UNIVERSITI PUTRA MALAYSIA

LIFE CYCLE AND OVIPOSITIONAL PREFERENCE OF ASIAN PAPAYA FRUIT FLY (*Bactrocera papayae* DREW & HANCOCK) FOR GUAVA (*Psidium guajava*, L.)

MOHD AMIR ZUNNASRI BIN MOHD NOOR

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By

MOHD AMIR ZUNNASRI BIN MOHD NOOR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master Science

March 2011

DEDICATION

This Master Research Thesis is dedicated to:

My beloved parents, Mr. Mohd Noor bin Mohaidin and Mrs. Siti Fatimah bte. Boseri as well as to my siblings, Mohd Amir Fansuri bin Mohd Noor, Nadia Nor Aiman bte Mohd Noor and Mohd Amir Hakim bin Mohd Noor.

Supportive supervisor and co-supervisor, Dr. Nur Azura binti Adam and Prof. Dr. Rita Muhamad Awang.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master Science

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Chair person: Nur Azura binti Adam, PhD

Institute: Institute Tropical of Agriculture

Asian papaya fruit fly *Bactrocera papayae* is one of the insects' pest that is very destructive and causing severe damage to guava, *Psidium guajava*, Linn. Details on *B. papayae* are still lacking compared to the other species such as *B. carambolae* and *B. cucurbitae.* This study was conducted to determine the number of larval instars, the life cycle and ovipositional preference of the *B. papayae* on guava.

Result showed that the *B. papayae* underwent three larval instars which can be determined by morphometric characters of the length and width of the larvae's bodies. The body length for the first, second and third instars were 1.27 ± 0.03, 4.33 ± 0.05 and 7.84 ± 0.07 mm respectively, whilst the width for the body were

0.23 ± 0.01, 1.04 ± 0.01 and 1.85 ± 0.03 mm respectively. Moulting took one day for each larval instar.

In the life cycle study, the percentage of individuals survived decreased as the stages changed from egg until adult. Findings showed that the eggs hatched after 1.16 days. Larvae underwent three instars and survived for 12.02 ± 0.13 days before entering the pupal stage. Pupae collected emerged as the adults after 7.03 ± 0.08 days. It was observed that the longevity of the adult male *B. papayae* was not significantly ($P>0.05$) different compared to the female adult.

The ovipositional preference could be determined by investigating the number of larvae laid by single female per guava. *Bactrocera papayae* female was observed preferred to oviposit on the mature guavas in both choice and no-choice experiments. There was no significantly different between the numbers of ovipositional punctures made and larvae laid on guavas in the choice and no-choice experiments.

There was a significantly different ($P<0.05$) in the number of larvae obtained at different maturity stages in both choice and no-choice experiments. In the choice and no-choice experiments, the numbers of larvae observed were comparatively higher in more ripened guavas than less ripened ones. This indicated that mature guavas provide more needs and nutrients required by the larvae to grow.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KITARAN HIDUP DAN KEGEMARAN OVIPOSISI LALAT BUAH ASIAN PAPAYA, (*Bactrocera papayae* DREW & HANCOCK) TERHADAP BUAH JAMBU BATU (*Psidium guajava*, L.)

Oleh

MOHD AMIR ZUNNASRI BIN MOHD NOOR

Mac 2011

Pengerusi: Nur Azura binti Adam, PhD

Institut: Institut Pertanian Tropika

Lalat buah Asian Papaya, *Bactrocera papayae* merupakan salah satu serangga perosak yang menyebabkan kerosakan yang teruk pada buah jambu batu, *Psidium guajava*, Linn. Maklumat-maklumat terperinci berhubung spesies ini masih berkurangan jika dibandingkan dengan spesies-spesies lain seperti *B. carambolae* dan *B. cucurbitae*. Kajian ini telah dijalankan untuk mengenalpasti bilangan instar larva, kitaran hidup dan kecenderungan beroviposisi *B. papayae* ke atas buah jambu batu.

Keputusan menunjukkan bahawa *B. papayae* melalaui tiga peringkat instar larva dan ianya boleh ditentukan berpandu kepada ciri-ciri morfometrik iaitu panjang

dan lebar badan larva. Panjang badan bagi instar pertama, kedua dan ketiga masing-masing ialah 1.27 ± 0.03, 4.33 ± 0.05 dan 7.84 ± 0.07 mm, manakala lebar badan masing-masing pula ialah 0.23 ± 0.01, 1.04 ± 0.01 dan 1.85 ± 0.03 mm. Proses salin kulit bagi setiap peringkat larva mengambil masa sehari.

Dalam kajian kitar hidup, peratusan individu-individu yang hidup berkurang dengan perubahan peringkat dari telur sehingga peringkat dewasa. Keputusan menunjukkan telur-telur menetas selepas 1.16 hari. Larva melalui tiga peringkat instar serta hidup selama 12.02 ± 0.13 hari sebelum memasuki peringkat pupa. Pupa bertukar menjadi lalat dewasa selepas 7.03 ± 0.08 hari. Pemerhatian mendapati bahawa kemandirian lalat jantan dewasa *B. papayae* didapati tidak bererti ($P>0.05$) dengan kemandirian lalat betina dewasa.

Kecenderungan untuk mengoviposit boleh ditentukan dengan mengkaji bilangan larva yang dihasilkan oleh seekor betina pada sebiji buah jambu batu. Lalat betina *B. papayae* lebih cenderung secara bererti ($P<0.05$) untuk mengoviposit telur pada buah jambu batu berumur yang lebih matang hari dalam kedua-dua eksprimen pilihan dan tanpa pilihan yang telah dijalankan. Tiada perbezaan bererti didapati pada bilangan cucukan oviposisi mahupun bilangan larva pada jambu batu dalam eksperimen pilihan mahupun tanpa pilihan.

Keputusan menunjukkan terdapat perbezaan yang bererti ($P<0.05$) bagi bilangan larva yang diperolehi bagi peringkat kematangan yang berbeza bagi kedua-dua ujikaji. Dalam ujikaji dengan pilihan dan tanpa pilihan, bilangan larva-larva secara perbandingan adalah lebih banyak pada buah jambu batu yan lebih matang. Ini menunjukkan bahawa buah jambu matang menyediakan lebih keperluan dan nutrien yang diperlukan oleh larva-larva untuk tumbesaran.

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hereafter. To my siblings, Mohd Amir Fansuri, Nadia Nor Aiman and Mohd Amir Hakim thanks for supporting your eldest brother in his jouney until now.

I certify that a Thesis Examination Committee has met on the **4th July 2011** to conduct the final examination of Mohd Amir Zunnasri bin Mohd Noor on his thesis entitled "**Life Cycle and Ovipositional Preference of Asian Papaya Fruit Fly, *Bactrocera papayae* (Drew & Hancock) Diptera:Tephritidae on Guava, *Psidium guajava*, L.)**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March1998. The Committee recommends that the student be awarded the degree of Master Science.

Members of the Thesis Examination Committee were as follows:

Lau Wei Hong, PhD
Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman of Examination Committee)

Dzolkhifli bin Omar, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal examiner)

Hafidzi Mohd Noor, PhD
Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Internal examiner)

Idris Abdul Ghani, PhD
Professor
Faculty of Science and Technology
Universiti Kebangsaan Malaysia
(External examiner)

.....
BUJANG KIM HUAT, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of **Master of Science**. The members of the Supervisory Committee were as follows:

Nur Azura binti Adam, PhD
Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Rita Muhamad Awang, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

.....
HASANAH MOHD GHAZALI, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declared that this thesis is my original worked exclude for the quotations and citations, which have been duly acknowledged. I also declared that my worked has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or in other institutions.

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MOHD AMIR ZUNNASRI BIN MOHDNOOR

Date: 4th March 2011

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