

GROWTH AND YIELD OF MAIZE AS AFFECTED BY ORGANIC AMENDMENTS WITH POTENTIAL FOR SOIL FERTILITY IMPROVEMENT

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Although organic amendments (OAs) are known to improve soil fertility and crop yield, improved crop performance cannot be observed with all OAs always. Thus, the objective of this study was to determine the effect of OAs with potential for soil fertility improvement on crop performance.

Soil samples were collected from an upland field in Peradeniya belonging to the Agro-ecological region WM2b by stratified random sampling method. Soil was air-dried, sieved (2 mm) and analyzed for texture, pH (1:2.5 water), cation exchange capacity (CEC) at pH 7 and organic matter (OM) content. Organic amendments tested were cattle manure and saw dust mixture (CS) at 2:1 ratio (incubated for two months) and bio-char (BC) produced prepared from sawdust (*Alstonia macrophylla*). A greenhouse experiment was conducted in a complete randomized design using maize (variety *Sampath*) for 70 days (50% flowering) in four replicates. Treatments were; control (S), soil mixed with mineral fertilizer alone (SF) and mineral fertilizers (F) combined with CS (1% w/w, soil) or BC (0.5% w/w, soil) to supply same level of nutrients as of SF. Treatments were repeated in a field experiment in a randomized complete block design at soil sampled location for 85 days and green-cobs were harvested. Plant growth and yield parameters were measured.

Soil was a sandy clay loam with OM content of 1.7 %. Soil pH and CEC were 6.1 and 16 cmol₍₊₎ kg⁻¹, respectively. Soil was deficient in all nutrients except sulphur. Incorporation of OA significantly increased OM but did not increase nutrient release from soil. Treatments, SF, CS+F and BC+F improved plant height and biomass in both greenhouse and field experiments. Organic amendments applied with fertilizers improved plant height by 13% compared to fertilizer alone in the greenhouse. The highest shoot biomass per plant in greenhouse experiment was recorded for BC+F (24.7±1.4 g) compared to SF (18.8±2.6 g), CS+F (18.6±1.9 g) and S (5.3±0.3 g). Plant height at 50% flowering in the field was highest for CS+F but growth or yield parameters at harvesting were not significantly different across SF, CS+F and BC+F. Average green-cob yield with addition of mineral fertilizers alone or with OAs was 15.7 Mt ha⁻¹ while soil only control resulted in 7.9 Mt ha⁻¹. Improvement in soil conditions other than nutrient availability with application of OAs may have improved plant performance.

Cattle manure–sawdust mixture or bio-char did not negatively affect crop growth or yield and can be utilized for maintaining crop yields while simultaneously rebuilding soil fertility.

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