

Kern/Tulare

# GWSS Update



A project of the Glassy-winged Sharpshooter Task Force of Kern and Tulare Counties. Participants: Agricultural Commissioner 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).

## Research explores use of transgenic bacterium to combat Pierce's Disease

Research exploring the use of a transgenic bacterium to deliver an anti-Pierce's Disease (PD) strategy is under way at the University of California at Riverside.

The project is headed by Dr. Thomas Miller, an expert in insect physiology and professor of entomology at UC Riverside. The pioneering study has received "significant support" from the U.S. Department of Agriculture's APHIS division and from the California Department of Food and Agriculture, Miller says.

Here's how Miller describes his project: During feeding bouts, the glassy-winged sharpshooter (GWSS) acquires the pathogenic — or disease-causing — bacteria, *Xylella fastidiosa*, in xylem fluid from infected plants. *Xylella* reproduces in the foregut of the sharpshooter and is available for transmission to another plant the next time the GWSS feeds. If this *Xylella* is the strain that produces PD in grapes, the grape plants begin showing symptoms in a matter of months and the entire disease process is slow to develop.

During these same feeding bouts, GWSS also acquires a number of other bacteria from the host plants that are commonly found in the xylem, but that produce no pathogenic effects. The other endophytic bacteria are cycled between GWSS and all of the different host plants it samples.

"This process is a silent one because no outward symptoms are produced in the plant to signal the presence of these innocuous bacteria," Miller says.

**Ax—the anti-*Xylella* vehicle.** One of these endophytic bacteria, *Alcaligenes xylosoxidans* (Ax), was identified by one of Miller's collaborators, Carol Lauzon at California State University at Hayward. She found that Ax forms colonies in the foregut of GWSS next to attachments of *Xylella* and colonizes plants as well. *Xylella* and Ax belong to a category of life form called symbionts, meaning they live with other organisms.

Miller and his team have selected Ax as a vehicle to deliver an anti-*Xylella* product in a process invented by Frank Richards, professor emeritus of Internal Medicine at Yale Medical School. Dozens of gene products have been screened, and two showed promise when tested by Miller's postdoctoral fellow, Blake Bextine, for ability to disrupt the PD cycle. Two of these are currently being inserted into the delivery bacteria by another collaborator, David Lampe of Duquesne University in Pittsburgh, Pa.

Last year, Lampe produced from Lauzon's Ax colony a sub-strain that produces a fluorescent protein as a gene marker. Bextine and Lauzon are using Lampe's marked strain to follow the interaction of Ax in several host plants besides grapevines. Miller's graduate student, Robin Bromley, obtained a permit from the Environmental Protection Agency (EPA) to conduct tests in selected vineyards in California on the movement of the genetically marked Ax.

**Regulatory, public hurdles.** Regulatory hurdles are significant to the application of this biotechnology, Miller notes.

"The probiotic-symbiont approach is sufficiently new that the professionals at EPA took a month to determine which law applied," he says. "The grape and wine industry has yet to decide how the new technology might fit in its crop protection practices or if it will be accepted at all."

A transgenic bacterium used to deliver an anti-PD strategy is a novel application, Miller says, but is certainly not new. Ice-minus bacteria were among the first genetically modified organisms to be tested in agriculture. (See <http://www.junkscience.com/dec98/badoran.htm>)

"Transgenic bacteria are being examined elsewhere for health protection in medicine," says Miller, "but the potential use of this technology to grapevine protection is certainly one of the newer applications of symbiont technology." ■

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### Web sites:

- [www.co.kern.ca.us/kernag/](http://www.co.kern.ca.us/kernag/)
- [http://cekern.ucdavis.edu/Custom\\_Program444/](http://cekern.ucdavis.edu/Custom_Program444/)

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—Thomas Miller,  
UC-Riverside

## PD/GWSS meetings set

### Oct. 28, 2003

The Pierce's Disease PD/GWSS Board will meet in Napa, Calif.

### Oct. 29, 2003

The Pierce's Disease PD/GWSS Advisory Task Force will meet in Napa, Calif.