

Awareness and promotion

Alongside any work to promote the FOT there will be an ongoing campaign to demystify fertilizer use. Farmer mobilization needs to be well planned and organized to be effective and reach more smallholder farmers. Building awareness and demand amongst farmers for the FOT is relatively straightforward with radio/sms based on farmers' endorsements, word of mouth, and building in visits to successful farmers was pointed as an effective approach. It is therefore essential to build demand through the expansion of a delivery network: demand and supply need to be grown simultaneously.

Public and Private extension services, such as the community knowledge workers in Uganda, can also go a long way in changing the mind-set of the farmers in Uganda on fertilizer use.

Farmer Field School, where village based experiments/trials could be conducted with, and by, the farmers, would work well in cascading awareness and demand and supporting a culture of the right use of fertilizer amongst smallholder farmers in the context of ISFM.

Public and private extension services are important, but so are other government agencies in the mobilization of smallholder farmers; for example, locating the FOT within the plans for state fertilizer subsidy.

If all advice services, public and private, can be encouraged to use an approach based on the FOT, smallholders will have coherent and consistent messages. Currently different providers often provide different and sometimes contradictory advice on fertilizer application. Joint training of the extension staff and also private extension service providers would help build greater cohesion but this will only succeed if it has full policy backing.

There is an opportunity to increase awareness of FOT through the CABI-supported Plantwise plant clinics that are being implemented in almost all the OFRA countries. Ideally, farmers want all their farming problems to be addressed in one sitting/visit, rather than piece-meal solutions. Already there has been awareness creation on the FOT at plant clinics. There was a general feeling by the intermediaries that a lot can happen on the FOT use at the plant clinics if well-coordinated. One extension worker suggested that plant doctors could also be trained on FOT usage.

The FOT can be further integrated into the input supply chain by bringing in agricultural loan institutions. The FOT helps profit maximization and act as a mini business plan to convince the bank to advance the loan

Conclusions and recommendations

There is a growing appreciation of FOT as an innovation in agriculture to address the problem of fertilizer application by the resource poor farmers among the extension workers in Uganda. This suggests a replicable model that could be applied elsewhere in sub-Saharan Africa where majority of farmers are small-scale with minimal purchasing power.

In Africa fertilizer application has been a major challenge, compounded by limited financial resources to purchase enough fertilizer.

The FOT can be an important as a decision making tool as it guides a farmer in choosing the most profitable nutrient-crop combination based on their assessment of the prevailing market conditions that season. The FOT can also be used to support better decisions about loan allocation as loan capital is a significant farm input.

Training on the FOT for the intermediaries needs to be well planned to ensure ample time is given bearing in mind the complexity involved in interpreting the FOT outputs to farmers and the likely additional questions that the farmers are likely to ask. To ensure that the FOT message is standardized, first mapping out of these intermediaries will be critical and then ensure joint trainings are organized for all the intermediaries where standardized training materials are used. This will curb the problem of different intermediaries giving differing messages on FOT to farmers.

Promotion and awareness creation calls for investment in training and support materials and materials for a promotional campaign. The FOT will require further refining the tool to ensure it continues to meet farmer's needs, including new crops.

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Links with additional information

1. More profitable fertilizer use for poor farmers <http://bit.ly/1LJtU1G>
2. Uganda work positioned to make fertilizer use more profitable for poor farmers <http://bit.ly/1RC1c8>
3. Fertilizer use among smallholder farmers in Uganda <http://bit.ly/1GVaRr>
4. The fertilizer use optimizer solver and macros programming manual <http://bit.ly/1LJuegY>

Monograph series:

This monograph is part of a series of four published in July 2015 and based on case study research and focus group discussion in Uganda.

Monograph 1: Fertilizer Optimization Tool, an innovation for resource poor farmers in Africa

Monograph 2: Institutionalization of the Fertilizer Optimization Tool, a key ingredient to sustainability lessons from Uganda

Monograph 3: Farmers start appreciate the benefits of using the Fertilizer Optimization Tool in guiding fertilizer application in Uganda

Monograph 4: Fertilizer Optimization Tool: From the community knowledge and extension workers perspective in Uganda [following-up on trained intermediaries]

These monographs can be downloaded from www.africasoilhealth.cabi.org

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Fertilizer Optimization Tool: Community Knowledge and Extension Workers Perspective in Uganda [following-up on trained intermediaries]



Optimization of Fertilizer Recommendations in Uganda. Monograph 4

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Overview

About four million households in Uganda survive on farming and a significant proportion live below the poverty line and suffer food insecurity. The inherent poor soil fertility plays a part. This is exacerbated by deficiencies in nitrogen (N) and phosphorus (P) and other biophysical factors, leading to soil fertility depletion.

Achieving significant change requires greater use of inorganic fertilizer, supplemented with soil and water conservation and organic nutrient supplementation. This will provide productivity and yield increases but how can resource-challenged smallholder farmers be supported to make this change?

Excellent agronomic responses to fertilizer application have been demonstrated and reported for many crops, verifying that fertilizer N and P use is effective for increasing crop yields in Uganda. This has positive implications for food security and farm profitability. Despite all these findings and low crop yields, farmers' adoption of fertilizer and other Integrated Soil Fertility Management (ISFM) technologies is still very low.

The intervention

The Optimizing Fertilizer Recommendations in Africa (OFRA) project has been funded to address the problem of poor farmers who cannot afford to implement current fertilizer recommendations. The project builds on the Alliance for a Green Revolution in Africa, Soil Health Program's funding in 2009 when a prototype Fertilizer Optimization Tool (FOT) was developed as a decision support tool to guide farmers in fertilizer investment. Additional investment in 2013 added more nutrient response trials and a comprehensive search of legacy data leading to more crops being added to the FOT.

The FOT is a milestone in agriculture, helping farmers optimize returns on their investment in fertilizer. The tool selects the best crop-nutrient combination based on maximizing the return on investment. It is highly beneficial to smallholder farmers for whom the cost of borrowing is very high: in April 2015 the Bank of Uganda increased the central business rate to 12 percent, so borrowed money has to work hard.

The FOT developed in Uganda, determines the optimal crop-nutrient-rate combination for maximizing net returns on investment from fertilizer use. The graph below shows the net return to fertilizer use for a number of crop-nutrient combinations. In this example, the highest return comes from N applied to rice followed by N applied to beans, so these would be the highest priority for purchase and application of fertilizer figure below, priority on finances will be given to the purchase and subsequent application of N on rice, then N on beans. If, after applying N to rice and beans, the smallholder farmer's budget is not depleted, the next highest rate of return is for N on Maize, P on soybean, P on groundnuts and finally N on sorghum.

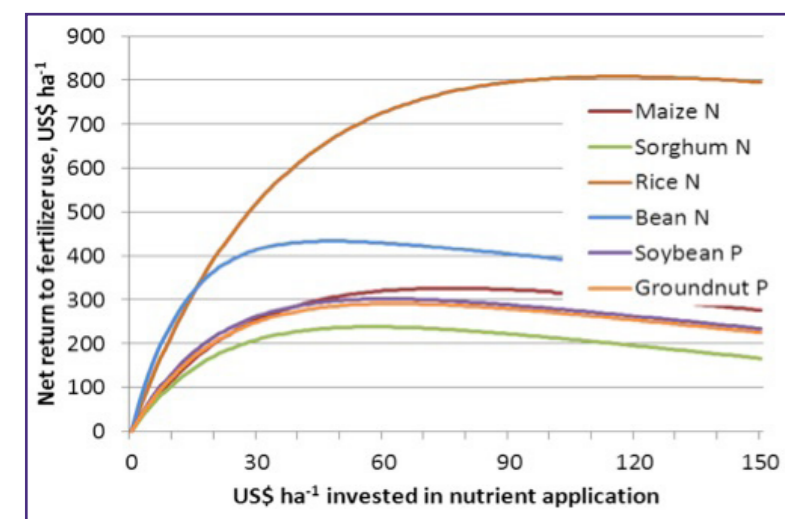


Figure 1: Net returns to fertilizer use varying with crop-nutrient-rate

Planning and designing the FOT roll out

Once FOT technology is developed and tested, the roll out stage is done using the existing technology transfer pathways to the end users (farmers). These pathways include the existing government extension agencies, private sector, through the farmer organizations; agro input dealers as well as NGOs active in agriculture which have an extension arm. These agencies require initial training tailored to ensure that they understand the FOT and can introduce it to farmers.

In Uganda over 500 government extension staff from National Agricultural Advisory Services (NAADS) and over 50 NGO Community Knowledge Workers (CKWs) were initially trained in different regions in Uganda to roll out the FOT in 2014/2015. However, this was not as successful as hoped due to restructuring of state extension in Uganda.



Figure 2: District agricultural officers practicing use of the mobile based FOT in Tororo, Uganda

Community knowledge and extension workers FOT story for Uganda

To learn from the Uganda experiences in using the FOT, a follow-up study was conducted in Uganda during April 2015. This follow-up study sought to assess the challenges in using the tool by the intermediaries and their experiences in using the tool to advise farmers. The study conducted focus group discussion with 40 extension and CKWs who were initially trained through National Agricultural Research Organization (NARO).

Valuable lessons are emerging from the Uganda experience of using and adapting FOT to various uses both by the intermediaries and by the resource-constrained smallholder farmers. The extension workers consider the FOT as a decision making tool for the farmers (helps farmers in choosing the most profitable enterprise). They also identified additional functions including advocacy for fertilizer use and given the FOT's ability to demonstrate potential returns on investment, it could play a key role in financial institutions reviewing loan applications from farmers to buy fertilizer and inputs.

Although the extension workers and community knowledge workers say that the FOT is a useful tool which makes their jobs easier, they suggested the tool needs some additions to enhance its applicability.

The questions farmer typically ask about fertilizer are:

- What fertilizer do I apply?
- How much in terms of quantity should I apply?
- On which crops should I apply?
- Where do I get the fertilizer?

Although the tool answers the first three questions, we need to ensure that they are linked to the sources of this important input. Many farmers state that the reasons they do not use chemical fertilizers in their farms is that they are either not available in the local agro-shops or they are not in the pack sizes that the farmers can afford.

The intermediaries consider the mobile phone app version of the FOT as more suitable than a computer based version. However, challenges in using the app include poor network coverage in some areas and lack of sufficient airtime to load the calculations given the poorly supported extension services. Sustainable model of constant availability of airtime needs to be considered when rolling out the tool in other countries: options for enabling the tool to work offline will go a long way in addressing this challenge.

In Uganda, interviews with Tororo district extension officers revealed that they have used FOT to arrive at estimates of the quantities of fertilizer each farmer needs to augment the government subsidised fertilizer. At the district level the number of farmers is known as is the quantity of fertilizer supplied by government each season. The districts are able to calculate the shortfalls for farmer needs for the season and advise the farmer what he/she needs to invest in fertilizer for the season, based on FOT approach recommendations.

Key considerations while rolling out FOT in OFRA countries

The Uganda FOT experience can provide lessons for roll out in the other 12 OFRA countries. Focus group discussions with more than 50 extension and community knowledge workers revealed various areas where the FOT could be enhanced.

FOT enhancements

Increasing climate uncertainty has resulted in African farmers diversifying their crops to mitigate risks of complete crops failure. The FOT will therefore need to be enhanced with new and different crops to support this farmer-led innovation.

In addition to the piloted Mobile app version of FOT, there are two versions of the FOT: an Excel platform on a computer, and a paper-based version. There was unanimous agreement by the CKWs and government extension workers that the training on all three was important to ensure that they do not at any one time get stuck in their extension/farmers advisory services. The initial duration for training the intermediaries should be enough and refresher training should be planned thereafter to ensure that they really grasp the concept and also to give room for them to share experiences.

Supporting the extension service through provision of relevant communication materials for the FOT was considered as critical to rolling out FOT in any OFRA country. The development of an FOT guide will help extension workers making quick and effective interpretation of the outputs to advise the farmer. The guide should explain how the figures are generated. This guide should also capture the application methods, spacing and other questions that farmers are likely to ask extension workers in relation to fertilizer and crop management in general. Gradually all of this guidance should appear on the screen as a prompt.

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