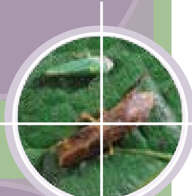
cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

PD/GWSS BOARD RESEARCH bulletin

SPRING 2007

What's Inside?



It Was Cold – But Was It Cold Enough?

This past winter was one of the coldest in California since well before the glassy-winged sharpshooter (GWSS) started invading California's vineyards. But as bud break begins, many are starting to wonder, "Was it cold enough to have an effect on the mortality of GWSS?"

Dr. Marshall Johnson, an entomologist with the University of California-Riverside, who's stationed at the UC Kearney Agricultural Center, says the answer depends not so much on how cold it got but on how warm the days were. "According to our studies, the GWSS can withstand extremely low temperatures for short periods of time," he said. "What is more important to their survival is how high the temperature gets during the day."

Johnson explains that at temperatures below 50 degrees GWSS are unable to ingest and process food. "In one test group of GWSS, it took 20 days with the temperature never climbing above 50 degrees for the cold to be 100 percent fatal to the GWSS," he said. "In other test groups, where the temperature climbed above 50 degrees even for a short time, GWSS survived."

Dr. David Morgan, a program supervisor with CDFA, reported that he has seen greatly reduced GWSS numbers. "Prior to the freeze in Ventura we were collecting 1,000 GWSS per person per hour using nets. After the freeze we went out on Feb. 8 and only collected 100 GWSS per person per hour." Morgan does acknowledge that the reduced numbers may not be a direct result of cold weather but could also be due to GWSS moving to different plants in the area of collection.

"If resources for GWSS management dwindle, government agencies will be forced to make decisions on which regions should receive area-wide treatment to suppress GWSS populations," said Marshall. "Our studies show that the presence of GWSS may vary with the severity of local winter temperatures. An annual estimation of overwintering GWSS survival will provide insight into where resources for GWSS suppression could be most effectively allocated."

Focus

Dr. Andy Walker at UC Davis is developing winegrape vines that are resistant to Pierce's disease. Recently, Walker talked about his ongoing research.

How long have you been working on PD-resistant winegrape vines?

I have been breeding PD-resistant grapes since 1997. PD-resistant winegrape breeding efforts were intensified in 2004 when the CDFA PD/GWSS Board asked us to switch our primary emphasis from table and raisin grapes to winegrapes.

Our rapid progress has been the result of advances made by my other PD project on the genetics of resistance to PD and our ability to find DNA markers that are closely linked with PD resistance. We use these markers to screen many of the progeny, which allows us to grow twice as many seedlings and then only plant resistant ones in the field for fruit evaluation.

In simple terms, how do you do it?

Our genetics project discovered PD resistance that is controlled by a single dominant gene. When we use traditional breeding methods to cross it with any *vinifera*, half of the progeny are resistant.

The first generation is 50 percent high quality *vinifera* genes, the next 75 percent, the third 87 percent and the fourth 94 percent. We have fruiting vines this year that are 87 percent high quality *vinifera* and PD resistant, and we will be planting seedlings that are 94 percent *vinifera*.

What grape varietals are you working with?

Last year we made crosses with Alicante Bouschet, Cabernet Sauvignon, Carignane, Chardonnay, Chenin blanc, Colombard, Sauvignon blanc, Symphony, Syrah, Tannat and Tempranillo. The year before we crossed to Airen, Alicante Bouschet, Barbera, Cabernet Sauvignon, Chardonnay, Cabernet franc, Syrah, Viognier and Zinfandel. We tried to select internationally recognized varieties as parents as well as those with unique color, tannin and flavor profiles.

I understand that you worked out a way to cut down the time needed for the breeding process. How did you do that and how much time has it saved?

We use the genetic markers to screen seeds as soon as they sprout and have been able to force seedlings to bloom in their second year by aggressively growing and training them. The biggest advantage is having the markers for our unique single-dominant gene PD-resistant source since 50 percent of the progeny are resistant and we can backcross to *vinifera* and generate large numbers of resistant progeny.

The standard breeding cycle from seed to seed is five to six years. We have reduced that to three years and have generated far more resistant progeny which allows us to select for the best combination of resistance, and fruit and wine quality.

Dr. Alan Tenscher, assistant grape breeder at UC Davis and a part of Dr. Andy Walker's team, inoculates a new grape vine with PD to check its resistance.

Do you have any estimate on how much your research has cost to get you to this point?

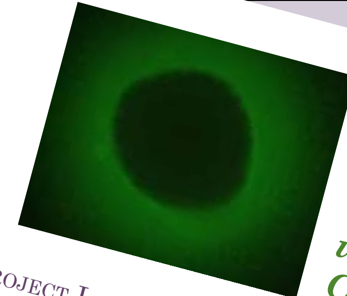
It's a bit hard to figure. The program began on a limited scale in 1998 as part of the American Vineyard Foundation's long-range collaborative project. I received about $70 to $85K per year then. By 2001 we were breeding PD-resistant table grapes in a collaborative project with David Ramming and were each getting about $80K per year; the genetics program was getting about $100K per year in those days. By 2004 we had been redirected to winegrape breeding and were getting about $140K for genetics and $140K for breeding each year. I guess it depends on which project and when... but it's all intertwined.

How far along are you to having a winegrape vine that growers can use?

We will evaluate the fruit and wine of PD-resistant 87 percent *vinifera* selections this fall. I hope to release the best of these to the industry for use in PD hot spots within a couple of years. We will have 94 percent *vinifera* PD resistant selections for fruit evaluation the following year and wines the year after that. Selections within these progeny should have very high quality, *vinifera*-like fruit.

At the same time, we have been breeding powdery mildew-resistant winegrapes so that we can combine PD and mildew resistance with excellent wine quality and further broaden the appeal and use of these resistant grapes.

On The Research Front



Management of Pierce's Disease in Grapevines by Interfering with Cell-to-Cell Communication by Xylella Fastidiosa

Project Leader: Steven E. Lindow, University of California, Berkeley, in cooperation with Subhadeep Chatterjee, University of California, Berkeley and Alexander Purcell, University of California, Berkeley

This project looked at the effect a particular bacteria had on *Xylella fastidiosa's (Xf)* cell-to-cell communication. Introducing certain strains of bacteria into Pierce's disease-infected vines disrupts cellular communication. The disruption reduces the movement of *Xf* within plants and the likelihood of disease transmission by sharpshooters. The team found a simple topical application of this bacteria to be quite effective and practical for commercial use.

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Laboratory and Field Evaluations of Neonicotinoid Insecticides Against the Glassy-Winged Sharpshooter

Project Leaders: Nick Toscano and Frank Byrne, University of California, Riverside, with cooperation from Carmen Gispert, UC Cooperative Extension, Riverside, and Ben Drake, Drake Enterprises

Imidacloprid is still the most common neonicotinoid insecticide used to suppress glassy-winged sharpshooter populations in vineyards and citrus orchards. Several new formulations of the insecticide have been introduced within the last year. The team compared the performance of Bayer CropScience's original Admire 2F formulation with its replacement, Admire Pro. According to the results, if growers follow application guidelines, using the new generic formulations will provide them with continued success in their efforts at managing the glassy-winged sharpshooter.

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Host Plant Preference and Natural Infectivity of Insect Vectors on Common Weeds Known to Host Xylella Fastidiosa

Project Leader: Kent M. Daane, University of California, Berkeley
Cooperators: Rodrigo Almeida, University of California, Berkeley, and Jennifer Hashim-Buckey, UC Extension, Kern County
Researchers: Christina Wistrom, Murray Pryor and Glenn Yokota, University of California, Berkeley

Common weed species are known to host *Xylella fastidiosa (Xf)* and sharpshooters, so should weed control be part of a Pierce's disease-control program? By monitoring sharpshooter populations on host plants in the southern San Joaquin Valley over the next year, the team can evaluate the importance of vegetation management in reducing the incidence of Pierce's disease. At the conclusion of the project, the team hopes to provide concrete recommendations to growers about the need for vegetation modification or removal in and around vineyards.

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New PD/GWSS Board Chair
Ben Drake

Ben Drake, a Temecula-area winegrape grower, has been selected to chair the 15-member PD/GWSS Board charged with advising the secretary of the CDFA on the use of the funds collected under the statewide PD/GWSS winegrape assessment. Also selected were Herb Schmidt of Silverado Vineyards in Napa as vice chairperson and Jim Unti of Canandaigua Wine Company in Madera as treasurer.

Drake, a former winery owner and long-time winegrape grower from Temecula, was one of the first winegrape growers in California to recognize the threat the GWSS posed to California's wine industry and was a driving force behind the creation of the Board.

"I think one of the biggest milestones resulting from the Board's work has been the recognition of the PD/GWSS threat to other commodities like citrus," said Drake. "And Board-funded research into beneficials (parasitic wasps), insecticides and other tools for our tool box has helped us stay in business here in Temecula. But we can't keep relying on these, so it's important that we figure out a permanent and sustainable solution to the PD/GWSS threat."

The Board is made up of growers and grower processors from California's major winegrape growing regions and is responsible for making program and research funding recommendations to the CDFA. Pierce's disease has no known cure and, if left unchecked, could be devastating to the grape industry and several other California crops.

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