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Vineyards and Caucasus Hills in Kvareli, Kakheti Region

# GEORGIAN GRAPE PRODUCTION COST TEMPLATE

DETERMINING THE “TRUE” COST OF GRAPE PRODUCTION IN  
GEORGIA

**Contract No. AFP-I-00-04-00002-00, TO #03**

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Grapes", UC California Davis Cooperative Extension, 2004	

## **OVERVIEW OF THE TEMPLATE**

In an effort to identify the “true” cost of wine grape production in Georgia, 2020 Development Company LLC was contracted to produce a template (Attachment 1) which can be the starting point for calculating these costs.

The attached document takes a “Best Practices” document from University of California Extension and a spreadsheet developed for calculating grape production costs in California and adjusts the format and information to best fit the costs in Georgia. See Attachment 2, “Sample Costs to Establish a Vineyard and Produce Wine Grapes,” UC California Davis Cooperative Extension, 2004.

This document should be adjusted further to meet Georgian grape production practices. The document is produced in a manner which allows the individual completing the form to make adjustments to fit their practices and processes. When completed accurately, this document will provide a “ballpark” cost of grape production.

While completing this document, it is critical that “opportunity” costs be considered. For example, the owner needs to “pay” themselves for their work. If they don’t pay themselves they should at a minimum figure the opportunity costs and include a figure for what “wage” they would receive if they were doing other work. This should also be the case with the land costs being calculated at opportunity or lease value.

For this document to work effectively it should be coupled with a “best practices” document prepared in Georgia by the Department of Agriculture, or other agriculture extension type service. This document would outline the production techniques that are recommended for use in the various regions. When the spreadsheet is adjusted to reflect the variables in the best practices document, it will provide an accurate picture of what is the true cost of grape production in Georgia.

## **Links to bibliographic and reference citations**

Documents utilized in developing this spreadsheet:

[http://coststudies.ucdavis.edu/uploads/cost\\_return\\_articles/grapewinenc2004.pdf](http://coststudies.ucdavis.edu/uploads/cost_return_articles/grapewinenc2004.pdf)

# WINE GRAPE PRODUCTION COST TEMPLATE

## SPREADSHEET FOR USE TO CALCULATE THE COSTS TO ESTABLISH A VINEYARD AND PRODUCE WINE GRAPES

By answering specific questions about production costs this spreadsheet will help identify the true cost of production of wine grapes in Georgia

<b>QUESTIONS</b>	By filling in the blanks highlighted in yellow the spreadsheet will calculate the costs throughout this document.		
<b>CALCULATIONS</b>	By filling in the yellow highlighted portions of this spreadsheet you can calculate the cost of establishing a vineyard		
<b>All changes should be made on this page and the changes will be reflected in the spreadsheets that follow.</b>			
<b>Operational costs</b>	<p style="text-align: center;"><b>Questions</b></p> <p>What annual revenue would you get if you leased the land to others?</p> <p>What is the value of the buildings on the land</p> <p>What is the value of the irrigation equipment utilized for this calculation?</p> <p>What is the value of the equipment dedicated to this project?</p> <p>Building depreciated in how many years</p> <p>Irrigation depreciation in how many years</p> <p>Equipment depreciated in how many years</p> <p>Residual value of building</p> <p>Residual value of irrigation equipment</p> <p>Residual value of equipment</p> <p>Interest rate</p>	<p style="text-align: right;">\$5 000,00</p> <p style="text-align: right;">\$20 000,00</p> <p style="text-align: right;">\$10 000,00</p> <p style="text-align: right;">\$5 000,00</p> <p style="text-align: right;">20</p> <p style="text-align: right;">20</p> <p style="text-align: right;">10</p> <p style="text-align: right;">\$3 000,00</p> <p style="text-align: right;">\$1 000,00</p> <p style="text-align: right;">\$1 000,00</p> <p style="text-align: right;">7%</p>	
<b>Hourly wages</b>	<p>Total annual office expense</p> <p>Total annual insurance costs</p> <p>Manager annual salary</p> <p>Taxes per hectare</p> <p>What is the hourly wage for General Labor?*</p> <p>What is the hourly wage for Machinery Labor?</p> <p>How many hectares are used in this spreadsheet</p>	<p style="text-align: right;">\$5 000,00</p> <p style="text-align: right;">\$600,00</p> <p style="text-align: right;">\$20 000,00</p> <p style="text-align: right;">\$1 000,00</p> <p style="text-align: right;">\$10,00</p> <p style="text-align: right;">\$11,00</p> <p style="text-align: right;">30</p>	
<b>What is the estimated tons per hectare</b>	<p>Year 3</p> <p>Year 4</p> <p>Year 5</p>	<p style="text-align: right;">5,00</p> <p style="text-align: right;">9,00</p> <p style="text-align: right;">12,00</p>	

<b>What is the estimated sales price per MT of the grapes produced?</b>  <b>Estimated Costs - Preparing and planting</b>		\$ 2 000,00	
		<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>
	<b>Cleaning the land equipment cost per hectare</b>		
	Clearing the land - labor number of hours	5	3
	Cleaning the land equipment cost per hectare	100	
	Clearing the land	\$183,00	
	<b>Cover crop</b>		
	Discing and plowing cover crop labor per hectare /hrs	5	1
	Discing and plowing cover crop equipment cost per hectare	100	
	Discing and plowing cover crop	\$161,00	
	<b>Seeding the cover crop</b>		
	Seeding the cover crop labor /hrs	5	1
	Seeding the cover crop equipment cost per hectare	\$20,00	
	Seeding the cover crop supplies per hectare	\$10,00	
	Seeding the cover crop	\$91,00	
	<b>Mowing the cover crop</b>		
	Mowing the cover crop - labor per hectare /hrs	5	2
	Mowing the cover crop - equipment per hectare	\$10,00	
	Mowing the cover crop supplies per hectare	\$10,00	
	Mowing the cover crop	\$92,00	
	<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>	
<b>Cost of discing the cover crop</b>			
Discing the cover crop labor /hrs	5	2	
Discing the cover crop - equipment per hectare	\$10,00		
Discing the cover crop - supplies per hectare	\$10,00		
Cost of discing the cover crop	\$92,00		
<b>Weeding the row - pre-planting</b>			
Weeding the row - pre-planting - labor per hectare / hrs	5	1	
Weeding the row - pre-planting - equipment per hectare	\$10,00		
Weeding the row - pre-planting - materials per hectare	\$10,00		
Weeding the row - pre-planting (Roundup?)	\$81,00		
<b>Vines and planting</b>			
Vines to be planted per hectare	2242		
Cost of vines	\$2,00		
	<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>	

	<b>Digging and planting per vine</b>		
	Digging and planting per vine - labor /hrs	0,25	0,1
		\$	
	Digging and planting per vine - equipment/supplies per vine	0,25	
	Digging and planting per vine	\$3,85	
	Replant 2nd year to replace weak and dead vines	4%	
	<b>Unmound and install grow tubes per vine</b>		
	Unmound and install grow tubes labor per vine	0,25	0,1
	Unmound and install grow tubes - equipment/supplies per vine	\$0,25	
	Unmound and install grow tubes per vine	\$3,85	
	<b>Install Trellis system per hectare</b>		
	Install Trellis system per hectare labor /hrs	30	5
	Install Trellis system per hectare equipment	\$3 000,00	
	Install Trellis system per hectare supplies	\$2 000,00	
	Install Trellis system per hectare	\$5 355,00	
	Additional 1st year Operating Costs per hectare	\$200,00	
	Additional 2nd - 5th year Operating Costs per hectare	\$100,00	
	Additional Operating Costs per hectare all years	\$100,00	
		<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>
<b>Cultural Costs</b>			
	<b>Training first year shoots</b>		
	training first year shoots per hectare labor /hrs	3	1
		\$	
	training first year shoots per hectare supplies	10,00	
	Training first year shoots	\$51,00	
	<b>Training subsequent year shoots</b>		
	Training subsequent year shoots per hectare labor hrs	10	1
	Training subsequent year shoots per hectare supplies and equipment	\$100,00	
	Training subsequent year shoots	\$211,00	
	<b>Winter Prune and move wires</b>		
	Winter Prune and move wires per hectare labor hrs	4	0,1
	Winter Prune and move wires supplies per hectare	\$10,00	
	Winter Prune and move wires	\$51,10	
	<b>Prune shred pruning and mowing</b>		
	Prune shred pruning and mowing per hectare labor hrs	4	0,1
	Prune shred pruning and mowing supplies and Equipment per hectare	\$10,00	

		\$51,10	
		Hrs. General labor	Hrs. Machinery labor
Prune shred pruning and mowing			
Weed vine row - winter			
Weed vine row - winter per hectares labor hrs		1	2
Weed vine row - winter per hectare supplies		\$100,00	
Weed vine row - winter		\$132,00	
<b>Weed vine row - Spring</b>			
Weed vine row - Spring per hectare labor hrs		2	1
Weed vine row - Spring per hectare supplies and equipment		\$200,00	
Weed vine row - Spring		\$231,00	
<b>Insecticide years 2 - 5</b>			
Insecticide years 2 - 5 per hectare labor hrs		3	2
Insecticide years 2 - 5 per hectare supplies and equipment		\$211,00	
Insecticide years 2 - 5		\$263,00	
<b>Frost protection - overhead sprinklers year 3 - 5</b>			
Frost protection - overhead sprinklers year 3 - 5 per ha labor hrs		3	2
Frost protection overhead sprinklers year 3 - 5 per ha supplies/equipment		\$200,00	
Frost protection overhead sprinklers year 3 - 5		\$252,00	
		Hrs. General labor	Hrs. Machinery labor
<b>Weed floor center - Mow and Disc</b>			
Weed floor center - Mow and Disc per hectare labor hrs		3	1
Weed floor center - Mow and Disc per hectare supplies/equipment		\$433,00	
Weed floor center - Mow and Disc		\$474,00	
<b>Irrigate first year</b>			
Irrigate first year per hectare labor hrs		5	1
Irrigate first year supplies and equipment		\$300,00	
Irrigate first year		\$361,00	
<b>Irrigate post harvest overhead sprinklers year 3 - 5</b>			
Irrigate post harvest overhead sprinklers year 3 - 5 per ha labor hrs		5	1
Irrigate post harvest overhead sprinklers year 3 - 5 per ha supplies/equip		\$399,00	
Irrigate post harvest overhead sprinklers year 3 - 5		\$460,00	
<b>Fertilize year 1</b>			
Fertilize year 1 per ha labor hrs		5	1
Fertilize year 1 per ha supplies/equipment		\$300,00	
Fertilize year 1		\$361,00	
<b>Fertilize year 2 - 5</b>			

Fertilize year 2 - 5 per ha labor hrs	5	1
Fertilize year 2 - 5 per ha supplies and equipment	\$300,00	
Fertilize year 2 - 5	\$361,00	
<b>Disease control - Mildew - copper &amp; sulpher yr 2 - 5</b>		
Disease control - Mildew - copper & sulpher yr 2 - 5 per ha labor hrs	5	1
Disease control - Mildew - copper & sulpher yr 2 - 5 per ha supplies/equip	3242	
Disease control - Mildew - copper & sulpher yr 2 - 5	\$3 303,00	
<b>Disease control year 2 - 5 Dusting Sulpher</b>		
Disease control year 2 - 5 Dusting Sulpher per ha labor hrs	5	1
Disease control year 2 - 5 Dusting Sulpher per ha supplies	\$232,00	
Disease control year 2 - 5 Dusting Sulpher	\$293,00	
	<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>
<b>Disease/Fertilize: Pre-bloom, Mildew/Boron, Zinc year 3 -5</b>		
Disease/Fertilize: Pre-bloom, Mildew/Boron, Zinc year 3 -5 labor hrs	5	1
Disease/Fertilize: Pre-bloom, Mildew/Boron, Zinc year 3 -5 supplies/equip	\$100,00	
Disease/Fertilize: Pre-bloom, Mildew/Boron, Zinc year 3 -5	\$161,00	
<b>Other chemical applications year 1</b>		
Other chemical applications year 1 per ha labor hrs	5	2
Other chemical applications year 1	\$300,00	
Other chemical applications year 1	\$372,00	
<b>Other chemical applications year 2 - 5</b>		
Other chemical applications year 2 - 5 per ha labor hrs	5	1
Other chemical applications year 2 - 5 per ha supplies/equip	\$100,00	
Other chemical applications year 2 - 5	\$161,00	
<b>Disc and plant crop cover - center</b>		
Disc and plant crop cover - center per ha labor hrs	3	3
Disc and plant crop cover - center per ha supplies/equip	\$200,00	
Disc and plant crop cover - center	\$263,00	
<b>Additional Operating costs per hectare year 1</b>		
Additional Operating costs per hectare year 1 per ha labor hrs	3	1
Additional Operating costs per hectare year 1	\$32,00	
Additional Operating costs per hectare year 1	\$73,00	
	<b>Hrs. General labor</b>	<b>Hrs. Machinery labor</b>
<b>Additional Operating costs per hectare year 2 - 5</b>		
Additional Operating costs per hectare year 2 - 5 labor hrs	2	1



	Additional Operating costs per hectare year 2 - 5 supplies/equip	\$233,00	
	Additional Operating costs per hectare year 2 - 5	\$264,00	
	<b>Additional Operating costs per hectare year 2 - 5</b>		
	Additional Operating costs per hectare year 2 - 5 labor hrs	1	1
	Additional Operating costs per hectare year 2 - 5 supplies/equip	\$300,00	
	Additional Operating costs per hectare year 2 - 5	\$321,00	
	<b>Additional Operating costs per hectare year 2 - 5</b>		
	Additional Operating costs per hectare year 2 - 5 labor hrs	1	1
	Additional Operating costs per hectare year 2 - 5 supplies/equip	\$200,00	
	Additional Operating costs per hectare year 2 - 5	\$221,00	
<b>Harvest Costs</b>			
	Pick and Haul fruit per hectare		
	Pick and Haul fruit per hectare year 3	\$1 000,00	
	Pick and haul fruit per hectare increase from per year after year 3 - 5	20%	
*If this is done by the owner/family use the wage rate they would earn through alternative employment			

## CALCULATIONS

	Cost Per Hectare					
	Year	1st	2nd	3rd	4th	5th
Tons Per Hectare	0	0	5.0	9.0	12	
<b>Planting Costs:</b>						
Clearing the land	183	0	0	0	0	
Discing and plowing cover crop	161	0	0	0	0	
Seeding the cover crop	91	0	0	0	0	
Mowing the cover crop	92	0	0	0	0	
Cost of discing the cover crop	92	0	0	0	0	
Weeding the row - pre-planting (Roundup?)	81	0	0	0	0	
Cost of Vines per hectare	4,484	179	0	0	0	
Digging and planting per hectare	8,632	345	0	0	0	
Unmounding and installing grow tubes per hectare	8,632	0	0	0	0	
Install Trellis system per hectare	5,355	0	0	0	0	
Additional 1st year Operating Costs per hectare	200				0	
Additional 2nd - 5th year Operating Costs per hectare		100	100	100	100	
Additional Operating Costs per hectare all years	100	100	100	100	100	
<b>TOTAL PLANTING COSTS</b>	<b>28,102</b>	<b>725</b>	<b>200</b>	<b>200</b>	<b>200</b>	
<b>Cultural Costs:</b>						
Training first year shoots	51	0	0	0	0	
Training subsequent year shoots	0	211	211	211	211	
Winter Prune and move wires	0	51	102	204	409	
Prune Shred Prunings and Mow	0	51	51	51	51	
Weed Vine Row - Winter	0	132	132	132	132	
Weed Vine Row - Spring	231	231	231	231	231	

Insecticide years 2 - 5	0	263	263	263	263
Frost protection overhead sprinklers year 3 - 5	0	0	252	252	252
Weed floor center - Mow and Disc	474	474	474	474	474
Irrigate first year	361	433	520	624	749
Irrigate post harvest overhead sprinklers year 3 - 5	0	0	460	460	460
Fertilize year 1	361	0	0	0	0
Fertilize year 2 - 5	0	361	361	361	361
Disease control - Mildew - copper & sulpher yr 2 - 5	0	3,303	3,303	3,303	3,303
Disease control year 2 - 5 Dusting Sulpher	0	293	293	293	293
Disease/Fertilize: Pre-bloom, Mildew/Boron, Zinc year 3 -5	0	0	161	161	161
Other chemical applications year 1	372	0	0	0	0
Other chemical applications year 2 - 5	0	161	161	161	161
Disc and plant crop cover - center	263	263	263	263	263
Additional Operating costs per hectare year 1	73	0	0	0	0
Additional Operating costs per hectare year 2 - 5	264	264	264	264	264
Additional Operating costs per hectare year 2 - 5	321	321	321	321	321
Additional Operating costs per hectare year 2 - 5	221	221	221	221	221
<b>TOTAL CULTURAL COSTS</b>	<b>2,992</b>	<b>7,033</b>	<b>8,044</b>	<b>8,250</b>	<b>8,579</b>
<b>Harvest Costs:</b>					
Pick and Haul fruit per hectare year 3	0	0	1,000	1,200	1,440
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>1,000</b>	<b>1,200</b>	<b>1,440</b>
<b>Interest On Operating Capital</b>	<b>2,177</b>	<b>543</b>	<b>647</b>	<b>676</b>	<b>715</b>
<i>calculated using interest rate of: 7.00%</i>					
<b>TOTAL OPERATING COSTS/HECTARE</b>	<b>33,271</b>	<b>8,301</b>	<b>9,891</b>	<b>10,326</b>	<b>10,935</b>
<b>Cash Overhead Costs:</b>					
Office Expense per hectare	167	167	167	167	167
Insurance cost per hectare	20	20	20	20	20
Manager salary per hectare	667	667	667	667	667
Taxes per hectare	1,000	1,000	1,000	1,000	1,000
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>1,853</b>	<b>1,853</b>	<b>1,853</b>	<b>1,853</b>	<b>1,853</b>
<b>TOTAL CASH COSTS/HECTARE</b>	<b>35,124</b>	<b>10,154</b>	<b>11,745</b>	<b>12,179</b>	<b>12,788</b>
<b>INCOME/ACRE FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>10,000</b>	<b>18,000</b>	<b>24,000</b>
<i>calculated using price/ton of: 2,000</i>					
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>35,124</b>	<b>10,154</b>	<b>1,745</b>	<b>0</b>	<b>0</b>
<b>PROFIT/HECTARE ABOVE CASH COSTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,821</b>	<b>11,212</b>
<b>ACCUMULATED NET CASH COSTS/HECTARE</b>	<b>35,124</b>	<b>45,279</b>	<b>47,023</b>	<b>41,202</b>	<b>29,991</b>
<b>Non-Cash Overhead Costs (Capital Recovery):</b>					
<b>Capital Recovery Cost:</b>					
Depreciation on building per year per hectare	28	28	28	28	28
Depreciation on irrigation system per year per hectare	15	15	15	15	15
Lease value/opportunity cost	167	167	167	167	167
Equipment	13	13	13	13	13
<b>TOTAL NON-CASH OVERHEAD COST/HECTARE</b>	<b>223</b>	<b>223</b>	<b>223</b>	<b>223</b>	<b>223</b>
<b>TOTAL COST/HECTARE FOR THE YEAR</b>	<b>35,348</b>	<b>10,378</b>	<b>11,968</b>	<b>12,402</b>	<b>13,011</b>
<b>Cost per MT</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 2,394</b>	<b>\$ 1,378</b>	<b>\$ 1,084</b>
<b>INCOME/HECTARE FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>10,000</b>	<b>18,000</b>	<b>24,000</b>
<b>TOTAL NET COST/HECTARE FOR THE YEAR</b>	<b>35,348</b>	<b>10,378</b>	<b>1,968</b>	<b>0</b>	<b>0</b>
<b>NET PROFIT/HECTARE ABOVE TOTAL COST</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,598</b>	<b>10,989</b>
<b>TOTAL ACCUMULATED NET COST/HECTARE</b>	<b>35,348</b>	<b>45,725</b>	<b>47,693</b>	<b>42,096</b>	<b>31,107</b>

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2004

**SAMPLE COSTS TO  
ESTABLISH A VINEYARD AND PRODUCE  
WINE GRAPES**

**CHARDONNAY**



**NORTH COAST REGION  
Sonoma County**

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## INTRODUCTION

The sample costs for vineyard establishment and wine grape production in Sonoma County are presented in this study. The hypothetical vineyard used in this report consists of 35 acres, 30 of which are being established and 5 acres in farmstead, roads, reservoir and pumping stations.

This study is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Costs and practices detailed in this study will not be applicable to every situation. A blank column titled *Your Cost* is provided in Tables 2 and 3 to enter your actual costs.

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For an explanation of calculations used for the study refer to the Assumptions. For more information call the Department of Agricultural and Resource Economics, Cooperative Extension, University of California, Davis, California, at 530-752-2414 or Rhonda Smith, UC Cooperative Extension Sonoma County Farm Advisor, at 707-565-2621 or email [rsmith@ucdavis.edu](mailto:rsmith@ucdavis.edu).

This and other cost of production studies can be ordered from the Department of Agricultural and Resource Economics, at the above address or by calling 530-752-4424. They can also be downloaded from the department's website <http://coststudies.ucdavis.edu>, or obtained from your county UC Cooperative Extension office.

**Acknowledgment.** Appreciation is expressed to the growers who provided input and reviews. Special thanks to Duff Bevill, Bevill Vineyard Management; Keith Horn, Clos du Bois Wines; Steve Hill, Durell Vineyards; and Kirk Lokka, Sonoma-Cutrer Vineyard.

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## ASSUMPTIONS

The following assumptions refer to Tables 1 to 9 and pertain to sample costs to establish a vineyard and produce wine grapes in the North Coast Region - Sonoma County. Practices described represent production procedures and materials that for the most part are considered typical of a well-managed vineyard in Sonoma County. However, some of the practices and costs described are not representative of all vineyard sites located in the county. Site characteristics that will have the greatest impact on farming practices and thus establishment and production costs include the following: slope, rocky, very clayey or shallow soils, soil chemistry characteristics that affect nutrient uptake, poor drainage, excessive wind, and soil pests and diseases such as nematodes and oak root fungus.

**The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

**Farm.** The hypothetical vineyard is assumed to lie in the Russian River Valley appellation in Sonoma County. The farm is owned and operated by the grower with assistance from a part-time foreman. The site has less than a 5% average slope and was previously planted to grapevines. The farm is 35 contiguous acres, 30 of which are planted. Roads, irrigation system, reservoir, and farmstead occupy the other 5 acres. There is no home on the property. The land is valued at \$65,000 per acre.

Two moderate-to-high yielding clones of Chardonnay are planted in the vineyard. The first crop is harvested in the third year and the vineyard is considered in full production by the fifth year. In this study, the average annual yield is 6 tons per acre, however in reality, production is strongly influenced by the vineyard's specific location within the Russian River Valley and weather that may significantly impact yield in some years.

The owner is responsible for making all of the production decisions, hiring the general laborers and operating the machinery. Basic hourly wages are \$11.57 for general labor and \$14.93 for machine labor. Payroll overhead is in addition to these wages.

**Site Determination (Regulations).** A site assessment done by the Sonoma County Agricultural Commissioner's office under the authority of the Sonoma County Vineyard Erosion and Sediment Control Ordinance (VESCO) determined the planting area to be a "Level 1". This designation does not require the installation of design features such as sediment basins or slope adjustment to manage surface flows from rainfall or prevent sediment movement. A \$300 fee is required for a Level 1 site and is paid in the first year only.

The purpose of VESCO is to reduce erosion and runoff in vineyards planted on slopes or high erodible soils. VESCO requires that growers notify the county Agricultural Commissioner of the intent to establish or replant a vineyard for commercial production. Documentation of slope and soil types coupled with a site visit by the county resulted in the determination of the site's Level status. Depending on the findings, an erosion and sediment control plan may be required prior to any site modifications. The fee charged by the county is dependent upon the Level determination, size of the vineyard and required mitigation.

Additional information related to regulatory oversight of vineyard development in Sonoma County can be found in the *Vineyard Site Assessment Guide* available from the University of California Cooperative Extension Sonoma County office.

**Vineyard Design.** The vineyard is laid out in three blocks each containing 40 rows. There are two avenues between the three blocks with turn-around space for equipment at the end of the rows. The rows are 1,000 feet long and have 166 vines per row. Vine spacing is 8-foot by 6-foot (row-by-vine) and vines are trained to bilateral cordons and spur pruned.

**Trellis System.** The trellis system, installed by a commercial trellis company, is designed to support a bilateral cordon-trained, spur-pruned vineyard. The estimated cost includes all components and installation labor. The trellis system in this study utilizes either a rebar or rolled edge, pre-notched, metal highway stake at each planting position with drill pipe for end posts. A single permanent cordon wire is attached to all stakes and end posts at a 36-inch height and 2 pairs of movable wires are hung on notches in the highway stakes. The trellis system is considered part of the vineyard since it will be removed at the time of vine removal and is shown in the vineyard establishment costs in Table 1. The following details the trellis system installation.

The vineyard is laid out in the spring of the first year, and all stakes, end posts and wires are installed. Five-foot, 3/8 inch rebar stakes are hammered into the ground on six foot centers leaving every third position for an in-line, nine-foot rolled edge metal highway stake. The latter stakes are driven three feet into the ground on 18-foot centers. A nine-foot, 2-7/8 inch drill pipe with a double spade is set at the end of each row, buried 4.5 feet into the ground. A permanent, 12-gauge, high tensile, cordon wire is attached to each rebar and highway stake 36 inches above the ground. The 14-gauge wire for supporting the drip irrigation lateral (black hose) is clipped to each highway stake 14 inches above the ground and secured to each end post. The drip lateral is attached to the drip wire with 14-gauge U-ties. Two pairs of movable, 14-gauge, high tensile wires are secured to each endpost and strung on the in-line highway stakes in the row. During the growing season, these movable wires are moved up the stakes as shoot growth occurs and are held in position by notches in the highway stakes.

### **Establishment Operating Costs**

The following establishment descriptions are typical practices for many vineyards in Sonoma County, but may not be appropriate to individual circumstances.

**Site Preparation.** Removal of the old vineyard and all land preparations up to planting the cover crop are contracted out to commercial companies. All of these activities, up to, but not including mowing the cover crop, occur in the fall of the year prior to planting. Although most operations that prepare the vineyard for planting are done in the year prior to planting, costs are shown in the first year in Table 1.

Costs to remove the old vineyard include separation and proper disposal of plastic, metal, and pressure treated wood that composed the old trellis and irrigation systems. Vines are pushed into a pile and burned. Lime is spread at 10 tons per acre over the cleared ground to adjust soil acidity to a desirable range. The ground is ripped in three different directions to a depth of four-feet to improve rooting depth and increase water infiltration. Two passes with a stubble disc follow and old vine roots are removed by hand after each pass. A drag is used on the third and final pass with the stubble disc.

A cover crop seed mix that maximizes production of vegetative biomass is broadcast in the fall over the entire 30-acre site and a drag is used on the same seeding pass. In the spring of the following year, the cover crop is mowed one time with a flail mower then disced three times by the owner.

**Vines.** Dormant, bench grafted Chardonnay vines are planted in the early spring on an 8-foot X 6-foot spacing (row-by-vine) resulting in a planting density of 908 vines per acre. In the second year 4% or 36 vines per acre are replanted for those lost in the first and second years. Vines will be trained during the first and second years

and are expected to begin yielding harvestable fruit in three years (third leaf). They will be productive for an additional 22 years.

**Plant.** The vineyard is planted in May of the first year and replanting weak or dead vines is done in the second year as described below.

*First Year.* After the site is mowed and disced in the spring, a contractor's crew lays out the vineyard. Each planting spot is marked with a plastic picnic knife. This is followed by trellis installation. Prior to planting, the vine rows are strip sprayed one time with Roundup herbicide. In May, a contractor digs the holes by hand, and plants dormant, bench grafted vines. Soil is mounded over each vine to protect it against drying and sunburn. Two to three weeks later each vine is unmounted and a grow tube is installed.

*Second Year.* In the first winter (January), grow tubes are opened and vines are pruned to a two-bud spur. Four percent of the vines, or 36 vines per acre, are replaced in the second year after dying during the first season.

**Prune, Train, Sucker.** Not all of the same practices that follow are used for other varieties or trellis systems. Also, the experienced vineyard owner or manager will modify these practices and still successfully develop the vineyard.

*First Year.* The training operations in the first growing season are made in two passes. During the first pass in April, the vines are unmounted when shoots begin to emerge from the mound. At that time, scion roots are trimmed and a grow tube is placed over each vine and tied to the stake. In mid May, on the second pass, the tube is lifted up and the vine is shoot thinned to one or two shoots and the tube is placed back over the vine and retied to the stake as necessary.

*Second Year.* During the plants' first winter, the grow tubes are opened and each vine is pruned to a single two bud spur. The tube is then closed and retied to the stake as necessary. At the same time the lower pair of moveable trellis wires are moved to the first position above the cordon wire and the upper pair of moveable wires are moved to the top position on the in-line stakes.

In spring and summer of the second growing season up to five passes are needed to train the vines. In the first pass during April, the tube is opened again, vines are shoot-thinned to one shoot and the tube is replaced. In the second pass in early May, the tube is permanently removed, the vine is topped and tied to the stake with three ties. Because vines grow at different rates, a third pass is needed for late vines, which are treated like those on the second pass. For the majority of vines on the third pass in June, lateral shoots are removed from the trunk and the top two laterals are loosely tied to the cordon wire. Two final passes – late June and July - are made continuing to tie cordon shoots to the wires and to train late vines. Additionally, on the final pass cordon shoots are topped and lateral shoots arising from the cordon shoots are stuffed inside the lower pair of moveable wires.

*Third Year.* In January of the second winter, pruning starts by cutting off all of the laterals from the cordons, and topping cordons if necessary. Later in January, the head of the vine is re-tied to the stake and the cordon canes are tied to the cordon wire. The top moveable pair of wires is moved to the middle position.

When rapid shoot growth occurs in early spring (April), the cordons are shoot-thinned to select spur positions. At the same time, cordon extensions on vines that require them are tied. On the next pass in May, approximately one-quarter of the shoots arising from the cordons require stuffing between the lower pair of moveable wires. Up to six spur positions per cordon are selected and cordon extensions are tied as needed. During the third pass at the end of June, all shoots arising from the cordons will be stuffed between the

appropriate pair of movable wires. In addition, crop removal occurs during the same pass in the following manner: all clusters are removed on shoots that are shorter than 18 inches in length; one cluster is allowed to remain on shoots that are between 18 to 24 inches in length and two clusters are left on shoots over 30 inches long.

Costs that reflect training practices are only shown through the fourth year in this study (Table 1); however, slower growing vines may need to be trained for a longer period. In addition, pruning costs during the production years in this study are only presented for activities directed to fully trained vines (Table 2).

**Pest Management.** The pesticides and rates mentioned in this cost study as well as other materials are listed in *UC Integrated Pest Management Guidelines, Grapes*, available at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). Pesticides mentioned in the study are commonly used, but are not recommendations.

**Insect and Mite Management.** A pest control adviser (PCA) monitors insect and mite pests and beneficial insect populations beginning in the first year to determine if control measures are necessary. In this vineyard, only thrips require chemical (Provado) control beginning in the third year. Worm pests are uncommon in the North Coast and are monitored, but control treatments are not needed in this study.

**Disease Management.** Foliar pathogens can cause disease in grapevines, but control actions for only the two major fungal diseases - powdery mildew and Botrytis bunch rot - are addressed in this study. Powdery mildew disease pressure is closely related to temperature and leaf wetness in the spring, and temperature and relative humidity in early summer; therefore weather conditions determine spray intervals and hence total number of fungicide applications per year. Weather will also play a role in the choice of materials used to control powdery mildew. Disease control treatments are not made in the first year.

*Second Year.* In this study, a spray and dusting program for powdery mildew control begins in the second year. The first two applications occur in early May. Both consist of a micronized sulfur product (Thiolux) tank mixed with a copper material (Champ). Because vines are small, only every third row is driven to apply these sprays. Two treatments with dusting sulfur follow in June and every other row is driven.

*Third Year.* In March, micronized sulfur (Thiolux) and copper (Champ) are tank mixed and applied twice. Again every third row is driven. These sprays are followed by four applications of dusting sulfur at 10-day intervals in which alternate rows are driven until mid May. Rally, one member of a class of fungicides known as sterol inhibitors (SI) is applied at pre-bloom in May and twice again at 14-day intervals. (The pre-bloom application is combined with foliar fertilizers). At pre-bunch close in late June, an SI (Rally) is tank mixed and applied with a material (Vanguard) that controls Botrytis bunch rot. Removing leaves or lateral shoots from around the clusters in late June on one side of the row also reduces incidence of Botrytis bunch rot and improves spray penetration. One last powdery mildew treatment is made in early July using Flint, a strobilurin (a fungicide class). All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer.

**Vineyard Floor Management/Weed/Cover Crop.** A “wall to wall” green manure cover crop is seeded after the site is prepared in the fall of the year prior to planting and in the row centers in the first fall after the vines are planted. In the second year, a cover crop mixture of legumes and annual grasses is seeded. No cover is planted in the third year because the floor will be protected by significant regrowth from previous plantings. All centers will be mowed and disced each spring and summer of the establishment years, up to the third season when an alternate strategy begins. The specific herbicides used in the vineyard may be affected by the presence of a Ground Water Protection Area. For more information, contact the Sonoma County Agricultural Commissioner’s office.



*First Year.* In April during site preparation, the grower mows once and discs three times before the contractor lays out the vineyard. A contact herbicide (Roundup) is applied to the vine rows prior to planting. After the vines are planted in May, the centers are mowed once and a contact herbicide (Roundup) applied in the vine rows. In the summer, the centers will be mowed once again and disced three times. Vine row weeds are controlled by one application of a contact herbicide (Roundup) in the summer. In the fall, the row centers are disced once and a green manure cover crop is seeded with the grower’s drill and roller.

*Second Year.* In the winter (January), vine row weeds are controlled with one application of a contact (Roundup) and pre-emergent herbicide (Prowl) mix. In the late spring, a second herbicide treatment is made with a contact material (Roundup) in the vine row just before the grow tubes are removed in early May. Row centers are mowed once in March with a flail mower and this single pass also chops the prunings. Centers are disced a total of three times from spring to early summer. In the fall (October), the row centers are disced once in preparation for planting a legume and annual grass cover crop seed using the grower’s drill.

*Third Year.* To control vine row weeds in the winter (January), a mixture of two pre emergent (Goal, Princep) and one post-emergent herbicide (Roundup) is applied. All centers are mowed once in the spring (March) to cut the cover crop and chop vine prunings. After the spring mowing/chopping, alternating centers are managed differently. One set is mowed once in May and no other vineyard floor management activities occur for the rest of the growing season. The other set of centers are disced four times through the summer. In June, vine rows receive one application of a contact herbicide (Roundup) as a summer strip spray. No cover crop is planted in the fall.

**Fertilize.** Fertilizer is applied through the drip irrigation system in all years of vineyard establishment. Soluble dry and liquid formulations are injected into the irrigation system using a fertilizer injector.

*First Year.* A solution grade fertilizer material, calcium nitrate (15.5-0-0), is applied through the drip irrigation system from April through July for a total of 60 pounds of nitrogen per acre.

*Second Year.* Calcium nitrate is applied through the drip system in April to supply 15.5 pounds of nitrogen per acre. Also, a total of 20 gallons of 2-15-15 is applied through the drip lines in a split application in June and July. By the end of the growing season, a total of 19.76 pounds of nitrogen, 32 pounds of phosphorus and 32 pounds of potassium per acre are applied.

*Third Year.* The same materials and rates are injected as in the second year. In addition, boron and zinc foliar micronutrients are tank mixed with the powdery mildew fungicide application that occurs just prior to full bloom. One pound of actual boron (Solubor) and two pounds of actual zinc (Neutral Zinc) per acre are sprayed.

**Irrigation.** In this study pumped irrigation water is calculated to cost \$6.03 per acre-inch. The irrigation cost includes labor and a water cost that is based on using a 15 hp motor to pump from 150 feet deep over 30 acres. Price per acre-foot of water will vary by grower in this region depending on quantity pumped, power cost, various well characteristics, and other irrigation factors.

Irrigation water is applied weekly through September each year, beginning in May in years 1 and 2, June in year 3 and July in year 4. No assumption is made about in-season rainfall or the irrigation system’s emission uniformity. A post-harvest irrigation is applied with the overhead sprinklers during the production years, beginning in year 3. The amount of irrigation water by years is shown in Table A.

Year	Number of	
	months	AcIn/year
1	5	2.00
2	5	3.00
3	4	3.34
4+	3	3.34
Applied irrigation water – Sprinkler		
3+	once-post harvest	2.00

**Frost Protection.** It is assumed that the vineyard will need frost protection during the months of March, April, and May for a total of three nights beginning in the third year and six nights in subsequent years. The sprinklers run for six hours per night. Water cost for frost protection is \$7.18 per acre-inch because of the extra pumping required from the reservoir.

**Harvest.** In this study, the first crop is harvested in the third leaf (third year) in order to increase the likelihood of uniform vine size throughout the vineyard. The vineyard contracts to have the grape crop custom harvested by hand in both the third and fourth years and is charged on a per acre basis. In many instances, it is more appropriate to take the first crop off in the second year if site conditions and initial vine growth warrant. Assumed average yields in the Russian River Valley are shown in Table B.

Table B. Annual Chardonnay Yields  
Sonoma County (District 3)

Year	Tons Per Acre
0	0.0
3	2.5
4	4.5
5+	6.0

**Assessments.** The grower is a member of two associations that fund their operations with membership fees. The Sonoma County Grape Growers Association (SCGGA) determines grower membership fees on an acreage basis. During the first two years, the fee is \$5.00 per non-producing grape acre with a minimum of \$250 per vineyard. Once the vineyard begins to produce fruit the fee changes to \$12.50 per bearing acre. The SCGGA internet site can be accessed at <http://www.sonomagrapevine.org/>.

The grower is also a member of the Russian River Valley Winegrowers (RRVW). Members are assessed on a tonnage-produced basis with a minimum of \$275 per vineyard regardless of yield. During the first two years, only the minimum fee is assessed by the RRVW. Additional information about this organization is available at <http://rrvw.org/>.

### Production Operating Costs

**Prune, Tie, and Sucker.** Pruning and tying are done during the winter months (January) and the prunings are chopped in March with a flail mower. Cordon shoot removal is done twice each year, once in April and again in May. Trunk suckering occurs once a year in May.

**Canopy Management and Crop Adjustment.** Wires are moved a total of two times (April and May) during each growing season in order to vertically position the canopy. Selected basal leaves and lateral shoots are removed by hand from the fruiting zone once in either June or July from the side of the row that receives the morning sun. The vine shoots are hedged once in June just above the top of the highway stakes.

In July at 10% veraison (i.e. 10% of the fruit has started to ripen), the crop level is adjusted by thinning. Fruit clusters are removed from shoots smaller than 18 inches in length. Two clusters are retained on shoots that are at least 30 inches long and one cluster is retained on shoots between 18 and 30 inches in length.

**Fertilize.** The fertilizers are applied through the drip system and as foliar sprays. Solution grade calcium nitrate is injected in June to give the vines 15.5 pounds of actual nitrogen. A mixed liquid fertilizer (2-15-15) is injected twice during the season at 10 gallons of material per acre per application. This brings the total actual nitrogen applied per acre for the season to 19.76 pounds. Potassium as potassium thiosulfate is injected in July. Thus, the total pounds of phosphorus and potassium are 32 and 62.5 pounds, respectively.

Normally, in two out of three years, a pre-bloom foliar application of both zinc (Neutral Zinc) and boron (Solubor) is added to the SI (Rally) spray application in mid to late May. Two pounds of actual zinc and one-pound actual boron are applied. In this study the full cost is included each year. Every third year, opposite cluster petioles are collected at bloom for tissue nutrient analyses. One third of the cost is included each year.

**Irrigation.** The cost includes labor and pumping costs based on using a 15 hp motor to pump from 150 feet deep over 30 acres. In this study pumped irrigation water is calculated to cost \$6.03 per acre-inch. Price per acre-inch of water will vary by grower in this region depending on quantity pumped, power cost, various well characteristics, and other irrigation factors. Beginning in July, irrigation water is applied weekly through September. A post-harvest irrigation in September is applied with the overhead sprinklers. No assumption is made about in-season rainfall or the irrigation system's emission uniformity.

**Frost Protection.** It is assumed that the vineyard will need frost protection for six nights during March, April and May. The overhead sprinklers run for six hours per night. After each frost protection event the reservoir is filled with water from the well. The cost of water used for frost protection is the cost of water pumped from the irrigation well to the reservoir and the cost to operate the booster pump during the freezing periods. Water cost for frost protection is \$7.18 per acre-inch because of the extra pumping required from the reservoir.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. **Pesticides mentioned in the study are not recommendations, but those commonly used in the region.** For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). A Pesticide Identification number is required to purchase pesticides for commercial use. For information regarding pesticide ID numbers and use permits, contact the Sonoma County Agricultural Commissioner's office. For additional production information, contact the UC Cooperative Extension Sonoma County Viticulture Farm Advisor.

*Pest Control Adviser.* The pest control adviser (PCA) monitors the field for pests, diseases, and nutrition. PCA's are required to provide written recommendations for pesticides that they advise a grower to use. Growers may hire private (independent) PCA's or receive the service as part of the services provided by their local retail agricultural chemical and fertilizer supplier. In this study the grower hires a private PCA.

*Vineyard Floor Management/Weed/Cover Crop.* Mowing and cultivation are used to manage vegetation in the centers and herbicides are used to control weeds in the vine rows. Beginning in the fall of the fourth year, a cover crop seed mixture of legumes plus annual grasses is planted throughout the vineyard. After planting the adjacent centers are managed differently. Prunings are placed in alternate centers and mowed/chopped once in March. Those centers will be mowed once again the following month and not disced. Adjacent centers are also mowed once in March then disced two times, once each in May and June. At the end of a four-year cycle, a different cover crop mix will be planted.

Vine row weeds are controlled with a winter (January) dormant mix using the pre-emergent herbicide, Goal and a contact herbicide, Roundup, applied as a strip spray. In two out of three years, Fire Power herbicide is strip sprayed in the spring. Every third year, perennial weeds are controlled with an application of Rely. In some situations Rely will be applied in the summer. In the above applications, two-thirds and one-third of the costs are charged to the vineyard each year.

*Insect and Mite Management.* A PCA monitors the vineyard weekly. It is assumed that it is necessary to treat grape leafhoppers once every third year and mites in two out of every three years. One-third and two thirds of the respective costs are charged to the vineyard each year. Provado is applied for leafhopper control and Acramite for mite control. In Table 3, the rates and material costs reflect the fact that they are not used every year.

**Disease Management.** The first powdery mildew preventative fungicide application is made at budbreak in early March with micronized sulfur (Thiolux) tank mixed with a copper product (Champ) and again 10 days later. Beginning in late March and continuing into May, five dusting sulfur applications are made. Prior to full bloom in May, an SI material (Rally) is applied. The same material is used two more times – once each in May and June. This is followed by an application of dusting sulfur in June. Just before bunch closure in late June or early July, a tank mix of a SI material (Rally) plus a Botrytis fungicide (Vanguard) is applied. For the remainder of July, dusting sulfur is applied twice. The mildew protection period ends with two consecutive applications of a stobilurin material (Flint) with the final spray application occurring during the first week of August. All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer. Hand leaf removal occurs once during June or July on one side of the canopy in order to reduce the incidence of Botrytis bunch rot and to improve spray penetration.

There are no costs assigned to control Pierce’s disease in this study. The incidence of this disease in Sonoma County vineyards is quite variable; however control measures and annual replanting costs can be significant in Pierce’s disease “hot spots.” In addition, there are no costs assigned to control vine mealybug. If it becomes established in a vineyard, at least one pesticide application will be required in addition to sanitation measures.

**Harvest.** Starting in the fifth year the fruit is mechanically harvested at a contract rate of \$50 per ton. It is assumed that the grapes are delivered to a winery inside of the county and the hauling cost being approximately \$15 per ton.

**Yields** Yield maturity is reached in the fifth year. An assumed average yield of 6 tons per acre over the vineyard life is used in this study. Yields can range, depending upon the environment and location, from 3 to 8 tons per acre.

**Returns.** Grape buyers determine return prices per ton for wine grapes according to variety, percent sugar, district grown and other factors. The base prices paid to Sonoma County Chardonnay growers are shown in Table C by the low and high returns received. The mean weighted average price for Chardonnay over the five-year period of 1998-2002 was \$1,838 per ton; therefore, that return price is used in Tables 1 and 3 in this study. A range of return prices are used in Table 7 for calculating net returns to growers at different yields.

Table C. Annual Prices Received for Sonoma County (District 3)

Crop Year	Range		Weighted Average
	Low	High	
1998	801	3,000	1,747
1999	1,000	3,356	1,856
2000	900	5,000	1,959
2001	397	6,000	1,906
2002	192	6,000	1,721
<b>Average</b>	<b>658</b>	<b>4,671</b>	<b>1,838</b>

<sup>§</sup> Data compiled from the Final Grape Crush Report, Table 8, 1998-2002 Crops. Published by California Agricultural Statistics Service

**Assessments.** The Sonoma County Grape Growers Association (SCGGA) membership fee for producing vineyards is \$12.50 per acre. The SCGGA Internet site is <http://www.sonomagrapevine.org/>.

The Russian River Valley Winegrowers (RRVW) members are assessed \$4.00 per ton with a minimum of \$275 per vineyard regardless of yield. Additional information about this organization is available at <http://rrvw.org/>.

**Pickup/ATV.** The grower uses the pickup for business and personal use. The assumed business use for the pickup is 765 miles per year for the ranch. In addition to spot spraying for weed control, the All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard and irrigating.

**Labor.** Labor rates of \$20.00 per hour for machine operators and \$15.50 for general labor include payroll overhead of 34%. The basic hourly wages are \$14.93 for machine operators and \$11.57 for general labor. The overhead includes the employer’s share of federal and California state payroll taxes, workers' compensation

insurance for vineyards (code 0040), and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2004 (California Department of Insurance). Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Wages for management are not included as a cash cost. Any return above total costs is considered a return to management and risk. However, growers wanting to account for management may wish to add a cost. The manager (owner) makes all production decisions regarding cultural practices, pest management, and labor as well as operates all machinery.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum Power Take Off (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$1.45 and \$1.88 per gallon, respectively. The fuel prices are averaged based on four California delivery locations plus \$0.24 per gallon, which is one-half the difference between the high and low price for regular gasoline in 2003 from the California State Automobile Association Monthly Survey. The cost includes a 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**Interest On Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 6.23% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

**Risk.** The risks associated with producing and marketing wine grapes are significant. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks that affect the profitability and economic viability of winegrape production. A market channel should be determined before the vineyard is planted and brought into production. Though not used in this study, crop insurance is a risk management tool available to growers.

### **Cash Overhead Costs**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm, not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, and equipment repairs.

**Property Taxes.** Counties in California charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis. The salvage value for land is equal to the purchase price because land does not depreciate.

**Insurance.** Insurance for farm investments vary depending on the assets included and the amount of coverage.

Property insurance provides coverage for property loss and is charged at 0.676% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$516 for the entire farm.

**Office Expense.** Office and business expenses for 30 acres are estimated at \$9,000 annually or \$250 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Foreman Salary.** The vineyard employs a single foreman to supervise work crews and production practices. Due to the small acreage, the vineyard employs the foreman 25% of the time and pays one quarter of the annual salary of \$50,000 plus 34% for payroll taxes and benefits.

**Sanitation Services.** Sanitation services provide portable toilets for the vineyard and cost the farm \$436 annually. This cost includes delivery and servicing of toilets.

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.

### **Non-Cash Overhead Costs**

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

**Capital Recovery Costs.** Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

*Salvage Value.* Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate.

*Capital Recovery Factor.* Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

*Interest Rate.* The interest rate of 6.23% used to calculate capital recovery cost is the United States Department of Agriculture-Economic Reporting Service's (USDA-ERS) ten year average of California's agricultural sector long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector.

**Building.** The shop building is a 400 square foot metal building or buildings on a cement slab.

**Land.** Land is valued at \$65,000 per acre. This study assumes the land was purchased for planting a vineyard. Because only 30 of the 35 acres are planted to grapes, land is valued at \$75,833 per plantable acre.

**Drip Irrigation System.** Since the vineyard is established on land previously planted to grapevines it is assumed to have an existing well and an adequate water supply. A new pump, 15 horsepower (hp) motor, filter system, and fertilizer injector will be installed along with the drip irrigation system prior to planting. The cost of these components plus drip laterals and the labor to install each are included in the irrigation system cost. Water and fertilizers are pumped to the vineyard through a filtration station into a mainline, sub-mains and then the drip laterals along the vine rows. In the first year, one, one-half gallon per minute emitter is punched into the lateral 18-inches from each stake. A second emitter is added in Year 2 so that each vine is centered between two emitters.

**Frost Protection System.** There are several components of the frost protection system: a 12 acre-foot reservoir, motor, pump, and overhead sprinklers. The reservoir is designed to hold enough water to protect the vineyard during the frost season. Water is pumped from the reservoir by the 1,650 gallons per minute (gpm) booster pump to the overhead sprinklers. Sprinkler risers are spaced 36 by 48 feet throughout the vineyard secured to existing highway stakes.

**Fuel Tanks.** A single 250-gallon fuel tank using gravity feed is on a metal stand. The tank is set up in a cement containment pad that meets federal, state, and county regulations.

**Tools.** This includes shop, hand, and miscellaneous field tools.

**Establishment Cost.** An establishment cost is the sum of the costs for land preparation, trellis system, vines, planting, cash overhead and production expenses for growing the vines through the first year that grapes are harvested. The vineyard establishment cost is used to determine the capital recovery cost, during the production years. The Total Accumulated Net Cash Cost on Table 1 in the third year represents the establishment cost. For this study the cost is \$16,657 per acre or \$499,710 for the 30-acre vineyard. The establishment cost is amortized over the remaining 22 years the vineyard is in production.

**Equipment.** Farm equipment is purchased either new or used. In Table 5, the new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION  
**Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD**  
 NORTH COAST - SONOMA COUNTY - 2004

Year	Cost Per Acre			
	1st	2nd	3rd	4th
Tons Per Acre (* occurs prior to first year)			2.5	4.5
Land Preparation: Custom - Site Level Determination*	10			
Land Preparation: Custom - Vineyard Removal *	350			
Land Preparation: Custom - Apply Lime *	330			
Land Preparation: Custom - Rip 3X *	450			
Land Preparation: Custom – Stubble Disc 2X, Grade + Stubble Disc 1X *	75			
Land Preparation: Seed Cover Crop “wall-to-wall” *	48			
Land Preparation: Mow Cover Crop	29			
Land Preparation : Disc 3X	41			
Weed: Vine Row - Preplant (Roundup)	26			
Survey & Layout Vineyard: Custom	175			
Dig & Plant Vines, Mound Over: Custom	817	38		
Vines: 908 Per Acre (4% Replant In 2nd Year)	2,724	111		
Unmound and Install Grow Tubes: Custom (1st pass)	681	23		
Install Trellis System - Custom	3,800			
<b>TOTAL PLANTING COSTS</b>	<b>9,556</b>	<b>172</b>	<b>0</b>	<b>0</b>
Cultural Costs:				
Train: First Year - Select Shoots (2nd Pass)	496			
Train: 2d Year 5X, 3d Year 3X, 4th Year 3X		1,364	620	496
Prune: Winter Prune & Move Wires		124	310	310
Prune: Shred Prunings/Mow		29	29	29
Weed: Vine Row – Winter (Prowl, Roundup) (Goal, Roundup, Princep) (Goal, Roundup)		27	49	39
Weed: Vine Row - Spring (Roundup)	26	26		
Insect: Thrips (Provado)			60	60
Frost Protection – Overhead Sprinklers (3 days in Year 3, 6 days in Year 4)			37	75
Weed: Floor Center - Mow (2X - Yr 1; 1X - Yrs 3 & 4 - Alt. Centers)	57		14	14
Weed: Floor Center - Disc (3X - Yr 1 & 2; 4X & 2X - Yrs 3 & 4 - Alt. Centers)	45	45	30	30
Irrigate	97	103	105	105
Irrigate: Post Harvest Overhead Irrigation			38	38
Fertilize: (15.5-0-0, Yr 1; 15.5-0-0 & 2-15-15, Yr 2, 3, 4)	46	78	78	78
Disease: Mildew 2X – Copper & Sulfur (Champ, Thiolux)		52	52	52
Disease: Mildew 2X in Year 2, 4X in Year 3 & 4 (Dusting Sulfur)		26	52	52
Disease/Fertilizer: Prebloom, Mildew/Boron, Zinc (Rally/Solubor, Neutral Zinc)			85	85
Disease: Mildew 2X (Rally)			101	101
Weed: Vine Row - Summer (Roundup)	26		26	26
Disease: Mildew/Botrytis Pre-bunch Close Spray (Rally/Vanguard)			101	101
Disease: Mildew Final Spray (Flint)			62	62
Weed/Cover Crop: Floor Center - Disc Ground for Cover Crop (Beginning Yr 4, 1X/4 Yr)	15	15		4
Weed/Cover Crop: Floor Center - Plant & Roll Cover Crop (Beginning Yr 4, 1X/4 Yr)	54	54		14
Pest Monitoring	15	15	15	35
ATV Use	22	22	22	22
Pickup Truck Use	27	27	27	27
<b>TOTAL CULTURAL COSTS</b>	<b>926</b>	<b>2,007</b>	<b>1,913</b>	<b>1,855</b>
Harvest Costs:				
Pick & Haul Fruit			725	1,080
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>725</b>	<b>1,080</b>
Assessments:				
Sonoma County Grape Growers Association	8	8	13	13
Russian River Valley Wine Growers Association	9	9	10	18
<b>TOTAL ASSESSMENT COSTS</b>	<b>17</b>	<b>17</b>	<b>23</b>	<b>31</b>
Interest On Operating Capital @ 6.89%	328	42	63	63
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>10,827</b>	<b>2,238</b>	<b>2,724</b>	<b>3,029</b>

UC COOPERATIVE EXTENSION  
Table 1. Continued

Year	Cost Per Acre			
	1st	2nd	3rd	4th
Tons Per Acre			2.5	4.5
Cash Overhead Costs:				
Office Expense	250	250	250	250
Liability Insurance	17	17	17	17
Sanitation Fee	15	15	15	15
Manager Salary (25% Time, includes payroll overhead)	558	558	558	558
Property Taxes	806	806	806	806
Property Insurance	33	32	32	32
Investment Repairs	143	143	143	143
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>1,822</b>	<b>1,821</b>	<b>1,820</b>	<b>1,821</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>12,649</b>	<b>4,059</b>	<b>4,544</b>	<b>4,850</b>
<b>INCOME/ACRE FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>4,595</b>	<b>8,271</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>12,649</b>	<b>4,059</b>	<b>0</b>	<b>0</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>	<b>0</b>	<b>0</b>	<b>51</b>	<b>3,421</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	<b>12,649</b>	<b>16,708</b>	<b>16,657</b>	<b>13,236</b>
Capital Recovery Cost:				
Shop Building	20	20	20	20
Land	4,724	4,724	4,724	4,724
Drip Irrigation System	136	136	136	136
Frost Protection System	191	191	191	191
Fuel Tank: 1 - 250 Gallon	3	3	3	3
Reservoir: 12 AcFt	227	227	227	227
Shop Tools	9	9	9	9
Equipment	159	152	135	152
<b>TOTAL CAPITAL RECOVERY COST</b>	<b>5,469</b>	<b>5,462</b>	<b>5,445</b>	<b>5,462</b>
<b>TOTAL COST/ACRE FOR THE YEAR</b>	<b>18,118</b>	<b>9,521</b>	<b>9,989</b>	<b>10,312</b>
<b>INCOME/ACRE FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>4,595</b>	<b>8,271</b>
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>	<b>18,118</b>	<b>9,521</b>	<b>5,394</b>	<b>2,041</b>
<b>TOTAL ACCUMULATED NET COST/ACRE</b>	<b>18,118</b>	<b>27,639</b>	<b>33,033</b>	<b>35,074</b>

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE WINE GRAPE**  
 NORTH COAST - SONOMA COUNTY - 2004

Operation	Operation	Cash and Labor Cost per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
<b>CULTURAL:</b>								
Prune: Winter	18.00	279	0	0	0	279		
Prune: Winter-Retie & Move Wires	8.00	124	0	0	0	124		
Weed: Vine Row - Winter (Goal, Roundup)	0.84	20	2	17	0	39		
Weed/Prune: Floor Centers - Shred Prunings/Mow (Alt Rows)	0.43	10	4	0	0	14		
Weed: Floor Centers - Mow Non-Pruning Centers (Alt Rows)	0.43	10	4	0	0	14		
Disease: 2X - Copper & Sulfur (Champ, Thiolux)	0.38	9	3	28	0	40		
Frost Protection: Overhead Sprinklers 6X	3.00	47	0	28	0	75		
Disease: Mildew 5X (Dusting Sulfur) - Alt. Rows	2.21	53	15	8	0	76		
Weed: Floor Center - Mow Alternate Centers	0.43	10	4	0	0	14		
Sucker: Cordons 2X	16.00	248	0	0	0	248		
Canopy: Move Wires 2X	16.00	248	0	0	0	248		
Sucker: Trunks	8.00	124	0	0	0	124		
Insect: Leafhoppers 1X/3Yr (Provado)	0.38	9	3	10	0	22		
Insect: Mites 2X/3Yr (Acramite)	0.76	18	6	35	0	59		
Weed: Floor Centers - Disc Alternate Centers 2X	0.48	12	3	0	0	15		
Weed: Vine Row - Spring 2X/3Yr (Fire Power)	0.16	4	0	3	0	7		
Weed: Vine Row - Spring 1X/3Yr (Rely)	0.38	9	3	4	0	16		
Disease/Fertilizer: Prebloom, Mildew/Boron, Zinc (Rally/Solubor, Neutral Zinc)	1.15	28	9	49	0	85		
Disease: Mildew Mid-Season 2X (Rally)	1.67	40	13	48	0	101		
Fertilize: N (CaNO3)	0.00	0	0	12	0	12		
Canopy: Leaf Removal	12.00	186	0	0	0	186		
Canopy: Hedging	0.43	10	5	0	0	16		
Fertilize: NPK (2-15-15)	0.00	0	0	66	0	66		
Disease: Mildew 3X (Dusting Sulfur)	2.21	53	15	5	0	73		
Disease: Mildew/Botrytis - Pre-bunch Close (Rally/Vanguard)	1.15	28	9	65	0	101		
Crop Adjustment: Fruit Thin	18.00	279	0	0	0	279		
Irrigate 12X (1X/week)	3.30	51	0	20	0	71		
Disease: Mildew Late Season (Flint)	2.29	55	18	52	0	125		
Fertilize: Potassium (Thiosulfate)	0.00	0	0	24	0	24		
Pickup Truck Use	0.85	20	6	0	0	27		
ATV Use	0.85	20	2	0	0	22		
Pest Monitoring PCA	0.00	0	0	0	35	35		
Fertilize: Tissue Analysis - 1X/ 3 Yrs	0.00	0	0	0	3	3		
<b>TOTAL CULTURAL COSTS</b>	<b>119.80</b>	<b>2,006</b>	<b>125</b>	<b>473</b>	<b>38</b>	<b>2,641</b>		
<b>HARVEST:</b>								
Harvest & Haul	0.00	0	0	0	840	840		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>840</b>	<b>840</b>		
<b>Postharvest:</b>								
Irrigation: Overhead Sprinklers	1.50	23	0	14	0	38		
Cover Crop: Disc Centers 1X/4 Yr	0.12	3	1	0	0	4		
Cover Crop: Plant 1X/4 Yr	0.12	3	1	10	0	14		
<b>TOTAL POSTHARVEST COSTS</b>	<b>1.74</b>	<b>29</b>	<b>2</b>	<b>25</b>	<b>0</b>	<b>56</b>		
<b>Assessment:</b>								
Sonoma County Grape Growers Association	0.00	0	0	13	0	13		
Russian River Valley Winegrowers	0.00	0	0	24	0	24		
<b>TOTAL ASSESSMENT COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>37</b>	<b>0</b>	<b>37</b>		
Interest on operating capital @ 6.89%						84		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,035</b>	<b>127</b>	<b>534</b>	<b>878</b>	<b>3,657</b>		

UC COOPERATIVE EXTENSION

Table 2. continued

Operation	Operation	Cash and Labor Cost per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
<b>CASH OVERHEAD:</b>								
Liability Insurance						17		
Manager's Salary						558		
Office Expense						250		
Sanitation Fees						15		
Property Taxes						891		
Property Insurance						90		
Investment Repairs						143		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>1,964</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>5,621</b>		
<b>NON-CASH OVERHEAD: Capital Recovery</b>								
		<u>Per producing Acre</u>		<u>Annual Cost Capital Recovery</u>				
Buildings: 400 sq ft		227		20		20		
Land @ \$65,000 per acre		75,833		4,724		4,724		
Drip Irrigation System		1,733		136		136		
Frost Protection System		2,213		191		191		
Fuel Tanks: 1-250 Gal		33		3		3		
Reservoir: 12 AcFt		2,900		227		227		
Shop Tools		67		9		9		
Establishment Cost		16,657		1,411		1,411		
Equipment		1,682		190		190		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>						<b>6,909</b>	<b>6,909</b>	
<b>TOTAL COSTS/ACRE</b>						<b>12,530</b>		

UC COOPERATIVE EXTENSION  
**Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPE**  
 NORTH COAST - SONOMA COUNTY 2004

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Chardonnay	6.00	ton	1,838	11,028	
<b>OPERATING COSTS</b>					
<b>Herbicide:</b>					
Goal 2XL	1.00	pint	13.32	13	
Roundup Ultra Max	0.50	pint	7.50	4	
Fire Power	0.67	qt	4.63	3	
Rely	0.50	qt	7.15	4	
<b>Fungicide:</b>					
Champ 2 Flowable	3.60	pint	4.69	17	
Thiolux Micronized Sulfur	12.00	lb	0.90	11	
Dusting Sulfur	80.00	lb	0.16	13	
Rally	20.00	oz	4.75	95	
Vanguard	10.00	oz	4.09	41	
Flint	4.00	oz	12.99	52	
<b>Water:</b>					
Water - Frost Protection	3.96	acin	7.18	28	
Water - Pumped	3.34	acin	6.03	20	
Water - Post Harvest	2.00	acin	7.18	14	
<b>Insecticide:</b>					
Provado Solupak	0.25	oz	40.90	10	
<b>Miticide:</b>					
Acramite 50 WS	0.50	lb	70.00	35	
<b>Fertilizer:</b>					
Solubor	4.90	lb	4.40	22	
Neutral Zinc	3.84	lb	0.92	4	
15.5-0-0 CaNO3 Solution Grade	15.50	lb N	0.77	12	
2-15-15	20.00	gal	3.30	66	
Potassium Thiosulfate	10.00	gal	2.36	24	
<b>Contract:</b>					
Mechanical Harvest	6.00	ton	125.00	750	
Haul to Crusher	6.00	ton	15.00	90	
PCA Fee	1.00	acre	35.00	35	
Tissue Analysis	1.00	acre	3.00	3	
<b>Cover Crop:</b>					
Seed	5.00	lb	2.10	10	
<b>Assessments:</b>					
SCGGA Fee	1.00	acre	12.50	13	
RRVW Fee	6.00	ton	4.00	24	
Labor (machine)	21.29	hrs	20.00	426	
Labor (non-machine)	103.80	hrs	15.50	1,609	
Fuel - Gas	3.35	gal	1.88	6	
Fuel - Diesel	48.72	gal	1.45	71	
Lube				12	
Machinery repair				38	
Interest on operating capital @ 6.89%				84	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>3,657</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>7,371</b>	

## UC COOPERATIVE EXTENSION

Table 3. continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS:</b>					
Liability Insurance				17	
Manager's Salary				558	
Office Expense				250	
Sanitation Fees				15	
Property Taxes				891	
Property Insurance				90	
Investment Repairs				143	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				1,964	
<b>TOTAL CASH COSTS/ACRE</b>				5,621	
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Buildings: 400 sq ft				20	
Land @ \$65,000 per acre				4,724	
Drip Irrigation System				136	
Frost Protection System				191	
Fuel Tanks: 1-250G				3	
Reservoir: 12 AcFt				227	
Shop Tools				9	
Establishment Cost				1,411	
Equipment				190	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				6,909	
<b>TOTAL COSTS/ACRE</b>				12,530	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				-1,502	

UC COOPERATIVE EXTENSION  
**Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WINE GRAPE**  
 NORTH COAST - SONOMA COUNTY 2004

Beginning JAN 04	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 04	04	04	04	04	04	04	04	04	04	04	04	04	
Cultural:													
Prune: Winter	279												279
Prune: Winter-Retie & Move Wires	124												124
Weed: Vine Row - Winter (Goal, Roundup)	39												39
Weed/Prune: Floor Centers - Shred Prunings/Mow (Alt Rows)			14										14
Weed: Floor Centers - Mow Non Pruning Centers (Alt Rows)			14										14
Disease: 2X - Copper & Sulfur (Thiolux, Champ)			40										40
Frost Protection: Overhead Sprinklers 6X			25	25	25								75
Disease: Mildew 5X (Dusting Sulfur) - Alt. Rows			24	39	13								76
Weed: Floor Center - Mow Alternate Centers				14									14
Sucker: Cordons				124	124								248
Canopy: Move Wires 2X				124	124								248
Sucker: Trunks					124								124
Insect: Leafhoppers 1X/3Yr (Provado)					22								22
Insect: Mites 2X/3Yr (Acramate)					59								59
Weed: Floor Centers - Disc Alternate Centers					7	7							15
Weed: Vine Row - Spring 2X/3Yr (Fire Power)					7								7
Weed: Vine Row - Spring 1X/3Yr (Rely)					16								16
Disease/Fertilizer: Prebloom, Mildew/B, Zn (Rally/Solubor, Zinc)					85								85
Disease: Mildew Mid-Season (Rally)					50	50							101
Fertilize: N (CaNO3)						12							12
Canopy: Leaf Removal						186							186
Canopy: Hedging						16							16
Fertilize: NPK (2-15-15)						33	33						66
Disease: Mildew 3X (Dusting Sulfur)						24	49						73
Disease: Mildew/Botrytis - Pre-bunch Close (Rally/Vanguard)						101							101
Crop Adjustment: Fruit Thin							279						279
Irrigate 12X							24	24	24				71
Disease: Mildew Late Season (Flint)							62	62					125
Fertilize: Potassium (Thiosulfate)							24						24
Pickup Truck Use	2	2	2	2	2	2	2	2	2	2	2	2	27
ATV Use	2	2	2	2	2	2	2	2	2	2	2	2	22
Pest Monitoring PCA	4	4	4	4	4	4	4	4	4	4			35
Fertilize: Tissue Analysis 1X/ 3 Yr					3								3
<b>TOTAL CULTURAL COSTS</b>	<b>449</b>	<b>8</b>	<b>126</b>	<b>334</b>	<b>668</b>	<b>437</b>	<b>478</b>	<b>94</b>	<b>31</b>	<b>8</b>	<b>4</b>	<b>4</b>	<b>2,641</b>
Harvest:													
Harvest & Haul									840				840
<b>TOTAL HARVEST COSTS</b>									<b>840</b>				<b>840</b>
Postharvest:													
Irrigation: Overhead Sprinklers									38				38
Cover Crop: Disc Centers 1X/4 Yr										4			4
Cover Crop: Plant 1X/4 Yr										14			14
<b>TOTAL POSTHARVEST COSTS</b>									<b>38</b>	<b>18</b>			<b>56</b>
Assessment:													
Sonoma County Grape Growers									13				13
Russian River Valley Wine									24				24
<b>TOTAL ASSESSMENT COSTS</b>									<b>37</b>				<b>37</b>
Interest on operating capital	3	3	3	5	9	12	14	15	20	0	0	0	84
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>452</b>	<b>10</b>	<b>129</b>	<b>339</b>	<b>678</b>	<b>449</b>	<b>492</b>	<b>109</b>	<b>966</b>	<b>26</b>	<b>4</b>	<b>4</b>	<b>3,657</b>

UC COOPERATIVE EXTENSION

Table 4. continued

Beginning JAN 04 Ending DEC 04	JAN 04	FEB 04	MAR 04	APR 04	MAY 04	JUN 04	JUL 04	AUG 04	SEP 04	OCT 04	NOV 04	DEC 04	TOTAL
<b>OVERHEAD:</b>													
Liability Insurance		17											17
Manager's Salary		56	56	56	56	56	56	56	56	56			558
Office Expense		25	25	25	25	25	25	25	25	25			250
Sanitation Fees		1	1	1	1	1	1	1	1	1			15
Property Taxes		891											891
Property Insurance		45					45						90
Investment Repairs		12	12	12	12	12	12	12	12	12	12	12	143
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>1,047</b>	<b>94</b>	<b>94</b>	<b>94</b>	<b>94</b>	<b>139</b>	<b>94</b>	<b>94</b>	<b>94</b>	<b>12</b>	<b>12</b>	<b>1,964</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>1,499</b>	<b>104</b>	<b>223</b>	<b>433</b>	<b>772</b>	<b>543</b>	<b>631</b>	<b>203</b>	<b>1,060</b>	<b>120</b>	<b>16</b>	<b>5,621</b>

§ Postharvest operation costs are discounted back to the time of the first harvest



UC COOPERATIVE EXTENSION  
**Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS**  
 NORTH COAST - SONOMA COUNTY 2004

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	- Cash Overhead -		Total
						Insur- ance	Taxes	
04	60 HP 4WD Tractor	29,000	16	5,194	2,717	116	171	3,003
04	ATV 4WD	6,700	5	3,003	1,070	33	49	1,152
04	Brush Shredder 6'	6,900	15	662	693	26	38	757
04	Disc - Offset 5'	4,350	15	418	437	16	24	477
04	Duster - 3 Pt	4,700	12	651	530	18	27	574
04	Orchard Sprayer 300 G	10,000	10	1,768	1,241	40	59	1,339
04	Pickup Truck 1/2 T	26,000	7	9,863	3,529	121	179	3,829
04	Ringroller - 5'	657	20	34	57	2	3	63
04	Seed Drill - 5'	7,000	10	1,238	869	28	41	938
04	Sprayer ATV 20 Gal	475	10	84	59	2	3	64
04	Vine Trimmer	14,200	10	228	1,933	49	72	2,054
<b>TOTAL</b>		<b>109,982</b>		<b>23,143</b>	<b>13,135</b>	<b>450</b>	<b>666</b>	<b>14,250</b>
60% of New Cost *		65,989		13,886	7,881	270	399	8,550

\* Used to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
<b>INVESTMENT</b>								
Buildings: 400 SqFt	6,800	20	680	586	25	37	136	785
Drip Irrigation System	52,000	25	5,200	4,065	193	286	1,040	5,585
Vineyard Establishment Cost	499,710	22		42,332	1,689	2,499	0	46,520
Frost Protection System	66,400	20	6,640	5,722	247	365	1,328	7,662
Fuel Tanks: 1-250G	1,000	25	100	78	4	6	20	107
Land	2,275,000	23	2,275,000	141,732	0	22,750	0	164,482
Reservoir: 12 AcFt	87,000	25	8,700	6,802	323	479	1,740	9,344
Shop Tools	2,000	10	200	260	7	11	40	318
<b>TOTAL INVESTMENT</b>	<b>2,989,910</b>		<b>2,296,520</b>	<b>201,577</b>	<b>2,489</b>	<b>26,432</b>	<b>4,304</b>	<b>234,802</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	30	acre	17.20	516
Manager's Salary 25% Time	30	acre	558.00	16,740
Office Expense	30	acre	250.00	7,500
Sanitation Fees	30	acre	14.53	436

UC COOPERATIVE EXTENSION  
**Table 6. HOURLY EQUIPMENT COSTS**  
 NORTH COAST - SONOMA COUNTY 2004

		COSTS PER HOUR							
Yr	Description	Actual	-- Cash Overhead --			----- Operating -----		Total	Total
		Hours Used	Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube		
04	60 HP 4WD Tractor	496.40	3.28	0.14	0.21	0.70	4.91	5.61	9.24
04	ATV 4WD	172.40	3.72	0.11	0.17	0.50	1.44	1.94	5.95
04	Brush Shredder 6'	39.00	10.66	0.39	0.58	3.10	0.00	3.10	14.74
04	Disc - Offset 5'	18.20	14.41	0.53	0.79	0.67	0.00	0.67	16.40
04	Duster - 3 Pt	132.70	2.40	0.08	0.12	0.65	0.00	0.65	3.25
04	Orchard Sprayer 300 G	244.80	3.04	0.10	0.14	1.69	0.00	1.69	4.97
04	Pickup Truck 1/2 T	142.50	14.86	0.51	0.76	1.91	5.40	7.31	23.43
04	Ringroller - 5'	3.70	9.37	0.38	0.56	0.07	0.00	0.07	10.38
04	Seed Drill - 5'	3.70	141.61	4.54	6.72	1.88	0.00	1.88	154.74
04	Sprayer ATV 20 Gal	29.90	1.18	0.04	0.06	0.13	0.00	0.13	1.40
04	Vine Trimmer	12.90	89.92	2.27	3.36	5.87	0.00	5.87	101.42

UC COOPERATIVE EXTENSION  
**Table 7. RANGING ANALYSIS**  
 NORTH COAST - SONOMA COUNTY 2004

COSTS PER ACRE AT VARYING YIELDS FOR WINE GRAPE

	YIELD (ton/acre)						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	2,641	2,641	2,641	2,641	2,641	2,641	2,641
Harvest Cost	420	560	700	840	980	1,120	1,260
Postharvest Cost	56	56	56	56	56	56	56
Assessment Cost	25	28	33	37	41	44	48
Interest on operating capital	81	82	83	84	85	85	86
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>3,223</b>	<b>3,367</b>	<b>3,513</b>	<b>3,658</b>	<b>3,803</b>	<b>3,946</b>	<b>4,091</b>
<b>TOTAL OPERATING COSTS/ton</b>	<b>1,074</b>	<b>842</b>	<b>703</b>	<b>610</b>	<b>543</b>	<b>493</b>	<b>455</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>1,964</b>	<b>1,964</b>	<b>1,964</b>	<b>1,964</b>	<b>1,964</b>	<b>1,964</b>	<b>1,964</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>5,187</b>	<b>5,331</b>	<b>5,477</b>	<b>5,622</b>	<b>5,767</b>	<b>5,910</b>	<b>6,055</b>
<b>TOTAL CASH COSTS/ton</b>	<b>1,729</b>	<b>1,333</b>	<b>1,095</b>	<b>937</b>	<b>824</b>	<b>739</b>	<b>673</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>6,909</b>	<b>6,909</b>	<b>6,909</b>	<b>6,909</b>	<b>6,909</b>	<b>6,909</b>	<b>6,909</b>
<b>TOTAL COSTS/ACRE</b>	<b>12,096</b>	<b>12,240</b>	<b>12,386</b>	<b>12,531</b>	<b>12,676</b>	<b>12,819</b>	<b>12,964</b>
<b>TOTAL COSTS/ton</b>	<b>4,032</b>	<b>3,060</b>	<b>2,477</b>	<b>2,089</b>	<b>1,811</b>	<b>1,602</b>	<b>1,440</b>

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1,550	1,427	2,833	4,237	5,642	7,047	8,454	9,859
1,650	1,727	3,233	4,737	6,242	7,747	9,254	10,759
1,750	2,027	3,633	5,237	6,842	8,447	10,054	11,659
1,850	2,327	4,033	5,737	7,442	9,147	10,854	12,559
1,950	2,627	4,433	6,237	8,042	9,847	11,654	13,459
2,050	2,927	4,833	6,737	8,642	10,547	12,454	14,359
2,150	3,227	5,233	7,237	9,242	11,247	13,254	15,259

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1,550	-537	869	2,273	3,678	5,083	6,490	7,895
1,650	-237	1,269	2,773	4,278	5,783	7,290	8,795
1,750	63	1,669	3,273	4,878	6,483	8,090	9,695
1,850	363	2,069	3,773	5,478	7,183	8,890	10,595
1,950	663	2,469	4,273	6,078	7,883	9,690	11,495
2,050	963	2,869	4,773	6,678	8,583	10,490	12,395
2,150	1,263	3,269	5,273	7,278	9,283	11,290	13,295

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
1,550	-7,446	-6,040	-4,636	-3,231	-1,826	-419	986
1,650	-7,146	-5,640	-4,136	-2,631	-1,126	381	1,886
1,750	-6,846	-5,240	-3,636	-2,031	-426	1,181	2,786
1,850	-6,546	-4,840	-3,136	-1,431	274	1,981	3,686
1,950	-6,246	-4,440	-2,636	-831	974	2,781	4,586
2,050	-5,946	-4,040	-2,136	-231	1,674	3,581	5,486
2,150	-5,646	-3,640	-1,636	369	2,374	4,381	6,386

UC COOPERATIVE EXTENSION  
**Table 8. COSTS AND RETURNS / BREAKEVEN ANALYSIS**  
 NORTH COAST - SONOMA COUNTY 2004

COSTS AND RETURNS - PER ACRE BASIS							
Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Wine Grape	11,028	3,657	7,371	5,621	5,407	12,530	-1,502

COSTS AND RETURNS - TOTAL ACREAGE							
Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Wine Grape	330,084	109,712	221,128	168,618	162,222	375,901	-45,061

BREAKEVEN PRICES PER YIELD UNIT					
CROP	Base Yield (Units/Acre)	Yield Units	----- Breakeven Price To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Wine Grape	6.0	Ton	609.51	936.77	2,088.34

BREAKEVEN YIELDS PER ACRE					
CROP	Yield Units	Base Price (\$/Unit)	----- Breakeven Yield To Cover -----		
			Operating Costs	Cash Costs	Total Costs
			----- Yield Units / Acre -----		
Wine Grape	Ton	1,838	2.0	3.1	6.8

UC COOPERATIVE EXTENSION  
**Table 9. DETAILS OF OPERATIONS**  
 NORTH COAST – SONOMA COUNTY 2004

Operation	Operation Month	Equipment Power Unit	Implement	Material	Broadcast Rate/acre	Material Unit
Prune: Winter	January	Labor				
Prune: Winter – Re-tie & Move Wires	January	Labor				
Weed: Vine Row -Winter	January	ATV - 4WD	Sprayer - ATV 20 Gal	Goal 2XL	1.00	pint
				Roundup	0.50	pint
Weed/Prune: Floor Centers– Shred Prunings/ Mow (Alt Rows)	March	60 HP 4WD Tractor	Shredder/Mower - 6'			
Weed: Floor Center- Mow No Prunings Centers (Alt Rows)	March	60 HP 4WD Tractor	Shredder/Mower – 6'			
Disease: Powdery Mildew Cu & S Spray 2X	March	60 HP 4WD Tractor	Orch Sprayer - 300 Gal	Champ	2.67	lb
				Thiolux	12.00	lb
Frost Protection : Overhead Sprinklers 6X	March	Labor		Water 2X	1.32	acin
	April	Labor		Water 2X	1.32	acin
	May	Labor		Water 2X	1.32	acin
Disease: Powdery Mildew Dusting Sulfur 5X	March	60 HP 4WD Tractor	Duster - 3 Point	Sulfur Dust	10.00	lb
	April	60 HP 4WD Tractor	Duster - 3 Point	Sulfur Dust 3X	30.00	lb
	May	60 HP 4WD Tractor	Duster - 3 Point	Sulfur Dust	10.00	lb
Weed: Floor Centers– Mow Alternate Centers	April	60 HP 4WD Tractor	Shredder/Mower - 6'			
Sucker: Shoot Thin Cordons 2X	April	Labor				
	May	Labor				
Sucker: Trunks	May	Labor				
Canopy: Move Wires 2X	April	Labor				
	May	Labor				
Insect: Leafhopper (Sprayed 1X/3 Years)	May	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Provado 75	0.25	oz
Insect: Mites (Sprayed 2X/3 Years)	May	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Acaramite	0.50	lb
Weed: Floor Centers– Disc Alternate Center 2X	May	60 HP 4WD Tractor	Disc - Offset 5'			
	June	60 HP 4WD Tractor	Disc – Offset 5'			
Weed: Vine Row -Spring (2X/3 Years)	May	ATV - 4WD	Sprayer - ATV 20 Gal	Fire Power	0.67	qt
Weed: Vine Row – Spring (1X/3 Years)	May	ATV - 4WD	Sprayer - ATV 20 Gal	Rely	0.33	qt
Disease/Fertilizer: Pre-Bloom - Mildew/Zn & B	May	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Rally	5.00	oz
				Solubor	4.90	lb
				Neutral Zinc	3.84	lbs
Disease: Mildew Mid-season Sprays 2X	May	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Rally	5.00	oz
	June	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Rally	5.00	oz
Fertilize: Nitrogen	June			15-0-0	15.5	lbs
Canopy: Leaf Removal	June	Labor				
Canopy: Hedging	June	Labor				
Fertilize: NPK 2X	June			2-15-15	10.00	gal
	July			2-15-15	10.00	gal
Disease: Mildew 3X	June	60 HP 4WD Tractor	Duster - 3 Point	Sulfur Dust	10.00	lb
	July	60 HP 4WD Tractor	Duster - 3 Point	Sulfur Dust 2X	20.00	lb
Disease: Mildew/Botrytis Pre-Bunch Close Spray	June	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Rally	5.00	oz
				Vanguard	10.00	oz
Crop Adjustment: Fruit Thin	July	Labor				
Irrigate 12X (1X/week)	July	Labor		Water	1.12	acin
	August	Labor		Water	1.10	acin
	September	Labor		Water	1.12	acin
Disease: Mildew Late Season 2X	July	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Flint	2.00	oz
	August	60 HP 4WD Tractor	Orchard Sprayer - 300 Gal	Flint	2.00	oz
Fertilize: Potassium	July			Potassium Thiosulfate	10.00	gal
Harvest & Haul	September			Harvest - Contract		
				Haul - Contract		
Irrigation: Postharvest Overhead Sprinklers	September	Labor		Water	2.00	acin
Cover Crop: Disc Centers (1X/4 Years)	October	60 HP 4WD Tractor	Disc - Offset 5'			
Cover Crop: Plant & Roll (1X/4 Years)	October	60 HP 4WD Tractor	Seed Drill - 5'	Cover Crop Mix	5.00	lb
			Ringroller - 5"			