

selling inputs is more demanding because it requires knowledge of purchase locations, product quality, storage, and safe use. Capacity building, both in technical knowledge and business skills, is therefore crucial to building viable enterprises that can be linked to input supply companies through a credit guarantee facility. This is what the Rockefeller Foundation has been doing in Malawi, and the work has resulted in a credit guarantee facility with very high (16:1) capital leverage. Despite this success, agro-dealer networks in Malawi still tend to concentrate in high potential areas.

We have discussed the issue of subsidy. It is clear that

poor farmers, not using improved seeds and fertilizers, are locked in a poverty trap. There is every reason to give them public support to get them out of this poverty trap. The question is how do you do that? In Kenya, the Farm Input Promotion Service has provided fertilizer in bags starting at one kilogram for poor farmers. After a demonstrated effect, many farmers have graduated into higher use levels. This has also been profitable for the agro-dealer.

Africa must reduce the high cost of fertilizer and improve its value-to-cost ratio. Increased prices caused a decline in the value-to-cost ratio from 1980 to 2000. The high cost is partly due to high

import cost, caused by the small amounts imported, and partly due to high transport costs to (and within) the continent. Joint procurement and distribution are essential but not enough because structural constraints, particularly infrastructure, also need to be addressed. Finally, local fertilizer manufacturing, with private sector participation, is another option to reduce cost.

To summarize, efforts at both national and regional levels can contribute toward a market system to reach millions of poor in the continent. Promising targets for these efforts include:

- At the national level: improve agro-dealer networks; establish

agricultural input credit guarantee schemes; improve output price incentives; and establish smart subsidies.

- At the regional level: initiate joint fertilizer procurement and distribution; invest in roads, rail, and ports; and harmonize policies, focusing, in particular, on fertilizer regulations and tariffs.

If all of this works, and we are able to lower the cost of fertilizer arriving on the continent, improve the efficiency of transport, and provide better output incentives, then Africa will be a happy Africa.

Successful Interventions for Fertilizer Sector Development

Developing Fertilizer Interventions for Semi-Arid Areas

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The potential of African agriculture can be tapped by harnessing science and technology to increase agricultural productivity, profitability, and sustainability. There are tools to empower African farmers to combat adversities and play a central role in developing agriculture into a vibrant economic sector that could banish hunger and malnutrition

from the continent. The Future Harvest Alliance of the Consultative Group on International Agricultural Research (CGIAR) Centers is an important partner in the African Green Revolution, working not only in collaboration among 15 other CGIAR centers but also with National Agricultural Research and Extension Systems (NARES), non-governmental organi-

zations (NGOs), and the private sector.

The question many ask is, Why must we use fertilizer? The simple answer is that without fertilizer, Africa cannot hope to feed itself. Judicious use of fertilizer inputs gives an immediate response and helps farming households achieve food self-sufficiency and produce surpluses for sale.

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Intensification is the key to self-sufficiency. One example is rice. Presently, the 7.6 million hectares in rice production in sub-Saharan Africa could produce 18.8 million tons of milled rice, requiring 0.74 million tons of fertilizer nutrients (NPK). Current consumption in sub-Saharan Africa is 11.9 million tons, of which about 50% (valued at US \$1.5 billion) is imported annually. Therefore, with resolve and right interventions, SSA could have a surplus of 6.9 million tons.

The Alliance is working on fertilizer usage in the drier areas, because these areas are home to the most vulnerable and food-insecure households in Africa. The soils are deficient in nitrogen and phosphorus and have per hectare cereal yields of less than 1 ton, often less than 500 kg. Many current fertilizer recommendations are based on crop responses in more reliable rainfall areas. Consequently, farmers in drier areas find fertilizer too expensive and risky. In addition, there has

been little investment in developing marketing strategies for these regions.

Traditionally, agronomists and soil scientists consider fertilizer quantities in relation to output goals. In contrast, farmers consider how to best use a small amount of fertilizer that they can afford, after having sold, for example, two chickens. Hence, a new research question arises: how much fertilizer can the farmers afford, and where and how should they use it? Answering this requires

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working with farmers and appreciating their circumstances and concerns.

In Mali, microdosing (20 kg per hectare of diammonium phosphate [18:46:0]) produced 80% more cereal grain (an additional 35,000 CFA [\$70] per hectare) than

farmers' current practices, with further gains achieved in combination with manure and better water management, such as Zaï pits. Farmers can also adopt crop-livestock diversification, agroforestry, crop rotation, intercropping, and targeted niche breeding. Worldwide, manure annually contributes the equivalent of US \$1.5 billion in inorganic fertilizer—mainly nitrogen, phosphorus, and organic matter. However, manure benefits crops most when it is combined with inorganic fertilizer. Legumes also have a major role to play, but work on them should be accompanied by market development efforts to ensure that surplus legumes are sold.

Soil fertility management alone cannot solve all of Africa's problems. It is essential that agronomists and soil scientists work closely with crop breeders and social scientists to ensure that appropriate crop varieties are developed for the various farming systems. This is known as the Integrated Genetic and Natural Resource Management (IGNRM) approach.

Over the last few years, the Alliance of the CGIAR Centers has been working with various partners to support many large-scale relief programs. Much work is now being done on linking on-farm promotion of fertilizer usage with input supply. For example,

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in West Africa, the Food and Agriculture Organization of the United Nations (FAO) Warrantage Project works to ensure that farmers have access to inputs by breaking large packs into smaller packs that farmers can afford. As one farmer said, "Without fertilizer, I produce nothing." More than 10,000 farmers are now using phosphorus fertilizer in the Sahel of West Africa. The next step will be to continue to build and strengthen our strategic partnerships and scale up and out.

Therefore, the challenge to this Summit is this: how can we increase the average per hectare fertilizer usage from 8 kg to 50 kg, using a holistic approach involving accessibility, affordability, and incentives? Africa must have the will, the right policy environment, and a roadmap for future actions to make this African Green Revolution a reality. You can count on the 15 centers under the CGIAR Alliance to be your partners for a food-secure Africa.