

Lecture No.28

PESTS OF PEPPER, CARDAMOM AND BETELVINE

1. PESTS OF PEPPER

About 20 insect species have been recorded damaging pepper plantation.

Major pests			
Pollu beetle	<i>Longitarsus nigripennis</i>	Alticidae	Coleoptera
Top shoot borer	<i>Cydia hemidoxa</i>	Eucosmidae	Lepidoptera
Berry gall midge	<i>Cecidomyia malabarensis</i>	Cecidomyiidae	Diptera
Marginal gall thrips	<i>Liothrips karnyi</i>	Thysanoptera	Thripidae
Minor pests			
Pepper mussel scale	<i>Lepidosaphes piperis</i>	Diaspididae	Hemiptera
Soft scale	<i>Marsipococcus marsupiale</i>	Coccidae	Hemiptera
Coconut scale	<i>Aspidiotus destructor</i>	Diaspididae	Hemiptera
Whitefly	<i>Aleurocanthus piperis</i>	Aleyrodidae	Hemiptera
Wild silkworm	<i>Cricula trifenestrata</i>	Saturniidae	Lepidoptera

I. Major pests

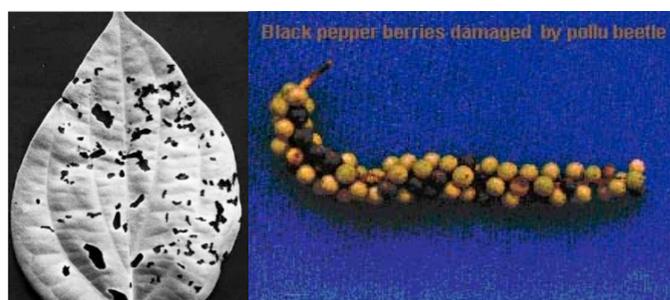
1. Pollu beetle: *Longitarsus nigripennis* (Chrysomelidae: Coleoptera)

Distribution and status: India (West Coast area)

Host range: Pepper (No alternate host reported so far)

Damage symptoms

The grubs bore into the berries of pepper. The infested berries dry up and turn dark in colour. Berries are hollow and crumble when pressed. Such hollow berries are called "POLLU" (Empty). Grub may also eat the spike causing the entire region beyond it to dry up. When contents of one berry is exhausted, the grub move to next and feed continuously.



Bionomics

Adult is a bluish yellow shining flea beetles. Eggs are laid on the berries and lays 1-2 eggs in each hole, egg period 5-8 days, larval period 30-32 days. Pupation occurs in soil in a depth of 5.0 - 7.5 cm. Pupal period 6-7 days. Life cycle completed in 40 - 50 days. Four overlapping generations in a year.

Management

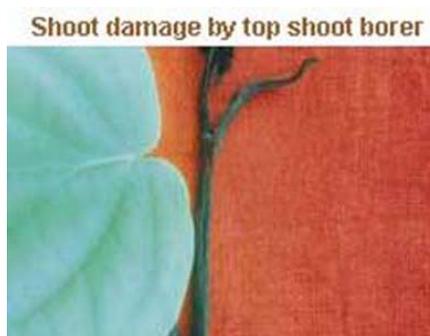
1. Rake the soil and incorporate quinalphos 1.5 D, carbaryl 5 D, endosulfan 4 D @ 25 kg/ha to kill the pupae in the soil
2. Spray dimethoate 30 EC 1.5 L or quinalphos 25 EC 2.0 L in 500 - 1000 L of water per ha.

2. Top shoot borer: *Cydia hemidoxa* (Eucosmidae: Lepidoptera)

Distribution and status: India

Damage symptoms

Serious pests of pepper in Kerala. The larva feeds on growing and young leaves causing drying and dying of terminal shoots.



Bionomics

Larva greyish green, 12-14 mm long, larval period 10 -15 days. Pupates inside shoots, pupal period 8 – 10 days. Adult moth is tiny, forewing black with distal half red, hind wing greyish. Life cycle completed in a month.

Management

Spray endosulfan 35 EC 1.0 L or quinalphos 25 EC 1.0 L in 500 - 1000 L water/ha

3. Berry gall midge: *Cecidomyia malabarensis* (Cecidomyiidae: Diptera)

Damage symptoms

The maggots infest the berries at the attachment of the berry to the spine, which causes gall like swelling on the tender stalks and shoots. The attacked berries appear larger in size in the beginning but appear shrunken later on.

Bionomics

Management

4. Marginal gall thrips: *Liothrips karnyi* (Thysanoptera: Thripidae)

Distribution and status: India

Host range: Pepper

Damage symptoms

Both nymphs and adults feed on leaves and cause formation of marginal folded galls on them. Presence of white or creamy white nymphs and adults inside the marginal galls is the typical symptom of attack. In severe cases of attack, whole plant becomes stunted and affects formation of spikes.



Bionomics

Eggs are laid in single within the marginal leaf folds or on the leaf surface, egg period 6-8 days. Nymphs whitish and sluggish, nymphal period 9-13 days, pupal period, 2 to 3 days adult longevity is 7-9 days.

Management

Spray monocrotophos 36 SL 750 ml or dimethaote 30 EC 1.0 L or chlorpyriphos 1.5 L in 500-1000 L water

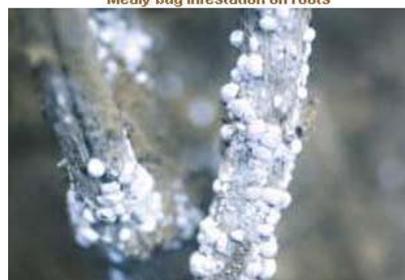
Minor pests

- Pepper mussel scale: *Lepidosaphes piperis* (Diaspididae :Hemiptera)
- Soft scale: *Marsipococcus marsupiale* (Coccidae :Hemiptera)
- Coconut scale: *Aspidiotus destructor* (Diaspididae :Hemiptera)



- Whitefly: *Aleurocanthus piperis* (Aleyrodidae :Hemiptera)

Mealy bug infestation on roots



II. PESTS OF CARDAMOM

About 56 species of insects and mites have been reported to attack cardamom in India.

Major pests				
1.	Cardamom thrips	<i>Sciothrips cardamomi</i>	Thripidae	Thysanoptera
2.	Cardamom whitefly	<i>Dialeurodes cardamomi</i>	Aleyrodidae	Hemiptera
3.	Cardamom aphid	<i>Pentalonia nigronervosa</i> ,	Aphididae	Hemiptera
4.	Shoot, panicle & capsule borer	<i>Dichocrocis punctiferalis</i>	Pyraustidae	Lepidoptera
5.	Rhizome weevil	<i>Prodiocetes haematicus</i>	Curculionidae	Coleoptera
6.	Early capsule borer	<i>Lampides elpis</i> ; <i>Jamides</i> sp	Lycaenidae	Lepidoptera
7.	Hairy caterpillar	<i>Eupterote cardamomi</i>	Bombycidae	Lepidoptera
8.	Galerucid borer	<i>Thamnuroides cardamomi</i>	Galerucidae	Coleoptera
Minor pests				
9.	Shootfly	<i>Formosina flavipes</i>	Chloropidae	Diptera
10.	Brown scale	<i>Saissetia coffeae</i>	Diaspididae	Hemiptera
11.	Root borer	<i>Hilarographa caminodes</i>	Yponomeutidae	Lepidoptera
12.	Skipper butterfly	<i>Plesioneura alysos</i>	Hesperiidae	Lepidoptera
13.	Looper	<i>Eumelia rosalia</i> <i>Ansiodes denticulatus</i> <i>Thalassodes</i> sp	Geometridae	Lepidoptera
14.	Cutworm	<i>Arcilassia plagiata</i>	Noctuidae	Lepidoptera
15.	Lacewing bug	<i>Stephanitis typicus</i>	Tingidae	Hemiptera
16.	Root knot nematode	<i>Meloidogyne</i> spp.		
17.	Red spider mite	<i>Dolyhotetranychus floridanus</i>	Tetranychidae	Acari

Major pests

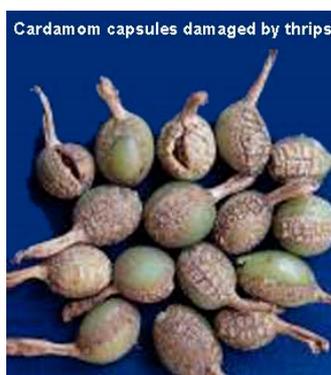
1. Cardamom thrips: *Sciothrips cardamomi* (Thripidae: Thysanoptera)

Distribution and status: India and Papua New Guinea. Most destructive pest of cardamom in South India

Host range: Cardamom, tea, grapevine, castor, cotton *Prosopis juliflora*, ginger and turmeric.

Damage symptoms

Thrips lacerate the surface tissues of capsules and suck the exuding sap. The injured tissues form a corky layer on the capsule surface which appear as scales. Such capsules appear stunted, malformed and shrivelled with gaping slits on the skin. The condition is popularly known as “cardamom itch”. Seeds from infected capsules give poor germination. At panicle formation stage, infestation causes stunting of panicles and shedding of flowers. Scrapping of capsules lower their quality and quantity to the extent of even 80-90%.



Bionomics

Greyish brown full grown adult female lays 5 - 31 minute, kidney shaped eggs on the leaf sheath, flowers and surface tissues of capsules, egg period 9-12 days. I and II nymphal instars lacerate the surface of the tissues; nymphal period 9-12 days; pupal period 3-5 days. Life cycle is completed in 20 -25 days. High temperature and low humidity favours the growth of the insects.

Management

- Maintain plant density with wider spacing of 2.5x2.5 m
- Regulate the shade in open areas
- Remove and destroy alternate hosts like *Panicum longipes*, *Ammomum* sp, *Alocasia* sp, *Colacasia* sp
- Remove dry leaves , leaf sheath and old panicles prior to chemical spraying.
- Spray phenthoate 500 ml or dimethoate or quinalphos 1.0 L or diafenthiuron 50 WP 800 g with 500 - 1000 L water/ha

2. Cardamom whitefly: *Dialeurodes cardamomi* (Aleyrodidae: Hemiptera)

Distribution and status: Serious pests in cardamom growing parts of Kerala in India

Damage symptoms

Nymphs occurs on the under surface of the leaves and suck the sap from the leaves causing yellowing and discolouration. Infested plant becomes stunted and covered with honey dew and sooty mould later.

Bionomics: Adult is small soft bodied moth like insect covered with white waxy bloom. Nymphs are pale greenish to greenish yellow in colour. Life cycle completed within 2-3 weeks

Management

- Collect and destroy damaged leaves with nymphs and puparia

- Use yellow sticky traps @ 12 /ha
- Spray methy demeton 25 EC or dimethoate 30 EC 1.0 L or acephate 75 SP 500 g 500 – 750 L water per ha

3. Cardamom aphid: *Pentalonia nigronervosa* f. *caladii* (Aphididae: Hemiptera)

Distribution and status: India , Australia, Sri Lanka. Major pest. It is a vector of “Katte” or marble mosaic disease in small cardamom.

Host range: *Colocasia* sp., *Alocasia* sp. and Banana.

Damage symptoms

Nymphs and adult infest the leaf sheath and the pseudostem. Colonies of aphids are seen inside leaf sheaths of the older pseudostems.

Bionomics: refer banana

Management

1. Remove alternate hosts like *Alocasia* and *Colocasia* in the vicinity.
2. Remove partly dried and decayed pseudostems which harbour the colonies of aphids
3. Spray methy demeton 25 EC or dimethoate 30 EC 1.0 L in 500 – 1000 L water per ha.

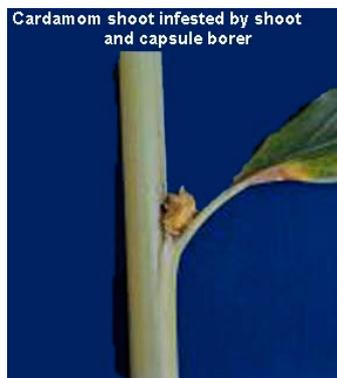
4. Shoot, panicle and capsule borer: *Dichocrocis punctiferalis* (Pyraustidae: Lepidoptera)

Distribution and status: Tamil Nadu, Karnataka and Kerala. Serious pest of nursery in cardamom

Host range: Castor, turmeric, guava, mulberry etc.,

Damage symptoms

The larva bores into the central core of the pseudostems resulting in the death of the central spindle causing characteristic “dead heart” symptom. Larva feeds on the immature capsules and feed on seeds rendering them empty. Oozing out of frass materials at the mouth of the bore hole - very conspicuous on stem / pods.



Bionomics



Adult moth lays eggs singly/ groups on tender parts of plant. Egg period is 6 to 7 days. Larva is brown in colour and covered with minute hairs arising on warts. Larval period 15-18 days, pupal period 7-10 days. Pupation takes place in loose silken cocoon in larval tunnel. Adult is pale, yellowish with black spots on wings. Life cycle lasts for 3-35 days.

Management: Refer castor

5. Rhizome weevil: *Prodiectes haemeticus* (Curculionidae : Coleoptera)

Distribution and status: India and Sri Lanka

Host range: Cardamom

Damage symptoms

Grubs tunnel and feed on the rhizome causing death of entire clumps of cardamom.

Bionomics

Eggs are laid in cavities made on rhizome. Egg period 8 -10 days. Larvae feed inside the rhizome, larval period 21 days. Pupate in the feeding tunnels, pupal period 21 days. Adult is a brown weevil, 12 mm in length. Adults live for 7 – 8 months. Only one generation in a year.

Management

1. Destroy affected plant/seedlings
2. Drench the base of the clump with malathion 1.25 L or carbaryl 50 WP 1.25 kg in 500 1000 L of water/ha

6. Early capsule borer: *Lampides elpis*; *Jamides* sp. (Lycaenidae: Lepidoptera)

Damage symptoms

The larva feeds on the buds, flowers and capsule making a circular bore hole on the developing capsules. The capsules become yellowish brown, dried, empty and shed.

Bionomics

Adult is a blue butterfly with wings having metallic luster on the upper surface and bordered with a white thin line and black shade. It lays eggs on the buds, flowers and inflorescence. Egg period 10 days. The larva is like slug, flat and pink measuring 2 – 3 cm long, larval period 18 – 20 days. Pupal period 15 days. Total life cycle is 45 days.

Management

Spray quinalphos 25 EC 1.5 L or carbaryl 50 WP 1 kg in 500 - 1000 L of water per ha.

7. Hairy caterpillar: *Eupterote cardamomi* (Bombycidae: Lepidoptera)

Distribution and status: South India

Host range: Cardamom

Damage

The caterpillars congregate on the trunks of shade trees and then drop to the cardamom plants. They feed voraciously in leaves of cardamom plants, defoliating within a short time.

Bionomics

The adult are large moth 70 -80 mm, ochrus in colour with post medial lines on the wings. 300 – 800 eggs are laid on the under surface of leaves of shade trees. Egg period 13 – 20 days. Larva is hairy and has a dark – grey body, pale brown head. Larva undergoes 10 instars in 5 months. Pupate in soil at a depth of 2 – 2.5 inch, pupa is cocoon, pupal period 7 – 8 months.

Management

1. Collect and destroy the hairy caterpillars.
2. Set up light traps to attract and kill the moths.
3. Spray phasalone 35 EC 750 ml in 500 - 1000 L of water per ha

8. Galerucid borer: *Thamnuroides cardamomi* (Galerucidae :Coleoptera)

Distribution and status: South India

Host range: Cardamom

Damage symptoms

The adult beetle drill capsules and cause tiny, circular bore holes. The infested capsules drop off of disintegrates with a crater like entry hole permanently. Fine saw like frash thrown out indicates the presence of beetle.

Bionomics

Adult is small dark brown cylindrical beetle with short hairs all over the body. Colourless barrel shaped 6 -12 eggs are laid in clusters in the capsule. The larva is white, soft bodied, wrinkled and slightly curved.

Management

- Regulate shade in thickly shaded areas.
- Spray insecticides like quinalphos 25 EC or phosalone 35 EC 1 L during March, April, May, August and September in 500 - 1000 L per ha.

Minor pests

9. Shootfly: *Formisina flavipes* (Chloropidae: Diptera)

The maggots bore into the central growing shoots of young cardamom causing dead heart symptom.

Adults lay white cigar shaped eggs in between the leaf sheath and pseudostem on the top whorl singly or in rows of 4 - 5. Pupates inside the shoot. Total life cycle is about 50 -92 days.

Management

- Remove the affected shoots at ground level and destroy them.
- Spray dimethoate 30 EC or quinalphos 25 EC 1 L in 500 -1000 L of water per ha.

10. Brown scale: *Saissetia coffeae* (Diaspididae: Hemiptera)

Adults and nymphs cause infestation. Infested leaves turn yellow and put forth scorching appearance. Adult female is red brown to dark brown in colour with smooth shining surface, more or less hemispherical. The eggs hatched inside the body of the female and after some time the crawlers starts emerging from the underside.

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

Both nymphs and adults suck the sap from the leaves causing yellowing and discolouration of leaves. Adult is small dull coloured bug with transparent shiny lace like reticulate wing. Female lays an average of 30 eggs, singly inserted in leaf tissue. Egg period is 12 days. Nymphal period is 13 days.

12. Cutworm: *Arcilassia plagiata* (Noctuidae: Lepidoptera)

The cut worms feeds on the tender leaves and causes defoliation in the nursery. The caterpillar is dark brown with prominent light yellow and longitudinal marking on the abdominal segments. Pupates in soil for 17 – 18 days.

13. Looper: *Eumelia rosalia*, *Ansiodes denticulatus*, *Thalassodes sp* (Geometridae: Lepidoptera)

14. Root borer: *Hilarographa caminodes* (Yponomeutidae: Lepidoptera)

15. Skipper butterfly: *Plesioneura alysos* (Hesperiidae: Lepidoptera)

16. Root knot nematode: *Meloidogyne spp.*

17. Red spider mite: *Dolyhotetranychus floridanus* (Tetranychidae: Acari)

III. PESTS OF BETELVINE

Major pests			
Aphid	<i>Aphis gossypii</i>	Aphididae	Hemiptera
Scales	<i>Lepidosaphes cornutus</i>	Coccidae	Hemiptera
White fly	<i>Aleurocanthus nubilans</i> and <i>Dialeurodes pallida</i>	Aleurodidae	Hemiptera
Mealy bug	<i>Geococcus citrinus</i>	Pseudococcidae	Hemiptera
Shoot bug	<i>Pachypeltis politus</i>	Miridae	Hemiptera
Minor pests			
Leaf eating caterpillar	<i>Spodoptera litura</i>	Noctuidae	Lepidoptera
Termite	<i>Odontotermes obesus</i>	Termitidae	Isoptera
Green looper	<i>Synegia sp.</i>	Geometridae	Lepidoptera
Giant African snail	<i>Achatina fulica</i>	Achatinidae	

Two types of cultivation viz., A single betel

Major pests

1. Aphid: *Aphis gossypii* (Aphididae: Hemiptera)

Damage symptoms

Both nymph and adults desap the tender shoot and leaves causing yellowing, curling and crinkling in leaves of support plants viz., *Sesbania* spp. Honey dew secreted by the aphids fall on the betelvine leaves and lead to the development of sooty mould which appear as black spots.

Bionomics

Two forms of females are available in an aphid colony. The alate (winged) and apterous (wingless) forms which can reproduce parthenogenetically and viviparously, giving birth to 10 -20 nymphs per day. The nymph becomes adults in another week time.

Management

1. Clip off excess infested *Sesbania* leaves
2. Spray chlorpyrifos 2 ml/L on agathi leaves

2. Scales: *Lepidosaphes cornutus* (Coccidae: Hemiptera)

Damage symptoms

Both nymph and adults infest the leaves, petioles and main veins. The scale infested leaves loose their colour, exhibit warty appearance, crinkle and dry up ultimately. The affected vines present a sticky appearance and wilt in due course.

Management

1. Select scale free seed vines
2. Spray NSKE 5 % @ 50 g / L or chlorpyrifos 20 EC 2ml/L or malathion 50 EC 1ml/L of water

3. White fly: *Aleurocanthus nubilans* and *Dialeurodes pallida* (Aleurodidae: Hemiptera)

Damage symptoms

Both nymph and adults suck the sap from the tender leaves causing yellowing, chlorotic spots and shooty mould development on leaves.

Bionomics

Adult is a minute insect covered with white waxy bloom.

Management

4. Mealy bug: *Geococcus citrinus* (Pseudococcidae: Hemiptera)

Damage symptoms

Both nymph and adults found on the root regions and desap the root portions

Management

Spray chlorpyrifos 20 EC 2ml/L or dimethoate 2ml/L. Concentrate the spray towards

the collar region.

5. Shoot bug: *Pachypeltis politus* (Miridae: Hemiptera)

Damage symptoms

Both nymph and adults suck the sap from the tender leaves causing leaf blotches leading to ultimate drying.

Bionomics

The adult is reddish brown bug. It thrusts its eggs singly within the tender plant parts. Egg period 8 - 16 days. Fecundity 72 eggs/female. Nymphal period 12 - 18 days. The incidence of this pest is severe in June to October.

Management: Spray malathion 50 EC at 2.0 ml/L

Minor pests

6. Leaf eating caterpillar: *Spodoptera litura* (Noctuidae: Lepidoptera)

Damage symptoms

The larva feeds on tender leaves of agathi crop and after complete devastation of agathi, they start feeding in newly planted betelvine causing irregular sides on leaves. It also damages the tip of the veins that results in failure of vein establishment.

Bionomics & Management: Refer cotton

7. Green looper: *Synechia* sp. (Geometridae: Lepidoptera)

Damage symptoms

The caterpillar feeds on leaves causing severe defoliation.

Bionomics

The adult is yellow and orange spotted moth. It lays eggs singly on leaves. The larva is dark green and grows to a length of 25 mm. It pupates in leaf fold. Life cycle completed in 25 - 30 days.

8. Giant African snail: *Achatina fulica* (Achatinidae)

Damage symptoms

The snails are found in betelvine gardens clinging to the lower and protected surface of the leaves of supporting plants. They feed on sprouted buds, leaves, outer layers of the stem of betelvine and supporting trees. Infestation is high during rainy and winter season.

Bionomics

The snails are large, bisexual with shell. Eggs are laid in rainy season in the soil surface or just below in batches of 200, adult fecundity 1000 eggs, egg period 7 days. Young ones take about nine months to mature, adult longevity up to 3 or 4 years.

Management

1. Heap the gunny bags near the fences of the betel vine gardens to attract, collect and kill the snails
2. Collect and destroy the hiding snails.
3. Metaldehyde pellets 5 % over the field to attract and kill the snails.

10. **Betelvine Bug:** *Dispunctus politus*

The nymphs and adults damage the leaves by puncturing and sucking the juice causing the leaves to shrivel, fade and dry up.

Question: Pepper, cardamom and betelvine

1. Scientific name of pollu beetle - ***Longitarsus nigripennis***
2. Pepper berries become hollow and crumble when pressed is due to ----- **Pollu beetle**
3. Pollu beetle pupates in -----
 - a. **Soil**
 - b. Berry
 - c. inbetween leaf
 - d. Within berry
4. ----- causes gall like swelling on the tender pepper stalks and shoots. **Berry gall midge**
5. Presence of white or creamy white nymphs and adults inside the marginal galls of pepper is the typical symptom of attack by
 - a. Pollu beetle
 - b. Berry gallmidge
 - c. **Marginal gall thrips**
 - d. Topshoot borer
6. Scientific name of pepper mussel scale is -----
 - a. *Aspidiodus destructor*
 - b. *Marsipococcus marsupiae*
 - c. ***Lepidosaphes piperis***
 - d. None of the above
7. *Dichocrocis punctiferalis* larva bores into the central core of the pseudostems resulting in the death of the central spindle causing characteristic “dead heart” in cardamom. Say **True** or False
8. ‘Cardamom itch’ is caused by
 - a. **Thrips**
 - b. Whitefly
 - c. Aphid
 - d. Scale
9. High temperature and low humidity favours the growth of cardamom thrips. Say **True** or False
10. ----- is responsible for transmitting Katte or marble mosaic disease in small cardamom
 - a. Thrips
 - b. Whitefly
 - c. **Aphid**
 - d. Scale
11. Scientific name of cardamom rhizome weevil ----- ***Prodiactes haematicus***
12. *Spodoptera litura* after feeding agathi, also damages the tip of the vine and results in failure of vine establishment. Say **True** or False
13. Giant African snail feeds on sprouted buds, leaves, outer layers of the stem of betelvine and supporting trees. Say **True** or False
14. Site of pupation of giant African snail is ----- **Soil**