

# EFFECTS OF ENVIRONMENT CONDITION ON THE POPULATION OF *BRONTISPA LONGISSIMA* GESTRO AND ITS PREDATOR *CHELISOCHES SPP.* IN NORTH LAMPUNG

by

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## ABSTRACT

A field study to investigate the effects of environment conditions on the population density of the coconut hispid *Brontispa longissima* Gestro and its predator Forficulid *Chelisoches* spp. was carried out in Sin ar Saerang mandiri (SSM) coconut plantation and its surrounding area, North Lampung, in May 1993. 120 trees taken at random with 1,200 still folded leaflets in 4 locations, 300 palms each, in the SW garden were observed. Another 120 trees, also taken at random, in similar patterns as that of the S.W were studied. Chemical treatments were conducted regularly in the XSM area but none in the surrounding area.

Results of the study showed that *B. Longissima* and its predator *Chelisoches* populations were found to be higher in the S.W.' garden than that of the surrounding coconut plantation. Those species of *Chelisoches* outside the garden and only one inside the area.

## INTRODUCTION

The coconut palm, *Cocos nucifera* Linnaeus, is one of the major industrial crops in Lampung province. Based on total area of 181,193 ha, about 96 % are operated by small holders and only 8,328 ha or 5.14% are owned by big companies (Ditjenbun, 1989).

One of the factors causing the decrease of nut production in the province is pest infestation such as, *Hidari irava* Moore, *Brontispa longissima* Gestro, *Artona catoxantha* Hanipson, *Oryctes rhinoceros* Linnaeus, *Rhynchophorus ferrugineus* Olivier, and various species of grasshoppers. This paper discusses the effects of the environment conditions on the population density of the coconut hispid *B. Longissima* and its predator.

### *Biology of Brontispa longissima Gestro*

The coconut pest, *Brontispa longissima* Gestro (Coleoptera: Hispidae), is one of the serious pests in the country (Tjoa, 1953, Lever, 1969, Kalshoven, 1981). Based on total growing area attacked the hispid occupied 48 in the country (Baringbing, 1986).

The adults and the larvae feed on both surfaces of the closely oppressed leaflets, and both stages gnaw long incisions in the tissues, parallel to one another and to the veins of leaflets. When the insects are numerous, the incisions are so close to one another that the whole of the attacked part of the leaflet dies, all leaflets are similarly injured, and photosynthesis is reduced almost to zero. Young palms less than about 8 years old suffer most, (Lever, 1969).

Adult females lay their eggs in the still-folded leaflets of both young and mature coconut palms. The eggs are brown and flat, and are laid in short chains up to 4, and sometimes singly, on the unexpanded leaflets in the bud. They hatch in 3-4 days. The whitish larva has a pair of

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prominent coliper-like hooks at the hind end. It becomes fully fed in about 54 weeks. The pupa moves freely, by wriggling, between the apposed surfaces of the developing leaflets and the adult emerges from it in 4-6 days. The whole cycle, from egg to adult occupies about 5-7 weeks in Java and Sulawesi (Kalshoven, 1981; Lever, 1969). The female matures sexually in about 2 more weeks, and then begins egg laying and produces on average 120 eggs in the course of several weeks (Kalshoven, 1981).

Objective of the study is to investigate the effects of environment condition on the population density of the beetle *B. longissima* and its predator forficulid *Chelisoche* spp. inside and outside the Sinar Saerang Mandiri coconut garden, North Lampung.

#### *Coconut Garden Situation*

The 900 ha Sinar Saerang Mandiri (SSM) coconut plantation, 75 m above sea level is located in Sidodadi Village, South Sungkai subdistrict, North Lampung regency, Lampung province. The 4 year old hybrid of PB-121 coconut palms are now beginning to produce fruits. Among the trees only cocoa is grown as an intercrop. Control of the pests, both attacking the palms and cocoa, was regularly conducted whenever the insects are present in the leaves.

Around the garden, mature coconut palms of local tall and dwarf cultivars belonging to small holders are grown with other crops such as banana, cassava, various kinds of vegetables, corn, and several species of trees like mango, jackfruit, and clove. No chemical insecticide was used in the control of the insect pest in this area.

Observations of the coconut pest *B. Longissima* and its predator *Chelisoche* spp. population were carried out in May 1993.

#### *Observations*

Based on the area attacked by *B. longissima* the SSM coconut garden was divided into 4 locations. Each location consisted of around 500 trees. Thirty still-folded heart leaves, taken at random, were observed from each location. Ten leaflets, 5 from each side, taken at random were cut. *B. longissima* population and its predators, *chelisoche* spp., in the leaflets, were then observed. There were 120 palms with 1200 leaflets in the SSM investigated. Similar method was also conducted in 4 locations outside the garden belonging to the small holders. Thus, there were 240 trees with 2,400 leaflets studied altogether.

## **RESULTS AND DISCUSSION**

Results of the study in both areas, Sinar Saerang Mandiri (SSM) and the surrounding gardens, are shown in Tables 1 and 2. Percentages of trees attacked by the hispid, *B. longissima*, inside and outside the SSM garden were almost equal, 13.33% and 15.83 %, respectively. The average dispersals of the pest predator, *Chelisoche* spp. in both areas were also almost equal, i.e., 3.33% and 5.83%. These tables show that the average population density of the hispid inside the SSM was higher than that of the surrounding gardens: 41.50 and 29.75, respectively per 300 leaflets. Population of *Chelisoche* spp. per 300 leaflets inside the SSM was a little bit higher than that of the outside of the garden, yet it is not significantly different statistically.

Location	Number of palms Observed	Number of leaves per palm	Number of leaflets per leaf	Percentage of trees Attacked	Population the pest in 300 leaflets	Percentage of <i>C. moris</i> dispersal	Population of <i>C. moris</i> in 300 leaflets
Antan I-A	30	22.67	192.13	10.00	48.0	3.33	2.0
Antan I-B	30	20.70	182.63	13.33	64.0	6.67	3.0
Antan 2-A	30	21.77	185.60	20.00	30.0	0.00	0.0
Antan 2-B	30	20.83	190.57	10.00	24.0	3.33	1.0
Total	120	85.97	750.57	52.33	166.0	13.33	6.0
Average	30	21.49	187.73	13.33	41.5	3.33	1.5

Inside the SSM garden, only one species of *Chelisochea* predator was obtained in the survey, that was *C moris*. The outside area, belonging to the small holders, 3 species of the forficulid existed : they were *C moris* and 2 other *Chelisochea spp.*, unidentified yet. Heavy insecticide treatments were always implemented in the SSM area whenever leaf-eating insects occurred in the palm and cacao trees. Consequently, 2 species of the genus were forced to transfer to safer places, the surrounding coconut gardens, where no chemical control was performed. There is a possibility that *C moris*, the only species of *Chelisochea* is now left in the SSM garden, will also leave the garden in time if this natural enemy could no longer tolerate the continuous insecticide destruction.

As stated earlier, cacao was the only crop grown among the palms in the SSM garden while in the outside area various kinds of crops were planted (banana, cassava, vegetable, corn, peanut, mango, jackfruit and clove). According to the natural biological control theory, pest population is lower in the area which consists of many species of plants compared to that area with only one or two crops. This theory is fully proved in the population of the hispid outside the SSM garden, in which coconut palms grown together with many other species of plants, was lower than the SSM it self.

Location	Number of palms Observed	Number of leaves per palm	Number of leaflets per leaf	Percentage of trees Attacked	Population the pest in 300 leaflets	Percentage of <i>C. moris</i> dispersal	Population of <i>C. moris</i> in 300 leaflets
Katanegara	30	15.40	208.87	26.67	47	3.33	2
Tamanjaya	30	17.20	183.27	13.33	6	10.00	2
Gedung Ketapang	30	21.07	197.40	20.33	65	10.00	3
Kota Agung-2	30	14.00	216.07	3.33	1	0.00	0
Total	120	67.67	802.61	63.33	119	23.33	7
Average	30	16.92	200.65	15.83	29.75	5.83	1.75

The highest population of the pest and its predator inside the SSM garden was found in Antan- 1 B block : 64 *B. longissima* and 3 *Chelisochea*, and outside the area, Gedung ketapang, had almost 65 pest and 3 predator of *B. longissima* inside die SSM was found in Antan-2 B block (24 insects) and 1 predator in the outside garden, Kotaagung-2 obtained the lowest. These data show where there is higher population of the pest, higher population of the predator is also obtained where population of the pest was low, prey population was also low. It can be concluded from these data that the population of the *Chelisochea* is more in an area where the prey is high.

The case for biological control of native pest species is technically more complicated than it is for the invading foreign pest. (Bosch et al., 1982) also mentioned that a native species must be presumed to have already associated with it an assortment of adapted natural enemies, and after investigation, this is usually found to be the situation. This is true in the coconut gardens outside the SSM since *Brontispa* and *Chelisoche*s were among the native trees in the area. To lessen the population of the pest in a long term, it is wise to introduce the pupae parasite of *Tetrostichus brontispae* Ferriere in areas mentioned above.

### CONCLUSION AND SUGGESTION

The average population of *B. longissima* inside the SSM was higher than that of the outside garden. Manipulation of the predator *Chelisoche*s is needed in the control of the pest. the pupae parasite of *T. brontispae* is suggested to be introduced in the SSM garden.

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