

*In the field training on fertilizer applications for farmers.*

PHOTO: INDORAMA

# Agronomy and crop nutrition: an African perspective

Training in advanced agronomy for crop production is an integral part of agriculture development in Nigeria. The priority is to increase farm-level productivity and improve agriculture growth at national level. **Balbir Singh**, head of agronomy at Indorama Fertilizers, highlights the importance of training West Africa's farmers, and summarises the progress made to date.

Population in sub-Saharan Africa is expected to double to about 2.4 billion by 2050. Agriculture is the backbone of African economy and central to the way of life of many African people. The sector accounts for about 16 percent of continent's GDP, 60 percent of its labour force and 20 percent of product exports. It also provides the main source of work and income for 90 percent of Africa's rural population.

African agricultural productivity falls short currently – lagging far behind other developing regions – and the continent is still prone to periodic food shortages. Because of this, agricultural transformation is the only way to ensure food security, zero hunger and the absence of malnutrition in Africa.

Crop yields across Africa are typically depressed due to the low use of agricultural inputs and a dependency on rain-fed agriculture. Indeed, only six percent of Africa's cultivated land is irrigated, currently, and average fertilizer consumption in sub-Saharan Africa is estimated at just 17 kilograms per hectare of cropland. That compares to average world fertilizer consumption of 135 kg/ha.

To meet these gaps – in crop productivity, fertilizer use and irrigation – Africa needs to transform its agricultural value chain. Adopting advanced agronomic methods and raising the level of inputs such as fertilizers will be key.

At present, low productivity is also exacerbated by insecure/fragmented land holdings and the slow adoption of agricultural technology. The majority of Africa's smallholder farmers have little or no experience with fertilizers and poor knowledge about their potential to enhance crop yields and quality. Even for farmers who may be aware of fertilizers, the majority do not know the right types and application rates for their particular soils and crops.

## A Nigerian Perspective

Agriculture is a major sector of Nigeria's economy, employing about 70 percent of the country's workforce of more than 200 million people. The majority of Nigerian farmers are smallholders. The average productivity of agricultural land is 1.5 t/ha, while average fertilizer use, at approximately 36 kg/ha, is also very low.

Within Nigeria, current agronomic strategies are focused on improving the efficiency of fertilizer use – enabling plants to capture more nutrients and use these in physiological functions that promote crop growth and yield. This, in turn, strengthens food security and contributes to the economic and environmental sustainability of agriculture. Improving nutrient use efficiency, however, does requires research into soil- and crop-specific fertilizers.

Improvements in agricultural productivity, due to their positive effects on employment and crop yields, can be an important part of the overall strategy for reducing food insecurity and unemployment Nigeria is aiming to double its food production.. Yet food output over the years has come to rely on local farmers, mostly residing in rural settings, who do not have the agronomic knowledge needed to deliver on this ambition. They also have little or no access to advances and improvements in agricultural technology.

Training in advanced agronomy for crop production is therefore an integral part of agriculture development in Nigeria. The priorities are increasing farm-level productivity and improving agriculture growth at national level.

## Training holds the key

Indorama is funding and running a wide range of agronomic training initiatives for farmers in Nigeria and other West Africa countries. These are improving awareness about the appropriate use of fertilizers, seeds & non-monetary inputs – and highlighting their potential for increasing farm productivity and transforming agriculture.

These initiatives are valuable and necessary, as advanced training in agronomy is a key contributor to agricultural development in Nigeria. In particular, it builds capacity for innovation in the farming sector by promoting the adoption and application of new technologies. Indorama's agricultural assistance work is helping Nigerian and other West African farmers improve their crop yields and increase their income by offering training in crop nutrition and best agronomic practices.

Indorama has set itself the target of training a total of 2.4 million farmers by 2022. The company's agronomy service is fully committed to achieving this target, improving the skills of farmers, and running awareness campaigns to improve crop productivity in Africa.

## Indorama: helping Africa's farmers

Indorama's training initiatives are designed to bridge the gap between outdated crop production technologies and the latest advanced agronomic practices. Training is also provided to smallholder farmers on market access. Other training provides farmers with advice on reducing post-harvest losses, and extending the shelf-life of food and fibres by properly preserving/drying/packing these – making it possible to supply Africa's rapidly rising urban population.

There are many agronomic strategies for improving crop production efficiency. These include the use of:

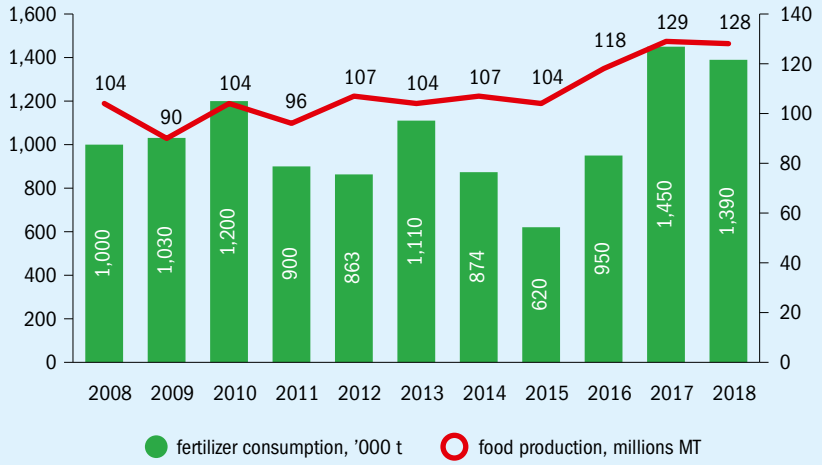
- Fertilizer recommendations informed by field response trials and based on soil or plant analyses
- Model-based decision support systems to inform fertilizers recommendations
- Fertilizers placement and other precision application technologies
- Crop residues, composts, or animal manures to improve soil quality.

There is a clear need to educate farmers on better agronomic practices in our view. While all farmer wish to improve their profits, this cannot happen without an increase in productivity. Yet many farmers currently lack the knowledge to turn their farm land into a more productive asset. Because of this, Indorama – as well as meeting the basic requirements for fertilizers –also provides farmers with comprehensive information, advice and assistance on:

- Crop growth and development
- Crop nutrient needs
- Soil testing
- Agronomic practices for every crop planted.

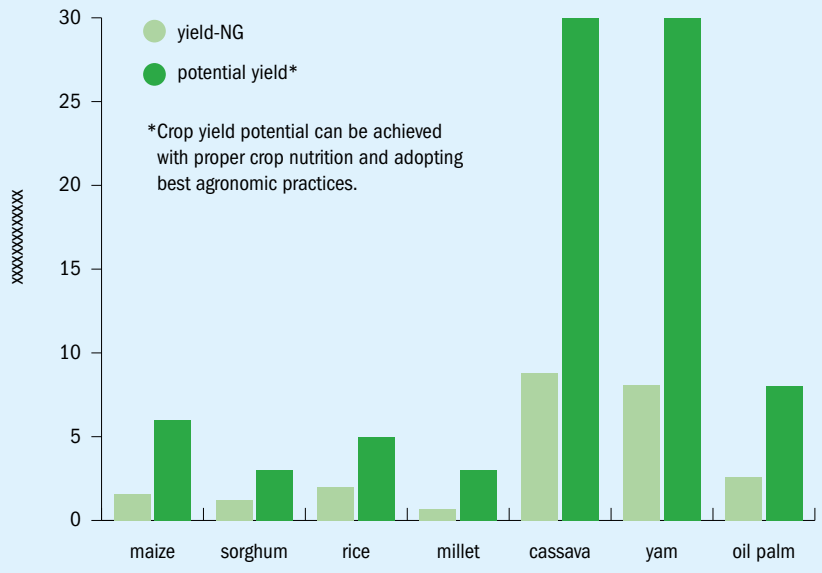
Small portions of farm land are used as demonstration plots. This helps farmers to understand why adopting present-day farming techniques is worthwhile and beneficial – by revealing the yield improvements that can be achieved with new techniques.

Fig. 1: **The correlation between Nigeria's fertilizer consumption and its crop production**




*Source: Indorama*

Fig. 2: **Nigeria: current crop yields vs crop yield potential**




*Source: Indorama*




*Targeted training to improve the skills of female farmers.*

PHOTO: INDORAMA

## Crop responses to fertilizers

Under field condition, many crops fail to achieve their full yield potential due to inadequate and imbalanced plant nutrition. In Nigeria, there is a clear correlation between higher crop production and rising fertilizer consumption (Figure 1). Understanding the role plant nutrients play in improving crop growth, yield and quality is therefore very important. When certain nutrients are missing, for example, crop leaves can become stunted, changing colour from green to yellow, with a direct impact on yield.

## 4R nutrient stewardship and nutrient deficiencies

Nutrients are the essential elements that crops consume and require to promote plants growth and development. 4R nutrient stewardship is an approach developed to guide farmers on the application and use of fertilizers. Valuably, over time adoption of the 4Rs can solve many of the issues arising from imbalanced fertilizer use. The 4Rs include:

- **Right Source:** The correct type of fertilizer a crop needs – such as NPKs or just urea.
- **Right Rate:** The amount of fertilizers the crop needs. For example, maize needs 120 kg of nitrogen supplied using 5.5 kg bags of urea
- **Right Time:** Applying fertilizers exactly when crops need these.
- **Right Place:** Placing nutrients in soils at a close enough distance to enable plants roots to actually take them up. In most instances this can be achieved by placing fertilizer within five centimetres of the plant's roots.

With the global population increasing, the demand for food crops and crops yielding oil, fibre and other by-products has also been rising. Nutrient management has therefore become a vital task for agronomists and farmers, as they seek to boost food crop production by closing the yield gap (Figure 2).

## Free services to farmers

As part of its agricultural education strategy, Indorama offers free agronomic services to help farmers get close to maximising the potential yields of major crops. The services offered includes soil testing (see photo), agricultural advisory services, training events for large and small farmers, market days, and radio talk shows.

Indorama started by offering free agronomy services in Nigeria but has since extended these to other West African countries such as Senegal, Mali, Ghana, Ivory Coast and Burkina Faso.

Indorama is committed to satisfying farmers by combining the supply of high-quality granular urea with a range of services. The company offers the following as pa rt of its service package to train and educate farmers:

- Soil testing and weather advisory
- A range of crop management practice brochures for individual crops (see photo) endorsed by Nigeria's Federal Ministry of Agriculture and Rural Development (FMARD)
- Field demonstrations and farm day activities
- Individual, group and mega-size farmer training events
- Farmer Service Centres offering agricultural advisory services
- Activities with international development agencies and the media
- Efficient and climate-friendly agricultural trials.

Indorama also offers farmer a range of digital services. These include the *Indorama Agronomy App* for mobile phones, digital animations films on crop production techniques, and the *Ignitia Tropical Weather Forecasting* tool.

By building-up and rolling-out agricultural IT applications, services can be offered to farmers on a mass scale. The development of the *Indorama Agronomy App*, for example, provides farmers with an instant update on weather, seeds, fertilizer applications, fertilizer availability and fertilizer prices. A digital animation film also show farmers how to achieve the best return on investment by successfully applying and managing fertilizers, while sharing a *Success Story Booklet* encourages fertilizer use by other farmers.

## Making agribusiness profitable and sustainable

The various programmes developed by Indorama, while matching the essential needs of farmers, also equip and train them to run a sustainable agribusiness. That includes advice on crop yield, quality, price, market fluctuations, as well as on the post-harvest situation and how to use local sales/retail information to realise the best price for crop produce.

Agronomy training has therefore become an essential, primary resource for Nigerian and West African farmers. Smallholders, by accessing this resource, can improve their agricultural productivity and so achieve higher returns by taking their surplus produce to market.