Final Progress Report due April 14

USDA APHIS – Texas Pierce's Disease Research and Education Program

Title of project: Entomology Research on Pierce's Disease of Grape in Texas.

Principal investigator: Isabelle Lauzière

Major accomplishments to date (April 1, 2005 through March 31, 2006):

In collaboration with F. Mitchell and APHIS, the survey activities for putative insect vectors were expanded to include an additional 17 locations across the state to the existing 28 locations in Central Texas. Insect identification and counts are yielding crucial information about the identity and distribution of a number of xylem fluid feeding Hemiptera, including 2 new species added in March to our previous total of 20 putative vectors. Observations of the reproductive biologies of select leafhoppers and spittlebugs from field collected materials (traps) as well as direct observation is underway with interesting results so far. To date near 800 female specimens have been processed for *H. coagulata* alone.

Preliminary observations for biocontrol agents of major Hemiptera (during the summer 2005) resulted in the identification of several parasitoid species (posted on the A&M PD website). Complementary observations were initiated early in 2006 based on newly acquired information related to the onset of oviposition in *H. coagulata* females obtained from the study described above. A much more detailed data set will be available this fall. While observations can be more easily conducted near our location (in Gillespie County), other observations at other locations would be of interest but an expansion of the search area would require personnel not currently available at this duty station.

In collaboration with F. Mitchell and B. Bextine a study was initiated for the characterization of the presence of *X. fastidiosa* and its frequency of occurrence in select xylem fluid feeding Hemiptera by techniques of molecular genetics. The bacterial pathotypes are also being investigated to better understand this grape disease. This process is time consuming (both extracting insects from traps and processing these by PCR) and costly. Less than 100 specimens have been processed thus far.

The re-establishment of insect colonies is proceeding with fairly good success so far and tremendous collection efforts of biological materials occurred during the first quarter of 2006. Several generations of *H. coagulata* have been produced in captivity this year and numbers are being increased in order to support summer and fall research activities.

Goals achieved:

In Central Texas (28 locations), we've acquired critical knowledge about the xylem fluid feeding insects potentially involved in carrying Pierce's disease, their diversity and respective abundance throughout the year. The main candidates, 3 species, were characterized through this intensive study and include the glassy-winged sharpshooter, our only confirmed vector to date. Trapping activities were expanded to over 45 locations statewide last summer. Species identification and insect counts are now being acquired and will be compared to the 2004-2005 data from the initial

survey area.

DNA from insects retrieved from traps is now being processed to assess percent contamination by *X. fastidiosa* and bacterial strains involved. Only then will we determine which insect species truly vectors the grape disease. However, tests will be needed to also assess efficacy of transmission. These are planned for 2006-07.

We are also using some of the insects captured on traps to carry out other types of observations such as an evaluation of the reproductive maturity of females of select species, and are progressing well.

The information acquired to date can already be used in establishing chemical control strategies while we obtain more indepth data that is critical in developing long term insect and disease management strategies.

Relevance to the USDA APHIS – Texas Pierce's Disease Research and Education Program:

Our studies help understanding the ecology and epidemiology of the disease, and characterizing the presence of *X. fastidiosa* and its pathotypes in insects captured at multiple locations. This research is the basis to developing effective and timely management strategies for Pierce's disease.

We are also preparing to study the vectoring capability of some of the vectors. This will provide critical information in understanding which of the insect species are more efficient in transmitting the disease organism. Disease acquisition times during feeding episodes are important to understand. This information, coupled with *X. fastidiosa* titer development in host plants and insects will fine tune management strategies.

Publications submitted/published; presentations/posters presented at national technical meetings/conferences:

Lauzière, I. and Elzen, G. 2006. Effect of 11 formulated insecticides on *H. coagulata* Say (Hemiptera: Cicadellidae) and its parasitoids *G. ashmeadi* Girault (Hymenoptera: Mymaridae). Journal of Entomological Science (submitted).

Lauzière, I., Sheather, S. and Mitchell, F. 2006. Diversity and seasonal abundance of xylem fluid feeding Hemiptera in vineyards of Central Texas and their surrounding habitats. Annals of the ESA (to be submitted April-May 2006).

Lauzière, I. 2005. First steps in understanding the world of xylem feeding leafhoppers in Central Texas. Texas Pierce's disease research conference. Stonewall. February 2005.

Lauzière, I. 2005. Preliminary studies on the biology of *Gonatocerus* (Hymenoptera: Mymaridae) parasitoids for biological control of the glassy-winged sharpshooter (Hemiptera: Cicadellidae. IOBC-NRS symposium. Magog. May 2005.

Lauzière, I. Mitchell, F. and B. Bextine. 2005. Xylem sap feeding Hemiptera of the Edwards Plateau, Texas: identification, abundance, seasonality, and disease vectoring potential. California Department of Agriculture Pierce's Disease Research Symposium. San Diego. December 2005.

Lauzière, I. 2005. Abundance and seasonality of xylem feeding leafhoppers in vineyards of the Edwards Plateau, Texas. Meetings of the Entomological Society of America. Fort Lauderdale. December 2005.

Lauzière, I. and Hassell, A. 2006. Exploration for leafhoppers yields a broad array of parasitoid species in Central Texas. Meeting of the Southwestern Branch of the Entomological Society of America. Austin. February 2006. Also posted at http://piercesdisease.tamu.edu/research/reports/

McDonald, D., **Lauzière, I.** and Mitchell, F. 2006. Statewide distribution and abundance of putative insect vectors of Pierce's disease of grape. Meeting of the Southwestern Branch of the Entomological Society of America. Austin. February 2006. Also posted at http://piercesdisease.tamu.edu/research/reports/

Online documentation (http://piercesdisease.tamu.edu) on full taxonomical identification, picture library for identification of 19 leafhoppers collected in Central Texas, and their respective importance. July 2005.

Mitchell, F., **Lauzière, I.** and B. Bextine. Insect vectors of Pierce's disease in Texas. PD feature. January 2006.

Signature: Date: April 13, 2006

If prepared by someone other than the Principal Investigator, please provide name and contact information: