
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2010

**SAMPLE COSTS TO
ESTABLISH A VINEYARD AND PRODUCE
WINEGRAPES**

CABERNET SAUVIGNON



NORTH COAST REGION

Sonoma County

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CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs.....	3
Production Cultural Practices and Material Inputs	7
Labor, Interest & Equipment	10
Cash Overhead Costs.....	11
Non-Cash Overhead Costs.....	11
REFERENCES	13
Table 1. COSTS PER ACRE TO ESTABLISH A VINEYARD.....	14
Table 2. COSTS PER ACRE TO PRODUCE WINEGRAPES	16
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINEGRAPES	18
Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WINEGRAPES	20
Table 5. RANGING ANALYSIS.....	22
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS.....	23
Table 7. HOURLY EQUIPMENT COSTS	24
Table 8. OPERATIONS WITH MATERIALS AND EQUIPMENT	25

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INTRODUCTION

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 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. Practices described are based on production practices considered typical for the crop and area, but will not apply to every situation. A blank column titled *Your Costs* is provided in Tables 2 and 3 to enter your actual costs.

For an explanation of calculations used in 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 530-752-3589 or Rhonda Smith, UC Cooperative Extension Sonoma County Farm Advisor, at 707-565-2621 or email rsmith@ucdavis.edu.

Cost of production studies can be downloaded from the department's website <http://coststudies.ucdavis.edu>, or obtained from your county UC Cooperative Extension office. They may also be ordered from the Department of Agricultural and Resource Economics, at the above address or by calling 530-752-6887.

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ASSUMPTIONS

The following assumptions refer to Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce winegrapes in the North Coast Region - Sonoma County (Crush District 3). 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, natural drainage, soil chemistry characteristics that affect nutrient uptake, excessive wind, and soil pests and diseases such as nematodes and Armellaria root rot.

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 Alexander Valley American Viticultural Area, Sonoma County, CA. The farm is owned and operated by the grower with assistance from a part-time foreman. The site has less than a 5% natural slope and was previously planted to grapevines. The farm is 35 contiguous acres, 30 of which are planted. Roads, irrigation system, and farmstead occupy the other five acres. There is no home on the property. The land is valued at \$65,000 per acre.

Two moderate-to-high yielding clones of Cabernet Sauvignon 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 over the life of the mature vineyard is five tons per acre; however in reality, production is strongly influenced by the vineyard's specific location within the Alexander Valley and by 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 \$12 for general labor and \$15 for machine labor. Payroll overhead is in addition to these wages.

Establishment Cultural Practices and Material Inputs (Table 1)

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

Site Determination (Regulations). A site assessment done by the Sonoma County Agricultural Commissioner's office under the authority of the *Sonoma County Grading, Drainage and Vineyard and Orchard Site Development Ordinance* verified the area to be replanted as a "Level I". 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 \$944 fee is required for a Level 1 site for a new vineyard or replant greater than 10 acres and less than 50. This is paid in the first year only.

The purpose of the regulation is to reduce erosion and runoff in vineyards as well as establish setbacks from wetlands, blue line creeks and other waterways with a defined bed and bank. The ordinance requires growers notify the county Agricultural Commissioner of the intent to establish or replant a vineyard exceeding one-half acre in size. Documentation of natural slope, soil types, set backs and best management practices for reducing impacts verified with a site visit by the county results 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, project size and required mitigation.

Site Preparation. Immediately prior to the removal of the old vineyard, the site is sampled to assess soil fertility and nematode populations. Both sample types are taken from areas of concern involving vine growth, thus the number of samples can be variable. In this vineyard, soil is collected from 3 different locations at 3 depths resulting in 9 soil samples and 3 soil-root samples for nematode analysis. 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 that vines are planted 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. In practice, there are various methods used to physically modify soil in a replant site. Soil can be ripped with two wingless tines (shanks) in more than one direction to improve access to stored soil moisture and decrease compaction caused by previous farming activities. Alternatively, a single winged tine can be used to make a single pass down the future vine rows to purposely restrict rooting depth and access to total available water. In this vineyard, the ground is ripped in three different directions to a depth of four-feet to increase rooting depth and access to available water. After the first pass, lime, gypsum, and compost are each spread at a rate of five tons per acre. Old vine roots are removed by hand after each pass. After the final ripping pass, 4-6 passes with a disc to smooth the soil surface for planting follows.

Cover Crop. 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. Straw is hand applied to the edges of the vineyard including the turn-around areas, to comply with best management practices of the county ordinance previously described. 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.

Vineyard Design. The vineyard is laid out in three blocks each containing 40 rows. There are two avenues between the four blocks with turn-around space for equipment at the end of the rows. The rows are 1,000 feet long and have 198 vines per row. Vine spacing is 8-foot by 5-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 vineyard is laid out in the spring of the first year, and all T-stakes, in-line and end posts and wires are installed. Eight-foot, T-stakes are installed on five foot centers and 8-foot T-posts are installed on 15-foot centers between stakes. Stakes and posts are driven three feet into the ground. A ten-foot, 2-7/8 inch drill pipe with a single spade is set at the end of each row and driven 4.5 feet into the ground. The 14-gauge wire for supporting the drip irrigation lateral (black hose) is clipped to each T-stake 14 inches above the ground and secured to each end post. The drip lateral is attached to the drip wire with one K-curl per vine. A permanent, 12-gauge, high tensile, cordon wire is attached to each stake and T-post, 32 inches above the ground. One 6-inch and two 8-inch notched cross arms are installed on each T-post at 12, 24 and 36 inches above the cordon wire respectively. In the second year, two pairs of movable, 14-gauge, high tensile wires are secured to each endpost and draped on the cross arms. During the growing season, these movable wires are moved to the ends of the cross arms as shoot growth occurs and are held in position by notches. 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.

Vines. Dormant, bench grafted Cabernet Sauvignon vines are planted in the early spring on an 8-foot X 5-foot spacing (row-by-vine) resulting in a planting density of 1,089 vines per acre. In June of the first year 2% or 21 vines per acre are replanted for those lost in the first year. In the second year 1% or 11 vines are replanted. Vines are trained during the second and third years and expected to begin yielding harvestable fruit in three years (third leaf). They will be productive for an additional 22 years.

Planting. 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 straw. This is followed by trellis installation. In late May, a contractor digs the holes by hand, and plants the vines. Long cartons are placed over each vine at the time of planting to protect against wind damage and chemical weed control sprays. In early summer 2% of the vines are replanted to replace weak or dead vines. One percent of the vines, or 11 vines per acre, are replaced in the second year.

Miscellaneous Labor. After planting general field labor does various field duties such as walking each row to check that irrigation water is reaching each vine through the spaghetti tubing and making necessary adjustments. They also check vines and flag dead vines for replanting in the fall.

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. Vines are monitored for growth, but are not shoot thinned or trained in the first year.

Second Year. During the plants' first winter (February), the cartons are lifted and each vine is pruned to a single two bud spur. The carton is then replaced and retied to the stake as necessary. In spring and summer of the second growing season three passes are required to train the vines. In the first pass during late May/early June, the carton is lifted, vines are shoot-thinned to one shoot which is tied to the stake and the carton replaced. In the second pass in July, the carton is permanently removed; the vine is re-tied to the stake and topped. Because vines grow at different rates, a third pass is needed for slower growing vines, which are treated like those on the second pass. For the majority of vines on the third pass in August, lateral shoots are removed from the trunk and the top two laterals are loosely tied to the cordon wire. 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 or in February, the head of the vine is re-tied to the stake and the cordon canes are tied to the cordon wire.

When rapid shoot growth occurs in early spring (April), the cordons are suckered. One shoot is left per spur position and up to six spur positions per cordon are selected. At the same time, cordon extensions on vines that require them are tied. The wires are moved in three passes (May, June, July). On the May pass, approximately one-quarter of the shoots arising from the cordons require stuffing between the lower pair of moveable wires. In June, spur positions continue to be selected to total six per cordon and cordon extensions are tied as needed. During the third pass in July, all shoots arising from the cordons will be stuffed between the appropriate pair of movable wires. Crop removal (fruit thinning) may occur in June during the same pass or a separate pass in the following manner: all clusters are removed on shoots that are shorter than 24 inches in length; one cluster is allowed to remain on shoots longer than 24 inches; however no more than 10-12 clusters are allowed to remain on a vine in the third year.

Costs that reflect training practices are only shown through the third 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. Pesticides mentioned in the study are commonly used, but are not recommendations.

Insect and Mite. A pest control adviser (PCA) monitors insect and mite pests, beneficial insect populations and looks for signs or symptoms of foliar diseases beginning in the third year to determine if control measures are necessary. The numbers of different lepidopteran (worm) pests are increasing in North Coast vineyards. These are monitored, but in this study, control treatments are not needed.

Disease. Foliar pathogens can cause disease in grapevines, but only powdery mildew, the major fungal disease, is addressed. Powdery mildew disease is closely related to temperature and leaf wetness in the spring, and to temperature 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. Disease control treatments are not made in the first and second year. Beginning in the third year, micronized sulfur (Thiolux) and copper (Champ) are tank mixed and applied in March and April followed by three sulfur dust applications – two in April and one in May – on alternate rows. Pristine, a product with two active ingredients each in different groups of fungicides is applied pre-bloom in May. That application is combined with foliar fertilizers. Dusting sulfur is again applied to alternate rows three times in June and once in July. One last powdery mildew treatment is made in July using Rally, a material in a third fungicide group. All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer.

Weed/Cover Crop (Vineyard Floor Management). Beginning in the first fall after the vines are planted, a cover crop is seeded. All centers will be mowed and disced each spring, and disced each summer of the establishment years. 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. In June, vine row weeds are controlled with one contact herbicide application (Buccaneer) followed by one hand weeding pass in late summer (July). In the fall, alternate row centers are disced once and a barley cover crop is seeded in disced centers with the grower's drill and roller.

Second Year. In the winter (January), vine row weeds are controlled with one application of a contact (Buccaneer) and pre-emergent herbicide (Prowl) mix. A second herbicide treatment is made with a contact material (Buccaneer) in the vine row in June. In March, all centers are mowed once and disced. They are disced a second time in June. In the fall (October), the same alternate row centers are disced once as were seeded the previous fall in preparation for planting a barley cover crop using the grower's drill.

Third Year. To control vine row weeds in the winter (January), a mixture of one preemergent (Chateau) and one post-emergent herbicide (Buccaneer) is applied. In June, the vine row is treated with Buccaneer. In March, the centers that had been seeded are mowed then disced. The alternate centers are mowed in March and June. In October, the same centers that had been seeded in the past are disced and now seeded with a grass-legume mix.

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. In the first and second year, a liquid NPK fertilizer (3-18-18) is applied once in June, twice in July and once in August for a total of 93.7 pounds (8 gallons) of material. In the third year, 30 pounds of a highly soluble NPK fertilizer (12-26-26) is applied through the drip irrigation system once in April. A single application of two gallons of 3-18-18 is made in early June. A total of 4.2 pounds per acre N and 12 pounds per acre P and K were applied. Also in the third year, boron and zinc foliar micronutrients are tank mixed with the powdery mildew fungicide application that occurs just prior to bloom. One pound of actual boron (Solubor) and two pounds of actual zinc (Neutral Zinc) per acre are sprayed. Petiole samples are taken by the PCA in May for nutrient analysis.

Irrigation. The irrigation cost includes labor and water. Based on grower pumping data, pumped irrigation water is calculated to cost \$16.50 per acre-inch. The well is approximately 120 feet deep with a 10 HP pump and standing water at approximately 50 feet deep. 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. In the first year, the irrigation sub-mains, risers, drip lines are installed and a single, one-half gallon emitter with spaghetti tubing is punched into the drip lateral. Miscellaneous field labor walks each row to check that irrigation water is reaching each vine through the spaghetti tubing and making adjustments as necessary. In the second year, a second emitter per vine, without spaghetti tubing, is added to the drip line.

Irrigation water is applied weekly through August in years 1 and 2, beginning in late May or early June. Beginning in year 3, the start of the irrigation period will be in June and continue into September. No assumption is made about in-season rainfall or the irrigation system's emission uniformity. Applied water volume by year is shown in Table A.

Year	Number of	
	months	AcIn/year
1	3	2.00
2	3	4.00
3+	4	6.00

In practice, the amount of water applied in the production years can vary significantly due to rainfall amounts and timing in the month preceding bud break in spring.

Frost Protection. It is assumed that the vineyard will need frost protection during the months of March, April, and May for a total of ten nights beginning in the third year. The windmachines run for five hours per night.

Harvest. In this study, the first crop is harvested in the third leaf. If the vines had been trained in the first year and site conditions and vine growth warrant, it may be appropriate to take the first crop off in the second year. 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 ton basis. Assumed average yields in the Alexander Valley are shown in Table B. It is important to note that a yield of 5 tons per acre is not achieved in all years.

Year	Tons Per Acre
0	0.0
3	1.5
4	3.5
5+	5.0

Production Cultural Practices and Material Inputs (Tables 2-8)

Prune, Tie, and Sucker. Pruning and tying are done during the winter months (January/March) and the prunings are chopped in March during the first mowing. Cordons are retied as necessary in February. Cabernet Sauvignon tends to push very few trunk suckers thus there is no pass dedicated to remove these suckers. Cordons are suckered once a year in April with hired crew.

Canopy Management (CM) and Crop Adjustment. Wires are dropped during pruning. They are moved up a total of three times (May, June, July) during each growing season in order to vertically position the canopy. In June, leaves are mechanically removed and the vine shoots are mechanically hedged just above the top of the T-stakes. This is followed by a hand “clean up” near the vine heads.

In June, the crop level is adjusted by thinning. Fruit clusters are removed from shoots shorter 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. In August at 95% veraison (i.e. 95% of the clusters have turned color), there is a single “green drop” pass to remove clusters that are not fully colored.

Fertilize. The fertilizers are applied through the drip system and as foliar sprays. CAN-17, a liquid fertilizer, is injected in the amount of 3.5 gallons (44 pounds of material) once in late April (one month after bud break) each year to deliver 7.5 pounds of nitrogen. An NPK fertilizer (12-26-26) is injected once at fruit set in early June in an amount that delivers 62.5 pounds of material. The total amount of nitrogen applied is 15 pounds per acre, and 16.2 pounds per acre each of phosphorus and potassium.

A pre-bloom foliar application of both zinc (Neutral Zinc) and boron (Solubor) is added to the (Pristine) spray application just prior to bloom in May. Two pounds of actual zinc and one-pound actual boron are applied. Each year, opposite cluster petioles are collected at bloom for tissue nutrient analyses. Every third year petioles are also collected in veraison (August) and post harvest (October). One third of the cost is included each year. Four samples per 30 acres or one sample per 7.5 acres is collected for analysis.

Irrigation. The cost includes labor and pumping costs based on using a 10 hp motor to pump from 150 feet deep over 30 acres. Based on grower input, pumped irrigation water cost \$16.50 per acre-inch. Price will vary by grower in this region depending on quantity pumped, power cost, various well characteristics, and other irrigation factors. Beginning in June, irrigation water is applied weekly through September. 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 ten nights during March, April and May. The windmachines run for five hours per night.

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 or contact the UC Cooperative Extension Sonoma County Viticulture Farm Advisor. To purchase pesticides for commercial use, a grower must be a Certified Private Applicator to obtain a Pesticide Identification number. For information regarding pesticide ID numbers and use permits, contact the Sonoma County Agricultural Commissioner's office.

Pest Control Adviser. The pest control adviser (PCA) monitors the field for pests, diseases, and nutritional status. PCAs are required to provide written recommendations for pesticides that they advise a grower to use. Growers may hire private (independent) PCAs or receive this service from PCAs who are employed by local retail agricultural chemical and fertilizer suppliers. In this study the grower hires a private PCA who monitors the field weekly.

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. After the three-year establishment period, a three-year cover crop rotation is implemented with alternate row-middles. The cover crop middles (CC) and the non-cover crop (NC) middles are switched every time a new cover crop is seeded. Planting the cover crop in the fall every three years involves ripping the new CC row middles to a 24-inch depth with a winged tine. Three tons per acre of gypsum is applied and disced in, and a legume and grass seed mix is planted using the grower’s drill.

The cover crop residue is mowed then disced three times in the spring and early summer following the fall planting. In early summer (June) the NC middles are mowed and the CC middles are disced. In years when a cover crop is not planted, all rows are mowed three times in late spring and early summer to kill the vegetation and shred prunings. For operations not done every year, one-third or two-thirds of the costs are allocated to the vineyard each year.

Vine row weeds are controlled with a winter (January) dormant mix using the pre-emergent herbicide, Goal and a contact herbicide, Buccaneer, applied as a strip spray. In practice, a different pre-emergent herbicide will be applied every third year.

Insect and Mite Management. A PCA monitors the vineyard weekly. It is assumed that it is necessary to treat mites once every third year. One-third of the costs are charged to the vineyard each year. Acramite is applied for mite control. In Table 3, the rates and material costs reflect the fact that they are not used every year. In addition, there are no costs assigned to control vine mealybugs. If it becomes established in a vineyard, at least one pesticide application will be required in addition to sanitation measures. The grower has two vine mealybug traps (no trap costs shown) up from June through October which are read by the PCA.

Disease Management. In late March and early April, micronized sulfur (Thiolux) and copper (Champ) are tank mixed and applied. These sprays are followed by three applications of dusting sulfur at 10-day intervals (twice in April and once in May) in which alternate rows are driven. Pristine, a material with active ingredients in two fungicide groups (quinine outside inhibitors and succinate dehydrogenate inhibitors) is applied at pre-bloom in the second or third week of May. (The pre-bloom application is combined with foliar fertilizers). Dusting Sulfur is applied to all rows three times in June and once in July. One last powdery mildew treatment is made in July using Rally, a material in the sterol biosynthesis inhibitor group of fungicides. (Avoiding two or more applications in a season with fungicides in the same group will reduce the development of resistance.) All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer.

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."

Harvest. Starting in the fourth year the fruit is mechanically harvested at a contract rate of \$450 per acre. It is assumed that the grapes are delivered to a winery within the county and the hauling cost included in the harvest cost.

Yields. Yield maturity is reached in the fifth year. An assumed average yield of 5 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 winegrapes according to variety, percent sugar, district grown and other factors. The mean weighted average price for Cabernet Sauvignon growers in Crush District 3 over the five-year period of 2005-2009 is \$2,236 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 5 for calculating net returns to growers at different yields.

Assessment. Grape growers in Sonoma County who sell a minimum of 25 tons are assessed 0.5% of the gross sales value of the crop under the authority of the California Winegrape Growers Commission Law under separate enabling statutes within the California Food and Agricultural Code, Division 22. Marketing Orders and Marketing Agreements are enabled under the California Marketing Act of 1937 (Division 21 of the California

Food and Agricultural Code). Grape sales assessments in Sonoma County are made available to the Sonoma County Winegrape Commission (SCWC), a non-profit marketing and educational organization established in 2006. The SCWC internet site can be accessed at <http://www.sonomawinegrape.org>.

Pickup/ATV. The grower uses the pickup for business and personal use. The assumed business use for the pickup is 3,000 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.

Post Harvest. In every third year, the cover crop centers are ripped with a winged tip shank (retro-ripped). When these centers are ripped, gypsum at three to four tons per treated acre is applied. One third of the ripping and gypsum costs are allocated to the budget each year.

Labor, Interest and Equipment

Labor. Labor rates of \$20.10 per hour for machine operators and \$16.08 for general labor include payroll overhead of 34%. The basic hourly wages are \$15.00 for machine operators and \$12.00 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. The cost is based on the average industry final rate as of January 1, 2010 (California Department of Insurance, unreferenced). 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.

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 takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$2.04 (excludes excise taxes) and \$2.70 per gallon, respectively. The cost includes a 2.5% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include a 7.5% sales tax plus federal and state excise tax. Some federal excise tax can be refunded for on-farm use when filing your income tax. The costs are based on 2009 Department of Energy (DOE) monthly data. 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 7 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 5.75% 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. The interest rate is the basic rate provided by a farm lending agency as of January 2010.

Risk. The risks associated with producing and marketing winegrapes 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.

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 0.767% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$621 for the entire farm.

Office Expense. Office and business expenses for 30 acres are estimated at \$9,000 annually or \$300 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 40% for payroll taxes and benefits.

Sanitation Services. Sanitation services provide portable toilets for the vineyard and cost the farm \$2,560 annually. This cost includes delivery and 10 months servicing the toilets.

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price. For vineyard establishment, investment repairs are 0.10% or approximately \$40 per acre for trellis and vine repair.

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 4.75% used to calculate capital recovery cost is the effective long term interest rate effective January 1, 2010. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

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

Land. Based on grower input, bare land is valued at \$65,000 per acre. This study assumes the land was purchased for replanting the vineyard and does not include the value of the vines. Because only 30 of the 35 acres are planted to grapes, land is valued at \$75,833 per planted acre. Price ranges for established vineyards and open land in Sonoma County are reported in “Trends in Agricultural Land & Lease Values” (California Chapter of the American Society of Farm Managers and Rural Appraisers).

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, 10 horsepower (hp) motor, filter system, and fertilizer injector is 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. Three windmachines are installed in the vineyard on cement pads in the second year and begin operation in the third year. The machines are propane powered and assumed to use 10-15 gallons per hour.

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 and supplies.

Establishment Cost. The 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 \$30,826 per acre or \$924,770 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. COSTS PER ACRE TO ESTABLISH A VINEYARD
 NORTH COAST - Sonoma County 2010

	Cost Per Acre			
	Year:	1st	2nd	
Tons Per Acre:				1.50
Land Preparation Costs:				
Site Determination: Development Fee		31		
Site Prep: Soil Test (1 per 10 acres x 3 depths)		18		
Site Prep: Nematode Sampling (1 per 10 acres)		7		
Site Prep: Vineyard Removal		600		
Site Prep: Fertilize (Lime, Gypsum & Compost)		700		
Site Prep: Rip 3X		350		
Site Prep: Pull old vine roots, pickup rocks		350		
Site Prep: Disk 6X (smooth ground for planting)		150		
Cover Crop: Plant cover crop (Barley) & spread straw		50		
Cover Crop: Mow cover crop		18		
Cover Crop: Disk cover crop 3X		44		
Plant: Mark , Layout, Stake Vineyard		325		
Trellis: Install Trellis (over 2 years)		10,000		
Irrigation: Install Drip & Submains (includes materials)		3,200		
Plant: (vines, labor, cartons)		5,826		
TOTAL SITE PREP AND PLANTING COSTS		21,670		
Cultural Costs:				
Irrigate: (water & labor)		64	81	130
Weed: Vine Row Spray (Buccaneer)		27	25	25
Plant: Replant 2% Yr 1, 1% Yr 2 (vines, labor, cartons)		102	59	
Fertilize: (4X Yrs 1 & 2. 1X Yr 3) Through drip (3-18-18)		76	76	19
Weed: Hand Weed Vine Row		213		
Cover Crop: Disc CC centers (cover crop preparation)		8	8	8
Cover Crop: Plant & Roll CC centers (Yrs 1-2, Barley. Yr 3, Legume/Grass Mixture)		24	24	34
Labor: Miscellaneous labor after planting		250		
Train: Prune to 2 buds			603	
Train: Train vines & tie			1,000	
Weed: Vine Row Winter Spray (Yr 2 Buccaneer, Prowl) (Yr 3 Buccaneer, Chateau)			28	67
Weed: Mow CC & NC centers (Yr 3 includes shred prunings)			32	32
Weed: Disc Centers (Yr 2, CC & NC. Yr 3 CC)			33	8
Weed: Mow NC centers				16
Fertilize: 1X Through drip (12-26-26)				44
Prune: Winter				289
Frost Protection: 10X				240
Train: Tie Cordons				161
Sucker: Sucker Cordons				322
Disease: Mildew (Thiolux, Champ) 2X				91
Disease: Mildew (Sulfur Dust) Alternate Rows				42
Fertilize: Petiole Analysis				5
Train: Move Wires & Stuff Shoots 3X				498
Prune: Crop Adjustment (thin fruit)				64
Disease: Mildew @ Prebloom (Pristine). Fertilize: (Zn, B)				96
Disease: Mildew @ Preveraison (Rally)				68
PCA				70
Pickup Use		114	114	114
ATV Use		23	23	23
TOTAL CULTURAL COSTS		901	2,105	2,467
Harvest Costs:				
Harvest and Haul				473
TOTAL HARVEST COSTS				473
Assessments:				
Sonoma County Winegrape Commission				17
TOTAL ASSESSMENT COSTS				17
Interest On Operating Capital @ 5.75%		947	82	67
TOTAL OPERATING COSTS/ACRE		23,518	2,187	3,023

UC COOPERATIVE EXTENSION
Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
Tons Per Acre:				1.50
CASH OVERHEAD:				
Liability Insurance		19	19	19
Office Expense		300	300	583
Sanitation Fees		85	85	300
Manager's Salary		583	583	85
Property Taxes		773	772	790
Property Insurance		11	11	24
Investment Repairs		15	15	75
TOTAL CASH OVERHEAD COSTS		1,787	1,786	1,878
TOTAL CASH COSTS/ACRE		25,306	3,973	4,901
INCOME/ACRE FROM PRODUCTION				3,354
NET CASH COSTS/ACRE FOR THE YEAR		25,306	3,973	1,547
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		25,306	29,279	30,826
NON-CASH OVERHEAD (Capital Recovery):				
Buildings		37	37	37
Land		3,602	3,602	3,602
Fuel Tanks		10	10	10
Shop Tools		11	11	11
Wind Machines				217
Equipment		172	156	216
TOTAL INTEREST ON INVESTMENT		3,832	3,816	4,093
TOTAL COST/ACRE FOR THE YEAR		29,138	7,789	8,994
INCOME/ACRE FROM PRODUCTION				3,354
TOTAL NET COST/ACRE FOR THE YEAR		29,138	7,789	5,640
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		29,138	36,927	42,567

CC=Cover Crop Centers, NC=Non Cover Crop Centers

Income = \$2,236 per ton

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST -Sonoma 2010

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:							
Weed: Spray Vine Row (Goal, Chateau)	0.84	20	2	102	0	124	
Prune: Winter Pruning	18.00	289	0	0	0	289	
CM: Tie Cordons	10.00	161	0	0	0	161	
Weed: Mow NC centers (shred prunings @ March mowing)	0.43	10	6	0	0	16	
Weed: Mow CC centers	0.43	10	6	0	0	16	
Weed: Disc CC centers 1X/3 Yrs	0.32	8	3	0	0	11	
Disease: Mildew (Thiolux [S], Champ [Cu]) 2X	0.76	18	9	64	0	91	
Frost Protection: Windmachines 10X	5.57	90	0	150	0	240	
CM: Cordon Sucker	20.00	322	0	0	0	322	
Disease: Mildew (Sulfur Dust)	1.18	28	11	12	0	51	
Weed: Disc & Roll CC centers 1X/3 Yrs	0.16	4	2	0	0	6	
Weed: Disc CC centers 2X/3 Yrs	0.32	8	3	0	0	11	
Fertilize: through drip (CAN17)	0.03	0	0	8	0	8	
Fertilize: Petiole Sampling & Analysis @ bloom	0.00	0	0	5	0	5	
CM: Move Wires	29.00	466	0	0	0	466	
Disease: Mildew (Pristine). Fertilize: Foliar (Solubor [B], Zinc [Zn])	1.15	28	13	55	0	96	
Weed: Vine Row (Buccaneer)	0.84	20	2	2	0	25	
Fertilize: through drip (12-26-26)	0.05	1	0	90	0	91	
Weed: Mow CC centers 2X/3 Yrs	0.57	14	7	0	0	21	
Weed: Mow NC centers	0.86	21	11	0	0	32	
CM: Leaf Removal (machine)	0.00	0	0	0	75	75	
CM: Hedge Vines (machine)	0.00	0	0	0	50	50	
CM: Clean Up (check if vines open)	6.00	96	0	0	0	96	
CM: Crop Adjustment (thin fruit)	12.50	201	0	0	0	201	
Irrigate: (water & labor)	3.30	53	0	99	0	152	
Insect: Mites (Acramite) 1X/3 Yrs. 1/3 cost each year	0.38	9	4	23	0	36	
Disease: Mildew @ veraison (Rally)	1.15	28	13	28	0	68	
CM: Crop Adjustment (green drop)	7.00	113	0	0	0	113	
Fertilize: Petiole Sampling & Analysis (at veraison) 1X/3 Yrs	0.00	0	0	2	0	2	
Pest Control Adviser	0.00	0	0	0	70	70	
Pickup Truck Use	3.33	80	33	0	0	114	
ATV	0.85	21	2	0	0	23	
TOTAL CULTURAL COSTS	124.14	2,098	120	630	195	3,083	
Harvest:							
Harvest-Hand Labor & Haul	0.00	0	0	0	450	450	
Assessment	0.00	0	0	56	0	56	
TOTAL HARVEST COSTS	0.00	0	0	56	450	506	
Postharvest:							
Fertilize: Petiole Sampling & Analysis 1X/3 Yrs	0.00	0	0	2	0	2	
Weed: Rip Cover Crop Centers (custom) 1X/3 Yrs	0.00	0	0	0	21	21	
Amendment: (Gypsum) CC centers 1X/3 Yrs	0.00	0	0	37	0	37	
Weed: Disc CC centers 1X/3 Yrs	0.16	4	2	0	0	6	
Weed: Plant Cover Crop in CC centers 1X/3 Yrs	0.08	2	1	9	0	11	
TOTAL POSTHARVEST COSTS	0.24	6	3	47	21	77	
Interest on operating capital @ 5.75%						78	
TOTAL OPERATING COSTS/ACRE		2,126	131	742	666	3,744	

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			
CASH OVERHEAD:								
Liability Insurance							21	
Manager's Salary							583	
Office Expense							300	
Sanitation Fees (Portable Toilets)							85	
Property Taxes							944	
Property Insurance							142	
Investment Repairs							115	
TOTAL CASH OVERHEAD COSTS							2,190	
TOTAL CASH COSTS/ACRE							5,934	
NON-CASH OVERHEAD:								
		Per producing Acre		Annual Cost Capital Recovery				
Building		533		37			37	
Land		75,833		3,602			3,602	
Wind Machines		3,000		217			217	
Fuel Tanks		150		10			10	
Shop Tools		83		11			11	
Vineyard Establishment		30,826		2,289			2,289	
Equipment		2,087		203			203	
TOTAL NON-CASH OVERHEAD COSTS		112,513		6,369			6,369	
TOTAL COSTS/ACRE							12,304	

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes. CC=Cover Crop, NC=Non Cover
 Costs for operations not done each year are allocated each year accordingly.

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Sonoma 2010

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Cabernet Sauvignon Winegrapes	5.00	ton	2,236.00	11,180	
OPERATING COSTS					
Herbicide:					
Goal 2XL	1.00	pint	17.25	17	
Chateau	10.00	oz	8.47	85	
Buccaneer	0.50	pint	4.37	2	
Fungicide:					
Champ 2 Flowable (copper)	7.20	pint	5.89	42	
Thiolux Micro Sul (sulfur)	24.00	lb	0.90	22	
Sulfur Dust	55.00	lb	0.21	12	
Pristine	10.00	oz	3.77	38	
Rally 40WS	5.00	oz	5.50	28	
Insecticide:					
Acramite 50 WS	0.33	lb	69.17	23	
Frost Protection:					
Wind Machine (Propane @ \$1.97 per gallon)	50.00	hr/ac	3.00	150	
Water:					
Water pumped	6.00	acin	16.50	99	
Fertilizer/Amendments:					
CAN-17 (17-0-0, 12.64 lbs/gal)	44.10	lb	0.18	8	
12-26-26 (water soluble)	62.50	lb	1.44	90	
Solubor (Boron)	4.90	lb	1.63	8	
Neutral Zinc	3.84	lb	2.50	10	
Gypsum (includes haul & spread)	0.83	ton	45.00	37	
Petiole Analysis	0.21	each	40.00	8	
Seed:					
Legume/Grass Mix (alternate centers, 1X/3 Yr)	17.00	lb	0.50	9	
Custom/Contract:					
PCA (pest, nutrition)	1.00	acre	70.00	70	
Leaf Removal	1.00	acre	75.00	75	
Hedge Vines	2.00	acre	25.00	50	
Harvest & Haul	1.00	acre	450.00	450	
Rip Cover Crop Centers	0.17	acre	125.00	21	
Assessment:					
Sonoma County Winegrape Commission (0.5% of gross)	0.01	gross	11,180.00	56	
Labor (machine)	16.59	hrs	20.10	333	
Labor (non-machine)	111.45	hrs	16.08	1,792	
Fuel - Gas	10.01	gal	2.67	27	
Fuel - Diesel	25.83	gal	2.04	53	
Lube				12	
Machinery repair				40	
Interest on operating capital @ 5.75%				78	
TOTAL OPERATING COSTS/ACRE				3,744	
NET RETURNS ABOVE OPERATING COSTS				7,436	
CASH OVERHEAD COSTS:					
Liability Insurance				21	
Manager's Salary				583	
Office Expense				300	
Sanitation Fees (Portable Toilets)				85	
Property Taxes				944	
Property Insurance				142	
Investment Repairs				115	
TOTAL CASH OVERHEAD COSTS/ACRE				2,190	
TOTAL CASH COSTS/ACRE				5,934	

UC COOPERATIVE EXTENSION

Table 3. Continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building				37	
Land				3,602	
Wind Machines				217	
Fuel Tanks				10	
Shop Tools				11	
Vineyard Establishment				2,289	
Equipment				203	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				6,369	
TOTAL COSTS/ACRE				12,304	
NET RETURNS ABOVE TOTAL COSTS				-1,124	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Sonoma 2010

Beginning JAN 10	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 10	10	10	10	10	10	10	10	10	10	10	10	10	
Cultural:													
Weed: Spray Vine Row (Goal, Chateau)	124												124
Prune: Winter Pruning	289												289
CM: Tie Cordons		161											161
Weed: Mow NC centers (shred prunings @ March mowing)			16										16
Weed: Mow CC centers			16										16
Weed: Disc CC centers 1X/3 Yrs			6			6							11
Disease: Mildew (Thiolux [S]. Champ [Cu]) 2X			46	46									91
Frost Protection: Windmachines 10X			72	96	72								240
CM: Cordon Sucker				322									322
Disease: Mildew (Sulfur Dust)				12	6	21	12						51
Weed: Disc & Roll CC centers 1X/3 Yrs				6									6
Weed: Disc CC centers 2X/3 Yrs				11									11
Fertilize: through drip (CAN17)				8									8
Fertilize: Petiole Sampling & Analysis					5								5
CM: Move Wires					129	177	161						466
Disease: Mildew (Pristine). Fertilize: Foliar (Solubor [B], Zinc [Zn])					96								96
Weed: Vine Row (Buccaneer)						25							25
Fertilize: through drip (12-26-26)						91							91
Weed: Mow CC centers 2X/3 Yrs						21							21
Weed: Mow NC centers						32							32
CM: Leaf Removal (machine)						75							75
CM: Hedge Vines (machine)						50							50
CM: Clean Up (check if vines open)						96							96
CM: Crop Adjustment (thin fruit)						201							201
Irrigate: (water & labor)						25	51	51	25				152
Insect: Mites (Acramite) 1X/3 Yrs. 1/3 cost each year						36							36
Disease: Mildew @ preveraison (Rally)							68						68
CM: Crop Adjustment (green drop)								113					113
Fertilize: Petiole Sampling & Analysis (at veraison) 1X/3 Yrs								2					2
Pest Control Adviser	7	7	7	7	7	7	7	7	7	7			70
Pickup Truck Use	9	9	9	9	9	9	9	9	9	9	9	9	114
ATV	2	2	2	2	2	2	2	2	2	2	2	2	23
TOTAL CULTURAL COSTS	432	179	173	519	326	874	310	183	44	18	11	11	3,083
Harvest:													
Harvest-Hand Labor & Haul									450				450
Assessment										56			56
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	450	56	0	0	506

UC COOPERATIVE EXTENSION

Table 4. Continued

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Beginning JAN 10													
Ending DEC 10	10	10	10	10	10	10	10	10	10	10	10	10	
Postharvest:													
Fertilize: Petiole Sampling & Analysis 1X/3 Yrs										2			2
Weed: Rip Cover Crop Centers (custom) 1X/3 Yrs										21			21
Amendment: (Gypsum) CC centers 1X/3 Yrs										37			37
Weed: Disc CC centers 1X/3 Yrs										6			6
Weed: Plant Cover Crop in CC centers 1X/3 Yrs										11			11
TOTAL POSTHARVEST COSTS	0	0	0	0	0	0	0	0	0	77	0	0	77
Interest on operating capital @ 5.75%	2	3	4	6	8	12	13	14	17	-1	0	0	78
TOTAL OPERATING COSTS/ACRE	434	182	177	525	334	886	324	198	510	151	11	11	3,744
Cash Overhead:													
Liability Insurance	21												21
Manager's Salary	49	49	49	49	49	49	49	49	49	49	49	49	583
Office Expense	25	25	25	25	25	25	25	25	25	25	25	25	300
Sanitation Fees (Portable Toilets)	9	9	9	9	9	9	9	9	9	9			85
Property Taxes	944												944
Property Insurance	71						71						142
Investment Repairs	10	10	10	10	10	10	10	10	10	10	10	10	115
TOTAL CASH OVERHEAD COSTS	1,127	92	92	92	92	92	163	92	92	92	83	83	2,190
TOTAL CASH COSTS/ACRE	1,561	274	269	617	426	978	487	289	602	242	94	94	5,934

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes.

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 NORTH COAST - Sonoma 2010

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WINEGRAPES

	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COSTS:							
Cultural Cost	3,083	3,083	3,083	3,083	3,083	3,083	3,083
Harvest Cost	450	450	450	450	550	550	550
Assessment Cost	22	34	45	56	67	78	89
Postharvest Cost	77	77	77	77	77	77	77
Interest on operating capital @ 5.75%	79	79	78	78	79	79	79
TOTAL OPERATING COSTS/ACRE	3,711	3,723	3,733	3,744	3,856	3,867	3,878
Total Operating Costs/ton	1,855	1,241	933	749	643	552	485
CASH OVERHEAD COSTS/ACRE							
TOTAL CASH COSTS/ACRE	5,902	5,914	5,924	5,935	6,047	6,058	6,069
Total Cash Costs/ton	2,951	1,971	1,481	1,187	1,008	865	759
NON-CASH OVERHEAD COSTS/ACRE							
TOTAL COSTS/ACRE	12,271	12,283	12,293	12,304	12,416	12,427	12,438
Total Costs/ton	6,135	4,094	3,073	2,461	2,069	1,775	1,555

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	161	2,085	4,011	5,936	7,760	9,685	11,610
2,036	361	2,385	4,411	6,436	8,360	10,385	12,410
2,136	561	2,685	4,811	6,936	8,960	11,085	13,210
2,236	761	2,985	5,211	7,436	9,560	11,785	14,010
2,336	961	3,285	5,611	7,936	10,160	12,485	14,810
2,436	1,161	3,585	6,011	8,436	10,760	13,185	15,610
2,536	1,361	3,885	6,411	8,936	11,360	13,885	16,410

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	-2,030	-106	1,820	3,745	5,569	7,494	9,419
2,036	-1,830	194	2,220	4,245	6,169	8,194	10,219
2,136	-1,630	494	2,620	4,745	6,769	8,894	11,019
2,236	-1,430	794	3,020	5,245	7,369	9,594	11,819
2,336	-1,230	1,094	3,420	5,745	7,969	10,294	12,619
2,436	-1,030	1,394	3,820	6,245	8,569	10,994	13,419
2,536	-830	1,694	4,220	6,745	9,169	11,694	14,219

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	-8,399	-6,475	-4,549	-2,624	-800	1,125	3,050
2,036	-8,199	-6,175	-4,149	-2,124	-200	1,825	3,850
2,136	-7,999	-5,875	-3,749	-1,624	400	2,525	4,650
2,236	-7,799	-5,575	-3,349	-1,124	1,000	3,225	5,450
2,336	-7,599	-5,275	-2,949	-624	1,600	3,925	6,250
2,436	-7,399	-4,975	-2,549	-124	2,200	4,625	7,050
2,536	-7,199	-4,675	-2,149	376	2,800	5,325	7,850

UC COOPERATIVE EXTENSION
Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 NORTH COAST -Sonoma 2010

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
10	60HP4WDNarrowTract	45,000	16	8,060	3,731	203	265	4,200
10	ATV 4WD	6,700	5	3,003	991	37	49	1,076
10	Brush Shredder 6 ft	8,500	15	816	767	36	47	849
10	Disc - Offset 5 ft	7,500	15	720	676	32	41	749
10	Duster - 3 pt	5,000	12	693	512	22	28	562
10	Air Blast Sprayer 300 gal	16,000	10	2,829	1,819	72	94	1,986
10	Pickup Truck 1/2 ton	32,000	7	12,139	3,978	169	221	4,368
10	Ringroller 5 ft	1,500	20	78	115	6	8	129
10	Seed Drill 5 ft	8,000	10	1,415	910	36	47	993
10	Sprayer ATV 20 gal	350	10	62	40	2	2	44
TOTAL		130,550		29,815	13,539	615	802	14,956
60% of New Cost *		78,330		17,889	8,123	369	481	8,974

*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	
Building 400 sq ft	16,000	25		1,107	61	80	320	1,568
Vineyard Establishment	924,770	22		68,663	3,546	4,624	1,200	78,033
Fuel Tanks 2-250 gallon	4,500	25		311	17	23	90	441
Land 35 Acres	2,275,000	25	2,275,000	108,062	0	22,750	0	130,812
Tools-Shop/Field/Fuel Tanks	2,500	10		320	10	13	50	392
Wind Machine	90,000	23		6,516	345	450	1,800	9,111
TOTAL INVESTMENT	3,312,770		2,275,000	184,979	3,980	27,939	3,460	220,358

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	30	acre	20.70	621
Manager's Salary	30	acre	583.33	17,500
Office Expense	30	acre	300.00	9,000
Sanitation	30	acre	85.33	2,560

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 NORTH COAST - Sonoma 2010

Yr	Description	COSTS PER HOUR							Total Costs/Hr.	
		Actual Hours Used	Capital Recovery	Cash Overhead			Operating			Total Oper.
				Insur- ance	Taxes	Repairs	Fuel & Lube			
10	60HP4WDNarrowTract	263	8.51	0.46	0.61	1.14	6.91	8.05	17.63	
10	ATV 4WD	400	1.49	0.06	0.07	0.50	2.05	2.55	4.17	
10	Brush Shredder 6 ft	69	6.67	0.31	0.41	3.97	0.00	3.97	11.36	
10	Disc - Offset 5 ft	29	13.95	0.65	0.85	1.19	0.00	1.19	16.64	
10	Duster - 3 pt	35	8.68	0.37	0.48	0.71	0.00	0.71	10.24	
10	Air Blast Sprayer 300 gal	103	10.58	0.42	0.55	2.75	0.00	2.75	14.30	
10	Pickup Truck 1/2 ton	285	8.37	0.36	0.46	2.36	7.68	10.04	19.23	
10	Ringroller 5 ft	7	9.42	0.49	0.64	0.17	0.00	0.17	10.72	
10	Seed Drill 5 ft	3	218.32	8.67	11.30	2.20	0.00	2.20	240.49	
10	Sprayer ATV 20 gal	50	0.48	0.02	0.02	0.10	0.00	0.10	0.62	

UC COOPERATIVE EXTENSION
Table 8. OPERATIONS WITH MATERIALS AND EQUIPMENT
 NORTH COAST - Sonoma 2010

Operation	Operation		Labor Hrs	Material	Broadcast Rate/acre	Unit
	Month	Tractor				
Cultural:						
Weed: Winter, Vine Row	January	ATV	ATV Sprayer	Goal	1.00	pt
				Chateau	10.00	oz
Weed: Vine Row	June	ATV	ATV Sprayer	Buccaneer	0.50	pt
Weed: Mow NC Centers (& Shred Prunings)	March	60HP	Mower/Shredder			
Weed: Mow CC Centers	March	60HP	Mower/Shredder			
Weed: Disc CC Centers 1X/3 Yrs	March	60HP	Disc Offset			
Weed: Disc & Roll CC Centers 1X/3 Yrs	April	60HP	Disc + Roller			
Weed: Disc CC Centers 2X/3 Yrs	April	60HP	Disc Offset			
Weed: Disc CC Centers 1X/3 Yrs	June	60HP	Disc Offset			
Weed: Mow CC Centers 2X/3 Yrs	June	60HP	Mower/Shredder			
Weed: Mow NC Centers	June	60HP	Mower/Shredder			
Weed: Disc CC Centers 1X/3 Yrs	October	60HP	Disc Offset			
Prune: Winter Prune	January				18.00	
VM: Tie Cordons	February				10.00	
VM: Sucker Cordons	April				20.00	
VM: Move Wires	May				8.00	
	June				11.00	
	July				10.00	
VM: Leaf Removal	June	Custom				
VM: Vine Cleanup	June				6.00	
VM: Hedge	June	Custom				
VM: Crop Adjustment (Fruit Thin)	June				12.50	
VM: Crop Adjustment (Green Drop)	August				7.00	
Disease: Mildew	March	60HP	Air Blast Sprayer	Thiolux	12.00	lb
				Champ	3.60	pt
	April	60HP	Air Blast Sprayer	Thiolux	12.00	lb
				Champ	3.60	pt
Disease: Mildew 2X Alternate Rows	April	60HP	Duster	Sulfur Dust	10.00	lb
Disease: Mildew 1X Alternate Rows	May	60HP	Duster	Sulfur Dust	5.00	lb
Disease: Mildew. Fertilize: Foliar	May	60HP	Air Blast Sprayer	Pristine	10.00	oz
				Solubor (B)	4.90	lb
				Neutral Zinc	3.84	lb
Disease: Mildew 3X	June	60HP	Duster	Sulfur Dust	30.00	lb
Disease: Mildew 1X	July	60HP	Duster	Sulfur Dust	10.00	lb
Disease: Mildew (preveraison)	July	60HP	Air Blast Sprayer	Rally	5.00	oz
Insect: Mites 1X/3 Yrs	June	60HP	Air Blast Sprayer	Acramite	0.33	lb
Frost Protection: Windmachines	March	Windmachine		Propane	1.67	
	April	Windmachine		Propane	2.23	
	May	Windmachine		Propane	1.67	
Fertilize: Petiole Analysis	May			Petiole Analysis		
Fertilize: Petiole Analysis 1X/3 Yrs	August			Petiole Analysis		
Fertilize: Petiole Analysis 1X/3 Yrs (Postharvest)	October			Petiole Analysis		
Fertilize: through drip.	April			CAN-17	44.10	lb
Fertilize: through drip.	June			12-26-26	62.50	lb
Fertilize: Foliar (see Disease/Fertilize above)	May					
Irrigate: 12X	June			Water	1.00	acin
	July			Water	2.00	acin
	August			Water	2.00	acin
	September			Water	1.00	acin
Harvest & Haul (Machine)	September	Custom				
Cover Crop: Rip Cover Crop Centers 1X/3 Yrs	October	Custom				
Amendment: Alternate Rows 1X/3 Yrs	October	Custom		Gypsum	0.83	ton
Cover Crop: Plant 1X/3 Yrs	October	60HP	Drill + Roller	Seed	17.00	lb