

Abstract

Project Code : MRG5580179

Project Title : Study of supercritical fluid extraction technology for production of high quality and solvent-free oil from *Moringa oleifera* (Maroom) seeds

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Abstract:

Moringa oleifera seed has gained importance over the years due to its great source of high quality oil that can be used in high value food, cosmetic, and pharmaceutical products. However, Moringa oil has never been successfully produced on the industrial basis due to the insufficient information available on the effective technique for oil extraction. It is generally extracted using organic solvent and screw pressing. Screw pressing generally produces low oil yield, on the other hand, the solvent extraction produces higher yield but its residue is the major health concern. This research proposed an alternative oil extraction from Moringa seeds using a pilot-scale supercritical fluid extraction (SFE) unit. SFE is considered as a green technology that is

non-toxic and allows the elimination of polluting organic solvents. Carbon dioxide (CO₂) was used as a solvent under near-critical and supercritical conditions in the pressure ranges from 15 to 35 MPa and the temperature ranges from 25 to 35 °C at the fixed flow rate of 20 kg/h. The extractions made under higher pressure enhanced the oil yield. Extraction at highest pressure of 35 MPa and moderate temperature of 30 °C showed the most solvation power and extracted the maximum oil quantity of 75.27%. The oleic acid was the most abundant unsaturated fatty acid in Moringa oil amounted to 72.26-74.72%. At the lowest pressure (15 MPa) CO₂ was the most selective solvent for the extraction of oleic acid, tocopherols, and sterols. By comparison, the physico-chemical properties of oils extracted by supercritical CO₂ were not substantially different from those of oils extracted by conventional methods. Susceptibility to oxidation of Moringa oil was measured by the Rancimat test and expressed as the induction period. The induction period of Moringa oil extracted by SFE was in the range of 14.30-19.77 h. Overall, Moringa oil can be effectively extracted using a pilot scale SFE at a relatively low temperature and pressure to give high quality oil.

Keywords : Supercritical fluid extraction, Conventional extraction, Moringa oleifera seed oil, Physico-chemical properties, Fatty acid profile