UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF NEEM SEED WITH OLEOCHEMICAL-BASED EMULSION IN WATER (EW) FORMULATION FOR CONTROLLING GOLDEN APPLE SNAIL, *Pomacea canaliculata*

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ABSTRACT

The invasion of golden apple snail in Malaysian agricultural systems has led to a great concern among the farmers, as it becoming a major pest in paddy cultivation. Efforts to control this pest have included physical and cultural control measures, using chemical pesticide and employing biopesticide. Neem has been increasingly used as molluscicidal agent against terrestrial and freshwater snail. Conventionally, commercial neem is formulated as an emulsifiable concentrate (EC) and this formulation was reported having a relatively large amount of aromatic hydrocarbon solvent and emulsifier that harmful to the environment and human health. Therefore, opportunities exist for the introduction of alternative formulation strategies, which may improve the environment and efficiency of applications. In this respect, the purpose of this study is to develop emulsion in water (EW) formulation of neem-based pesticide from neem seed extract using oleochemical solvents and non-ionic surfactant for controlling golden apple snail. The development of the formulation was commenced with the extraction of neem seed and evaluation of its bioactivity against the golden apple snail. Further, the formulation was developed in three different types of oleochemical-based solvent carrier that stabilized with Tween® and Span® surfactant blends and xanthan gum. The neem seed extracts were then incorporated into the optimal formulation (EW-neem), and followed by physicochemical characterization and stability evaluation. The efficacy of EW-neem formulations against golden apple snail and their persistence in the environment were also evaluated under small-scale field. Approximately 46.6µg/100g defatted neem of azadirachtin was recovered from neem seed extract using 80% (v/v) methanol solvent. The bioassay test showed that the aqueous methanolic extract of neem seed have the highest potency on golden apple snail with 96h LD50 was 24.8mg/l. Surfactant blend of Tween®80 and Span®80 was found as an appropriate emulsifier system to provide the required HLB value for palm oil methyl ester (12.0), RBD palm olein (10.0) and soybean oil (9.0). Then, the optimal base formulation was obtained with the composition of 4% (w/w) Tween®80 and Span®80 blend, 20% (w/w) of the oil phase and 0.5% (w/w) of xanthan gum. The physicochemical characterizations of formulated EW-neem indicated that the formulation is stable in mild acidic solution with small particles size as well as having a good flow behaviour and low surface tension. Furthermore, the developed EW-neem formulations exhibited good stability over 60 days in room storage. Meanwhile, the azadirachtin in the formulation was stabled up to 14 days of storage. The results demonstrated that the formulated EW-neem composed of palm oil methyl ester showed the best efficacies (96h LD50: 45.3mg/l) and effective up to three days after application. The EW-neem formulations showed promise as a possible control strategy for golden apple snail and evaluation in the actual paddy field is highly recommended.

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