

Scale-Up Process for *Phyllanthus niruri* Enriched Extract by Supercritical Fluid Extraction

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Abstract : Supercritical fluid extraction (SFE) has been known as a sustainable and safe extraction technique for plant extraction due to the minimal usage of organic solvent. In this study, a scale-up process for the selected herbal plant (*Phyllanthus niruri*) was investigated by using supercritical carbon dioxide (SC-CO₂) with food-grade (ethanol-water) cosolvent. The quantification of excess ethanol content in the final dry extracts was conducted to determine the safety of enriched extracts. The extraction yields obtained by scale-up SFE unit were not much different compared to the predicted extraction yields with an error of 2.92%. For component contents, the scale-up extracts showed comparable quality with laboratory-scale experiments. The final dry extract showed that the excess ethanol content was 1.56% g/g extract. The fish embryo toxicity test (FETT) on the zebrafish embryos showed no toxicity effects by the extract, where the LD₅₀ value was found to be 505.71 µg/mL. Thus, it has been proven that SFE with food-grade cosolvent is a safe extraction technique for the production of bioactive compounds from *P. niruri*.

Keywords : scale-up, supercritical fluid extraction, enriched extract, toxicity, ethanol content

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