

THE COST OF GROWING WINE GRAPES IN WESTERN COLORADO

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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 three decades have seen a dramatic expansion. Since 1990, vineyard acreage has increased from 240 acres to about 1,000 acres and licensed wineries have increased from five to ninety-six.

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 can be used for comparison purposes. 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 the analysis. These operations, if required, should be factored into the 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, vineyard producers must use sound production practices. A good producer will select the best site possible and manage the vines to encourage strong production. 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. However, the average in the state of Colorado is 2.5 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 market price for grapes is an important factor of profitability. The price received for the wine grapes in this analysis is assumed to be \$1,300 per ton. The market price for grapes may be more or less depending on variety and year-to-year volatility in markets. It may also be less important for a vineyard to make money if the specialized grape variety is grown to produce a profitable wine. For example, the crop level (shoot and cluster thinning) may be modified to enhance berry composition for a unique wine style.

Fourth, the levels of capital expenditures, including land and equipment costs, are important in determining the financial success of producing grapes. 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 ‘Syrah’ 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 a 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. We are assuming a 20 acre vineyard planted to 4 different varieties of 5 acres each.

Labor

The wage rates for labor are the net cost to growers. Unskilled labor is valued at \$10.00



per hour (\$8.00 wage rate plus \$2.00 per hour payroll expenses). Skilled labor is valued at \$12.00 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 \$1.80 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 driver. 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, 2 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 2008-2009 price, \$1,300 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 a mix of new or near new used equipment. 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: 6.00 percent Acreage Capacity: 20 acres							
<u>Machine</u>	<u>Purchase</u>	<u>Salvage</u>	<u>Useful</u>	<u>Annual</u>	<u>Annual Cost Per Acre</u>		
	<u>Price</u>	<u>Value</u>	<u>Life</u>	<u>Cost</u>	<u>2-acres</u>	<u>10-acres</u>	<u>20-acres</u>
Tractor (30 hp w/attachments)	15,000	1,500	10	1,845	923	185	92
Truck	20,000	2,000	10	4,000	2,000	400	200
Sprayer Equipment	6,200	620	10	558	279	56	28
Weed Sprayer	1,000	100	10	90	45	9	5
Disc	1,200	120	10	108	54	11	5
Grape Hoe	4,800	480	10	432	216	43	22
Flail Chopper	7,500	750	10	675	338	68	34
Auger	1,500	150	10	135	68	14	7
Harrow	1,200	120	10	108	54	11	5
Bird Netting Equipment	7,500	750	10	675	338	68	34
Irrigation Equipment	20,000	2,000	20	900	450	90	45
Trailer	1,000	100	10	90	45	9	5
Shop Tools	2,500	250	20	113	56	11	6
Other Misc. Equipment	3,000	300	20	135	68	14	7
Total Machinery Investment	\$92,400			\$9,864	\$4,932	\$986	\$493

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 \$6,385.79 per acre.

Tables 3 through 11 show production expenses and cash inflows for the transition period (years 2 through 10) 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 10 the vineyard begins generating a positive accumulated cash flow.

Table 12 represents production expenses and cash sales for maintenance years, 11 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

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Site Preparation</u>					
Deep Ripping (custom)	acre	150.00	1	150.00	_____
MB Plow (labor)	hrs.	12.00	1.5	18.00	_____
Disc (labor)	hrs.	12.00	1.25	15.00	_____
Float (custom)	acre	15.00	1	15.00	_____
Soil Sample	samples	28	3	84.00	_____
Pre-Plant Weed Control	sprays	40.00	2	80.00	_____
<u>Vineyard Layout and Planting</u>					
Vine/Post Locations (labor)	hrs.	10.00	15	150.00	_____
Grapevines	vines	1.80	968	1742.40	_____
Trimming and Planting Labor	hrs.	10.00	60	600.00	_____
<u>Trellis</u>					
Line Posts (4" x 8')	posts	7.00	155	1085.00	_____
End Posts (4" x 10')	posts	12.00	54	648.00	_____
Wire (12.5 gaHT, 3,825' rolls)	rolls	72.50	1.3	94.25	_____
Wire (14.0 gaHT, 5,858' rolls)	rolls	72.50	5.0	362.50	_____
Stakes & Clips	stakes	0.12	968	116.16	_____
Trellis Labor	hrs.	10.00	40	400.00	_____
Post Driving	posts	2.55	191	487.05	_____
Staples	50 lb. box	28	1	28.00	_____
<u>Fungicides and Insecticides</u>					
Fungicides	acre	22.22	2	44.44	_____
<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 Year 1 Expenses	dol.	0.06	3,100	185.99	_____
Total Year 1 Establishment/Production Expenses				\$6,385.79	_____
Cash Inflows From Sales				\$0.00	_____
Net - Year 1				-\$6,385.79	_____



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 and Training Labor	hours	10.00	75	750.00	_____
Tying Material	rolls	1.20	17	20.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	25	250.00	_____
<u>Replanting</u>					
Grapevines (2%)	vines	1.80	20	36.00	_____
Trim & Planting	hrs.	10.00	2	20.00	_____
<u>Canopy Management</u>					
Shoot and Cluster Removal	hrs.	10	30	300.00	_____
Tying Material	dol.	1.20	20	24.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68	2	136.00	_____
Application	hrs.	10	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & 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.	10.00	20	200.00	_____
<u>Harvest Expense</u>					
Picking Labor	acre	150.00	0	0.00	_____
<u>Miscellaneous Expenses</u>					
	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Year 2 Expenses	dol.	0.06	1,075.70	64.54	_____
Interest on Year 1 Accrued Expenses	dol.	0.06	6,385.79	383.15	_____
Total Year 2 Production Expenses				\$2,599.09	_____
CASH INFLOWS FROM SALES		1,300	0	\$0.00	_____
Net - Year 2				-\$2,599.09	_____
TOTAL ACCUMULATED NET RETURNS				-\$8,984.88	_____



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>					
Pruning and Training Labor	hours	10.00	40	400.00	_____
Tying Material	rolls	1.20	2	2.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	20	200.00	_____
<u>Fertilization</u>					
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____
<u>Canopy Management</u>					
Shoot Thinning	hrs.	10.00	14	140.00	_____
Shoot Positioning & Tying	hrs.	10.00	12	120.00	_____
Suckering	hrs.	10.00	4	40.00	_____
Cluster Thinning	hrs.	10.00	2	20.00	_____
Tying Tape	rolls	1.20	2	2.40	_____
				0.00	_____
<u>Birdnetting</u>					
Netting	roll	420.00	5	2100.00	_____
Installation/Removal	hrs.	10.00	18	180.00	_____
Tractor Labor	hrs.	12.00	9	108.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68	2	136.00	_____
Application	hrs.	10	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & Lubrication	acre	25.00	1	25.00	_____
Repairs and Maintenance	acre	50.00	1	50.00	_____
<u>Irrigation Expenses</u>					
	acre	290.00	1	290.00	_____
<u>Harvest Expense</u>					
Picking Labor	ton	150.00	2.5	375.00	_____
<u>Miscellaneous Expenses</u>					
	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Year 3 Expenses	dol.	0.06	2,223.40	133.40	_____
Interest on Accrued Expenses	dol.	0.06	8,984.88	539.09	_____
Total Year 3 Production Expenses				\$5,119.30	_____
CASH INFLOWS FROM SALES		1,300	2.5	\$3,250.00	_____
Net - Year 3				-\$1,869.30	_____
TOTAL ACCUMULATED NET RETURNS				-\$10,854.18	_____

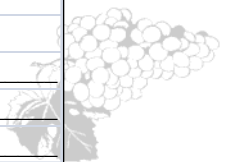


Table 5: Wine Grape Production Expenses - Year 4						
Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate	
<u>Pruning and Training</u>						
Pruning and Training Labor	hours	10.00	40	400.00	_____	
Tying Material	rolls	1.20	2	2.40	_____	
<u>Weed Control</u>						
Herbicides and Application	acre	15.00	2	30.00	_____	
Weed Control Labor	hrs.	10.00	20	200.00	_____	
<u>Fertilization</u>						
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____	
<u>Canopy Management</u>						
Shoot Thinning	hrs.	10.00	14	140.00	_____	
Shoot Positioning & Tying	hrs.	10.00	12	120.00	_____	
Suckering	hrs.	10.00	4	40.00	_____	
Cluster Thinning	hrs.	10.00	2	20.00	_____	
Tying Tape	rolls	1.20	2	2.40	_____	
				0.00	_____	
<u>Birdnetting</u>						
Installation/Removal	hrs.	10.00	18	180.00	_____	
Tractor Labor	hrs.	12.00	9	108.00	_____	
<u>Fungicide and Insecticides</u>						
Fungicides	acre	68.00	2	136.00	_____	
Application	hrs.	10.00	2	20.00	_____	
<u>Machinery (Operating)</u>						
Fuel & Lubrication	acre	25.00	1	25.00	_____	
Repairs and Maintenance	acre	50.00	1	50.00	_____	
<u>Irrigation Expenses</u>						
	acre	290.00	1	290.00	_____	
<u>Harvest Expense</u>						
Picking Labor	ton	150.00	3	450.00	_____	
<u>Miscellaneous Expenses</u>						
	acre	200.00	1	200.00	_____	
<u>Operating Interest</u>						
1/2 Year 4 Expenses	dol.	0.06	1,210.90	72.65	_____	
Interest on Accrued Expenses	dol.	0.06	10,854.18	651.25	_____	
Total Year 4 Production Expenses				\$3,145.70	_____	
CASH INFLOWS FROM SALES				1,300	3.0	
Net - Year 4				\$754.30	_____	
TOTAL ACCUMULATED NET RETURNS				-\$10,099.89	_____	

Table 6: Wine Grape Production Expenses - Year 5						
Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate	
<u>Pruning and Training</u>						
Pruning and Training Labor	hours	10.00	40	400.00	_____	
Tying Material	rolls	1.20	2	2.40	_____	
<u>Weed Control</u>						
Herbicides and Application	acre	15.00	2	30.00	_____	
Weed Control Labor	hrs.	10.00	20	200.00	_____	
<u>Fertilization</u>						
Leaf Sample (includes labor)	variety	35.00	0.2	7.00	_____	
<u>Canopy Management</u>						
Canopy Work	acre	258.00	1	258.00	_____	
				0.00	_____	
<u>Birdnetting</u>						
Installation/Removal	hrs.	10.00	18	180.00	_____	
Tractor Labor	hrs.	12.00	9	108.00	_____	
<u>Fungicide and Insecticides</u>						
Fungicides	acre	68.00	2	136.00	_____	
Application	hrs.	10.00	2	20.00	_____	
<u>Machinery (Operating)</u>						
Fuel & Lubrication	acre	25.00	1	25.00	_____	
Repairs and Maintenance	acre	50.00	1	50.00	_____	
<u>Irrigation Expenses</u>						
	acre	290.00	1	290.00	_____	
<u>Harvest Expense</u>						
Picking Labor	ton	150.00	4	600.00	_____	
<u>Miscellaneous Expenses</u>						
	acre	200.00	1	200.00	_____	
<u>Operating Interest</u>						
1/2 Year 5 Expenses	dol.	0.06	1,253.20	75.19	_____	
Interest on Accrued Expenses	dol.	0.06	10,099.89	605.99	_____	
Total Year 5 Production Expenses				\$3,187.59	_____	
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____	
Net - Year 5				\$2,012.41	_____	
TOTAL ACCUMULATED NET RETURNS				-\$8,087.47	_____	



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>						
Pruning and Training Labor	hours	10.00	40	400.00	_____	
Tying Material	rolls	1.20	2	2.40	_____	
<u>Weed Control</u>						
Herbicides and Application	acre	15.00	2	30.00	_____	
Weed Control Labor	hrs.	10.00	20	200.00	_____	
<u>Fertilization</u>						
Leaf Sample (includes labor)	variety	35.00	0.2	7.00	_____	
<u>Canopy Management</u>						
Canopy Work	acre	258.00	1	258.00	_____	
				0.00	_____	
<u>Birdnetting</u>						
Installation/Removal	hrs.	10.00	18	180.00	_____	
Tractor Labor	hrs.	12.00	9	108.00	_____	
<u>Fungicide and Insecticides</u>						
Fungicides	acre	68.00	2	136.00	_____	
Application	hrs.	10.00	2	20.00	_____	
<u>Machinery (Operating)</u>						
Fuel & Lubrication	acre	25.00	1	25.00	_____	
Repairs and Maintenance	acre	50.00	1	50.00	_____	
<u>Irrigation Expenses</u>						
	acre	290.00	1	290.00	_____	
<u>Harvest Expense</u>						
Picking Labor	ton	150.00	4	600.00	_____	
<u>Miscellaneous Expenses</u>						
	acre	200.00	1	200.00	_____	
<u>Operating Interest</u>						
1/2 Year 6 Expenses	dol.	0.06	1,253.20	75.19	_____	
Interest on Accrued Expenses	dol.	0.06	8,087.47	485.25	_____	
Total Year 6 Production Expenses				\$3,066.84	_____	
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____	
Net - Year 6				\$2,133.16	_____	
TOTAL ACCUMULATED NET RETURNS				-\$5,954.31	_____	



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>						
Pruning and Training Labor	hours	10.00	40	400.00	_____	
Tying Material	rolls	1.20	2	2.40	_____	
<u>Weed Control</u>						
Herbicides and Application	acre	15.00	2	30.00	_____	
Weed Control Labor	hrs.	10.00	20	200.00	_____	
<u>Fertilization</u>						
Leaf Sample (includes labor)	variety	35.00	0.2	7.00	_____	
<u>Canopy Management</u>						
Canopy Work	acre	258.00	1	258.00	_____	
				0.00	_____	
<u>Birdnetting</u>						
Installation/Removal	hrs.	10.00	18	180.00	_____	
Tractor Labor	hrs.	12.00	9	108.00	_____	
<u>Fungicide and Insecticides</u>						
Fungicides	acre	68.00	2	136.00	_____	
Application	hrs.	10.00	2	20.00	_____	
<u>Machinery (Operating)</u>						
Fuel & Lubrication	acre	25.00	1	25.00	_____	
Repairs and Maintenance	acre	50.00	1	50.00	_____	
<u>Irrigation Expenses</u>						
	acre	290.00	1	290.00	_____	
<u>Harvest Expense</u>						
Picking Labor	ton	150.00	4	600.00	_____	
<u>Miscellaneous Expenses</u>						
	acre	200.00	1	200.00	_____	
<u>Operating Interest</u>						
1/2 Year 7 Expenses	dol.	0.06	1,253.20	75.19	_____	
Interest on Accrued Expenses	dol.	0.06	5,954.31	357.26	_____	
Total Year 7 Production Expenses				\$2,938.85	_____	
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____	
Net - Year 7				\$2,261.15	_____	
TOTAL ACCUMULATED NET RETURNS				-\$3,693.16	_____	



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>					
Pruning and Training Labor	hours	10.00	40	400.00	_____
Tying Material	rolls	1.20	2	2.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	20	200.00	_____
<u>Fertilization</u>					
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	_____
				0.00	_____
<u>Birdnetting</u>					
Installation/Removal	hrs.	10.00	18	180.00	_____
Tractor Labor	hrs.	12.00	9	108.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68.00	2	136.00	_____
Application	hrs.	10.00	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & Lubrication	acre	25.00	1	25.00	_____
Repairs and Maintenance	acre	50.00	1	50.00	_____
<u>Irrigation Expenses</u>	acre	290.00	1	290.00	_____
<u>Harvest Expense</u>					
Picking Labor	ton	150.00	4	600.00	_____
<u>Miscellaneous Expenses</u>	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Year 8 Expenses	dol.	0.06	1,253.70	75.22	_____
Interest on Accrued Expenses	dol.	0.06	3,693.16	221.59	_____
Total Year 8 Production Expenses				\$2,804.21	_____
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____
Net - Year 8				\$2,395.79	_____
TOTAL ACCUMULATED NET RETURNS				-\$1,297.37	_____

Table 10: Wine Grape Production Expenses - Year 9

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Pruning and Training Labor	hours	10.00	40	400.00	_____
Tying Material	rolls	1.20	2	2.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	20	200.00	_____
<u>Fertilization</u>					
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	_____
				0.00	_____
<u>Birdnetting</u>					
Netting	roll	420.00	5	2100.00	_____
Installation/Removal	hrs.	10.00	18	180.00	_____
Tractor Labor	hrs.	12.00	9	108.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68.00	2	136.00	_____
Application	hrs.	10.00	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & Lubrication	acre	25.00	1	25.00	_____
Repairs and Maintenance	acre	50.00	1	50.00	_____
<u>Irrigation Expenses</u>	acre	290.00	1	290.00	_____
<u>Harvest Expense</u>					
Picking Labor	ton	150.00	4	600.00	_____
<u>Miscellaneous Expenses</u>	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Year 9 Expenses	dol.	0.06	2,303.70	138.22	_____
Interest on Accrued Expenses	dol.	0.06	1,297.37	77.84	_____
Total Year 9 Production Expenses				\$4,823.46	_____
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____
Net - Year 9				\$376.54	_____
TOTAL ACCUMULATED NET RETURNS				-\$920.84	_____



Table 11: Wine Grape Production Expenses - Year 10

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Pruning and Training Labor	hours	10.00	40	400.00	_____
Tying Material	rolls	1.20	2	2.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	20	200.00	_____
<u>Fertilization</u>					
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	_____
				0.00	_____
<u>Birdnetting</u>					
Installation/Removal	hrs.	10.00	18	180.00	_____
Tractor Labor	hrs.	12.00	9	108.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68.00	2	136.00	_____
Application	hrs.	10.00	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & Lubrication	acre	25.00	1	25.00	_____
Repairs and Maintenance	acre	50.00	1	50.00	_____
<u>Irrigation Expenses</u>	acre	290.00	1	290.00	_____
<u>Harvest Expense</u>					
Picking Labor	ton	150.00	4	600.00	_____
<u>Miscellaneous Expenses</u>	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Years 10 Expenses	dol.	0.06	1,253.70	75.22	_____
Interest on Accrued Expenses	dol.	0.06	920.84	55.25	_____
Total Years 10 Production Expenses				\$2,637.87	_____
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____
Net - Years 10				\$2,562.13	_____
TOTAL ACCUMULATED NET RETURNS				\$1,641.29	_____



Table 12: Wine Grape Production Expenses - Years 11-20

Operation	Units	Unit Cost	Units Per Acre	Cost Per Acre	Your Estimate
<u>Pruning and Training</u>					
Pruning and Training Labor	hours	10.00	40	400.00	_____
Tying Material	rolls	1.20	2	2.40	_____
<u>Weed Control</u>					
Herbicides and Application	acre	15.00	2	30.00	_____
Weed Control Labor	hrs.	10.00	20	200.00	_____
<u>Fertilization</u>					
Leaf Sample (includes labor)	variety	40.00	0.2	8.00	_____
<u>Canopy Management</u>					
Canopy Work	acre	258.00	1	258.00	_____
				0.00	_____
<u>Birdnetting</u>					
Installation/Removal	hrs.	10.00	18	180.00	_____
Tractor Labor	hrs.	12.00	9	108.00	_____
<u>Fungicide and Insecticides</u>					
Fungicides	acre	68.00	2	136.00	_____
Application	hrs.	10.00	2	20.00	_____
<u>Machinery (Operating)</u>					
Fuel & Lubrication	acre	25.00	1	25.00	_____
Repairs and Maintenance	acre	50.00	1	50.00	_____
<u>Irrigation Expenses</u>	acre	290.00	1	290.00	_____
<u>Harvest Expense</u>					
Picking Labor	ton	150.00	4	600.00	_____
<u>Miscellaneous Expenses</u>	acre	200.00	1	200.00	_____
<u>Operating Interest</u>					
1/2 Years 11-20 Expenses	dol.	0.06	1,253.70	75.22	_____
Total Years 11-29 Production Expenses				\$2,582.62	_____
CASH INFLOWS FROM SALES		1,300	4.0	\$5,200.00	_____
Net - Years 11-20				\$2,617.38	_____



Profitability

Profitability without Including Investment Costs

Wine grape production has the potential to generate 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 2 years while the grapevine is getting established. The vineyard should produce a small crop in year 3 (2.5 ton per acre) and increase every year for years 4 and 5 (3.0 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 six more years to pay off the accumulated establishment costs. As shown in Table 13, accumulated returns are not positive until year 10 for grape prices of \$1,300 per ton. Over twenty years, each acre will accumulate returns of \$105,732 net of production expenses. The present value of this future income, discounted at a 4 percent rate, equals \$13,586. 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 \$13,586 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 4 percent per year.

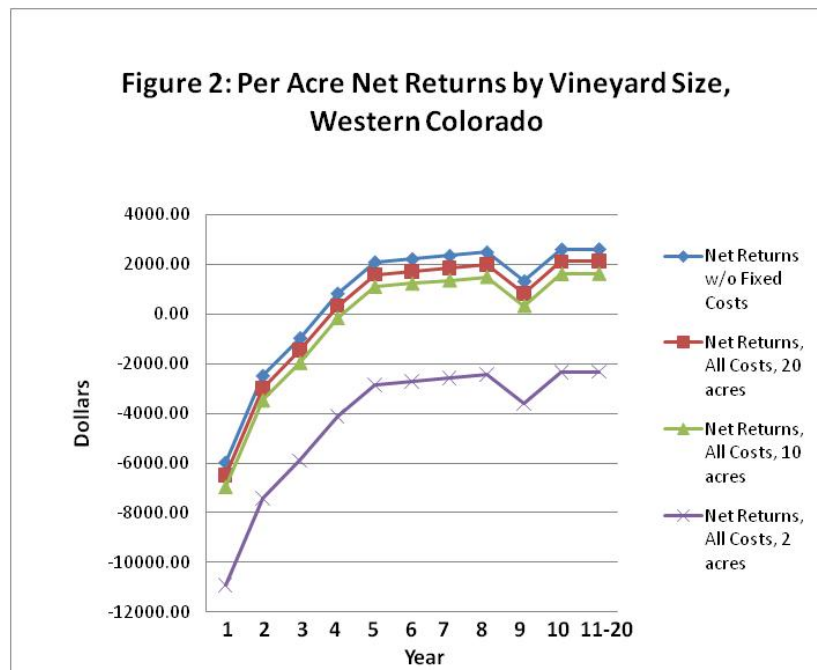
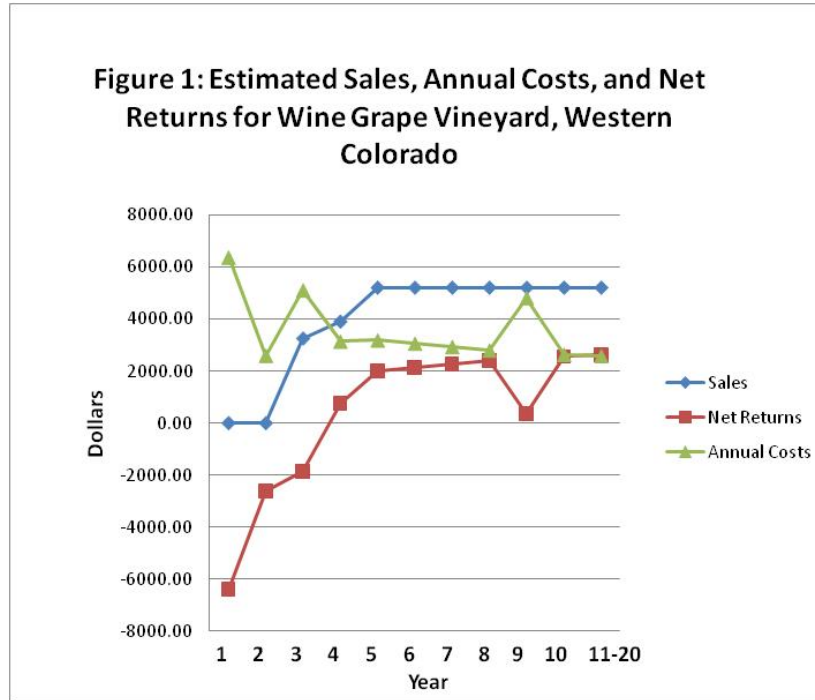
Profitability Including Equipment

The maximum investment of \$13,586 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 \$92,400. 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, after ten years, another \$66,900 plus inflation will have to be spent. At a 4 percent real cost of money, \$43,485 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 \$135,885 ($92,400 + \$43,485$).

Even though profits look healthy, a small acreage would have difficulty making money. As shown in Table 13, a two-acre vineyard would lose \$32,614 per acre if they purchased the full equipment set we describe in Table 1, before even counting land purchase costs. That is, someone would have to give you the land and nearly \$33,000 per acre to make production profitable. There simply are not enough acres to effectively divide the equipment costs. A ten-acre vineyard spends the same on fixed costs but less per acre



because the capital expenditures is divided over ten acres instead of two. With ten acres, a producer can pay up to \$4,346 for land and land preparation. A producer with twenty acres can afford to pay only \$8,966. Figure 2 illustrates net returns by vineyard size with and without equipment costs.



Sensitivity of Results – Factors That Can Change These Results

The results in Table 13 are based on 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 13, a \$150 per ton reduction in output price from \$1,300 to \$1,150 per ton reduced the investment return by nearly 50 percent (\$13,586 to \$6,891 per acre). If prices go up to \$1,450 per ton, the vineyard could afford to pay up to \$15,660 per acre for a twenty-acre vineyard.

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 acreage's, 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. Of course the logistics for cooperating or renting equipment would be difficult to overcome, but the economic incentives for doing so are very strong.



Table 13: Grape Profitability and Price Sensitivity

Year	Production Expenses	Grape Yield (tons/acre)	Price: \$1,150 per ton			Price: \$1,300 per ton			Price: \$1,450 per ton		
			Gross Returns	Net Returns	Accumulated Returns	Gross Returns	Net Returns	Accumulated Returns	Gross Returns	Net Returns	Accumulated Returns
1	6,386	0.0	0	-6,386	-6,386	0	-6,386	-6,386	0	-6,386	-6,386
2	2,599	0.0	0	-2,599	-8,985	0	-2,599	-8,985	0	-2,599	-8,985
3	5,119	2.5	2,875	-2,244	-11,229	3,250	-1,869	-10,854	3,625	-1,494	-10,479
4	3,146	3.0	3,450	304	-10,925	3,900	754	-10,100	4,350	1,204	-9,275
5	3,188	4.0	4,600	1,412	-9,512	5,200	2,012	-8,087	5,800	2,612	-6,662
6	3,067	4.0	4,600	1,533	-7,979	5,200	2,133	-5,954	5,800	2,733	-3,929
7	2,939	4.0	4,600	1,661	-6,318	5,200	2,261	-3,693	5,800	2,861	-1,068
8	2,804	4.0	4,600	1,796	-4,522	5,200	2,396	-1,297	5,800	2,996	1,928
9	4,823	4.0	4,600	-223	-4,746	5,200	377	-921	5,800	977	2,904
10	2,638	4.0	4,600	1,962	-2,784	5,200	2,562	1,641	5,800	3,162	6,066
11	2,583	4.0	4,600	2,017	-766	5,200	2,617	4,259	5,800	3,217	9,284
12	2,583	4.0	4,600	2,017	1,251	5,200	2,617	6,876	5,800	3,217	12,501
13	2,583	4.0	4,600	2,017	3,268	5,200	2,617	9,493	5,800	3,217	15,718
14	2,583	4.0	4,600	2,017	5,286	5,200	2,617	12,111	5,800	3,217	18,936
15	2,583	4.0	4,600	2,017	7,303	5,200	2,617	14,728	5,800	3,217	22,153
16	2,583	4.0	4,600	2,017	9,321	5,200	2,617	17,346	5,800	3,217	25,371
17	2,583	4.0	4,600	2,017	11,338	5,200	2,617	19,963	5,800	3,217	28,588
18	2,583	4.0	4,600	2,017	13,355	5,200	2,617	22,580	5,800	3,217	31,805
19	2,583	4.0	4,600	2,017	15,373	5,200	2,617	25,198	5,800	3,217	35,023
20	2,583	4.0	4,600	2,017	17,390	5,200	2,617	27,815	5,800	3,217	38,240
Total Accumulated Returns					\$9,732			\$105,732			\$201,732
Maximum Investment (\$/acre incl. mach./equip.)					\$6,891			\$13,586			\$20,280
Maximum Land Investment (\$/acre)											
2 acre vineyard						-\$39,309			-\$32,614		-\$25,920
10 acre vineyard						-\$2,349			\$4,346		\$11,040
20 acre vineyard						\$2,271			\$8,966		\$15,660



Catastrophic Event

Historically, the wine growing regions of Colorado experiences 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 2 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 twelve. Second, the total accumulated return for the 20-year life will be approximately \$4,110 per acre less. You can only afford to pay \$9,476 per acre for land and equipment in a twenty-acre vineyard, compared to \$13,586 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. However, 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.

