VINTAGE REPORT
Napa 2017

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VINTAGEREPORT
Napa 2017

Event Report

INTRODUCTION

The 2017 Napa Vintage Report took place on January 18th, 2017, at the Westin Verasa in Napa, CA. The gathering was the eighth iteration of the annual conference in Napa. The 2017 Vintage Report aimed to provide an engaging platform for winemakers and grape growers to share their experiences with the 2017 vintage, and share new technology and research advances and their impact on future winemaking and vineyard management practices. The content of the conference was organized based on the plant calendar for a growing year, proceeding from winter/spring to fall harvest, analyzing the various vintage effects on phenology, physiology, and berry composition.

KEYNOTE: GREG JONES

The 2017 Vintage Report kicked off with Gregory V. Jones PhD., Director of Wine Education and professor and research climatologist in the Department of Environmental Studies at Linfield College, presenting on the state of the North American climate. The vintage was marked by 2017 as being the warmest year on record that was not influenced by an El Nino weather pattern. According to Professor Jones' presentation, since 1895 California has seen an increase in average temperature of nearly 2.2 degrees Fahrenheit, and from the period 1981 to 2017, the years of 1999, 2010, and 2011 are the only vintages with average temperatures below the 1981-2017 average. The 2017 vintage began with well above average rainfall and snow accumulation in California, and was the 20th wettest year in the 123 year record. As a result, California saw its lowest drought conditions in the past 18 years. The cool conditions brought by the La Nina weather pattern lingered into the late spring, before a dominant ridge set in off the coast into the summer, bringing extreme heat events in the months of June, August, and September. California and the entire west coast is currently observing a rather "resilient" ridge that produced a very dry December, leading to our current low rainfall and snow accumulation numbers going into the 2018 season. The snow-water equivalent values in the mountain regions of the western United States are down nearly everywhere except for the Northern Rockies. Although much of California transitioned out of moderate/severe drought during the wet winter of 2017, the current lack of snowpack in early 2018 could pull the state back into drought conditions. Current models are favoring a slightly cooler and drier than normal start to 2018 from February to April for Northern California, with a warming trend moving south. Drought conditions are likely to develop and continue for regions of southern California. One thing to keep in mind for the Northern California grape growing regions: the chance of frost tends to be increased with this type of cool spring weather outlook. However, in the end, 2018 looks like it will be another warm year, overall, likely similar to 2017, 2012, 2013, and 2014.

THE VINTAGE REPORT MAP & DATA SUMMARY

Throughout the Vintage Report, Thibaut Scholasch, PhD, co-Founder and VP of Research and Development at Fruition Sciences, highlighted data trends during the 2017 growing season via transitional talks between the Vintage Report's various speakers. He placed the day's speakers and topics within the context of the growing season, and shared new findings in vineyard data collected around the Napa Valley. From the beginning of the season, important parameters to set the stage for vine growth are rain and thermal time accumulation during the winter months. From the period of November 1st to March 1st the Napa Valley saw a large and steady amount of rainfall, similar to 1995, 1998, and 2011. Just like 2011, fields were saturated to field capacity well before and after budbreak. Thermal time during the same period was reduced slightly compared to 2016, 2015, and 2014, but was very similar to both 2012 and 2013. On top of this, thermal time accumulation during the second period of the season, March 1st to June 21st has been steadily rising since the 2013 vintage. 2017 did not deviate from this trend, showing a high thermal time accumulation before the end of June.

So what is the consequence of this high thermal time and abundance of water on leaf area development, vine architecture and physiology? Field data collected using a real-time fluorescence leaf measurement technique to determine plant Nitrogen Biological Index (NBI) revealed that vine leaf nitrogen content in Napa reached its peak anywhere from 100-200 GDD earlier than observed in 2016, with a slightly lower average maximum. Additionally, crop coefficient (Kcb) values recorded around the valley revealed a high crop coefficient value, or a high vine "horsepower", similar to 2010 and 2011; however, the peak Kcb values were reached nearly a month earlier in 2017. The large amount of winter rain, the low rainfall after budbreak, and the high crop coefficient values set up a scenario where the root reservoirs in 2017 were likely depleted faster than expected before veraison. All of these trends confirm the need for winemakers and vineyard managers to assess both nitrogen and vine water use on a site specific basis, as each terroir will require different operational timing. Finally, Thibaut highlighted what was possibly the most extreme driver of the 2017 vintage: the high frequency and severe nature of heat events. High heat events increase the risk of cavitation and decrease the chance of green berry survival (with temperatures above 43C). Recent scientific findings have shown that high temperatures during the month before veraison can lead to a delayed onset of veraison and sugar loading, and reduced anthocyanin levels at fruit maturity. The extreme heat waves in August and September in Napa were likely responsible for the ripening delays and sudden berry volume accumulation stop that many growers observed across Napa. In conclusion for 2017, Thibaut Scholasch displayed his annual vintage map, comparing vintages by rain amount, length of dry period, and frequency/intensity of heat waves.

FROM BUDBURST TO MATURITY: MODELING THE FUTURE OF WINEGRAPE PHENOLOGY

As the second scientific speaker following the keynote address, Elizabeth M. Wolkovich, PhD., Assistant Professor, Department of Organismic and Evolutionary Biology, Harvard University, presented findings from her ongoing research on the modeling of winegrape phenology from dormancy to budbreak, flowering, veraison, and maturity. Modeling budbreak is the most difficult, since the date relies upon dormancy. Vines only exit the dormancy stage when they've accumulated enough "chilling hours", or amount of time spent within a cool winter stage. However, vines do not accumulate any chilling hours below freezing, and temperatures that are "too warm" observed during the winter may offset some of accumulated chilling hours. Once vines accumulated enough chilling hours they enter "ecodormancy", where the accumulation of heat drives the plant transition out of dormancy and into budbreak. For modeling budbreak and each stage individually thereafter, Dr. Wolkovich and her team have discovered that each stage has a specific "rate of development" curve with a peak optimal temperature for development. This means that the same temperatures will have different effects on the rate of development and transition between phenological stages for different varietals of wine grapes. Additionally, above the optimal temperature for a varietal, the rate of development drops significantly with higher temperatures. This likely played a role in 2017 in Napa, with many extreme heat events during early summer and the months leading up to harvest. So far the models that Dr. Wolkovich has developed work well for modeling Cabernet Sauvignon and Merlot in the Napa Valley. In an era of warming climate, we may continue to see delayed development due to high temperatures both during dormancy and during the growing season.

2017 RIPENING DYNAMICS IN NAPA: BERRY ACTIVE SUGAR LOADING, BERRY VOLUME EVOLUTION, HARVEST POSITION

Moving further into the growing season, the day's analysis of the 2017 fruit maturity evolution in Napa began after lunch with a presentation by Nicolas Bernard, the Research and Development Manager for Vivelys. He presented the Vivelys grape maturation measurement tools, the sugar loading period, and results from Napa and around California. The active sugar loading period is the period from veraison to physiological ripeness, when sugar is no longer actively added to the berry. One of the most important factors to check at this physiological ripeness, or sugar loading stop, is the brix level. The brix level at sugar loading stop is an indicator of the quality of the ripening. The sugar

brix level at sugar loading stop is an indicator of the quality of the ripening. The sugar loading period depends both on photosynthetic activity (climate, vine water status, and nutrition) and vine equilibrium (yield and leaf area). In Napa in 2017, the average sugar loading stop in Cabernet Sauvignon occurred on the 22nd of August at 20.3 brix, with an average of 160 mg of sugar per berry. This observed 20.3 brix at sugar loading stop was lower than observed in 2016. Both the duration of the sugar loading period and final sugar amount per berry were both lower than the previous two vintages in 2015 and 2016. The shorter period of sugar loading was likely caused by extreme heat wave events in August and early September, right during the key period of active sugar loading. This hypothesis aligns with a sharp dip/stall in the berry volume evolution at the same end of August/ beginning of September time. During those heat waves a 10% loss of berry volume was observed. Finally, the 2017 harvest window was closer to the end of the active sugar loading period than both of the previous vintages. In other words, there was less time between physiological maturity and harvest than in 2015 and 2016.

OVERVIEW OF PHENOLIC EXTRACTION INTO RED WINES: A CELLULAR PERSPECTIVE

Continuing on the theme of fruit ripening and fruit maturity, the Vintage Report's next scientific guest, Federico Casassa, PhD., Professor of Enology/Sensory Analysis at Cal Poly San Luis Obispo, presented his most recent research on phenolic extraction. Professor Casassa began with an overview of the grape skin cell wall composition and seed makeup, in order to differentiate the paths taken by skin and seed tannins when extracted from the berry. In order to share his recent research on matrix-derived interactions between tannin compounds, Professor Casassa shared an experimental fermentation with extended maceration on Merlot. At the beginning of the fermentation, skin and seed tannins were extracted in a relatively linear, 50:50 ratio, before reaching a plateau in tannin concentration. However, as fermentation continued for another ten days, the tannin concentration once again began to increase in a linear fashion. The ratio between skin and seed tannin changed during this second increase in concentration, resulting in a final tannin ratio of 75% from seed to 25% from skin. This brings forward the question: what is happening to release this second wave of seed tannin? Are the seeds "collapsing", or reacting to the higher alcohol content further into the fermentation? Less is known about the seed tannin extraction than skin tannin, which are likely released from the inner layer of skin tissue and are exceptionally prone to fining during the winemaking process. In conclusion, many matrix interactions occur during crush and fermentation with highly reactive tannins and with the presence of anthocyanin. Further research will hopefully shed even more light on tannin extraction.

SMOKE TAINT IN GRAPES AND WINE

Perhaps the single most impactful and devastating series of events from the 2017 Napa vintage were October's wine country fires. As the final presenter of the day, Eric Hervé, PhD. of ETS Laboratories, presented on his latest work, on smoke taint studies carried out by the ETS team since the California fires of 2008.

Research on smoke taint in grapes began in both Australia and British Columbia after a series of fires impacted the 2003 vintage. The research done from 2003 to 2007 revealed that volatile smoke compounds were indeed absorbed by grapes and leaves, and eventually became in a large part bound to sugars (they become "glycosylated"). The main issues with glycosylated compounds is that they are odorless and easily evade sensory detection. During fermentation, however, they are partially hydrolyzed (freed form their sugar moiety), which can cause smoke taint to appear in wine . For this reason, the industry needed markers for grapes that could be analyzed in the lab to estimate the risk of final wine smoke taint. These marker compounds that can be analyzed, by labs such as ETS Laboratories, are guaiacol and 4-methylguaiacol. To the experience of ETS Laboratories, reportable levels of free guaiacol in most grapes indicate some absorption of smoke volatile compounds, with higher levels meaning an increased risk of smoke taint materializing in wine.

Analyses run after fires in California during the 2015 vintage confirmed the empirical guidelines for interpreting grape tests outlined in 2008, and revealed guaiacol concentrations in final wines that were 3-5 times higher than the concentration measured in the original grapes.

Results from the 2018 vintage showed that, probably due to the late timing of the fires and less glycosylation happening inside senescent grapes, final concentrations of free guaiacol in wines were only on average 1.6 times higher than the concentrations measured in grapes at harvest. In other words, the risk of smoke taint appearing in wine appeared lower than would be the case when fire events happen earlier in the season.

With regard to mitigation of smoke taint, Dr. Hervé highlighted that data showed that washing the grapes and reducing the maceration time for red wines did not help reduce smoke taint. For future events involving smoke, two actions to try and mitigate smoke effects are to reduce the number of leaves that make it through sorting, and keep grapes separated into small lots through fermentation (if possible). Unfortunately, once smoke taint appears in a wine, there is at this point no perfect remediation option available.

In conclusion

The 2017 Napa Vintage Report unfolded during the day and followed the 2017 vintage from budbreak to harvest, with discussion topics covering phenological modeling, the state of the climate, ripening dynamics in the months before harvest, tannin extraction in the cellar, and smoke taint analysis results from the wine country firestorms. Overall, the 2017 vintage unfolded with a large supply of moisture in the winter and early spring, followed by a dry late spring and summer alongside a high frequency of extreme heat events. Fruit ripening dynamics were likely slowed by the extreme temperature conditions during the middle of active sugar accumulation. Going into 2018, it will be important to continue to monitor the effects of smoke exposure on 2017 wines, and it will be essential to further adapt practices to mitigate the effects of possible frequent and extreme heat events. We look forward to seeing you next year at the Napa Vintage Report to discuss the 2018 growing season!

What is the Vintage Report?

The Vintage Report brings together scientists, winemakers and industry leaders from all over the world to produce a one-day seminar that engages open minds within the industry to discuss the previous harvest in light of the most recent scientific findings and newly available data.

www.vintagereport.com