

Multi-Response Optimization of Microwave-Assisted Extraction of Phenolics and Flavonoids from *Chromolaena odorata* Leaves using Response Surface Methodology

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EXTENDED ABSTRACT

Chromolaena odorata L. is an evergreen bush that may reach 1 m or more as a shrub. Different phenolics and flavonoids that mostly protect cultured skin cells, human small cell lung, reduced oxidative degradation, and breast cancer had been isolated [1, 2]. Microwave-assisted extraction (MAE) was examined to maximize the extraction of total phenolic content (TPC) and total flavonoid content (TFC) from the leaves of *Chromolaena odorata* using a Box-Behnken design of response surface methodology (RSM). Irradiation time (1-5 min); microwave power level (400-800 W) and ethanol concentration (20-60%) were the considered MAE variables for the optimal recoveries of TPC and TFC from *Chromolaena odorata* leaves. Quadratic models satisfactorily described the experimental data and optimized conditions for maximum recoveries of polyphenols and flavonoids. The generated models were significant ($p < 0.05$) and the optimal MAE variables were irradiation time, 3 min; microwave power level, 493 W; and ethanol concentration of 51% with TPC yield of 88.73 mg GAE/g d.w. and TFC yield of 68.25 mg QE/g d.w. The three investigated variables contributed significantly to the optimal recovery yields. In fact, predicted and experimental data were in good agreement. More so, liquid chromatography-mass spectrometer quadrupole time of flight (LCMS QTOF) and Fourier transform infrared transform (FTIR) analyses were used identify the phenolic compounds and functional groups present in the extract. Thus, the derived models can be used in an industrial extraction process to enhance a large scale extraction system.

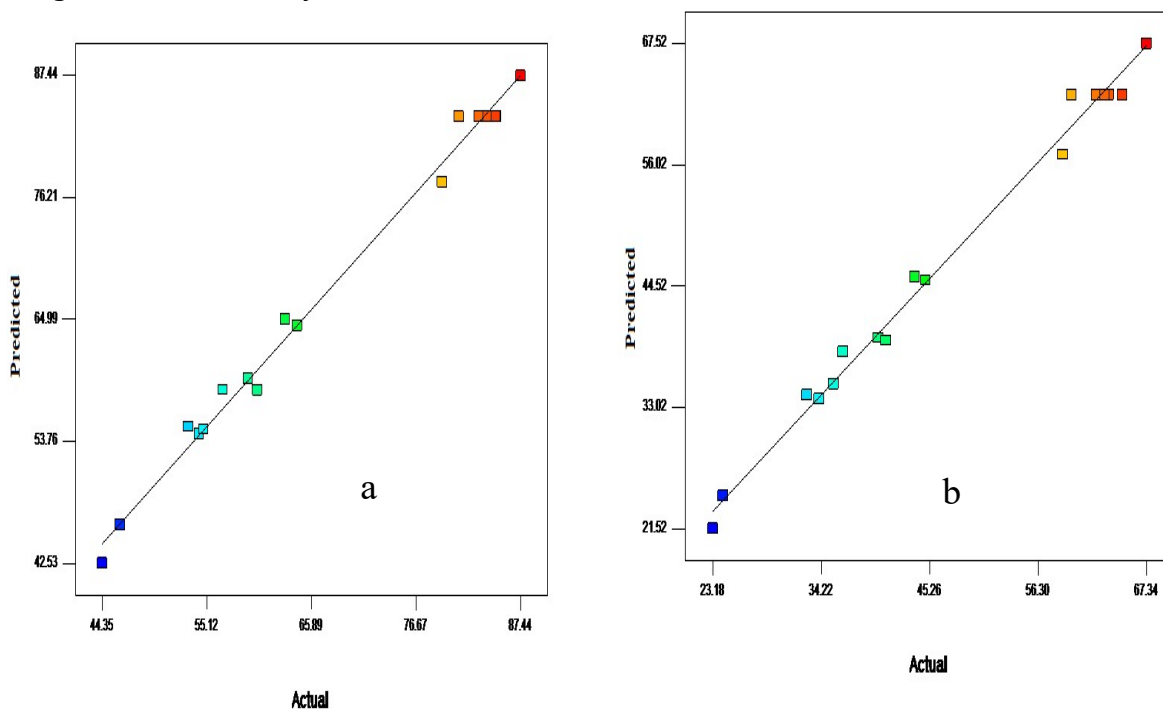


Fig. 1: Plots of predicted against experimental values for TPC with R^2 of 0.9918 (a) and TFC with R^2 of 0.9912 (b).

Keyword: Response surface methodology; *Chromolaena odorata*; Optimization; Phenolic compounds.

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References

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