Optimization of Extraction Conditions for Antioxidants Derived from *Hydrangea serrata Seringe* using Response Surface Methodology

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Abstract

This study aimed to establish the optimal conditions for maximizing the extraction of bioactive compounds and antioxidants from *Hydrangea serrata Seringe* (*H. Seringe*). To achieve optimization, total polyphenol content, total flavonoid content, and radical scavenging activity were set as dependent variables, whereas extraction time, extraction temperature, and acetone concentration were set as independent variables, aiming to simultaneously maximize all dependent variables. Seventeen different conditions were examined, and a quadratic regression model was successfully constructed from the experimental data. Optimization results indicated that all variables were significantly correlated with extraction efficiency, with the order of variable effects being acetone concentration > extraction temperature > extraction time. Optimal conditions were predicted to extract a total polyphenol content of 39.27 mg GAE/g DM, a total flavonoid content of 3.81 mg QE/g DM, and a radical scavenging activity of 53.01%, which was confirmed by alignment with the validation results (p > 0.05). The successful optimization of extraction variables demonstrates significant potential for enhancing the application of *H. serrataas* a natural antioxidant in the food, cosmetics, and pharmaceutical industries.