# STAABUIEtin Stress Tolerant Maize for Africa

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#### Contents

Amplifying the benefits of stress tolerant maize through street performances
Making seed systems work for men and women4
Showcasing the impact of STMA work 5

Ennancing partnerships for	
greater impact	5
Pictorial	5



### Partners





### Stress tolerant maize varieties transforming lives in northern Uganda

Seed of drought tolerant maize developed through long-running global and local partnerships in Africa is improving nutrition and food security in northern Uganda, a region beset by conflicts and unpredictable rainfall.

### The International Maize and Wheat

Improvement Center (CIMMYT) has been working with Uganda's National Agricultural Research Organization (NARO) and local seed companies to develop and disseminate maize seed of improved stress-tolerant varieties. Under the Drought Tolerant Maize for Africa (DTMA) and the Stress Tolerant Maize for Africa

their livelihoods due to the insurgency by the

Gulu, one of the affected districts, has been on

a path to recovery for the past few years. With

the prevailing peace, Geoffrey Ochieng' and his

wife can now safely till their 4.5 acres of land to grow maize and other staples. They are able to

feed their family and sell produce to meet other

However, farmers in this region, bordering

South Sudan, are facing more erratic rains

new drought-tolerant and disease-resistant

to this variable climate and secure a good

maize harvest even in unreliable seasons.

maize varieties, the Ochieng' family can adapt

"The popularity of this drought-tolerant variety

among the farmers has been growing thanks to

diseases like northern corn leaf blight and gray

its good yield and reliability even with poor

rains and its resistance to common foliar

and the uncertain onset of rainfall. Thanks to

(STMA) projects, farmers are now using varieties such as the UH5051 hybrid, known locally as Gagawala, meaning "get rich."

For two decades, most of the population in northern Uganda has lived in internally displaced people's camps and depended on food aid and other relief

emergencies for

household needs.

**Tolerance is key** 

Lord's Resistance Army (LRA).



Dorine Akoth, a smallholder demo plot farmer in northern Uganda, admires a maize crop on a quarter acre piece of land on which several varieties that have passed through CIMMYT's breeding pipeline have been planted.

or it didn't rain a lot, I would be lucky to get 400 kg per acre with the Longe 5, while I get twice as much with the hybrid," Ochieng' explained.

Thanks to this stress tolerant maize variety, he can pay his children's school fees and provide some surplus grain to his relatives.

### Out with the old, in with the new

"One key strategy to improve our farmers' livelihoods in northern Uganda is to gradually replace old varieties with new varieties that can better cope with the changing climate and problematic pests and diseases," said Godfrey Asea, the director of the National Crops Resources Research Institute (NaCRRI) at NARO. "Longe 5 for instance, has been marketed for over 14 years. It has done its part and it needs to give way to new improved varieties like UH5051."

The Gulu-based company Equator Seeds has been at the core of the agricultural transformation in northern Uganda. From 70 metric tons of seed produced when it started operations in 2012, the company reached an annual capacity of about 7,000 to 10,000 metric

ped leaf spot, plus good resistance to the maize streak virus," explained Daniel Bomet, a NARO

streak virus," explained Daniel Bomet, a NARO maize breeder. "Maturing in slightly over four months, Gagawala can produce two to three maize cobs, which appeals to farmers."

Ochieng' has been planting UH5051 maize since 2015. Before adopting the new hybrid, Ochieng' was growing Longe 5, a popular open-pollinated variety that is less productive and not very disease-resistant.

"What I like about UH5051 is that even with low moisture stress, it will grow and I will harvest

something," Ochieng' said. Under optimal conditions, he harvests close to 2 metric tons of maize grain on one acre of UH5051 hybrid.

> With the old Longe 5 variety, he would only harvest 700 kg. "If the rains were delayed

tons of certified seed of different crops in 2018. Working with dedicated outgrowers such as Anthony Okello, who has a 40-acre piece of land, and 51 farmer cooperatives comprising smallholder farmers, Equator Seeds produces seed of open-pollinated hybrid maize and other crops, which reaches farmers through a network of 380 agro-dealers.

"80% of farmers in northern Uganda still use farm-saved or recycled seed, which we consider to be our biggest competitor," Tonny Okello, CEO of Equator Seeds remarked. "Currently, about 60% of our sales are in maize seed. This share should increase to 70% by 2021. We plan to recruit more agro-dealers, establish more demonstration farms, mostly for the hybrids, to encourage more farmers to adopt our high yielding resilient varieties."

The two-decade unrest discouraged seed companies from venturing into northern Uganda but now they see its huge potential. "We have received tremendous support from the government, nongovernmental organizations, UN and humanitarian agencies for buying seed from us and distributing it to farmers in northern Uganda and South Sudan, to aid their recovery," Okello said.

### Social impact

The Ugandan seed sector is dynamic thanks to efficient public-private partnerships. While NARO develops and tests new parental lines and hybrids in

"80% of farmers in northern Uganda still use farm-saved or recycled seed, which we consider to be our biggest competitor," Tonny Okello, Equator Seeds CEO.

their research facilities, they have now ventured into seed production and processing at their 2,000-acre Kigumba Farm in western Uganda through NARO Holdings, their commercial arm.

"Because the demand for improved seed is not always met, NARO Holdings started producing certified seed, but the major focus is on production of early generation seed, which is often a bottleneck for the seed sector," Asea said.

Another innovative collaboration has been to work with the Uganda Prisons Service (UPS) establishments to produce maize seed. "When we started this collaboration with UPS, we knew they had some comparative advantages such as vast farmland, ready labor, mechanization equipment and good isolation, which are important for high-quality hybrid maize seed production," Asea explained. The UPS facility in Lugore, Gulu, which has 978 hectares of land, produces foundation seed of UH5051.

"Prisons offer a big potential to support the growing seed industry," he said. "Together with CIMMYT, we should build further the capacity of UPS to produce foundation and certified seeds. It provides much-needed income for the institutions. The inmates, in addition to being remunerated for farm labor, are engaged in positive outdoor impactful activities. This skill is helpful for their future reintegration in the society."

Read the original article here.

# A spotlight on partner seed companies

Western Seed

partners with progressive

farmers to plant demo farms to

showcase the performance of its

varieties. The marketing team invites

other farmers to the demo sites to

see the performance of various

varieties, besides learning about

recommended agronomic

practices.

### Equator Seeds Company, Gulu, northern Uganda

CIMMYT has been supporting northern Uganda-based Equator Seeds Company, in collaboration with Uganda's National Agricultural Research Organization (NARO), to develop and produce high-yielding, drought-tolerant (DT) and disease-resistant maize seed varieties, which have increased farmers' harvests and improved their livelihoods. The Drought Tolerant Maize for Africa (DTMA), and later, the Stress Tolerant Maize for Africa (STMA) projects have supported Equator Seeds to gain germplasm access, set and improve their hybrid seed production system. Equator Seeds is now producing UH5051 hybrid, which is

tolerant to drought and major diseases, and the open pollinated variety (OPV) Longe 5D.

### Why is it important?

With one main rainy season from April to October, farmers in northern Uganda do not want their maize crops to fail. Yet, the region faces more erratic rainfall patterns, rain onset can vary by one month with projected temperature rising by up to 3.1 degrees by 2060 (Uganda country climate risk assessment report, 2018).

Farmers need to grow high-yielding, climate-resilient

and disease resistant varieties. A lot of farmers in Gulu grow farm-saved or recycled seed and OPVs such as the Longe 5D. With new climate-resilient hybrids and under optimal conditions, farmers can more than double their harvest as compared to the disease sensitive OPVs.

The yield gain is particularly high under dry or erratic rainy conditions. Farmers can sell the extra grain and feed their family year-round without incurring expenses to make up for food deficits. Such savings allow farmers to invest more in family health or in their children's education. Scaling up drought-tolerant varieties like UH5051 means farmers are more resilient to drought, as most of them have no access to supplementary irrigation in case of protracted dry spells.

Read the original profile here.

### Western Seed Company, Kenya

Western Seed has had a long-term relationship with CIMMYT in delivering high yielding, stress tolerant maize seed to small scale farmers in mid altitude areas. Over the past twenty years, CIMMYT has been collaborating with the company in developing high-yielding, stress tolerant maize seed varieties with tropical mid-altitude germplasm. Collaboration with CIMMYT began under the Africa Maize Stress (AMS) project.

The company participates in CIMMYT's regional trials and regularly con-

tributes to CIMMYT's maize research program. As a member of the International Maize Improvement Consortium (IMIC) Africa, established by CIMMYT in 2018, the company can now access Materials Under Development (MUD) to aid its breeding program.

The company currently operates in Kenya, Uganda, Tanzania, Rwanda and Zambia. Over half a million farmers across eastern Africa rely on Western Seed for their hybrid maize seed needs. Western Seed's mission is to bring technology to the farmer with the aim of reaching out to two million smallholder farmers across nine countries in SSA over the next decade.

How farmers benefit from this research-for-development partnership

Western Seed is one of the first private partner seed company in Africa to use CIMMYT's Doubled Haploid (DH) facility at the Kiboko research station for its breeding program. The facility helps the company to develop inbred parental lines faster and at lower costs compared to the conventional breeding methods. The company also uses the MLN Screening facility in Naivasha to evaluate its materials for MLN tolerance. With better improved varieties available at competitive prices, farmers can become more resilient against changing climate, pests and diseases.

Read the original profile here.

#### STMA Bulletin - October-December 2019

# Investing in drought tolerant maize is good for Africa

Recent impact studies in Uganda and Zambia show that farmers adopting droughttolerant maize increased their yields significantly and reduced risks of crop failure.

Zambia's vice-president recently <u>called for a</u> reduction in maize dominance and a ramp-up of crop and diet diversification in his country. The reality is that maize is and will remain an important food crop for many eastern and southern African countries.

Diet preferences and population growth mean it is imperative to find solutions to increase maize production in these countries. Yet, experts forecast a <u>10-30 percent decline in maize</u> <u>yields by 2030</u> in a business-as-usual scenario, with projected temperature increases of up to 2.7 degrees by 2050 and problematic drought risks.

Knowing the importance of maize for the food security of countries such as Zambia, it is crucial to help farmers get better and more stable yields under erratic and challenging climate conditions.

To address this, the International Maize and Wheat Improvement Center (CIMMYT) and its partners have been developing hundreds of new maize varieties with good drought tolerance across sub-Saharan Africa. Stakeholders in the public research and African seed sectors have collaborated through the Drought Tolerant Maize for Africa (DTMA) project and the Stress Tolerant Maize for Africa (STMA) initiative to develop drought tolerant seed that also incorporates other qualities, such as nutritional value and disease resistance.

A groundbreaking <u>impact study</u> released six years ago demonstrated that drought tolerant maize significantly reduced poverty and food insecurity, particularly in drought years. A new study from CIMMYT and the Center for Development Research (ZEF) focused on the main maize growing areas of Zambia confirms adopting drought tolerant maize can increase yields by 38 percent and reduce the risks of crop failure by 36 percent. Over three quarters of the rainfed farmers in the study experienced drought during the survey. These farming families of 6 or 7 people were cultivating 4 hectares of farmland on average, half planted with maize.

Another <u>study on drought-tolerant maize</u> <u>adoption in Uganda</u> estimated also good yield increases and lower crop failure risks by 26 to 35 percent.

# A balancing act between potential gains and climate risks

Drought tolerant maize has a transformational effect. With maize farming becoming less risky, farmers are willing to invest more in fertilizer and other inputs and plant more maize. However, taking the decision of adopting new farm technologies in a climate risky environment could be a daunting task. Farmers may potentially gain a lot but, at the same time, they must consider downside risks.

### As Gertrude Banda, a lead farmer in

eastern Zambia puts it, hybrid seeds have a cost and when you do not know whether rains will be enough "this is a gamble." In addition to climate uncertainty, farmers worry about many other woes, like putting money aside for urgent healthcare, school fees, or cooking nutritious meals for the family.

Information is power

An additional hurdle to adoption is that farmers may not know all the options



Geoffrey Ochieng, a farmer in northern Uganda, on his 4.5-acre piece of land on which he has planted the stress tolerant UH5051 variety. Photo: Joshua Masinde/CIMMYT.

available to cope with climate risks. While 77 percent of Zambia households interviewed said they experienced drought in 2015, only 44% knew about drought-tolerant maize.

This unequal access to knowledge and better seeds, also <u>observed in Uganda</u>, slows adoption of drought-tolerant maize. There, 14 percent of farmers have adopted drought-tolerant maize varieties. If all farmers were aware of this technology, 8 percent more farmers would have adopted it.

Because farmers are used to paying for cheap open-pollinated varieties, they are only willing to pay half of the hybrid market price, even though new hybrids are performing very well. Awareness campaigns on the benefits of drought-tolerant maize could boost adoption among farmers.

According to the same study, the potential for scaling drought-tolerant maize could raise up to 47 percent if drought-tolerant varieties were made available at affordable prices at all agrodealers. Several approaches could be tested to increase access, such as input credit or subsidy schemes.

Read the original article here.

# Street theater amplifies case for stress tolerant maize varieties

The Stress Tolerant Maize in Africa (STMA) project team in Nigeria used street theatre to drum up messages on how to mitigate stresses affecting maize production. The messages targeted mainly the youth, informing them that with the right stress resilient seed varieties and the application of recommended agronomic practices, they can turn farming into a lucrative enterprise. The messages were developed by the STMA team in collaboration with the Adopted Village Project of the National Agricultural Extension and Research Liaison Services (NAERLS), the Nigerian Forum for Agricultural Advisory Services (NIFAAS) and the Theatre and Performing Arts Department of Ahmadu Bello University, Zaria.

Local troupes displayed their skills in song, dance and drama to relay messages on the need for youth to venture into climate-smart agriculture to overcome challenges of drought, current and emerging pests and diseases, as well as improve their yield.

Seven such performances were enacted at various markets and streets in Nigeria between August and November 2019. The theme of the street performance was, "Smart people, smart farming". Since 2017, the STMA team has effectively used this unique campaign approache to mobilize communities in rural areas to adopt stress tolerant maize seed varieties for improved yields and livelihoods.



Local artists at different markets in Nigeria perform songs, dance and drama to create awareness on the benefits of adopting stress resilient maize seed varieties.

# Making seed systems work for men and women

# Seed systems play a major role in Africa's agricultural transformation — but are they gender-friendly?

One important pillar of Africa's food security is ensuring that quality seeds are developed and delivered to the millions of smallholder farmers that feed the continent. Reaching the last mile with climateresilient and disease-resistant seeds remains a challenge in many parts of sub-Saharan Africa.

"In countries where we invested in seed systems initiatives, we have seen an upsurge in smallholder farm productivity," <u>said Joseph</u> <u>DeVries</u>, the President of Seed Systems Group. "A story that is not adequately told is that of the important role of women along the seed value chain. In Kenya, 40% of owners of agrodealer shops are women. The farming sector would gain a lot with a stronger role for women in developing a gender-sensitive seed sector," he noted.

DeVries was one of the keynote speakers at the "Gender dynamics in seed systems in sub-Saharan Africa" workshop organized by the International Maize and Wheat Improvement Center (CIMMYT) on December 2, 2019 in Nairobi, Kenya. The meeting brought together researchers, development practitioners, donors, farmers' representatives, farmers, seed companies and other private actors.



Some of the participants at the "Gender dynamics in seed systems in sub-Saharan Africa" workshop held or December 2, 2019 in Nairobi, Kenya. (Photo: Kipenz Films/CIMMYT).

CIMMYT's Gender and Development Specialist, Rahma Adam, observed that with the African seed sector being male-dominated, the patriarchal nature of the family and community systems make it harder for women to penetrate the sector easily. For instance, many women employed in the sector mostly dominate the low-paying jobs. Workshop participants agreed that while there are many opportunities for women in the sector, the barriers to entry are many.

### Acknowledging the gender gap in agriculture

"Decades of gender research have shown that where there is gender inequality, there is food insecurity," remarked Jemimah Njuki, senior program specialist from the International Development Research Center (IDRC). The gender gap in agricultural productivity observed in sub-Saharan Africa — <u>up to 30%</u> in countries like Nigeria and Malawi — is often explained by unequal access to inputs and male labor for heavy operations such as land preparation, access to knowledge and capital.

Addressing such unequal access is not enough, according to Njuki. To switch to a truly gender-sensitive food system, "you need to address social norms and women's agency and what they can do on their own." Taking the example of financial services, women often find difficulties obtaining loans because banks ask for collateral like title deeds, which



CIMMYT's Gender and Development Specialist, Rahma Adam (L) and Janey Leakey, Director of Leldet Seed Company in Nakuru, Kenya, addressing participants at the "Gender dynamics in seed systems in sub-Saharan Africa" workshop on December 2, 2019. The event was organized by CIMMYT and held in Nairobi, Kenya. (Photo: Kipenz Films/ CIMMYT).

are typically in the name of the husband or a male in-law. Yet, women are very good at repaying their loans on time. Making finance institutions "womanable" as Njuki put it, would be good for the welfare of women and their family, hence good for business.

### Is there such a thing as seed for women farmers?

Within a household, who has a say in buying new seeds? Do men and women farmers look for the same traits and attributes?

A <u>study</u> conducted in Ethiopia, Kenya, Tanzania and Uganda by Paswel Marenya, a senior agricultural economist at CIMMYT, revealed that in many cases, the man has a greater say in selecting new seed varieties. Other research shows that beyond grain yield, the characteristics of "a good variety" <u>differ</u> <u>between men and women farmers</u>. In the study, both genders mention what they were willing to pay as trade-off against yield. Women would favor a variety with a longer grain shelf-life (ability to store 3-4 months). Men preferred a variety

that performs well with low fertilizer requirements. Equally, women farmers engaged in participatory varietal selections tended to provide more nuanced evaluation of varieties than men. Despite this evidence, seed companies do not often adapt their seed marketing strategy according to gender.

### Making institutions and seed systems gender-sensitive

Are there missed opportunities for the seed sector by being "genderblind"? Rahma Adam believes "the current one-size-fits-all model does not work for many women farmers". She advises seed companies to be more gender-sensitive when organizing seed marketing operations. Women tend to have less time to attend field demos, the major marketing tool for seed companies. Packaging may not be adapted to suit their more limited purchasing power.

There are good examples of women seed entrepreneurs that have established their niche and reach out to women farmers. Janey Leakey, Director of Leldet Seed Company in Nakuru, Kenya, is one such example. She markets small seed packs called Leldet bouquet, a mix of improved maize and legume seeds at the cost of a cup of tea, to enable women farmers test new varieties.

To read the rest of the story, click here.

### Showcasing the impact of STMA work

The STMA project team in Nigeria attended the 4th Africa-wide Extension Week (AEW) in Abidjan on November 24-30, 2019 where they articulated the project goals, activities and achievements in the region. The team distributed STMA promotional materials (factsheets and success stories) and souvenirs to visitors at the exhibition arena. The biennial event was organised by the

Africa Forum for Agricultural Advisory Services (AFAAS), Agence Nationale d'Appui au Developement Rural (ANADER), and the West and Central Africa Network of Agricultural and Rural Advisory Services (RESCAR-AOC). Over 1,500 participants from Africa and beyond the continent attended. It was attended by agricultural scientists and professionals in extension and advisory services from the public and private sector.



Enhancing partnerships for greater impact

The CIMMYT team in Zimbabwe, led by the Country Representative and STMA Project Leader, Cosmos Magorokosho, hosted senior officials from Angola's Agricultural Research Institute (IIA) in November 2019. The meeting explored possibilities of amplifying collaboration with CIMMYT in areas of germplasm exchange, training, technical backstopping and provision of foundation seed for certified seed production. The IIA team was led by Director General, Joao Ferreira Da Costa Neto. As part of the visit, the Angola delegation paid a visit to, among other key partners, the Department of Research and Specialist Services, which is under the Ministry of Agriculture, Seed companies (SeedCo and Mukushi) and Muzarabani research station.

Later in December 2019, the CIMMYT team made a reciprocal visit to Angola for more discussions on the identified areas of partnerships. Smallholders farmers in Angola, like in many other countries in sub-Saharan Africa, are grappling with erratic and below average rains, with negative impacts on yields especially for maize, the main cereal grown in the country. To buffer themselves from these negative effects of climate change, the farmers are increasingly rallied to adopt stress tolerant maize seed varieties. The country is one of the few in SSA where orange maize is grown, and therefore needs stress tolerant varieties to bolster productivity.

CIMMYT and IITA in partnership with the Department of Agricultural Research Services (DARS) at Chitedze Agricultural Research Station in Malawi conducted a week-long training on product profile-based maize breeding for increased genetic gains, targeting maize breeders in Africa's public or private sectors. The training took place in Lilongwe, Malawi on November 11-15, 2019. Such trainings are increasingly becoming critical given the recent developments in molecular applications, precision phenotyping and integration of doubled haploid technology to enhance the efficiencies and reduce the breeding time for genetic gains, amid resource constraints. Thirty-four participants (see group photo on the right) from 14 African countries in Africa attended the training.





margarer warula, a smallholder farmer in Nambuchi location, bungoma County is impressed by the size of the cob from her field on which she planted the WH403 variety that is marketed by Western Seed. Photo Credit: Joshua Masinde/CIMMYT.



Peter Malunga, a smallholder farmer in Nakhwana location, Bungoma County admiring maize on a farm in Bungoma County. Photo Credit: Joshua Masindei CIMMYT.

## Upcoming events

East African Product Advancement Meeting to take place in Nairobi on January 21, 2020.

### PICTORIAL Stress tolerant maize delivers good vields



Joseph Kaita and his wire Alice Kaita display large cools of maize cools they just narvested from their farm. They plant the WH507 drought and disease tolerant variety. Photo Credit: Joshua Masinde/CIMWYT.



Victor Wasike from Bungoma, is happy with the performance of the WH505. Besides its drought tolerance, the variety has a potential to produce double cobs, an important factor in yield enhancement. Photo Credit: Joshua Masinde/CIMMYT.



27-year old Elizabeth Naliaka, a smallholder farmer in Bungoma County, displaying some grains of maize in front of her house. She practices on-the-ground open air drying. Photo Credit: Joshua Masinde/CIMMYT.



Scholastica Wamalwa 'winnows' the maize grain being dried in open air on a canvas outside her family's house in Kimaeti, Bungoma County. Photo Credit: Joshua Masinde/CIMMYT.

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