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# Thermal Conductivity of Some Compacted Trinidadian Soils as affected by Peat Content

E.I. Ekwue[1]; R.J. Stone[2]; D. Bhagwat[1]

[1]Faculty of Engineering, The University of the West Indies, St. Augustine, Trinidad, W.I.; e-mail of corresponding author: ekwue@eng.uwi.tt
[2]Faculty of Science and Agriculture, The University of the West Indies, St. Augustine, Trinidad, W.I.

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The effects of incorporating peat into three Trinidadian agricultural soils before compaction on soil thermal conductivity $k$ was investigated in a laboratory experiment. A factorial experiment was used to study the effect of peat applied at four levels (0%, 4%, 8% and 12% by mass) on maximum thermal conductivity $k_{max}$ and the corresponding moisture content on three soils (sandy loam, clay loam and clay) compacted using 5, 15 and 25 Proctor hammer blows. The compaction tests were carried out at different moisture contents ranging from 5% to 55%. Bulk densities achieved during soil compaction were measured to assist in the interpretation of results.

Results showed that while mean values of $k_{max}$ of the soils declined significantly (probabilty $P = 0{\cdot}001$) from 1·49 to 1·04 $W\,m^{-2}\,°C^{-1}$ with increasing peat content, the mean values of the moisture contents at which they occurred increased from 26·1% to 41·7%. While $k_{max}$ increased, the corresponding moisture contents decreased with increasing compaction levels. This applied to all soils tested. The clay soil had significantly lower values of thermal conductivities and greater corresponding moisture contents than the clay loam and the sandy loam soils. During soil compaction, thermal conductivity and bulk density behaved in the same manner, except that the maximum bulk density was achieved at lower moisture content than thermal conductivity. There was a significant interaction effect between soil type and peat content on thermal conductivity. There was also a reasonable agreement between the laboratory measured thermal conductivity data and those predicted using the Campbell model. A linear equation developed to relate thermal conductivity to bulk density suggests that a unique relationship may exist between the two parameters, when compacted soils are involved. A multiple linear regression equation was further developed for predicting bulk density from experimental factors.