

OPTIMISATION OF EXTRACTION PHENOLIC ANTIOXIDANTS  
FROM PEGAGA (*Centella asiatica*) USING  
RESPONSE SURFACE METHODOLOGY  
(RSM)

MELISA PANG JIUN SHAN

B. Sc. (Hons.) FOOD SCIENCE & NUTRITION  
FACULTY OF APPLIED SCIENCES  
USCI UNIVERSITY

2010



## ABSTRACT

Pegaga (*Centella asiatica*) is a type of perennial herb that can be found in warmer regions like Sri Lanka, South Africa, Madagascar and Malaysia. The objective of this study was to optimise extraction of polyphenols from *Centella asiatica* by single factor experiment and to determine the optimum combination of extraction parameters by applying central composite rotatable design (CCRD) in response surface methodology (RSM). Assays employed in determination of polyphenols content were total phenolic content (TPC) assay, total flavonoid content (TFC) assay, 2,2'-azinobis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging assay and 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The effect of ethanol concentration (0 – 100%), extraction time (20 – 120 min) and extraction temperature (25 – 65°C) of polyphenols extraction were investigated at the first stage. Experimental results showed extraction parameters (ethanol concentration, extraction time and extraction temperature) had significant effect ( $p < 0.05$ ) on extraction of polyphenols content and antioxidant capacities. The optimised extraction parameters for polyphenols content (TPC and TFC) were 60% ethanol, 20 min and 65°C. The optimised values were 1278.83 mg GAE / 100 g DW and 567.88 mg CE / 100 g DW respectively. Optimised values for antioxidant capacities (ABTS and DPPH) were 818.90  $\mu\text{mol TEAC/ 100 g DW}$  and 2315.83  $\mu\text{mol TEAC/ 100 g DW}$  extracted with 60% ethanol, 20 min, 25°C. The best combination of response functions for TPC and TFC was found to be 47% of ethanol concentration, extraction time of 100 min and extraction temperature of 57°C whereas the optimum conditions for optimum ABTS and DPPH radical scavenging capacities were 74% of ethanol concentration, extraction time of 40 min and extraction temperature of 33°C. The experimental values for TPC, TFC, ABTS and DPPH under the optimum conditions were 1189.81 mg GAE/ 100 g DW, 639.34 mg CE/ 100 g DW, 819.54  $\mu\text{mol TE/ 100 g DW}$  and 2308.47  $\mu\text{mol TE/ 100 g DW}$  respectively, which were reasonably close to the predicted values with the percentage differences of 1.24%, 2.75%, 1.02% and 3.04%. This indicates the suitability of the developed models and proven of success of RSM in optimizing the extraction conditions for phenolic compounds and antioxidant capacities from *Centella asiatica*.