Background

The African Green Revolution will not be achieved without increasing fertilizer use. This objective is particularly difficult in the continent’s vast semi-arid regions where farmers commonly have little or no access to inorganic fertilizer. If fertilizer is available, it is usually prohibitively expensive. Also, lack of experience leads many farmers to view fertilizer as a risky investment. Recent ICRISAT research has proven that small-scale farmers in drier, drought-prone regions can consistently obtain high payoffs through the precise application of small doses of inorganic fertilizer – a technology known as micro-dosing. These research results have been confirmed in many on-farm trials. In Zimbabwe, during the past three years, more than 160,000 small-scale farmers have improved their grain yields and food security as a result of micro-dosing. Farmers were provided 25 kg of ammonium nitrate for use on approximately one acre of land. Grain yields increased by 30–50% on more than 95% of the plots where this fertilizer was applied.

The problem, however, is that so far fertilizer has been provided free of charge in the form of direct handouts to vulnerable households under relief programs. This practice has severely undermined fertilizer sales through the commercial market. Fertilizer companies prefer to sell large quantities to NGOs and the government rather than go to the trouble of pursuing a retail trade. Retailers are reluctant to try to sell a product that may be given away for free by an NGO. These problems are multiplied by high rates of price inflation and periodic transport constraints. The relief programs have now run for three consecutive years and look set to be implemented again during the upcoming 2006/07 cropping season. What will happen to these farmers when the relief programs end, cutting off the supply of free fertilizer?

Changing Perceptions about Fertilizer Use

At the beginning of this experiment, the targeted farmers in Zimbabwe’s most drought-prone regions were asked why they were not using any inorganic fertilizer despite extension recommendations calling for high rates of application. Most claimed it was simply not available in local retail shops (Figure 1). Some said they had to travel long distances to larger business centers to find it, which contributed to their complaints about the high cost of this input. Many farmers had no experience using inorganic fertilizer and admitted they did not know about its performance, but were influenced by the perception that fertilizer is too risky and is likely to ‘burn’ their crops. In effect, the lack of availability of the input contributed to a lack of experience. The lack of experience led farmers to underestimate the value of fertilizer and overestimate the risks. This limited the demand for the input and the incentives of local retailers to tie up scarce capital in stocking it. In effect, there was a classic decision making trap. Farmers are uncertain about the benefits of fertilizer and are therefore reluctant to buy it. The lack of demand reduces the incentive of rural retail outlets to stock fertilizer. This increases the costs of obtaining this input, further reducing demand.
The promotion of experimentation with micro-dosing with ammonium nitrate in Zimbabwe has led farmers to reconsider the value of this input. Farmers are learning that fertilizer is less risky than they expected, and offers higher returns in the form of higher grain yields. But many still cannot find fertilizer in their local retail shops.

Assuring Fertilizer Accessibility

ICRISAT worked with ZFC to promote stocking fertilizer in a series of rural retail shops that had not previously sold this input. The shops were identified in areas where vulnerable households had been assisted with free handouts and advice on the application of micro-dosing. The retail outlets were provided with ammonium nitrate fertilizer on credit for a period of up to three months. Fertilizer prices were set at commercial rates – including a 20% retail markup. In the first year of the program, 60% of the fertilizer was sold. In the second year, everything was sold. Most retail outlets ran out of stock within the first two weeks of the program.

Demand for Alternative Pack Sizes

In order to better understand the demand for this input, ZFC agreed to provide several different pack sizes for sale – 5 kg, 10 kg, and 50 kg bag sizes. In the past, fertilizer companies concentrated on selling only 50 kg bags to farmers. This coincided with national extension recommendations calling for the application of at least 200 kg of fertilizer, even in the driest parts of the country. Yet many farmers complained that they could not afford this much fertilizer. Recent relief programs have been providing 25 kg bags. If farmers are
given more of a choice, will some prefer even smaller units – because of their uncertainty about the input or their limited access to cash?

The study results highlight two major issues. First, farmers are interested in purchasing a range of different fertilizer pack sizes (Figure 2). Those with the least amount of experience using fertilizer or purchasing this input preferred to purchase the smaller bags. Those with more experience purchased the larger bags. This suggests the value of a fertilizer marketing strategy that encourages initial purchases of smaller units with the understanding that as farmers gain experience, they will gradually increase their purchases. Almost 40% of the buyers had never purchased fertilizer before, and almost all of these purchased the 5 and 10 kg bags first. Not unexpectedly, the quantity of rainfall normally received also influenced the size of bags being purchased (Figure 3). In moderate rainfall zones (e.g., Zimbabwe’s Natural Region III), farmers were more likely to purchase 50 kg bags than in the lower rainfall zones. However, new adopters still preferred to start with the smaller bags. Again, this suggests the value of a marketing strategy offering multiple sized bags throughout the country.

These results also confirm the value of promoting micro-dosing as a means to introduce farmers to the benefits of fertilizer use and encourage their experimentation with this input. Whereas fertilizer companies have complained that their mission is to sell more fertilizer (in larger sized bags) than less (in smaller sized bags), these findings suggest the value of encouraging a transition from smaller investments by individual farmers to larger investments over time.

**Strategic Implications**

Zimbabwe’s drought relief programs have introduced inorganic fertilizer to large numbers of farmers in the country’s extensive semi-arid areas. Many farmers have enhanced their experience through additional experimentation with this input. Technical recommendations to pursue micro-dosing appear particularly productive. But questions remain about the sustainability of these gains if fertilizer remains expensive and difficult to find. In most semi-arid regions of the country, when the relief programs stop handing out fertilizer, usage will simply end unless these access constraints are resolved.

**Assuring Commercial Supplies**

Fertilizer companies remain uncertain about the size and profitability of fertilizer demand among small-scale farmers in Zimbabwe’s semi-arid regions. As long as they can sell most of their stocks through relief and development programs, and in the highest rainfall regions, they remain unlikely to invest much in pursuing this market. ICRISAT’s initiatives have proven the value of inorganic fertilizer in semi-arid cropping systems, and the willingness of farmers to purchase this at commercial prices, but the relative profitability of this market remains uncertain. ZFC still needs to be convinced that this market will grow. This implies
the need for additional years of collaborative testing of market demand. In this process, fertilizer supply systems directly linking rural retailers with the fertilizer companies need to be strengthened. ICRISAT should eventually eliminate its role as an intermediary in this relationship.

**Supplying Fertilizer to Vulnerable Households**

Multiple years of free input distribution under relief programs has encouraged farmers to expect free handouts and discouraged retailers from stocking these inputs. The achievement of sustained gains in household food security depends on the elimination of these handouts. Rural retailers should be incorporated into programs to assist the poorest and most vulnerable households. This can be accomplished by providing farmers vouchers for subsidized inputs that are redeemable in rural shops. This encourages farmers to continue to look to rural shops for their agricultural inputs and encourages retailers to stock seed and fertilizer. An additional advantage of the use of vouchers is that the value of this subsidy can be adjusted depending on the severity of the drought or vulnerability constraint. Interest and experience with voucher-based distribution programs is growing in Zimbabwe. But these strategies need more thorough testing and evaluation.

**Increasing Choice**

Until now, it has been assumed that farmers need 50 kg bags of fertilizer. This coincides with extension recommendations calling for the application of large quantities of this input. Yet growing evidence suggests many farmers simply cannot afford bags of this size, preferring instead to experiment with smaller quantities of fertilizer. By expanding farmers' choices of technologies to apply and inputs to purchase the prospects for technological change and input market development can be considerably enhanced. Fertilizer companies should be encouraged to produce a range of nutrient mixes in different sized packs and retailers should be encouraged to experiment selling a diversity of products.

**Extension Support**

The extension advice about fertilizer use historically provided to small-scale farmers in Zimbabwe’s semi-arid areas has been shortsighted. It has usually brushed aside resource constraints and risk preferences by offering a blanket recommendation for high rates of fertilizer application. However, most of these farmers are extremely poor and risk averse. They are asking how best to apply what limited quantities of fertilizer they can afford, not how much they should buy. A different sort of extension strategy that takes these questions into consideration is required.

The micro-dosing program has proven the high marginal returns to small doses of ammonium nitrate fertilizer. This has reinvigorated farmer interest in this input. This foundation now needs to be strengthened with related advice on a wider array of nutrient mixes including basal fertilizer compounds and mixtures of organic and inorganic nutrients. Farmers need to be encouraged to increase their investments over time. Shopkeepers selling these inputs may provide a growing portion of extension advice.

The relief programs have taught many farmers the value of fertilizer. What remains is to encourage farmers to regularly purchase this input. Once this is achieved the food security gains achieved through these programs will be sustained.