

## Thermal Conductivities of Some Agricultural Soils in Trinidad as Affected by Density, Water and Peat Content

Edwin I. Ekwue <sup>a,Ψ</sup>, Reynold J. Stone <sup>b</sup>, Everson J. Peters <sup>c</sup> and Sharda Rampersad <sup>d</sup>

<sup>a, c, d</sup> Faculty of Engineering, The University of the West Indies, St. Augustine, Trinidad and Tobago, West Indies  
E-mails: Edwin.Ekwue@sta.uwi.edu; Everson.Peters@sta.uwi.edu; srampersad@gmail.com

<sup>b</sup> Faculty of Science and Agriculture, The University of the West Indies, St. Augustine, Trinidad, Tobago, West Indies;  
E-mail: Reynold.Stone@sta.uwi.edu

<sup>Ψ</sup> Corresponding Author

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**Abstract:** The thermal conductivities of twenty-six (26) agricultural soils in Trinidad were measured in the field and the laboratory with a KD2 sensor and probe. The effect of compacting four of the soils (two clayey and two sandy) to five bulk densities (1.2 to 1.6 Mg m<sup>-3</sup>) with zero and 4% peat content at four water contents (5, 12, 19 and 26%) on thermal conductivity was further investigated in the laboratory. The thermal conductivity measured in the field ranged from 0.73 to 1.69 W m<sup>-1</sup> °C<sup>-1</sup> and were within 0.11 W m<sup>-1</sup> °C<sup>-1</sup> of the corresponding laboratory-measured values for the individual soils. Thermal conductivity of the laboratory-compacted soils ranged from 0.25 to 2.00 W m<sup>-1</sup> °C<sup>-1</sup>, increased with increasing bulk density and water contents but decreased with the addition of peat. The clay soils exhibited lower values of thermal conductivity than the sandy soils, at given values of bulk density, water content and peat content. Good agreement was found between the laboratory and field measurements of thermal conductivity and the corresponding predicted values using the Campbell model of thermal conductivity. The results obtained are discussed in relation to pipe laying and agricultural operations in Trinidad and Tobago. Apart from soils with appreciable sand contents, most soils would require standard backfills during cable laying.

**Keywords:** Thermal, conductivity, peat, cable, soil, water, density