agMOOCs

INTEGRATED PEST MANAGEMENT IN MANGO

Course teacher

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Mango (*Mangifera indica*)

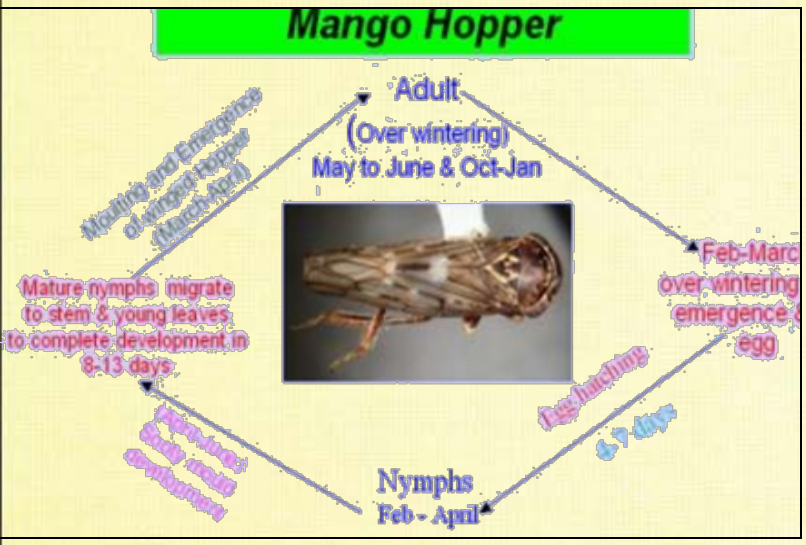
- Known as “King of fruits” for its strong aroma, delicious taste and high nutritive values
- India ranks first in production
- Area 2567 Million ha and production 19273 million tonnes
- Varieties grown
    - Alfanso
    - Neelam
    - Dashari
    - Totapuri
    - Sindhu

Pests of mango

Pest of national significance	Pests of regional significance
Mango hopper	Scale
Mango mealy bug	Shoot webber
Fruit fly	Termites
Stem borer	Thrips
Stone Weevil	
Leaf Webber	
Inflorescence midge	
Red ant	

Mango leaf hopper: *Ideoscopus clypealis, I. indicus and Armitodus atkinsoni* (Cicadellidae: Hemiptera)

Severe during Nov-Feb when plant is at flowering stage



☞ Nature of damage :

1	Adult and nymphs suck the sap from the Leaves, flowers and fruits

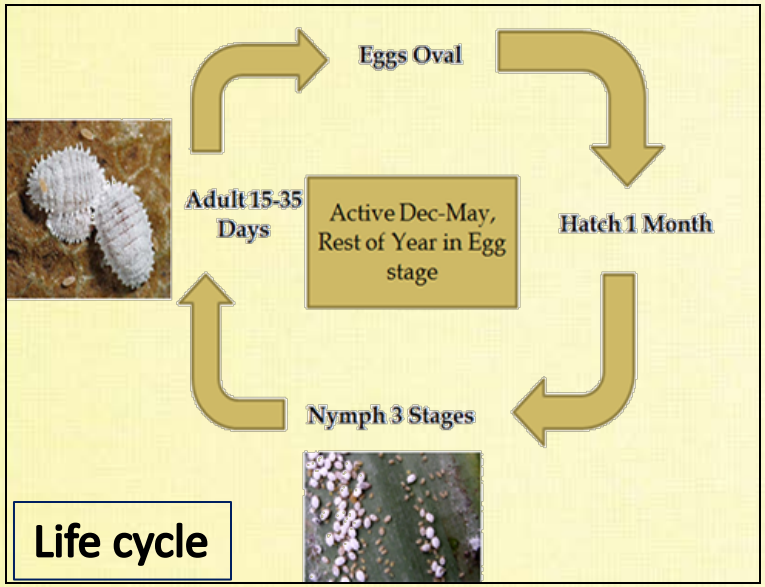
☞ Damage symptoms :

1	Curling & drying of affect part
2	Reduce the plant vigor and destroys the inflorescence
3	Fruits often drop
4	Sooty mould development by honeydew secretion

Favourable condition : High humidity favor the population buildup

Mango mealy bug: *Drosicha mangiferae* (Green) (Margarodidae : Homoptera)

Feeds on as many as 62 different plant species, among them, mango, citrus, jujube and guava suffer most



Life cycle

☞ Nature of damage :

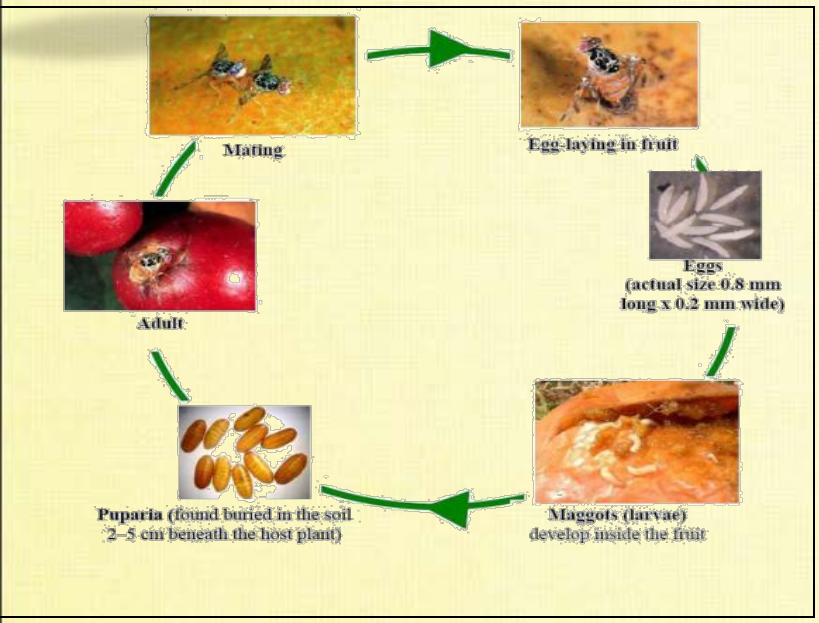
1	Both adults and nymphs suck sap from inflorescence, tender leaves, shoots and fruits and affect the fruit set

☞ Damage symptoms:.

1	Sooty mold development by honey dew excretion .
2	Heavy infestations devitalize the plant and result in reduction in fruit size and premature dropping of fruits.

Mango fruit fly: *Bactrocera dorsalis, B. correctus & B. Zonatus* (Teprhritidae: Diptera)

- Polyphagous pest attacks all the fruit crops
- Flies breed on fruits that are mature and population increases rapidly during summer



☞ Nature of damage :

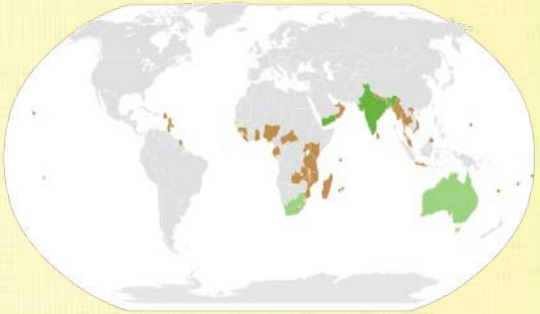
1	Female punctures outer wall of mature fruits to insert eggs and causes egg laying injury
2	Maggots feed on mesocarp

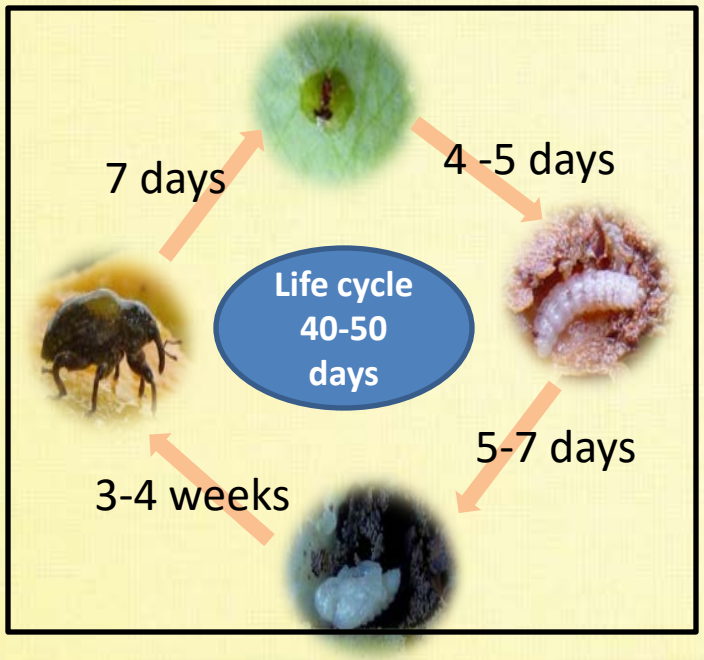
☞ Damage symptoms :

1	Ovipositional punctures on pericarp
2	Feeding injury causes secondary infection like fruit rot

Mango stone weevil: *Sternochetus mangiferae* (Curculionidae: Coleoptera)

- **It is a specific pest of mango**
- **In India it is confined to humid areas in southern and coastal regions, most common in S. India.**





Nature of symptoms

1	Both grub and adult feed on nut

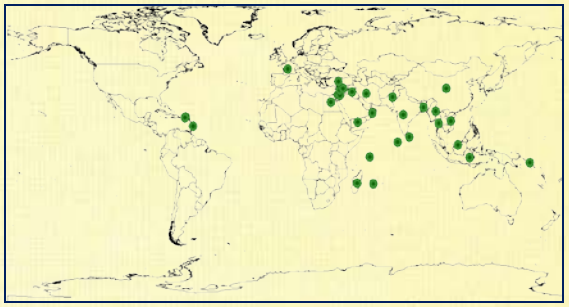
Damage symptoms

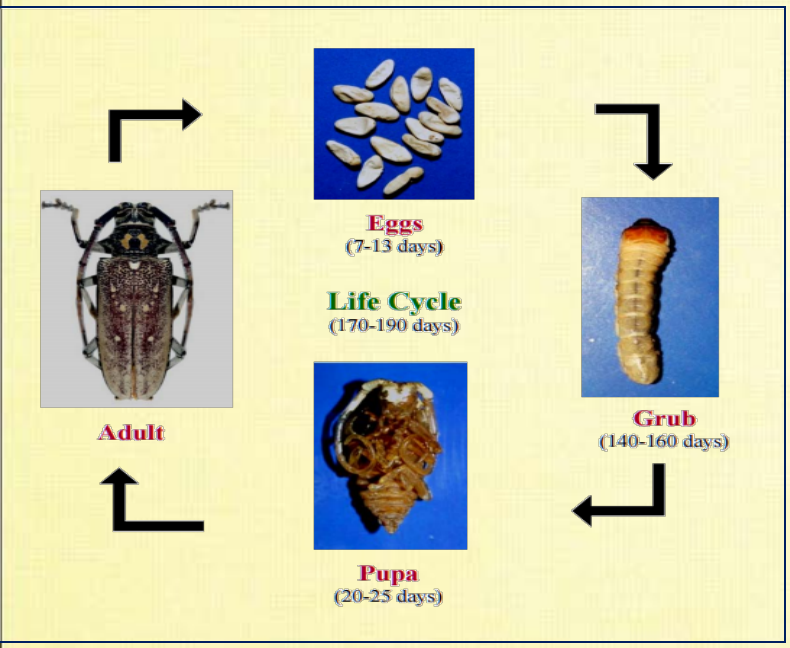
1	Grubs bore through the pulp, feed on seed coat and later damage the cotyledons
2	The pulp adjacent to the affected stone is seen discoloured when the fruit is cut open




Mango stem borer: *Batocera rufomaculata* (Cerambycidae : Coleoptera)

- Attacks mango, fig, rubber, Jack, mulberry and eucalyptus etc





☞ Nature of damage :

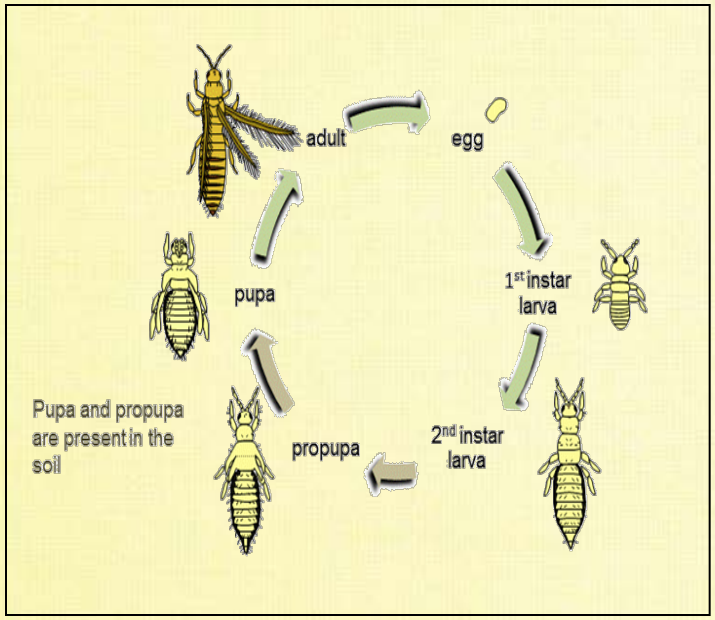
1	Grub is the damaging stage which tunnels through the trunk or branches

☞ Damage symptoms:

1	Grubs tunnel into the stem through trunk and branches
2	In severe cases causes wilting

Thrips: *Coliothrips indicus, Rhipiphorothris cruentatus, Scirtothrips dorsalis*
(Thripidae : Thysanoptera)

***C. indicus and R. cruentatus* feed on *leaves* and *S. dorsalis* on inflorescence, and young fruits**



☞ Nature of damage :

1	Nymphs and adults lacerate the tissues and suck the oozing cell sap.
2	Leaf feeding species feed on mesophyll near leaf tips.

☞ Damage symptoms:

1	Affected leaves show silvery sheen and bear small spots of faecal matter
2	Affected fruits show corky appearance





Red ant: *Oecophylla smaragdina* (Formicidae: Hymenoptera)




☞ Nature of damage :

1	The ants web and stitch together a few leaves

☞ Damage symptoms :

1	Top leaves of the branches webbed and build their nests
2	They mainly problematic during harvesting the mangos

Leaf miner: *Acrocercops syngramma*

☞ Damage symptoms :

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

Inflorescence / leaf/ twig midge: *Erosomyia indica, Dasineura amaramanjarae* (*Cecidomyiidae: Diptera*)

☞ Nature of damage :

1	Maggots bore in to tender leaves, inflorescence and small fruits

☞ Damage symptoms :

1	Maggot tunnel the axis of inflorescence and destroy it completely. It causes bending and drying of the inflorescences.
2	Young maggots bore into tender fruits which slowly turn yellow and finally drop.
3	The inflorescence shows stunted growth and its axis bends, at the entrance point of larva

Scale: *Chloropulvinaria polygonata, Aspidiotus destructor* (Diaspididae: Hemiptera)

Chloropulvinaria polygonata

☞ Nature of damage :

1	Nymphs and adults suck the sap from tender parts

☞ Damage symptoms :

1	The nymphs and adult scale suck the sap of leaves and other tender parts reducing vigor of plants
2	They also excrete honeydew which helps in the development of sooty mould on leaves and other tender parts

Aspidiotus destructor

Integrated pest management

Pre-sowing operations

Cultural practices:

- Plough the field before planting to destroy existing weeds in the field
- Use resistant/tolerant varieties

During vegetative stage

Mechanical methods:

- Collect and destroy crop debris and insect damaged plant parts
- Remove weed plants
- Handpick the gregarious caterpillars and the cocoons which are found on stem and destroy them in kerosene mixed water.

Cultural methods:

- Provide timely irrigation, organic manure, fertilizer as per the recommended dose, drainage, weeding, mulching etc

After 3 years of planting

Mechanical operations

Operation	Target pest
Hand picking of gregarious forms of larvae	Leaf webber, Shoot webber
Banding of tree trunk with alkathene (400 gauge), 25 cm wide sheets	Mango mealybug
Pruning the over crowded shoots	Leaf hoppers, red ants, leaf miner and scale
Collection and destruction of infested and fallen fruits at weekly interval till harvest fruit.	Fruit fly and stone weevil
Destroy all left over seeds and fruits in the orchard	Mealybug, fruitfly and stone weevil

Physical operations

Practice	Target pest
Install methyl eugenol traps @ 10-12/acre for mass trapping	Fruit fly

Biological methods

Bio-agents	**Target pests**
Verticillium lecanii	Mango hoppers
Beauveria bassiana, Menochilus sexmaculatus	Mango mealybug
Metarhizium anisopliae or *Beauveria bassianna*	Stem borer

Chemical management

Chemicals	Target pests
Mango leaf hoppers	Imidacloprid17.8% SL @ 3ml / l, or Lambda-cyhalothrin 5% EC @ 0.5-1.0 ml/l
Leaf webber	Quinalphos @ 0.05%
Scale	Dimethoate @ 0.06%
Mango thrips	Dimethoate @ 0.15 %
Leaf miner	Quinalphos @ 0.05% and Fenthion @ 0.1%
Red ant	Dimethoate 1.5 ml/l of water after disturbing the nest

Stone weevil

Cultural:

- Collection and destruction of infested and fallen fruits at weekly interval till harvest fruit.
- Ploughing of orchard after harvest to expose hibernating adults, reduce, infestation levels.
- Destroy all left over seeds in the orchard and also in the processing industries.

Biological:

- Parasitoids are unknown on stone weevil. The natural enemies *mite Rhizoglyphus sp,* Ants *(Camponatus sp., Monomorium sp*. and *Oecophylla smaragdina)* and fungus *Aspergillus sp, Beauveria bassiana* has been found to be pathogenic on mango weevil

Chemical:

- 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 flowing (November, December) with carbaryl (0.2%) or fenthion (0.1%) or chlorpyriphos 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.
- Vapour heat treatment of fruits.
- Irradiation of fruits with 0.25-0.75 KGY to control stone weevil.

Fruit fly

- Prior to harvest (30-40 days) collect and dispose off infested and fallen fruits to prevent further, multiplication and carry over of population.
- Ploughing of orchard during November-December to expose pupae to sun's heat which kills them.
- Hanging of methyl eugenol wooden block traps soaked in ethanol, methyl eugenol and malathion (6:4:1) during fruiting period from April to August @10 traps/ ha tie them tightly at 3-5 feet above ground level.
- To control adult flies during severe infestation placing poison bait viz Protein hydrolysate +malathion 50 ml +200 ml molasses in 2 litres of water be sprayed adding an additional 18 liters of water to bait poison. Commencing at pre oviposition period and repeat at 15 days interval. Addition of 10 ml methyl eugenol in place of molasses is also recommended.
- Hot water treatment of fruit at 48 +_ 10 C for 60 min.
- Three weeks before harvesting, spray Deltamethrin 2.8 EC @ 0.5 ml/l + Azadiractin (3000 ppm) or 2 ml/l.
- Irradiation of fruits 400 Grays using cobalt 60 to control fruit fly.
- 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 ml of Deltamethrin by using an old broom.
- Managing fruit flies also reduces anthracnose disease and prevents late fruit fall