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Effect of Selected Oil Amendments on Physical Properties of an Alsofisol in Abeokuta Southwestern Nigeria

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Abstract

This study was carried out in 2004 and 2005 at Ajegunle Farm Settlement Scheme's site, near Abeokuta, southwestern Nigeria. A factorial experiment in randomized complete block design with 3 replicates was set up. The factors were poultry manure (0, 5 and 10 t ha^{-1}), lime as $CaCO_3$ (0 and 250 kg ha^{-1}) and NPK 15-15-15 (0 and 100 kg ha^{-1}). Maize (TZSR-Y) was planted. Soil physical properties measured included dry bulk density, saturated hydraulic conductivity (*Ks*), unsaturated water flow and clay dispersion ratio (CDR). The range of surface soil bulk density, from 1.27-1.42 g cm^{-3}, observed for poultry manure application was significantly lower than the range of 1.39-1.48 g cm^{-3}, when manure was not applied. The highest *Ks* value of 1.70 cm min^{-1} from plot applied with 10 t ha^{-1} poultry manure (PM) was significantly higher than 0.41-0.49 cm min^{-1} from all inorganically treated plots and the control. At the end of the second cropping season, application of poultry manure especially at 10 t ha^{-1} reduced the CDR from 17.1% to a range of 15.7%-9.3%, thereby increasing the soil aggregate stability. Application of 10 t ha^{-1} Poultry manure significantly improved the infiltration rate of the field. Integrated use of lime or 10 t ha^{-1} Poultry manure with NPK as well as application of 10 t ha^{-1} poultry manure only, improved the ability of soil to transmit water (sorptivity) under unsaturated condition. Combined application of poultry manure with inorganic amendments is therefore important in the improvement of physical properties of the soil.

Keywords: Unsaturated water flow; clay dispersion ratio; integrated nutrient management; aggregate stability.