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Maize production

Because the soil in your field is different from one place to another you need a new strategy to get a good yield and increase production.

Maize grows well on deep, well-drained fertile soil and needs adequate management practices. Most times the crop is grown on marginal lands or poor soils with little or no nutrient added to maintain soil fertility. This is why some farmers get low output.

Chemical fertilizer use for your maize will depend on the kind of soil in your field, the yield you want, added manure, what was planted on your field before and the way you manage your farm by weeding, putting manure etc.

Organic fertilizers like manure and compost are great inputs you can add to your soil to make it produce more. They also help the inorganic fertilizers to work well in helping the crop to grow and produce more. However, we don't have so much manure because we use the straw and stalk for fuel, forage, buildings, etc. Organic fertilizers need to be used alongside inorganic fertilizers to sustain the levels of productivity and maintain the soil we have to ensure that some residue is left on our farms.

A maize field. Source: Author

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Recommended rates for fertilizer application

Based on Agro climatic zones and soil type a generalized blanket recommendation for fertilizer application is provided in a summary below

RECOMMENDATION (NUTRIENT HA^{-1}) BY ZONES	
AGRO-EC ZONE	**FERTILIZER MATERIAL HA^{-1}**
SAHEL	
120kg N	Urea 260kg or 5 bags) or CAN (462kg or 9 bags) 20-10-10 (300kg or 6 bags) at planting or 2 - 3 WAP and 2½ bags of Urea at 5 - 6 WAP
SUDAN	
60kg P_2O_5	SSP (333kg or 7 bags)
NORTHERN GUINEA SAVANAH	
30kg K21	MOP (50kg
SOUTHERN GUINEA SAVANAH	
100kg N	Urea (220kg or 5 bags) or CAN (385kg or 8 bags) or 20-10-10 (667kg or 13 bags) half N at planting or 2 - 3 WAP and half 5 - 6 WAP
50kg P_2O_5	SSP (278kg or 6 bags)
30kg K_20	MOP (50kg or 1 bag)
FOREST	
70kg N	Urea (150kg 0r 3 bags) or CAN (250kg or 5 bags) or 20-10-10 (350kg or 7 bags)
50kg P_2O_5	SSP (139kg or 3 bags)
30kg K_20	MOP (50kg or 1 bag) or 4 bags of 20-10-10, 1 bag Urea + 1 bag single super phosphate

Source: Chude *et al.* 2012.

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Why is fertilizer Important

Over time, experience has shown that greater sustained use of Nitrogen and Phosphorus (mineral fertilizer) raises the productivity of smallholder farmers. The pressure on land resources has led to continuous use of the same fields over and over with little or no added input leading to nutrients losses. Fallow periods are shortened, and soils already naturally low in productivity (See Map) are further stretched. Nutrients lost by crop removal at harvest, leaching and erosion, immobilized by microorganisms can be easily replaced with fertilizer application. Inorganic fertilizer is thus needed to raise crop production. However, a number of factors will affect how the crop will respond to the added fertilizer.

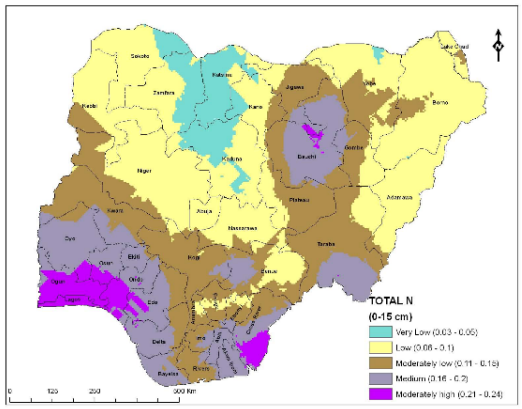
These are:

1. Crop factors: Deals with the type of crop.
2. Soil factors: Type of soil, texture, color
3. Climatic factors: Adequate and timely rainfall, sunshine etc.
4. Economic factors: labor, capital.
5. Management factors: Manipulating the soil's properties, weeding, timing of farm activities etc.
6. Fertilizer use can only be effective when the crop responds to it. Some crops will need larger amounts of a particular nutrient than others e.g. cereals like maize, require more nitrogen than legumes e.g. (groundnut, soybeans).

Improved varieties will require higher doses of fertilizer than local variety. To ensure high crop performance you should check your soil fertility from time to time to ascertain the nutrient status of the soil through soil testing every 3-5 years.

Erosion and nutrient management

Because of heavy rains, soil organic matter, nutrients and soil particles are lost in a single rainfall and over time. This affects the soils' potential to produce as the **topsoil**, most important part of soil, is lost. The loss is



Source: Chude et al, 2012.

greater in soils that are shallow in depth than deep soils.

Agronomic practices to reduce soil erosion such as mulching, cover cropping, green manuring and tied riding (this involves tying the ridges at the top and bottom to help conserve water and prevent erosion) will help to build soil organic matter which in turn increases the benefit of fertilizer use by the crops to produce better yields and increase farmer productivity.

New Strategy to use

The farm can be divided into management zones along the lines of the physical property texture, soil bulk (deep or shallow) and topography (high or flat land) so that resources of fertilizer and manure are allocated to those zones where higher productivity is perceived (low lands with deep soil).

The 5R principle: These fertilizer management practices can improve fertilizer use efficiency in order to increase production of crops grown. They are necessary alongside other good maize production practices and necessary input cost considerations.

1. The **Right Source** of fertilizer for the kind of crop grown and the soil type.

2. The **Right Rate.** Applying the fertilizer in the right amounts.

3. The **Right Time** in relation to the stage of growth and development of the crop as well if the soil is wet.

4. The **Right Place**. The fertilizer should be placed close to the plant and in the soil.

5. The **Right Location.** Fertilizer is placed according to the field's topography. Higher doses of chemical fertilizer should be applied at the valley bottom (flat lands) and mid – slope (not too high) with the least application on higher lands. Since a farmer's field is usually never uniform, the farmer should stand and examine his field and see to which direction it slopes. Just as it is an indigenous knowledge to make ridges across a slope than along the slope to minimize erosion that rule of thumb should be used. Fields with hilly portions will have shallow soils and will be prone to more loss of soil particles and nutrients hence lower doses of chemical fertilizer should be used than on flat field usually at valley bottoms. The use of tied ridges and bunds at the top of the slope and mid slopes will help to minimize erosion conserve water and nutrients improving crop production.

Feed the Future Innovation Lab for Food Security Policy

Nigeria Agricultural Policy Project
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Guide on how to account for soil physical properties and fertilizer use in Maize based systems

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Soil health is critical for increased crop productivity in Nigeria. Thus, managing your resources very well will help in improving your crop yield now and in the future

The productivity of soils in Nigeria, as in other parts of sub-Saharan Africa is very low. This is coupled with increasing high temperatures, soil variability and rainfall variability in intensity and amount.

How the soil in your field is managed and the way the amount of chemical fertilizer and organic materials (manure, compost, residues etc.) are used will depend on several factors and cannot be the same for all farmers. Also, it is not enough to just use chemical fertilizer alone if you want to get a good yield