Vinews
Viticulture Information News, Week of 4 July 2016
Columbia, MO

Are There Vectors of the bacterium *Xylella fastidiosa* that causes Pierce's Disease in Missouri?

There have been a number of insects identified as vectors of the bacterium *Xylella fastidiosa* that causes Pierce's disease. These insects belong to four main classifications; froghoppers, spittlebugs, sharpshooters, and leafhoppers. According to Don Johnson in Arkansas, *Xylella fastidiosa* is presumed to be vectored by leafhopper species in two tribes. Tribe Proconniini includes; *Oncometopia orbona*, *Paraulacizes irrorata*, and *Homalodisca insolita*. Tribe Cicadellini includes; *Graphocephala Coccinea, G. versuta*, and *G. hieroglyphica*.

Shoots displaying symptomology of Pierce's disease from Central Missouri in early July 2015. Confirmed positive for PD by Elisa test.

A literature search revealed that *G. versuta* and *G. hieroglyphica* were found in mixed tall fescue (*Festuca arundinacea* Schreb) pastures of Missouri more than 30 years ago. In this research, that was specific to documenting leafhoppers in Missouri tall fescue pastures more than 50 species of leafhoppers were identified. I compared this list to 16 known *Xylella fastidiosa* insect vectors that were identified by Turner Sutton in North Carolina. Both *G. hieroglyphica* and *G. versuta* were identified as potential vectors of PD.

With so many leafhoppers documented in Missouri, what should grape growers be on the lookout for when scouting. Since leafhoppers are quick moving visually monitoring is difficult. Leafhoppers can be monitored with double-sided yellow sticky traps. The two species identified in the literature as being present in Missouri and potential vectors of *Xylella fastidiosa* have some unique coloration compared to the ubiquitous potato leafhopper.

In Missouri, there are approximately, 17 million acres are Tall fescue pastures which is about a third of the state. Although Tall fescue is abundant in Missouri, Tall fescue has not been shown to be a host of *Xylella fastidiosa*. There are a number of annual and perennial plant species that are hosts of *Xylella fastidiosa*. Many of these plant hosts show no symptoms or only mild symptomology. This makes it difficult to determine potential PD host plants unless a large number of a particular plant species are tested.

Compared to other PD host plants, grape vines display very diagnostic symptomology when infected with *Xylella fastidiosa*. Most recognizable are scorched leaf margins on a few shoots of a plant. These leaves will abscise from the petiole and fall to the ground. The leaf petioles remain attached to the shoots which results in a matchstick appearance. Suspect plants can be tested for PD. Testing can be performed by the University of Missouri Plant Diagnostic Center (see information below) for submitting sample(s).

Sharpshooters are leafhoppers. The term Sharpshooter was first used in 1893 and described the feeding damage done from the glassy winged sharpshooter piercing-sucking mouthpart.

Managing PD relies on an integrated approach. Habitat modification that creates an unfriendly habitat for potential vectors. This may involve having a monocrop between the vine rows and keeping potential *Xylella fastidiosa* host plants (weeds) controlled within the vine rows. Increased plant diversity resulted in increased leafhopper diversity in mixed tall fescue pastures which suggests that plant diversity attracts more leafhoppers. Grape vines that are symptomatic and test positive for PD should be removed from the vineyard. Removing PD infected vines will reduce vine to vine transmission if *Xylella fastidiosa*.

Pierces's disease was first confirmed in Missouri in 2013. In 2015, a second plant was confirmed positive for PD. Although PD is present in MO, there are limited confirmations. The limited number of confirmed cases of PD in Missouri may be due to cold winter temperatures. *Xylella fastidiosa* declines in infected grape vines when exposed to cold temperatures. After 24 hours at -4° F (-20 C) or 14° F (-10 C) no *Xylella fastidiosa* survived in vitro. Vines infected with Xylella fastidiosa have been shown to "revive" or be "cold cured" after experiencing cold temperatures. With winter temperatures of the continental US warming by an average of 2.4 °F since 1970 and the Midwest experiencing the fastest winter warming compared to the rest of the US, reliance on "cold curing" may one day be out of reach.

References

Key Insect Pests of Muscadines & PM in Arkansas http://comp.uark.edu/~dtjohnso/Muscadine_PM_15_Jan_09.pdf

Management of Pierce's Disease in Texas http://winegrapes.tamu.edu/files/2015/11/mgt_PD_TX.pdf

Leafhoppers associated with mixed Tall fescue pastures in Missouri (Homoptera: Cicadellidae) https://www.jstor.org/stable/pdf/25083928.pdf?_=1467738552850

Host list of Pierce's disease strains of *Xylella fastidiosa* https://nature.berkeley.edu/xylella/control/hosts.htm

Pierce's Disease: What to look for http://www.missourigrapegrowers.org/wp-content/uploads/2012/06/Pierces-Disease-What-to-Look-For.pdf

The effect of warming winter temperatures on the severity of Pierce's disease in the Appalachian Mountains and Piedmont of the Southeastern United States. https://www.plantmanagementnetwork.org/pub/php/research/2008/pierces/

Examining the effects of cold therapy on Pierce's disease-infected grapevines and the viability of *Xylella fastidiosa* cells in vitro. http://iv.ucdavis.edu/files/108872.pdf

Sampling suspect grapevines for Pierces Disease

- Collect petioles from a minimum of 10 leaves showing PD symptoms
- Place samples a small paper bag (Do not dry petioles, send immediately)
- Fill out a sample submission form found here
- Send samples and submission form to:

  Plant Diagnostic Clinic
  28 Mumford Hall
  University of Missouri
  Columbia, MO 65211

- Samples should be sent on a Monday or Tuesday to avoid weekend mail delays
- Cost is $25 for the Elisa test for Pierces Disease

Prolonged wet periods and Potential for Disease

Thunderstorm events throughout much of Missouri over the past week have resulted in prolonged wetting periods. Many of the major grape pathogens need free moisture on grape tissue in order for infection to occur. These pathogens include; Black rot, downy mildew, Phomopsis, and Anthracnose. Dense canopies coupled with clusters now at berry touch or beyond result in increasing the time of tissue dry down after a rain event. Some thunderstorm rain events have produced rainfall amounts exceeding 5-inches. These large rain events can reduce the protective qualities of protectant fungicides such as Captan. As you encounter these rain events remember the following:

- Nighttime temperatures in the 70's coupled with free moisture is ideal for Black rot. With these environmental conditions Black rot only needs 7 hours of free moisture for infection
- If two-inches or more of rain fell on a recently applied protectant fungicide then the protectant fungicide should be reapplied
- If the protectant fungicide is 7-days or older and 1-inch of rain has fallen the protectant fungicide should be reapplied
- Protectant fungicides in order to be effective must thoroughly dry before a rainfall event
- If forecasts predict a rainy period consider tank-mixing a systemic fungicide with a protectant fungicide
- If disease pressure is high reduce the time interval between cover sprays and consider using the high rate of the fungicide
- Although grape berries develop age related resistance to many of the common pathogens 4 to 6 weeks after bloom, many grape cultivars are still in that transition period. Also the grape foliage, especially new growth remains highly susceptible to many of the major grape pathogens throughout the growing season.

A couple rots have made there presence this week : Black rot and Birds-eye rot/Anthracnose

Birds-eye rot (above) caused by Anthracnose. Notice the berry lesions can resemble a birds-eye and over time the lesions interior turns grey-colored. Anthracnose infection of leaf tissue results in angular lesions that result in crinkled distorted leaves.

Black rot on Chambourcin leaves and grape berries. Compare Brown rot leaf lesions to Anthracnose leaf lesions above.

Cumulative Growing Degree Days for the Seven Grape Growing Regions of Missouri from April 1 to July 4, 2016.

Region	Location by County	Growing Degree Days[1]		
		2016	2015	30 Year Average
Augusta	St. Charles	1570	1599	1507
Hermann	Gasconade	1499	1532	1445
Ozark Highland	Phelps	1618	1634	1523
Ozark Mountain	Lawrence	1601	1614	1520
Southeast	Ste. Genevieve	1573	1660	1556
Central	Boone	1542	1510	1465
Western	Ray	1457	1450	1422

[1]Growing degree days at base 50 from April 1 to July 4, 2016. Data compiled from Useful and Useable at https://mygeohub.org/groups/u2u/tools . Click on link below to determine growing degree days in your area.

To determine the number of growing degree days accumulated in your area since April 1, click this link Search for GDD at your location using this tool.

Please scout your vineyards on a regularly scheduled basis in an effort to manage problem pests. This report contains information on scouting reports from specific locations and may not reflect pest problems in your vineyard. If you would like more information on IPM in grapes, please contact Dean Volenberg at 573-882-0476 or volenbergd@missouri.edu