

Title of the course : Insect pests of Fruits, Plantation, Medicinal & Aromatic Crops
Class : **B.Sc(Hons) Horticulture**, 2nd Year 2nd Sem
Title of the topic : Insect Pests of Stored and Processed Vegetables, Ornamental and Spices
College : College of Horticulture, Rehli
Name of Teacher : **Dr. S.K.Mishra**

Insect Pests of Stored and Processed Vegetables, Ornamental and Spices

1. Cigarette beetle, *Lasioderma serricornis* (Anobiidae: Coleoptera)

- **Hosts:** cocoa, tobacco dried cassava, black and red pepper, ginger, turmeric, dried fruits and vegetables, chilli powder, spices, etc.

Nature of damage:

- Grubs are damaging
- Make small cylindrical galleries
- Adults feed very little
- The larvae are very active and move and bore into the commodity.

Identification:

- Adult beetles are stout, oval, 2.0- 2.5 mm, light brown
- The elytra are smooth with very short hairs
- The antennae are about half the length of body with fourth to tenth segments as serrate
- When disturbed the adults conceals its head under the large pronotum
- The grubs are white and scarabaeiform.

Life history:

- Each female lay 100-110 eggs
- Generally 4-6 larval instars
- Larval period is 30-35 days
- Adults live for 2-4 weeks
- Adults do not feed.

Salient features

- Eggs are laid closely on the commodity.
- On hatching the larvae often eat their egg shells
- They move more deep into the loosely packed commodities than tightly packed commodities
- Pupation takes place in fragments of attacked commodity and waste material by making pupal cells
- Adults are active fliers and fly freely in the evening and night.

2. Drug store beetle, *Stegobium paniceum* (Anobiidae: Coleopteran)

- **Hosts:** chocolate, confectionary, biscuits, dried fruits and vegetables and spices.

Nature of damage:

- Grubs damage by making small cylindrical galleries through the commodities
- Adults fed very little
- Larvae are quite active and move around or bore into the commodity.

Identification:

- It is similar to cigarette beetle in appearance but can be distinguished by its antennae.
- In *Stegobium* the last three segments form a large loosely segmented club.
- The elytra have longitudinal striae which are also present in *Lasioderma*

Life history:

- The biology of this pest is similar to *Lasioderma* except that *Lasioderma serricorne* performs better at higher temperature and grows more rapidly than does *S. paniceum*.

3. Almond moth: *Ephestia (Cadra) cautella* (Phycitidae: Lepidoptera)

Nature of damage:

- Damage is caused by the larvae
- Feed on the germ portion of grains leaving rest of the kernel undamaged

- They form webs on the top layer of grains, storage bags, etc.

Identification:

- Moths are about 13 mm
- Wing expanse of 20-25 cm
- Wings are dirty white to grayish in colour with indistinct black bands about 4mm from the head
- Larvae are grayish white, hairy with dark brown head with two dark areas on the first segment behind the head

Life history

- Females lay 200-250 eggs
- Oviposition period is 3-4 days
- Matured larva spin silken cocoon at the junction of two overlapping edges of staked bags
- Adults emerge by breaking the cocoon and live for about 14 days

Salient features

- Females lay eggs in grains exposed through sampling spots in jute bags
- Caterpillars are quite active and feed voraciously on embryo of seed
- Before pupation large number of wandering larvae trail behind silken threads
- The optimum conditions for development are 28-30°C with RH above 70%.
- Below 15°C and RH 50% or less the development is practically stopped.

4. Indian meal moth, *Plodia interpunctella* (Phycitidae: Lepidoptera)

- **Hosts:** Important pest of dried and stored commodities in the pantry.

Identification

- Basal half of the fore wings is silver white or grayish, outer two third portion is reddish, copper bronze with irregular bands
- Hind wings are also silvery grey with silky fringes.
- Fresh larva is transparent, about 1mm

- Full grown larva is about 13mm in size, dirty white in colour having granular skin and hairs on the body.

Life cycle

- Incubation period varies from 2 to 17 days
- Larval period is 30-35 days but may be prolonged during low temperatures
- Total life cycle is completed in about 27 days but may be prolonged during winter

Salient features

- Each female can lay 40-275 eggs during its life time
- It feeds superficially but may construct more than one silken tunnel
- Best temperature is around 30°C and RH around 75 %
- Below 10°C there is no development

Management of stored pests:

- Sun drying
- Surface treatment
- Fumigation
- Improved storage receptacles

5. Onion maggot/ onion fly, *Delia antiqua*

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INSECT PESTS OF CARDAMOM

1. Banana aphid, *Pentalonia nigronervosa* (Aphididae: Hemiptera)

- **Distribution:** India, Sri Lanka and Australia.
- **Host range:** Banana, small and large cardamom, Colocasia sp and Allocasia sp

Damage:

- Both nymphs and adults suck the cell sap from leaf sheath and pseudo stem
- Vector of cardamom mosaic (Kattle disease), Amomum mosaic and foorky disease of large cardamom

Identification

- Wingless aphid is dark brown, pyriform, 1.34 mm in length.
- Abdomen is dark brown, shining and slightly bulged.
- The winged form is dark brown elongated and pyriform
- They are larger than the wingless with less body width.

Life cycle

- The reproduction is parthenogenetic
- Adult longevity varies from 8-26 days with an average of 14 days
- Each female can lay 8-28 off springs with an average of 14 per female
- Nymphs become mature in 12-15 days
- Four nymphal stages.
- Several overlapping generations in a year

Management:

- Spray 300 ml of phosphamidon 85 WSC or 875 ml of dimethoate 30 EC in 250 L of

water per hectare at an interval of two weeks

2. Cardamom thrips, *Sciothrips cardamom* (Thripidae: Thysanoptera)

- **Distribution:** All cardamom growing areas
- **Hosts:** Cardamom

Damage

- Nymphs and adults are damaging
- Lacerates all aerial parts and feed on oozing sap
- Infestation on panicle and flower buds results in stunted growth of panicles, shedding of flower buds and warty growth
- The infested capsules are light in weight, inferior in quality
- Low market price
- This insect is a serious pest of cardamom
- Pest population is high during dry months i.e. December in April.

Management:

- Spraying of quinalphos (0.03%) or phenthoate (0.03%) or phosalone (0.05%) or fenitrothion (0.05%) or dimethoate (0.05%)
- Application of insecticides can be skipped during June-July

3. Cardamom whitefly, *Dialeurodes cardamom* (Aleyrodidae: Hemiptera)

- **Hosts:** Cardamom

Damage

- This whitefly is serious on cardamom plants.
- Damage is caused by the nymphs and adults by sucking the cell sap from leaves
- Infested leaves turn yellow
- Attack first appear on the lower leaves and gradually progresses to the upper region
- Severe damage leads to drying up of plants.

Identification

- The eggs are oval shaped
- Nymphs are green in colour

Life cycle

- Each female lays 200-250 eggs
- Eggs hatch in 10-15 days
- Nymphs become pupa in 3-4 weeks
- Pass through 3-4 instars

Salient features

- Lay eggs mostly on the under surface of the leaf.
- Newly emerged nymphs crawl for few hours and after finding a suitable place settle down.
- There are two different seasonal activities i.e. April-May and October-November.
- However, the availability of pest in other seasons can not be ruled out.

Management

- Use of yellow sticky traps
- Need based use of systemic insecticides
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4. Castor capsule borer, *Dichocrosis punctiferalis* (Pyralidae: Lepidoptera)

Damage

- Serious pest of nursery plants and young green pods
- In nursery plants it bores into the stem and cause death of the central shoot
- It also eats away the tender seeds of young berries.

Identification

- Larvae are reddish brown with black blotches all over the body and a pale stripe on the

lateral side.

Life cycle:

- Eggs hatch in about a week
- Larvae become full fed in 2-3 weeks
- Pass through 4-5 instars
- Pupal stage lasts for about a week
- Three generations in a year.

Salient features

- The moths lay eggs on leaves and soft part of the plant
- Larvae bore into the stems, berries
- Pupation takes place inside the seed or some times in frass that collects after feedings

Management:

- Collect and destroy the infested shoots and capsules
- Spray the crop with carbaryl (0.1%)

5. Cardamom hairy caterpillars: (a) *Lenodera vittata* (Lesiocampidae: Lepidoptera)

Hosts: commonly found feedings on cardamom in South India.

Identification

- The moth is stout, fairly big and densely covered with scales
- The larvae are clothed with a dense belt of capitate hairs
- About 106-110 mm in length
- Eggs are cream coloured, dome shaped

Damage

- Larvae are the damaging
- Feed on the leaves and other tender parts of the plant

Life cycle

- Oviposition period of 6-9 days
- Larvae emerge from the eggs in 10-13 days
- Moults six times in 112-115 days
- Pupal period is 5-7 months

Salient features

- The moths emerge during June
- Lay eggs in rows on both the upper and lower surface of the leaves
- Each female can lay 100-300 eggs
- Pupation takes place in the soil
- Only one generation in a year.

b) *Eupterote cardamomi* (Eupterotidae: Lepidoptera)

- **Distribution:** South India
- **Hosts:** Cardamom

Identification

- The adults are large moths, ochreous in colour, with post medial lines on the wings
- 70-80 mm in wing expanse
- The larvae are hairy, dark grey in colour with pale brown head, bearing conical tuft of hairs on the dorsal side of the body
- Full grown the caterpillar are 90 mm in length

Damage

- The larvae feed on leaves of the shade trees up to the 6th or 7th instar
- Later on they drop down to the cardamom plants growing underneath with the help of silken threads
- Feed on the leaves voraciously and defoliate the cardamom plants
- Heavy reduction in the yield

Lifecycle

- Eggs hatch in 15-17 days
- Larva passes through ten instars
- Larval period is 140-151 days
- Pupal period is 7-8 months
- The moth lives for about 20 days
- There is only one generation in a year.

Salient features

- Moths emerge with the commencement of the South West monsoon rains in June and July
- Female moth lay 400-500 eggs in flat masses on the under surface of leaves
- Each egg mass contains about 50-160 eggs
- It pupates in a silken cocoon at a depth of 5-8 cm for 7-8 months

c) Other hairy caterpillars:

- *Eupterote canarica*
- *E. testacea*
- *E. fabia*
- Sporadic and occasionally cause damage to cardamom plants
- The life cycle and habits are similar to earlier described species.

Management of hairy caterpillars:

- These hairy caterpillars can be controlled by spraying the crop with malathion (0.05%) or carbaryl (0.1%)

6. Rhizome weevil, *Prodiocetes haematicus* (Curculionidae: Coleoptera)

Distribution: Different states of south India.

Damage

- Damage is caused by grubs
- Tunnel and feed inside the rhizomes
- Death of entire plumps of the cardamom plants.

Identification

- The adult is a brown weevil measuring 12 mm in length.

Life cycle

- Grubs emerge from the eggs in 8-10 days
- Larvae become full fed in three weeks
- Pupate for 3 weeks.
- Adult weevils live for 7-8 months.
- There is only one generation in a year.

Salient features

- The weevils emerge during April, soon after an early shower of the monsoons
- Bore into the rhizomes by making tunnels
- Larvae feed inside the rhizomes and become full fed in three weeks
- They pupate within the feeding tunnels

Management

- Destroy effected plants/seedlings
- If grub population is more in the soil, drench with 1.25 L of malathion 50 EC in 625 L of water per hectare

Insect pests of large cardamom

- Hairy caterpillars, *Clelea plumbiola*
- Stem borer, *Glyphipterix sp.*
- Beetles, *Chrysomela sp*
- *Georgria quadrimaculata*
- White grubs

Minor pests of cardamom:

- Wingless grasshoppers, *Orthacris sp.* (Acrididae: Orthoptera)
- Leafhopper, *Tettigoniella ferruginea* (Cicadellidae: Hemiptera)
- Spittle bug, *Aphrophora nuwarans* (Aphrophoridae: Hemiptera)
- Banana lace wing bug, *Stephanitis typica* (Tingidae: Hemiptera)
- Thrips, *Leewania maculans* (Thripidae: Thysanoptera)
- The bag worm, *Acanthopsyche bipars* (Psychidae: Lepidoptera)
- Root borer, *Hilarographa caminodes* (Plutellidae: Lepidoptera).
- Cutworm, *Noctua plagiata* (Noctuidae: Lepidoptera)
- Root gall midge, *Hallomyia cardamomi* (Cecidomyiidae : Diptera)

INSECT PESTS OF GINGER

1. Shoot borer, *Dichocrosis punctiferalis* (Pyralidae: Lepidoptera)

Damage:

- It is a serious pest of ginger
- Damage is done by the caterpillars
- bore into the central shoots of the plant
- Affected plants turns yellow and dry up

Management

- This pest can be controlled by cutting and removing the affected shoots and spraying the crop with malathion (0.05%).

2. Spice beetle, *Stegobium paniceum* (Anobiidae: Coleoptera)

Damage

- The grubs and adults feed on dry ginger in ware houses
- The grubs tunnel rhizomes by cutting microscopic holes and continues feeding from inside

Management

- This pest can be controlled by giving a heat treatment (54-66oC for 6 h) to rhizomes.
- Dusting of warehouse with pyrethrin also controls this pest.

Minor pests of ginger

- Scale, *Aspidiotus hartii* (Diaspididae: Hemiptera)
- Termeric skipper, *Udaspes folus* (Hesperiidae: Lepidoptera)
- Maggots:
 - *Calobata sp.* (Micropezidae : Diptera)
 - *Chalcidomyia atricornis* (Chloropidae : Diptera)
 - *Formasina flavipes* (Chloropidae : Diptera)
 - *Celyphus sp.* (Celyphidae : Diptera)
- Weevil, *Hedychrous rufofasciatus* (Curculionidae : Coleoptera)

INSECT PESTS OF TURMERIC

1. Castor capsule borer, *Dichocrocis punctiferalis* (Pyralidae: Lepidoptera)

Damage

- Serious pest of nursery plants and young green pods
- In nursery plants it bores into the stem and cause death of the central shoot
- It also eats away the tender seeds of young berries.

Identification

- Larvae are reddish brown with black blotches all over the body and a pale stripe on the lateral side.

Life cycle:

- Eggs hatch in about a week
- Larvae become full fed in 2-3 weeks
- Pass through 4-5 instars
- Pupal stage lasts for about a week
- Three generations in a year.

Salient features

- The moths lay eggs on leaves and soft part of the plant
- Larvae bore into the stems, berries
- Pupation takes place inside the seed or some times in frass that collects after feedings

Management:

- Collect and destroy the infested shoots and capsules
- Spray the crop with carbaryl (0.1%)

2. Bihar hairy caterpillar, *Spilarctia (Spilosoma) obliqua* (Arctiidae: Lepidoptera)

Damage

- This pest damages the turmeric plants extensively in Bihar and Bangal states.
- Damage is caused by the caterpillars
- First two stages the tiny caterpillars feed gregariously
- Older larvae disperse widely in search of food.

Management:

- Young caterpillars can be controlled by spraying the crop with malathion (0.05%)
- Moths can be trapped in artificial light and killed
- Young gregarious caterpillars can be collected and killed manually in kerosinized water.

Minor pests of turmeric

- Coccids: *Aspidiotus hartii* (Diaspididae: Hemiptera)
 - *A. cucumae* (Diaspididae: Hemiptera)
- Leaf thrips: *Anaphothrips rudanensis* (Thripidae: Thysanoptera)
 - *Asprothrips indicus* (Thripidae: Thysanoptera)
 - *Panchaetothrips indicus* (Thripidae: Thysanoptera)
- Skipper butterfly, *Udaspes folus* (Hesperiidae : Lepidoptera)
- Chrysmellid beetle, *Lema pracusta* (Chrysomelidae : Coleoptera)
- Banana lacewing bug, *Stephanitis typica* (Tingidae: Hemiptera)

Cotton whitefly

1. Cotton whitefly, *Bemisia tabaci* (Aleyrodidae: Hemiptera)

- **Distribution:** Throughout the northern and western regions of the Indian sub-continent
- **Hosts:** Cotton, okra, cabbage, cauliflower, melons, potato, egg plant, coriander and several weed plants.

Damage

- Caused by nymphs and adults
- Suck the cell sap from leaves and other tender plant parts
- Vitality of the plant is reduced
- Nymphs also excrete honey dew on which sooty mould grows
- Interferes with photosynthesis
- Also transmit viruses.

Identification

- The eggs are stalked, sub elliptical and light yellow initially and turns brown before hatching
- Nymphs are elliptical
- Adults are small white coloured insects

Life cycle

- Eggs hatch in about 3-5 days
- Nymphs grow through three stages
- Become pupae in about 9-14 days during summer and 17-81 days during winter
- Pupal period is of 2-8 days
- Total life cycle is completed in 14-122 days.

Salient features

- The pest breeds through out the year
- During cold seasons only adults are noticed
- Females lay eggs singly on the under surface of the leaves
- Suck the sap from tender parts of the plant.

Management:

- Use of yellow sticky traps
- Need based spray of phosphamidon (0.04%) or oxy-methyldemeton (0.025%) or dimethoate (0.03%).
- Observe a waiting period of 7 days

Minor pests of coriander

- Aphid, *Hyadophis coriandri* (Aphididae: Hemiptera)
- Bug, *Agonoscelis nubila* (Pentatomidae: Hemiptera)
- Indigo caterpillar, *Spodoptera exigua* (Noctuidae: Lepidoptera)

2. Cinnamon butterfly, *Chilasia clytia* (Papilionidae: Lepidoptera)

- **Distribution:** South India and Srilanka.
- **Hosts:** A number of wild species of cinnamon and other forest trees.

Damage

- Early instars feed on the lamina of the freshly emerged leaves
- Later instars feed voraciously on leaves leaving only the mid ribs

- In case of severe infestation the growth of plant is adversely affected

Identification

- Freshly hatched larva is jet black in colour with white patches which later undergo various changes in colour pattern
- The dorsal side of adult moth is rich velvety brown
- Ventral surface of body varies from soft pale brown to rich velvety brown.

Life cycle

- Eggs hatch in 3-5 days
- The larva moults five times
- Larval period is 12-18 days
- Pupal period is completed in 11-13 days.
- Adults live for 3-5 days
- Total life cycle is completed in 24-36 days.

Salient features

- Lay eggs singly on the upper and lower surface of young leaves, petioles and also on tender shoots
- Larvae feed on leaves
- Pupation takes place in rough silken padding on the stem prepared by the larva

Management:

- Pest can be kept under check by collecting the butterflies with the help of net and destroying them
- In case of severe infestation, spray the crop with quinalphos @ 1.5 L/500 L of water/ha.

Minor pests of cinnamon

- Leaf psyllid, *Pauropsylla depressa* (Psyllidae: Hemiptera)
- Leaf miner, *Phyllocnistis chrysothralina* (Phyllocnistidae: Lepidoptera)
- Tussock caterpillar, *Dasychira mendosa* (Lymantridae: Lepidoptera)

INSECT PEST OF BLACK PEEPER

1. Polu beetle, *Longitarsus nigripennis* (Chrysomelidae: Coleoptera)

Damage:

- Grubs bore and feed on the contents of tender berries making them hollow
- The external indication of infestation is the presence of dark, drying berries possessing characteristic circular hole in the midst of green healthy berries
- A single grub can destroy 3-4 berries
- The extent of damage caused by polu beetle goes up to 40 per cent in certain endemic areas

Identification

- Polu beetle is small, shining and brownish black flea beetle with stout legs
- Grubs are pale yellow

Life cycle

- The adult beetle lays eggs in small shallow depressions made on the rind of tender pepper berries
- A single grub can destroy 3-4 berries.
- Fully grown grubs drop to soil, construct oval shaped earthen cocoons and pupate in them
- Total life cycle of the pest is completed in 40-50 days
- There are four generation between July and January.
- Egg laying stops by December when pepper berries mature.
- Pest is active from July to Jan-Feb but the maximum population is during November
- The high yielding cultivars suffer more heavily
- TMB V and 'Shimoga' were particularly free from pollu beetle infestation.

Management:

- Cultural operations like raking of soil and regulation of shade by standards.

- Tilling the soil at the base of the vine at regular intervals
- Soil application of insecticides is also affective in controlling the grubs falling to ground for pupation.
- Spraying of vines with quinalphos (0.05%) twice a year during July and October control the pest effectively.

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

Damage

- The caterpillars damage terminal shoots by boring into them
- Drying of terminal portions of the vines.

Salient features:

- Adults are yellow coloured moths
- The incidence is more during August to December, when tender shoots are available
- Pest takes about a month to complete its life cycle

Management

- Spraying vines with dimethoate or phosphamidon at 0.05% is effective
- Parasitoids like *Apanteles* sp. (Braconidae), *Euderus* sp. (Eulophidae) and *Goniozus* sp. (Bethylidae) have been reported to attack the caterpillars in nature

3. **Gall forming thrips**, *Liothrips (Gynaikothrips) karnyi* (Thripidae: Thysanoptera)

Salient features:

- It is a persistent pest in almost all the pepper growing areas of India
- The thrips make marginal galls on leaves within which they live in colonies
- Rasp and suck the sap
- Leaf tissue become thick
- Under server infestation whole leaf presents crinkled or mall formed appearance

- Proliferation of cells
- Leaves become brittle

Management

- Spraying of vines with malathion (0.1%) or dimethoate (0.05%) or quinalphos (0.54%) is effective
- An anthocorid bug and some predaceous mites have also been reported

4. Scales and mealybugs : *Lepidosaphes piperis* (Coccidae: Hemiptera)

- Mussel scale, *Lecanium marsupiale*
- Hard scales, *Aspidiotus destructor*
 - *Pinnaspis aspidistrae*
 - *P. marchali*
 - *Chionaspis voricosa*
- Mealy bugs, *Ferrisia virgata*

Damage

- Scales and mealy bugs often cause considerable damage to pepper
- They suck the cell sap from plants
- Badly infested vines dry up gradually.

Management

- Spraying of malathion (0.1%) or dimethoate (0.05%) is effective in controlling these coccids.

5. Gall midge, *Cecidomyia malabrensis* (Cecidomyiidae: Diptera)

Damage

- The eggs are laid on the spikes
- The maggots get embedded in the pulp of berries and at the attachment of berry to spike

- Full grown maggots fall to the ground and pupate in soil
- Infested berries increase in size in the beginning but appear stunted later
- Cause Swelling on tender stalks and shoots.

Minor pests

- Flea beetles, *Pagria costatipennis*
 - *Neculla pollinaria*
- Weevil, *Eugnathus curvues*
 - *Mylocerus sp.*
- Stem borers, *Pterolophia annulata* (Cerambycidae: Coleoptera)
 - *Diboma procera*