Saturated Hydraulic Conductivity (Ksat) in Relation to Some Soil Physical Properties of Some Ferralic Soils with Hydromorphic Segregation in Delta State, Nigeria

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Abstract.
The study was conducted in a ferralic soil with hydromorphic segregation in Anwai, Asaba, Delta State. A grid of 12m x 12m were mapped out and pegged 4m apart to give a total of sixteen (16) experimental points. At each point, soil samples were taken at a pre-determined depth of 0-20cm and routinely processed and analyzed for particle size fractions, bulk density, particle density and total porosity. Saturated hydraulic conductivity was determined using a locally fabricated 12 cm iron core-cylinder which was carefully driven into the soil and core samples collected for laboratory determination and conductivity calculated using Darcy’s law. Data collected were analyzed using mean, standard deviation and coefficient of variation, while the relationship between saturated hydraulic conductivity was established using regression models. The results of the study showed that the particle size fractions of the soils varied from sandy loam to clay loam. Bulk density and particle density were low to moderate with mean values of 1.44 gcm$^{-3}$ and 2.34 gcm$^{-3}$. Total porosity was low with mean value of $38.06\%$ and a coefficient of variation of $9.56\%$. Saturated hydraulic conductivity correlated positively with total sand ($0.98xx$), Clay ($0.52x$), bulk density ($0.94xx$) and total porosity ($r = 0.56x$) silt content showed poor correlation significant ($r = 0.34ns$). The general results showed that key soil physical properties such as sand, clay, bulk density and total porosity can be used to predict hydraulic functions in the soil matrix.

Keywords: Saturated hydraulic conductivity, soil physical properties, hydromorphic segregation, Delta State

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