



CHEMICAL CONTROL OF *OPISINA ARENOSELLA*, BLACK HEADED CATERpillARS AT THE EAST COAST PARK, SINGAPORE

Prepared by Mr. He Lian Sheng¹, Dr Mohd Ali¹, Ms Gloria Ong¹ and Ms. Yap Mei Lai¹

In 2012, the officers from Plant Health Laboratory Department, Agri-Food & Veterinary Authority (AVA) were alerted by NParks officers of defoliated *Cocos nucifera* (coconut palms) at the East Coast Park (ECP). Upon investigation by AVA officers, a small population of *Opisina arenosella* Walker (black-headed caterpillars) was found on some coconut palms showing symptoms on the lower fronds. This led to a more intensive survey of the ECP to determine the status of the infestation of coconut palms. Survey findings indicated that 35.5% of the 199 palms in area C and 87.5% of 201 palms in area D were infested with this pest at varying severity and the situation seemed to be confined to these areas within the ECP.

As this was the first time that the caterpillars were found in Singapore and the sites were deemed suitable, it was agreed that a field trial to evaluate the chemical control measures would be conducted collaboratively between AVA and NParks. Abamectin (1.8% EC) and Imidacloprid (18% EC) were selected to test out their control efficacy against *O. arenosella* Walker. Both insecticides have been reported to possess systemic and trans-laminar activity that would be useful in the intended soil application. A total of 95 coconut palms with 85 naturally infested palms ranging from 3 to 6 meter height spreading across the main areas at the ECP i.e. Area C4 (near barbeque pit 32C and near the fitness corner) and Area D2/D4 were selected for the pesticide efficacy field trial.

One concentration of each insecticide was tested in this field trial i.e. 2ml/L for abamectin (1.8% EC) and 3ml/L for imidacloprid (18% EC) and applied via soil drenching with the assistance of NParks officers. The mortality of the larvae and pupae was assessed by direct counting of the insects found on the collected fronds of the treated palm trees i.e. 6 samples were collected per treatment. Sampling and counting was done fortnightly during the first two months after treatment and subsequently, once at the third month and once at the 9th month after application. Insect specimens collected from the field were placed in insect cages to monitor their mortality in the laboratory.

From the mortality data obtained, the correct mortality using the Sun-Shepard's Formula (Puntener, 1981) for non-uniform pest population was analysed statistically. There was no observed phytotoxicity on the treated palms in the location during the trial period.

The results indicated that both tested insecticides effectively control the caterpillars two weeks after application. There was no significant difference between the efficacies of the two insecticides. Abamectin (1.8% EC) worked faster than that of imidacloprid (18% EC) in the first two months while imidacloprid (18% EC) had a much longer residual effect against *O. arenosella* Walker on the coconut palms. Nine months after application, imidacloprid (18% EC) appeared to continue to exert some control over the caterpillars. After the application, abamectin (1.8% EC) took two month to reach its maximum pest control effect while imidacloprid (18% EC) needed three months. At the tested concentration, both abamectin (1.8% EC) at 2ml/L and imidacloprid (18% EC) at 3ml/L were found effective and safe to apply on coconut palms to control the target pest through soil drenching.

Currently, based on AVA's surveillance, moderate population of *O. arenosella* Walker appeared to be localised to the East Coast Park in Singapore and this is the first detection site for this pest. The infestation of this pest may have gone unnoticed due to the difficulty to access the palm fronds of tall palms around Singapore. The origin of this pest in Singapore is difficult to be determined. It is recommended to initiate a survey of other areas with coconut palms or other palms to determine the incidence of the black-headed caterpillars in Singapore and to alert PHLD¹/ AVA on suspected occurrence of this pest.

¹ Plant Health Laboratory Department, Agri-Food & Veterinary Authority of Singapore; AVA_Planthealth@ava.gov.sg

Pest Biology

Opisina arenosella Walker (*Nephantis serinopa* Meyr), (Insecta: Lepidoptera: Gelechioidea: Oecophoridae: Xyloryctinae) commonly known as the black headed caterpillar is considered a serious pest infesting coconut palms causing considerable damage and reducing the yield in countries i.e. India, Sri Lanka, Bangladesh, Indonesia where coconut is an economic crop. This pest has been reported to attack other palms as well.

As a pest, *O. arenosella* Walker consumes the lower epidermis and mesophyll of coconut fronds resulting in a characteristic scorched appearance to the leaves, and an inability to maintain their yield.

Little is known about the moth form of this nocturnal pest. Eggs are usually laid on the lower side of the leaves. Female laid an average of 140 eggs and the egg stage lasted for 3-5 days. The young caterpillars fed on the leaves creating galleries or runways in the leaves covered with silk and frass and depositing the excreta on the lower side of the leaflets. The caterpillar goes through five instars that could last up to 5-8 weeks. The pupal stage lasts around 9-12 days dependent on the temperature. The female moth lives about 7 days while male moth lives for around 5 days. The whole life cycle can be completed around 60-75 days.

Various methods of control have been explored but the primary control method is the soil drenching of insecticides directly to the roots of coconut plams (Nirula, 1956; Sundaramurthy & Santhankrishan, 1979; Kanagaratnam, 1976; Nadarajan & Channabasavanna, 1981).



Figure 1. The larva of black headed coconut caterpillar, *Opisina arenosella* Walker and the associated damage symptoms.



Figure 2. A coconut palm infested by the caterpillars with damaged lower fronds.



Figure 3. AVA & NParks officers on site evaluating the efficacy of the control treatment at ECP.

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