



Smallholder farmers in Uganda have been urged to maximise fertiliser use alongside organic manure to improve soil nutrients. Photo Credit: Istock

Fertiliser optimisation tool gives farmers more for less

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REPORTS of Uganda's surplus production of crops like sugar cane and its being endowed with natural resources often give the impression that the country is blessed with fertile soils. Yet this is contrary to what soil scientists have found.

A study conducted by National Agricultural Research Laboratories (NARL) Kawanda shows that Uganda faces severe soil nutrient depletion.

This is because many farmers keep tilling the land over and over again without applying practices that maintain soil fertility.

Calculate the amount

Therefore, it is recommended that small holder farmers should maximise

fertiliser use alongside organic manure to improve soil nutrients.

The most important ingredients required to increase soil fertility are nitrogen, potassium and phosphorous (NPK). Secondary components include calcium, magnesium, sulphur, copper, iron, manganese and zinc.

The scientists have come up with Uganda Fertiliser Optimisation Tool (FOT). It is computer-based tool used to calculate the required amount of fertiliser for a specific agricultural activity per unit hectare. It also indicates what a farmer will earn from the output invested.

The software is loaded on mobile phones.

NARL is working on this project with University of Nebraska. In US, the FOT has been applied by farmers and has worked well.

The profit

Dr Cranmer Kayuki Kaizi of NARL says that FOT considers the land area the farmer wishes to plant for a particular crop and expected commodity value at harvest, the cost of fertiliser and the finance available to the farmer for purchase of fertiliser.

The profitability varies greatly depending on which nutrient is applied to which crop and at what rate.

FOT was developed for crops such as sorghum, beans, rice, groundnuts and maize. Currently, the team is in the process of developing this tool to cover other crops.

It is made available to extension workers who show farmers how to calculate the fertiliser rate for a particular crop and estimate average yield and net returns.

The target is extension workers in various African countries: namely, Uganda, Kenya, Tanzania, Rwanda, Mozambique, Zambia, Malawi, Ethiopia, Ghana, Burkina Faso, Nigeria and Niger.

Guide farmers

Calculations are made with MS Excel, and a farmer will be able to know that if he or she applies 50kg of urea on one hectare, the yield will amount to 44kg of maize grain per hectare.

For the case of rice, if the fertiliser purchased amounts \$60 (Shs204,900) per hectare, the farmer will be in position to reap \$700 (Shs2,390,500) per hectare. Therefore, the tool enables farmers to apply fertiliser depending on the economic return.

The tool also helps guide the farmers on which crops to invest in and the fertiliser usage. In Uganda, it has been tried in Kapchorwa, Aleptong, Arua, Tororo, Sironko, and Apac districts and it is to be introduced in Kisoro, Kabale and Ntungamo districts.

The implementing partners, CABI and NARL have trained community knowledge-based (CKB) trainers in Kapchorwa and Mbale.

Increased yields

Sam Satya, the coordinator, says that using FOT has advantages such as putting farmers with little cash at hand in a position to buy fertiliser at whatever quantity in a bid to get good yields.

Farmers growing other crops not covered by FOT are at a disadvantage because they are not able to make use of it.

So far, about 300 farmers in Mbale and Kapchorwa have adapted the FOT technology and they have realised increased yields.

The farmers have learnt to determine which quantity of fertiliser to purchase for an acre of land. Previously they would apply 50 kg of either urea or diammonium phosphate (DAP) on one acre. Yet, by applying FOT, a farmer can use 30 kg of urea and 12 kg of DAP for one acre and still reap better yields.

A farmer who used 50kg of urea would harvest eight bags of maize but now by using less quantity of urea, he or she can harvest 20 bags of maize.

Farmers are advised to measure the fertiliser and mix it with soil per hole, and by the time it spreads across the field and it rains, the fertiliser would have been absorbed.

Managing soil fertility

In case farmers lack money to purchase fertiliser mainly urea and diammonium phosphate (DAP), they may grow legume crops, which fix nitrogen in the soil.

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Cover crops such as Macuna, Chlotolaria and soya bean are key nitrogen-fixing crops that farmers are encouraged to grow during fallowing of their fields.

It is also advisable for farmers to embrace use of inorganic fertiliser like urea because 100kg of urea contains 46 percent nitrogen compared to 100kg

of organic manure, which contains 1.0 percent nitrogen.

Therefore, it is recommended that smallholder farmers should maximise fertiliser use alongside organic manure to improve soil nutrients.

Fertilising pastures

The experts contend lawn fertilisers should be spread evenly and applied according to manufacturer's instructions. Water is required if the weather is dry.

To help the nutrients penetrate the soil, aerate the lawn before applying fertiliser. This also helps improve surface drainage and prevents compaction.

Apply more fertiliser for light soils

Light and free-draining soils, usually sandy in composition, lose nutrients more quickly than other types, especially in rainy spells. Apply fertiliser more frequently on these soils, especially nitrogen fertilisers to maintain levels.

Apply less fertiliser for clay soils

Heavy clay soils and soils containing a lot of organic matter require less frequent application. This is because both substances act as reservoirs holding the nutrients and releasing them slowly over time to the plants.

Acidic or chalky soils

Phosphates and potash become more soluble in an acid soil, making them easier for rain to wash away. In chalky (alkaline) soils, phosphate becomes insoluble when mixed with the calcium present in chalky soils. In both cases, divide the application into two or three and apply over the growing season.

Trees

To feed a tree, apply fertiliser evenly in the area under the canopy. The tree's feeding roots tend to be near the surface in that area. A gentle shallow aeration will improve penetration of the nutrients as well as improve surface drainage and reducing compaction. Avoid damage to the roots by keeping shallow.