Texas AgriLife Extension Service

Texas PD Notes

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Special Edition

Pierce's Disease in Texas, A Ten Year Perspective

Veteran growers will remember the late 90's and the panic that ensued in the Hill Country after a single grower in Burnet County revealed that her vineyard was widely affected by Pierce's disease. What was changing? The Hill Country had always been thought to be safe, or at least a transition zone for PD, but now it appeared to be showing up in vineyards across the region. A false negative diagnosis due to bad antiserum from the manufacturer gave A&M a black eye for missing the call… and something had to be done.

Intensive sampling of surrounding plant material at the Burnet county Site (Williams Vineyard) relied on ELISA testing, but the insensitivity of the technique did not reveal other plant species that might have provided the initial source of the pathogen. For the next few years the grape growing community engaged research and extension personnel from Texas A&M and helped define the issues and challenges that would offer some relief. During those times, Pierce's disease was poorly understood, at least in terms of pathogen/vector/host dynamics in Texas. Sandy Purcell, Don Hopkins and a few other researchers had worked on PD over the course of their careers, but funding was limited-mainly because that the disease was intermittent and cyclical in California. The introduction of the glassy-winged sharpshooter (GWSS) into California that dramatically changed the threat to the California industry as well as the politics of Pierce's disease nationwide. An opportunity presented itself.

In 1998, Initial Sampling at Trish Williams' Vineyard Relied on ELISA Diagnostics and Failed to Reveal Infection of Adjacent Plant Species

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For Pierce's Disease Grower Diagnostic Services, Contact the Texas Plant Disease Diagnostic Lab at http://plantclinic.tamu.edu

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In 2000, the Horticulture sub-committee of the U.S. House of Representatives Committee on Agriculture held a special hearing in Napa, California to talk about the threat Pierce's disease and the Glassy-winged sharpshooter posed to the grape industry in California and other growing regions in the United States. The American Vineyard Foundation put together a list of speakers they wanted to testify at this hearing, and Texas was asked to help make the case to fund much needed research in areas outside of California.

The door opened in 2003 when Dr. Lloyd Wendel provided an opportunity for the beginning of a Texas program by dedicating a portion of the California APHIS funding. Initially, the idea was contentious within APHIS and the California industry, but very shortly after the beginning of the program, it became clear to everyone that a small investment in Texas would pay big dividends for everyone concerned. The argument was that because the disease and a diverse guild of vectors were native to our state, Texas provided the ideal laboratory to understand both vector and disease dynamics. While glassy-winged sharpshooter was an introduced pest in California, the genetic evidence pointed to Texas as the source of that infestation and our populations were at equilibrium with the environment.

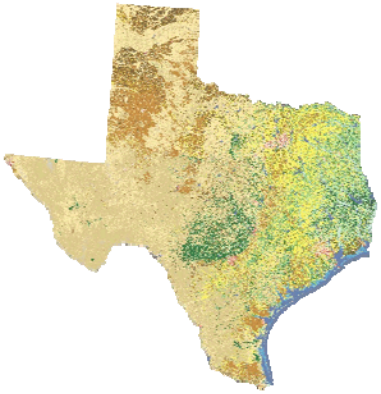
The establishment of a PD Grower Advisory Board helped the research and extension team prioritize the research needs of the industry. The list of short and long-term projects and included:

- Mapping disease distribution across the state
- Geographical site attributes associated with risk of disease
- Refining disease diagnostic skills
- Understanding the diversity, distribution and seasonality of insect vectors
- Investigating pathogen spread within and between vineyard blocks
- Sources of the pathogen outside of the vineyard
- Understanding variety and rootstock interactions under PD pressure
- Exploring the genetic diversity of *Xylella* in Texas
- Indentifying new resistant and tolerant varieties with high wine quality potential

Over the past seven years, numerous collaborative and independent projects have shed light on all of the objectives initially outlined by the team and the advisory committee. Here are a few key points that we feel have given us a tremendous position to manage this disease.

Disease Distribution- We now know that Pierce's disease is present in all parts of the state. The Gulf Coast and most of East Texas are still considered a very high pressure area and we strongly recommend the cultivation only of tolerant varieties such as 'Blanc du Bois' and 'Black Spanish'. While some are growing susceptible cultivars in this region, and others are pursuing novel curative actions, the economic risk is very high. Across the Hill Country and central Texas, a set of cultural practice recommendations appear to be working. While we still need to recognize significant risk in the central and northern part of the state, we feel that the disease can be successfully managed. In west Texas, the disease appears to be wide-spread and vines have indeed died from Pierce's disease. This is the least explored part of the state, but again pathogen and vectors appear to be abundant and capable of infecting even isolated plantings. In the High Plains, the disease is also widespread among vineyards, but vine death has not been documented. Despite any curative action that cold winters might provide, centers of infection persist and growers should not discount the problems associated with vine infection.

The Original Texas Pierce's Disease Research & Extension Team, 2003



Pierce's Disease Has Been Confirmed in All Growing Areas of the State, But Relative Risk of Loss Differs Among Regions

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The Vectors- While the introduction of GWSS into California resulted in a fourth vector in that state, the past eight years of trapping and entomological research have shown that across Texas, over thirty species of sharpshooters are present. Smaller species are thought to be able to more effectively transmit the disease, but they do not travel far from the woody or grassland edges of vineyards. Larger species may infect vines less frequently, but they travel further from vineyard edges and are capable of feeding on woody tissue not removed by normal annual pruning. While GWSS is an important vector, by no means is it the only important insect worthy of management. Although seasonality of this diversity of vector species poses a valid threat most of the year, it is significant that across much of the state, there is a significant migration of GWSS into vineyards at the end of May. This phenomenon is an important benchmark in management protocols. It is also noteworthy that while GWSS numbers may be higher in May and June, relatively few of these insects appear to have acquired the pathogen. However later in the season when insect numbers are lower, a far greater percentage of sharpshooters are "hot".

The Pathogen- Initial investigations confirmed that numerous native plants were indeed supplemental hosts of *Xylella*. What remains problematic is that all PCR analyses seem to report that they are other than the grape strain of the pathogen. Frustrating as it is, *Xylella* grape strain has only been confirmed in wild and cultivated grape. This could be because ragweed or other strains are much more abundant in wild hosts and outgrow grape strain in weeds and trees and dominate isolation work and PCR analyses. We do still recommend that growers locate susceptible grape plantings away from known sources of *Xylella* infested plants.

Studies of the epidemiology of Pierce's disease shows definitive evidence of strong vine to vine movement in Texas. The disease appears to spread more rapidly among vines within a row as opposed to across rows. This contradicts much older opinions from California, but we feel that vine to vine transmission may be more strongly correlated with large sharpshooter species such as GWSS. As a result of these studies, rogueing of infected vines is a cornerstone of our management recommendations.

Grapevine Response- We now know that native Texas grape species, as well as varieties such as 'Black Spanish' and 'Blanc du Bois' are not resistant, but tolerant to Pierce's disease. This distinction is important because having wild vines nearby or planting tolerant varieties in close proximity to susceptible varieties means you are probably putting a source of grape strain *Xylella* in close proximity to vines at risk.

Among susceptible cultivars, there is considerable variability in what pathologists call field tolerance. Although infected susceptible varieties will ultimately die in much of Texas, some varieties such as 'Chardonnay' or 'Sangiovese' are very sensitive and show symptoms shortly after infection and die relatively quickly. Others such as 'Cabernet Sauvignon' and 'Chenin Blanc' may take quite some time to show initial symptoms and may live and produce for a few years after first signs of infection.

We also now know that there is a tremendous amount of variability in the growth and longevity of un-grafted grape rootstocks to the pathogen. This is not terribly surprising given that the native Texas species *V. berlanderi* is a parent of the most commonly used robust stocks. We are currently investigating the interaction between susceptible, intermediate and field tolerant rootstocks and cultivars to understand if growers can use these differences in minimizing financial losses.

Numerous Native Plants Serve as Reservoirs of *Xylella* as Well as Alternate Feeding and Reproductive Sites for Sharpshooters

Eight Years of Vineyard Insect Surveys Have Revealed Over 30 Species of Sharpshooters Capable of Transmitting Pierce's Disease

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Other Work– We continue to improve our capability to detect the pathogen in plants and insects to help provide long term solutions to the problem. New tolerant varieties are being evaluated and our understanding of *Xylella* genetics is vastly improved. Sub-lethal *Xylella* strains are being evaluated as a way of preventing disease. Phage, the natural enemies of bacteria, are being isolated and evaluated for control. Manipulation of biochemical pathways in grapevines seek to disarm *Xyllella*. This multitude of approaches will improve management of this disease in the not-too distant future.

Recommended Management Protocols for Texas Grape Growers

1. **Recognize Risk**- Across Texas, growers and prospective growers need to recognize that this disease does indeed pose a risk to the production of grapes. Select appropriate varieties and rootstocks according to the specific area of state you intend to plant.

2. **Site selection** remains a cornerstone of our management recommendations. Plant vineyards away from known sources of the pathogen and areas such as creek and river bottoms that are conducive to high sharpshooter populations. Establish at least a 100' barrier between vineyard and riparian vegetation. 300' is preferable.

3. Vegetation Management– Both in and around vineyards, this remains an extremely important part of breaking the disease triangle of pathogen/vector/host. Eliminating supplemental sources of the pathogen and making the area in and around your vineyard inhospitable for sharpshooters is necessary for optimal disease management. Make your vineyard look like a golf course and keep adjacent areas closely mowed.

4. Injectable Nicotenoid Insecticides Work! The single greatest tool in our growers toolbox in minimizing losses from Pierce's disease is the use of imidacloprid or other neonicotenoid insecticides. This soft pest management technology deters feeding, stops feeding should it occur, and can drastically decrease vector numbers in your vineyard. Over the years, sharpshooter numbers have decreased 87% in vineyards that have used imidicloprid.. This product is sold under the trade name Admire as well as a number of generic product labels. It is most effective in vineyards with drip irrigation, on coarse or moderately coarse soils and if applied in split applications roughly thirty days apart. Most growers choose to make the first application in early May and the second application roughly a month later. This product has a 30 day pre-harvest interval.

On heavier soil types, related products may prove more effective. Thiamethoxam (Platinum) or dinotefuran (Venom) are less tightly held by the soil and are more available to vines on heavy clay soils. They are, however more expensive and much more subject to leaching. This is recommended for all plantings of susceptible cultivars, even in the High Plains.

5. Roguing– Infected susceptible vines is essential for growers across north-central Texas and the Hill Country. It is essential in stopping the epidemic before vine to vine transmission further compromises the planting. In the High Plains, rogueing vines that repeatedly show symptoms is also wise. While there is more work to do, we recommend that eliminating vines that serve as viable sources of further infection is probably wise in all cases.

6. Knowledge is the Best Prevention- For experienced growers and new growers alike, the key to preventing losses from Pierce's disease is to stay apprised of new developments and current recommendations. While this disease is not yet conquered, when we look back over the past 10 years, we can truly appreciate how far we have come.

Injectable Neoniocotenoid Insecticides Remain As the Most Important Tool in the Management of Pierce's Disease