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Effect of Tractor Traffic Frequency on Cone Penetration Resistance of Tropical Arable Soils of Akure, Nigeria

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ABSTRACT The goal of this study was to evaluate the effect of a light tractor (31.9 KW power and 36.4 KN weight) traffic frequency on cone penetration resistance of tropical arable soils of Akure, Nigeria. Twelve experimental plots were considered in which the soils textures ranged from sandy clay loam to clay, according to USDA Soil Textural Classification. The study was conducted at the Experimental site of the STEP B project of the Federal University of Technology, Akure, Nigeria. The experimental plots were subjected to 1, 3, 5, 7, 9 and 11 passes of the tractor. Variables measured were (PR) penetration resistance, and moisture content with depth. The variables were monitored at the centre lines of the left(L) and right(R) wheels of the tractor.Results showed that means of the L and R values were not significantly different at the 5% level of significance. Mean values of PR (in the depth range of 0 to 30 cm and 1 to 11 passes) were, 1310 to 1707 kPa (sandy clay loam), 1395.5 to 1617.5 kPa (sandy clay), and 1260 to 1607.5 kPa (clay).PR increased with depth to a limit and then reduced in value in the range of depth considered. The mean PR values before the tractor passes (control) ranged between 450 and 850 kPa in the plots. The moisture content during the experimentation ranged from 11.0 – 17.5% (db). PR, depth and MC data were analysed using Excel software package to establish relationship between variables for the purpose of prediction.

Keywords: Tractor traffic, Penetration resistance, soil type, depth and moisture content