Fertilizer Systems Development Strategy
Approach to increasing fertilizer use and adoption
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Context and Rationale

In Sub-Saharan Africa, agriculture remains a major component of the economy. It accounts for about 80% of all African livelihoods and 70% of the incomes of the poorest. However, due to low productivity of production systems in Africa, and 27% of the continent's population is chronically undernourished (Wanzala & Groot, 2013). In order for productivity to increase, farmers must adopt modern production technologies, including improved seed and fertilizer. However, African soils tend to be highly weathered and depleted of nutrients. Decades of continual, subsistence farming have exacerbated these difficulties through nutrient mining, leaching, and inadequate erosion control.

Mineral fertilizers are the “fuel” that powers Green Revolutions, according to Nobel Peace Prize Laureate Dr. Norman Borlaug (IFDC, 2006, p. 3). Although it is well understood that organic fertilizers play an important role in raising soil fertility, supply of livestock manure is insufficient to make up the deficit to support soil fertility. A cow produces approximately 15 kg of nitrogen in manure each year, while a maize crop with a target yield of 3 MT/ha requires approximately 100 kg of N/ha (Palm, 1995). It is therefore a misconception that Africa can produce the food it needs by relying solely on organic fertilizer.

Since the Africa Fertilizer Summit in 2006, fertilizer usage on the continent has doubled, to an average of 16 kg/ha. This is real progress, however, it is still far below the target of 50 kg/ha agreed upon by the African Heads of State at the Summit. The use of fertilizer among smallholder farmers is constrained by the lack of purchasing power and awareness among smallholder farmers as well as the lack of appropriate fertilizers. Fertilizers cost between US$600 and US$ 800 per MT at farm gate in most areas of sub-Saharan Africa. Equally high is the cost of credit from financial institutions, generally between 20% and 40% per annum. Addressing issues of affordability and the availability of appropriate and high quality fertilizer products requires effective fertilizer policies and regulatory systems that are consistently enforced.

Since 2008, AGRA has supported numerous interventions to increase fertilizer use. Over 300,000 MT of fertilizers were delivered to smallholder farmers through AGRA’s Agro-dealer Development Program, and an additional 600,000 MT through a collaboration with the Africa Fertilizer Agribusiness Partnership (AFAP). In its new strategy, AGRA commits to catalyze and sustain an inclusive agricultural transformation in Africa that increases incomes and improves food security for 30 million farming households in 11 focus countries. This requires more innovative ways of increasing fertilizer use. Reaching the modest target of 50 kg/ha among the AGRA target farmers would translate to 1.5 million MT of fertilizer applied annually.

Strong evidence points to remarkable improvements in maize yields possible (Figure 1) through combined use of improved blends of fertilizer and improved seed. This is because Africa’s soils have been progressively depleted of nutrients and secondary macro-nutrients, leading to the emergence of severe deficiencies. Thus, fertilizers that contain macro-nutrients (nitrogen, phosphorus, and potassium), the secondary nutrients (sulphur, calcium, and magnesium), and several important micro-nutrients (zinc, iron, and molybdenum) are required to rectify the situation. Fertilizer blending from imported raw materials offers flexibility in the formulas that can be produced to better suit different crop and soil requirements.
AGRA’s Approach to Increasing Fertilizer Use

Within AGRA’s new, integrated approach, increasing the use of fertilizer will be key to sustaining value chains. This necessitates the development of a fertilizer system as an integral component of a soil fertility management system (Figure 2). AGRA will work with a diverse range of public and private institutions, including governments, research institutes, private sector, non-governmental organizations, and smallholder farmers to develop fertilizer systems in AGRA’s 11-country program area. This will involve interventions in the areas of: 1) soil testing/mapping; 2) development and validation of new fertilizer blends; 3) awareness creation; 4) fertilizer supply and distribution; and 5) policy and country support on fertilizer systems.

Figure 2: Conceptual framework of the fertilizer value chain
1. Soil testing and mapping

Creating balanced fertilizers that respond to specific soil needs must be based on soil testing and mapping, followed by validation of the new formulations. Such validation must be based on sound testing methodologies and recommendations that are based on the agronomic and economic efficiency of the new formulations. Attention is also be given to acidic soils where liming is recommended. AGRA supports selected teams of public soil scientists, private soil testing services, fertilizer companies, and others to test and map soils. Various technologies and approaches to soil testing and mapping are currently available, including digital soil testing by the Africa Soil Information Services (AfSIS) funded by the Bill and Melinda Gates Foundation and a wide range of credible wet chemistry laboratories. Such assessments provide a key reference point for evaluating the nutrient status and distribution of essential macro-nutrients (N, S, P, Mg, Ca, K, Cl (chloride) and micro-nutrients (manganese, copper, Zn, Mo, boron).

Although soil testing and mapping will be targeted to AGRA's priority agro-ecological zones, the extent of testing and mapping will depend on existing information and similar ongoing work by other partners such as the International Institute of Tropical Agriculture (IITA), the International Fertilizer Development Center (IFDC) and fertilizer companies. Soils in Ethiopia and Rwanda, for example, have already been mapped, with several outstanding gaps in need of validation. Nigeria and Tanzania are likewise currently mapping their soils. However, Mozambique, Uganda, Burkina Faso, and Mali have done very little soil mapping.

2. Development of the new fertilizer blends

Substantial yield increases for almost all crops can be achieved in Africa by blending secondary macronutrients and micronutrients into standard fertilizers. The development of blended fertilizers is guided by information obtained from soil maps to target the right fertilizer and application rates to a particular crop and location, and is crucial for improving the efficiency of fertilizer use and for preventing negative environmental consequences. Newly formulated fertilizers are validated through crop response and missing element trials to establish the agronomic and economic efficiencies of the new blend. This work is carried out by teams of public soil scientists working side-by-side with private fertilizer companies.

While improved blends of fertilizer offer clear advantages over commodity fertilizers, due to the costs involved, private fertilizer companies are seldom willing to develop a product that is specific to locations and crops. Companies are also uncertain of the potential market demand for a new product. While the costs of developing a new blend can be supported by AGRA, working capital needs (required for its production and marketing) can be supplied through a partnership with entities such as AFAP, which has experience in assisting fertilizer blenders through large credit guarantees in Tanzania, Mozambique, and Ghana. AFAP also carries out feasibility studies to establish the viability of fertilizer blending businesses, which gives confidence to aspiring local fertilizer blenders. In these situations, AGRA can provide financial support to internationally recognized technical assistance to ensure that new products meet quality standards.

3. Awareness creation

As with any new product, blended fertilizers require awareness creation. The popularization of the new blends is anchored within AGRA’s extension advisory services strategy. Over the years, AGRA has implemented farmer awareness creation activities through several avenues, including: 1) farmer field days, on-farm demo’s, and radio messaging; 2) village-based advisors linked to nearby agrodealers; 3) distribution of small, sample packs of inputs from interested local suppliers; 4) selected information and communication and technology (ICT) applications which inform
and orient farmers on inputs and improved farming practices; 5) supporting input suppliers and distributors to design and implement effective farmer education campaigns; and, 6) working with interested offtakers in the private sector to increase farmer awareness of quality requirements and input use. These activities are integrated within the R&D/extension/input supply chain as illustrated in Figure 3. AGRA works to ensure that the promotion of fertilizer use goes hand-in-hand with the use of improved seeds and good agronomic practices.

Figure 3. An illustration of awareness creation as an integral part of a wider value chain

References


Fertilizer Systems Interventions

**FERTILIZER PRODUCT DEVELOPMENT**

- **Soil Testing & Mapping**
  - *Key Players*: National Agriculture Research (NARS), CGIAR, AfSIS, Private sector such as Soildoc, Soil cares
  - *Synthesis of existing soil databases*

- **Validation Trials**
  - Crop response and omission trials
  - *Key players*: NARS, CGIARs, NGOs, Fertilizer Companies

- **Product Development**
  - *Key Players*: NARS, Fertilizer companies

**TECHNOLOGY DISSEMINATION**

- **Awareness Dissemination**
  - Village-Based Advisors, Demos, smaller packs, radio ICT Platforms;
  - *Key Players*: Agro dealers, NGO’s, Fertilizer companies

**SUPPLY CHAIN MANAGEMENT**

- **Commercialization & Distribution**
  - *Key players*: fertilizer companies Financing partners, banks, AECF, AFAP for capital and working capital for feeder materials and operations, hub agro-dealers, retail agro-dealers.

**FARMER ACCESS**

- **Enablers**
  - *Physical Access; Key players*: Hub and retail agro-dealers,
  - *Financial access; Key players*: Credit, Risk, Sharing facility offtakers.

**VISUAL AIDS**

- **Policy** - Release of new blends, quality control
- **Financing for Actors in the fertilizer chain including farmers**