

## Lecture No.7

### PESTS OF COCONUT AND ARECANUT

#### COCONUT

The coconut and other palm trees are attacked by specific pests like rhinoceros beetle, red palm weevil, black headed caterpillar and also by a number of polyphagous insects like white grub. Slug caterpillars occasionally major pest status. Black headed caterpillar is severe in coastal regions.

<b>Major pests</b>				
1.	Rhinoceros beetle	<i>Oryctes rhinoceros</i>	Scarabaeidae	Coleoptera
2.	Red palm weevil	<i>Rhynchophorus ferrugineus</i>	Curculionidae	Coleoptera
3.	Black headed caterpillar	<i>Opisina arenosella</i>	Cryptophasidae	Lepidoptera
4.	Coconut Eriophyid mite	<i>Aceria guerreronis</i>	Eriophyidae	Acari
5.	White grub	<i>Leucopholis coneophora</i>	Melolonthidae	Coleoptera
6.	Slug caterpillar	<i>Parasa lepida</i> and <i>Contheyla rotunda</i>	Cochlidiidae	Lepidoptera
<b>Minor pests</b>				
7.	Mealy bug	<i>Pseudococcus longispinus</i>	Pseudococcidae	Hemiptera
8.	Scale insect	<i>Aspidiotus destructor</i>	Diaspididae	Hemiptera
9.	Lacewing bug	<i>Stephanitis typicus</i>	Tingidae	Hemiptera
10.	Termite	<i>Odontotermes obesus</i>	Termitidae	Isoptera
11.	Coconut skippers	<i>Gangara thyrsis</i> and <i>Saustus gremius</i>	Hesperiidae	Lepidoptera

#### 1. Rhinoceros beetle: *Oryctes rhinoceros*, (Scarabaeidae:

**Coleoptera)**

#### Host range

Pineapple, sugarcane, arecanut, sago, oilpalm, palmyra, date palm and wild dates.

#### Distribution and status

Widely distributed throughout coconut growing areas in India. Regular pest on coconut.

#### Damage symptoms

Central spindle appears cut or toppled; fully opened fronds show characteristic diamond shaped cuttings. Holes with chewed fibre sticking at the base of central spindle.



## Bionomics

Female lays upto 140 oval creamy white eggs in manure pits or decaying vegetable matter at a depth of 5 to 15 cm. Egg period 8-18 days, Stout, sluggish, white grub with pale brown head is found at a depth of 5 to 30 cm. Grubs feed on the decaying matter and grub stage lasts for 99 to 182 days. Grub pupates in earthern cells at a depth of 0.3 to 1 m and emerges as adults in 10-25 days. Adult beetle is stout, black and has a long horn projecting dorsally from the head in male. Horn is short in female.



## Management

- i. Destroy and dispose all dead trees
- ii. Avoid manure pits in the vicinity of coconut gardens
- iii. Rake and turn up the decaying manure to expose the developing grub, egg and pupae to sun drying and predation. Then apply the fungal culture of *Metarrhizium anisopliae* to manure pits during cooler months of October - December.
- iv. Encourage reduviid predators, *Platymeris laevicollis*
- v. Once in three months, drench the manure pits with carbaryl 50 WP 1 g/lit
- vi. In seedlings, place naphthalene balls @ 3 / tree, in the innermost three leaf axils once in 45 days.
- vii. Soak castor cake @ 1 kg/5 lit of water in wide mouthed mud pots and keep them in the garden to attract and kill adults. Replace the slurry once in 30 days.
- viii. Fermented toddy may be kept in wide mouthed earthern vessels in different places to attract the adults during night.
- ix. The crown region may be properly cleaned during harvests and the adults may be hooked out using a long wire.
- x. Light traps may be set up to attract the adults during monsoon months and following rains during summer.
- xi. The top-most three axils may be filled with a mixture of sand + Neem Seed Powder (2:1) once in three months (150 g/tree)

- xii. Fill leaf axil with powdered marotti cake (*Hydnocarpus*) @ 250 g /palm during May, September and January as a prophylactic measure.
- xiii. Incorporate *Clerodendron infortunatum* whole plant in the breeding sites
- xiv. Use aggregation pheromone traps Rhinolure @ 1/ha. Instal the trap at five feet from the ground level.



## 2. Red palm weevil: *Rhynchophorus ferrugineus* (Curculionidae: Coleoptera)

### Distribution and status

Kerala, Karnataka, Tamil Nadu, Assam and Maharashtra. Enjoys major pest status.

### Damage symptoms

Holes on the trunk with brownish ooze; yellowing of inner leaves and gradual wilting of central shoot in the crown. Up to 50 Nos. of grubs can be found feeding on the soft tissues inside the trunk.



### Bionomics

Egg: Female lays up to 276 oval, white eggs in scooped out small cavities on palms of up to seven years, and on older trees it deposits in the hands and other cut injuries of trunk. Egg period 2 to 5 days. Grub: Apodous light yellowish grub with a red head becomes full grown in 36-78 days and pupates in a fibrous cocoon inside the trunk itself. Reddish brown adult weevil has six dark spots on thorax. Male has conspicuous long snout with tuft of hairs.

**Egg**



**Grub**



**Cocoon**



*Pupa*



*Adult*



### Management

- i. Remove and disposal of damaged and wilted trees.
- ii. Avoid injuries on trunk and any injury should be plastered with clay or cemented with copper oxychloride.
- iii. Avoid cutting green fronds.
- iv. Root feeding with monocrotophos @ 10 ml + 10 ml water should be done after harvest of nuts. Observe a waiting period of 45 days.
- v. Set up attractant traps using mud pots with molasses / toddy 2.5 lit + acetic acid 5 ml + yeast 5 g + split tender coconut stems / petioles @ 30/ac.
- vi. Insert 1-2 aluminium phosphide tablets inside the tunnel and plug all the holes with clay + copper oxychloride
- vii. Use aggregation pheromone traps @ 1/ha or use ferrolure in combination with food baits consisting of 1kg sugarcane molasses + 5g of yeast + 5ml glacial acetic acid + split petioles of coconut taken in a bucket of 10 L capacity



### 3. Black headed caterpillar: *Opisina arenosella* (Cryptophoridae: Lepidoptera)

**Distribution and status:** All over Peninsular India (East and West Coasts)

**Damage symptoms:** Dried up patches on leaflets of the lower leaves. Galleries of silk and frass on underside of leaflets.



3 to 4 youngest leaves remain green at the centre



Galleries of silk and frass on underside of leaves

#### Bionomics

Greyish white small moth lays about 180 eggs in groups on leaves. Egg period is 5 days. Greenish brown larva with dark brown head and prothorax, and a reddish mesothorax. Larval period 40 days, pupal period 12 days. It pupates inside the web in a thin silken cocoon.



#### Management

- i. Cutting and burning all the infested leaves and fronds.
- ii. In small plantations, carbaryl 50 WP 2 g/L may be sprayed.
- iii. In summer, release bethylids, braconid and euphorid parasitoids from January at 1:1:10 per tree.
- iv. Root feeding with monocrotophos @ 10 ml + 10 ml water with a waiting period of 45 days after root feeding.

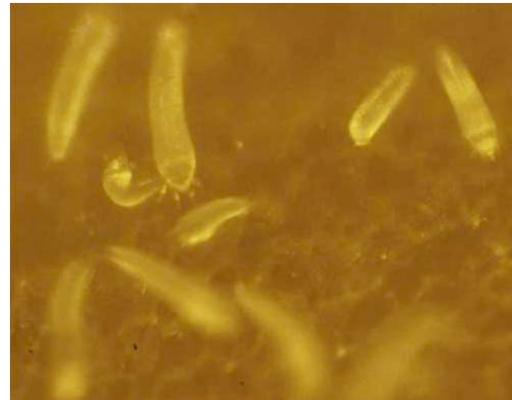
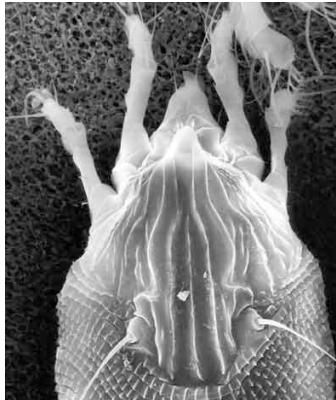
### 4. Coconut Eriophyid mite: *Aceria guerreronis* (Eriophyidae : Acari)

#### Distribution and status

Tamil Nadu, Karnataka and Andhra pradesh. Recently, observed in Andaman and Lakshadweep Islands. Dispersal of mite also occurs through insects, birds, lizards, squirrels and coconut husk. It attained major pest status after the super cyclone in 1998

## Bionomics

- Pale coloured, elongated, worm like mite is very minute in size measuring 200-250 micron length and 36-52 micron in width with two pairs of legs in the anterior end ,head with piercing and sucking mouth parts.
- Life cycle consists of egg, two larval instars and an adult-stage and is completed in 10-12 days.



## Damage symptoms

The mite infests and develops on the meristematic tissues under the perianth. Initial symptoms exhibit as triangular pale white or yellow patches close to the perianth. Continuous feeding results in necrosis of tissues leading to formation of brown color patches, longitudinal fissures and splits on the outer surface of the husk; oozing of brown gummy exudation; reduced nut size, copra content and malformation of nuts.



## Management

### i. Nutrients (per tree / year)

Urea 1.3 kg, super 2.0 kg, potash 3.5 kg, neem cake 5 kg, borax 50 g, gypsum 1 kg, MgSO<sub>4</sub> 500 g, FYM 50 kg

### ii. Root feeding

a. Root feeding with TNAU - Agro Biocide 30 ml/tree

b. Root feeding with carbosulfan 15 ml + 15 ml water / tree at 45 days interval or

fenpyroximate at 10 ml/tree

c. TNAU - Agro biocide - 30 ml/tree - (60 days after Carbosulfan root feeding).

**Note:** Before root feeding, pluck nuts. After root feeding, next harvest should be done 45 days later.



### iii. Spray - Fenpyroximate 5 EC 1.0 ml/L of water

## 5. White grub: *Leucopholis coneophora* (Melolonthidae: Coleoptera)

### Host range

Sweet potato, cassava, colocasia and banana raised as intercrop in coconut plantations.

### Damage symptom

Leaves turn yellow, immature nuts shed, flowering delayed. White grubs are exposed when base of the tree is dug.

### Bionomics

Female lays eggs in the soil at a depth of 7 to 15 cm. Egg period 20 days, grub period 10-11 months, prepupal period 9-12 days. pupal period 25 days. Pupation occurs in soil. Adult beetle emerges after monsoon showers.



### Management

1. Summer ploughing exposes the immature stages
2. Sow the crop early in the kharif season.
3. Treat the seeds with chlorpyrifos @ 12 ml/kg of kernels.
4. Apply phorate 10 G 10 kg or carbofuran 3 G 30 kg per ha in the soil at or before sowing.
5. Spray 500 g carbaryl 50 WP 500 g in 250 L of water per ha on the preferred hosts like ber, guava, banana, in the vicinity

**6. Slug caterpillar: *Parasa lepida*, *Contheyla rotunda***  
**(Cochliidae: Lepidoptera)**



**Damage symptoms**

Defoliation, leaving only the midrib and veins.

**Bionomics**

*Parasa lepida*



Flat shiny eggs are laid on the under surface of leaves in batches of 20-30, egg period 6-7 days. Larva: Larval period is about 42 days and it has greenish body with white lines and four rows of spiny scoli tipped red or black, which cause irritation and pain. It pupates in a compact elliptical chocolate brown shell like cocoon, which is convex above and flat below. Cocoons are covered with irritating spines and hairs; pupal period 21 days. Adult moth has green wings with prominent dark patch at the base of each forewing.

*C. rotunda*: Larva black or grey dorsally and dorso-laterally. Adult is a small greyish brown moth. Forewings are slight dark in colour with series of black points; hind wings slightly darker.

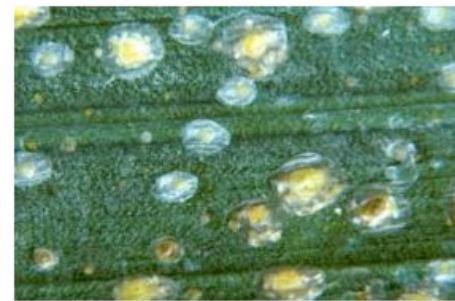
**Management**

Spray endosulfan 2.0 L in 1000 L of water per ha

**Minor pests**

**7. Mealy bug:** *Pseudococcus longispinus* (Pseudococcidae: Hemiptera)

**8. Scale insect:** *Aspidiotus destructor* (Diaspididae: Hemiptera)



**9. Lacewing bug:** *Stephanitis typicus* (Tingidae: Hemiptera)

**10. Termite:** *Odontotermes obesus* (Termitidae: Isoptera)

**11. Coconut skipper,** *Gangara thyrsis* and *Saustus gremius* (Hesperiidae: Lepidoptera)



## ARECANUT

<b>Major pests</b>				
1.	Spindle bug:	<i>Carvalhoia arecae</i>	Miridae	Hemiptera
2.	Sorghum or white mite	<i>Oligonychus indicus</i>	Tetranychidae	Acari
3.	Palm or red mite	<i>Raoiella indica</i>	Tenuipalpidae	Acari
4.	Root grub	<i>Leucopholis burmeisteri</i>	Melolonthidae	Coleoptera
5.	Inflorescence Caterpillar	<i>Tirathaba mundella</i>	Pyralidae	Lepidoptera
6	Pentatomid bug	<i>Halymorpha marmorea</i>	Pentatomidae	Hemiptera
<b>Minor pests</b>				
7.	Scale insects	<i>Aonidiella orientalis</i>	Diaspididae	Homoptera
8.	Stem weevil	<i>Diocalandra stigmaticollis</i>	Curculionidae	Coleoptera

### 1. Spindle bug: *Carvalhoia arecae* (Miridae: Hemiptera)

**Distribution and status:** Serous pest in Kerala, Karnataka and parts of Tamil Nadu

#### Damage symptoms

Inhabit the inner most leaf axils, usually below the spindle. Both nymphs and adults suck sap. Infested portions develop necrotic patches leading to drying. Spindle fails to open. Severe infection leads to stunting of the palm.

#### Bionomics

Adult bugs are brightly coloured red and black. Eggs are laid singly between the leaflets of the spindle. The eggs hatch in 9 days. There are five nymphal stages and it is completed in 15-24 days. The light violet brown nymphs have greenish yellow border.

#### Management

1. Maintain proper drainage in the plantation area.
2. Uproot the heavily infested palm and burn it.
3. Drench the spindle with lindane 1.3 D at 2.5 g/L of water.

4. Place 2 g in perforated poly bags in the innermost leaf axils of palm to kill the immature.

## **2. Sorghum or white mite: *Oligonychus indicus* (Tetranychidae: Acari)**

Adults and nymphs of this spider mite colonise the lower surface of leaves, suck sap, which causes yellowing and drying of leaves. The colony is found below a white web on the leaves. Life cycle is of short duration. The total duration of the immature stages varies from 6.5 to 9.0 days.

### **Management**

Spray dicofol 18.5 EC 2 ml /L or dimethoate 30 EC 1.5 ml /L of water.

## **3. Palm or red mite: *Raoiella indica* (Tenuipalpidae: Acari)**

**Host range:** Areca nut, coconut, date and ornamentals.

### **Damage symptoms**

Neglected and poorly irrigated gardens and nurseries, particularly those in exposed conditions are prone to severe infestation. Colonies of these mites start declining with the onset of rains in June.

### **Bionomics**

Nymphs and adults are seen in large numbers on the lower surface of leaves, in severe cases of infestation they may be seen on the leaf stalks and on the spindles. The life cycle lasts 13 days. .

**Management:** As given for sorghum/white mite

## **4. Root grub: *Leucopholis burmeisteri* (Melolonthidae: Coleoptera)**

**Distribution and status:** Areca tracts of Kerala and Karnataka. Root grubs or 'white' grubs occur in low lying and clayey soils where the water table is high.

**Host range:** Roots of areca nut, grasses, banana, cocoa, tapioca, yams etc.

### **Damage symptoms**

Grubs feed voraciously on areca roots which results in dropping and drying of leaves. Affected seedlings come off easily. Palms with few years of infestation show a sick appearance, with yellowing of leaves, tapering of stem, and reduction in yield. The palms topple in case of severe loss of root system

### **Bionomics**

Adult beetles (cockchafers) emerge during May-June after few days of premonsoon showers i.e., after 8-10 days of showers, between 6.30 to 7.30 PM. These beetles lay eggs in soil mostly up to 10 cm depth. Eggs hatch out in about

three weeks. The early instar grubs feed on the roots of grasses and other humus. The grub period with three instars is completed in 7 to 8 months. The pupation is in soil in cocoons of mud. This period lasts about one month. The adult beetle is chestnut brown in colour. The second and third instar grubs of these beetles feed on tender and mature roots of the palm, in severe cases of incidence, the bole of the palm is also eaten up.

### **Management**

1. Collect the beetles in the evening after the premonsoon showers and kill them.
2. Apply phorate 10 G 15 g per palm to the soil twice a year. Repeat for 2- 3 years continuously.

## **5. Inflorescence Caterpillar: *Tirathaba mundella* (Pyralidae: Lepidoptera)**

**Distribution and status:** Karnataka and Kerala.

### **Damage symptoms**

The caterpillars feed on the inflorescences especially the tender female flowers and rachillae, web them into a wet mass with silken threads and take shelter in it. Mature caterpillars can damage newly opened inflorescences also. In severe cases of incidence, they bore into the tender buttons and tender nuts as well. Delayed spathe opening, yellowing of spadices, presence of small holes with frass and drying patches on the spathe are the external symptoms of attack.

### **Bionomics**

The adult moth lays eggs in the mechanically damaged portions of the spadices and the emerging caterpillars bore into the inside of the spadices. The egg period lasts five days and the larval period for about 26 days with five instars. Pupal period lasts for 9-11 days.



### **Management**

1. Force open the spadix, remove the damaged inflorescences and burn.

2. Prepare and keep the poison bait to control slugs as they are the predisposing factors.
3. Conserve red ants as they are predatory
4. Spray malathion 2 ml/L of water.

## **6. Pentatomid bug: *Halymorpha marmorea* (Pentatomidae: Hemiptera)**

**Distribution and status:** Kerala and Karanataka Incidence of this bug is seen from March/April to July/August.

**Host range:** Areca nut, cowpea, bitter gourd.

### **Damage symptoms**

This bug causes tendernut drop in areca. The later instar nymphs and adult bugs pierce the tender nuts and suck the kernel sap. As a result, the kernel dries up and the tendernuts drop. Characteristic pinprick black marks are seen at the point of feeding sites, which lead internally to the kernel.

### **Bionomics**

Adults are bronze colored with brown spots and measure 1.75 cm long. In the young stage, they are black with white spots on the legs.

### **Management**

1. Monitor cow pea and bitter gourd, if any, in the vicinity to remove mechanically and destroy.
2. Conserve eupelmid egg parasitoid *Anastatus bangalorensis*
3. Spray endosulfan 0.05% (1.5 ml /L of water) or fenvalerate to the bunches of the affected palm and the neighboring palms

### **Minor pests**

## **7. Scale insects: *Aonidiella orientalis* (Diaspididae: Homoptera)**

Scale insects colonise the leaves, spathes, leaf sheaths and bunches and suck sap from the tissues. Continuous feeding on nuts results in pre-mature yellowing of nuts and in severe infestation, the kernel may not develop and may turn black and shrivel up. The scale insects are present throughout the year, but are more serious during October to February.



### Questions - Coconut

1. Prominent horn is present in which sex of adult rhinoceros beetle ? **Male**
- 2.----- fungus used to control rhinoceros beetle - ***Metarhizium anisopliae***
3. Central spindle appears cut or toppled in coconut is a symptom of -----  
**Rhinoceros beetle**
4. Conspicuous long snout with tuft of hairs in males is seen in - **Red palm weevil**
- 5.----- is an aggregation pheromone used for control of red palm weevil - **Ferrolure**
- 6.----- is the scientific name of coconut black hairy caterpillar -***Opisinia arenosella***
7. Alternate host of ***Oryctes rhinoceros*** -----
  - a. pineapple
  - b. sugarcane
  - c. arecanut
  - d. **all the above**
8. Dried up patches on leaflets of the lower leaves of coconut is symptom of
  - a. **Black headed caterpillar**
  - b. Skipper
  - c. Rhinoceros beetle
  - d. Red palm weevil
9. Root feeding technique is followed to control following pest
  - a. Red palm weevil
  - b. Skipper
  - c. Rhinoceros beetle
  - d. **Black headed caterpillar**
10. Scientific name of slug caterpillar is ----- ***Parasa lepida***
11. Site of oviposition for white grub is
  - a. on leaf
  - b. **Soil**
  - c. inbetween leaf
  - d. on under surface of leaf
12. Brown color patches, longitudinal fissures and splits on outer surface of the coconut husk is due to

- a. Red palm weevil
- b. **Eriophyid mite**
- c. Rhinoceros beetle
- d. Black headed caterpillar

13. Scientific name of eriophyid mite is

- a. *Rhynchophorus ferrugineus*
- b. *Oryctes rhinoceros*
- c. *Opisina arenosella*
- d. ***Aceria guereronis***

14. *Opisina arenosella* belongs to \_\_\_\_\_ family

- a. Curculionidae
- b. **Cryptophasidae**
- c. Scarabaeidae
- d. Arctiidae

15. Eriophyid mite attained major pest status in the year -**1998**

16. \_\_\_\_\_ is a predator of Rhinoceros beetle ***Platymeris laevicollis***

17. Female of rhinoceros beetle lays eggs in \_\_\_\_\_ (**manure pits or decaying vegetable matter**) to a depth of \_\_\_\_\_ (**5-15 cm**)

18. \_\_\_\_\_ stage of rhinoceros beetle does the damage to coconut fronds (Adult)

19. Holes on the trunk with brownish ooze is a symptom caused by \_\_\_\_\_ (**Red palm weevil**)

20. \_\_\_\_\_ damage is more pronounced in the coastal region (**black headed caterpillar**)