MRR INNOVATION LAB PROJECT IN BRIEF

SUBSIDIZING LEARNING ABOUT RESILIENCE-BUILDING AGRICULTURAL TECHNOLOGIES IN MOZAMBIQUE

Lead Principal Investigator
Jonathan Malacarne, University of Maine

Project Partners
Centro de Estudos de Políticas e Programas Agroalimentares (CEPPAG), Universidade Eduardo Mondlane; Hollard Insurance; NCBA CLUSA; Phoenix Seeds; UC Davis

Development Innovation
Learning subsidies for insured drought-tolerant maize seeds

Commodity
Maize

Targeted Population
Small-scale farmers

Country/Location
Mozambique, Manica Province

Timeline
2022-2025

Funding
$750,000 (USAID)

FEED THE FUTURE INNOVATION LAB
FOR MARKETS, RISK & RESILIENCE
basis.ucdavis.edu

Resilience-building agricultural technologies help rural households in developing countries withstand and recover from climate-related disasters. However, sustaining the adoption of these technologies is a challenge because they do not provide benefits in every year. This MRR Innovation Lab project in Mozambique is testing short-term subsidy and training programs for rural households to learn about stress-tolerant maize bundled with index insurance for a seed-replacement guarantee. The project contributes evidence on how to spark lasting adoption for resilience-building technologies.

The Challenge

Amid the increasing risk of climate-related disasters like drought, a number of new agricultural technologies offer promising ways for small-scale farming families in developing countries to increase their resilience. However, these technologies, in particular stress-tolerant seed varieties and agricultural index insurance, have seen limited adoption among the vulnerable households they can most benefit.

Stress-tolerant seed varieties are most often adopted only with the support of generous subsidies, and are most likely to be dropped if their benefits are not immediate and large. Both technologies individually do have proven benefits, but by design their main benefits only come in the event of moderate or severe losses, which do not happen every year.

From 2015-2018, a research team led from UC Davis designed and tested a bundle of stress-tolerant maize varieties developed by CIMMYT and agricultural index insurance that provided a seed-replacement guarantee. In that study,[1] the stress-tolerant maize proved resilient to moderate mid-season drought. The in-kind seed replacements helped farmers who experienced severe drought to immediately recover and even increase their yields in the following season. In spite of these substantial benefits, the

RESEARCH INNOVATION

The decision to adopt an agricultural technology is fundamentally a learning process.[1] This includes learning from experience, from the experience of others and through education.[2] Learning is critical for resilience-enhancing agricultural technologies that by design provide benefits that can vary from year to year.

Price subsidies promote learning through experience by lowering the cost of experimenting with a technology. In 2011, ten African countries were spending over a billion dollars on input subsidies.[3]

Training and extension programs promote learning through education. Around the world, over half-a-million agricultural extension workers provide knowledge that helps farmers make informed decisions about their management strategies.[4] Such programs can increase farmers' understanding of how and when a new technology will provide benefits.

[1] Lybbert, T., et al. 2010. "Stochastic benefit streams, learning, and technology diffusion: why drought tolerance is not the new Bt." *AgBioForum*.
[2] Cai, J., et al. 2021. "Sparking Permanent Adoption of Resilience-building Agricultural Technologies." MRR Innovation Lab Evidence Insight.
[3] Jayne, T. S., et al. 2013. "Input subsidy programs in sub-Saharan Africa: A synthesis of recent evidence." *Agricultural Economics*.
[4] Aker, J. C. 2011. "Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries." *Agricultural Economics*.

challenge remains of sustaining adoption through seasons when the bundle only adds to the cost of planting.

In recent years, the initial project's private sector partners in Mozambique have scaled up the bundle in partnership with NCBA CLUSA with support from USAID.[2] The continued scaling of this bundled intervention provides an opportunity to test focused approaches to sparking lasting adoption of these resilience-building technologies and to add evidence of the bundle's impacts.

Research Design

This project in Mozambique uses a randomized controlled trial (RCT) to test two approaches to building lasting adoption of drought-tolerant maize seed bundled with index insurance for a seed-replacement guarantee. The two approaches seek to subsidize learning in different ways. The first approach targets learning-by-doing by providing a voucher that reduces the cost to purchase the insured seeds. The second approach targets learning that can take place without direct experimentation through community-based training sessions and experimental games that highlight how the insured seeds reduce overall vulnerability to drought.

The project will involve just over 1,000 farm households from 80 communities in the Manica province in central Mozambique. Each community has access to the insured seeds through the agrodealer network established by NCBA CLUSA, Phoenix Seeds and Hollard Insurance, and will be allocated to one of four groups, each representing a different combination of subsidy approaches.

Learning, and subsequently, sustained adoption, is expected to depend both on the subsidy strategy and on a household's experience with drought. As such, the study communities are geographically dispersed to maximize variation in the drought conditions experienced across communities

within the same treatment group.

The research team will collect data on agricultural decisions and outcomes, as well as on household food security and general economic wellbeing. In order to study the learning process itself and the role of learning in decision-making, surveys will elicit farmers' expected income from planting the insured drought-tolerant seeds compared to conventional improved varieties under a variety of drought conditions.

Development Impact

Ongoing collaborations in Mozambique between private-sector and NGO partners with support from USAID have already made important strides to make insured drought-tolerant maize available in rural communities. This MRR Innovation Lab project builds on that momentum while providing critical evidence on how to maximize reach and impact. This project supports USAID objectives in Mozambique to reduce rural households' vulnerability to drought and other shocks while also connecting them to markets.

This project is also measuring how investments in resilience compare against relying entirely on disaster relief to protect the wellbeing of vulnerable, rural communities. In addition to the threat of drought, Mozambique also faces a high risk of devastating cyclones that destroy agricultural productivity. Cyclones in 2019 and 2021 killed hundreds and damaged over 700,000 hectares of cropland.[3] The insured maize in this study may provide an opportunity for farmers who lose their livelihoods in a disaster to replant at no cost with high-quality seeds.

[1] Boucher, S., et al. 2021. "Bundling Stress Tolerant Seeds and Insurance for More Resilient and Productive Small-scale Agriculture." NBER Working Paper.
[2] Feed the Future Partnering for Innovation. 2020. "No More Risky Business: Remote Sensing Technology for Delivering Insured Crop Seeds in Mozambique." *Agrilinks*.
[3] UNICEF. 2020. *Cyclone Idai and Kenneth.*

Development Opportunity: Mozambique

12.3 : Population in millions (2018)
38.2% : Poverty rate at $1.90/day, 2011 PPP (2016)
10.2 : Rural population in millions (2018)
66% : Total employment in agriculture (2019)
36.8% : Prevalence of undernourishment (2017)
37.9% : Prevalence of stunting for children under 5 years (2015)

Source: World Bank

Mozambique has among the best records of sustained economic growth in Africa, averaging 7 percent per year over the last decade. However, poverty and undernutrition rates remain high in a country that is acutely vulnerable to drought, flooding and tropical storms.

Poverty and food insecurity are the main underlying causes in Mozambique of chronic undernutrition. Food availability is limited by low yields and inadequate access to markets for many citizens.

Mozambique is the second-largest formal exporter of food in the southern Africa region and could progress toward a trade surplus if regulation and agricultural practices improve. Its strategic location and trade corridors make the country a key player in regional and global food security.

FEED THE FUTURE INNOVATION LAB FOR MARKETS, RISK & RESILIENCE
basis.ucdavis.edu

2133 Social Sciences & Humanities
University of California, Davis
1 Shields Avenue | Davis, CA 95616
(530) 752-7252 | basis@ucdavis.edu

www.feedthefuture.gov

The Feed the Future Innovation Lab for Markets, Risk and Resilience generates and transfers knowledge and innovations that promote resilience and empower rural families, communities and markets to share in inclusive agricultural growth.