

# 2015 Vermont Vineyard Feasibility Study

Mark Cannella, University of Vermont Extension



## Acknowledgements:

Funding for this project was provided through the Working Lands Enterprise Initiative and the Vermont Agency of Agriculture, Food and Markets.

*We give special thanks to the advisory group that helped shape this project.*

*We are grateful to the individuals and businesses who so openly and generously shared their experiences and records to develop a full understanding of how Vermont vineyards work.*

Terence Bradshaw, University of Vermont  
Ben Durant, East Shore Vineyard  
Chris Granstrom, Lincoln Peak Vineyard  
Ethan Joseph, Shelburne Vineyard  
Joseph Klimek, Mad River Vineyard  
Bob Livingstone, East Shore Vineyard  
Peg Allen, Crop Protection Services  
Larry Parker, USDA Farm Service Agency  
Andy Farmer, Northeastern Vine Supply  
Cheryl Herrick, UVM Extension Center for Sustainable Agriculture

*For more information about this publication contact:*

**Mark Cannella**

Assistant Professor of Extension, Farm Business Specialist

Email: Mark.Cannella@uvm.edu

Phone: (802) 223-2389

University of Vermont Extension

617 Comstock Road, Suite 5

Berlin, VT 05602

**Cover Photo Credit:**

Lincoln Peak Vineyard

**Citation:**

Cannella, M.P. 2015. *2015 Vermont Vineyard Feasibility Study*,  
FBRR 014: University of Vermont Extension.

UVM Extension helps individuals and communities put research-based knowledge to work. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. University of Vermont Extension, Burlington, Vermont

University of Vermont Extension, and U.S. Department of Agriculture, cooperating, offer education and employment to everyone without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or familial status.



*Photo Credit: Lincoln Peak Vineyard*

## Contents

Introduction.....	3
Methods .....	4
Key Findings.....	5
Assumptions for the Model Vineyard.....	6
Land, Buildings and Equipment .....	9
Financing .....	10
Labor, Expenses and Management Considerations.....	11
Financial Scenarios and Discussion .....	11
Additional Considerations .....	15
Marketing: The Grower –Winery Relationship .....	18
Alternatives: The Small Grower Opportunity .....	18
References.....	20

## **Introduction**

The Vermont wine sector is growing. The number of wineries managing their own vineyards is increasing, and there is also a demand from existing wineries to source high-quality wine grapes from other Vermont growers. Currently, approximately 175 acres of wine grapes are grown in Vermont, by both established commercial operations, and a growing number of new businesses entering grape and wine production. The evidence suggests that there is significant room for the industry to grow to meet the demand for Vermont value-added products.

Throughout our conversations with experienced grape growers, we heard it reiterated: vineyard management has a deeply dynamic nature. In addition to some of the challenges associated with any Vermont agricultural operation, grape cultivation has a few of its own. Even under the best scenario, wine grape production is a long term investment that will take many years to pay back. In some cases, plants nurtured all the way to mature yield may eventually be unsuitable for their vineyard's location, or may not match the owners' initial expectations for quality. But Vermont growers are also seeing success in terms of yield, quality, and recognition within the industry. Several Vermont wineries have won repeated awards for wines made from newer cold-hardy hybrids that have proven they can be grown to high standards in Vermont.

A number of excellent publications have been developed over the past 15 years that explore vineyard economics in other regions of the United States (Yeh, 2014; White, 2005, Wolf, 2008; Bardelon, n.d.) but they focus on growing practices, varieties, yields and market conditions that are not relevant to Vermont. Vermont growers, investors, and service providers articulated a need to be able to evaluate the financial feasibility of a vineyard guided by the best practices that have been developed (and continue to evolve) in Vermont today.

We present this information with two purposes in mind:

1. First, we seek to share current best practices and cost data that prospective wine grape growers can utilize as benchmarks for managing their vineyard.
2. Second, our model and associated decision tools can assist prospective and existing operations with pro-forma cash flow planning to evaluate the viability of proposed or current operations.

### ***About the Business – or Hobby – of Growing Vermont Grapes***

Vermont has historically had a limited potential for wine grape production due to cold winters and additional climate factors. The recent development of cold-hardy hybrid grape varieties, however, has given new life to an emerging grape and wine industry. Key industry leaders in Vermont and other states agree that there are significant financial and management challenges to growing grapes at a small scale (less than 30 acres). A conundrum faces growers scaling-up from what may start as a hobby (perhaps less than 2 acres) to a transition size of 3-8 acres that is intended to perform as a commercial business. Growing grapes at this scale can be cost-prohibitive and logistically challenging due to the associated labor challenges, problems with sizing machinery, and efficiency problems. Many small vineyard and win-

ery operators will openly declare that their profits are most readily earned in the winery and not in the vineyard.

This is not to say that there's no place for small operations. The industry leaders who advised this project agree that part-time and small hobby vineyards can be feasible for those who are not relying on short term profitability alone to keep the business viable. They will also serve the essential purpose of introducing consumers to new grape varieties and the traits of regional wines. High quality grapes are always in demand by wineries. Regardless of scale, each vineyard will require passionate commitment to the art and management of growing grapes. Prospective owners of both large and smaller vineyards will face the inevitable financial and farm management challenges present at all scales.

## Methods

This feasibility study is developed with contributions from viticulture specialists, interviews with growers, key literature sources and financial forecasting methods. A panel of five experienced Vermont growers, researchers and winemakers contributed to the project. They shared experiences, financial records and production records and they validated the aspects of the financial modelling as it was developed. The panel also shared "lessons learned" and identified improved practices that new vineyards could implement in order to avoid mistakes from the past.

A 21 year cash flow model was developed to match aspects of viticulture, climate, winemaking and markets that are unique to Vermont. The cash flow model includes gross sales, variable costs, fixed costs, capital inflows, capital outflows and debt service. Owner income tax factors are not included in the model. The financial model was run for various scenario vineyards ranging from 5-20 acres. Key financial metrics are summarized for each scenario and they include measures of gross sales, net cash flow from operations, annual cash flow, owner capital contributions and cumulative cash flow for the business.

The model does not include discounting of future cash flows to calculate time value of money ratios. Such calculations are very relevant to the future owners and it is strongly recommended that they undertake that next analysis after forecasting cash flows.

This report is based on the vineyard financial model developed and maintained by University of Vermont Extension in 2015<sup>1</sup>. The cultural practices and assumptions proposed in this report will not apply to all vineyards. Significant variables such as site selection, weather, disease, markets and management preferences will result in different results at each vineyard. This guide does not reflect the performance of any one farm and it is intended to be used as a guide in vineyard planning.

---

1 For more information on outreach education resources contact Mark Cannella, UVM Extension.

## Key Findings

Financial modelling for 5-20 acre scenario vineyards in Vermont revealed several financial considerations that vineyard owners must consider in their planning. A detailed analysis of the model results is presented in the *Financial Scenarios and Discussion* section.

- Equity: Each vineyard scenario includes significant investments in real estate, buildings and improvements. These investments, whether paid in cash or with borrowed money, will result in increasing net worth or equity for the owners over time. Owners will be forced to balance short term cash challenges with long term investments and the prospect that business assets may appreciate over time.
- Annual and Cumulative Cash Flow Deficit: All vineyards experience an annual cash flow deficit in the early years of operation. The size of the cumulative deficit and the duration of the negative cash flow are both related to the size of the vineyard. The 20 acre vineyard experiences the largest cumulative deficit of all scenarios by reaching – (\$350,000) in year 4. The 20 acre vineyard is also the earliest to accrue annual cash flow surpluses starting in year 5 that bring the scenario to a break-even point in year 19/20, earlier than any other scenario.

The 5 acre vineyard scenario accrues a smaller cash flow deficit of –(\$250,000) but the cumulative deficit grows until year 17. The standard 5 acre scenario begins to retain a small positive cash flow in Year 17 but the vineyard is not projected to break even for at least an additional 15 years.

All scenarios will require that additional working cash is acquired to maintain the business during the prolonged deficits.

- Margins: The operating margin<sup>2</sup> of the vineyard is influenced by scale. The larger 20 acre vineyard generates an annual operating margin of \$35,000 - \$50,000 per year beginning at mature yields in year 5. The smaller 5 acre scenario generates an operating margin of \$2,000 - \$7,000 in years 5-20.
- The Influence of Reduced Start Up Costs: Two common cost-reduction situations that were explored included: purchasing conserved farmland at a reduced price and establishing a small vineyard on farmland that was already owned with existing buildings. Both these factors were shown to improve the financial performance of the vineyard. More details on these discounted cost scenarios can be seen in the *Financial Scenarios and Discussion* section.

---

<sup>2</sup> Operating Margin: gross sales – operating expenses

## **Assumptions for the Model Vineyard**

The participating growers in this project were quick to note that many of our assumptions are both “best practices,” and often, “most expensive” practices. They recognize that there are many strategies that an individual grower may follow to reduce their expenses, and that new growers can learn from those with more experience to find less expensive but effective options.

### ***Vineyard Layout***

The vineyard is laid out with 9 ft (aisle) by 6 ft (in row) spacing. Rows are 350 ft in length with 14 rows per acre. Total plant density is 812 vines per planted acre on a high-wire cordon system. The land ownership calculations in the model account for the additional land needed for lanes, headlands and the assumption of un-usable land.

### ***Varietal Selection***

The study is based on the use of cold hardy hybrids, chiefly those recently developed in Minnesota. Much of the early *V. Vinifera* plantings in Vermont have been removed in favor of hybrid varieties better suited to the climate. At the time of this report growers were showing a preference and/or tolerance for the wine grape potential from Marquette, St. Croix, LaCrescent, Frontenac, Frontenac Gris, Louise Swenson and Prarie Star. The cost of grape vines is \$2.90 per vine for varieties with no royalty payment and \$3.40 per vine for varieties with a royalty due. The cost factors an advance pre-order for the 5-20 acre scale (4,000 vines or more) that are suitable for mechanical planting.

New varieties continue to be developed and be released. Industry leaders recognize that successful vineyards and wineries must adapt to new grape types and changing consumer demands, now and in the future. Winemakers also recognize that it will take several years of production to determine if a certain variety is producing high quality grapes within the vineyard or within certain soil and micro-climate sub-types. It is common for growers to pull out certain plantings if they prove to be unsuccessful.

### ***Yield and Price***

Our grower panel shared yield records to determine realistic expectations for production. Four to 4.5 tons per acre is a reasonable yield from mature vines. The model assumes the following yield for all varieties planted: 0 tons per acre (T/A) for year 0, 1, 2 ; 1.0 T/A in year 3 ; 2.75 T/A in year 4; 4 T/A in Year 5 and forward.

This model assumes that 10 % of the planted acres will be removed and replanted to a different variety in Year 12. See *Marketing: The Grower-Winery Relationship* section of this report for more information on how wine quality criteria can impact yield expectations.

Grapes are valued at \$1.00 per pound (\$2,000 per ton).



Photo Credit: Ethan Joseph, Shelburne Vineyard

### ***Vineyard Site Preparation, Planting and Trellis Construction***

The theoretical vineyard site is a hay field with moderately drained soils and moderate fertility, which we felt to be a typical scenario a new vineyard owner would encounter in the Green Mountain State. Initial site preparation is completed though custom hired operators starting in Year 0<sup>3</sup>. Vine installation is completed in summer of Year 1.

The following steps were included in the site preparation budget to convert the hayfield to vines. Steps 1-8 occur in Year 0. Steps 9-12 occur in Year 1.

1. Hay harvest
  - a. First cut hay yield was estimated at 1 ton per acre (poor yield), round bale size of 850 pounds and round bale value of \$35 each.
2. Installation of drainage systems (to occur at the most appropriate time before end of Year 0)
3. Herbicide knockdown followed by a waiting period.
4. Heavy tillage, ripping, de-sodding
5. Stage 2 of heavy tillage and disk harrow to incorporate sod.
6. Subsoil
7. Light tillage and field prep in the fall of year 0
  - a. Additional costs are included here for taking soil samples and soil amendments. General soil conditioner (lime) and fertilizer application in Year 0 is calculated at \$175 per planted acre.
8. Winter wait
9. Year 1 laser planting of vines
  - a. Vines are planted by a custom-hired laser planting service at cost of \$0.60 per vine.
10. Trellis and post installation
  - a. A hi-wire trellis system is used for all varieties. (Maier, 2012; Zabadal, 1997; Wolf, 2008).
11. Light tillage in aisles for path management
12. Seed down aisles with perennial cover.

---

<sup>3</sup> Custom rates were estimated using the 2014 NASS/Pennsylvania Custom Machinery Rates (NASS, 2014). Reported rates were inflated by 15% to account for higher costs observed in Vermont.

***Integrated Pest and Disease Management (IPM)***

The following section lays out a sample spray program used to estimate the cost of materials and the equipment required for IPM activity in the vineyard. The sample program is specific for Vermont and was developed with feedback from our advisory group and the IPM recommendations available from the University of Vermont Cold Climate Grape Production program<sup>4</sup> (Berkett, 2009; Weigle and Muza, 2014). Managers should expect to have unique IPM plans that will address the specific situations in the vineyard and their preferences for certain products. Overall IPM materials costs should be decreased or increased to reflect less or more aggressive spray programs. Pricing is based on the closest available formulations and package sizes available in Vermont in December 2014.

*Table 1: Disease Spray Program*

<b>Year</b>		<b>Notes</b>
Year 0	No Sprays	
Year 1 (planting year)	No Sprays	
Year 2	Full Program	50% of total volume of spray needed due to early stage of canopy development.
Year 3 and forward	Full Program	100% spray volume
<b>Application</b>	<b>Product</b>	<b>Single Application Cost Per Acre</b>
Spray 1	Mancozeb plus Rally	Dithane F-45: \$16.92 Rally 40 WSP: \$11.92
Spray 2	Mancozeb plus Rally	<i>Same as above</i>
Spray 3	Captan plus Sovran/Abound	Captan 4L: \$8.06 Sovran: \$15.72
Spray 4	Captan plus Sovran/Abound	<i>Same as above</i>
Spray 5 Target Sprays- 1-2 sprays for powdery mildew.	Sulfur, captan or phosphonate product	Phostrol: \$9.06

<sup>4</sup> More information on pest and disease management can be found through the University of Vermont Cold Climate Grape Production program.

Table 2: Pest Spray Program

Year	Product Options	Notes	Single Application Cost Per Acre
Year 1	Options Carbaryl/Sevin, Adios, Carbamec, Slam:	25% spray needed due to early total volume of stage of canopy development	Carbaryl: \$24.98
Year 2	Carbaryl/Sevin	(50% rate)	Carbaryl: \$24.98
Year 3	Carbaryl/Sevin	(100% rate)	Carbaryl: \$24.98
Year 4	Intrepid/Avaunt	Prepare for possibility of fruit insects (grape berry moth, grape flea beetle or cane borer).	Avuant: \$37.51
Years 5 and forward	<i>Product to be determined based on target species</i>	Plan on 1 application of broad-spectrum insecticide to manage fruit-damaging insects.	

## Land, Buildings and Equipment

The model assumes that 1.2 acres of land is needed for every 1 acre of grape vines (812) planted. This accounts for headlands and roadways between blocks of vines. An additional 2 acres of land is added to land ownership to account for shop construction and an assumed amount of unproductive land.

Land is valued at \$6,000 per acre based on recent appraisals of similar sold properties (Curler, n.d.) This is higher than typical agricultural land value with the understanding that land purchases of less than 30 acres will not benefit from the discounted acre price associated with larger farm sales. Real estate taxes assume a statewide average tax rate of 2% and enrollment in the Vermont Current Land Use Appraisal Program for agricultural land. The adjusted taxable value of agricultural land is \$275 per acre. A discounted land price scenario used \$3,250 per acre to model land costs associated with conservation easements.

### *Farm Buildings and Improvements*

The farm includes a shop measuring 600 square feet. The shop construction is estimated at \$30,000 based on construction costs of \$50 per square foot. An additional \$8,000 is included to account for additional costs for water, electrical or small outbuilding needs that are unique to each site.

### *Field Drainage System*

Field drainage systems are installed at a close 18 foot spacing to provide more uniformity through the vineyard. Drainage costs were quoted at \$0.37 per foot for materials, \$0.65 per foot for installation and an estimated total \$3,000 per acre. Smaller parcels of 20 acres or less may incur higher costs because the transport and set-up expenses for the hired installer are being spread out over fewer acres.

## Equipment

A fixed equipment profile is used for vineyard scenarios from 10-20 acres. The equipment list and items are scaled down for scenarios ranging 5-9 acres. Equipment purchases begin in Year 0 (pre-planting) and continue through Year 3. Materials to handle grape harvests (wagons and bins) are phased in from Year 3-5 based on the maturity of the vines. The majority of equipment is expected to stay in use for the duration of the model period. One major exception is the replacement of the pick-up truck in Year 12 (capital expenditure). See APPENDIX A for a full list of equipment.

Table 3: Equipment investments in Year 0, Year 1, Year 3 and Year 5 (20 acre vineyard)

Year 0 Equipment	Year 1 Equipment	Year 3 Equipment	Year 5 Equipment
\$ 48,000	\$60,800	\$ 36,750	\$ 11,250

## Financing

The land, buildings, improvements, vineyard installation and equipment investments are amortized under the assumptions below. Agricultural lenders are expected to revalue lost capital on new buildings, drainage, vines and trellis that will impact the appraised value to secure each loan. This model assumes the owner's personal equity/assets are sufficient to secure all loans. Loan products commonly include variable rates not modelled in this study.

Financing Assumptions:

- Interest Rates: 6% Fixed Rate
- Down Payment: 20% on market value of item or improvement
- Origination Fee: 0.5%
- Term of Loan:
  - Land: 20 years
  - Shop Construction and Drainage: 20 years
  - Equipment: 7 years

Table 4: Total Investments Year 0 – 5 for a 20 acre vineyard (does not include vine replanting after year 10)

Description	Amount	Per Acre
Real Estate Investment	\$139,200	\$6,960
Buildings and Improvement	\$98,000	\$4,900
Equipment Investment (Year 0 -5)	\$156,800	\$7,840
Vines and Install (Year 1)	\$61,712	\$3,086
Trellis Install (Year 1)	\$46,390 <sup>1</sup>	\$2,320
	<b>\$502,102</b>	<b>\$25,105</b>

<sup>1</sup> Labor for installation of trellis is included in the management payroll estimates for Year 0. This results in a potentially lower trellis cost as these costs are included elsewhere.

The cash flow model demonstrates where cash flow becomes negative and the owner(s) would need to locate additional cash sources. The model does not account for the provision of this additional operating cash or include any costs (interest) to access these sources.

## **Labor, Expenses and Management Considerations**

### ***Labor and Management***

The model farm is assumed to be operated by a manager, seasonal crew and additional labor hired for specific pruning or harvest activities. Labor and management cost were developed through use of actual payroll records for three vineyards operating in the 10-20 acre scale. Comprehensive payroll records improve the accuracy of accounting for “non-farming” activities like coordinating seasonal crews, commute/transport between vineyard sites and relevant farming activities that are separate from vine management. The following factors are used for labor costs: Management - \$1,800 per acre; Crew - \$1,389 per acre and Harvest Labor - \$1,737 per acre. Currently in Vermont several vineyards also operate wineries. Certain managers may split their time between the vineyard and winery to create a full time or full year position that might not be feasible from the vineyard alone.

This model does not assume the owner and manager are the same person but it is quite possible they will be. In cases where the results indicate a negative cash flow to the business it is important to note that a dual/owner manager will still be receiving compensation as an expense to the business. This totals over \$30,000 per year for the 20 acre vineyard. See the section entitled “Owner Capital and Cash Flow” for a discussion on how the dual owner/manager role relates to the interplay between management expenses (to the business) and cumulative owner cash position.

### ***Farm Insurance***

Farm insurance was calculated at 1% of the initial building and equipment investments.

### ***Crop Insurance***

Crop insurance was estimated at \$50 per acre using current parameters for the USDA Non-Insured Crop Disaster Assistance Program (NAP). Crop Insurance begins in the 4<sup>th</sup> growing year of the vines. Crop Insurance calculations are based on an average expected yield of 4.25 tons per acre.

## **Financial Scenarios and Discussion**

The assumptions for the model vineyard were converted into a 21 year cash flow model. The model tracks the following financial measures:

- Gross Sales
- Variable Costs
- Fixed Costs
- Total Operating Costs
- Net Cash (before capital expenditures)
- Capital Inflows
- Capital Outflows
- Net Cash per Year (after capital)
- Cumulative Net Cash
- Cash Position of Owner
- Cumulative Principal Paid and Down Payments

A number of ratios and comparative percentages were calculated. The model demonstrates cash-basis performance of the business. The model does not calculate discounted cash flows that consider the time value of money. Such calculations are very relevant to the future owner or partners and it is strongly recommended that they complete that analysis. For example (as we discuss further in the *Owner Capital & Cash Flow* section), it is important to note that the model charges the business an operating cost for management starting in year 0. In the case where the owner is providing management and labor there is the possibility that portions of this cash expense may become reinvested as the source of “owner contributions” that cover cash flow deficits throughout the life of the business.

The financial model was run for the following scenarios:

- 20 Acres
- 15 Acres
- 5 Acres
- 20 Acres on Conserved Land (discounted land costs)
- 5 Acres with Previously Owned Land and Buildings

These scenarios were chosen to investigate the impact of vineyard size on financial performance. A 20 acre vineyard in Vermont would be considered large. Two discounted cost scenarios were developed to model reasonable real-world situations that would reduce the start-up costs for a new vineyard installation. The conserved land scenario included land costs valued at \$3,250 per acre (reduced from the \$6,000 per acre). The 5 acre discounted scenario assumes that the land and buildings are already owned. This may be a common situation for existing farms that are considering diversification of income or an exit from a previous farming business in order to pursue grape production. This scenario does include the cost for field drainage investments.

A summary of key financial indicators for all scenarios is presented in Appendix B.

Financial measures comparing different income and cost factors are highly variable in Year 0 – Year 5 due to the heavy loading of establishment costs in Year 0 – Year 3 and the delay of mature yields until Year 5 – 6. These measures do not fluctuate as widely once mature and consistent harvest yields are recognized. Table 5 demonstrates key average financial measures from year 6 and forward.

*Table 5: Financial Measure Averages from Year 6 – Year 20 in the 20 Acre Vineyard*

Annual Gross Sales	\$ 156,480
Annual Operating Costs	\$114,907
Operating Costs as Percent of Gross Sales	74 %
Operating-Expense Ratio <sup>2</sup>	70 %
Capital Outflows as Percent of Gross	12 %
Management Compensation Per Year	\$34,000

<sup>6</sup> Operating-Expense Ration = (Total Operating Expense – Interest)/Gross Farm Income

The 20 acre vineyard scenario in Figure 1 below reaches its maximum cumulative cash flow deficit of (\$353,044) in Year 4. Cumulative net cash flow remains negative until it breaks even between Year 19 and Year 20. Other forms of working capital will be needed to maintain positive cash flow. Individual managers will need to plan for any cost (interest payment or the opportunity cost on owner capital) for borrowed working cash.

Figure 1: Gross Sales and Net Cash from Year 0 – Year 20 (20 acre vineyard)

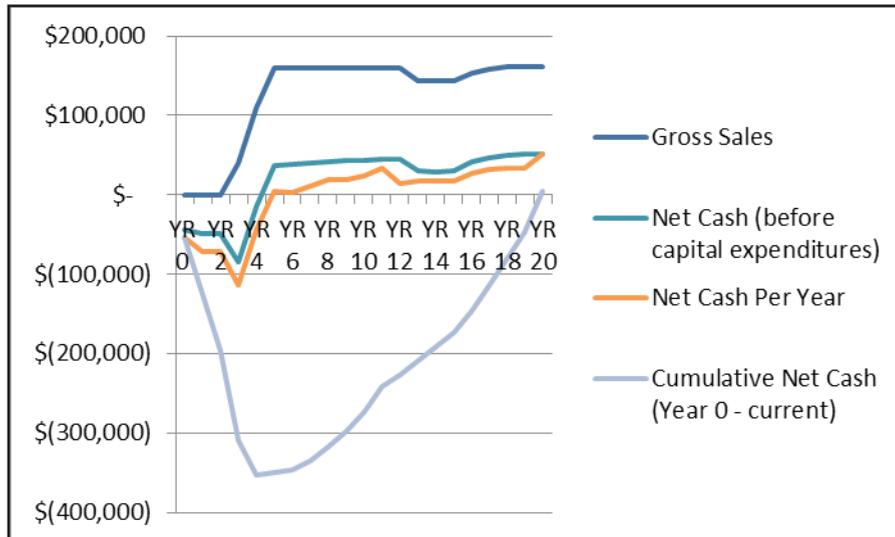
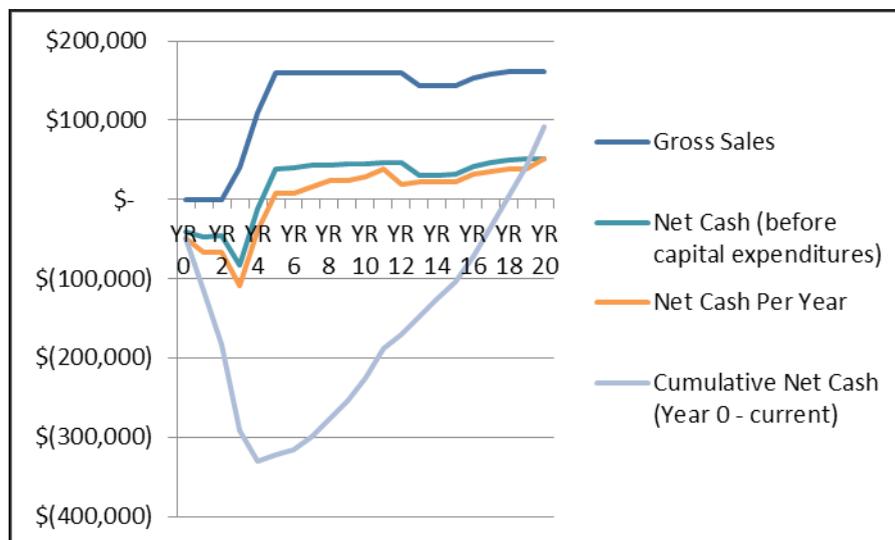


Figure 2 demonstrates that the financial indicators for a 20 acre vineyard benefit from the reduced costs of conserved land. The cumulative net cash for the business breaks even approximately two years earlier than the standard 20 acre scenario.

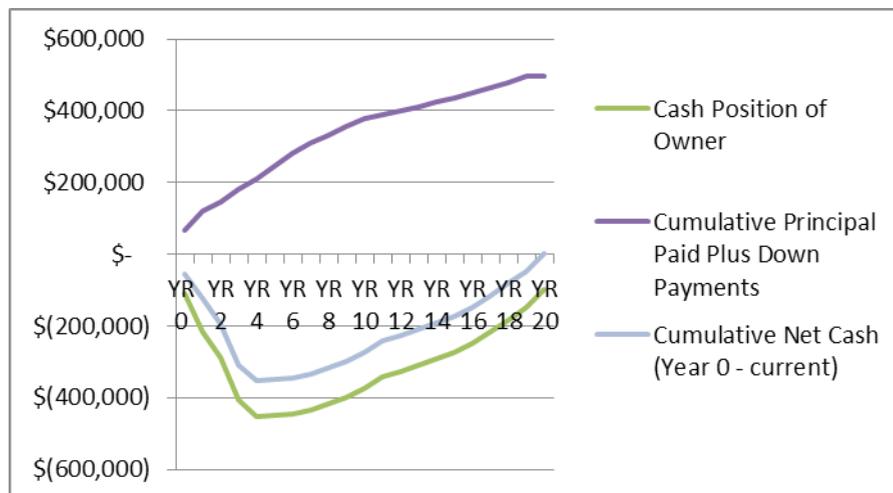
Figure 2: Gross Sales and Net Cash from Year 0 – Year 20 (20 acre vineyard, CONSERVED LAND)



The capital investment to establish the vineyard is significant. When all annual cash expenses are averaged over the 20 year model, approximately 30% of annual costs are spent on capital expenditures and principal portion of debt service. Variable costs average 40% of total expenses and fixed costs average 30% of total expenses.

Despite significant cash deficits that must be managed, the business is making significant investments in land, equipment, buildings and improvements. The business owners will make down payments and principal payments of over \$500,000 over the entire model projection (see Figure 3). The ownership value of the business assets must be considered in relation to the cash deficit and cost of cash acquisition that the owners bear throughout the life of the business. Some of the equipment assets will have reached the end of their useful life within 20-25 years while the land asset may be considered an appreciating asset over time. This model tracks investments on a cost basis but it does not account for depreciation or fair market valuation adjustments over the life of the business.

Figure 3: Cumulative cash flows compared to principal payments Year 0 – Year 20 (20 acre vineyard)

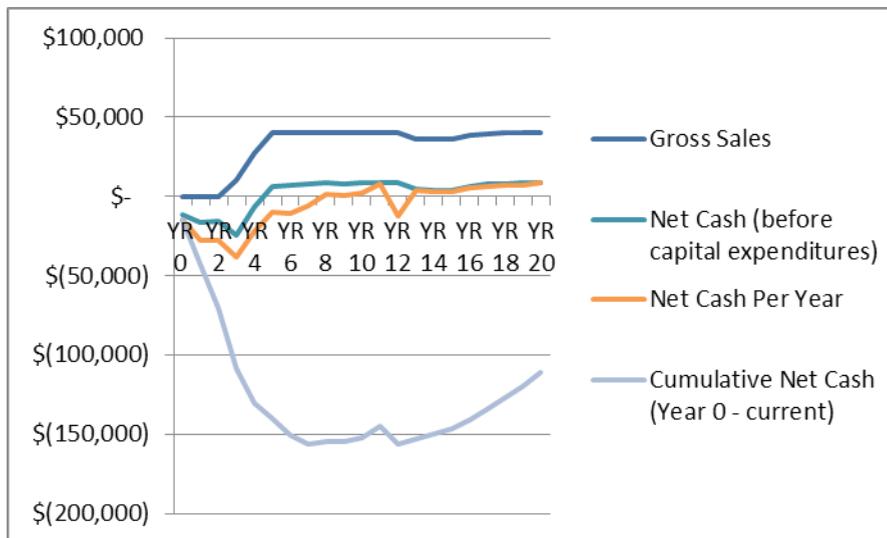


The model demonstrates the impact of scale. The 20 acre scenarios are able to reach a Cumulative Net Cash Break Even within the 21 year model (See Table 5). The 5 acre scenarios are at a significant disadvantage due to the smaller gross sales and will not reach break-even within the 21 year horizon of the cash flow model. The fixed costs and capital investments are disproportionately higher for the small vineyard due to the reduced scale of the business. The 5 acre scenario is not able to reach an annual net cash break even until Year 17. At that point, the business is facing an accumulated cash deficit of \$250,000. The discounted 5 acre scenario that assumes that the land and buildings are owned reaches an annual net cash break even between years 10-12 but the limited positive cash flow from this smaller vineyard pushes the cumulative net cash break even time period past 30 years from the initial planting year (See Figure 4).

Table 5: Financial Indicators for 20, 15 and 5 Acre Vineyard Models without discounted costs

Standard Scenarios	20 ACRE	15 ACRE	5 ACRE
Net Cash Break-Even Year (before capital payments)	Year 5	Year 5	Year 5
Net Cash Break-Even Year (after capital payments)	Year 5	Year 7	Year 17
Cash Position of Owner in Year 20	(\$97,756)	(\$173,152)	(\$285,835)
Cumulative Net Cash of Business In Year 20	\$3,802	(\$88,589)	(\$241,036)
Cumulative Principal Paid and Down Payments	\$496,789	\$424,109	\$249,331
Cumulative Principal and Owner Cash Position Combined	\$399,033	\$250,957	(\$36,104)

Figure 4: Gross Sales and Net Cash from Year 0 – Year 20 (5 acre vineyard with previously owned land and buildings)



There is no single indicator in the suite of cash based financial measures that can determine which scenario is superior. Each manager will evaluate their own situation and identify the factors most important to their own business.

A summary of key financial indicators for all scenarios is presented in Appendix B.

## Additional Considerations

### Management Factors

- Experienced crew: Vineyard establishment and operation is a skilled activity. New farmers may start out with the romantic view of a harvest time in which their friends and family come to help during that exciting and busy period. But established vineyards have evolved past volunteer and untrained labor to year-round or returning employees that have the skills to accomplish pruning, combing, thinning, and harvest tasks efficiently and to the required standards.

- **Site Selection:** A good site avoids unseasonable spring and fall frost and reduced labor costs because vegetative growth tends to be under control. High vigor sites will require much more labor. Controlled growth results in better quality grapes and commands a higher price. An excellent site vs marginal site may well be the difference between success and failure.
- **Grower Skill:** A highly skilled grower is crucial to success. The myriad day to day decisions the grower makes add up to a big difference in results at the end of the season. Today's decisions will often dictate the future many years out and cannot always be reversed.
- **Vineyard Mechanization:** This is still an open question in Vermont. One obstacle is that most vineyard mechanization has been developed for Vertical Shoot Position system while most of Vermont grapes are grown on top wire (high wire) cordon. Another obstacle is scale. Most vineyard machines only start to become feasible at a scale that has not yet been reached in typical Vermont vineyards.
- **Many dual vineyards and wineries** indicate that adding value to grapes is required to maintain a viable business. General consensus is that it can be more feasible financially to establish the winery first and begin to make and sell wine immediately to generate cash flow. As the years progress, a vineyard could be slowly established and self-grown grapes could be phased-in to the supply the winery.
- **Cost Reduction:** Participating managers and reviewers were quick to suggest certain strategies to reduce the costs of establishing a vineyard. The advisory group embraced the need for managers to find creative ways to reduce costs. The same advisors also cautioned that cost reduction strategies can often backfire. For example, propagation of future planting stock could reduce costs but also prove disastrous if plant vigor is compromised. Others suggest the harvest of cedar trellis posts from on the farm to reduce trellis installation costs. The same managers recognize the inherent challenges of an end-post anchor failure or trellis repair among established vines.
- **Cost Additions:** Bird netting is an expensive investment that may be unnecessary for some vineyards while it may be unavoidable for others. This site specific condition is difficult to predict.

### ***Owner Capital and Cash Flow***

All the scenarios demonstrate a significant cash flow deficit that must be addressed. Given the uncertainty of business performance in the early years it is likely the business and owners will need to have resources to supply this cash or secure the cash from other sources. This project does not make the assumption that the owner and manager is the same person, however, it is feasible that the business is run by a dual owner and manager. It is important to note that the model charges the business an operating cost for management starting in year 0. In the case where the owner is providing management and labor there is the possibility that portions of this cash expense may become reinvested as the source of "owner contributions" that cover cash flow deficits throughout the life of the business.

All scenarios assume that the management expenses are withdrawn out of the business. The “cash position of the owner” indicator in the financial results assumes the owner has withdrawn any related management salary and utilized it personally (household expenses or personal savings/investments). This management salary is not factored into the “cash position of the owner” if the owner is in fact the manager drawing the salary. For the 20 acre scenario, the owner/manager will have been paid approximately \$35,000 per year for a total of ~\$700,000 over the 21 year model. For the 5 acre scenario the owner/manager will have been paid \$9,000 per year (slightly reduced in year 0 – 3) from the business for a total of ~\$180,000 over the 21 year model.

Prospective vineyard owners must consider the optimal balance between different sources of capital. The owner will need to have strong equity and available cash to pursue the project. These factors are both advantageous to working with commercial lending agencies if the owners will require outside capital to establish the business. Agricultural lenders should be consulted early in the planning to understand their collateral requirements and their methods of calculating lost capital to secure any loans on investments like new building construction or trellis and vine installation. Owners should plan to maintain cash reserves that can mitigate the operating deficits of year 0-5 before the vines reach mature yield. Such credit may be available but may come at higher interest rates or require additional assets be pledged to secure the debt.

### ***Income Taxes and Impact on Cash Flow***

The income tax treatment of the newly established vineyard is not included in this financial model. Tax implications will have impacts on the cash flow for the business and/or owner(s) (or other business entity) that must be assessed on a case-by-case basis, and incorporated into a full financial budget for the project.

The United States Internal Revenue Service (IRS) provides guidance on the tax implications of owning and operating a vineyard in The Wine Industry Audit Technique Guide (Internal Revenue Service, 2011). Prospective growers are advised to seek professional tax, accounting and legal services to evaluate their specific situation before embarking on the vineyard project. Networking with vineyard owners in regions with established wine industries is likely to produce referrals to professionals that have experience with vineyard establishment. It is expected that prospective owners will be leveraging established equity and cash on hand to establish the business. Advance planning will have significant implications and possible benefits that can guide the new owner’s decisions.

The IRS provides definitions for land clearing, soil and water conservation, indirect costs, direct costs and pre-productive costs. Pre-productive cost must be capitalized into the costs of the vines and depreciation on those costs will begin once the vines have produced a commercially harvestable crop. An election to deduct certain pre-productive costs is available and more information is available in I.R.C . § 263 A covering uniform capitalization rules.

## Marketing: The Grower –Winery Relationship

Wine producing regions will move through various stages from infancy to maturity. A region must have access to high quality wine grapes to progress from technically correct wines into a realm of recognizably high quality wines.

It is essential for wine grape growers to partner closely with wine makers. The relationship is of paramount importance. Both the grower and winemaker will have their own unique needs, expectations and anxiety based on the expectations within each’s marketplace.

As in any agricultural business, wine grape crop performance is heavily impacted by yield. But wine grape growers driven by maximum yield objectives run the risk of missing the wine grape quality factors needed in the winery. A variety of situations may require management to reduce yields and enhance or maintain a quality standard needed in the winery. These situations may be driven by vine age, seasonal weather patterns or that unwelcome storm system predicted to arrive right at optimal harvest time.

Grape pricing is commonly based on the “bottle price multiplier” calculation (Bordelon, n.d ; Lamy, 1995). The “bottle price multiplier” calculation says that the final sale price of one bottle of wine multiplied by 100 will equal the price of one ton of grapes. According to the bottle price formula: \$20 per bottle x 100 = \$2,000 per ton of grapes or \$1.00 per pound. Other factors will impact a negotiated grape price and this initial calculation can be one aspect of the overall negotiation. Wineries that are able to make and market a higher quality wine are often willing to pay more for high quality grapes.

Table 13: Factors influencing the marketability of a grape crop

Chemical	Physical	Other Factors
<ul style="list-style-type: none"> <li>• Brix</li> <li>• Titratable Acid (TA)</li> <li>• pH</li> <li>• Tannin Extractability</li> <li>• Tartaric to Malic Acid Ratio</li> <li>• Flavor Development</li> <li>• Maturity of Stems/Seeds</li> <li>• Who is responsible for measuring chemical parameters</li> </ul>	<ul style="list-style-type: none"> <li>• Volume of Delivery</li> <li>• Temperature of grapes upon delivery</li> <li>• Signs of Spontaneous Fermentation</li> <li>• Disease/Insect Presence</li> <li>• Material Other Than Grapes</li> </ul>	<ul style="list-style-type: none"> <li>• Communication between grower and buyer</li> <li>• Timing of Delivery</li> <li>• Delivery included or separate from grape price</li> <li>• Accuracy of grower yield projection vs actual delivery</li> </ul>

## Alternatives: The Small Grower Opportunity

Scenarios for smaller vineyards measuring 10 acres and less were explored. For vineyards of 6-10 acres the required equipment, land and buildings were all downsized to fit a smaller vineyard. Unfortunately, each scenario performed worse financially compared to 11-20 acre vineyards. Cumulative net cash flow remained negative for over 25 years, compared to the break-even achieved by the 20-acre vineyard between Year 19-20. The reality, however, is that people will often embark on an agricultural venture at a scale of operation that is financially far from ideal. If a prospective grower is sufficiently

capitalized and is prepared to withstand losses in the interest of learning, a good argument can be made for an owner to establish a business at smaller scale in order to build experience and mediate the larger risks presented by a larger vineyard business.

Small vineyards can successfully partner with wine makers. Growers should discuss the minimum pressing /wine batch size that is feasible for wineries to ensure that smaller harvests can be sold. These small vineyards (under 5 acres) can present significant commercial business challenges but may be viable as a fulfilling hobby and lifestyle choice. There are potential income tax or property tax benefits that may accrue to the owner that could make the project more feasible. Key industry leaders interviewed for this project acknowledge that emerging wine regions are established by passionate individuals who are not driven solely by financial objectives.

## References

- Berkett, L.P. (2009). *An initial integrated pest management strategy for new cold climate winegrape growers*. University of Vermont Extension. Available online at: <http://www.uvm.edu/~fruit/>
- Bordelon, Bruce. (n.d.). *Economics of Midwestern Grape Production*. Purdue University. Available online at: <https://ag.purdue.edu/hla/fruitveg/Pages/Grapes.aspx>
- Curler, A. (n.d.). [Interview by M. Cannella].
- Domoto, P. (n.d.). *Cost of Establishing a Vineyard*. Iowa State University Extension. Excel Spreadsheet. Available online at: [http://www.agmrc.org/commodities\\_\\_products/fruits/wine/winery-and-vineyard-feasibility-workbooks/](http://www.agmrc.org/commodities__products/fruits/wine/winery-and-vineyard-feasibility-workbooks/)
- Lamy, J.L. (1995). *Relating grape prices to wine prices: the Bottle Price Multiplier*. Vineyard & Winery Management, November/December 1995. pg. 20-25.
- Maier, B. (2012). *Trellis End Post Assembly Designs for Vineyards*. NM State University, Cooperative Extension Service.
- National Agricultural Statistics Service. (2014). 2014 Custom Machinery Rates 2014. Available online at: [http://www.nass.usda.gov/Statistics\\_by\\_State/Pennsylvania/Publications/Machinery\\_Custom\\_Rates/CustomRates%202014.pdf](http://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Machinery_Custom_Rates/CustomRates%202014.pdf)
- Yeh, A.D, Gomez, M.I. and G.B. White. (2014). Cost of Establishment and Production of V.Vinifera Grapes in the Finger Lakes Region of New York-2013. EB2014-01. Dyson School of Applied Economics and Management, Cornell University.
- Weigle, T. and Muza, A. (2014). *2014 New York and Pennsylvania Pest Management Guidelines for Grapes*. Ithaca,N.Y.: Pesticide Management Education Program, Cornell University.
- White, G.B. (2005). *Cost of Establishment and Production of Vinifera Grapes in the Finger Lakes Region of New York -2004*. E.B. 2005-06. Department of Applied Economics and Management, Cornell University.
- Internal Revenue Service. (2011). *The Wine Industry Audit Technique Guide*. Available online at: <http://www.irs.gov/Businesses/Small-Businesses-&Self-Employed/The-Wine-Industry-Audit-Technique-Guide>
- Wolf, T., & Resource, A. (2008). *Wine grape production guide for eastern North America*. Ithaca, N.Y.: Natural Resource, Agriculture, and Engineering Service (NRAES) Cooperative Extension.
- Zabadal, T. J. (1997). *Vineyard Establishment: Planting and early care of vineyards*. Michigan State University Extension.

<b>Appendix A: Equipment Inventory Listing</b>			
<b>Item</b>	<b>Quantity</b>	<b>Purchase Price</b>	<b>Fair Market Value</b>
<b>YEAR 0 EQUIPMENT</b>			
55-horsepower tractor (4WD, Cab )	1	\$ 40,000	\$ 40,000
Flail Mower	1	\$ 7,000	\$ 7,000
Shop Equipment (estimate total value)	1	\$ 1,000	\$ 1,000
		<b>Yr 1 Subtotal</b>	<b>\$ 48,000</b>
<b>YEAR 1 EQUIPMENT</b>			
High Speed Lawn mower (ie Z, dixie chopper)	1	\$ 9,000	\$ 9,000
Undervine cultivation	1	\$ 10,000	\$ 10,000
optional: 4 wheeler or other in row vehicle	1	\$ 5,000	\$ 5,000
Truck: Used Pickup	1	\$ 20,000	\$ 20,000
50 gallon herbicide sprayer, 3 pt hitch	1	\$ 1,000	\$ 1,000
300 Gallon air blast sprayer (go with small fan)	1	\$ 15,000	\$ 15,000
Backpack (hand pump) sprayers	1	\$ 100	\$ 100
Pruning Shears	5	\$ 40	\$ 200
PTO driven auger 12"	1	\$ 500	\$ 500
		<b>Yr 1 Subtotal</b>	<b>\$ 60,800</b>
<b>YEAR 3 EQUIPMENT</b>			
In field harvest wagon	1	\$ 1,000	\$ 1,000
Bird Control Equipment (based on acres planted)	20	\$ 100	\$ 2,000
Harvest Lugs (up to 30 lb capacity)	100	\$ 8	\$ 750
Storage Bins Year 3 (based on yr3 & yr 4 yield)	55	\$ 553	\$ 30,415
		<b>Yr 3 Subtotal</b>	<b>\$ 34,165</b>
<b>YEAR 5 EQUIPMENT</b>			
Storage Bins Year 5 (based on yr 5 & forward)	25	\$ 553	\$ 13,825
		<b>Yr 5 Subtotal</b>	<b>\$ 13,825</b>
<b>TOTAL EQUIPMENT INVESTMENT YR 0 - YR 5</b>			<b>\$ 156,800</b>

<b>APPENDIX B: Cash Flow Model Results</b>			
<i>Standard Scenarios</i>			
	<b>20 ACRE</b>	<b>15 ACRE</b>	<b>5 ACRE</b>
Net Cash Break-Even Year (before capital payments)	Year 5	Year 5	Year 5
Net Cash Break-Even Year (after capital payments)	Year 5	Year 7	Year 17
Cash Position of Owner in Year 20	(\$97,756)	(\$173,152)	(\$285,835)
Cumulative Net Cash of Business In Year 20	\$3,802	(\$88,589)	(\$241,036)
Cumulative Principal Paid and Down Payments	\$496,789	\$424,109	\$249,331
Cumulative Principal and Owner Cash Position Combined	\$399,033	\$250,957	(\$36,104)
<i>Discounted Cost Scenarios</i>			
	<b>Conserved Land</b>		<b>Owned Land and Bldgs</b>
	<b>20 ACRE</b>		<b>5 ACRE</b>
Net Cash Break-Even Year (before capital payments)	Year 5		Year 5
Net Cash Break-Even Year (after capital payments)	Year 5		Year 8
Cash Position of Owner in Year 20	\$2,764		(\$138,670)
Cumulative Net Cash of Business In Year 20	\$91,561		(\$111,311)
Cumulative Principal Paid and Down Payments	\$432,989		\$162,341
Cumulative Principal and Owner Cash Position Combined	\$435,753		\$23,671
<i>20 Acre Scenarios</i>			
	<b>20 ACRE</b>	<b>Conserved Land</b>	
	<b>20 ACRE</b>		
Net Cash Break-Even Year (before capital payments)	Year 5	Year 5	
Net Cash Break-Even Year (after capital payments)	Year 5	Year 5	
Cash Position of Owner in Year 20	(\$97,756)	\$2,764	
Cumulative Net Cash of Business In Year 20	\$3,802	\$91,561	
Cumulative Principal Paid and Down Payments	\$496,789	\$432,989	
Cumulative Principal and Owner Cash Position Combined	\$399,033	\$435,753	

