

Fungi Associated with Grapevine Dieback in Central Texas Vineyards

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Abstract

Fungal pathogens are associated with grapevine dieback symptoms in many important winegrowing regions around the world. Dieback symptoms in central Texas vineyards has led to research to identify fungal species involved, to examine pathogenicity and to initiate appropriate control strategies for reducing this threat to commercial grape production in Texas.

Introduction

Until recently, *Eutypa lata* has been considered the primary fungal pathogen causing canker disease of grapevine spurs, cordons and trunks across the United States. Recent studies have determined that in addition to *Eutypa*, other fungal genera are also associated with grapevine cankers including *Botryosphaeria* spp. (Urbez-Torres et al, 2006), *Phomopsis viticola* (Gubler et al, 2005), *Phaeoacremonium aleophilum* (Rooney-Latham et al, 2005), *Phaeoamoniella chlamydospora*, and other related fungi.

Grapevine dieback symptoms have long been observed in central Texas vineyards of eight-plus years of age and are generally associated with spur positions, cordons and trunks. "Text-book" V-shaped cankers have led many growers to believe that "Eutypa" was the cause of this dieback. In addition, recent observations of tiger-striped foliage, and brown to black streaking led some to believe that "Esca" could be associated. Identification of fungal pathogens is the first step in developing control solutions.

Materials and Methods

Symptomatic grapevine tissue was collected from 2007 through 2008 in central Texas vineyards and included Cabernet Sauvignon, Merlot and Vignier varieties. Weakened and stunted grapevines exhibiting perennial cankers and wood streaking associated with dead spurs, cordons and trunks was collected, then stored and shipped under refrigerated conditions to the U.C. Davis Plant Pathology Lab, Davis, California for evaluation.

Diseased samples were processed in the laboratory, 110+ isolations were made and pure fungal colonies obtained through techniques described by Urbez-Torres et al. (2006). Isolations of fungal species were first identified tentatively based on both colony physical characteristics (mycelial color and growth) and spore morphology (conidial color, shape, and size). These were then compared to previously collected species found in California and Michigan grapevines and those reported in previous literature. Total genomic DNA of different fungal isolates from Texas was extracted for detailed identification to species level and to confirm morphological identification. Pathogenicity trials followed the identification process.

Results and Discussion

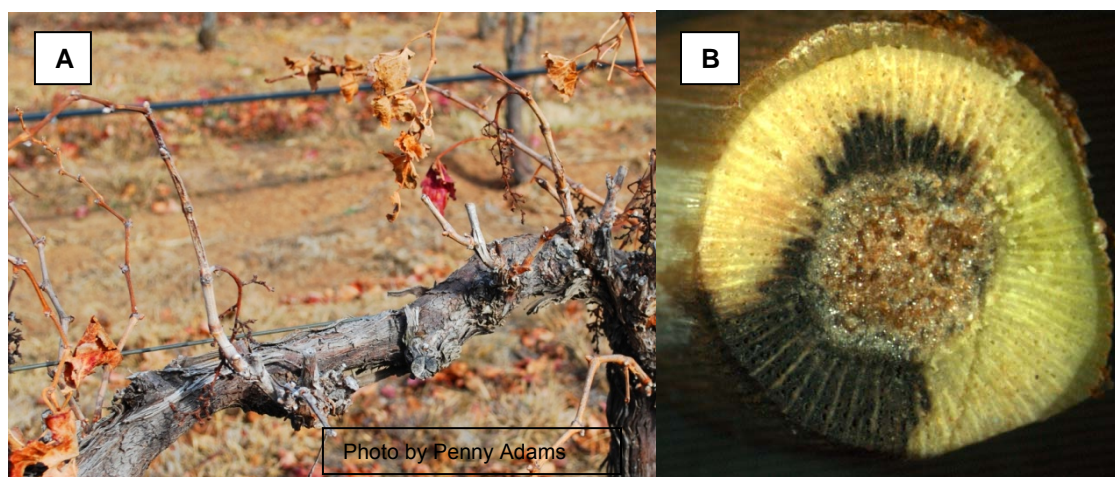
This first collection of work on the subject of grapevine dieback in central Texas vineyards has led to the identification and characterization of 11 different fungal species including *Lasiodiplodia theobromae* (= *B. rhodina*), *Botryosphaeria dothidea*, *Neofusicoccum parvum* (= *B. parva*), *Diplodia seriata* (= *B. obtusa*), *Diplodia corticola*, *Phomopsis viticola*, *Eutypella vitis*, *Diatrypella* sp., *Truncatella* sp., *Pestalotiopsis uvicola*, and *Pestalotiopsis* sp. Association of these fungi with grapevine cankers and dieback symptoms represent new records for Texas.

Identification to species of many fungal pathogens associated with grapevine dieback is difficult due to the display of confusing and often multiple symptoms; including weak or stunted shoot growth, mild foliar chlorosis, canker development, vascular wood streaking, wilting of foliage, cane bleaching, bud mortality, graft failure, wood necrosis and vine dieback. Symptoms vary depending upon variety, clone, growing region and time of year. Additionally, aggressive fungal species may mask or cover up others.

The most common fungi isolated in this sampling were Botryosphaeriaceae spp., including *L. theobromae* and *N. parvum*, **the two most virulent species attributed to grapevine dieback in other grape growing areas of the world**, (Úrbez-Torres et al. 2009), followed by *Pestalotiopsis* spp., *P. viticola*, and *Diatrypaeaceae* spp. Infection by Botryosphaeriaceae species occurs through fresh pruning wounds.

“Phomopsis Cane and Leaf Spot” of grapevines, *P. viticola* commonly infects new vegetative growth, however it was only recently identified in central Texas vineyards. In this study, *P. viticola* was primarily isolated from V-shaped cankers located on mature wood, which agrees with observations from a recent study conducted in California whereby a high percentage of grapevine cankers yielding *P. viticola* was reported (Úrbez-Torres et al. 2006).

Causal organisms of “Eutypa” and “Esca” were not found in this study; although further work is warranted due to the common occurrence of visual symptoms associated with these important grapevine diseases in the vineyards throughout Texas.



Grapevine Dieback Symptoms shown on a typical cordon (A) and in cross-section (B)

Applications of Research

Many common vineyard management practices (inappropriate pruning and overcropping of vines) along with environmental stress factors (drought) may play a significant role in incidence and movement. These fungal pathogens usually become more wide-spread as vineyards mature causing a reduction in yields and ultimate shortened lifespan.

Growers with infected vines can re-train trunks and/or cordons to reverse the economic status of the vineyard. This process requires temporary increased labor costs associated with dormant pruning of dead or dying wood and re-training of new trunks along with increased material cost.

Management Techniques

- Use of Clean Vine Materials at Planting
- Vine Stress Management
 - Good Choice of Rootstock
 - Proper Planting Techniques
 - Good Irrigation Practices
 - Fruit Load Management
- Sanitation Pruning
- Double Pruning
- Late Timing of Pruning (especially of large diameter wood)
- Removal, Burning or Burial of Infected Wood Outside the Vineyard
- Protection of Pruning Wounds
 - Create Physical Barrier with Latex Paint
 - Fungicide Applications (when approved and available)
 - Boron Paste Applications as a Nutrient
- Sanitation of Surrounding Areas

References

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