

Effect of Combining Cattle Manure and Inorganic P-fertilizer on Soil Properties and Maize Yield in Acidic Soils in Beira Corridor, Mozambique

Muambole, Arlindo

Abstract:

Mozambique lags behind all other Southern and Eastern African countries in maize production leading to maize imports. Soil nutrient depletion, lack of combination of organic resources with mineral resources coupled with high soil acidity has been identified as the main causes of the declining crop yields. Maize yield in smallholder systems in central Mozambique can be increased by optimum utilization of mineral fertilizers combined with cattle manure and other locally available organic resources. The aim of this study was to evaluate the effect of combining cattle manure and inorganic P-fertilizer on soil properties and maize yield in acidic soils along Beira Corridor, Mozambique. The objectives were to evaluate the effect of combined incorporation of cattle manure and mineral fertilisers on soil properties and maize yield; to determine the optimum rate of manure-inorganic fertiliser interactions for increased fertilizer use efficiency and to assess the profitability of combined application of cattle manure and mineral fertilisers for small scale farmers. The experiment consisted of combination of three levels of inorganic P-fertilizers (TSP) at 0; 25 and 50 kg ha⁻¹ (P₂O₅) with three levels of cattle manure (0, 5 Mg/ha and 10 Mg/ha). The total treatments tested were nine and arranged in RCBD with four replications. Analysis of variance (ANOVA) was used for data analysis, and treatment means were compared at probability ($p < 0.05$) using Least Significant Difference (LSD). Cattle manure at 10 Mg/ha combined with TSP at rate of 50 kg/ha gave higher maize grain yield of 4.87 Mgha⁻¹ compared to 0.55 Mgha⁻¹ of the control. Combination of mineral fertilizers with manure significantly increased phosphorus use efficiency by 98%; phosphorus agronomic efficiency by 87%; phosphorus recovery efficiency by 0.46 g kg⁻¹ and utilization efficiency by 98%. Inorganic P-fertilizer use was cheapest when TSP as source of P was combined with manure at rate of 5 Mg ha⁻¹ having Value Cost Ratio of 8.12 but P-fertilizer (as TSP) was most expensive when applied without manure, having VCR of 3.40. Advocacy on combination of cattle manure that is locally available with TSP should be increased to improve soil properties, crop yield, fertilizers use efficiency, income and profit to farmers.