

## Highlights and Impacts of April 2005 – March 2006 Projects Funded by the Texas Pierce’s Disease Research and Education Project

Project Investigator’s Name: Dr. Lisa Morano

Project Title: Evaluating hybrids and native vegetation in PD hot zone; Genetic diversity of *Xylella fastidiosa* strains in Texas

Significant Accomplishment	Impact on Texas Pierce’s Disease Management
<p>1. Completion of study of Pierce’s Disease in a Gulf Coast hybrid vineyard. Collected data on viticultural parameters and bacterial load in hybrids Cynthiana, Black Spanish and Blanc du Bois. Data was taken both temporally and spatially across vineyard using 3 techniques including ELISA, PCR and indirect immunofluorescence. Vineyard data was combined with positive plant reservoirs and insect vectors in the area.</p>	<p>There were several important findings of this study. First, under high disease pressure hybrid varieties can become infected with <i>X. fastidiosa</i> suggesting they have a mechanism of bacterial tolerance rather than complete resistance. Black Spanish and Blanc du Bois appear to have very low bacterial levels and no loss of yield or vigor over time suggesting they are excellent options in areas of high PD pressure. At this particular vineyard the variety Cynthiana harbors very high bacterial levels and has yields which have been declining. Several native plants including Yaupon holly were shown to be reservoirs for <i>X. fastidiosa</i> and there are at least two different insect vectors positive for <i>X. fastidiosa</i> in this area.</p>
<p>2. A new sensor designed by AnzenBio for field testing <i>X. fastidiosa</i> was evaluated. The sensor was shown to be easier and faster than standard ELISA. However, when our lab ran a series of dilutions using standard ELISA and the AnzenBio sensor, standard ELSIA was more sensitive.</p>	<p>Evaluation of all new detection methodologies is very important for both the researchers and growers in Texas. Currently, this new methodology is less sensitive than ELISA, but we are working with the company as they try to improve their sensors. They are also working on a mixture which may improve PCR sensitivity of signal from insect vectors which has been a problem due to digestive enzymes inhibiting the PCR reactions.</p>
<p>3. We have collected almost 20 strains from other scientists in the PD group. This number is likely to grow this quarter as bacteria are easiest to extract in fall. The gyraseB gene has been sequenced for almost all strains. Using gyraseB information we have been able to categorize most the Texas strains as either a grape group or a mulberry/weed group. For the most part the grape group come from infected grapes and the weed strains have come from infected weeds and trees. One strain from a grape has come back mulberry/weed suggesting strains in weeds may be able to jump to vines.</p>	<p>Categorization of strains from infected vines and surrounding areas will allow us to understand the epidemiology of PD. This will help us evaluate the most likely plant reservoirs around vineyards. When combined with the work of Mark Black, we will be able to give growers information about which surrounding plants are most critical to remove.</p>

4. In addition to sequencing the gyraseB gene of *X. fastidiosa* strains we have begun a characterization of the strains using DNA fingerprinting with the use of small sequence repeats in the *X. fastidiosa* genome. Using this technique we have been able to identify several different grape strains, several different weed strains and determine which of our strains may be most closely related.

Relatedness of strains will be critical for creating a phylogenetic tree of strains in Texas. If this data is compared to tree data in other states we may be able to hypothesize the origins of *X. fastidiosa* within N. America. Locations of highest diversity of strains in Texas may also suggest locations best suited for finding effective parasitoids.

Source and Amount of Funds Leveraging Current Pierce's Disease Project:

1. 2005 Minority Science and Engineering Improvement Program Grant from the Department of Education. This grant is \$300,000 for 3 years. Some of this money can be used to fund undergraduates working on PD research during the summers. This grant has no significant supply money.
2. I wrote a CDFA grant in spring 2005, but it was not funded.
- 3.

Publications/Presentations Documenting Research/Education Outputs (please provide full citations for publications; and the title, audience, location, and date of each presentation):

1. Invited seminar. Title: Unraveling the ecology and epidemiology of Pierce's disease in grapevines. Department of Biological Sciences, Sam Houston University, Huntsville, Texas. March 24, 2005, faculty and graduate students in attendance.
2. Published abstract. Morano, L. 2005. Pierce's disease in Texas: Evaluating a PD hot zone, investigating insect frequencies, and *Xylella fastidiosa* genetics. Abstr. ASEV 56<sup>th</sup> Ann. Meet. June 20-24.
3. Published abstract. Jaimes, J., I. Lauziere and L. Morano. 2005. Comparison of three potential insect vectors of Pierce's Disease across eight Texas vineyards. Abstr. ASEV 56<sup>th</sup> Ann. Meet. June 20-24.
4. Published abstract. Buzombo, P. and L. Morano. 2005. Strain differences in *Xylella fastidiosa* observed using indirect immunofluorescence. Abstr. ASEV 56<sup>th</sup> Ann. Meet. June 20-24.

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