



# Feeding Africa's soils whitepaper



# Feeding Africa's soils: a route map to address a continent's nutrient challenges

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## INTRODUCTION

**In the 1960s, the continent was self-sufficient in food. More than that, it was a net food exporter, with exports averaging 1.3 million tons a year between 1966 and 1970.**

Today, the situation is very different. Despite the continent's vast arable land, water and manpower resources, around 250 million people go to bed hungry every night. In 2017, Africa's annual food import bill was estimated at \$35 billion, expected to increase to \$110 billion by 2025.

In many senses, of course, Africa is rising – and it is agriculture that is driving prosperity and progress in millions of lives. But, with current yields of cereals and legumes standing at only 15 – 30% of their potential, the challenges posed by climate change and increased population mean the continent is set to get progressively more food insecure.

This trend looks set to accelerate as demands increase on Africa's already overworked soils. It has been estimated that during the last 30 years, across approximately 200 million hectares of cultivated land in 37 African countries, per hectare soil fertility depletion averaged 660kg nitrogen, 75kg phosphorous, and 450kg potassium.

In East Africa's intensively cultivated highlands, meanwhile, nutrient mining by crops, leaching, and inadequate erosion controls are causing every hectare to lose an estimated 36kg nitrogen, 5kg phosphorous, and 25kg potassium every year.

It is only by increasing yields to 80% of potential – equivalent to around seven tons per hectare (t/ha) – that the region will become self-sufficient on existing farmland by 2050. Closing the yield gap in this way, we believe, will depend on significantly increasing various agricultural inputs, including soil nutrients from both organic and

inorganic fertilizers, improved germplasm (seeds) and efficient agronomic and water-management practices.

Achieving this much-needed change on the requisite scale will demand concerted action on many fronts, ranging from farmer education and training to better co-operation across the public and private sectors, increased investment in fertilizer manufacturing and supply, integrated distribution and stimulated demand. These in turn have significant implications for government policy, subsidies and financing models.

All the while, care must be taken to ensure that fertilizer usage is sufficiently judicious to minimise any potential for environmental damage and to prevent agriculture from expanding into natural land by increasing yields in existing fields.

This brief paper addresses these issues. It outlines the key lessons, challenges, and opportunities that exist for the public and private sectors, non-profit players (international organizations and NGOs), banks, and farmers themselves.

In short, it sets out a roadmap for a more productive, more self-sufficient, wealthier, and healthier continent. For a more in-depth analysis of the issues, please see our recent publication: [\*\*\*Feeding Africa's soils: Fertilizers to support Africa's agricultural transformation.\*\*\*](#)

## SHARPENING FOCUS ON THE ABUJA SUMMIT RESOLUTIONS

The dangers involved in Africa's declining soil productivity have been recognised for many years. In 2006, at the Abuja Fertilizer Summit, African governments undertook to increase fertilizer nutrient usage from less than 10 kilograms per hectare (kg/ha) to 50 kg/ha by 2015.

Even at the time, this appeared to be an insufficiently ambitious target: fertilizer usage in the Netherlands, Germany, India, and Malaysia, for example, respectively



averages 290, 211, 179, and 150 kg/ha. However, by 2016, the average usage in sub-Saharan Africa had risen to only 16 kg/ha – a significant improvement, but still far short of target.

Today, cost barriers and a lack of awareness mean farmers in Africa still don't have enough mineral or organic nutrients to replenish their lands. They continue to struggle with some of the most depleted soils in the world. This is despite the fact that relatively small improvements have the potential to drive significant positive change. For example, increasing targeted fertilizer application by 20% would raise rice yields by 5.1%, wheat by 11%, and maize by 9.9%. As well as producing more food, these changes would have great environmental benefits too, enabling 2 million hectares of currently cultivated land to be set aside for reforestation.

At AGRA, we believe a number of steps are required to drive and enable the uptake in fertilizer usage called for at the Abuja summit nearly 15 years ago. One of these is to adopt as the basis for relaunching fertilizer use the resolution to double agricultural productivity by 2025 that was agreed at the African Union Summit in Malabo, Equatorial Guinea, in 2014.

There has been progress in several areas since 2006. Many organisations, including AGRA and a wide range of partners, have worked hard to address the key factors inhibiting fertilizer usage across Africa. But much more clearly needs to be done to deliver on the Abuja and Malabo resolutions. Below, we highlight the key areas that we believe require most attention.

### LOWERING BARRIERS AND IMPROVING PROTECTION THROUGH PUBLIC POLICY

Above all, to achieve the goals of the Abuja and Malabo resolutions, a joined-up approach is required across the entire agribusiness value chain, from regional and national governments setting policy and promoting fertilizer use, through private-sector manufacturing, distribution, and marketing to training and education for individual farmers.

This is reflected in the holistic approach we take at AGRA, with interlinked focus areas embracing policy, agriculture enterprise, inputs, markets, process and storage, and finance.

In the area of policy, we recognize that major reform is needed to deal with a range of issues, including food insecurity, nutrient depletion, low productivity, declining arable land per capita, and fast-increasing global demand.

However, we also believe that reform in one key area can have a positive impact elsewhere. For example, policies that make it easier for smallholders to buy fertilizers and sell their crops are likely to increase the use of fertilizers, improve soil fertility management, and boost agricultural productivity. We therefore believe that governments should develop and harmonize their policy and regulatory frameworks, through existing continental and regional structures including the recently signed African Continental Free Trade Area.

That way, countries would benefit from the development of regional fertilizer markets by lowering barriers to trade and by harmonizing rules and standards. We also believe more attention and resources need to be put into developing and enforcing regulations, to support better quality control and prevent the sale of adulterated or mislabelled products.

In addition, there is a need for policies that encourage fertilizer manufacturers to work directly with farmers, supplying them with balanced formulations and training them to use them for the best results.

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## INCREASING FERTILIZER DEMAND AMONG FARMERS

The potential scale of Africa's fertilizer market is immense. Today, though, despite the existence of subsidy programs to encourage uptake, a large majority of the continent's smallholders use only a little fertilizer – if any at all.

They face an intimidating array of barriers to uptake. They currently have little or no knowledge about fertilizers and their benefits. They have no information on soil-testing, and therefore do not know what types of fertilizer to buy or what dosages to apply. They cannot afford to pay the high prices currently asked for fertilizers, and the current policy landscape doesn't enable the supply of affordable products to local markets where farmers can easily buy them. And, without access to reliable and profitable markets, farmers have little incentive to boost production.

We believe that demand can be created in many ways. In addition to improved crop marketing, local advisers, agrodealers, and fertilizer manufacturers could deliver

awareness campaigns around available new blends and fertilizer benefits, including hands-on demonstrations and smaller pack sizes. And investments could be made in promoting farm-level soil-testing services, such as mobile laboratories and the soilDoc testing kit developed by Columbia University.

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## EDUCATING FARMERS TO ENSURE THE RIGHT MIX AND USE OF FERTILIZERS

In general, crops respond better to inorganic than to organic fertilizers alone, but yield most with a combination of the two types.

In recent years, however, there has been a widely held belief that it is somehow 'better' to use organic rather than inorganic fertilizers. This is to ignore the complex array of factors that affect crop yields and fertilizer use, including the specific physical characteristics of soil chemistry, structure, and texture, the time of year, the farming systems in use, and more.

To gain the best results, extension workers should be empowered to help farmers to understand what types of fertilizers and soil amendments such as lime and bio-stimulants are available and how to use them appropriately. Tools such as the '4Rs' of nutrient stewardship (right source of fertilizer, right rate, right time, and right place) must be emphasised during farmer training.

Fertilizer use must also be guided by soil tests and mapping to ensure the right types and quantities are recommended and used. To achieve this, countries need to develop their expertise in areas including fertilizer formulation and blending as well as soil testing and mapping. Also, wider use is needed of the various decision-support tools that make it easier to determine the right type and dosage of fertilizer. These include the Africa Soil Health Consortium's Fertilizer Optimization Tool and the Nutrient Expert from the International Plant Nutrition Institute.

This will lead the move away from blanket application towards innovative approaches like fertilizer-blending that ensure the production of soil-specific nutrients to meet specific crop needs.

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## IMPROVING THE SUBSIDY LANDSCAPE

Setting policy and investing in infrastructure are not the only areas in which we believe governments can play a more effective role. They also need to improve

and redesign current input subsidies to ensure they address challenges that have led to market failures and do not incentivize bad behaviour that would cause environmental damage. Improvement will heighten trust in subsidy support. We also believe that alternative practical ways of implementing the funds currently used for subsidies should be considered, including better support for credit provision, improved infrastructure, stronger extension services, extended irrigation schemes, and more.

Currently, around two-thirds of African countries are running subsidy programs to help reduce the price of fertilizers for farmers, which without such support cost \$600 - \$800 per tonne at the farm gate in most parts of sub-Saharan Africa.

Current problems with subsidy mechanisms include insufficiently accurate targeting due to a lack of clarity about who the beneficiaries should be. We believe there is potential for the private sector to play a greater role in this area: with businesses leading distribution, governments would be able to focus more closely on the policy and regulatory environment.

In areas where subsidies remain the most effective ways of increasing fertilizer consumption, using smart subsidies based on electronic vouchers and mobile phones can improve targeting and prevent abuse.

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## STREAMLINING SUPPLY IN AFRICA

There is a current paradox that most fertilizers produced in Africa are exported, yet Africa still imports most of the finished fertilizer products it uses – the region south of the Sahara imports 95% of the fertilizers it uses.

This is despite the fact that Africa has the potential to build a world-leading fertilizer industry, based on its wealth of natural resources: it contains massive reserves of the three plants macronutrients (nitrogen, phosphate, and potash) and of oil and gas to produce fertilizers.

While the fertilizer industry in Africa has grown – from 4.9 million tonnes of nutrients in 1990 to 7.4 million tonnes in 2013 – this was just 4% of world production at the time. Remaining challenges to development include the high costs of capital financing, the competitive international market environment, difficulties in financing large-scale projects, and the continent's poor distribution infrastructure.

That said, we are pleased to see large investments being made through an emerging private sector promise to increase the production of urea and ammonia-based fertilizers, as well as multi-nutrient fertilizer blends, organic fertilizers and industrial agricultural lime, and to diversify the potential sources of products.

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## DEVELOPING DISTRIBUTION TO SAVE TIME AND MONEY

Increased public investment is required to reduce the farm-gate price of fertilizers. Currently, poor infrastructure is one of the most important factors hampering uptake, alongside bureaucratic hurdles, product adulteration, price racketeering, and problems in raising finance, all of which raise costs, reduce volumes, and cause delays. Distribution systems need to address all these factors.

Three main distribution systems are in place today: private sector, serving individual farmers; government-run bulk-procurement systems, working with known farmers and groups; and bulk procurement schemes run by plantations and crop buyers. Of these, the private-sector schemes are the most efficient for farmers, while bulk procurement systems sometimes tend to serve the bodies that run them better than the farmers they exist to serve.

In our view, there is a need to strengthen wholesale and retail dealers by setting up and/or strengthening hub agrodealers and village outlets, facilitating credit, building distribution associations, improving the exchange of information on supply and demand, and building capacity, training, and certification.

Developing brands can also help overcome problems associated with adulteration. This is because brand owners will work to protect their image by guaranteeing the quality of products sold under their name. New products such as blends lend themselves to branding better than generic single-nutrient fertilizers.

Finally, we believe that competition should be encouraged in the supply and distribution of fertilizers, with the aim of reducing costs, improving service, and helping to guarantee product quality.

## Case Study

### **AGRA'S SOIL HEALTH PROGRAM**

From 2007 to 2019, AGRA's Soil Health Program (SHP) created awareness of integrated soil fertility management (ISFM) practices among over 5.91 million farmers, of whom some 2.26 million are using these technologies to double crop yields on about 1.81 million hectares of land. Approximately 40% of these farmers are women. As a result, yields on the farmers' fields have increased from about 1.5 to 3 t/ha for cereals and from 0.8 to 1.2 t/ha for legumes.

The core of the ISFM framework is the use of inorganic and/or organic fertilizers, improved seeds, and good agronomic practices. The program promoted several practices, including fertilizer micro-dosing, conservation agriculture, inoculation of legumes, cereal-legume rotations, intercropping, and liming to correct soil acidity. As well as improving nutrition, the crop diversification in ISFM technologies contributed to resilience to climate change threats and pest and disease outbreaks.

## Case study

### **NIGERIA'S PRESIDENTIAL FERTILIZER INITIATIVE**

Nigeria's Presidential Fertilizer Initiative, supported by AGRA, was set up in 2016 to find new ways of making fertilizers available and affordable throughout the country. In a key aspect of the initiative, a special company – NAIC-NPK – was created to manage a new Fertilizer Fund on behalf of the Fertilizer Producers and Suppliers Association of Nigeria (FEPSAN).

The company successfully negotiated generous discounts across the four inputs: locally produced urea and limestone, diammonium phosphate from Morocco, and muriate of phosphate from Europe. These were then blended in Nigeria to meet the specific needs of particular crops.

Some of the initial targets of the initiative were not immediately met. Nonetheless, results were impressive, including the blending and distribution of 400,000 tonnes of fertilizer, a significant fall in the cost of NPK (nitrogen, phosphorous, potassium) blends, and the direct or indirect creation of more than 250,000 jobs.

To address any shortfalls, FEPSAN quickly added more blending plants to improve reach across the country and set up a task force to combat adulteration and price racketeering. In a second phase, signed in May 2017, further improvements included stronger logistics and increased capacity, with the aim of further improving the distribution of fertilizers and inputs.

FEPSAN is also partnering with the Unity Bank of Nigeria to offer credit facilities to agrodealers.

## **ENHANCING ACCESS TO FINANCE**

Currently, two of the most powerful constraints limiting the uptake of fertilizers are farmers' low purchasing power and the high costs of the products they need. The situation is further complicated by the fact that loans are hard to get – and even when they are available, interest rates are high.

We believe that the availability of affordable, inclusive financing models is required throughout the fertilizer and output value chains. This cannot be left solely to financial service providers and other sources of finance – regional and national governments also have an important role to play through setting up loan-guarantee schemes to improve the availability of working-capital finance for agro-dealers, farmer groups, and micro-finance institutions.

An immediate priority, we believe is to evaluate and scale up the most appropriate innovative financing models that already exist, from bodies including AGRA ourselves, the African Fertilizer and Agribusiness Partnership (AFAP), the African Development Bank, with the African Fertilizer Financing Mechanism (AFFM), national governments and more.

Better use also needs to be made of digital technologies, enabling secure and streamlined money transfer and easy access to and exchange of information.



## AGRA: IMPACT AND EVIDENCE

In 2017, AGRA launched our five-year strategy to increase incomes and improve food security for 30 million smallholder farming households across 11 African countries. This is designed to deliver an inclusive and wide-ranging agricultural transformation, enabling smallholder agriculture across the continent to become highly productive, efficient, competitive, and sustainable.

The importance of this goal cannot be overstated. Today, agriculture is responsible for 65% of Africa's employment, 35% of its GDP, and 75% of its internal trade. The continent's smallholder farmers

make up 80% of the population. However, too many of our farmers cannot access the inputs they need, including fertilizers, for Africa to be food secure.

During the policy period, we have focused on plugging the gaps in Africa's agriculture system – in particular by bringing vital products and services closer to farmers. Through our networks of agro-dealers and village-based advisors, we have helped to reduce the distances farmers travel to access inputs, from 20 km in most AGRA countries to 10.7 in Nigeria, 10.8 in Burkina Faso and less than five in Rwanda.

We have also invested in many parts of the fertilizer value chain, from

production to creating awareness among farmers. Several parallel initiatives to develop and market new blends of fertilizer formulated to suit local soil types are now underway, and we have recently helped research institutions and private-sector organizations to develop new blends. Uptake of these has been rapid, and with 35,000 metric tonnes of fertilizer sold, we have already surpassed the target for our five-year strategy. In addition, some governments, including those of Ghana, Uganda and Malawi, have used their subsidy programs to introduce the new fertilizer blends, with an estimated quantity of 266,500 MT already distributed to smallholder farmers.

## For more information

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