



VINEYARD ECONOMICS  
**ESTABLISHING AND  
PRODUCING WINE GRAPES**  
IN HOOD RIVER COUNTY

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# Vineyard Economics: Establishing and Producing Wine Grapes in Hood River County

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## Introduction

The Hood River Valley is world renowned for producing high-quality tree fruits, with winter pears making up the majority of the orchard acreage and production in the valley. Recent trends toward decreasing profitability for pear and apple production have led orchardists to consider alternative farming enterprises.

The Hood River area is not well known as a wine-growing region. In 2003, there were estimated to be approximately 83 acres of producing vineyards in Hood River County, less than 1 percent of the state total. Nonetheless, several award-winning wines have been produced by local wineries, and vineyard-designated wines are made with fruit grown in Mid-Columbia vineyards. This suggests that with careful attention to vineyard establishment—including site selection, variety selection, and vineyard management practices—the potential exists for the production of high-quality wine grapes in the Hood River area.

Vineyard establishment requires considerable effort and financial resources. The economics of vineyard establishment and fruit production may limit the extent of local vineyard expansion. This publication is intended primarily for those considering the economic and financial consequences of planting a vineyard in Hood River County. It also may be useful to those with existing vineyards. Together with existing analyses of tree fruit production, this publication provides a tool for comparing the economic profitability of wine grapes with alternative

farm and non-farm investments for growers, bankers, and other investors.

## Assumptions

In the preparation of this publication, several assumptions were made that provided a basis for the wine grape vineyard analysis. These assumptions include:

1. Typical acreage for a farm in Hood River County is 70 acres of irrigated land. Bearing acres include: 30 acres of winter pears, 8 acres of fresh market Bartlett pears, 4 acres of canning market Bartlett pears, 8 acres of high-density pears, 5 acres of medium-density apples, 5 acres of high-density sweet cherries or wine grapes, and 10 acres, or approximately 15 percent, of the orchard under establishment.
2. Plant 871 own-rooted vines per acre (5' x 10') spacing with a productive life of 25 years, once full production of 3 tons per acre is reached.
3. The wine grape vineyard is trained to a vertically shoot positioned system.
4. Wine grape prices are \$1,500 per ton.
5. Commercial yields begin in year 3, and full production is reached in 5 years after planting with yields of 0.75, 2, and 3 tons per acre in years 3 to 5, respectively.
6. All labor is hired at a rate of \$10.00 per hour, which includes worker's compensation, unemployment insurance,

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- and other labor overhead expenses. Harvest labor costs are custom hired at a cost of \$170 per ton. All labor is treated as a cash variable expense.
7. Seasonal labor facilities provided by the owner cost \$40,000 for a 10-person unit. The life of the facility is 30 years, and the value is depreciated using the straight-line method of depreciation with a zero salvage value. Interest is calculated using the average value of the facility multiplied by an 8 percent interest rate  $((\text{cost} + \text{salvage value}) \div 2 \times 0.08)$ . Repairs and maintenance for these facilities cost 2.5 percent of the purchase price per year.
  8. Foreman housing with all utilities, except telephone, is provided at no cost to the employee and is valued at \$600 per month, or \$103 per acre. It is treated as a fixed non-cash opportunity cost to the operator. This is the estimated market rental rate for a three-bedroom, two-bathroom house in the area.
  9. The machinery and equipment used in the budget reflect the typical machinery complement of a farm in Hood River County. A detailed breakdown of machinery values is shown in Table 1. Table 2 provides estimated machinery costs from the American Society of Agricultural Engineers. The 70-hp tractor is used for flailing, shredding brush, pulling an air-blast sprayer, and during harvest. The 50-hp tractor is used to auger holes for new vines, spread fertilizer, pull an older air-blast sprayer, apply gopher bait, and for harvest. The 35-hp tractor is used to spray weeds, assist in harvest, and as a general utility tractor. Table 3 lists the estimated cost of each operation with a 10-foot vine row spacing. Gasoline and diesel costs per gallon are \$1.70 and \$1.40, respectively.
  10. The interest rate on operating funds is 10 percent and is treated as a cash expense. One-half of the cash expenses are borrowed for a 6-month period.
  11. Machinery, housing facilities, and land are owned by the operator and assessed 10 and 8 percent rates of interest, respectively, as opportunity costs. Land is valued at \$6,000 per acre.
  12. Previous year's establishment costs are funded by the operator at a charge of 8 percent interest and are considered an opportunity cost.
  13. Herbicides used for strip maintenance are applied to 30 percent of each acre.
  14. A drip irrigation system is used at an estimated cost of \$2,000 per acre. In addition, a filtration system is installed at a total cost of \$2,500, or \$500 per acre. The life of both systems is 25 years, and values are depreciated using the straight-line method of depreciation with a zero salvage value. Interest is calculated using the average value of the system multiplied by an 8 percent interest rate  $((\text{cost} + \text{salvage value}) \div 2 \times 0.08)$ . Repairs and maintenance for the system cost 1 percent of the purchase price per year.
  15. The trellis system is installed at a cost of \$2,500 per acre. The life of the system is 25 years, and it is depreciated using the straight-line method of depreciation with a zero salvage value. Interest is calculated using the average value of the system multiplied by an 8 percent interest rate  $((\text{cost} + \text{salvage value}) \div 2 \times 0.08)$ . Repairs and maintenance for the system cost 1 percent of the purchase price per year.
  16. Two wind machines are used for frost control, along with three vineyard heaters per acre. The wind machines are valued at \$17,000 each, and heaters cost \$10 each. Salvage value is zero. Depreciation periods are 25 years for the wind machines and 10 years for the heaters using the straight-line method of

depreciation. Interest is calculated using the average value of the wind machines and heaters multiplied by an 8 percent interest rate  $((\text{cost} + \text{salvage value}) \div 2 \times 0.08)$ . Repairs and maintenance are estimated to cost 1 percent of the purchase price of the wind machines and heaters per year.

17. Additional assumptions are listed for variable, fixed cash, and fixed non-cash costs in Table 5.
18. Price inflation for the time period of this study was ignored.
19. Income tax consequences are also ignored for this study.

**Table 1. Machinery cost assumptions.**

Machine	Size or description	Market value	Hours or miles of annual use	Expected life (yrs)
Tractor	4 wheel dr 70hp, new	\$30,000	579	10
Tractor	2 wheel dr 50hp, old	17,000	193	20
Tractor	2 wheel dr 35hp, old	7,500	176	20
Air-blast sprayer	400 gallon unit, PTO, new	15,000	167	10
Flail chopper	8' unit	6,000	166	7
Weed sprayer	100 gallon unit	2,000	41	15
Fertilizer spreader		2,300	13	20
Brush windrow		3,500	31	20
Gopher machine		1,200	13	20
Pickup	1/2 ton 4x4, new	20,000	12,000	10
Truck	2 ton, used	15,000	3,500	20
ATV	4 wheeler, new	5,500	3,000	5
Auger		1,700	N/A	20
Front-end loader & backforks		5,800	N/A	10
Bin trailer		5,000	N/A	10
Picking buckets for wine grapes		500	N/A	5
Irrigation system	Drip system, per acre	2,000	N/A	25
Wind machine	2 units, gasoline	34,000	35	25
Vineyard heaters	3 units, per acre	30	15	10
Trellis system - wine grapes	per acre	2,500	N/A	25
Housing facilities	1 unit	40,000	N/A	30

**Table 2. Machinery cost calculations.**

Machine	Size or description	--- Variable costs ---		--- Fixed costs ---		Total cost
		Fuel & lube	Repairs & maint.	Depr. & interest	Insurance	
----- Costs per hour -----						
Tractor	4 wheel dr 70hp, new	\$9.66	\$0.52	\$6.70	\$0.47	\$17.35
Tractor	2 wheel dr 50hp, old	8.05	0.46	8.82	0.79	18.13
Tractor	2 wheel dr 35hp, old	8.05	0.18	4.26	0.38	12.88
Air-blast sprayer	400 gallon unit, PTO, new	0.00	7.17	11.74	0.54	19.45
Flail chopper	8' unit	0.00	2.51	6.27	0.22	9.00
Weed sprayer	100 gallon unit	0.00	0.71	5.61	0.30	6.61
Fertilizer spreader		0.00	0.96	18.10	1.09	20.15
Brush windrow		0.00	1.92	11.15	0.67	13.74
Gopher machine		0.00	0.51	8.99	0.54	10.04
----- Costs per mile -----						
Pickup	1/2 ton 4x4, new	\$0.20	\$0.05	\$0.21	\$0.02	\$0.47
Truck	2 ton, used	0.39	0.29	0.34	0.04	1.07
ATV	4 wheeler, new	0.04	0.02	0.04	0.02	0.12
----- Costs per acre -----						
Auger		\$0.00	\$0.24	\$2.43	\$0.00	\$2.67
Front-end loader & backforks		0.00	2.32	34.80	0.00	37.12
Bin trailer		0.00	0.71	10.71	0.00	11.43
Picking buckets for wine grapes		0.00	1.20	5.00	0.00	6.20
Irrigation system	Drip system, per acre	0.00	20.00	160.00	0.00	180.00
Wind machine	2 units, gasoline	25.50	9.71	38.86	0.00	74.07
Vineyard heaters	3 units, per acre	1.50	0.01	0.18	0.00	1.69
Trellis system - wine grapes	per acre	0.00	25.00	200.00	0.00	225.00
Housing facilities	1 unit	0.00	14.29	41.90	0.00	56.19

Source: American Society of Agricultural Engineers

**Table 3. Estimated cost of each operation with power-unit for a 10' between row spacing.**

Operation	Tractor	Miles per hour	Acres per hour	-- Machine costs --			Total cost per acre
				Labor cost per acre	Variable cost per acre	Fixed cost per acre	
Air-blast sprayer	4 wheel dr 70hp	2.00	1.21	\$8.25	\$14.31	\$16.04	\$38.60
Flail chopper	4 wheel dr 70hp	2.00	2.06	4.85	9.73	7.81	22.39
Weed sprayer	2 wheel dr 35hp	3.50	3.18	3.14	2.81	3.32	9.27
Fertilizer spreader	2 wheel dr 50hp	3.00	2.55	3.93	3.72	11.32	18.96
Gopher machine	2 wheel dr 50hp	2.50	2.42	4.12	3.72	7.90	15.74

**Table 4. Input assumptions for establishing wine grapes (per-acre basis).**

	Year 1	Year 2	Year 3	Year 4	Full Prod
Prices per ton	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Tons per acre	0.00	0.00	0.75	2.00	3.00
Cost of general vineyard labor, per hour	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
Cost of harvest labor, per ton	0.00	0.00	170.00	170.00	170.00
Hours of pruning labor	0.00	4.00	24.00	24.00	24.00
Hours of labor to pull brush	0.00	0.00	16.00	16.00	16.00
Hours of labor to tie canes	0.00	0.00	12.00	12.00	12.00
Hours of irrigating labor	10.00	10.00	10.00	10.00	10.00
Hours to remove & replace vine labor	0.00	2.50	2.50	2.50	2.50
Hours to maintain trellis labor	0.00	0.00	0.00	2.00	2.00
Hours for frost protection labor	0.00	0.00	0.50	0.50	0.50
Hours for training	4.00	12.00	15.00	15.00	15.00
Hours for sucker removal	0.00	0.00	15.00	15.00	15.00
Hours for cluster thinning	0.00	0.00	10.00	10.00	10.00
Hours for leaf pulling	0.00	0.00	0.00	3.00	6.00
Hours for hedging	0.00	0.00	4.00	4.00	4.00
Hours for bird control	0.00	0.00	20.00	20.00	20.00
Cost of fertilizer - foliar applied	\$25.00	\$25.00	\$50.00	\$50.00	\$50.00
Cost of herbicide strip maintenance	25.00	100.00	100.00	100.00	100.00
Cost of fungicides	0.00	50.00	175.00	225.00	225.00
Cost of rodent materials	7.00	7.00	7.00	7.00	7.00
Cost of ties for canes	4.00	4.00	4.00	4.00	4.00
Cost for bird control & clip netting	0.00	0.00	800.00	0.00	0.00
Times for herbicide strip spray	1.00	2.00	2.00	2.00	2.00
Times for fungicides	0.00	2.00	7.00	7.00	7.00
Times for rodent control	1.00	1.00	1.00	1.00	1.00
Times for mowing vineyard floor	4.00	4.00	4.00	4.00	4.00
Property taxes	30.00	30.00	30.00	30.00	30.00
Property insurance	25.00	25.00	25.00	25.00	25.00
Land values	6,000	6,000	6,000	6,000	6,000
Foreman housing (per month)	600	600	600	600	600
Irrigation assessment	35.00	35.00	35.00	35.00	35.00
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00
Vine cost	0.75	0.75	0.75	0.75	0.75
Vine grow tubes	0.50	0.50	0.50	0.50	0.50
Gasoline price	1.70	1.70	1.70	1.70	1.70
Diesel fuel price	1.40	1.40	1.40	1.40	1.40
Operating interest rate	10.00%	10.00%	10.00%	10.00%	10.00%
Machinery interest rate	10.00%	10.00%	10.00%	10.00%	10.00%
Land interest rate	8.00%	8.00%	8.00%	8.00%	8.00%
Establishment interest rate	8.00%	8.00%	8.00%	8.00%	8.00%
% of operating capital borrowed	50.00%	50.00%	50.00%	50.00%	50.00%
Months to borrow operating capital	6.0	6.0	6.0	6.0	6.0
Planted vines	871	20	20	20	20

## Results of establishing wine grapes in Hood River County

### Cash flow analysis

Table 5 contains a per-acre cash flow analysis for establishing a wine grape vineyard planting. A cash flow analysis shows the cash costs required to establish a vineyard. Cash costs include labor, vines, trellis, fertilizer, chemicals, machinery repairs, fuel, lube, oil, labor housing repairs and maintenance, operating (short-term) interest, machinery and housing insurance, irrigation water assessments, and property taxes. The income, variable costs, and cash fixed costs are shown for each of the

5 establishment years, at which time full production of the vineyard is reached. Production begins in year 3, with 0.75 ton of wine grapes per acre, and increases to 3 tons at full production. Total variable costs are \$2,769 in the first year, with an additional \$106 of cash fixed costs for a total cash cost of \$2,875 per acre.

A positive cash flow begins in year 4, with gross income exceeding total cash costs by \$230 per acre. At full production, or in 5 years, the vineyard does not return a sufficient amount of gross income to pay all previous years' costs. There is \$9,076 of prior costs per acre remaining.

**Table 5. Cash costs and returns of establishing a vineyard (per-acre basis).**

	Year 1	Year 2	Year 3	Year 4	Full Prod
Income:					
Yield (tons/acre)	0.00	0.00	0.75	2.00	3.00
Price (dollars/ton)	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>
Gross income (dollars/acre)	0.00	0.00	1,125.00	3,000.00	4,500.00
Variable costs (per acre):					
Field preparation	27.33	0.00	0.00	0.00	0.00
Vines	1,088.75	25.00	25.00	25.00	25.00
Irrigation system	0.00	2,000.00	0.00	25.00	25.00
Trellis installation & maintenance	0.00	1,000.00	1,500.00	0.00	25.00
Tie for canes	0.00	0.00	4.00	4.00	4.00
Fertilizer	25.00	25.00	50.00	50.00	50.00
Chemicals	25.00	150.00	275.00	325.00	325.00
Rodent materials	7.00	7.00	7.00	7.00	7.00
Harvest labor	0.00	0.00	127.50	340.00	510.00
General labor	1,145.46	436.17	1,582.41	1,432.41	1,462.41
Bird netting	0.00	0.00	800.00	0.00	0.00
Machine costs	321.28	226.51	318.26	301.16	302.82
Housing facilities	14.29	14.29	14.29	14.29	14.29
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>40.33</u>	<u>24.07</u>	<u>81.96</u>	<u>64.97</u>	<u>70.01</u>
Total variable costs	2,769.43	3,983.04	4,860.43	2,663.83	2,895.53
Gross income - variable cost	-2,769.43	-3,983.04	-3,735.43	336.17	1,604.47
Fixed cash costs (per acre):					
Insurance	40.79	40.79	40.79	40.79	40.79
Water assessment	35.00	35.00	35.00	35.00	35.00
Property taxes	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>
Total fixed cash cost	105.79	105.79	105.79	105.79	105.79
Total cash cost	2,875.22	4,088.83	4,966.22	2,769.63	3,001.33
Net projected returns	-2,875.22	-4,088.83	-3,841.22	230.37	1,498.67
Cumulative returns	-2,875.22	-6,964.05	-10,805.27	-10,574.90	-9,076.22



Figure 1. Cash Costs to Establish a Vineyard the First 5 Years of Establishment.

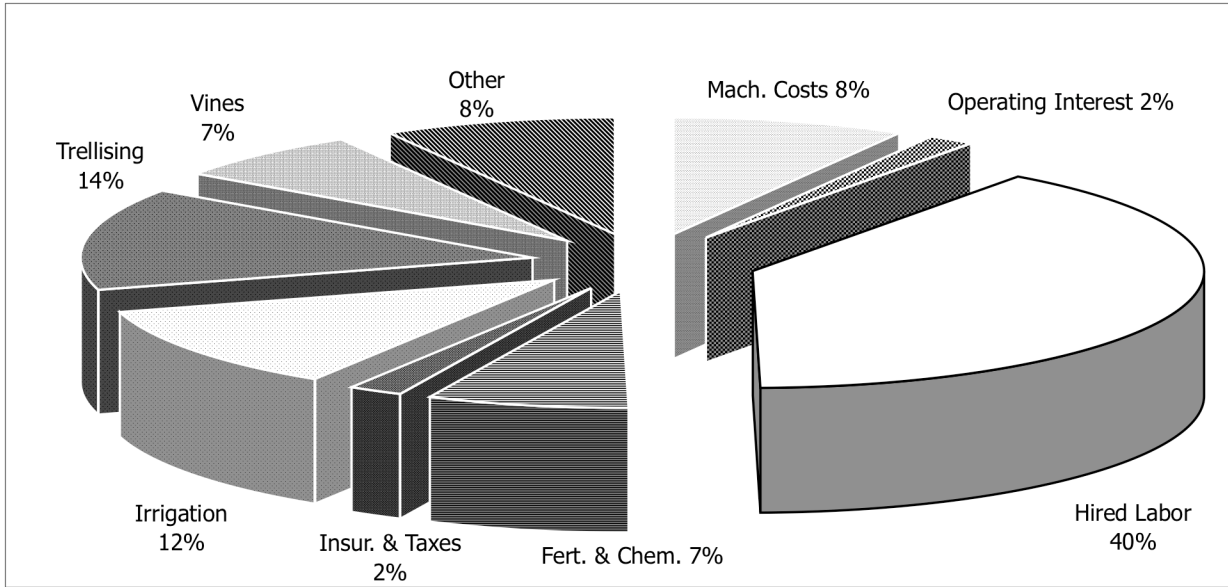


Figure 1 shows the major cost components in relation to total cash costs. Hired labor represents 40 percent of the total cash costs to establish this vineyard. The trellis system is next with 14 percent of the cash costs. The irrigation system is the third largest cost item with 12 percent of the total cash costs. Machine costs, which include fuel, oil, and repairs, are 8 percent of the cash costs. Vine costs are relatively low, accounting for 7 percent of the total cash costs. The remaining cost items encompass 19 percent of the total cash costs.

*Economic costs and returns*

Table 6 details the economic costs and returns for the establishment of a wine grape vineyard. Economic costs include all the cash costs, listed in Table 5, and the ownership costs that are either an opportunity cost to the owner or dollars borrowed from a financial institution. These ownership costs include the principal and interest payments or a return on investment to the grower, or both, for machinery,

housing, land, and funds to pay for previous year's establishment costs. The gross income and variable cash costs remain the same as in Table 5 except that the irrigation and trellis systems are amortized over their productive life in this analysis and included in fixed machine costs.

Gross income exceeds variable costs beginning in Year 4, with \$336 per acre return to the grower. Gross income, however, never exceeds total economic costs during the 25-year amortization period and, as a result, this particular vineyard has an annual deficit of \$726 per acre. In addition, at the end of the establishment period, \$13,473 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of \$1,199 per acre as shown in Table 11, Full Production Years, page 16.

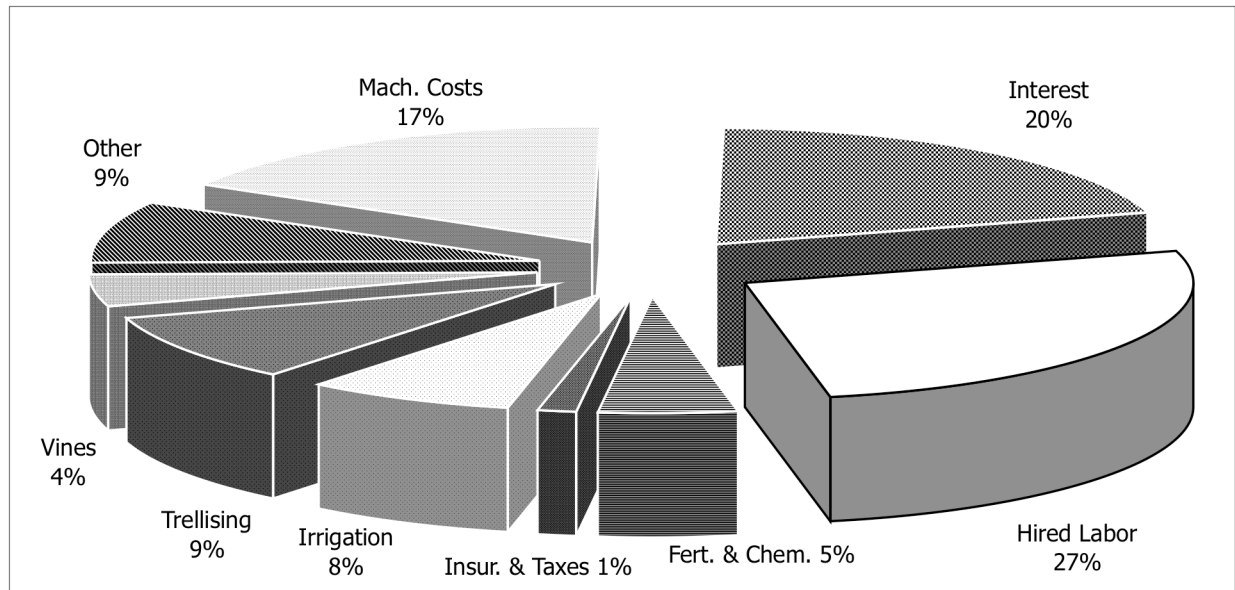
Figure 2 (page 9) shows the cost components in relation to total economic costs. When all economic costs are included, labor costs remain the largest cost item, with 27 percent of the total costs for the first 5 years of establishment. Interest costs are

the next highest cost item with 20 percent of the total economic costs, and machine costs (fuel, oil, repairs, depreciation, and interest charges) are 17 percent. The combined costs

of vines, trellising, and the irrigation system account for 21 percent. The remaining cost items are 15 percent of the total economic costs.

Income:	Year 1	Year 2	Year 3	Year 4	Full Prod
Yield (tons/acre)	0.00	0.00	0.75	2.00	3.00
Price (dollars/ton)	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>	<u>1,500.00</u>
Gross income (dollars/acre)	0.00	0.00	1,125.00	3,000.00	4,500.00
Variable costs (per acre):					
Field preparation	27.33	0.00	0.00	0.00	0.00
Vines	1,088.75	25.00	25.00	25.00	25.00
Tie for canes	0.00	0.00	4.00	4.00	4.00
Trellis maintenance	0.00	0.00	0.00	25.00	25.00
Fertilizer	25.00	25.00	50.00	50.00	50.00
Chemicals	25.00	150.00	275.00	325.00	325.00
Rodent materials	7.00	7.00	7.00	7.00	7.00
Harvest labor	0.00	0.00	127.50	340.00	510.00
General labor	1,145.46	436.17	1,582.41	1,432.41	1,462.41
Bird netting	0.00	0.00	800.00	0.00	0.00
Machine costs	321.28	226.51	318.26	301.16	302.82
Housing facilities	14.29	14.29	14.29	14.29	14.29
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>40.33</u>	<u>24.07</u>	<u>81.96</u>	<u>64.97</u>	<u>70.01</u>
Total variable costs	2,769.43	983.04	3,360.43	2,663.83	2,870.53
Gross income - variable cost	-2,769.43	-983.04	-2,235.43	336.17	1,629.47
Fixed costs (per acre):					
Insurance	40.79	40.79	40.79	40.79	40.79
Water assessment	35.00	35.00	35.00	35.00	35.00
Property taxes	30.00	30.00	30.00	30.00	30.00
Machine costs	605.41	605.41	605.41	605.41	605.41
Foreman housing	102.86	102.86	102.86	102.86	102.86
Housing facilities	41.90	41.90	41.90	41.90	41.90
Land interest cost	480.00	480.00	480.00	480.00	480.00
Interest on establishment costs	<u>0.00</u>	<u>332.24</u>	<u>544.66</u>	<u>873.95</u>	<u>1,019.72</u>
Total fixed cost	1,335.97	1,668.21	1,880.63	2,209.92	2,355.68
Total economic cost	4,105.40	2,651.25	5,241.06	4,873.75	5,226.22
Net projected returns	-4,105.40	-2,651.25	-4,116.06	-1,873.75	-726.22
Cumulative returns	-4,105.40	-6,756.65	-10,872.70	-12,746.45	-13,472.67

Figure 2. Economic Costs to Establish a Vineyard the First 5 Years of Establishment.



The net projected economic returns for establishing a wine grape vineyard are shown in Figure 3 (page 10). Both the cumulative cash and economic cost and returns are represented. The projected returns for this vineyard will cover all cash costs of establishment in 12 years. With the assumptions in this study, however, this vineyard will not generate sufficient gross income to cover all economic costs for the 25-year period. Determining the necessary levels of change to price or inputs that will make this vineyard a prudent business investment requires a sensitivity analysis. Using this approach, we determined that profitability could be achieved by doing any one of the following:

- a) Increasing the wine grape prices by 26 percent from \$1,500 to \$1,890 per ton,
- b) Increasing anticipated yield by 29 percent (0.97, 2.58, and 3.87 tons per acre for years 3, 4, and 5, respectively), or

- c) Decreasing the rate of return for machinery, land, and previous years' establishment costs to 2.5 percent for all ownership costs.

The results of these adjustments are shown in Figure 4 (page 10). It should be noted that by reducing assumed interest rates to 2.5 percent, the amount of money required to establish this vineyard in year 5 is decreased by \$3,980 per acre (from \$13,473 per acre in Table 6 to \$9,493). Increasing grape price or yield reduces the amount of money required for vineyard establishment in year 5 by \$2,354 per acre.

Growers often focus on reducing vine costs, fertilizers, and chemicals as a means of reducing costs. In order to increase the chances of financial success, more emphasis should be placed on varieties and practices that optimize yields and fruit quality for a particular location or increasing crop yield and income.

Figure 3. Economic and Cash Costs to Establish a Vineyard in Hood River County

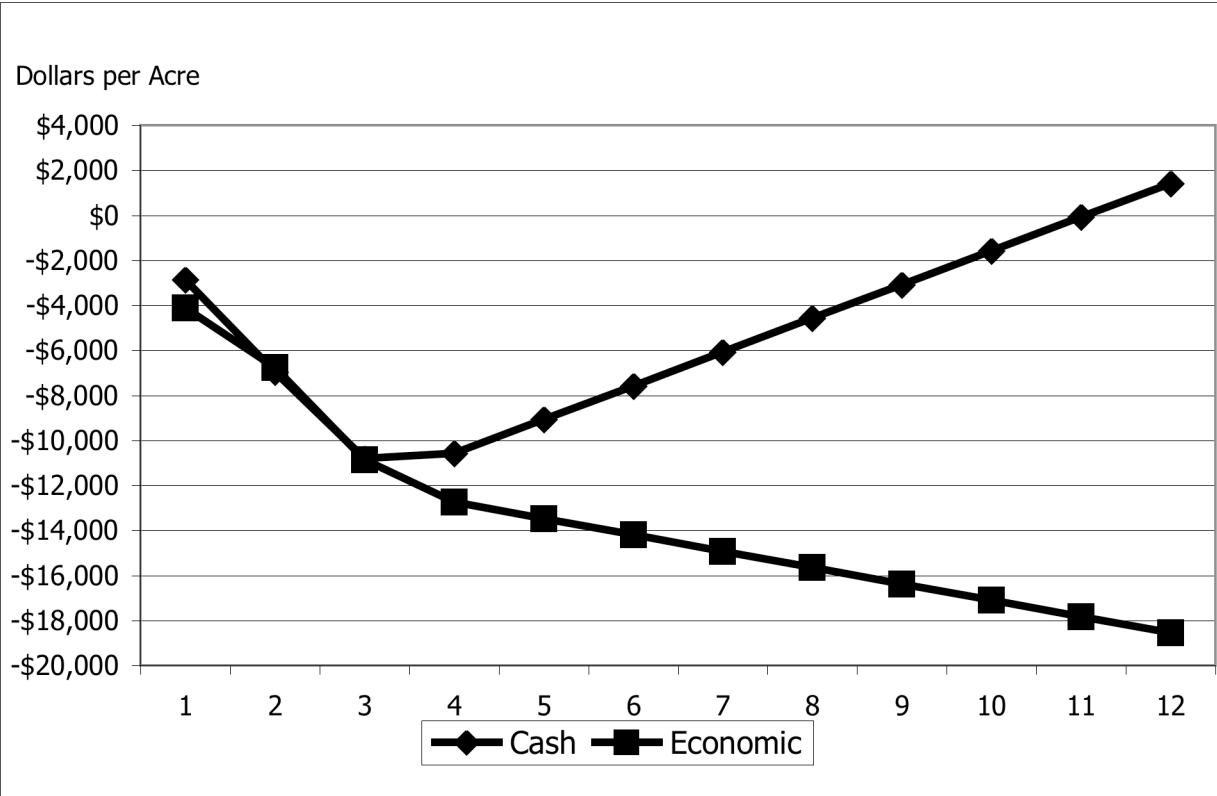
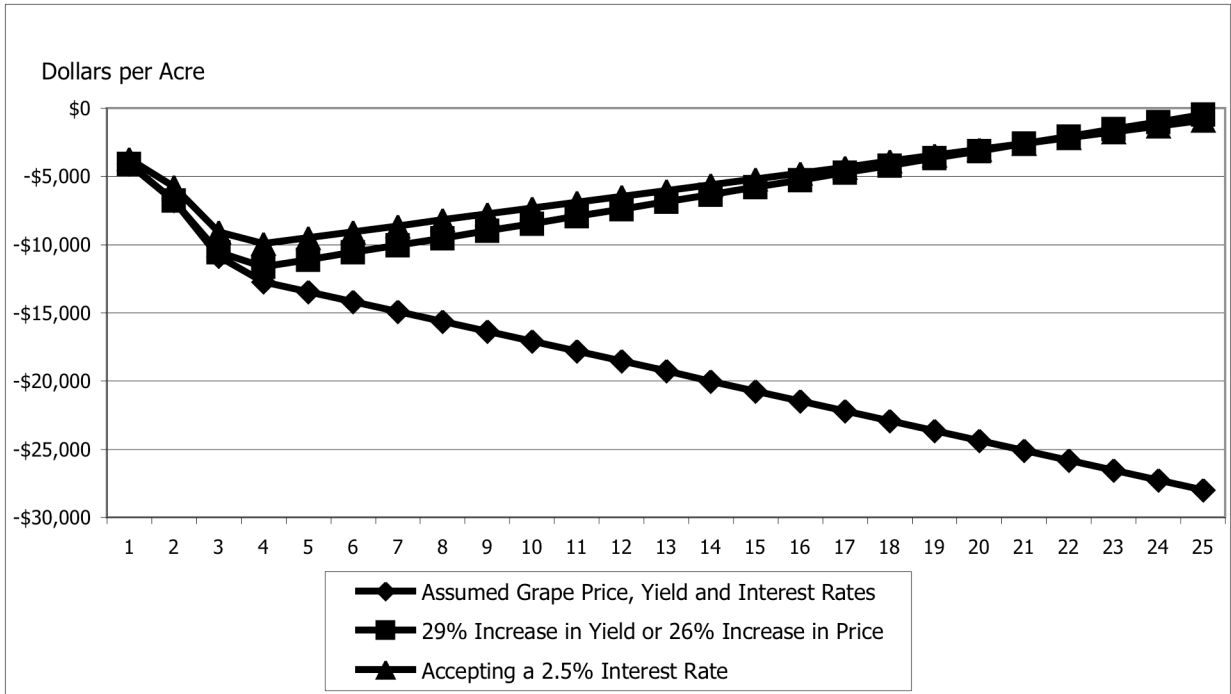


Figure 4. Projected Net Returns with Changes to Wine Grape Prices, Yields, and Interest Rates Assumed in this Study



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## Conclusion

The results of the sensitivity analysis indicated that profitability could be achieved by increasing fruit prices by 26 percent, increasing yield by 29 percent, or accepting a 2.5 percent rate of return on investment. A combination of increased prices, yield, or lower rates of return on investment also is a possibility. Achieving any of these outcomes in a cool-climate grape-growing region, such as the Mid-Columbia, generally depends on careful attention to detail in vineyard establishment and management practices.

In cool-climate areas, the regional climate (macroclimate) may be well suited to the production of high-quality fruit. Many potential vineyard sites, however, may be unsuitable for the successful production of high-quality fruit on a consistent basis due to limitations of the site climate (mesoclimate). Vineyard mesoclimate is affected by several factors that must be considered during vineyard site selection.

Moderately productive, well-drained soils often are favored over deep, fertile, highly productive soils in order to balance vegetative growth and fruit production and quality. On more productive sites, growers must carefully manage this balance to avoid overly vegetative vines that may produce lower quality fruit. Canopy management and other practices are critical.

Sloping ground with southern or southwestern exposure contributes to good air drainage for frost avoidance and high interception of solar radiation for photosynthetic activity critical for production of sugar and other fruit constituents. Low- to moderate-elevation sites often are chosen over high-elevation sites because the latter may result in insufficient heat units for fruit maturation. Prime sites for wine grape production may be limited, but suitable sites can be identified in the Hood River Valley.

The choice of variety is a critical factor in successful wine grape production. Grape varieties have different requirements for accumulated heat units during the growing season. The variety choice must match the site potential for heat units over the course of the growing season to achieve optimum fruit maturity.

Many agricultural products have a value-added component that increases producer profitability. If growers are able to share in the value-added process of winemaking, they may be more likely to profit financially.

This cost of establishment study is meant to provide useful information to wine grape producers and investors who are considering planting a new vineyard. However, like any other enterprise budget, using your own current costs will make the budget more meaningful. Many tools are available to assist in budgeting, such as templates from university farm management specialists and computer software programs such as Crop Profitability Analysis (CPA). Talk with your Extension agent about the latest in vineyard replacement tools and budget information.

Growers must not forget the importance that a particular enterprise such as a vineyard can have in the overall financial stability of the farm business. Financial managers can recommend planting a new vineyard or planting one grape variety over another to improve profitability, but the financial requirements to complete the planting could jeopardize cash flows, increase the debt-to-asset ratio, and diminish the solvency of the farm. There are many economic and financial considerations to review before such decisions are made. Seeking advice from university Extension and research faculty, industry representatives, or consultants can help in those decisions and keep your farm profitable and vineyard investments feasible.

## APPENDIX A

### Enterprise Budgets for Wine Grapes in Hood River County

<b>Table 7. Year 1, wine grape establishment, \$/acre economic costs and returns.</b>								
<i>Variable cash costs</i>			Description	Labor	Machinery	Materials	Total	
Soil sample				0.00	0.00	43.65	43.65	
2.00	applications			20.00	14.76	0.00	34.76	
10.00	hours			100.00	0.00	1.20	101.20	
1.00	application			4.85	9.73	0.00	14.58	
20.00	hours			200.00	0.00	26.13	226.13	
35.00	hours			350.00	148.90	1,088.75	1,587.65	
Tie canes				0.00	0.00	4.00	4.00	
10.00	hours			100.00	0.00	0.00	100.00	
20.00	hours			200.00	0.00	0.00	200.00	
1.00	application			3.93	3.72	25.00	32.65	
1.00	application			3.14	2.81	25.00	30.95	
4.00	hours			40.00	0.00	0.00	40.00	
4.00	times			19.41	38.91	0.00	58.32	
1.00	application			4.12	3.72	7.00	14.84	
10.00	hours			100.00	20.00	0.00	120.00	
Pickup, truck, & ATV				0.00	78.74	0.00	78.74	
Housing facilities				0.00	0.00	14.29	14.29	
Miscellaneous & overhead				0.00	0.00	75.00	75.00	
6.00	month			<u>0.00</u>	<u>0.00</u>	<u>40.33</u>	<u>40.33</u>	
Total <b>variable</b> costs				1,145.46	321.28	1,306.69	2,817.08	
<i>Fixed cash costs</i>							Unit	Total
Machinery & equipment insurance							acre	10.01
Pickup, truck, & ATV insurance							acre	5.79
Water assessment							acre	35.00
Property insurance							acre	25.00
Property taxes							acre	<u>30.00</u>
Total <b>fixed cash</b> costs								105.79
<i>Fixed non-cash costs</i>							Unit	Total
Machinery & equip - depreciation & interest							acre	551.36
Pickup, truck, & ATV - depreciation & interest							acre	54.06
Foreman housing							acre	102.86
Housing facilities							acre	41.90
Land interest charge							acre	<u>480.00</u>
Total <b>non-cash</b> costs								1,230.17
Total <b>fixed</b> costs								1,335.97
Total of all costs per acre								4,153.05

**Table 8. Year 2, wine grape establishment, \$/acre economic costs and returns.**

<i>Variable cash costs</i>	Description	Labor	Machinery	Materials	Total	
Prune	4.00 hours	40.00	0.00	0.00	40.00	
Tie canes		0.00	0.00	4.00	4.00	
Vine replacement with grow tubes	2.50 hours	25.00	0.00	25.00	50.00	
Install trellis system	10.00 hours	100.00	41.17	0.00	141.17	
Shredding brush		4.85	9.73	0.00	14.58	
Fertilizer - foliar applied		0.00	0.00	25.00	25.00	
Herbicide strip maintenance	2.00 applications	6.28	5.62	100.00	111.90	
Fungicides	2.00 applications	16.50	28.62	50.00	95.12	
Vine training	12.00 hours	120.00	0.00	0.00	120.00	
Mowing vineyard floor	4.00 times	19.41	38.91	0.00	58.32	
Rodent control	1.00 application	4.12	3.72	7.00	14.84	
Irrigation	10.00 hours	100.00	20.00	0.00	120.00	
Pickup, truck, & ATV		0.00	78.74	0.00	78.74	
Housing facilities		0.00	0.00	14.29	14.29	
Miscellaneous & overhead		0.00	0.00	75.00	75.00	
Interest: operating capital	6.00 months	<u>0.00</u>	<u>0.00</u>	<u>24.07</u>	<u>24.07</u>	
<b>Total variable costs</b>		436.17	226.51	324.36	987.04	
<i>Fixed cash costs</i>					<u>Unit</u>	<u>Total</u>
Machinery & equipment insurance				acre	10.01	
Pickup, truck, & ATV insurance				acre	5.79	
Water assessment				acre	35.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>30.00</u>	
<b>Total fixed cash costs</b>					105.79	
<i>Fixed non-cash costs</i>					<u>Unit</u>	<u>Total</u>
Machinery & equip - depreciation & interest				acre	551.36	
Pickup, truck, & ATV - depreciation & interest				acre	54.06	
Foreman housing				acre	102.86	
Housing facilities				acre	41.90	
Land interest charge				acre	480.00	
Prior year's establishment costs				acre	<u>332.24</u>	
<b>Total non-cash costs</b>					1,562.42	
<b>Total fixed costs</b>					1,668.21	
<b>Total of all costs per acre</b>					<u>2,655.25</u>	

**Table 9. Year 3, wine grape establishment, \$/acre economic costs and returns.**

<b>Total gross income</b>		Quantity	Unit	\$/unit	Total	Price/ton	
Pinot Noir grapes		0.75	Tons	1,500.00	<u>1,125.00</u>	<u>1,500.00</u>	
<b>Total gross income</b>					1,125.00	1,500.00	
<b>Variable cash costs</b>		Description	Labor	Machinery	Materials	Total	Cost/ton
Prune	24.00	hours	240.00	0.00	0.00	240.00	320.00
Pull brush	16.00	hours	160.00	0.00	0.00	160.00	213.33
Tie canes	12.00	hours	120.00	0.00	4.00	124.00	165.33
Vine replacement with grow tubes	2.50	hours	25.00	0.00	25.00	50.00	66.67
Install trellis system	20.00	hours	200.00	19.18	0.00	219.18	292.23
Shredding brush			4.85	9.73	0.00	14.58	19.44
Fertilizer - foliar applied			0.00	0.00	50.00	50.00	66.67
Herbicide strip maintenance	2.00	applications	6.28	5.62	100.00	111.90	149.21
Fungicides	7.00	applications	57.74	100.17	175.00	332.91	443.88
Vine training	15.00	hours	150.00	0.00	0.00	150.00	200.00
Sucker removal	15.00	hours	150.00	0.00	0.00	150.00	200.00
Cluster thinning	10.00	hours	100.00	0.00	0.00	100.00	133.33
Hedging	4.00	hours	40.00	0.00	0.00	40.00	53.33
Mowing vineyard floor	4.00	times	19.41	38.91	0.00	58.32	77.76
Bird control & clipping net	20.00	hours	200.00	0.00	800.00	1,000.00	1,333.33
Rodent control	1.00	application	4.12	3.72	7.00	14.84	19.79
Frost protection	0.50	hours	5.00	36.73	0.00	41.73	55.64
Irrigation	10.00	hours	100.00	20.00	0.00	120.00	160.00
Picking equipment			0.00	1.20	0.00	1.20	1.60
Harvesting costs	0.75	tons	127.50	4.28	0.00	131.78	175.70
Pickup, truck, & ATV			0.00	78.74	0.00	78.74	104.98
Housing facilities			0.00	0.00	14.29	14.29	19.05
Miscellaneous & overhead			0.00	0.00	75.00	75.00	100.00
Interest: operating capital	6.00	months	<u>0.00</u>	<u>0.00</u>	<u>81.96</u>	<u>81.96</u>	<u>109.28</u>
<b>Total variable costs</b>			1,709.91	318.26	1,332.25	3,360.43	4,480.57
<b>Fixed cash costs</b>				Unit	Total	Cost/ton	
Machinery & equipment insurance				acre	10.01	13.34	
Pickup, truck, & ATV insurance				acre	5.79	7.71	
Water assessment				acre	35.00	46.67	
Property insurance				acre	25.00	33.33	
Property taxes				acre	<u>30.00</u>	<u>40.00</u>	
<b>Total fixed cash costs</b>					105.79	141.06	
<b>Fixed non-cash costs</b>				Unit	Total	Cost/ton	
Machinery & equip - depreciation & interest				acre	551.36	735.14	
Pickup, truck, & ATV - depreciation & interest				acre	54.06	72.07	
Foreman housing				acre	102.86	137.14	
Housing facilities				acre	41.90	55.87	
Land interest charge				acre	480.00	640.00	
Prior year's establishment costs				acre	<u>544.66</u>	<u>726.22</u>	
<b>Total non-cash costs</b>					1,774.84	2,366.45	
<b>Total fixed costs</b>					1,880.63	2,507.51	
<b>Total of all costs per acre</b>					5,241.06	6,988.08	
<b>Net projected returns</b>					-4,116.06	-5,488.08	



**Table 10. Year 4, wine grape establishment, \$/acre economic costs and returns.**

<b>Total gross income</b>		Quantity	Unit	\$/unit	Total	Price/ton	
Pinot Noir grapes		2.00	Tons	1,500.00	<u>3,000.00</u>	<u>1,500.00</u>	
Total <b>gross</b> income					3,000.00	1,500.00	
<b>Variable cash costs</b>		Description	Labor	Machinery	Materials	Total	Cost/ton
Prune	24.00	hours	240.00	0.00	0.00	240.00	120.00
Pull brush	16.00	hours	160.00	0.00	0.00	160.00	80.00
Tie canes	12.00	hours	120.00	0.00	4.00	124.00	62.00
Vine replacement with grow tubes	2.50	hours	25.00	0.00	25.00	50.00	25.00
Trellis maintenance	2.00	hours	20.00	0.00	25.00	45.00	22.50
Shredding brush			4.85	9.73	0.00	14.58	7.29
Fertilizer - foliar applied			0.00	0.00	50.00	50.00	25.00
Herbicide strip maintenance	2.00	application s	6.28	5.62	100.00	111.90	55.95
Fungicides	7.00	application	57.74	100.17	225.00	382.91	191.46
Vine training	15.00	hours	150.00	0.00	0.00	150.00	75.00
Sucker removal	15.00	hours	150.00	0.00	0.00	150.00	75.00
Cluster thinning	10.00	hours	100.00	0.00	0.00	100.00	50.00
Leaf pulling	3.00	hours	30.00	0.00	0.00	30.00	15.00
Hedging	4.00	hours	40.00	0.00	0.00	40.00	20.00
Mowing vineyard floor	4.00	times	19.41	38.91	0.00	58.32	29.16
Bird control & clipping net	20.00	hours	200.00	0.00	0.00	200.00	100.00
Rodent control	1.00	application	4.12	3.72	7.00	14.84	7.42
Frost protection	0.50	hours	5.00	36.73	0.00	41.73	20.86
Irrigation	10.00	hours	100.00	20.00	0.00	120.00	60.00
Picking equipment			0.00	1.20	0.00	1.20	0.60
Harvesting costs	2.00	tons	340.00	6.35	0.00	346.35	173.18
Pickup, truck, & ATV			0.00	78.74	0.00	78.74	39.37
Housing facilities			0.00	0.00	14.29	14.29	7.14
Miscellaneous & overhead			0.00	0.00	75.00	75.00	37.50
Interest: operating capital	6.00	months	<u>0.00</u>	<u>0.00</u>	<u>64.97</u>	<u>64.97</u>	<u>32.49</u>
Total <b>variable</b> costs			1,772.41	301.16	590.26	2,663.83	1,331.92
<b>Fixed cash costs</b>					Unit	Total	Cost/ton
Machinery & equipment insurance					acre	10.01	5.00
Pickup, truck, & ATV insurance					acre	5.79	2.89
Water assessment					acre	35.00	17.50
Property insurance					acre	25.00	12.50
Property taxes					acre	<u>30.00</u>	<u>15.00</u>
Total <b>fixed cash</b> costs						105.79	52.90
<b>Fixed non-cash costs</b>					Unit	Total	Cost/ton
Machinery & equip - depreciation & interest					acre	551.36	275.68
Pickup, truck, & ATV - depreciation & interest					acre	54.06	27.03
Foreman housing					acre	102.86	51.43
Housing facilities					acre	41.90	20.95
Land interest charge					acre	480.00	240.00
Prior year's establishment costs					acre	<u>873.95</u>	<u>436.97</u>
Total <b>non-cash</b> costs						2,104.12	1,052.06
Total <b>fixed</b> costs						2,209.92	1,104.96
Total of all costs per acre						4,873.75	2,436.87
Net projected returns						-1,873.75	-936.87

**Table 11. Full production years, wine grape establishment, \$/acre economic costs and returns.**

<b>Total gross income</b>		Quantity	Unit	\$/unit	Total	Price/ton	
Pinot Noir grapes		3.00	Tons	1,500.00	<u>4,500.00</u>	<u>1,500.00</u>	
<b>Total gross income</b>					4,500.00	1,500.00	
<b>Variable cash costs</b>		Description	Labor	Machinery	Materials	Total	Cost/ton
Prune		24.00 hours	240.00	0.00	0.00	240.00	80.00
Pull brush		16.00 hours	160.00	0.00	0.00	160.00	53.33
Tie canes		12.00 hours	120.00	0.00	4.00	124.00	41.33
Vine replacement with grow tubes		2.50 hours	25.00	0.00	25.00	50.00	16.67
Trellis maintenance		2.00 hours	20.00	0.00	25.00	45.00	15.00
Shredding brush			4.85	9.73	0.00	14.58	4.86
Fertilizer - foliar applied			0.00	0.00	50.00	50.00	16.67
Herbicide strip maintenance		2.00 applications	6.28	5.62	100.00	111.90	37.30
Fungicides		7.00 applications	57.74	100.17	225.00	382.91	127.64
Vine training		15.00 hours	150.00	0.00	0.00	150.00	50.00
Sucker removal		15.00 hours	150.00	0.00	0.00	150.00	50.00
Cluster thinning		10.00 hours	100.00	0.00	0.00	100.00	33.33
Leaf pulling		6.00 hours	60.00	0.00	0.00	60.00	20.00
Hedging		4.00 hours	40.00	0.00	0.00	40.00	13.33
Mowing vineyard floor		4.00 times	19.41	38.91	0.00	58.32	19.44
Bird control & clipping net		20.00 hours	200.00	0.00	0.00	200.00	66.67
Rodent control		1.00 application	4.12	3.72	7.00	14.84	4.95
Frost protection		0.50 hour	5.00	36.73	0.00	41.73	13.91
Irrigation		10.00 hours	100.00	20.00	0.00	120.00	40.00
Picking equipment			0.00	1.20	0.00	1.20	0.40
Harvesting costs		3.00 tons	510.00	8.01	0.00	518.01	172.67
Pickup, truck, & ATV			0.00	78.74	0.00	78.74	26.25
Housing facilities			0.00	0.00	14.29	14.29	4.76
Miscellaneous & overhead			0.00	0.00	75.00	75.00	25.00
Interest: operating capital		6.00 months	<u>0.00</u>	<u>0.00</u>	<u>70.01</u>	<u>70.01</u>	<u>23.34</u>
<b>Total variable costs</b>			1,972.41	302.82	595.30	2,870.53	956.84
<b>Fixed cash costs</b>				Unit	Total	Cost/ton	
Machinery & equipment insurance				acre	10.01	3.34	
Pickup, truck, & ATV insurance				acre	5.79	1.93	
Water assessment				acre	35.00	11.67	
Property insurance				acre	25.00	8.33	
Property taxes				acre	<u>30.00</u>	<u>10.00</u>	
<b>Total fixed cash costs</b>					105.79	35.26	
<b>Fixed non-cash costs</b>				Unit	Total	Cost/ton	
Machinery & equip - depreciation & interest				acre	551.36	183.79	
Pickup, truck, & ATV - depreciation & interest				acre	54.06	18.02	
Foreman housing				acre	102.86	34.29	
Housing facilities				acre	41.90	13.97	
Land interest charge				acre	480.00	160.00	
Amortized establishment costs				acre	<u>1,198.91</u>	<u>399.64</u>	
<b>Total non-cash costs</b>					2,429.08	809.69	
<b>Total fixed costs</b>					2,534.88	844.96	
<b>Total of all costs per acre</b>					5,405.41	1,801.80	
<b>Net projected returns</b>					-905.41	-301.80	