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GLASSY WINGED SHARPSHOOTERS, *HOMALODISCA COAGULATA*, IN SOUTHERN CALIFORNIA AVOCADO ORCHARDS

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SUMMARY

The presence of whitish exudates or sharpshooter excrement as a contaminant on the shoulders of avocado fruit from the feeding of *Homalodisca coagulata* (GWSS) on fruit pedicles has caused concern among California avocado growers and precipitated this study.

Populations of *GWSS*- were studied in avocado orchards adjacent to orange groves from March 2002 to November 2002 at two locations (two orchard pairs) in San Diego. Beat sampling, visual examination and sticky cards were used to assess the numbers of GWSS adults, nymphs and egg masses and the occurrence of the parasitoids *Gonatocerus ashmeadi* and *G. morilli* in both pairs of orchard types. Sharpshooter excrement was assessed as percent fruit contaminated and as percent fruit surface area covered. Adult GWSS were present and feeding on the fruit pedicels in both avocado orchards studied. Both parasitoids were found in similar numbers within the avocado and orange study areas at both sites. s. The appearance of excrement-covered avocado fruit at both sites occurred in late summer. For both sites, a correlation was found between both the percent fruit with excrement and the percentage of fruit surface covered with exudate with distance from the adjacent orange grove in the September measurements. By October the percentage of fruit with excrement contamination and the percentage of exudate coverage on the fruit were no longer correlated with distance from the adjacent orange grove at either site. This indicated that GWSS had evenly dispersed within the avocado orchards after earlier migration from adjacent citrus groves. The impact of excrement on the marketability and quality of avocado fruit remains to be investigated, but since there was no correlation between fruit size and intensity of GWSS feeding as measured by percentage exudate coverage, no evidence was found that GWSS feeding on the pedicel affects fruit development. Considering the observations in this study, we think that GWSS is unlikely to achieve the pest status in avocado that it has in citrus. The occurrence of GWSS in avocado seems related to the presence of citrus in the vicinity. The exudate coverage of fruit may be problematic in areas with a citrus-avocado interface.

Key Words: *Homalodisca coagulata*, avocado, orange, population dynamics

INTRODUCTION

Glassy-winged sharpshooters (GWSS) (*Homalodisca coagulata* Say) have spread widely in Southern California since their introduction in 1990 (Sorensen and Gill, 1996). GWSS adults and nymphs feed on xylem fluids, which are generally of low nutritional quality. Therefore the amount of liquid required for development and survival of GWSS is large and the amount of excrement produced may be substantial (Andersen *et al.*, 1989). More than 225 plant genera are listed as host plants for GWSS, including avocado (Anon, 2003). In Southern California GWSS are bivoltine, and the second generation that occurs in late summer is generally more numerous than the spring generation (Phillips, 2000).

In 2001, large numbers of second-generation adults were reported feeding on pedicels in avocado groves, and considerable amounts of white excrement residue were found on fruit surfaces. These reports were localized in Pauma Valley (San Diego County) in Southern California. In 2002, we assessed the potential pest status of GWSS in avocado and studied the natural populations of GWSS in avocado and adjacent orange groves and observed the presence of the egg parasitoids *Gonatocerus morilli* and *G. ashmeadi* and assessed the presence of excrement on fruit in Pauma Valley.

MATERIALS AND METHODS

In San Diego County, two groves were monitored every two weeks from March 2002 to November 2002. For each of the field sites, 20 Hass avocado trees located adjacent to a Valencia orange grove were selected for observation, together with 5 Valencia orange trees in the first row of the adjacent Valencia grove. Two plots were located in Pauma Valley, San Diego County (P I and P II). In P I the trees were young (2-5 year old) and up to 1.5m tall, while in P II trees were 8 years old and 5-7m tall. Each of the 5 orange trees and 20 avocado trees selected per grove were observed once every two weeks; the number of egg masses, nymphs and adults on the branch tips (0.6m in length) of 5 branches were counted by visual inspection and beat sampling. Relative changes in observed population densities were analyzed using ANOVA.

Sticky cards

In August and September, yellow sticky cards were used to monitor numbers of GWSS adults and GWSS parasitoids (*Gonatocerus ashmeadi* and *G. morilli*) in oranges and avocado at plots PI and PII in Pauma Valley. Cards were collected after two weeks and the numbers of adult GWSS and parasitoids trapped were recorded.

GWSS exudate on avocado fruit

In Pauma Valley, avocado fruit on trees were scored both in September and October for the percentage of the surface covered by exudate. The fruit size and position of this fruit in the tree were also recorded. These observations were made on 160 avocado fruit on young trees (PI) and mature trees (PII) in the row adjacent to orange trees. On mature trees (P II) 160 fruit were also observed at a distance of 5 rows and 10 rows from orange trees.

RESULTS AND DISCUSSION

The numbers of adult GWSS did not differ between avocado and orange trees immediately adjacent to each other (Fig.1). The numbers of nymphs in young orange trees in Pauma Valley (plot P I) were higher (F= 4.59; *P*=0.0063, 3df) than in either young or mature avocado or mature orange trees. The number of egg masses in mature avocado trees in P II was lower (F= 5.75; *P*=0.0018, 3df) than in young avocado trees or both young and old orange trees. These observations show that GWSS adults move freely into avocado groves, and although egg masses are laid in both orange and avocado trees, they oviposit less frequently in avocado trees. Fewer nymphs were found in avocado, which may be related to the fewer egg masses laid and/or differential mortality of nymphs developing on avocado trees.

Sticky Cards

With the exception of adult GWSS trapped in P II from 9/5 to 9/20, numbers of GWSS, *G. ashmeadi* and *G. morilli* did not differ between cards positioned in orange trees or avocado trees in the same plot (Table 1). Therefore, both adult GWSS and egg parasitoids move freely into avocado groves.

GWSS exudate on avocado fruit

No correlation was found between position of fruit on the tree and/or size of the fruit and the percentage of exudate coverage on the fruit (Fig.2), indicating that the data do not substantiate GWSS feeding affecting fruit development. When correlating the distance between avocado trees and orange trees and the number of fruit with any exudate coverage we found a strong correlation in September (R^2=0.94, F=31.58, *P*=0.0302), with the amount of fruit with any exudate declining with increasing distance from orange trees. In October, the same plots no longer showed this correlation (Fig. 3). When looking at the percentage of coverage on fruit (excluding fruit without exudate) we found a correlation (R^2=0.92, F=23.8, *P*=0.0395) that showed a similar decline in percentage coverage with increasing distance from orange trees in September. This correlation was also no longer significant in October. On heavily covered fruit sooty mold was found growing on the excrement. These results indicate that adult GWSS feeding on the fruit pedicels of avocado can coat considerable fruit surface area with their excrement. The effect of this exudate coverage in unclear, since the data do not substantiate the concern that GWSS affects fruit development. The effect on marketability of exudate-covered fruit may be substantial, although further study on fruit quality of exudate covered fruit is needed.

CONCLUSIONS

It is clear that GWSSs occur in “Hass” avocado and that the excrement of feeding GWSS adults may cover a substantial amount of fruit surface area. During the second generation, the amount of exudate coverage may increase and cover larger areas of the fruit, and black sooty mold may be present on top of the exudate. Considering the observations in this study, we think that GWSS is unlikely to achieve the pest status in avocado that it has achieved in citrus (Phillips, 2000). However, the exudate coverage of fruit may be problematic in areas with a citrus-avocado interface. Research on the quality of exudate-covered fruit is needed to determine whether or not this presents an economic concern to the grower.

Acknowledgements

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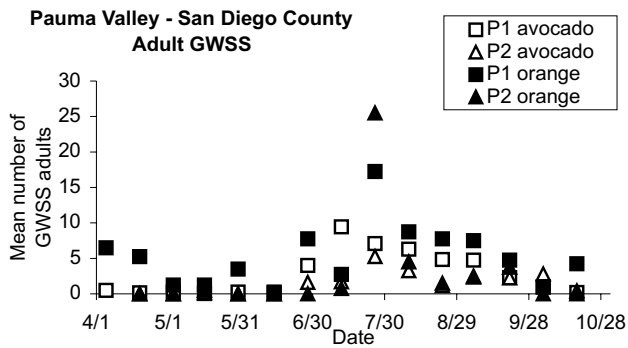
REFERENCES

ANDERSEN PC, BRODBECH BV, MIZZELL RF 1989. Metabolism of aminoacids, organic acids and sugar extracted from the xylem fluid of four host plants by adult *Homalodisca coagulata*. Entomologia Experimentalis et Applicata, 50: 149-159.

ANON 2003. Pierces' Disease Program, section 3658, article 1. California Department of Food and Agriculture. http://pi.cdfa.ca.gov/pqm/manual/454.htm#appendixa

PHILLIPS PA 2000. The glassy-winged sharp shooter – a new threat for California citrus as potential vector of CVC. CAPCA Advisor Magazine, July/August, pp. 16-17, 28.

SORENSEN, J.T. AND GILL, R.J., 1996. A range extension of *Homalodisca coagulata* (Say) (Hemiptera: Clypeorrhyncha: Cicadellidae) to Southern California. Pan Pacific Entomologist, 72 (3):



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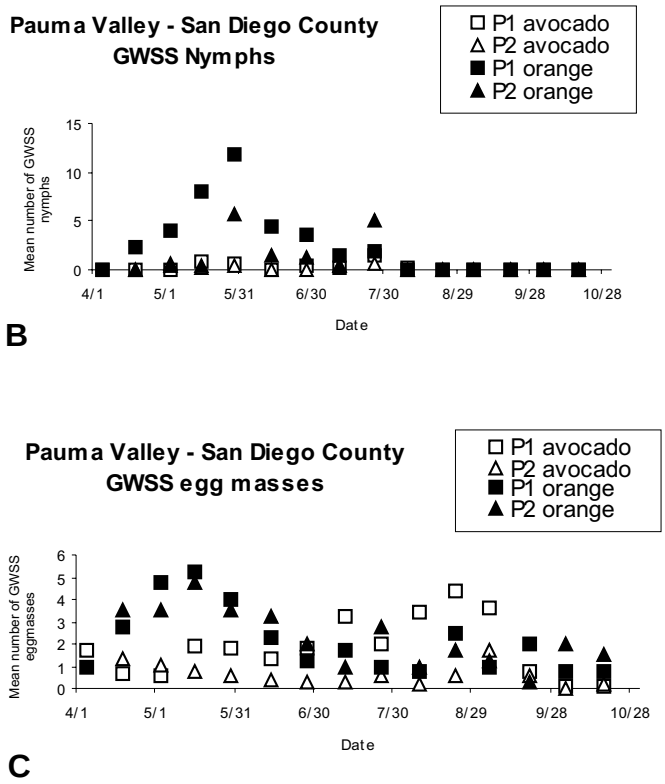

Figure 1. Mean number of GWSS adults (A), nymphs (B) and egg masses (C) found in beat samples and/or visual inspection of 5 branch tips per tree in two plots in Pauma Valley from April to November, 2002.

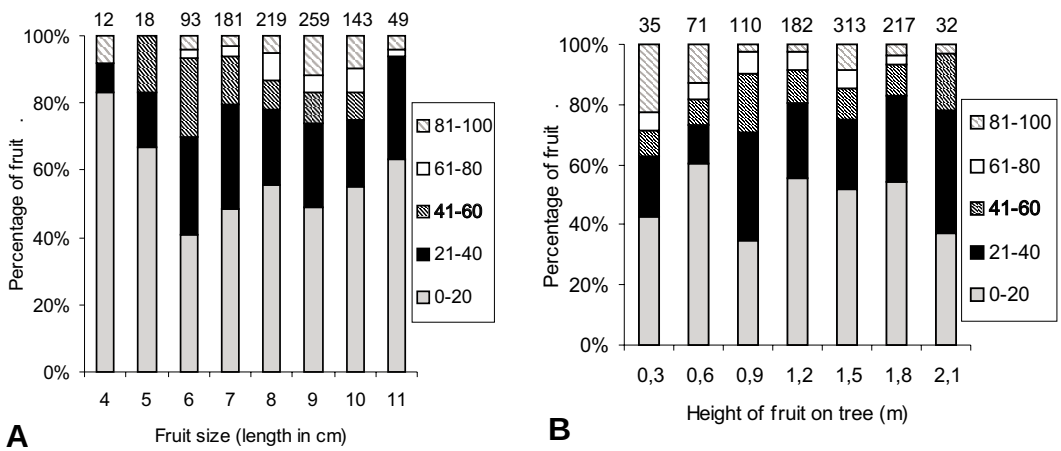

Figure 2. Relationship between the percentage exudate coverage on the fruit and fruit size (A) and height of fruit on the tree (B), numbers above bars are the total number of fruit in the category.

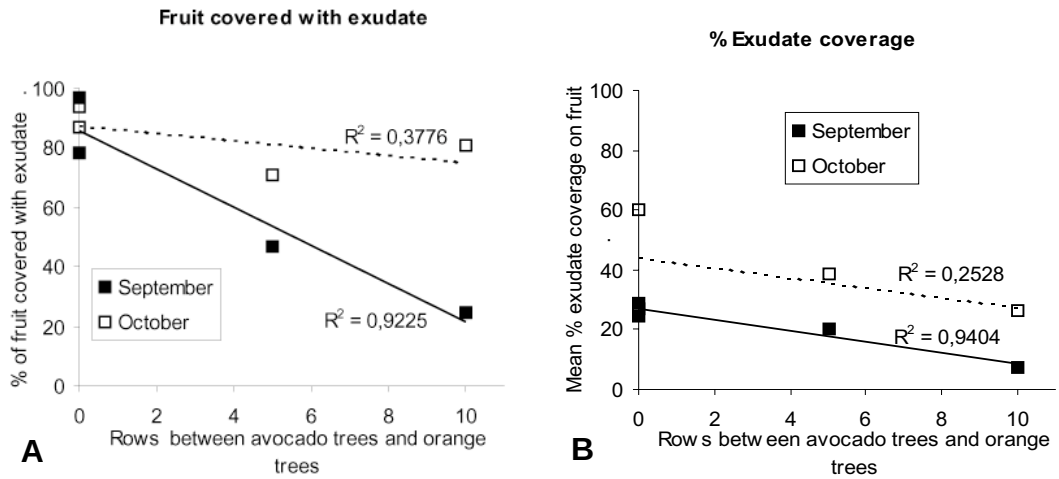

Figure 3. Relationship between distance from orange trees and percentage fruit with exudate coverage (A) and mean percentage exudate coverage on the fruit (B).

	GWSS adults	G. ashmeadi	G. morilli
8/23/02			
P1 avocado	139.7±33.2a	56.7±8.2a	7.3±2.8a
P1 orange	116.0±39.0a	48.0±4.6a	5.6±2.5a
P2 avocado	79.7±18.3a	20.6±10.4b	10.0±2.7a
P2 orange	X	X	X
9/5/2002			
P1 avocado	48.3±16.9a	61.7±20.0a	11.7±3.6a
P1 orange	46.5±13.1a	69.8±21.1a	20.4±2.2a
P2 avocado	51.7±19.7a	23.7±7.1b	9.7±3.3b
P2 orange	137.9±21.3b	11.2±3.1b	3.0±3.1b
9/20/2002			
P1 avocado	25.7±10.4a	21.7±4.5a	56.7±15.3a
P1 orange	12.1±6.2a	17.4±9.7a	41.1±19.7a
P2 avocado	32.7±9.4a	13.3±2.2b	13.7±4.2b
P2 orange	44.7±22.5a	10.1±2.5b	17.4±9.6b

Table 1. Mean number of adult GWSS, *Gonatocerus ashmeadi* and *G. morrilli* ± SE trapped on yellow sticky cards in two Pauma Valley plots (P1, P2), each with cards in avocado and orange (different letters indicate significantly different means, X = no cards for that date)