



## Wine industry funded research can save growers money and lead to healthier vineyard soils. Hansen: Test for nutrients before spending big money

Melissa Hansen // Apr 19, 2016 // Diseases // Grapes // Pest Management // Research

You walk through your vineyard and see suspicious-looking red leaves. Before you assume the worst — grapevine leafroll or red blotch disease — consider that your vines could have a nutritional imbalance.

Dr. Joan Davenport, soil scientist for Washington State University, recently completed nutrient management research funded by the Washington State Wine Commission that resulted in recommendations on how to best apply phosphorus leading to healthy vineyards.

The project is part of Davenport's overall effort to develop guidelines for nutrient management of irrigated wine grapes in eastern Washington.

In wine grape cultivars, red leaves can indicate several possible stress disorders.

Previous research by Davenport documented that in eastern Washington, red grape cultivars exhibit low phosphorus though red leaf discoloration in the older leaves of the vine, and in white cultivars, low phosphorus shows up as a slightly darker green color in the older leaves.

Red leaves — with green veins — are also associated with grapevine leafroll and red blotch diseases.



**The top Cabernet Sauvignon leaves are healthy, the bottom leaves show phosphorus**

 (Courtesy Joan Davenport)

When you find red leaves, Davenport says you should first determine if the color is a result of a nutritional deficiency.

“Take nutritional samples first to learn if phosphorus levels are adequate,” she said, adding that nutritional samples are less expensive than PCR (polymerase chain reaction) testing used for diseases. “If nutritional levels are adequate, then run samples for diseases.”

### Soil application effective

A key finding of Davenport’s research was to determine the best way to apply phosphorus to wine grapes.

Because phosphorus has very low solubility and dispersion in soils, Davenport wanted to learn if soil applications, applied as liquids through drip systems, would be as effective as foliar applications. Additionally, she wanted to compare the amounts of phosphorus needed to remediate a low phosphorus vineyard.

In comparing foliar and soil applications, she found that soil application of phosphorus was just as effective as foliar — but without the potential for leaf burn. “We didn’t have any better results with foliar versus soil applications,” Davenport said.

Her experiment involved two vineyards of Cabernet Sauvignon and Merlot cultivars for a total of four trial blocks.

Soil and tissue samples were taken in the four locations two years before the study was initiated to ensure the sites were deficient in phosphorus.

In the 2014 and 2015 growing seasons, four rates of phosphorus were applied: zero, 12, 25 and 37 pounds per acre. The rates were divided across three applications made at bloom, one month postbloom and veraison.

Applications were made through the drip system as fertigation or as a foliar application sprayed directly on the leaves.

There were no differences in crop yield or quality factors between the fertilizer treatments in either year, according to Davenport. Yield reflected the difference in management of the vineyard blocks. However, after two years of the same phosphorus fertilizer treatments, all trial plots had sufficient levels of tissue phosphorus.

She reported that there were slight differences in response between the two vineyards that were initially low in phosphorus.

On the Cabernet 2 trial, leaf phosphorus reached the desired level of greater than 0.15 percent from all treatments, but was slightly higher with the foliar applications than the soil applications.

On the Merlot 2 trial, all phosphorus treatments achieved the desired level except in the lowest foliar rate of 12 pounds per acre.

“While we didn’t quantify leaf burn as part of the experiment, we did see leaf burn from the foliar applications in the first year from all the foliar applications,” Davenport reported. “Any time you’re putting on a foliar application, there is potential to lose leaf area.”

Overall, the results suggest that either soil or foliar fertilizer treatments are effective. Although both types of applications worked, she recommends the soil application method as the better option because it avoids potential for leaf burn.

Research data also suggest that 25 pounds per acre of phosphorus, split three times during the growing season for two years, will bring deficient phosphorus levels into the adequate range.

The project was originally intended for three years, but data collected (four different fields for two years) represented eight site years and was sufficient to address the research issues.

The frequency of phosphorus deficiency in wine grape vineyards has increased in the last few years, according to Davenport. There are several reasons this could be occurring.

One is that older vineyard blocks that had phosphorus fertilizer applied pre-plant have run out of the nutrient and current supplemental programs are not supplying enough. Another could be varietal, as nutrient needs vary by variety and clone. •



*New nutrient guidelines are coming for wine grape growers*

*Dr. Joan Davenport, soil scientist for Washington State University, will soon culminate much of her career's work in the publication of nutrient guidelines for Washington wine grape growers.*

*Davenport's nutrient evaluation research dates back to the late 1990s. She has spent years developing meaningful nutrient guidelines for irrigated vineyards in the Inland Pacific Northwest. Her research, supported by the wine industry, involved surveying nutrient levels in grape tissue samples, field fertilizer plots and a series of studies that included taking more than 5,000 photos of vines grown in containers with adequate nutrition or induced nutritional disorders.*

*She is collaborating with the International Plant Nutrition Institute to optimize the format and delivery of time-lapse photos that illustrate the visual symptoms of nutritional disorders in both red and white wine grapes.*

*Up to now, Washington wine grape growers have relied on guidelines from other regions, like those developed by the University of California, Davis, that are based on very different climates than the Northwest. Eastern Washington soils are relatively dry and can be cold in the spring.*

*Although vineyards are irrigated, Davenport explained there's very little plant-available soil moisture in wine grape vineyards because the soil moisture is tied up tightly.*

*An example of major differences between the Northwest and California is in how tissue samples should be taken. California growers commonly use petioles for tissue analysis. She found that under Northwest conditions, growers should use the whole leaf when sampling plant tissue.*

*Timing of the sample — which she recommends be done at veraison — is also different, since tissue samples are generally taken at bloom in California.*

*– by Melissa Hansen, a research program manager for the Washington State Wine Commission and former associate editor with Good Fruit Grower.*

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By Melissa Hansen | April 19th, 2016 | April 15th 2016 Issue, Blogs, Diseases, Grapes, Melissa Hansen, Pest Management, Research

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Melissa Hansen is the research program manager for the Washington Wine Commission. Hansen previously was an Good Fruit Grower associate editor from 1996 through 2015. **Read her stories:** [Author Index](#)

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