Farmers select innovations and practices that work for them

Farming in Kenya's arid regions is challenging because of low and erratic rainfall, land and water depletion, and climate change. Although decades of agricultural research have produced effective technologies to increase productivity, these have not been adopted by farmers. This project aims to develop innovative strategies for accelerating large-scale adoption and scaling up durable farming systems in three regions of Kenya.

The challenge: adapting innovations to individual farms

The Kenya Agricultural Research Institute (KARI) has developed improved seed varieties and practices for managing crops, livestock, soil, and water resources in arid and semi-arid agricultural regions. But these innovations are not a one-size-fits-all solution. Smallholder farmers need to assess each option — on its own and in combination with other options — to determine how to adapt and scale it up. Only then can they create resilient farming systems in Kenya's semi-arid lands, which account for over 7.5 million ha and are home to 20% of the country's population.

Engaging farmers in evaluation

Early in the project, researchers from McGill University and KARI began working with over 1,200 women and men in 54 farmer groups to identify what works and what doesn't when it comes to adoption of improved crop technologies and farming practices. This was later extended to another 216 farming groups, involving more than 5,400 farmers. The farmers are evaluating various combinations of 16 technologies selected from an initial list of more than 100 options to identify the most sustainable — and most profitable — ones. Several of their selections are already producing results.

Determining what works

Maize continues to be the dominant staple in Kenya. But its susceptibility to drought puts the food security of smallholder farmers at risk. Early results from this project show that farmers are increasingly receptive to growing more nutritious crops, in addition to maize, that produce higher yields, mature earlier, and are more drought-tolerant.

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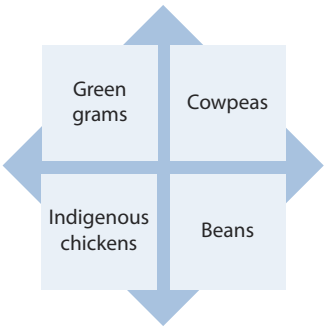
Green grams crop from Kabela farmers group plot

From the inventory of 16 improved crop varieties and practices developed by KARI, each farmer group chose eight for evaluation. Among the 54 farmer groups, only one ranked maize first. Drawing on scientific evidence, indigenous knowledge, and local practices, farmers selected crop varieties based on their resilience (i.e., ability to withstand drought) and other innovations based on their contribution to food production, income, and gender equity. Their top choices included native plants such as green grams and cowpeas, whose nitrogen-fixing qualities contribute to plant growth. They also chose to grow improved bean varieties and raise indigenous chickens (Figure 1).

FIGURE 1: Farmers' top technology choices



Next, 1,007 women and 716 men farmers participated in marketing workshops to identify the most viable business options (Figure 2). They looked at yield per hectare, price per unit, gross margin, and income.

FIGURE 2: Farmers' top business choices

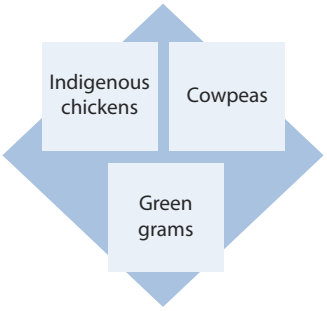


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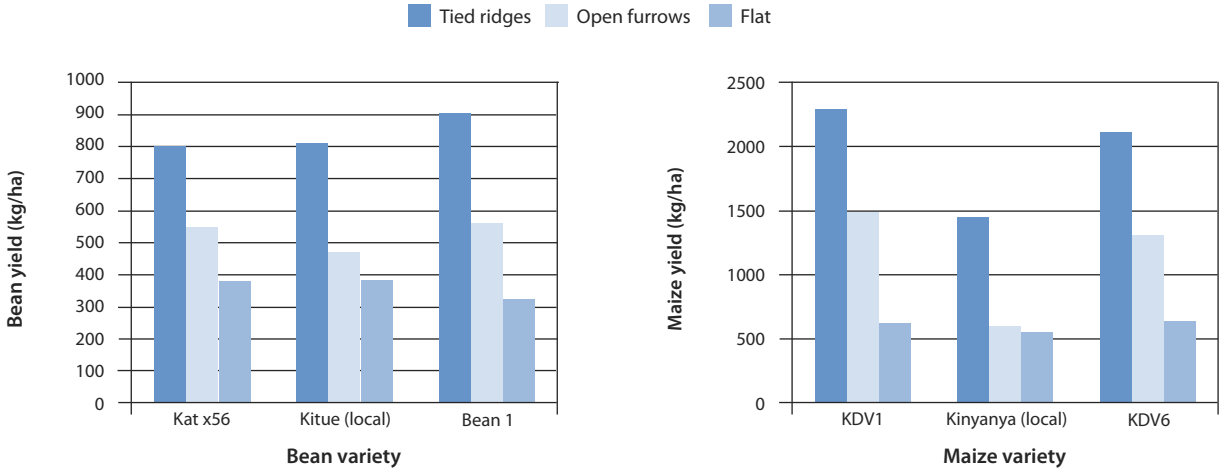
FIGURE 3: Tied ridging increases yield of beans and maize.

Better water management increases yields

In field trials held over two seasons, farmers evaluated improvements related to crop protection, water and soil nutrient management, and good agronomic practices. For example, top marks were given to an irrigation practice called tied ridging, which creates furrows that dead-end every few feet to prevent surface run-off (Figure 3). The practice was used at all 54 evaluation sites and resulted in impressive improvements in crop productivity during a relatively dry rainy season (Figure 4). The farmers who participated in the evaluation directly benefited from the results.

FIGURE 4: Effect of soil surface management options on crop yield in Yatta



Better plant and animal care maximizes production

Next, researchers created field maps to show farmers where each crop should be planted for best results. They also developed production guidelines for dryland crops, such as beans, cowpeas, green grams (Table 1), and pigeon peas, as well as horticultural crops, such as grain amaranth, vegetable amaranth, watermelon, black nightshades, and aloe.

TABLE 1: Production guidelines for green grams

Green grams	
Variety	N26, N22
Spacing	60 cm × 20 cm
Seeding rate	20–25 kg/ha
Fertilizer	Diammonium phosphate 124 kg/ha
Depth	4–5 cm
Pest control	Spray with recommended pesticides to control aphids, thrips, leafhoppers, pod borers, and pod-sucking bugs
Disease control	Use fungicide-dressed seed
Post harvest	Use Super Actellic (50 g/90-kg bag) to control Apion beetle

As part of the project, training was provided to one farmer from each of the 54 sites. These "service providers" are helping other farmers in their group implement best practices in raising indigenous chickens commercially. For example, Osho Ltd, a Kenyan company involved in animal health care products, is teaching each service provider how to manage Newcastle disease, a major problem in indigenous chicken production.

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Hands on exercise vaccinating indigenous chickens against Newcastle disease

Protecting the crop from birds

The project found that farmers prefer high-value crops like millet and sorghum as alternatives to maize because they fetch a higher price and are more drought resistant. Gadam sorghum is particularly valued because it has a ready and local market in East African Brewers Ltd. However, birds eat up to 70% of the crop unless farmers spend more than a month each growing season scaring them away — doubling their workload.

If another solution could be found, millet and sorghum would require about 148 days of labour per hectare a year, compared with 136 days/ha for maize. Providing farmers with alternatives to bird scaring will allow them to spend time on other productive activities and diversify their income sources.

Next steps

More than 5400 farming households are seeing for themselves what works and what doesn't when it comes to improved crop varieties and practices. The next steps are to scale up these successes to the 600,000 risk-prone households throughout this region and beyond. This will require:

- Identifying models from this project that need strengthening and successes elsewhere that could be adopted locally
- Helping with the private sector identify commercial opportunities in working with small-holder farmers in these communities
- Developing sustainable marketing approaches for inputs, produce, and ancillary services
- Engagement with decision-makers at the local, regional, national and global levels
- Policies and institutions that reduce barriers to up-scaling and out-scaling
- Additional development research and investment

PROJECT DETAILS

Title: Scaling up agricultural innovations in Kenya

Website: : www.mcgill.ca/globalfoodsecurity/research-initiatives/kari

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Country: Kenya
Funding: CA$4.3 million
Duration: March 2011 to August 2014

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Visit www.idrc.ca/cifsrf to learn about other projects funded by the Canadian International Food Security Research Fund.

The **Canadian International Food Security Research Fund (CIFSRF)** is a program of Canada's International Development Research Centre (IDRC) undertaken with the financial support of the Government of Canada provided through Foreign Affairs, Trade and Development Canada (DFATD).

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