Virginia Wine Board interim report
15 June 2005 – 31 December 2005

Project: Viticultural aspects of wine grape cultivar, clone and training system evaluations

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Amount funded in FY 2006: A total of $14,342, of which $10,494 was for Wolf and $3,848 was for Jeremy Pattison at the Southern Piedmont AREC (variety trial location)
Balance as of 12 January 2006: $3,125.04 (Wolf's)

Objectives:

1) To evaluate a series of Chardonnay clones for relative strengths and weaknesses.
2) To evaluate Traminette, Cabernet Franc, and Viognier under three different training systems.
3) To evaluate a series of novel wine grape cultivars in the Eastern Piedmont of Virginia.

Progress:

1. Chardonnay clone evaluations

No activity in this section of project since last (October 2005) interim report

2. Traminette, Cabernet Franc, and Viognier under three different training systems:

Traminette (own-rooted vs. grafted to C-3309), Cabernet franc, and Viognier are being evaluated under three different training systems at Winchester, Virginia: two divided canopy systems (Geneva Double Curtain and Smart-Dyson) and the "standard" as used in Virginia, non-divided, Vertical Shoot-Positioned (VSP). The training system comparison was established in 1998 and fruit yield, fruit chemistry, and wine quality were evaluated in each of 2000 – 2004 seasons. We chose to continue this project one more year (2005) for detailed yield data and wine-making. The field aspects of this project are complete with the exception that we would like to maintain the Traminette for several years (minimal maintenance) in order to follow the fate of the non-grafted vines relative to grafted vines.

The traminette data were presented at the American Society of Enology and Viticulture/Eastern Section annual meeting held in St. Louis Missouri in July 2005. The Viognier viticultural and enological data will be presented at an international conference in New Zealand in February 2006. The Viognier data were presented to the Virginia industry on two occasions in 2004. All will be repackaged as an updated grapevine training bulletin for industry use.

3) Grape cultivar evaluation in the Eastern Piedmont of Virginia (SPAREC)

Virginia Tech began a formal evaluation of 19 wine grape varieties at the Southern Piedmont Agricultural Research and Extension Center (SPAREC) in Blackstone, Virginia (30 miles east of Farmville) in 2000, with some of the planting occurring in 2001. The unique climate of the eastern/southern piedmont warrants a separate evaluation of varieties – day and night temperatures are typically warmer than those of northern Virginia, and the threat of winter injury

is lessened; however, bud break is earlier and the region experiences a strong continental climate, which increases the threat of spring frost damage.

The varieties under evaluation at the SPAREC (Table 1) were chosen on the basis of their performance elsewhere in the state (i.e., Winchester), have late bud break (e.g., Mourvedre, Cabernet Sauvignon, Tannat), have pronounced aromas that might persist under less than optimal ripening conditions (e.g., Traminette and Petit Manseng), or have established commercial merit in hot climates (e.g., Norton, Tinta Cao, Touriga Nacionale.

Generally, our goal with variety evaluations such as that at the SPAREC is to evaluate the material over a 5- to 10-year fruiting period. Our previous variety evaluation at Winchester was maintained from 1988 through 1998, with harvest and wine data collected over eight years. We are interested in both the viticultural (yield components, pest issues, vine size/vigor, adaptation to local climate) and enological performance of varieties (see, http://www.ext.vt.edu/pubs/viticulture/463-019/463-019.pdf). The day-to-day management of the Blackstone vineyard is carried out by staff of the SPAREC with assistance and oversight by Dr. Jeremy Pattison. We also acknowledge the excellent support provided by Ned Jones, Margaret Coates, Mac Tilson and other staff at the SPAREC in this effort. Wine-making is done within the Department of Food Science and Technology on the main campus by Dr. Bruce Zoecklein, Sandy Birkenmaier and others. Staff from the Winchester AREC (Kay Miller, Fritz Westover, T. Wolf and occasionally others) visit the SPAREC for pruning, shoot-thinning, crop thinning, and harvest, with harvest comprising many visits due to the period over which the varieties ripen. My point here is that many people are involved with the conduct of this project. On that note, we also gratefully acknowledge the generous, sustaining financial support of the Virginia Wine Board, the Viticulture Consortium:East (USDA/CSREES) and, in the establishment phase, the North Carolina Grape Council.

The vines at SPAREC are planted in three-vine plots (8 feet between plants) in rows that are 10 feet wide (to accommodate the equipment available at the SPAREC). Plots are replicated 6 times in a completely randomized design for a total of 18 vines per variety. The exception to this is for Norton which, due to its sensitivity to sulfur and copper fungicides, is planted separately and trained to Geneva Double Curtain. The vineyard has drip irrigation and a deer exclusion fence. Vines (except Norton) are trained to Smart-Dyson. Typically, shoot density is set by dormant pruning and shoot-thinning to result in about 5 shoots per foot of canopy for the upper canopy and about 3 shoots/foot for the lower canopy. Crops in 2005 were regulated somewhat to target approximately 3.5 tons/acre. We may superimpose 2 crop levels on plots in the future in order to determine what a tolerable crop level is from a wine quality standpoint.

General observations to-date: Initial harvest data were collected in 2004, with more detailed data collected during the 2005 harvest. While it is preliminary, some trends are appearing. Wildlife has been troublesome at the vineyard: Raccoons have been attracted to the ripening grapes and have taken a toll on yields. We are retrofitting the deer fence this winter with a band of wire-mesh around the base of the fence to exclude small mammals. Green June bugs are more abundant at Blackstone than at Winchester (photo), and their feeding in 2004 appeared to aggravate rot problems. Assail insecticide appeared to help with green June bug management in 2005. Birds have also been a problem and we are currently pricing the cost and feasibility of an overhead net for the 2006 season.

Primary fruit chemistry at harvest in 2005 is shown in Table 1. Several varieties appear to be promising: Petit Manseng, the white-fruited variety from the Jurançon, retained its distinctive flavors and exhibited a good balance of sugar and acidity at harvest. Cabernet Sauvignon #337, Rousanne, Tinta cao, and Norton also tasted very good at harvest. Generally, the grapes at the SPAREC have had higher pH values at harvest, for a corresponding sugar concentration, than what we have seen at the cooler Winchester site (example here with Viognier and Vidal, both of which have been grown at Winchester and Blackstone). This is likely due to the higher heat summations at Blackstone, compared to Winchester. The Cabernet Sauvignon clone #337 is of particular interest in that it ripens much earlier than either of the Cabernet franc clones at Blackstone – we harvested clone #337 at the same date that we harvested Chardonnay in 2005. Clone #337 is noted for its relatively small berries and deep color. Clone #337 is also known to be virus-infected (Rupestris stem-pitting and type-2 leafroll), but the consequences of this infection are not certain. We have not seen obvious virus problems with the clone #337 vines after 5 years in the ground.

Viognier and Traminette, which are also grown at Winchester, have not expressed as intense flavors or aromas at harvest at Blackstone as they do at the Winchester site. Again, that may reflect the greater heat experienced at Blackstone. As with many of the varieties grown at Blackstone, Viognier fruit has a relatively high pH (Figure 1), at the point when soluble solids exceed 20 or 21 °Brix.

We've lost several of the Tempranillo vines to vascular pathogens (e.g., crown gall) and/or winter injury. It's uncertain at this point whether we simply started with poor nursery stock or whether the vines are not adapted to the Blackstone environment. The fruit matures early and has had mediocre quality. NY73.0136.17, an unnamed red from the Cornell breeding program, similarly colors early, but does not acquire perceptible flavors or aromas or soluble solids levels greater than about 18° Brix. Aleatico and Muscat blanc also mature early. These are both aromatic varieties and (consequently) suffered significant depredation by raccoons and green June bugs this year. If we can eliminate the wildlife problems, these varieties might find an interesting niche in the eastern/southern piedmont, perhaps as used in conjunction with fruit drying to produce wines with more concentration and/or residual sweetness. Tannat and Norton looked reasonably good at harvest. We have been able to achieve much lower acid levels at Blackstone than at Winchester with Norton, a reflection of the lower vigor and more open canopies at the Blackstone site.

Selected components of crop yield for the 2005 season are presented in Table 2. We had arbitrarily targeted 3.5 tons/acre in 2005; however, we fell well short of that with several varieties, including Cabernet Franc clone #313. Despite the lower yields, clone #313 failed to accumulate sugar to the same extent as the more heavily cropped Cabernet franc #1. Tannat greatly exceeded our target crop level (Table 2). We will repeat the target crop levels of about 3.5 tons/acre in 2006; however, the target crop level will be adjusted upwards and possibly lower, in time, to more fully evaluate the effects of crop level on fruit and wine quality.

Again, this is a very preliminary progress report and no firm conclusions can be made to

recommend one variety over another. Pruning weight data are being collected with all varieties and pruning weights have been acceptable (> 0.3 pounds per foot of row) or supra-optimal. The wines being made from the Blackstone fruit will be subjected to chemistry and sensory evaluations and will help identify varieties that are relatively superior performers in the relatively warm part of the state.

Table 1. Harvest date and primary fruit chemistry of varieties/clones being evaluated at the Southern Piedmont Agricultural Research and Extension Center, Blackstone, Virginia, in 2005.

Variety (clone)	Harvest date	Brix	pH	TA (g/L)
Aleatico	N/A			
Cabernet franc (“#313”)	26 Sept-05	18.3	3.85	5.01
Cabernet franc (#1)	26 Sept-05	20.5	3.87	4.60
Cabernet Sauvignon (#337)	12 Sept-05	20.3	3.74	5.42
Chardonnay (#96)	12 Sept-05	21.8	3.81	4.85
Mourvedre	19 Sept-05	20.8	3.92	4.32
Muscat blanc	12 Sept-05	19.1	3.73	4.70
Norton	26 Sept-05	22.2	3.88	6.11
NY73.0136.17	7 Sept-05	17.3	3.46	5.18
Petit Manseng	12 Sept-05	25.2	3.28	8.08
Petit Verdot	20 Sept-05	21.7	3.92	5.26
Rousanne	12 Sept-05	21.8	3.75	5.45
Tannat	19 Sept-05	21.5	3.43	6.08
Tempranillo	7 Sept-05	19.5	3.80	5.56
Tinta cao	19 Sept-05	20.5	3.64	4.38
Touriga nacionale	19 Sept-05	18.9	3.61	4.42
Traminette	19 Sept-05	19.8	3.51	4.53
Vidal	19 Sept-05	21.7	3.51	5.38
Viognier	12 Sept-05	22.9	3.97	5.04

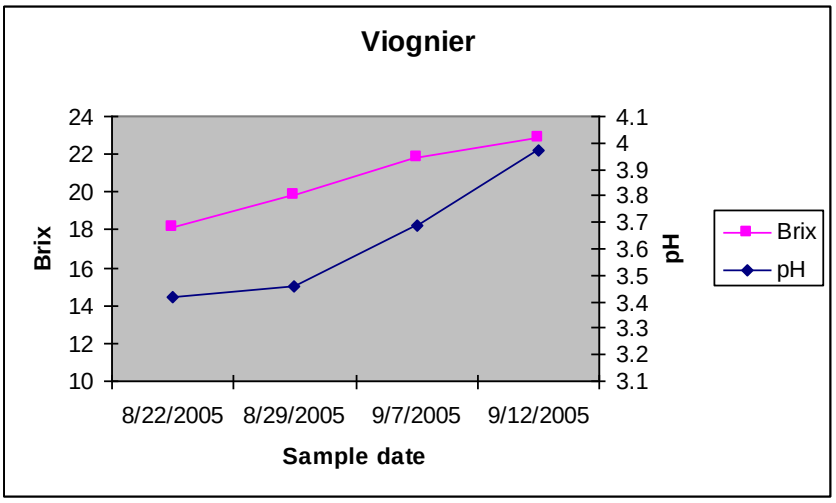

Table 2. Components of 2005 crop yield for varieties/clones being evaluated at the Southern Piedmont Agricultural Research and Extension Center, Blackstone, Virginia.

Variety (clone)	Berry wt. (g)[yz]	Cluster wt. (g)[x]	Crop per vine (lbs)	Tons per acre equivalent[w]
Aleatico	.	.	.	.
Cabernet franc (“#313”)	1.60	75.8 def	7.5 d	2.05 d
Cabernet franc (#1)	1.75	115.0 bc	17.0 ab	4.62 ab
Cabernet Sauvignon (#337)	1.14	83.5 cde	17.5 ab	4.78 ab
Chardonnay (#96)	1.22	115.8 bc	14.7 bc	4.00 bc
Mourvedre	1.47	172.5 a	12.0 cd	3.28 cd
Muscat blanc	1.55	203.6 a	.	.
Norton	1.33	.	.	.
NY73.0136.17	1.50	.	.	.
Petit Manseng	0.85	61.9 ef	11.3 cd	3.07 cd
Petit Verdot	1.20	49.2 f	11.2 cd	3.07 cd
Rousanne	1.64	105.6 bcd	13.5 bc	3.69 bc
Tannat	1.51	200.6 a	19.6 a	5.35 a
Tempranillo	1.95	.	.	.
Tinta cao	1.10	106.9 bcd	10.8 cd	2.96 cd
Touriga nacionale	1.20	58.4 ef	10.5 cd	2.86 cd
Traminette	1.49	131.2 b	12.8 bc	3.50 bc
Vidal	1.68	175.7 a	.	.
Viognier	1.31	113.4 bc	12.8 bc	3.50 bc

[z] Average individual berry weight at harvest.
[y] Missing data are for vines which suffered extreme rot or bird depredation
[x] Means within a column that are followed by the same letter are not significantly different at $P > 0.05$.
[w] Based on 545 vines per acre.