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Supported by the CGIAR

UGANDA STRATEGY SUPPORT PROGRAM (USSP)

Brief No. 4

Use of inorganic fertilizers in Uganda

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Improving agricultural productivity is vital for poor rural households in Uganda to meet their food security needs and to promote sustained increases in income. Inorganic fertilizer can be a powerful productivity enhancing input. While Uganda has one of the highest soil nutrient depletion rates in the world, it has one of the lowest rates of annual inorganic fertilizer application – only 1.8 kg per hectare. The World Bank calculated that the value of replacing these depleted soil nutrients could be 20 percent of average rural Ugandan household income. Promoting fertilizer use is therefore crucial to sustainably increase agricultural productivity in Uganda. This brief explores the economics of fertilizer use by smallholder farmers in Uganda, the determinants of fertilizer use, and options for government action.

Uganda's fertilizer marketing chain, as shown in Figure 1, is highly concentrated, creating conditions of oligarchy and imperfect competition. The size of the market 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 in Kenya, they still remain high compared to prices in the rest of the world. Moreover, the variability in fertilizer prices globally is transferred directly to the Ugandan market – Ugandan farmers who use fertilizer are bearing the full weight of the sharp increases in global prices in 2007 and 2008.

Maize is the staple food crop grown by Uganda smallholders for which inorganic fertilizer application is likely to be the most profitable. An increasingly important crop in Uganda, maize is grown both as a food crop and as an export commodity. However, yields are low, averaging 1.0 tons per hectare. Poor soil fertility, particularly nitrogen deficiency, is a severe constraint to smallholder maize productivity. Studies of maize grown at three fertility regimes revealed significant response to nitrogen application. Medium rates of fertilizer application (60 kg N, 45 kg P₂O₅, 30 kg K₂O per hectare) yielded a 270 percent

increase in yield over no fertilizer application, while doubling the amount of fertilizer from this medium level of application increased yields by only 16 percent. As such, relatively modest investments by smallholders in inorganic fertilizer could dramatically increase their maize productivity.

Determinants of inorganic fertilizer use

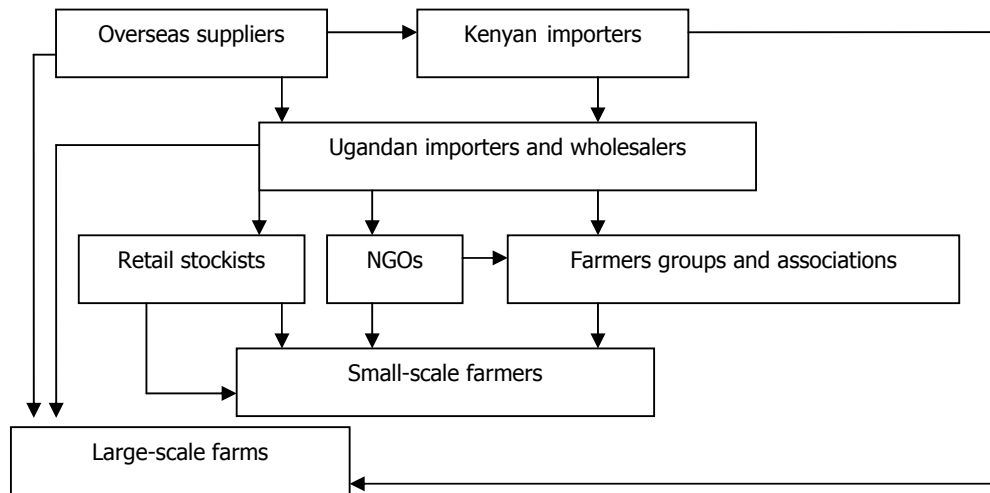
Agronomically, maize yield responses to the application of inorganic fertilizer in most locations in Uganda are significant, but most smallholder farmers do not use fertilizers. There are three primary determinants of inorganic fertilizer use amongst smallholder farmers in Uganda – demand-specific, supply-specific, and cross-cutting – that together account for this pattern.

Demand-specific factors

There are two demand-specific factors. High fertilizer prices and low output prices is the first. Farm-level fertilizer prices in Uganda are among the highest in the world. In spite of the significant yield response to fertilizer application on maize, the high fertilizer prices are not offset by sufficiently high producer prices for maize, resulting in fertilizer use being only marginally profitable. Recognizing this, farmers will have only quite limited demand for fertilizers.

Poor agricultural advisory services is the second demand-specific determinant. In general, inadequate technical information is provided to smallholders on how they might make profitable use of inorganic

Figure 1: The fertilizer marketing chain in Uganda



Source: Omamo, 2003

fertilizer. Without the information they require to make efficient use of the fertilizer they purchase, farmers are unable to make a profit on their investment in fertilizer, so quickly turn away from the use of the technology

Supply-specific determinants

Supply-specific determinants include risky policy environments and institutional risk. Unpredictable government or donor intervention in the fertilizer market interferes with the establishment of a practice of regular fertilizer use by smallholders. Historically, the government of Uganda has not been as interventionist in fertilizer markets as its neighbors, but by the same token it has done little to effectively promote a strong agricultural inputs sector.

Institutional risk is another supply specific determinant. Uganda’s quality control, packaging, safety and enforcement are inadequate and frequent procedural changes create uncertainty and risk to fertilizer suppliers. Other supply-specific determinants include the high costs of market entry and the lack of commercial storage facilities.

Cross-cutting determinants

Cross-cutting determinants include the availability of the infrastructure and institutions that are vital for fertilizer availability and market access. Poor road networks in Uganda limit the supply of fertilizer and increase fertilizer costs. Weak market information systems are also cross-cutting. Uganda lacks a marketing system capable of supporting the development of effective input markets. Poor financial services also limit fertilizer use and supply. Farmers lack credit to finance purchases of fertilizer and to market their production. Suppliers lack access to credit, limiting the amount of fertilizer available to farmers. High interest rates and stringent collateral requirements also limit the use and supply of fertilizer.

Government role in fertilizer input markets: Investment in public goods

The determinants listed above reveal a need for action. While the results of government interventions to foster sustainable soil fertility management practices, including the use of inorganic fertilizer, in the past have failed to impress, no other actor can meet the needs of farmers, suppliers, importers and producers. This section articulates policies that balance the need for limited government intervention and a flourishing private sector in strengthening the supply and use of inorganic fertilizers in Uganda.

Improve infrastructure. Poor roads and transport networks contribute significantly (according to one survey, 50-60 percent) to the high cost of fertilizer, while also making transporting goods to market a challenge. Public investment requires an efficient, reliable infrastructure for the movement of bulk goods like fertilizer. More public funds should be directed towards the Ministry of Works and the Uganda National Road Authority for effective transport infrastructure development programs. This will lower the transaction costs incurred in fertilizer procurement, reducing the price of fertilizer.

Improve access to finance. According to the World Bank, credit limitations are a binding constraint to increased agricultural production in Uganda and will continue to impact production in the future. Improved access to credit has been shown elsewhere to be an important component of efforts to increase fertilizer use to raise agricultural productivity. In Uganda, the Prosperity for All program is developing rural financial services through savings and cooperatives, but many major constraints in access to rural finance remain and must be addressed more effectively by the government.

Enhance incentives for on-farm investment. When farmers can invest, they have a tendency to invest in

off-farm ventures rather than in fertilizers or other productivity-enhancing inputs. To increase investment in fertilizer, the government should identify and implement mechanisms to lower the input-to-output price ratio through increasing crop output prices, reducing fertilizer prices, or both, thereby increasing the profitability of fertilizer use.

Introduce appropriate regulations. Indirect but effective regulation that creates incentives and encourages investment by the private sector should be encouraged. Effective agricultural input quality control regulation is critically important to preventing product adulteration.

Strengthen research and extension. Public sector support for agricultural research systems, improved seed, and the dissemination of appropriate input recommendations is important in raising farmers' willingness to pay for fertilizers. Uganda's Plan for the Modernisation of Agriculture needs to increase the availability of agricultural extension services through the expansion of NAADS.

Strengthen coordination linkages. Farmers cannot benefit fully from market participation until they develop the human capital required for creating and managing cooperatives. Strategic relationships between all fertilizer market chain actors, including farmer groups, must be established.

Market-smart subsidies. While subsidies have often failed to stimulate fertilizer use in the past, a market-based approach to fertilizer subsidies is necessary in the short term. Market-smart policies are public subsidies and related interventions that promote increased use of fertilizers in a way that stimulates input market development without impeding private investment. Market-smart subsidies can sometimes be useful in the short run to address some of the problems that contribute to low fertilizer use, but do not present a long term solution to the problem of missing fertilizer markets. Sustainable growth in fertilizer use is only likely if public resources can support measures that address the many underlying structural problems that affect the supply and use of inorganic fertilizer in Uganda.

Juliet Namaazi was a Senior Research Assistant with the Kampala office of the International Food Policy Research Institute when this paper was prepared.

This brief is intended to promote discussion; it has not been formally peer reviewed but has been reviewed by at least one internal and/or external reviewer.

The Uganda Strategy Support Program of the International Food Policy Research Institute (IFPRI) works closely with the government of Uganda, represented by the Secretariat for the Plan for the Modernisation of Agriculture (PMA), and other development partners to provide information relevant for the design and implementation of Uganda's agricultural and rural development strategies. For more information, see www.ifpri.org/themes/ussp/ussp.htm or www.pma.go.ug.

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