

Assessment of Maceration, Ultrasonic and Microwave Assisted Extraction for Total Phenolic Content, Total Flavonoid Content and Kaempferol Yield from *Cassia alata* via Microstructures Analysis

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Abstract.

This paper presents the effect of different extraction methods on total phenolic content (TPC), total flavonoid content (TFC) and kaempferol yield from *Cassia alata* via microstructure analysis. TPC and TFC of *C. alata* were measured spectrophotometrically by using Folin Ciocalteu assay and aluminium chloride colorimetric assay, respectively. Identification and quantification of kaempferol were performed using an ultra-performance liquid chromatography coupled photodiode array (UPLC-PDA). The results showed that microwave assisted extraction (MAE) has the highest TPC, TFC and kaempferol yield (37.92 ± 0.50 mg GAE/g DW, 135.18 ± 2.90 mg QE/g DW, 17.67 ± 1.06 mg KA/g DW), followed by ultrasonic assisted extraction (UAE) (26.91 ± 0.43 mg GAE/g DW, 86.69 ± 1.67 mg QE/g DW, 14.19 ± 0.43 mg KA/g DW) and maceration extraction (ME) (20.68 ± 1.63 mg GAE/g DW, 70.13 ± 4.43 mg QE/g DW, 12.01 ± 0.25 mg KA/g DW). The scanning electron microscopy analysis shows extensive contraction of the plant cell mesophyll and epidermis in the UAE and MAE compared to that of ME which yielded TPC and TFC about 24% to 93% higher than that of ME. The glandular trichomes completely disappear from the MAE sample which explains the highest kaempferol yield obtained. The efficiency of polyphenols extraction relies on the disruption level of the *C. alata* leaves

Keywords: *Cassia alata*; microstructure analysis; total phenolic content; total flavonoid content; kaempferol; maceration extraction (ME); ultrasonic assisted extraction (UAE); microwave assisted extraction (MAE).