



## Farmers start to appreciate the benefits of using the FOT in guiding fertilizer application in Uganda



### Optimization of Fertilizer Recommendations in Uganda. Monograph 3

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## Overview

Blanket fertilizer recommendations have typically been developed with the intent of maximizing yield or profit per hectare. Profit per hectare is generally appropriate where farmers have access to capital and the financial ability to apply fertilizer across all of their crop land to maximize net returns per hectare; this is generally their most profitable option.

Smallholder farmers in Africa generally use little fertilizer. The reasons for this include inefficiencies across the fertilizer value chain meaning that fertilizer is not available in outlets close to the farmer at the time when they are needed, fertilizer cost, and the high opportunity cost (money spent on fertilizer is not available for other needs). Thus, smallholders typically cannot apply fertilizer to all of their cropland in line with the available recommendations. Often, smallholders can apply fertilizer on only a small part of their farm. They need to make choices that maximize the benefit-to-cost ratio; this implies that applications should be based on the crop-nutrient rate combinations that give the greatest net returns for their investment capacity.

Existing blanket recommendations do not allow farmers to maximize net returns on their investment. In addition there is a lack of information about correct application rates, timings, and the use of the correct products (such as fertilizers containing appropriate nutrients) for different crops.

The majority of Ugandan farmers have very limited resources available to invest in all farming inputs especially on fertilizer. Their dilemma is: 'I have this much money to spend on fertilizer – which fertilizers should I apply to which of my crops to get the most benefit?' Further, there is a general lack of knowledge of proper application practices, including timing and appropriateness of different products for specific crops and soil conditions among extension workers and agro-input dealers. These intermediaries are, therefore, unable to provide the appropriate advice to farmers. Consequently, many farmers lack the knowledge and skills needed to use fertilizer and other integrated soil fertility management (ISFM) components efficiently.

## Why a Fertilizer Optimization Tool?

A **fertilizer optimization tool** has been developed to address the problem of farmers with limited resources to invest in fertilizer given the demanding needs for quality seeds, pest control and labour, among other inputs. Low mineral fertilizer use by smallholder farmers in Africa commonly constrains productivity.

Existing fertilizer recommendations take care of the non-finance constrained fertilizer users who commonly strive to maximize mean net returns across all planted acres. These recommendations are, however, infeasible for smallholders with limited financial capacities.

**A fertilizer optimization tool has been developed to address the problem of farmers with limited resources to invest in fertilizer.**

## Benefits of using the FOT

The tool optimizes the crop-nutrient-rate combinations expected to maximize the net return on investment. The FOT is a computer program that runs on a laptop computer. Extension workers and other intermediaries who have received special training work with individual farmers to develop fertilizer recommendations suited to their unique circumstances.

**Assumption:** A farmer has 1 hectare of land, plants six different crops and US\$ 170 available for fertilizer use.

Following the FOT guidance the net return (profit) was found to be US\$ 1,918 with fertilizer spread across the crops and applied at appropriate times: maize returns US\$ 676 and rice returns US\$ 804. The FOT has increased the return on investment by 2 or 3 times.

Because of the relatively high returns on investment compared with traditional fertilizer use recommendations, smallholders can gradually increase fertilizer use in subsequent seasons.

## The FOT rollout in Uganda

The FOT was developed and, for it to get to the end users (farmers), it needed to be rollout by use of the intermediaries (extension workers and the community knowledge workers). The intermediaries were first trained through the National Research Organization (NARO – Uganda) and were then charged with the responsibility of rolling out the FOT to farmers. In January to February 2015, the intermediaries were involved in advising farmers on fertilizer application during the long rains season using the FOT. In order to learn from the Uganda experiences in using the FOT, a follow-up study was conducted in Uganda between 8 –18 April 2015. The aim was to assess the challenges farmers faced in using the tool as well as learning from them the benefits they are enjoying as a result of using the FOT for fertilizer application in their farms. Three focus group discussions were held with smallholder farmers in each of Tororo, Mbale and Kapchorwa districts and each of the focus group comprised of an average of 20 participants (8 men and 12 women) all with less than 5 acres of farm land.

### What farmers say about the FOT and its benefits

The majority of the smallholders indicated that they realized the importance of using fertilizers before seeing the FOT. Significantly, the tool has helped them in reducing wastages in applying fertilizer. It has also assisted them in choosing the most profitable crop where to apply fertilizer crop-nutrient combinations to get maximum returns.

**The tool has helped smallholders in reducing wastages in applying fertilizer.**

Abbey Omitta from Tororo district, said: *“The tool has come at the right time when farmers have been running up and down with banking institutions to borrow money to buy farm inputs such as fertilizer but we waste fertilizer by applying ridiculous amounts”*. The tool provides an avenue to convince financial institutions to advance input credit to farmers. The farmers were initially using the bottle tops to apply fertilizer to each planting hole and spent so much time during planting, but with the FOT the row application moves faster.

Lucy Chesang from Kapchorwa Eastern Uganda said: *“With the FOT I use less fertilizer thus reducing the wastage as I used to do before I learnt about use of the FOT to guide in fertilizer application. As farmers, we are saving so much in terms of money and can redistribute this in other crops. Initially I used to buy excess fertilizer thinking the more I applied fertilizer the more the yields I could get. Besides we did not know how to apply and also which fertilizer to apply. I used to apply 50 kgs of fertilizer on maize crops in half an acre which I was told it was too much fertilizer and excess spoils the environment, so we are contributing in taking care of the environment. My husband is also embracing the use of the FOT. When the second season came he asked me, Lucy please bring that FOT of yours so that we can decide how much fertilizer we will need to buy”*.

In Machigaga parish, Bukkerere village in Tororo, Chary reported that he used to apply 50 kg of DAP as basal fertilizer to maize crops in one acre but did not have any left over money to buy urea for top dressing. However, with the use of the FOT he reduced the quantity of DAP applied by 8 kg and used the extra money to buy urea and the results were very encouraging. Moreover, another farmer Juliet Yeshe from Kapchorwa reported that in a piece of one acre land where she used to grow rice without fertilizer and harvesting 10 sacks, after getting introduced to the FOT technology where the right quantities were applied, she harvested 15 bags getting an extra 5 bags that season. Before the the FOT, the fertilizer was looked as a preserve of the rich, but the FOT is enabling even the resource poor to enjoy the benefits of using the fertilizer in their farms.

Chary also identified a difficulty with the way the tool was being used: *“I cannot get all this output from the FOT that the extension worker who generates when he/she visits my farm to advice on fertilizer application in my mind. Is it possible that we have reference materials or a form to fill the output for the farmer to keep it for making reference as he/she applies fertilizer?”*

## Conclusions and recommendations

There is need to work on the supply side of the agricultural inputs, notably fertilizer. The majority of farmers reported that there are limited input sources where they could get fertilizer and, wherever it is available, it is not available in the packages that farmers can afford given their low levels of income. There are also unfamiliar types of fertilizers supplied, some coming in different colours from what the farmers know and can recognize. There is need therefore for the extension and other intermediaries to step up their training and awareness to support farmers to be able to recognize the different types of fertilizers.

Awareness creation on the importance of fertilizer needs to be increased and engage more stakeholders. There still exist myths that the use of fertilizer destroys the soil and even causes cancer. To debunk these myths, targeted campaigns are needed in these regions and the campaign needs to be backed up with stories of farmers who have used successfully fertilizer successfully in their farms.

There is also need for better government quality control of fertilizer and to work with the manufacturing companies to ensure they produce the right quality fertilizer for the needs of the farmers. Training of farmers by extension should include staff from the fertilizer companies and/or the input dealers, especially those that are in daily contacts with the farmers or are in extension to ensure that farmers' needs are comprehensively addressed.

Farmers using the FOT appreciate better financial returns from applying fertilizer to their crops. To address the problem of farmers not being able to remember the FOT outputs, a form summarizing the recommendations needs to be developed for the farmer take home. On the back of the form information about other good ISFM practices, such as management of crops, diseases and correct spacing has been included.

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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/1GVaRAr>
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](http://www.africasoilhealth.cabi.org)

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