

**2007 Pierce's Disease Research Symposium**  
**Vineyard View**  
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The seventh Pierce's Disease Research Symposium was convened by the California Department of Food and Agriculture (CDFA) in San Diego from December 12 – 14. The symposium has two main purposes. One is to provide an opportunity for the wine industry to hear scientists report on the progress being made on their research into finding a control for Pierce's Disease (PD). The second and probably the more important one, is to give scientists working on this important problem the opportunity to network, brainstorm, and figure out better ways to cooperate. It is very important for California growers and wineries to keep up to date on the progress of the program because it is their money that is paying for the research through the California Statewide Winegrape Assessment Program.

CDFA continually reassesses the format of the symposium to provide as useful a meeting as possible. This year the presenters were a combination of researchers being funded by the winegrape assessment as well as others working in related areas around the US that could be of value to work being done in the PD Research Program. The poster session held concurrently with the talks briefly summarized the results of all the current research and the scientists doing the work were available to discuss the work and answer any questions. One new feature of the symposium was a series of round table discussions where researchers and other conference attendees brain-stormed about a specified topic.

*Opening Session*

The first session of the symposium was dedicated to presentations on general but important program matters. The first two summarized a report from a Research Scientific Advisory Panel that CDFA convened to review the progress of the PD/GWSS Research Program since the National Academy of Sciences (NAS) reviewed the program in 2004. If you think the two reviews are pretty close together you are not the only one. Bob Wynn, CDFA PD Control Program Director, commented in his opening remarks that the PD Research Program is the most scrutinized program with which he has been associated in his career. The California wine industry should feel confident that CDFA, and the PD Board that oversees the assessment-generated research fund, are watching very carefully how the money is spent.

Dr. Nancy Irelan, Red Tail Ridge Winery New York, who was contracted by CDFA in 2007 to convene and oversee the review panel, and Dr. Roger Innes, from Indiana University and Chair of the Advisory Panel, gave a brief overview of the final report of the panel. I will make a few comments here. A copy of the complete report can be found at: [www.cdfa.ca.gov/pdcp/Documents/RSAP\\_Final\\_Report\\_08302007.pdf](http://www.cdfa.ca.gov/pdcp/Documents/RSAP_Final_Report_08302007.pdf). It is well written and I recommend you download this report if you want to get a detailed idea of the state of the PD Research Program and recommendations on what should be done next.

Over \$11 million dollars of industry money has been spent on Pierce's Disease/Glassy-winged sharpshooter (PD/GWSS) research since 2001. The assessment program sunsets in 2011, so only three years of funding remain in the current cycle. The goals of the review were to: assess research program progress against stated goals and recommendations made by prior program reviews; do a research gap analyses and strategic planning for the remaining three years of the program; enhance the objectivity and transparency of the research assessment and funding recommendation process, and broaden the technical perspective of the program. The review panel members were selected based on their research and innovation track record and international reputation within their field of expertise. To avoid any potential conflicts of interest, panel members could not have received any funding for research from the PD Research Program.

The final report presented a summary of how much research is being done in the seven priority areas defined by the CDFA PD/GWSS Board (host resistance via traditional breeding and transgenics, biological control of *Xylella fastidiosa* (*Xf*), understanding transmission of the disease, biological control of GWSS, Monitoring GWSS population densities and dispersal, Monitoring *X. fastidiosa*, and Other). The two research areas with the largest number of projects are promotion of GWSS natural enemies and pathogenicity of *Xf*.

The panel also looked for important areas of work that were being neglected. The most surprising lack of research effort identified was the absence of projects focused on the NAS-recommended areas related to economic studies of PD/GWSS and PD/GWSS control measures. These areas will be stressed in the next call for proposals for new research that is currently underway. The report then went on to summarize where significant progress has been made since 2004, such as identification of *Xf* factors that mediate virulence in grape vines, potential for using transgenic rootstocks resistant to PD, insecticidal-based control of GWSS, and breeding for PD resistance and mapping resistant genes.

The report ended by listing a series of research areas that should be targeted for further funding based on the ones that held the most promise for development of effective PD control strategies, some of which are being worked on now. Some of these are assessment of PD resistance in existing commercial grape varieties, use of a *Xf* signal factor to disrupt *Xf* colonization in the vine, production of GWSS parasitoids, interaction of *Xf* with GWSS, and economic analysis of the impact of PD/GWSS in agriculture.

### *Research Presentations*

One presentation I found particularly interesting was given by Dr. Barry Hill, CDFA. He reported that the wine industry in Temecula is booming. Remember this is the region where PD/GWSS killed over one third of the vines in the late 1990's and set into motion the process that evolved into the CDFA PD Control Program. Amazingly, Dr. Hill reported there are more vineyard acres and wineries present now than before the problem began. How is this possible? It is being accomplished by applying the systemic

insecticide Admire<sup>®</sup> through vineyard drip irrigation systems at the critical time of year when vine to vine transmission of PD by GWSS occurs.

History has often shown that diseases vectored by insects cannot be effectively managed because the vector cannot be controlled to a low enough level to stop significant disease transmission. It was thought that the same would be true for PD/GWSS. However, the Temecula growers have demonstrated it is possible to manage PD in the presence of GWSS. Work by Drs. Toscano, Byrne (UC Riverside), Hill, and others have shown that not only does Admire kill GWSS it also has a repellent effect which in combination reduces feeding to such a level that significant PD transmission does not occur. Before any reader closes this magazine concluding the PD/GWSS situation has been solved, it is important to acknowledge Dr. Hill's critical observation that this is an insecticidal solution to the PD/GWSS problem and can only be considered short term. History has shown that pest problems managed strictly by pesticides alone eventually become problems again due to pesticide resistance and other environmental factors.

In the vector biology and ecology session of the symposium Dr. Joao Lopes from Brazil made a presentation on the current situation with managing Citrus Variegated Chlorosis (CVS), a devastating disease of citrus in his country. This disease has a lot of similarities to PD in California because it is also caused by a strain of *Xf* and is vectored by whole suite of sharpshooters in Brazil. When the disease first appeared in 1987 some thought it spelled the end of the citrus industry but through a great deal of research, as well as experimentation by growers, the disease is currently managed by vector control, reducing inoculum in the orchards through prompt removal of diseased trees, and use of healthy and clean nursery stock. He concluded that the long-term management of CVC will involve a suite of control strategies, which I think provides us insight to the long-term management of PD/GWSS in California.

A presentation by Dr. Tom Burr, Cornell University, helped me realize the challenge we are up against when it comes to figuring out how to manage PD. He reported that at least 50 genes are related to the formation and function of structures on the outside of individual *Xf* cells called pili. Researchers feel that pili play a critical role in how *Xf* move through the grape vine and also in the role of colony production, which ends up affecting water flow in the vine. Understanding how pili form and behave could have important implications for PD control. However, the cell regulation of how pili form and function is very complex and is a challenge to figure out.

On the other hand, work being done by Dr. John Labavitch at UC Davis has shown that sometimes the genetics can be simple. His research group discovered an enzyme produced by *Xf* that breaks down the pit membrane in vine xylem vessels allowing it to spread. He has shown that a single gene is responsible for this enzyme and that PD is reduced when you 'knock out' this gene. He also identified a plant protein that may interfere with this enzyme. He has hypothesized that if a grape rootstock is genetically modified to produce this protein and transport it to the scion it might be possible to prevent PD. This has been done in pear, providing proof of concept for this idea.

One area of research is past the proof of concept stage and may be ready for field trials. Dr. Steve Lindow, UC Berkeley, and others, have identified a molecule released by *Xf* that acts as a signal, playing a role in colony formation in the vine. Studies have shown that colonies do not form to the degree to which they plug up the vine xylem vessels if this signal is disrupted. They also identified a chemical that disrupts this signal and it is thought that if it is sprayed on the vine and absorbed it may prevent the development of PD. A field trial is now being contemplated. At this point I should point out that there are still two schools of thought as to how *Xf* causes PD. One says that it happens through *Xf* colonies plugging xylem vessels disrupting water conduction. The other says *Xf* somehow triggers vine cells to die through a process called programmed cell death.

I thought the round table discussions were interesting and may stimulate cooperation among research and possibly new research projects. For example, at the discussion I attended I found out that Dr. Don Hopkins, from the University of Florida, many years ago found a non-virulent strain of *Xf* that when inoculated into a grape vine has prevented the development of PD in these vines for 10 years. Researchers at the table laid plans as to how a trial using this strain could be done in California.

I will conclude with a notable observation and an important question Dr. Innes, head of the Research Advisory Panel, made in his presentation that highlight the challenges ahead. First, he pointed out that the bulk of the research projects currently underway are more than five years away from providing on the ground solutions to the PD/GWSS problem. He then asked the rhetorical question ‘will the solutions proposed from the research be economically and/or politically feasible?’ For example, during the question and answer period one attendee observed that in his opinion, much of the research being done will not be useable due to non-scientific issues. What he was being referring to is the fact that most scientists have concluded that long term management of PD will rely on genetic manipulation of the grape vine, *Xf*, and/or some other bacteria. However, it is felt that the organic community and many consumers will not accept this management approach. No one said the solution to the PD problem will be easy and experience is bearing this out.

Some of the presentations made at the symposium can be viewed at [http://www.cdfa.ca.gov/pdcp/2007\\_Research\\_Symposium\\_Presentations.html](http://www.cdfa.ca.gov/pdcp/2007_Research_Symposium_Presentations.html). A copy of the symposium proceedings, which contains brief summaries of all the currently funded research projects, can be found at [http://www.cdfa.ca.gov/pdcp/2007\\_Research\\_Proceedings.html](http://www.cdfa.ca.gov/pdcp/2007_Research_Proceedings.html).