



# The Economic Feasibility of Growing Wine Grapes in Idaho

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# Introduction

Long-run profitability is essential to farm business survival and is highly dependent on decisions made by the farm operator. Wine grape growers, like other agricultural business owners, must decide how best to allocate a limited supply of land, labor, and capital. Allocating these resources wisely can determine the difference between business success or failure. Knowledge about costs of production and expected returns is crucial in evaluating the economic feasibility of any potential business venture and in monitoring the financial health of an existing operation. Specific questions that current or prospective growers must consider are

- Should I grow wine grapes?
- Do I have the management skills needed to grow wine grapes?
- What type of wine grape(s) should I grow?
- Should I purchase land to grow wine grapes?
- How should I harvest my grapes?
- Do I have a long-term, price-guaranteed contract with a winery?
- Or, do I plan to develop a winery myself?

These last two questions prove the most critical because long-term contracts are not currently being offered in Idaho. Lacking a contract, prospective growers will need to think seriously about building a winery and producing their own wine. Because of the marketing, production, and financial risks of growing grapes, growers must be prudent in their decision-making. A five-year time lag between planting vines and realizing profits makes financing a vineyard and winery difficult and risky.

An enterprise budget is a decision-making tool that estimates the costs, returns, and profit per acre of a single enterprise. Crop budgets help provide answers to the above questions and to many other questions. Current or prospective wine grape producers should carefully weigh the economic implications of entering this business.

## History

Wine grapes, *Vitis vinifera* L., were first planted in Idaho in the 1870s. But national Prohibition, which followed state Prohibition in 1919 and lasted until 1933, took its toll on the wine region. Vineyards were not planted again in Idaho until 1970. Since 1993, Idaho's wine grape acreage has doubled, making it the fourth largest fruit industry in the state (USDA and Idaho Agricultural Statistics Service 1999). Most vineyards are concentrated along the Snake River in Canyon, Ada, and Elmore counties. In 2001, approximately 750 acres of wine grapes were in production in the state, with 75 percent of that total in Canyon County. Cabernet Sauvignon is Idaho's dominant red variety, while Chardonnay is the state's most common white variety.

In the 1970s, an economic feasibility study was done to examine grape production in Idaho (Michalson 1975). That study's assumption was that if grapes were to be grown, they should produce as much net income as the crops currently being grown. Crops currently being grown were identified, and four common crop rotations were developed. After data were collected and the crop budgets developed, the internal rates of return for grapes were calculated and compared with the annual rates of return from the crop rotations. The study concluded that, with an expected internal rate of return in excess of 22.5 percent for the 6- to 8-ton per acre yield levels, grapes should compete effectively with the annual crops produced in the area. The analysis indicated that a grape industry could contribute to the profitability of Idaho agriculture, depending on the variety of grapes grown and their adaptation to Idaho climatic conditions (Michalson 1975).

## Objectives

Given the recent interest in growing wine grapes in Idaho, the University of Idaho Parma Research and Extension Center has tested European grape varieties for cold hardiness, fruit quality, growth habits, and irrigation and fertilizer needs (Fritz 2000). The objectives of this study are to compile wine grape enterprise budgets for a typical Idaho vineyard and present a current economic analysis of growing grapes in Idaho.

## Methods

The model vineyard and assumptions in this study were based on information gathered during the spring of 2001 in face-to-face interviews with Idaho wine grape growers. The data were combined with ownership cost calculations (Appendix A), agronomic data, market prices, and other outside data in a computerized budget generator (UC Davis 1990) to generate the crop enterprise budgets in Appendix B, tables B1-B5. The resulting cost and returns estimates (enterprise budgets) for Idaho wine grapes represent the cultural practices and inputs of a typical (not average) Idaho wine grape grower.

A 40-acre farm was selected as the model vineyard, with 5 acres set aside for roads, irrigation systems, and a farmstead, leaving about 35 acres for wine grape production. The land is owned, managed, and operated by the grower. The vineyard is planted on a suitable site in terms of drainage, soils, slope, and climate. Grapes do well in a variety of soils, but a sandy loam is probably best; good drainage is the most important consideration. Southern or western exposure is desirable, and sloping land aids frost protection.

## Resources

Land, labor, and capital are the categories of resources used in agricultural production. Input costs can be either explicit or implicit. Explicit costs are cash outlays for cash rent, hired labor,

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interest on loans, and operation inputs. Implicit costs are not cash outlays, but rather costs such as owner labor and interest on owner equity for which a cost is imputed. In most farm operations, the owner supplies a portion of the capital invested in the operation, but rarely does the owner supply all of the capital. Regardless of who supplies the capital, all implicit and explicit costs must be considered when estimating economic costs.

Owner-supplied labor, land, and machinery have opportunity costs associated with them, and these costs should be accounted for in an enterprise cost analysis. Opportunity cost is based on the fact that every input has an alternative use, even if the alternative is no use. Once an input is committed to a particular use, it is no longer available for any other, and the income from that alternative must be forgone. For example, the owner can always find some other use for his/her labor, perhaps working a second job in town. The owner can also find other uses for financial capital, such as investing in the stock market. The cost of owner-supplied labor or capital is the cost of opportunity forgone in its next best alternative use. If the opportunity cost is less than the expected income from the vineyard, then the grower truly is breaking even. All input costs should be accounted for, regardless of source, and valued at the prevailing market rate.

**Capital requirements**—Capital investment is broken down into two components in this study (1) machinery and equipment and (2) investment in stand establishment and land. Machinery and equipment investment for the model vineyard includes a 3/4-ton pickup truck, two 80-horsepower tractors, miscellaneous tools, and equipment for planting, pruning, thinning, spraying, and harvesting (table 1). Capital has been invested in the 40 acres of land and establishment of 35 acres of grapes, a drip irrigation

system with pumps and filtering equipment, and a double cordon trellis system. Associated with each of the capital investment items (except land) are the useful life and the hours each item is used per year. The capital investment in equipment and machinery totals \$181,600. Other investments total \$561,960, for a total capital investment of \$743,560 for the 35-acre vineyard. Thus, the capital investment for 35 acres of wine grapes can reach almost three-quarters of a million dollars, of which land cost is just a fraction.

Capital costs are charged for operating, intermediate, and long-term inputs. Interest on operating capital is charged (nominal rate of 9.5 percent) from the time an input is employed until the month of harvest or until the end of the operating year if no harvest takes place that year. Interest on intermediate inputs, such as machinery, is charged at 10 percent. Interest on land and vineyard investment is valued at a risk-adjusted rate (real rate of 6 percent). An overhead cost of 2.5 percent of cash expenses also is charged to the operation to cover unallocated costs such as office expenses, legal and accounting fees, and utilities. Land is owned and valued at \$2,500 per acre, resulting in an annual opportunity cost of \$150 per acre (6% x \$2,500).

**Labor requirements**—Labor varies greatly with each vineyard task. A considerable amount of labor is required to produce high-quality fruit. During the first and second years of establishment, installation of the irrigation and trellis systems is the most labor-intensive activity. A drip irrigation system is used on the model farm as a means of controlling vine growth and injecting fertilizers. The bilateral cordon training system is used with a vertical trellis, consisting of three wires: a drip tube wire, a cordon wire, and a catch wire.

Considerable labor is required throughout the spring and summer for pruning, training, thinning, spraying, fertilizing, and culti-

**Table 1. Capital investment for a 35-acre vineyard.**

	2001 purchase price (\$)	Useful life (years)	Hours used each year
<b>Machinery and equipment</b>			
Blast sprayer	10,000	12	35
Cultivator	1,800	15	45
Flail mower	6,000	15	75
Grape harvester	30,000	15	40
Grape hoe	7,500	15	90
Grass seed drill	5,300	15	25
Tractor 1 - 80hp	44,000	15	200
Tractor 2 - 80hp	44,000	15	275
Pickup (3/4 ton)	31,000	6	300
Weed sprayer	2,000	5	70
<b>Subtotal</b>	<b>181,600</b>		
<b>Stand establishment and land</b>			
ATV	5,000	6	
Gondola wagon	6,000	15	
Irrigation system	38,500	20	
Miscellaneous	10,000	20	
Post pounder	2,000	15	
Sled planter	3,000	15	
Tools	10,000	15	
Trellis system	81,000	20	
Land	100,000		
Stand investment	306,460	16	
<b>Subtotal</b>	<b>561,960</b>		
<b>Total investment</b>	<b>743,560</b>		

vating. To have productive grapevines that produce quality fruit, the vines must be trained and pruned properly. Cluster thinning also produces high-quality fruit, maintains plant vigor, and eliminates overproduction. Cover crops are usually planted between the rows to lessen soil erosion. Harvest poses the most critical labor demands, as fruit must be removed within a relatively short time period.

Pest management is another important consideration in growing grapes. Insects commonly found in Idaho vineyards include cutworms, thrips, leafhoppers, and mites. Pest monitoring is essential throughout the summer months coupled with blast spraying to control insects. Diseases such as powdery mildew and bunchrot require fungicide applications. Herbicides are sprayed to help control weeds.

The annual labor requirements listed in table 2 are typical for a 35-acre vineyard but will vary depending on growing conditions. Labor, regardless of source, is valued at the prevailing market rate of \$7.00 per hour. The labor rate includes a base wage plus a percentage for Social Security, Medicare, unemployment insurance, and other labor overhead expenses. A management fee (5 percent of gross returns in the full-production years) is also included to cover the costs of managing the vineyard.

Labor requirements are the smallest in the first year of establishment (1610 hours). Pruning and training are the most labor-intensive activities in the vineyard. In the second and third year, as the grapes need pruning and training, labor requirements are high, 4,795 and 4,010 hours, respectively. In the fifth year, when the vineyard is fully established, pruning still requires the most labor.

## Establishment Costs

It takes approximately four years to establish the vineyard and bring grapes to full production. Thus, initial establishment costs must be carried forward, to be eventually offset by future income. In this way, the costs of establishing a vineyard are spread over the harvest years. This is done by carrying forward both the total net establishment costs and interest incurred during the growing years. Total net establishment costs for years 1 to 4 are amortized over the harvest life of the vineyard. The establishment investment cost is \$1,056 and is identified under ownership costs in the wine grape costs and returns estimates for Year 5 (table B5 in Appendix B). A further discussion of the establishment investment cost is found in the Economic Analysis section.

## Results

Separate costs and returns, or enterprise budgets, for the model vineyard are estimated for the first four years when the vineyard is being established (tables B1-B4), and a fifth enterprise budget accounts for the costs and returns when the vineyard achieves full production (table B5). In Years 1 and 2 high capital outlays are incurred with no income. Years 3 and

beyond have ongoing growing costs along with harvest costs that are offset by the beginning revenue stream. In Year 3 the vineyard is at 40 percent of full production, in Year 4 at 70 percent, and in Year 5 it reaches full production. Full production should average about 5 tons per acre annually through the remaining 16-year life of the vineyard. The productive life of a vineyard depends on the care it receives, and most vineyards should last at least 20 years (4 years of establishment and 16 years of full production).

The costs in Appendix B (tables B1-B5) are categorized as either operating costs or ownership costs. Operating costs are the day-to-day maintenance and operations costs of the vineyard: fertilizer, chemicals, hired labor, fuel, and repairs. Operating costs are variable costs, costs that increase with increasing grape production.

Ownership costs are costs that result simply from owning assets with life spans exceeding one year (machinery, vehicles, equipment, buildings, and land), regardless of how much they are used. Costs associated with investments are depreciation, interest on investment, property taxes, and property insurance. Ownership costs are fixed costs; even if production ceases, these costs continue to be incurred.

In the long run, returns must meet or exceed both operating and ownership costs for the vineyard to be economically viable. When returns are equal to the sum of operating and ownership costs (total costs), the enterprise is at break-even. At break-even the grower is recovering all out-of-pocket expenses and realizing a competitive return on the capital investment in land, machinery, equipment, and vines. When the return from grapes exceeds the break-even point, then the grower earns a return to risk, or profit.

## Years 1 and 2

In Year 1, the vineyard is prepared by plowing, disking, planing, fertilizing, and harrowing. Rows are marked out and the rootstock is planted using a sled planter at a rate of 806 sticks per acre. Rootstock is typically purchased from California or Washington at an average of \$1 per stick. The drip irrigation system is positioned on the ground. Total cost (labor and materials) for the irrigation system is \$1,100 per acre installed. Grow tubes are applied after planting to protect the young vines from weather damage and herbicide drift, to reduce evapotranspiration, to increase growth rates, and to reduce labor needed for training. Growers may choose to lift the grow tubes or remove them completely during

**Table 2. Annual labor requirements for a 35-acre vineyard.**

	Year 1 (hours)	Year 2 (hours)	Year 3 (hours)	Year 4 (hours)	Year 5 (hours)
Pruning/Training	0	3570	2695	735	805
Spraying/Fertilizing	0	140	105	105	140
Planting	525	70	0	0	0
Cultivating	105	140	245	145	140
Irrigating	210	210	210	210	210
Trucking/Pickup	315	315	315	315	315
Harvesting	0	0	105	105	175
Miscellaneous	455	350	335	410	420
<b>Total</b>	<b>1610</b>	<b>4795</b>	<b>4010</b>	<b>2025</b>	<b>2205</b>

the winter months to avoid any effect the tubes may have on cold hardiness. Some herbicide is applied in Year 1 when a cover crop is planted. Total costs to develop and prepare the site are \$2,874 per acre in Year 1 (table B1).

During the early spring of the second year, vines are pruned (the best cane is usually selected and shortened to two buds). The trellis system is also assembled at \$2,300 per acre. In the summer, the new vines are trained to the vertical trellis. The small percentage of vines that do not survive the first year are replanted. The irrigation system, which is comprised of emitters suspended along the vine row from a wire 18 inches above the ground, is now moved up to the drip wire. Irrigation maintenance includes checking emitters, cleaning filters, and flushing the system. Fungicide, herbicide, and insecticide applications occur in Year 2, but are limited. A cover crop is planted in Year 2. Total costs per acre in year two are \$3,290 (table B2).

### Years 3-5

The practices employed in Year 3 and in following years are generally alike with a few exceptions. Some training needs to be done in Year 3, but by Year 4 the vines should be trained. Vines are pruned in March, followed by the planting of a cover crop. The cover crop is mowed often during the early summer and fall, but goes dormant by mid-summer.

Vineyards are regularly monitored throughout the spring and summer for diseases and pests. Fungicides and insecticides are blast sprayed as needed. Herbicides are periodically sprayed and supplemented with cultivation during the spring and summer to reduce weed competition. Neutron probing is routinely done to monitor soil moisture for irrigation decisions. Shoot and cluster thinning are typically performed in July and August to enhance grape quality.

Grapes are harvested when the fruit reaches the desired ripeness for its intended purpose. As the fruit ripens, the color changes, the sugars increase, and the acids decrease. The timing of ripening varies from year to year. Berries are sampled daily as the harvest approaches to determine sugar, acid, and pH. During harvest, a pull-type grape harvester straddles the vine rows and shakes the ripe grapes into a collection basket, which in turn conveys the fruit into a gondola. The grapes are then transferred from the gondola to trucks and transported to the winery. Total costs in years 3 through 5 (tables B3-B5) are \$3,886 per acre in Year 3, \$3,758 per acre in Year 4, and \$4,024 per acre in Year 5.

### Economic Analysis

Total net establishment costs for years 1 through 4 are \$8,583

per acre. The net establishment cost is calculated by summing the total costs per acre for years 1 through 4 and then subtracting total gross returns for years 3 and 4. This can be seen in returns to risk (tables B1-B4). Total costs account for the total investment required to bring one acre of newly established wine grapes to full production.

The annualized cost investment, spread over 16 harvest years, is \$1,056 per acre and includes stand depreciation plus interest on investment. Annualized investment costs are calculated using the capital recovery approach shown in Appendix A and labeled as stand investment under non-cash ownership costs in Table B5.

The net return for grapes at full production is \$726 per acre (table B5). Future inflation is ignored. The analysis in table 3, generated from tables B1-B5, summarizes five years of cash flows for an acre of wine grapes grown in Idaho. The enterprise does not generate a positive annual cash flow until Year 5. In Year 5 cumulative gross incomes exceed cumulative cash costs.

Cash flow analysis indicates cash requirements needed to establish an acre of wine grapes and when sufficient income will be available to recover initial cash investment. However, enterprise profit, or the economic break-even point, cannot be projected using a cash flow analysis because non-cash items, such as depreciation and interest on owner equity, are excluded (see table 4).

Table 4 summarizes the projected gross income, total costs, net projected returns, and cumulative net returns presented in tables B1-B5. Total costs to establish the vineyard (the sum of cumulative operating and ownership costs for years 1-4) are \$13,809 per acre. Cumulative net returns, profit or loss, are the sum of projected net returns.

In this analysis of Idaho wine grapes, net losses are projected to occur each year through Year 4 of establishment (table 4). Some income is earned in years 3 and 4, but because the vines are not at full production, the earned income is not enough to offset costs incurred during the establishment years. Year 5, full production, is the first year that gross income exceeds total costs. A net return occurs that year, which continues on through the life of the vineyard.

Figure 1 summarizes the establishment costs in tables B1-B4. Labor is the most significant vineyard cost at 27 percent of total establishment costs for years 1-4, followed by machinery, interest, and trellis/irrigation system costs. Machinery comprises 15 percent of vineyard costs, interest 15 percent, and trellis/irrigation 10 percent. Land cost is minor, at 4 percent.

**Table 3. Cash costs and returns, per acre, of establishing and producing Idaho wine grapes, 35-acre vineyard.**

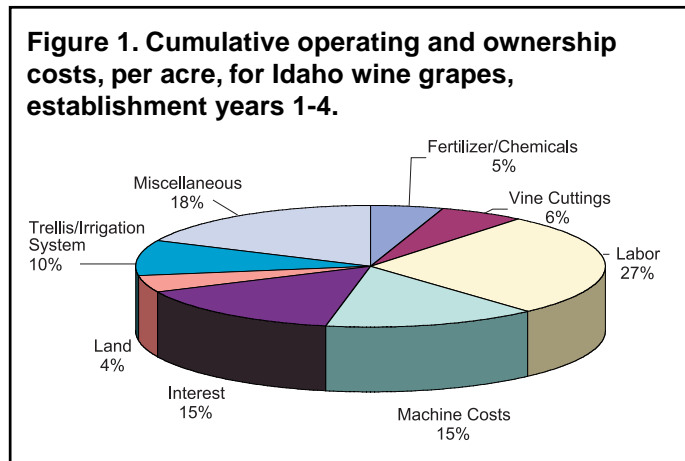
	Year 1 (\$/acre)	Year 2 (\$/acre)	Year 3 (\$/acre)	Year 4 (\$/acre)	Year 5 (\$/acre)
Gross income	0	0	1900	3325	4750
Cash operating costs	1783	1437	1417	1061	1126
Cash ownership costs	447	593	678	707	634
Total cash costs	2230	2029	2095	1768	1761
Annual cash flow	-2230	-2029	-195	1557	2989
Cumulative cash flow	-2230	-4259	-4454	-2897	93

**Table 4. Economic costs and returns of establishing Idaho wine grapes, 35-acre vineyard.**

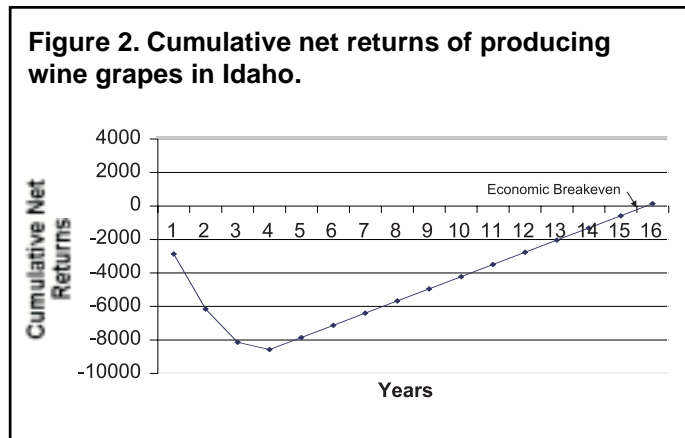
	Year 1 (\$/acre)	Year 2 (\$/acre)	Year 3 (\$/acre)	Year 4 (\$/acre)	Total cumulative costs and returns (\$/acre)
Gross income	0	0	1900	3325	5225
Cash operating costs	1783	1437	1417	1061	5697
Total ownership costs	1091	1854	2470	2697	8112
Total costs	2874	3290	3886	3758	13,809
Net projected returns	-2874	-3290	-1986	-433	
Cumulative net returns	-2874	-6164	-8151	-8584	

In Year 16, total costs are fully recovered (figure 2), and the vineyard breaks even. The economic break-even point occurs when cumulative net returns become positive. The costs and returns in table 4 have been projected out 16 years to the point where the total costs of establishing the vineyard (\$13,809 per acre) are fully recovered. Considering that a vineyard has a lifespan of at least 20 years, the vineyard is an economically viable operation, given the costs and returns presented here. Twenty years is a very conservative figure, as many vineyards are not replaced for 25 to 30 years. Based on these results, the grower realizes a competitive return to his capital invested in the vineyard in addition to a return to his management and risk or profit. Table B5 shows a return to risk of \$726 per acre at full production.

**Figure 1. Cumulative operating and ownership costs, per acre, for Idaho wine grapes, establishment years 1-4.**



**Figure 2. Cumulative net returns of producing wine grapes in Idaho.**



## Conclusion

Southwestern Idaho has the potential to become a nationally recognized grape-growing region, as the growing conditions there are very similar to those found in Washington. The costs and returns estimates developed in this study are based on assumptions of input prices, wine grape markets, labor availability, site conditions, cost of capital, and weather, all of which can have substantial influence on vineyard profitability. The estimates indicate that grapes can be a viable alternative that may provide diversification to existing farm operations when other fruit crops become uneconomical due to low prices and high costs of production. However, production, marketing, and financial risks are associated with growing wine grapes in Idaho. A five-year time lag between planting vines and realizing profits makes financing a vineyard difficult and risky. Also, Idaho vineyards are threatened by winterkill one in every eight years. The bottom line comes down to contracts. As no long-term contracts are currently being offered, prospective growers must make every effort possible to secure a contract or make long-term plans to build a winery. Because of the expense and risk associated with planting vines, potential Idaho growers should carefully assess the production and financial risks before committing the sizable capital resources to bring a vineyard to fruition. This study should assist such a thorough economic analysis.

## References

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# Appendix A. Ownership Cost Calculations

Ownership costs for an asset lasting more than one year must be allocated over its useful life to derive an annual ownership cost. Ownership costs include both the decline in value over time based on expected use or obsolescence (depreciation) and the opportunity interest on the value of the asset. Ownership costs also include property tax and casualty insurance.

The following methods for calculating depreciation and opportunity interest and for calculating taxes and insurance are consistent with the recommendations of the National Task Force on Commodity Costs and Returns Measurement Methods sponsored by the American Agricultural Economics Association. In keeping with their recommendations, a real rather than a nominal interest rate is used.

## Depreciation and Interest

Depreciation and interest were calculated using the annual equivalent capital recovery technique. This method is recommended over the estimation technique using straight-line depreciation (repayment) plus return on the average investment.

$$\text{Depreciation and Interest} = B\left(\frac{a}{p}\right)_n^i - V\left(\frac{a}{f}\right)_n^i$$

where,

B = initial investment

V = salvage value

i = interest rate in decimal form

n = years of useful life

$\left(\frac{a}{p}\right)_n^i = i(1+i)^n / [(1+i)^n - 1]$  = uniform series end-of-period amount (a) equivalent to present sum (p); or capital recovery factor.

$\left(\frac{a}{f}\right)_n^i = i / [(1+i)^n - 1]$  = uniform series end of period amount (a) equivalent to future sum (f); or sinking fund factor.

Source: Thuesen, H. G., W. J. Fabrycky, and G. J. Thuesen. *Engineering Economy*. New York: Prentice-Hall, 1971.

## Taxes and Insurance

The property tax and insurance cost calculations were made using rates of 1.0 and 0.6 percent, respectively, applied to the average level of investment.

$$\text{Insurance} = I[(B + V)/2]$$

where,

B = initial investment

V = salvage value

I = insurance rate

$$\text{Taxes} = T[B + V/2]$$

where,

B = initial investment

V = salvage value

T = personal property tax rate

# Appendix B: Crop Enterprise Budgets

**Table B1. Costs And Returns Per Acre to Produce Wine Grapes, Year 1**

	Quantity Per Acre	Unit	Price or Cost(\$)/Unit	Value or Cost(\$)/Acre	Your Cost
<b>Gross Returns</b>					
Wine Grapes	0.00	ton	0.00	0.00	_____
Total Gross Returns For Wine Grapes				0.00	_____
<b>Operating Costs</b>					
Custom:					
Custom spray	3.00	acre	15.00	45.00	_____
Custom ripping	1.00	acre	75.00	75.00	_____
Custom disk	1.00	acre	10.00	10.00	_____
Custom plane	1.00	acre	10.00	10.00	_____
Custom fertilize	1.00	acre	5.50	5.50	_____
Custom harrow	1.00	acre	10.00	10.00	_____
Custom markout	2.00	acre	10.00	20.00	_____
Soil probing	1.00	acre	30.00	30.00	_____
Petiole sampling	1.00	acre	6.00	6.00	_____
Herbicide:					
Roundup	64.00	oz	0.40	25.60	_____
Gramoxone	1.50	qt	8.78	13.17	_____
Fertilizer:					
Sulfur	200.00	lb	0.20	40.00	_____
Nitrogen	35.00	lb	0.26	9.10	_____
Phosphate	30.00	lb	0.26	7.80	_____
Potash	15.00	lb	0.17	2.55	_____
Plants:					
Vine cuttings	805.00	each	1.00	805.00	_____
Seed:					
Rye grass	35.00	lb	0.10	3.50	_____
Irrigation:					
Irrigation power	20.00	Irr	1.95	39.00	_____
Labor (irrigation)	6.00	hr	7.00	42.00	_____
Water assessment	1.00	acre	40.00	40.00	_____
Labor (machine)	16.71	hr	7.00	117.00	_____
Labor (non-machine)	24.25	hr	7.00	169.75	_____
Fuel - Gas	25.74	gal	1.50	38.61	_____
Fuel - Diesel	18.64	gal	1.20	22.37	_____
Lube				9.14	_____
Machinery Repair				29.32	_____
Interest on Operating Capital @ 9.50%				157.39	_____
Total Operating Costs/Acre				1782.77	_____
Net Returns Above Operating Costs				-1782.77	_____
<b>Cash Ownership Costs</b>					
Management fee				237.51	_____
General overhead				54.86	_____
Property taxes (machinery)				49.97	_____
Property insurance				10.35	_____
Investment repairs				94.29	_____
Total Cash Ownership Costs/Acre				446.98	_____
<b>Non-Cash Ownership Costs (Depreciation and Interest)</b>					
Land				150.00	_____
Irrigation system				129.21	_____
Miscellaneous tools and equipment				118.55	_____
Equipment				246.44	_____
Total Non-Cash Ownership Costs/Acre				644.20	_____
Total Costs/Acre				2873.95	_____
Returns to Risk				-2873.95	_____



**Table B2. Costs And Returns Per Acre to Produce Wine Grapes, Year 2**

	Quantity Per Acre	Unit	Price or Cost(\$)/Unit	Value or Cost(\$)/Acre	Your Cost
<b>Gross Returns</b>					
Wine Grapes	0.00	ton	0.00	0.00	_____
Total Gross Returns For Wine Grapes				0.00	_____
<b>Operating Costs</b>					
Other:					
Pruning	806.00	vine	0.10	80.60	_____
Herbicide:					
Roundup	32.00	qt	0.40	12.80	_____
Gramoxone	1.50	qt	8.78	13.17	_____
Fertilizer:					
Nitrogen	15.00	lb	0.26	3.90	_____
Foliar nutrients	2.00	each	10.00	20.00	_____
Planting:					
Vine cuttings	40.00	each	1.00	40.00	_____
Seed:					
Rye grass	35.00	lb	0.10	3.50	_____
Irrigation:					
Irrigation power	20.00	lrr	1.95	39.00	_____
Labor (irrigation)	6.00	hr	7.00	42.00	_____
Water assessment	1.00	acre	40.00	40.00	_____
Fungicide:					
Microthiol	10.00	lb	0.65	6.50	_____
Custom:					
Soil probing	1.00	acre	30.00	30.00	_____
Petiole sampling	1.00	acre	6.00	6.00	_____
Insecticide:					
Dimethoate	1.50	qt	8.40	12.60	_____
Labor (machine)	20.43	hr	7.00	142.99	_____
Labor (non-machine)	101.00	hr	7.00	707.00	_____
Fuel - Gas	25.74	gal	1.50	38.61	_____
Fuel - Diesel	32.00	gal	1.20	38.40	_____
Lube				11.55	_____
Machinery Repair				35.18	_____
Interest on Operating Capital @ 9.50%				112.99	_____
Total Operating Costs/Acre				1436.78	_____
Net Returns Above Operating Costs				-1436.78	_____
<b>Cash Ownership Costs</b>					
Management fee				237.51	_____
General overhead				50.09	_____
Property taxes (machinery)				109.94	_____
Property insurance				31.77	_____
Investment repairs				162.86	_____
Total Cash Ownership Costs/Acre				592.17	_____
<b>Non-Cash Ownership Costs (Depreciation and Interest)</b>					
Land				150.00	_____
Trellis system				271.84	_____
Irrigation system				129.21	_____
Miscellaneous tools and equipment				118.55	_____
Interest on carryover				287.00	_____
Equipment				304.77	_____
Total Non-Cash Ownership Costs/Acre				1261.36	_____
Total Costs/Acre				3290.31	_____
Returns to Risk				-3290.31	_____

**Table B3. Costs And Returns Per Acre to Produce Wine Grapes, Year 3**

	Quantity Per Acre	Unit	Price or Cost(\$)/Unit	Value or Cost(\$)/Acre	Your Cost
<b>Gross Returns</b>					
Wine Grapes	2.00	ton	950.00	1900.00	_____
Total Gross Returns For Wine Grapes				1900.00	_____
<b>Operating Costs</b>					
Other:					
Pruning	806.00	vine	0.30	241.80	_____
Insecticide:					
Lorsban 4E	1.00	qt	9.50	9.50	_____
Oil	3.00	gal	3.00	9.00	_____
Provado	1.00	oz	33.00	33.00	_____
Agrimec	8.00	oz	5.30	42.40	_____
Herbicide:					
Roundup	32.00	oz	0.40	12.80	_____
Gramoxone	3.00	qt	8.78	26.34	_____
Seed:					
Rye grass	35.00	lb	0.10	3.50	_____
Irrigation:					
Irrigation power	20.00	lrr	1.95	39.00	_____
Labor (irrigation)	6.00	hr	7.00	42.00	_____
Water assessment	1.00	acre	40.00	40.00	_____
Fungicide:					
Microthiol	10.00	lb	0.65	6.50	_____
Rubigan	8.00	oz	8.00	64.00	_____
Flint	4.00	oz	8.00	32.00	_____
Fertilizer:					
Foliar nutrients	2.00	each	10.00	20.00	_____
Custom:					
Soil probing	1.00	acre	30.00	30.00	_____
Petiole sampling	1.00	acre	6.00	6.00	_____
Custom haul grapes	2.00	ton	15.00	30.00	_____
Thinning:					
Shoot thinning	1.00	acre	15.00	15.00	_____
Drop clusters	1.00	acre	10.00	10.00	_____
Labor (machine)	25.70	hr	7.00	179.90	_____
Labor (non-machine)	48.00	hr	7.00	336.00	_____
Fuel - Gas	25.74	gal	1.50	38.61	_____
Fuel - Diesel	49.48	gal	1.20	59.38	_____
Lube				14.70	_____
Machinery Repair				42.27	_____
Interest on Operating Capital @ 9.50%				32.81	_____
Total Operating Costs/Acre				1416.50	_____
Net Returns Above Operating Costs				483.50	_____
<b>Cash Ownership Costs</b>					
Management fee				237.51	_____
General overhead				51.66	_____
Property taxes (machinery)				168.14	_____
Property insurance				52.55	_____
Investment repairs				168.57	_____
Total Cash Ownership Costs/Acre				678.44	_____
<b>Non-Cash Ownership Costs (Depreciation and Interest)</b>					
Land				150.00	_____
Trellis system				271.84	_____
Irrigation system				129.21	_____
Miscellaneous tools and equipment				140.55	_____
Interest on carryover				611.00	_____
Equipment				488.93	_____
Total Non-Cash Ownership Costs/Acre				1791.53	_____
Total Costs/Acre				3886.47	_____
Returns to Risk				-1986.47	_____

**Table B4. Costs And Returns Per Acre to Produce Wine Grapes, Year 4**

	Quantity Per Acre	Unit	Price or Cost(\$)/Unit	Value or Cost(\$)/Acre	Your Cost
<b>Gross Returns</b>					
Wine Grapes	3.50	ton	950.00	3325.00	_____
Total Gross Returns For Wine Grapes				3325.00	_____
<b>Operating Costs</b>					
Other:					
Pruning	806.00	vine	0.13	104.78	_____
Insecticide:					
Lorsban 4E	1.00	qt	9.50	9.50	_____
Oil	3.00	gal	3.00	9.00	_____
Provado	1.00	oz	33.00	33.00	_____
Agrimec	8.00	oz	5.30	42.40	_____
Herbicide:					
Roundup	32.00	oz	0.40	12.80	_____
Gramoxone	3.00	qt	8.78	26.34	_____
Seed:					
Rye grass	35.00	lb	0.10	3.50	_____
Irrigation:					
Irrigation power	20.00	lrr	1.95	39.00	_____
Labor (irrigation)	6.00	hr	7.00	42.00	_____
Water assessment	1.00	acre	40.00	40.00	_____
Fungicide:					
Microthiol	10.00	lb	0.65	6.50	_____
Rubigan	8.00	oz	8.00	64.00	_____
Flint	4.00	oz	8.00	32.00	_____
Fertilizer:					
Foliar nutrients	2.00	each	10.00	20.00	_____
Custom:					
Soil probing	1.00	acre	30.00	30.00	_____
Petiole sampling	1.00	acre	6.00	6.00	_____
Custom haul grapes	3.50	ton	15.00	52.50	_____
Thinning:					
Shoot thinning	1.00	acre	15.00	15.00	_____
Drop clusters	1.00	acre	10.00	10.00	_____
Labor (machine)	26.53	hr	7.00	185.68	_____
Labor (non-machine)	14.00	hr	7.00	98.00	_____
Fuel - Gas	25.74	gal	1.50	38.61	_____
Fuel - Diesel	50.97	gal	1.20	61.16	_____
Lube				14.97	_____
Machinery Repair				43.03	_____
Interest on Operating Capital @ 9.50%				21.10	_____
Total Operating Costs/Acre				1060.87	_____
Net Returns Above Operating Costs				2264.13	_____
<b>Cash Ownership Costs</b>					
Management fee				237.51	_____
General overhead				43.69	_____
Property taxes (machinery)				195.10	_____
Property insurance				62.18	_____
Investment repairs				168.57	_____
Total Cash Ownership Costs/Acre				707.05	_____
<b>Non-Cash Ownership Costs (Depreciation and Interest)</b>					
Land				150.00	_____
Trellis system				271.84	_____
Irrigation system				129.21	_____
Miscellaneous tools and equipment				140.55	_____
Interest on carryover				798.00	_____
Equipment				500.84	_____
Total Non-Cash Ownership Costs/Acre				1990.43	_____
Total Costs/Acre				3758.35	_____
Returns to Risk				-433.35	_____

**Table B5. Costs And Returns Per Acre to Produce Wine Grapes, Years 5 - 20**

	Quantity Per Acre	Unit	Price or Cost(\$)/Unit	Value or Cost(\$)/Acre	Your Cost
<b>Gross Returns</b>					
Wine Grapes	5.00	ton	950.00	4750.00	_____
Total Gross Returns For Wine Grapes				4750.00	=====
<b>Operating Costs</b>					
Other:					
Pruning	806.00	vine	0.13	104.78	_____
Insecticide:					
Lorsban 4E	1.00	qt	9.50	9.50	_____
Oil	3.00	gal	3.00	9.00	_____
Provado	1.00	oz	33.00	33.00	_____
Agrimec	8.00	oz	5.30	42.40	_____
Herbicide:					
Roundup	32.00	oz	0.40	12.80	_____
Gramoxone	3.00	qt	8.78	26.34	_____
Seed:					
Rye grass	35.00	lb	0.10	3.50	_____
Irrigation:					
Irrigation power	20.00	lrr	1.95	39.00	_____
Labor (irrigation)	6.00	hr	7.00	42.00	_____
Water assessment	1.00	acre	40.00	40.00	_____
Fungicide:					
Microthiol	10.00	lb	0.65	6.50	_____
Rubigan	12.00	oz	8.00	96.00	_____
Flint	4.00	oz	8.00	32.00	_____
Fertilizer:					
Foliar nutrients	2.00	each	10.00	20.00	_____
Custom:					
Soil probing	1.00	acre	30.00	30.00	_____
Petiole sampling	1.00	acre	6.00	6.00	_____
Custom haul grapes	5.00	ton	15.00	75.00	_____
Thinning:					
Shoot thinning	1.00	acre	15.00	15.00	_____
Drop clusters	1.00	acre	10.00	10.00	_____
Labor (machine)	27.46	hr	7.00	192.23	_____
Labor (non-machine)	14.00	hr	7.00	98.00	_____
Fuel - Gas	25.74	gal	1.50	38.61	_____
Fuel - Diesel	52.85	gal	1.20	63.42	_____
Lube				15.31	_____
Machinery Repair				44.07	_____
Interest on Operating Capital @ 9.50%				21.94	_____
Total Operating Costs/Acre				1126.41	=====
Net Returns Above Operating Costs				3623.59	=====
<b>Cash Ownership Costs</b>					
Management fee				237.51	_____
General overhead				43.00	_____
Property taxes (machinery)				142.12	_____
Property insurance				43.26	_____
Investment repairs				168.57	_____
Total Cash Ownership Costs/Acre				634.46	=====
<b>Non-Cash Ownership Costs (Depreciation and Interest)</b>					
Land				150.00	_____
Trellis system				271.84	_____
Irrigation system				129.21	_____
Miscellaneous tools and equipment				140.55	_____
Stand investment				1056.02	_____
Equipment				515.11	_____
Total Non-Cash Ownership Costs/Acre				2262.72	=====
Total Costs/Acre				4023.59	=====
Returns to Risk				726.41	=====

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