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Tracking YAN from Veraison to Harvest

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After analyzing over 700 samples for yeast assimilable nitrogen (YAN) this harvest season –including about 400 samples for *Veraíson to Harvest* – we're just beginning to get an idea of the range and variation of YAN content found vineyards across the state.

For this work, we followed changes in total YAN, PAN, and ammonia weekly from veraíson through harvest in all of our commercial blocks that were part of *Veraison to Harvest*.

Components of YAN. A quick reminder: YAN represents the total nitrogen available for yeast to use for its nutrimental needs. YAN is made up of organic nitrogen forms called primary amino nitrogen (or PAN), and an inorganic form (ammonia.) The concentrations of PAN and ammonia were measured via chemical analysis with a spectrophotometer and enzymatic analysis, respectively, then simply added together to determine the total YAN concentration.

Trends in our 2010 YAN samples. Our data suggests that YAN concentrations do follow certain general patterns. But because total YAN is a result of complex interactions between many environmental and physiological factors, including annual climatic variation, it's wise not to over-interpret conclusions from just one year of data. In the graphs to the right (Figure 1) and on the following page (Figure 2), the average concentration for YAN, PAN, and ammonia in each grape variety (Cabernet Franc, Riesling, Chardonnay, Noiret, and Traminette) is shown for each sampling date, starting in late August and continuing until each cultivar was harvested.

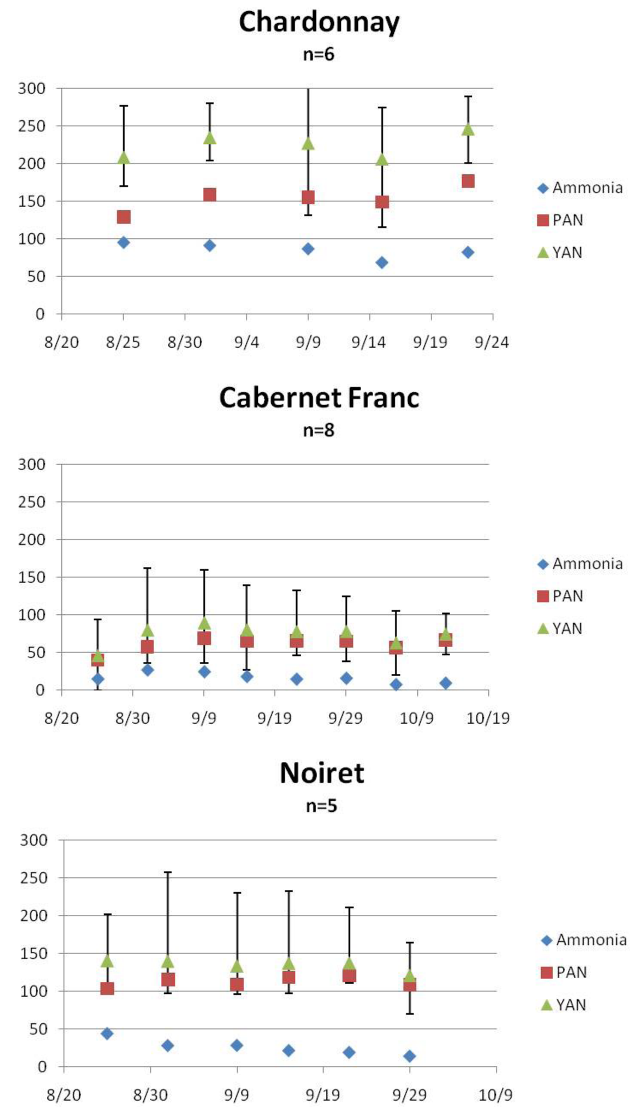

Figure 1. *Yeast Assimilable Nitrogen and its components PAN and ammonium from veraîson to harvest in New York Cabernet franc, Chardonnay, and Noiret vineyards in 2010.*

These composite graphs do not include controls for regional variation, as samples were taken from across the state. This variation is, in part, responsible for the rather large range – as indicated by the vertical 'error bars' for total YAN. These bars, which represent the highest and lowest values (or *range* of values) observed during that week provide clear evidence that predicting YAN values across sites or even within vineyards is a challenge.

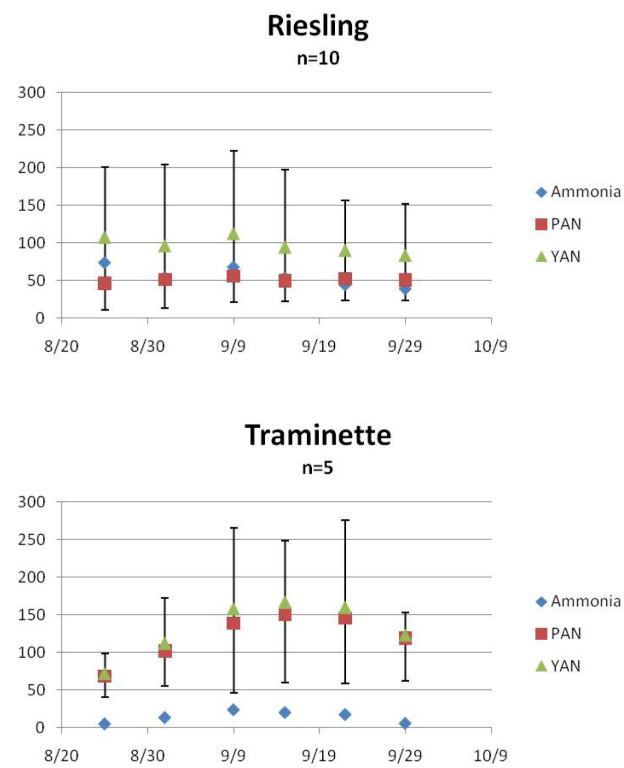

Figure 2. *Yeast Assimilable Nitrogen and its components PAN and Ammonium from veraÎson to harvest in New York Riesling and Traminette vineyards in 2010.*

Cultivars reacted differently. One thing that is immediately obvious is that trends for changes in YAN are much more cultivar dependant than are the usual, predictable harvest parameters of pH, TA, °Brix and berry weight. Data in Figure 1 suggests that as Cabernet Franc matured, it experienced a slight increase in YAN around veraíson, followed by either a plateau or slight decrease. Chardonnay and Noiret showed small changes in YAN, but the ammonia component decreased while the PAN seemed to increase. Finally, Traminette (Figure 2) showed an increase in YANcorresponding to an increase in PAN after veraíson.

Comparison with 1998 Survey. In 1998 a survey of nitrogen compounds in grape musts from California, Oregon, and Washington was performed at UC Davis (Butzke, 1998). **Table 1 (**below) compares the only two varieties that were common to the *Veraíson to Harvest* samples and Butzke's work. In both cases New York had a higher proportion of samples with nitrogen deficiency, with 100% of the samples of Cabernet Franc showing deficiency. These differences could be the result of environment, climate, viticultural practices or all of the above.

Changes in PAN and ammonium components. Generally the concentration of ammonia decreases as grapes ripen, and the concentration of amino acids increases. Not all amino acids are assimilable, so this shift can have a variable effect on the YAN concentration. In the October 6th edition of *Veraíson to Harvest* Chris Gerling reminded us that proline (one of 21 amino acids) is not metabolized by yeast, and therefore is not counted in the PAN or YAN values.

Previous studies have shown that proline accumulated post-veraíson can result in a decrease in total YAN. For example, there's evidence that the evolution of nitrogen in Cabernet sauvignon consists primarily of the conversion of ammonia to proline, resulting in a net decrease in yeast-assimilable nitrogen. We don't know if the same pattern holds across different cultivars, but hope that further data collection will shed light on this. As part of this project, Dr. Lailiang Cheng will be measuring the changes in individual amino acids during ripening – and we will be trying to correlate YAN with yield components, tissue and soil samples, and other relevant vineyard measurements.

In future years, so we hope to provide more clarity on the major drivers of YAN through additional surveys and treatments in the vineyard. One thing is clear: YAN varies from site to site and variety to variety, for reasons that are yet unclear to us. This means that the only way to know for sure what your YAN values are is to test your musts. If you can't test for YAN, it's likely that routine nitrogen addition should be made, though based on the variability we see, it's difficult to predict what the right addition should be. Stay tuned: With additional data, we hope to shed more light on the major vineyard drivers of YAN next year.

In the meantime, our data this year indicate that testing YAN in fruit samples collected a few weeks before harvest will give a relatively robust indication of what you will have in the winery at the start of fermentation. *Sample early. Avoid the rush during crush*.

Reference Butzke, C. 1998. *Survey of yeast assimilable nitrogen status in musts from California, Oregon, and Washington.* AJEV 49(2):220-224

Table 1. *Yeast assimilable nitrogen and its components in a 1998 study of Cabernet Franc and Chardonnay from California and New York (Butzke et al 1998)*

Variety	Location	Number	Ammonium (mg N/L)	PAN (mg N/L)	YAN (mg N/L)	YAN RSD (%)	% Samples <140 mg N/L
Cab Franc	CA	41	48	124	172	38	36.6
Cab Franc	NY	8	10.5	69.5	80	24	100
Chardonnay	CA	224	102	152	254	30	4.5
Chardonnay	NY	6	58	152	211	31	16.7