
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2008

SAMPLE COSTS
TO ESTABLISH A VINEYARD AND PRODUCE
WINEGRAPES

Cabernet Sauvignon



San Joaquin Valley North
CRUSH DISTRICT 11
of San Joaquin and Sacramento Counties

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INTRODUCTION

Sample costs to establish a vineyard and produce winegrapes under drip irrigation in the northern San Joaquin Valley – Crush District 11 of Sacramento and San Joaquin counties are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on production practices considered typical for the crop and area, but these same practices will not apply to every situation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 3 and 4 is provided for entering your costs.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589 or your local UC Cooperative Extension office.

Sample Cost of Production Studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-4424. Current studies and some archived studies can be downloaded from the department website at <http://coststudies.ucdavis.edu> or obtained from selected county UC Cooperative Extension offices.

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ASSUMPTIONS

The assumptions refer to Tables 1 to 9 and pertain to sample costs to establish the vineyard and produce winegrapes in the northern San Joaquin Valley – Crush District 11 of Sacramento and San Joaquin counties. For district location and other related information, see the website <http://www.lodiwine.com>. The cultural practices described represent production operations and materials considered typical on a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The study does not represent a single farm and is intended as a guide only. **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 200 contiguous acre farm, located on the valley floor in Crush District 11 of San Joaquin and Sacramento counties, is owned and operated by the grower. Sixty acres of winegrapes are being established and are the basis of this study. In addition, 135 acres of mature vineyards are in production, and roads, irrigation systems, fencing, and farmstead occupy five acres.

Establishment Cultural Practices and Material Inputs

The following practices refer to Tables 1 & 2.

Vineyard Conversion and Land Preparation. The new vineyard is being planted on land that had an existing vineyard. The old grapevines are removed in the fall. After the vines have been pushed out and burned, soil amendments may be added. The land is slip plowed in two different directions to a depth of 5-6 feet to break up hardpan, improve root penetration, water infiltration and also pull up additional roots remaining from the previous vines. The ground is then disced two times. The field is floated (triplaned) two times. The following spring the ground is cultivated (disced) two times with a pre-emergent, residual herbicide applied during the first discing and the material further incorporated with the second discing. All operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year. Custom or contract operators do all operations except the discing and herbicide application.

Fumigation: Because of costs and governmental restrictions, fumigation is not considered as a cost in this study. Fumigation costs may range from \$400 to \$2,200 per acre depending on materials and methods. Other alternatives are to leave the land fallow for a couple of years with the addition of soil amendments – manure, gypsum and lime.

Vines. Potted benchgraft vines, Cabernet Sauvignon variety, are planted on a 7-foot x 10-foot spacing at 622 vines per acre. Vines are trained to a bilateral cordon at 44 inches above ground and spur pruned. Cordons are the horizontal branches and spurs or shoots are the bearing units on the cordon. The grapevines are assumed to begin yielding fruit in three years and produce for an additional 22 years.

Planting. The field is marked and laid out in the fall or spring (April). Planting starts in early spring (May) and is done by hand. The potted plants are placed in the planting hole and the soil formed around the roots. The following year an average of 2% or 13 vines per acre will be replanted.

Trellis System. A commercial trellis company installs the system. The cost in the study is for complete installation and includes materials and labor. The system is assumed to be installed between February and June and the 24-inch cross arms attached to alternate stakes between June and October. The trellis system is designed

to support a bilateral cordon trained and spur pruned vineyard. The system in this study utilizes metal T stakes at each vine with eight nine-foot end posts per acre at row ends to anchor the wires. The T stakes can be installed at the time of survey and marking or any time prior to planting. Five permanent wires are secured to the end posts and attached to the metal T stakes. The drip line is suspended from the bottom strand with drip clips. The trellis system is considered as part of the vineyard since it will be removed when the vines are removed; therefore, it is included as part of the establishment cost.

Training. Training and pruning establish the vine framework and these techniques will vary with variety and trellis system. In this study, training during the establishment years includes pruning, tying, suckering, shoot positioning, and shoot thinning. All operations are not done each year, nor are all the operations used for other training methods or trellis systems. The prunings during the first three years are placed in between the vine rows (vine middles) and are chopped during the first discing.

First Year. The vines are allowed to grow freely with no attempt at training.

Second Year. During dormancy (February) vines are pruned back to two buds to provide shoots of which, one is selected for trunk development, taking 11.5 man-hours. Green tying, which includes suckering, tying, and vine training is done in May, June, and July, but can be done from April through September. Green tying takes a total of 66.27 man-hours. Vines are trained by tying one shoot up the T stake to become the main trunk. During the latter part of the season, this shoot is topped at or slightly below the cordon wire. Two lateral shoots are selected from the trunk as the bilateral cordons. Any remaining lower laterals are also pruned and the cordons cut back to the appropriate length as determined by girth. Suckering is the removal of sprouts from the rootstock that compete with the main trunk and cordons for water and nutrients.

Third Year. Green tying at 33.15 man-hours (including suckering) in May and June continues by extending the cordons along the permanent cordon wire and selecting spur positions. Canes from spurs are pruned appropriately taking 16.57 man-hours. Slower growing vines continue to be trained; however, year three is the last year that the vines are trained in this study. After the vines are trained, canopy management including shoot positioning, thinning, and suckering trunks and cordons is done in June and takes 16.5 man-hours. The vines are mechanically trimmed in September prior to harvest.

Irrigation. Irrigation costs in the tables include pumped water plus labor. Water is calculated to cost \$60.00 per acre-foot. No assumption is made about effective rainfall. During the first two years, irrigations begin in May and end around September. In the third year additional irrigations are made postharvest. The amount of water applied to the vineyard period varies each year as shown in Table A.

Table A. Applied Irrigation Water			
AcIn/Year			
Year	Preharvest	Postharvest	Total
1	6	0	6
2	10	0	10
3+	13	3	16

Drip System. Mainlines are laid out in the fall prior to trellis installation. The drip line is laid on top of the ground. After planting the drip line is attached to the drip wire on the trellis system. If needed, the ground is preirrigated to ease the hand digging for the planting hole. The drip system includes the tape or drip line, laterals, fertilizer injectors, filters, and the installation labor. The labor also includes laying out the line and hanging it on the bottom trellis wire. The cost is shown under Non-Cash Overhead (Investments).

Pest Management. The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC Integrated Pest Management Guidelines, Grapes*. Pesticides mentioned in the study are commonly used, but are not recommendations.

Insects. Many insects attack grapevines, therefore monitoring begins in the first year. Leafhoppers (*Erythroneura elegantula* and *E. variabilis*) can cause serious problems and are controlled with Provado insecticide beginning in June of the third year. The material is applied with the grower’s tractor and vineyard sprayer.

Diseases. Many pathogens attack grapevines, but the major disease assumed is powdery mildew (*Uncinula necator*). Powdery mildew control begins in April of the third year, but timing depends upon the disease pressure, which can vary from year to year. Sulfur dust is applied five times and Rally, a sterol inhibitor, one time and Flint, a strobilurine, one time.

Weeds. Prior to planting, Treflan, a preemergent herbicide, is applied with a spray boom attached to the front of a disc. Incorporation is completed with a second discing. The row middles are cultivated (disced) three to five times per season during the establishment years. The vine rows are sprayed in late fall or winter during the first two years with a combination of herbicides such as Prowl, Goal and Roundup. Also, during the first two years, the vine rows are hand weeded and assumed to take 13.25 man-hours each year. Surflan, Goal and Roundup are applied to the vine rows in the winter (winter strip spray) beginning in the third year. Summer weed control in the vine row begins in the second year with Roundup herbicide applied by the grower.

Vertebrate. Jackrabbits are the major pest, although cottontail, brush rabbit, pocket gophers, squirrels, voles (meadow mice), and coyotes can also cause damage. Milk cartons placed around the young vines at planting protect the vines from rabbit damage. Another method is to build a fence around the vineyard.

Fertilization. Liquid fertilizer, 5-0-12, is applied through the drip line at 500 pounds (45 gallons) per acre during the first three years. This applies nitrogen at 25 pounds per acre and potassium at 60 pounds per acre.

Harvesting. Harvesting starts in the third year. In this study the crop is custom harvested by machine. Hauling to the winery is contracted and the grower pays both the harvest and hauling costs.

Year:	3	4+
Tons Per Acre:	3.0	6.5

Yield. Typical annual yields for Cabernet Sauvignon in Crush District 11 are shown in Table B.

Production Cultural Practices and Material Inputs

Refers to Tables 3 - 9

Vine Management (VM)/Prune. Hand pruning at 30 man-hours per acre is done during the winter months (February). The prunings are placed in the row middles and chopped/shredded. The prunings are incorporated into the soil during the first discing in March. Winter tying at 8.80 man-hours per acre, where cordons are tied to the cordon wire with twine at the trunk and at each end of the cordons is done in March. Subsequently, trunk suckering (5.5 man-hours) is done in April, shoot removal (16.5 man-hours) in May, and leaf removal (16.5 man-hours) in June. The vines are mechanically trimmed (skirted) in June and prior to harvest in September. Suckering is the removal of water sprouts from the trunk and below the soil surface. Shoot removal is the operation whereby the weak shoots, which lack vigor and do not originate from the fruiting spur buds, are removed. If needed, the clusters may be thinned (cluster thinning) later in the season to reduce crop load or remove clusters that may be delayed in maturity. Other varieties may require cluster thinning due to

compactness. During leaf removal the basal leaves are removed in and around the fruit zone to allow for exposure and better air movement. Shoot positioning, thinning, and suckering trunks and cordons continue through the production years. Positioning and thinning shoots allows vines space to develop good fruit clusters, and opens the canopy to allow greater air movement through the vines and around the clusters. Pruning costs in this study are based on an hourly rate, although much of the pruning in the region is done by piecework.

Fertilization. Fertilizer can be applied through the drip system throughout the year. In this study, fertilizer containing nitrogen and potassium (5-0-12) is applied equally in May and October at 300 pounds (27 gallons) per acre. This supplies 15 pounds of N and 36 pounds of K per acre per application. Labor costs for applying the fertilizer are assumed to be included in the irrigation labor.

Irrigation. Irrigation costs in the tables include pumped water and irrigation labor. The water is calculated to cost \$60.00 per acre-foot (\$5/acre-inch) based on pumping costs as provided by the growers. Thirteen acre-inches are applied during the growing season beginning in April and three acre-inches are applied post harvest (September/October). No assumption is made about effective rainfall. The average rainfall in the area is 17 to 18 inches. Irrigation labor is averaged over the season, although extra time may be required during the first irrigation to flush and check the system, and make any necessary repairs.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. Information and pesticide use permits are available through the local county Agricultural Commissioner's office. Pesticides mentioned in this study are used to calculate rates and costs. Although growers commonly use the pesticides mentioned, other pesticides are available. Spray adjuvants are recommended for use with many pesticides, but are not accounted for in this study. Pesticide costs vary by location, brand, and grower volume. Pesticide costs in this study are from dealers in the region.

Pest Control Adviser (PCA). The PCA monitors the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private consultants on a per acre basis or receive the service as part of an agreement with an agricultural chemical and fertilizer company. Separate costs for a PCA are not included in this study.

Weeds. Herbicide choice is a function of weed pressure, which can change over time. In this vineyard vine row weeds (strip spray) are controlled with a tank mix of Surflan, Goal, and Roundup applied during December or January. Roundup herbicide is used primarily for summer weed control in the vine row as a strip or spot spray. It is assumed that although the spray applicator drives every row, material applied to the vine row amounts to 40% of the field acreage. Resident vegetation in the row middles is managed with one mowing in March, at which time the prunings are shredded, and with four discings per season – March, April, June, October.

Insects. Grape leafhopper (*Erythroneura elegantula*), variegated leafhopper (*Erythroneura variabilis*), Pacific spider mite (*Tetranychus pacificus*) and Willamette spider mite (*Eotetranychus willamettei*) are the most important insects in the area. In this study Provado is applied in June (combined with mildew spray) to control leafhoppers. Mites are controlled with Omite in July (combined with mildew spray). Incidental pests such as omnivorous leafroller (OLR), leafroller, grape mealybug, and thrips are not accounted for, but may require an additional material for control in one of the spray applications or as an additional spray application. Vine mealybug, a new pest, may need to be controlled.

Diseases. Many diseases attack grapevines, but the major disease assumed in this study is powdery mildew (*Uncinula necator*). Powdery mildew treatments begin in mid-April with five dusting sulfur applications at 10 to 14 day intervals followed by two fungicide applications (Rally and Flint), each with different modes of action. Sulfur is applied once in April, three times in May, and once in June. Rally (sterol inhibitor) is applied in June and Flint (strobilurine) in July.

Harvest. The crop is machine harvested by a custom operator and costs \$300 per acre. Hauling to the winery is contracted and the grower pays \$18 per ton for local hauls. Additional charges will apply to hauls considered being out of the local area.

Yields. Yield maturity is reached in the fourth year. An assumed average yield of 6.5 tons per acre is used to calculate yields over the production years. Yield range for Cabernet Sauvignon in Crush District 11 is 4.5 to 9.5 tons per acre and is affected by variations in vine spacing and trellis systems. Annual yields are measured in tons as shown in Table B.

Returns. Return prices per ton for winegrapes are determined by variety and percent sugar (Brix). During the harvest season, Brix ranges from a low at the beginning of harvest and gradually increases and is higher toward the end of the harvest. The effect of sugar percentages on prices (low and high) is shown in Table C for Crush District 11 growers. Use of return prices for grapes is for calculating net returns to growers at different yields and price as shown in the Ranging Analysis Table. A price in the middle of the range of \$450 per ton for Cabernet Sauvignon winegrapes is used in this study.

Table C. Annual Returns for Cabernet Sauvignon
Crush District 11¹

Year	\$/Ton		Weighted Average
	Low	High	
2003	90	1,208	376
2004	150	1,208	375
2005	100	1,208	356
2006	100	1,208	342
2007	150	1,208	375
Average	118	1,208	365

¹Final Grape Crush Report 2003 – 2007.

²Based on minimum of 100 ton lots

Assessments. The Lodi Winegrape Commission supports winegrape promotion, research, and education for Crush District 11 growers. The commission assesses growers \$0.0045 (\$4.50 per \$1,000) on the gross crop returns (yield x returns). A mandatory assessment by the California Department of Food and Agriculture (CDFA) assesses growers \$0.001 (\$1.00 per \$1,000) on the gross crop returns to support the Pierces Disease/Glassy Winged Sharpshooter Insect program. Although not included as an assessment, the Lodi District Grape Growers Association, a voluntary organization represents growers in Crush District 11 and serves the local political interests of the growers. The association assesses the growers \$3 per bearing/non-bearing acres with a total minimum of \$150 and maximum of \$1,500. The California Association of Winegrape Growers (CAWG) is also a voluntary organization that represents growers, but on state and federal political issues. The association assesses the growers \$4.75 per bearing/non-bearing acres with a minimum of \$150.

Pickup/ATV. It is assumed that the pickup is used for business and personal use. Time and mileage use for the pickup and ATV are not taken from any specific data.

Labor, Equipment and Interest

Labor. Labor rates of \$14.63 per hour for machine operators and \$10.64 for general labor includes payroll overhead of 33%. The basic hourly wages are \$11.00 for machine operators and \$8.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for vineyards (code 0044), and a percentage for other possible benefits. Workers' compensation costs

will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2008 (personal email from California Department of Insurance, March 2008, unreferenced). Labor for operations involving machinery are 20% higher than the operation time given in Table 3 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

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 6.75% 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 rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of April 2008.

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 \$3.54 (excludes excise taxes) and \$3.57 per gallon, respectively. The price is based on the growers May, 2008 delivery invoice. The cost may include a 2% local sales tax on diesel fuel and 8% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 3 is determined by multiplying the total hourly operating cost in Table 8 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.

Risk. The risks associated with crop production should not be minimized. 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, which affect profitability and economic viability. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

Cash Overhead

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.

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.

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 0.74% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$774 for the entire farm.

Office Expense. Office and business expenses are estimated at \$130 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges. The expense also includes annual fees imposed by government agencies and are listed below:

California Air Resources Board Mitigation Plan Fee. Each grower with 100 contiguous acres is required to submit an annual plan to the California Air Resources Board (CARB), as to practices or operations to reduce particulate matter from roadways and agricultural operations. This fee is \$100 per site.

Agricultural Water Discharge Monitoring. Each grower is required to join a Water Coalition or provide their own monitoring and data collected to the Regional Water Quality Control Board (RWQCB). Each site under a growers operation is assessed a per acre fee in order to set up monitoring sites representative of the Water Coalitions to which the grower belongs. These sites are monitored and periodically collected samples are analyzed by independent laboratory as to listed containments of concern. Results are reported to the RWQCB. The fee depends on the Water Coalition district established, but is \$2.50 per are in this case.

County Agricultural Commissioner Pesticide Storage Fee. Each grower is required to report to the local County Ag Commissioner, all pesticides stored on an annual basis above established minimums for registering in case of a fire or natural disaster. The fee is \$100 per site.

Sanitation Services. Sanitation services provide portable toilets for the vineyard and cost the farm \$2,450 annually. The cost includes a double toilet, delivery and 9 months of weekly service.

Crop Insurance. The cost of \$100 per unit (variety) is the basic catastrophic rate paid by the growers. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage ranging from 50 to 75% of predetermined yield.

Management/Supervisor Wages. A salary for a farm manager for the 200-acre farm is included to indicate that a cash cost for professional supervision of the vineyard is incurred. An expense of \$68,500 per year that includes 33% for payroll overhead and insurance benefits is used in this study.

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price except on vineyard establishment which is 0.5% to cover costs for vine replacement and trellis repairs.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Farm equipment in the region is purchased new or used.

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 7.

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. An interest rate of 4.25% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of April 2008.

Establishment Cost. Costs to establish the vineyard are used to determine capital recovery expenses, depreciation, and interest on investment for the production years. Establishment cost is the sum of the costs for land preparation, trellis system, drip system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$12,802 per acre or \$768,120 for the 60-acre vineyard. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production. Annual vineyard maintenance (vines and trellis) is calculated at 0.5% of the establishment costs.

Irrigation System. The well, a 25 horsepower (HP) pump and the installation labor are included in the irrigation system cost. This well and pump serve only the 60-acre vineyard. Other well(s) are used on the remaining property and are not included. Water is pumped from a 120-foot depth. The irrigation system is considered an improvement to the property and has a 25-year life.

Land. Bare land as valued by the grower participants is \$20,000 per acre or \$20,513 per planted (195) acres. Limited cropland sales in the Lodi area in 2007 showed a range of \$8,000 to \$12,000 for cropland and \$15,000 to \$19,000 for vineyard sales (2008 Trends in Agricultural Land).

Building. The shop building(s) consists of 2,400 square feet of metal building on a cement slab.

Tools. This includes shop tools, hand tools, and miscellaneous field tools such as pruning tools.

Fuel Tanks. Two 500-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

Equipment Costs. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are in the Whole Farm Equipment, Investment and Business Overhead Tables. 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.

Acknowledgements. Thank you to Mohr-Fry Ranch for providing meeting rooms and to the growers that provided input.

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For information concerning the above or other University of California publications, contact UC DANR Communications Services at 1-800-994-8849, online at www.ucop.edu, or your local county UC Cooperative Extension office.

UC COOPERATIVE EXTENSION
Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

	Cost Per Acre			
	Year:	1st	2nd	3rd
Tons Per Acre:				3
PLANTING COSTS:				
Land Prep: Vineyard Removal (custom)		425		
Land Prep: Slip Plow 2X (custom)		600		
Land Prep: Disc 2X (custom)		80		
Land Prep: Triplane 2X (custom)		70		
Land Prep: Apply Herbicide (Treflan) & Incorporate		35		
Plant: Mark , Layout Vineyard		103		
Plant: Dig Hole, Plant, Wrap Vines (includes wraps/milk cartons)		311	24	
Vines: 622 Per Acre (2% Replant In 2nd Year)		1,773	37	
TOTAL PLANTING COSTS		3,396	61	
TRELLIS SYSTEM COSTS:				
Install Trellis (custom)		4,172		
TOTAL TRELLIS COSTS		4,172		
CULTURAL COSTS:				
Train: Prune vines by hand			122	176
Irrigate: Pumping & Labor		73	103	133
Fertilizer: 5-0-12		60	60	60
Train: Green Tie (Sucker, Tie & Train)			750	398
Weed: Winter Strip Spray (Yrs 1-2, Prowl, Goal, Roundup. Yr 3, Surflan, Goal, Roundup)		73	73	81
Weed: Hand Weed		141	141	
Weed: Disc (3X 1st Year, 5X Year 2+)		46	77	77
Weed: Summer Strip Spray (Roundup)			25	25
Insect: Leafhoppers (Provado)				48
Train: Shoot Positioning/Thin				176
Disease: Mildew 4X (Dusting Sulfur)				70
Disease: Mildew 1X (Rally)				52
Disease: Mildew: (Flint)				60
Train: Trim Vines				13
Pickup Truck Use		32	32	33
ATV Use		17	17	17
TOTAL CULTURAL COSTS		442	1,402	1,420
HARVEST COSTS:				
Pick Fruit				300
Haul To Crusher				54
TOTAL HARVEST COSTS				354
Assessments:				
Lodi Winegrape Commission & the CDFA Sharpshooter Program				8
TOTAL ASSESSMENT COSTS				8
Interest On Operating Capital @ 6.75%		439	62	41
TOTAL OPERATING COSTS/ACRE		8,450	1,525	1,823

UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			3
CASH OVERHEAD COSTS:				
Office Expense		130	130	130
Liability Insurance		4	4	4
Sanitation Fees		13	13	13
Managers Salary		351	351	351
Property Taxes		220	220	221
Property Insurance		11	11	12
Investment Repairs		55	55	55
TOTAL CASH OVERHEAD COSTS		784	784	786
TOTAL CASH COSTS/ACRE		9,234	2,309	2,609
INCOME/ACRE FROM PRODUCTION				1,350
NET CASH COSTS/ACRE FOR THE YEAR		9,234	2,309	1,259
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		9,234	11,543	12,802
NON-CASH OVERHEAD (CAPITAL RECOVERY):				
Building (s)		24	24	24
Fuel Tanks		1	1	1
Shop/Field Tools		6	6	6
Drip Irrigation System (drip, filters, injection)		92	92	92
Pumping Station (pump, well)		55	55	55
Land		872	872	872
Equipment		25	26	48
TOTAL INTEREST ON INVESTMENT		1,075	1,076	1,098
TOTAL COST/ACRE FOR THE YEAR		10,309	3,385	3,707
INCOME/ACRE FROM PRODUCTION				1,350
TOTAL NET COST/ACRE FOR THE YEAR		10,309	3,385	2,357
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		10,309	13,694	16,051

UC COOPERATIVE EXTENSION
Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

	Unit	\$/Unit	Year 1		Year 2		Year 3	
			Total Per Acre					
			units	\$	units	\$	units	\$
OPERATING COSTS								
Custom:								
Vineyard Removal	acre	425.00	1.00	425				
Slip Plow	acre	300.00	2.00	600				
Disc	acre	40.00	2.00	80				
Triplane	acre	35.00	2.00	70				
Trellis System	acre	4,172.00	1.00	4,172				
Mark & Layout Field	each	0.17	622.00	103				
Dig & Plant Vines	each	0.30	622.00	187				
Place Carton around Vine	each	0.13	622.00	81				
Machine Harvest	acre	300.00					1.00	300
Haul to Winery	ton	18.00					3.00	54
Fertilizer:								
5-0-12	lb	0.12	500.00	60	500.00	60	500.00	60
Fungicide:								
Dusting Sulfur	lb	0.50					75.00	38
Rally 40W	oz	4.92					4.00	20
Flint	oz	13.50					2.00	27
Insecticide:								
Provado Solupak	oz	20.31					0.75	15
Herbicide:								
Treflan HFP	pint	3.44	1.00	3				
Prowl 3.3 EC	pint	4.50	3.84	17	3.84	17		
Goal 2XL	pint	12.75	2.40	31	2.40	31	2.40	31
Surflan 4 AS	pint	7.91		0			3.20	25
Roundup Weather Max	pint	10.00	1.20	12	2.40	24	2.40	24
Water:								
Water:	acin	5.00	6.00	30	10.00	50	16.00	80
Vines:								
Grafted Vines	each	2.85	622.00	1,773	13.00	37		
Vine Ties (Ty-M-Up)	acre	15.00		0	3.00	45	3.00	45
Milk cartons	each	0.07	622.00	44	13.00	1		
Assessments:								
Lodi Winegrape Commission	Gross \$	0.0045					1350.00	6
CDFA Sharpshooter	Gross \$	0.0010					1350.00	1
Labor:								
Equipment Operator	hrs	14.63	5.17	76	5.79	85	10.82	158
General Labor	hrs	10.64	42.77	455	98.22	1045	71.22	758
Fuel, Lube & Repair:								
Gas	gal	3.54	4.18	15	4.18	15	4.25	15
Diesel	gal	3.57	8.58	31	9.60	34	22.66	81
Lube & Oil				7		7		14
Machinery repair				11		12		29
Interest								
				439		62		41
TOTAL OPERATING COSTS				8,449		1,525		1,822

UC COOPERATIVE EXTENSION
Table 3. COSTS PER ACRE to PRODUCE WINEGRAPES
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

Operation	Operation	Cash and Labor Cost per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
CULTURAL:								
Weed: Winter Strip (Surflan, Goal, Roundup)	0.51	9	4	68	0	81		
VM/Prune: Hand Prune	30.00	319	0	0	0	319		
VM/Prune: Chop/Shred Prunings	0.30	5	7	0	0	12		
Weed: Disc 4X	1.68	30	32	0	0	62		
VM/Prune: Winter Tie	8.80	94	0	15	0	109		
VM/Prune: Trunk Sucker	5.50	59	0	0	0	59		
Disease: Mildew 5X (Sulfur Dust)	1.42	25	12	38	0	74		
Irrigate: (pumping & labor)	5.00	53	0	80	0	133		
VM/Prune: Shoot Removal/Shoot Position	16.50	176	0	0	0	176		
Fertilize: through drip 2X (5-0-12)	0.00	0	0	72	0	72		
VM/Prune: Leaf Removal (hand)	16.50	176	0	0	0	176		
VM/Prune: Trim Vines (mechanical)	0.69	12	16	0	0	28		
Disease: Mildew (Rally). Insect: Leafhopper (Provado)	0.86	15	18	34	0	67		
Weed: Summer Strip Spray (Roundup)	0.51	9	4	12	0	25		
Disease: Mildew (Flint). Insect: Mites (Omite)	0.86	15	18	81	0	113		
Pickup Truck Use	0.86	15	18	0	0	33		
ATV Use	0.86	15	2	0	0	17		
TOTAL CULTURAL COSTS	90.85	1,026	130	399	0	1,555		
HARVEST:								
Machine Harvest Fruit	0.00	0	0	0	300	300		
Haul To Winery	0.00	0	0	0	117	117		
TOTAL HARVEST COSTS	0.00	0	0	0	417	417		
ASSESSMENT:								
Crop Assessments	0.00	0	0	18	0	18		
TOTAL ASSESSMENT COSTS	0.00	0	0	18	0	18		
Interest on operating capital @ 6.75%						48		
TOTAL OPERATING COSTS/ACRE		1,026	130	417	417	2,038		
CASH OVERHEAD:								
Office Expense						130		
Liability Insurance						4		
Sanitation Fees						13		
Manager Salary						351		
Crop Insurance						2		
Property Taxes						286		
Property Insurance						60		
Investment Repairs						119		
TOTAL CASH OVERHEAD COSTS						963		
TOTAL CASH COSTS/ACRE						3,002		
NON-CASH OVERHEAD:								
		Per producing Acre		-- Annual Cost --				
				Capital Recovery				
Building 2,400 sq ft		410		24		24		
Fuel Tanks 2 - 500 gal		18		1		1		
Tools-Shop/Field		72		6		6		
Drip System (drip, filters, injectors)		1,400		92		92		
Pumping System (well, pump)		833		55		55		
Land		20,513		872		872		
Vineyard Establishment		12,802		907		907		
Equipment		429		48		48		
TOTAL NON-CASH OVERHEAD COSTS		36,477		2,006		2,006		
TOTAL COSTS/ACRE						5,007		

VM=Vine Management and refers to the respective paragraph in text

UC COOPERATIVE EXTENSION
Table 4. COSTS AND RETURNS PER ACRE to PRODUCE WINEGRAPES
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Winegrape - Cabernet Sauvignon	6.50	ton	450.00	2,925	
OPERATING COSTS					
Herbicide:					
Goal 2XL	2.40	pint	12.75	31	
Surflan 4 AS	3.20	pint	7.91	25	
Roundup Weather Max	2.40	pint	10.00	24	
Vine Aids:					
Tying Materials	1.00	acre	15.00	15	
Fungicide:					
Dusting Sulfur	75.00	lb	0.50	38	
Rally	4.00	oz	4.75	19	
Flint	2.00	oz	13.50	27	
Water:					
Water-Pumped	16.00	acin	5.00	80	
Fertilizer:					
5-0-12 (liquid fertilizer)	600.00	lb	0.12	72	
Insecticide:					
Provado 1.6 Solupak	0.75	oz	20.31	15	
Omite 30W	7.00	lb	7.68	54	
Custom:					
Machine Harvest	1.00	acre	300.00	300	
Haul to Crusher	6.50	ton	18.00	117	
Assessment:					
Lodi Winegrape Commission (\$0.0045)*	2,925.00	gross value	0.01	15	
Sharpshooter Program CDFA (\$0.001)*	2,925.00	gross value	0.00	3	
Labor:					
Equipment Operator	10.25	hrs	14.63	150	
General Labor	82.30	hrs	10.64	876	
Fuel, Lube, Oil & Repair:					
Gas	4.25	gal	3.54	15	
Diesel	20.52	gal	3.57	73	
Lube				13	
Machinery repair				29	
Interest on operating capital @ 6.75%				48	
TOTAL OPERATING COSTS/ACRE				2,038	
NET RETURNS ABOVE OPERATING COSTS				887	
CASH OVERHEAD COSTS:					
Office Expense				130	
Liability Insurance				4	
Sanitation Fees				13	
Manager Salary				351	
Crop Insurance				2	
Property Taxes				286	
Property Insurance				60	
Investment Repairs				119	
TOTAL CASH OVERHEAD COSTS/ACRE				963	
TOTAL CASH COSTS/ACRE				3,002	
NET RETURNS ABOVE CASH COSTS/ACRE				-77	

*Assessment rounded to \$0.005 x gross value

UC COOPERATIVE EXTENSION

Table 4. continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building 2,400 sq ft				24	
Fuel Tanks 2 - 500 gal				1	
Tools-Shop/Field				6	
Drip System (drip, filters, injectors)				92	
Pumping System (well, pump)				55	
Land				872	
Vineyard Establishment				907	
Equipment				48	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				2,006	
TOTAL COSTS/ACRE				5,007	
NET RETURNS ABOVE TOTAL COSTS				-2,082	

UC COOPERATIVE EXTENSION

Table 5. MONTHLY CASH COSTS to PRODUCE WINEGRAPES
SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

Beginning JAN 08	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 08	08	08	08	08	08	08	08	08	08	08	08	08	
CULTURAL:													
Weed: Winter Strip (Surflan, Goal, Roundup)	81												81
VM/Prune: Hand Prune		319											319
VM/Prune: Chop/Shred Prunings			12										12
Weed: Disc 4X			15	15		15				15			62
VM/Prune: Winter Tie			109										109
VM/Prune: Trunk Sucker				59									59
Disease: Mildew 5X (Sulfur Dust)				15	45	15							74
Irrigate:				13	13	26	28	28	13	13			133
VM/Prune: Shoot Removal/Shoot Position					176								176
Fertilize: through drip 2X (5-0-12J)					36					36			72
VM/Prune: Leaf Removal (hand)						176							176
VM/Prune: Trim Vines (mechanical)						14			14				28
Disease: Mildew (Rally). Insect: Leafhopper (Provado)						67							67
Weed: Summer Strip Spray (Roundup)						25							25
Disease: Mildew (Flint). Insect: Mites (Omite)							113						113
Pickup Truck Use	3	3	3	3	3	3	3	3	3	3	3	3	33
ATV Use	1	1	1	1	1	1	1	1	1	1	1	1	17
TOTAL CULTURAL COSTS	85	323	140	106	273	342	146	32	31	68	4	4	1,556
HARVEST:													
Machine Harvest Fruit									300				300
Haul To Winery									117				117
Crop Assessments									18				18
TOTAL HARVEST COSTS									435				435
Interest on operating capital @ 6.75%	0	2	3	4	5	7	8	8	11	0	0	0	48
TOTAL OPERATING COSTS/ACRE	86	326	143	110	278	349	154	40	476	68	4	4	2,038
OVERHEAD:													
Office Expense	11	11	11	11	11	11	11	11	11	11	11	11	130
Liability Insurance			4										4
Sanitation Fees	1	1	1	1	1	1	1	1	1	1			13
Manager Salary	29	29	29	29	29	29	29	29	29	29	29	29	351
Crop Insurance		2											2
Property Taxes				143								143	286
Property Insurance	30					30							60
Investment Repairs	10	10	10	10	10	10	10	10	10	10	10	10	119
TOTAL CASH OVERHEAD COSTS	81	53	55	194	51	81	51	51	51	51	50	193	963
TOTAL CASH COSTS/ACRE	167	379	199	304	330	430	205	92	527	119	54	197	3,002

VM=Vine Management and refers to the respective paragraph in text

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WINEGRAPES

	YIELD (tons/acre)									
	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
OPERATING COSTS:										
Cultural Cost	1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555
Harvest Cost	381	390	399	408	417	426	435	444	453	462
Assessment Cost (based on \$450/ton)*	11	12	14	15	16	17	19	20	21	22
Interest on operating capital @ 6.75%	48	48	48	48	48	48	48	48	49	49
TOTAL OPERATING COSTS/ACRE	1,996	2,006	2,016	2,026	2,037	2,047	2,057	2,067	2,079	2,089
Total Operating Costs/ton	443	401	367	338	313	292	274	258	245	232
CASH OVERHEAD COSTS/ACRE	963	963	963	963	963	963	963	963	963	963
TOTAL CASH COSTS/ACRE	2,959	2,969	2,979	2,989	3,000	3,010	3,020	3,030	3,042	3,052
Total Cash Costs/ton	657	594	542	498	461	430	403	379	358	339
NON-CASH OVERHEAD COSTS/ACRE	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006	2,006
TOTAL COSTS/ACRE	4,965	4,975	4,985	4,995	5,006	5,016	5,026	5,036	5,048	5,058
Total Costs/ton	1,103	995	906	833	770	717	670	630	594	562

*See assumptions for additional information

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (ton/acre)									
	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
300	-646	-506	-366	-226	-87	53	193	333	471	611
400	-196	-6	184	374	563	753	943	1,133	1,321	1,511
500	254	494	734	974	1,213	1,453	1,693	1,933	2,171	2,411
600	704	994	1,284	1,574	1,863	2,153	2,443	2,733	3,021	3,311
700	1,154	1,494	1,834	2,174	2,513	2,853	3,193	3,533	3,871	4,211
800	1,604	1,994	2,384	2,774	3,163	3,553	3,943	4,333	4,721	5,111
900	2,054	2,494	2,934	3,374	3,813	4,253	4,693	5,133	5,571	6,011
1,000	2,504	2,994	3,484	3,974	4,463	4,953	5,443	5,933	6,421	6,911

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/ton	YIELD (ton/acre)									
	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
300	-1,609	-1,469	-1,329	-1,189	-1,050	-910	-770	-630	-492	-352
400	-1,159	-969	-779	-589	-400	-210	-20	170	358	548
500	-709	-469	-229	11	250	490	730	970	1,208	1,448
600	-259	31	321	611	900	1,190	1,480	1,770	2,058	2,348
700	191	531	871	1,211	1,550	1,890	2,230	2,570	2,908	3,248
800	641	1,031	1,421	1,811	2,200	2,590	2,980	3,370	3,758	4,148
900	1,091	1,531	1,971	2,411	2,850	3,290	3,730	4,170	4,608	5,048
1,000	1,541	2,031	2,521	3,011	3,500	3,990	4,480	4,970	5,458	5,948

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/ton	YIELD (ton/acre)									
	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
300	-3,615	-3,475	-3,335	-3,195	-3,056	-2,916	-2,776	-2,636	-2,498	-2,358
400	-3,165	-2,975	-2,785	-2,595	-2,406	-2,216	-2,026	-1,836	-1,648	-1,458
500	-2,715	-2,475	-2,235	-1,995	-1,756	-1,516	-1,276	-1,036	-798	-558
600	-2,265	-1,975	-1,685	-1,395	-1,106	-816	-526	-236	52	342
700	-1,815	-1,475	-1,135	-795	-456	-116	224	564	902	1,242
800	-1,365	-975	-585	-195	194	584	974	1,364	1,752	2,142
900	-915	-475	-35	405	844	1,284	1,724	2,164	2,602	3,042
1,000	-465	25	515	1,005	1,494	1,984	2,474	2,964	3,452	3,942

UC COOPERATIVE EXTENSION
Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT and BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
08	30 HP 4WD Tractor	19,305	15	3,758	1,583	85	115	1,783
08	70 HP 4WD Tractor	45,000	12	11,251	4,127	208	281	4,616
08	ATV 4WD	7,700	5	3,451	1,108	41	56	1,205
08	Disc - Tandem 7'	8,500	8	1,919	1,069	39	52	1,160
08	Duster - 3 Pt	6,000	5	1,954	998	29	40	1,067
08	Mower - Flail 7'	12,000	20	500	886	46	63	995
08	Vineyard Sprayer 400 gal	20,000	5	6,515	3,327	98	133	3,558
08	Pickup Truck 1/2 T	26,000	7	9,863	3,133	133	179	3,445
08	Vine Trimmer	12,000	10	1,503	1,374	50	68	1,492
08	Weed Sprayer 200 gal	4,000	5	1,303	665	20	27	712
TOTAL		154,605		42,017	17,653	728	983	19,363
60 % of New Cost *		92,763		25,210	10,592	437	590	11,618

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
Building 2,400 sqft	80,000	30		4,768	296	400	1,600	7,064
Drip Irrigation System (drip, filters, injectors)	84,000	25		5,520	311	420	1,680	7,931
Fuel Tanks 2-500 gallon	3,500	25	1,295	200	18	24	70	312
Land (200 acres)	4,000,000	25	4,000,000	170,000	0	40,000	0	210,000
Pumping Station (pump, well)	50,000	25		3,286	185	250	1,000	4,721
Tools-Shop/Field	14,000	15	1,400	1,213	57	77	280	1,627
Vineyard Establishment	768,120	22		54,431	2,842	3,841	3,840	64,953
TOTAL INVESTMENT	4,999,620		4,002,695	239,417	3,709	45,012	8,470	296,607

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Crop Insurance (\$100 per variety)	60	acre	1.67	100
Liability Insurance	200	acre	3.87	774
Manager Salary (includes P/R overhead)	195	acre	351.28	68,500
Office Expense	195	acre	130.00	25,530
Sanitation Fees	195	acre	12.56	2,450

UC COOPERATIVE EXTENSION
Table 8. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

Yr Description	COSTS PER HOUR							Total Costs/Hr.
	Actual Hours Used	Cash Overhead			Operating			
		Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
08 30 HP 4WD Tractor	571	1.66	0.09	0.12	0.87	6.05	6.92	8.79
08 70 HP 4WD Tractor	1,139	2.17	0.11	0.15	2.08	14.11	16.19	18.62
08 ATV 4WD	169	3.94	0.15	0.20	0.58	1.36	1.94	6.23
08 Disc - Tandem 7'	315	2.04	0.07	0.10	1.43	0.00	1.43	3.64
08 Duster - 3 Pt	276	2.17	0.06	0.09	0.88	0.00	0.88	3.20
08 Mower - Flail 7'	58	9.22	0.48	0.65	5.47	0.00	5.47	15.82
08 Vineyard Sprayer 400 gal	529	3.77	0.11	0.15	2.62	0.00	2.62	6.65
08 Pickup Truck 1/2 T	169	11.13	0.47	0.64	1.93	18.66	20.59	32.83
08 Vine Trimmer	134	6.14	0.22	0.30	5.09	0.00	5.09	11.75
08 Weed Sprayer 200 gal	243	1.64	0.05	0.07	1.03	0.00	1.03	2.79

UC COOPERATIVE EXTENSION
Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS
 SAN JOAQUIN VALLEY NORTH (Crush District 11) 2008

Operation	Operation Month	Tractor	Implement	Non-Machine	Material	Broadcast Rate/acre	Unit
				Labor (hrs/acre)			
Cultural:							
Weed: Winter Strip (vine row)	Jan	30HP 4WD	Weed Sprayer		Goal	2.40	pint
					Surflan	3.20	pint
					Roundup	1.20	pint
VM/Prune: Hand Prune	Feb			30.00			
VM/Prune: Shred Prunings	Mar	70HP 4WD	Mower-Flail				
Weed: Disc 4X	Mar	70HP 4WD	Disc 7'				
	Apr	70HP 4WD	Disc 7'				
	June	70HP 4WD	Disc 7'				
	Oct	70HP 4WD	Disc 7'				
VM/Prune: Winter Tie	Mar			8.80	Tying Material		acre
VM/Prune: Trunk Suckering	Apr			5.50			
VM/Prune: Shoot Removal & Position	May			16.50			
VM/Prune: Leaf Removal	June			16.50			
VM/Prune: Trim Vines	June	70HP 4WD	Vine Trimmer				
	Sept	70HP 4WD	Vine Trimmer				
Disease: Mildew (dust) 5X	Apr	30HP 4WD	Duster		Dusting Sulfur	15.00	lb
	May	30HP 4WD	Duster		Dusting Sulfur	45.00	lb
	June	30HP 4WD	Duster		Dusting Sulfur	15.00	lb
Disease: Mildew. Insect: Leafhopper	June	70HP 4WD	Vineyard Sprayer		Rally	4.00	oz
					Provado	0.75	oz
Disease: Mildew. Insect: Mites	July	70HP 4WD	Vineyard Sprayer		Flint	2.00	oz
					Omite	7.00	lb
Irrigate	Apr			0.50	Water	1.50	acin
	May			0.50	Water	1.50	acin
	June			1.00	Water	3.00	acin
	July			1.00	Water	3.50	acin
	Aug			1.00	Water	3.50	acin
	Sept			0.50	Water	1.50	acin
	Oct			0.50	Water	1.50	acin
Fertilize: through drip	May				5-0-12	300.00	lb
	Oct				5-0-12	300.00	lb
Weed: Summer Strip Spray	June	30HP 4WD	Weed Sprayer		Roundup	1.20	pint
Harvest & Haul	Sept	Custom					