



SPRING 2019

# bulletin



CALIFORNIA DEPARTMENT OF  
FOOD & AGRICULTURE

## INSIDE THIS ISSUE

## New Research Suggests ‘Vaccine’ for Pierce’s Disease on the Horizon

Among the solutions being looked at for Pierce’s disease (PD) is an unconventional “vaccine” approach to protect grapevines from *Xylella fastidiosa* (*Xf*), the pathogen that causes the disease. The concept may sound too good to be true, but the fundamental tools to achieve a similar effect are now at hand.

Researchers at UC Berkeley, led by Dr. Steven Lindow, have identified *Paraburkholderia phytofirmans* as a bacterium that can efficiently, and without causing any apparent harm, enter a grapevine and trigger the equivalent of an immune response, building resistance to the spread of both *P. phytofirmans* and *Xf*. Unlike most vaccines though, the treatment may even fight *Xf* when it is applied after the grapevine has been infected with the pathogen.

*P. phytofirmans* can be introduced to the grapevine via a droplet puncture or by spray application with a penetrating surfactant. The bacterium then multiplies for three to four weeks, spreading up to three feet out from the application site. Around that point, it triggers the plant’s PR1 and ETR1 genes, initiating a disease resistance reaction that significantly lowers the population of *P. phytofirmans* as well as any *Xf* present at the time.

The researchers tested this treatment with *Xf* introduced before, at the same time as, and after *P. phytofirmans* was inoculated. Substantial control of PD was seen in Cabernet Sauvignon in all field trials, with the largest reductions in disease severity observed in plants treated with *P. phytofirmans* applied by droplet puncture or spray application either at the same time as or up to three weeks after the pathogen.

“The high levels of disease control are exciting and suggest that even higher levels could be conferred after further exploration of practical questions, like optimum timing and application methods,” said Dr. Lindow.

The team hopes the treatment will be available to growers within a few years. A patent disclosure was submitted to the University of California in December 2018 and, if granted, could facilitate further commercial development of this disease control method. *P. phytofirmans* is a naturally occurring bacterium well recognized to be a beneficial organism, therefore, few regulatory hurdles are expected. Since the bacterium will need to be registered with the Environmental Protection Agency before it can be used commercially, a company must be found to produce it and support the registration process. According to Dr. Lindow, the registration and commercialization process could take a few years.

Many in the industry are optimistic. “This development gives growers hope that a usable solution for Pierce’s disease may be right around the corner,” said Steve McIntyre, chair of the PD/GWSS Board’s Research Screening Committee. “I’m excited for the day we can use this technique in the field.”

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#### Continued Vigilance Is Key to Keeping GWSS From Spreading on Nursery Stock

- The cooperative statewide Pierce’s Disease Control Program oversees a host of activities throughout the state to reduce the risk of moving GWSS on nursery stock

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#### On the Research Front

- What facilitates the movement of *Xylella fastidiosa*, the bacterium that causes Pierce’s disease, within grapevines?
- The spike in GWSS activity in Temecula in 2017 prompted concerns. What do 2018 numbers indicate?
- Assessing the vine mealybug risk in Napa County to refine management strategies

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#### New PD/GWSS Board Officers and Members

- Chair: Keith Horn
- Vice chair: Domonic Rossini
- Treasurer and new member: William Drayton
- New member: Randy Heinzen

# Continued Vigilance Key to Keeping GWSS From Spreading on Nursery Stock

Nursery stock can present a high risk for spreading the glassy-winged sharpshooter (GWSS), especially during spring. The first GWSS of the season begin to emerge at the same time as the nursery industry is selling and shipping 75 to 85 percent of their total annual stock. With multitudes of flowers and plants being gifted for spring holidays and people digging into spring landscaping and backyard vegetable gardens, some nurseries are shipping as many as 20,000 plants a day.

The cooperative statewide Pierce's Disease Control Program (PDCP) oversees a host of activities throughout the state to reduce the risk of moving GWSS on nursery stock. Approximately 53 percent of California's 13,000 licensed nurseries are in GWSS-infested counties and many ship to non-infested areas of the state.

As a cornerstone PDCP activity, the nursery program prevents the spread of GWSS with trained county agricultural inspectors monitoring all nursery shipments at both origin and destination. Plants identified as hosts for GWSS are inspected before being shipped from infested areas. Plants shipped to non-infested areas must be certified as GWSS-free before shipping and may be inspected once again when they arrive at destination, before they are released for sale. If any live GWSS, including egg masses, are found at destination, the entire shipment or the affected portion of the shipment may be destroyed, returned to the point of origin, or reconditioned and released by the local agricultural commissioner.






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**In 2018, for the first time in the PDCP's history, no viable GWSS life stages were found in nursery shipments from GWSS-infested locations to non-infested locations for an entire year.**

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During 2018, 34,000 nursery stock shipments were made from GWSS-infested areas to non-infested areas of the state, and origin county inspectors stopped 51 egg masses, one nymph, and three adults from moving in nursery stock shipments. Between January and March of 2019, there were 9,622 nursery stock shipments from the GWSS-infested areas to non-infested areas of the state, up by approximately 10 percent from the same time last year. One regulatory action has been taken this year due to a viable GWSS egg mass being found in a shipment. Two egg masses were found at origin by county inspectors in March 2019.

## PDCP NURSERY ACTIVITIES

-  Inspection of nursery stock in infested areas prior to shipping to non-infested areas
-  Treatment of nursery stock when necessary
-  Certification of shipments
-  Inspection of nursery stock at receiving nurseries prior to sale
-  Trapping in and near shipping and receiving nurseries

When participating in the Nursery Stock Approved Treatment Program (ATP), qualified nurseries can ship nursery stock without an origin inspection, if the shipments are treated with specific materials. These materials are 100 percent efficacious at killing GWSS adults and nymphs, including emerging nymphs. In 2018, eight ATP nurseries shipped approximately 3.3 million plants in 12,779 shipments. Forty-six counties received plant material from ATP nurseries throughout the year, with no viable GWSS found in any shipments. From January 1 through March 31, 2019, there were 2,460 ATP shipments consisting of 610,463 plants. No regulatory actions have needed to be taken yet this year.



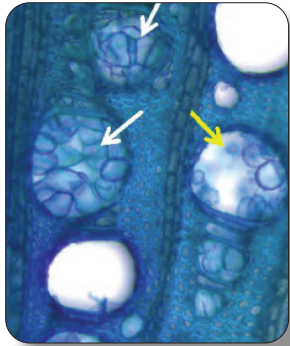
Nursery stock being inspected before shipment

# On the RESEARCH FRONT



## CALIFORNIA PD/GWSS BOARD

*Partnership for Winegrape Pest Solutions*



Cross-section of the xylem vessels of a grapevine with *Xylella fastidiosa*

### Characterization of *Xylella fastidiosa* Plant Cell Wall Degradation and Inhibition of the Type II Secretion Machinery

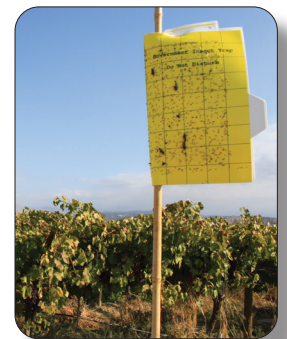
**Principal Researchers:** Caroline Roper, UC Riverside; Dario Cantu and Andrew McElrone, UC Davis; and Qiang Sun, University of Wisconsin

The research team investigated what facilitates the movement of *Xylella fastidiosa* (Xf), the bacterium that causes Pierce's disease (PD), within grapevines, and the subsequent clogging of the water-conducting cells that worsens PD severity. They found that Xf spreads through the plant by using cell wall degrading enzymes to break down the barriers separating xylem vessels. Limiting these enzymes may allow more xylem vessels to remain open and minimize a vine's drought-stress symptoms. The team is now investigating how to inhibit the secretion machinery responsible for delivering the Xf enzymes to provide a comprehensive approach to restricting Xf and PD development.

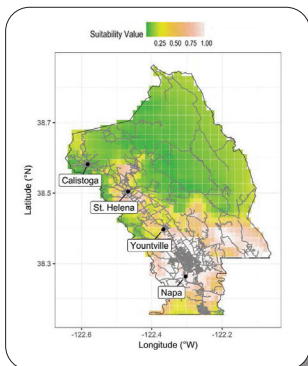
### Riverside County Glassy-winged Sharpshooter Program in Temecula Valley

**Principal Researcher:** Matt Daugherty, Department of Entomology, UC Riverside

For more than 15 years Temecula Valley has been part of an area-wide control program to suppress and monitor glassy-winged sharpshooter (GWSS) populations. The sizeable increase in GWSS activity seen in Temecula in 2017 prompted concerns of a chronic resurgence in GWSS populations as has occurred in other areas of California over the last few years. Lower counts for 2018 seem to suggest that the results from 2017 could represent an acute spike in activity. Even so, the driver of the high numbers in 2017 is not known definitively, and there is clearly potential for substantial interannual variability in GWSS abundance in the region. Temecula grape growers are encouraged to remain vigilant with GWSS and Pierce's disease monitoring and management activities.



Close to 200 traps, like the one above, are located in Temecula citrus groves and vineyards



Prediction of vine mealybug habitat suitability in Napa County

### Quantifying Vine Mealybug Spatio-Temporal Dynamics: Assessing Invasion Risk to Refine Management Strategies

**Principal Researchers:** Matt Daugherty, Department of Entomology, UC Riverside, and Monica Cooper, University of California Cooperative Extension

The invasive vine mealybug (VMB) is a serious pest in California vineyards. The research team investigated factors governing its spread by looking at Napa County survey data from 2012 to 2017. They found the VMB to be actively spreading throughout Napa County and expect it to continue at rates upwards of a half mile per year. The amount of precipitation in the driest month, elevation, and trap distance to nearest winery were identified as the most important and strongly associated predictors of habitat suitability for VMB.

# New PD/GWSS Board Officers and Members

The Pierce's Disease and Glassy-Winged Sharpshooter Board elected new officers and welcomed new members at its January 2019 meeting.

Keith Horn was elected chair of the PD/GWSS Board for a one-year term, succeeding outgoing chair Ryan Metzler of Fruita Del Sol in Fresno, who served his last day as a board member on January 25, 2019.

"The PD/GWSS Board and the wine grape industry have come a long way together," said Horn. "2018 brought us no new GWSS infestations and no GWSS finds in nursery shipments, but we won't rest there. Pierce's disease remains a threat, and we must keep our eye on budget challenges as well as new pests and diseases to ensure California's winegrape growers continue to benefit from the activities of the board."

Domonic Rossini, partner/owner with Fratello Farming in Modesto was elected vice chair. New board member William Drayton, director of technical viticulture and winemaking with Treasury Wine Estates in St. Helena, was elected treasurer. Drayton replaced former board member Drew Johnson of Atlas Vineyard Management in Napa.

"The PD/GWSS Board is a hugely important asset to the industry, a major firewall to stopping the spread of Pierce's disease, and more important than ever," said Drayton. "As a board member, I want to ensure that growers' investment is spent wisely and that we maximize benefits for the grower community."

The board also welcomed new member Randy Heinzen, president of Vineyard Professional Services (VPS) in Paso Robles, who replaced John Crossland, also of VPS.

"The board is rich with industry experience and incredible viticulture acumen," said Heinzen. "I will bring a fresh perspective to our commitment of keeping a practical eye on the long-term. We have to develop the best research we can to slow the movement of Pierce's disease and GWSS, and other exotic pests, viruses, and threats that likely will thrive in a changing climate."



**Keith Horn of Gonzales was elected chair**



**New board member William Drayton of St. Helena was elected treasurer**



**New board member Randy Heinzen of Paso Robles**