SPATIAL DISTRIBUTION OF GLASSY-WINGED SHARPSHOOTERS IN A DIVERSE AGRICULTURAL SYSTEM, AND CORRELATION BETWEEN DIRECT OBSERVATIONS AND STICKY TRAP DATA

Project Leaders:

David Bartels
USDA-APHIS-PPQ-CPHST
Edinburg, TX 78539

Lloyd Wendel
USDA-APHIS-PPQ-WR
Edinburg, TX

Matthew Ciomperlik
USDA-APHIS-PPQ-CPHST
Edinburg, TX

Cooperators:

David Elms
CDFA-PDP
Bakersfield, CA

Rosie Yacoub
CDFA-PDP
Sacramento, CA

Don Luvisi
UC Cooperative Extension
Bakersfield, CA

Reporting Period: The results reported here are from work conducted from January 1, 2001 through September 30, 2002.

INTRODUCTION

The glassy-winged sharpshooter (GWSS) is an invasive species that is threatening California agriculture. GWSS live on many different host plants, but the main concern is their potential to vector Pierce's disease in grapes. Pierce's disease can kill susceptible grape vines within 2 years after infection (Varela et al. 2001). An area-wide management program is underway in Kern County to manage outbreak populations of GWSS and slow their northward spread in the San Joaquin valley. To be successful, large scale regional insect management programs require an accurate assessment of pest density and distribution to provide decision support for program managers (Liebhold et al. 1993, Roberts et al. 1993). This report details program activity aimed at understanding the spatial distribution of GWSS populations in Kern County.

OBJECTIVES

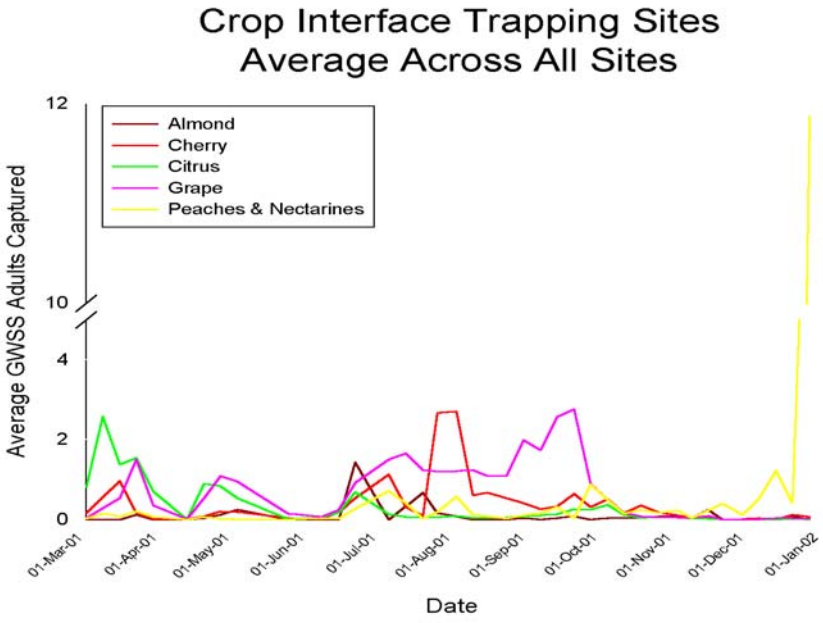
1. Determine the spatial distribution and density of GWSS in a diverse agricultural setting.
2. Determine the within field distribution of GWSS and movement between citrus and other perennial host crops.
3. Determine the correlation between yellow sticky trap data and direct observations taken in the field.

RESULTS AND CONCLUSIONS

A trapping program was initiated to provide pest location and density information. Sticky trap data was collected from a pilot project area consisting of 1457ha (3600ac) of citrus, 1255ha (3100ac) of grapes, and 688ha (1700ac) of other perennial hosts including almond, blueberries, cherries, nectarines, peaches, and pistachios. GWSS adults are highly visually oriented in searching for hosts. Recent work (Hix et al. 2001, Puterka et al. (submitted)) demonstrated that yellow is the most attractive color for trapping. Yellow sticky traps with 36cm^2 of trapping surface from Seabright Laboratories (Emeryville, CA) were placed throughout the area in a 402m (¼ mile) grid and serviced weekly by CDFA. Traps are placed on 2m bamboo poles to standardize the height of trapping across the entire grid. Within citrus groves and other tree fruits, traps were placed within the row between 2 trees near the corners of the field. Traps in grapes were placed within the trellis 0.1m above the canopy on bamboo poles near the corners of the field. The trapping grid has been expanded from the original pilot project area to include most of the grape/citrus producing areas in Kern County. Over 4000 traps in citrus and grape are serviced on a weekly basis to provide managers detailed information on GWSS locations and density.

In addition to the standard grid, yellow sticky traps were set up in an intensive grid at 11 sites within the pilot project to look at GWSS movement at crop interfaces. Citrus was the common crop at each site. The other crops included 4 grape vineyards, 4 cherry orchards, 2 peach/nectarine orchards, and 1 almond orchard. Trapping grids consisted of 3 transects of traps. Each transect was comprised of 16 traps with 8 traps located in each crop. The traps extended 200m into the crop away from the interface and were approximately 24 m apart. Traps were checked weekly as part of the regular trapping program run by CDFA. Data collection began at the end of February with the first reporting date on March 1, 2001.

When averaged across all sites, the overall trapping pattern for each crop was similar for the entire year, with a few exceptions (see Figure). Early in the season GWSS adult were trapped in the highest numbers in citrus prior to the foliar and systemic treatments in citrus that were applied as the management strategy. Levels in citrus remained low all season due to these treatments. From July to October most GWSS trap captures occurred in grape and cherry. The highest numbers occurred in the site with organic grapes. Late in the year numbers peaked in traps of one peach/nectarine orchard as the grower was pruning the trees and putting on a dormant oil / insecticide treatment. This winter activity points to the need to trap continuously through out the year to detect populations in areas where they may be overwintering.



Direct observations in the pilot project were made on a monthly cycle with all citrus orchards being sampled at a rate of 10 observations per 40 acres. Grapes and other host crops were sampled at the interface sites where trapping occurred. Two different sampling methods were used in each crop, and these varied based on differences in plant morphology between crops. In citrus, visual counts and beat net sampling methods were used. Two minute visual counts were made of the number of adult GWSS on the terminal growth on approximately ½ of the tree to a height of 2m, and then recorded onto a data sheet. Then, the terminal foliage is beat with a 2.5cm dowel rod to dislodge GWSS into a 62.5cm canvass net. This sample is then transferred to a labeled sealed plastic bag for counting at the laboratory. In the case of grapes, ten equally spaced visual counts are conducted on 4.3 linear meters of canes and recorded. When grape foliage is present, it is swept 20 times with a 37.5cm canvass net over an equivalent area as the visual count. Visual count and beat net sampling methods are used in tree crops, while visual and sweep net sampling methods are used in vine and shrub crops (i.e., blueberries). Finally, each sample unit (tree, vine, etc.) is recorded with a unique GPS coordinate. These results are being mapped and correlations made with sticky trap captures.

REFERENCES

Hix, R.L., M.R. McGuire and G.J. Puterka. 2001. Development of trapping systems to trap the glassy-winged sharpshooter *Homalodisca coagulata* adults and nymphs in grape. Proceedings Pierce's Disease Research Symposium, (eds. M. Athar Tariq, Stacie Oswalt and Tom Esser). California Department of Food and Agriculture, Sacramento, California. pp. 45-47.

Liebhold, A.M., R.R., Rossi and W.P. Kemp. 1993. Geostatistics and geographic information systems in applied insect ecology. Annu. Rev. Entomol. 38: 303-327.

Puterka, G.J., M. Reinke, D. Luvisi, M.A. Ciomperlik, D.W. Bartels, L.E. Wendel and D.M. Glenn 2002. Particle film, Surround WP, effects on glassy-winged sharpshooter behavior and its utility as a barrier to sharpshooter infestations in grape. Plant Health Progress. *(Submitted).*

Roberts, E.A., F.W. Ravlin and S.J. Fleischer. 1993. Spatial data representation for integrated pest management programs. Amer. Entomol. 39: 92-107.

Varela, L.G., R.J. Smith and P.A. Phillips. 2001. Pierce's Disease. University of California Agricultural and Natural Resources Publication 21600.

FUNDING AGENCIES

Funding for this project was provided by the USDA Animal and Plant Health Inspection Service and the California Department of Food and Agriculture.