Specialty Fertilizers and Local Blending for Banana and Plantain

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Summary

The production of banana in Sub-Saharan Africa suffers widely from low nutrient availabilities in soils. To counter this limitation, fertilizers must be applied that provide a balanced supply of nutrients. Specially designed fertilizer blends can be used that contain nutrients like nitrogen, phosphorus, potassium, sulfur, and others in proportions that are aligned with soil fertility status and crop requirements. Readily accessible single nutrient fertilizers and existing infrastructure in Sub-Saharan Africa can be used to mix these specialized blends for farmers. Note that banana and plantain have a particularly high requirement for potassium, and that blends for root crops are also suitable for this crop as well. Applying the right fertilizer at the right time and place to banana and plantain greatly enhances productivity and nutritional value and strengthens resilience to drought and pests. Specialty fertilizer blends allows farmers to obtain greater returns on input investments.

Technical Description

Formulations of blended or compounded fertilizers balance and replenish nutrient stocks in soils, which ensures that the added inputs are utilized more efficiently for increasing banana and plantain production. Blending technology offers a very large degree of flexibility to adapt fertilizer formulations in line with general soil characteristics and production objectives, as is prescribed by the guiding principles of integrated soil fertility management. The various elements that are mixed have specific benefits. For example nitrogen, phosphate and potassium promote stem growth, flowering and bunch filling, sulfate reinforces photosynthesis and transpiration, and calcium, magnesium and zinc enhance the uptake of nutrients and water from soils. Use of specialty fertilizers for banana and plantain has very strong synergies with improved varieties as larger bunches necessitate greater nutrient demand. Applying micronutrients results in fruit with greater nutritional and energetic value that help overcome deficiencies in rural communities. The right nutrient balance promotes uniform ripening and prevents splitting of immature and early ripened fruit.

Uses

Fertilizer blending technology is suitable for all major growing areas and especially important in low fertility soils. Split applications of specially blended fertilizers greatly

improve the health of plantations and their yields and nutritive value. This approach is particularly important when farming highly weathered soils characterized by low fertility and pH imbalance. Note that fertilizer mixes designed for banana can be suitable on root, tuber and flower crops; and this versatility is advantageous for input manufacturers, distributers and farmers alike.

Composition

Specific nutrient formulas result from blending a wide range of solid granular fertilizers like urea (46% N), potassium chloride (52% K), single superphosphate (16 to 20% P_2O_5, 11 to 21% Ca and 11 to 12% S) or triple superphosphate (46% P_2O_5). Micro-nutrients like zinc, boron, amongst others can be added in solid form or impregnated as liquid. An example of a mixed top-dressing fertilizer is “Banana blend” from Zambian with 12% N, 3% P_2O_5, 22% K_2O, and 35% organic matter which should be applied at 100 g per plant every month. Examples of specialty compound fertilizers for banana and plantain are Java®, Power®, Nitrabor® and Winner® from Yara which contain N, P, K, S, Zn, Ca, Mg, Fe, and B that serve different stages of the production cycle. Another useful blend for topdressing root, tuber and fruit crops (5:13:21 + MgO 5.8% + CaO 4% + S 3% + Zn 0.4%) manufactured by MEA Fertilizers in Kenya. These fertilizers are typically sold in bag sizes ranging from 5 to 50 kg.

Means of application

Information about the nutrient deficiency and imbalance in specific growing areas is contained within soil maps and past agronomic trials and is often sufficient for developing blending formulations. The production of the specialty fertilizer blends is also subject to the availability of different single fertilizers. Manufacturing of blends is done using a dry rotary system available at medium to large scales and is best packaged into sizes needed by farmers. Banana and plantain require NPK at rates of 200-40-200 kg ha-1 spread across the production cycle. When planting, a spot application around the base of plants at 3 to 6 month intervals is advised. Some of these inputs may be substituted with organic inputs, particularly for ratoon crops.

Agroecologies	Highlands, Humid forest, Moist savanna.
Regions	Africa South of Sahara.
Developed in Countries	Cameroon, Ethiopia, Kenya, Nigeria, Rwanda, Somalia, Tanzania, Uganda.
Available in	Cameroon, Ethiopia, Kenya, Nigeria, Rwanda, Somalia, Tanzania, Uganda.
Solution Forms	Input Supply.

Solution Applications	Soil fertility management.
Agricultural Commodities	Banana/Plantain.
Target Beneficiaries	Small-scale farmers, Commercial farmers, Agro-dealers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

To produce a new blended fertilizer, the following steps are required: 1) Derive the formula of blended fertilizers based upon nutrient demands and the soil fertility conditions requirements across a large production area, 2) Establish manufacturing protocols for mixing different sources of fertilizer and packaging the blend, 3) Sensitize agro-dealers about the benefits and profitability of specialty fertilizer blends and provide customer information about them, 4) Provide these branded fertilizers at affordable prices on local markets and monitor their sales, and 5) Conduct demonstrations and trials to assess the efficacy of a blend compared to other management options, and refine the formulation and branding campaigns over time as necessary.

Production Costs

Designing a new fertilizer blend needs not be expensive as it can be based upon desk study from a wealth of secondary information, including the composition of similar products. Refining that blend over time based upon agronomic trials and plant and soil analysis is considerably more expensive. Manufacturing specialty blended fertilizers bears a considerable start-up cost based upon capital investment for on multi-channel dry rotary systems and automated packaging. There is also the cost of assembling the primary fertilizers to be blended. These costs are considerably reduced for fertilizer companies with existing blending capacity that is seeking to expand their product lines. Smaller, more labor-intensive blending systems may be developed for localized operations, and even operated as a community-based operation once specific formulations are known.

Customer Segmentation

Several commercial input suppliers in Africa distribute fertilizer blends designed specifically for banana. Blended fertilizers are intended for use by small-scale and commercial producers through distribution via agro-dealer networks.

Potential Profitability

The profitability of fertilizer blending is not based upon crop response to individual component fertilizers, but rather their improved response to strategic combinations of those ingredients, a feature that well informed farmers are willing to buy. Basically, blended fertilizers should offer returns that are greater than the sum of the ingredient parts. Combining two or more needed fertilizers offers more efficient labor operations as well. Research in Cameroon has shown that fertilizing plantain with NPK at 200-40-200 kg ha-1 can increase yields by about 6.0 t ha-1.

Licensing Requirements

The formulations of fertilizer blends may be subject to licensing but are more often protected as trade secrets. Those with knowledge of fertilizer composition may easily calculate desired blend proportions from different primary fertilizer materials.

Innovation as Public Good

Responses to fertilizer application and combinations are available as Regional Public Goods when published by research institutions.

Institutions

Accompanying Solutions

Improved Varieties of Plantain for Tropical Lowlands

Improved Varieties of Banana for the African Highlands