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COCONUT PESTS IN SRI LANKA—THE COCONUT CATERPILLAR

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ABSTRACT

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This is the first of an intended series of short papers on pests of the coconut palm in Sri Lanka, especially meant to provide the coconut grower with information on the distribution, nature of damage, spread of pest and control measures.

In this paper the present distribution of the coconut caterpillar—*Nephantis serinopa* Meyrick—in Sri Lanka is broadly outlined. A brief description of the pest, its biology and the nature of damage is given. The spread of the pest and control measures that could be adopted are discussed.

INTRODUCTION

The coconut palm in Sri Lanka is attacked by a variety of pests; most of them are insects. The majority attack the leaves, while others attack the trunks (stems), inflorescences, young nuts and roots. Some are major pests which cause considerable damage and loss to the Industry, while others are less damaging. There is still a third category, where the damage done is so negligible that no serious attempts have been made to study these insects in detail, and thus very little is known about them.

Most of these insects remain as minor pests, either because the environmental conditions are not favourable for their rapid multiplication, or because they are adequately controlled by natural enemies.

Of the major pests, the coconut caterpillar—*Nephantis serinopa*, the red weevil—*Rhynchophorus ferrugineus*, the coconut scale—*Aspidiotus destructor*, and the black beetle—*Oryctes rhinoceros*, are predominant. The coconut leaf miner—*Promecotheca cumingi* (a recent introduction to Sri Lanka) was a major pest and a serious threat to the coconut industry a few years back, but is at the moment, very well controlled by the introduced parasites, and may be considered as a pest of lesser importance now.

Of the minor pests the more important are: the nettle grub—*Parasa lepida*, termites, the shot-hole borer—*Xyleborus similis*, the yellow spotted locust—*Aularchis miliaris*, and the bag worm—*Manatha (psyche) albipes*.

It is intended to present a series of short papers on the pests of the coconut palm in Sri Lanka, with special attention to the more important or major pests, in order to provide some information on the present situation of coconut pests in Sri Lanka. This paper deals with the coconut caterpillar, and is the first of the series.

The coconut caterpillar—*Nephantis serinopa* Meyr. (Lepidoptera: Xyloryctidae) is a pest of coconut in Sri Lanka, India, Pakistan and Burma. In Sri Lanka it was first recorded in the eastern province by Green in 1900. Since then, it has spread into most coconut growing areas of the island and is now found in the northern, north western, western, southern and central provinces. It is a serious pest in the eastern province.

PEST BIOLOGY AND CONTROL

Description

Moths of *N. Serinopa* are ashey-grey in colour, 10 to 15 mm long with a wing spread of 20 to 25 mm, and can be seen flying about at dusk in infested coconut estates. The females are slightly larger than the males. The sexes can be distinguished by the conspicuous tuft of hairs (scales) at the base of the hind-wings of the males. Each female lays about 150 eggs on the underside of the leaflets. These hatch in about 3 - 4 days. Each larva is pale white with a prominent dark brown head. The infested green matter gives a greenish hue to the body of the larva. There are five larval instars. Reddish brown longitudinal markings, one dorsal and two lateral, appear along the length of the larval body in the 4th and 5th instars. The fully grown 5th instar larva which is about 15 mm long becomes inactive and turns pinkish just before it pupates. The larval period lasts about 4 - 8 weeks, and the pupal for about 9 - 12 days. Moths emerge from the pupae.

The coconut caterpillar shows an overlapping of generations, so that all the stages viz. adults, eggs, larvae and pupae, may be found at the same time at any one place of infestation.

Nature of Damage

Damage to the coconut palm is caused by the larvae which feed on the green parenchymatous tissue of the leaves. They feed from the lower or underside, leaving the thin parchment-like upper epidermis undamaged. This undamaged upper epidermis soon turns greyish brown, and a brown patch appears where each larva has been feeding. When a number of larvae feed on a single leaflet the individual brown patches may coalesce and the

entire leaflet may turn brown. During heavy infestations, entire leaves may be attacked in this manner. From a distance a heavily attacked plantation would appear greyish-brown with only 2 or 3 leaves at the top of each palm remaining green, and would create to a casual observer, the impression of damage due to fire.

The actively feeding larvae build galleries made of silk and excreta, inside which they live, and which they continue to extend as they feed and increase in size. Generally only one larva will be found inside a single gallery, but where adjacent galleries coalesce more than one larva may be seen. Larval and pupal stages of the pest may be found inside these galleries. Sometimes moths may also be seen on the leaflets. Occasionally galleries are also formed on nuts. The 4th and 5th instar larvae are voracious feeders, and major damage to the plantation is seen when the pest occurs in these stages.

Spread of the Pest

Moths of the coconut caterpillar are not strong flyers, and do not seem to be capable of flying long distances, without the help of wind. It has been observed that pest material can be easily carried with infested coconut leaves transported to uninfested areas.

The pest may sometimes be unwittingly transported in the adult form on a vehicle, moving through an infested area. The adult may then fly off when disturbed or at night and go to the nearest coconut palm. Adults carried in this manner could start an infestation in a previously unaffected area.

Control

Control of this pest can be attempted in three different ways :—

- (a) Mechanical
- (b) Chemical
- (c) Biological

(a) Mechanical Control:

In the early stages of infestation, when only a few trees are attacked, further spread of the pest can be arrested by cutting and burning the infested leaves. *If adult moths are noticed*, fires may be lit at dusk, in the infested areas, so that the moths, which are nocturnal, are attracted to the fire and are destroyed. In seedlings and young palms, collection and destruction of the pest can be done, either by hand-picking the larvae, or by selectively cutting out the infested leaflets, and this practice can be most effective, in the early stages of infestation.

Mechanical control measures adopted should however be followed up with chemical or biological control measures or both.

(b) *Chemical Control:*

Before any chemical control measures are initiated, efforts should be made to ascertain whether natural enemies of the pest (parasites and predators etc.) are already present in sufficient numbers. If large numbers of natural enemies (biological control agents) are present, chemical spraying, night fires etc. should not be resorted to.

Application of D.D.T. at 0.2% has provided 70% to 80% reduction in larval populations in about two weeks (Nirula *et al.* 1951). The application of a suitable organophosphorus insecticide at very low concentrations (0.05% active ingredient) if carefully handled could result in substantial reduction in pest populations. Considering the nature of the coconut palm, and the pest that lives on it, for very effective results, spraying programmes should best be confined to seedlings and young plantations.

(c) *Biological Control:*

(i) *Using other beneficial insects:*

Jayarajam (1941), Dharmaraju (1963) and others, have made studies of the natural enemies of the coconut caterpillar in Sri Lanka. A number of insects which attack the coconut caterpillar and feed and multiply on it have been identified. These insects are referred to as parasites, and the science of their use in controlling the pest is called biological control.

For the control of the coconut caterpillar, egg-parasites are available which attack the eggs of the pest, larval parasites which attack the larvae and pupal parasites which attack the pupae. Some of these parasitic insects are bred in the laboratories of the Coconut Research Institute at Lunuwila (in the north western province) and at Mylambavel in the eastern province.

An egg-parasite, *Trichogramma braziliensis* (Trichogrammatidae) is being bred and released in infested areas. This insect introduces its own egg into the egg of the coconut caterpillar. The young parasite larva resulting will thus be inside the coconut caterpillar (pest) egg. These young parasite (larvae) will feed on the coconut caterpillar egg and thereby destroy it.

Some of the larval parasites that are bred in the laboratories and issued to planters are *Perisierola nephantidis* (Bethyridae), *Spoggosia* (*Stomatomyia*) *bezziana* (Tachinidae) and *Eriborus trochanteratus* (Ichneumonidae). These lay their eggs on or in the body of the coconut caterpillar. When the eggs hatch the young parasites (larvae) feed on the body of the coconut caterpillar and thereby destroy it. When parasite populations are high large numbers of pest are destroyed.

A pupal parasite *Trichospilus pupivora* (Eulophidae) has been recorded from *Nephantis* infested coconut estates in Sri Lanka. This parasite is effective in the western and north western provinces of Sri Lanka where



Fig. 1. Coconut caterpillar - infested palms.

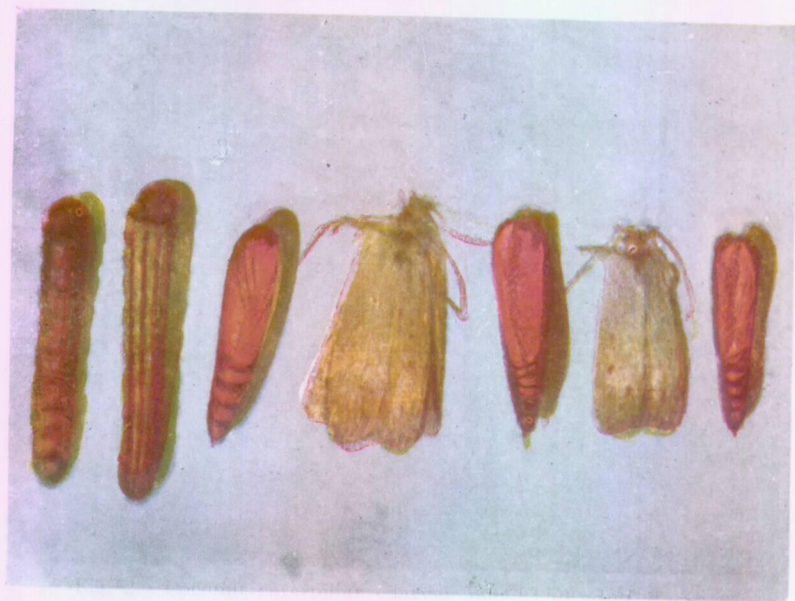


Fig. 2 Coconut caterpillar - larval, pupal and adult stages.

the climate is milder, but is susceptible to the higher temperatures (over 32°C) and lower humidities (below 40%) which prevail in the eastern province during the dry season. Furthermore, it acts as a hyperparasite on *Spoggosia*, which is a predominant parasite in the eastern province.

Other parasites such as *Apanteles taragamae* (Vipionidae), *Brachymeria, nephandidis* (Chalcididae) etc. are found under natural conditions (Dharmaraju 1963). The introduced and naturally occurring parasites collectively work towards the control of the pest.

All these parasites which feed on the different stages of the pest, multiply and increase rapidly in numbers. A single female parasite is capable of laying many eggs and many off-springs will be produced in the next generation to attack the pest with renewed vigour. An interesting aspect of this relationship is that all these parasites have very short life-cycles (egg to adult average being about 15 days). Thus within one pest generation which lasts for about two months, the parasites are able to produce four generations.

An important feature in this method of control is that an initial introduction of a relatively small number of parasites, will be able to control a large pest population in a short period of time. In successful biological control programmes the parasites increase in number and bring down the population of the pest, so that once a balance is established between the pest and the parasites, the process will be self-perpetuating and no further releases of parasites or for that matter, concerted action in any form, will be necessary.

(ii) *Using other organisms:*

A bacterium *Bacillus thuringiensis* has been tried out as a spray (a suspension of spores in a liquid medium). Its usefulness is limited in that a spraying operation is involved and the natural spread of the bacterium in the field is uncertain.

Growers in Sri Lanka are expected to bring pest infestations to the notice of the Coconut Research Institute. After assessing the damage, parasites of the pest are either personally released by the Institute's officers or are sent by post in glass tubes, packed in wooden boxes. On arrival the tubes should be examined and if the parasites have emerged, they should be released on the crowns of affected palms. Night fires should not be lit after releasing parasites.

Pest Populations

The Institute maintains regular records of population densities of the coconut caterpillar on selected estates in the eastern province, north western province, and the western province. Sampling is carried out

regularly and population density of the coconut caterpillar and the populations of larvae and pupae parasitised by various parasites are estimated.

It has been observed that the pest is more active during the dry months of the year, and their numbers decline during the rainy season. Attempts to correlate weather factors with population densities on an estate in the western province have not revealed a meaningful relationship (Ekanayake, 1968). It is observed, however, that there is considerable mortality of 1st and 2nd instar larvae during heavy rains due to drowning and fungus attack which develop under the humid conditions.

Estate Sanitation and Environmental Control

In any pest control activity adequate attention should be paid to estate sanitation and environmental control. In addition to coconut, the coconut caterpillar has a number of other host plants including the palmyra palm—*Borassus flabelliformis*, the tali-pot—*Corypha umbraculifera*, the kitul—*Caryota urens* (Ekanayake, 1968). In fact records indicate that this pest may primarily have been a pest of palmyra and is now found attacking coconut as well. In the eastern and northern provinces of Sri Lanka, palmyra is found to grow freely along with coconut and in localities where *Nephantis* infestations occur, it attacks both palmyra and coconuts.

During the unfavourable rainy season the larval galleries, together with the thin papery epidermis of the coconut leaf are easily soaked and damaged, and larval and adult mortality as a result, is high. During this period very good protection is afforded to the pest present on the palmyra palm, by the much thicker epidermal roof over the larval galleries. Almost impregnable protection from parasite, predators and weather, is obtained where 2 palmyra leaves touch and overlap with the larval gallery in between. It has been the personal observation of the writer that uncontrolled growth of palmyra in coconut lands contributes to the survival and spread of *Nephantis*.

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