Summary 7

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Title: **"Sensory attributes of Cabernet Sauvignon wines made from vines with different crop yields"**

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According to popular wisdom, low yield vines produce better wine than higher yield vines. In a recent survey held at Davis, California in 2000, 50% of California winemakers agreed that "low grape yields produce higher quality wine", whereas 19% disagreed. Scientific evidence that this is true is lacking, perhaps because quality is so difficult to define. For this reason, the authors set out to study what is the true impact of different yie lds on the sensory characteristics of a Cabernet sauvignon wine.

- Yield was manipulated either through 1) **winter pruning**, or through 2) **cluster thinning** at veraison. In the first case, the authors studied 6 treatments pruned to different bud numbers: 12, 18, 24, 30, 36, and 48 buds/vine. In the second case, they studied 8 treatments thinned to different numbers of clusters: 12, 24, 36, and 48 clusters/vine, superimposed to a winter pruning of 24 buds/vine; and 48, 64, 72, and 96 clusters/vine, superimposed to a winter pruning of 48 buds/vine. Their goal was to cover a reasonably wide range of final crop yields, and then study the effects of these various yields on wine sensory characteristics.

- Before proceeding, the researchers verified that the treatments had the intended effect on yield reduction. This is an extremely important, often forgotten, step in viticulture trials. They were able to confirm that the treatments that had received different pruning levels showed yields that varied 3-fold in 2000, and 2.5-fold in 2001 (from 6.1 t/ha to 22.2 t/ha). Similarly, they confirmed that the treatments that had received the different thinning levels showed yields that varied 4-fold (from 4.3 t/ha to 17.5 t/ha).

- To evaluate the wines, they used a technique called descriptive analysis. The first step involved the rigorous training of a panel of tasters (13 judges in 2000, 17 judges in 2001). This type of panel, called an analytical panel, has the task of measuring the intensity of different attributes in wine, not unlike how we would use a highly calibrated and reproducible instrument.

- To ensure the objectivity of their sensory results, the authors took care of every possible detail to avoid introducing errors, such as coded glasses, triplicate presentation of samples, water-rinsing between different attributes, randomized order of presentation, and single-sample presentation for flavor attributes (to avoid carry-over effects from aroma attributes). Each judge tasted no more than 4-5 wines per session, to avoid fatigue. Each judge performed 3-4 sessions per week, for a period of 6 weeks.

- Through the statistical analysis of their results, the researchers were able to test that their panel was functioning correctly. For instance, they were able to see that, even though results differed sometimes when two identical wine replications were scored, the variation due to the viticultural treatments was always larger than the variation due to the replication, proving the treatments did have an effect. Similarly, even though one of the judges tended to score differently than the rest of the panel, the majority of the members did follow a similar trend.

- Once the authors confirmed that they could trust their panel scores, they were able to evaluate the results. For the different pruning level wines, as buds per vine increased, vegetal aromas decreased, fruity aromas increased, and astringency decreased, all significantly, for both vintages. For the different cluster thinning wines, as clusters per vine increased, astringency and bitterness decreased, but in this case there were no significant variations in the aromas.

- The authors emphasize what they consider to be their main finding in this study: **the way a given similar yield was achieved had an impact on the sensory results**. When yield is manipulated by pruning, lower yield wines are more astringent, more vegetal and less fruity. When yield is manipulated by cluster thinning, there is little effect on wine aromas. In other words, **winter pruning was a more effective way to alter aroma attributes than cluster thinning**.

- The authors point out that this different response might be related to differences in the leaf area to fruit ratios of the different treatments. When yield is increased by pruning, both shoot length and leave area are reduced. In contrast, when clusters are thinned, the latter parameters remained unchanged. Both methods of yield manipulation are also likely to affect fruit microclimate differently. Finally, the vine "needs to live" with the manipulation for much longer when you prune (Dec-Jan) than when you thin (Jun-Jul of the following year), so the vine has more time to balance its crop.

What are some of the implications of this study? First, I think the authors succeeded in shedding serious doubts on a long-held myth by establishing that, all things equal, it cannot be assumed that a wine produced from vines with lower crop levels will always be fruitier and of better quality than a wine from vines with higher levels. Instead, the authors show that an adequate, effective leaf area to fruit ratio should be the winegrower's goal. And that ratio does have recommended minimum and maximum limits. Second, when talking about yield and their sensory impact, we are going to need to specify from now on how that yield was attained (not unlike how we need to mention vine density when discussing tons/acre). And this should be no surprise. We all know how pruning, shoot removal, green-cluster thinning, veraison thinning, water stress, can all change final yield. Yet we know how differently each of these practices impact the vine itself. In this paper the authors show that their effect on the resultant wine can be equally profound. Dr. Matthews explains it beautifully in his illustration appearing in The Matthews Lab website: http://matthews.ucdavis.edu. Check under "It's the journey rather than the destination".

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