

Effect of Clay and Biochar on the forms of Phosphorus in the sandy soil

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In developing sustainable phosphorus (P) management strategies, it is crucial to understand P transformation among different fractions and pools. Here we report that application of clay, biochar and combination of clay and biochar may promote soil quality therefore plants may use P efficiently. This study investigates the forms and distribution of phosphorus (P) after 1, 7, 15 days in a Badgingarra soil that contained 98% sand, 0.6% silt and only 1.4% clay using a sequential procedure. Wheat straw (WS) and Chicken manure (CM) biochar was added at rate of 0, 10, 25 t ha⁻¹. Clay also was added at rate of 0, 3%, 10%. A modified Hedley fractionation measured the amount and relative solubility of P after 1, 7, 15 days of incubation. Result from this research showed that The stable fractions (organic P and HCl-P) mineralised to more available P as form of labile-P with the time. Net organic P present as residual-P increased with almost all amendments. Both biochar increased residual-P by 12-17% at higher rate (25 t ha⁻¹) respectively compared to the soil without biochar added. Combination of clay and biochar also increased residual-P in the soil with time by 24-88% in comparison with control soil and only clayed soil (P<0.05). Results from this research showed that P added by biochar and combination of biochar and clay was preferentially found in the inorganic P (Pi) mostly in labile pools after 1, 7, 15 days. The largest difference among the amendments was in clay plus biochar, which was significantly increased during incubation (32%-63%). This paper now explores the assumption that the high levels of less soluble forms of phosphorus with clay and biochar at higher rate 10 t ha⁻¹ - 25 t ha⁻¹ respectively would, over time, become more available P.