



PAPAYA

MEALYBUG & ITS MANAGEMENT

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Why flare up

- ◆ Over use of insecticides
- ◆ Polyphagous & greater survival
- ◆ Use of broad spectrum insecticides
- ◆ Use of cocktail Insecticides
- ◆ High reproductive potential
- ◆ Shorter generation period
- ◆ Waxy protective coat - chemical barrier
- ◆ Climate change - increase in temperature and CO₂ levels

LYCAENID PREDATOR, *SPALGIS EPIUS*



Larva

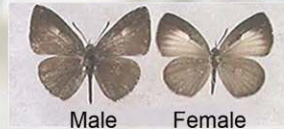


Pupa



Pupal case

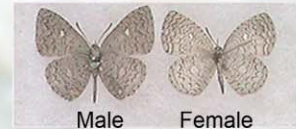
UPPERSIDE



Male

Female

UNDERSIDE



Male

Female

Tips for success

- ◆ Regular and timely monitoring
- ◆ Act early & spot application
- ◆ High volume spraying
- ◆ Add surfactant
- ◆ Avoid pyrethroids
- ◆ Avoid cocktail
- ◆ Avoid combination products
- ◆ Spray on under surface of leaves, fruits, flowers, stem and soil
- ◆ Ant control
- ◆ Community effort



Cryptolaemus montrouzieri Mulsant

PARASITOIDS



Management

- ◆ Remove the alternate weed hosts
 - ◆ Remove and destroy the infested parts of the plant
 - ◆ Monitor the incidence regularly and look for crawler emergence
 - ◆ Take up the management at initial stage to get maximum control
 - ◆ Look for parasitoid and predatory activity. Many coccinellid beetles and hymenopteran wasps prey/parasitize them
 - ◆ Lycaenid predator : *Spalgis epius* larva feeds voraciously on different stages of mealybug and are abundant in wild mulberry, *Morus* sp. They can be collected released in place of need.
 - ◆ If the natural enemy activity is more delay/avoid taking up control measures
 - ◆ Wherever necessary, use botanical insecticides like neem derivatives such as neem oil 2%, NSKE 5% and fish oil rosin soap @ 25g / litre of water
 - ◆ As a last resort use any one of the recommended chemicals at the recommended dose with recommended dilution for maximum control
- | | | | | | |
|----------------|-------|--------------|----------------|---------|----------------|
| ◆ Profenophos | 50 EC | - 2 ml/litre | ◆ Dimethoate | 30 EC | - 2 ml / litre |
| ◆ Chlorpyrifos | 20 EC | - 2 ml/litre | ◆ Thiomethoxam | 25 WG | - 0.6 g/litre |
| ◆ Buprofezin | 25 SC | - 2 ml/litre | ◆ Imidacloprid | 17.8 SL | - 0.6 ml/litre |
- ◆ Profenophos or dimethoate can be combined with neem oil 20 ml/l (or) Nimbecidine 10000 ppm 2 ml/l
 - ◆ Add one ml Teepol or Sandovit / litre
 - ◆ After a fortnight check for newly emerging crawlers; if necessary, go for second spray.

MEALYBUG *and its* MANAGEMENT - PAPAYA

Paracoccus marginatus Williams & Granara de Willink

Mealybugs belong to the family – *Pseudococcidae*; superfamily *Coccoidea* and the order *Hemiptera*.

Appearance

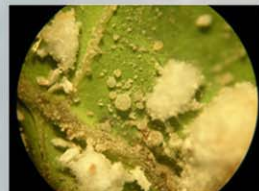
- ◆ Small to medium sized yellow coloured insects with mealy or waxy coating; measuring 2.2 mm long and 1.5 mm wide.
- ◆ Very difficult to find out the actual colour since covered by mealy coating.
- ◆ Oval to elongate insects with 17 pairs of lateral and terminal waxy filaments which are characteristic to the particular genus.

Life cycle

- ◆ Consists of four stages in female : Egg – Larva I – Larva II – Adult
- ◆ Six stages in male : Egg – Larva I – Larva II – Pre pupa – Pupa – Adult
- ◆ The first instar larva referred as “crawler” is the active stage. Upon hatching it moves out, selects a suitable place (normally tender soft portions) and starts feeding. Thereafter there will be no movement.
- ◆ The adult male has distinct head, thorax and abdomen and has a pair of membranous wings in the meso thorax and the second pair is modified into halteres.
- ◆ Males short lived and don't feed; just mate and die.



Ovisac



Egg



Crawler



Adult female



Adult male

Symptoms

- ◆ Initially the affected portion will be chlorotic, later changed to brown and dry away.
- ◆ These bugs excrete honey dew and as a result infested portion becomes shiny and moist and to this, secondary infection by sooty mould fungus, *Capnodium* occurs resulting in black colour covering the affected parts.

The following will help to identify the early infestation of mealybugs

- ◆ Yellowing of leaves
- ◆ Malformation of affected portion due to toxin injection
- ◆ Stunted leaf growth and leaf and fruit drop
- ◆ Presence of red/black ants
- ◆ Honey dew excretion
- ◆ Sooty mould growth due to *Capnodium* fungus
- ◆ Outright killing of the plant



Reproduction

- ◆ Normally oviparous.
- ◆ Eggs are laid just beneath the body or just at the posterior end of the abdomen in an ovisac in groups of 200-300.
- ◆ Each female is capable of laying about 400 to 500 eggs.
- ◆ Nymphs become adults in a period of about a month.
- ◆ Adults live for about 30-60 days depending upon the environment.
- ◆ Adults may move from one area to other till it finds a suitable place for feeding and reproduction.
- ◆ Normally they are seen beneath the stem, undersurface of the leaves, in the leaf axils, flower buds and fruits and occasionally on the roots.

ALTERNATE HOSTS



Field identification :

- ◆ When the mealybug is pressed in a white paper, it turns yellow. Whereas it turns pink in case of pink mealybug.
- ◆ When transferred to alcohol, body colour changes to black.

Egg : Yellow, laid in sac, three to four times the body length and covered with white wax. Egg period : 2-7 days.

Nymphs : Yellow colour with 4 - 5 instars completed in a month.

Honeydew and ants

- ◆ These bugs feed more than what is required and excess carbohydrates, amino acids are being excreted as honey dew.
- ◆ To feed the honeydew which is rich in amino acids and sugars, red and black ants are attending the mealybugs
- ◆ Whenever the excess honeydew is not removed there is a possibility of mealybugs getting entangled in them
- ◆ So it is necessary to frequently remove the excess honeydew, that is done by ants. In turn they protect the bugs from natural enemies like parasitoids and predators. Hence, the association of ant and mealybug is symbiotic.

Spread

- ◆ Through planting materials, infested materials, weed hosts, ants and wind.

Host plants

- ◆ This mealy bug is polyphagous and infests all the plants and no plant is free from this pest. They are common in household flower plants, annuals, fruit crops followed by vegetables and other crops. In addition, they also attack a variety of weed hosts and the weeds serve as alternate hosts whenever main crop is not available. Important hosts are jatropha, guava, *Plumeria alba*, cotton, redgram, teak, tapioca, *Morus* sp. sunflower, fruits and vegetables.