

## Pest and Diseases of Coconut and Their Control\*

R. MAHINDAPALA

Coconut Research Institute, Lunuwila, Sri Lanka

Coconut palms in Sri Lanka are affected by a considerable number of pests and diseases some of which reduce production or quality. Pests of the coconut palm can be broadly categorized into major pests and minor pests.

- Major pests*
1. Coconut leaf miner, *Promecotheca cumingi*
  2. Coconut caterpillar, *Nephantis serinopa*
  3. Red Weevil, *Rhynchophorus ferrugineus*
  4. Black beetle, *Oryctes rhinoceros*
  5. Coconut Scale, *Aspidiotus destructor*

- Minor pests*
1. Termites
  2. Nettle grub and bag worm, *Parasa lepida* and *Psyche albipes*
  3. Spotted locust, *Anlarches miliaris*

### 1. The Coconut leaf miner, *Promecotheca cumingi*

The coconut leaf miner had been inadvertently introduced to Sri Lanka in 1970, and caused extensive damage to coconut palms, in the first instance in the Colombo area and subsequently in the suburbs. This is one of the most important pests of coconut palms in coconut growing areas of the world.

The beetles are uniformly reddish brown and 7-8 mm long. The damage caused to the leaves of the coconut palm is of two kinds. The larvae feed by mining the tissues of the leaflets, whereas the adults feed by making narrow grooves in the lower surface of the leaflets. Thus, in severe infestations, as was evidenced in the Colombo area in the early 70's, the larvae and adults jointly make the greater part of each leaflet and therefore of each leaf non-functional, and since all the leaves are damaged in the same way, affected palms are greatly weakened and the crop is drastically reduced. The damaged leaves shrivel and readily tear and break in the wind, and the palm acquires a brownish grey colour.

\* Presented at the Seminar on Research and Development Programme for Coconut Production on 17th March, 1978 at the Agrarian Research and Training Institute, Colombo 7.

The pest is now under complete control, which was brought about by the importation, mass-breeding and release of a parasite, *Dimmockia javanica*, which attacks the larval stages of the pest.

## 2. The Coconut caterpillar, *Nephantis serinopa*

This pest causes serious damage to coconut palms and is present in all coconut growing areas of Sri Lanka with a preponderance in the Eastern Province. This is a moth with brownish-grey wings. The eggs are laid on the leaves and the emerging caterpillars, which are whitish, feed on leaf tissue making galleries made of excreta. Severe outbreaks of this pest involving hundreds of acres have been observed in Sri Lanka, causing considerable crop losses. The damage is particularly severe in dry months, and it is partially controlled during wet weather due to asphyxiation of the larvae.

This pest too is controlled by biological means. Several parasites, which are capable of attacking different stages of the life cycle, are mass-multiplied in the laboratory and released in the field to control this pest. Suitable insecticide such as Trichlorophon can be used in conjunction with parasites to control this pest, whenever total success cannot be achieved with parasites due to some reasons.

## 3. The Red Weevil, *Rhynchophorus ferrugineus*

This is a devastating pest, especially in young coconut stands. The pest is a large (about 3 cm), very robust, dark brown weevil. The female lays its eggs in wounds along the trunk or in petioles and also in wounds caused by the black beetle. The young larvae immediately bore into the trunk, making deep tunnels. Gradually, the tissue of the trunk is eaten up, and the palm collapses as the burrows become extensive.

Since the detection of the pest is difficult, emphasis should be placed on preventive aspects. Palms should be regularly inspected and wounds dressed. Heavily infested palms may be treated with a suitable insecticide such as Methyl S Demeton and Monocrotophos.

## 4. The black beetle, *Oryctes rhinoceros*

The black beetle is not a particularly harmful insect in Sri Lanka, but considerable damage is observed in palms located near fibre dust heaps and in poorly managed lands where decaying logs etc. are found. These are the breeding grounds of the beetle.

The beetle is a shining, dark brownish-black insect, 25-30 mm long which gnaws through the tightly packed unopened leaves in the central bud, with the result that when the leaves open they are seen to have great triangular gashes in them, as if the leaflets had been cut with scissors. The injuries caused by this beetle often attracts the Red Weevil.

The eggs are laid in moist, decomposing vegetable matter, where grubs grow and adults emerge. As a fundamental prophylactic measure, all possible breeding places must be eliminated and every effort made to ensure that no new ones are created. Crowns of palms could also be treated with a suitable insecticide such as B.H.C. to act as a repellent.

## 5. The Coconut Scale, *Aspidiotus destructor*

This can be a serious pest of coconut. In severe outbreaks, it forms a continuous crust over the lower surface of all the leaves, which first become yellow owing to heavy loss of sap and blocking of the stomata, and finally die.

The eggs, which are yellow, are laid under the scale around the body of the female. On hatching, the minute active nymphs leave the maternal scale and each takes up a position on the leaf suitable for its feeding needs; it remains in this position throughout its development, and, if it is a female, throughout its adult life also. The males have wings.

Small infestations can be controlled by cutting and burning the infested fronds. Heavier infestations are controlled by biological means *i.e.*, by the release of predators, namely the lady bird beetles.

In addition to the above mentioned pests, several minor pests cause damage to coconuts. These are as follows:

### 1. Termites

Some termites are pests of seedlings and seednuts. Sometimes they can be a serious pest in nurseries. The wilting of the central shoot is the first sign of their attack, which usually occurs at the base of the collar.

It is desirable to destroy termite nests in the land. Transplanted seedlings should be protected from termites by applying a suitable insecticide such as Chlordane.

### 2. The Nettle grub, *Parasa lepida*, and the Bag worm, *Psyche albipes*

Both these are leaf-eating caterpillars and are occasionally found in large numbers causing extensive defoliation. If detected early, the infested fronds could be cut and burnt. Under normal conditions these are kept under check by naturally occurring parasites, but, if it is widespread, a suitable insecticide such as Trichlorophon should be applied.

### 3. Another pest which makes an occasional appearance is the spotted locust, *Aularchis miliaris*, which is a defoliator. A suitable insecticide should be applied in case of such an infestation.

From the foregoing account it is seen that most coconut pests are controlled by biological means. By and large, the man who depends on agriculture is convinced that he must use pesticides regularly. Data have been made available to emphasize the apparent need for, and the good derived by the farmer from, the faithful use of pesticides. Although some of these claims are justified in certain cases, they are not accepted as broad truths. Pesticides pollute the environment, endangering man, wildlife and other non-target organisms. Pesticides also upset natural balances between pests, parasites and predators, thus causing sudden flare-ups of pests. In addition, there are other disadvantages in using pesticides. However, biological control neither causes pollution nor upsets in the natural balances. Furthermore, it is cheap. Another problem in the case of coconut pest control using pesticides is the height of the palms. Because of this, it is not easy to apply insecticides to coconut palms, and when applied, a considerable amount drifts. These problems are overcome by using biological agents.

It is also appropriate to mention that we have had staggering success with biological control of *Promecotheca*. This pest caused heavy damage soon after its introduction and complete control was achieved by using parasites, which were mass-bred and released in the field. This success, achieved in a relatively short period of time, was possible by close co-operation of several organizations; an event yet unparalleled in pest control in Sri Lanka.

### *Diseases of the coconut palm*

Most of the diseases of coconut are caused by fungi.

#### 1. Bud Rot caused by *Phytophthora palmivora*

The disease manifests strongly in young plantations where humidity is high, such as in wet areas and where an underplantation is excessively shaded by the old stand.

The fungus infects the cabbage in the crown causing a complete decay. It may be impossible to detect this during the early stages. However, affected palms should be cut and burnt. As a prophylactic measure, fungicides could be applied to the crowns of palms neighbouring diseased individuals.

## 2. Stem Bleeding caused by *Ceratocystis paradoxa*

The fungus infects both young and old palms through cracks in the bark. The fungus causes the internal tissue to rot which is followed by exudation of sap.

The affected areas, which are readily recognized by dark patches, should be removed and a fungicide and/or coal tar should be applied.

## 3. Leaf blight caused by *Pestalozzia palmarum* and *Drechslera incurvata*

Leaf blight is very common in young palms, and is associated with imbalanced nutrition. The disease remains endemic under waterlogged conditions. This condition could be controlled by the application of an additional dose of super phosphate. In extreme cases, application of a copper fungicide may be considered.

### *Disorders of the coconut palm*

#### Leaf Scorch Decline

Leaf Scorch Decline is a disorder of coconut prevalent mostly in the Southern Province. The most characteristic feature of this is the necrosis or scorching of the tips of the leaflets of the lower fronds. This condition is observed only in older palms (about 20 yrs. and older). In addition to scorching, the degree of which can vary according to the condition of the palm, tapering of the trunk, narrow nuts, a decline of yield and extensive root decay can be observed.

These symptoms should not be confused with those typical of Magnesium deficiency, leaf blight and tapering and yellowing due to neglect.

The causal agent(s) of this disorder is not yet known. However, as there is an extensive root decay, it is possible that the uptake of water and minerals is affected. This may be corrected, at least temporarily, by inducing the palms to produce new roots by building a bund of soil around the bole.

Coconut diseases, somewhat similar to our Leaf Scorch Decline, are prevalent in almost all coconut growing countries. The causal agent of most of these 'diseases' is yet to be elucidated. Recent investigations have revealed the presence of Mycoplasma-like organisms and viroids associated with Lethal Yellowing Disease (Jamaica) and Cadang Cadang (Philippines) respectively.

#### *Special care in a national replanting scheme*

Pest attacks during the seedling stage can considerably retard its growth. Coconut seedlings are more susceptible to certain pests than others, during their early stages. In view of this, special care should be taken at and after replanting coconut. Failure to observe this may result in large scale losses of valuable planting material. Some of the pests and diseases that can affect seedling coconuts are as follows:

#### 1. *Termites*

Either in the nursery or in transplanted seedlings, termite attack can be very serious. If termite nests are found in the land, use of coconut husks in filling the planting holes has to be either avoided or done with special care by treating these with a suitable insecticide such as Chlordane. As indicated earlier, the bud withers away when the seedling is attacked by termites, and it is virtually impossible to cure such a seedling. It is, therefore, very important that the nuts of the seedlings are treated with the insecticide before replanting.

## 2. *Black beetle*

This pest can cause serious damage to coconut seedlings. Often the unopened leaves are attacked causing retardation of growth. Repeated attacks can cause the death of seedlings. As indicated earlier, all possible breeding places must be eliminated. Dead plant material which is rotting or which will rot if accumulated must be burned or buried, and fallen trunks must be split and burnt. Much additional damage, and often the death of seedlings and young palms, result from the attraction of the Red Weevil to the wounds inflicted by the Black beetle. The tender leaves of young palms should be treated with a repellent insecticide such as B.H.C.

## 3. *The Red Weevil*

This pest may prove to be fatal and can cause serious damage to young plantations. This pest has to always depend on injuries such as those found in leaf bases as well as cut ends of petioles to gain entry to the palm. It is of utmost importance that all wounds be dressed with coal tar to prevent egg-laying. As a part of proper management, cutting fronds and leaving them untreated and mechanical injuries to trunk should be avoided.

## 4. *Other pests*

In addition to the above mentioned major pests, serious damage can be caused to seedlings by some minor pests. When there is heavy weed growth and when the plantation is close to a forest, it is possible to get attacks of the locust, which will defoliate seedlings very quickly. Similarly, in places where there is extensive weed growth, damage from rats, bandicoots and porcupines can be anticipated. Such damage can be considerably reduced by periodic weeding.

It is also not uncommon to find outbreaks of minor caterpillar pests such as the Nettle grub, *Parasa lepida*, the Bag worm, *Psyche albipes*, and *Elamnius*. These caterpillars are voracious feeders on tender leaves. It is best, therefore, to inspect the seedlings regularly for the presence of such leaf-eating caterpillars. These are easily controlled by the application of a suitable insecticide (e.g. Trichlorophon, B.H.C. etc.), and if the incidence is low, by cutting and burning.

## 5. *Diseases*

An aspect which merits mention here is the seedling death by improper planting. If the seedlings are planted too deeply so as to cover their collar region, it is possible for the saprophytic fungi of soil such as *Fusarium* to cause collar rot of seedlings. This is most easily prevented by ensuring that the collar is well above the ground level at planting.

Another very common disease of seedlings and young palms is leaf blight. This is mostly due to improper manuring and seedlings are very susceptible. Death of seedlings due to leaf blight is not uncommon. Young palms are weakened due to loss of green areas. This condition can be prevented by supplying the seedlings with proper nutrients.

The Coconut Research Institute provides a number of services free of charge in pest and disease control of coconut. These are as follows:

### 1. *Supply of organisms for the biological control of coconut pests*

The Coconut Research Institute maintains two insectaries, one at Lunuwila and the other at Chenkaladi, for mass-breeding and supply of parasites for the control of Coconut Caterpillar. In addition, parasites of the Coconut leaf miner and predators of the Coconut Scale are mass-bred and supplied whenever there is a demand.

Parasites of the coconut caterpillar are bred on a larval stage of an alternate host, which is reared in maize. The parasites are introduced into tubes containing the larvae of the alternate host, where they will proceed to lay eggs on the host larvae. With time, the eggs hatch, and

the emerging grubs start feeding on the host larva. Sometimes, other insects are used to anaesthetize the host larva after the egg-laying, so that the host larva will be unable to wriggle and dislodge the eggs of the parasite.

Pest infestations are first surveyed by officers of the Coconut Research Institute to assess the severity and to consider the release of appropriate parasites or predators, as the case may be.

## 2. *Spraying Unit*

The Coconut Research Institute maintains a spraying unit equipped with power-sprayers for spraying coconut palms whenever appropriate. This is occasionally used to spray insecticides as a complimentary control measure to biological control. The unit is supplied, together with operators, free of charge, but the owners have to supply the necessary insecticide, labour and fuel.

3. The Officers of the Crop Protection Division of the Coconut Research Institute are often employed in the identification of pests and diseases. The officers will inspect the plantation and recommend necessary control measures.

Members of the public who desire to avail themselves of these services are kindly requested to contact the Director, Coconut Research Institute, Bandirippuwa Estate, Lunuwila (Telephone, Dankotuwa 95), giving the location and extent of the plantation.