

## Optimization of supercritical fluid extraction of phytosterol from roselle seeds with a central composite design model.

### ABSTRACT

Recovery of phytosterol from roselle (*Hibiscus sabdariffa* L.) seeds via supercritical carbon dioxide extraction modified with ethanol was investigated at pressures of 200–400 bar, temperatures from 40 to 80 °C and at supercritical fluid flow rates from 10 to 20 ml/min. It was found that an entrainer such as ethanol could enhance the solubility and extraction yield of roselle seed oil from the seed matrix, compared to values obtained using supercritical CO<sub>2</sub>. After a typical run (holding period of 30 min, continuous flow extraction of 3 h), the results indicate that the oil recovery was optimal with a recovery of 108.74% and a phytosterol composition of 7262.80mgkg<sup>-1</sup> at relatively low temperature of 40 °C, a high pressure of 400 bar and at a high supercritical fluid flow rate of 20 ml/min in the presence of 2 ml/min EtOH as entrainer. The solubility of roselle seed oil increased with temperature at the operating pressures of 200, 300 and 400 bar. Supercritical fluid extraction involved a short extraction time and the minimal usage of small amounts of entrainer in the CO<sub>2</sub>.

**Keyword:** Carbon dioxide; Optimization; Phytosterol; Response surface methodology; Roselle seed oil; Supercritical fluid extraction.