Thrips and Wind Scarring on GEM Avocado Fruit – A Study on Two Locations in Ventura County Funded by the California Avocado Commission First Year Report October 2020

Research Project Title: Gem avocado scarring study

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Objectives of the Research:

- Determine if the scarring observed on young Gem avocado fruit is caused by wind or avocado thrips feeding
- Determine if wind screens, insecticide applications, or organosilicon surfactants (e.g., Silwet®) can significantly reduce the scarring of young Gem avocado fruit

Methods and Materials:

This trial was set up as a Random Complete Block Designed study of four replicates to evaluate the effects of wind and Avocado Thrips (*Scirtothrips perseae)* feeding damage to GEM variety avocados. Two locations were chosen for this study (see included map). The first site (Site 1 – Orr) was picked for the predominant afternoon west wind that the orchard is subjected to and the second site (Site 2 – Rancho Largo) was known to have less exposure to the same afternoon winds (See included map). To test for the damage caused by these two sources untreated checks and treatments for thrips were made looking at two different treatment regimens on trees that were wind protected with installed windscreens and without windscreens (see attached photos of windscreens installed at both sites) Treatment products and rates can be found in the Treatment Application Tables of this report. Treatments were the same at both sites but separated by eight days in late May, 2020 All applications and rates were made according to the parameters set up in the original protocol.

Results and Discussion:

All data for this trial will be found in this report along means data tables, photos and charts for all data discussed. Thrips data was collected by selecting five leaves per

replicate per treatment on a weekly basis during the normal period for thrips scaring in Ventura county from mid-May to early July. Economic thresholds requiring treatment for this pest are considered to be one nymphal thrips per underside leaf on average. Later thrips and wind scaring were collected by randomly selecting 20-25 fruit per replicate per analysis date, rating the damage as predominantly from thrips or wind scaring based on past observations (see example photos later in this report). The damage was also rated as nonexistent to severe based on a 0-3 rating scale with 0 equaling no damage and 3 as severe damage. Damage rating photos for both thrips and wind can be found in the included photos. Wind speeds outside and inside the orchards were collected twice weekly at both locations commencing on May 26, 2020 and ending on July 30, 2020 (this data can be found in wind speed charts 1-3)

Site 1 Orr Data Discussion: Weekly wind speeds in the early afternoon for this location can be found in wind chart 1. Wind speeds at this location were almost 50 percent greater than those experienced at Site 2.

Thrips count data can be found in Site 1 means data tables (title of this data report: 20cacavo01 Fruit damage Study in GEM Avocados with Wind Screens - Site 1) columns 2-11 (columns 2 and 3 are pre-treat data), with the post treat averages reported in column 12. This data is also represented in Chart 1 that follows. Significant reduction in average post treat thrips populations relative to the untreated check without windscreens (Treatment 1) was seen in the untreated check with windscreens (Treatment 2). Treatments 3-6 showed even further significant reductions in thrips population over treatments 1 and 2.

Damage assessments for two dates will be found in data columns 14-21 and Charts 2 and 3. The data from the later analysis (columns 18-21) will be discussed now. Chart 2 shows the incidence percent of damage from thrips and wind (data columns 18 and 20). As can be seen in this data the predominant damage for this location was from the wind as seen from the data in column 20. No significant differences in damage was seen between any of the thrips treatments. The most significant wind scar was seen in treatment 3 (no windscreen) and the least significant wind scar was seen in treatment 2 (windscreen protected). The average wind damage for the non-windscreen protected fruit was found to be 34 percent of the fruit analyzed, while the average damage for the windscreen protected fruit was 20 percent. Chart 3 and data columns 19 and 21 report the severity of damage from thrips and wind, again with no significant differences noted in thrips damage severity. On a scale of 0-3 (0=no damage, 3=severe damage) the most severe damage again was seen in treatment 3 and the least severe in treatment 2. The average severity for the non-windscreen protected fruit was found to be 0.54 and, on the windscreen, protected fruit to be 0.25.

It should be noted that damage at this site was considerably less than what was seen in 2019 and any fruit averaging less than a 1 on the severity scale would most likely be packed as a first grade fruit.

Site 2 Largo Data Discussion: Weekly wind speeds in the early afternoon for this location can be found in wind chart 2. Wind speeds at this location were almost 50 percent less than those experienced at Site 1.

Thrips count data can be found in Site 2 means data tables (title of this data report: 20cacavo01 Fruit damage Study in GEM Avocados with Wind Screens - Site 2 Rancho Largo) columns 2-11 (columns 2 - 4 are pre-treat data), with the post treat averages reported in column 12. This data is also represented in Chart 4 that follows. Significant reduction in average post treat thrips populations relative to the untreated check without windscreens (Treatment 1) was seen in the untreated check with windscreens (Treatment 2). Treatment 4 (organosilicon treat without windscreens) showed even further significant reductions in thrips population over treatments 1 and 2. Finally treatments 3,5, and 6 showed the best thrips control in this trial. Thrips pressure was much greater at this site over Site 1. It should also be noted that in all cases the thrips populations on average were lower where the windscreens were installed over the similar treatments without windscreens.

Damage assessments for two dates will be found in data columns 13-20 and Charts 5 and 6. The data from the later analysis (columns 17-20) will be discussed now. Chart 5 shows the incidence percent of damage from thrips and wind (data columns 17 and 19). As can be seen in this data the predominant damage for this location was from the thrips as seen from the data in column 17. Very significant differences in damage was seen between in the thrips treatments, with very significant amount of damage found in all treatments. As early noted, the amount of thrips damage was always reduced where the windscreens were present with the least amount of damage to be found in treatment 5, the Abamectin and oil treatment with windscreens. As seen in Chart 5 and data column 19 no real significant damage occurred at this site from the wind. Chart 6 and data columns 18 and 20 report the severity of damage from thrips and wind, again with significant differences noted in thrips damage severity for this location. On a scale of 0-3 (0=no damage, 3=severe damage) the most severe damage due to thrips was seen in treatment 1, the untreated check with no windscreens and the least severe in treatment 5. The average severity for the non-windscreen protected fruit from thrips was found to be 1.17 and, on the windscreen, protected fruit to be 0.84. Damage severity due to wind in this trial was negligible.

As stated, earlier fruit rating less than a 1 on the severity scale would most likely be packed as first grade fruit. Even thought the thrips damage incidence was found to be high, the severity for the thrips treated fruit was found to be low except for treatment 4 (organosilicon no windscreens).

At no time during the course of this trial were any adverse or phytotoxic effects observed to this crop from the spray treatments.

All data rated as significant was done so utilizing the Duncan's Multiple Test Range

analysis at a 95% confidence level.

Conclusions:

The first conclusion that should be drawn from this data is that wind speed severity does influence the damage that can occur to this fruit from limb, leaf, and fruit to fruit rubbing. The lower wind speed averages at Site 2 might indicate that there is a minimum average wind speed that will not adversely affect the fruit damage from rubbing. The second conclusion is that windscreens can reduce the negative effects of the winds experienced in this trial, particularly at Site 1. Third it may be proven with later testing that as these GEMs mature and grow the fruit rubbing damage may decrease over time. The damage at Site 1 was much less severe this year, then seen in 2019. Site 2 trees are at least one or two years older than Site 1 trees and may have less scarring not due to less wind, but maturity.

It was interesting to note that the presence of the windscreens also affected the thrips population by reducing them in Site 2 and reducing the damage inflicted by those populations to the fruit. The use of the organosilicon did seem to reduce the scarring from both the thrips and wind, but further study may be needed to confirm this.

The data from this single year's study has been positive in helping to differentiate the damage caused by wind and thrips. Further study to confirm these observations would be warranted.