

STUDY ON THE MAJOR FOLIAR PESTS OF DURIAN AND THEIR CONTROL

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ABSTRACT

There are three Homopterous insects identified as durian foliar pest. These are: (1) *Allocarsidara incognita* Hollis, (2) *Haplaphalara* n.sp.), and (3) *Amrasca* sp. The first two were classified as major foliar pest. *A. incognita* is the most dominant species. The descriptions of the different life stages of these foliar pests are discussed with their characteristic damage. *A. incognita* and *Haplaphalara* sp. were found present in the durian growing provinces in Eastern Mindanao where the survey was conducted. These pests were not observed in areas with sporadic planting like in Leyte, Camarines Sur and Laguna.

Rainfall influences the population build up of these foliar pests. Preliminary studies show that *A. incognita* can be controlled by chemical spraying with any of the following insecticides with their recommended dosage: Malathion, Azinphos-ethyl + BPMC, Azinphos-ethyl, Deltamethrin, Endosulfan, Cypermethrin, Chlorpyrifos, Dimethoate. There were some potential parasites and predators observed.

INTRODUCTION

The establishment of durian plantings especially in large scale will expectedly lead to the population build-up of pests and diseases especially in newly opened areas where the natural habitat of living organism is disturbed. Also introduction of varieties new to the area may, unknowingly, introduce some pests. Lately, there are observations on foliar infestations prevalent on young and old durian tree. It is suspected that these foliar pests are some of the causes of the death of old and young trees.

These pests are observed during the flushing and fruit formation.

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REVIEW OF LITERATURE

Gabriel (1975) listed only three insect pests of durian, the Carpenter moth (*Zeuzera coffea*), an unidentified ecophorid borer and peach moth (*Dichocoris punctiferalis* Guenee) which attack some parts of the tree. In addition, fruit flies also attacked durian in Los Baños and Davao as cited by Coronel (1986).

It is mentioned in IBPGR Secretariat in their Genetic Resources of Tropical and Subtropical Fruits and Nuts that there are at least 14 insect species that attack durian in Indonesia, including three scale insects, several leaf-eating caterpillars, two trunk and branch borers and three fruit borers (Lepidoptera) in which none are listed very damaging and control is not usually practiced (Kalshoven and Vander Vecht, 1950). In a personal communication by Dr. Mario R. Gavarra, the durian fruit borer, a Lepidopterous insect he had collected was identified as *Tonica* sp.

In Malaysia, a scale insect which belong to genus *Asterolecanium* (Homoptera: Lecanidae) is responsible for the pitted, dimpled, yellow spots on the leaves and for their subsequent defoliation (Kwee, 1990). This insect suck the plant sap of the leaves of both seedlings and adult trees, causing defoliation which can be serious on seedlings.

A durian psyllid was also studied in Malaysia by Saet-Gadug and Hussein, M. (1990) identified as *Tenaphalara malayensis*, a Carsidarid family. In the Philippines, Braza and Calilung (1981), published the identity of the durian psyllid as *Tenaphalara malayensis* but was corrected as *Allocarsidara incognita* by David Hollis (1987).

OBJECTIVES

1. To identify the major foliar insect pests;
2. To study the biology of the major foliar insect pests;
3. To study the ecology and control of the identified foliar insect pests of durian.

METHODOLOGY

Field Survey and Observation

A general survey on the presence of prevailing pests were undertaken on July 1988-1989 in the durian producing provinces. The distribution and level of their importance was established in the durian orchard DNRDC-BPI, Bago Oshiro, Davao City. A monthly observation of the prevailing pests were recorded.

The presence of infestation were ocularly estimated based on the characteristic damage.

Observation and population sampling of the foliar pests in the DNRDC-BPI orchard was conducted on a monthly basis through the following procedure:

The durian trees were tagged randomly with at least 15 percent of the number of trees totaling to 29 trees. For each tree, five shoots of 5 cm in length were sampled from four directions (North, South, East & West).

In the course of sampling, parasites and predators were also included in the observation.

The areas with durian plantings were also surveyed for the presence of the foliar pests identified.

Trials for chemical screening for the control of pests were also included for possible control recommendations.

Laboratory Studies

Introduction of pest in durian seedlings for the biological observations were made in a series of trials.

The new major foliar insect pests collected were sent to Dr. David Hollis of the British Museum for identification.

RESULTS AND DISCUSSIONS

The identity of the major foliar insect pests involved are the following (Table 1):

1. *Allocarsidara incognita* Hollis (Carsidaridae: Homoptera)

This is the one that is commonly called as the Durian psyllid. This is a sucking insect. Among the foliar pests identified, this is the most dominant species infesting the durian trees in Davao.

This was earlier identified as *Tenaphalara malayensis* Crawford by Braza Calilung, (1981) but Dr. David Hollis of the British Museum published in a review of Malvaes-feeding psyllid family Carsidaridae (Homoptera) a correction of the identity. Dr. Hollis commented that this species is very similar to *T. malayensis* but can be recognized by the structure of the male genitalia. Females of the two species are very difficult to separate from each other.

The total life cycle of this insect ranges from 7 to 19 days (Table 2). The egg hatches from 2-6 days and undergo five nymphal instars with a total development period of 14 days on the average from egg to nymph.

The adult measures about 2.95 mm long and 0.78 mm in width. The color is greenish to brownish. The nymphal stage has cottony white material covering their body, which looks like their tail and sheds-off during molting.

The eggs are round to oval in shape. The color is pale transparent white and turns yellowish orange when about to hatch. They are deposited singly in the unopened leaves or terminal buds, (fig. 1)

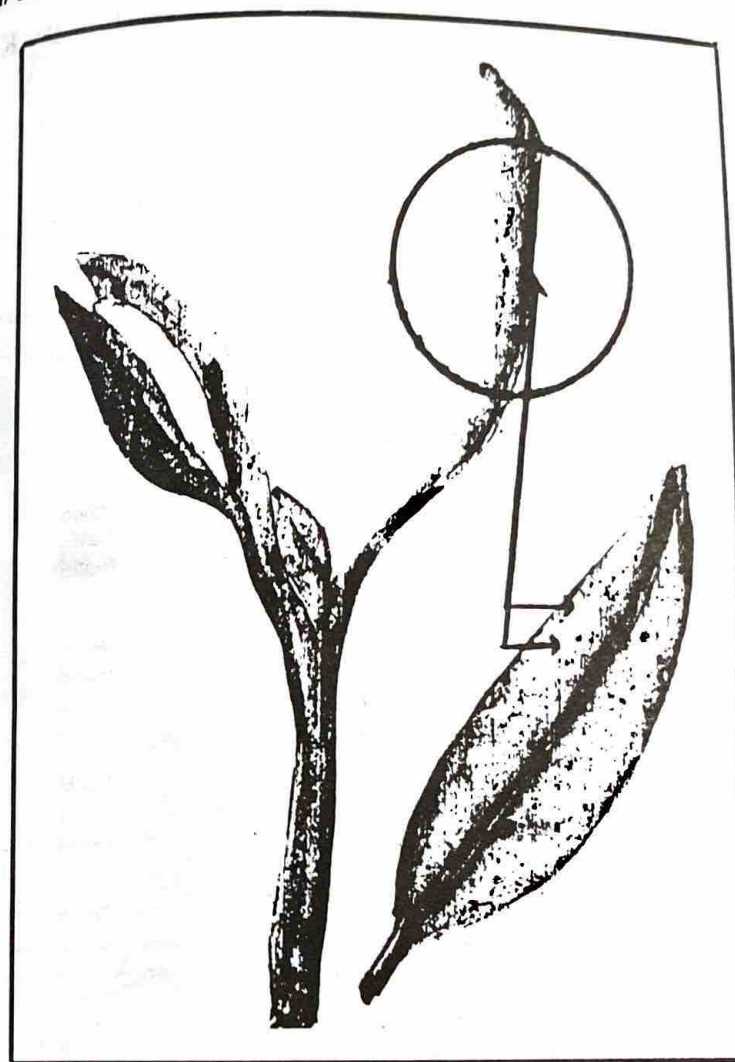


Figure 1. Unopened leaves and shoot (oviposition site of *A. incognita* (Crawford))

Nature and Extent of Damage:

The newly hatched nymph feed by sucking on the young leaves in which causes pitted yellowish spots in the leaves. They suck the plant sap of the leaves of both seedling and adult trees causing eventual defoliation which may result to dying of the trees in heavy infestation. In addition, honey dews are also secreted thus causing sooty molds. This nature of

damage resembles with the scale insect damage mentioned by Dr. Kwee (1990) in Malaysia.

Table 1. List of the newly recorded foliar pest of durian. (Pableo, et al., 1989 & 1992).

Foliar Pests	Description		Color & Shape	Plant Parts Infested
	Length (mm)	Width (mm)		
1. <i>Allocarsidara incognita</i> Crawford (Carsidaridae: Homoptera)	2.95	0.78	greenish to brownish nymphal stage cottony white material covering with tail	shoots and leaves
2. <i>Haplaphalara</i> n.sp. (Homoptera)	1.19	0.72	brownish and roundish in shape w/ cottony white material	shoots, leaves and fruitlets
3. <i>Amrasca</i> sp. (Empoascini, Typhlocibinae: Homoptera)	(Insufficient sample)		green-hopper, tinier than <i>A. incognita</i>	shoots, leaves
with 2 spots			on its wings	black

Table 2. Life cycle of *Allocarsidara incognita* Hollis *Durio zibethinus* Murr.

STAGES	RANGE (No. Of Days)	MEAN (No. of Days)
egg	2-6	4.41
nymphal instar		
1st	1-3	2.41
2nd	1-2	1.91
3rd	1-3	2.0
4th	1-2	1.58
5th	1-3	1.75
Total Dev.t Stage (Egg to nymph)	7-19	14.06

2. *Haplaphalara* n.sp. (Homoptera) - or commonly called as "bao-bao".

The adult is brownish in color, shorter and stubby in shape which measures about 1.19 mm in length and 0.72 mm in width. This infests the flushes or shoots and also in flowers and fruitlets. The presence of this pest especially the nymphal stage is characterized by the presence of white cottony-like material produced or excreted by the nymphs.

The egg is kidney shaped. It is deposited singly under the scale-like epidermal covering of the durian leaves (Fig. 2).

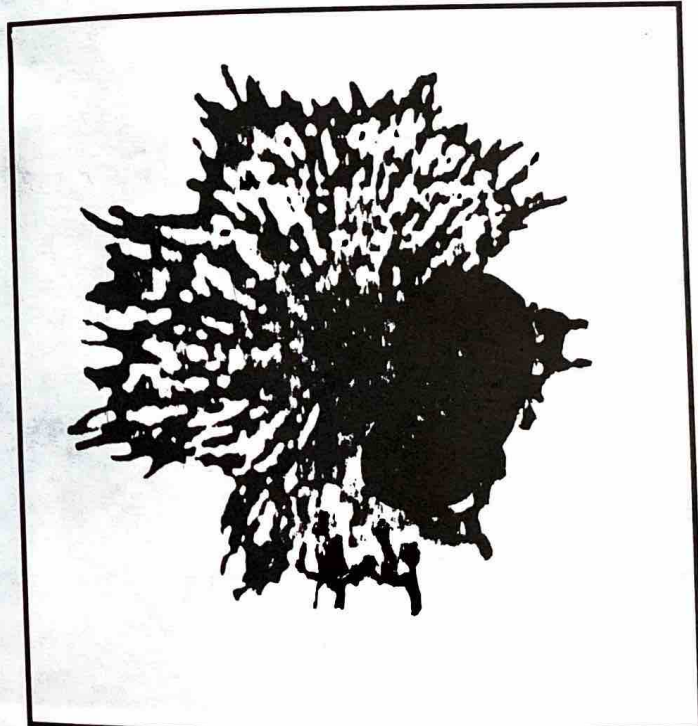


Figure 2. Egg of *Haplaphalara* sp. deposited underneath the scale like epidermal covering of the durian leaf or young stem

Nature and Extent of Damage.

This *Haplaphalara* sp. is also a sucking insect and like *A. incognita*, it also sucks plant sap on the young leaves, flowers and fruitlets. This is one of the factors that contribute to the fruitlet drop. In severe infestation on the shoots, the tree may eventually die due to defoliation.

Amrasca sp. (Empoascini, Typhlocybae: Homoptera)*

This is a hopper, green in color with 2 black dots in the pair of wings. This resembles the *A. incognita*, Hollis but slightly tinier. This is also found infesting the durian shoots but is not so important as the first two species.



Figure 3a. Durian fruitlet with *Haplaphalara* sp. nymphs.

* Identified by Dr. David Hollis, a taxonomist of the British Museum.



Fig. 3b. Shoots of durian with *Haplaphalara* sp. adult and nymphs.

Parasites and Predators

There were parasites and predators observed during sampling in the durian orchard of DNCRDC.

These were:

- 1) Green lace wing (Order Neuroptera)

The larvae of this lacewing prey the nymphs of both *A. incognita* and *Haplaphalara* sp.

- 2) Syrphid (Order Diptera)

They have the same role with the lacewing. It was also the larva that were observed to feed on the nymphs of the said foliar pests.

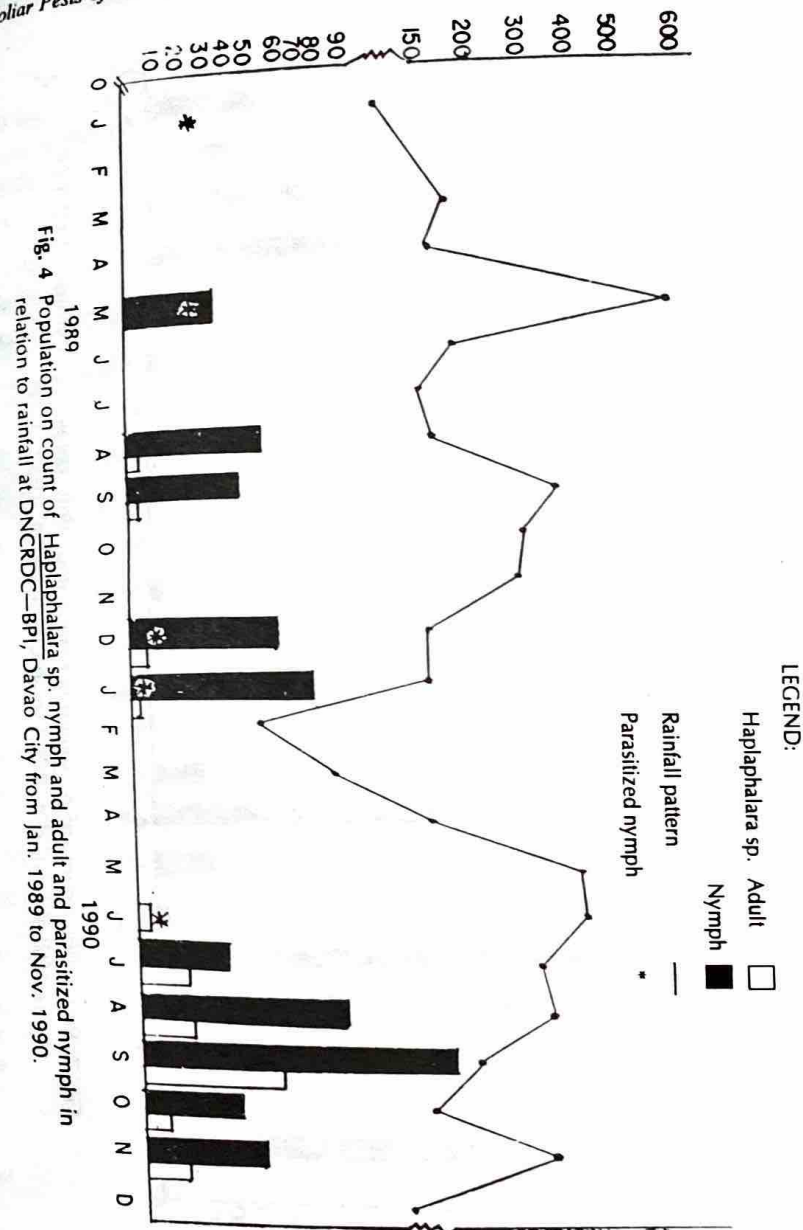
- 3) Nymphal parasitoids

They parasitize the nymphs of the *A. incognita* and *Haplaphalara* sp. These parasitoids were also sent for identification and identified as *Psyllaephagus allocarsidarae* **. These parasitoids were observed as potential biological control agents for these major foliar pests of durian. Result of a preliminary observation from field collection reached 16 per cent average mummified nymphs per leaf collected for presence of these psyllids. This was based from 22 leaf samples with 168 psyllids nymphs, 27 of which were mummified.

Seasonal Abundance of the Foliar Pests

The durian psyllid, *A. incognita* and *Haplaphalara* sp. occur in the Philippines during dry and wet seasons. Their relative abundance, however, differ through the months due to many factors (Fig. 4 & 5). The season as well as the prevailing weather affects the quality of the host survival of the different stages of the psyllid and activities of the parasites and predators were observed by Dr. Calilung (1989) in ipil-ipil and these observations were also true to durian psyllid.

** Identified by Dr. Evelyn Oquias of UPLB.



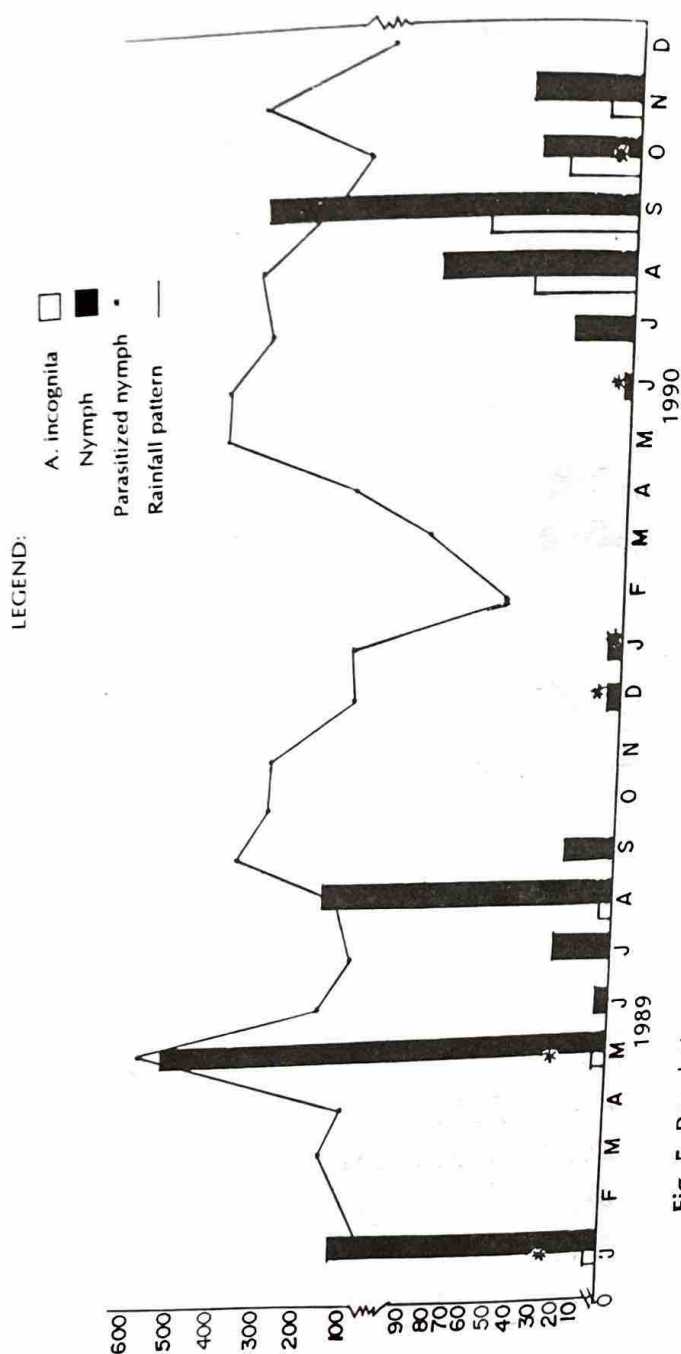


Fig. 5 Population counts of *A. incognita* nymph and adult, parasitized nymphs in relation to rainfall at DNRDC-BPI, Davao City from Jan. 1989 - Dec. 1990.

The monthly population density per 20 shoots of the durian foliar pests are shown in (Table 3). These were taken from the sampling plot located at the DNRDC-BPI. The mean monthly relative abundance of psyllids ranged from 0 to 63 and 0 to 577 nymphs and adults respectively for *A. incognita* and 0 to 57 adults and 0 to 283 for nymphs, respectively.

Table 3. Population counts of the foliar pest of durian observed at DNRDC Durian Orchard (Jan, 1989 to Dec. 1990).

MONTH	<i>A. incognita</i>		Haplaphalara sp		Parasitized	Rainfall
	Adult	Nymph	Adult	Nymph	Nymph	(mm)
1989:						
Jan.	1	133	0	0	28 = 21%	57.91
Feb.	0	6	0	0	0	91.69
Mar.	0	0	0	0	0	125.48
Apr.	0	0	0	0	0	110.00
May	8	577	0	34	23 = 3.76%	343.91
Jun.	0	5	0	0	0	131.32
Jul.	0	26	0	283	0	97.79
Aug.	6	157	3	59	6 = 2.77%	114.03
Sept.	0	21	1	47	0	235.46
Oct.	-	-	-	-	-	199.14
Nov.	0	0	0	0	0	197.87
Dec.	1	5	5	63	4 = 5.8%	122.69
1990:						
Jan.	2	8	2	75	1	112.27
Feb.	0	1	0	0	0	27.94
Mar.	0	0	0	0	0	41.40
Apr.	-	-	-	-	-	114.30
May	-	-	-	-	-	254.51
Jun.	0	1	3	0	4	262.13
Jul.	23	25	19	36	0	192.02
Aug.	43	84	19	80	0	222.25
Sept.	63	305	57	111	0	114.81
Oct.	30	40	6	40	8 = 10%	80.01
Nov.	2	13	19	46	0	220.73
Dec.	-	-	-	-	-	71.12

Generally environmental conditions are more favorable to insects during dry seasons than during wet seasons. Calilung (1989) observed this in Ipil-ipil psyllid and this was also true to Durian psyllid. Optimum body temperature is easily acquired by the insects during the dry season when the air temperature is high. Normal insect activities like flight (for colonization and mating) takes place at optimum body temperature. Rain may disrupt the insects normal activities, aside from the direct damage such as death. Higher population are mostly observed during the wet season mainly due to the better quality and abundance of food during this time (Fig. 4 & 5). In the case of psyllids, flushing of the host trees during the wet season offers them abundant food supply. Since the shoots are utilized as both feeding and oviposition sites. Their abundance are translated by the psyllids into high population densities. Also, rainfall and low air temperature affect the activities of natural enemies.

Most trees have lessened terminal growth, while other species even shed leaves to conserved water during dry season. Since psyllids would feed only on young succulent tissues of the shoots, the host tree is not in a favorable condition to colonize during dry season. This is one reason why psyllid numbers are low during dry season.

Distribution of these Foliar Pests

The areas where durian plantings are found were also surveyed and inspected for the presence of these foliar pests. These foliar pests were found present in the following durian growing areas visited in Eastern Mindanao (Table 4), like in Davao City, South Cotabato, North Cotabato, Davao del Norte, Agusan del Sur, Bukidnon. However, these pests were not observed in Leyte, Camarines Sur and Laguna wherein there were sparse durian plantings.

Control

Based from a trial on screening of some chemicals for immediate control of the *A. incognita* using their respective recommended dosage for sucking insects, all of the insecticides below resulted to 100 percent mortality regardless of their mode of action whether Systemic, contacts and stomach insecticide. The chemicals tested were: Malathion, Azinphos-ethyl + BPMC, Azinphos-ethyl, Deltamethrin, Endosulfan, Lambdacyhalothrin,

Chlorpyrifos, Dimethoate and Monocrotophos (Table 4). Among the list, Malathion is the cheapest.

Table 4. Distribution of the Foliar pests in some Durian growing areas surveyed (1988-1989).

PLACE	FOLIAR PESTS	
	<i>A. incognita</i>	<i>Haplaphalara</i> sp.
1. Davao City		
Bago Oshiro	+	+
Calinan	+	+
Toril	+	+
2. South Cotabato		
Tupi	+	+
3. North Cotabato		
Kidapawan	+	+
4. Davao del Norte	+	+
5. Agusan del Sur	+	+
6. Bukidnon		
Kibawe	+	+
7. Leyte		
Abuyog	-	-
8. Camarines Sur	-	-
9. Laguna		
Los Banos	-	-

+ The pest is present.
- The pest is absent.

These results were proven effective by proper timing of spray for seedlings and trees that can be reached by a sprayer. Frequency of spraying should still be considered and during flushing and based on the population.

Another potential control recommendation is the use of the natural enemies mentioned especially the nymphal parasite.

RECOMMENDATION

It is therefore recommended that a more detailed study on the biology and mass rearing of these natural enemies will be conducted.

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Table 5. Chemical control treatment of durian psyllid nymph of *A. incognita* before and after treatment with corresponding recommended rates for sucking insects and the current price per liter.

Treatment	Pre-treatment Count	Post-treatment Count After 2 Hours (% mortality)	Recommended Rate for Sucking Insects (tbsp)	Price per Liter Current Price (P) (1993)
T1 Malathion	29.27	100	* 2-5	200.00
T2 Azinphos-ethyl + BPMC (Gusacarb)	36.27	100	6.5-9.5	350.00
T3 Azinphos-ethyl (Gusathion)	33.47	100	6-9	335.00
T4 Deltamethrin (Decis)	18.87	100	1.5-2.5	800.00
T5 Endosulfan (Thiodan)	19.53	100	* 3-5	270.00
T6 Lambda-cyhalothrin (Karate)	18.87	100	1.5-2.5	700.00
T7 Chlorpyrifos (Lorsban)	36.87	100	2-3	350.00
T8 Dimethoate (Roxion)	26.53	100	* 1.5-2.0	303.00
T9 Monocrotophos (Azodrin 202R)	17.20	100	* 2-3	300.00
T10 Control (water)	14.20	45.50		

* Azodrin is listed among restricted chemicals.