



# **MEALY BUGS IN COTTON AND THEIR MANAGEMENT**



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Mealy bugs are small, soft bodied sap sucking insects, considered as minor pests in many crops, have recently attained the status of major pest and emerged as a serious threat for cotton cultivation in all the cotton growing states of India. During 2006-07 mealy bugs caused severe damage in Gujarat and Punjab causing heavy reduction in yield and have spread to all the cotton growing regions of India.



**Infested Plant**

The insects are cottony in appearance, adults and the crawlers suck the sap from the stems, twigs, leaves, flower buds and young bolls with piercing and sucking mouthparts, which prevents the transportation of essential nutrients. Honeydew' a sugary liquid is excreted by these insects that falls on the leaves and serves as a medium for the growth of sooty moulds, a fungus that reduces photosynthetic ability of the plant. It feeds on soft tissues and injects saliva that causes curling of leaves.

#### **Reasons for spread and upsurge:**

- ◆ Removal of pesticide umbrella for bollworms in Bt cotton hybrids and use of selective insecticides for sucking pests favoured the progress of the pest.
- ◆ Posses a waxy coating which protects them from insecticides and natural mortality factors.
- ◆ High reproductive rate.
- ◆ Capable of hiding in the soil, cracks and crevices, where insecticides are not able to reach.
- ◆ Elimination and absence of naturally occurring predators, parasitoids and pathogens.
- ◆ Natural carriers such as plant products, wind, water, rain, birds, human beings and farm animals facilitate the quick spread of the pest.

#### **Species of mealy bugs prevailing in cotton**

- ◆ *Phenacoccus solenopsis* Tinsley
- ◆ *Paracoccus marginatus* Williams and Granara de Willink
- ◆ *Maconellicoccus hirsutus* Green

#### **Specific identification characters of the different mealy bugs**

##### ***P. solenopsis***

- ◆ Adult females are 2.5 – 4.0 mm long with 9 segmented antennae and long flagellate dorsal setae.
- ◆ Short filaments around fibre body and dark strips on the back





Crawler



Female



Male

- ◆ Anal filaments about one fourth the length of the body
- ◆ Females produce egg mass in an ovisac
- ◆ Males have one pair of very simple wings, long antennae and absence of mouthparts with white wax filaments projecting posteriorly
- ◆ Matured females lay eggs in ovisacs, each ovisac contain 150-600 minute eggs of 0.3-0.4 mm length.
- ◆ Egg and nymphal period were 3-9 and 20-25 days respectively. The mealybug completes 15 generations per year.

### ***P. marginatus***

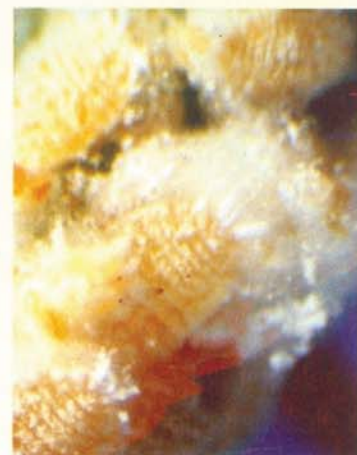
- ◆ The adult female is yellow in colour with white waxy coating, approximately 2.2 mm long (1/16 inch) 1.4 mm wide.
- ◆ Males are approximately 1.0 mm long, with an elongate oval body that is widest at the thorax (0.3 mm) with well developed wings.
- ◆ Eggs are greenish yellow and are laid in an egg sac that is three to four times the body length and entirely covered with white wax. 100-600 eggs are laid per ovisac.
- ◆ Females and males have 4 and 5 instars respectively
- ◆ The ovisac is developed ventrally on the adult female
- ◆ Females have no wings, and move by crawling short distances or by being blown in air currents.
- ◆ Males tend to be colored pink, especially during the pre-pupal stages, but appear yellow in the first and second instar.
- ◆ Turns bluish-black when placed in alcohol, as is characteristic of other members of this genus. A series of short waxy caudal filaments less than  $\frac{1}{4}$  the length of the body exist around the margin
- ◆ Adult males with stout fleshy setae on the antennae and the absence of fleshy setae on the legs.



Egg



Crawlers

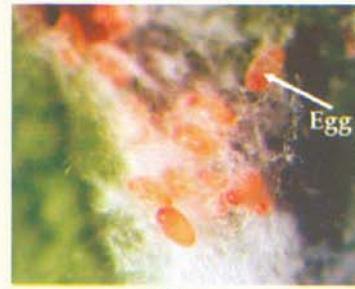


Adult



### ***M. hirsutus***

- ◆ Adults are brick red in colour and covered with significantly more white waxy material. Absence of long tails or waxy projections around the edge of the body.
- ◆ Adults produces ovisac
- ◆ The mealy bugs exhibit a red fluid when squashed
- ◆ Adult females are pinkish and sparsely covered with white wax
- ◆ Adult male is winged with one pair of wings and two caudal filaments.
- ◆ 3rd and 4th nymphal instars are present in male and female respectively.
- ◆ Ovisac is irregular and remains beneath the body. Egg mass contains about 500-600 pinkish eggs. The eggs are minute and hatch in 5-6 days.
- ◆ The crawlers are highly mobile with pink colour and with 6-7 days of developmental period.
- ◆ Female completes its life cycle in 25-30 days with 10-12 generations per year.



Egg



Crawlers



Female



Male

### **Carryover of pest**

- ◆ The carryover of mealy bug is mainly through the weeds in cotton fields, water channels and naturally by wind, ants, birds and animals and through infested plant material.
- ◆ Cotton mealy bug being polyphagous migrates to number of plants after uprooting of cotton stalks and survives in shrubs and bushes on the fence during off-season.
- ◆ Improper disposal of uprooted weeds helps in migration, from weeds to cotton fields.
- ◆ Ants association in mealybug infested plants facilitates the spread of the pest.

### **Damage symptoms**

- ◆ The feeding of mealy bug causes yellowing of leaf, premature leaf drop, dieback and death of plants if unchecked.
- ◆ The serious attack especially by *P. marginatus* and *M. hirsutus* results in bunchy growth, plants remain stunted and produce fewer bolls.
- ◆ The boll opening is also adversely affected and yield reduction occurs.
- ◆ Heavy clustering of mealy bugs can be seen on lower surface of leaves giving the appearance of a thick mat with waxy secretion and it also affect the development of squares, flowers and bolls.





*P. solenopsis*



*P. marginatus*



*M. hirsutus*

- ◆ The insect weakens the plants by sucking the sap from leaves, twigs, stems and sometimes from the roots and also from fruiting bodies.
- ◆ The pest excretes sweet honey dew which encourages the development of black sooty mould, and adversely affect the photosynthetic activity.
- ◆ The honey dew also attracts ants which in turn help in the dispersion of mealy bugs from plant to plant.
- ◆ Drying up of the entire plant and damage is seen mostly in patches.

#### Alternate host:

- ◆ **Cultivated hosts:** Okra, tomato, cabbage, brinjal, papaya, grapes, citrus, guava, cucurbits, banana, silk cotton and many ornamental plants such as *Hibiscus*, *Chrysanthemum*, *Ixora* and *Plumaria* sp.

**Weed hosts:** *Parthenium*, *Abutilon*, *Tritox*,

- ◆ *Trianthema*, *Sida* and *Subabul*



Bhendi



Parthenium



Glyricidia



Papaya



Tomato

#### Management

##### Cultural and Mechanical control

- ◆ Field borders and fences should be free from weeds such as *Parthenium* and *Abutilon* and other plant debris that may support mealybugs. If few plants are infested severely, uproot and destroy to prevent future spread.
- ◆ Crop residues with infestation should be removed and burnt to prevent the mealy bugs invading the new crop.
- ◆ Ploughing the infested fields to expose the immature stages in the soil for the destruction through biotic and abiotic interventions.
- ◆ Discourage growing alternate host plants like *Hibiscus*, *Okra*, *Papaya*, *Custard apple*, *Guava* etc in and nearby cotton fields.
- ◆ Encourage *Cowpea* as border crop on bunds and irrigation channels to enhance the multiplication of predatory insects particularly *coccinellids*.



## Natural enemies complex

### (a) Predators :

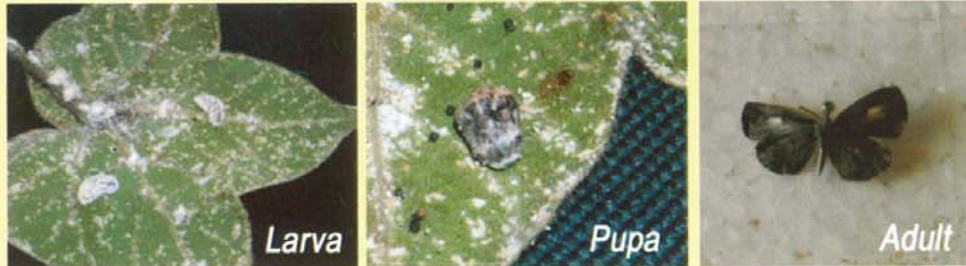
Coccinellids: *Cryptolaemus montrouzieri*, *Brumus suturalis*, *Coccinella septempunctata*, *Cheilomenes sexmaculata* and *Spalgis epius* (lepidopterans)

### (b) Parasitoids

*Aenasius* sp. on *P. solelnopsis*

*Torymus* sp. and *Prochiloneurus aegyptiacus* on *P. marginatus*

### *Spalgis* sp.



## Chemical Control

During the initial stage of infestation apply either, anyone of the recommended insecticides as spot application. Judicious use of the following insecticides in rotation is recommended for heavily infested fields.

1. Profenophos 50EC@1.25 lit/ha (or)
2. Quinalphos 25EC @ 2 lit/ha (or)
3. Chlorpyrifos 20EC @2.5 lit/ha (or)
4. Thiodicarb 75WP @ 750 gm/ha (or)
5. Buprofezin 25EC @ 1.25 lit/ha
6. Foliar spray of *Verticillium lecanii* (or) *Beauveria bassiana*, *Metarhizium anisopliae* @10 gm/lit of water is effective during high humid months (Oct. - Dec.) in reducing the population of mealy bug.

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