DEVELOPMENT OF TRAPPING SYSTEMS TO TRAP THE GLASSY-WINGED SHARPSHOOTER *HOMALODISCA COAGULATA* ADULTS AND NYMPHS IN GRAPE (AVF V107)

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INTRODUCTION

The glassy-winged sharpshooter (GWSS) *Homalodisca coagulata* is native to the southeastern United States where it is a known vector of various strains of the bacterium *Xylella fastidiosa.* Since its introduction into California, it has become established in large numbers in certain areas. Pierce's disease has been a problem in California for more than 100 years, but the GWSS is a more efficient vector of *X. fastidiosa* because it is a stronger flier than native California sharpshooters, and it can feed on the xylem of seemingly dormant woody stems.

The wine industry in Temecula, CA has been seriously impacted by Pierce's disease (PD) losing about 30% of its vineyards to date. The combination of PD and GWSS in California poses a serious threat to the grape industries. About 98,000 acres of table grapes are currently cultivated in California with 14,000 acres of table grapes in the Coachella Valley (Riverside County). The Coachella Valley has a history of PD and there is currently a high population of glassy-winged sharpshooters. The combination of the bacterium and new vector creates a serious disease threat to grape in the area. A similar situation has occurred in Kern County, California as well.

One of the crucial components and cornerstones of integrated pest management is the monitoring for the presence and density of a pest. Proper detection methods allow for optimum integration of biological, cultural, physical, chemical and regulatory measures to manage a pest. Yellow sticky traps have been used extensively in the southeastern U.S. for monitoring leafhoppers including GWSS in peach (Ball, 1979) and citrus (Timmer et al., 1982). However, the reliability of these methods to detect the GWSS in California is questionable, and traps specifically designed for GWSS do not currently exist. To compound the situation, current methods are not standardized. For example, different sizes and shades of yellow sticky traps are being used in monitoring programs. The AM designation on certain traps actually refers to the apple maggot for which the trap was designed. Furthermore, the relationship of trap catches to actual populations of GWSS in grape or citrus are currently unknown.

Trap designs based on the behavior and biology of the insect in question have a much higher chance of success than relying on trial and error of traps designed to monitor other insects. Female GWSS secrete and deposit brochosomes on the forewings just prior to egg laying (Hix, 2001). These spots are then scraped off during egg laying. Furthermore, white spots are secreted before each egg mass is laid, and female GWSS can only produce rod shaped brochosomes after mating. It is therefore feasible to relate preovipositional females with white spots and residues to egg masses in associated vegetation analysis. The white spots are very visible on females caught in traps (Hix, 2001). Many leafhopper species produce brochosomes, but only females are known to produce the rod shaped brochosomes.

OBJECTIVES

This research addresses: 1) which hue of yellow is the most attractive to GWSS; 2) what is the field longevity of a trap before weather and photo degradation impact trap reliability; 3) how does trap catch relate to populations of GWSS in citrus and grape; 4) GWSS spectral sensitivity; 5) how does temperature affect trap catch; 6) the feasibility of using certain wavelengths of light to enhance trap catch of GWSS in vineyards and associated orchards; 7) develop and evaluate sticky barriers to trap and detect GWSS nymphs within a vine or tree canopy.

RESULTS AND CONCLUSIONS

Three trap types were field tested in 2001. Traps were deployed in citrus groves and grape vineyards with known high populations in addition to groves and vineyards with low populations. Trap types tested included flight intercept traps (5 colors), plates (11 colors), and nymph traps (3 colors). Traps were checked weekly and visual count of egg masses, nymphs, and adults were made. Trapped GWSS were sexed, and females with forewing spots of brochosomes or residue were noted.

The data from the intercept traps and colored plates clearly indicated that GWSS are attracted to yellow as well as orange. Attraction to these colors was statistically significant and demonstrated that even though the AM type trap may have reliability issues, it is clearly not a "blunder trap."

The yellow and orange colored plates were very successful in catching adult GWSS. Yellow plates caught statistically more GWSS than AM traps while orange traps usually caught more than the AM traps (Figure 1). The interesting thing is that the yellow plates were more reliable at catching GWSS at low population levels than the AM traps. The nymph traps reliably caught 1st through 5th instar nymphs in moderate to low populations. These traps are easy to deploy in grape canes in situations where it could take hours of searching to locate nymphs. Low populations of GWSS nymphs in a vineyard may pose threats of moving *X. fastidiosa* from vine to vine within trellises. The fluorescent yellow and canary yellow intercept traps attracted large numbers but the collection mechanism only caught about 15% of the bugs that encountered the panels, which made the traps unreliable. However, intercept traps were capable of catching live insects.

Additional progress was made in determining that adult and nymphs are attracted to upper UV, and certain wavelengths in the yellow and orange ranges. The preliminary data indicated relationships between the number of ovipositional females trapped and egg laying in associated vegetation.

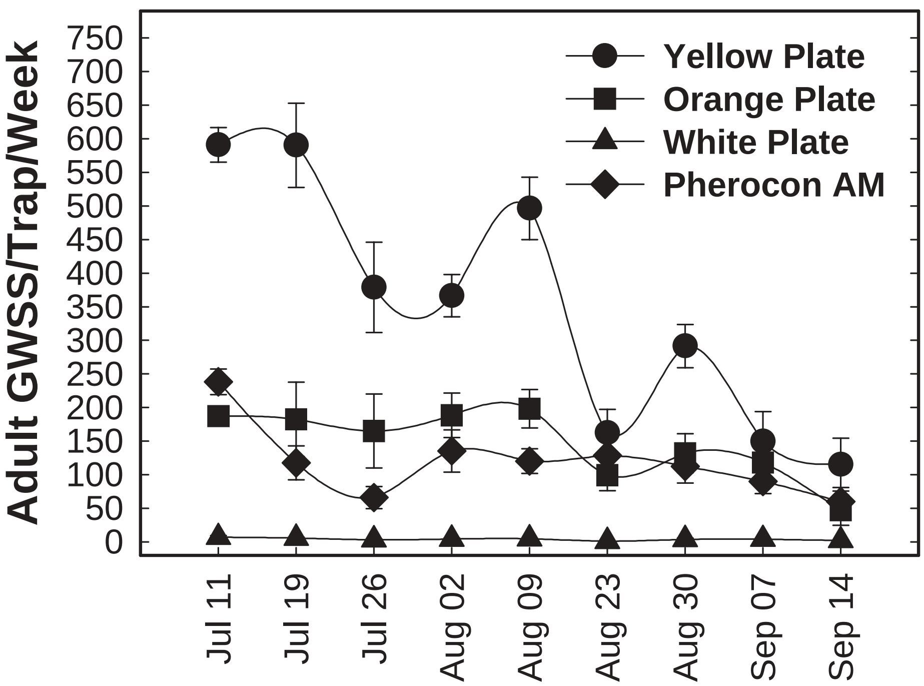

Fig. 1. Comparisons of Yellow, Orange, and White Plates and AM traps. Bars= ±SE n=5.

REFERENCES

Ball, J. C. 1979. Seasonal patterns of activity of adult leafhopper vectors of phony peach disease in north Florida. Environmental Entomologist 8:686-689.

Hix, R. L. 2001. Egg-laying and brochosome production in glassy-winged sharpshooter. California Agriculture 55: 19-22.

Timmer, L., W. Timmer, R. F. Lee, J. C. Allen and D. P. H. Tucker. 1982. Distribution of sharpshooters in Florida citrus. Environmental Entomologist 11:456-460.

Rakitov, R. A. 2000. Secretion of brochosomes during ontogenesis of a leafhopper, *Oncometopia orbona* (F.) (Insecta, Homoptera, Cicadellidae). Tissue and Cell 32:28-39.