Project Report
Virginia Wine Board, July 2017

Title: Viticulture Extension and Research Initiative

Principal Investigator:

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Type of project and amount of award: Extension / education; $39,276.00

Objective: To increase the level of viticultural research and extension program support to grape and wine producers in Virginia and to help meet the research and extension needs of an expanding industry.

Progress: The scope and continued expansion of the Virginia grape industry merits increased personnel support to provide extension, technical support of viticultural issues that constrain industry development. Part of this support is provided by Virginia Cooperative Extension assets, including state level *specialists* (e.g., Wolf, Bergh, Pfeiffer, Nita and others), local extension *agents* (e.g., Love, Sutphin, Lachance, Sastre and others), as well as graduate students, post-doctoral associates, research associates and classified staff. This project provides supplemental travel and material support, primarily for Tremain Hatch, at Virginia Tech's Winchester Agricultural Research and Extension Center. Tremain Hatch was hired as a Viticulture Research/Extension Associate in 2010, after completion of his MSc degree in viticulture at Virginia Tech. From 2010 to 2015 Mr. Hatch's salary was paid in a partnership between the College of Agriculture and Life Sciences (CALS), and a USDA/NIFA grant awarded to Wolf in 2010. Upon completion of the USDA grant in August 2015, we negotiated a 3-year extension of Mr. Hatch's salary at 100% from CALS. Beyond year-3 we are expected to obtain grant support for his salary. Any grant support obtained prior to the 3-year sundown of CALS support will extend the 3-year appointment by a comparable amount. Therefore, we have successfully sought opportunities including the Virginia Tobacco Commission and with this proposal to augment and extend the period of funding for Mr. Hatch.

As proposed, the project funds were principally used to offset salary and operational costs of Mr. Hatch in fiscal year 2017, and in support of two principal missions: *Extension activities* were to include the organization and conduct of meetings and workshops in different regions of the state, updates to Virginia Tech's viticulture website (http://arec.vaes.vt.edu/arec/alson-h-smith/grapes/viticulture/extension.html), addressing weekly requests for basic grape growing information, site visits, and trouble-shooting vineyard problems. The research portion of the project was intended to have Mr. Hatch lead an effort to collect further data and summarize a project designed to evaluate how and when we sample grapevines to most accurately determine their nitrogen (N) nutrient status. Both components are described in this report.

Extension: Mr. Hatch conducted the following activities/outputs over the Fiscal Year 2017 (July 2016-June 2017) as related to his viticulture extension activities.

Specific Activities:

- Conducted 32 individual vineyard visits to help grape growers assess vineyard site suitability, review existing vineyard operations, and trouble-shoot vineyard problems.
- Organized and participated in vineyard meetings across the state, including:
    - Research goal prioritization on 9 August 2016
        - Research faculty from Virginia Tech met with a panel of grape growers at King Family Vineyard to help clarify what problems should be addressed with research endeavors in order to benefit the industry.
    - Vineyard Field trip on 10 August
        - This technical tour brought grape growers from around the state together to visit innovative vineyard operations and talk to the managers. Over 50 growers visited Early Mountain, Carter Mountain, Pollak and Loving Cup vineyards in early August on the motor-coach based tour.
    - Southeastern United Grape and Wine Symposium on 16 November
        - Led a viticulture session about what varieties and training systems work well for Virginia grape growers.
    - In-service Viticulture training for Virginia cooperative Extension agents
        - This day-long training on 30 November provided Virginia Cooperative Extension agents in Southside Virginia with information they need in order to provide resources and recommendations to grape growers in their counties (Hatch and Wolf).
        - A web based in-service training for agents in Southwest Virginia was held on 22 June.
    - 2017 Vineyard Meetings
        - Pruning workshop on 24 January in Orange County
        - Pruning Workshop on 16 February in Giles County with New River Grape Growers
        - Pruning Workshop on 7 March in Loudoun County
        - IPM workshop on 15 march in Madison County
        - Weekend Warriors workshop on 1 April in Frederick County
        - Seasonal Vineyard meeting on 10 May in Frederick County
        - Seasonal Vineyard meeting on 24 May in Rappahannock County
        - Seasonal Vineyard meeting on 27 May in Essex County with Coop
        - Seasonal vineyard meeting on 7 June in Loudoun County
        - Seasonal Vineyard meeting on 14 June with Loudoun Winegrowers Association
    - Participation with Grower Association meetings
        - Virginia Vineyards Association Winter Technical meeting 23 & 24 February
        - Virginia Vineyards Association Summer Technical meeting 12 July
- Sent 238 email messages to grape growers, including 39 responses to new clientele exploring the prospects of commercial grape growing in Virginia
- Made or answered 54 extension-related phone calls to grape growers

- Responsible for regular updates to the viticulture website and transfer of content to a new university website design (http://arec.vaes.vt.edu/arec/alson-h-smith/grapes/viticulture/extension.html)
- Served as primary author/developer of a new Vineyard Financial Calculator, an Excel spreadsheet that allows the user to model and evaluate different scenarios to understand vineyard costs and returns. Bulletin has been published: https://pubs.ext.vt.edu/AREC/AREC-188/AREC-188.html

Research: Mr. Hatch has served as lead researcher on a vineyard trial evaluating nitrogen (N) application methods at a collaborating vineyard in Shenandoah County. Tables 1 summarizes vine responses to nitrogen treatments at this vineyard. As anticipated, large soil applications of N (60 kg N/ha – about 57 pounds of actual N per acre) increased crop yield as well as vine size. However, the combination of a moderate soil application and foliar application (30 N/ha to soil and 10 kg N/ha to foliage as urea) maintained yield levels, increased YAN but did not lead to a measurable increase in vine size as measured by pruning weight with Vidal blanc vines at Brown Bear Vineyards (Table 1).

Table 2 summarizes the plant tissue analysis results of either leaf blades and petioles or petioles at veraison. The petioles showed a larger spread between the field treatment levels than did the leaf blades and petioles. The petioles showed the control and white clover treatment to have a moderate N deficiency (Table 2). Whereas, the leaf blade and petiole samples showed all treatment to be within an acceptable range (Table 2). In this case, petioles collected at veraison were superior to leaf blades and petioles at identifying meaningful differences in vine N status between the field N treatments.

For the 2017 growing season, we removed the poorly performing white clover treatment plots in order to compare the performance of compost to the synthetic forms of N used in the project. Composted chicken litter was applied to the former white clover plots on 29 March 2017, at a rate of 4035 kg/HA (1.8 tons/acre) targeting a rate of 30 kg N/HA to be available in the year of application. We will gauge the performance of an organic form of N against synthetic N applied at a similar rate for effect on vine nutrient status, vine size, yield and YAN. We will monitor the plant nutrient status for N as well as other macro and micro nutrients included in the compost. For example, the rate of compost we applied contains 150 kg potassium/ha of (131 pounds of K/acre), which might not be desirable.

Table 1. 2016 Results of N project at Brown Bear Vineyard. *Vidal blanc* response to fertilizer treatments, shown as percent change compared to control.

RESULT	YIELD	YAN	PRUNING WEIGHT
CONTROL	.	.	.
30 N	-14%	+142%	-7%
60 N	+8%	+73%	+13%
30 N + FOLIAR	-3%	+100%	0%
WHITE CLOVER	-12%	+32%	-9%
WHITE CLOVER + FOLIAR N	-7%	+171%	-13%

Table 2. 2016 plant tissue analysis results from N project at Brown Bear Vineyard. Different fertilizer treatment levels were assessed by plant tissue analysis of either petioles or leaf blades and petioles collected at veraison. *Appropriate range for leaf blades and petioles is 2.25-3.35% and for petioles 0.80-1.20%.

Treatment and Tissue Type	Average % N	Percent change from control	Interpretation based upon plant tissue analysis*
Leaf blades and petioles			
30 N Soil	2.49	5%	Appropriate N status
60 N Soil	2.90	23%	Appropriate N status
Control	2.37	.	Appropriate N status
White Clover	2.45	3%	Appropriate N status
Petioles only			
30 N Soil	0.88	24%	Appropriate N status
60 N Soil	1.01	42%	Appropriate N status
Control	0.71	.	N Deficiency
White Clover	0.78	10%	N Deficiency

Table 3. Travel by Viticulture Research/Extension Associate and/or T.K. Wolf, July 2016 – July 2017.

Date	Point of Travel	Nature of Travel	Miles
5-Jul	Shenandoah Co.	N application trial	47
19-Jul	Warren County	N application trial	100
21-Jul	Shenandoah Co.	N application trial	72
1-Aug	Chatham Virginia	SoVA grant Meeting	515
2-Aug	Warren County	N application trial	62
4-Aug	Shenandoah County	N application trial	49
9-Aug	Albemarle County	Viticulture Research Information Session	243
10-Aug	Loudoun County	Vineyard Field Trip	60
18-Aug	Rappahannock Co.	Vineyard Site Visit	96
27-Sep	Frederick County	Vineyard Site visit w/ Mark Sutphin	39
14-Oct	Shenandoah County	Vineyard site visit	48
19-Oct	Lexington VA	Two vineyard site visits	291
9-Nov	Loudoun and Clark Co.	Vineyard visit and sample pickup	98
30-Nov	Pittsylvania Co.	In-service training	432
22-Dec	Safford Co.	Vineyard site visit, new grower	180
12-Jan	Shenandoah Co.	Pruning Vidal for N project	58
20-Jan	Winston Salem	Gave two talks at the NC winegrowers annual meeting	594
24-Jan	Orange Co.	Pruning workshop at Honah Lee	197
25-Jan	Warren Co.	Pruning SB for N project	59

8-Feb	Fauquier and Page Co.	Pruning for Rootbag evaluation, pruning site visit to Luray	175
9-Feb	Early Mtn Vineyards	Attend VVA Board meeting	195
16-Feb	Giles County	Pruning Workshop with NRVGG	463
23-Feb	Charlottesville	VVA winter technical meeting	240
28-Feb	Rockingham Co	New Grape Grower site visit	110
7-Mar	Loudoun County	Pruning workshop, Breaux Vineyards	80
8-Mar	Loudoun County	WRE tasting	80
9-Mar	Hunting Creek Vineyards	SOVA new grower Primer	455
15-Mar	Madison County	Vineyard IPM workshop, Early Mtn Vineyards	149
17-Mar	Madison County	Trunk diseases and vineyard troubleshooting	200
20-Mar	C'ville, Omni Hotel	Present proposal to VWAB	264
30-Mar	Stanardsville	Participate in VVA Board meeting	195
28-Apr	Staunton Va	Present proposal to VA Ag Council	130
28-Apr	Rappahannock Co.	Trouble shooting winter injury	100
17-May	Shenandoah Co.	N project, herbicide touch up	50
24-May	Fauquier and Rappahannock Co.	Vineyard troubleshooting and vineyard meeting	100
26-May	Shenandoah County	N project, soil applications	50
27-May	Essex County	Northern Neck Vineyard Meeting	205
7-Jun	Loudoun County	VCE meeting	104
13-Jun	Rappahannock County	Troubleshooting at 2 vineyards	147
16-Jun	Chesterfield and Charles City Counties (Wolf)	Extension visits to 2 vineyards to evaluate extent of winter injury	400
20-Jun	Albemarle Co.	VCE vineyard meeting	200
22-Jun	Shenandoah County	N application trial	47
22-Jun	Standardsville (Wolf)	Participate in VVA Board meeting	141
30 -Jun	Essex, Westmoreland and Charles City Co.	Vineyard Troubleshooting	300
6 Jul	Richmond	Pick up wine for ASEV/ES meeting	276
17-July	Shenandoah Co.	N application trial	47
25 July	Shenandoah Co.	N application trial & scouting for Vineyard Field Trip	55

Summary: We have pursued and largely fulfilled both the extension and research missions that were proposed with this project. The extension activities listed within this report generally reflect those developed by Tremain Hatch. Dr. Tony Wolf is involved with a range of other extension (and research) activities, most of which do not have a bearing on the funds provided with this project. Therefore the focus is on the direct activities of Mr. Hatch.