

High Quality Red Wine Production: trying to determine the effects of soil (water) and slope (drainage) on vine vigor

Considering 3 viticulture characteristics on 2 sites in N. Virginia: soil – slope – shoot tip termination

Consider the differences in the vineyards and wines between Steepvyd and Flatvyd in a normal rainfall year with slope and soil as the key quality parameters. Is it, as Olivier Humbrecht says, all about getting terminal bud termination in July?

2008 has developed as a typical vintage in the Mid-Atlantic region with plenty of regular rainfall and humidity, in the form of afternoon thundershowers with high nighttime and early morning dew points. Soil profile is largely charged to field capacity.

The French believe that soil is the most important component of terroir. Dave Lett in Oregon viticulture places climate ahead of soil in its contribution to wine quality. Of course, both are vital but which is more crucial in the challenging growing conditions of the Mid-Atlantic region?

There are two new vineyards, both very high quality and expensive development projects, in Northern Virginia, that may help us understand the relative importance of these two terroir components in this region.

Flatvyd is on the gentle rolling plains just south of Middleburg and planted in 2004 and 2005. Soils are sand mixed with clay on gentle terrain with various aspects and 0-3 percent slope.

Steepvyd, about 15 miles west is planted in greenstone and granite on steep slopes, varying from a few percent to up to 30 at its steepest with aspects from northeast to west. It was planted in 2006.

Both are trained on VSP at 2.5m x 1.2m. Vines are new clones of Bordeaux red varieties and devigorating rootstocks, in the case of Flatvyd, Slate Quarry Riparia, a clone of Riparia that is even more vigor limiting than Riparia Gloire. Steepvyd is almost all RG with some 420A. Vines at both vineyards are in their fourth leaf.

The intent at Steepvyd has been since its inception to grow a small and balanced vine, with low yields per vine to make the most concentrated red wine possible. The Steepvyd site was selected solely based on its ability to fulfill fine wine expectations. Flatvyd is an existing farm with viticulture well adapted to its soil conditions.

Small vines that are well-balanced help to promote earlier fruit maturity and may allow the crop to avoid harvest season threats such as rain and frost. With proper management it can promote greater uniformity within and between vines.

Rainfall is a great challenge in the region. While annual averages are typical for many other great wine regions, the distribution is problematic with greater amounts during the critical harvest season than are desirable. Hurricanes and hail pose additional weather threats to fine

wine production. Finally, a dominant concern in the continental Eastern climate is winter kill, which can extend into Northern Virginia. Climate patterns for high quality viticulture have not been mapped in the region. Rain shadows influenced by the Appalachian Mountains in the eastern foothills may offer a significant advantage. Weather plays a significant role in any vintage. Enough rainfall is needed not to stress the vine for water or nutrients. Yet too much water at the wrong time can activate shoot tips and cause the vines to lose their focus on ripening fruit.

Temperature is also an important role player during the ripening period. A “sweet spot” of temperature ranges allows the berries biosynthesis processes to form flavor and phenolic compounds responsible for mouth feel/texture and those flavors we associate with particular grape varieties. The role of humidity or daily diurnal temperature shifts are less well understood but influence physiological processes. Fruit zone and vineyard floor management can help to influence and regulate temperatures. Early-mid summer rains have some effect on wine outcomes but mostly influence canopy management and disease and pest problems. The better drained soils help to moderate canopy size and allow devigorating rootstocks to function better.

Soils should be low to moderate in nutrient value, especially nitrogen (1.2-1.8) and organic matter (< 2%) in order to assure a small vine. However, no nutrient stress should be placed on the vine. A moderate amount of water stress at correct phenological development period can influence berry size and shoot tip termination. The objective is to grow a small to moderate size vine in fine balance and good health whose shoot tips will cease growth between lag phase (seed hardening) and veraison.

Soil structure and texture is critical for drainage. Slope can assist drainage and this influence increases as slope increases (if well-drained soils exist). One objective is to move soil moisture as quickly as possible to field capacity by surface and subsurface drainage and then further towards permanent wilting point via favorable subsurface drainage features. The effective rooting zone will have an influence on plant/water relations as vines with shallow roots systems will dry faster as water drains and evaporates past the rooting zone. In the example of Flatvyd and Steepvyd, perhaps the most variable features are soil texture/structure and slope. At Steepvyd, those qualities were sought specifically to empty the effective rooting zone of water as quickly as possible after rainfall, ideally draining to field capacity very quickly and moving beyond towards permanent wilting point or the point when a vine will have easy access to water (and therefore nutrients as well). The soils total available water capacity was determined through careful study and the proper rootstocks were assigned. The granite-based soils at Steepvyd were selected mainly for their drainage features

Higher vigor – left
Lower vigor - right



Canopy size on August 1 and effects of soil change at VydX on August 1



Canopy at VydQ on August 1

High density spacing, a small and balanced vine and low yields per vine can shorten the vegetative cycle of the vine and help to promote fruit ripening. An earlier harvest may offer several advantages to wine quality, including picking before hazards such as frost, hail, rain, disease, etc. It affords more time between harvest and leaf fall for the tissue lignification and vine acclimation as it prepares for winter. It compresses the ripening process giving late red varieties, in particular, a greater opportunity to

reach full maturity and thus to make better wines – this means primarily lower acidity and better balance. Methoxypyrazines must be regulated by thoughtful canopy management. Yields should be determined by pruning and minimal or no green harvest adjustment. All fruit must be completely disease free.

At Flatvyd, the sandy component of the soil assists drainage. It would be interesting to compare the water holding and storage capacities of the two soils and they may be similar but the difference in slope may be the most significant feature, giving Steepvyd an advantage when water becomes a problem after mid-summer.

Veraison to a few weeks post-veraison is the best time to observe and learn from vines in that season. With the canopy and crop set, the results of the viticulture and environmental conditions are largely determined. Weather until harvest will have a dramatic effect on fruit quality, but further manipulation will not have a significant impact, either good or bad.

Both vineyards were visited on the morning on August 1, 2008. Canopy factors observed include:

- Leaf size
- Leaf color
- Condition of shoot tip – degree of termination
- Extent of tissue lignification
- Lateral production – number, position and relative age
- Shoot diameter, density, position and length
- Internode length
- Canopy density in leaf layers
- Amount and timing of leaf removal
- Number of hedging passes

- Relative berry size
- Relative cluster size
- Amount and timing of green harvest
- Percent and distribution of veraison
- Additional information that would be interesting to know:
 - Leaf or stem water potential
 - Level of total and plant available moisture
 - Precipitation amounts and distribution

As a general observation, Steepvyd was much more mature than Flatvyd in virtually every category. Perhaps the most notable feature was 50%+ veraison in Merlot at Steepvyd and 0-10% at Flatvyd. Leaf color was also dramatically different with still deep green leaves at Flatvyd and light green yellowish leaves at Steepvyd. Shoot tips had terminated in the past week at Steepvyd with some minor terminal lateral growth due to recent rains but shoots and laterals were still growing vigorously at Flatvyd. Canopy densities also reflected these differences in shoot and lateral growth. At Steepvyd, deeper soils (same rootstock) produced vines with greener and bigger leaves and larger canes. Steepvyd fruit was characterized by loose clusters and small berries.

One interesting question that is worth considering as these vineyards mature is will they produce wines of similar quality at different vine sizes and balance on similar vine spacing? It appears that Flatvyd will always have the bigger vines. Will or could meticulous viticulture, if applied to Flatvyd, provide enough compensation for the additional vigor imparted by the site? Will the vine vigor moderate over time? According to pruning weights, if the Flatvyd vines exceed 0.4 lbs/ft of trellis, would the fruit quality (and quantity) benefit from a divided canopy?

Conclusion: In a high rainfall region and vintage, soil and slope trump climate in importance unless a consistent rain shadow can be found. A well-drained soil with as steep a slope as possible will help to promote vine and fruit ripening. A cooler area/site with proper variety-clone-rootstock assignment needs to be matched and viticulture must be superb. High density plantings assist in producing fine red wines.

Wine making factors:

- Excellent wine maker who can find balance and quality in a difficult vintage
- Minimal handling and intervention whenever possible
- Well-equipped, clean, well-drained, well-aerated, functional winery facility
- Winery sanitation
- Phenolics and acid balance in the vineyard
- Hand (?) harvest dry, clean and perfectly mature fruit
- Sort grapes 3x – in the field, pre-destemmer, post-destemmer
- Gentle handling of fruit, must and juice
- Primary fermentation for maximum extract (rotary fermenters?)
- Acid and tannin balance tools
 - Micro-oxygenation?
 - Blending – a great and underutilized skill in the East

- Enological tannins?

Tasting notes:

2006 Flatvyd – red, garnet medium color, very fruity aromas with black cherries, medium weight and texture on the palate, nice balance with good oak and tannin, savory and slightly herbal on the palate, good acid structure, medium finish. This is a safe and somewhat conservative wine but a good start for a new winery. 3 year old vines.

Steepvyd has not yet produced a wine so the ultimate proof of these hypotheses cannot be extended to their site and viticulture. 2008 is their first vintage and the wines look promising. In such a new vineyard it is difficult to tease out the quality effects due to precocious young vines with shallow roots or the compilation of viticulture effects by design. We will have to wait and see if this is one recipe for excellent wines in our region.

2006 Linden Hardscrabble – deep, rich, red/purple color, nose with dark fruits, spices, on the palate this is a wine with great depth and concentration, solid mid-palate, rich, smooth and round in the mouth with a nice oak overtones and tannin balance, enough to let you know that the fruit was ripe, ripe, black fruit, great length and balance on the finish. This is a very fine Hardscrabble in a vintage with a difficult end game. 25 year old vines.

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