Texas Cooperative Extension

TEXAS PD NOTES

JANUARY 15, 2006 VOLUME 2, ISSUE 1

Winter Temps

In areas prone to Pierce's disease, growers commonly wish for a cold winter to assist with eradicating late season Pierce's disease infections.

The winter of 2005/2006 started out looking to be a cold one, but the warming trend after Christmas may well threaten the health of all perennial crops across the state.

It has long been believed that winter minimum temperatures limit the range of PD and that cold weather is therapeutic to grapevines recently infected with *Xylella fastidiosa*. This reaction appears to be an indirect one.

When cuttings from infected vines are exposed to low temperatures, the treatment does not affect the bacterium. With rooted plants , cold temperatures do indeed reduce the number of living bacterial cells within the xylem of infected plants.

It is hypothesized that some part of the vine's cold hardiness mechanism contributes to this curative action. The exact temperatures and duration of cold event needed for this curative effect are not known and are probably variety specific.

In addition to helping overcome PD, a return to cooler seasonal temperatures will assist in uniform bud-break and will help vines regain hardiness prior to the inevitable hard freeze in the next couple of months.

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Researchers Attend CDFA Meeting

The fifth annual Pierce's Disease Research Symposium was held this past December 5-7 in San Diego, California. This meeting, sponsored by the California Department of Food & Agriculture, featured reports and discussions with leading researchers from numerous disciplines working on some facet of Pierce' Disease.

In addition to the administrative team made up of Tim Davis, Dennis Gross and Kevin Heinz, Texas PD members attending the meeting included David Appel, Mark Black, Jim Kamas, Isabelle Lauziere and Lisa Morano. Texas-based ARS researchers Jesse DeLeon, Joe Patt and John Goolsby as well as Bobby Guerra and George Nash from USDA/APHIS also participated in this year's meeting.

Growers can download the 2005 symposium proceedings as well as those from past years from the CDFA website at:

http://www.cdfa.ca.gov/phpps/pdcp/ResearchSymposium/gwSympIndex.htm

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Feature Article– Insect Vectors of Pierce's Disease in Texas–

Forrest Mitchell

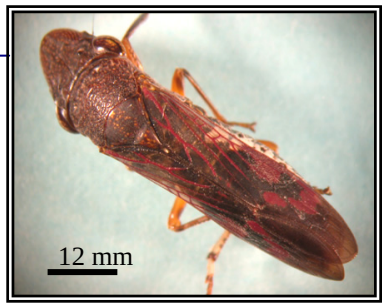
Pierce's disease (PD) of grape is only known to spread from plant to plant by insect feeding. Not just any insect is capable of this. Because *Xylella fastidiosa*, the bacterium that causes PD, resides in the xylem vessels of the plant, insects that selectively feed on the sap carried in these vessels are the major suspects. There are not a lot of these kinds of insects. Plant sap in the xylem does not carry a lot of nutrients. Nutrients are mostly in the phloem and most sap feeding insects concentrate on probing in those cells. There are a few groups, notably the sharpshooters and leafhoppers (family Cicadellidae) and the spittlebugs and froghoppers (families Cercopidae and Clastopteridae) that have specialized on xylem sap for nutrition. Instead of feeding slowly on rich phloem they feed quickly on the nutrient poor xylem, processing large quantities and excreting it rapidly. When there are enough sharpshooters feeding in a tree or on a sunflower the excreted sap comes down fast enough to look like a mist.

These two groups – sharpshooters and spittlebugs – have the only known vectors of Pierce's disease to date. The insect most people are familiar with is the glassy-winged sharpshooter, *Homalodisca coagulata*, which is found commonly in Texas vineyards. There are, however, several species of sharpshooters in Texas. *Graphocephala versuta*, a relative of California's blue-green sharpshooter (*Graphocephala atropunctata*) , is found in many vineyards across the state. At times, it is the most common of the sharpshooters found on the sticky traps. The small nondescript spittlebug *Clastoptera xanthocephala* may also be seasonally abundant on traps. Males of this species are less than 1/4 inch long and are easily overlooked.

In the last two years, these three species have comprised about 90% of the xylem feeding insects that have been identified on the yellow sticky cards being used in Texas vineyards to monitor insects. Although the glassy-winged sharpshooter is a proven vector, the vector status of the other two is still unknown. This fall entomology researchers were able to investigate all three species via specialized assays that look for the presence of *X. fastidiosa*. Approximately 38% of the glass-winged sharpshooters in our sample were positive for the presence of the bacterium, while 45% of the *G. versuta* were positive. Only three of the *C. xanthocephala* have been examined, but one was positive for the presence of *X. fastidiosa*. Preliminary tests indicate the strain of *X. fastidiosa* in *G.versuta* was different than in the other two insects.

While these results do not demonstrate vector capability, they are certainly enough to warrant close looks at both *G. versuta* and *C. xanthocephala*. Work is ongoing as we have only scratched the surface of this issue. Pictures of these and other xylem feeding insects can be found online at: http://piercesdisease.tamu.edu/education/

Homalodisca coagulata



Graphocephala versuta

Clastoptera xanthocephala

Pictures by Isabelle Lauzière, Entomologist, Texas Agricultural Experiment Station

In the last two years, these three species have comprised about 90% of the xylem feeding insects that have been identified on the yellow sticky cards being used in Texas vineyards to monitor insects

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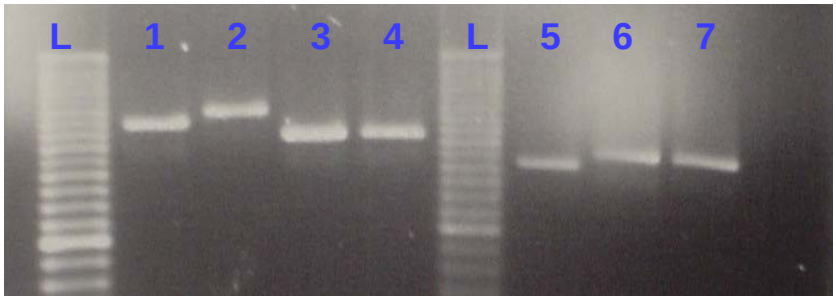
Creating Genetic Fingerprints of *Xylella fastidiosa* Strains in Texas– Lisa Morano

Pierce's disease (PD) has historically been a problem along the Gulf, but its increasing important movement into the Texas Hill Country has created many questions about the ecology and epidemiology of this disease. Characterization of strains of *Xylella fastidiosa* (*Xf*) is important because it allows for the identification of bacterial diversity and mapping of bacterial movement. The Morano lab has begun to genetically characterize Texas *Xf* isolates, many collected by Mark Black's lab from infected Hill Country vineyards and surrounding vegetation. Preliminary indications are that the pathogen is primarily moving from vineyard to vineyard; however, establishment of *Xf* infections in other plant hosts suggest that in some cases the bacterium may be moving into vineyards from surrounding vegetation. Therefore, genetic evaluation of isolates will determine if any grape strains are found in surrounding vegetation (including wild grape) or if any strains categorized as non-grape are found within vineyards. Our lab, in conjunction with Blake Bextine's lab at UT -Tyler will create a genetic fingerprint of each isolate. Some of our preliminary research suggests there are multiple genetically distinct isolates of *Xf* in our Texas vineyards. Therefore, understanding strain differences by generating a genetic catalog of *Xf* strains and developing rapid diagnostics to determine strains will be invaluable in understanding the epidemiology of *Xf* in general and the pathogen's movement within Texas.

Lisa Morano (left) and undergraduate Marlin Mathews examine a Xylella fastidiosa culture in the University of Houston-Downtown

THE MORANO LAB HAS BEGUN TO GENETICALLY CHARACTERIZE TEXAS *XF* ISOLATES, MANY COLLECTED BY MARK BLACK'S LAB FROM INFECTED HILL COUNTRY VINEYARDS AND SURROUNDING VEGETATION.



Gel photograph showing diversity among 7 different isolates of *Xylella fastidiosa* extracted from infected vines. The bands indicated that small sequence repeats (SSR) of DNA are not the same in all isolates. Using different SSRs we create a DNA fingerprint for each bacterial isolate. **"L"** indicates ladder and is used to estimate the size of each band.