Soil fertility; a crucial code toward a smiling farmer

Food security is an individual’s or household’s ability (physically or financially) to access enough, safe, and nutritious food.

Over two-thirds of Uganda’s population is food insecure. The situation is likely to worsen because the population is growing faster (3.2% per annum) than food crop production (2.7% per annum) [Economic Policy Research Centre Fact Sheet No. 1, July 2012]. Therefore improving agricultural productivity is imperative for households in Uganda to meet their food security needs and to promote their incomes. Improving and maintaining the soil’s fertility, especially fertiliser use, is one of the key issues pertinent to improving the soil’s productivity.

What are fertilisers?

Fertilisers are materials which can be added to the farmer’s garden/soil so as to release nutrients that are important for the crop to grow and give a good harvest.

Fertilisers may be artificial/inorganic (manufactured from industries or mined from the earth) or natural/organic e.g animal manure and compost manure. Artificial fertilisers are usually in form of granules or dust.

Fertilisers are usually added to the soil in order to add the necessary nutrients, however it is important for a farmer to know what is missing in the soil before buying or applying fertilisers. However, testing the soil is a process that is complex for an ordinary farmer to carry out; it is usually done in research institutes like Kawanda or Makerere University.

When applied, some fertilisers will release one major nutrient e.g urea and ammonium nitrate (these release nitrogen), rock phosphate/PREPAC, TSP, and SSP (these release phosphorous).

Other fertilisers can release two or more major nutrients e.g NPK (releases nitrogen, phosphorous, and potassium), and DAP (releases nitrogen and phosphorous).

How are fertilisers applied?

For farmers who grow their crops such as maize in rows, a furrow or line can be dug (10-15cm deep) along the length of the row near the roots, and then fertiliser placed in this furrow and covered with soil. This method is known as band application, and is suitable for less soluble fertilisers.

For crops which are not grown in rows, fertiliser can be spread in a prepared field where planting is going to take place. The fertiliser may or may not be integrated into the soil. The fertiliser should however be uniformly spread. This application method is called
broadcasting and is suitable for fertilisers applied at the start such as phosphorous and potassium.

A stick can also be used to make a circular furrow around the plant and fertiliser put in this furrow. The furrow should be dug depending on how the roots spread.

Fertiliser can as well be poured in a planting hole, covered with a small layer of soil, and then the seed/seedling sown/planted in hole. This method is called spot application.

Also for plants that are congested or not planted in rows, fertiliser can be dissolved in water and then sprayed on the leaves. This is usually done for nitrogen fertilisers like UREA. This method is foliar application.

For large scale or commercial farms like flower farms, the plants receive the fertiliser through irrigation pipes, whereby fertiliser is mixed from one central area and then sent through the pipes to different plants on the farm. This method is known as fertigation.

When are fertilisers applied?

For phosphate and potassium fertilisers, they are usually applied to the soil just before planting or at planting. The fertiliser may then be incorporated into the soil at a depth of 10-15cm. When fertilisers are applied like this, it is known as starter or basal fertiliser application.

Nitrogen fertilisers are usually applied a few weeks after germination. For example in maize crop, nitrogen fertiliser is usually applied when the crop is around 2 feet high, which is usually after the 1st weeding. When fertilisers are applied at this time, it is known as top or side dressing.

A fertiliser may also be applied in different portions or at different growth stages of a crop. For example in a maize crop, a nitrogen fertiliser like UREA can be applied when the crop is at knee high level and then again applied when the crop is flowering/tussling. This is then referred to as split application.

Fertiliser use in Uganda

Uganda is a signatory to the “Abuja Declaration on Fertilizer for an African Green Revolution” (2006). As per the Declaration, Government of Uganda is committed to increasing fertilizer use to at least 50kg per hectare per annum by the year 2015. However the total fertilizer consumption (in nitrogen fertilizer) remains at a low level: the 5-year average in Uganda is only 3,842 tons, which is about 5 percent of the Kenyan fertilizer consumption and 12 percent of the Ethiopian fertilizer consumption (FAOSTAT, 2010). Declining soil fertility is cited in the Agricultural Development Strategy and
Investment Plan for 2010/11-2014/15 as one of the major challenges to increasing crop production in Uganda.

The size of the fertiliser market in Uganda is estimated to be between 16,000-20,000 tons of fertilizer products annually. However, about half of Uganda’s annual fertilizer imports are imported directly by commercial crop growers. The commercial fertilizer supply system upon which smallholder farmers are dependent consists of five to seven importers, about 15 to 20 wholesalers, and 250 to 300 small-scale rural retail stockists. Importing firms face high costs in transporting the bulky commodity. While the costs of importing fertilizer to Uganda have fallen significantly in recent years due to increased supplies from Kenya, they still remain high compared to prices in the rest of the world. Ugandan farmers who use fertiliser are bearing the full weight of the sharp increases in global prices in 2007 and 2008 [IFRI, Uganda Strategy Support Program; brief No.4]

The Uganda Census of Agriculture (UCA) of 2008/09 revealed that most farmers (50%) were not using inorganic fertilizers because they are too expensive. Other reasons provided for not using fertilizers included; lack of knowledge (25%), limited access (14.1%) and the perception that fertilizers are useless (9.5%). Regarding organic fertilizers, lack of knowledge was considered as the major limiting factor followed by high cost. Other factors that influence fertiliser use include: low output prices compared to the fertiliser input prices, poor agricultural advisory services, risky policy environments, poor road networks, weak market information systems.

UCA further revealed that only 8% of farm households use inorganic fertilizers and about 26% of households use organic fertilizers in crop production. Central region (34.2% organic and 11.7% inorganic) leads other regions in the proportion of households using organic and inorganic fertilizers while northern region is least fertiliser user (9.6% organic and 4.4% inorganic). According to UCA, use of inorganic fertilizers in grain production such as sorghum can increase output by 40-60%.

A USAID-funded study carried out by the International Institute of Tropical Agriculture (IITA) in nearly 200 farmer fields in Uganda (the second largest producer and consumer of bananas in the world) showed that modest fertilizer use can significantly increase the crop's yield. In Central Uganda, for example, annual yields doubled from 10 to 20 tonnes per hectare with modest fertilizer application. "The application of fertilizers not only increases bunch weight but also shortens the crop cycle so the plants produce more bunches in a year," says van Asten, an IITA agronomist. Van Asten cautions that fertilizer use has to be very strategic. For example, the practice only becomes more profitable when it is specific to a crop and a region, and targeted at only those nutrients that are most deficient.

The above study also estimated that more than 1.5 million tons of Potassium (K) are removed (during harvesting) from the rural areas where the bananas are grown and transported to Kampala where most of the markets are. These nutrients are mined by
farmers, but not immediately replaced. Over time, this nutrient mining could diminish the soil's ability to sustain profitable banana production.

Conclusion

The need for replenishing soil fertility in Uganda is well recognized. Henao and Baanante (2006) estimate that the loss of Nitrogen, Phosphorus, and Potassium (NPK) in the 2002-2004 cropping seasons was about 66 kilograms per ha per year, which puts Uganda at the 14th highest loser of soil nutrients among African countries. The land availability, at the same time, is rapidly declining in Uganda. Because of a high population growth rate and slow population movement from rural to urban areas, the arable land per person has declined by half, from 0.6 ha per person in the 1960s to 0.3 ha per person in the 2000s (FAO, 2008).

There is need for a National Fertiliser Policy to promote agricultural productivity through improved infrastructure, access to credit, creating awareness on fertiliser use, supporting domestic fertiliser production, harmonising policies related to fertiliser use, strengthening research and extension, and others.

Although fertiliser application is important, it will not in itself raise the yields. Other agronomic practices such as good field preparation, proper spacing, early planting, use of high yielding and resistant varieties, and adequate watering will need to be integrated so as to have high yields.

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