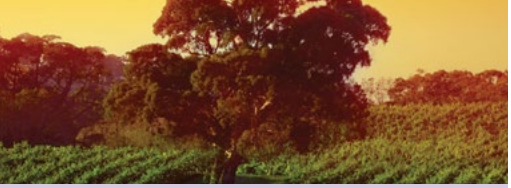


CALIFORNIA
PD/GWSS BOARD
Partnership for Winegrape Pest Solutions

SUMMER 2021

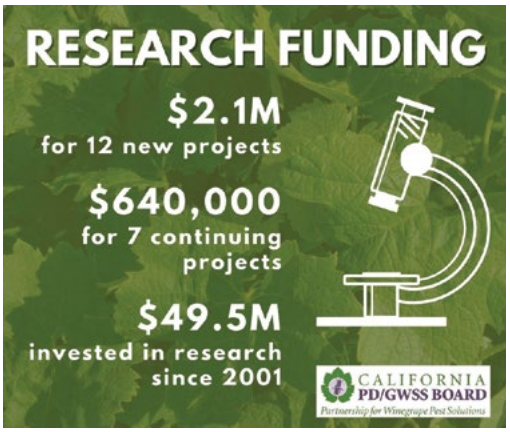
# bulletin

cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

INSIDE THIS ISSUE

# PD/GWSS Board Funds 12 New and Seven Continuing Research Projects

The Pierce's Disease/Glassy-winged Sharpshooter (PD/GWSS) Board recommended more than $2.1 million in new funding at its April meeting for 12 research projects addressing PD, grapevine viruses, and vectors over the next three years. The recommendation was approved by California Department of Food and Agriculture Secretary Karen Ross.




View a list of newly funded research projects on the next page. The funding recommendation followed a rigorous review by the Board's research screening committee and scientific review panels of the 17 proposals that were submitted in response to the Board's annual request for proposals. The next opportunity for researchers to submit proposals will open December 2021.

"We are pleased to support a growing number of high-quality projects," said Will Drayton, PD/GWSS Board vice-chair. "We hope this trend continues and would like to see even more proposals for innovative ideas and targeted research in the future."

The Board is also funding seven continuing multi-year projects that total $640,000 for fiscal year 2021-22. These include field trials to test PD-resistant plant materials and technologies, field studies on the topical delivery of promising grape-derived peptides for treatment of PD, development of gene editing technology for grapevines using plant protoplasts and investigating transgenic rootstock-mediated protection of grapevine scion against PD by dual-stacked DNA constructs.

The Board has invested over $49.5 million since 2001 in research and outreach to protect vineyards, prevent the spread of pests and diseases, and deliver practical and sustainable solutions. The consistent, reliable funding made possible by the winegrape grower assessment means that California's wine industry supports leading scientists dedicated to finding solutions to PD and other serious pests and diseases of winegrapes.

Learn more about the Board's research and outreach activities at bit.ly/3yzAuau.

# Research Projects Beginning in 2021-2022

| Topic | Title | Project Leader | Total Funding* |
|---|---|---|---|
| **Pierce's Disease/ Glassy-Winged Sharpshooter** | Modeling of *Xylella fastidiosa* transmission and grapevine susceptibility using fluid dynamic simulations | R. Almeida, UC Berkeley | $148,926 |
| | Progression of Pierce's disease symptoms and *Xylella fastidiosa* colonization of grapevines under field conditions | R. Almeida, UC Berkeley | $99,501 |
| | Systemic formulations of antibacterial nanoparticles for Pierce's disease management | L. De La Fuente, Auburn University | $104,221 |
| **Viruses** | Improved decision-making for grapevine leafroll and red blotch diseases using rapid identification tools and a regional approach to monitoring and management | M. Cooper, UCCE | $471,618 |
| | Developing an efficient DNA-free, non-transgenic genome editing methodology in grapevine | L. Deluc, Oregon State University | $50,111 |
| | Transmission biology of grapevine red blotch virus | M. Fuchs, Cornell University | $219,989 |
| | Grapevine fanleaf virus-host interactions for disease symptom development | M. Fuchs, Cornell University | $142,155 |
| | Virus-based delivery of interfering RNAs targeting grapevine leafroll-associated virus(es) | Y.-W. Kuo, UC Davis | $159,214 |
| | Investigating the impact of grapevine red blotch virus (GRBV) on grape skin cell wall metabolism and soluble pathogenesis-related proteins in relation to phenolic extractability | A. Oberholster, UC Davis | $257,142 |
| | Structure-function studies on grapevine red blotch virus to elucidate disease etiology | C. Rock, Texas Tech University | $140,725 |
| **Insects** | Genomics based technology for identification, tracking, insecticide resistance surveillance, and pest management of vine mealybug and grape mealybug in vineyards | L. Burbank, USDA-ARS | $118,756 |
| **Viruses & Insects** | Resistance to grapevine leafroll-associated virus 3 and its major mealybug vectors | M. Fuchs, Cornell University | $233,725 |

**grant durations will be one to three years*

# on the RESEARCH FRONT

CALIFORNIA PD/GWSS BOARD

*Partnership for Winegrape Pest Solutions*

Testing the RNAi effects in six different grapevine cultivars.

## Virus-based Delivery of Interfering RNAs Targeting Grapevine Leafroll-Associated Virus(es) and Associated Mealybugs

***Project leaders: Yen-Wen Kuo and Bryce Falk, UC Davis***

This project utilizes virus-based RNA interference (RNAi) strategies to develop grapevine virus-based approaches to combat Grapevine leafroll-associated viruses and the insect vector mealybugs. The team is modifying two grapevine viruses to be non-pathogenic viral vectors to deliver and enhance the RNAi efficacy in the grapevine rootstocks and scions. They are testing the RNAi effects in six grapevine cultivars and in mealybugs feeding on the rootstocks and scions. This project will provide new information and contemporary strategies to incorporate into the existing management approaches. Read more at bit.ly/2T51spZ.

## Improving Extension Outcomes: Identifying Drivers and Barriers to Adoption of Management Practices Using Leafroll and Red Blotch Disease as Model Systems

***Project leaders: Monica Cooper and Malcolm Hobbs, UC Cooperative Extension, Napa***

The team surveyed over 150 vineyard workers to assess drivers and barriers to adopting leafroll and red blotch disease management practices and usefulness of educational resources. Key factors include economic considerations, technical factors and knowledge of disease ecology, perceptions of vector incidence, and regional difference. All educational resources were seen as useful, especially vineyard observations, seminars/field days, research trials, public advisers, and newsletters. The team is currently analyzing data from in-depth interviews with over 40 vineyard workers. Read more at bit.ly/3wwcJOB.

Symptoms of grapevine red blotch disease.

Primed grapevine showing fewer blocked vessels and lower PD symptoms.

## Characterization of the Lipopolysaccharide-mediated Response to *Xylella fastidiosa (Xf)* Infection in Grapevine

***Project leaders: Caroline Roper, UC Riverside and Dario Cantu, UC Davis***

One method a plant uses to protect itself from disease is defense priming, its "memory" to quickly recognize pathogens and activate a strong immune response for disease resistance or tolerance. *Xf* uses its LPS molecule to shield itself from being recognized by the grapevine immune system. The team is working on isolating *Xf*'s LPS molecule in order to inject it directly into the plant like a vaccine to ultimately create grapevines resistant to Pierce's disease.
Read more at bit.ly/3ff1Qe7.

The CDFA PD/GWSS Board partners with other organizations to leverage funding for research and outreach projects. Funding partners include the American Vineyard Foundation, the Consolidated Central Valley Table Grape Pest and Disease Control District, the USDA Agricultural Research Service, and other organizations.

# Practical Tips for Managing Grapevine Red Blotch Virus

Research teams funded by the PD/GWSS Board are diligently building understanding of how grapevine red blotch virus (GRBV) spreads and affects grapevines. The goal is to deliver effective disease detection, resistance, and management strategies to winegrape growers.

Disease management relies on accurate detection of the virus, eliminating the virus from foundational stocks, planting only clean, virus-tested material, and removing infected vines. Virus reduction in winegrowing regions is most effective when growers work together using area-wide approaches, in addition to managing conditions in their own vineyards.

GRBV causes substantial losses to the winegrape industry, and there is no cure for infected vines. The virus spreads by grafting and by the three-cornered alfalfa hopper. Red blotch-infected vineyards are found across the U.S., indicating infected planting material is the major source of the virus. The disease causes red or chlorotic blotches on leaves of red- and white-berried vines, delayed fruit ripening and reduced fruit quality.

One key management strategy is using certified planting material when starting new vineyards or replacing diseased vines. After GRBV was identified in 2011, Foundation Plant Services (FPS), the source of planting material for all California nurseries, found infected vines in one of its vineyards. The research team at FPS is monitoring the virus' spread and vineyard insect populations to keep its material clean for nurseries and provide valuable information for other researchers.

Although important, starting with clean planting material will not guarantee that the virus will not enter most vineyards at some point and then be spread by the three-cornered alfalfa hopper. A Cornell University research team, led by Marc Fuchs and Keith Perry, have created an accurate, inexpensive, and user-friendly GRBV diagnostic tool (LAMP assay) for on-site testing. Rapid, on-site testing can aid growers' visual assessment of symptoms, selection of vines for further testing and with management decisions for vine replacement.
In vineyards with less than 30 percent of plants infected, they recommend removing infected vines. If the infection rate climbs above 30 percent, they recommend removing the entire vineyard.

There is no cure for GRBV currently but creating virus-resistant vines could be possible. A Texas Tech University research team, led by Chris Rock and Sunitha Sukemaran, is looking at how GRBV causes disease in grapevines at the molecular level to develop grapevines resistant to the virus through engineering or breeding.