

Researchers Determined to Discover Why Growers Are Seeing More PD

If you are a winegrape grower on the north and central coasts and you've noticed an increase of Pierce's Disease (PD) among your vines the last couple of years, you're not alone.

Earlier this year the PD/GWSS Board received a proposal to fund research to look into the latest outbreak of PD in the North Coast area. After a review of the proposal, the PD/GWSS Board voted in August to fund a research project titled, "Evaluating Potential Shifts in Pierce's Disease Epidemiology," which was submitted to the Board for funding by University of California, Berkeley, Associate Professor Rodrigo Almeida.

While PD does tend to run in high and low cycles, this time around seems to be different. "Growers from the North Coast to Santa Barbara have noticed an increase in the incidence of PD, something that has also been observed by UC Farm Advisors as well," said Almeida. "In addition, some clusters of symptomatic vines are occurring in areas distant from riparian zones."

Because of these observations and other factors, the Board felt it was worthwhile to look for any new conditions or vectors that may be contributing to this recent PD outbreak.

"The reemergence of Pierce's disease in coastal California represents a significant problem for affected areas," said Almeida. "The goal of this research project is to understand what factors are driving these new patterns. We hope to gain an understanding of what is happening to help us devise management practices."

The research proposal was endorsed by the Napa County Agricultural Commissioner's Office and the Napa County Winegrape Pest and Disease Control District.



A grape cluster on a PD infected vine showing damage to both leaves and fruit.

1220 N Street
Sacramento, CA 95814
www.cdfa.gov



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- Identifying and testing if certain *Xylella fastidiosa* (*Xf*) proteins could be used to block the vector transmission of *Xf* from plant to plant.
- A project to broaden the genetic base of Pierce's disease (PD) resistance by searching for and characterizing new forms of PD resistant genes.
- This project addresses the recent upsurge in glassy-winged sharpshooter numbers in Kern County, where reliance on a small number of insecticides may have imparted resistance to pests.

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Research Funded to Try to Discover Why an Increase in PD

- Growers around the state are reporting more PD than usual. The PD/GWSS Board moves to fund research to try to discover if there really is an increase and, if so, why it might be happening.

European Grapevine Moth Update

It's fall, and with no European grapevine moths (EGVM) found during the 2015 season, it's so far so good.

It was June of last year when the last EGVM was found anywhere in California. That was a single EGVM trapped in a Sonoma County vineyard.

EGVM (*Lobesia botrana*) was first reported in the United States in Napa County in October 2009. The moth is native to Southern Italy but is now found throughout Europe, North and West Africa, the Middle East and Eastern Russia.

In 2010 the PD/GWSS Board designated the EGVM as a threat to California's winegrapes. Besides funding EGVM research, the Board allocated money for grower outreach programs to help stop the spread of the pest in counties where the EGVM had been found.

Statewide, during the 2015 season, over 47,000 traps were deployed and inspected regularly for the EGVM.

Napa's pest detection trappers began pulling down the EGVM traps in Napa County the first part of October – all 11,683 of them! "We trap at a rate of 100 traps per square mile in ag areas and 25 traps per square mile in urban settings," said Deputy Ag Commissioner for Napa County Tracy Cleveland. "If we stay on this path and we have no finds at any point this year, we are well on our way toward eradication of the European grapevine moth."

"In Sonoma County, we have 6,267 traps deployed," said Sonoma County Agricultural Commissioner Tony Linegar. "We have approximately 900 vineyard acres in the quarantine area out of a total of 62,650 vineyard acres in Sonoma County, and if no further moths are trapped between now and the end of the second flight next year, then we will remove those 900 acres from quarantine."

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The quarantine area was reduced in some portions of the county in August of last year. If no moths are discovered through the second flight of 2016, the United States Department of Agriculture will consider lifting the EGVM quarantine from areas still under restriction in Napa and Sonoma counties and deem the pest eradicated. A post-eradication plan is being developed to address future trapping densities, the response to any new finds, and ongoing education and outreach efforts.



Just one of the nearly 12,000 EGVM traps placed in and around vineyards throughout Napa County.

PD/GWSS Board Concerned About Rising GWSS Numbers in Kern County

Since the very early days of the war on the glassy-winged sharpshooter (GWSS) in California, Kern County, particularly the General Beale area, has been on the front line.

Over the last 15 years, millions of dollars have been spent on the area-wide suppression programs to reduce GWSS numbers in the region. This investment has played a critical role in slowing the advance of both GWSS and Pierce's disease (PD) in California and, for the most part, has been very successful.

While GWSS numbers seem to be up all around the state this year, no place had seen as big an increase as Kern County. During this past spring and summer, the PD/GWSS Board was made aware that something in the area appears to have changed, with some unusual challenges in terms of suppressing GWSS populations and protecting the local grape industry from damage due to Pierce's disease.

"The increases in GWSS numbers we are seeing may be due to warmer than typical winters the past few years," said GWSS Program Director for the USDA in California Beth Stone-Smith. "But there are certainly other variables potentially impacting the situation as well."

In October, the PD/GWSS Board met in Bakersfield so Board members could see firsthand what was going on, talk to people familiar with the area and discuss what could be done to reverse the current trend in GWSS populations.

"Our discussions included talking with members of the local team, including scientists and farm advisors who are familiar with our GWSS area-wide



PD/GWSS Board and PD Task Force members (above) tour a vineyard in the Bakersfield area as part of their joint meeting held in October. (Right) Damage from PD/GWSS is evident among these plantings south of Bakersfield.



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program," said Stone-Smith. "Together we are analyzing the dynamics in the area and are working toward potential courses of action to address the GWSS population levels this fall and next spring."

Discovering what is happening in Kern County is key to reducing the impact of PD on those living with GWSS in this and other areas, and aids in mitigating the natural and artificial spread of GWSS across the region in such things as bulk citrus moving to packing houses.

On the RESEARCH FRONT



RESEARCH PD/GWSS BOARD

Blocking *Xylella fastidiosa* Transmission

Principal Investigator: Rodrigo Almeida, Dept. of Environmental Science, Policy and Management, UC Berkeley

The main goal of this project was to identify and test if *Xylella fastidiosa* (*Xf*) proteins with chitin-binding activity could be used to block the vector transmission of *Xf* from plant to plant. The work showed that a chitinase mutant strain of *Xf* was less able to colonize plants and insect vectors, identifying a new target for future research. It also identified a protein associated with the disruption of *Xf* transmission by vectors under greenhouse conditions. Several candidates of transmission-blocking molecules were tested in vitro for their transmission blocking ability. The research not only identified potential candidates but also demonstrated, under experimental greenhouse conditions, that the concept of blocking the vector transmission of *Xf* to plants is feasible.



Two GWSS on a winegrape vine in Temecula. GWSS like these are the major source of *Xf* transmission in most of Southern California.

Map-Based Identification and Positional Cloning of *Xylella fastidiosa* Resistant Genes From Known Sources of Pierce's Disease Resistance in Grapes

Principal Investigator: Andrew Walker, Dept. of Viticulture and Enology, UC Davis

A major focus of this project is to broaden the genetic base of Pierce's disease (PD) resistance by searching for and characterizing new forms of PD-resistant genes. There has been major progress in breeding PD-resistant winegrapes, and they are now approaching release to growers. The next phase of the breeding program, now under way, is to combine multiple PD-resistant genes into one plant. Aggressive pathogens and pests often overcome resistance provided by a single gene. With this in mind, our Pierce's disease breeding/genetics program is now developing DNA markers so that we can combine resistance from different genes into a single plant. Researchers have discovered more



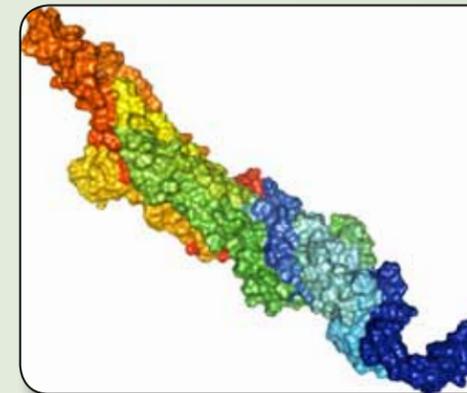
Dr. Walker at UC Davis surveys a vineyard full of PD resistant winegrape vines.

sources of strong resistance and are now mapping and developing markers to determine if these new genes control different types or forms of resistance.

Management of Insecticide Resistance in Glassy-Winged Sharpshooter Populations Using Toxicological, Biochemical and Genomic Tools

Principal Investigator: Rick Redak, Dept. of Entomology, UC Riverside

Insecticide resistance is one of the major causes of pest control failures for growers. In many cases the resistance to a principal insecticide used within an area may also confer cross-resistance to other insecticides. This project addresses the recent upsurge in glassy-winged sharpshooter numbers in Kern County, where reliance on a small number of insecticides may have imparted resistance to pests. The project will also investigate whether the level of insecticide use has led to insecticide resistance in western Riverside County (Temecula area) and in Orange County (commercial nursery industry).



A 3-D representation of one of the subunits for the nicotinic acetylcholine receptor. This is one of the places being looked at for insecticide resistance.