

Cooperative Extension

Citrus Peelminer (*Marmara gulgosa*)

The University of Arizona \$ College of Agriculture \$ Tucson, Arizona 85721 (part of the publication
“Citrus Arthropod Pest Management in Arizona”)

David Kerns¹, Glenn Wright², and John Loghry³

¹Department of Entomology, Yuma Agricultural Center - Valley Station, 6425 W. 8th St., Yuma, AZ 85364

²Department of Plant Science, Yuma Agricultural Center - Mesa Station, RR1, Box 40M, Somerton, AZ 85350

³Arizona Crop Improvement Association, Yuma Agricultural Center - Mesa Station, RR1, Box 40M, Somerton, AZ 85350

DESCRIPTION AND LIFE HISTORY: The citrus peelminer is common pest of citrus throughout Arizona, but is most troublesome in central Arizona where it has occasionally reached extremely damaging levels. Citrus peelminer is very polyphagous (has many hosts) and among others can be found mining oleander, cotton, melons, peppers and grapes. In citrus, the peelminer can be found mining the stems of flush growth, but are most frequently found mining the fruit peel. Peelminers appear to favor grapefruit and navel oranges, but can be found mining lemons as well. This insect occurs in greatest number in August through October. Populations are thought to buildup in cotton and oleander before moving into citrus.

The adult is a dark-gray moth mottled with brown and cream-colored markings on its wings. The moth is small; about the size of a mosquito (4 mm in length). The moths are active in the morning and early-evening and can live about 11 days. The adult female lays her eggs singly on the fruit surface or on the stems of new flush growth. The number of eggs produced per female may range from 10 to 50 eggs. The eggs are whitish in color, extremely small, oval in shape, convex on top, and with distinct sculpturing. The eggs will hatch in 4 to 5 days.



Figure 30. The citrus peelminer is a dark-gray moth about the size of a mosquito.

The hatching larva immediately begins mining beneath the epidermal cell layer of the peel or stem. There are three distinctive morphological forms for the larvae. The sapfeeding or mining form is flat and laterally sculptured. These larvae are semitransparent-yellowish in color, and can reach a length of about 4.4 mm. The sap feeding form will occur during the first 4 instars and a fifth instar if it occurs. Each instar requires about 3 days to complete. The larvae will then pass through a non-feeding intermediate form, before molting into the spinning form. The spinning form is reddish-brown in

color. The spinning form lasts about 1 day and the larvae can reach a length of 4.2 mm.



Figure 31. The spinning form of the citrus peelminer larvae cuts out of the mine and pupates in crevasses on the tree or in the ground litter.

The spinning larva is a non-feeding stage and will exit the mine, lower itself from the fruit by a silken thread to a secluded niche at the leaf axial, or in a crevasse in the bark, or in ground trash. Pupation takes place in a silken cocoon covered with small, white balls. Peelminer cocoons are rarely observed in the field. Pupation requires 10 to 12 days to complete. The entire life cycle generally takes about 30 days to complete.



Figure 32. Citrus peelminers pupate in crevasses on the tree or in ground trash.

Damage: Citrus peelminers have traditionally been more damaging to citrus in central Arizona than in the Yuma area, and heavy infestations appear to be associated with heavy use of broad-spectrum insecticides in nearby cotton (an alternate host for citrus peelminer). Citrus peelminers prefer to infest grapefruit and navel oranges rather than other citrus varieties. Citrus peelminers mine the rind of citrus fruit leaving serpentine patterns which prevents the fruit from being sold for fresh

market. Damage is most severe in late summer and early fall.



Figure 33. Grapefruit with extensive mining by citrus peelminer.

MONITORING: Currently there is not a reliable way for monitoring citrus peelminer adults so effort should concentrate on sampling larvae. Monitoring for citrus peelminer should begin in July by scouting for the presence of mining in the citrus, and nearby cotton and oleander. Detection of high populations in nearby cotton or oleander may indicate a potential problem in citrus in late summer and fall. From August though November, citrus should be scouted for peelminer more extensively. Check fruit for developing mines. Citrus peelminer tend to prefer fruit on the lower inside canopy, so efforts should be concentrated on the lower 4 ft of canopy.

When mines are found, care should be taken to determine if the larvae are alive since there are a number of predators and parasitoids that prey on peelminers. When 5 to 10% of the fruit have small active mines, with little or no sign of predation, an insecticide application maybe justified.

CONTROLS:

Cultural:

- **Pruning.** Pruning can open the canopy aiding in spray penetration and coverage if curative spraying is required.

- **Multicrop program.** Citrus peelminer cannot survive on Bt cotton. When possible, cotton acreage near citrus should be planted with Bt varieties to reduce local peelminer populations. Avoid using multiple applications of broad-spectrum insecticides for whitefly control in non-Bt cotton near citrus. These applications destroy the parasitoids that normally maintain peelminer

populations below damaging levels.

Biological:

•**General Predators and Parasitoids.** Establishing biological control of citrus peelminer is ultimately the best and most effective means of controlling this pest. There are many natural enemies that prey on peelminer larvae, among these are a number of parasitoids. The parasitoid *Cirrospilus coachellae* has proven to be extremely effective. This parasitoid is common, particularly during late summer and early fall. Predators also appear to be important biological control agents of peelminers. The predacious mites, the Yuma spider mite and a *Tydeus* sp., have been observed feeding on citrus peelminer larvae through the peel's upper epidermal layer.



Figure 34. *Cirrospilus coachellae* is an important parasitoid of citrus peelminer (photo courtesy of Beth-Grafton Cardwell, University of California, Davis).

Commonly used Chemicals: Chemical control of citrus peelminer can be difficult. The use of selective insecticides for citrus thrips control and in nearby cotton will often prevent problems with peelminers by preserving natural enemies. The addition of narrow range spray oil with the insecticide and high spray volumes (≥ 200 gal/ac) will increase inner-canopy coverage and control.

•**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 has demonstrated efficacy towards citrus peelminer. Chlorpyrifos is applied at an average rate of 4 to 6 lb-ai per acre. Thorough coverage is needed 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 and will disrupt biological control. Do not apply more than 10 lbs-ai per acre per season. The restricted entry interval for chlorpyrifos is 1 day.

•**Spinosad.** 1 day PHI. Spinosad (SUCCESS, ENTRUST), a macrocyclic lactone isolated from the soil microorganism *Saccharopolyspora spinosa*. It is normally applied to citrus at rates of 0.06 to 0.15 lbs ai per acre. Spinosad is highly effective against citrus peelminer and is the product of choice for peelminer control. However, inner-canopy coverage is essential. Spinosad is relatively nontoxic to beneficial insects and mites. Spinosad may not be applied more than twice per year, and may not be used in nurseries. The restricted entry interval is 4 hours.