

Nutrient Availability in Acid Sulfate Soil as Affected by Phosphorous Source and Biochar under Different Water Management Regimes

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This study was conducted aiming at investigating the changes of nutrient availability in Acid Sulfate Soil (ASS) in relation to addition of different phosphorus (P) sources and biochar under two water management regimes. An incubation soil experiment was conducted as a two-factor factorial experiment in a complete randomized design with 3 replicates for a period of one month. Treatments comprised of application of Triple Super Phosphate (TSP) to the recommendation of the Department of Agriculture, Sri Lanka for rice crop, Rock Phosphate (RP) as the same rate of P_2O_5 of TSP application, 5% rice husk biochar application as per the dry weight of soil and unamended control soil. All treatments were evaluated under two water management regimes, continuous flooding (2-cm water level above the soil) and alternate wetting and drying (2-cm overlying water for one-week, removed and kept drying during succeeding week). After one month, soils were sampled and analyzed for pH, electrical conductivity, available P, Potassium (K), total Nitrogen (N), and bioavailable concentrations of Aluminium (Al), Iron (Fe), Zinc (Zn), Manganese (Mn), Copper (Cu) and Cobalt (Co). Biochar addition significantly ($P < 0.05$) increased soil pH, K, and Mn concentrations in soil and there was no significant influence on the availability of other metals in ASS. Across both water management regimes, Al concentration of soil amended with biochar was reduced by 64% and 49% respectively compared to those of soils amended with TSP and RP. The results indicate the potential of amending ASS with biochar to increase pH and alleviate Al toxicity which should be further confirmed by a long-term experiment in the field.

Keywords: Acid sulfate soil, Aluminium toxicity, Biochar, Phosphorous deficiency

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