

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

JOHN LHYCO R. DOTIMAS


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**BACHELOR OF SCIENCE IN AGRICULTURAL 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:


MAY A. CABRAL, M.Sc.
Member, Advisory Committee
6-25-2024

Date Signed


DANILO S. PARAGAS, Ph.D.
Member, Advisory Committee

Date Signed

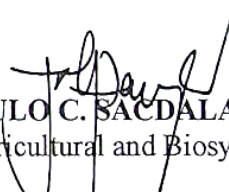

CAROLYN GRACE G. SOMERA, Ph.D.
Member, Advisory Committee

Date Signed

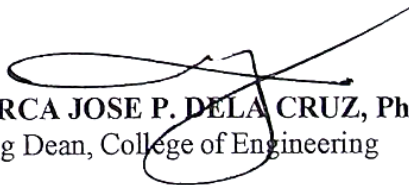

JOHN VINCENT A. NATE, M.Sc.
Chair, Advisory Committee

Date Signed

Accepted as partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB MACHINERY AND POWER ENGINEERING)**:


JOHN PAULO C. SACDALAN, Ph.D.
Head, Department of Agricultural and Biosystems Engineering

Date Signed


ROY SEARCA JOSE P. DELA CRUZ, Ph.D.
Acting Dean, College of Engineering

Date Signed

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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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF APPENDICES	xii
LIST OF APPENDIX TABLES	xiii
LIST OF APPENDIX FIGURES	xvii
ABSTRACT	xviii
INTRODUCTION	1
Background of the Study	1
Statement of the Problem	2
Objectives of the Study	3
Significance of the Study	4
Scope and Limitation of the Study	5
Time and Place of the Study	6
REVIEW OF RELATED LITERATURE	7
Oriental Fruit Fly	7
Origin and Physical Appearance of Fruit Fly	7
The Effects of Fruit Fly into the Economy	8
Integrated Pest Management (IPM)	9
Male Annihilation Technique (MAT)	9
Different MAT Manual Trap	10
Chromatic	13
Green Nanotechnology	13
Threat of Pesticides and Insecticides	14
Methyl eugenol	16

Physical and Chemical Property of Methyl eugenol	16
Source of Methyl eugenol	17
Responsive Species of Fruit Fly on Methyl eugenol	17
Silver Nanoparticle	19
Physical and Chemical Property of Silver Nanoparticles	20
Advancing Integrated Pest Management through Automation	21
Application of Sensor Technologies	22
Application of Geographic Information System (GIS)	22
Application of Expandable Manual Telescopic Mast	24
METHODOLOGY	26
Conceptualization of the Study	26
Flowchart of the Study	28
Materials and Methods	30
Chemical Preparation and Synthesis	30
Testing Site Preparation	33
Manual Intervention	34
Mechanical Intervention	35
Design Considerations	36
Mechanical Considerations	36
Automation Considerations	36
Development of Mechanical Trap	37
Telescopic Mast	39
Arduino wiring and code	42
Trapping Mechanism	44
Mechanism of the Machine	44
Trapping Capacity and Effectivity	45
Statistical Design	46
RESULT AND DISCUSSION	47
Chemical Attractants' Synthesis and Formulation	47
Ultraviolet Visible Spectrometry	50
Pest Occurrence Index	52

Pest Occurrence Index in CRRDC	54
Pest Occurrence Index in RET	56
Pest Occurrence Index in CAg	57
Identified Hotspot	59
Fabricated Solar-powered Automated Scent Lure Trap	63
Performance Parameters	64
Trapping Capacity	66
Trapping Effectivity	66
Number of Captured Fruit fly for CRRDC Area	67
Number of Captured Fruit fly for RET Area	69
Number of Captured Fruit fly for CAg Area	70
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	73
Summary	73
Conclusions	74
Recommendations	75
LITERATURE CITED	76
APPENDICES	83
Appendix Tables	84
Appendix Figures	111

LIST OF TABLES

TABLE		PAGE
1	Fruit fly complex family responsive on methyl eugenol	18
2	Component and function of mechanical lure trap	38
3	Pest occurrence index on CRRDC area	55
4	Pest occurrence index on RET area	56
5	Pest occurrence index on CAg area	58
6	Identified hotspots of fruit flies in testing sites	59
7	Pest occurrence index data	65
8	Trapping capacity of automated scent lure trap at different testing sites	66
9	Trapping effectivity of automated scent lure trap at different testing sites	67
10	Analysis of variance table for CRRDC area	68
11	Comparison and summary of the result for CRRDC area	68
12	Analysis of variance table table for RET area	69
13	Comparison and summary of the result for RET area	70
14	Analysis of variance table table for CAg area	70
15	Comparison and summary of the result for CAg area	71

LIST OF FIGURES

FIGURE		PAGE
1	Picture between male and female adult oriental fruit fly	8
2	Steiner trap for fruit fly	10
3	DIY plastic bottle trap of fruit fly	11
4	Plastic bottle trap filled with sticky trap for fruit fly	12
5	Plastic container with stocking and opening mount	12
6	Picture of fly trap	13
7	Picture of methyl eugenol chemical structure	17
8	Picture of microscopic view of silver nanoparticles`	20
9	Picture of chemical structure of silver nanoparticles	21
10	Picture of GIS of CLSU proposed general land use and infrastructure plan	24
11	Picture of motorized automatic telescopic poles	25
12	Conceptual framework of the study	27
13	Flowchart of the study	29
14	Chemical process synthesis of silver nanoparticle	32
15	Manual lure trap (top view, front view, and perspective view)	35
16	Schematic diagram for mechanical trap	37
17	Drawing of the telescopic mast	40

18	Drawing of the different base of telescopic mast	41
19	Drawing of the upper part of telescopic mast	42
20	Arduino wiring and coding	43
21	Mechanical trap component in exploded view	44
22	Chemical process synthesis of silver nanoparticle with data	48
23	(a) Raw neem leaves; (b) Air-dried neem leaves; (c) Blended neem leaves	49
24	Preparation of combine attractant (me-agnp) at 1:1:1 ratio	49
25	UV-Vis spectrophotometer result of agnp	51
26	Actual picture of manual lure trap	52
27	Testing area 1 (CRRDC fieldhouse 1)	53
28	Testing area 2 (RET-OVPRE orchard)	53
29	Testing area 3 (CAg <i>bahay kubo</i> site)	54
30	Pest occurrence index on CRRDC area	60
31	Pest occurrence index on RET area	61
32	Pest occurrence index on CAg area	62
33	Actual picture of mechanical lure trap	63

LIST OF APPENDICES

APPENDIX		PAGE
I	Appendix Table	84
II	Appendix Figure	111

LIST OF APPENDIX TABLES

APPENDIX TABLE		PAGE
1	Descriptive statistics for CRRDC area	84
2	Homogeneity of variances for CRRDC area	84
3	Test for normality for CRRDC area	84
4	Summary statistics for CRRDC area	84
5	Standard error for CRRDC area	84
6	Least significant difference (LSD) test for CRRDC area	84
7	Descriptive statistics for RET area	84
8	Homogeneity of variances for RET area	85
9	Test for normality for RET area	85
10	Summary statistics for RET area	85
11	Standard error for RET area	85
12	Least significant difference (LSD) test for RET area	85
13	Descriptive statistics for CAg area	85
14	Homogeneity of variances for CAg area	85
15	Test for normality for CAg area	85
16	Summary statistics for CAg area	86

17	Standard error for CAg area	86
18	Least significant difference (LSD) test for CAg area	86
19	Raw data of manual intervention pest occurrence index of setup T1A1.1	87
20	Raw data of manual intervention pest occurrence index of setup T1A1.2	87
21	Raw data of manual intervention pest occurrence index of setup T1A1.3	88
22	Raw data of manual intervention pest occurrence index of setup T1A2.1	88
23	Raw data of manual intervention pest occurrence index of setup T1A2.2	89
24	Raw data of manual intervention pest occurrence index of setup T1A2.3	89
25	Raw data of manual intervention pest occurrence index of setup T1A3.1	90
26	Raw data of manual intervention pest occurrence index of setup T1A3.2	90
27	Raw data of manual intervention pest occurrence index of setup T1A3.3	91
28	Raw data of manual intervention pest occurrence index of setup T1A4.1	91
29	Raw data of manual intervention pest occurrence index of setup T1A4.2	92
30	Raw data of manual intervention pest occurrence index of setup T1A4.3	92
31	Raw data of manual intervention pest occurrence index of setup T2A1.1	93
32	Raw data of manual intervention pest occurrence index of setup T2A1.2	93
33	Raw data of manual intervention pest occurrence index of setup T2A2.1	94
34	Raw data of manual intervention pest occurrence index of setup T2A2.2	94

35	Raw data of manual intervention pest occurrence index of setup T2A3.1	95
36	Raw data of manual intervention pest occurrence index of setup T2A3.2	95
37	Raw data of manual intervention pest occurrence index of setup T2A4.1	96
38	Raw data of manual intervention pest occurrence index of setup T2A4.2	96
39	Raw data of manual intervention pest occurrence index of setup T2A5.1	97
40	Raw data of manual intervention pest occurrence index of setup T2A5.2	97
41	Raw data of manual intervention pest occurrence index of setup T2A6.1	98
42	Raw data of manual intervention pest occurrence index of setup T2A7.1	98
43	Raw data of manual intervention pest occurrence index of setup T2A7.2	99
44	Raw data of manual intervention pest occurrence index of setup T2A8.1	99
45	Raw data of manual intervention pest occurrence index of setup T2A8.2	100
46	Raw data of manual intervention pest occurrence index of setup T2A9.1	100
47	Raw data of manual intervention pest occurrence index of setup T2A9.2	101
48	Raw data of manual intervention pest occurrence index of setup T2A10.1	101
49	Raw data of manual intervention pest occurrence index of setup T2A10.2	102
50	Raw data of manual intervention pest occurrence index of setup T2A11.1	102
51	Raw data of manual intervention pest occurrence index of setup T2A11.2	103
52	Raw data of manual intervention pest occurrence index of setup T3A1.1	103

53	Raw data of manual intervention pest occurrence index of setup T3A1.2	104
54	Raw data of manual intervention pest occurrence index of setup T3A2.1	104
55	Raw data of manual intervention pest occurrence index of setup T3A2.2	105
56	Raw data of manual intervention pest occurrence index of setup T3A2.3	105
57	Raw data of manual intervention pest occurrence index of setup T3A2.4	106
58	Raw data of manual intervention pest occurrence index of setup T3A3.1	106
59	Raw data of manual intervention pest occurrence index of setup T3A3.2	107
60	Raw data of manual intervention pest occurrence index of setup T3A3.1	107
61	Raw data of manual intervention pest occurrence index of setup T3A3.4	108
62	Raw data of pest occurrence index mechanical lure trap	108
63	Bill of materials of telescopic mast	109
64	Bill of materials of trapping mechanism and arduino component	110

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*)**.

Adviser: JOHN VINCENT A. NATE, M.Sc.

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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