

PESTS THAT DAMAGE COCOA PLANTS IN KERALA

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Cocoa is one of the major tropical cash crops providing valuable and nutritious food and drink. In Kerala, the crop is gaining rapid popularity with the farmers. In most areas of cultivation, the production is often severely limited by pest infestation. Studies on the pests associated with cocoa have been carried out in the Tamil Nadu State by Abraham, 1958, Abraham and Padmanabhan, 1967 and Abraham *et. al* 1970. Sathiamma (1974) reported the occurrence of the red borer *Zeuzera coffeae* Nietner in Kerala. A survey was conducted during 1976-78 in different parts of the Kerala State to study the nature of damage and seasonal history of the insectan and non-insectan pests associated with the crop and the results are reported in this paper.

Order: *Hemiptera*

Fam: *Pseudococcidae*

Mealy bugs:

Planococcus citri (Risso), *Rastrococcus iceryoides* (Green)

Of the two species, *P. citri* was relatively numerous and widespread than *R. iceryoides*. These bugs occur in groups on the tender shoots, flower stalks, foliage and on the developing pods. The tender pods are often severely attacked and these dry up due to desapping by colonies of the mealy bugs. The mature pods infested by the bugs develop irregular sunken necrotic lesions and their normal development is adversely affected. The bugs are attended by the red ant *Oecophylla smaragdina* Fabr. The peak populations of the mealy bugs occur during July-October.

The occurrence of *P. citri* and *R. iceryoides* on Cocoa in the Nilgiris has been already reported (Ayyar, 1940; Abraham and Padmanabhan, 1967).

The mealy bugs could be controlled effectively by high volume application of quinalphos (0.08%) or phosalone (0.1%).

Fam: *Margarodidae*

The mango mealy bug, *Drosicha stebbingi* Gr.

Nymphs and females are characterised by distinctly segmented elongate oval bodies and these are found to cluster on the tender shoots and desap the tissues resulting in drying up. The infestation is observed during November-December. The bugs are attended by the black ant *Camponotus compressus* Linn.

Fam: *Aphididae*

The citrus Aphid, *Toxoptera aurantii* (Kirkaldy)

The purplish-brown aphids occur throughout the State during July-September on the flower stalks, tender flaccid leaves, buds and on tender chupon shoots. Alate forms were not observed in any of the localities surveyed.

On the foliage, these aphids are confined to lower sides around the veins. The aphids are attended by a large number of *Prenolepis* sp. (Formicidae : Hymenoptera). Heavy infestation of *T. aurantii* brings about pre-mature shedding of flower and withering of the tender foliage.

Chemical control is not essential against the pest collection of infested flaccid leaves and destroying them will be sufficient to prevent their multiplication.

T. aurantii is widely distributed in W. Africa (Eastop, 1961) but the present record is the first in India on Cocoa.

Fam: *Membracidae*

The cow bug, *Gargara (Maerops) mixta* Buckt.

The greenish nymphs and adults of *G. mixta* were recorded from Kannara and Puthoor areas of the Trichur district to feed on tender shoots. The females deposit eggs in slits cut on the tender shoots

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and these punctures eventually dry up. The nymphs and adults web the shoots to afford mechanical protection to the attendant ants, *Occophylla smaragdina* Fabr.

Members of the genus *Gargara* have been recorded on Cocoa in Ghana (Boulard, 1968). In India, Lefroy (1909) recorded *G. mixta* on *Dalbergia sisso*. The present record is the first on Cocoa on India.

Fam: *Miridae*

The tea mosquito bug—*Helopeltis antonii* Sign.

The mirid bugs were found to cause damage to shoots and pods in thickly shaded gardens in parts of the Idukki and Kozhikode districts during October-November. On the pods, circular water-soaked lesions develop around feeding punctures and these lesions later on become pitch black (Plate 1).

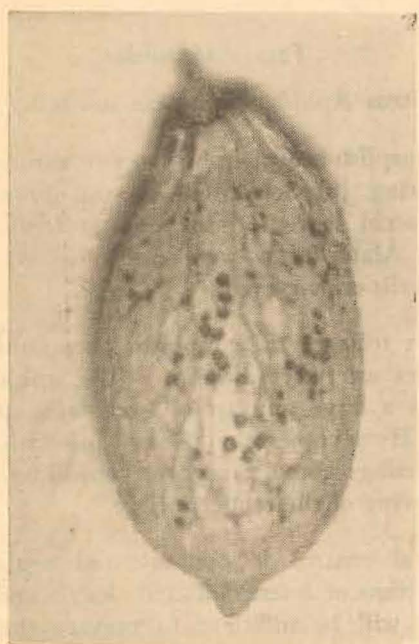


Plate 1. Cocoa pod damaged by *H. antonii*.

Multiple feeding punctures causes deformation of fruits due to asymmetrical development. On shoots, necrotic streaks develop around feeding punctures. The coalescence of the lesions causes dieback of the shoots.

In the Kanyakumari district of Tamil Nadu State, *H. antonii* has been reported as a serious pest of Cocoa (Abraham and Padmanabhan, 1967). The losses inflicted by the insect in Kerala to the Cocoa crop is quite negligible at present. This insect is already a major pest of Cashew and Tea in the

State and it is quite likely that the insect assumes major status on Cocoa in future. Insecticidal control against *Helopeltis* is not required at this stage, since the damage is not severe. However, in plantations close to cashew gardens vigilant surveillance will be quite essential against the pest. *H. antonii* is widely distributed on Cocoa in Ceylon (Wright, 1907).

Order : *Thysanoptera*

Fam: *Thripida*

Red banded Thrips

Selenothrips (Heliethrips), Rubrocinclus (Giard).

Adults and nymphs appear in colonies on the lower sides of leaves and occasionally on the pods and feed on the fluid exuding from scraped tissues. The infested leaves turn pale-green to pale-brown later and dry up. The pods develop scabby patches around feeding sites.

The pest was recorded from all the districts, the peak period of occurrence being Jan-March. The pest infestation was relatively milder in well maintained gardens with proper shade.

Order: *Lepidoptera*

Fam: *Cossidae*

The red borer, *Zeuzera Coffeae Nietner*

The insect occurs throughout the State and is particularly serious on young plants up to 1½ years age.

The reddish larvae burrow into thick fan shoots or into the main stem below the first jorquette along the centre and finally make a transverse tunnel before pupation. Small lateral galleries with openings are made at intervals of about 25 cm from which frass exude. The infestation is widespread in Kerala and the fatality is about 5%.

The lateral gallery openings are water soaked due to the exudation of a fluid from within the stem.

Infestation of the main stem of young plants causes drying up of the entire plant. The affected fan shoots show withering leaves and these shoots are subsequently snapped off. Sathiamma and Bhat (1974) have already reported the occurrence of the insect as a pest of Cocoa in the Karnataka State.

tion against the borer is particularly essen-
 young plants up to the first jorquetting.
 g BHC 0.1% on the stems or applying BHC
 P with a cotton swab on the main stem is
 o afford good protection. In grown up
 such protection cannot be recommended in
 hazards to insect pollinators.

Fam: *Lymantriidae*

Olene (Dasychira) mendosa Hub.

light-brownish, densely hairy larvae of *O.*
 z were found to feed on the foliage of cocoa
 n parts of the Trichur district during August-
 ber. The larvae occur in groups of 2-3 and
 raceously on the foliage (Plate. 2) *D. niobe*

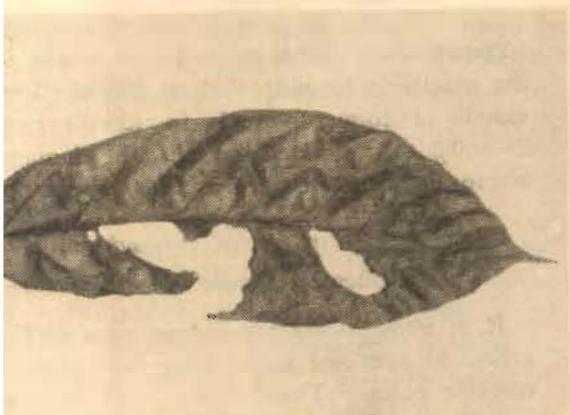


Plate 2. Cocoa leaf damaged by *Olene mendosa*.

) has been reported as a pest of Cocoa leaves
 anna (Gerard, 1966). The present record of
) *mendosa* is the first on Cocoa. Clipping of
 l leaves and destroying the larvae will be
 nt to manage their populations.

Fam: *Hypsiidae*

Argina cibraria Clerck

A. Syringa C.

y larvae of *A cibraria* and *A syringa* were
 to feed densely on tender foliage in the
 and Kottayam districts.

Fam: *Geometridae*

Denospila (Thallasodes) quadraria Guen

greenish looper caterpillars were observed as
 pests of foliage in the Trichur District.

Order: *Coleoptera*

Fam: *Cerambycidae*

Stemgirdler, *Sthenias grisator* Fab.

The stem girdler beetles *S. gristor* were recorded
 from the Idukki, Kottayam, Quilon and Kozhikode
 districts of the State. Infestation was relatively
 severe in gardens bordered by wild vegetation. The
 stout beetle girdles the main stem as well as thick
 fan branches and causes breakage at the ringed
 region. Control of the pest is very difficult.

Fam: *Scarabaeidae*

Sub fam. *Rutelinae*

Chafer beetles, *Popillia complanata* Newaman

Groups of *P. complanata* feed on roots of young
 plants and cause drying up of the entire plants. In
 festation is severe in freshly planted seedlings in
 gardens adjoining wild vegetation. The grubs are
 abundant in July-August. Prophylactic applica-
 tion of BHC 10% or Aldrin 10% DP around the
 root systems of seedlings at planting will be essen-
 tial to reduce damage.

Sub family : *Melolonthinae*

Cockchafer beetle, *Leucopholis* sp.

Roots of young and grown up plants interplanted
 with coconut in parts of the Malapuram districts
 were found subject to infestation by the cockchafer
 grubs, *Leucopholis* sp. for the first time. The
 grubs feed on the surface root mat and parts of the
 tap root causing yellowing and drooping of the
 entire foliage. The pest incidence is observed in
 March-April after receipt of the pre-monsoon showers.
 Soil application of insecticides after digging is the best
 strategy against the pest, but this cannot be recom-
 mended in Cocoa gardens in view of the damage
 to the surface root mat. In affected gardens, soil
 drenching with 0.2% BHC suspension in the early
 morning hours appear to be the only effective con-
 trol method.

Fam: *Curculionidae*

Myllocrus viridanus Fab.

M. maculosus Desb.

The greenish weevil, *M. viridanus* occur through-
 out the State as a major pest of cocoa, while *M.*

maculosus is found in a few gardens as a minor pest.

Numerous adults occur on the under surfaces of lamina and feed on the interveinal tissues leaving the veins intact (Plate 3). The flaccid tender flushes

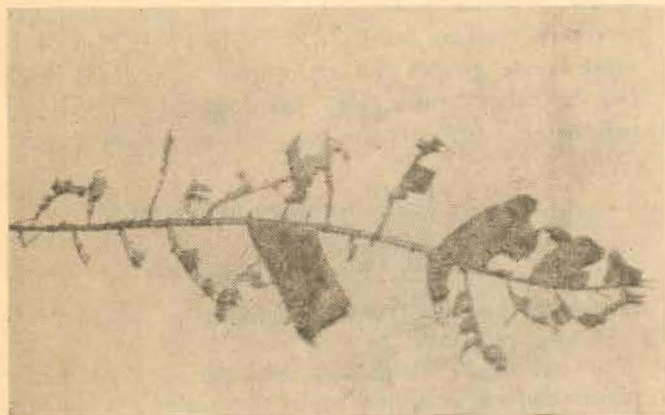


Plate 3. Leaf skeletonized by *M. viridanus*.

are not preferred for feeding. The peak populations of the beetle are observed in July-September. Infestation is relatively severe on young plants and quite often, the entire foliage of such plants are skeletonized leading to retardation in growth. On freshly planted seedlings, prophylactic application of fenitrothion (0.05%), quinalppos (0.05%) or fenthion (0.05%) is essential to afford absolute protection. It has to be ensured that the insecticidal films thoroughly cover the under surfaces of leaves.

Abraham and Padmanabhan (1967) have recorded *M. viridanus* on Cocoa in the Nilgiris and Yercaud regions of the Tamil Nadu State. *M. maculosus* is reported for the first time.

Non-insection pests

Striped squirrel

Funambulus tristriatus tristriatus Wroughton

(Rodentia; Sciuromorpha; Sciuridae)

The striped squirrel is the most serious pest of Cocoa throughout Kerala. They gnaw irregular holes through the walls of bronzing or mature pods (Plate 4) and extract the internal contents and feed on



Plate 4. Cocoa pod damaged by the striped squirrel. the mucilaginous pulp surrounding the beans. The extent of losses to pods in Kerala ranges from 25—60%. In isolated gardens, the damage is quite severe and often the entire pods are lost.

Rattus rattus Wroughtonii

(Rodentia; Myomorpha, Muridae)

R. r. wroughtonii are serious pests of Cocoa crop raised as a mixed crop along with densely planted coconut palms. These rats inhabit coconut crowns and descend from the palms during night and feed on maturing pods. The nature of damage is quite similar to the damage inflicted by the squirrels. The holes gnawed on the pod are surrounded by areas of endocarp exposed by scrapping of the fleshy portions of pods (Plate 5).



Plate 5. Cocoa pod damaged by *Rattus rattus wroughtonii*

The rats and squirrels prefer pods in the post-bronzing stage for feeding. Harvesting of the pods just when the furrows develop bronzing is found to reduce the losses substantially. Setting up bamboo traps in coconut crowns will be quite essential to control rats.

The Civet cat

Paradoxurus sp.

(Mammalia: Carnivora: viverridae)

The Civet cats are found to cause damage to pods in parts of the Malappuram, Kozhikode, Cannanore and the Kadakkal area of the Quilon district. The cats cut across the maturing pods near the centre and remove the lower halves along with the internal contents. The other halves of the pods will often be remaining on the plants. Rarely, the cats remove the entire pods from the plants.

Summary

A survey was conducted during 1976—78 in the State of Kerala, India to study the pest complex associated with the crop. The major pests were *Planococcus citri* (Risso) (Homoptera: Pseudococcidae), *Zeuzera coffeae* Nietner (Cossidae; Lepidoptera), *Sthenias grisator* Fab. (Cerambycidae; Coleoptera), *Mylocerus viridanus* Fab. (Curculionidae; Coleoptera), *Funambulus tristriatus tristriatus* Wroughton (Rodentia; Sciuridae) and *Rattus rattus wroughtonii* (Rodentia; Muridae).

The minor pests include *Rastrococcus iceryoides* Green. (Homoptera: Pseudococcidae), *Drosicha stebbingi* Gr. (Homoptera, Margarodidae), *Toxoptera aurantii* (Kirkaldy) (Homoptera: Aphididae), *Gargara (Macrops) mixta* Buckt. (Homoptera; Membracidae), *Helopeltis antonii* Sign. (Hemiptera: Miridae), *Sele-nothrips rubrocinctus* (Giard). (Thripidae; Thysanoptera), *Olene (Dasychira) mendosa*, *Argina crib-raria* Clark and *A. syringa* C. (Hypsididae; Lepidoptera), *Oenospila (Thallasodes) quadraria* Guen., *Popillia complanata* Newaman (Scarabaeidae; Rutelinae), *Leucopholis* sp (Scarabaeidae; Melolonthinae), *Mylocerus maculosus* Desb. (Coleoptera; curculionidae) and *Paradoxurus* sp. (Mammalia; viverridae).

The nature of damage and peak periods of activity of the pests have been indicated. The management methods against the pests have been suggested.

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