



The American Society for Viticulture and Enology Eastern Section A Selection of 2011 Research Abstracts

It is my humble opinion that the best wine growers are intellectually curious about their vineyard and want to know what makes it tick. It's the job of the viticulture research community to dissect the clock and explain how it works. I come from a science family and I love this stuff. I also farmed and understand that not everything on a farm can or needs to be explained. But if your curiosity juices do not start gushing after you read this article, well, I'm not sure you can ever be fully engaged with your vineyard, or grow the best grape possible.

It is commonly accepted that yields can have an impact on grape quality. A lot of this relationship depends on the goals of the grower and wine maker, suffice to say if you lower yields you'll end up with less wine and there will be an impact on the bottom line. As wine growers in the Finger Lakes zoom in on high quality Riesling production, the question of cost-benefit is on the minds of every prudent grower and wine maker. Trent Preszler and Justine Vanden Heuvel at Cornell University tested vines at four different cropping levels from 2008 to 2009 to measure the effects on fruit chemistry but also on the ability of grape growers to recover costs at lower yields. The numbers are stark and sobering for those who subscribe to low yields/high quality school of thought. Needless to say, this model is driven entirely by bottle price, and what the consumer is willing to pay. A second paper presented by Mr. Preszler has some fascinating, and potentially disturbing research about consumer behavior and preference for Finger Lakes wines (and no doubt other Eastern wines). It investigates the effect of shoot thinning and leaf removal timing and severity on yield, fruit composition, wine quality and consumer willingness-to-pay. As the region pushes for fine wine, the urgent question is can wine command the necessary bottle price to pay for expensive viticulture practices. This is a very complicated analysis but in 2009, experimental willing-to-pay analysis indicated that consumers would pay an 8% premium per bottle on average for wine made from grapes produced using shoot thinning and late, heavy leaf removal.

A successful primary fermentation is a desirable beginning for any wine, but achieving one can be a problem, particularly in cool climates. Yeast assimilable nitrogen (YAN) is an important part of any healthy fermentation. Mark Nisbet, et al. from Cornell University discovered in a survey of New York wineries that 80% of samples had YAN concentrations below the recommended minimum threshold of 140 mg N/L. The group also looked at the predictive reliability of early YAN testing to forecast a need for amelioration in the vineyard prior to harvest. This would also allow wine makers enough time to test for YAN and take corrective steps in both the vineyard and cellar as necessary.

Imagine if you could just spray something on your grapes and they would get nice and ripe every year. Researchers have known for a long time that abscisic acid (ABA) has a role in fruit ripening. A good way to test this hypothesis is to ripen Cabernet Sauvignon on the Niagara

Peninsula where cool climate Cabernet is pushed to its limits, which is exactly what Gabriel Balint and Andrew Reynolds at Brock University did. In their trials, exogenous ABA was more effective in advancing ripening if it was applied to leaves instead of directly on berries. In their trials, both treatment concentrations “hastened the onset of veraison” and berry weight was lower in the treated plots compared to the control, and ABA treated vines displayed a variation in the amount and ratio of anthocyanins. The authors make this mind-bending statement, “Overall, the use of external ABA was effective in hastening veraison and improving grape composition of Cabernet Sauvignon.”

A second ABA paper was presented by Zhang and Dami from Ohio State University. The stated goal of the study was to improve fruit quality and cold hardiness of commercially important grape varieties using abscisic acid. Their hypothesis is that ABA would improve fruit color in red varieties and advance cold cold acclimation and dormancy, thus improving cold hardiness. To do this they tested different rates of foliar ABA applications on Cabernet Franc and Chambourcin vines in both greenhouse and field settings in 2009/10. Optimum rates of ABA affected shoot growth, dormancy, periderm formation, and cold hardiness. The authors concluded that ABA has the potential to improve the cold hardiness of tender grape varieties. Repeat mind-bend!

Eastern vineyards get a lot of rain compared to most fine wine regions and many vineyards experience problems with excessive vine vigor. Dr. Tony Wolf at Virginia Tech has three very capable researchers assisting him with his vine vigor trials. Cain Hickey and Gill Giese are graduate students, and Tremain Hatch is his former graduate student and now a viticulture extension and research associate. Tony has been reporting over the past few years the results of his multi-variable trial on Cabernet Sauvignon (clone 337) using different rootstocks (Riparia Gloire, 420A, and 101-14), cover crop treatments, irrigation, and root restriction (pruning and fabric bags) to measure their impact on vine vigor and fruit and wine chemistry and sensory quality. It is no surprise that they have been able to identify differences between treatments that indicate the importance of source-sink relationships in vine physiology and growth patterns throughout the growing season. A secondary goal was to see if these treatments had an effect on dormant bud cold hardiness. The most consistent effect was increased cold hardiness of buds on vines grafted onto Riparia Gloire. They report that rootstock differences in mean low temperature exotherm (LTE) were as great as 1.5°C, particularly in the important early fall acclimation period and in spring deacclimation. Riparia Gloire reduced overall vine vigor, yielding pruning weights about 25% lower, but oddly, also 25% higher crop per vine, though crop loads were low on all treatments. When examining the effects of root pruning and various cover crops, reducing petiole nitrogen concentration was a common result in treatments. There was some variability between trial years, for example in 2008 berry skin color density was greatest for vines grown with orchardgrass and least for those with perennial ryegrass, but only for this year of treatment. Cluster and berry weights were reduced in some years. Juice pH, titratable acidity, and soluble solids at harvest were not significantly affected by the treatments. Small lot wine trials were produced in 2010 for evaluation. Other effects found by the group include wines from under-trellis ground cover and root restriction (fabric bags) had increased color density compared to weed-free strips and no root restriction, and vines with root restriction had lower canopy density and reduced berry malic acid at harvest. This work is complemented by vineyard floor management trials on Long Island and Illinois. Alice Wise’s alternative weed management trial is in its fourth year of data using under row cover crop and management treatments.

Though it has been functional for quite some time, the New York Vineyard Site Evaluation System is not only a valuable tool for analyzing a property for potential vineyard development but it contains a large collection of valuable information about vineyard evaluation and development. In a cool climate, proper site selection is critical for the production of high quality wines. Alan Lakso, et al. at Cornell University have used the GIS data base at Institute for Application of Geospatial Technologies to process soil characteristics, climatic and topography parameters to provide basic site information for site decision support. Site suitability maps are generated based on the soil and climate requirements of specific grape species and varieties. It can even model the “lake effect” of the Finger Lakes using relationships of topography and temperature patterns. This technology helps to reduce the risk of adverse climate and poor soils when choosing a vineyard site. You can visit NYVSE at <http://www.nyvineyardsite.org/>

Dr. Lakso is working on another amazing cutting-edge technology project that could revolutionize vine water status monitoring in grapevines. While irrigation is not foremost in the minds of most eastern viticulturists, there are certainly dry years when water scheduling and management can help to improve the quality of wine grapes. Using nanofabrication tools and techniques they are developing a novel micro-electro-mechanical system (MEMS)-based microsensor that will accurately, continuously and directly measure plant and soil water status. The small microtensiometer will be embedded in the stems of woody plants and soils to gather real-time data, which can be transmitted via wireless networks to GIS centers that will allow growers to fine tune their water management practices.

Gavin Sacks, enology professor at Cornell University is brilliant at connecting vine physiology to wine chemistry, and actually makes it interesting. His work on methoxypyrazines and how to manage them has had a significant impact on wine quality. Now he is investigating fruit zone management practices and their impact on various sensory compounds in Riesling. Using five cluster exposure metrics of varying spatial precision on two sites at two phenological stages he is measuring eight compounds that are known to contribute to the Riesling flavor profile, such as glycosylated TDN (petrol) and vitispirane (flowery), which are positively influenced by cluster exposure layer or cluster exposure flux. The relative predictive power of the cluster exposure metrics was CEFA > log CEL > CEL > PIC ~ %PPF. You’ll have to read the paper to identify the acronyms.

Dr. Sacks is also working on identifying and characterizing the key odorants in non-*labrusca* grape species such as *V riparia*, *cinerea* and *vinifera*. The foxy aromas in *labrusca* originate from methyl anthranilate and 2-aminoacetophenone and I have long been suspicious that these compounds can cross contaminate other wines, especially delicate white wine varieties. He is also examining the grape-derived odorants with vegetative and early aromas.

There are many more papers in addition to these, all focusing on issues relevant to wine growing in the non-western states. Collectively they represent a very satisfying blend of basic and applied research, some will take many years to yield applied results, some help to affirm what we already know but may not be well-understood, and others offer information and recommendations that growers and wine maker can use immediately. Many of these projects rely on the cooperation of commercial grape growers and wine makers. It is this collaboration that will really help to push the quality and production of wines in the Eastern U.S.

I think most people in the wine industry take this work for granted. They don't feel connect to it or that they benefit from it and that's partly the fault of researchers and educators like me. A few really care and enthusiastically support viticulture and enology research. Yet the knowledge and technology generated by our research community benefit everyone in the wine community. As support dwindles everywhere it is important for the wine industry to be, at minimum vocal, and at best participatory, in its support of research and extension programs.

There is a link to the research abstracts on the Pennsylvania Wine Grape Network website. The full research paper for each abstract can be found on the American Journal for Enology and Viticulture website but you must be a member of ASEV to gain access to them. For this reason alone, membership is well worthwhile.

Mark L. Chien
Viticulture Educator
Penn State Cooperative Extension
<http://pawinegrape.com/>
December, 2011