

**OPTIMIZATION OF EXTRACTION CONDITIONS OF
WATER-SOLUBLE PHENOLICS FROM TAWA-TAWA (*Euphorbia
hirta* L.) BASED ON DENSITOMETRIC TLC USING GALLIC ACID
AS MARKER COMPOUND**

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Optimization of Extraction Conditions of Water-Soluble Phenolics from Tawa-tawa (*Euphorbia hirta* L.) Based on Densitometric TLC Using Gallic Acid as Marker Compound

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ABSTRACT

The present study aimed to optimize the extraction conditions of water-soluble phenolics for tawa-tawa (*Euphorbia hirta* L.) with gallic acid as the compound of interest. Water was used as extraction solvent. The effect of the interactions of different extraction temperature (50°C, 60°C and 70°C) and extraction time (20 min, 40 min and 60 min) were investigated. To evaluate the importance of the parameters on the extraction efficiency of gallic acid, a factorial design was used. The normal probability plot and estimates of standard error showed that time and temperature were both significant parameters. It further showed that time was a more significant contributor than temperature to the extraction efficiency of gallic acid. The results revealed that interaction of time and temperature did not have significant effects. The ANOVA results showed that only extraction parameter with significant effect was time ($p < 0.05$). Temperature and its interaction with time did not have significant effects. Based on the desirability values generated by Design-Expert 9.0.4, the optimal conditions in extracting gallic acid were the following: extraction time of 60 minutes and extraction temperature of 70°C. Results of FTIR analysis confirmed the presence of the following functional groups: O-H, C=O, C-O, C-H (aromatic), C=C (benzene) and out-of-plane bending or oops. Gallic acid in tawa-tawa is present in esterified form and exists as part of hydrolysable tannins.

Keywords: tawa-tawa, gallic acid, extraction, optimization, factorial design, densitometric TLC, FTIR