HOST SELECTION BEHAVIOR AND IMPROVED DETECTION FOR GLASSY-WINGED SHARPSHOOTER, *HOMALODISCA COAGULATA* (SAY)

Project Leaders:
Russell F. Mizell, III
University of Florida
Monticello, FL 32344

Peter C. Andersen
University of Florida
Quincy, FL 32351

INTRODUCTION

The glassy-winged sharpshooter (GWSS), *Homalodisca coagulata*, a major leafhopper vector of Pierce's disease, *Xylella fastidiosa*, in the Southeast, has recently colonized many locations in California with devastating results. Better and more effective monitoring tools are needed to detect GWSS presence at very low population levels for regulatory and quarantine purposes and to accurately estimate local GWSS population density. Other than direct observation or sweep net collection, the only available survey and detection tool is a yellow sticky trap. CDFA is presently using the Pherocon AM yellow trap configured in two dimensions to capture GWSS adults. Yellow traps capture significantly more GWSS than other colors. Other data suggests that GWSS behavior is driven primarily by vision, and while GWSS apparently can visually discriminate between host plants and other objects, GWSS does not appear to use plant volatiles in host finding. No research has been directed towards improving the yellow trap or to evaluate trap precision at detecting GWSS relative to GWSS population density. We are investigating trap size, shape, and spectral reflectance pattern along with placement parameters (height, background, proximity to vegetation) to optimize a field detection method for GWSS. We are also investigating GWSS behavior during host plant searching and selection.

OBJECTIVES

1. To improve and optimize a trapping method(s) (size, configuration, spectral reflectance pattern, field placement, etc.) to detect and monitor GWSS.
2. To determine the mechanisms used by GWSS in host plant finding and selection.

RESULTS AND CONCLUSIONS

Local populations of GWSS in Florida are usually much lower than populations observed in California under most host plant-habitat situations. We attribute this to the higher plant diversity present in Florida that allows GWSS to feed on many host plant species without intense aggregation on irrigated crops, such as citrus and grapes present in the dry areas of California. As a result, local GWSS populations in Florida more closely approximate founding GWSS populations that may occur in California during early colonization of new locations.

Adult GWSS may feed on hundreds of different host species and are long-lived and exceptionally mobile. Mark-recapture experiments indicate that GWSS is capable of moving away from a release point at least 200 m in less than 2 hours. Natural seasonal fluctuations in plant xylem chemistry determine the seasonal use of host plants by GWSS adults. GWSS move in short flights from plant to plant but also appear to move over longer distances using extended flights. As a result, caution must be followed in any interpretation of trap catch relative to estimation of the potential numbers of GWSS in the proximal and distal surrounding vegetation.

***Current Trapping*:**
CDFA is using the yellow Pherocon AM trap which provides a two dimensional surface that is 18 x 22 cm or 396 cm^2. These traps are inexpensive and easy to use because the stickem is already applied to the trap. Trap size facilitates shipment, handing and storage. Any new trap configuration must balance the need for ease of use and cost versus improved detection and monitoring. Therefore, our goal was to evaluate trap configurations that would improve detection and monitoring but be practical to use in large numbers.

***Trap Color*:**
In previous and present research we have found that GWSS are only captured in significant numbers in traps yellow in color. We have found that bright yellow hues that have little or no reflectance below wavelengths of 500 nm (blue-violet-UV) are preferred by GWSS. As little as 20% reflectance in the wavelengths below 500 nm decrease trap captures. Experiments using traps with a range of colors and intensities of gray support these conclusions.

***Trap Shape and Size*:**
We have found that traps of 3-dimensional cylinders perform better then rectangles and other two dimensional configurations and provide at least 3x increase in trap catch over the regular Pherocon AM. We have found that trap size affects trap capture. Trap capture increases with trap surface area without regard to shape. By testing combinations of shape and size we have found that larger traps (plastic pots as large as 30 x 30 cm) perform better than smaller traps and that cylinders perform better than two dimensional traps. Trap capture increases proportionally as cylinder diameter increases from 5 - 7.6 -10.7 cm and cylinder length increases from 15.2 - 30.5 - 61 cm.

***Trap Placement (background and contrast)*:**
We have found that trap placement relative to host plants and other landscape structures is very important. Placement of two dimensional traps in the open increased trap capture rate by 2x over captures by traps placed against tree foliage or in the interior of host plants. Traps placed at heights near the top or just above the vegetation captured more GWSS than traps placed surrounded by vegetation or near the ground.

***Practicality and Recommendations*:**
Given our results and recognizing the needs of regulatory for large numbers of cost-effective and biologically effective traps, we suggest that detection and monitoring can be significantly improved. Until further experimentation is complete, the Pherocon AM trap as presently configured can be used more effectively if a cylinder-shaped trap (7-8 cm diameter x 30-40 cm length) is made from two Pherocon AM traps. This can be accomplished easily using a stapler to attach the traps together, but would require the use of rubber gloves to avoid the stickem. Several alternatives could be easily developed. Mailing tubes 15 x 30 cm painted Glidden Safety yellow would perform better than the current Pherocon AM trap but would require more space to ship and handle. A cylinder trap could be configured in the field using the appropriately sized, prefabricated yellow rectangles with stickem that could be shipped and handled by placing the sticky sides of two traps together. With either of the alternative traps, cost and effort would remain relatively the same as required for the Pherocon AM trap, however, trap capture would be improved by a factor of 2-4.