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Full Length Research Paper

Organic based nutrient management strategies: Effect on soil nutrient availability and maize (*Zea mays* L.) performance in Njoro, Kenya

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Abstract

A field experiment based on the concept of organic nutrient management (ONM) was conducted in Njoro, Kenya to test the effect of improved legume fallows; crotalaria (CR), lablab (LB), garden pea (GP) and natural fallow (NF, as control) on available soil N and P, and maize performance. The experimental layout was a

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split plot in a randomized complete block design. The main plots were two cropping systems involving the improved legume fallows and NF preceding sole maize and maize bean (M/B) intercrop. The sub-plots were two residue management types; residue incorporation and residue removal with farm yard manure (FYM) incorporated in its place. Incorporation of LB, CR and GP residues resulted in higher concentrations of N and P in soil than NF residue and FYM incorporation in both cropping systems. Under sole maize, grain yield following LB was significantly higher (51, 28.2 and 52%) than after CR, GP and NF, respectively. In the M/B intercrop, maize grain yield following LB was significantly higher (38.5 and 28.5%) than after GP and NF with no significant differences in yields following CR and LB. Maize dry matter (DM) yields followed a similar trend. Overall, maize grain and DM yields were higher in sole maize cropping system than in M/B intercrop with an additional 0.5 - 0.6 kg ha⁻¹ of bean grain yield obtained in the latter cropping system. The improved fallow legumes, with LB being superior, enhanced soil productivity and consequently higher yields of the succeeding crop. The ONM strategy tested is thus a feasible technology that could easily fit into the circumstances of the resource poor farmers within the region.

Key words: Biological nitrogen fixation, farm yard manure, improved legume fallow, residue management.