February 17, 2006

Kern/Tulare

GWSS Update

A project of the Glassy-winged Sharpshooter Task Force of Kern and Tulare Counties. Participants: Agricultural Commissioner's Offices of Kern and Tulare Counties, California Department of Food and Agriculture, University of California-Cooperative Extension, U.S. Department of Agriculture (APHIS and ARS Divisions).

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Protein markers help pinpoint GWSS movements

Scientists are making headway in the quest to learn more about the dispersal characteristics of the glassy-winged sharpshooter (GWSS).

A new insect mark-capture technique is helping researchers distinguish GWSS and its natural enemies so they can study dispersal, migration, longevity and density traits. The findings are expected to bolster understanding of where the highly mobile sharpshooter feeds and breeds in a complex agricultural landscape.

"What's unique about this technique is that we're using inexpensive protein markers that are working out marvelously," says the study's project leader, James Hagler, a research entomologist with USDA's Agricultural Research Service (ARS) in Maricopa, Ariz. "What's also unique is that we're able to spray large acreages with those markers, something that hadn't been achieved before."

Citrus trees in a Porterville orchard are sprayed with a nonfat dry milk protein marker to track GWSS movement. (Photo: James Hagler, USDA-ARS)

Developing GWSS markers. Understanding where, how and when the sharpshooter travels has been difficult, partly because there hasn't been an effective marking technique for studying insect dispersal at the landscape level.

But researchers with USDA-ARS and the University of California recently have identified at least two inexpensive protein markers that work well in helping detect sharpshooters in the field. They showed that two protein markers, nonfat dry milk and chicken egg whites, can be rapidly acquired and retained on insects for three weeks after direct marking in the field.

Hagler, along with ARS researchers Jackie Blackmer, Thomas Henneberry and Russell Groves, and UC's Kent Daane, worked with cooperator Vince Jones of Washington State University on the study. They reported their findings at the 2005 Pierce's Disease Research Symposium in San Diego last December.

The group developed anti-casein and anti-egg white ELISAs (enzyme-linked immunosorbent assays). In turn, the ELISAs were used to detect the presence of each protein on the protein-marked insects.

During the field study in Porterville, Calif., they sprayed a large citrus plot and a large olive tree plot with the proteins using a conventional air blast sprayer. They also ex-

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Ag in the spotlight

California Governor Arnold Schwarzenegger (left) learns about farm equipment from A.G. Kawamura, Secretary of the California Department of Food and Agriculture, at World Ag Expo in Tulare Feb. 15. (Photo: Catherine Merlo)

CDFA seeks PD/GWSS Research Director

The California Department of Food and Agriculture is seeking a motivated, innovative outside consultant to serve as Research Director for the Pierce's Disease and Glassy-winged Sharpshooter Board. Please refer to contract number "RFP #05-0616" at https://www.cscr.dgs.ca.gov/cscr/ for more information. Contact: Ms. Joy Mountjoy (jmountjoy@cdfa.ca.gov, 916-651-8182). Deadline: March 30, 2006.

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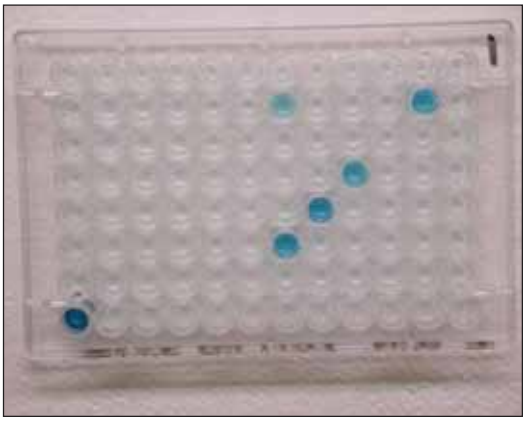
posed the insects to pre-marked life tissue, confining them in nylon-meshed screen cages.

Insects that were hit by the protein solutions or exposed to marked plant tissue obtained enough protein to be detected by each protein-specific ELISA.

Data indicate that the nonfat dry milk and egg-white protein markers were retained well on both GWSS and predaceous beetles, regardless of the application method. Generally, the topical marking procedure yielded higher ELISA values than the insects marked by contact exposure. Both methods, however, were sufficient for marking almost 100 percent of each population for more than two weeks.

A third protein marker, soy milk, was studied but did not show as much promise as the two other markers. "It's an effective mark, but the soy-specific ELISA also reacts with citrus plant tissue," Hagler says.

In addition to distinguishing GWSS, the nonfat dry milk and egg white protein markers can be used to identify insect movement from different areas within a crop or between different crops.



The dark blue spots in this ELISA are GWSS that were marked with one of two proteins, nonfat dry milk and egg whites. (Photo: James Hagler, USDA-ARS)

Citrus branches were covered with nylon-mesh screen cages to confine GWSS and other insects before spraying. Assayed up to 21 days after marking, the insects showed they retained the protein marker. (Photo: James Hagler, USDA-ARS)

The UC-Division of Agriculture and Natural Resources funded the three-year study, which began in September 2004.

Tracking GWSS and irrigation practices. Hagler and colleagues are now using the protein mark-capture technique to determine how "continuous deficit irrigation" practices in Valencia oranges influence the population dynamics of GWSS and other associated natural enemies. They believe their findings will generate significant new information about host selection behavior and movement patterns of the sharpshooter in California.

You can read about this GWSS study, and many more, in the 2005 PD Symposium Proceedings at http://www.cdfa.ca.gov/phpps/pdcp/ResearchSymposium/gw2005Proceedings.htm.

—Catherine Merlo

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James Hagler, USDA's Agricultural Research Service