# Mealy Bug a Potential Threat to Agri- Horti - Silvi Cultures

**Rajasekhar L. and Divya Jagana**

[1]M.Sc. (Ag.) Ph.D. Entomology, Agricultural Officer, Department of Agriculture, Govt. of A. P.

[2]M.Sc. (Ag.) Plant Pathology., PGDPHM, Assistant professor at COH, Dr. Y.S.R. Horti University, A.P

Corresponding Author: rajagrico724@gmail.com

Due mostly to specific abiotic changes in the climate and environment, there has been a rise in the number of mealy bug species in crop plants and the wild during the past ten years. Mealy bugs, which were once thought to be insignificant pests in many crops, have become severe pests in recent years. Mealy bugs with delicate bodies that are coated in a cottony, white substance. They are shielded from extreme heat and moisture loss by the white "fluff" all over the body and due to which their identification is much difficult. Identification of mealy bugs is utmost crucial for their management. When the infestation is widespread, management efforts have not been successful, or it recurs regularly, identification becomes even more crucial. The most important genera and species in each area differ. *Pseudococcus*, *Planococcus*, *Scaphoideus*, *Ferresia*, and *Maconellicoccus* are among the genera that frequently contain them. Since mealy bugs consume every component of plants, heavy infestations lead to defoliation and, ultimately, plant death. Certain species inject plant toxins while feeding, which results in stunted or distorted growth. Their capacity to reproduce, their tolerance to temperature, their preferred feeding sites, the presence of efficient control measures, and their capacity to spread viruses all influence the amount of harm produced, which differs among species.

**Photographs: Koppert.com**

**Biology**

Wings are only formed during specific phases of their life cycle. Before maturing, they go through a number of nymphal phases, and they usually exhibit to numerous generations year. Mealy bugs have different life cycles depending on their species and sex. From the egg stage to the second instar stage, the life cycle of male and female mealy bugs is identical. The prepupa stage in males comes after the second instar stage, followed by the pupa and, lastly, the adult male stage. The female mealy bug, however, has a third instar stage that concludes at the adult stage, in contrast to the male. They typically hibernate under the bark as eggs or tiny nymphs. Collectively, they feed by dipping their mouthparts into the phloem and drawing out sap. They are therefore possible carriers of viruses. Mealy bugs are much less mobile on the plant than other groups of vectors such as aphids and leafhoppers, a feature that makes them relatively inefficient as virus vectors. They spread from one plant to another in contact with it, and the crawling nymphs move more readily than adults.

**Host Range**

A variety of mealybugs are found all over the world. It is believed that 149 species of mealybugs use their piercing and sucking feeding habits to feed on plants. Planococcus species are the most prevalent and harmful, seriously harming crop plants mechanically. Numerous host plants, including mangos, grapevines, citrus, custard apples, sapota, cashews, pineapples, and ornamentals including hibiscus, croton, ferns, cactus, gardenias, and orchids, have been found to harbour it. In addition to these, reports of mealybug infestations in tuber crop storage, including aerial yam, elephant foot yam, colocasia, cassava, etc., have also been made. Destruction and pathogen transmission by mealybugs have been reported on guava, citrus, pomegranate, grapes, sugarcane, banana, black pepper, pineapple plantain, stone fruit, berries, yam, cassava, cashew, papaya, pawpaw and cocoa.

**Striped mealybug (*Ferrisia virgata*)**

The species is connected to the host plant's aerial part. It has long tails and a grey body wrapped in very long waxy filaments. The body fluid is light, and the dorsum has two dark stripes. This species generates ovisac, or egg mass.

**Longtail mealybug (*Pseudococcus longispinus*):** The anal and second-to-last pairs of wax filaments are each

as long as the body and resemble long tails; the abdomen has a dorsal median stripe.

**Citrus mealybug (*Planococcus citri*)**

**Photograph: Koppert.com**

Body is yellow to pink in colour, covered with medium sized slightly curved waxy filaments and is not pyramid shaped. One dorsal median stripe is present on the back in adults and body fluid is clear. Anal filaments are less than one-eighth the length of the body. This species produces an egg mass or ovisac which is irregular and remains under body of female.

**Solanum mealybug (*Phenacoccus solani*):** Very short waxy filaments cover the body. There are no long tails or body stripes. Neither an egg mass nor an ovisac are produced by this species.

**Pink sugarcane mealybug (*Saccharicoccus sacchari*):** The mealybug, which is light pink in hue, lives beneath sugarcane's leaf sheaths. The legs of adult females are movable.

**Mealy bugs as virus carriers**

Compared to aphids and whiteflies, mealybugs are transmitters of a few genera of plant viruses. Due to their less mobile nature, they are less effective in transmitting plant viruses than aphids, leafhoppers and other insect vectors. In addition, the sex and age of mealybugs affect virus transmission rates. For example, old female mealybugs are less efficient in transmitting plant viruses. Also, the life stages of the nymph affect their transmission rate of viruses (adults are more effective than nymphs). Mealybugs transmit viruses of the genus Ampelovirus, and some Closteroviruses, of the Closteroviridae family. Mealybugs also transmit badnavirus of the Caulimoviridae family. Closteroviridae generally consists of four genera- Closterovirus, Ampelovirus and Crinivirus, Velarivirus. Some studies have also confirmed the transmission of vitiviruses by some mealybug species. These viruses trigger leaf discoloration, deformation, mottling and leaf yellowing.

**Ampeloviruses transmitted by mealybugs**:

- Grapevine leafroll associated virus 1- *Planococcus ficus*, *Pseudococcus longispinus*, *Phenacoccus aceris*, *Heliococcus bohemicus*-grapevine.
- Grapevine Leafroll - associated virus 3- *Planococcus ficus*, *Pseudococcus. longispinus*, *Ferrisia gilli*, *Phenacoccus aceris*, *Pseudococcus calceolariae*, *Heliococcus bohemicus*,*Pseudococcus maritimus*-grapevine.
- Grapevine leafroll associated virus 4 - *Planococcus ficus*, *Pseudococcus longispinus*, *Phenacoccus aceris*-grapevine.
- Grapevine leafroll associated virus 13- *Planococcus ficus*, *Pseudococcus longispinus*-grapevine.
- Pineapple mealy bug associated viruses 1 and 3- *Dysmicoccus brevipes*, *Dysmicoccus neobrevipes*-Pineapple.
- Pineapple mealy bug associated virus 2- *Dysmicoccus brevipes*, *Dysmicoccus neobrevipes*-pineapple.
- *Phenacoccus manihoti*, *Phenacoccus herreni* – Cassava.

**Badnavirus transmitted by mealybugs**

- Banana Streak Virus *Planoccocus citri* Risso, *Saccharicoccus sacchari*, *Dysmicoccus brevipes*, *Ferrisia virgata*.
- Citrus Yellow Mosaic Badnavirus - *Planococcus citri* – Citrus, Sugarcane bacilliform virus - *Saccharicoccus sacchari* – Sugarcane, Sugarcane mild mosaic virus- *Saccharicoccus sacchari*-Sugarcane.

**Vitiviruses transmitted by mealybugs**

- Grapevine virus A -*Pseudococcus spp*,*Planococcus*-Grapevine, Grapevine virus B- *Planococcus ficus*, Grapevine Virus D - *Phenacoccus spp*, Grapevine Virus E - *Heliococcus spp*-grapevine.

**Management**

In order to manage these pests, farmers must implement integrated control strategies. Because their control is hindered by the ability of many species to feed on all aerial plant parts, and occasionally the roots; their preference for tissues buried under a thick canopy; and their capacity to survive and multiply on a wide range of native plants and weeds. Additionally, it has a high rate of reproduction, a shorter generation time, the capacity to conceal itself in soil, plant cracks and crevices, and the tendency to spread swiftly by natural carriers including plant products, wind, water, rain, birds, people, and farm animals. Nonetheless, they are susceptible to an equally wide range of predators and parasites.

Natural enemies of mealybugs are numerous e.g. parasitic wasps, ladybird beetles, hoverflies, lacewings etc. Parasitic wasp lays its eggs on the maturing mealybugs, killing these mealybugs and feeding on them. *Gyranusoidea*, *Coccophagus, Leptomastix, Allotropa, Pseudaphycus* and *Acerophagus* are reported to be parasitic wasps of mealybugs. *Gyranusoidea tebygi* and *Anagyrus mangicola* are natural enemies of the mango mealybugs, *Rastrococcus invadens and Rastrococcus iceryoides.* In addition, the population of citrus mealybug is reported to be reduced by natural parasites, such as *Leptomastidea abnormis* (Girault), *Leptomastix dactylopii* Howard, *Chrysoplatycerus splendens* Howard and *Anagyrus pseudococci* (Girault). However, parasitic fungus, such as *Entomophthora fumosa and* other natural parasites (brown lacewing, *Sympherobius barberi* (Banks) and green lacewing, *Chrysopa lateralis* Guérin, trash bugs, syrphid fly larvae and scale-eating caterpillars, *Laetitia coccidivor, Cryptolaemus montrouzieri* Mulsant, *Decadiomus bahamicus* (Casey) *Scymnus flavifrons* Melsheimer, *Chilocorus stigma* (Say) and *Olla abdominalis* var. *plagiata* (Say), are reportedly effective against some species of mealybug.

The mode of action by which these parasitoids and predators suppress and eliminate different species of mealybugs differs. For example, *Epidicarnosis lopezi*, a parasitoid of cassava mealybugs lays eggs on the mealybug and their larvae feed on them. Similarly, the mealybug predator *Cryptolaemus montrouzieri*, reported by Anjana and Joy, can feed on a maximum of 5000 mealybug eggs in various life stages. Additionally, *Anagyrus kamali* controls the pink mealy bug population by piercing the adult mealy bug and laying eggs in them. The eggs hatch and the contents of the mealy bug are used to nourish itself until it attains adulthood.

Consideration should be given to other insects (especially ants) that may antagonize the success of this biological control based on their relationship with mealy bugs. The population of ants must be under control since they can mitigate the effectiveness of this method. Some ants have a mutualistic relationship with mealy bugs, since they benefit from the honeydews made by mealy bugs. Ants have an antagonistic relationship with the natural enemies of mealy bugs. Also, ants play a role in the transportation and dispersion of several mealy bug species, as several studies have demonstrated the transport and dispersal of mealy bugs by ants.

The citrus mealybug (*Planococcus citri*) is reported to be effectively controlled by a range of parasites such as *Eptomastidea abnormis* (Girault), *Leptomastix dactylopii* Howard, *Chrysoplatycerus splendens* Howard and *Anagyrus pseudococci* (Girault).

**Chemical control**: **(As per CIBRC)**

- Grapes – Buprofezin 25 % SC 1000-1500 ml per Ha**,** Spirotetramat 15.31 % w/w OD - 700 mL per Ha**.**
- Sugarcane, Mango - Monocrotophos 36 % SL 1500 mL per Ha (S.O. 4294(E) date 29th Sept, 2023).
- Mango Mealy bug - Spirotetramat 11.01 % + Imidacloprid 11.01 % w/w SC @ 0.075% Spray fluid as required depending upon size of tree.
- Cotton mealy bug - Bifenthrin 8% + Clothianidin 10% SC 1000 mL Per Ha, Buprofezin 20 % + Acephate 50 % w/w WP @ 1250 mL per Ha, Fipronil 15% + Flonicamid 15% WDG @ 400 mL per Ha, Spirotetramat 11.01 % + Imidacloprid 11.01 % w/w SC @ 625mL per Ha, Sulfoxaflor 21.8 % w/w SC @ 375 mL per Ha.

* * * * * * * * *