

**JOINT ACTION OF *Tephrosia vogelii* AND *Piper aduncum* BASED
NANOEMULSION AS AN ALTERNATIVE CONTROL AGAINST
Spodoptera frugiperda (J.E. Smith) (Lepidoptera: Noctuidae)**

BY

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MASTER PROGRAM IN PLANT PROTECTION

FACULTY OF AGRICULTURE

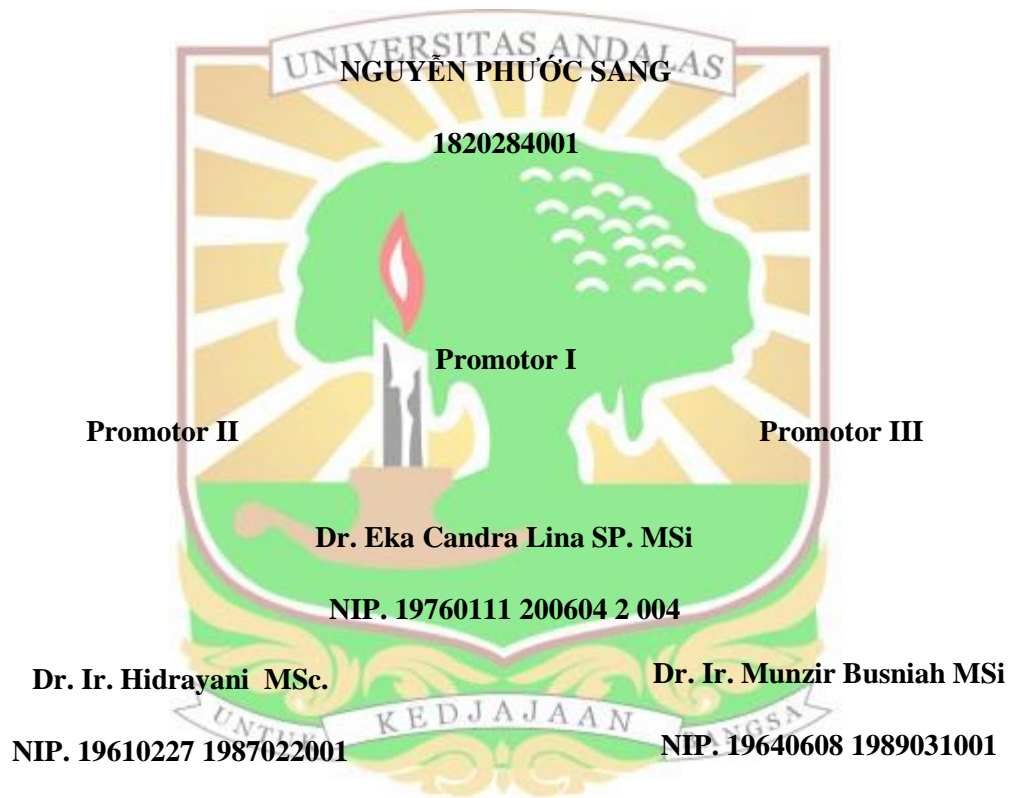
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Abstract

The nanoemulsion has an oil and aqueous phase that were homogenized by using a magnetic stirrer and ranged in size from 20 to 200 nm. Bio-combi extracts frequently contain intricate combinations of active ingredients that may collaborate to enhance biological activity to kill pest. The objectives of the study were to determine the most effective ratio and concentration of nanoformulation of *Tephrosia vogelii* leaves and *Piper aduncum* fruits extracts mixture against *Spodoptera frugiperda* and to study the physiological effects of the mixture on the insect. Low-energy spontaneous emulsification with a magnetic stirrer was used to create nanoemulsions of both extracts. The method to test insecticidal activity was carried out singly and in a mixture on larvae of *S. frugiperda* using the deep leaf method and physiology was residual method on the leaves. The results showed that the ratio of 1:5 nanoformulation was the most effective formulation to manage the population of *S. frugiperda* indicated by the highest mortality, the longest larval development at a concentration of 0.56%, which were 84.12% and 6.43 days. Of the three analytical size of the nanopesticide, only nanoformulation 1:5 was satisfied the nanoemulsion requirements and the criteria were 97 nm. The relative LC50, and LC95 values were 0.214, and 1.410%. The results showed that the combined index of nanoemulsion extracts was not only additive at LC50 values of 0.92% lower than at LC95 values of 0.68%, indicating a weak synergistic impact, but also had a negative influence on the growth rate, the efficiency of conversion of ingested and digested food.

Keywords: Botanical insecticides, extract, mixture, nanoemulsion