

**Year-end report to Virginia Wine Board  
30 June 2007**

**Title:** Optimized grape potential through root system and soil moisture manipulations  
VA Tech FRS # 447728

**Principal Investigator:** Tony K. Wolf

**Award amount:** \$18,323

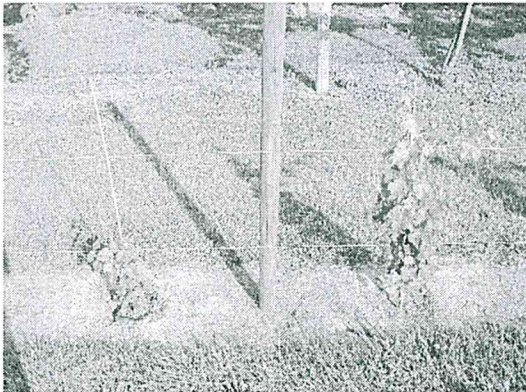
**Amount remaining at year-end:** \$1,440 (+/-)

**Objectives:**

- 1) Evaluate 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 (VA site)
- 2) Evaluate cover crop species and root pruning to impose water stress on Cabernet Sauvignon vines (NC)

**Comments on funding:** Funding for this and other Virginia Wine Board projects was made available in early September, 2006. Proposed expenses in July and August were largely avoided or paid from other funds due to uncertainty of funding. The amount shown as remaining at year-end is an approximation. The accounts manager at the AHS AREC (Wolf's work location) was on extended medical leave from early-May through July 2007. This resulted in delayed postings of some charges to the Wine Board accounts. Furthermore, in order to meet Wine Board administrative needs, we were unable to post some wage charges to the accounts after mid-June 2007.

**Progress:**



Vine on left was planted in a root-restriction bag to constrict vegetative vine development. Vines are in second season in the vineyard.

Objective #1: Cabernet Sauvignon, clone #337 was planted and trellis constructed as described in FY 2007 first quarter report (30 September 2006). Progress since then includes routine vineyard management (pruning, early season vine training, pest management, etc.). Vines have made excellent growth and trellis construction was completed spring 2007. Soil moisture probe access tubes (12) were installed in June 2007. Irrigation components were purchased but we lacked time to install in summer 2007; irrigation will be installed in fall 2007. Border vines (Petit Manseng) were planted in guard rows and buffer plots in May 2007. The growth suppression afforded by root-restriction bags was evident by mid-summer of 2007 (Photo to left). This objective is proceeding on track with project objectives.



Objective #2: The work of graduate student Gill Giese at Shelton Vineyards in Dobson, NC is proceeding as proposed. This project asks two very basic questions:

- Can the vegetative growth period and berry size of mature Cabernet Sauvignon grapevines be regulated with permanent, under-trellis cover crops or root-pruning?
- If so, do those responses translate to improved grape and wine potential quality?

Ideally, we'd like vegetative growth of grapevines, particularly shoot extension, to cease at about the time of veraison. The continued vegetative growth of vines in the final ripening of the crop is often associated with "vegetal" character in wines from methoxypyrazines and other compounds that can be formed in young leaves. The continued vegetative development of vines also contributes to fruit rot problems and increased labor for trimming. We'd also like to produce grapes that have relatively small berries. Small berries have a greater surface-to-volume ratio than do large berries; small berries thus have greater concentrations of flavor and aroma compounds. Achieving smaller berries and restricted vegetative development might be possible by regulating the water available to vines by competition (under-trellis grass) or by root system restriction (root bags, root-pruning, or "size-restricting" rootstocks).

Multiple shoot growth measures among treatments in 2006 and 2007 revealed a reduction in the extent of shoot growth achieved by root pruning, as well as a reduction in shoot length/growth rate with several of the ground covers; orchard grass was the most effective cover crop tested at reducing shoot growth. The effects of root pruning and cover crops on restricting vegetative growth of these vines was most pronounced in the early (prior to July) part of the season, which was relatively dry. Data have also been collected on the performance of 5 different cover crops, on soil moisture, and on plant water potentials as affected both by root pruning and by cover crops. Dormant season pruning weights were collected in winter (06/07) and also showed that both root-pruning and cover crops were effective in reducing vine size. Berry weights and primary fruit chemistry were unaffected by treatment in 2006; however, crops were picked somewhat earlier than optimum (about 19°Brix) due to wet weather and concerns about fruit degradation.

A preliminary report was presented to attendees of the Virginia Vineyards Association's summer technical meeting on 3 August 2006. Research papers were presented on this research at two meetings in July 2007:

- American Society for Enology and Viticulture/Eastern Section, 16-17 July, Fogelsville, PA
- Viticulture Research Forum, University of California, Davis, 17-19 July, Davis, CA



The photo to left illustrates the effect of under-trellis cover crop (vine to right) on suppressing vegetative growth of vines in the North Carolina study. The vine on left is in a border plot which is maintained with an herbicide strip under the trellis. The vine on right has the more optimal canopy architecture.

Summary: Project is on track good. Growth suppression has been possible with cover crops or root-pruning. Effects on fruit chemistry and potential wine quality are still uncertain. The current research is addressing this question.