Nursery Rejections Down in 2015 – Plant Inspections Are Working

Since 2001 the nursery inspection program has been key to stopping the spread of the glassy-winged sharpshooter (GWSS) around California. This important program continues to be a fine example of how government and industry can work together to protect agriculture from invasive pests.

Regulatory Program Update

For all of 2015 there were 38,067 nursery stock shipments from GWSS generally infested areas to non-infested areas of the state. This is down 6,016 shipments from 2014.

Also in 2015, six regulatory actions (Notices of Rejection or NORs) were taken by destination counties for shipments that contained a viable GWSS life stage, compared to twelve NORs in 2014. During outgoing inspections, the origin county inspectors stopped 150 egg masses, three nymphs and 13 adults from moving in nursery stock shipments.

Nursery Stock Approved Treatment Program (ATP)

During the same period there were 10,179 ATP shipments, consisting of approximately 2.43 million plants. ATP shipments and the number of plants from 2014 were 11,761 and 2.72 million, respectively. No viable life stages were detected in any shipments.

A tree in a Southern California nursery is inspected for GWSS before being loaded for shipment to Northern California.

ATP Egg Masses Sleeved at Destination

Under the ATP, county inspectors may choose to monitor GWSS egg masses found at destination on treated shipments of nursery stock. In 2015, a total of 18 egg masses from five ATP yards were monitored in insect-rearing sleeves by destination counties. No viable GWSS emerged from the egg masses.

Date Collected	Destination County	Host & # of Egg Masses	Treatment	Fate	Date Released
2/19/2015	Sonoma	*Olea* sp. (3)	Sevin SL	Dead	3/10/2015
5/7/2015	Sonoma	*Azalea* sp. (2)	Sevin SL	Dead/Parasitized	5/11/2015
6/10/2015	Santa Clara	*Tristania* sp. (1)	Sevin SL	Dead	6/12/2015
8/4/2015	San Joaquin	*Ligustrum* sp. (1)	Sevin SL	Dead	8/11/2015
8/7/2015	Santa Clara	*Arbutus* sp. (2)	Tame	Dead/Parasitized	8/13/2015
9/11/2015	Imperial	*Dalbergia* sp. (5)	Sevin SL	Dead/Parasitized	9/21/2015
10/7/2015	Santa Clara	*Tristania* sp. (4)	Tame	Dead/Parasitized	10/14/2015

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PD/GWSS BOARD RESEARCH

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bulletin

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Recently Identified Enzyme May Hold New Insight into Pierce's Disease Grapevine Damage

Adapted from an article in Food & Agriculture

An enzyme that UC Davis plant scientists have recently identified appears to play a key role in how Pierce's disease (PD) spreads in a grapevine and kills it. The discovery could lead to new diagnostics and potential treatments for PD as reported in *Scientific Reports*, an online journal of the Nature Publishing Group.

"With a bacterial disease, if you understand how the virulent form spreads, you can better control or remove it," said Abhaya Dandekar, a professor of plant sciences and senior author of the study. "We anticipate that this discovery could open new ways to think about dealing with PD and highlight other areas of immune response in general that haven't yet been considered."

A researcher at UC Davis examines a petri dish which shows the results of the effects of the LesA enzyme.

Most enzymes are proteins and are known to increase the rate of a reaction by lowering the activation energy for a change to occur. Some can make these conversions to a product occur many millions of times faster, so they can have a tremendous impact on any biological system.

The research team began by analyzing a collection of *Xylella fastidiosa's (Xf)* enzymes and other proteins secreted during the infection process. Such secreted proteins are known to play key roles in triggering many plant diseases. The resulting data indicated that an enzyme, which the researchers named LesA, was quite abundant during *Xf* infections and shared characteristics with similar enzymes known to be capable of breaking down plant cell walls. The researchers went on to confirm their suspicions by demonstrating that a mutant strain of *Xf* bacteria — with a specific gene knocked out or inactivated — lacked the ability to cause infection in grapevines.

"The LesA enzyme has the ability to move through cell membranes, equipping the *Xf* bacteria to invade the grapevine and live in its xylem tissues, where it feeds on fat-like compounds called lipids," said Dandekar.

In this way, the LesA enzyme triggers the process that causes the typical PD leaf damage — a process completely unrelated to the xylem blockage and water stress that had previously been thought to cause the symptomatic leaf damage.

"I think it's really important that if we understand the mechanism by which *Xylella* causes disease, then we can blunt those processes, develop diagnostics that can identify the disease in early stages and develop possible strategies to cure the disease," said Dandekar.

The CDFA PD/GWSS Board provided funding for the research which was conducted by Rafael Nascimento and Hossein Gouran, both graduate students in Dandekar's laboratory. Dandekar said that further research may find ways to counteract the disease. *(See related article about new video on page 2)*

INSIDE THIS ISSUE

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GWSS Egg Masses Found in Napa and Sonoma Counties

- In March, Napa and Sonoma county ag inspectors found GWSS egg masses on nursery plants shipped in from Southern California.

New Video - Researchers Discover a Protein Plays Key Roll in Pierce's Disease

- UC Davis researchers talk about their latest discovery and how it may change how we look at PD.

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On the Research Front

- The discovery of how GWSS communicate with each other could be used to disrupt their mating.
- Grapevines with modified rootstocks developed from four different research projects are being field tested together to test their PD-suppressing properties.
- Update on field trials using a benign strain of *Xylella fastidiosa* to prevent Pierce's disease in winegrapes.

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2015 Inspection Program Stats

- Plant inspections are working, and the numbers show it. With over 38,000 shipments in 2015, inspectors found only six shipments with any signs of GWSS.

GWSS Eggs Found on Nursery Shipments in Napa and Sonoma

Inspectors in both Napa and Sonoma counties found glassy-winged sharpshooter (GWSS) egg masses on two nursery shipments of plants in early March and again in late March, leading to the destruction of the lot of the plants where the eggs masses were found.

The first find was on March 7th by Napa County inspectors who discovered a single egg mass on a plant that was shipped from an Orange County nursery to a retail outlet in American Canyon, Calif.

Inspectors destroyed the affected variety of plants in which the egg mass had been found, and no other GWSS life stages were found on the remaining plants.

Two Napa County Agriculture Department inspectors examine a leaf removed from a plant that was part of an incoming nursery shipment which appears to have a GWSS egg mass.

Then on March 8th, Sonoma County inspectors found one GWSS egg mass on a plant that had also been shipped from the same supplier in Orange County.

Then again on March 29, while officials were inspecting 100 large trees delivered to a local winery from a Riverside County nursery, Napa County agricultural plant inspectors found some older and apparently nonviable egg masses for the insect. But one egg mass was confirmed as viable.

"This is a good news, bad news story," said Napa County Agriculture Commissioner Greg Clark. "The bad news is that this happened at all, but the good news is that the PD/GWSS program has been effective in preventing the spread of GWSS because of the cooperative partnership between the nursery industry, state and federal governments, and county agriculture commissioners."

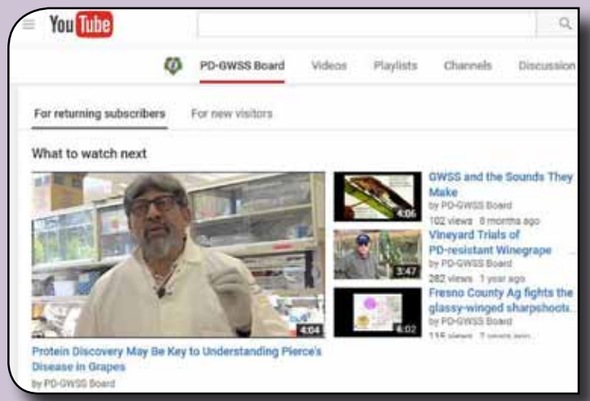
Local agricultural officials routinely inspect incoming nursery shipments for all life stages of GWSS. If any GWSS are found, they have the option to return the entire shipment, destroy the plants, or recondition and release the load. If treated and shipped under the Approved Treatment Program (ATP), county inspectors may choose to monitor GWSS egg masses found at destination. (See related article on back page of this newsletter.) Over the life of the ATP, no GWSS have emerged from egg masses that were found and monitored.

New Video

Protein Identified That Appears to Play a Key Role in Pierce's Disease

A new video takes you into the lab at UC Davis as researchers show how they discovered a protein (enzyme) that may be key to understanding how Pierce's disease develops in grapevines.

Watch the video at youtu.be/GvFGiM2o0B4



on the RESEARCH FRONT

PD/GWSS BOARD RESEARCH

A laser-Doppler vibrometer is pointed at a single GWSS to pick up the sounds it is making.

Substrate-Borne Vibrational Signals in Intraspecific Communication of the Glassy-winged Sharpshooter

Co-Principal Investigators: Rodrigo Krugner, San Joaquin Valley Agric. Sci. Center, USDA ARS, Parlier, Calif., and Valerio Mazzoni, Fondazione Edmund Mach (FEM), Research and Innovation Center, San Michele all'Adige, Italy

Leafhoppers and sharpshooters communicate via very low frequency "sound" waves transmitted through the plants and could be the key to a novel control method that may be incorporated into an integrated pest management strategy. A laser-Doppler vibrometer, used to make non-contact vibration measurements of a surface, is being used to identify and describe signals used by GWSS between both sexes for communication with specific signals required to achieve mating. Since what GWSS "say" to each other has a big effect on behaviors, signals may be exploited as an attractant, repellent, and/or disruptive signal which could be a useful, non-chemical control method for suppressing GWSS populations. The ability to establish a communication channel and elicit GWSS response to select signals represents an important step towards the next goal: identification of signals capable of disrupting GWSS mating.

Field Evaluation of Grape Plants Expressing Potential Protective DNA Sequences Effective Against Pierce's Disease

Co-Principal Investigators: David G. Gilchrist and James E. Lincoln
Dept. of Plant Pathology, UC Davis, Calif.

The purpose of this field planting was to evaluate grapevines and rootstocks expressing different transgenes for their effectiveness at protecting the vines from Pierce's disease (PD) under field conditions. The site selected enabled controlled inoculation and close monitoring of the grapevines for symptoms, bacterial behavior, and patterns of growth development. Test plants included ungrafted conventional Thompson Seedless and Freedom plants as controls. Modified plants and rootstocks from four different investigators were grafted to untransformed PD-susceptible scions to assess potential for disease suppression in an untransformed scion receiving PD-suppressing properties being produced in the modified rootstocks. The results to date of this field experiment indicate that there are modified vines from each of the investigators that appear to be suppressing the symptoms of PD in inoculated vines.

David Gilchrist examining one of the unmodified control grapevines used in the field trial which clearly shows signs of Pierce's disease.

Project leader Donald Hopkins injects an established winegrape vine with the benign strain of *Xylella fastidiosa*.

Biological Control of Pierce's Disease of Grapevines in the UC Riverside Vineyard With a Benign Strain of *Xylella fastidiosa*

Project Leader: Donald Hopkins, Mid-Florida REC, University of Florida, Apopka, Florida

Field trials to evaluate the biocontrol of Pierce's disease (PD) in Cabernet Sauvignon and Pinot Noir using a benign strain of *Xylella fastidiosa* were established at UC Riverside in 2011, where GWSS vectors of PD were abundant. The biocontrol strain of *Xf* provided excellent control of PD through 2015, with no vines dying. In both cultivars, plant vigor and fruit production have remained very good. Under severe PD pressure, the biocontrol strain has proven to be effective over four seasons.