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THE SUPPLY OF INORGANIC FERTILIZERS TO SMALLHOLDER FARMERS IN UGANDA

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Inorganic fertilizer is one of a handful of agricultural technologies that has immense potential for raising the productivity of poor smallholder farmers, enabling them to increase income, accumulate assets, and set themselves economically on a pathway out of poverty. The very low prevalence of fertilizer use by Ugandan farmers is evidence that farmers find it difficult to access fertilizers for their crops at a price that will allow them to obtain sufficient and reliable returns from their investment in fertilizer.

This brief presents the results of a late-2010 study of fertilizer supply to smallholder farmers in Uganda that was done to assess whether the taxes (explicit or implicit) that are applied at various points along the fertilizer importation and marketing chain or the absence of key public goods and services reduce the access that smallholder farmers have to fertilizer. This study objective is met by taking a broader look at how fertilizer is supplied to smallholder farmers and how they do or do not make use of it.

CONTEXT

The economics of fertilizer use by Ugandan smallholder farmers is clearly problematic.

- The input is costly, being a bulky commodity produced overseas and shipped inland from Mombasa, in neighboring Kenya, principally by expensive road transport.
- Information for farmers as to how they can make most efficient and profitable use of fertilizer is limited.
- Inadequate or costly credit markets and significant household cash constraints present added barriers to fertilizer use by smallholder farmers. Weak credit markets in Uganda also make it difficult for importers and traders to efficiently supply fertilizer at low cost.
- On the crop output side, fertilizer use has substantial risks. Farmers may not obtain the returns in crop yields or revenues from crop sales necessary to pay for the fertilizer used. Rain-fed, low-input agriculture is inherently risky. Moreover, pest and disease pressures on crops are high in Uganda. Equally, volatile and uncertain crop prices make it difficult for farmers who use fertilizer to be confident that they will obtain a sufficient return from the sale of the additional harvest via the use of fertilizer to pay for the input.
- Finally, while many rural areas of Uganda are densely populated, the country as a whole still has uncultivated arable land, particularly in north central Uganda. Opening new land to cultivation to produce more crops is generally less costly for Ugandan farmers than investing in yield-enhancing technologies, like fertilizer, on existing cultivated land. Nonetheless,

the output prices for crops that are traded in local markets will be determined in part, due to market integration, by the lower costs of production in the land-surplus areas. The lower output prices that result consequently render profitable use of fertilizer on crops more difficult for smallholders to achieve.

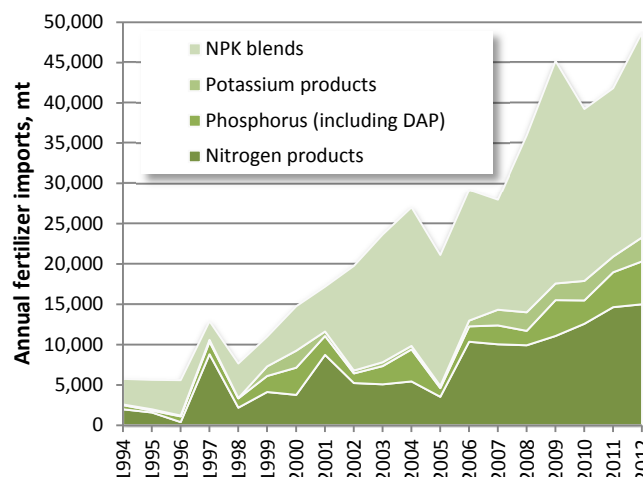
It is within this challenging economic context of fertilizer use by smallholder farmers that our study is situated.

FERTILIZER SUPPLY AND USE IN UGANDA

Currently all of the inorganic fertilizer used in the country is imported. The annual total fertilizer imports by product weight for both commercial agricultural enterprises and smallholders as recorded by the Uganda Revenue Authority between 1994 and 2012 are graphed below. Prior to the mid-1990s, very little if any fertilizer was marketed to smallholder farmers by the private sector. Fertilizer was brought into the country primarily for cash crop production. Large-scale crop producers – agricultural plantations or contract farming systems for, most notably, tea, sugarcane, and tobacco – were and continue to be significant consumers of fertilizer, importing the product either directly or through tenders. However, this study did not pay much attention to this important component of fertilizer supply and use in Uganda, focusing rather on the supply of fertilizer to smallholder farmers.

While we cannot disaggregate fertilizer imports between large-scale users and smallholders, some part of the increase in fertilizer consumption in Uganda since 2000 is likely a result of increasing smallholder uptake of the input. This is primarily a result of the reforms in agricultural markets and parastatal

ANNUAL FERTILIZER IMPORTS, UGANDA, 1994-2012



Source: Uganda Revenue Authority import database
Note: DAP, diammonium phosphate; mt, metric ton; NPK, nitrogen phosphorus

institutions that took place in the 1990s in Uganda. The government has not subsidized fertilizer supply for smallholder farmers since the reforms of the 1990s. Nonetheless, maize, coffee, and vegetable farmers, in particular, seem to be increasingly recognizing that profitable use of inorganic fertilizer is possible on these crops, so fertilizer use by smallholders is increasing.

However, the small absolute quantities involved must be recognized. With slightly less cultivated land than Uganda, in 2010 Kenya imported an estimated 480,000 mt of fertilizer—10 times the amount brought into Uganda. In Uganda, the recent annual imports of 40,000 mt of fertilizer per year correspond to fertilizer product application rates on all cultivated land of 4 kg/ha, or around 1.8 kg/ha of nutrient per year. Average application rates on smallholder fields are significantly lower than this, given the substantial proportion of fertilizer imported by large-scale commercial agricultural producers. Data from the 2008/09 Uganda Census of Agriculture shows that about 8 percent of smallholder farmers nationally use inorganic fertilizer on any of their crops (Okoboi & Barungi 2012). Fertilizer use by smallholders in Uganda remains uncommon.

Global commodity and transport prices are the primary determinants of the price that fertilizer users in Uganda pay for the input. A study in 2006 of fertilizer supply in Uganda estimated the landed cost of fertilizer in Kampala to be US\$ 540/mt. Of this price, the free-on-board (FOB) commodity price at the source port accounted for 53 percent of the total price in Kampala, while transport from the shipping port to Mombasa, Kenya, and on to Kampala accounted for 25 percent. The margins obtained by the importers and traders accounted for an estimated 5.3 percent of the cost (Chemonics & IFDC 2006). The table here compares average international export prices with local Uganda retail prices (average of prices from retailers in several market centers) for the period August 2010 to January 2011, when prices were higher than in 2006.

Uganda is a price taker for fertilizer from international markets, so it can do little about that element of the landed cost of fertilizer in the country. However, there is more scope for action related to transport cost, including working with the government of Kenya to improve Mombasa port operations.

FERTILIZER PRICES, COMPARISON UGANDA RETAIL PRICE TO FREE-ON-BOARD PRICE FROM INT'L SUPPLIERS, US\$ PER MT, AVERAGE AUGUST 2010 TO JANUARY 2011

	Local retail price, US\$	Int'l export price, US\$	Export price component of local price, %	Export source
Urea	709	352	49.6	Arab Gulf
Diammonium Phosphate (DAP)	976	546	55.9	Baltic
Triple Superphosphate (TSP)	994	449	45.2	North Africa

Source: <http://www.amitsa.org>

FERTILIZER LEGISLATION AND REGULATION

Two pairs of laws and regulations have been in place in Uganda to regulate the importation, distribution, storage, and marketing of agricultural chemicals, including inorganic fertilizer: a

1989 statute with 1993 regulations, and a 2006 act with draft regulations specifically for fertilizer that are still awaiting the assent of the minister of agriculture. The principal elements of the legislation are that all agricultural chemicals manufactured, imported, or sold in Uganda must be registered, packed, and labeled in accordance with the act. All dealers in agricultural chemicals must be registered and demonstrate a certain level of knowledge concerning the use of the products in which they deal. Importation of agricultural chemicals into Uganda requires an import permit. Such permits will be given only to registered dealers in agricultural chemicals who seek to import registered products. The Ministry of Agriculture is responsible for the implementation of the regulations, and agricultural inspectors are to enforce these regulations.

In reviewing the legislation with attention to fertilizer, three issues of a policy nature arise:

- First, the 2006 act treats all agricultural chemicals the same, without distinction as to their relative potential risks to public health and security – only in the draft 2011 regulations is any distinction made between pesticides and inorganic fertilizer. As standard commodities that have been traded globally for almost 100 years, the properties of high-analysis fertilizers are well known, as are the risks associated with their use. The regulations requiring registration of individual fertilizer products from all international suppliers and the import permits required to then bring in the products limit access to the Ugandan market by international suppliers. This in turn results in limits on supply to smallholder farmers and effectively raises the price that they must pay for inorganic fertilizer. As such, separate laws and regulations are needed in Uganda for pesticides and any new and unknown agricultural chemicals (including new inorganic fertilizers) on the one hand, and for the common high-analysis inorganic fertilizers on the other.
- Second, the regulations give only a small role for the Uganda National Bureau of Standards (UNBS), the statutory agency responsible for enforcing product standards in Uganda for public health and safety. UNBS inspectors and analysts can be expected to readily assess the quality of standard inorganic fertilizers. Placing the quality assurance of these fertilizers within the responsibility of UNBS, rather than the Ministry of Agriculture, would permit a much broader set of distribution and marketing channels to be used for the sale of fertilizer, expanding the access Uganda farmers have to fertilizer. However, a key complementary action to such a change in the regulatory framework would be to significantly increase the information made available to consumers on the proper use of fertilizer.
- Finally, while import permits are provided by the Ministry of Agriculture to importers at no direct cost, considerable indirect costs are associated with following the regulations for importing fertilizer. The benefits in terms of public health and safety from imposing these sorts of regulatory costs on the importation and sale of a standardized global product like high-analysis inorganic fertilizers are quite small. This process should be streamlined, possibly doing away with it altogether, so that farmers derive the benefit of lower prices, which are likely to exceed the value of any benefits from close regulation of fertilizer importation and marketing in Uganda.

The regulatory system for fertilizer in Uganda as designed is excessive—both in terms of the direct and indirect costs associated with following the regulations and in terms of the benefits for public health, safety, and welfare for which the regulations have been put in place. Policy reform is needed to reduce the regulatory burden faced by importers and dealers of fertilizer in Uganda.

OPERATIONS OF FERTILIZER IMPORTERS

In 2010, between 10 and 15 firms imported fertilizer into Uganda, both Kenyan firms that have opened up offices in Uganda and, smaller-scale indigenous Ugandan importers. Kampala remains the main base for fertilizer importers. Longer-term observers noted, however, that some of the stronger fertilizer importers in the past are no longer so prominent, suggesting that margins for Uganda's fertilizer importers are quite tight and the volatility of global fertilizer prices in recent years has made importing fertilizer a relatively risky business.

Kenya is now the principal source of fertilizer for importers that serve smallholder farmers in Uganda. Such importers are able to purchase fertilizer stocks in Nairobi from the depots of fertilizer firms there by the 28-ton truckload. Purchasing fertilizer in these smaller lots keeps their financing requirements manageable and reduces their exposure to risk of unsold inventory constraining cash flow in their business.

A wider range of fertilizer than is likely justified from an agronomic standpoint is imported. Each crop is associated with a particular basal and top-dressing fertilizer. So, while urea and CAN may be quite similar as relatively high analysis N-fertilizers, urea is known as a maize top-dressing fertilizer, while CAN is known as the fertilizer for coffee, so the dealer will need to stock both. This practice of keeping a diverse stock of fertilizers increases business risk, particularly for the smaller importers.

Most fertilizer brought into Uganda is bagged in 50-kg bags. Smaller quantities of fertilizer are sold to individual customers, but these are generally packaged at the point of sale in poorly labeled plastic bags—illegally so, contravening the regulations on the manner in which agricultural chemicals can be sold.

FERTILIZER RETAILERS

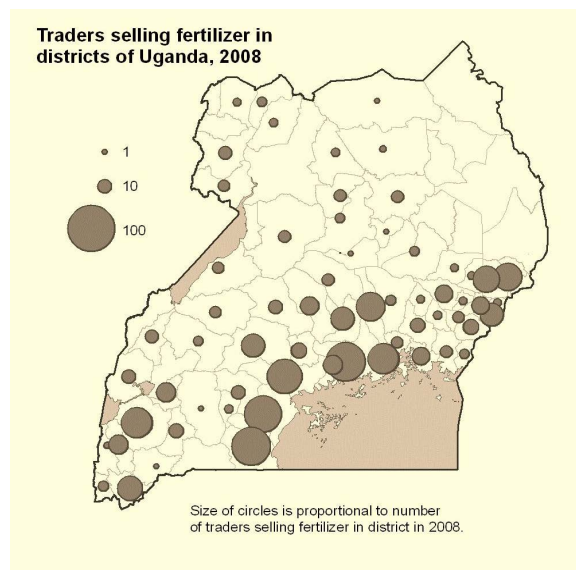
In 2008, a census of agro-input dealers enumerated 1,992 dealers across Uganda (AT-Uganda 2009). Of these, 966 reported that they sold fertilizer. The map here uses graduated circles to represent the number of fertilizer dealers reported in each district in the agro-input dealer census. Seventeen of the 80 districts in Uganda at the time of the census had no fertilizer dealers. This map is based on the count of fertilizer dealers in each district, regardless of the quantity of fertilizer sold. A map based on quantity sold would be dominated by the map symbols for Kampala and, to a lesser extent, Mbale.

In undertaking this study, two surveys were conducted—a trader survey and a farmer survey—in four farming areas of Uganda where more fertilizer is used than is the norm for the country as a whole: Masaka to the northwest of Lake Victoria, where fertilizer is used on maize and Robusta coffee; peri-urban Kampala, where fertilizer is used primarily on vegetables; the maize area around Iganga just north of northern shore of Lake Victoria; and the western slopes of Mount Elgon on the border

with Kenya to the east, where fertilizer is used on maize and Arabica coffee.

The trader survey involved 70 randomly selected fertilizer traders in the four study areas. Here we present selected findings.

DISTRIBUTION OF FERTILIZER DEALERS IN UGANDA



- The median annual sale of fertilizer per trader is 200 bags or 10 mt of fertilizer. The traders' business sales are specialized in agriculture—few of those in the sample sold any nonagricultural items. However, only four traders surveyed reported obtaining 70 percent or more of their total sales from fertilizer alone.
- Most traders operate from only a single premise. They have relatively few assets beyond their business premises. Less than one-third have any vehicles for transport of goods.
- A single supplier was used by 54 percent of the traders in the sample, while 12 percent used three or more suppliers. Traders tend to obtain several small orders from their suppliers over a season, rather than single large orders—the median number of orders obtained in 2010 was five. Kampala is the most common place for fertilizer traders to obtain their stocks.
- The quality of the fertilizer they market is not a major concern for most traders in Uganda. Only nine traders reported ever experiencing a problem with fertilizer quality.
- The majority of traders sell fertilizer to customers in small quantities. Sales of less than 50 kg account for an estimated 61 percent of the fertilizer sales of traders. Most break 50-kg bags and either repack the fertilizer themselves into smaller standard-weight packets or simply sell it loose by weight. The most common packet size into which traders repack fertilizer is 1 kg.
- Virtually all traders will offer advice to farmers on the use of fertilizer. However, the means by which traders obtain this information is quite varied, and the quality of the information that they communicate to farmers is difficult to judge.

FERTILIZER USE BY SMALLHOLDER FARMERS

In the farmer survey, 275 smallholder farmers were randomly selected in communities in the four survey areas, 161 of whom were fertilizer users. Key findings are presented here:

- Fertilizer users are significantly more likely to engage in off-farm employment than are nonusers. Among off-farm workers, those who use fertilizer are more likely to work off-farm for more days of the year than those who do not use fertilizer in their farming.
- Most farmers purchase fertilizer twice a year, obtaining fertilizer just before they apply it. Although some farmers purchase several bags of fertilizer at a time, the median amount purchased in the largest purchase reported by farmers was 50 kg—generally a single bag of a single type, but in some cases smaller amounts of two types of fertilizer. Virtually all farmers purchased fertilizer from traders rather than other sources.
- The average distance to fertilizer supplier from the farm of the survey farmers was 10.4 km. US\$6.30 was the median cost of transporting the fertilizer per kg per km for those sample farmers who paid for transport.
- Farmers' groups were the most commonly mentioned source of information on how best to use fertilizer on their crops, followed by the farmer's own experience.

CONCLUSION

The government of Uganda has taken several actions that have improved farmer access to fertilizer. However, government inaction is having an adverse effect on efforts to increase fertilizer use in some areas. The most important of these missing public goods are not specific to fertilizer but are implicated in broad development efforts in Uganda. These include improving transportation links; expanding and strengthening credit markets; and improving market information that farmers and traders need to make sound commercial decisions.

The government also can undertake several fertilizer-specific initiatives to enhance farmer uptake of the input:

- Overcome information constraints.
 - For fertilizer traders, on the regulatory regime within which they must operate, particularly with regard to procedures related to fertilizer importation.

- For farmers, on the proper agronomic use of fertilizer on specific crops under specific agroecological conditions. Farmers and traders surveyed reported that farmers use fertilizer in a quite uninformed manner. Both the agricultural advisory services currently offered to farmers and syntheses of past research results on fertilizer response in the main crops grown in Uganda are very limited.
- For all, more information on the economics of fertilizer use on the various crops grown by smallholder farmers is needed. Few farmers know how they might determine whether fertilizer use will be profitable on their own farms. Such recommendations need to be adaptable for changing market conditions. They also should be useful for resource-constrained farmers who need to choose which elements of a recommended fertilizer package they should prioritize in their farming.
- Reform regulations. A considerably lighter regulatory regime than what is now in place would allow more fertilizer into Uganda, resulting in lower costs for farmers.
- The government should exercise a cautious attitude toward undertaking direct interventions to promote increased fertilizer use by Ugandan smallholder farmers. The high fertilizer prices that Uganda faces are not a result of market failure, for which a government subsidy might motivate corrective action.

There is clearly need for intensification of agricultural production in several areas of Uganda where the population density has risen to levels that make it difficult for sufficient production to be generated from existing cropland using traditional production methods. The government of Uganda must pay closer attention to how it can enable smallholder farmers to profitably and appropriately make use of inorganic fertilizer, improved seeds and planting materials, and other improved agricultural technologies for higher agricultural production by smallholders on current cropland. Paying attention to supply-side factors related to the use of inorganic fertilizer and the other technologies is an important element of such efforts.

This note is a synthesis of IFPRI Discussion paper 01228 entitled *The Supply of Inorganic Fertilizers to Smallholder Farmers in Uganda: Evidence for Fertilizer Policy Development* – <http://www.ifpri.org/sites/default/files/publications/ifpridp01228.pdf>.

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