AY201718 Continuing Researchers Support Program - Final Report

Exploring the Impacts of Red Blotch Disease on Vine Growth, Physiology and Fruit Composition in Oregon Pinot noir and Pinot gris

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Objectives

1. Identify growth effects related to Red Blotch infection in cool climate white and red winegrape varieties in Oregon's Willamette Valley.
2. Identify fruit composition effects during ripening and harvest of cool climate white and red winegrape varieties in Oregon's Willamette Valley.

Methods

We identified two commercial vineyards in the Willamette Valley with symptoms of Red Blotch Disease that would collaborate with us on this project. Site A was located just east of Amity, Oregon within the Eola-Amity Hills American Viticultural Area (AVA). This vineyard was planted in 2007 with Pinot noir clone 828 on a Riparia Gloire rootstock and trained in a cane pruned vertical shoot position guyot system. Site B was located north of Lafayette, Oregon in the Dundee Hills AVA and planted in 1996 with Pinot gris on a 5C rootstock. This vineyard was also cane pruned and trained to the vertical shoot position guyot system.

Site A. A section of the vineyard was selected based on past visual symptoms of red blotch disease that would likely have infected and healthy, non-infected vines. Virus testing was conducted on this 90-vine section. Once testing results were available, we selected 20 vines for our data collection based on four categories of symptoms and grapevine red blotch associated virus (GRBaV) virus infection: 1) symptomatic positive, 2) symptomatic negative, 3) asymptomatic positive, and 4) asymptomatic negative. The majority of vines fell into three categories, and only one vine fell into symptomatic-negative category.

The 20 vines were monitored weekly beginning at the pea-size berry stage (July 2017) until leaf fall (post-harvest, November 2017) for visual leaf/canopy symptoms. Several measures were taken as frequently as possible for the majority of weeks during July-August, including photoassimilation, stomatal conductance, and leaf chlorophyll. Photoassimilation and stomatal conductance were measured on individual leaves per each data vine on clear, sunny days with an infrared gas analyzer (Li-Cor Li-6400XT, Lincoln, NE, USA) using standard practices. Leaf chlorophyll was measured using a SPAD meter (SPAD-502, Konica Minolta, Ramsey, NJ, USA). Weekly visual observations included noting leaf color, intensity of discoloration, and position of symptoms in the canopy. At harvest, whole vine yield and cluster counts were measured to determine vine yield and mean cluster weight. A 5-cluster sample per vine was collected and taken back to the lab for cluster weights and measures, including berry count and berry weight. The literature indicates that GRBaV causes a delay or cessation of ripening, and we want to determine whether this is occurring in these vineyards. To test ripeness effects, the 5-cluster sample was juiced and analyzed for basic ripeness parameters, including total soluble solids, pH, and titratable acidity. Berry samples have also been frozen for later analysis of fruit qualities, such as anthocyanins and tannins that may be affected by the virus. This work will be continuing during fall term 2017.

Site B. Since we had less historical information about visual symptoms and virus at site B, we used a different approach. The vineyard manager believed the entire block was infected and that there were no healthy vines for comparison within-block. Therefore, the entire block was monitored weekly for visual symptoms of the GRBaV from pea-size berries until leaf fall. Chlorophyll measures were also taken on 10 randomly selected vines during this time using a SPAD meter (SPAD-502, Konica Minolta, Ramsey, NJ, USA). Once visual symptoms began to appear, 12 vines were identified to have 1) canopy symptoms, 2) canopy symptoms and delayed fruit development (based on color), and 3) no visual symptoms. These vines were then monitored for visual symptoms, leaf chlorophyll, and fruit development. Reference vines were then harvested and analyzed for basic ripeness, including total soluble solids, pH, and titratable acidity. Post-harvest, leaf samples were collected from each of our 12 data vines for virus testing to confirm if vines are positive or negative for GRBaV.

Key Findings to Date

The typical visual symptoms known for GRBaV, including dark red blotches on leaves, was observed in the Pinot noir at site A, and yellowing was observed in the Pinot gris at site B. The symptoms we observed are similar to what has been observed by others in different localities and cultivars. The development of symptoms was also similar at both sites with symptoms first appearing on basal leaves during veraison (color change of fruit, beginning of ripening), while mid- and upper canopy symptoms occurred later in the season. The presence of visual symptoms is a good indicator that a vine is infected, but the lack of symptoms in all vines that tested positive for GRBaV could indicate a delayed symptomatic and a vineyard could be infected while showing no symptoms.

Photoassimilation and stomatal conductance were measured at site A to determine if the virus had any impact on carbon assimilation or water stress. From our data, both photoassimilation and stomatal conductanced decreased throughout the growing season, which was expected due to increasing water stress on the vines. The infected vines generally had lower photoassimilation and stomatal conductance than those of the unifected vines, but these were not statistically different except on July 31, 2017 and August 31, 2017. The other of the four sample dates did not show differences. Leaf chlorophyll values were also rarely different between symptomatic and asymptomatic vines. I believe this to be due to the random selection of leaves on symptomatic vines, as not all leaves would be symptomatic. Yield, cluster weight, berry weight, total soluble solids, pH, and titratable acidity were also not different between infected and non-infected vines. This was surprising given that others have shown delayed ripening in GRBaV in winegrapes grown in other regions.

Next Steps

The visual observations during this study support the visual symptoms that others have noted, but more observations are currently being made through leaf fall to understand late season symptoms and potential physiological implications. The physiological effects seen during this study are far from definitive, while values were generally lower in infected vines the difference was still insignificant. To fully understand the physiological effects, further observations will need to be made. This project is still ongoing with observations still being made weekly to observe leaf fall, and fruit composition will be analyzed this fall to determine potential impacts on color and phenolic ripeness of the fruit. For the information on symptoms and impacts of Red Blotch disease gathered during this study it needs to be shared with the local wine industry. This will happen at two upcoming events a Red Blotch disease extension workshop and a meeting with a local viticulture technician group.