PENNSTATE

Cooperative Extension
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Steep Terrain Viticulture in Virginia

If you watched or read anything about the recent U.S Open golf tournament in Merion, PA, you learned much about the essentials of good drainage in an application far away from vineyards. Torrential rains pounded the course early in the week and all the pundits said the short course would be soft and easy, a sitting duck for the best golfers in the world. But the groundskeepers knew differently and kept quiet. In the end, the course beat the players with the winning score of +1. Drainage triumphs over Mother Nature!

Hillside vineyards have held a fascination for wine growers since ancient times. It seems wherever the Romans planted vines – Piedmont, the Rhone Valley, the Mosel or Rheingau, they were always looking for slopes. It's said that they always looked for the places where the winter snow melted first.

In a conversation with two very experienced wine growers recently we tried to think of humid wine regions around the world and only a few come readily to mind – Bordeaux, Tuscany, Piedmont, Germany, north island of New Zealand and the Mid-Atlantic, but we are in a special niche of fine wine production. Rain imparts a particular character to wine and if in excess not necessarily desirable, and brings particular demands on growing grapes as we know from vintages like 2009 and 2011. You could say the smart money goes where it's warm and dry, but they can't make wines with the character of a German Riesling or a Cabernet Sauvignon from Pauillac.

The distribution of rain and its impact on soil moisture and vine behavior is the key. Rutger de Vink, owner of RdV Vineyards asked Kees van Leeuwen, at the time viticulture director at Chateau Cheval Blanc and professor at the University of Bordeaux what was the key in Bordeaux to unlocking great wine, and he replied the ability to stop vegetative growth before veraison. Ah, it sounds so easy, and is, if you farm in a dry climate. But in the Mid-Atlantic, it is a challenge that can only be met with a vineyard that has particular attributes including soil drainage, slope, and meso and micro climates that support the viticultural and wine objectives.

The Virginia Vineyards Association organized a steep terrain workshop and met at two appropriate sites, RdV and Glen Manor in Northern Virginia (Linden is also in the same neighborhood). It was an exciting opportunity for the 170 participants to learn how steep vineyards impact wine quality. When you first view RdV and GMV, you just know these growers want good wine really badly. Slopes are a maximum of 30 percent and average 20. The cost of development and farming steep vineyards is much higher than more gentle sites - usually vine density is greater and soils are rocky. One person asked how they were able to spend all day

You would be hard pressed to find a better place for a meeting

walking up and down the hills. The answer was easy when you looked at Rutger and Jeff and their crews, they all look like marathon athletes.

Finding any vineyard site begins with what kind of wine (type, style and price-point) is intended to be grown and then finding a site with attributes that service these goals. Here I will simply report what was said with a few of my own impressions. It is evident that at both vineyards the wine goal is the best red wine possible, specifically RdV's Lost Mountain and Rendezvous (both 2013 top 12 in Virginia Governor's Cup) and GMVs Hodder Hill (2012 Governor's Cup winner), both are Bordeaux blends. This is not to imply that only steep sites can produce excellent red wines, but they impart their own character to the wines made on hillsides.

Clearing the land is not easy and can be expensive. RdV started out mostly as a wooded, hillside property and it is especially difficult to imagine a vineyard through the forest on a piece of property – it is a leap of faith. 30 acres were cleared for vineyard. Clearing land involves heavy equipment that can take a severe toll on the soil s one rule is do not work on wet soil. That means not destroying the soil texture by rolling or dragging logs and stumps down the hill but transporting them down the hill. Shake soil off of stumps before moving it. In the East, clear land in the late summer when it's dry. Even so, cleared sites should be amended with compost to restore damaged soil structure by heavy equipment. It was suggested that the land owner fully understand laws regulating the development of land and especially the removal of trees. Comments from Rutger and the audience said it costs $3000 to $5000 per acre to clear a lot properly.

The intent at RdV was always small vine viticulture aimed at producing a classy Bordeaux red blend, and the site selection process was directed at this goal. Rutger hired Alex Blackburn of Soil Foundations in Virginia to do the initial soil mapping of the site. Alex dug hundreds of soil cores to develop a detailed soil map of greenstone and granite sub soils. The site is predominately granite and photos of cuts into the hillside for the winery caves reveal the rock in stunning fashion! Granite was needed to support the intention of growing a high quality and high priced Bordeaux red

blend with Cabernet Sauvignon, Merlot, Cabernet Franc and Petit Verdot. Integrated Winegrowing, viticulture consultants from California were brought on to do more soil evaluation to help properly design and develop the vineyard. So much of the success of a vineyard depends on all the patience and skill of site selection, followed by the hard work of evaluation and design that must be done before the first vine is planted. This is when a great vineyard is made. Even with all this investment of research and design, it's almost impossible to get every decision correct. A week before the meeting, a grafting crew from California had budded sections of Petit Verdot to Merlot to Cabernet Sauvignon – the PV had too much cayenne pepper and the Cabernet Franc was too leafy. CS 337 and FPS 4, Merlot 181 and Cabernet Franc 214, and PV 400 are the main clones that are planted. New PV clones should be available soon. Rutger encourages clonal diversity in the vineyard. My friend Jeff Newton at Coastal Vineyard Care in Santa Barbara said that new vineyards were planted there with the intention of pulling them out after ten years and replanting to "get it right," having learned lessons about the placement of rootstocks and varieties. I was never sure if he was just kidding when he said this. If field grafting or budding becomes a reality in Eastern US vineyards, it will change the face of our wine industry because we can change over *vinifera* and hybrid vines with a full crop in the second year. It will give us some of the varietal flexibility that arid regions have always had. Skilled grafters make the task look easy but it is such refined technique that it demands experts such as this crew from Worldwide Grafters, and the follow up work of bleeding vines, tape and paint, and training is critical to success. These grafters left a 4-bud spur to relieve some of the pressure on the graft union.

Rainfall is challenging in the Mid-Atlantic region for wine grape production. Even though annual rainfall amounts is not that different from Napa or the Willamette Valley, distribution through the summer and especially during the harvest season (after veraison) creates problems for ripening grapes, especially late red varieties, and fruit rots. Virginia receives about 1200 mm of rain annually compared to Bordeaux's 700. Our rainfall pattern includes summer thundershowers, and hurricanes and low pressure storms during harvest. Therefore, anything that can encourage drainage, natural or artificial, will promote fruit ripening. A goal I always considered important is to get the soil after a heavy downpour to drain to field capacity as quickly as possible. Once it arrives at FC, it can move towards permanent wilting point and help contain excessive vegetative growth. Coarse soils, slopes, drain tile all contribute to water evacuation from the effective rooting zone. So this is the magic of RdV and GMV - the move water and air away from the vines.

In Virginia vines take off quickly in the spring with a fully charged soil profile, the key is to get this growth to slow and stop as veraison approaches. If it's a wet summer, let cover crop grow and mow infrequently, if dry move cover crop close. Use vigor diversion canes if necessary, their crop is a sink for photosynthates that helps to slow down the vine in early-mid season, remove them before veraison.

Sustainable viticulture is the standard at RdV. Downy mildew is the biggest disease problem. They try not to spray too clean, which means they are spraying too much. The spread of grapevine yellows appears to be dependent on vintage conditions – at RdV 1% in CS with higher rates in the middle of the vineyard. Cicadas are not yet a problem at RdV although you could certainly hear them.

The benefits of a vineyard on a slope include improved soil and air drainage, and often better wind and solar conditions. It had rained 3" the day before and the ground was dry enough to run equipment over it. A key goal is to get vegetative growth to stop before veraison. Low water holding capacity is a beneficial feature. Rutger compared it to a vine in either a big 10 gallon bucket vs. a smaller 5 g bucket in a nursery, and how long it takes for each to drain and dry.

We have hard hitting and often fast moving storms. The faster we can get the water away from the effective rooting zone, the sooner we can get the soil moisture below field capacity. Removing water can also be assisted by surface drainage. NCRS can help design drainage features in a vineyard such as shallow waterways, French drains and subsurface drain tile.

A field needs proper preparation and mapping prior to this essential step. Site preparation at RdV includes ripping soil to 18" using a locally-made winged shank on the vine row. The winged plow, advocated by Alf Cass, lifts and lowers the soil in the root zone and helps to make the soil (and thus vine growth) more uniform. Soil pH is very low, in the 4.8 to 4.9 range so gypsum and limestone – gypsum leaches more readily than lime but does not alter pH, it binds soluble aluminum. 5 t/a compost was added to the soil to help restore structure after getting pounded by equipment during timber removal and field preparation. Erosion during the site preparation process can be a significant problem and great effort was expended to keep the soil in place, including straw bales and silt fences then seeded with rye. Sheep fescue is the typical permanent cover crop. A clear plan and readiness to implement must be in place immediately after soil work is done. At Glen Manor the soils are deep and well-drained with high rock content and low to moderate water holding capacity and comprising green schist, granodiorite and greenstone.

Yields at RdV average 3 t/a, though generally lower for Cabernet Sauvignon and higher for Merlot. Vines yielded 1 t/a in their second year. Vines are pruned to 8 shoots per vine. 3 t/a brings adequate balance to the vines, in vigorous areas a kicker cane is used, the crop is a significant sink for photosynthates, and is removed 1-2 weeks before veraison – it helps to calm the plant. At Glen Manor's Hodder Hill vineyards yields for red varieties is between 1.5 and 2.5 t/a, and 4 t/a for Sauvignon Blanc with vine densities from 454 to 1361 vines per acre.

The RdV vineyard was planted in 2006. It's all VSP on 7 x 4 spacing with steel line stakes and wood end posts, fruit wire is at 24" which allows for air movement in the vineyard. Rutger said he would plant vines closer. In 60% of the vineyards rocks are carefully placed under the vines – it helps control weeds, stores and releases heat to the vines. Weeds in rock rows are controlled by flaming and Roundup is used in non-rock rows. RdV hillside aspects are highly variable but rows are oriented as close to north-south as possible, with 10 or so degree NE-SW considered ideal to pick up morning sun and deflect afternoon heat. GMV was established in 1995 with the vineyards between 1000-1200 feet elevation and a mainly western aspect. Newer blocks are

trained to double guyot VSP but in the older blocks lyre training was used. Cover crop is used to ensure that summer rain is wicked away from the vine roots.

Consultants at RdV include Jean-Philippe Roby and Eric Boissenot (see "Bordeaux's Secret Weapon" in the June 30 Wine Spectator for an excellent article about Eric) are from Bordeaux. RdV has four full time employees. Gabriel Flores is the vineyard manager and Josh Grainer is the wine maker. The crew is unbelievably skilled and is a key to the winery's success. Rutger travels extensively to learn about grape growing and wine making. He finds marketing to be the most puzzling part of the wine business.

RdV is drip irrigated. GMV is dry-farmed. Tips and tendrils will indicate water stress, a pressure bomb is used to measure water stress, like in Bordeaux about -12 bar is the threshold for considering to irrigate vines.

How deep do roots grow? 80% are in the effective rooting zone, and most of the roots are in top 36" where most of the goodies (water, nutrients) are. Rootstocks at RdV is almost all low vigor Riparia Gloire and some 420A. Rocks limit root growth at 12-18." Some roots go deep if there is not a physical or chemical impediment.

Few fertilizers are used and petioles are tested at bloom and veraison.

It costs twice as much to develop a hillside as a normal vineyard site, but management costs are a third less because of balanced vines on light soils. Crawlers are used to farm the slopes, including a tracked skid loader that has equipment mounted on the forks. There is no 3-pt equipment. It is difficult to maintain cover crops in sloped headland areas, operators try to turn on flat areas.

I had to taste some delicious wines with Kelly White at Glen Manor Vineyard, including an amazingly refreshing and floral 2012 rosé from Cabernet Sauvignon, Cabernet Franc and Merlot, also a stunningly fruity and delicious 2012 Petit Manseng (3% RS) that is redolent with pineapple and mango fruit, their Vin Rouge (Cabernet Sauvignon, Merlot and Petit Merlot) is delicate but with structure and attractive fruit flavors, and a very ripe 2011 Cabernet Franc full of dark cherry and black currant fruit (no MPs in sight) that is a tour de force for this very soggy vintage. These are hillside wines at their most voluptuous.

There is so much to be learned from these two amazing vineyards. I would suggest that wine growers make a pilgrimage to northern Virginia and visit RdV and GMV – make an appointment ahead to talk with either Rutger or Jeff, or one of their main assistants, so you can learn as much as possible. Try to connect the vineyard to wines by tasting their wines (don't forget to buy wine while you are there as a show of gratitude for their time and sharing of knowledge). Other

wineries in the area include Linden, Delaplane, Chester Gap, Chrysalis and many others. Go to the Virginia Wine website to plan your visits and find contact information.

Reference Resources:

- Virginia Vineyards Association - http://www.virginiavineyardsassociation.com/
- Glen Manor Vineyards - http://glenmanorvineyards.com/
- RdV Vineyards – http://www.rdvvineyards.com/
- Virginia Tech Viticulture Research and Extension - http://www.arec.vaes.vt.edu/alson-h-smith/grapes/viticulture/index.html

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