Economic Feasibility of Table Grape Production in Kentucky

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Abstract

The local foods movement and alternatives to traditional agriculture are gaining considerable interest, not only in Kentucky, but throughout the country. This research provides information that may aid farmers in the decision to invest or not in the alternative agricultural enterprise of viticulture. The primary objective of the research was to determine the expected profitability for a 1-acre table grape vineyard in Kentucky. Data on production relationships, costs, and returns came from the Western Kentucky University demonstration vineyard, published enterprise budgets, and market observations. Annual pro-forma budgets were estimated for a 20-year planning horizon. It was assumed that the vineyard would not yield until the third year and that full production would begin in the fourth year and continues through the 20th year. It was further assumed that the farmer would market production via local farmers' markets, school districts, and wholesale markets. Two pre-tax net present values were estimated using a 5% discount rate. The first assumed no compensation to family labor, which indicated a break-even point in the 4th year, a benefit-cost ratio of 2.39, and net present value of $91,059. The second analysis assumed compensation for family labor and indicated a break-even point in the 6th year, a benefit-cost ratio of 1.54, and a net present value of $54,724. Excluding taxation, the results indicate that table grape production in Kentucky is potentially economically viable.

Key Words: Viticulture, Table Grapes, Kentucky, Economic Feasibility

JEL Codes: Q1

Introduction

The local foods movement and alternatives to traditional agriculture are gaining considerable interest, not only in Kentucky, but throughout the southern U.S. and the rest of the country. This research explores the opportunity for farmers to invest or not in a table grape vineyard. The grape acreage in Kentucky from 1997 to 2007 increased at an average annual rate of 20% while the number of vineyards increased at rate of 8% per year.[1] At the same time of this growth the number of licensed wineries within the state increased more than four-fold[2] and farmers were diversifying from tobacco to alternative enterprises (Mukabeta and Brown, 2011). There has been some concern among the community of viticulturists that the wine grape industry in the region could experience surplus for certain wine grape varieties (Woods and Mansfield, 2006; Woods and Ernst, 2011). Thus, some viticulturists may consider diversifying into the table grape industry. Although the marketing system for fresh table grapes within the state is not as well developed as that for wine grapes, farmers markets, the Kentucky Proud program, and specialty restaurants interested in utilizing locally grown foods are beginning to provide marketing outlets for locally grown table grapes (University of Kentucky, 2010). Upon a review of the literature, there appears to be more studies available exploring the economic feasibility of wine grape production than that pertaining to the economic feasibility of table grape production for small-scale producers in Kentucky. This study is expected to help fill some of that gap.

The primary objective of this research was to determine the expected profitability of small scale table grape production in Kentucky. The analysis assumed a one acre family run vineyard producing table grapes, a 20-year horizon with no yield until the third year, and reaching full production in the fourth year. It is assumed that the family investor seeks to

[1] Estimated using data obtained from the USDA-NASS Quick Stats (http://quickstats.nass.usda.gov/).
[2] Estimated using data obtained from Wine America (http://www.wineamerica.org/newsroom/wine%20data%20center/2007%20wineries%20by%20state.pdf)

maximize wealth and that the table grapes will be sold through farmers markets, school systems, and wholesale markets.

Data and Methods

Production relationships, costs, and returns data came from both primary and secondary sources. Primary data was obtained from the Western Kentucky University demonstration vineyard. Secondary data was from published enterprise budgets and other literature, as well as market observations. Annual pro-forma budgets were estimated for a 20-year planning horizon. It was assumed that the vineyard does not yield until the third year and that full production begins in the fourth year and continues through the 20th year. It was assumed that the final product be marketed via local farmers markets, school systems, and whole sale markets. The investor is assumed to have a goal of wealth maximization. The net present value (NPV) method was used to help determine the profitability.

The NPV model, summarized by Barry and Ellinger (2012), evaluates investments on discounted cash flows, is consistent with the wealth maximization goal, and applicable toward analyzing the expected profitability of a table grape vineyard. The model can be described by equation-1.

$$NPV = \sum_{t=0}^{T} \frac{R_t}{(1+r)^t} - \sum_{t=0}^{T} \frac{C_t}{(1+r)^t} \quad (1)$$

where R_t and C_t are revenues and costs, respectively, incurred in time period t and r is the discount rate. When the NPV $\geq$ 0 it simply states that the discounted value of the revenues are equal to or greater than the discounted value of the costs and thus the revenues equal or exceed the costs of the investment. If this is the case, we would then accept the investment, otherwise we reject the investment.

Manipulation of equation-1 yields the benefit-cost ratio described by equation-2.

$$B/C = \frac{\sum_{t=0}^{T} \frac{R_t}{(1+r)^t}}{\sum_{t=0}^{T} \frac{C_t}{(1+r)^t}} \tag{2}$$

If the B/C $\geq$ 1, it indicates that the discounted revenues of the investment equal or exceed the discounted costs of the investment. If this is the case, we would accept the investment, otherwise we reject the investment.

A third manipulation of the basic NPV equation is given by equation-3, which is used to help determine the internal rate of return (IRR) of the investment. This is a rate that is unique or "internal" to the investment, it is the rate of return where the NPV = 0. The investor can utilize the IRR to reject, accept, or rank order investments. The investor may compare the IRR of one investment against that for another or an investor can compare the IRR to her/his minimal acceptable rate of return. The IRR is determined by solving equation-3 for the discount rate (r) that achieves a NPV of zero.

$$\sum_{t=0}^{T} \frac{R_t - C_t}{(1+r)^t} = 0 \tag{3}$$

The procedures used to help determine the potential profitability of a small scale table grape vineyard for Kentucky were (1) to develop annual enterprise budgets for the 20-year time horizon, (2) construct an annual cash flow table, and (3) estimate the NPV, B/C, and IRR.

Development of the enterprise budgets utilized published budgets from the University of Kentucky, which were modified based upon the assumptions of the study, experiences from the Western Kentucky University demonstration vineyard, and input from viticulturist, other

professionals, and market observations. The annual enterprise budgets are provided in the appendices at the end of this report.

Revenues can be influenced by yield, markets, and product prices. The research assumed that the vineyard would have no yield in years 1 and 2, would yield 2,500 pound per acre in year 3, and in years 4 through 20 would yield 10,000 pounds per acre. It was assumed that the product would be sold through farmers markets, school systems, and wholesale markets. The shares of yield and the revenues per pound were based upon expectations and experiences of marketing product from the Western Kentucky University demonstration vineyard. These assumptions are described in table-1:

Table-1: Assumptions about Markets & Revenues

Market	**Share of Yield**	**Revenue/Pound**
Farmers Market (full price)	18.75%	$3.00
Farmers Market (reduced price)	5.00%	$2.50
School System (full price)	18.75%	$1.50
School System (reduced price)	5.00%	$1.25
Wholesale Market (full price)	37.50%	$1.25
Wholesale Market (reduced price)	10.00%	$0.75
Waste or lost yield	5.00%	$0.00

Two analyses were conducted, both using a 5% discount rate. The first analysis assumed no compensation to family labor while the second analysis assumed that family labor was compensated. Both were pre-tax analyses.

Table-3 presents the analysis for the case in which family labor is not compensated. Column-1 indicates the time period. The data in columns 2 and 3, revenues and costs respectively, were obtained from the estimated enterprise budgets, which are provided in the appendices at the end of this report. This discount factor for any given time period is estimated as $1/(1 + r)^t$. The discounted revenues are obtained by multiplying the revenues by the discount factor in any given year. The discounted costs are calculated in a similar fashion; costs multiplied by discount factor in any given year. The net present value in any given year is obtained by utilizing equation-1 listed above.

The second analysis assumed that family labor would be compensated. Thus assumptions had to be made about the family structure, contribution of each family member, and the opportunity cost of their labor. These assumptions are provided in Table-2.

Table-2: Assumption on the Opportunity Cost of Family Labor

Labor Provider	**Cost/Hour**	**Assumptions**
Adults	$20.00	• 2 adults • Can obtain $40,000 annual salary employment • Provides 60% of labor
Children	$7.25	• 2 children • Can obtain KY minimum wage employment • Provides 40% of labor

Given the assumptions listed in table 2 the composite opportunity cost of labor is $14.90/hour, that is 0.6($20) + 0.4($7.25) = $14.90. The adult labor is assumed to work 2,000 hours per year at $40,000 annually, or $20/hour. Table-4 presents the NPV analysis for the case in which family labor is compensated.

Table-3: Net Present Value for 1-Acre Table Grape Vineyard (no compensation to family labor, pre-tax)

Year	Revenues	Costs	Discount Rate	Discount Factor	Discounted Revenues	Discounted Costs	Net Present Value
0	0.00	243.70	0.05	1.0000	0.00	243.70	-243.70
1	0.00	6,661.37	0.05	0.9524	0.00	6,344.16	-6,587.86
2	0.00	953.72	0.05	0.9070	0.00	865.05	-7,452.91
3	3,937.50	4,021.68	0.05	0.8638	3,401.36	3,474.08	-7,525.63
4	15,750.00	5,627.34	0.05	0.8227	12,957.56	4,629.63	802.31
5	15,750.00	5,627.34	0.05	0.7835	12,340.54	4,409.17	8,733.67
6	15,750.00	5,627.34	0.05	0.7462	11,752.89	4,199.21	16,287.36
7	15,750.00	5,627.34	0.05	0.7107	11,193.23	3,999.25	23,481.34
8	15,750.00	5,627.34	0.05	0.6768	10,660.22	3,808.81	30,332.76
9	15,750.00	5,627.34	0.05	0.6446	10,152.59	3,627.43	36,857.92
10	15,750.00	5,627.34	0.05	0.6139	9,669.13	3,454.70	43,072.35
11	15,750.00	5,627.34	0.05	0.5847	9,208.70	3,290.19	48,990.86
12	15,750.00	5,627.34	0.05	0.5568	8,770.19	3,133.51	54,627.54
13	15,750.00	5,627.34	0.05	0.5303	8,352.56	2,984.30	59,995.80
14	15,750.00	5,627.34	0.05	0.5051	7,954.82	2,842.19	65,108.43
15	15,750.00	5,627.34	0.05	0.4810	7,576.02	2,706.85	69,977.60
16	15,750.00	5,627.34	0.05	0.4581	7,215.26	2,577.95	74,614.91
17	15,750.00	5,627.34	0.05	0.4363	6,871.67	2,455.19	79,031.39
18	15,750.00	5,627.34	0.05	0.4155	6,544.45	2,338.28	83,237.57
19	15,750.00	5,627.34	0.05	0.3957	6,232.81	2,226.93	87,243.45
20	15,750.00	5,627.34	0.05	0.3769	5,936.01	2,120.89	91,058.57
Totals					156,790.02	65,731.44	**91,058.57**

Table-4: Net Present Value for 1-Acre Table Grape Vineyard (family labor compensated, pre-tax)

Year	Revenues	Costs	Discount Rate	Discount Factor	Discounted Revenues	Discounted Costs	Net Present Value
0	0.00	288.39	0.05	1.0000	0.00	288.39	-288.39
1	0.00	7,704.09	0.05	0.9524	0.00	7,337.23	-7,625.62
2	0.00	1,549.56	0.05	0.9070	0.00	1,405.50	-9,031.11
3	3,937.50	7,299.68	0.05	0.8638	3,401.36	6,305.74	-11,935.49
4	15,750.00	8,905.34	0.05	0.8227	12,957.56	7,326.45	-6,304.37
5	15,750.00	8,905.34	0.05	0.7835	12,340.54	6,977.57	-941.40
6	15,750.00	8,905.34	0.05	0.7462	11,752.89	6,645.30	4,166.19
7	15,750.00	8,905.34	0.05	0.7107	11,193.23	6,328.86	9,030.56
8	15,750.00	8,905.34	0.05	0.6768	10,660.22	6,027.48	13,663.30
9	15,750.00	8,905.34	0.05	0.6446	10,152.59	5,740.46	18,075.43
10	15,750.00	8,905.34	0.05	0.6139	9,669.13	5,467.11	22,277.45
11	15,750.00	8,905.34	0.05	0.5847	9,208.70	5,206.77	26,279.38
12	15,750.00	8,905.34	0.05	0.5568	8,770.19	4,958.83	30,090.75
13	15,750.00	8,905.34	0.05	0.5303	8,352.56	4,722.69	33,720.62
14	15,750.00	8,905.34	0.05	0.5051	7,954.82	4,497.80	37,177.63
15	15,750.00	8,905.34	0.05	0.4810	7,576.02	4,283.62	40,470.03
16	15,750.00	8,905.34	0.05	0.4581	7,215.26	4,079.64	43,605.65
17	15,750.00	8,905.34	0.05	0.4363	6,871.67	3,885.37	46,591.95
18	15,750.00	8,905.34	0.05	0.4155	6,544.45	3,700.35	49,436.05
19	15,750.00	8,905.34	0.05	0.3957	6,232.81	3,524.15	52,144.71
20	15,750.00	8,905.34	0.05	0.3769	5,936.01	3,356.33	54,724.40
Totals					156,790.02	102,065.62	**54,724.40**

Results

Under both scenarios and following the assumptions of the research, on a pre-tax basis the results indicate that a small-scale table grape vineyard in Kentucky has the potential to be a profitable enterprise. Depending upon whether or not family labor is compensated, it is expected that the vineyard would break-even within four to six years and that the investment may increase the family's pre-tax wealth by approximately $55,000 to $91,000 over 20 years. Furthermore, over the 20 year period, it is estimated that each $1 invested in the vineyard could return approximately $1.50 to $2.40 of revenues. The results of the study are summarized in Table-5.

Table-5: Result for NPV Analysis of a 1-Acre Table Grape Vineyard (20-year horizon, pre-tax)

Measure of Analysis	Scenario #1: No Compensation to Family Labor	Scenario #2: Family Labor is Compensated
Net Present Value	$91,058.57	$54,724.40
Benefit Cost Ratio	2.39	1.50
Internal Rate of Return	54.86%	34.03%
Break Even Point	Year 4	Year 6

Summary and Conclusion

The local food movement and alternative to traditional agriculture have been and are continuing to be part of the changing complexion of farming in Kentucky, as well as other part of the country. One alternative that has been on the rise in Kentucky, particular since the tobacco settlement, has been grapes. Many viticulturists have focused upon producing wine grapes, an alternative to wine grapes are table grapes. This research provided a brief analysis of the potential profitability of investing in a table grape vineyard. Based upon the assumptions of the study, the results indicate that table grape production could potentially be profitable in Kentucky. Yet there are many implications that should be considered and warrant further analysis. For example, cold storage can be critical toward improving the ability to satisfy various markets over

time. Market access and product price are definitely critical, this study made assumptions that may or may not hold in all cases. As with many new or alternative crops, more entrants could lower profits. Furthermore, taxation should also be considered prior to making an investment. As always it is recommended that sensitivity analysis be conducted on key variables that could change expected results.

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Appendix-1: Establishment Costs (Year-0 Estimated Revenues & Costs)

Description	Quantity	Units	$/Unit	Total ($)
Gross Returns				
Grapes: Farmers Market (Full Price)	0.00	lbs.	3.00	0.00
Grapes: Farmers Market (Reduced Price)	0.00	lbs.	2.50	0.00
Grapes: Schools (Full Price)	0.00	lbs.	1.50	0.00
Grapes: Schools (Reduced Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Full Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Reduced Price)	0.00	lbs.	0.75	0.00
Grapes: Lost to Production, Harvest, and Marketing	0.00	lbs.	0.00	0.00
Total Gross Returns				0.00
Variable Costs				
Production				
Soil Test	2.00	assays	12.00	24.00
Lime	3.00	ton	14.50	43.50
Herbicide	2.00	quarts	19.60	39.20
Grass Seed	90.00	lbs.	0.80	72.00
Machinery Cost	1.00	acre	25.00	25.00
Total Variable Production Costs				203.70
Return Above Variable Costs				-203.70
Fixed Costs				
Machinery & Equipment	1.00	acre	40.00	40.00
Total Fixed Production Costs				40.00
Total Explicit Production Costs				243.70
Return to Operator Labor, Land, Capital, and Management				**-243.70**
Operator and Unpaid Family Labor	3.00	hours	14.90	44.69
Total Operator and Unpaid Family Labor				**44.69**
Explicit Production Costs + Unpaid Labor				288.39
Return to Land, Capital, and Management				**-288.39**

Appendix-2: Planting (Year-1 Estimated Revenues & Costs)

Description	Quantity	Units	$/Unit	Total ($)
Gross Returns				
Grapes: Farmers Market (Full Price)	0.00	lbs.	3.00	0.00
Grapes: Farmers Market (Reduced Price)	0.00	lbs.	2.50	0.00
Grapes: Schools (Full Price)	0.00	lbs.	1.50	0.00
Grapes: Schools (Reduced Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Full Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Reduced Price)	0.00	lbs.	0.75	0.00
Grapes: Lost to Production, Harvest, and Marketing	0.00	lbs.	0.00	0.00
Total Gross Returns				0.00
Variable Costs				
Production				
Herbicide (Burndown)	1.00	quart	19.60	19.60
Herbicide (In-Season)	3.00	quart	24.40	73.20
Fungicides	3.00	applications	44.00	132.00
Insecticides	4.00	applications	23.20	92.80
Vines	600.00	vine	3.50	2,100.00
Fertilizer	150.00	lbs.	0.14	21.00
Irrigation	5.00	months	17.40	87.00
Machinery Costs	1.00	acre	52.00	52.00
Interest	1.00	acre	171.87	171.87
Trellis Materials				
4" Posts	180.00	post	6.92	1,245.60
6" End Posts	50.00	post	14.05	702.50
Wire	10,000.00	feet	0.02	200.00
Miscellaneous Trellis Materials	1.00	acre	275.00	275.00
Paid/Hired Labor				
Planting	60.00	hours	10.24	614.40
Build Trellis	60.00	hours	10.24	614.40
Total Variable Production Costs				6,401.37
Return Above Variable Costs				-6,401.37
Fixed Costs				
Machinery & Equipment	1.00	acre	80.00	80.00
Irrigation System	1.00	year	180.00	180.00
Total Fixed Production Costs				260.00
Total Explicit Production Costs				6,661.37
Return to Operator Labor, Land, Capital, and Management				**-6,661.37**
Operator and Unpaid Family Labor	70.00	hours	14.90	1,042.72
Total Operator and Unpaid Family Labor				1,042.72
Explicit Production Costs + Unpaid Labor				7,704.09
Return to Land, Capital, and Management				**-7,704.09**
Oportunity Cost of Land	1.00	Acre	95.74	95.74
Total Unpaid Land Expense				95.74
Total Explict Production Cost + Unpaid Labor + Opportunity Cost of Land				7,799.83
Return to Capital and Management				**-7,799.83**

Appendix-3: Growth (Year-2 Estimated Revenues & Costs)

Description	Quantity	Units	$/Unit	Total ($)
Gross Returns				
Grapes: Farmers Market (Full Price)	0.00	lbs.	3.00	0.00
Grapes: Farmers Market (Reduced Price)	0.00	lbs.	2.50	0.00
Grapes: Schools (Full Price)	0.00	lbs.	1.50	0.00
Grapes: Schools (Reduced Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Full Price)	0.00	lbs.	1.25	0.00
Grapes: Grocery, Wholesale, Other (Reduced Price)	0.00	lbs.	0.75	0.00
Grapes: Lost to Production, Harvest, and Marketing	0.00	lbs.	0.00	0.00
Total Gross Returns				0.00
Variable Costs				
Production				
Herbicide	3.00	quart	24.40	73.20
Fertilizer	300.00	lbs.	0.14	42.00
Hired Labor (Pruning)	16.00	hours	10.24	163.84
Fungicides	3.00	applications	44.00	132.00
Insecticides	4.00	applications	23.20	92.80
Irrigation	5.00	months	17.40	87.00
Machinery Costs	1.00	acre	46.00	46.00
Interest	1.00	acre	36.88	36.88
Total Variable Production Costs				673.72
Return Above Variable Costs				-673.72
Fixed Costs				
Machinery & Equipment	1.00	acre	70.00	70.00
Irrigation System	1.00	year	210.00	210.00
Total Fixed Production Costs				280.00
Total Explicit Production Costs				953.72
Return to Operator Labor, Land, Capital, and Management				**-953.72**
Operator and Unpaid Family Labor	40.00	hours	14.90	595.84
Total Operator and Unpaid Family Labor				595.84
Explict Production Costs + Unpaid Labor				1,549.56
Return to Land, Capital, and Management				**-1,549.56**
Oportunity Cost of Land	1.00	Acre	95.74	95.74
Total Unpaid Land Expense				95.74
Total Explicit Production Cost + Unpaid Labor + Opportunity Cost of Land				1,645.30
Return to Capital and Management				**-1,645.30**

Appendix-4: Growth (Year-3 Estimated Revenues & Costs)

Description	Quantity	Units	$/Unit	Total ($)
Gross Returns				
Grapes: Farmers Market (Full Price)	468.75	lbs.	3.00	1,406.25
Grapes: Farmers Market (Reduced Price)	125.00	lbs.	2.50	312.50
Grapes: Schools (Full Price)	468.75	lbs.	1.50	703.13
Grapes: Schools (Reduced Price)	125.00	lbs.	1.25	156.25
Grapes: Grocery, Wholesale, Other (Full Price)	937.50	lbs.	1.25	1,171.88
Grapes: Grocery, Wholesale, Other (Reduced Price)	250.00	lbs.	0.75	187.50
Grapes: Lost to Production, Harvest, and Marketing	125.00	lbs.	0.00	0.00
Total Gross Returns	2,500.00			3,937.50
Variable Costs				
Production				
Herbicide	2.00	quart	24.40	48.80
Fertilizer	1,200.00	lbs.	0.14	168.00
Fungicides	13.00	applications	44.00	572.00
Insecticides	4.00	applications	23.20	92.80
Irrigation	6.00	months	17.40	104.40
Hired Labor (Pruning)	40.00	hours	10.24	409.60
Machinery Costs	1.00	acre	52.20	52.20
Total Pre-Harvest Variable Costs				1,447.80
Harvesting and Marketing				
Harvest, Sort, and Pack	40.00	hours	10.24	409.60
Clamshells for Retailing	1,500.00	clamshells	0.13	195.00
Lugs for Picking and Wholesale	80.00	lugs	4.64	371.20
Refrigeration	70.00	days	1.74	121.80
Transportation Expense - Farmers Markets	300.00	miles	0.555	166.50
Transportation Expense - School System	150.00	miles	0.555	83.25
Transportation Expense - Wholesale Markets	150.00	miles	0.555	83.25
Farmers Market Weekly Fee	10.00	weeks	10.00	100.00
Total Harvest and Marketing Variable Costs				1,530.60
Interest	1.00	acre	72.28	72.28
Total Variable Costs of Production, Harvest, and Marketing				3,050.68
Return Above Variable Costs				886.82
Fixed Costs				
Machinery & Equipment	1.00	acre	50.00	50.00
Irrigation System	1.00	year	180.00	180.00
Cooling System	1.00	year	341.00	341.00
Pest Control	1.00	year	225.00	225.00
Annual Farmers Market Fee	1.00	year	75.00	75.00
Annualized Cost of Farmers Market Equipment (Tent, Table, Chairs, Etc.)	1.00	year	100.00	100.00
Total Fixed Production, Harvesting, and Marketing Costs				971.00
Total Explicit Production, Harvesting, and Marketing Costs				4,021.68
Return to Operator Labor, Land, Capital, and Management				**-84.18**
Operator and Unpaid Family Labor - Production and Harvesting	100.00	hours	14.90	1,490.00
Operator and Unpaid Family Labor - Farmers Markets Marketing	80.00	hours	14.90	1,192.00
Operator and Unpaid Family Labor - School System Marketing	20.00	hours	14.90	298.00
Operator and Unpaid Family Labor - Wholesale Marketing	20.00	hours	14.90	298.00
Total Operator and Unpaid Family Labor				**3,278.00**
Explict Production, Harvesting, and Marketing Costs + Unpaid Labor				7,299.68
Return to Land, Capital, and Management				**-3,362.18**
Oportunity Cost of Land	1.00	Acre		95.74
Total Unpaid Land Expense				95.74
Total Explicit Production, Harvesting, and Marketing Cost + Unpaid Labor + Opportunity Cost of Land				7,395.42
Return to Capital and Management				**-3,457.92**

Appendix-5: Full Production (Year-3 Estimated Revenues & Costs)

Description	Quantity	Units	$/Unit	Total ($)
Gross Returns				
Grapes: Farmers Market (Full Price)	1,875.00	lbs.	3.00	5,625.00
Grapes: Farmers Market (Reduced Price)	500.00	lbs.	2.50	1,250.00
Grapes: Schools (Full Price)	1,875.00	lbs.	1.50	2,812.50
Grapes: Schools (Reduced Price)	500.00	lbs.	1.25	625.00
Grapes: Grocery, Wholesale, Other (Full Price)	3,750.00	lbs.	1.25	4,687.50
Grapes: Grocery, Wholesale, Other (Reduced Price)	1,000.00	lbs.	0.75	750.00
Grapes: Lost to Production, Harvest, and Marketing	500.00	lbs.	0.00	0.00
Total Gross Returns	10,000.00			15,750.00
Variable Costs				
Production				
Herbicide	2.00	quart	24.40	48.80
Fertilizer	600.00	lbs.	0.14	84.00
Fungicides	13.00	applications	44.00	572.00
Insecticides	4.00	applications	23.20	92.80
Irrigation	6.00	months	17.40	104.40
Hired Labor (Pruning)	40.00	hours	10.24	409.60
Machinery Costs	1.00	acre	69.60	69.60
Total Pre-Harvest Variable Costs				1,381.20
Harvesting and Marketing				
Harvest, Sort, and Pack	130.00	hours	10.24	1,331.20
Clamshells for Retailing	8,000.00	clamshells	0.13	1,040.00
Lugs for Picking and Wholesale	60.00	lugs	4.64	278.40
Refrigeration	70.00	days	1.74	121.80
Transportation Expense - Farmers Markets	300.00	miles	0.555	166.50
Transportation Expense - School System	150.00	miles	0.555	83.25
Transportation Expense - Wholesale Markets	150.00	miles	0.555	83.25
Farmers Market Weekly Fee	10.00	weeks	10.00	100.00
Total Harvest and Marketing Variable Costs				3,204.40
Interest	1.00	acre	100.48	100.48
Total Variable Costs of Production, Harvest, and Marketing				4,686.08
Return Above Variable Costs				11,063.92
Fixed Costs				
Machinery & Equipment	1.00	acre	120.26	120.26
Irrigation System	1.00	year	180.00	180.00
Cooling System	1.00	year	341.00	341.00
Pest Control	1.00	year	225.00	225.00
Annual Farmers Market Fee	1.00	year	75.00	75.00
Annualized Cost of Farmers Market Equipment (Tent, Table, Chairs, Etc.)	1.00	year	100.00	100.00
Total Fixed Production, Harvesting, and Marketing Costs				941.26
Total Explicit Production, Harvesting, and Marketing Costs				5,627.34
Return to Operator Labor, Land, Capital, and Management				**10,122.66**
Operator and Unpaid Family Labor - Production and Harvesting	100.00	hours	14.90	1,490.00
Operator and Unpaid Family Labor - Farmers Markets Marketing	80.00	hours	14.90	1,192.00
Operator and Unpaid Family Labor - School System Marketing	20.00	hours	14.90	298.00
Operator and Unpaid Family Labor - Wholesale Marketing	20.00	hours	14.90	298.00
Total Operator and Unpaid Family Labor				**3,278.00**
Explicit Production, Harvesting, and Marketing Costs + Unpaid Labor				8,905.34
Return to Land, Capital, and Management				**6,844.66**
Oportunity Cost of Land	1.00	Acre		95.74
Total Unpaid Land Expense				95.74
Total Explicit Production, Harvesting, and Marketing Cost + Unpaid Labor + Opportunity Cost of Land				9,001.08
Return to Capital and Management				**6,748.92**