

# Microwave-assisted extraction of saponin, phenolic and flavonoid compounds from *Trigonella foenum-graecum* seed based on two level factorial design

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## ABSTRACT

Fenugreek (*Trigonella-foenum graecum*) is a tropical plant with medicinal properties which is traditionally known since the ancient time. In this research, various microwave-assisted extraction (MAE) related parameters such as extraction time (2–12 min), ethanol concentration (20–100%), microwave power (300–700 W), ratio of feed-to-solvent (1:8-1:16 g/mL) and extraction temperature (40–80 °C) were evaluated using experimental method of one-factor-at-a-time (OFAT). The screening of extraction parameters was then evaluated using two-level factorial design under Design-Expert to find out the significant parameters in terms of obtaining high extraction yield, total saponin, phenolic and flavonoid contents in fenugreek seed. The results of OFAT revealed that the maximum yields of recovery were achieved at microwave parameters of 3 min irradiation time, microwave power 600 W, 60% solvent concentration, 1:10 g/mL of feed-to-solvent ratio and 70 °C temperature. The screening process using two level factorial design (TLFD) also indicated that solvent concentration, time of irradiation, microwave power and ratio of feed-to-solvent were the significant parameters affecting the recovery yields of total saponin, phenolic and flavonoid contents where ( $p < 0.05$ ). While, the temperature of microwave was not counted significant ( $P > 0.05$ ). The extract was also evaluated for its chemical composition using GC–MS analysis..

## KEYWORDS

Fenugreek seed; Factorial design; Total saponin content; Total flavonoid content; Total phenolic content

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