

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

SAMPLE COSTS TO PRODUCE ORGANIC WINE GRAPES
North Coast Region – Sonoma County 2004

CONTENTS

INTRODUCTION 2
ASSUMPTIONS 3
 Organic Production Operating Costs 4
 Cash Overhead Costs 8
 Non-Cash Overhead Costs 8
REFERENCES 11
Table 1. COSTS PER ACRE TO PRODUCE ORGANIC CHARDONNAY GRAPES 12
Table 2. COSTS AND RETURNS PER ACRE TO PRODUCE ORGANIC CHARDONNAY GRAPES 14
Table 3. MONTHLY CASH COSTS – ORGANIC CHARDONNAY GRAPES 16
Table 4. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS 18
Table 5. HOURLY EQUIPMENT COSTS 19
Table 6. RANGING ANALYSIS 20
Table 7. DETAILS BY OPERATION 21

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INTRODUCTION

The sample costs for organic wine grape production in the North Coast Region - Sonoma County are presented in this study. The hypothetical vineyard used in this report consists of 30-acres that were established conventionally and then converted to organic production. An additional 5-acres are 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 either based on current figures or those presented in the companion study *Sample Costs to Establish a Vineyard and Produce Wine Grapes, 2004, Sonoma*. Costs and practices detailed in this study will not be applicable to every situation. A blank column titled, *Your Cost*, is provided in Tables 1 and 2 to enter your actual costs. 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.

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.

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ASSUMPTIONS

The following assumptions refer to Tables 1 to 7 and pertain to sample costs to produce organic 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, 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.

Land. The hypothetical vineyard described in this study 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. 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, hires the general laborers and operates 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.

Vines. Dormant, bench grafted Chardonnay vines are planted on a 6-foot X 8-foot spacing (vine-by-row) resulting in a planting density of 908 vines per acre. In the second year 4% or 36 vines per acre are replanted. Vines are trained during the first and second years and are expected to begin yielding harvestable fruit in the third year (third leaf) and be productive for an additional 22 years.

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.

Trellis System. The trellis system in this study is designed to support a bilateral cordon-trained, spur-pruned vineyard. Five-foot, 3/8 inch rebar stakes are on six foot centers and every third position has an in-line, nine-foot rolled edge metal highway stake. Each end post is a nine-foot, 2-7/8 inch drill pipe with a double spade. A single 12 gauge, high tensile permanent cordon wire is attached to all stakes and end posts at a 36-inch height. During the growing season, two pairs of movable, 14-gauge, high tensile wires are moved up the stakes as shoot growth occurs and are held in position by notches in the highway stakes. The trellis system, considered part of the vineyard since it will be removed at the time of vine removal, is included in the Vineyard Establishment Costs.

Organic Production Operating Costs

Prune, Tie, and Sucker. Pruning and tying are done during the winter months - January, February - and the prunings are placed in alternate middles and chopped with the “annual grass centers” mowing pass in February (see Cover Crop). 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. Wires are moved three times – once in April and twice in May - during each growing season in order to vertically position the canopy. Leaves or lateral shoots are removed by hand from the fruiting zone, once in either June or July, on the side of the row that receives the morning sun. The vine shoots are mechanically hedged once after veraison (July) just above the top of the highway stakes.

Crop Adjustment. In July, at 10% veraison (i.e. 10% of the fruit has started to ripen), the crop is adjusted by thinning. Fruit clusters are removed from shoots shorter than 18-inches in length. A single cluster is retained on shoots between 18 and 30-inches in length and two clusters allowed to remain on shoots greater than 30 inches.

Cover Crops. Two different cover crops are planted in the vineyard in alternating row middles. A leguminous cover crop mixture (“annual legume centers”) is planted every year to provide cover during the winter, add organic matter, and fix nitrogen. A combination of mowing and cultivation is used to manage this cover crop. Another cover crop mix, primarily grasses (“annual grass centers”), is planted in the remaining alternate centers and is reseeded every fourth year and mowed only. For each cover crop the centers are prepared for planting in October of the appropriate year by disking. The crop is then planted, rolled, and irrigated. Because the “annual grass centers” are planted every fourth year, one-fourth of the cost is charged to the budget each year.

Fertilize/Soil Amendments. In April of each year, the grower broadcasts the compost in the vineyard on the “annual legume centers” with a tractor and material spreader (see Cover Crops). The compost is biologically active, screened and the source material consists of green waste and manure. In three out of five years, compost at five tons per treated acre is applied and in two of five years, four tons per treated acre are applied. Over five years, this averages 4.60 tons per treated acre (2.30 tons per broadcast acre) per year. In years that the compost is reduced, one ton of either gypsum or oyster shell lime is commercially blended with the compost. Based on a five-year cycle, the costs for each material are allocated to the budget each year at 0.20 tons per treated acre (0.10 tons per broadcast acre) and the material costs are shown as a line item in the tables. Application costs are shown only on the compost line item in the tables because the gypsum and lime are blended with the compost.

Tissue Analysis. Every third year, opposite cluster petioles are collected at bloom for tissue nutrient analyses and one-third of the labor and laboratory cost is allocated to the budget each year.

Irrigation. The irrigation cost includes pumped water at \$6.03 per acre-inch, and irrigation labor at 0.15 hours per irrigation per acre. The cost is based on using 15 horsepower (hp) motor to pump from 150 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. No assumption is made about effective in-season rainfall or the irrigation system’s emission uniformity. Irrigation occurs weekly through the drip system from May through September. Overhead sprinklers are turned on once every year in the fall to apply 2 acre-inches to the cover crop. This is to insure adequate and timely germination of the cover crop and is applied to the entire vineyard.

Frost Protection. It is assumed that the vineyard will need frost protection with overhead sprinklers for a total of six nights from March through May and the sprinklers will run six hours per night. Annual frost protection

water use totals 3.96 acre-inches. The cost includes the water at \$7.18 per acre-inch and labor at 0.50 hours per acre-inch. The water cost is the water pumped from the irrigation well to the reservoir and the cost to operate the booster pump. After each frost protection event the reservoir is filled with water from the well.

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 available pesticides, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For information regarding requirements for private certified applicators and pesticide use permits, contact the local County Agricultural Commissioner's office. For production information contact the UC Cooperative Extension Sonoma County Viticulture Farm Advisor.

Pest Control Adviser. A Pest Control Adviser (PCA)/Consultant is hired to monitor the vineyard weekly for insects, mites and beneficial insects as well as diseases to determine if control measures are necessary.

Weeds/Vineyard Floor Management. Weeds in the vine row centers are managed differently depending on the cover crop. Mowing and cultivation are used to manage vegetation in the centers. Flaming, hand hoeing, and mechanical cultivation are used to control weeds in the vine rows.

Annual Grass Centers. A winter annual grass mixture – blando brome, zorro fescue, crimson clover – is planted in these centers and mowed with a flail mower a total of three times: February, April, and May. The winter vine prunings are placed in these centers and chopped with the February mowing. The following two mowings are timed to maximize mature seed development.

Annual Legume Centers. An annual mixture of legumes and grasses – vetch, bell beans, peas, and oats – is planted in these centers. The centers are mowed in April then disked two times in May prior to seed head development. In June, the centers are cultivated with a spring tooth cultivator.

Vine Rows. The weeds in the vine rows are flamed once during the winter and early spring to kill winter weeds. The first flaming pass is in January and the second in February or March depending on spring temperatures and weed growth. If flaming occurs in late spring, the centers must be disked to avoid fire danger and possible vine damage. The cost includes an ATV pulling a 50-gallon propane tank and flamer loaned by the propane supplier. A single-sided in-row cultivator makes two passes per vine row – the first in either April or May, and the next in July. This reduces the weed population in the vine row, but leaves some weeds near the vine. In-row cultivators vary in function and effectiveness, yet all will leave an island of weeds around the base of the vines and stakes. Therefore that area is hand hoed in July.

Insects and Mites. It is assumed that it is necessary to treat grape leafhoppers every three years and mites every year. An Organic Materials Review Institute (OMRI) approved oil (JMS Organic Stylet-Oil) is applied in late April and early May for mite as well as disease control and every third year in early June for grape leafhopper control. The June leafhopper spray replaces the respective sulfur disease spray. One-third of the material and application costs for the June leafhopper spray is shown as a cost each year.

Disease. Lime sulfur is applied once every two years in alternate rows as a dormant spray for mildew and phomopsis control, thus one-half of the cost is charged to the vineyard each year. Powdery mildew and phomopsis preventative fungicide applications are also made just after budbreak in early April and again 10-days later. Kumulus DF, an organic approved wettable sulfur (S) and Champion, an organic approved copper (Cu) are used in both applications, which are made to alternate rows. In late April and early May, JMS Organic

Stylet-Oil is applied to prevent shoot botrytis and powdery mildew and control mites. Powdery mildew is controlled later in May at bloom with Kumulus DF sulfur and Serenade. In early June, Kumulus DF sulfur is applied once followed by a late June application at pre-bunch close when Serenade is added to the tank. One year out of every three, the early June application is replaced with oil for leafhopper control, therefore two-thirds of the sulfur material and application costs are included each year. Dusting sulfur for mildew control is applied twice in July and once in August. All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer. In some years, the vineyard floor is too wet for tractor access in April; therefore the two applications of the Kumulus DF and Champion tank mix are applied using an ATV, but is not accounted for in this study.

Hand leaf removal occurs during June or July on one side of the canopy 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 “hot spots.”

Harvest. The fruit is mechanically harvested at a contract rate of \$50 per ton. It is assumed that the grapes are delivered to a local winery (within a 15 mile radius) and the hauling costs are \$25 per ton.

Yields. The estimated average annual yield is 6 tons per acre. Yields range, depending on the environment and location, from 3 to 8 tons per acre. In some situations, and in years with high pest populations, organic yields may be lower than conventional yields because fewer treatment options, or organically approved pesticides, are available to treat immediate or pressing needs. Organic yields are assumed to yield equivalent to conventional yields in this study.

Returns. A price premium for organic wine grapes paid by the wineries does not currently exist. Therefore, organically produced grapes are sold at the same price as conventionally produced wine grapes. This study uses the 1998 – 2002 weighted average price of \$1,838 per ton as shown in Table A.

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 A by the low and high prices received. A range of return prices for grapes are used in Table 6 for calculating net returns at different yields.

Table A. Annual Prices Received for Chardonnay[§]
Sonoma County (District 3)

Crop Year	Range -----		Weighted Average
	Low	High	
	-----\$/Ton-----		
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
Average	658	4,671	1,838

[§] 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 can be accessed at <http://www.scgga.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/>

The North Coast Winegrowers (NCW) grower-members are assessed \$7.00 per planted acre with a minimum of \$150 and a maximum of \$800 per vineyard. Additional information about this organization is available at <http://www.northcoastwinegrowers.com>.

The California Department of Food and Agriculture (CDFA) registers all organic growers and charges a fee. The fee is based on Gross Organic Production Value and is taken from a table divided into ranges of returns. The gross value in this study falls into the \$300,000 to \$400,000 range in the table and the annual charge for this study is \$29 per acre or \$875 per farm.

In this study, California Certified Organic Farmers (CCOF) is the certifying organization that determines the cost of certification and inspections. CCOF is one of a number of third party organizations in the United States that can certify organic growers within California. Different organizations have different fee structures. The organic certificate from CCOF is estimated to be \$450 per year (\$15 per acre).

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. The All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard, and irrigating. The ATV is also used for weeding (flaming) the vineyard and the operation time is included in that cost.

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 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

The grower's 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 production decisions regarding cultural practices, pest management, and labor as well as operates the 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 1 is determined by multiplying the total hourly operating cost in Table 5 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 organic winegrape production. A market channel should be determined before the vineyard is planted and brought into production. 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 and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, management services, and equipment repairs.

Property Taxes. Counties 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 in Northern California.

Insurance. Insurance for farm investments varies 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.

Crop Insurance: The grower purchases crop insurance. The 2004 premium quoted by one insurance agent for the Chardonnay variety in the Russian River District was \$325 per acre for the 75% coverage level. Premiums will vary by actual production history, variety, location, and coverage level (% of average yield). Contact a crop insurance agent for more information.

Foreman Salary. The vineyard employs a part-time foreman to supervise work crews and production practices. Because of the small acreage the vineyard employs the foreman 25% of the time and pays 25% of the annual salary of \$45,000 plus 40% for payroll taxes and benefits.

Office Expense. Office and business expenses for 30 acres are estimated at \$7,500 annually or \$250 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

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

Sanitation Services. Sanitation services provide a portable toilet for the vineyard and cost the farm \$436 annually which includes delivery and servicing.

Miscellaneous Costs. These costs may occur and some may be cultural expenses or investments, rather than cash overhead. Examples of these costs are management fees, habitat restoration along the creek, deer fencing, vertebrate control, hedgerow development and building owl boxes. One hundred dollars per acre is used in this study, but depending upon which items are done, costs can be much higher.

Non-Cash Overhead Costs

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. These are shown in the Capital Recovery section of the tables and the Investment Costs portion of Table 4.

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. The purchase price and salvage value for equipment and investments are shown in Table 4.

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 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. In other words, the next best alternative use for these resources is in another agricultural enterprise.

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. 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 motor, filter system, and nutrient injector were installed along with the drip irrigation system prior to planting. The cost of these components plus drip laterals and emitters and the labor to install each are included in the irrigation system cost. Water and in some situations, nutrients are pumped to the vineyard through a filtration station into a mainline, sub-mains and then the drip laterals along the vine rows.

Frost Protection System/Reservoir. 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 and are secured to the existing highway stakes.

Fuel Tank. One 250-gallon diesel fuel tank mounted on stand, using gravity flow for dispensing. Tank is in cement containment that meets all federal, state, and local regulations.

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

Vineyard 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 in the third establishment year represents the establishment cost (see *Sample Costs to Establish a Vineyard and Produce Wine Grapes, 2004, Sonoma*). 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 new or used. In Table 4, the new purchase price is adjusted to 60% to indicate a mix of new and used equipment. In this table, annual ownership costs for equipment and other investments are presented. Equipment costs are composed of three parts: non-cash overhead (capital recovery costs), 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 in the Equipment Operating Costs section under **Organic Production 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 PRODUCE ORGANIC WINE GRAPES
 NORTH COAST - Sonoma County 2004

Operation	Cash and Labor Cost per acre						Total Cost	Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost		
Cultural:								
Disease: Phomopsis/Mildew (Lime Sulfur) 1X/2Y Alt Row	0.29	7	2	19	0	28		
Prune: Winter	18.00	279	0	0	0	279		
Prune: Winter - Retie & Lower Wires	8.00	124	0	0	0	124		
Weed: Vine Rows 2X (flame)	3.00	72	6	30	0	108		
Weed: Mow Grass Centers & Shred Prunings	0.43	10	4	0	0	14		
Frost Protection 6X	1.98	31	0	28	0	59		
Disease: Mildew/Phomopsis (Cu/S) 2X Alt Row	1.15	28	9	21	0	58		
Canopy: Move Wires 3X	36.00	558	0	0	0	558		
Weed: Mow Grass Centers 2X	0.86	21	8	0	0	29		
Weed: Mow Legume Centers 1X	0.43	10	4	0	0	14		
Fertilize: Legume Centers (compost)	0.37	9	4	81	0	94		
Fertilize: Legume Centers (gypsum) 1X/5Yr	0.00	0	0	4	0	4		
Fertilize: Legume Centers (oyster shell lime) 1X/5Yr	0.00	0	0	10	1	10		
Sucker: Cordons 2X	16.00	248	0	0	0	248		
Disease: Mildew/Botrytis/Mites (oil) 2X	2.29	55	18	182	0	255		
Sucker: Trunks	8.00	124	0	0	0	124		
Disease: Mildew (Kumulus, Serenade) 2X	2.29	55	18	94	0	167		
Irrigate 20X (weekly)	2.40	37	0	20	0	57		
Weed: Cultivate Vine Row 2X	2.58	62	19	0	0	81		
Weed: Disk Legume Centers 2X	0.48	12	3	0	0	15		
Fertilize: Petiole Sample/Analysis 1X/3Yr	0.10	2	0	0	3	5		
Disease: Mildew (Kumulus) 2X/3Yr	0.77	18	6	2	0	26		
Insect: Leafhopper 1X/3Yr	0.38	9	3	15	0	27		
Weed: Cultivate Legume Centers 1X	0.09	2	1	0	0	3		
Canopy: Leaf Removal	21.50	333	0	0	0	333		
Canopy: Hedge (mechanical)	0.26	6	3	0	0	9		
Weed: Hoe Vine Row	22.00	341	0	0	0	341		
Disease: Mildew (sulfur dust) 3X	0.89	21	6	5	0	32		
Crop Adjust: Thin Fruit (hand)	10.00	155	0	0	0	155		
Pickup (farm use)	0.85	20	6	0	0	27		
ATV (farm use)	0.85	20	2	0	0	22		
Pest: Consultant (field monitoring)	0.00	0	0	0	35	35		
TOTAL CULTURAL COSTS	162.24	2,669	123	510	39	3,340		
Harvest:								
Harvest & Haul	0.00	0	0	0	900	900		
TOTAL HARVEST COSTS	0.00	0	0	0	900	900		
Postharvest:								
Cover Crop: Disk Legume Center	0.24	6	2	0	0	7		
Cover Crop: Plant Legume Center	0.25	6	2	21	0	29		
Cover Crop: Roll Legume Center	0.10	2	1	0	0	3		
Cover Crop: Disk Grass Center 1X/4Yr	0.06	1	0	0	0	2		
Cover Crop: Plant Grass Center 1X/4Yr	0.06	1	0	6	0	8		
Cover Crop: Roll Grass Center 1X/4Yr	0.05	1	0	0	0	2		
Irrigate: Cover Crop (Grass & Legume Centers) OH Sprinkler	1.00	16	0	14	0	30		
TOTAL POSTHARVEST COSTS	1.76	34	5	42	0	81		
Assessments:								
Gross Returns Fee CDFA Registration	0.00	0	0	29	0	29		
Inspection Fee CCOF	0.00	0	0	15	0	15		
SCGGA, RRVW, NCW	0.00	0	0	247	0	247		
TOTAL ASSESSMENT COSTS	0.00	0	0	291	0	291		
Interest on operating capital @ 6.89%							108	
TOTAL OPERATING COSTS/ACRE		2,703	128	842	938	4,719		

UC COOPERATIVE EXTENSION

Table 1. continued

Operation	Cash and Labor Cost per acre						
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:							
Property Taxes						897	
Liability Insurance						17	
Property Insurance						94	
Crop Insurance						325	
Foreman Salary: 25% time (include PR Overhead)						525	
Office Expense						250	
Investment Repairs						143	
Sanitation Fees						15	
Miscellaneous						100	
TOTAL CASH OVERHEAD COSTS						2,366	
TOTAL CASH COSTS/ACRE						7,084	
NON-CASH OVERHEAD: Capital Recovery							
		<u>Per producing Acre</u>		<u>Annual Cost Capital Recovery</u>			
Building: 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	
Reservoir: 12 acre feet		2,900		227		227	
Fuel Tanks: 1-250 gal		33		3		3	
Shop Tools		67		9		9	
Vineyard Establishment Costs		16,657		1,411		1,411	
Equipment		2,647		309		309	
TOTAL NON-CASH OVERHEAD COSTS		102,310		7,028		7,028	
TOTAL COSTS/ACRE						14,113	

UC COOPERATIVE EXTENSION
Table 2. COSTS AND RETURNS PER ACRE to PRODUCE ORGANIC WINE GRAPES
 NORTH COAST - Sonoma County 2004

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Chardonnay Organic Wine Grapes	6.00	ton	1,838.00	11,028	
OPERATING COSTS					
Fungicide:					
Lime Sulfur	3.00	gal	6.30	19	
Champion WP (copper [Cu])	4.00	lb	3.00	12	
Kumulus DF (sulfur)	21.65	lb	0.91	20	
Serenade	12.00	lb	7.04	84	
Sulfur Dust	30.00	lb	0.16	5	
Insecticide:					
Stylect Oil	8.66	gal	22.80	197	
Weed Control:					
Propane (for flamer)	20.00	gal	1.52	30	
Water:					
Water: Frost Protection	3.96	acin	7.18	28	
Water: Crop Production (pumped)	3.34	acin	6.03	20	
Water: Cover Crop (OH sprinklers)	2.00	acin	7.18	14	
Fertilizer:					
Green Waste/Manure Compost	2.30	ton	35.00	81	
Gypsum (include haul & spread)	0.10	ton	37.50	4	
Lime (Oyster Shell)	0.10	ton	95.00	10	
Seed:					
Grass/Brome/Crimson Mix (Grass Centers)	3.00	lb	2.10	6	
Legume/Grass Mix (Legume Centers)	50.00	lb	0.42	21	
Assessment:					
CDFA Fee	1.00	acre	29.00	29	
SCGGA	1.00	acre	12.50	13	
RRVW	6.00	ton	4.00	24	
NCW	30.00	acre	7.00	210	
CCOF Inspection Fee	1.00	farm	15.00	15	
Contract/Custom:					
Fertilizer: Tissue Analysis	1.00	acre	3.00	3	
Mechanical Harvest	6.00	ton	125.00	750	
Haul to Crusher	6.00	ton	25.00	150	
Pest Consultant Fee	1.00	acre	35.00	35	
Labor (machine)	22.80	hrs	20.00	456	
Labor (non-machine)	144.98	hrs	15.50	2,247	
Fuel: Gas	4.68	gal	1.88	9	
Fuel: Diesel	46.33	gal	1.45	67	
Lube				11	
Machinery repair				41	
Interest on operating capital @ 6.89%				108	
TOTAL OPERATING COSTS/ACRE				4,719	
NET RETURNS ABOVE OPERATING COSTS				6,309	

UC COOPERATIVE EXTENSION

Table 2. continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS:					
Property Taxes				896	
Liability Insurance				17	
Property Insurance				94	
Crop Insurance				325	
Foreman Salary: 25% time (include PR Overhead)				525	
Office Expense				250	
Investment Repairs				143	
Sanitation Fees				15	
Miscellaneous				100	
TOTAL CASH OVERHEAD COSTS/ACRE				2,366	
TOTAL CASH COSTS/ACRE				7,085	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building: 400 sq ft				20	
Land: \$65,000 per acre				4,724	
Drip Irrigation System				136	
Frost Protection System				191	
Reservoir: 12 acre feet				227	
Fuel Tanks: 1-250 gal				3	
Shop Tools				9	
Vineyard Establishment Costs				1,411	
Equipment				309	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				7,028	
TOTAL COSTS/ACRE				14,113	
NET RETURNS ABOVE TOTAL COSTS				-3,084	

UC COOPERATIVE EXTENSION
Table 3. MONTHLY CASH to PRODUCE ORGANIC WINE GRAPES
 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:													
Disease: Phomopsis/Mildew (Lime Sulfur) 1X/2Y Alt Row	28												28
Prune: Winter	279												279
Prune: Winter - Retie & Lower Wires	124												124
Weed: Vine Rows 2X (flame)	54		54										108
Weed: Mow Grass Centers & Shred Prunings		14											14
Frost Protection 6X			20	20	20								59
Disease: Mildew/Phomopsis (Cu/S) 2X Alt Row				58									58
Canopy Mgmt: Move Wires 3X				186	372								558
Weed: Mow Grass Centers 2X				14	14								29
Weed: Mow Legume Centers 1X				14									14
Fertilize: Legume Centers (compost)				94									94
Fertilize: Legume Centers (gypsum) 1X/5Yr				4									4
Fertilize: Legume Centers (oyster shell lime) 1X/5Yr				10									10
Sucker: Cordons 2X				124	124								248
Disease: Mildew/Botrytis/Mites (oil) 2X				128	128								255
Sucker: Trunks					124								124
Disease: Mildew (Kumulus, Serenade) 2X					83	83							167
Irrigate 20X (weekly)					7	14	14	14	7				57
Weed: Cultivate Vine Row 2X					41		41						81
Weed: Disk Legume Centers 2X					15								15
Fertilize: Petiole Sample/Analysis 1X/3Yr					5								5
Disease: Mildew (Kumulus) 2X/3Yr						26							26
Insect: Leafhopper 1X/3Yr						27							27
Weed: Cultivate Legume Centers 1X						3							3
Canopy: Leaf Removal						333							333
Canopy: Hedge (mechanical)							9						9
Weed: Hoe Vine Row							341						341
Disease: Mildew (sulfur dust) 3X							21	11					32
Crop Adjust: Thin Fruit (hand)							155						155
Pickup (farm use)	2	2	2	2	2	2	2	2	2	2	2	2	27
ATV (farm use)	2	2	2	2	2	2	2	2	2	2	2	2	22
Pest: Consultant (field monitoring)	4	4	4	4	4	4	4	4	4	4	4	4	35
TOTAL CULTURAL COSTS	493	22	81	658	940	494	589	33	15	8	4	4	3,340
Harvest:													
Harvest & Haul									900				900
TOTAL HARVEST COSTS									900				900

UC COOPERATIVE EXTENSION

Table 3. continued

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	
Postharvest:													
Cover Crop: Disk Legume Center										7			7
Cover Crop: Plant Legume Center										29			29
Cover Crop: Roll Legume Center										3			3
Cover Crop: Disk Grass Center 1X/4Yr										2			2
Cover Crop: Plant Grass Center 1X/4Yr										8			8
Cover Crop: Roll Grass Center 1X/4Yr										2			2
Irrigate: Cover Crop (Grass & Legume Centers) OH Sprinkler										30			30
TOTAL POSTHARVEST COSTS										81			81
Assessments:													
Gross Returns Fee CDFA Registration									29				29
Inspection Fee CCOF									15				15
Fees: SCGGA, RRVW, NCW									247				247
TOTAL ASSESSMENT COSTS									291				291
Interest on operating capital	3	3	3	7	13	15	19	19	26	-1	0	0	108
TOTAL OPERATING COSTS/ACRE	496	25	85	665	952	510	608	52	1,020	88	4	4	4,508
Cash Overhead:													
Property Taxes	896												896
Liability Insurance	17												17
Property Insurance	47						47						93
Crop Insurance		325											325
Foreman Salary: 25% time (includes PR Overhead)	53	53	53	53	53	53	53	53	53	53			525
Office Expense	25	25	25	25	25	25	25	25	25	25			250
Investment Repairs	12	12	12	12	12	12	12	12	12	12	12	12	143
Sanitation Fees	1	1	1	1	1	1	1	1	1	1			15
Miscellaneous	10	10	10	10	10	10	10	10	10	10			100
TOTAL CASH OVERHEAD COSTS	1,061	426	101	101	101	101	148	101	101	101	12	12	2,366
TOTAL CASH COSTS/ACRE	1,557	451	186	766	1,053	610	756	152	1,332	189	16	16	7,085

UC COOPERATIVE EXTENSION
Table 4. 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	Cultivator - 5'	750	20	39	66	3	4	72
04	Disk - Offset 5'	4,350	15	418	437	16	24	477
04	Duster - 3 Pt	4,700	12	651	530	18	27	574
04	In-Row (Vine Row) Cultivator	7,060	20	368	617	25	37	680
04	Material Spreader	15,000	12	2,078	1,690	58	85	1,833
04	Orchard/Vine Sprayer 300 Gal	10,000	10	1,768	1,241	40	59	1,339
04	Pickup Truck 1/2 Ton	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	Vine Trimmer (hedger)	14,200	10	228	1,933	49	72	2,054
TOTAL		132,317		25,544	15,449	534	789	16,772
60% of New Cost *		79,390		15,326	9,269	320	474	10,063

*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	
Buildings: 400 sq ft	6,800	20	680	586	25	37	136	785
Land	2,275,000	23	2,275,000	141,732	0	22,750	0	164,482
Drip Irrigation System	52,000	25	5,200	4,065	193	286	1,040	5,585
Frost Protection System	66,400	20	6,640	5,722	247	365	1,328	7,662
Reservoir: 12 ac ft	87,000	25	8,700	6,802	323	479	1,740	9,344
Fuel Tanks: 1-250 Gallon	1,000	25	100	78	4	6	20	107
Shop Tools	2,000	10	200	260	7	11	40	318
Vineyard Establishment Cost	499,710	22		42,332	1,689	2,499	0	46,520
TOTAL INVESTMENT	2,989,910		2,296,520	201,577	2,489	26,432	4,304	234,802

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	30	acre	17	516
Crop Insurance	30	acre	325	9,750
Foreman Salary + OH	30	acre	525	15,750
Office Expense	30	acre	250	7,500
Sanitation Fees	30	acre	15	436
Miscellaneous Costs	30	acre	100	3000

UC COOPERATIVE EXTENSION
 Table 5. HOURLY EQUIPMENT COSTS
 NORTH COAST - Sonoma County 2004

Yr Description	COSTS PER HOUR							Total Costs/Hr.
	Actual	Cash Overhead			Operating			
	Hours Used	Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
04 60 HP 4WD Tractor	472.00	3.45	0.15	0.22	0.70	4.91	5.61	9.43
04 ATV 4WD	115.50	5.56	0.17	0.25	0.50	1.44	1.94	7.92
04 Brush Shredder 6'	51.50	8.07	0.30	0.44	3.10	0.00	3.10	11.90
04 Cultivator - 5'	2.60	15.13	0.62	0.91	0.14	0.00	0.14	16.80
04 Disk - Offset 5'	23.60	11.09	0.41	0.60	0.67	0.00	0.67	12.77
04 Duster - 3 Point	26.50	11.97	0.41	0.60	0.65	0.00	0.65	13.64
04 In-Row (Vine Row) Cultivator	77.30	4.79	0.19	0.29	1.29	0.00	1.29	6.56
04 Material Spreader	11.00	91.78	3.13	4.64	5.71	0.00	5.71	105.25
04 Orchard/Vine Sprayer 300 Gal	214.90	3.47	0.11	0.16	1.69	0.00	1.69	5.43
04 Pickup Truck 1/2 Ton	25.50	83.03	2.85	4.22	1.91	5.40	7.31	97.41
04 Ringroller - 5'	4.50	7.59	0.31	0.46	0.07	0.00	0.07	8.43
04 Seed Drill - 5'	9.20	56.64	1.82	2.69	1.88	0.00	1.88	63.02
04 Vine Trimmer (hedger)	7.70	149.87	3.78	5.59	5.87	0.00	5.87	165.11

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
 NORTH COAST - Sonoma County 2004

COSTS PER ACRE AT VARYING YIELD TO PRODUCE ORGANIC WINE GRAPES

	YIELD in Tons/Acre						
	3.00	4.00	5.00	6.00	7.00	8.00	9.00
OPERATING COSTS:							
Cultural Cost	3,340	3,340	3,340	3,340	3,340	3,340	3,340
Harvest Cost	450	600	750	900	1,050	1,200	1,350
Assessment Cost	278	283	287	290	294	299	303
Postharvest Cost	81	81	81	81	81	81	81
Interest on operating capital	104	105	105	106	107	108	109
TOTAL OPERATING COSTS/ACRE	4,253	4,409	4,563	4,717	4,872	5,028	5,183
Total Operating Costs/ton	1,418	1,102	913	786	696	629	576
CASH OVERHEAD COSTS	2,366	2,366	2,366	2,366	2,366	2,366	2,366
TOTAL CASH COSTS/ACRE	6,619	6,775	6,929	7,083	7,238	7,394	7,549
Total Cash Costs/ton	2,206	1,694	1,386	1,181	1,034	924	839
NON-CASH OVERHEAD COSTS	7,028	7,028	7,028	7,028	7,028	7,028	7,028
TOTAL COSTS/ACRE	13,647	13,803	13,957	14,111	14,266	14,422	14,577
Total Costs/ton	4,549	3,451	2,791	2,352	2,038	1,803	1,620

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	397	1,791	3,187	4,583	5,978	7,372	8,767
1,650	697	2,191	3,687	5,183	6,678	8,172	9,667
1,750	997	2,591	4,187	5,783	7,378	8,972	10,567
1,838	1,261	2,943	4,627	6,311	7,994	9,676	11,359
1,850	1,297	2,991	4,687	6,383	8,078	9,772	11,467
1,950	1,597	3,391	5,187	6,983	8,778	10,572	12,367
2,050	1,897	3,791	5,687	7,583	9,478	11,372	13,267
2,150	2,197	4,191	6,187	8,183	10,178	12,172	14,167

NET RETURN 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	-1,969	-575	821	2,217	3,612	5,006	6,401
1,650	-1,669	-175	1,321	2,817	4,312	5,806	7,301
1,750	-1,369	225	1,821	3,417	5,012	6,606	8,201
1,838	-1,105	577	2,261	3,945	5,628	7,310	8,993
1,850	-1,069	625	2,321	4,017	5,712	7,406	9,101
1,950	-769	1,025	2,821	4,617	6,412	8,206	10,001
2,050	-469	1,425	3,321	5,217	7,112	9,006	10,901
2,150	-169	1,825	3,821	5,817	7,812	9,806	11,801

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	-8,997	-7,603	-6,207	-4,811	-3,416	-2,022	-627
1,650	-8,697	-7,203	-5,707	-4,211	-2,716	-1,222	273
1,750	-8,397	-6,803	-5,207	-3,611	-2,016	-422	1,173
1,838	-8,133	-6,451	-4,767	-3,083	-1,400	282	1,965
1,850	-8,097	-6,403	-4,707	-3,011	-1,316	378	2,073
1,950	-7,797	-6,003	-4,207	-2,411	-616	1,178	2,973
2,050	-7,497	-5,603	-3,707	-1,811	84	1,978	3,873
2,150	-7,197	-5,203	-3,207	-1,211	784	2,778	4,773

UC COOPERATIVE EXTENSION
Table 7. OPERATIONS WITH EQUIPMENT
 NORTH COAST – Sonoma County 2004

Operation	Operation Month	Tractor	Implement	Material	Broadcast Rate/acre	Unit
Cultural:						
Disease: Phomopsis/Mildew (lime sulfur) 1X/2Y Alt Row	January	60 HP 4WD	Orchard Sprayer	Lime Sulfur	3.00	gal
Prune: Winter	January			Grower Labor	18.00	hr
Prune: Winter - Retie & Lower Wires	January			Grower Labor	8.00	hr
Weed: Vine Rows 2X (flame)	January	ATV 4WD	Flamer (loaned)	Propane	10.00	gal
	March	ATV 4WD	Flamer (loaned)	Propane	10.00	gal
Weed: Mow Grass Centers & Shred Prunings	February	60 HP 4WD	Brush Shredder 6'			
Frost Protection: Sprinkle 6X	March			Water	1.32	acin
	April			Water	1.32	acin
	May			Water	1.32	acin
Disease: Mildew/Phomopsis (Cu/S) 2X Alt Row	April	60 HP 4WD	Orchard Sprayer	Champion	2.00	lb
				Kumulus	5.00	lb
	April	60 HP 4WD	Orchard Sprayer	Champion	2.00	lb
				Kumulus	5.00	lb
Canopy Mgmt: Move Wires 3X	April			Labor	12.00	hr
	May			Labor	12.00	hr
	May			Labor	12.00	hr
Weed: Mow Grass Centers 2X	April	60 HP 4WD	Brush Shredder 6'			
	May	60 HP 4WD	Brush Shredder 6'			
Weed: Mow Legume Centers 1X	April	60 HP 4WD	Brush Shredder 6'			
Fertilize: Legume Centers (compost)	April	60 HP 4WD	Material Spreader	Compost	2.30	ton
Fertilize: Legume Centers (gypsum) 1X/5Yr	April		blended w/compost	Gypsum	0.10	ton
Fertilize: Legume Centers (oyster shell lime) 1X/5Yr	April		blended w/compost	Oyster Shell Lime	0.10	ton
Sucker: Cordons 2X	April			Grower Labor	8.00	hr
	May			Labor	8.00	hr
Disease: Mildew/Botrytis/Mites (oil) 2X	April	60 HP 4WD	Orchard Sprayer	Stylet Oil	4.00	gal
	May	60 HP 4WD	Orchard Sprayer	Stylet Oil	4.00	gal
Sucker: Trunks	May			Labor	8.00	hr
Disease: Mildew (Kumulus, Serenade) 2X	May	60 HP 4WD	Orchard Sprayer	Kumulus	5.00	lb
				Serenade	6.00	lb
	June	60 HP 4WD	Orchard Sprayer	Kumulus	5.00	lb
				Serenade	6.00	lb
	June	60 HP 4WD	Orchard Sprayer	Kumulus	5.00	lb
Irrigate 20X (weekly)	May			Water	0.42	acin
	June			Water	0.83	acin
	July			Water	0.84	acin
	August			Water	0.83	acin
	September			Water	0.42	acin
Weed: Cultivate Vine Row 2X	May	60 HP 4WD	In-Row Cultivator			
	July	60 HP 4WD	In-Row Cultivator			
Weed: Disk Legume Centers 2X	May	60 HP 4WD	Disk - Offset 5'			
	May	60 HP 4WD	Disk - Offset 5'			
Fertilize: Petiole Sample/Analysis 1X/3Yr	May			Labor	0.10	hr
Disease: Mildew (Kumulus) 2X/3Yr	June	60 HP 4WD	Orchard Sprayer	Kumulus	1.65	lb
Insect: Leafhopper 1X/3Yr	June	60 HP 4WD	Orchard Sprayer	Stylet Oil	0.66	gal
Canopy: Leaf Removal	June			Labor	21.50	hr
Weed: Cultivate Legume Centers	June	60 HP 4WD	Cultivator			
Canopy: Hedge (mechanical)	July	60 HP 4WD	Vine Trimmer			
Weed: Hoe Vine Row	July			Labor	22.00	hr
Disease: Mildew (sulfur dust) 3X	July	60 HP 4WD	Duster	Sulfur Dust	10.00	lb
	July	60 HP 4WD	Duster	Sulfur Dust	10.00	lb
	August	60 HP 4WD	Duster	Sulfur Dust	10.00	lb
Crop Adjust: Thin Fruit (hand)	July			Labor	10.00	hr

UC COOPERATIVE EXTENSION

Table 7. continued

	Operation			Material	Broadcast	
	Month	Tractor	Implement	Rate/acre	Rate/acre	Unit
Pickup (farm use)	Annual					
ATV (farm use)	Annual					
Pest: Consultant (field monitoring)	Crop Season			Contract	35.00	\$/acre
Harvest & Haul	September	Custom				
Cover Crop: Disk Legume Center	October	60 HP 4WD	Disk - Offset 5'			
Cover Crop: Plant Legume Center	October	60 HP 4WD	Drill - Grain	Legume/Grass	50.00	lb
Cover Crop: Roll Legume Center	October	60 HP 4WD	Ringroller 5'			
Cover Crop: Disk Grass Center 1X/4Yr	October	60 HP 4WD	Disk - Offset 5'			
Cover Crop: Plant Grass Center 1X/4Yr	October	60 HP 4WD	Drill - Grain	Grass/Brome	3.00	lb
Cover Crop: Roll Grass Center 1X/4Yr	October	60 HP 4WD	Ringroller 5'			
Irrigate: Cover Crop (Grass & Legume Centers) OH Sprinkler	October			Water	2.00	acin