

Chicken litter biochar improves phosphorus availability in acid soils

ABSTRACT

Phosphorus deficiency in tropical acid soils such as Ultisols and Oxisols is a distinct problem because of their characteristically high contents of aluminium (Al) and iron (Fe). Abundance of Al and Fe tend to bind with soluble inorganic P. Organic amendments such as chicken litter biochar can be used to mitigate P fixation. The objective of this study was to determine the optimum amount of chicken litter biochar that could be used to improve P availability of tropical acid soils. An incubation study was carried out for 20, 40, and 60 days with varying rates of chicken litter biochar and 50% Triple Superphosphate (TSP). Selected soil physico-chemical properties before and after incubation were determined using standard procedures. Amending acid soil with chicken litter biochar increased soil pH, total P, available P, and CEC and it also reduced exchangeable acidity, exchangeable Al^{3+} , and exchangeable H^+ . However, the use of 60% and 90% of 5 t ha⁻¹ chicken litter biochar with 50% TSP of the existing recommendation were more pronounced on soil P availability. This is because chicken litter biochar has large surface area and this creates a pool of negative charges in acid soils to fix Al instead of P. The findings in this study suggest that chicken litter biochar can positively alter soil chemical properties in a way that enhances P availability.

Keyword: Organic amendments; Waste management; Soil productivity; Phosphorus fixation; Soil liming