Preliminary Results of Studies on Glassy Winged Sharp Shooters in Avocado

Project Leaders: Pascal Oevering, Phil A. Phillips, and Ben A. Faber

Cooperating Personnel: Chris Payne

University of California Cooperative Extension, Ventura County, Ventura, CA 93003

Benefit to the Industry

Since its introduction around 1990, the glassy-winged sharpshooter (*Homalodisca coagulata*) (GWSS) has developed into a known pest in California citrus orchards and vineyards. Avocado is listed as an oviposition host plant and although GWSS has been observed feeding and laying eggs in avocado groves, it is not considered a pest of this crop. However, since 2001, growers in San Diego County (Pauma Valley) reported excessive sharpshooter numbers in groves. In a few orchards the sharpshooters' exudate, or "rain", covered fruit so heavily that the fruit appeared almost white, raising concerns about fruit marketability. Some growers also expressed a concern that high GWSS numbers on trees were causing "raisining" of immature fruit, and damage to new growth. In Ventura County there were also a few reports from growers in 2001 and the UCCE Ventura research team observed exudate on fruit in Fillmore. There is no information available about sharpshooters affecting avocado growth and vigour and therefore, the actual threat remains undocumented.

This pilot research sponsored by the California Avocado Commission has taken a two pronged approach to investigating potential effects of GWSS in avocado. For one season, we observed (1) the development of naturally occurring populations in Pauma Valley (San Diego County) and Fillmore (Ventura County) and (2) in confinement studies we intended to assess the effects of prolonged feeding on young avocado trees. We intend to improve understanding of the potential effects of GWSS on avocado. With this information necessity evaluations studies for the development of biological and cultural control programs for GWSS can be based on scientific data.

This report presents preliminary data of a project that will finish in October 2002; a full report will be available in November/December 2002.

Objectives

6) Monitor the naturally occurring GWSS population in Hass avocado orchards adjacent to Valencia orange trees in two sites in Pauma Valley (San Diego County) and two sites in Fillmore (Ventura County) from March 2002 to November 2002.
7) Determine the effects of prolonged GWSS feeding on young avocado tree growth, and assess the reproduction of GWSS on young avocado trees.

Naturally Occurring GWSS Populations

For each of the field sites 20 Hass avocado trees were selected in a row adjacent to Valencia oranges of which 5 were selected for observation. In plot Pauma Valley I (PI), the trees were young (2-5 year old) and up to 5 ft tall, in plot PII trees were 8 years old and 15-20ft tall. In plot Fillmore I (FI) avocado trees were 2-4 years old (up to 6 ft tall) adjacent to 25 year old Valencia orange trees (20ft tall), and FII were mature trees 10 years old. Each tree was observed once every two weeks; the number of egg masses, nymphs and adults on the branch tips (2 feet in length) of 5 branches were counted by visual inspection and beat sampling. Monitoring will continue until November 2002. The sampling method employed will be related to absolute numbers found on Valencia orange trees in collaboration with Dr. Carlos E. Coviella (Dept. Entomology, UCR) in October. The preliminary data is shown in Fig. 1a-f; statistical analyses will be included when all data is available in the final report.

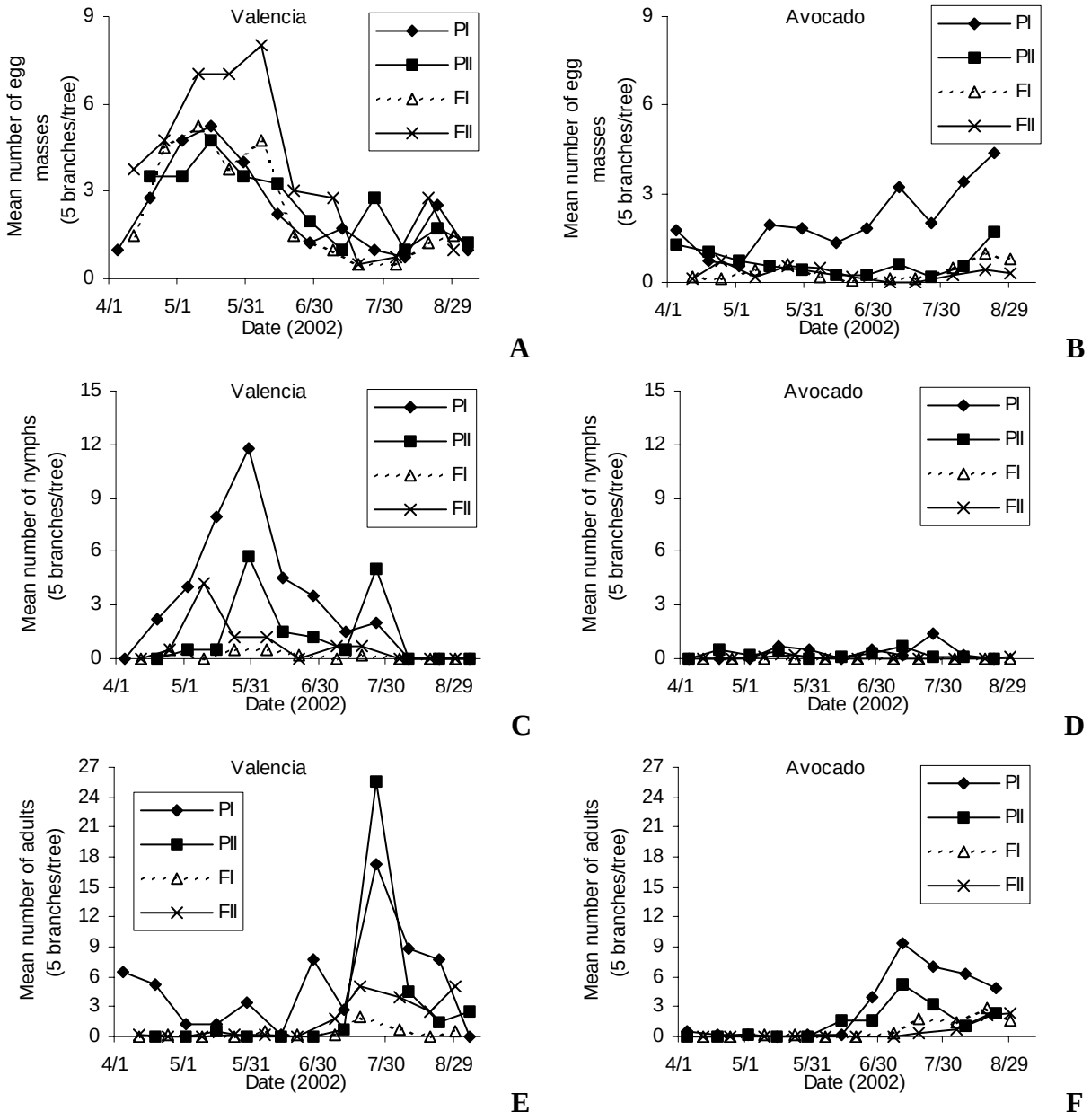

Fig. 1. Preliminary data on the naturally occurring population of GWSS in Valencia trees and adjacent avocado trees in Pauma Valley (PI and PII) in San Diego County and Fillmore (FI and FII) in Ventura County. **A**&**B**: egg masses sampled by visual inspection; **C**&**D**: nymphs sampled by beat samples, **E**&**F**: adults sampled by beat samples and visual inspection.

A total of 160 avocado fruit per plot were scored for exudate coverage (% surface covered) and fruit size in Pauma Valley. In PII, 160 fruit was observed in the row adjacent to Valencia orange trees, and 5 and 10 rows into the avocado grove. The fruit will be reexamined in October 2002, the early September observations showed no correlation between fruit size and percentage exudates coverage. The total number of fruit with any coverage of exudate was significantly less with increasing distance from Valencia orange trees (PII), also more fruit on younger trees (PI)) was covered with exudate compared with the older trees (PII) at the same distance from Valencia orange trees (variance not equal: Kruskal Wallis $P<0.01$) (Fig 2a). Of the fruit with exudate coverage, significantly less exudate coverage was found 10 rows from the Valencia orange trees, 1 and 5 rows did not differ significantly for the

mature trees (PII), the younger trees (PI) had the largest mean exudate coverage of the covered fruit (variance not equal: Kruskal Wallis $P<0.01$) (Fig 2b).

Observations on fruit will be repeated in October 2002 and will include an analysis quantifying the number of fruit showing the "raisining" effect reported by growers. Results will be available in the final report.

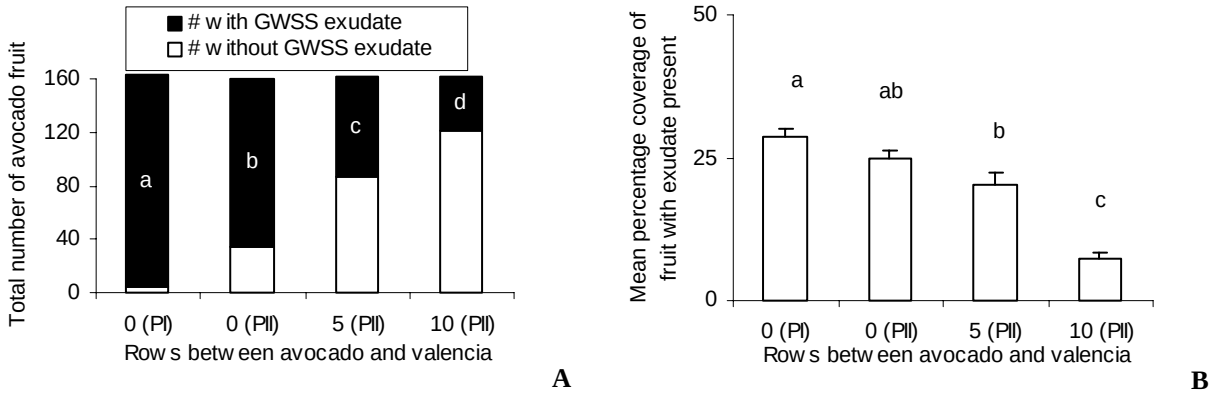

Fig. 2. Fruit analyses September 2002 comparing 160 fruit at distances of 0 (plot PI, young trees) and 0, 5 or 10 rows from Valencia orange trees (plot PII, mature trees). **A**: Amount of fruit with any exudates coverage present; **B**: Mean percentage coverage + SE of fruit with any exudates present (different letters indicate significant differences).

Effect of Prolonged GWSS Feeding on Young Avocado Trees

In Fillmore, Ventura County, two year old Lamb Hass trees were selected for use in GWSS confinement studies. 30 trees were randomly devided into three groups of 10. Lengths of all branches and tree height and size of fruit of all trees were measured before 20 trees were caged with 70% shade cloth. Leaves with GWSS egg masses were removed. In ten cages, 200 adult GWSS (collected from lemons in Fillmore) were released, the remaining 10 caged trees were used as controls, together with the 10 uncaged trees. After 101 days (May 3 to August 12, 2002), through cuts in the side panels, the ten cages in which GWSS were released were sprayed with 10.67 fl oz/100 gal Tame 2.4 EC spray (active ingredient: fenpropathrin; FIFRA Section 2(ee)); after which the number of GWSS caught on a tarp placed underneath the caged tree were counted. After removal of the cages, the lengths of all branches and tree height of all trees were measured together with the size of mature fruit and the number of fruit set during the 101 days. No data on uncaged fruit size increase could be obtained, since fruit on uncaged trees was harvested during the trial period.

The increase in length and height did not differ between the treatments; neither did the increase in fruit size (Fig 3ab). Significantly more fruit set on uncaged trees (variance not equal: Kruskal Wallis, $P<0.001$) and significantly more egg masses were found on uncaged trees (variance not equal: Kruskal Wallis, $P<0.0001$) (Fig 3cd). No effect can be related to the presence of GWSS, since no differences were found between in caged trees with or without GWSS (Fig. 3).

A total of only 3 GWSS were found in the cages after 101 days, and with the lack of egg masses deposited on leaves in the cages, this indicates that the released GWSS did not survive for long. We are currently testing whether is this due to an effect of the cages or avocado as a host plant, by releasing GWSS to caged lemon trees (a known host plant on which GWSS is normally able to reproduce). Results will be available in the final report.

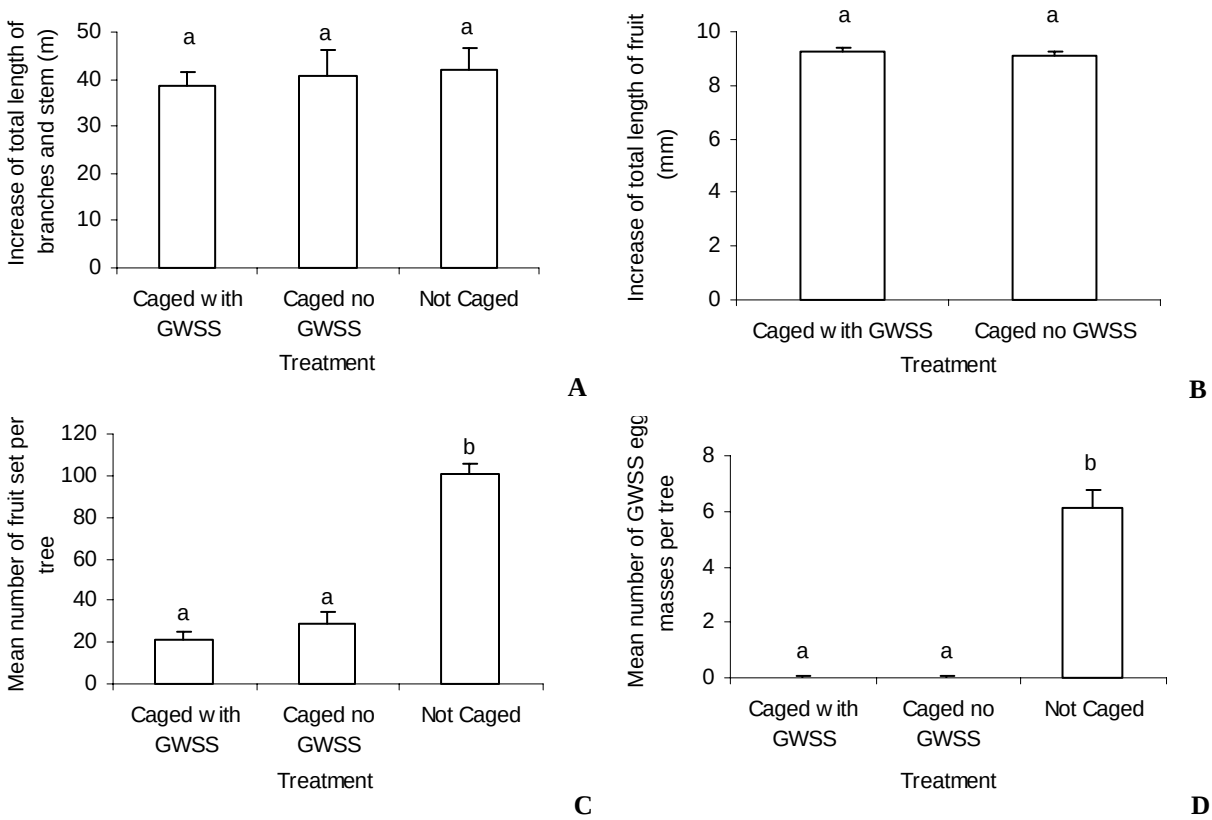

Fig 3. Effect of GWSS on tree and fruit growth, fruit set and the observed GWSS reproduction after 101 days on uncaged trees and caged trees, with and without 200 released adult GWSS. **A**: Mean increase of branch length and height of trees + SE; **B**: Mean increase in fruit size + SE; **C**: Mean number of fruit set + SE; **D**: Mean number of egg masses per tree + SE (different letters indicate significant differences).