GLASSY-WINGED SHARPSHOOTER IMPACT ON ORANGE YIELD, FRUIT SIZE, AND QUALITY

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Reporting Period: The results reported are from work conducted from November 2001 to November 2002.

INTRODUCTION

We need to know what impact the glassy-winged sharpshooter (GWSS), *Homalodisca coagulata*, has on fruit yield, size and quality as well as tree vigor. The goals of this project are to determine the usefulness of management of GWSS to prevent yield loss, fruit size reduction, and degraded fruit quality. This information is paramount before we can even begin to incorporate these into conventional IPM programs. First we have to know what impact GWSS has on citrus, and second we need to know how to use the materials against the GWSS in IPM programs to prevent potential losses. Prior to this study, efforts to manage GWSS in citrus were primarily to suppress populations to limit the spread of *Xylella fastidiosa*.

The primary goal of the first year of this project was to properly set up the three experiments in this project. First, the research sites had to be evaluated for suitability. Second, high and low populations of glassy-winged sharpshooters had to be established at a site with Valencia oranges and a site with Navel oranges.

OBJECTIVES

This research was initiated to:

1. Address the impact of GWSS on fruit yield, and distribution of fruit size when GWSS are controlled compared to untreated blocks of Valencia oranges, 'Washington' navel oranges, and grapefruit
2. Evaluate the effects of high GWSS populations have on fruit quality (sugar/acid ratios, peel thickness, sugar/acid ratio, juice quality, peel texture and firmness, susceptibility to post-harvest disorders) in Valencia and Navel oranges;
3. Evaluate the effects of large GWSS populations have on water stress, nutrient loss (Ca etc.), metabolite loss (amino acids, xylem translocated PGRs) due to xylem feeding and fruit drop and fruit quality, and fruit drop
4. Determine if Admire enhances fruit size, tree health and vigor in the absence of GWSS.

RESULTS AND DISCUSSION

A Valencia Experiment (Experiment 1) was established at a site near Newhall (Ventura County). The site has 6 replications of 6 40-tree rows plus a 7th spare replicate with low GWSS populations and high GWSS populations. The low population treatment was established by applying Admire 2F to all 6 rows (4 guard rows + 2 harvest rows, May and August) in each low population replication. Four rows serve as "guard" rows in each replicate with 2 center rows serving as harvest rows. Insects were monitored weekly by trapping, and visually counting adults, nymphs and egg masses. Efforts to establish differential populations were successful. On 8 August 2002, visual searches revealed 6.0adults/3 min search/tree (± 1.0 SEM) in the high population trees verses 0.7/3 min search/tree (± 0.4 SEM) in the low population trees. The high and low population trees had 2.7 (± 0.6 SEM) and 0.9 (± 0.2 SEM) egg masses/25 leaf turns respectively.

One of the harvest rows was harvested in May the other in August. The fruit was sent to Filmore-Piru Packing House for packout and evaluation. Two cartons from 2 sizes (113 and 138) and 2 grades (Choice and Export) from each block and treatment (total of 96 cartons) were selected. Trans-Pacific shipment was simulated by storing the 96 cartons from at the packinghouse for 21 days at 2.8°C (37°F) after which time the fruit was sent to KAC for storage at 20°C (68°F) for 4 days followed by 12.8°C (55° F) for 5 days. The procedure was followed for the May and August harvest rows. For post-harvest evaluation at harvest, initial measurements of general appearance, pitting, puff and crease, peel firmness, thickness, color,

TA, TSS, and % juice were taken from a 20 fruit sub-sample. Fruit was evaluated for general appearance, rind pitting, and decay following simulated shipment. The size distribution for the Valencia Experiment was not statistically significant for the high population and low population trees, which is not surprising since this fruit was harvested within a few weeks of Admire treatment. This demonstrated that the trees were similar at the beginning of the experiment.

At the May Valencia harvest, 10 oranges were taken from 5 trees per replication and evaluated for pitting and signs of potential GWSS ovipositor wounding on the fruit surface. Only 3.1% of the fruit had pitting. There were no signs of attempted oviposition on the remaining 96.9% of the oranges. Also, when the initial fruit evaluation was compared to final evaluation, significantly more fruit had pitting (Figure 1). The pitting is seemingly a postharvest disorder and is not caused by direct damage of the GWSS. The preliminary information suggests a physiological problem possibly a result of GWSS xylem feeding behavior. Research plans for 2002-03 have been modified to address these issues.

A similar experiment was initiated on 21 August 2001 for 'Washington' Navel oranges. A site was established in Mentone with a completely random design with 5 replications with high and low GWSS populations. Each population level has three rows of 43 trees (2 guard rows and 1 central harvest row). The low populations were established by applying 32 oz of Admire 2 via drip irrigation 21 Aug 2001 and 7 May 2002. The central harvest rows of the low population rows were subsequently treated with 3.2 oz of Baythroid (cyfluthrin, a pyrethroid) to minimize encroachment from adult GWSS flying into these rows from heavily infested neighboring groves. However, this encroachment was desired in the high population reps. Baythroid was chosen because it has excellent knockdown of adults and nymphs and kills nymph hatching from eggs up to 21 days following application. Furthermore, pyrethroids tend to repel GWSS.

Preliminary data was collected from the harvest trees on 21 January 2002. This was not enough time to have complete effect on the treated trees, since fruit set had occurred at least 4 months prior to the first Admire treatment. Thirty oranges were randomly collected from each tree in the harvest rows and hand ringed for size, weighed, and total soluble solids (TSS) determined. Size distributions, average orange weight, and TSS for the high and low population trees were not significantly different.

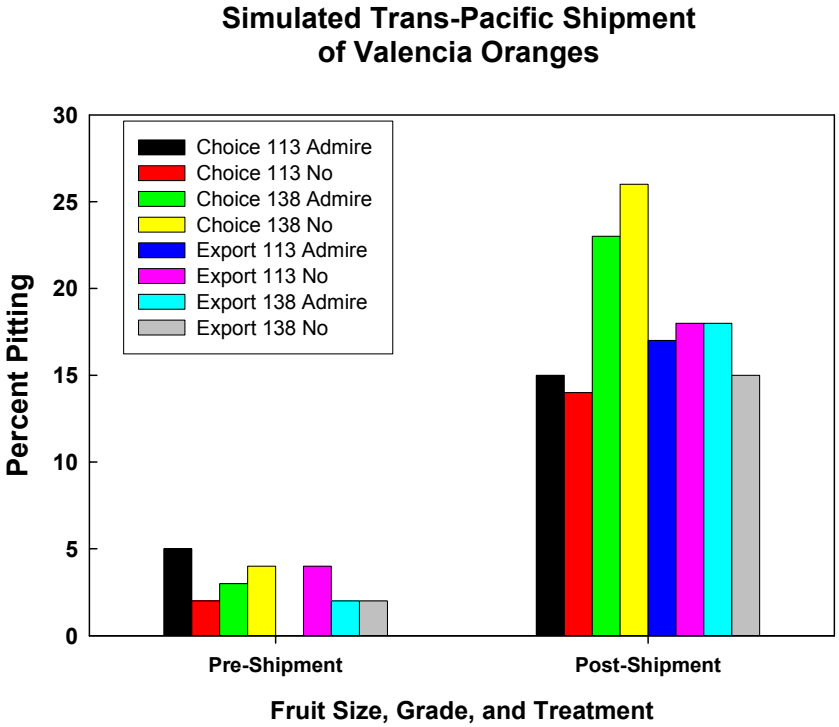

Figure 1. Comparison of initial evaluation verses final evaluation after simulated trans-Pacific shipment of May harvested Valencia oranges. More fruit had Pitting following the storage regime of 21 days at 2.8°C (37°F), the fruit was sent to KAC for storage at 20°C (68°F) for 4 days followed by 12.8°C (55°F) for 5 days.

FUNDING AGENCIES
Funding for this project was provided by the California Citrus Research Board and the University of California Pierce's Disease Grant Program.