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Complementary effects of organic and mineral fertilizers on maize production in the smallholder farms of Meru South District, Kenya

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Author(s)

Edwin Mwititi Mutegi, James Biu Kung' u, Mucheru Muna, Pypers Pieter, Daniel Njiru Mugendi

ABSTRACT

Low soil fertility is a major constraint to maize production in the small holder farms of Meru South District. This is mainly attributed to the mining of nutrients due to cropping without external addition of adequate nutrients. Mineral fertilizers are expensive hence unaffordable by most small holder farmers. The use of organic matter to increase and maintain soil fertility is being considered as a solution to help the low-income small holder farmers. A study was conducted in Mucwa location, Meru South District to determine the levels of complementarity between organic and mineral N amendments on maize yields and their influence on soil chemical properties. The experiment was set in a complete randomized block design (CRBD) with three replicates. The treatments were compared with the response obtained from control. The general soil fertility parameters changed slightly with Calcium, Magnesium and Potassium increasing in all treatments. The organic Carbon and total Nitrogen was higher in treatments that received sole organic N sources than in sole mineral N and a combination of organic and mineral N sources. The highest maize grain yield of 4.8 t ha⁻¹ and 4.2 t ha⁻¹ were realized from sole application of calliandra during the 2005 Short rains and 2006 Long rains cropping seasons. Generally the maize grain yields were lower in treatments with mineral N alone compared to the treatments with organics. Treatments with sole calliandra and sole tithonia had the highest benefit cost ratio (BCR), followed closely by manure treatment. More so, integration of organic and mineral N sources resulted to higher net benefit and BCR than the application of the recommended rate of mineral fertilizers. Results obtained indicated that the use of either organic or combined organic/mineral N soil amendment appear to be superior to using mineral amendment sources alone.

KEYWORDS

Soil Fertility; Organic Carbon; Total Nitrogen; Benefit Cost Ratio

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