they need to release such varieties quickly, and farmers are ultimately the ones who benefit." In April and May 2009, 49 technicians from West and southern Africa were also trained on variety testing and release approaches in Ghana and Zambia. Other topics covered included: management of field trials and nurseries; seed production; screening for drought, Striga, low soil fertility; and variety release approaches and systems. DTMA project scientists and collaborators conducted the training and included: Baffour Badu-Apraku (IITA), Peter Setimela (CIMMYT), Manfred Ewool (Crop Research Institute, Ghana), Prof. M. Fakorede (Awolowo University, Nigeria), Mick Mwala (University of Zambia), Catherine Mungoma and Mwansa Kabambe (Golden Valley Research Institute, Zambia) and Francisco Miti (Seed Control and Certification Institute, Zambia). A similar training course for 36 Ethiopian maize technicians was held between 23 and 27 November in Nazaret, Ethiopia. The course was coordinated by Dan Makumbi.

In 2009, the project produced the *Variety testing and release approaches in DTMA project countries in sub-Saharan Africa* report. The report's authors, Peter Setimela, IITA's Baffour Badu-Apraku, and Wilfred Mwangi, collected and summarized data on variety testing and release regulations in the 13 DTMA project countries (Angola, Benin, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Tanzania, Uganda, Zambia and Zimbabwe). The survey results show that variety testing and release systems and approaches differ greatly among the countries. Among the key findings is that in some of the countries there were limitations of high costs involved, lengthy processes, and delays in the return of investment. What recommendations does the study make? These include: the use of data from other countries and breeders' own data to reduce the time (and resources) spent on collecting data for variety release committee meetings; developing and promoting regional variety release systems; harmonizing regional seed laws to ensure that they are clearly understood and consistently interpreted across all countries; simplifying variety testing by reducing the number of traits for distinctness, use and stability (DUS) and value for cultivation and use (VCU); increasing the frequency of national varietal release committees meetings and providing more government funds to support these meetings.

As a result of these various variety release support efforts, new DT maize varieties were released for production and marketing by national authorities in Zimbabwe and Nigeria, in November and December, respectively. The Nigerian varieties are SAMMAZ20, SAMMAZ26 and SAMMAZ27 (OPVs) and SAMMAZ22, SAMMAZ23, SAMMAZ24, and SAMMAZ25 (hybrids). These were developed by IITA in partnership with the Institute for Agricultural Research of Ahmadu Bello University in Zaria, Nigeria. In Zimbabwe, Agriseeds, a local seed company, will produce ZM 309 and ZM 401 (both OPVs).

Reforming seed policies in West Africa: Thirty-four participants from six countries—Benin Republic, Cote d'Ivoire, Nigeria, Ghana, Kenya, and Mali—met in Abuja, Nigeria in October 2009 to discuss the findings and policy recommendations of a joint IITA-CIMMYT study on bottlenecks in the West African seed sector, and to identify the best strategies for increasing access to improved maize seed by the region's farmers. The participants comprised seed entrepreneurs from the private sector, policy makers, donors, and officials from research and development institutions and representatives of sub-regional political, economic and research organizations.

Key among the findings was that only 33% of seed demanded by the region's farmers was supplied in 2007, and in Nigeria for example, this was mainly through government subsidy programs. Blamed for this was poor access by farmers, high cost of improved seed, few effective seed companies, high seed production and marketing costs, and lack of awareness by farmers on new maize varieties.

"A functional, effective, vibrant, and streamlined seed sector is critical for the DTMA project and the region to achieve increased incomes for farmers, reduced food prices for consumers and improved profitability and sustainability of the seed industry," said Wilfred Mwangi, DTMA Project Leader.

"Private seed producers including the community-based schemes play a vital role in seed sectors, and governments can support them to reach more farmers, even those in marginal areas through improving the policy environment; increasing their access to production credit and market infrastructure; and providing targeted subsidies that will not distort the market," said Tahirou Abdoulaye, the IITA economist who led the study.

To improve farmers' awareness on the yield and profit benefits of using seed of the new DT maize varieties, and to encourage them to buy this seed, incentive schemes and better extension services support were proposed. Additionally, enhancing the distribution channels and ensuring that only high quality seed is sold to farmers be it certified or truthfully labeled, would also complement these efforts. In West Africa, a total of 16 DT maize varieties and hybrids were released in 2009.

Capacity building for sustainability: In February 2009, the DTMA project organized a course on best practices in statistics and data management for maize breeders, for 27 scientists and students from CIMMYT, IITA and collaborating national agricultural research systems (NARS) in Harare, Zimbabwe. They brushed up their knowledge and skills in basic and advanced statistical analysis through highly interactive theoretical and hands-on sessions. Discussions touched on use of molecular marker technology—a technology set to increase breeding efficiency and improve drought tolerance and disease resistance in maize lines. The participants also visited maize trials at CIMMYT in Zimbabwe to learn more about best practices in mechanization and electronic capture of field data. Resource persons from CIMMYT were Jose Crossa, Gary Atlin, Cosmos Magorokosho, Bindi Vivek, John MacRobert, Hector Sanchez, Jiankang Wang, Kassa Semagn and Yunbi Xu. Others were Sarah Hearne (IITA) and Jean Sabado (International Rice Research Institute - IRRI).

In June 2009, a group of 15 scientists from southern Africa were trained on how to use Fieldbook, the CIMMYT-designed software for managing breeding programs. Hosted by CIMMYT-Zimbabwe, the training was carried out in Harare. It was a useful exercise to them all, and they termed the software as being "user-friendly" and the "best for managing breeding materials and analyses."

Through visiting scientist opportunities at both CIMMYT and IITA, national scientists (PhD and MSc students and breeders from national research programs) improved their skills especially in breeding for drought tolerance and related aspects. In 2009, three PhD and four MSc students successfully completed their degree programs.

"Before my training at CIMMYT, my work was limited to collaborative research as I had no capacity to initiate my own breeding program. After working with the top-range scientists, I have gained what I had been seeking for a long time—the knowledge and practical skills in maize breeding—and I can confidently support my government's efforts in developing new and suitable maize varieties," says Atungoza Bilaro, a young breeder from the Tumbi Research Institute in Tanzania. For him, the training was timely as many senior breeders have retired and he feels more confident in his abilities to help fill the gap left.

Business management for African seed businesses: CIMMYT seed system specialist John MacRobert has produced a practical guide entitled *Seed Business Management in Africa*, which covers both the technical and business aspects of running a successful seed company in detail. "In recent years there has been a surge of entrepreneurs entering the seed sector all over Africa, as they have recognized a market opportunity," says MacRobert. "The question is how to

help these fledgling and growing businesses become profitable and sustainable." This book serves as a one-stop shop for seed producers, marketers, researchers and managers in the seed business.

In 2008, 28 managers from 15 African countries were trained on how to run successful seed businesses and the management manual was developed. Speaking a year later, one of the participants, Ibrahim Abdullahi, Managing Director of Maslaha Seeds, Nigeria appreciates the course's usefulness and the knowledge he acquired, especially as he was still new in seed business management. "I found the course fantastic!" he said. For more information and to access this book online, see http://dtma.cimmyt.org/index.php/publications/doc_view/87-seed-business-management-in-africa?tmpl=component&format=raw

Promoting DT maize in Kenya and Tanzania: In June 2009, the Kenya Maize Working Group (KMWG) held a promotional materials development workshop, in Nairobi. Members of the group and communication specialists were invited to discuss ways in which to publicize the drought-tolerant maize varieties. Participants agreed on the key messages on the DT maize—'can withstand drought, early maturing and yield stability'—through which farmers could be encouraged to grow quality certified DT maize. The means identified include: radio, television and mobile telephones; posters, fliers, brochures, banners, newspapers and messages (slogans) printed on T-shirts and caps. The group would also explore the use of field demonstrations, and maize fairs specific to DT maize varieties. In Tanzania, a local seed company, Tanseed International is using innovative and effective promotional strategies such as "maize seed men"—men with ears of improved (maize) varieties pinned to their tunics and a "mobile seed shop"—a vehicle with signs and a loudspeaker that travels throughout villages promoting and selling improved maize seed.

Insights from community survey reports: A report on a community survey carried out in eastern Kenya has been published and posted on the DTMA website (http://dtma.cimmyt.org/index.php/publications/doc_view/83-community-survey-report-kenya-2009?tmpl=component&format=raw). Similar surveys have been carried out in the other DTMA project countries. The studies provide information on key DTMA indicators such as adoption rates for maize varieties in different areas, as well as critical household and area characteristics including relative riskiness and profitability of maize, drought-risk coping strategies used by farmers and general livelihood strategies.

DNA profiling for progress: The website now has information on the procedure for submission of seed samples to a laboratory for DNA fingerprinting, to be assessed for genetic purity. See http://dtma.cimmyt.org/index.php/publications/doc_view/98-dna-fingerprinting-methodology-2009?tmpl=component&format=raw for a step-by-step guide on how to send seed samples and the quantity required.

Consolidating maize breeding data: DTMA scientists have carried out extensive studies leading to the development of new tools and methodologies for drought tolerance breeding. These findings have been consolidated and the data on maize breeding is available at http://dtma.cimmyt.org/index.php/software. New in 2009 are IMIS version 5.5; Fieldbook v.8.4.9; Maizefinder database v.Sep2009; and Maizefinder application v.8.3. MaizeFinder database v.Sep2009 gives adjusted means updated from 1993 to 2008, and also a summary of experiments by breeding program and year; while downloading MaizeFinder application v.8.3. will install the latest version of MaizeFinder, without the database.

Published in 2009: The following publications produced by the DTMA project members and partners are available online at the given links.

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Makumbi, D. 2009. *Results of the 2008 Regional Trials Coordinated by CIMMYT-Kenya.* Nairobi, Kenya. CIMMYT.http://dtma.cimmyt.org/index.php/publications/doc_view/95-results-of-the-2008-regional-maize-trials-coordinated-by-cimmyt-kenya?tmpl=component&format=raw

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Tahirou, A., D. Sanogo, A. Langyintuo, S.A. Bamire, and A. Olanrewaju. *2009. Assessing the constraints affecting production and deployment of maize seed in DTMA countries of West Africa.* IITA, Ibadan, Nigeria. http://dtma.cimmyt.org/index.php/publications/doc_view/96-dtma-seed-sector-analysis-in-west-africa-?tmpl=component&format=raw

Policy Brief 1: Reforming seed sector policies for livelihood improvement in eastern and southern Africa. http://dtma.cimmyt.org/index.php/publications/doc_view/91-reforming-seed-sector-policies-for-livelihood-improvement-in-eastern-and-southern-africa?tmpl=component&format=raw

*Policy Brief 2: Improving efficiency of maize seed production in eastern and southern Africa.*http://dtma.cimmyt.org/index.php/publications/doc_view/89-improving-efficiency-of-maize-seed-production-in-eastern-and-southern-africa?tmpl=component&format=raw

Policy Brief 3: Improving maize seed marketing in eastern and southern Africa. http://dtma.cimmyt.org/index.php/publications/doc_view/90-improving-maize-seed-marketing-in-eastern-and-southern-africa?tmpl=component&format=raw

DNA Fingerprinting Methodology to Distinguish Maize Open-Pollinated Varieties. http://dtma.cimmyt.org/index.php/publications/doc_view/98-dna-fingerprinting-methodology-2009?tmpl=component&format=raw

DTMA Drought Phenotyping Protocol. http://dtma.cimmyt.org/index.php/documents/doc_view/64-dtma-drought-phenotyping-protocol-mar-09?tmpl=component&format=raw

DTMA Highlights of 2008. http://dtma.cimmyt.org/index.php/documents/doc_view/62-dtma-annual-highlights-2008?tmpl=component&format=raw

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