Preliminary Studies on Seasonal Phenology of Citrus Mealybug in the San Joaquin Valley

University of California
Agriculture and Natural Resources

Lauren Vuicich, Kevin Gonzalez, and Sandipa G. Gautam*
University of California Cooperative Extension & Statewide IPM Program, Exeter, California
*sangautam@ucanr.edu

Abstract

Citrus mealybug has been increasingly reported from the San Joaquin Valley since 2019. Limited use of neonicotinoids, loss of chlorpyrifos, and changing weather conditions may be some of the factors leading to mealybug pressure. In 2022, we initiated preliminary studies to collect information on how and when citrus mealybug moves within a tree canopy. Study aimed at developing methods to track development, generations, and monitor movement within a tree. Thirteen trees with history of infestation were monitored since February 2022. Two-inch-wide double-sided sticky tape was wrapped around trunk and four main branches in different directions to track population movement. Tapes were replaced weekly and counted for egg masses/immatures/adults. Results are discussed in the context of generations in the SJV and mealybug scouting.

Methods

- Thirteen trees with previous mealybug infestations in a 12-year-old navel orange orchard were monitored.
- Two-inch wide double sided sticky tapes were wrapped around the trunk and 4 inner branches in four cardinal directions of each tree (Figure 1).
- Sticky tape samples were collected weekly by peeling the tapes and attaching on a white paper.
- White paper with 5 tape pieces for each tree was then inserted into a clear plastic bag and labeled (Figure 2A).
- Sticky tapes were observed under the stereoscope for citrus mealybug females (Figures 2B&3), crawlers (Figures 2C&3), and egg masses.
- Citrus mealybug males in the same block were monitored using pheromone trap and lure (Figures 2D&3).
- Traps were replaced weekly, and lure was replaced once every 5 weeks.

Figure 1. Sticky tapes set on the trunk and four branches to monitor citrus mealybug population in 2022.

Preliminary Findings- where are mealybugs present within a tree canopy?

- Although mealybug populations were present in February, movement of mealybug started in the first week of April (Figure 4).
- Early in the season, mealybug moved up on the trunk, and into the inner branches from outer canopy leaves, and onto fruit in June/July (Figure 4&5).
- There may be 5 complete generations of citrus mealybug in the SJV based on male trap counts (Figure 4).
- Monitoring will continue through January 2023.

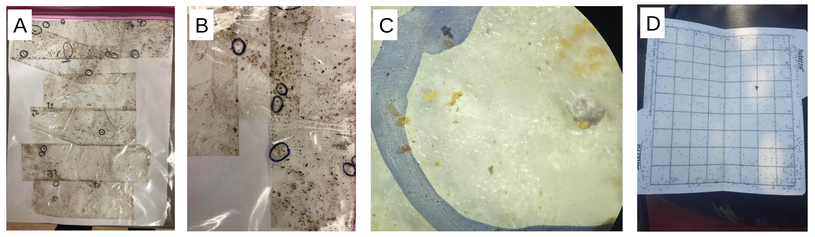

Figure 2. Citrus mealybug traps. A: sticky tape traps collected from the trunk and four branches, B: Females caught on sticky tape, C: crawlers caught on sticky tape; males on sticky trap (D)

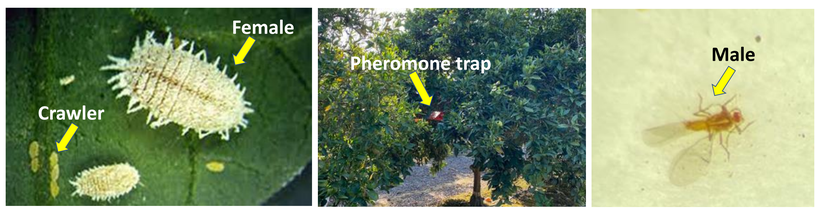

Figure 3. Mealybug crawlers and females (left), pheromone trap (middle), and male (right).

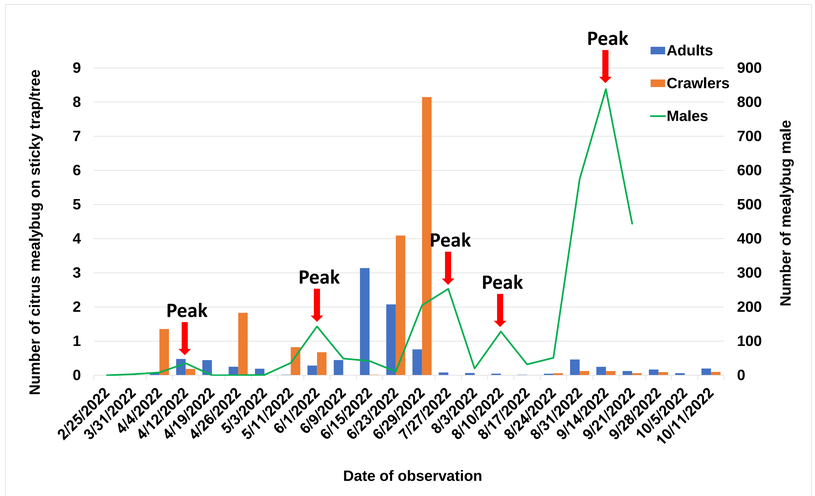

Figure 4. Citrus mealybug caught on double sided tapes (bar chart). Line graph shows citrus mealybug males caught on pheromone trap in the same block. Note: 5 peaks from April-September.

- Mealybugs are everywhere within the tree canopy. Immatures and females were found on new flush, mature leaves, young fruit, developing fruit, mature fruit, trunk at inner canopy branches (Figure 5).

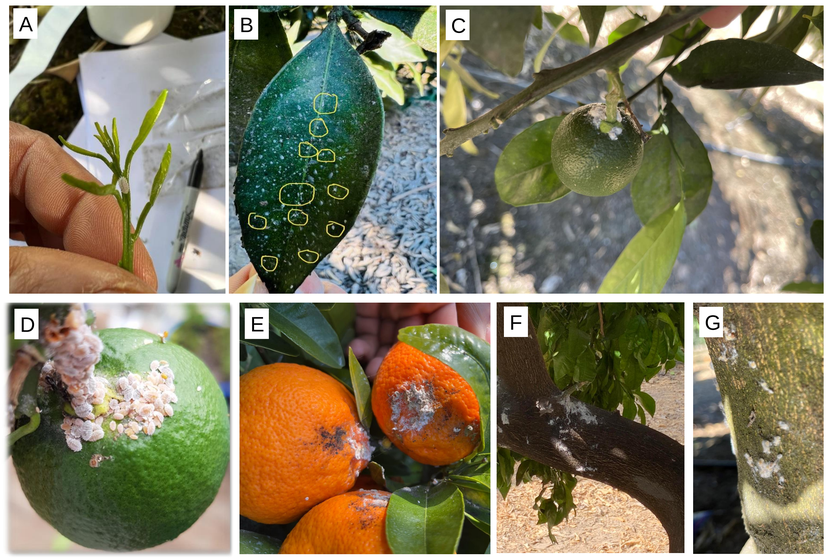

Figure 5 Citrus mealybug infestation on different parts of tree. A: new flush, B: mature leaf, C: young fruit, D: developing fruit, E: mature fruit, F: inner branches; G: trunk

Recommendations and Future Research

- Mealybug populations move within the tree canopy. Scout for mealybugs on outer canopy leaves with signs of sootymold infestations until April, on inner branches in May, on young developing fruits from June-September, and on mature fruit later in the season.
- Evaluate fruit at harvest, especially looking between clusters, at the navel end, for presence of mealybug in your groves.
- Based on the results of this study, 2023 field trials to study seasonal phenology will be optimized to monitor populations in different orchards, with known populations, using male trap cards, leaf sampling and fruit sampling.
- Insecticide trials in 2023 will be focused on managing immature populations in late March/early April and in June.

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