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Using saturation water percentage data to predict mechanical composition of soils

[\(get PDF\)](#) J.S.C. Mbagwu¹, D.O. Okafor²¹ International Centre for Theoretical Physics, 34100 Trieste, P.O. Box 586, Italy² Department of Soil Science, University of Nigeria, Nsukka, Nigeria

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abstract One hundred and sixty-six soil samples representing eleven textural classes and having wide variations in organic matter (OM) contents and other physico-chemical properties were collected from different locations in southeastern Nigeria to study the relationship between mechanical composition and saturation water percentage (SP). The objective was to develop a prediction model for silt+clay (SC) and clay (C) contents of these soils using their SP values. The magnitude of the correlation coefficients (r) between SC or C and SP was dependent on the amount of organic matter (OM) present in the soils. For soils with $<1.00\%$ OM, the correlation (r) between SC and SP was 0.9659 ($p < 0.001$) and that between C and SP was 0.9539 ($p < 0.001$). For soils with $> 2.00\%$ OM* the V values were generally low, varying between 0.5320 and 0.2665 for SC and 0.6008 and 0.3000 for C. The best-fit regression models for predicting SC and C were developed with soils having $<1.00\%$ OM. An independent data set from 25 soil samples collected from other parts of the study area was used to test the predictive ability of the best-fit models. These models predicted SC and C accurately in soils having between 0.28 and 1.10 % OM, but poorly in soils having between 1.31 and 3.91 % OM. These results show that the use of saturation water percentage to predict the mechanical composition of soils is most reliable for soils with low ($<1.00\%$) OM contents.

keywords soil mechanical composition, prediction, saturation water percentage