

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

Project: Optimized Grape Potential Through root system and soil moisture manipulations

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Objectives:

- 1) Evaluate in a factorial fashion the impact of complete ground cover vs. under-trellis weed control, three rootstocks, and three root manipulation techniques as means of regulating the vegetative/reproductive balance of Cabernet Sauvignon clone #337 (Virginia site)
- 2) Evaluate a series of vineyard floor cover crop species for relative effectiveness in competing with Cabernet Sauvignon grapevines, again to regulate the vegetative/reproductive vine balance (North Carolina site)

Progress:

Objective # 1 (AHS Agricultural Research and Extension Center [AREC], Winchester VA):

Cabernet Sauvignon clone #337 vines were grafted in 2005 and are ready for planting in spring, 2006 as proposed. Vineyard site at the AHS Jr. AREC in Winchester VA has been laid out and planting will proceed in May, 2006.

Three factors will be examined for their relative efficacy in regulating vegetative growth:

- ground cover crop vs. under-trellis herbicide strip
- comparison of three different rootstocks
- root manipulation (pruning, root restriction, vs. control)

Excepting root restriction bags, most treatments will not be applied until the second or third growing season. Essentially, this objective is progressing as planned.

Objective # 2 (Shelton Vineyards, Dobson, North Carolina):

Complete vineyard floor cover crops and root-pruning are being evaluated for their ability to limit vine vigor and improve grape quality of Cabernet Sauvignon (clone #7 on C-3309 rootstock) in an established (1999) vineyard. Treatments include comparison of complete floor cover (including under the trellis) of five grass species:

- tall fescue (cv 'Kentucky 31')
- "turf-type" fescue (cv 'Elite-II'),
- perennial ryegrass (*Lolium perenne*)
- creeping red fescue (*Festuca rubra*),
- orchardgrass (cv. WB300)

- control: conventional scheme of row-middle grass (tall fescue) combined with a 1-m under-trellis weed free (herbicide) strip.

Existing floor cover was killed with glyphosate in fall of 2004. Treatments were established in early spring 2005 (row middles with Truax Inc. sod-seeder and under-trellis area by hand). Stand establishment was mediocre for several of the grasses, and the plots were re-established in late-summer 2005.

Root-pruning (the second factor) was applied to both sides of treatment plots, 40 to 60 cm from the vine trunks, in a line parallel with trunks, just before bud-break (Figure 1 A and B). Root-pruning will be done annually at bud-break.



Figure 1. Gill Giese is measuring depth of trench used to prune Cabernet Sauvignon roots at Shelton Vineyards, NC. Trenching was done on both sides of “Root-pruned” plots, with trenches immediately refilled. A vibrating cable-laying device (B) was tried; however, this required about twice the time required by the trencher.

Treatments (a total of 12) are arranged in a split-plot experimental design with blocks replicated six times for a total of 72 plots.

Vegetative growth:

A goal of the various treatments was to suppress vegetative growth. Shoot length data were collected on three dates during the 2005 season (Figure 2). Due to the less than optimal stand establishment, we collected shoot growth data for only two treatments in 2005: the KY-31 tall fescue plots and the control. The ground cover (fescue vs herbicide strip under the trellis) had no effect on the rate of shoot growth; however, root-pruning significantly reduced growth ($P > 0.004$) of shoots in root-pruned plots.

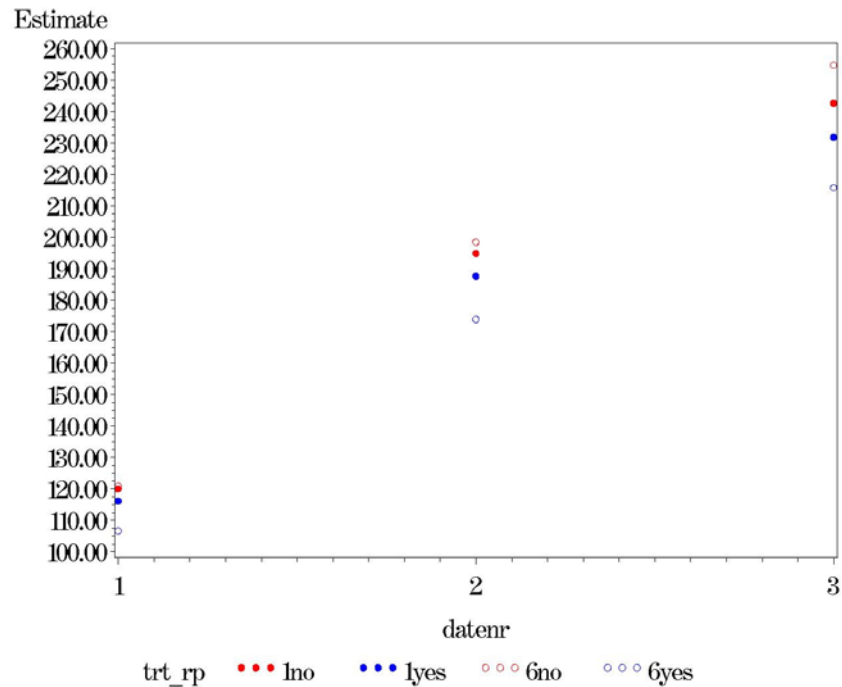


Figure 2. Shoot length (cm) for shoots of vines in treatment 1 (KY-31 fescue) and treatment 6 (herbicide strip) with vines further subjected to root-pruning (blue circles) or not (red-circles). [note: for black and white – the two upper circles on each date are red/no root pruning; the two lower circles at each date are blue/root-pruned vines].

Fruit sampling and components of yield: Samples of 50 berries were collected from each treatment replicate at 7- to 10-day intervals beginning at approximately 18 °Brix, until and including harvest. Soluble solids, pH and TA were determined on samples as proposed, although only the berry weights and soluble solids are shown (Table 1). There were no effects of either the ground cover or the root pruning on these parameters in 2005.

Table 1. Berry weights and Brix at harvest for Treatment 1 (KY-31 fescue) and Treatment 6 (weed-free under-trellis strip) and as a function of root-pruning.

Treatment	Berry wt. (g) at harvest		Soluble solids (°Brix) at harvest	
	Non-root-pruned	Root-pruned	Non-root-pruned	Root-pruned
Treat 1	1.73	1.71	19.6	19.5
Treat 6	1.75	1.79	19.3	19.3

Summary, Objective #2: the project is on track. We have ordered soil moisture probes and have also installed a series of buckets with comparable grass species in each treatment replicate in order to conveniently remove and weigh the buckets to gravimetrically determine soil moisture loss as a function of the cover crop species in the coming growing season. Vine pruning weights will be collected in March 2006 and the root-pruning repeated in late-March. We anticipate a complete range of data collection during the 2006 season, now that the cover crops are more fully established.