A Look at Temperature Differences and Fruit Flavors in Cabernet Sauvignon Rows with Strong East and West Facing Slopes

Madelyn Calderon, Zachary Green, Justin Archibald

Washington State University Tri-Cities, 2701 Crimson Way, Richland, WA 99354

Abstract

This study focused on the impact of vineyard row orientation within a specific block of Cabernet Sauvignon grapes that was characterized by a strong gradient, separating the rows into east and west facing. This 2.66-acre block of Cabernet Sauvignon in Kiona, WA, was monitored from the middle of the growing season, July 15, 2019, to harvest, September 24, 2019, using soil temperature probes and grape samples for standard juice analysis. Vine orientation had a significant impact on grape composition; influencing pH, titratable acidity, Brix at harvest and yield. Wines from opposite orientations are being made and will be evaluated for flavor characteristics in the fall of 2020. Understanding the impact of the spatial positioning of the vineyard on grape composition will aid in the site selection and the orientation of the vines and decisions to separately harvesting the fruit. The data collected from this experiment has potential for further research into the variances that row and vine orientation has on the grape and wine quality.

Introduction

Topographical influences play a major role in vineyard practices. It can influence the site selection, cultivar choices, row orientation, solar radiation and more factors. Aspect is defined as the compass direction of the orientation of the slope. The vineyard of this study observed aspects of both east and west facing slopes. As the sun travels across the sky, this would allow the eastern slope to receive morning sunlight, which is cooler and allows for more shading when the afternoon sun is hot. The western slope would remain shaded in the morning and receive the more intense afternoon sun. Considering these spatial environments allows for improved viticultural practices and ultimately more defined grape and wine quality. With a row orientation to increase sun exposure, the vines may have an enhanced exposure to solar radiation; early season soil warming, and decreased frost probability and in relation to the grape chemical structure, photosynthetic rate increases, ripening accelerates and there is a better balance between sugar and acid.

Materials and Methods

This 2.66-acre block of Cabernet Sauvignon, clone 10m, of Skyfall, Precept vineyard in Kiona, WA, was monitored from the middle of the growing season, July 15, 2019, to harvest, September 24, 2019, using soil temperature probes. Vines are oriented in 37 rows with NS orientation crossing over this small hill. Probes were placed in row 3, 18 and 24, with 4 probes in each row. Grape samples were taken weekly in September to determine harvest. Rows 3-16 were chosen to harvest, as it had the most consistent chemistry and growth. 1.5 tons of east and 1.5 tons of west were hand harvested by Precept Vineyard personnel on the morning September 24, 2019; and crushing and destemming were carried out at Bookwalter Winery, Richland, WA on the same day, with 30 ppm of potassium metabisulfite added to each lot. East and West were fermented separately in 1.5-ton stainless steel fermentation tanks, with all yeast and nutrient additions being added in equal amounts to each batch the following day. The yeast, 0.2 g/L of Fermol Mediterranee – AEG, and yeast nutrient, 0.1 g/L of Fermolplus Energy GLU, was added on September 25. On September 27, 0.2 g/L of Fermoplus DAP free complex yeast nutrient was added to both lots as the Brix had dropped in half. Both lots had completed fermentation on October 1, 2019. Both East and West ferments were pressed off the grape skins, racked into barrels and inoculated with malolactic bacteria on October 4. After completion of malolactic fermentation on October 15, 40 mg/L of SO2 was to each barrel. Each barrel was racked from lees on the same day. Free SO2 has been maintained at 30 mg/L. Wines from opposite orientations will be evaluated for flavor characteristics in the fall of 2020.

Results

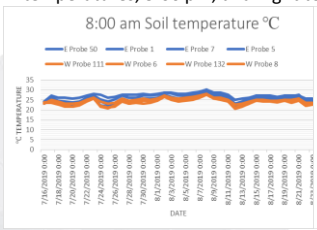
Chemical analysis of both east and west lots after crushing and destemming on September 25, 2019.

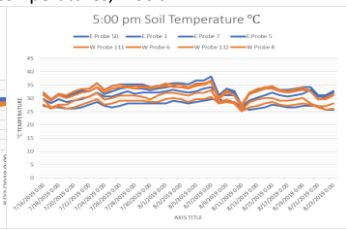
Lots 9/25	pH	T.A g/L	Brix	Malic Acid g/L	PAN mg/L	Tartaric Acid g/L
East	3.73	5.0	22.7	1.58	109	3.08
West	3.67	5.9	22.3	1.84	102	4.00

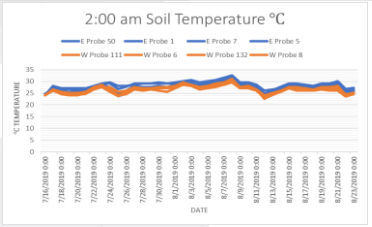
East grapes had higher pH, Brix and more primary amino nitrogen, compared to West grapes which had a higher titratable acidity, malic acid and tartaric acid content.

Results continued

Soil temperature data from July 15, 2019, to September 24, 2019, comparing graphs of morning temperatures, 8:00 am; afternoon temperatures, 5:00 pm; and night temperatures, 2:00 am.







At 8:00 am, soil temperatures were consistently higher on the east-facing slope. At 5:00 pm, soil temperatures were sporadic and neither east nor west read higher. At 2:00 am, soil temperatures were higher for east-facing slope.

Conclusion

The overall goal was to observe differences in grape and wine quality between east-facing slope and west-facing slopes. In theory, the west-facing slope would receive the afternoon sun, which is more intense and would lead to an advanced ripening compared to eastern slopes. In reference to soil temperature, morning soil temperatures are greater on the eastern side, as expected but afternoon temperatures have both sides equal. The higher east-facing soil temperatures in the night reflect that overall; the east slope has higher soil temperatures. The eastern grape composition also reflects an advanced ripening with an increase in sugar and a decease in pH, titratable acidity and malic acid.

Acknowledgment

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