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### **Soil Quality Information and Fertilizer Use Among Smallholder Farmers in Kenya: Does Knowledge Influence Choice?**

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#### **Abstract**

Soil degradation is a major concern in sub-Saharan Africa resulting in depleted and undernourished soils. Dependence on depleted soil is a key reason why sub-Sahara Africa lags behind other developing regions in meeting its agricultural productivity goals. The low productivity is exacerbated by imbalanced use of fertilizers by the farmers without knowing soil fertility status and nutrient requirement of crops thus causing adverse effects on soil and crops both in terms of nutrient toxicity and deficiency. Diagnostic techniques such as soil tests are methods of detecting and analyzing soil at an appropriate field level make it possible for farmers to obtain precise information about the nutrient needs specific to their fields. In addition, most fertilizers in the markets in sub-Saharan Africa are made as to supply only the macro nutrients mainly nitrogen, phosphorus and potassium. However, recent studies have highlighted that in reality the soils may also be deficient in other macronutrients as well as micronutrients such as Sulphur, Boron, Zinc and so on. Such deficiencies may render crops unresponsive to application of these fertilizers.

Owing to this, we conducted soil tests for farmers in Kenya and issued farmers with results from the soil tests indicating which nutrients were deficient in their soils. We sought to find out whether information on the quality of the soils influences the type of fertilizer the farmers use and yields. We find that compliance to the recommended fertilizer minerals is low among the farmers. Main constraints to compliance include affordability, accessibility, knowledge (some farmers could not understand the test results). This implies that availing the information to farmers is not enough: there is need to empower them financially and also present the information to famers in a way they would understand. In addition, some of the recommended mineral components are currently not available in

the markets hence the need to blend conventional NPK fertilizers with additional nutrients including micro nutrients.

### **Conclusion and policy recommendations**

Soil degradation is a major concern in and a key contributor to low productivity in sub-Saharan Africa. The problem is especially severe in densely populated areas, where soils have been continuously cultivated and face fertility constraints that make them less responsive to chemical fertilizers. This is worsened by imbalanced use of chemical fertilizers by the farmers without knowing soil fertility status and nutrient requirement of crops thus causing adverse effects on soil and crops both in terms of nutrient toxicity and deficiency. Diagnostic techniques such as soil tests are methods of detecting and analyzing soil tests at an appropriate field level make it possible for farmers to obtain precise information about the nutrient needs specific to their fields. Most fertilizers in the markets in sub-Saharan Africa are made as to supply only the macro nutrients (mainly N,P,K), however, in reality the soils may also be deficient in other macronutrients as well as micronutrients. This may affect yields negatively as well as the income of farmers.

We conducted soil tests for 1800 farmers in Western and Central Kenya and issued soil test results to all the farmers. We also randomly supplied custom-made fertilizers to some of the farmers. We then conducted follow-up surveys to assess the effect of information about soil quality from the soil tests. However, majority of the farmers did not use the soil test results- some said they could not find the recommended fertilizer blends in the market; others could not afford the fertilizers while others reported to having difficulties understanding the results. Similarly proportionately few farmers (about 7%) applied the recommended nutrient rates. These farmers were significantly more educated, had significantly higher income levels and more had received credit. We further assessed the effect of using recommended fertilizer blends using difference in difference method. Using the recommended nutrients rates (custom mix fertilizers) led to significantly higher yields. Hence there is need to make fertilizer blends more affordable and accessible to the farmers as well as training farmers on interpreting soil test results.

*For further assistance, more information or if you would like to conduct interviews with the Lead Principal Investigator, you can do so through: Judy Kimani, 0720 96 33 48, ([jkimani@tegemeo.org](mailto:jkimani@tegemeo.org)).*