

THE COST OF GROWING WINE GRAPES IN WESTERN COLORADO

By

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Introduction

Wine grapes have been grown on a limited basis in Colorado since the end of the last century, but the last two decades have seen a dramatic expansion. Since 1990, vineyard acreage has increased from 240 acres to about 550 acres and licensed wineries have increased from five to 41.

Colorado grape production can be a profitable intensive use of agricultural land for both small and large acreage landholders. However, many of Colorado's commercial vineyards are less than 5 acres in size and operated as a secondary income enterprise. Successful growing and marketing of grapes requires not only sound management but also a substantial initial capital investment. Part of the investment, establishment cost, is distributed over time. Under ideal conditions, and optimal management, a minimum of six years is required to recover establishment and annual operational costs. However, another part, equipment cost, is distributed over acres. The more acres cropped, the lower the investment cost per acre. Grape sales on each acre have to cover the variable production costs, like water, prorated establishment costs, prorated equipment costs and the price of land, which is not always possible with small acreages on expensive land.

This report shows typical vineyard costs and returns that you can compare to your own vineyard. The establishment and annual operating costs (direct and indirect) are estimated for a "representative" vineyard in western Colorado. Due to the variability of circumstances faced by individual vineyards, some fixed costs such as land, deer/elk fencing, taxes, and insurance are not explicitly included in our cost estimates. Major land preparation such as timber clearing, rock removal, or land leveling is also ignored. Special frost protection measures and retraining strategies for winter-injured vines are also not included in this analysis. These operations, if required, should be factored in to your own analysis. Vineyard site, grape variety, vineyard design, pest management and other cultural practices will also affect vineyard establishment and operating costs.

The following budgets were developed using practices and materials that have proven both practical and cost effective in Colorado. Enterprising growers might find alternative materials or practices to reduce operating costs without impairing vineyard productivity or grape quality. The "Colorado Grape Growers Guide" (Bulletin 550A) is an excellent resource for production practices and the particular needs for growing grapes in a high desert environment.

Basic Findings

The profitability and investment returns of grape vineyards depend on four major factors:

- Sound production practices.
- Consistently good yields.
- Consistently good prices.
- Reasonable investment and establishment costs.

First, you must be a good producer. A good producer will select the best site possible and manage the vines to the highest level. This requires sound management decisions that can modify vine growth

and directly affect quality and quantity of the crop. Cultural management decisions such as variety selection, soil fertility, irrigation, pest, disease and weed control and canopy management (shoot positioning, pruning, hedging, thinning, and leaf removal) can modify the crop, change the physiology of the berry and thus fruit quality. Consult the "Colorado Grape Growers Guide" for recommended management practices.

Second, vineyard yields must be consistently good. Under good management, shoot numbers on the vine can be adjusted to produce yields averaging 4 tons per acre. Lower yields due to frost or poor management will require more time to recover establishment and operational costs. Higher yields can be achieved with good management and growing conditions.

Third, the price received for the crop is assumed here to be \$1,250 per ton. You may get more or less depending on variety and year-to-year volatility in markets. It may also be less important to make money in your vineyard if you grow specialized grapes for your own winery. For example, you may want to modify your crop level (shoot and cluster thinning) to enhance berry composition for a unique wine style.

Fourth, is what you pay for land, equipment and other capital expenses. Land prices vary considerably in western Colorado with small (1-5 acre) prime fruit growing parcels usually demanding the highest price. Equipment can be purchased new or used, leased, borrowed, or inherited and can dramatically alter costs. Capital expenses such as an irrigation system may be reduced because of government cost-share programs or maybe the system was purchased with the land. Capital expenses relating to vine density and vineyard site potential can be different for each situation. For example, a vigorous vine like 'Shiraz' planted on a deep, fertile, heavy clay loam site will perform best if the vine spacing is increased from 4 to 6 feet and thus capital expenses (vine and trellis costs) are reduced.

All of these factors directly affect the profitability and investment return of your vineyard.

Assumptions

Site

The representative vineyard is established on open land with no improvements and where the hazards of winter cold injury and spring frosts are minimal. Even the best vineyard sites in western Colorado can expect crop yield reduction due to freeze or frost injury.

Labor

The wage rates for labor is the net cost to growers. Unskilled labor is valued at \$8.00 per hour (\$6.00 wage rate plus \$2.00 per hour payroll expenses). Skilled labor is valued at \$9.00 per hour. Skilled labor is typically denoted as a machinery operation experience.

Grapevines

The vines are self rooted, certified virus free, premium number one vines valued at a competitive price of \$1.00 per vine. Replanting is done as necessary, typically 2-3 percent of original planting.

Trellis

The trellis for this ideal vineyard is a typical 7 wire Vertical Shoot Positioned (VSP) trellis system. The trellis was installed with a hydraulic power drive. Four-inch diameter by 8 feet CCA treated pine line posts are driven 2 feet and spaced every 30 feet in each row. H-bracing is used for anchoring and these are also CCA treated pine that measure 4-5 inches in diameter by 10 feet in length and are hydraulically driven 4 feet. A bamboo stake, ½- inch diameter by 4 feet in length, is installed with each vine. The vines are spur pruned and cordon trained. The vines are spaced 5 feet between vines and 9 feet between rows for a vine density of 968 vines per acre.

Irrigation

The irrigation system included in this "representative" vineyard is a modern low volume drip system. All tubing, emitters, media filters, header piping, electric valves, controller panel, wiring and shelter are included in the system. Each vine has a 4-liter per hour emitter. The \$20,000 irrigation system (Table 1) is capable of irrigating a twenty-acre vineyard. Costs could be reduced somewhat to accommodate smaller acreage. Linear feet of tubing, number of emitters, valves etc. would be reduced and thus lower the overall irrigation system cost. The current cost of an irrigation system, which includes labor and materials, is approximately \$2,000 - \$2,500 per acre.

Grape Prices

Unless noted otherwise, grapes are priced at the vineyard at a competitive 2001-2002 price, \$1,250 per ton. Grape prices vary substantially by variety.

Tax Impacts

No tax impacts have been included in this analysis. There are important tax considerations that should be discussed with your accountant prior to vineyard investment.

Equipment

The equipment listed in Table 1 is enough to adequately service and manage a twenty-acre vineyard. Costs are based on new values. Total machinery expense can vary substantially, depending on grower preference. For example, you may want to spend \$7,000 more for a four-wheel drive tractor versus a two-wheel drive, or to purchase used machinery.

Table 1: Equipment Requirements-Grape Vineyard, Western Colorado

Interest Rate: 10.0%
Acreage Capacity 20acres

<u>Machine</u>	<u>Purchase Price</u>	<u>Salvage Value</u>	<u>Useful Life</u>	<u>Annual Cost</u>	<u>Annual Cost Per Acre</u>		
					<u>2 Acres</u>	<u>10 Acres</u>	<u>20 Acres</u>
Tractor (30 hp w/attachments)	15,000	1,500	10	2,175	1,088	218	109
Truck	16,000	1,600	10	2,320	1,160	232	116
Sprayer equipment	5,600	560	10	812	406	81	41
Weed Sprayer	1,000	100	10	145	73	15	7
Disc	1,200	120	10	174	87	17	9
Grape Hoe	4,800	480	10	696	348	70	35
Flail Chopper	7,500	750	10	1,088	544	109	54
Auger	1,500	150	10	218	109	22	11
Harrow	1,000	100	10	145	73	15	7
Bird Netting/Equipment	15,000	1,500	10	2,175	1,088	218	109
Irrigation Equipment	20,000	2,000	20	2,000	1,000	200	100
Trailer	1,000	100	10	145	73	15	7
Shop Tools	2,500	250	20	250	125	25	13
Other Misc. Equipment	3,000	300	20	300	150	30	15
Total Machinery Investment	\$95,100			\$12,642	\$6,321	\$1,264	\$632

Salvage Value=10 Percent of Purchase Price

Annual Cost=((Purchase Price-Salvage Value)/Years of Life)+((Purchase Price+Salvage Value)/2)*Interest Rate

Costs and Returns

The annual budgets in Tables 2-11 show annual production expenses and cash inflows from sales. The first budget, Table 2, represents the direct and indirect costs of establishing a wine grape vineyard, excluding machinery and irrigation equipment. Land, equipment and irrigation costs are highly variable and therefore will be discussed in later sections. The net costs in Year 1 are estimated at \$4,798.96.

Tables 3 through 10 show production expenses and cash inflows for the transition period (years 2 through 9) from establishment to maintenance. Total accumulated net returns, annual revenues minus expenses, show how much is available to pay off establishment costs (land, equipment, etc.), including interest. Total accumulated expenses peak in year 3 and in year 8 the vineyard begins generating a positive accumulated cash flow.

Table 11 represents production expenses and cash sales for maintenance years, 10 through 20. Once the vineyard is established and operating at full production, expenses and sales are assumed to be constant. A well-managed vineyard can be productive for 20 years and 30 to 40 years are not unusual. In this analysis, we assume a vineyard life of 20 years.

Table 2: Wine Grape Establishment and Year 1 Production Expenses

<u>Operation</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Units Per Acre</u>	<u>Cost Per Acre</u>	<u>Your Estimate</u>
<u>Site Preparation</u>					
Deep Ripping (custom)	acre	150.00	1	150.00	
Plow (Labor)	hrs.	9.00	1.5	13.50	
Disc (Labor)	hrs.	9.00	1.25	11.25	
Soil Sample	samples	28.00	3	84.00	
Float/Landplane(custom)	acre	8.00	1	8.00	
<u>Vineyard Layout and Planting</u>					
Vine/Post Locations(labor)	hrs.	9.00	5	45.00	
Grapevines	vines	1.00	1000	1000.00	
Trimming & Planting Labor	hrs.	8.00	70	560.00	
<u>Trellis</u>					
Line Posts (4"x8')	posts	6.00	152	912.00	
End Posts (4" x 10')	posts	6.33	32	202.56	
Wire (12.5 ga/HT, 4000')	rolls	70.00	8	560.00	
Stakes	stakes	0.25	1000	250.00	
Labor	hrs.	8.00	40	320.00	
Post Driving	posts	2.00	184	368.00	
Staples	50 lb. box	28.00	1	28.00	
<u>Machinery (cash operating)</u>					
Fuel and Lubrication	acre	50.00	1	50.00	
Repairs and Maintenance	acre	30.00	1	30.00	
<u>Operating Interest</u>					
1/2 yearly cash expenses	dol.	0.09	2296.16	206.65	

Total Year 1: Establishment/Production Expenses	4,798.96
Cash Inflows From Sales	0.00
Net - Year 1	(\$4,798.96)

Table 3: Wine Grape Production Expenses-Year 2

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Pruning/Training Labor	hrs.	8.00	80	640.00	
Tying Material	rolls	1.00	17	17.00	
<u>Weed Control</u>					
Weed Control Labor	hrs.	8.00	27.5	220.00	
Spraying/Herbicides	acre	40.00	1	40.00	
<u>Replanting</u>					
Grapevines (2%)	vines	1.00	20	20.00	
Trimming and Planting	hrs.	8.00	2	16.00	
<u>Canopy Management</u>					
Shoot and Cluster Removal	hrs.	8.00	30	240.00	
Tying Material	dol.	1.00	20	20.00	
<u>Fungicide and Insecticides</u>					
Fungicides	acre	22.22	1	22.22	
<u>Machinery (Operating)</u>					
Fuel and Lubrication	acre	25.00	1	25.00	
Repairs and Maintenance	acre	50.00	1	50.00	
<u>Irrigation Expenses</u>					
Water	acre	90.00	1	90.00	
Irrigation Labor	hrs.	9.00	20	180.00	
<u>Harvest Expense</u>					
Picking Labor	ton	128.00	1	128.00	
<u>Miscellaneous Expenses</u>					
	acre	200.00	1	200.00	
<u>Operating Interest</u>					
1/2 Year 2 Expenses	dol.	0.09	954.11	85.87	
Interest on Year 1 Expenses	dol.	0.09	4798.96	431.91	

Total Year 2: Production Expenses				2,426.00	
Cash Inflows From Sales		1,250.00	0.5	625.00	
Net - Year 2				-1,801.00	
Total Accumulated Net Returns				(\$6,599.96)	

Table 4: Wine Grape Production Expenses-Year 3

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Tying Tape	rolls	1.00	2	2.00	
Pruning/Training Labor	hrs.	8.00	40	320.00	
<u>Weed Control</u>					
Herbicide/Application	acre	40.00	1	40.00	
Weed Control Labor	hrs.	8.00	20	160.00	
<u>Fertilization</u>					
Leaf Sample	variety	50.00	1	50.00	
<u>Canopy Management</u>					
Shoot Thinning	hrs.	8.00	14	112.00	
Shoot Positioning & Tying	hrs.	8.00	12	96.00	
Suckering	hrs.	8.00	4	32.00	
Cluster Thinning	hrs.	8.00	2	16.00	
Tying Tape	rolls	1.00	2	2.00	
<u>Birdnetting</u>					
Netting	roll	700.00	1	700.00	
Installation/Removal	hrs.	8.00	27	216.00	
Tractor Labor	hrs.	9.00	9	81.00	
<u>Fungicides</u>					
Sulfur	acre	4.00	3	12.00	
Sterile Inhibitor	acre	12.00	3	36.00	
<u>Harvest</u>					
Picking Labor	ton	128.00	1	128.00	
<u>Machinery (operating)</u>					
Fuel & Lubrication	acre	50.00	1	50.00	
Repairs & Maintenance	acre	30.00	1	30.00	
<u>Irrigation Expense</u>	acre	270.00	1	270.00	
<u>Miscellaneous Expense</u>	acre	200.00	1	200.00	
<u>Operating Interest</u>					
1/2 Year 3 Expenses	dol.	0.09	1276.50	114.89	
Int. on accrued expenses	dol.	0.09	6599.96	594.00	
Total Year 3: Production Expenses				3,261.88	
Cash Inflows from Sales		1,250.00	1	1,250.00	
Net Year 3				-2,011.88	
Total Accumulated Net Returns				(\$8,611.84)	

Table 5: Wine Grape Production Expenses-Year 4

<u>Operation</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Units Per Acre</u>	<u>Cost Per Acre</u>	<u>Your Estimate</u>
<u>Pruning and Training</u>					
Pruning/Training Labor	hrs.	8.00	40	320.00	
Tying Tape	rolls	1.00	2	2.00	
<u>Weed Control</u>					
Herbicide/Application	acre	40.00	1	40.00	
Weed Control Labor	hrs.	8.00	10	80.00	
<u>Fertilization</u>					
Leaf Sample	variety	50.00	1	50.00	
<u>Canopy Management</u>					
Shoot Thinning	hrs.	8.00	14	112.00	
Shoot Positioning & Tying	hrs.	8.00	12	96.00	
Suckering	hrs.	8.00	4	32.00	
Cluster Thinning	hrs.	8.00	2	16.00	
Tying Tape	rolls	1.00	2	2.00	
<u>Birdnetting</u>					
Installation/Removal	hrs.	8.00	27	216.00	
Tractor Labor	hrs.	9.00	9	81.00	
<u>Fungicides</u>					
Sulfur	acre	4.00	3	12.00	
Sterile Inhibitor	acre	12.00	3	36.00	
<u>Harvest</u>					
Picking Labor	ton	128.00	2.5	320.00	
<u>Machinery (operating)</u>					
Fuel & Lubrication	acre	50.00	1	50.00	
Repairs & Maintenance	acre	30.00	1	30.00	
<u>Irrigation Expense</u>	acre	270.00	1	270.00	
<u>Miscellaneous Expenses</u>	acre	200.00	1	200.00	
<u>Operating Interest</u>					
1/2 Year 4 Expenses	dol.	0.09	982.50	88.43	
Int. on accrued expenses	dol.	0.09	8,611.84	775.07	

Total Year 4: Production Expenses				2,828.49	
Cash Inflows from Sales		1,250.00	2.5	3,125.00	
Net Year 4				296.51	
Total Accumulated Net Returns				(\$8,315.33)	

Table 6: Wine Grape Production Expenses-Year 5

<u>Operation</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Units Per Acre</u>	<u>Cost Per Acre</u>	<u>Your Estimate</u>
<u>Pruning and Training</u>					
Tying Tape	rolls	1.00	2	2.00	
Pruning/Training Labor	hrs.	8.00	40	320.00	
<u>Weed Control</u>					
Herbicide/Application	acre	40.00	1	40.00	
Weed Control Labor	hrs.	8.00	10	80.00	
<u>Fertilization</u>					
Leaf Sample	variety	50.00	1	50.00	
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	
<u>Birdnetting</u>					
Installation/Removal	hrs.	8.00	27	216.00	
Tractor Labor	hrs.	9.00	9	81.00	
<u>Fungicides</u>					
Sulfur	acre	4.00	3	12.00	
Sterile Inhibitor	acre	12.00	3	36.00	
<u>Harvest</u>					
Picking Labor	ton	128.00	4	512.00	
<u>Machinery (operating)</u>					
Fuel & Lubrication	acre	50.00	1	50.00	
Repairs & Maintenance	acre	30.00	1	30.00	
<u>Irrigation Expense</u>	acre	270.00	1	270.00	
<u>Miscellaneous Expense</u>	acre	200.00	1	200.00	
<u>Operating Interest</u>					
1/2 Year 5 Expenses	dol.	0.09	1078.50	97.07	
Int. on accrued expenses	dol.	0.09	8315.33	748.38	

Total Year 5: Production Expenses				3,002.44	
Cash Inflows from Sales	1,250.00		4	5,000.00	
Net Year 5				1,997.56	
Total Accumulated Net Returns				(\$6,317.78)	

Table 7: Wine Grape Production Expenses-Year 6

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate																								
<u>Pruning and Training</u>																													
Tying Tape	rolls	1.00	2	2.00																									
Pruning/Training Labor	hrs.	8.00	40	320.00																									
<u>Weed Control</u>																													
Herbicide/Application	acre	40.00	1	40.00																									
Weed Control Labor	hrs.	8.00	10	80.00																									
<u>Fertilization</u>																													
Leaf Sample	variety	50.00	1	50.00																									
<u>Canopy Management</u>																													
Canopy Work	acre	258.00	1	258.00																									
<u>Birdnetting</u>																													
Installation/Removal	hrs.	8.00	27	216.00																									
Tractor Labor	hrs.	9.00	9	81.00																									
<u>Fungicides</u>																													
Sulfur	acre	4.00	3	12.00																									
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<u>Harvest</u>																													
Picking Labor	ton	128.00	4	512.00																									
<u>Machinery (operating)</u>																													
Fuel & Lubrication	acre	50.00	1	50.00																									
Repairs & Maintenance	acre	30.00	1	30.00																									
<u>Irrigation Expense</u>	acre	270.00	1	270.00																									
<u>Miscellaneous Expense</u>	acre	200.00	1	200.00																									
<u>Operating Interest</u>																													
1/2 Year 6 Expenses	dol.	0.09	1078.50	97.07																									
Int. on accrued expenses	dol.	0.09	6317.78	568.60																									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Total Year 6: Production Expenses</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,822.67</td> <td></td> </tr> <tr> <td>Cash Inflows from Sales</td> <td></td> <td style="text-align: right;">1,250.00</td> <td style="text-align: center;">4</td> <td style="text-align: right;">5,000.00</td> <td></td> </tr> <tr> <td>Net Year 6</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,177.33</td> <td></td> </tr> <tr> <td>Total Accumulated Net Returns</td> <td></td> <td></td> <td></td> <td style="text-align: right;">(\$4,140.44)</td> <td></td> </tr> </table>						Total Year 6: Production Expenses				2,822.67		Cash Inflows from Sales		1,250.00	4	5,000.00		Net Year 6				2,177.33		Total Accumulated Net Returns				(\$4,140.44)	
Total Year 6: Production Expenses				2,822.67																									
Cash Inflows from Sales		1,250.00	4	5,000.00																									
Net Year 6				2,177.33																									
Total Accumulated Net Returns				(\$4,140.44)																									

Table 8: Wine Grape Production Expenses-Year 7

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate																								
<u>Pruning and Training</u>																													
Tying Tape	rolls	1.00	2	2.00																									
Pruning/Training Labor	hrs.	8.00	40	320.00																									
<u>Weed Control</u>																													
Herbicide/Application	acre	40.00	1	40.00																									
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<u>Operating Interest</u>																													
1/2 Year 7 Expenses	dol.	0.09	1078.50	97.07																									
Int. on accrued expenses	dol.	0.09	4140.44	372.64																									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Total Year 7: Production Expenses</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,626.70</td> <td></td> </tr> <tr> <td>Cash Inflows from Sales</td> <td></td> <td style="text-align: right;">1,250.00</td> <td style="text-align: right;">4</td> <td style="text-align: right;">5,000.00</td> <td></td> </tr> <tr> <td>Net Year 7</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,373.30</td> <td></td> </tr> <tr> <td>Total Accumulated Net Returns</td> <td></td> <td></td> <td></td> <td style="text-align: right;">(\$1,767.15)</td> <td></td> </tr> </table>						Total Year 7: Production Expenses				2,626.70		Cash Inflows from Sales		1,250.00	4	5,000.00		Net Year 7				2,373.30		Total Accumulated Net Returns				(\$1,767.15)	
Total Year 7: Production Expenses				2,626.70																									
Cash Inflows from Sales		1,250.00	4	5,000.00																									
Net Year 7				2,373.30																									
Total Accumulated Net Returns				(\$1,767.15)																									

Table 9: Wine Grape Production Expenses-Year 8

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate																								
<u>Pruning and Training</u>																													
Tying Tape	rolls	1.00	2	2.00																									
Pruning/Training Labor	hrs.	8.00	40	320.00																									
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<u>Harvest</u>																													
Picking Labor	ton	128.00	4	512.00																									
<u>Machinery (operating)</u>																													
Fuel & Lubrication	acre	50.00	1	50.00																									
Repairs & Maintenance	acre	30.00	1	30.00																									
<u>Irrigation Expense</u>	acre	270.00	1	270.00																									
<u>Miscellaneous Expense</u>	acre	200.00	1	200.00																									
<u>Operating Interest</u>																													
1/2 Year 8 Expenses	dol.	0.09	1078.50	97.07																									
Int. on accrued expenses	dol.	0.09	1767.15	159.04																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Total Year 8: Production Expenses</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,413.11</td> <td></td> </tr> <tr> <td>Cash Inflows from Sales</td> <td></td> <td style="text-align: right;">1,250.00</td> <td style="text-align: right;">4</td> <td style="text-align: right;">5,000.00</td> <td></td> </tr> <tr> <td>Net Year 8</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2,586.89</td> <td></td> </tr> <tr> <td>Total Accumulated Net Returns</td> <td></td> <td></td> <td></td> <td style="text-align: right;">\$819.74</td> <td></td> </tr> </table>						Total Year 8: Production Expenses				2,413.11		Cash Inflows from Sales		1,250.00	4	5,000.00		Net Year 8				2,586.89		Total Accumulated Net Returns				\$819.74	
Total Year 8: Production Expenses				2,413.11																									
Cash Inflows from Sales		1,250.00	4	5,000.00																									
Net Year 8				2,586.89																									
Total Accumulated Net Returns				\$819.74																									

Table 10: Wine Grape Production Expenses-Years 9

<u>Operation</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Units Per Acre</u>	<u>Cost Per Acre</u>	<u>Your Estimate</u>																		
<u>Pruning and Training</u>																							
Tying Tape	rolls	1.00	2	2.00																			
Pruning/Training Labor	hrs.	8.00	40	320.00																			
<u>Weed Control</u>																							
Herbicide/Application	acre	40.00	1	40.00																			
Weed Control Labor	hrs.	8.00	10	80.00																			
<u>Fertilization</u>																							
Leaf Sample	acre	50.00	1	50.00																			
<u>Canopy Management</u>																							
Canopy Work	acre	258.00	1	258.00																			
<u>Birdnetting</u>																							
Installation/Removal	hrs.	8.00	27	216.00																			
Tractor Labor	hrs.	9.00	9	81.00																			
<u>Fungicides</u>																							
Sulfur	acre	4.00	3	12.00																			
Sterile Inhibitor	acre	12.00	3	36.00																			
<u>Harvest</u>																							
Picking Labor	ton	128.00	4	512.00																			
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<u>Miscellaneous Expense</u>	acre	200.00	1	200.00																			
<u>Operating Interest</u>																							
1/2 Year 9 Expenses	dol.	0.09	1078.50	97.07																			
<u>Interest on accrued exp.</u>	dol.	0.09	-819.74	-73.78																			
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Total Year 9: Production Expenses</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 30%; text-align: right;">2,180.29</td> </tr> <tr> <td>Cash Inflows from Sales</td> <td></td> <td style="text-align: right;">1,250.00</td> <td style="text-align: right;">4</td> <td></td> <td style="text-align: right;">5,000.00</td> </tr> <tr> <td>Net Year 9</td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: right;">\$2,819.71</td> </tr> </table>						Total Year 9: Production Expenses					2,180.29	Cash Inflows from Sales		1,250.00	4		5,000.00	Net Year 9					\$2,819.71
Total Year 9: Production Expenses					2,180.29																		
Cash Inflows from Sales		1,250.00	4		5,000.00																		
Net Year 9					\$2,819.71																		

Table 11: Wine Grape Production Expenses-Years 10-20

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Tying Tape	rolls	1.00	2	2.00	
Pruning/Training Labor	hrs.	8.00	40	320.00	
<u>Weed Control</u>					
Herbicide/Application	acre	40.00	1	40.00	
Weed Control Labor	hrs.	8.00	10	80.00	
<u>Fertilization</u>					
Leaf Sample	acre	50.00	1	50.00	
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	
<u>Birdnetting</u>					
Installation/Removal	hrs.	8.00	27	216.00	
Tractor Labor	hrs.	9.00	9	81.00	
<u>Fungicides</u>					
Sulfur	acre	4.00	3	12.00	
Sterile Inhibitor	acre	12.00	3	36.00	
<u>Harvest</u>					
Picking Labor	ton	128.00	4	512.00	
<u>Machinery (operating)</u>					
Fuel & Lubrication	acre	50.00	1	50.00	
Repairs & Maintenance	acre	30.00	1	30.00	
<u>Irrigation Expense</u>	acre	270.00	1	270.00	
<u>Miscellaneous Expense</u>	acre	200.00	1	200.00	
<u>Operating Interest</u>					
1/2 Years 10-20 Expenses	dol.	0.09	1078.50	97.07	

Total Years 10-20: Production Expenses				2,254.07	
Cash Inflows from Sales		1,250.00	4	5,000.00	
Net Years 10-20				\$2,745.94	

Profitability

Profitability Without Including Investment Costs

Wine grape production has potential to generate generous profits in western Colorado when properly managed. Figure 1 charts the annual sales, production costs and net returns per acre for a "representative" western Colorado vineyard, not including equipment or other fixed ownership costs. Sales are zero for the first year while the grapevine is getting established. The vineyard should produce a small crop in year 2 (1/2-ton per acre) and increase every year for years 3 through 5 (1 ton, 2.5 tons and 4 tons per acre, respectively). A 4-ton yield was assumed to be maintained for years 6 through 20. There are many factors (environmental, cultural, pest management, varieties, etc.) that can cause yield variation. Realistic estimates of yield and market prices are important factors to consider before investing in a wine grape enterprise.

Including the Cost of Establishment and Land

Establishment cost is an investment that takes time to pay off. Annual production is profitable starting in year 4. However, it takes four more years to pay off the accumulated establishment costs. As shown in Table 12, accumulated returns are not positive until year 8. Over twenty years, each acre will accumulate returns of \$33,845, net of production expenses. The present value of this future income, discounted at a 9 percent rate, equals \$7,833. This amount is the maximum investment on top of establishment costs (land, equipment, etc.) this grape enterprise will support. In other words, if you pay \$8,636 per acre today for your land and equipment, you will be earning the same amount over twenty years as you would have by investing in stocks or bonds, for example, that earned 9 percent per year.

Profitability Including Equipment

The maximum investment of \$7,833 per acre has to cover land and equipment. Machinery and equipment ownership costs, including depreciation and interest are itemized in Table 1. These costs are fixed and do not change with the level of output. The total machinery purchase costs are estimated to be \$95,100. Over a twenty-year period, every piece of equipment except for the irrigation, shop tools, and miscellaneous equipment would have to be replaced once. Therefore, in ten years, another \$69,600 plus inflation will have to be spent. At a 4 percent real cost of money, \$47,019 must be set aside today to buy equipment in ten years. Total equipment cost for a twenty-year vineyard in today's dollars is therefore \$142,119 (95,100 + 47,019).

Even though profits look healthy, a small acreage would have difficulty making money. As shown in Table 12, a two-acre vineyard would lose \$63,226 per acre if they purchased the full equipment set we describe in Table 1, before even counting land purchase or preparation costs. That is, someone would have to give you the land and over \$63,000 per acre to make production profitable. There simply are not enough acres to effectively divide the equipment costs over. A ten-acre vineyard spends the same on fixed costs but less per acre because he divides it over ten acres instead of two. With ten acres, a producer still cannot afford to pay for land and land preparation because he is losing \$6,379 per acre. However, a producer with twenty acres can afford to pay only \$727. Figure 2 illustrates net returns by vineyard size with and without equipment costs.

Figure 1: Estimated Sales, Annual Costs, and Net Returns For Wine Grape Vineyard, Western Colorado

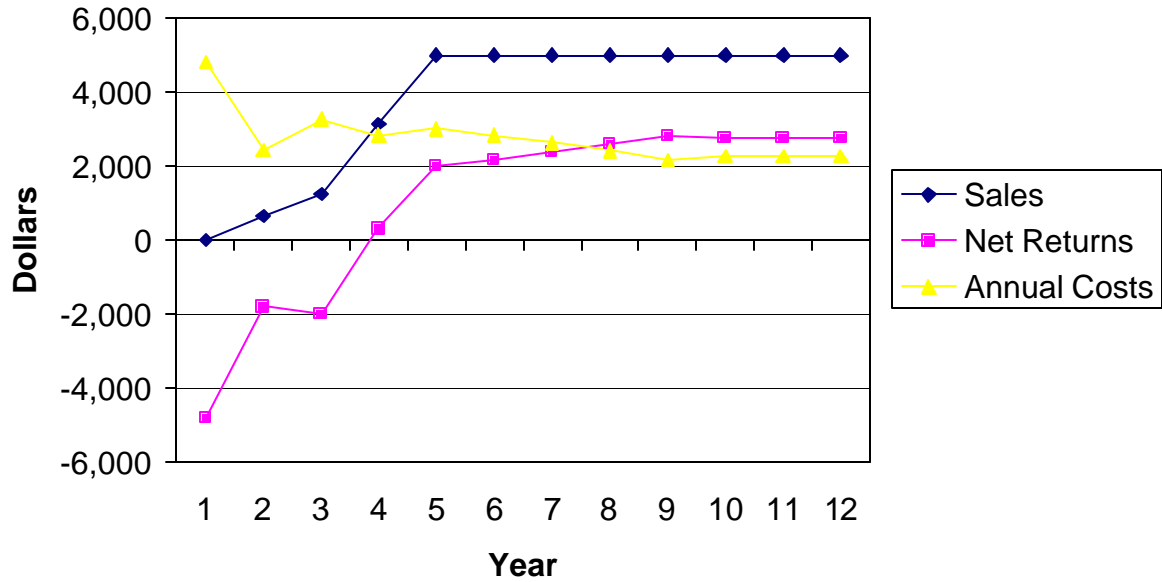


Figure 2: Per-Acre Net Returns by Vineyard Size, With and Without Equipment Costs, Western Colorado

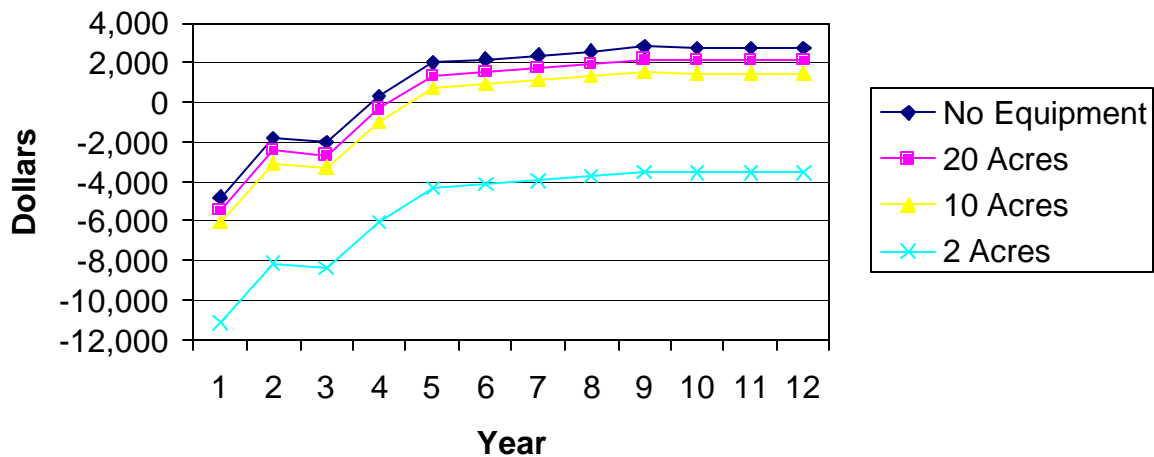


Table 12: Grape Profitability and Price Sensitivity

Year	Production Expenses	Grape Yield (tons/acre)	Price: \$1,250.00per ton			Price: \$1,050.00per ton			Price: \$1,450.00per ton		
			Gross Returns	Net Returns	Accumulated Returns	Gross Return	Net Return	Accumulated Returns	Gross Return	Net Return	Accumulated Returns
1	\$4,799	0.0	\$0	-\$4,799	-\$4,799	\$0	-\$4,799	-\$4,799	\$0.00	-\$4,799	-\$4,799
2	2,426	0.5	625	-1,801	-6,600	525	-1,901	-6,700	725	-1,701	-6,500
3	3,262	1.0	1,250	-2,012	-8,612	1,050	-2,212	-8,912	1,450	-1,812	-8,312
4	2,828	2.5	3,125	297	-8,315	2,625	-203	-9,115	3,625	797	-7,515
5	3,002	4.0	5,000	1,998	-6,318	4,200	1,198	-7,918	5,800	2,798	-4,718
6	2,823	4.0	5,000	2,177	-4,140	4,200	1,377	-6,540	5,800	2,977	-1,740
7	2,627	4.0	5,000	2,373	-1,767	4,200	1,573	-4,967	5,800	3,173	1,433
8	2,413	4.0	5,000	2,587	820	4,200	1,787	-3,180	5,800	3,387	4,820
9	2,180	4.0	5,000	2,820	3,639	4,200	2,020	-1,161	5,800	3,620	8,439
10	2,254	4.0	5,000	2,746	6,385	4,200	1,946	785	5,800	3,546	11,985
11	2,254	4.0	5,000	2,746	9,131	4,200	1,946	2,731	5,800	3,546	15,531
12	2,254	4.0	5,000	2,746	11,877	4,200	1,946	4,677	5,800	3,546	19,077
13	2,254	4.0	5,000	2,746	14,623	4,200	1,946	6,623	5,800	3,546	22,623
14	2,254	4.0	5,000	2,746	17,369	4,200	1,946	8,569	5,800	3,546	26,169
15	2,254	4.0	5,000	2,746	20,115	4,200	1,946	10,515	5,800	3,546	29,715
16	2,254	4.0	5,000	2,746	22,861	4,200	1,946	12,461	5,800	3,546	33,261
17	2,254	4.0	5,000	2,746	25,607	4,200	1,946	14,407	5,800	3,546	36,807
18	2,254	4.0	5,000	2,746	28,353	4,200	1,946	16,353	5,800	3,546	40,353
19	2,254	4.0	5,000	2,746	31,099	4,200	1,946	18,299	5,800	3,546	43,899
20	2,254	4.0	5,000	2,746	33,845	4,200	1,946	20,245	5,800	3,546	47,445

Maximum Investment (\$/acre) \$7,833 \$2,529 \$13,137

Maximum Land Investment (\$/acre)

2 acre vineyard -\$63,226 -\$68,530 -\$57,923
10 acre vineyard -\$6,379 -\$11,683 -\$1,075
20 acre vineyard \$727 -\$4,577 \$6,031

Sensitivity of Results – Factors That Can Change These Results

The results in Table 12 are based on our estimates about what average production looks like in western Colorado. However, most producers are not average. Therefore, we varied some of our assumptions to examine how that could impact our results in a positive or negative direction. Carefully examine where your operation fits and where you can make changes to take full advantage of making your operation profitable.

Output Price

Vineyard profitability is highly affected by the price of grapes. As shown in Table 12, a 16 percent reduction in output price from \$1,250 to \$1,050 per ton reduced the investment return by over 60 percent (\$7,833 to \$2,529 per acre). An output price increase of 16 percent hikes income by over 60 percent. If prices go up to \$1,450 per ton, you could afford to pay up to \$6,031 per acre for a twenty-acre vineyard. If for some reason prices fall to \$1,050 per ton, you cannot make money on a twenty-acre vineyard, while holding our other assumptions constant.

Output price may go up on its own. However, it may benefit you to be more proactive by seeking a more secure solution. One way to do this is to find a niche market that pays higher prices for your grapes, such as organic or market to your own winery.

Equipment Costs

As demonstrated above, equipment costs can make or break a vineyard. In this example, it is assumed that a full complement of machinery is purchased and owned. For smaller acreages, it may be beneficial to hire custom operators to perform custom machine operations instead of owning every piece of equipment. Alternatively, equipment costs will be reduced if your equipment is used for other purposes or shared with someone else. You can afford to pay \$7,833 per acre for land, or \$13,137 with high prices, before accounting for equipment costs. You can determine how much you can afford for equipment by subtracting the land price from these amounts. In our example, you spend \$142,119 in today's dollars for an equipment complement that will last for the next twenty years, counting replacing some pieces. Dividing by 20 acres costs you about \$7,100 per year. If you could set up a cooperative or share the costs with someone else that had 20 acres, for example, your costs would fall to about \$3,500 per acre. If you only had 5 acres, you could cooperatively purchase the equipment with producers that grow on another 35 total acres, and you also would be spending only \$3,500 per acre. Of course the logistics for cooperating or renting equipment would be difficult to overcome, but the economic incentives for doing so are very strong.

Production Yields and Costs

Our results are highly influenced by our assumptions about your costs of production and yields. Many people get higher yields than 4 tons per acre or have lower costs of production. Therefore, we looked at how much you could afford to invest for land and land preparation if you have higher yields, lower costs or both. Our higher yield assumption assumes that you could get a 25 percent higher yield (5 tons per acre) on a regular basis. This is not uncommon in western Colorado with good management and varieties. Low cost assumes that you could reduce costs by 10 percent.

Finally, we provide the results for a producer that gets higher yields and lower costs. This is the most unlikely scenario since higher yields usually mean higher costs.

As shown in Table 13, even the best of conditions do not produce enough returns to purchase land in many of our quality production areas if you only have ten acres—although it helps a lot. However, if you have twenty acres, you probably produce enough income to purchase high quality land and make a return. The picture would improve further if you received higher prices or lowered your equipment costs as described earlier.

Table 13: Maximum Land Investment

	10 Acre <u>Vineyard</u>	20 Acre <u>Vineyard</u>
Average (Typical) Management	-\$6,379	\$ 727
Low Cost (Reduced 10%)	-\$3,847	\$3,259
High Yield (Increased 25%)	\$1,909	\$9,014
Low Cost/High Yield	\$4,440	\$11,546

Catastrophic Event

Historically, the wine growing regions of Colorado experience a catastrophic freeze episode (-20°F or lower) about once every twenty years. Just for example, we calculated the economic effect of a catastrophic freeze event in year 6 in the life of the vineyard. The loss is two fold. First, a complete freeze out in year 6 will require another two more years before accumulated returns will turn positive. This means that accumulated return on your establishment and production costs will not be positive until year ten. Second, the total accumulated return for the 20-year life will be approximately \$3,000 per acre less. You can only afford to pay \$4,852 per acre for land in a twenty-acre vineyard, compared to \$7,833 without the catastrophic loss. The extra cost of retraining winter-injured vines is not included.

Conclusions

Colorado has tremendous potential to make money with wine vineyards. However, high land prices and equipment costs make it unlikely to be profitable on small acreages. Of course, not everyone is in the business to make money. But, for those who are, careful land selection, skilled management, and size are important. For smaller growers, vineyards can be made more profitable by reducing equipment costs and land costs. Sharing equipment with other enterprises or neighbors, renting, or buying used can reduce equipment costs. Using your land for other purposes, such as your home, tourism, bed and breakfast or other crops may reduce land prices.