

ORIGINAL PAPER

Supercritical Carbon Dioxide Extraction of Sorghum Bug (*Agonoscelis pubescens*) Oil Using Response Surface Methodology

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Abstract

Supercritical fluid extraction (SFE) of sorghum bug oil (SBO) with carbon dioxide was performed and compared with Soxhlet extraction using hexane. Response surface methodology (RSM) was used to determine the effects of pressure (200–400 bar) and temperature (50–70 °C) on the sorghum bug oil yield in SC-CO₂. The high extraction yield (more than 45.0%) was obtained at 300 bar and 60 °C followed by 400 bar and 70 °C, while the lower yield was obtained at 159 bar and 60 °C. At low pressure levels (159 and 200 bar), the oil yield decreased due to the reduced density of CO₂ at higher temperatures. Gas chromatography was used to characterize the fatty acids of the oils obtained while α -tocopherol was quantified by HPLC. No differences were found in the fatty acid compositions of the various extracts, while the α -tocopherol extracted from sorghum bug oil by the conventional solvent method was less than that extracted by the SFE process using CO₂. It can be observed that the conventional solvent extraction method exhibited notable DPPH radical-scavenging activity, with an efficacy slightly lower ($IC_{50} 7.45 \pm 0.3$) than that of the SFE extracts.

Keywords *Agonoscelis pubescens* _ Antioxidant activity _ 1,1-Diphenyl-picrylhydrazyl _ Fatty acid _ Oil extraction _ Response surface methodology _ Supercritical carbon dioxide