



Grapes

New grape disease reduces yields, quality



A new disease that threatens the health of grapevines nationwide highlights the need for stronger clean plant campaigns. The disease, first reported in a Napa Valley vineyard in 2008, has been identified in infected vines in the top three U.S. grape growing regions of California, Washington, and New York, as well as a few other East Coast and southern states, and Canada.

New disease has symptoms similar to grapevine leafroll disease.

by Naidu Rayapati and Melissa Hansen

Washington State University researchers are tentatively calling the new disease grapevine redleaf disease due to the red to purple color on leaves of red varieties. Symptoms range from red veins and blotches to total reddening of the leaves in some red grape cultivars. Veins on the leaf undersides can be pink or red, or the major veins can still be green.

California and New York scientists have dubbed it "grapevine red blotch disease," but WSU scientists preferred to use the broader term "redleaf" to cover the full spectrum of symptoms, so that growers pay attention to all suspicious red leaves.

The difference in symptoms could be due to own-rooted vines being used in Washington and grafted vines in California, New York, and other places.

Misidentified in vineyards?

The symptoms of redleaf disease in red-fruited cultivars may look similar to those produced by grapevine leafroll disease, but the new disease is distinct in several respects. Like leafroll, redleaf symptoms show up just after veraison and look very similar to leafroll, which could be why growers and university researchers never paid much attention to it in the vineyard. Many just thought it was leafroll virus. But the epidemiological aspects are quite distinct.

It's like a person having the flu or West Nile virus. Symptoms can be similar, but the nature of the virus and mode of its spread are very different, and the same treatment doesn't work for both. With leafroll disease, growers have focused on controlling grape mealybug and scale infestations to slow the spread of the disease. But with redleaf, a new vector is suspected, and a different set of management tactics is required.

How does it spread?

WSU bench graft tests showed that redleaf disease is graft-transmissible. Symptoms on the scion (virus-free Cabernet Franc) were similar to those observed in the source vines used as the rootstock. Based on the

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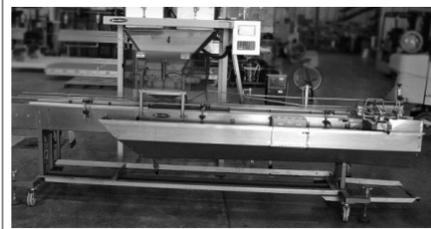
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Growers are encouraged to contact Naidu Rayapati for advice and visit the WSU grape virology web site for additional information: naidu.rayapati@wsu.edu, wine.wsu.edu/virology/

A Merlot grapevine shows redleaf symptoms on mature leaves in the lower portions of the canopy. Symptoms are easily confused with grapevine leafroll disease.



Cabernet Franc clusters from a single vine show infection on the left, nonsymptomatic cluster on the right.

wide host and geographic distribution, and the fact that it is transmitted through grafting, the disease is thought to spread through propagative material. Redleaf disease has been detected in young and old vineyards.

Research conducted at WSU has implicated the Virginia creeper leafhopper (*Erythroneura zizac* Walsh) as a carrier or possible vector based on tests under greenhouse conditions. Both nymphal and adult leafhoppers have piercing and sap sucking mouth parts.

Economic impact

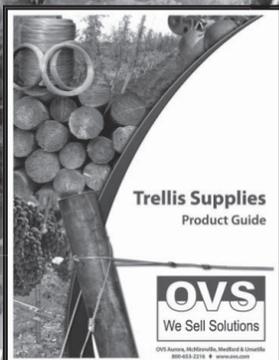
The economic prosperity of Washington's wine industry is at risk of irreparable damage due to the new disease and its negative impact on fruit and wine quality. Initial reports from University of California and USDA scientists at Davis have found the new disease can result in significant reduction of sugar accumulation in fruit—up to 5° Brix.

Dr. Naidu Rayapati's research team, among the first to conduct extensive yield and fruit quality evaluations of diseased vines, found reduced yields of 22 percent and 37 percent in own-rooted Merlot and Cabernet Franc, respectively, when compared to nonsymptomatic vines. Pruning weights and shoot lengths of infected vines of Merlot and Cab Franc were also reduced—pruning weights by 25 percent and shoot lengths by up to 20 percent.

An analysis of fruit quality attributes showed that berries from redleaf disease-affected grapevines of both

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cultivars had significantly lower soluble solids (12 percent in Merlot, 14 percent in Cab Franc), higher titratable acidity (9 percent in Merlot, 16 percent in Cab Franc), and lower extractable anthocyanins (Merlot 4 percent, Cab Franc 9 percent) when compared to berries from nonsymptomatic vines.

In contrast, there was no difference in the pH of juice extracted from berries of symptomatic and nonsymptomatic grapevines of both cultivars.

Taken together, these results clearly showed significant negative impacts of grapevine redleaf disease on vine vigor, fruit yield, and berry quality attributes in own-rooted wine grape cultivars of Merlot and Cabernet Franc, under commercial growing conditions.

Preliminary surveys conducted last year by Rayapati's team indicated the new disease is prevalent in other red-berried varieties, in addition to Merlot and Cab Franc. It's unknown if the disease causes symptoms in white grape varieties.

Additionally, WSU does not know if the new disease was originally introduced into Washington State through cuttings imported from outside sources.

In California, the disease has been observed primarily in vineyards planted with red varieties, with some detected in Chardonnay, according to the U.S. Department of Agriculture and University of California, Davis. Red varieties infected, thus far, include Cabernet Franc, Cabernet Sauvignon, Merlot, Malbec, Mourvèdre, Petite Sirah, Petit Verdot, Pinot Noir, and Zinfandel. ●



A Merlot leaf shows symptoms of the newly detected disease—red blotches and red veins.

WAKE-UP call

The newly detected grapevine redleaf disease is a wake up call to Washington's wine industry. Growers and winemakers have been grappling with grapevine leafroll disease, but now with the emergence of

redleaf disease, the industry has to deal with two of the most serious virus diseases affecting wine grape vineyards.

With increased sourcing by growers and wineries of plant materials from different grape growing regions to meet the growing demand for new plantings, there is potential for viruses alien to Washington State vineyards to be introduced through contaminated cuttings and propagative material. The perennial and long-term nature of vineyards means that infected vines can serve as a "Typhoid Mary" and provide constant infection sources for secondary spread by leafhoppers.

Washington State University's grape virology research team, headed by Dr. Naidu Rayapati, is working to learn more about the new disease. Immediate research priorities for the coming year include identifying the extent of redleaf presence in Washington vineyards; learning if the disease is present in white varieties; and learning more about disease behavior and how it spreads through vineyards. Other questions that need answers are:

- Is redleaf disease from a recent introduction or has it been here for many years?
- What are the ages of infected vineyards?
- Is there commonality in the locations of infections? (shared plant material sources or region)
- Are some cultivars more susceptible than others?
- Is the geminivirus present in Concords or other juice grape varieties?
- Field confirmation of suspected vectors and other potential species is needed.

Besides their negative impacts on fruit yield and quality of grapes, the introduction of alien viruses is of great concern for sanitation and grapevine certification programs in Washington and the nation. Thus, it is imperative that a concerted approach among stakeholders, researchers, and regulatory agencies may be to strengthen our clean plant campaign efforts to ensure sustainable growth of Washington's grape and wine industry.

—N. Rayapati and M. Hansen

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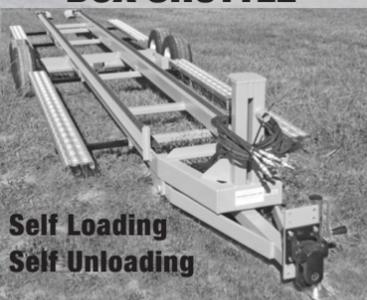
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