



UNIVERSITI PUTRA MALAYSIA

**COCOA POD BORER *CONOPOMORPHA CRAMERELLA* SNELLEN
INFESTATION UNDER SHADE AND CONTROL TREATMENTS**

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UNDER SHADE AND CONTROL TREATMENTS**



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

**COCOA POD BORER *CONOPOMORPHA CRAMERELLA* SNELLEN
INFESTATION UNDER SHADE AND CONTROL TREATMENTS**

By

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August 2012

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Cocoa pod borer (CPB) is the most serious pest of cocoa and the infestation caused severe losses of cocoa crop hence production in Malaysia although several control approaches had been implemented. Management tactics including thinning of shade trees in mature cocoa plantation gained less attention by cocoa growers. Chapters 3, 4 and 5 reported in this thesis were examining effects of different levels of available shade trees, which are Light, Medium and Heavy Shade. These studies were conducted in inter-block and within block, and parameters studied were CPB eggs distribution and infestations. The results showed that different levels of shade affected the distribution of CPB eggs, hence influenced the severity of infestation. Findings show that an aggregated distribution, mean, entry and exit holes, CPB infestation during low and peak crop seasons and Average Damage Severity Index (ADSI) values were found to be highest at the Heavy Shade Block and significantly

different with Medium and Light Shade Blocks. The results will be useful to envisage the seriousness of CPB infestation (Chapter 4). It was denoted that heavy shade will lead to more serious infestation compared with medium and light shade. However, there was no significant difference of different shade levels in small size plantation (Chapter 5) compared with bigger plantation (Chapters 3 and 4). This might be influenced by the flying capability of CPB which can fly within short distance, thus was capable to oviposit their eggs at adjacent trees regardless to the different shade level. Based on the egg distribution and infestation level, the selection of appropriate control approaches will be carried out to reduce the yield loss caused by the CPB. It is postulated that thinning of the heavy existing shade trees to light shade level will help in reducing the population built-up of CPB, therefore reducing its infestation. Aside of management approaches by thinning of shade trees, CPB infestation may be reduced by using other techniques. Two different spraying calendars of insecticide and biological control agent were studied (Chapters 6 and 7). The results indicated that Cocoa Black Ants (CBA) were capable in reducing CPB infestation more than insecticide applications especially during low crop season. Number of entry and exit holes, damage category and ADSI values can be good indicators in evaluating the effectiveness of each control; however sampling of CPB eggs was more important in determining the yield later on. Overall, major findings from these studies especially the necessity to thinning heavy shade trees and potential use of CBA as biological control agent must be disseminated to cocoa smallholders, due to both techniques may succeed in reducing the infestation caused by the CPB.

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

SERANGAN ULAT PENGOREK BUAH KOKO *CONOPOMORPHA CRAMERELLA* SNELLEN DIBAWAH LINDUNGAN DAN RAWATAN

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Ulat Pengorek Buah Koko (UPBK) adalah serangga perosak paling utama koko dan sehingga kini, kerosakannya menyebabkan kerugian besar tanaman koko di Malaysia walaupun beberapa kawalan telah dijalankan. Amalan pengurusan termasuk mengurangkan pokok lindungan di kawasan koko dewasa tidak mendapat sambutan oleh penanam koko. Bab 3, 4 dan 5 yang dilaporkan didalam tesis ini melibatkan kesan perbezaan tahap lindungan iaitu lindungan Sedikit, Sederhana dan Lebat. Kajian dijalankan didalam serta diantara blok dan parameter yang dikaji adalah sebaran telur UPBK dan kesan serangan. Keputusan kajian menunjukkan bahawa perbezaan tahap lindungan mempengaruhi tahap kerosakan. Sebaran agregat, purata, lubang masuk dan keluar, tahap serangan semasa musim buah lebat dan sedikit serta nilai 'Average Damage Severity Index (ADSI)' adalah paling tinggi di Blok Lindungan Lebat dan berbeza ketara berbanding Blok Lindungan Sederhana dan Sedikit. Keputusan ini boleh digunakan untuk meramalkan tahap

kerosakan oleh UPBK (Bab 4). Didapati, tahap lindungan lebat menyebabkan kerosakan yang paling serius jika dibandingkan dengan lindungan sedikit dan sederhana. Walaubagaimanapun, tidak terdapat perbezaan bererti berkaitan perbezaan tahap lindungan di kawasan kajian yang lebih kecil (Bab 5) jika dibandingkan dengan kawasan yang lebih besar (Bab 3 dan 4). Ianya mungkin disebabkan oleh tahap kebolehan UPBK untuk terbang dalam jarak yang dekat, lantas berkebolehan untuk bertelur pada pokok bersebelahan tanpa mengambil kira tahap lindungan. Berdasarkan sebaran telur dan tahap kerosakan, pemilihan langkah kawalan yang bersesuaian perlu dilaksanakan bagi mengurangkan kerosakan oleh UPBK. Adalah penting bagi mengetahui bahawa pengurangan tahap lindungan lebat kepada lindungan sedikit dapat membantu merendahkan populasi, dan seterusnya serangan UPBK. Selain dari langkah mengurangkan lindungan, serangan UPBK juga boleh dikurangkan melalui teknik lain. Dua kalendar semburan racun serangga serta agen kawalan biologi diselidiki di Bab 6 dan 7. Keputusan menunjukkan bahawa Semut Hitam Koko (SHK) mampu mengurangkan serangan lebih daripada penggunaan racun serangga terutama semasa musim buah yang rendah. Bilangan lubang masuk dan keluar, kerosakan, nilai ADSI menjadi petunjuk kepada keberkesanan setiap kawalan, namun persampelan telur penting untuk menentukan hasil kelak. Kesimpulannya, penemuan utama kajian iaitu mengurangkan tahap lindungan serta potensi SHK perlu disebar kepada penanam koko, berikutan kedua-dua teknik mampu mengurangkan tahap serangan oleh UPBK.

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To all my family members and friends; Thank you for making me as a better person.

May Allah S.W.T be with me, tomorrow, today, and forever.



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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:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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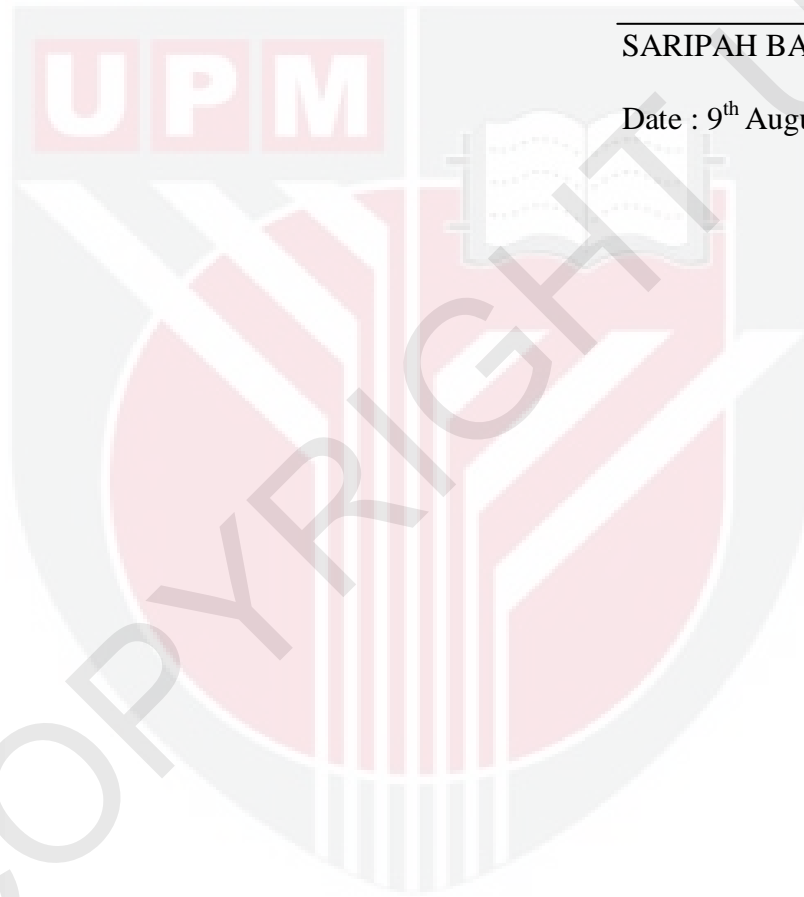


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