

**GREEN SYNTHESIS OF SILVER AND COPPER NANOPARTICLES FOR  
POTENTIAL BIOPESTICIDE APPLICATION AGAINST  
ORIENTAL FRUIT FLY (*Bactrocera dorsalis* Hendel)**

**JAY-LORD PASCUA VILORIA**



An Undergraduate Thesis Submitted to the Faculty of the Department of Chemistry,  
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## APPROVAL AND ACCEPTANCE

The undergraduate thesis entitled **GREEN SYNTHESIS OF SILVER AND COPPER NANOPARTICLES FOR POTENTIAL BIOPESTICIDE APPLICATION AGAINST ORIENTAL FRUIT FLY (*Bactrocera dorsalis* HENDEL)** prepared and submitted by **JAY-LORD P. VILORIA** in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN CHEMISTRY** is hereby

APPROVED:

  
**DANILA S. PARAGAS, M. Sc.**  
Adviser

06-13-2017

Date

  
**NELSON M. PANAJON**  
Critic

06-13-2017

Date

  
**REDEL L. GUTIERREZ, Ph.D.**  
Department Research Coordinator

06-13-2017


Date

  
**DANILA S. PARAGAS, M. Sc.**  
Department Chair

06-13-2017

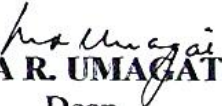
Date

AND ACCEPTED:

  
**ANNA MA. LOURDES S. LATONIO, Ph.D.**  
College Research Coordinator

06-13-2017

Date

  
**MYRNA R. UMAGAT, Ph.D.**  
Dean

06-13-2017

Date

## BIOGRAPHICAL SKETCH

### PERSONAL INFORMATION

Name : **JAY-LORD P. VILORIA**  
Date of Birth : October 4, 1996  
Place of Birth : Science City of Muñoz, Nueva Ecija

### EDUCATIONAL BACKGROUND

Elementary : **RIZAL ELEMENTARY SCHOOL**  
Science City of Muñoz, Nueva Ecija  
March 2009  
Secondary : **MUÑOZ NATIONAL HIGH SCHOOL**  
Science City of Muñoz, Nueva Ecija  
March 2013  
Tertiary : **CENTRAL LUZON STATE UNIVERSITY**  
Science City of Muñoz, Nueva Ecija  
**Bachelor of Science in Chemistry**  
June 2017

### SCHOLARSHIP AND AWARDS

University Scholar : 1<sup>st</sup> Sem 2013-2014; 1<sup>st</sup> Sem 2016-2017  
College Scholar : 2<sup>nd</sup> Sem 2013-2014; 1<sup>st</sup> Sem 2014-2015  
1<sup>st</sup> Sem 2015-2016; 2<sup>nd</sup> Sem 2014-2015  
Dean's List : 2<sup>nd</sup> Sem 2014-2015

### EXTRA CURRICULAR ACTIVITIES

Vice President  
for External Affairs : CLSU Chemical Society (A.Y. 2016-2017)  
Member : Philippine Association of Chemistry Students  
(2014-Present)

- 2<sup>nd</sup> Place : Philippine Science Consortium's  
Math and Science Quiz (Chemistry Area)  
Ifugao State University  
January 7-8, 2015
- Finalist : BPI-DOST Science Awards 2017  
Makati City  
April 4-5, 2017
- Participant : PACSiklaban 2017  
University of the Philippines – Diliman  
February 22, 2017
- : PACSiklaban 2016  
Adamson University  
February 21, 2016
- : PACSiklaban 2015  
University of the Philippines – Diliman  
February 22, 2015

#### **SEMINARS ATTENDED**

- Participant : Shimadzu Technology for Analytical  
Instrumentation  
CAS Little Theater, CLSU  
October 8, 2015
- : PhilRice Nutrition Month Seminar  
PhilRice Central Experiment Station  
July 30, 2013

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# GREEN SYNTHESIS OF SILVER AND COPPER NANOPARTICLES FOR POTENTIAL BIOPESTICIDE APPLICATION AGAINST ORIENTAL FRUIT FLY (*Bactrocera dorsalis* HENDEL)<sup>1</sup>

JAY-LORD P. VILORIA

## ABSTRACT

**Background:** The fruit fly species *Bactrocera dorsalis* (Hendel) has been throughout one of the most serious pests affecting agricultural fruits in most tropical countries. In this study, green synthesis of silver and copper nanoparticles is aimed for their potential application against oriental fruit flies. **Methods:** Silver (AgNPs) and copper nanoparticles (CuNPs) were synthesized from reacting AgNO<sub>3</sub> and CuSO<sub>4</sub>·5H<sub>2</sub>O, respectively, with *Cymbopogon citratus* and *Tridax procumbens* leaf extracts. Optimization by varying the volume ratio, pH, and temperature of the reaction mixture was done. The percent mortality of fruit flies were evaluated after progressive exposure to the plant extracts-synthesized metal nanoparticles. **Results:** The formation of AgNPs and CuNPs using plant extracts is favorable in basic conditions - pH 11 using *C. citratus*, and pH 9 using *T. procumbens* extract; and requires an optimum temperature of 50°C for AgNPs, and not lower than 70°C for CuNPs. AgNPs present in agglomerates with an approximate length of 70 nm, and CuNPs with an average length of 57 nm were fabricated. *T. procumbens*-AgNP exhibited the highest anti-fruit fly activity, causing 66.7 ± 23.1% mortality. AgNPs has significantly improved the insecticidal activity of the two plant extracts, while CuNPs has caused no mortality, possibly due to very low concentration consumed by the fruit flies. **Conclusion:** The effectiveness of silver nanoparticles in pest control has been further proven in this study. The effective treatments can be incorporated to bait stations using natural attractants to prevent environmental concerns.

**Keywords:** green synthesis, silver nanoparticles, copper nanoparticles, optimization, *Bactrocera dorsalis*

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