

Microwave-assisted extraction of bioactive compounds from Sarawak *Liberica* sp. coffee pulp: Statistical optimization and comparison with conventional methods

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Abstract

Coffea liberica, commonly known as *Liberica* coffee, is a kind of coffee that originated in Liberia, a West African country. It is considered a less-known coffee bean variety, which accounts for less than 2% of commercially produced coffee worldwide. In this study, the influences of optimization of microwave-assisted extraction (MAE) on the total phenolic content (TPC), total flavonoid content (TFC), and total carbohydrate content (TCC) of bioactive compounds extracted from Sarawak *Liberica* sp. coffee pulp were studied. Response surface methodology was adopted with a face-centered central composite design to generate 34 responses by taking three microwave parameters into consideration, microwave power (watt), time of irradiation (second), and solvent-to-feed ratio as independent variables. As a result, the findings revealed that optimum extraction conditions were conducted as follows: microwave power of 700W, time of irradiation of 180s, and solvent-to-feed ratio of 86.644:1. While under optimal extraction conditions, MAE outperformed conventional maceration extraction in terms of extraction efficiency and had no significant difference ($p < .05$) with Soxhlet extraction on the extraction of TPC (12.94 ± 2.25 mg GAE/g), TFC (9.84 ± 0.38 mg QE/g), and TCC (876.50 ± 64.15 mg GE/g). Present work advances the usage of Sarawak *Liberica* sp. coffee for the development of functional products and aids in reducing environmental pollution by utilization of coffee pulp waste.

KEYWORDS

bioactive compounds, *Coffea liberica*, microwave-assisted extraction, response surface methodology

1 | INTRODUCTION

One of the most popular beverages in the world is coffee, which is also a key commercial food item. Arabica (80%) and Robusta (20%) are the two most widely grown and traded varieties of coffee, whereas *Liberica* accounts for less than 1% of global production (Ismail et al., 2022). In Malaysia, however, Arabica is only very rarely

grown in highland areas, with *Liberica* (73%) and *Robusta* (27%) being the two most popular coffee kinds. According to Azmil (1991), *Robusta* and *Liberica* coffee may be successfully grown in Malaysia because of its ideal growing temperature range of 18–28°C (maximum at 34°C). Nevertheless, Arabica can only be cultivated in altitude regions, such as the Cameron Highlands in Pahang, where temperatures must be below 23°C.

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