

## PESTS OF COCOA AND THEIR MANAGEMENT

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Pest management is one of the critical components in health management of cocoa. More than 50 insect pests infesting cocoa are recorded in India (Mariamma Daniel, 1994). Pest occurrence is widely observed during summer and post monsoon seasons. The major insect pests and vertebrate pests infesting cocoa are described below.

### 1. Tea mosquito bug: (*Helopeltis* spp.)

The important species of tea mosquito bug found in the Asian region is belongs to genus *Helopeltis* (*H. antonii*, *H. theivora* and *H. bradyi*) and it is distributed in Sri Lanka, Indonesia, Malaysia and India. Among the *Helopeltis* species, *H. bradyi* is commonly observed infesting cocoa. Being a ubiquitous pest, tea mosquito bugs are quite damaging in cocoa gardens adjoining cashew plantations irrespective of all seasons (Devasahayam, 1985).

**Symptoms:** Nymphs and adults of this mirid bug suck sap from the leaves, young shoots, inflorescence and pods. The injury made by the suctorial mouth parts of the insect cause exudation of a resinous gummy substance from the feeding punctures. The tissues around the point of entry of stylets become necrotised and black scab formed (Fig.1), due to the action of the phytotoxin present in the saliva of the bug. These lesions turn pinkish brown in 24 hours and become black in 2-3 days. Feeding on tender leaves causes crinkling (Fig.1). Affected shoots show long black lesions and may cause die-back in severe cases. Infested inflorescence usually turns black and die, immature pod may drop off. Heavily infested trees show scorched appearance, leading to the death of shoots and growing tips.

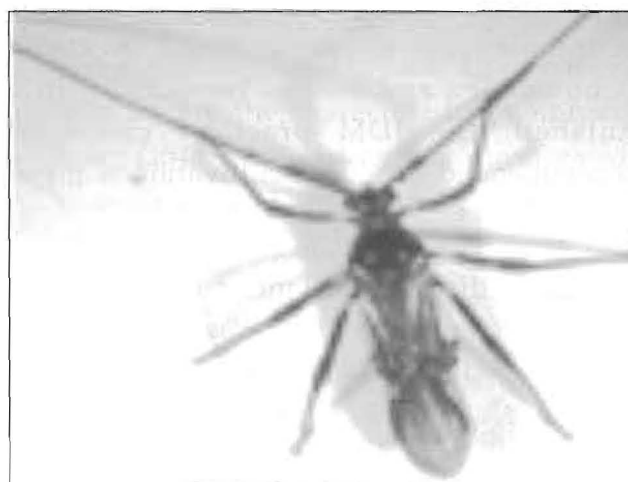


Fig.1. Tea mosquito bug damaged a) cherelles, pods, b) twigs, c) *H. bradyi*

### Management:

- Regulation of shade and sunshine through is important in managing TMB damage.
- Removal of alternate hosts such as guava, cashew, neem etc. from the immediate vicinity.
- Spraying any one of following insecticides viz., Lamdacyhalothrin 5EC (0.003 %) 0.3 ml /L (or) Imidacloprid 17.8 SL (0.004 %) 0.25 ml /L.
- If infestation persists spray may be repeated at 20 to 30 days interval, one spray each during flushing and flowering seasons. Spraying shall be resorted to afternoon hours.



## 2. Mealy bugs: (*Planococcus lilacinus* and *P. citri*)

Mealy bugs are emerging insect pest of cocoa in India, which is mostly confined during summer season (Nair, 1981).

**Symptoms:** Feeding on tender apical shoots results in reduced growth and such shoots deformed into a slender hair like processes resembling a brush. Colonization of flower cushions results in cushion abortion and continuous attack results in withering and drying up of flower cushions. Infestation of cherelles by mealy bug induces chermelle wilt. Feeding on the rind of pods results in irregular cracks and pitting. Usually beans are not affected by mealy bug colonized on mature pods (Fig.2). Seedlings and young plants colonized by the mealy bugs show retarded growth and excessive branching at undesired height. The population of mealy bug attains peak during April- May.

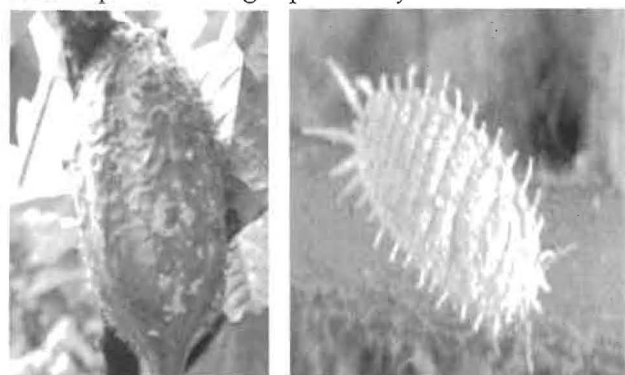


Fig.2. a) *P. lilacinus* affected pod with ants,  
b) Adult of *P. lilacinus*

### Management:

- Conservation of lady bird beetles belonging to *Pullus* sp. as well as *Lycaenid*, *Spalgus epius* for encouraging bio-suppression of mealy bugs.
- Common management practices includes, spot application on the pest loci with 0.5% neem oil emulsion two-times at fortnightly intervals or need-based application of Imidacloprid @ 0.3 ml /L of water or Dimethoate 30 EC @ 1.6 ml /L of water.

## 3. Aphids: (*Toxoptera aurantii*)

The aphid is present throughout the year, but population is found to be low from February to July, with a peak from August to January.

**Symptoms:** Aphids colonize terminal and growing shoots of cocoa causing leaf deformation (Fig.3) during summer. They can also colonize on succulent stem, flower buds and small cherelles, which may cause premature shedding of flowers and curling of leaves. Extensive damage is not reported.

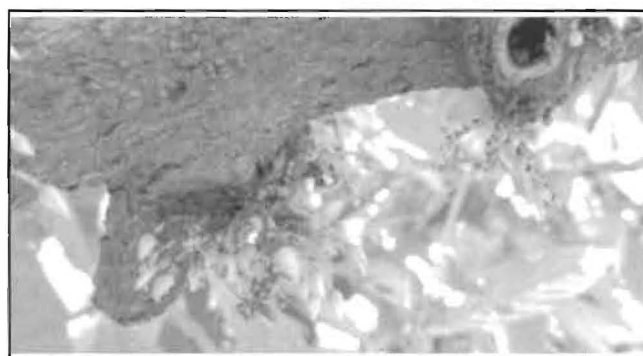


Fig.3. Aphid infestation on flowers

### Management:

- Cultural practices like timely pruning of the cocoa trees will reduce the colony build up.
- A number of natural enemies feed on the aphids and reduce the population. These include coccinellid beetles (*Coccinella septempunctata*, *Scymnus coccivora*, *Chilocorus nigrita* etc.), syrphids (*Eristalis* spp., *Volucella* spp.) and chrysophids (*Chrysoperla carnea*).
- In case of severe incidence of aphid, management may be directly resorted to application of chemical insecticides like spraying of Dimethoate (0.06%) 30 EC 2 ml/lit. will reduce the incidence and spread of aphid. If the infestation is recurring, second spray may be given after an interval of 20 to 30 days.

## 4. Leaf eating caterpillar: (*Lymantria ampla*)

Cocoa trees in all its growing stages consist of

a pattern of leaf production, known as flushing. The new leaves are at first red, then they turn pink, white and finally green colored. During the flush, cocoa is particularly susceptible to attack by a wide variety of leaf eating insects belongs to Lepidoptera and Coleoptera. There are major peaks of flushing in October and March.

**Symptoms:** The caterpillars cause severe damage on leaves in young plants (Fig.4). The early-instar larvae feed on leaves or the surface tissues of growing pods during day and night, but later instar caterpillars are nocturnal in habit. Their population increases after the monsoon rains.



Fig.4. Infestation of leaf eating caterpillar on leaves

**Management:**

- If the damage is very severe, neem oil (0.5%) spraying could be given.

**5. Stem borer: (*Zeuzera coffeae*)**

Stem borer attack is more in forest cleared plantations or plantations near forests in the cocoa growing regions. The red borer of coffee, *Zeuzera coffeae* Nietn (Cossidae) is a serious pest in many countries.

**Symptoms:** Grubs tunnel the bark initially and penetrate deeper making galleries (Fig.5). On younger trees, the pest attack occurs at the jorquette, which normally results in the drying or breaking of the portion above.



Fig.5. Stem borer

**Management:**

- Mechanical collection and destruction of grubs from the affected branches.
- Place Chlorpyriphos 0.05% soaked cotton and fasten with polythene strips. Swab Coal tar + Kerosene @ 1:2 (basal portion of the trunk - 3 feet height) after scraping the loose bark to prevent oviposition by adults.

**6. Cocoa fruit borer: (*Conogethes punctiferalis*)**

**Symptoms:** Though this pest was reported as a minor pest of cocoa nowadays it is emerging as major pest. Caterpillar after hatching from eggs feed on rind/ husk of cocoa pods later bore and feed the internal contents of the pods extruding the granular faecal pellets which are seen outside the pods (Fig.6)



Fig. 6 Fruit borer



### Management:

- Field sanitation is of utmost importance to bring down the population of fruit borer.
- Collection and destruction of infested pods and cherelles from the plantation will lower the pest incidence.
- Newer molecules like Flubendiamide and Spinosad are found to be effective against this pest in other host plants. Whereas, the efficacy of newer chemicals, botanicals and biopesticides are yet to be evaluated in cocoa.

### 7. Rats and Squirrels:

Rats (*Rattus rattus*) and squirrels (*Funambulus trisriatus* and *F. palmarum*) are the major vertebrate pests of cocoa. They cause serious damage to the pods.

**Symptoms:** Rats usually gnaw the pods near the stalk portion whereas, squirrels gnaw the pods in the centre. The rats are known to damage the mature as well as immature cocoa pods whereas, the squirrels damage only the mature ones. They gnaw the pods and feed on the mucilage covering of the beans.

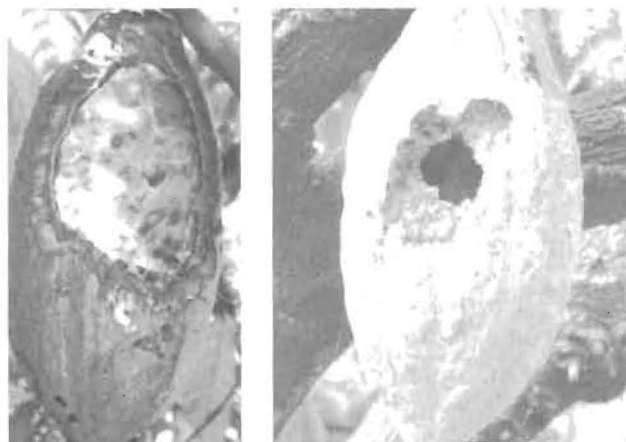


Fig. 7. Rat (a) and Squirrel damage (b)

### Management:

- Rats can be kept under check by keeping 10 g Bromadiolone (0.005%) wax cakes on the branches of cocoa trees twice at an interval of 10-12 days.

- Squirrels are best controlled by trapping with wooden or wire mesh single catch 'live' trap with ripe coconut kernel as the bait.
- The success is more if trapping is carried out during the lean periods of the crop (October-November) and when the alternate foods such as paddy, cashew apples, mangoes and jackfruits are not available.
- Timely harvest of the pods as well as maintaining proper plant density will help in increasing the efficiency of poison baiting as well as trapping.

### Integrated Pest Management Package for Managing Pests of Cocoa

Integrated pest management (IPM) is the management of any insect pest by utilizing all available pest management tactics in compatible and sustainable manner, which maintains the pest population at level below the economic injury. It includes cultural, mechanical, physical, chemical and biological control measures and host plant resistance.

#### a) Cultural and Mechanical control:

- Maintain a healthy and balanced ecosystem to preserve natural enemies that kill/ manage pest population naturally.
- Planting/ growing of tolerant or resistant varieties which can sustain and produce well under heavy insect pest incidence.
- Plant a barrier crop that is not attractive to stem borers, such as *Leucaena glauca*, cocoyam, sweet potato or *Pueraria* species. The barrier must be at least 15 m wide and established early for new plantings.
- Maintain a complete canopy, in young plantings, temporary shading is needed, e.g. with bananas and plantains. Alternative hosts of any insect pest of cocoa should not be used as shade trees on cocoa farms.

- Remove chupons regularly because mirids are attracted to the young and soft shoots which cocoa trees produce throughout the season. Do not prune too heavily as this may stress the trees and cause the growth of new chupons, which increase TMB feeding.
- Regular and complete harvesting of pods is almost certainly the most effective cultural technique of reducing carry over stages of insects like fruit borer etc. Hand picking and destruction of borer infested pods is important strategy
- Removal and destruction of stem borer infested branches can reduce the incidence of this pest.
- Rat traps and nooses are popular, but of little effective for lowering populations and so a combination of good practices will be successful. These must be implemented over large areas as rodents reproduce and spread quickly. Areawide/ community based management of rodents will always be effective than individual farm wise management.

#### b) Biological control:

The native natural enemies of cocoa pests include predators, parasites, insect pathogens and generalist predators like spiders, reduviids, some coccinellids etc. (Mariamma Daniel and Saraswathy, 2001).

- Mealy bug in cocoa can be managed by enhancing natural population of its natural enemies like coccinellid, *Pullus* sp. and a Lycaenid, *Spalgis epeus*.
- Aphid can be managed by predators like syrphids, hemerobiid, a chrysopid, a cecidomyiid and an endoparasitic cecidomyiid. Among these two species of syrphids viz., *Dideopsis aegrotus* (Fab.) and *Paragus yerburiensis* Stuck. are key predators of this aphid.
- The chrysopid, *Ankylopteryx octopunctata* is a general predator feeding also on other cocoa

insects like the nymphs of *Helopeltis* spp., tree hoppers etc.

- The black ant (*Dolichoderus thoracicus*) has been used in some farms for managing tea mosquito bug.
- *Telenomus* spp. is one of the important egg parasitoid of TMB.

#### c) Chemical control:

- If all of above described management strategies fails and in case of severe incidence chemical control should be advocated as described in the chapter, specific to pests and seasons.
- Areca- cocoa and Coconut- cocoa ecosystem conserves lot of natural enemies and beneficial flora and fauna which shouldn't be destroyed by spraying.
- Registered pesticides should be used with recommended dosage.

#### References

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