Year-end progress report for CDFA contract number 09-0782.

Title: Field trial for resistance to Pierce's disease

Principal Investigator:	**Co-PI:**	**Cooperator:**
Thomas Miller	Matt Daugherty	Peggy A. Mauk
Department of Entomology	Department of Entomology	Agricultural Operations
UC Riverside	UC Riverside	UC Riverside
Riverside, CA 92521	Riverside, CA 92521	Riverside, CA 92521
thomas.miller@ucr.edu	matt.daugherty@ucr.edu	peggy.mauk@ucr.edu

Reporting Period: The results reported here are from work conducted from Spring 2010 to March 2013.

Introduction.
This project was designed to monitor and care for field plots of genetically modified grapevines being tested for resistance to Pierce's disease. There is no funding for research, but we were fortunate to have an undergraduate student, Candice Sanscartier, take an interest in monitoring the insect populations trapped in the experimental vineyards and analyzing them for presence of pathogen. Candice won undergraduate research grants from the UC Riverside campus to support her work and presented results at undergraduate research conferences during the 2011-2012 academic year. She is writing up the 3 year results for a publication now with statistical analysis provided by Matt Daugherty.

Objective and activities to achieve objectives.
A major focus of Pierce's disease management includes development of grapevine varieties that are less susceptible to *Xylella fastidiosa*. We are providing support for field trials of newly developed grapevine varieties that show promising reductions in Pierce's disease severity. The field trials are intended to duplicate a commercial operation to determine how grapevines will fare in the presence of pressure from the sharpshooter leafhopper vectors that transmit the pathogen causing Pierce's disease. The specific objectives of the project are as follows:

1. Prepare the vineyard. Rogue out existing plants and build trellises as needed.
2. Transplant test grapevines to the experimental vineyard.
3. Maintain the grapevines in a manner similar to that done by commercial vineyards.
4. Monitor for pests and diseases (a separate objective not specifically funded on this project).
5. Dispose of plants at the end of trials according to PIPRA protocols.

Results.
The project was initiated in the spring of 2010, which included the first phase of planting. Since that time agricultural operations has continued to maintain the research plots, which has included irrigation, pruning and training vines on the trellises, removal of flowers to meet compliance requirements, and occasional fertilization and fungicide application to control powdery mildew. Moreover, we have regularly inspected vines in the research plot to evaluate insect pest abundance and evidence of plant disease as a separate project.

Peggy Mauk, head of Ag Operations at UC Riverside, planted barley between the rows of trellises to help retain moisture, nutrients and keep weeds down starting in 2011. The practice seems to have decreased the weed load that normally occurs in these fields in Spring and Summer. The barley was planted during Spring of 2012 and remained through July 2012.

Candice Sanscartier monitored the presence of GWSS using yellow sticky traps and counted egg masses by vine and did Q-PCR analysis of the captured GWSS for *Xylella* strain. The main seasonal peak of GWSS as caught on yellow sticky traps in the experimental vineyards usually starts at the end of June, peaks in July and tails off in October. GWSS insects visiting the experimental vineyard in field 9F were carrying the pathogen causing Pierce's disease (PD) in susceptible plants. A few of the control plants in the Dandekar vineyard showed symptoms early on.

All of this confirms that field 9F in UCR Agricultural Operations is under intense pressure from insects transmitting the *Xylella fastidiosa* pathogen causing PD in susceptible grapevine varieties. By random sampling at least half of the insects tested were carrying the pathogen from July to November, 2010. We expect this is normal.

The grapevines in the experimental vineyards were pruned in winter 2011-2012. The spring shoots were trained to one trellis wire in the Dandekar vineyard to the west and two wires in the vineyards to the east. All grapevines were fertilized in June/July 2012 with 15:15:15 potassium, phosphorus and nitrogen.

Photographs of the Dandekar vineyard were requested March 2013 for their own report. These were emailed a day later.

Publications or presentations
Sanscartier, C. A., A. K. Arora, G. M. Tulgetske and T. A. Miller. (2012) Glassy-winged sharpshooter population survey and *Xylella fastidiosa* detection. UCR Undergraduate Research Journal 6: 31-36.

Sixth Annual Symposium for Undergraduate Research, Scholarship and Creative Activity May 3 & 4, 2012, Highlander Union Building room 302. Poster presentation by Candice Sanscartier giving highlights of research reported in the publication above.

Research relevance
This project is providing support for a field trial of novel grapevine varieties that show promising reductions in their susceptibility to Pierce's disease. Over the past year Agricultural Operations continued to maintain grapevines, within the initial planting at UC Riverside's Citrus Research Center and Agricultural Experiment Station. Since April 2011 we began similar maintenance and monitoring in the second planting at the site. Ultimately the sharpshooter and disease monitoring information is important for determining whether research plants are exposed to *Xylella fastidiosa*, which is a requirement for adequately testing these novel grapevine varieties.

Layperson summary of project accomplishments.
Experimental genetically altered grapevines containing resistance to Pierce's disease appear to be thriving through two seasons in the face of intense pressure from vector insects carrying the disease pathogen. All control grapevines not containing resistance factors showed signs of Pierce's disease.

Status of funds.
All unexpended funds were returned to CDFA; the amount was around $21,000.
CDFA requested that a proposal be submitted to continue monitoring these vineyards for an additional year. The proposal was accepted and a new fund number with new end date established. The agency award number was 12-0468-SA. The amount was $6,500.00. Effective dates were 02/01/2013 to 12/31/2014.

Intellectual property issues.
N/A