

## Cooperative Extension

# Citrus Mealybug (*Planococcus citri*)

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**DESCRIPTION AND LIFE HISTORY:** The citrus mealybug is a sporadic, and extremely damaging and difficult to control pest of citrus, primarily in Yuma County. Citrus mealybugs prefer humid conditions and are most often problem in groves planted on heavier soils or with large and/or closely planted trees where a great deal of tree shading occurs. In citrus, mealybugs spread by crawling from tree to tree, wind, on bird's feet, machinery, and labor crews. Citrus mealybugs are pests of many agricultural and horticultural crops.



**Figure 20. Adult female citrus mealybug.**

The adult female mealybug is pinkish in color, wingless, and is covered with white-cottony wax, and has a fringe of elongated waxy filaments that extend about the periphery of the body. Fully grown, the female mealybug is about 3 mm long and 1.5 mm in width. The female is mobile, but lacks wings and cannot fly. It will lay 300 to 600 eggs in clumps of 5 to 20 inside egg sacs composed of white cottony-waxy filaments.

The eggs are pink in color and will hatch in 2 to 10 days. The first instar is very active and called a crawler. Crawlers are yellowish-pink in color and are often found congregated upon the egg sac or around the porous glands on citrus fruit.



**Figure 21. Citrus mealybug crawlers and nymphs on a lemon fruit.**

Citrus mealybugs will pass through two additional instars before molting to an adult female or forming a male pupa.

Each instar requires 7 to 16 days to complete. Female nymphs resemble adult female in appearance, while male nymphs are more elongated. Male citrus mealybugs will emerge from their pupae in 7 to 14 days and resemble elongated gnats, with tail filaments. Males are generally about 4.5 mm in length.

This document and others on citrus insect pests can be found at  
<http://cals.arizona.edu/crops/citrus/insects/citrusinsect.html>



**Figure 22** Adult male citrus mealybug.

Under optimal conditions, a citrus mealybug will mature from an egg to a reproductively mature adult in about 30 days. Citrus mealybugs overwinter primarily as eggs on the upper roots, trunk, and lower branches of the tree. These eggs will hatch in April and the crawlers will make their way to green twigs and fruit. Subsequent generations develop primarily on the fruit. In Arizona, citrus mealybugs will pass through 4 to 6 overlapping generations.

**DAMAGE:** Citrus mealybug is a sporadic pest of citrus, occurring primarily in older, well-shaded groves planted on heavy soils. They will feed on the roots, bark, foliage, and fruit. The citrus mealybug injects toxic saliva while extracting plant sap resulting in defoliation, fruit discoloration, fruit splitting, and fruit drop. Additionally, the buildup of honeydew and associated sooty mold fungus can also lead to reduced fruit quality and lowered tree vitality through loss of photosynthetic capacity. Severe infestations can result in 80% defoliation and 100% fruit drop. Damage is most severe in the summer.



**Figure 23.** Lemons heavily infested with citrus mealybugs.

**MONITORING:** Citrus mealybug population monitoring should begin in March by examining the trees' trunk and lower branches for overwintering populations. These will appear as areas of white waxy material. Particular attention should be paid to shady groves with large trees where mealybugs have occurred in the previous year and/or there is a large population of nesting birds. As the season progresses, upper branches, twigs, and fruit should be closely monitored for mealybug dispersal. If mealybugs are present during the spring, less disruptive insecticides (spinosad, abamectin) for citrus thrips control should be considered. Inclusion of narrow range oil with thrips insecticide applications will aid in suppressing mealybugs. Once 15 to 20% of the fruit become infested, a curative insecticide treatment should be considered. Insecticide applications should be timed with the emergence of the first instar crawlers for the best efficacy.

Commercially available citrus mealybug pheromones used in conjunction with yellow sticky cards can be utilized to detect mealybug activity. These pheromones will only attract male mealybugs, but can aid in early detection.

When citrus mealybugs are common it is important to determine how much parasitism is occurring. On an infested fruit, gently blow away the accumulated wax revealing the mealybugs. Look for mealybug mummies which contain the parasitoid pupae. Mummies will appear as darkened, swollen, non-winged mealybugs. A irregular shaped hole will be present on the posterior end of the mummy where a parasitoid adult has emerged. When parasitism is detected, insecticides that are less disruptive to parasitoid activity should be chosen.



**Figure 24.** Citrus mealybug mummy, with parasitoid exit hole.

## CONTROLS:

### Cultural:

- **Pruning & hedging.** Hedging trees to prevent touching between trees will help prevent within grove spread of infestations. Additionally, pruning will aid in opening up the canopy to maximize spray penetration and coverage.

- **Equipment Sanitation.** Thorough cleaning of equipment and harvest materials will help prevent the spread of mealybug from an infested grove to others.

### Biological:

- **General Predators and Parasitoids.** Ultimately, biological control is the most effective means of controlling citrus mealybug. Parasitoids provide excellent control of the citrus mealybug if they are not disrupted by insecticide treatments. In Arizona, there are several parasitic wasps that prey on mealybug, but an *Anagraphus* sp appears to be most prevalent and important.



**Figure 25. *Anagraphus* sp., a common parasitoid of citrus mealybug. Enclosed pupa (right), adult (center), and parasitoid exposed in pupa (left).**

*Anagraphus* sp. parasitoid populations can be augmented with commercially available *Anagraphus* spp. In addition to parasitoids, native predators include among others, lady beetles, predaceous mites, lacewings, and syrphid flies can aid in mealybug control. Commercial releases of green lacewings appear to aid in mealybug control in some cases.

- **Mealybug Destroyer.** An introduced predator of the citrus mealybug, the larva and adult mealybug destroyer, *Cryptolaemus montrouzieri*, is a voracious feeder of citrus mealybug. Its larvae resemble a mealybug but are about twice as large as the adult citrus mealybug

females. The adult is a small beetle with dark brown elytra (hardened front wings) and a light brown head and prothoracic shield (covering over the head). It does not winter well and therefore commercial releases are sometimes necessary where citrus mealybugs were a problem the previous year. Growers should release about 500 *Cryptolaemus* per acre.

**Commonly used Chemicals:** Chemical control of citrus mealybug can be extremely difficult. Use of selective insecticides for citrus thrips control will often prevent problems with mealybugs by preserving natural enemies. Control is most easily achieved if applications are started during the initial infestation of the fruit, and when the first instar crawlers are prevalent. The addition of narrow range spray oil with the insecticide and high spray volumes (greater than or equal to 200 gal per acre) will increase control. Since citrus mealybug populations can be very clumped in distribution within a grove, it is not usually necessary to treat an entire grove. Hand-gun sprayers can be useful in targeting individually infested trees, and can deliver high volumes at high pressures which will help maximize control. However, no single treatment may offer acceptable control; follow-up applications are often necessary. New chemical management tactics are currently being researched.

- **Chlorpyrifos.** 28 day PHI at rates exceeding 3 lbs-ai per acre or 14 days PHI for rates of 3 lbs-ai per acre or less. Chlorpyrifos (LORSBAN) is an organophosphate that is commonly used for control of citrus mealybug. Chlorpyrifos is applied at an average rate of 4 to 6 lb-ai per acre. Thorough coverage is need for chlorpyrifos to be most effective. It is toxic to bees and should not be applied during daylight hours during bloom. Additionally, chlorpyrifos is toxic to predatory insects and mites, and parasitoids. Do not apply more than 10 lbs-ai per acre per season. The restricted entry interval for chlorpyrifos is 1 day.

- **Methidathion.** 14 day PHI. Methidathion (SUPRACIDE) is an organophosphate that is labeled for use in Arizona citrus for control of citrus mealybug. Methidathion is applied at 0.25 to 0.5 lbs-ai per 100 gal. For adequate control, spray volumes of 800 to 1,200 gallons per acre may be required. Thorough coverage is need for methidathion to be most effective. Methidathion may be tank-mixed with spray oils which will aid in efficacy. It is toxic to bees and cannot be applied during bloom. Additionally, methidathion is toxic to predatory insects and mites, and parasitoids, although these effects

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are short lived. Do not apply more than 5 lbs-ai per acre per application. Do not exceed 2 applications per growing season, and allow at least 45 days between applications. The restricted entry interval for methidathion is: 48 hours when applied at rates less than or equivalent to 2.0 lbs-ai per acre, and 14 days when the rate exceeds 2.0 lbs-ai per acre.

•**Buprofezin.** 60 day PHI. Buprofezin (APPLAUD) is an insect growth regulator that disrupts the molting process through chitin synthesis inhibition. The labeled rate for buprofezin in citrus for control of scales is 1.5 to 2.0 lbs-ai per acre. Since this material affects molting, treatment should be made during peak crawler (first instar) emergence. The mealybugs will go through several molts before they are killed, which may take 21 days before population reduction is noticeable. Do not apply more than two applications per season, and allow at least 60 days between applications. Buprofezin is very selective and although it will negatively impact ladybeetle and lacewing larvae to a limited degree, it is very safe to predaceous mites and parasitoids. The restricted entry interval for buprofezin is 12 hours.

•**Malathion.** 7 day PHI. Malathion is an organophosphate insecticide that has shown efficacy towards citrus mealybug. The labeled rates for malathion in citrus for control of scales is 1.0 to 2.0 lbs-ai per 100 gal. For adequate control, spray volumes of 800 to 1,200 gallons per acre may be required. Thorough coverage is needed for malathion to be most effective. Do not apply when trees are in bloom. Malathion is toxic to insect predators and parasitoids, but is short lived. The restricted entry interval for malathion is 12 hours.