

Some Observations of California ~ Pennsylvania ~ Bordeaux Viticulture

I was in Davis for a National Clean Plant Network meeting and took the opportunity to visit some vineyards in Napa and Sonoma. My notes are made while frantically scribbling on a small notepad while bouncing around in a truck or walking up and down steep hills. I try to be as accurate as I can, but please understand that these are just rough notes from informal conversations. A version of this article with photographs can be found on The Wine Grape Network web site at <http://winegrape.cas.psu.edu/>.

Daniel Roberts and Mark Greenspan from Integrated Winegrowing in Sonoma County were my hosts for this fascinating tour. The weather had been unusually cool in the north coast and there was clearly concern about ripening red varieties. WI's brand of wine growing take carefully selected varieties to the limits of where they can ripen, so if Mother Nature throws a curve ball, the risks are much higher. They cannot begin to understand the vintage challenges in the East, even in a relatively fine year like 2005, so it was interesting to hear how they cope with climatic deviation.

It is not easy to make the leap from high quality, arid climate viticulture to the brand of wine growing we have here. At the high end, theirs is driven by mind-boggling amounts of money and a singular focus on achieving quality. I still believe that lessons from other regions are always instructive in what we do here. I just wish we could get \$10,000/t for high end Cabernet Sauvignon. That makes a lot of good things possible.

It was interesting how vine nutrition and water are used as tools for regulating vine, crop and berry size. Very low vigor soils are characterized by shallow rooting depth, significant rock content, and low nutrient values. East side soils are more reddish brown in color and west side soils are white to light gray volcanic ash and can have very low pHs making phosphorous deficiency and aluminum toxicity real problems. The soils are prepared in a unique way using a winged plow (Figure 1) to lift the soil and lay it back into place right on the vine row. This loosens the soil but does not degrade soil structure. It also



Figure 1: Winged Plow

creates a uniform root zone for the vines. If pH is too low, gypsum (5 t/a) and lime (3t/a) are incorporated as deep as possible. P is used as a limiting nutrient in that, if held to very low amounts, will regulate vine vigor (Figure 2). It is regularly fertigated to vines to keep it at threshold levels with triple super phosphate being the fertilizer of choice. P and Fe are the only two nutrients that can recover color from red or yellow leaves back to green so P (Figure 3) is the choice as a tool. Vine nutrition is very closely monitored by taking three petiole tests per season at bloom, bloom +30 and veraison. Fertigation programs are based on this data. I can't

recommend this kind of micro-nutrient management in our vineyards, but it is interesting how nutrition can be used as a tool for managing vine size.

Irrigation is the other key tool for delivery of fertilizers but also to regulate water to the vine at maintenance, not replacement, levels. Wine growers in Bordeaux and California try to induce slight stress on the vine



Figure 2: low vigor hillside Merlot

after bloom which helps to limit berry size. Then water is metered in to maintain vine functions until just before veraison when it is again held back to induce shoot cessation. After that, careful monitoring of soils with Stevens soil probes and leaf tissue pressure bombs are used to adjust irrigation amounts. Daniel found that Syrah can withstand up to -19 bar, a level that would cause Cabernet Sauvignon to defoliate. Syrah does not close its stomates as readily as other varieties and must be pushed to ripen fully. Ideally, leaves in the mid-cane area are kept green and active – basal leaves are old and non-functional and apical leaves are still net sinks for resources. 3 gal/2x/wk is an average irrigation regime in late season conditions.



Figure 3: Phosphorous deficiency in leaves

Once a detailed soil survey is done, rootstock assignment is critical to limiting vine size or creating a balanced vine. Soil pits are an essential tool for this evaluation. 101-14 accumulates potassium and is very nematode resistant. Riparia Gloire and 420A are used in deeper soils – deep being a relative term here, these soils are still shallow and infertile by our standards. 3309C is used on shallow soils. Others use 110R. 5C is very drought susceptible (and also to crown gall), and is not used. 140R is vigorous and needs more water to support the growth it generates. If soils are high in sodium 1103P is the rootstock of choice. 1616C is close to 101-14 in performance and does well in wet, spring soils and has excellent rootknot nematode resistance. Rootstock vigor relationships are not linear and it takes great skill to tweak performance using water and nutrients.

Cover crops are rarely used but where soils need additional drainage, tile and cover crops are installed. In the interest of limiting vine vigor, cover crops are mowed and clippings are removed from the vineyard. They do not want to build up nitrogen or organic matter in the soil. Most grasses used are fescues, low growing and dormant through much of the season. They generally fill about half of the row middle. It was suggested that C-4 grasses may be effective in Eastern soil and climate applications because of their tremendous transpiration rates. Corn is a C-4 plant. They respire about 10 times as much water as a normal grass. If cover crops are used, irrigation must be available for dry years. Compost is used to ameliorate soil structure, not to build organic matter or nutrients.

Climate is so important to wine quality. The fine line between meso and micro climates are tested in these viticultural schemes where very slight gradations in aspect, elevation and slope may change ripening patterns. The objective is to grow a particular variety on the cool edge of its ability to fully ripen in most years. On cold nights, when the temperature drops below 40F, the ripening process stops. Diurnal shift is more important than daytime high. If temperatures stay in the 70s/40s it may take 30 days to move five brix. Adcon weather stations are used on all sites to collect valuable data for future use.



Figure 4: Hillside vineyard in western hills

Noir. Among Pinots, the Martini clone is not well respected but the Swan and now Jackson clones are favored.

Variety and clones are matched microscopically to site soil and climate. The varieties are quite predictable, perhaps with the exception of Rudd Vineyard's attempt to grow top quality Sauvignon Blanc on steep west side slopes. Merlot, in general, ripens ahead of Cabernet Sauvignon at 24 brix vs. 26-28 for CS. The favored Chardonnay clone is the old Wente selection with small clusters and shot berries – its ampelography is very similar to Pinot Noir. Dijon clones have fallen from favor, except with Pinot

Row direction interacts with climate and is very important in sunlight intense arid climate viticulture. A compass is considered an essential tool. Vineyard developers must get the orientation just right to deflect intense mid-day sunlight and also take full advantage of the sun in September during the critical ripening month. It was possible to taste a dramatic difference in berry ripeness between the south and north sides of east/west rows – there might be a 2 week gap between picking the south and north sides. It was easy to tell differences in berry and leaf temperatures. NE – SW rows are becoming more common. Remember the next time you drive through Napa Valley on Rte 29. It is not a N-S road and, in fact, sometimes it is oriented E-W.

6x4 spacing (1800 vines/ac) is becoming commonplace. The distance between rows doesn't matter, only in terms of yields per acre. Distance between vines limits yields. In Bordeaux, the great chateau get < 1 kg/vine on one meter spacing. In these vineyards 2-3 lbs/vine is acceptable. Trellis is vsp with generally thin canopies but I noted one Abreu farmed vineyard retrofitted with 3x 6" crossarms that are used to "fluff" the canopy in order to get filtered light into the interior. This dulls the intensity of sunlight and helps to create a dappled sunlight effect. It was reminiscent of the box appearance of the low vsp systems in Bordeaux and Burgundy.

Micro-jet misters are used to prevent heat spikes which dramatically affect quality in red wines. During peak daytime temperatures, misters can lower ambient canopy temperature by as much as 15F. It doesn't create enough additional relative humidity to create disease problems, most of the water evaporates before it lands on a leaf surface, but just enough to lessen berry dehydration. Because the drops are so small, the prism effect from overhead irrigation is avoided.

As far as I can see, disease is not a problem in these vineyards. Most leaf issues had to do with nutrient deficiencies. Oddly, gophers, wild turkeys, deer and other vertebrates are the big

problems now. I was told of a bluish fungal disease that affects Pinot Noir and Chardonnay in the very cool, often foggy Sonoma Coast region. It forms along cracks in the berry and copper dust is used to suppress it.

Integrated Winegrowing Viticulture Summary:

- Soils – low nutrient, low total available water, high rock content, low vigor
- Water – timed, deficit irrigation
- Nutrition – micro nutrient management, especially with P,Mg,K
- Climate – at meso and micro level, the coolest to fully ripen a variety, no heat spikes
- Clones – correct choice is critical to quality
- Grapes – small clusters, small berries
- Rootstocks – mostly low vigor and nematode resistant. Top choices are Riparia Gloire, 420A and 101-14
- Cover crop – low growing fescue, dormant in summer
- Row direction – important for moderating light intensity and heat
- Slope and aspect – critical in hills
- Spacing – optimal 6'x 4', closer if estate vineyard
- Most important tools: eyeballs and brain.

At the new Ovid Vineyards on Pritchard Hill in the hills high above the valley just east of Rutherford (Figure 5), a David Abreu* vineyard is producing exceptional quality fruit, at least to my palate. It is a different kind of viticulture that Daniel Roberts, perhaps a little less extreme but



site selection is at the very heart of growing fine wine.

Ovid is 15 acres on 6x3, vsp with double guyot training at 20" with the canopy topping out at 60", 3-4 shoots per foot, extremely careful training with the heads right below the fruit wire (Figure 6), very consistent pruning with well balanced canopies but not parallel shoot positioning – the canopies are in such balance as to not require much positioning, hedging (once this season) or leaf pulling. It just looks like a well balanced canopy (Figure 5). Vines were cropped at one cluster per shoot, but after a recent thinning pass, there were only about 9

Figure 5: view from Ovid

clusters on each vine, shoulders were removed. Berries were tiny (I would guess less than 1 gram each)

and clusters were long, conical and loose (Figure 6). The fruit tasted very sweet but not jammy and the seed and skin tannins were very soft. I might guess that the elevation might help to moderate the heat and ripening occurs more slowly, allowing for lower alcohols and better flavor development. Soils are rocky, very well drained, volcanic soils with large boulders. I saw some guys picking up rocks in a recently cleared field and it looked like they would be there for months. Andy Erickson, the wine maker, emphasized the importance of having a good crew to do the work, which is unbelievably consistent throughout the vineyard. If uniformity in viticulture is important to quality, they have it figured out here. The same crew that works the vines, picks the grapes (starting at 2 a.m.) and then works at the winery on the sorting tables.

This is quite a remarkable process with three guys dumping grapes from 30 lb boxes and sorting them before the destemmer. A Delta destemmer is running so slow as to be barely audible, and no rollers crushing berries and seeds. The whole berries fall onto a vibrating, slotted belt that shakes green shot berries and other small pieces into a bin and the remaining berries fall onto a 15 foot conveyor where 8 guys, 4 on a side, pick out unripe berries and pieces of stem. The grapes then fall into a chute and directly into a concrete fermentation tank. The amazing care and gentleness of the whole process is designed not to bruise the fruit.



Figure 6: balanced canopy and crop

Clonal selection is important here: Cabernet Sauvignon 4 and 337, Cabernet Franc 327 and 332, Merlot 181 and a suitcase clone of Petit Verdot. Rootstocks are 110R, 101-14 and 420A. 420A is very drought tolerant with medium vigor. 3309 get stressed early and needs water. August heat is deflected by NE-SW rows. Row middles are clean and winter covers are planted to control erosion.



Figure 7: Small, loose clusters and berries on Cabernet Sauvignon



Dumping and Sorting in
Front of destemmer

Shaker after destemmer

Sorting after the shaker/
destemmer

David Abreu is self-taught viticulturist and has been developing and managing many of the great Napa vineyards since 1980, including Grace Family, Pahlmeyer, Araujo, Bryant Family, Harlan and Viader. He makes his own wine from the Madrona Ranch which sells for more than \$200 a bottle. His vineyard development costs may exceed \$100,000/ac and management costs are about \$12,000/ac. While legendary as a wine grower, he is somewhat controversial due to his vineyard development on steep, erodable hillside around the valley.



Figure 8: Bedington soils, lots of rock

Bedington clay loam (Figure 8) with a very high percentage of fractured rock, is uniquely suited for wine grape production. In dry years, like 2001 and this year, the grapes are exceptional. Many of you know Jan's vineyard because he is my default teaching vineyard for extension workshops. His Scott-Henry (Figure 9) is about as well executed as, well, Scott Henry's. I know because when I was in Oregon I saw Scott's. Jan is in a typical Eastern quandary. In dry years his vineyard would probably be great on close spacing, vsp but in wetter years the SH is perfect for handling the additional vigor. But dry years

Can we draw a line between this brand of wine growing and Pennsylvania? Probably, but maybe not just yet. It will come when we discover the right soils to perform this kind of viticulture on. I suspect they are around, in particular in places around the Lehigh valley and down in Adams and York counties. Here in Lancaster County, Jan and Kim Waltz are already more than half way there. Their vineyard, on the top of an eroded hill of



Figure 9: Scott Henry training

are always better and he is harvesting some superb grapes this year. The viticulture is almost as perfect as we can hope for here with a balanced canopy fitting neatly in all the Smart parameters. And who can argue with yields of 15-17 lbs per divided vine? Compare these to the 2-3 that our colleagues in California are getting. Is there a difference in quality? Yes, the north coast fruit has greater intensity, the berries are much smaller, but in the final analysis of wine I'll bet that only the most discerning wine drinker could tell the



difference. Jan has converted some of his vines to vsp (Figure 10) but is still using four canes in a divided system. Note the slight difference with the upper SH canopy in Fig . Even with this system, which the book says creates overcrowding, he achieves a balanced canopy. A lot of reason why this works is because of Jan, who is as meticulous and creative a grower as we can hope to have. My great curiosity would be for him to find his most depleted site and plant 6x4, vsp and try, in years like this, to go for the teensy berries and see what he can do with the wine. If it makes the 90+/\$100 bottle, then we'll know we have arrived.

Jan is has planted Dijon clones of Chardonnay (Figure 8) and Sauvignon Blanc, the latter a variety I hope might be feasible in our climate. His new vineyards are beautifully developed and maintained and the first crop was excellent



Figure 11: Two year old Chardonnay vines



Figure 12: Chardonnay Dijon clone 96

Jan runs a pretty standard but incredibly well executed management program on the vineyard. Disease control is superb with just a mild outbreak of powdery mildew in one temperamental spot in the vineyard. His weed control is excellent with a Braun grape hoe and spot Roundup applications. I can't fuss about his canopy management, while not parallel positioned, the overall affect of achieving balance offers great leaf and fruit exposure. Mostly, though, it's the time Jan spends in the vineyard and his willingness to learn and pay attention to every detail and no expense is spared. It takes this kind of commitment and devotion to make it al work. This kind of viticulture can be applied to all levels of grape production, perhaps not as feasible in natives but certainly adaptable to hybrid varieties. Attention to detail and bring knowledge to bear on wine growing will benefit any site, any variety on any type of trellis.



Nancy Waltz harvesting Merlot

As I thought about my visits and talked with Rutger de Vink (RdV Vineyards in Virginia) about his recent visit to Bordeaux, I once again tried to connect dots. Kees van Leeuwen, the exceptional viticulturist from Ch Cheval Blanc who visited last year for ASEV in Roanoke spoke of two primary goals for making great claret – achieving small berries and shoot cessation at veraison. It sounds pretty simple. The corollary to what the wine growers in Napa are trying to do is quite astonishing because

the wine styles are generally quite different.

In fact, hearing Rutger describe his visit to Cheval Blanc made me think he was describing the same vineyards I saw in California. Very odd. That got me to thinking about whether wine style is preordained according to terroir, even if the viticultural goals are the same. It might seem odd that two regions with completely different stylistic objectives would find themselves similar viticultural goals. I am encouraged because the clay soils which often make the best wines in Bordeaux, may have similar properties to our own and soil in Bordeaux is ever so much more

important in a wet climate than an arid one. Rutgers says they look for clays with high shrink and swell capacity, about 12-14" with plenty of rock to assist drainage. These clays hold moisture for years but drain fairly well in wet ones. As in California, rootstocks are important, primarily for their phylloxera resistance, but also for their ability to moderate vine vigor.

As in California and Bordeaux, water and nutrients are the keys to producing really good wine. I'll guess that the best wines made in our region will be more like those from Europe because of the difference in sun load. California just gets so much sunlight, almost to the exclusion of all else. And as the growers refine their viticulture, they are actually trying to temper the effects of all that light. I wish the answers were as simple as dry years make good wines, wet years don't. The viticulture I saw in California is almost formulaic in nature, but it takes tremendous experience and knowledge to make it work correctly. In our region, until we are able to understand the very complex and seemingly infinite relationships between vine, soil, water, light, temperature and humidity, we'll always be struggling to build consistency and quality into our wines. The bordelaise have had centuries to observe and learn and smart people like Kees are figuring it out. We have to learn from them and then learn ourselves. I'm always impressed by what I see in other places. There is a real "wow!" effect in areas like Napa and Bordeaux. But what I always bring home is that we aren't that far from them. We can do it, too. To me, it seems completely possible that we can take most of what I observed in California on this recent trip and plunk it down on the best sites in Pennsylvania and grow really great wines here in good or better vintages. The work to be done is finding the best places for grapes and applying the viticulture to it. Does the world need another great Napa Cabernet? Wouldn't a great Cabernet from Pennsylvania be much more exciting?

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