



Traveling Canopy and Crop Management Road Show in Pennsylvania

I found out just how big and diverse this state is during a recent 1200 mile tour to the northeast, northwest and southwest regions. I'd like to thank the growers and extension colleagues who helped me to arrange these meetings. It was enlightening for me and hopefully helpful to them.

I saw the effects of frost damage in some vineyards ranging from none to severe. Once again the importance of site was emphasized. In the northeast, the merlot at the home vineyard of a grower was unscathed but another vineyard has endured moderate to severe damage. I was troubled that secondaries had not grown out more three weeks after the last frost event. Normally the initial shock of the damage to shoots is tempered by the arrival and regrowth of secondary shoots. The crop is often reduced and later in ripening but often the vines look pretty normal. In many of the vineyards I saw, secondaries had barely pushed or were just stubby nubs. This phenomenon was reported from various areas so it is not an isolated occurrence. The explanation for this is elusive. In Erie we were joined by colleagues from Ontario, Dr. Helen Fisher from Guelph University and Dr. Andy Reynolds from Brock U. Together we speculated about the multiple, cumulative effects of residual drought from 2007, tissue injury from this cold snaps this winter, possible overcropping or poor management (such as disease) last year and the generally cool (damp or dry depending on regional climate) spring weather. It is hard to tease out the exact causes of the poor growth. I suggested that growers treat these vines as they would a winter-injured vine, continuing to manage disease, insects, canopy with additional water and nutrient supplements where needed (see Sara Spayd recommendation in N Carolina following the '07 Easter freeze event). The frost and winter injury punctuate the risks to wine growers in the area. Without a doubt crop insurance should be a standard part of any vineyard business here but proper site and variety selection are the keys to sustainable and profitable wine growing. We discussed methods of frost avoidance including the use of wind machines. At \$25K for a new upright they are not cheap but must be measured by estate vineyards against the value of the wine in the vineyard. The wines continue to excite me in the Endless Mountains. I continue to believe that the strong suit here are the white varieties. I had a chance to taste the same Frontenac Gris that I tried in November and it is still a punch bowl of grapefruit, apricot and citrus fruits, it is a knockout wine.

The frost damage caused moderate to significant crop losses for vineyards. This is one of the serious threats to economic sustainability for the wine industry. Wine makers should start seeking alternative sources of grapes right away and not wait until the last minute. Lock in your essential raw materials with grape contracts, especially if dealing with unfamiliar growers who may be in more distant places. Make sure there is a very clear understanding of the quantity and quality expectations for the fruit.

A visit to the new Lakeview Winery in North East confirmed once again the importance of the grower-wine maker relationship to wine quality. Sam Best, a retired postal worker started his eco-friendly winery a few years ago. His goal was to produce the best wine possible from Pennsylvania grown products, including grapes and barrels from Keystone Cooperage. He works with his grower neighbors Alan and Jodie Rassi to produce very nice wines from such a young winery business. The 2008 Riesling was crisp, clean, delicate, fruity, and vibrant – a classic example of the variety. Sam acknowledged that he isn't a grower but nonetheless is learning about viticulture and willing to trust his raw materials to the Rassi's. They work closely together.

The soils and climate in Erie continue to impress me. We looked at a marine map of Erie and Ontario with Andy and Helen and they described the incredibly subtle and sometimes dramatic differences in climate between the south side of Lake Erie and Lake Ontario. What a difference a 200' of lake depth can make. The growing regions, as the crow flies are not that distant at all. The soils may be the strength of Lake Erie – more gravel than the clayey soils in the Niagara region. I'm pretty convinced if these soils can be exploited then fine aromatic whites assured and even red wines in a good season seem promising. It is all part of the discovery process in a new/old wine region.

Discover continues at the North East Research Lab where Bryan Hed, Jody Timer and John Griggs do viticulture research that is disproportionately productive to other much larger research outfits. Bryan talked at length about his work with reducing fruit rots using growth hormones and leaf removal. The physiological effect that he is trying to impose on the berries to reduce set is to starve them of photosynthates in an attempt to reduce berry size and fruit set. Gibberellic acid has some effect on reducing berry set but it is tricky to apply because timing and rates are critical and is not yet registered for use on grapes. Still, the research is interesting. I have mentioned before his follow up work to a study done by Stan Howell in Michigan on trace bloom leaf removal (also a 2 weeks after fruit set and veraison) and the effects of reducing fruit set and opening up the clusters in Vignoles and Chardonnay, two notoriously tight-clustered varieties. The reduction in botrytis and other late season fruit rots is impressive. All treatments received two Vanguard + Elevate applications. In fact, Bryan said that an additional two botrytis applications (4 total) did not provide as effective control as the leaf removal treatment. We grow a lot of tight clustered varieties such as Pinot Noir, Pinot Gris, Riesling, Chardonnay and Vignoles so this work could be a major step in wine quality improvement – trace bloom treatments displayed lower cluster weight, higher brix, lower acids, and a reduction of all fruit rots. The only down side may be larger berries. There are, of course, cautionary notes such as concerns about return fruitfulness at the affected nodes, especially in spur pruned vines but for the moment the research continues and looks promising for growers.

There was also a new experiment looking at the use of pomace as a mulch in the vine row at 3 different amounts, the maximum of 20 t/a. Helen mentioned that they were looking at compost in Ontario to improve soil texture. Here, the goal is provide a slow release of nutrients to the soil. You can read much more about the research at the North East Research Lab at their web site:

<http://research.cas.psu.edu/Erie/default.htm>

The purpose of the tour was to talk about the importance of sound canopy and fruit zone-crop management practices for wine quality. Shoots were generally about 12-24" in length so this was a good time to cover the topics. Andy gave some good comments about the "pillars" of canopy management:

- Vine balance
- Keeping the fruit warm
- Leaves exposed to the sun
- Mild water stress at veraison

Together these encompass much of what we are trying to accomplish in canopy management including shoot thinning and positioning, leaf removal and hedging, vine spacing, training and trellising, etc. Andy said that the average vine spacing in the Niagara region is 8 x 4.5, fruit wire at 36" and yields for Chardonnay in the 4 t/a range, lower for Pinot Noir, Cabernet Franc and Cabernet Sauvignon (< 3t/a). We talked about vine density and how it affects wine quality and the economics of growing grapes, especially for independent vineyards. Andy commented that many new "farming with money, not for money" estate vineyards are not sustainable. The analogy of "Ferrari vs Fiat" wines and wine production was made with great validity. There is room for all kinds of wines in the marketplace. I just insist that no matter the style or price point, that the wines be high quality. The economics often come into better balance when there is a long term and good relationship between grower and winery and sometimes if acreage contracts are used.

At the coffee pot we focused on frost and disease control. It has been very wet in southeast PA but dry in the northwest with only a few rains since budbreak. I have been asked of a spray application of a strobilurin fungicide, a class that is very susceptible to building disease resistance, followed immediately by a heavy rain, counts against the total number of applications of that material in a season. The emphatic answer was yes, that if the material had time to dry it had its effect and needs to be counted toward the total. We are entering the critical pre-bloom to post-bloom disease control period so growers need to have their best materials and best coverage out to protect their vines. The investment now pay dividends deep into the growing season. If there is are frequent rains, spray intervals should be tightened, especially on vinifera varieties. One grower mentioned that he had very good results controlling the late season rots (sour and ripe) with captan and sulfur sprays. How late you spray sulfur should be done in strict consultation with the wineries. In Ontario they are paying close attention to phomopsis and powdery mildew, most growers have sprayed 3x so far. Bryan emphasized the need to scout the vineyard for insect and disease, but stated that insect control is reactive based on trap counts and observations of damage whereas disease control is pro-active and needs to be preventative in nature. Scouting the hot spots in the vineyard is usually the best way to monitor the presence of disease and/or insects, they are usually the first to flare up. Rows by the woods, for example, are often the first to be affected.

The coffee pot meetings offered by members of the Lake Erie Regional Grape Program are an excellent way for growers to keep current on research and extension recommendations and activities and offer a forum for growers to interact. As an isolated grape extension agent in the rest of Pennsylvania I am envious of the vast resources available to grape growers in the Erie

region. The newest among them is Kevin Martin, an ag economist focusing on vineyard business management. He is a native of the region but moved from Texas to join the LERGP team. He is already having an impact. At the meeting he distributed cost/benefit analysis data and recommendations for weed control and canopy management. I strongly urge all growers to receive subscribe to the LERGP newsletter and e-mail bulletins which come out regularly and are chock full of great information. You can read much more about LERGP at their web site:

<http://lergp.cce.cornell.edu/index.htm>

A visit to SW PA revealed variable frost damage from little to severe with crop loss. Growers said where the fog sets up is very important so relative position to water (river or lake) can be important along with local elevation.

When we normally think of wine barrels our imagination takes us to the forests of France and names like Nevers, Allier and Vosges. Who would ever guess that in the tiny town of Jefferson, PA, tucked in the furthest southwest corner of the state that one of the best cooperages would be making barrels from Pennsylvania oak. Many of our wine makers are familiar with Keystone Cooperage barrels but so are wine makers across the U.S. and S. America. Brian Wilson, owner and cooper at Keystone was our host and tour guide of his family business and it is a tour that no grower or wine maker should miss. First, I'll say that I have always been immensely impressed by the craftsmanship of Keystone barrels. In all my visits to cellars I do not think I have ever seen a Keystone leaker. So it was reinforcing to see the dedication of the coopers who build these fine barrels, at a fraction of the cost of French barrels. We can debate the relative nuance of French vs. American oak, especially in Chardonnay and Pinot noir, but there is no argument over the quality of the barrels.

Brian's family was involved in value-added oak products when they decided to give wine barrel making a try in 2001. The learn curve was a steep one. He and brother Mike traveled around the world talking to coopers and wine makers and came back and started making barrels. They are self taught, like many of our wine makers. Keystone produces about 5000 barrels a year.

The American white oak logs are sourced from Pennsylvania forests. It was fascinating to learn about the selection process. Keystone does not do its own lumbering, they assist with the selection of trees and contract out the cutting and initial milling process. Trees are sorted in the woods and the staves are sorted again at Keystone. Brian talked a lot about the various grain structure and how it is affected by temperature. Their forests are in a sweet spot in the East. Too far south and the grain is too loose, too far north and cold and the grain becomes too tight. He said they will harvest trees as far north as Meadville. They make two styles of barrel – a normal grain and a tight grain. Staves are either 25mm or 29mm in thickness and can be fire or steam bent.

Everywhere there are stacks of staves and logs. The logs are very, very straight as a result of a rigorous selection process. They are milled into staves and stacked very carefully in a particular pattern with space in between each stave to allow the wood to cure for either 2 or 3 years outdoors. Jefferson receives about 65" of rain/yr which helps to leach tannins from the wood.

Brian explained that the toasting is the magic in the barrel and the most important part of the barrel making process. It is what really affects the wine along with the slow oxidative process. They have developed their own method of toasting, using scraps of oak to build a fire in a small chimney shaped device of their own design. Unlike the traditional fire that flash toasts the wood the chimney generates a radiant heat that allows the toast to penetrate deeper into the wood. This keeps the new wood further from the wine and prevents green and harsher tannins from getting into the wine. It takes about an hour to toast a barrel and they can do up to 60/day in their facility. Barrels are toasted to a light or medium grade. Temperature and color are monitored to assure the correct level of toast.

There is a lot of specialized equipment in barrel making such as devices that align and pull the staves into the shape of a barrel. Giant planers and sanders finish the wood and barrels. But there is still a lot of handwork involved such as the judgment of how long to toast a barrel and in the final assembly.

Brian had recommendations for barrel handling upon arrival at the winery. Ideally, wine goes right into a barrel. If they are not going to be used for a month or more they should be left in the plastic shrink wrap. Barrels can be rinsed with 4-5 gallons of water and left overnight before draining.

They also produce French oak barrels from Never and Allier. The green staves are shipped from France and air-dried at Keystone and go through their normal assembly process. The French oak is described as more subtle.

You can learn more about Keystone Cooperage at their web site:
<http://www.keystonecooperage.com/>

Pennsylvania is a big state with diverse wine regions. I drove 1100 miles in 3 days and everywhere I went I met dedicated growers, wine makers and extension colleagues. I would like to thank Bill Pencek and John Esslinger in the Endless Mountains, Andy Muza, Tim Weigle, Kevin Martin, John Griggs and Bryan Hed in Erie, and Lee Young in SW PA for helping to organize the field meetings on this tour. Also Paul Milnes, Jeff Homer, Gary Toszko, Stan Sowinski, Alan and Jodie Rassi, Sam and Becky Best, Sharon Klay and Ray Matthews, Brian Wilson and Jaimie Thistlewaite for hosting meetings and tours. All of them extended warm and gracious hospitality to me and fellow growers and extension educators, and generously shared their knowledge, experience and wines.

Mark L. Chien
Statewide Viticulture Extension Educator
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Below is the outline I used for my canopy and crop presentations. FYI.

Canopy and Crop Management Outline

Viticulture and wine goals:

- Great wine from ripe and clean fruit
- In any season canopy/crop have greatest impact on fruit quality
- Multiple benefits – disease, ripeness, aesthetics, etc.
- It works for all grape species, varieties, clones

Why canopy?

- Lower ALL diseases: spray, air and sunlight (UV and PM) penetration
- Helps ripeness, color, etc (temperature and light/pigment)
- Can lower MPs
- Aesthetics – selling grapes and wine

Why crop?

- Reduce disease pressure
- Improve fruit quality, sometimes dramatically eg CF

Before you plant:

- Style and price point
- Terroir: soil, climate, plant and viticulture
- Site selection
 - Soil: low to moderate nutrient, well to excessively well drained, rock content
 - Climate: rainfall distribution – after veraison
 - Plants: variety/clone and rootstock – natural size eg. CS big, PN small, disease resistance
 - Viticulture – must be superb in our environment
 - Local environment: slope aspect elevation woods row-direction vine-density

A balanced vine of the correct size: harmony, equilibrium, uniformity and balance!

- How to determine the correct size on a soil
- What is correct vine size
- How to achieve vine balance: foliage/veg and crop/reprod

Vineyard design

- Vine density and spacing: yield per vine and quality. CS in Bordeaux vs Central Valley
- Length of canes and cordon
- Cordon vs cane
- Length of cane or cordon – even shoot growth
- Row direction – wind and sun
- Elevation: local and absolute – length of season, frost and freeze, soil moisture
- Slope: air and water drainage. >3%
- Aspect: se-sw

Measures of a good canopy: See Smart Golden Rules

- The concepts of vine size and balance
- Pruning weights
- Crop weight
- When to divide

Trellis and training systems

- When to divide
- How to divide
- Setting up the trellis
- Single <> Double
- Single
 - Vsp
 - High cane or cordon
- Divided
 - SH
 - SD
 - GDC
 - Lyre

How to do it

- Balance prune but also by intuition
- Shoot thinning
 - Head of vine
 - End of canes
 - Double shoots
- Suckers: top and bottom
 - Insurance wood
- Double pruning, vigor diversion, crop insurance canes
- Double canes
- Shoot position and wire lifting
 - Timing
 - How to do it
 - Locking shoots
- Leaf removal – sunlight, aeration,
 - When – after fruit set
 - Piedmont – early
 - Bryan work – trace bloom
 - How – east side > west side > both sides
 - Multiple passes
 - Lateral removal
- Hedging – depends on the weather 1-4x/yr

Veraison is crunch time for canopies: already set but not over

- Shoot tips STOP

- Late whites and reds need 4-6 more weeks! Waiting for flavor.
 - Disease control, esp DM and PM – broccoli tops
 - Complications with netting and spraying
 - Fruit zone nets
 - Birds

- Fruit zone management – getting the fruit ripe
 - Leaf removal – light penetration
 - Spacing of clusters for light and air
 - CHO for winter

- Crop estimating
 - Lag phase estimates
 - When to sample
 - Determine correct multiplier
 - Sampling accuracy
 - Compare to harvest weights
 - Collect historical data
 - How, when and what to thin for best results

- Canopy management is all about people: timing is critical
 - Time/motion, speed, economics
 - Enough workers
 - Skilled workers
 - There when you need them: spring flush/moving wires
 - Monitor their work!

Keep the canopy clean – enhancing ripeness of fruit and wood

- Insects: GBM, jackets and JBs
- Diseases – all but especially fruit diseases
- Mites
- Equipment and operators
- Calibration
- Timing
- Materials and rates

Fruit zone management

- Keep clusters evenly spaced, no clusters touching
- Aeration and penetration
- Late season sprays and leaf removal
- Critical temperature needs for phenolics: color, tannin, flavor

Relationship of yield and quality

- Examples of quality
- Lag phase crop estimating

- Thinning practices and timing

Info resources

- Sunlight into Wine
- 2009 NY-PA Pest Mgt Guidelines for Grapes
- Wine grape production guide for E NA
- Articles by Mark Greenspan in WBM
- Vineyards and wineries that make great wine – Niagara Peninsula, Long Island, Virginia

Taste your wine and benchmark wines and work closely and cooperatively with the wine maker

Visit best vineyards growing your varieties around veraison to learn about their practices. Adopt and test accordingly.

Continue to investigate and learn about viticulture and enology