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Supercritical carbon dioxide extraction of highly unsaturated oil from Phaleria macrocarpa seed

(Article)

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Abstract

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Good quality oil with high unsaturated fatty acids was found in the seed of a medicinal plant Phaleria macrocarpa (Mahkota dewa). Different parts especially fruit flesh of this plant are being traditionally used as important folk medicine whereas seed of this plant is usually neglected. In this study, the oil was extracted from P. macrocarpa seed using supercritical carbon dioxide. The extraction parameters were optimized by central composite design (CCD) of response surface methodology (RSM). Due to the non-linearity of the extraction process, artificial neural network (ANN) was also applied for predicting the oil yield. The optimum conditions obtained from RSM were 72°C, 42MPa and 4.5ml/min CO_2 flow rate where the oil yield was 52.9g per 100g of dry sample and coefficient of determination (R^2) was 0.99. The ANN and RSM prediction showed similar R^2 of 0.99 and ANN has lower average absolute deviation (AAD) of 0.25% compared to RSM (AAD of 0.31%). Five fatty acids were identified by gas chromatography-mass spectroscopy (GC-MS) analysis of the oil. The amount of oleic acid (18:1) was found to be highest (43.56%) among all the fatty acids. The total unsaturated fatty acid was 73.62% and saturated fatty acid was 26.38% in the P. macrocarpa seed oil.

Author keywords

Artificial neural network | Fatty acids | Phaleria macrocarpa seed oil | Response surface methodology