# DEVELOPMENT OF AUTOMATED LURE TRAP USING GREEN NANOTECHNOLOGY: METHYL EUGENOL AND SILVER NANOPARTICLES IN CONTROLLING ORIENTAL FRUIT FLY (*Bactrocera dorsalis*)

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**BACHELOR OF SCIENCE IN AGRICLTURAL AND BIOSYSTEMS ENGINEERING**
**(AB Machinery and Power Engineering)**

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## ACCEPTANCE SHEET

This undergraduate thesis entitled **"DEVELOPMENT OF AUTOMATED LURE TRAP USING GREEN NANOTECHNOLOGY: METHYL EUGENOL AND SILVER NANOPARTICLES IN CONTROLLING ORIENTAL FRUIT FLY (*Bactrocera dorsalis*),"** prepared and submitted by **JOHN LHYCO R. DOTIMAS**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB MACHINERY AND POWER ENGINEERING)**, is hereby accepted:

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## BIOGRAPHICAL SKETCH

The author, John Lhyco R. Dotimas is the youngest child of Mr. Luis Dotimas and Mrs. Ofelia Dotimas. He was born on May 25, 2002 in Cabanatuan City, Nueva Ecija. Currently, he is residing with his family in Poblacion Sur, Rizal, Nueva Ecija since 2002.

In the year 2013, he graduated elementary education at Rizal Central School (RCS) with awards for leadership. Four years later, he finished Junior High School at Rizal National High School (RNHS) with an outstanding performance award in science. He took his senior high education in the same school under Science, Technology, Engineering, and Mathematics (STEM) where he bagged leadership award. For his tertiary education, he went to Central Luzon State University (CLSU) and pursued Bachelor of Science in Agricultural and Biosystems Engineering and majored in AB Power, Machinery, and Energy Engineering. During his Bachelor, he was given an opportunity to be financially supported by CHED Student Financial Assistance Program (SFAP) and he was awarded thrice as College Scholar.

Apart from academic awards and scholarship support, during his stay in CLSU, the researcher joined the CLSU Paru-parung Bukid and Peer Facilitators group. In such way, he met different kinds of people who became friends and have helped him nourish his social life and make his stay in the university bearable.

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## ABSTRACT

**DOTIMAS, JOHN LHYCO R.**, Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **July 2024**, **DEVELOPMENT OF AUTOMATED LURE TRAP USING GREEN NANOTECHNOLOGY: METHYL EUGENOL AND SILVER NANOPARTICLES IN CONTROLLING ORIENTAL FRUIT FLY (*Bactrocera dorsalis*).**

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The Oriental Fruit Fly (Bactrocera dorsalis) poses a significant threat to various crops, leading to substantial agricultural losses and necessitating the development of more effective pest control methods. Traditional traps and manual interventions are labor-intensive and often ineffective, highlighting the need for innovative solutions. This study addresses this problem by developing a solar-powered automated scent lure traps as a sustainable alternative for controlling the Oriental Fruit Fly in agricultural settings.

The study was conducted across three testing sites: CRRDC, RET, and CAg. Manual traps were made and deployed for manual intervention phase, which spanned 14 days. The pest occurrence indices were recorded to evaluate the effectiveness of different chemical attractants. In all testing areas, the combined attractant of Methyl Eugenol (ME) and Silver Nanoparticles (AgNP) emerged as the most effective lure, consistently outperforming single attractants. Moreover, the hotspots or the location where the fruit flies accumulate at the different testing sites were pinpointed as the high-infestation areas for targeted trap deployment for mechanical intervention phase. These identified hotspots were visually presented on a map retrieved from Quantum Geographic Information System (QGIS). The mechanical intervention phase involved the deployment of the developed solar-powered automated scent lure traps over an 8-day period. Statistical analysis confirmed that the combined chemical attractant significantly increased fruit fly captures and that the automated traps consistently outperformed manual traps across all testing sites. The automated scent lure trap was evaluated by determining the trapping effectivity and capacity, further proving its effectiveness compared to the manual traps.

The results of the study highlight the potential of automated traps to revolutionize pest management practices by offering continuous operation with minimal human intervention. Integrating such technologies into agricultural pest control strategies can enhance efficacy and sustainability. Further research and collaboration are recommended to optimize trap design, attractants, and operational parameters to improve efficacy and scalability in fruit fly control efforts.

Keywords: oriental fruit fly; automated scent lure trap, manual lure trap; methyl eugenol; silver nanoparticles

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