

B.Sc. Horti. IVth Sem

**Insect pest of fruit, plantation,
medicinal and aromatic crops (PPH-221)**

Topic name : Insect pests of Mango and their management



Present by

**Dr. Omendra Sharma
DEPARTMENT OF ENTOMOLOGY
CSA UNIVERSITY UP.**

Major pests of mango

1.	Mango hoppers	<i>Idioscopus niveosparsus</i> , <i>I. clypealis</i> , <i>Amritodus atkinsoni</i>	Cicadellidae	Hemiptera
2.	Stem borer	<i>Batocera rufomaculata</i>	Cerambycidae	Coleoptera
3.	Fruit fly	<i>Bactrocera dorsalis</i>	Tephritidae	Diptera
4.	Mango nut weevil	<i>Sternochaetus Mangiferae</i>	Curculionidae	Coleoptera
5.	Mango mealy bug	<i>Drosicha mangiferae</i>	Cicadellidae	Hemiptera
6.	Bark eating Caterpillar	<i>Indarbela tetraonis</i> , <i>I. Quadrinotata</i>	Metarbelidae	Lepidoptera
7.	Mango leaf webber	<i>Orthaga exvinacea</i>	Noctuidae	Lepidoptera
8.	Shoot borer	<i>Clumetia transversa</i>	Noctuidae	Lepidoptera
9.	Leaf caterpillar	<i>Bombotelia jacosatrix</i>	Noctuidae	Lepidoptera

Mango Hopper



Insect Pests of National Significance

Nymphs and adults of *Idioscopus* species suck sap from twigs, inflorescences, tender leaves and fruits. Affected plant tissue turns brown, may deform and dry up.





Damage symptoms due to Mango Hopper

Adults lay eggs on flower buds and inflorescence stalk.

Adults and Nymphs suck sap from flowers, causing drying of flowers and subsequent dropping.

Secrete honey dew and as a result, sooty mould develops causing less photosynthesis.

Heavy puncturing and continuous draining of the sap causes curling and drying of the infested tissue

3-4 generations completed in a growing season, with a population build up in February-April and June-August.

Hoppers shelter in the cracks and crevices of the bark or underside the leaves of the trees during the off season.



Damage symptoms due to Mango Hopper



Sooty Mould formation on mango leaves due to Mango Hopper infestation : - A secondary symptom.



Honey dew deposition

Control measures for Mango hoppers

Cultural control:

1. Pruning of dense orchards in the month of November - December, orchard sanitation and field sanitation.
2. Keep the nursery area clean, free of weeds and grasses.
3. Removal of weeds and alternate host plants like hibiscus, custard apple, guava etc.
4. Avoid dense plantings, maintained open canopy; prune overcrowded overlapping branches after rainy season.
5. Avoid excess use of nitrogenous fertilizers.
6. Smoking of orchards by burning of crop residues/cow dung cake during evening hours.

Biological Control:

Application of bio-agents, *Metarhizium anisopliae* @ 1×10^8 cfu/ml or *Beauveria bassiana* @ 108 cfu /ml on tree trunk once during off season and twice at 7 days interval during flowering season.



Control measures for Mango hoppers.

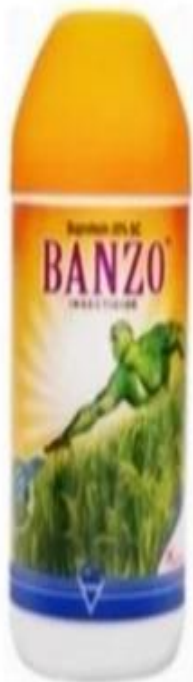
Chemical Control:

Application of any of the following insecticides gives a good control, but spray should be done only after insect pest population crosses its ETL. First spray should be given at the early stage of panicle formation. The second spray at full-length stage of panicles but before full bloom and the third spray after the fruits set at pea size stage.

- **Buprofezin 25% SC @ 1.25ml/ l of water, 5 - 15 l per tree.**
- **Deltamethrin 2.8% EC @ 0.03 - 0.05% (0.33 to 0.5 ml / lit) As per field requirement.**
- **Dimethoate 30% EC @ 990 - 1320 ml in 600-800 l of water/acre.**
- **Imidacloprid 17.8% SL @ 3ml / l of water, 10 l/ tree.**
- **Lambda-cyhalothrin 5% EC @ 0.5 - 1.0 ml/ l of water.**
- **Malathion 50% EC @ 900 - 1200 ml in 600 - 800 l of water/acre.**
- **Monocrotophos 36% SL @ 600 - 800 ml in 200 - 800 l of water/acre.**
- **Oxydemeton-methyl 25% EC@ 600 - 800 ml in 600 - 800 l of water/acre.**
- **Thiamethaxam 30 FS (0.05%)**

A rational rotation of insecticide is desirable to counteract the tendency of pest to develop field resistance.

Some insecticide used for controlling Mango hoppers.





Mango Mealybug

Nymphs and adults suck the plant sap and reduce the vigour of the plant.



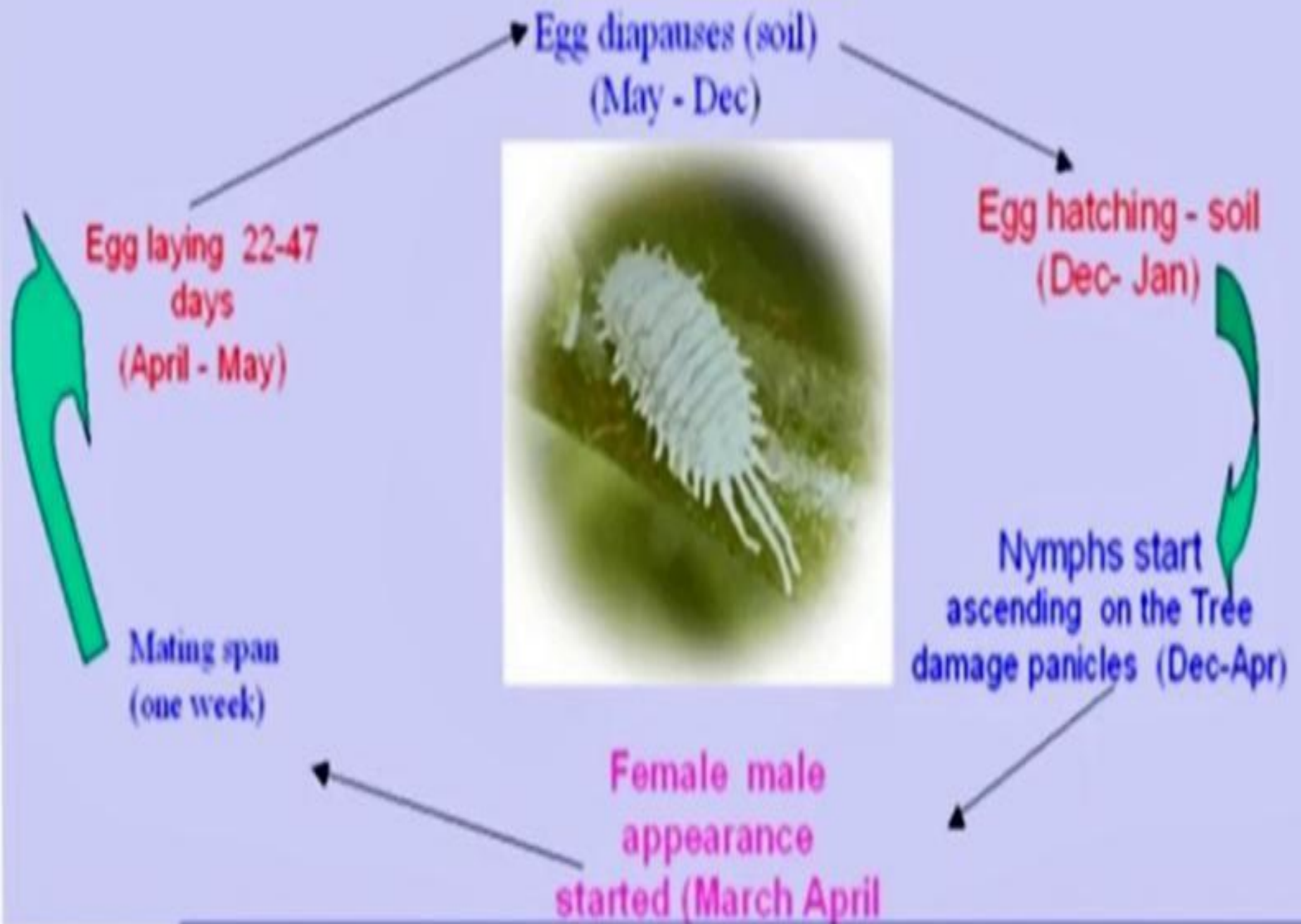
Mealybug attacks every part of the plant.



Sooty mould formation on mangoes due to mealybug infestation 10

Mango Mealy Bug

Life Cycle



Mango Mealy bug: Nature of infestation

- 1) The female adult mealy bug crawls down the tree in the month of April-May and enter in the cracks in the soil for laying eggs.
- 2) Just after hatching, the minute newly hatched pink to brown coloured nymphs crawl up the tree.
- 3) After climbing up the tree, they start sucking the sap of tender plant parts.
- 4) Only nymphs and female mealy bugs are harmful as they suck plant sap. Male do not eat anything.
- 5) They are considered more important because they infest the crop during the flowering season.

Control measures for Mango mealybug.

Cultural control:

1. Flooding of orchard with water in the month of October kill the eggs.
2. Ploughing of orchard in November and raking of soil around tree trunk helps to expose the eggs to natural enemies and sun.
3. Removal of weeds.
4. Fastening of alkathene sheet (400 gauge)/grease band of 25 cm wide afterwards mud plastering of trunk at 30 cm above the ground in the middle of December helps in preventing juvenile mealy bug to plant and thereby minimise infestation.
5. Destruction of infested fallen leaves In July –August.



Fig 5. Alkathene banding on tree trunk to check migration



Mealybugs are known to bribe ants with their sugary secretion (honeydew) and in return ants help in spreading of mealybugs and provide protection from predator ladybird beetle, parasites and other natural enemies.



Fig. 7. Association of ants and mealybugs



Inflorescence Midge



The midge infests and damages the crop in three different stages.

1. The first attack is at the floral bud burst stage. The eggs are laid on newly emerging inflorescence; the larvae tunnel the axis and thus destroy the inflorescence completely. The mature larvae make small exit holes in the axis of the inflorescence and slip down into the soil for pupation.
2. When the tender fruits are attacked in second term, they slowly turn yellow and finally drop.
3. The third attack is on tender new leaves encircling the inflorescence. The most damaging one is the first attack in which the entire inflorescence is destroyed even before flowering and fruiting.

Control : As the larvae pupate in the soil, ploughing of the orchard expose pupating larvae to sun helps in killing them. Spraying of 0.05% Fenetrothion or 0.045% Dimethoate at the bud burst stage of the inflorescence is effective.

Inflorescence Midge larvae feeding on mango inflorescence



Mango Fruitfly



- The female punctures the outer wall of the mature fruits with its pointed ovipositor and insert eggs inside the mesocarp of mature fruits.
- After hatching, the larva feeds on the pulp of fruit which appears normal from outside, but drops down finally. The mature maggots fall down into the soil for pupation.
- The emergence of fruitfly starts from April onwards and the maximum population is recorded during May - July, which coincides with fruit maturity.



Control measures for Mango Fruit Fly.

Cultural control:

1. Prior to harvest (30-40 days ahead) collect and disposed off infested and fallen fruits to prevent further multiplication and carry-over of population.
2. Ploughing of orchard during November-December to expose pupae to sun's heat which kills them.
3. If infestation is heavy, bait splash on the trunk only, once or twice at weekly interval is recommended. To prepare bait splash, mix 100 gm of jaggery in one litre of water and add 1- 2 ml of deltamethrin by using an old broom.
4. Managing fruit flies also reduces Mango anthracnose disease and prevents late fruit fall.

Physical control:

Hot water treatment of fallen mature fruits at 48 ± 1 °C for 4 - 5 min



Mechanical control:

1. Male annihilation technique: Set up fly trap using methyl eugenol. Prepare methyl eugenol 1 ml/l of water + 1 ml of malathion solution.
2. Take 10 ml of this mixture per trap and keep them at 25 different places in one ha between 6 and 8 am.
3. Collect and destroy the adult flies.

Different types of Mango Fruit Fly Traps



Control measures for Mango Fruit Fly.

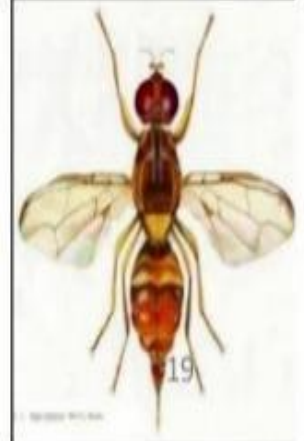
Chemical control : The adult fruit flies can also be controlled by bait sprays.

Bait spray can be prepared by combining any one of the insecticides as given below and protein hydrolysate or molasses or jaggery @ 10 gm per liter of waater.

1. fenthion 10 EC 1ml/l,
2. malathion 50EC 2 ml/l,
3. dimethoate 30 EC 1 ml/l,
4. carbaryl 50 WP 4 g/l.

Spray the mixture at 2 weeks interval before ripening of fruits.

Racking up of soil below the tree and drench with chlorpyriphos 20 EC @ 2.5 ml/l to kill the pupa.



Mango Scale Insects

The nymphs and adult scales suck the sap of the leaves and other tender parts and reduce the vigour of the plants. They also secrete honeydew, which helps in the development of sooty mould on leaves and other tender parts of the tree. In case of severe scale infestation, growth and fruit bearing capacity of the mango tree is affected adversely.



Control: Pruning of the heavily infested plant parts and their immediate destruction followed by two sprays of Monocrotophos (0.04%) or Dimethoate (0.06%) at an interval of 20 days is very effective in controlling the scale population.

Mango Scale Insects



Scale infestation on leaves



Closeup view of eggs, crawlers and male

Mango leaf gall midge



- Eggs are laid on the under surface of leaves.
- On hatching maggots bore inside leaf tissue, and feed within, resulting in formation of small raised wart-like galls on leaves.
- Affected leaves get deformed and drop prematurely.

Control

If infestation is severe, especially in young orchards, spray dimethoate, phosphamidon or monocrotophos.

Mango seed / stone weevil



It is a common pest of mango in southern India. Varieties with high TSS and sugar such as Alphonso, Bangalora, Neelum, etc. are more prone to attack by this pest.

Female lay eggs under the rind of ripening fruits. Newly emerged grubs bore through the pulp, feed on seed coat and later cause damage to cotyledons. Pupation takes place inside the seed. Pulp is discoloured around the affected portion.

The pulp adjacent to the affected stone is seen discoloured when the fruit is cut open.

Mango seed/ stone weevil



Close-up of an egg-laying mark of mango seed weevil



Grub of mango seed weevil



Adult mango seed weevil

Cultural control:

Collection and destruction of infested and fallen fruits at weekly interval till fruit harvest.

Ploughing of orchard after harvest to expose hibernating adults, therefore reduces infestation. Destroy all left over seeds in the orchard and also in the fruit processing industries.

Chemical control :

Spraying Dimethoate (0.1%) twice at 15 days interval when fruits are of marble size.

Spray main trunk, primary branches and junction of branches prior to flowering (November, December) with carbaryl (0.2%) or fenthion (0.1%) or chlopyriphos 20 EC @ 2.5 ml/l to control beetles hiding in the bark.

Spray Acephate 75 SP @ 1.5 g/l when fruits are of lime size (2.5-4 cm diameter) followed by Deltamethrin 28 EC @ 1ml/l after two or three weeks.

Mango bark eating caterpillar



The damage is caused by grubs either to roots or stems. The grubs after hatching from eggs first feed on bark and make irregular cavities. It makes tunnels which may either be in boring upward, resulting in drying of branches. The caterpillar spins brown zig-zag ribbon-like silken web on tree which consists of their excreta and wood particles. Larvae also make shelter tunnels inside where they rest.

Mango Bark-eating caterpillar



Management

1. Keep orchard clean and healthy.
2. Clean the infested hole and put emulsion of quinalphos (0.05%) in each hole and plug them with mud.
3. Drench stem thoroughly with quinalphos (0.05%) / chlorpyrifos (0.02 %) when incidence is high.
4. Placement of petrol soaked cotton swab inside the bore hole and subsequent plugging with mud is also effective.

Mango Leaf webber

Symptoms: Initially caterpillars feed on leaf surface gregariously by scrapping. Later they make web on tender shoots and leaves together and feed within. Several caterpillars may be found in a single webbed up cluster of leaves



Management

- Pruning of overcrowded and overlapping branches and mechanical removal of infested webs by leaf web removing device and burning them.
- Ploughing of orchard checks its population by destroying the hibernating pupae.
- Two to three sprays commencing from last week of July with carbaryl (0.2%) or quinalphos (0.05%). This spray will also take care of mango psylla (*Apsylla cistellata*).
- The use of same chemical for every spray should be avoided.

Mango Leaf webber inside its web



Mango shoot gall psylla

Mango Shoot gall psylla.

Shoot gall psylla is a monophagous pest of mango in northern India. Nymphs emerge during August-September and suck cell sap from adjacent buds. As a result of feeding, buds develop into hard conical green galls. The galls are usually seen during September-October. Consequently there is no flowering and fruit setting. Nymphs over winter inside the galls.



Management of Mango shoot gall psylla

Cultural management of Mango shoot gall psylla

: practice of removal of eggs bearing leaves from a shoot during March last week which decreases number of shoot gall formation.

Mechanical management of mango shoot gall psylla

Pruning of shoots upto 30 cm which bears galls during September to check further spread of incidence

Chemical Management of mango shoot gall phylla

1. Galls with nymphs should be collected and destroyed.
2. Spray dimethoate (0.06%) or quinalphos (0.05%) at fortnightly interval starting from August.
3. Spray Profenophos @ 2 ml/litre which is having ovicidal action during the second week of March.
4. Spray 2, 4-D (150 ppm, i e 150 mg/ liter of water) during October which opens the galls and nymphs come out and are killed with cold.
5. New mango orchard in humid region need to be discouraged.

Mango shoot borer

Mango Shoot-borer

Larvae bore into young tender leaves during August and freshly hatched caterpillar bore into mid rib. After a couple of days, they bore into tender shoots near the growing point tunneling downward, throwing their excreta resulting in dropping of leaves and wilting of terminal shoots.





. Infestation of shoot borer on young leaves

Mango shoot borer



Larva of shoot borer

Management of Mango Shoot Borer

1. Attacked shoots should be clipped off and destroyed.
2. Spray cabaryl or quinalphos (0.05%) at fortnightly interval from the commencement of new flush.

Downward tunnelling in terminal shoots caused by dark pink caterpillar with dirty spots is seen. Abnormal stunting with bunchy appearance of terminal branch is seen under high severity of attack by shoot borer.

Tip drying



Symptoms of mango shoot borer infestation



Multiple branch formation

Mango stem borer



The grubs feed by tunneling the bark of branches and main stem. Shedding of leaves and drying of terminal shoots takes place in early stage of attack while damage to main stem causes tree death. Chewed food matter along with excreta is seen at the infestation site.



Mango stem borer Management

1. Grow tolerant mango varieties viz., Neelam, Humayudin
2. Remove and destroy dead and severely affected branches of the tree
3. Avoid injury at the base of trunk while pruning
4. Remove alternative hosts like moringa, silk cotton in the near vicinity of mango plant.
5. During off-season, apply absorbent cotton soaked in 10 ml monocrotophos 36 SL per tree by padding without unnecessarily injuring the trunk.
6. Use a needle or long wire to pull out the grubs from the bore holes. The bore holes may be filled with DDVP @ 5 ml or monocrotophos 36 WSC 10 to 20 ml or one celphos tablet (3 g aluminum phosphide) or apply carbofuran 3G 5 g per hole and plug with clay + copper oxychloride paste.
7. Swab Coal tar + Kerosene @ 1:2 or Carbaryl 50 WP 20 g / L (basal portion of the trunk - 3 feet height) after scraping the loose bark to prevent oviposition by adult beetles.



Mango stem borer infested plant



Mango Thrips

Nymphs and adults lacerate the tissues and suck the oozing cell sap. Thrips feeds on leaves, florescence, and young fruits. Leaf feeding species feed on mesophyll tissues near leaf tips. Affected leaves show silvery shine, leaf edges curls upward and bear small spots of faecal matter. Affected fruits show corky appearance.

If the infestation is severe, can be controlled by either dimethoate (0.15%) or Monocrotophos (0.1%). Spraying of Abamectin, Azadirachtin, Deltamethrin, Lambda-cyhalothrin or Lufenuron in their recommended dose can control this pest. .



Damage symptoms by mango Thrips



Mango Fruit borer

Symptoms: A major pest in Orissa, West Bengal and Coastal Andhra Pradesh. Pest is active from January to May. Adults lay eggs on fruits. After hatching larvae bore into fruits. Fully grown caterpillars (25 mm) have red bands on body alternating with white bands.

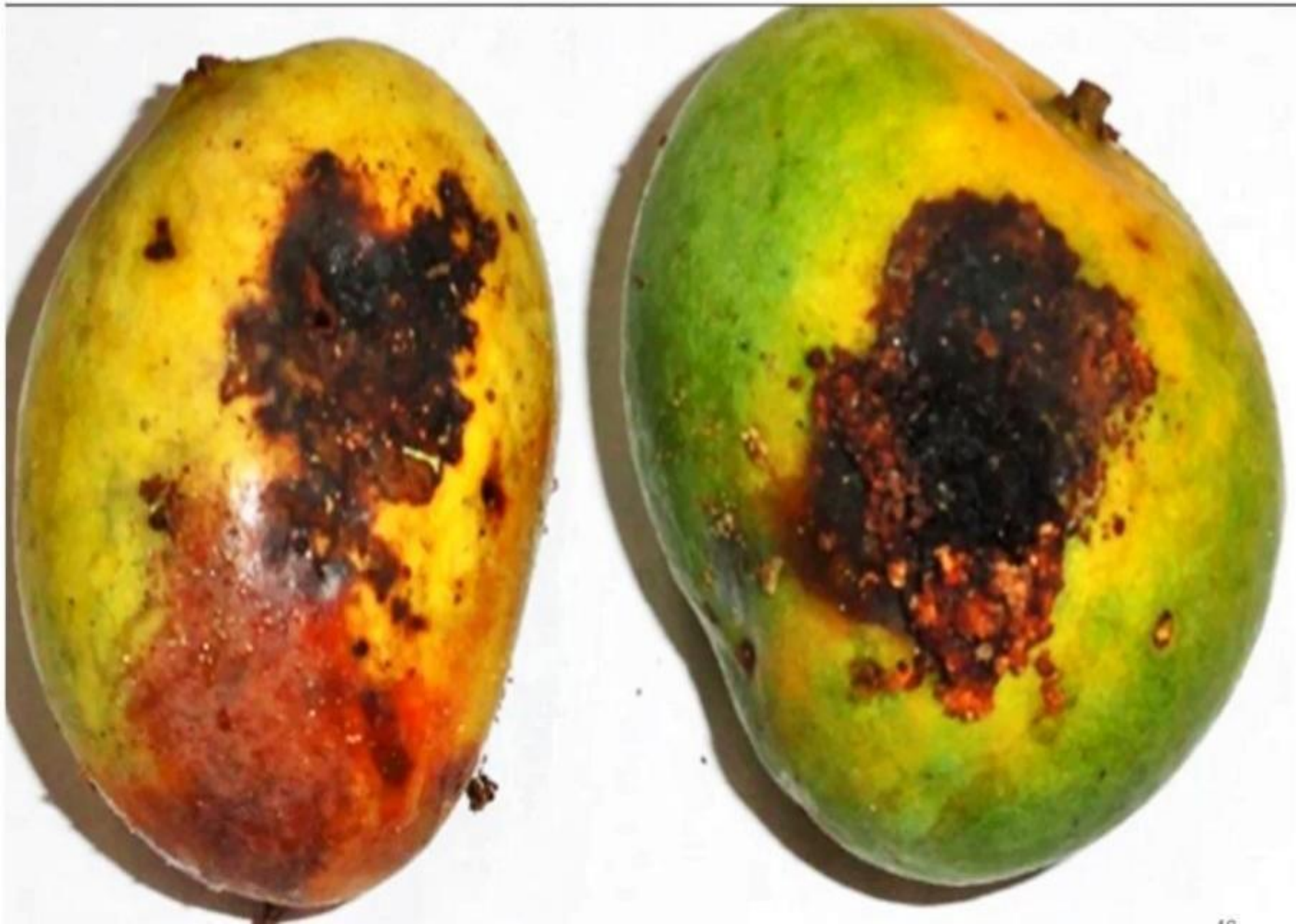
Caterpillars bore into the fruit at the bottom (beak region) and feed inside reaching Kernels. Entrance hole is plugged with excreta. Affected fruits rot and fall prematurely.



Management

1. Collection of fruits and dead wood after fruit harvest.
2. Destroy all fallen fruits.
3. Spray fenthion (0.1%) at marble size onwards and repeat with Deltamethrin 28 EC @ 1ml/l after two weeks in case of heavy infection.
4. No spray should be given fortnight before harvest.

Mango Fruit borer infested fruits



Mango Leaf miner

Symptoms: Tiny caterpillars mine under the dorsal epidemics of tender leaves and feed within; as a result grayish white blisters appear on leaves.



Management

Clipped off destroy the affected shoots.

Spray quinalphos (0.05%) or fenthion (0.1%) from the emergence of new flush.

Red tree ant

Symptoms: The ants web and stitch together a few leaves, usually at the top of the branches and build their nests. The ants are carnivorous and prey upon small insects. However, indirect damage is caused by protecting insects like aphids and scales, which excrete honey dew



Management

1. Nests should be removed and destroyed mechanically by web cutting device.
2. Spraying any contact insecticides, like quinalphos, or Chlorpyrifos or Dimethoate after disturbing the nest.

THANK YOU