

## **The Status of Grapevine Trunk Diseases in the Northeastern United States.**

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Trunk diseases caused by fungi are economically important diseases in all grape growing regions worldwide. They are a major concern because they decrease the lifespan of vineyards. In addition, they reduce yield and quality of grapes and increase vineyard management costs.

The life cycle and epidemiology is very similar for all the fungi known to cause trunk diseases. Those diseases are cryptic and symptoms usually take several years to develop. Mechanical, pruning or frost wounds are the point of entry for fungal spores. They subsequently grow, decay the wood and slowly kill the vines. Fruiting bodies form on dead wood and spores are released in presence of water and dispersed by wind, infecting fresh new wounds.

Several fungi are known to cause trunk disease in grapevine. *Eutypa dieback* (causal agent *Eutypa lata*) was the first identified and as a consequence has been studied most extensively. It is the main trunk disease problem of wine grapes grown in temperate regions. The cost to wine grape production alone in California has been estimated to be in excess of 260 million dollars per annum. In the past 15 years, Esca disease (causal agents *Phaeoacremonium* and *Phaeoconiella* spp.) has received much attention. Two forms of Esca have been reported on young and older grapevines. Young Esca causes decline and death of recently planted vines and is usually associated with plant stress. Old Esca is mostly a problem on table grapes because the fruit clusters borne by the infected vines are unmarketable. Recently, Bot canker (causal agent *Botryosphaeria* spp.) has been studied extensively. The disease is very similar to *Eutypa dieback* but it occurs in vineyards grown in a wider range of climates. Finally, other fungi such as *Phomopsis* sp. and Basidiomycete fungi can also cause wood decay in grapevines but have received little attention.

These wood decay fungi are known to have a broad host range. They also cause disease on many other woody crops, such as forest trees and woody ornamentals. Consequently, in any given vineyard, disease pressure is often high. Moreover, several of these fungi can be found in concert in wood cankers, causing in such cases, a faster decline of the infected grapes. Difference in susceptibility to the pathogens has been reported but no *Vitis vinifera* cultivar is immune to infection.

Control methods employ sanitation of the vineyards with removal of dead/dying vines and the pruning of dead arms in order to reduce the source of spore inoculum originating from within a vineyard. Late pruning in the dormant season (as close as possible to bud-break) is also a recommended cultural practice, because wounds heal faster with high degree-day temperatures. Chemicals have been tested for control of *Eutypa dieback*. Products must to be applied directly onto the wounds to be effective. In California, Topsin M is registered for that particular disease and is known to be effective against the pathogen. Boron-based products can also be applied to organically control this disease. However, it is advised to mix those products with a paste so that it remains on the wound surface until the wounds are fully healed. Biocontrol agents (*Trichoderma*-based product)

also showed some success in controlling *Eutypa*. However, the challenge for all these treatments is to be effective across the all range of fungi causing wood decay.

The status of trunk diseases in the Northeastern United States has yet to be clearly established. A preliminary survey of four states in the Eastern U.S. (i.e., New York, Pennsylvania, Maryland, and Virginia), initiated in 1997 by Dr. George Leavitt, yielded *Botryosphaeria* spp., *E. lata* and *Phomopsis* sp. from diseased tissues in affected vineyards. Although *Eutypa* dieback has long been recognized as a common disease of grapevines in the Eastern U.S., these results demonstrated that as in other production regions, other organisms are also likely causes of a canker and branch dieback “complex”. Wood decay and branch dieback associated with wound cankers are common in eastern vineyards. They are often overlooked due their slow development relative to the more common disease targets of annual spray programs (powdery and downy mildews, etc.), but undoubtedly cause economic losses and are impediments to profitability and sustained production. This project is intended to begin a systematic focus on the prevalence and causes of this disease complex throughout the East, in order to both raise grower and extension advisor consciousness, and to provide the necessary foundation for the development of rational control programs.

In 2007, 20 vineyards were sampled covering 4 states (i.e. New York, Connecticut, Rhode Island, and Vermont). Wood sampling included several *Vitis vinifera* and grape hybrids. Isolations from wood decay were performed and pure cultures of the fungi were obtained. Identification of the fungi is still under way using morphological characters and DNA sequencing. Preliminary results (2 vineyards) showed that the causal agents of *Eutypa* dieback, Esca, and Bot cankers are present. *Phomopsis* sp. and Basidiomycetes fungi were also identified, sometimes at a high frequency. The results from the 2007 field sampling will soon be completed and species identification of these fungi will be confirmed.

The field sampling will continue in the next 2 years covering the main grape growing regions in the Northeastern United States. After that period of time we expect to have a better understanding of trunk disease risks in that region. We will also compare hybrid cultivars to *V. vinifera* and determine if they are as susceptible to trunk disease. This information will help develop robust control strategies.