Pre-Treatment of Pulsed Electric Field Extraction of Kaffir Lime Leaves Essential Oil Using Steam and Water Distillation Method

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ABSTRACT

Kaffir lime leaves (Citrus hystrix DC.) are a source of essential oils with significant commercial value. Indonesia has great potential in essential oil production, a significant obstacle faced is the low extraction efficiency with traditional techniques. The purpose of this study was to find the optimal parameters for the extraction process using steam and water distillation techniques, and to examine the impact of Pulsed Electric Field (PEF) pretreatment on the yield, refractive index, and specific gravity of essential oils. This study was conducted using a combination of electrical parameters, such as electrode distances (0.5 cm and 1.5 cm) at a voltage of 15 kV, and different PEF treatment times (10, 20, and 30 seconds). The results showed that, compared to the control, the PEF treatment was able to increase essential oil production. At an electrode distance of 1.5 cm and a period of 10 seconds, the best treatment results produced a yield of 0.7140% while the control produced 0.4848%. PEF treatment did not significantly change the specific gravity (0.8551–0.8651 g/mL) or refractive index (1.447–1.448). GC-MS analysis showed that PEF treatment was able to reduce heat-induced compound degradation while maintaining the main constituents of the essential oil. In general, the use of PEF as a pretreatment increased extraction efficiency without reducing the quality of the final essential oil.

Keywords: *Essential Oil, Kaffir Lime Leaves, Pulsed Electric Field, Yield, Steam and Water Distillation.*