ASPECTS OF PIERCE'S DISEASE RISK IN TEXAS

Project Leaders:
Mark C. Black
Department of Plant Pathology & Microbiology
Texas A&M University
Agricultural Research and Extension Center
Uvalde, TX 78802

James S. Kamas
Department of Horticultural Sciences[2]
Texas A&M University
Fredericksburg, TX

Researchers:
Alfred M. Sánchez and James L. Davis
Department of Plant Pathology & Microbiology
Texas A&M University
Agricultural Research and Extension Center
Uvalde, TX 78802

Penny Adams
Department of Horticultural Sciences[2]
Texas A&M University
Texas Cooperative Extension
Fredericksburg, TX

Reporting Period: The results reported here are from work conducted September 2004 to September 2005.

ABSTRACT
Granite-based and limestone-based vineyard soils are being compared in a screenhouse test for possible effects on Pierce's disease (PD) following mechanical inoculation of *Xylella fastidiosa* (*Xf*) in 'Chardonnay'. The twelve most common root stocks used in Texas vineyards are being evaluated a 3-year field test with endemic *Xf*. Texas sites with native *Vitis vulpina* nearby may have increased PD risk.

INTRODUCTION
Pierce's disease (PD), caused by the bacterial pathogen *Xylella fastidiosa* (*Xf*), is the most limiting factor for growing grapes in much of Texas. Multiple PD control and management strategies are needed, including genetic resistance, site selection, and vegetation management.

Some Texas vineyards (e.g., with granite-based soils) do not have PD but nearby vineyards (limestone-based soils) have high disease incidence and severity. We do not yet know if reduced site risk is directly or indirectly related to the soils at vineyards with no history of PD. The reduced risk may be partly explained by soil effects on plant species composition (Black et al., 2005) and absence of species susceptible to *Xf* and highly utilized by vectors.

Vineyards in southern and southeastern Texas where PD risk is consistent utilize cultivars with native American *Vitis* species backgrounds (*V. aestivalis*, *V. simpsonii*, *V. labrusca*, etc.) but *V. vinifera* scion cultivars are often used in other parts of the state. In cooler regions of Texas (including regions with PD problems), *V. vinifera* cultivars are grafted on rootstocks with native American *Vitis* sp. backgrounds. Little is known about rootstock PD reactions, and influence of rootstock on performance of scion cultivars during epidemics. Phytosanitary concerns in Texas should include both scion and rootstock because of riskf for *Xf* introduction into uninfested regions.

Many *Vitis* species are native in Texas, and wild grapes are common near many vineyards. An understanding of PD reaction among native *Vitis* species will contribute to site risk assessment, and recommendations for selective vegetation management.

OBJECTIVES
1. Compare PD progress in a susceptible cultivar grown in a screenhouse in soils from vineyards with or without PD histories.
2. Evaluate *Xf* reactions among the most commonly planted grape rootstocks in Texas at a vineyard site with known risk for PD.
3. Test native Texas *Vitis* species in central to southwest Texas for *Xf* infections.

RESULTS
Soil from two vineyards with no history of PD (granite-based; Gillespie Co., McCulloch Co.) and soil from two vineyards with PD histories (limestone-based; Gillespie Co., Blanco Co.) were collected in the spring of 2005. These were compared to a commercial peat moss-based potting medium (Metro-Mix 366) in a white shaded screenhouse to exclude vectors (62% total shade) in black plastic pots (0.082 m^3) irrigated with distilled water. PD-susceptible 'Chardonnay' (own-rooted) was inoculated 22-23 August 2005 with log-phase *Xf* cells isolated from *V. vinifera* in Gillespie Co (SCP buffer control). Symptoms and ELISA data will be collected in late 2005 and early 2006.

The 3-yr rootstock study was planted in 2005 in Llano County, TX at a site where two previous plantings of *V. vinifera* cultivars were lost to PD. Entries are 5BB, 5C, 110R, 1103P, 1613C, 1616C, Champanel, Dog Ridge, Freedom, Harmony, Salt Creek and SO4 (five plants/plot, five replications). Leaves with PD symptoms in cv. 'Black Spanish' adjacent to this

test were positive with ELISA in September 2005. Data to be collected includes symptoms and ELISA reactions in 2006 and 2007.

Vitis mustangensis (the most common native grape species in most of Texas) and *V. cinerea* var. *helleri* (syn. *V. berlandieri*) were negative for numerous ELISA tests and several *Xf* isolation attempts in 2003 and 2004. Rooted cuttings of *V. mustangensis* were mechanically inoculated in the greenhouse with *Xf* in 2005, with data to be collected later this year. Symptomatic *V. vulpina* (with GWSS egg masses) samples from near the PD-vineyard in Llano Co. were positive in 2005 for *Xf* with ELISA; *Xf* isolation attempts were unsuccessful in 2004 on very few asymptomatic samples, and are underway on 2005 samples. Work on other wild grapes in Texas is planned to better understand roles of native Vitis in vineyard PD epidemics.

CONCLUSIONS

Assessing PD risk in Texas vineyards is a complex problem. Knowledge of *Xf* sources in Texas increases prospects for disease control locally and in other wine grape production regions. Native vegetation may be an important source of *Xf*, and some susceptible species are absent at certain vineyards without PD (Black et al., 2005). We are concerned about planting stock as a means of disseminating *Xf*. Infected but tolerant (few if any acute symptoms) cultivars grown in Texas and other southern states can be reservoirs of *Xf* (Harkness and Moreno, 2004). Infected planting stocks of these varieties are potential sources of initial inoculum if planted adjacent to *V. vinifera* and in previously PD-free areas. Pathogen-free *Xf*-tolerant planting materials may become infected and a source for nearby *V. vinifera*.

REFERENCES

Black, M. C., A. M. Sanchez, J. L. Davis, J. S. Kamas, and S. E. Ortiz. 2005. Supplemental *Xylella fastidiosa* hosts found near four central Texas vineyards with or without Pierce's disease histories. Phytopathology 95:S10 (Abstr.).

Harkness, M., and L. Morano. 2004. Initial analysis of hybrid varieties Blanc du Bois, Cynthiana, and Black Spanish within a Pierce's disease hot zone. Amer. J. Enol. Vitic. 55:318A (Abstr.).

FUNDING AGENCIES

Funding for this project was provided by the USDA Animal and Plant Health Inspection Service.