



Innovation Lab for Assets and Market Access News

EVENT HIGHLIGHTS CHALLENGES AND OPPORTUNITIES FOR INCREASING MAIZE PRODUCTIVITY IN KENYA

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NAIROBI, Kenya —

To increase maize productivity in Kenya will require solutions from researchers, policy makers and those in seed and input markets, was the consensus at a Feb. 8, 2017 conference in Nairobi.

The conference, “Enhancing Smallholder Productivity in Kenya: Evidence from a Randomized Controlled Trial of New Seed Varieties,” presented findings from a randomized controlled trial (RCT) conducted by researchers from AMA Innovation Lab and the Tegemeo Institute of Agricultural Policy and Development. Panelists and participants broadened the discussion to describe comprehensive challenges and solutions to increasing smallholder maize productivity.

Maize is a main staple in Kenya, though productivity among smallholder farmers, who account for about 75 percent of Kenya’s food production, is 1.6 tons/hectare against a potential of 6 tons/hectare. “Increased agricultural productivity is key to both increasing food security and reducing poverty,” said Tegemeo director Mary Mathenge, a principal investigator on the RCT.

Maize productivity has declined even as the area cultivated is increasing. Since 1980, yields for most crops in Kenya, including rice, are either stagnating or in decline, which has led to grain shortfalls. Mary Karanja, representing Kenya’s agriculture principal secretary Richard Lesiyampe, said that these shortfalls are currently being met by imports.

Shortfalls have also led to higher prices, said Anthony Kioko, the programme manager for the Cereal Growers Association. “What can we do to ensure that productivity improves to the point where the pressure of higher and higher prices gets to be less?”

Studying hybrid maize adoption

Half of Kenya’s seed market is controlled



AMA Innovation Lab director Michael Carter presenting at the conference, “Enhancing Smallholder Productivity in Kenya: Evidence from a Randomized Controlled Trial of New Seed Varieties.”

by the government-supported Kenya Seed. Western Seed, the producer of the hybrid maize tested in this RCT, is private company that has produced seed tailored for Kenya’s mid-altitude zones (1,000-1,500m). In these areas, the climate is warmer and the growing season is shorter than at higher altitudes.

“You’ve got to generate the genetics in your breeding program that addresses all the constraints that the farmers have,” said Western Seed CEO Saleem Esmail.

The cost of seed in this study, with proper planting, was about KSH 2,000/acre, he said. Adding the recommended fertilizer should maximize the variety’s productivity to four tons/hectare higher yields than local seed.

The AMA Innovation Lab/Tegemeo team sought to identify constraints to adopting Western Seed’s hybrid maize. They also measured the impact of relaxing constraints to buying fertilizers and included soil testing to recommend appropriate fertilizer blends.

KEY POINTS

Maize is a main staple in Kenya, though productivity among smallholders, who account for about 75 percent of food production, is 1.6 tons/hectare compared to 6 tons/hectare potential.

Yields for the study’s sample in the western region increased by about 40 percent, raising household income and the number of meals households consumed and the variety of foods.

Availability of some hybrid seeds and quality fertilizer in local stores is a persistent problem, as are counterfeit versions of both seed and fertilizer are also a growing problem.



The 2012-2016 study included 1,600 farmers in five counties in the western region and five in the central region. The team worked closely with Western Seed, Acumen Fund and MIT's Agricultural Technology Adoption Initiative. MEA Fertilizers provided and transported their branded fertilizer and Crop Nutrition Laboratory Services (CropNuts) conducted the soil testing.

Joseph Saka participated in the study and came from Homa Bay to attend the conference. He said, "It's difficult to produce a new idea to a group of people in a local area but after some time, several of us had good experiences," he said.

Higher yields, improved wellbeing

Yields for the study's sample of farmers in the western mid-altitude areas increased by about 40 percent. This increased the number of meals households consumed and the variety of foods. Household income also went up, though maize only made up about 25 percent of these farmers' total income.

Farmers who already consistently used hybrid seed realized an 80-90 percent yield increase. Farmers in the central region used improved seed and fertilizer in about nine of the last ten seasons, but in the western region used them at one fourth that rate.

AMA Innovation Lab director Michael Carter, a principal investigator on the RCT, said this suggests a poverty trap: western farmers cannot afford more productive technologies and, as a result, may sink deeper into poverty. Kenya's western region has an average poverty rate of about 31 percent.

Only about 62 percent of farmers used the soil testing results, primarily for a lack of money to buy the recommended fertilizer. Other reasons included that the results were too complicated, and that the recommended fertilizer was not available locally.

Soil testing also showed high variation in soil quality, even within villages. This variation within villages, said Emilia Tjernström, an assistant professor of public affairs and agricultural & applied economics at the University of Wisconsin-Madison, means that farmers have a hard time learning from each other what inputs will increase productivity.

Julia Franklin, the global sourcing director at One Acre Fund, said that farmers want to see proof of concept before they try a new technology. "Farmers are extremely risk averse," she said. "They don't want to try something new unless they have seen their neighbor has had success with a product."

Challenges for maize productivity

While the experiment showed that a local seed company really can make a difference for smallholder farmers, an agroecological niche market may not be sustainable for a small company. "If agroecological niches are not profitable," said Carter, "then what's the public policy to get the genetic material there?"

Kenya Seed's 614 maize hybrid, developed in 1986, remains one of the most popular varieties in Kenya. However, environmental conditions at mid-altitude may make 614 less productive. "It takes a longer period to mature," said Njagi, "and if you're planting it in a place where you use less fertilizer you are not going to see a bump in production."

The Government of Kenya has approved over 250 hybrid maize varieties, though many have never been commercialized or were replacements for earlier hybrid seed. "In this country it can take up to four years before you can get one registered," said Esmail. "It's seven years just to get the first seed of a new variety to the farmer's hand."

The availability of some hybrid seeds in local stores is also a persistent problem. Unavailability of Western Seed hybrid maize compromised the experiment in the central region. To ensure the experiment worked in the western region, Western Seed provided the research team seeds on consignment.

Direct delivery also eliminated the chance for counterfeit seed, which conference participants said was a growing problem. As part of the RCT, Tjernström took samples from local agrodealers and found seeds with germination rates as low as zero. Farmers also got no return for fertilizer bought locally.

Azariah Soi, managing director at Kenya Seed, said they are working to ensure genuine seed reaches farmers, but added, "To cut counterfeiting we have to work with the government minister of agriculture to ensure that farmers get good quality seed."

Joyce Malinga, a director at the Kenya Agricultural and Livestock Research Organization, said, "If we do not put in the issues of capacity building and support for farmers, then all our efforts on research and development will not bear fruit."

Karanja, speaking for Richard Lesiyampe, said that Kenya needs further research to develop acceptable maize varieties, to test the efficacy and efficiency of common pesticides, and to identify the best cereal, legumes and crops that maximize land use. "Without farmers' determination and ceaseless efforts we would not feed this country," she said.

Research lessons from the RCT

In a panel, researchers described how technology has improved data collection, but comes with its own challenges. Mercy Kamau, senior research fellow at Tegemeo, said that using computers to record data starting in 2012 improved Tegemeo's real-time collection, but connectivity problems and power outages remain challenges.

Samuel Bird, a Ph.D. candidate at UC Davis, described how the team used phone surveys to collect data immediately after harvest and planting and then to coordinate hybrid seed purchases. However, Tjernström added, not everyone has a phone or it's not charged.

On surveys, many farmers were unable to name the seed they used and didn't keep the bags. This could be overcome with DNA analysis, said Njagi, and Tegemeo is currently seeking funding to do this kind of analysis.

Farmers also frequently overestimate the sizes of their plots. Njagi said this could be because in rural areas the dimensions of an acre of land keeps changing. The cost of accurate GPS measurement is high, but enumerators can provide rough estimates with a tablet or mobile phone. 🌿

The three policy briefs that summarize the study's key findings are available at: <http://basis.ucdavis.edu>.

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To ensure our work has broad impact, we regularly host and sponsor outreach events and translate our work into accessible policy documents that integrate our findings for governments, NGOs and others working to reduce poverty and increase prosperity worldwide. Our work is funded by USAID to support the U.S. Government's global hunger and food security initiative.

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