

POPULATION FLUCTUATIONS OF THE COCONUT CATERPILLAR, *NEPHANTIS SERINOPA*, IN CEYLON *

By

U. B. M. EKANAYAKE,

Coconut Research Institute of Ceylon.

SUMMARY

The Coconut Caterpillar is controlled by biological means in Ceylon. Certain of its parasites are bred in the laboratory and released in affected estates. Census of the pest population densities are maintained on nine coconut estates and these are given in the paper.

INTRODUCTION

The Coconut Caterpillar, *Nephantis serinopa* (Lepidoptera : Cryptophasidae) is a pest of coconut palms in India, Burma and Ceylon. In Ceylon it was first recorded in 1900 and by 1920 had reached serious proportions in the Eastern Province. At present the pest also occurs in the Western, North Western, Central and Southern Provinces.

Jayarathnam (1941) has referred to the early attempts at controlling the pest by biological means, by releasing its parasites, particularly the pupal parasite, *Trichospilus pupivora* Ferriere (Eulophidae). Until 1958 this work was carried out by the Department of Agriculture (Ceylon). In the same year the Coconut Research Institute of Ceylon took over this work. In 1960 the Institute obtained the services of an Entomologist under the Colombo Plan Technical Co-operation Scheme, and established a Parasite Breeding Station at Mylambavelly in the Eastern Province. Dharmaraju (1963) has discussed the biological control of the Coconut Caterpillar in Ceylon in great detail. Parasites of the Coconut Caterpillar are now bred in the laboratories of the Coconut Research Institute and are released in the affected estates.

Since 1964 a census of the Coconut Caterpillar population densities have been maintained regularly in five estates. Four of these estates are in the Eastern Province and the other in the Western Province. Since 1966 sampling has also been carried out regularly in four estates in the North Western Province. This paper deals with the fluctuations of the Coconut Caterpillar population densities in these estates.

LIFE HISTORY OF THE COCONUT CATERPILLAR

The life history of the Coconut Caterpillar has been described earlier (Jayaratnam 1941, Dharmaraju 1963). Female moths live for about 6 to 8 days and the males live for about 10 days in the laboratory. Each female lays approximately 150 eggs, which are deposited on the under side of the coconut leaflets. The eggs take about 3 to 4 days to hatch. The larvae feed on the leaf tissues except the upper epidermis and the mid rib and live on the lower sides of the leaflets in galleries made of silk and excreta. There is considerable variation in the duration of the larval period and it may last from about 28 to 56 days. The larvae pupate within the galleries and the pupal period varies from 9 to 12 days. The Coconut Caterpillar shows an overlapping of generations.

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PARASITES OF THE COCONUT CATERPILLAR

Lists of the parasites, hyperparasites, predators and pathogens of the Coconut Caterpillar have been given by Dharmaraju (1962, 1963). At present the following parasites are reared in the laboratory and released in the affected estates :

- Microbracon brevicornis* Wesmael (Braconidae)
- Perisierola nephantidis* Muesebeck (Bethyridae)
- Spoggosia (Stomatomyia) bezziana* Baranoff (Tachinidae)
- Trichospilus pupivora* Ferriere (Eulophidae)
- Tetrastichus israeli* M&k (Tetrastichidae)

Spoggosia bezziana appears to be an efficient larval parasite, although in certain areas it is heavily hyperparasitised. Of the indigenous parasites we find that *Diocetes* sp (Ichneumonidae) and *Apanteles taragamae* Viereck (Vipionidae) are useful larval parasites. We have now succeeded in rearing the former in the laboratory and it is hoped to release this parasite in certain selected areas. Although *Microbracon brevicornis* has been released in large numbers, it does not appear to have established itself as yet.

Unfortunately it has not been possible to estimate the population densities of the parasites in the field as yet.

PEST POPULATIONS

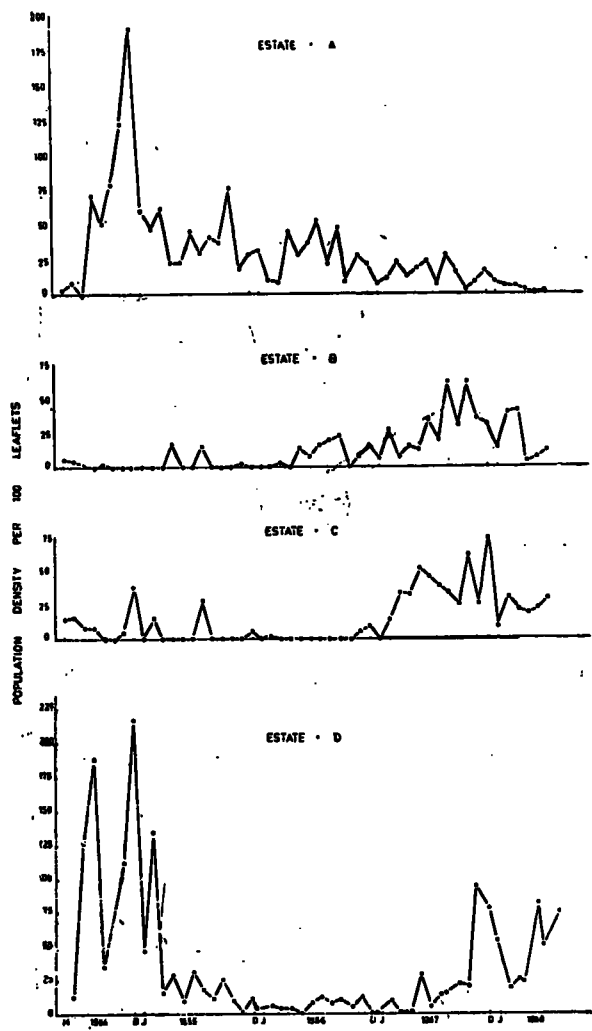
Each estate is sampled about once every four weeks. Five palms are selected at random and a leaf is removed from each of the palms. The leaflets of these five leaves are bulked and a sample of 100 leaflets removed at random for the Coconut Caterpillar population counts. The 100 leaflets are examined to determine the population densities of the different stages of the Coconut Caterpillar, and the mortality factors. Thus we obtain the population density of the pest per 100 leaflets. Some work in progress at present on sampling techniques, should enable us to give estimates of population densities per square metre of leaf area, the extent of defoliation and any reduction of yield due to Caterpillar attack.

Figure I shows the fluctuations of the Coconut Caterpillar population densities on four estates in the Eastern Province. The estates are separated from each other by other coconut lands and lie in the "coconut belt" on the eastern coast. It is seen that in Estate A, the population densities have decreased over the last four years. However, in the other three estates the population densities have tended to increase over the same period.

Figure II shows the population densities on four estates in the North Western Province. Here we see that the populations tend to fluctuate in a similar manner. Figure III shows the population densities in an estate in the Western Province.

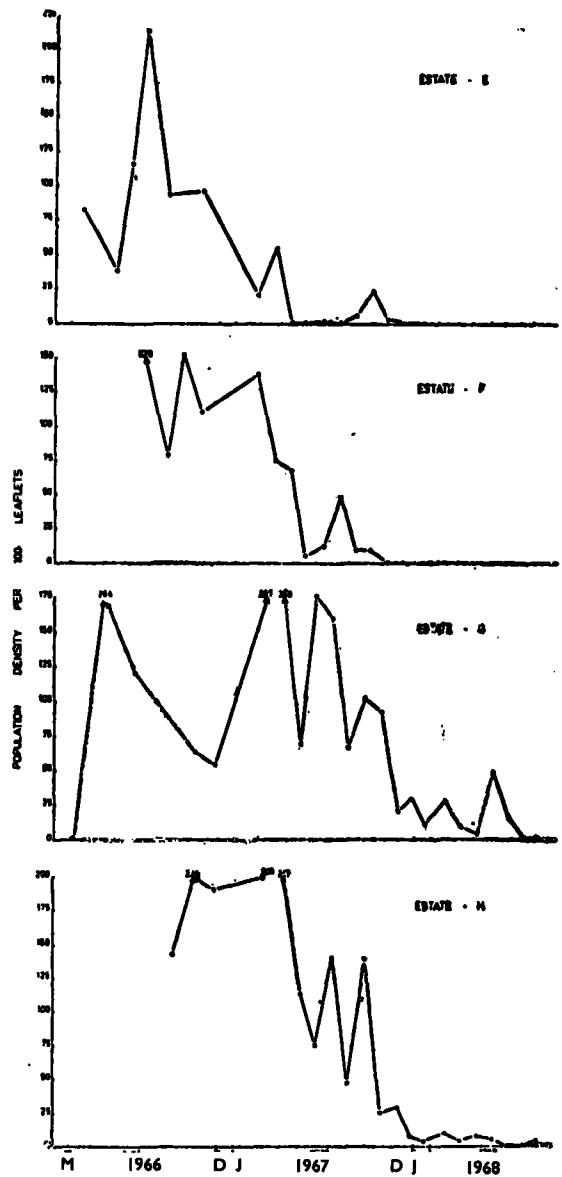
DISCUSSION

It has been observed (Dharmaraju 1963) that the pest is prevalent during the dry months of the year, and that their numbers decline during the rainy season. The information collected on Estate I (Figure III) in the Western Province has been examined to determine whether the fluctuations in the population densities are related to any weather factor. So far we have not found any meaningful relationship. It is not likely that weather factors are 'regulating' the populations of the Coconut Caterpillar, although certain weather factors may be responsible for a large percentage of the total mortality.



NEPHANTIS SERINOPA POPULATION DENSITIES ON FOUR COCONUT ESTATES IN THE EASTERN PROVINCE OF CEYLON

FIGURE I



NEPHANTIS SERINOPA POPULATION DENSITIES ON FOUR COCONUT ESTATES IN THE NORTH WESTERN PROVINCE OF CEYLON

FIGURE II

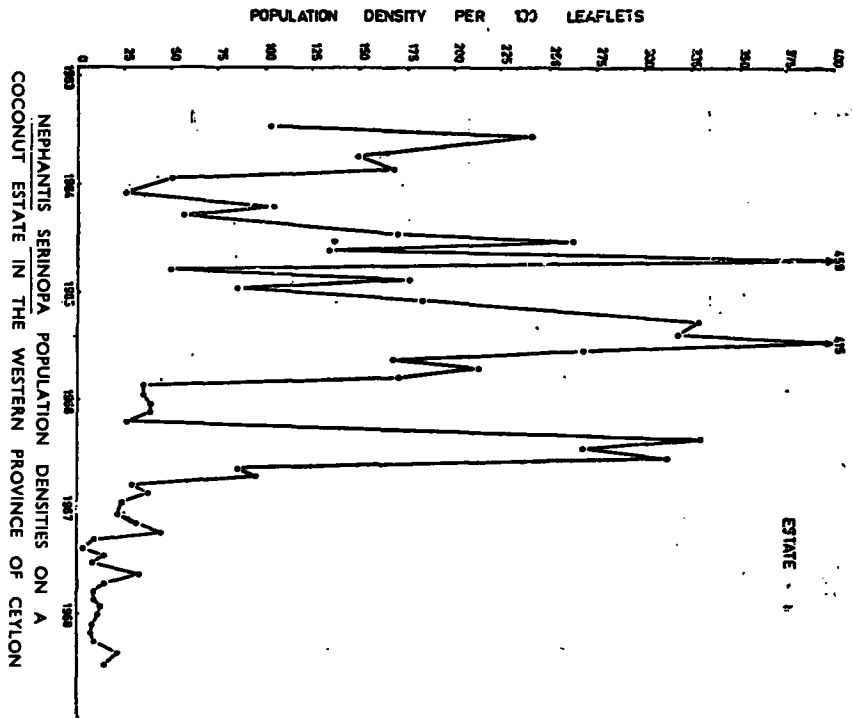


FIGURE III

We would like to test the hypothesis that the parasites are responsible for regulating the population densities of the Coconut Caterpillar. Here we are faced with a number of difficulties. Most of the long-term population studies on insects have been carried out on univoltine species, and where fairly accurate samples can be taken at certain stages of the life cycle. The Coconut Caterpillar shows an overlapping of generations, and a leaf defoliator of coconut is not the easiest animal to sample.

We find similar difficulties in carrying out long-term population studies on the other pests of coconut in Ceylon. It would be very useful to develop methods of sampling of the pests of coconut and to develop new techniques of interpreting population data.

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