

Title Determination of thermal properties of the rhizome of *Podophyllum peltatum* for drying and ethanol extraction

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Abstract

The rhizome of *Podophyllum peltatum* is a major source of podophyllotoxin which is an antitumour compound and obtained by ethanol extraction in a packed bed. Thermal conductivity of a packed bed of rhizome particles was determined using the line heat source method at temperatures ranging from 25 to 55 °C, moisture contents from 0.138 to 0.70 dry basis (db) and effective densities from 512 to 1354 kg m⁻³. The measurement was done with the pores of the bed filled with air or ethanol. Specific heat of rhizome particles was measured using differential scanning calorimetry (DSC) for moisture contents, 0.1486–0.621 dry basis (d.b.) and temperatures, 35–80 °C. Depending on temperature, moisture content and effective density, the effective thermal conductivity ranged from 0.06 to 0.25 W m⁻¹ °C⁻¹. Likewise, specific heat and thermal diffusivity ranged from 1118 to 2932 J kg⁻¹ °C⁻¹ and 0.82×10⁻⁷ to 1.53×10⁻⁷ m² s⁻¹, respectively. Descending–ascending trends of thermal diffusivity with moisture content ranging from 0.14 to 0.60 dry basis (d.b.) were observed for all tested temperatures. Simple regression models were developed based on the experimental data and the regression models were further improved to enhance their predictability using genetic algorithm (GA).