



Legume Innovation Lab



Farmer Decision Making Strategies for Improved Soil Fertility Management in Maize–Bean Production Systems

The Challenge

Smallholder farmers in Mozambique and Uganda manage complex multifunctional maize–bean cropping systems in diverse landscapes and agroecosystems. Unfortunately, they register low yields and endure pervasive poverty and food insecurity due to harvests of 200 to 500 kg/ha, which are significantly less than the 2,000 kg/ha often obtained in researcher-managed fields.

Low bean productivity in maize–bean systems is due to low soil fertility, limited availability of improved seed varieties, excess water during plant growth, insects, and diseases. But poor and declining soil fertility is considered the primary constraint. Improved technologies and management practices could substantially increase yields; however, adoption of improved crop management practices, particularly those addressing soil fertility, has been modest for beans.



A nutrient-omission study examining the effects of N, P, K, Mg, Ca, S, and micronutrients on bean plant growth and development



top, Smart phones provide educational videos from which farmers can learn new techniques and practices; *bot.*, Examining field soil.

The Project

This project is based on two premises: sustainable intensification of agriculture production requires improved soil fertility management and addressing soil-related constraints requires, fundamentally, enhancing smallholder farmers' skills in diagnosing and finding solutions to important yield constraints.

This project seeks to develop methods and procedures that enable smallholder farmers with varying levels of education to better diagnose soil-related production constraints and make improved crop system management decisions that contribute to higher productivity in the short term and improvements in soil fertility in the long term.

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Feed the Future Legume Innovation Lab

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l. to rt., Training on triple bagging in Rakai; soil samples are gathered in Uganda; viewing animated video on a smartphone in Mozambique.

Project Objectives

1. Characterize farmers' practices, problem diagnoses, and solutions.
2. Develop and refine models of farmers' decision making.
3. Develop and validate appropriate diagnostic and decision support aids.
4. Develop and assess the effectiveness of innovative approaches for dissemination of information and decision support aids, training, and follow-up technical support.

Projected Outcomes

1. Empowering farmers (especially women) to take an active role in identifying problems and solutions in bean production.
2. Improving household income through the sale of increased bean production.
3. Providing a higher volume of beans for traders along the value chain within the country and in cross-border trade.
4. Ensuring the greater availability of nutritious beans and less dramatic seasonal price fluctuations for net consumers.

Major Achievements

1. Determining organic and/or inorganic fertilizer and liming options for major soil types
2. Integrating indigenous knowledge and digital soil mapping in regional catena
3. Presenting soil testing and improved crop management and fertilizer options for improved bean yield using various media (extension training, radio, printed materials, animated video)
4. Supporting field trials, demonstration plots, and farmer field days in 25+ communities
5. Development of multistakeholder innovation platform (900+ members) in Uganda connecting smallholder farmers with seed producers, input dealers, microfinance, traders, extension services, district agricultural agencies.



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