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USE OF AMENDMENTS TO IMPROVE SOIL PROPERTIES IN ACHIEVING HIGH YIELD FOR MAIZE (*ZEA MAIZE*)

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Sri Lankan soils are generally low in soil fertility and cropping is difficult without high nutrient inputs. This study was conducted to identify beneficial management practices to overcome the soil physical and chemical limitations in achieving high yield of maize. The experiment was conducted at the University Experimental Station, Dodangolla, Kundasale in the intermediate zone mid country of Sri Lanka (IM3c) where soil belongs to Reddish Brown Latosolic soils (RBL; Rhodudalfs). Initially, a composite soil sample was collected from the field at 0-20 cm depth and soil sample was analyzed for soil fertility parameters and available nutrients. Site Specific fertilizer (SF) recommendation was formulated using the modified missing element technique. Treatments were SF, biochar applied at 0.5% by weight with SF (BC+SF), incubated cattle manure and saw dust applied at 1% by weight with SF (CS+SF,) and a soil only control (C). Treatments were initially tested at the greenhouse for 72 days and they were later tested in the field for a complete growing season of maize. The pH of the soil was 5.6 indicating slightly acidic in reaction and had moderate cation exchange capacity of 13.5 $cmol_+/kg$. Texture of the soil was sandy loam and organic matter content was 1.3%. The electrical conductivity in this soil was 0.10 dS/m, indicating a non-saline status. Deficient levels of available N, P, K, S, Ca, Zn, Cu, Mn and sufficient levels of Mg and Fe were observed. Plant dry weight increased significantly with the addition of amendments *i.e.*, fertilizers in adequate quantities (SF), fertilizer and biochar (BC+SF) and, fertilizer and cattle manure- sawdust CS+SF) to the soil in the greenhouse. A significant plant height increase was observed for the field experiment with the addition of soil amendments at 50% tasselling. Plant dry weights and length of cob significantly increased in all treatments +SF compared with the control but no significant difference was observed between amendment treatments and the SF only treatment. A significantly higher grain yield (6825 kg/ha) was observed for the BC+SF treatment than the other treatments. Seed number per cob (536 seeds/cob) was also significantly higher in the biochar treatment. Complete nutrient package developed based on the soil analysis significantly increased the plant growth. High C:N ratio amendments did not limit the available nutrients in the greenhouse study or in the field. No significant difference was observed for soil pH with the addition of amendments. Results of the field experiment indicated that biochar with adequate nutrients increased the soil fertility of the RBL soil. Therefore, it is indicated that biochar improves the soil chemical constraints resulting high yield of maize.

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