ABSTRACT

Noor Roufiq Ahmadi. Extraction Process Engineering Kamandrah (Croton tiglium L.) Seed Oil with Expression and Biolarvacide Development Of Dengue Fever Preventive. Under direction of DJUMALI MANGUNWIDJAJA, ONO SUPARNO, and DYAH ISWANTINI PRADONO.

Kamandrah (Croton trigium L.) is one of many medicinal plants found in the some parts of Indonesia. Kamandrah seeds produce oil that can be used as biolarvacide. The objectives of this research were to study larvacidal activity of the ingredients contained in the seed extract of kamandrah; to get optimum conditions of kamandrah seed extraction using pressing method; to provide processing technology of larvacide production; and to analyze the financial feasibility of the product. The results of proximate analysis of kamandrah seed oil showed that it contained 6.29% water, 3.6% ash, 53.73% fat, 11.98% protein, 8.25% crude fiber, and 16.15% carbohydrates (by difference). Kamandrah fruits harvested at the age of 42 days after flowering (fully brown rind colour) were the most effective as larvacide against A. aegypti larvae. The yield of oil was 20.42% and the LC₅₀ value was as much as 132.67 ppm (24 hours) and 70.08 ppm (48 hours). The acid number of the oil was 8.76 mg KOH/g oil; free fatty acid level was 4.36 mg KOH/g oil; peroxide number was 3.59 meq O/100g; refractive index was 1.4783; specific gravity was 0.9466 g/ml and colour values were 73.03, 64.13, and 3.26 for L*, a* and b*, respectively. The two major unsaturated fatty acids components in kamandrah oil were oleic acid (42.33%) and linoleic acid (2.03%). The results of GC-MS analysis with NIST library search showed that the active ingredients predicted as insecticide were piperidine and 1,4-naphthoquinone while the result of identification with a library pest showed the the active ingredients were butacarboxim compound, 2,3,6-trichlorphenol, dnoc, and propamocarb. Based on optimization of kamandrah seed extraction process, the optimum conditions to obtain the optimum yield, LC₅₀ and LC₉₀ values using canonical analysis were heating temperature of 85°C, pressure of 10.54 Pa, and heating time of 15 minutes. The response values for yield, LC₅₀ and LC₉₀ at this optimum condition were 29%, 41.85 ppm, and 87.51 ppm, respectively. The results of product design for the plant-derived (vegetable) larvacide made from kamandrah oil showed that the best form was sustained released granules, which was non-irritating to eyes and skin, with LC₅₀ values of 1,039 ppm (24 hours) and 718 ppm (48 hours). Financial analysis showed that the larvacide produced from oil extract of kamandrah seed was feasible to be developed and produced with NPV of Rp. 25.509.663.712, IRR of 32.9%, Net B/C ratio of 1.4 and PBP of 5.9 years.

Keywords : Croton tiglium L., age of harvest, active ingredients, LC, larvacide, expression, oil extraction, financial analysis