

# STMA Bulletin

Stress Tolerant Maize for Africa

January-March 2019

STMA Bulletin is a quarterly publication of the Stress Tolerant Maize for Africa (STMA) project. This initiative funded by the Bill & Melinda Gates Foundation and the United States Agency for International Development (USAID) is led by the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA). For more information about STMA visit: <http://stma.cimmyt.org>

## Contents

Some highlights from 2018 .....	1
Digital imaging tools make maize breeding much more efficient .....	2
The missing seed market: Promoting improved seeds for women farmers .....	3
Drought-tolerant hybrid seed offers farmers reprieve from hunger.....	3
Solving the "last mile" challenge of maize seeds .....	4
News and events .....	4

## Funded by

BILL & MELINDA GATES foundation



## Partners

IITA  
Transforming African Agriculture



STMA  
Stress Tolerant  
Maize for Africa

## Why African farmers need Stress Tolerant Maize for Africa (STMA)?

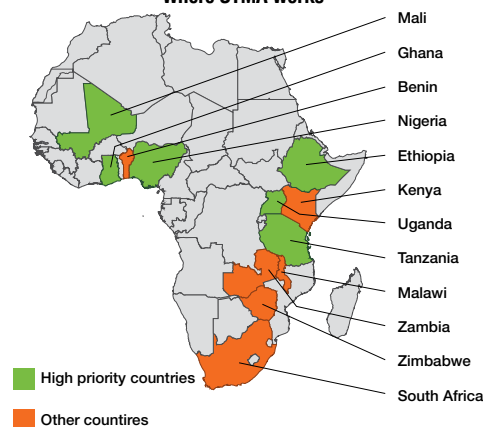
Over 200 million households in sub-Saharan Africa (SSA) depend on maize for food security and their well-being, yet maize yields in this region are very low compared to other parts of the world. Maize farmers face drought and other climate stresses, emerging pests and diseases, low soil fertility. The slow adoption of new stress tolerant varieties means farmers are unable to reach their yield potential.

The STMA project funded by the Bill & Melinda Gates Foundation and the United States Agency for International Development (USAID) aims to develop in a cost-effective way multiple stress tolerant varieties, and through partnerships with local public and private seed sector, make these improved seeds available at scale in SSA.

The project is in its third year of implementation and it is implemented in

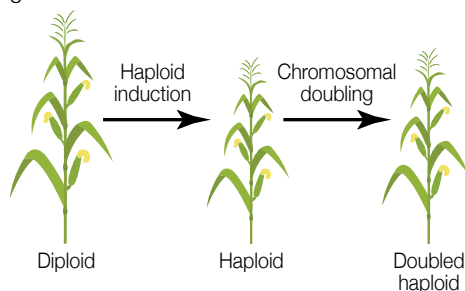
partnership with seed companies (private and public) and extension services providers to foster equal participation of men and women in varietal trials.

### Where STMA works

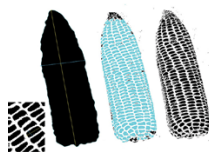


## Some highlights from 2018

Well-adapted second generation tropical haploid inducers [now available for partners](#) with Maize Lethal Necrosis (MLN) tolerance and high oil content; 7-10% cost reduction for Double Haploid production compared to 1<sup>st</sup> generation.



90% faster ear and kernel trait data collection thanks to low-cost digital ear imaging plugin. This digital phenotyping tool can be used for faster, more accurate on-farm trials' yield assessment.



Recently released CIMMYT MLN tolerant three-way cross hybrid yields 5 times more grain than MLN sensitive commercial hybrids (4.6 tons per hectare against 900 kg/ha).



CIMMYT drought tolerant maize: A key innovation for millions of farmers, says FAO Drought tolerant (DT) maize was among [20 success stories](#) featured at the Innovation Fair of the [International Symposium on Agricultural Innovation for Family Farmers](#), organized and hosted by FAO in Rome from 21 to 23 November, 2018.



Farmer participatory varietal selection, field demonstrations and finance literacy training involving women's group in Uganda help increase adoption of improved varieties.



## Digital imaging tools make maize breeding much more efficient

To keep up with growing maize demand, breeders aim at optimizing annual yield gain under various stress conditions, like drought or low fertility soils. They identify the genetic merit of each individual plant, so they can select the best ones for breeding.

To improve that process, researchers at the International Maize and Wheat Improvement Center (CIMMYT) are looking at cost-effective ways to assess a larger number of maize plants and to collect more accurate data related to key plant characteristics. Plant phenotyping looks at the interaction between the genetic make-up of a plant with the environment, which produces certain characteristics or traits. In maize, for example, this may manifest in different leaf angles or ear heights.

Recent innovations in digital imagery and sensors save money and time in the collection of data related to phenotyping. These technologies, known as high-throughput phenotyping platforms, replace lengthy paper-based visual observations of crop trials.

Authors of a [recent study](#) on high-throughput phenotyping tools observe that obtaining accurate and inexpensive estimates of genetic value of individuals is central to breeding. Mainassara Zaman-Allah, an abiotic stress phenotyping specialist at CIMMYT in Zimbabwe, emphasizes the importance of improving existing tools and developing new ones. “Plant breeding is a continuously evolving field where new tools and methods are used to develop new varieties more precisely and rapidly, sometimes at reduced financial resources than before,” he said. “Under the Stress Tolerant Maize for Africa (STMA) project, we are working on implementing the use of drone-based sensing, among other breeding



Measuring maize attributes such as ear size, kernel number and kernel weight is becoming faster and simpler through digital imaging technologies.

Taking pictures of just harvested maize cobs to be analyzed by the Maize Ear Analyzer.

innovations, to reduce time and cost of phenotyping, so that the development of new varieties costs less.”

“The use of drones,” he explained, “cuts time and cost of data collection by 25 to 75 percent compared to conventional

methods, because it enables to collect data on several traits simultaneously — for example canopy senescence and plant count.” Read more about how STMA makes maize breeding faster and cheaper [here](#).

## STMA impact as of end December 2018

 **60** New maize varieties released with **TOLERANCE TO MULTIPLE-STRESSES**

Production of **51,565** tons of certified seed



**ADOPTION** of new varieties by **2.08 million households** on **2.05 million hectares**

## The missing seed market: Promoting improved seeds for women farmers

In Ethiopia, a [World Bank study](#) found that female farm managers produce 23 percent less yield per hectare compared to their male counterparts. This is explained partly by unequal access to information on improved seed varieties and what best agricultural practices to use.

### Gender-Responsive Approaches for the Promotion of Improved Maize Seed in Africa



USAID CIMMYT BILL & MELINDA GATES FOUNDATION

The “[Gender-Responsive Approaches for the Promotion of Improved Maize Seed in Africa](#)” guidebook, developed by the International Maize and Wheat Improvement Center (CIMMYT), is filling this gap. Designed for seed companies,

extension workers and development organizations, it explains how best to package information about improved seed and farming technologies for men and women, with the goal of increasing adoption rates. More on this story [here](#).



Doris Muia shows how well SAWA maize is doing at her farm, despite limited rainfall. (Photo: Joshua Masinde/CIMMYT)

## Drought-tolerant hybrid seed offers farmers reprieve from hunger



Mary Munini, a smallholder farmer in Vyulya, in Kenya’s Machakos County, inspects her maize crop. She planted the farm-saved seed, which does not tolerate drought or severe heat, so she is expecting a massive crop loss this season. (Photo: Joshua Masinde/CIMMYT)

Like many other smallholder farmers spread across the water-stressed counties of Machakos, Makeni and Kitui, in Kenya’s lower eastern region, Mary Munini is staring at a massive crop loss. Prolonged dry spells have for years threatened the food security and livelihoods of many rural families in the region who depend entirely on rain for their agricultural production.

In a neighboring farm, the situation is different. The owner, Gitau Gichuru,

planted the [SAWA hybrid](#), an improved maize seed variety designed to withstand drought conditions. This variety was developed by scientists at the International Maize and Wheat Improvement Center (CIMMYT) and promoted to Kenyan farmers by Dryland Seed, a local seed company. This initiative to improve maize farmers’ climate resilience in the region was possible thanks to the support of the Bill & Melinda Gates Foundation under

the [Stress Tolerant Maize for Africa \(STMA\) project](#). With the right agronomic practices, the SAWA hybrid can return a yield advantage of up to 20 percent compared to other popular drought-tolerant hybrids in the region.

“We have only had some little rain, at the time of planting and during the vegetative state. To be honest, I didn’t expect the crop to amount to anything. But, as you can see, I am looking forward to a good harvest,” Gichuru says. Read more [here](#).



Farmer Gitau Gichuru (right) shows maize from his farm to CIMMYT’s regional representative for Africa, Stephen Mugo. Gichuru planted SAWA hybrid maize, developed by CIMMYT scientists. (Photo: Joshua Masinde/CIMMYT)

## Solving the “last mile” challenge of maize seeds



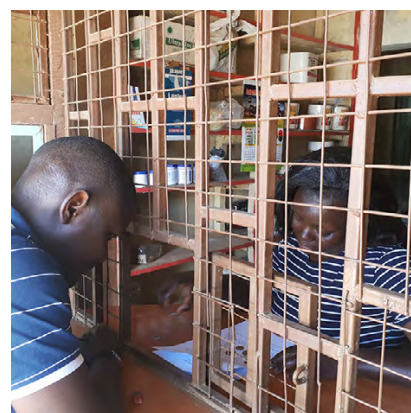
Philomena Muthoni Mwangi stands at the entrance of her agrodealer shop, Farm Care, in the village of Ngarariga. (Photo: Jerome Bossuet/CIMMYT)

Agrodealers play a pivotal role in delivering the gains of the green revolution to millions of smallholders in Africa. So far, seed systems research has mainly focused on the factors influencing farmers’ adoption of or seed companies’ investment in new varieties. However, little is known about independent agrodealers, who play an important role in the “last mile” of seed systems, distributing improved maize seeds and fertilizers as well as giving agronomic advice.

Under the Stress Tolerant Maize for Africa (STMA) project, CIMMYT has launched a new research effort to better understand agrodealers in Kenya, with a specific focus on maize seed marketing. “We want to collect

detailed quantitative and qualitative data about the way agrodealers outsource and choose their maize varieties, and how they market these seeds to farmers,” explained CIMMYT associate scientist Pieter Rutsaert, who leads the study. This research will help government agencies, NGOs and funders to design better interventions related to agrodealers, for greater and more sustainable impact.

Agrodealers are not a homogeneous group. This study will provide useful insights to design targeted seed scaling strategies that consider all kinds of agrodealers, moving away from a one-size-fits-all approach. Read more about this story [here](#).



Muthoni Mwangi responds to the investment game, during her interview. (Photo: Jerome Bossuet/CIMMYT)

## News and events

The 2019 STMA Annual Review and Planning Meeting will take place in Lusaka, Zambia from May 7 to May 9. The 2019 MAIZE Youth Innovators Awards will be given during the event.

### To contribute to or participate in STMA, please contact:

**Cosmos Magorokosho**, Project Lead, email: [c.magorokosho@cgiar.org](mailto:c.magorokosho@cgiar.org)  
Mobile: +263 773 212 731

International Maize and Wheat Improvement Center (CIMMYT) [www.cimmyt.org](http://www.cimmyt.org)

**Mailing address:** CIMMYT-Kenya: ICRAF House, UN Avenue, Gigiri, PO Box 1041-00621, Nairobi, Kenya.

**Project website:** <http://stma.cimmyt.org>