World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:12, No:10, 2018

Preparation and Evaluation of Citrus hystrix Nanoemulsion Formulation against Rice Weevil, Sitophilus oryzae

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Abstract : Sitophilus oryzae is a primary destructive insect pest. A study on nanoemulsion formulation of C. hystrix peel oil and evaluation of its insecticidal effect on the adults of S. oryzae was held in toxicology laboratory at Faculty of Agriculture, Universiti Putra Malaysia (UPM). Three nanoemulsion formulations (F1, F2, and F3) were prepared using C. hystrix peel oil (a.i), Tween 80 (surfactant), AMD 810 (carrier) and deionized water. The selected formulations have undergone stability tests, surface tension, zeta potential and particle size measurements. The formulations were tested for their contact and fumigant activity against the adults of S. oryzae. LC_{50} values were obtained from Probit regressions using the Polo-PC program. All the formulations showed stability under storage temperature and centrifugation. They were characterized as nanoemulsions as they remained in the range of nanoscale 200 nm. The formulations revealed lower surface tension in the range of 29.5 to 30.4 mN/m. They showed stable of zeta potential values. The formulations showed the highest toxicity against the adults of S. oryzae. The order of decreasing toxicity was F1 > F2 > F3 with LC_{50} values of 52.1, 58.5, and 61.7 µl/l for contact toxicity, and 71, 75.5, and 76.7 µl/l air for fumigant bioassay after 72 hours. Formulation of C. hystrix peel oil in a nanoemulsion enhance its effectiveness and reduce the amount of applied essential oil.

Keywords : Citrus hystrix peel oil, Sitophilus oryzae, nanoemulsion, contact toxicity, Fumigant bioassay
Conference Title : ICACPMP 2018 : International Conference on Agricultural Chemical Products and Management Practices
Conference Location : Paris, France
Conference Dates : October 29-30, 2018