
UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES
COOPERATIVE EXTENSION
AGRICULTURAL ISSUES CENTER
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
2019

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



Southern San Joaquin Valley
Fresno, Kern, Kings, Madera and Tulare Counties
Rubired Variety

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INTRODUCTION

Sample costs to establish a winegrape vineyard and produce winegrapes are presented in this study. This analysis does not represent any single farm and is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on August 2019 figures. The same sample costs are used from establishment through the production years, knowing that costs will change from year to year. A blank column titled Your Costs is provided in Tables 2 and 3 for your convenience.

For an explanation of calculations used, refer to the section titled Assumptions. For more information contact Donald Stewart; University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or destewart@ucdavis.edu. To discuss this study with a local southern San Joaquin valley extension farm advisor contact your county cooperative extension office. ucanr.edu/County_Offices/.

Sample Cost of Production studies for many commodities are available and can be downloaded from the website, coststudies.ucdavis.edu. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A costs and returns study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the

region the study is based. The authors thank the farmer cooperators, UC Cooperative Extension and other industry representatives who provided information, assistance, and expert advice. **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.** *The University is an affirmative action/equal opportunity employer.*

ASSUMPTIONS

The assumptions contain background in developing Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce winegrapes under drip irrigation in the southern San Joaquin Valley. The cultural practices described are based on production practices considered typical for the crop and area, but will not apply to every situation.

This study explains the annual costs associated with an ongoing operation, under the assumptions that the farm was operated this way in prior years and will continue in subsequent years. The costs, materials, and practices in this study will not apply to all farms. Timing and types of 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.

Farm. The hypothetical 200 contiguous acre farm, located on the valley floor of the southern San Joaquin Valley, is owned and operated by the grower. Winegrapes, Rubired are being established on 40 acres. In addition, 155 acres of mature vineyards are in production, and roads, irrigation systems, fencing, and farmstead occupy five acres. Crush districts can include parts of counties or entire counties within the boundaries. The location of the vineyard within the valley or crush district will have an effect on the variety planted and the trellis system.

Establishment Cultural Practices and Material Inputs

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 pulled out and burned, soil amendments may be added.

The land is ripped or slip plowed (depending on soil type) in two different directions to a depth of six feet to break up hardpan, improve root penetration and water infiltration and also pull up additional roots remaining from the previous vines. The ground is then cultivated (disced) two times. The field is floated (tri-planed) two times. The vine rows are strip fumigated with Telone II and a tractor with a roller packs/seals the soil immediately after. The ground is opened up about 3 weeks later with a light chisel. All operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

Soil Pits/Sampling. In early fall, after the old vineyard has been removed, a minimum of two backhoe pits are dug with a custom hired backhoe. The pit soil horizon profile is viewed and recorded by the grower's Pest Control Advisor (PCA), or Certified Crop Advisor (CCA) and two soil samples at various depths are taken from each pit and sent to a commercial lab for standard soils analysis. The information from the pits is used to help determine vine nutrition and irrigation needs based on soil depth, texture, and plant available water. These pits can also help determine if the field needs sub-soiling or deep ripping to break up hardpans.

Trellis System. A custom operating company installs the trellis system. The costs are for installation which includes materials and labor. The system is put in before planting and the 24-inch cross arms are attached to each stake between June and October. The trellis system is designed to support a quadrilateral cordon trained to a horizontally divided canopy and spur pruned vineyard. The system in this study utilizes 125-gauge metal T-stakes at each vine with 10-foot end posts 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. Two permanent cordon wires (11-gauge) are secured to the end posts and attached to the metal T-stakes. The drip irrigation line is suspended from the bottom wire (13-gauge) with drip clips. The trellis system is considered part of the vineyard since it will be removed when the vines are removed; therefore, it is included as part of the establishment cost.

Vines. Potted bench graft vines (Rubired variety) with pest resistant rootstocks are planted on a 7-foot x 11-foot spacing at 566 vines per acre. Vines are trained to a quadrilateral cordon height at 68 inches above the ground and spur pruned. Cordons are the horizontal branches (separated at 24 inches) 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 early spring. Planting starts in the spring, late April or May and is done by hand. The potted plants are placed in the planting hole and the soil is formed around the roots. Cartons are wrapped around the bottom of the vines. The following year an average of 2 percent or 11 vines per acre will be replanted in May. Second year replants are provided by the nursery at no cost.

Training/Pruning: Canopy Management (CM). Training and pruning establish the vine framework and these techniques will vary with variety and trellis system. Training during the establishment years includes pruning, tying, suckering 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 mowing.

First Year. The vines are allowed to grow freely. The vines are trained to the cordon wire only. However, new vines may require to be loosely tied to a stake to keep from growing into the row middles and getting damaged during cultivation or mowing.

Second Year. During dormancy (February) vines are pruned back to two buds to provide shoots of which one is selected for trunk development. The pruning takes approximately 5.5 hours per acre. 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 75 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. Four lateral shoots are selected from the trunk as the quadrilateral 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 46 hours of labor (including suckering) in May and June continues by extending the cordons along the permanent cordon wire and selecting spur positions. Dormant canes from spurs are pruned to 2-bud spur, taking 23 hours of labor. 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

includes suckering trunks and cordons, by hand which is done in June. The vines are mechanically trimmed and skirted in June and again in September prior to harvest.

Irrigation. Irrigation costs in the tables include district water charges and labor. Water is calculated to cost \$200 per acre-foot (\$16.67 per acre inch). No assumption is made about effective rainfall. During the first two years, irrigations begin in April or May and end in September. In the third and following years, additional irrigation water may be applied post-harvest. The amount of water applied to the vineyard varies during establishment years as shown in Table A.

Drip Irrigation System. The irrigation mainlines and laterals are laid out in the fall. The drip line is rolled out and attached to the drip wire on the trellis system prior to planting. If needed, the ground is pre-irrigated to ease the hand digging for the planting hole. The drip irrigation system includes the tape or drip line, laterals, fertilizer injectors, and filters. The cost for the drip irrigation system is under Non-Cash Overhead (Investments). The drip irrigation installation labor includes laying out the line, hanging it on the bottom trellis wire and is included as a pre-planting cost in Table 1.

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*. See the production pest management section for more information.

Insects. Nursery materials should be checked to prevent introduction of invasive species such as vine mealy bug (VMB). 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 Platinum insecticide beginning in June of the third year. Acramite is applied in the summer of the second and third years for mite control. In some situations, it is necessary to apply Acramite the first year. Starting in year three, vine mealybug needs to be controlled midseason (May) with Admire Pro or an imidacloprid chemigated through the irrigation system and a foliar application of spirotetramat (Movento).

Diseases. Several primary 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 four times and Rally, a sterol inhibitor, one time and Flint, a strobilurine, one time. The usage of a di-methyl inhibitor (dbi) can also be rotated with a strobilurine (sbi).

The vineyard must be scouted for viruses in the fall. This is conducted by the farm manager and the associated costs are included in the manager's salary. Additional costs associated with testing plant samples for viruses are not included in this study.

Weeds. After planting, when weeds begin to emerge, the vine rows are striped sprayed with Goal 2XL and Roundup. The row middles are mowed 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 H₂O, Goal 2XL and Roundup. Also, during the first two years, the vine rows are hand weeded and assumed to take four man-hours per acre each year. Summer weed control in the vine row begins in the second year with Rely herbicide applied by the grower. Surflan, Goal 2XL and Roundup are applied to the vine rows in the winter (winter strip spray) beginning in the third year. Cartons are essential and must be in place to protect the vines from vertebrate pests and herbicides such as Rely.

Vertebrate. Gophers are the major pest, although, squirrels, voles (meadow mice), and coyotes can also cause damage. Milk cartons placed around the young vines at planting protect the vines from gopher damage. The cost of protecting the vines with cartons is included in the vineyard planting costs. Owl Boxes can be placed around the vineyard for additional vertebrate control. Reported vertebrate control costs are for the gophers only.

Fertilization. Liquid fertilizer is applied through the drip irrigation system at a rate of 25 lbs. of nitrogen and 60 lbs. of potassium per acre per year during the first three years. Beginning in year four the nitrogen and potassium applications are based on yield, Table A. It is important to note that potassium is not required until the first harvested crop in year three, but will remain relatively in place during years one and two.

Annual fertilizer rates are split and applied in April and June or one month after bud break and fruit set. An additional post-harvest fertilizer application in October may be needed, but is not included. This is a standard fertility program; however, depending on the soil type and wine grape variety adjustments to the rate, frequency, and timing of fertilizer other applications may be necessary.

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

Yield. Typical annual yields for Rubired winegrapes are shown in Table A.

Table A. Production Information.

Year	<u>Applied Irrigation Water</u>	<u>Annual Yields for Rubired</u>	<u>Applied Fertilizer (lbs./Acre)</u>	
	AcIn/Year	Tons Per Acre:	N	K
1	18	0	25	60
2	18	0	25	60
3	36	10	25	60
4+	36	20	60	100

Production Cultural Practices and Material Inputs

Prune: Canopy Management (CM). Mechanical pruning is done during the winter months (February). Winter tying and hand follow up to clean up the cordons requires 4 hours of labor per acre which is completed in March. Cordons are tied to the cordon wire with twine at the trunk and at each end of the cordons. The prunings are placed in the row middles and chopped with a flail mower also in March. Subsequently, trunk suckering is done by hand in April. The vines are mechanically trimmed (skirted) in June. A more severe trimming is done prior to harvest in September to facilitate fruit removal by the machine harvester. Suckering is the removal of water sprouts from the trunk and below the soil surface.

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. Cluster thinning is not included in this study. Shoot thinning, and suckering trunks and cordons continue through the production years. 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 and reduces crop load. Pruning costs in this study are based on an hourly rate.

Fertilization. Fertilizer can be applied through the drip system throughout the year. Assuming a 20-ton yield, fertilizer containing nitrogen 20-0-0 (Urea-liquid) and potassium 0-0-25 (K), are applied in April and June or one month after bud break and fruit set. The total amount of fertilizer applied per year is 60 pounds of N and 100 pounds of K per year. Labor costs for applying the fertilizer are included in the irrigation labor.

Sampling. Petiole samples are taken at bloom to monitor macro and micronutrients. One sample is taken for every 40 acres. Additional soil amendments and soil samples may be needed to address plant nutrient deficiencies.

Irrigation. Irrigation costs in the tables include district water, booster pumping and irrigation labor. The water is calculated to cost \$200 per acre-foot (\$16.67/acre-inch). Thirty-two acre-inches are applied during the growing season beginning in April and four acre-inches are applied post-harvest (September/October). No assumption is made about effective rainfall. 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. N-pHuric acid is injected into the irrigation system in October to prevent scale buildup during the winter months. The labor to chemigate N-pHuric acid is included as irrigation labor.

Sustainable Groundwater Management Act (SGMA). SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. For detailed information visit the website; water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

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 ipm.ucanr.edu.

Although growers commonly use the pesticides mentioned, many other pesticides are available. Check with your local extension farm advisor, PCA and/or the UC IPM website for current recommendations. To purchase pesticides for commercial use, a grower must be a Certified Private Applicator to obtain a Pesticide Identification number. For information and pesticide use permits, contact the local county agricultural commissioner's office.

Pesticides with different active ingredients, modes of action, and sites of action should be rotated as needed to combat species shift and resistance. Adjuvants are recommended for use with many pesticides for effective control, the adjuvants and their costs are not included in this study.

Pest Control Adviser/Certified Crop Advisor (PCA/CCA). The PCA or crop consultant monitors the field for agronomic problems including pests and nutrition and writes pest control recommendations. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. The PCA does not charge a direct fee, they receive a commission from the chemical sales.

Application Methods. Pesticide and fertilizer applications are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by tractor and ground sprayer or foliar-broadcast with tractor and PTO air blast sprayer. Insecticides and fungicides can be tank mixed and applied to the crop in the same operation. Some pesticides may be applied to a percentage of the acreage.

Insects. Pacific spider mite (*Tetranychus pacificus*) and Willamette spider mite (*Eotetranychus willamettei*) are controlled with an application of Acramite miticide in July (combined with mildew spray). Platinum is applied in June (combined with mildew spray) to control leafhoppers. Incidental pests such as omnivorous leafroller (OLR), leaf folder, grape mealybug, grape leafhopper (*Erythroneura elegantula*), variegated leafhopper (*Erythroneura variabilis*), Virginia creeper leafhopper and thrips are controlled by the treatments stated above. Vine mealybug needs to be controlled midseason (May) with Admire Pro or an imidacloprid chemigated through the irrigation system and a foliar application of spirotetramat Movento in June (combined with mildew spray).

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 dusting sulfur applied four times at 7 to 14 day intervals. Two additional fungicide applications, each with different active ingredients' and modes of action; Rally (sterol inhibitor) is applied in June, and Flint (trifloxystrobin) is applied in July.

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 Chateau, Prowl H₂O, Goal 2XL, and Roundup applied during December or January. Rely 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 percent of the field acreage. Resident vegetation in the row middles is managed with four mowing's per season – March, April, June, and October. The March mowing also shreds the prunings and takes longer, which is shown in Table 4.

Harvest, Yields and Revenue

Harvest. The crop is machine harvested by a custom operator and costs \$350 per acre. Hauling to the winery/crusher is contracted and the grower pays \$20 per ton for local hauls. Additional charges will apply to hauls considered being out of the local area. The custom operator charges a setup - In/Out fee for the staging/loading area, lighting and other equipment needed for harvesting. This cost is spread over the entire farm.

Yields. Yield maturity is reached in the fourth year. An average yield of 20 tons per acre over the vineyard life is used in this study. Yields range, depending upon the location, weather, variations in vine spacing and trellis systems. Annual yields are measured in tons per acre as shown in Table A.

Revenue. Return prices per ton for winegrapes are determined by variety and percent sugar (Brix). The price used in this study is \$273 per ton for Rubired winegrapes.

Ranging Analysis. Table 5 has a range of return prices used for calculating net returns per acre at different yields. Agricultural producers target yields and prices such that lower yields tend to be associated with higher prices. Therefore, the ranging analysis's do not show the cases of very high yields with very high return prices or very low yields with very low return prices. Table 5 includes a yield range of 15.5 tons to 24.5 tons per acre and a price range of \$213 to \$333 per ton.

Assessments. This is a list of organizations that charge fees to winegrape growers in this region. There are regional community, environmental and regulatory assessments that are not included.

3rd Party Inspection Fee. The Winegrape Inspection Program provides an impartial service that makes determinations and certification of soluble solids, materials other than grapes (MOG) and defects. The fee is \$0.415 per ton.

Glassy Winged Sharpshooter (GWSS). A program to control the GWSS. The fee is \$1.25 per \$1,000 of gross crop returns

Labor, Equipment, and Interest

Labor. Hourly wages for workers are \$22.00 for machine operators and \$12.50 per hour non-machine labor. Adding 40.53 percent for the employers' share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$30.91 and \$17.60 per hour for machine labor and non-machine labor, respectively. The overhead includes the employer's share of federal and California state payroll taxes, workers' compensation insurance for vineyards and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers. The cost is based on the average industry rate as of August, 2019. Labor for operations involving machinery are 20 percent higher than the equipment time to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

California Minimum Wage and Overtime Rules. In 2016, The California State Government passed legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for 2019 is \$12.00 per hour for companies with more than 25 employees and will rise each year by \$1.00 per hour until it reaches \$15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes. For businesses with 25 or fewer employees, the minimum wage rate is \$11.00 per hour in 2019; thereafter, their minimum wage rate increases by \$1.00 per hour each year from \$11.00 per hour in 2019 to \$15.00 per hour in 2023.

Recent California regulations also decrease the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. The regulations decrease the overtime threshold for agricultural workers from 60 hours per week and 10 hours per day by 5.0 hours per week and 0.5 hours per day each year until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. By January 1st, 2019 (2022 for employers with 25 or fewer employees) employees will also be entitled to overtime for 8 hours on the seventh consecutive day of work.

These regulations may cause increased cost of labor used on farms, whether as direct hires, as farm labor contractor employees or as a component of custom services.

For more information and to view the California minimum wage and overtime phase-in schedules visit aic.ucdavis.edu/

Management/Supervisor Wages. A salary for farm management for the 200-acre farm is included to indicate that a cash cost for professional supervision of the vineyard is incurred. An expense of \$84,318 per year that includes 40.53 percent for payroll overhead and insurance benefits. The total cost for a farm manager is \$421 per acre or \$16,864 for management of the 40 acres. This charge is reported under cash overhead.

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 and Biological

Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum power takeoff (PTO) horsepower, and fuel type. hq@asabe.org. Prices for on-farm delivery of diesel and gasoline are \$3.95 and \$3.63 per gallon, respectively. The cost includes a 13.0 percent sales tax on diesel fuel and 2.25 percent sales tax on gasoline. The cost also includes state excise tax for diesel and gasoline at \$0.36 and \$0.42, which are refundable for on-farm use when filing your income tax. Federal Highway tax and local District sales taxes are not included.

Fuel/Lube/Repairs. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel and down time.

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 percent 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.

Pickup/Utility Vehicle (UTV). The 1/2 ton pickup is for business use. The UTV is used in and around the vineyard. Time and mileage use for the pickup and UTV are not taken from any specific data.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 5.25 percent 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 August 2019.

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 of wine grape production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner, in various combinations for a sustainable operation. Moreover, Table 5 of this study reflects a ranging analysis of returns based on various assumptions which is therefore hypothetical in nature. It is important to realize that actual results may differ from the returns contained in this study. Any returns above total costs are considered returns on risk and investment to management, (or owners).

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. These costs can include property taxes, interest on operating capital, office expenses, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1 percent 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 percent of the average value of the property.

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

Property Insurance. This provides coverage for property loss and is charged at 8.86 percent per \$1,000 of the value of the assets over their useful life.

Liability insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for including bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, and injury or damage to another's property. For this study, a baseline liability insurance plan costs \$930 for the entire 200 acre farm. Additional coverage, above baseline would incur more costs.

Crop Insurance. Federally supported crop insurance is available to wine grape growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50-85 percent of the approved average yield as established by verifiable production records from the vineyard. Actual insurance coverage is by unit, not by acre. The cost, per unit (variety) is the basic baseline rate paid by the growers in this region, additional costs for premium coverage are not included in this study. A cost of \$300 for the 40 acres or \$7.50 per acre is shown in the production year. rma.usda.gov/policies/.

Office Expenses. Office and business expenses are estimated at \$150 per acre. These expenses include office supplies, telephones/internet, bookkeeping, accounting, office utilities, and miscellaneous administrative charges.

Sanitation Services. Sanitation services provide portable toilets and garbage disposal for the vineyard at an annual cost of \$25 per acre. The cost includes a double trailer mounted toilet, sinks for hand washing, delivery, and 4 months of weekly toilet service.

Miscellaneous Costs. This charge of \$24 per acre is for employee safety training, continuing education training for pest control and nutrient applications and special field conditions.

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

Non-Cash Overhead

Non-cash overhead costs, shown on an annual per-acre basis, are calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase prices 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 and Biological Engineers (ASABE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE, by the annual hours of use in the 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 6.

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 6 percent is used to calculate capital recovery. The rate will vary depending upon the loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of August 2019.

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, irrigation system, planting, vines, cash overhead and cultural 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 \$21,682 per acre or \$867,280 for the 40-acre vineyard. The establishment cost is amortized 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 percent of the establishment costs.

Land. Based on grower input and *Trends-2019*, crop land with irrigation availability plantable to wine grape vineyards is valued between \$18,000 and \$28,000. This study uses \$23,000 per acre, with the producing acreage estimated worth at \$25,875 per acre. The crop land value plus the establishment cost, $(\$23,000 + \$21,682 = \$44,682)$ is within the value range of an established winegrape vineyard which range in value from \$30,000 to \$50,000 per acre in this region.

Irrigation System. The well is considered operational and in place. Maintenance costs are for routine checking of the bowls and casing. A 40-horsepower booster pump, filter system, main, lateral and drip lines are included in separate costs. The well can irrigate the 40-acre vineyard and can service another 40 acres. Other wells are used on the remaining property and costs are not included. An additional operating cost for an annual well test and water analysis, which is used for the nitrogen management plan. The irrigation systems are included as a separate non-cash overhead costs and are considered an improvement to the property with a 25-year life.

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.

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

REFERENCES

American Society of Agricultural and Biological Engineers. (ASABE). July, 2015. “*American Society of Agricultural Engineers Standards Yearbook*”. Russell H. Hahn and Evelyn E. Rosentreter (ed.). St. Joseph, MO. hq@asabe.org

Boehlje, Michael D., and Vernon R. Eidman. 1984. “*Farm Management*”. John Wiley and Sons. New York, New York.

California Department of Insurance. 2019 *California Workers’ Compensation Rating Data for Selected Agricultural Classifications as of January 2019*. California Department of Insurance, Rate Regulation Branch. insurance.ca.gov/0500-about-us/

"Economic Research Service - Publications." United States Department of Agriculture. ers.usda.gov/data-products.aspx.

Energy Information Administration. *Weekly Retail on Highway Diesel Prices-June, 2019*. eia.gov/petroleum/gasdiesel/

"Identify and Manage Pests in Crops and Agriculture." University of California Statewide Integrated Pest Management Program. ipm.ucdavis.edu/PMG/crops-agriculture.html.

Murdock, Jeremy, D.A. Sumner. “*Sample Costs to Establish a Vineyard and Produce Winegrapes, San Joaquin Valley North, Cabernet Sauvignon, Crush District 11 - 2019*”. coststudies.ucdavis.edu/en/current/

"National Agricultural Statistics Service." United States Department of Agriculture. nass.usda.gov/Quick_Stats/.

“*Trends in Agricultural Land & Lease Values*”. California Chapter of the American Society of Farm Managers and Rural Appraisers. 2019. American Society of Farm Managers and Rural Appraisers, Woodbridge, CA. calasfmra.com

"Workers' Compensation Rate Comparison." California Department of Insurance. insurance.ca.gov/01-consumers/105-type/9-compare-prem/wc-rate/index.cfm

Zhuang, Shijian, M. Fidelibus, S. K. Kurtural, K. Lund, G. Torres, D. Stewart, D.A. Sumner. “*Sample Costs to Establish a Vineyard and Produce Winegrapes, San Joaquin Valley South, Chardonnay - 2019*”. coststudies.ucdavis.edu/en/current/

Zhuang, Shijian, M. Fidelibus, S. K. Kurtural, K. Lund, G. Torres, D. Stewart, D.A. Sumner. “*Sample Costs to Establish a Vineyard and Produce Winegrapes, San Joaquin Valley South, Cabernet Sauvignon - 2019*”. coststudies.ucdavis.edu/en/current/

Zhuang, Shijian, M. Fidelibus, S. K. Kurtural, K. Lund, G. Torres, D. Stewart, D.A. Sumner. “*Sample Costs to Establish a Vineyard and Produce Winegrapes, San Joaquin Valley South, Colombard - 2019*”. coststudies.ucdavis.edu/en/current/

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD
 2019 San Joaquin Valley, South – Rubired

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			10.0
Pre-Planting Costs:				
Vineyard Removal		1,200		
Soil Pits/Sampling		220		
Rip/Slip Plow: (6' Depth) 2x		660		
Disc & Roll: 2x		100		
Tri-plane: 2x		90		
Fumigate: Vine Row-Strip (Telone II)		1,200		
Seal/Pack Soil		10		
Post Fumigation: Open Soil		10		
Mark & Layout Vineyard		113		
Trellis: Materials & Labor		7,414		
Irrigation: Layout Drip Lines		400		
TOTAL PRE-PLANTING COSTS		11,417		
Planting Costs:				
Plant: Dig Holes/Place Cartons, 566 Vines/Acre, 2 nd yr. 11 replants		2,462	42	
TOTAL PLANTING COSTS		2,462	42	
Cultural Costs:				
Weeds: Post Planting Herbicides		28		
CM: Prune Vines-Hand labor			97	405
Irrigation: Water & Labor		353	353	662
Irrigation: Well Test/Water Analysis		3	3	3
Irrigation: System Maintenance (N-pH/uric Acid)		15	15	15
Fertilizer: 20-0-0 (Urea), 0-0-25 (Potassium)		43	43	43
Fertilizer: Petiole Sampling				2
Chemigate: Vine Mealybug (Admire Pro)				31
CM: Green Tie (Sucker, Tie & Train) (3x Yr. 2, 2x Yr. 3)			1,343	825
Weeds: Dormant Strip Spray		59	59	69
Weeds: Hand Weed		70	70	
Weeds: Mow (3x Yr. 1, 5x Yr. 2+)		35	58	58
Weeds: Summer Spot Spray (Rely 280)			20	20
Vertebrate: Gophers 2x		18	18	18
Insects: Vine Mealybug (Movento)				86
Insect: Leafhoppers (Platinum)			52	52
Insect: Mites (Acramite 50WS)			96	96
Disease: Mildew 4x (Dusting Sulfur)				77
Disease: Mildew 1x (Rally)				37
Disease: Mildew: 1x (Flint)				66
CM: Trim Vines/Skirting (Mechanical)				40
Pickup Truck Use		50	50	58
UTV Use		33	33	36
TOTAL CULTURAL COSTS		706	2,308	2,694
Harvest:				
Setup: In/Out Fee				4
Machine Harvest: Pick Fruit				350
Haul To Crusher				200
Assessments: 3 rd Party Inspection & GWSS				8
TOTAL HARVEST COSTS				562
Interest On Operating Capital @ 5.25%		614	61	53
TOTAL OPERATING COSTS/ACRE		15,199	2,411	3,308

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 1. CONTINUED

2019 San Joaquin Valley, South - Rubired

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			10.0
Cash Overhead Costs:				
Liability Insurance		5	5	5
Managers Salary		421	421	421
Office Expenses		150	150	150
Sanitation		25	25	25
Miscellaneous Training		24	24	24
Property Taxes		249	249	250
Property Insurance		221	221	221
Investment Repairs		70	70	70
TOTAL CASH OVERHEAD COSTS		1,165	1,165	1,166
TOTAL CASH COSTS/ACRE		16,363	3,575	4,474
INCOME/ACRE FROM PRODUCTION				2,730
NET CASH COSTS/ACRE FOR THE YEAR		16,363	3,575	1,744
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		16,363	19,938	21,682
Non-Cash Overhead (Capital Recovery):				
Irrigation System		240	240	240
Fuel Tanks: 2-500 Gallon		5	5	5
Land		1,380	1,380	1,380
Tools: Shop/Field		6	6	6
Well: Routine Service		19	19	19
Equipment		22	33	72
TOTAL INTEREST ON INVESTMENT		1,670	1,684	1,723
TOTAL COST/ACRE FOR THE YEAR		18,033	5,259	6,197
INCOME/ACRE FROM PRODUCTION				2,730
TOTAL NET COST/ACRE FOR THE YEAR		18,033	5,259	3,467
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		18,033	23,292	26,759

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. COSTS PER ACRE TO PRODUCE WINEGRAPES
 2019 San Joaquin Valley, South - Rubired

Operation	Equipment		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs/Ac)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Cultural:								
Well Test/Water Analysis	0.00	0	0	0	4	0	4	
CM: Prune Mechanical	0.00	0	0	0	0	68	68	
CM: Tie/Cleanup Cordons Hand Labor	0.00	70	0	0	15	0	85	
Weeds: Mow 4x	0.86	32	13	8	0	0	53	
CM: Trunk/Cordon Suckering	0.00	62	0	0	0	0	62	
Fertilizer: Petiole Sampling	0.00	0	0	0	0	2	2	
Disease: Mildew (Dust) 4x	1.22	45	19	6	7	0	77	
Irrigate: Water & Labor	0.00	62	0	0	600	0	662	
Fertigate: 20-0-0 (N), 0-0-25 (K) 2x	0.00	18	0	0	56	0	73	
Vertebrate: Gophers 2x	0.00	13	0	0	10	0	23	
Chemigate: Vine Mealybugs	0.00	9	0	0	22	0	31	
CM: Trim Vines-Skirting Mechanical 2x	1.25	46	19	14	0	0	80	
Disease/Insects: 2x	0.71	26	13	6	223	0	268	
Weeds: Summer Spot Spray	0.18	7	0	0	13	0	20	
Chemigate: N-pHuric Acid	0.00	9	0	0	6	0	15	
Weeds: Dormant Strip Spray	0.25	9	0	0	100	0	110	
Pickup Truck Use	1.00	37	17	5	0	0	58	
UTV Use	0.92	34	1	1	0	0	36	
TOTAL CULTURAL COSTS	6.39	479	82	40	1,055	69	1,726	
Harvest:								
Harvest: Setup-In/Out Fee	0.00	0	0	0	0	4	4	
Machine Harvest	0.00	0	0	0	0	350	350	
Haul to Crusher	0.00	0	0	0	0	400	400	
Assessments	0.00	0	0	0	15	0	15	
TOTAL HARVEST COSTS	0.00	0	0	0	15	754	769	
Interest on Operating Capital @ 5.25%								30
TOTAL OPERATING COSTS/ACRE	6.39	479	82	40	1,070	823	2,525	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. CONTINUED
 2019 San Joaquin Valley, South - Rubired

Operation	Total Cost	Your Cost
CASH OVERHEAD:		
Liability Insurance	5	
Manager Salary	421	
Office Expenses	150	
Sanitation	25	
Miscellaneous Training	24	
Crop Insurance	8	
Property Taxes	358	
Property Insurance	317	
Investment Repairs	179	
TOTAL CASH OVERHEAD COSTS/ACRE	1,486	
TOTAL CASH COSTS/ACRE	4,011	
NON-CASH OVERHEAD:		
	Per Producing Acre	Annual Cost Capital Recovery
Irrigation System	3,125	240
Fuel Tanks: 2-500 Gallon	63	5
Land	23,000	1,380
Tools: Shop/Field	75	6
Well: Routine Maintenance	250	19
Vineyard Establishment	21,682	1,696
Equipment	487	56
TOTAL NON-CASH OVERHEAD COSTS	48,682	3,403
TOTAL COSTS/ACRE		7,413

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINEGRAPES
 2019 San Joaquin Valley, South - Rubired

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Winegrapes: Rubired	20.0	Ton	273.00	5,460	
TOTAL GROSS RETURNS				5,460	
OPERATING COSTS					
Herbicide:				113	
Rely 280	1.50	Pint	8.56	13	
Goal 2XL	2.00	Pint	12.43	25	
Prowl H2O	4.00	Pint	4.74	19	
Roundup PowerMax	1.50	Pint	3.75	5	
Chateau	6.00	Oz	8.49	51	
Insecticide:				187	
Admire Pro	10.00	floz	2.19	22	
Platinum 75 SG	4.00	Oz	7.20	29	
Movento	8.00	floz	7.96	64	
Acramite 50WS	16.00	Oz	4.56	73	
Fungicide:				64	
Dusting Sulfur	26.68	lb	0.25	7	
Rally 40W	4.00	oz	3.50	14	
Flint	3.00	oz	14.49	43	
Fertilizer:				56	
Urea-liquid 20-0-0	60.00	Lb N	0.68	41	
Potassium 0-0-25	100.00	Lb K	0.15	15	
Water:				610	
Well/Pump Test	0.02	Each	200.00	3	
Water Analysis	0.02	Each	50.00	1	
Water: District	36.00	AcIn	16.67	600	
N-pHuric Acid	0.12	Gal	47.54	6	
Custom:				823	
Prune: Mechanical	566.00	Vine	0.12	68	
Petiole Tissue Analysis	1.00	Acre	1.50	2	
Setup: In/Out Fee	1.00	Acre	4.00	4	
Machine Harvest	1.00	Acre	350.00	350	
Haul to Crusher	20.00	Ton	20.00	400	
Vine Aids:				15	
Tying Materials	1.00	Acre	15.00	15	
Assessment:				15	
3rd Party Inspection Fee	20.00	Ton	0.42	8	
GWSS	5.46	GVal	1.25	7	
Vertebrate:				10	
Gopher Bait	5.00	Lb	1.92	10	
Labor:				479	
Equipment Operator Labor	7.67	hrs	30.91	237	
Canopy Management Labor	7.50	hrs	17.60	132	
Irrigation Labor	5.50	hrs	17.60	97	
Non-Machine Labor	0.75	hrs	17.60	13	
Machinery:				123	
Fuel-Gas	5.01	gal	3.63	18	
Fuel-Diesel	16.25	gal	3.95	64	
Lube				12	
Machinery Repair				28	
Interest on Operating Capital @ 5.25%				30	
TOTAL OPERATING COSTS/ACRE				2,525	
TOTAL OPERATING COSTS/TON				126	
NET RETURNS ABOVE OPERATING COSTS				2,935	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. CONTINUED
 2019 San Joaquin Valley, South - Rubired

	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS		
Liability Insurance	5	
Manager Salary	421	
Office Expenses	150	
Sanitation	25	
Miscellaneous Training	24	
Crop Insurance	8	
Property Taxes	358	
Property Insurance	317	
Investment Repairs	179	
TOTAL CASH OVERHEAD COSTS/ACRE	1,486	
TOTAL CASH OVERHEAD COSTS/TON	74	
TOTAL CASH COSTS/ACRE	4,011	
TOTAL CASH COSTS/TON	201	
NET RETURNS ABOVE CASH COSTS	1,449	
NON-CASH OVERHEAD COSTS (Capital Recovery)		
Irrigation System	240	
Fuel Tanks: 2-500 Gallon	5	
Land	1,380	
Tools: Shop/Field	6	
Well: Routine Service	19	
Vineyard Establishment	1,697	
Equipment	56	
TOTAL NON-CASH OVERHEAD COSTS/ACRE	3,403	
TOTAL NON-CASH OVERHEAD COSTS/TON	170	
TOTAL COST/ACRE	7,413	
TOTAL COST/TON	371	
NET RETURNS ABOVE TOTAL COST	-1,953	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE - WINEGRAPES
 2019 San Joaquin Valley, South - Rubired

	FEB 19	MAR 19	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	NOV 19	DEC 19	Total
Cultural:												
Well Test/Water Analysis	4											4
CM: Prune Mechanical	68											68
CM: Tie/Cleanup Cordons Hand Labor		85										85
Weeds: Mow 4x		19			12				12			53
CM: Trunk/Cordon Suckering			62									62
Fertilizer: Petiole Sampling			2									2
Disease: Mildew (Dust) 4x			19	19	19	19						77
Irrigate: Water & labor			94	106	117	125	134	42	42			662
Fertigate: 20-0-0 (N), 0-0-25 (K) 2x			37		37							73
Vertebrate: Gophers 2x				9					14			23
Chemigate: Vine Mealybugs				31								31
CM: Trim Vines-Skirting Mechanical 2x					40			40				80
Disease/Insects: 2x					129	139						268
Weeds: Summer Spot Spray					20							20
Chemigate: N-pHuric Acid									15			15
Weeds: Dormant Strip Spray											110	110
Pickup Truck Use	5	5	5	5	5	5	5	5	5	5	5	58
UTV Use	3	3	3	3	3	3	3	3	3	3	3	36
TOTAL CULTURAL COSTS	81	112	234	174	382	292	142	91	90	9	119	1,726
Harvest:												
Harvest: Setup-In/Out Fee								4				4
Machine Harvest								350				350
Haul to Crusher								400				400
Assessments								15				15
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	769	0	0	0	769
Interest on Operating Capital @ 5.25%	0	1	2	3	4	6	6	10	-1	-1	-1	30
TOTAL OPERATING COSTS/ACRE	81	113	235	177	386	298	149	870	89	8	118	2,525
CASH OVERHEAD												
Liability Insurance	5											5
Manager Salary	38	38	38	38	38	38	38	38	38	38	38	421
Office Expenses	14	14	14	14	14	14	14	14	14	14	14	150
Sanitation	2	2	2	2	2	2	2	2	2	2	2	25
Miscellaneous Training								24				24
Crop Insurance								8				8
Property Taxes	179					179						358
Property Insurance	159					159						317
Investment Repairs	16	16	16	16	16	16	16	16	16	16	16	179
TOTAL CASH OVERHEAD COSTS	413	70	70	70	70	408	70	102	70	70	70	1,486
TOTAL CASH COSTS/ACRE	494	184	306	247	457	706	219	972	160	78	189	4,011

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 5. RANGING ANALYSIS
 2019 San Joaquin Valley, South - Rubired

COSTS AND RETURNS PER ACRE AND PER TON AT VARYING YIELDS TO PRODUCE RUBIRED WINEGRAPES

	YIELD (Tons/Acre)						
	15.50	17.00	18.50	20.00	21.50	23.00	24.50
OPERATING COSTS/ACRE:							
Cultural	1,726	1,726	1,726	1,726	1,726	1,726	1,726
Harvest	598	654	713	769	829	884	944
Interest on Operating Capital @ 5.25%	29	29	29	30	30	30	30
TOTAL OPERATING COSTS/ACRE	2,353	2,409	2,469	2,525	2,585	2,641	2,701
TOTAL OPERATING COSTS/TON	151.80	141.71	133.45	126.25	120.22	114.82	110.22
CASH OVERHEAD COSTS/ACRE	1,486	1,486	1,486	1,486	1,486	1,486	1,486
TOTAL CASH COSTS/ACRE	3,838	3,895	3,954	4,011	4,070	4,126	4,186
TOTAL CASH COSTS/TON	247.64	229.10	213.75	200.53	189.31	179.41	170.86
NON-CASH OVERHEAD COSTS/ACRE	3,403	3,403	3,403	3,403	3,403	3,403	3,403
TOTAL COSTS/ACRE	7,241	7,297	7,357	7,413	7,473	7,529	7,589
TOTAL COSTS/TON	467.00	429.00	398.00	371.00	348.00	327.00	310.00

Net Return per Acre above Operating Costs for Rubired Winegrapes

PRICE (\$/ton)	YIELD (tons/acre)						
	15.50	17.00	18.50	20.00	21.50	23.00	24.50
Wine Grape Red							
213.00	949	1,212	1,472	1,735	1,995	2,258	2,518
233.00	1,259	1,552	1,842	2,135	2,425	2,718	3,008
253.00	1,569	1,892	2,212	2,535	2,855	3,178	3,498
273.00	1,879	2,232	2,582	2,935	3,285	3,638	3,988
293.00	2,189	2,572	2,952	3,335	3,715	4,098	4,478
313.00	2,499	2,912	3,322	3,735	4,145	4,558	4,968
333.00	2,809	3,252	3,692	4,135	4,575	5,018	5,458

Net Return per Acre above Cash Costs for Rubired Winegrapes

PRICE (\$/ton)	YIELD (tons/acre)						
	15.50	17.00	18.50	20.00	21.50	23.00	24.50
Wine Grape Red							
213.00	-537	-274	-14	249	509	772	1,032
233.00	-227	66	356	649	939	1,232	1,522
253.00	83	406	726	1,049	1,369	1,692	2,012
273.00	393	746	1,096	1,449	1,799	2,152	2,502
293.00	703	1,086	1,466	1,849	2,229	2,612	2,992
313.00	1,013	1,426	1,836	2,249	2,659	3,072	3,482
333.00	1,323	1,766	2,206	2,649	3,089	3,532	3,972

Net Return per Acre above Total Costs for Rubired Winegrapes

PRICE (\$/ton)	YIELD (tons/acre)						
	15.50	17.00	18.50	20.00	21.50	23.00	24.50
Wine Grape Red							
213.00	-3,940	-3,676	-3,417	-3,153	-2,894	-2,630	-2,370
233.00	-3,630	-3,336	-3,047	-2,753	-2,464	-2,170	-1,880
253.00	-3,320	-2,996	-2,677	-2,353	-2,034	-1,710	-1,390
273.00	-3,010	-2,656	-2,307	-1,953	-1,604	-1,250	-900
293.00	-2,700	-2,316	-1,937	-1,553	-1,174	-790	-410
313.00	-2,390	-1,976	-1,567	-1,153	-744	-330	80
333.00	-2,080	-1,636	-1,197	-753	-314	130	570

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 2019 San Joaquin Valley, South - Rubired

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Cash Overhead			Total
					Capital Recovery	Insurance	Taxes	
19	87HP4WD Tractor Narrow	78,045	15	15,194	7,383	413	466	8,262
19	75HP4WD Tractor Narrow	57,083	15	11,113	5,400	302	341	6,043
19	Pickup Truck 1/2 Ton	28,000	7	10,621	3,750	171	193	4,115
19	Orchard Sprayer 500 Gallon	26,000	10	4,598	3,184	136	153	3,472
19	Vine Trimmer 11'	18,000	10	3,183	2,204	94	106	2,404
19	Mower-Flail 8'	12,000	15	1,152	1,186	58	66	1,310
19	UTV 4WD	8,350	5	3,742	1,318	54	60	1,432
19	Duster - 3 Pt 11'	8,000	10	1,415	980	42	47	1,068
19	Weed Sprayer 200 Gallon	4,800	5	1,564	862	28	32	922
19	Sprayer UTV 20 Gallon	480	8	108	66	3	3	72
TOTAL		240,758	-	52,690	26,334	1,300	1,467	29,101
60% of New Cost*		144,455	-	31,614	15,800	780	880	17,461

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
INVESTMENT								
Irrigation System	125,000	25	8,750	9,619	593	669	2,500	13,380
Fuel Tanks: 2-500 Gallon	12,500	25	875	962	59	67	250	1,338
Land	1,035,000	40	1,035,000	62,100	9,170	10,350	0	81,620
Tools: Shop/Field	15,000	20	1,050	1,279	71	80	300	1,731
Vineyard Establishment	867,280	25	0	67,844	3,842	4,336	4,336	80,359
TOTAL INVESTMENT	2,074,780	-	1,047,075	143,343	13,830	15,609	7,786	180,569

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/Farm	Unit	Price/Unit	Total Cost
Liability Insurance	200	Acre	4.65	930
Manager Salary	40	Acre	421.00	16,840
Office Expenses	40	Acre	150.0	6,000
Sanitation	40	Acre	25.00	1,000
Miscellaneous Training	40	Acre	24.00	960
Crop Insurance	40	Acre	7.50	300

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 7. HOURLY EQUIPMENT COSTS
 2019 San Joaquin Valley, South - Rubired

Yr.	Description	Winegrape Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
				Insurance	Taxes	Lube & Repairs	Fuel		
19	75HP4WD Tractor Narrow	147	3.04	0.17	0.19	3.50	13.97	17.47	20.87
19	ATV 4WD	54	1.98	0.08	0.09	0.80	1.21	2.01	4.16
19	Vine Trimmer 11'	50	6.61	0.28	0.32	7.47	0.00	7.47	14.68
19	Duster - 3 Pt 11'	49	4.90	0.21	0.24	1.13	0.00	1.13	6.47
19	Pickup Truck 1/2 Ton	40	7.90	0.36	0.41	4.55	16.64	21.19	29.85
19	Mower-Flail 8'	35	5.35	0.26	0.30	5.41	0.00	5.41	11.32
19	87HP4WD Tractor Narrow	31	4.16	0.23	0.26	4.40	16.49	20.89	25.54
19	Orchard Sprayer 500 Gallon	29	15.92	0.68	0.76	3.67	0.00	3.67	21.03
19	Weed Sprayer 200 Gallon	10	2.16	0.07	0.08	0.70	0.00	0.70	3.00
19	SprayerATV20 Gallon	7	0.21	0.01	0.01	0.13	0.00	0.13	0.36

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 8. OPERATIONS WITH EQUIPMENT AND MATERIAL INPUTS
 2019 San Joaquin Valley, South - Rubired

Operation	Month	Tractor	Implement	Labor Type/Material	Rate/Ac	Unit
Well Test/Water Analysis	Feb			Well/Pump Test	0.02	Each
				Water Analysis	0.02	Each
CM: Prune-Mechanical	Feb			Prune Mechanical	566.00	Vine
CM: Tie/Cleanup Cordons	Mar			Canopy Management Labor	4.00	hour
				Tying Materials	1.00	Acre
Weeds: Mow 4x	Mar	75HP4WD Tractor Narrow	Mower-Flail 8'	Equipment Operator Labor	0.36	Hour
	Apr	75HP4WD Tractor Narrow	Mower-Flail 8'	Equipment Operator Labor	0.23	Hour
	June	75HP4WD Tractor Narrow	Mower-Flail 8'	Equipment Operator Labor	0.23	Hour
	Oct	75HP4WD Tractor Narrow	Mower-Flail 8'	Equipment Operator Labor	0.23	Hour
CM: Trunk/Cordon Sucker	Apr			Canopy Management Labor	3.50	Hour
Fertilizer: Petiole	Apr			Petiole Tissue Analysis	1.00	Acre
Disease: Mildew (Dust)	Apr	75HP4WD Tractor Narrow	Duster - 3 Pt 11'	Equipment Operator Labor	0.37	hour
				Dusting Sulfur	6.67	lb
	May	75HP4WD Tractor Narrow	Duster - 3 Pt 11'	Equipment Operator Labor	0.37	hour
				Dusting Sulfur	6.67	lb
	June	75HP4WD Tractor Narrow	Duster - 3 Pt 11'	Equipment Operator Labor	0.37	hour
				Dusting Sulfur	6.67	lb
	July	75HP4WD Tractor Narrow	Duster - 3 Pt 11'	Equipment Operator Labor	0.37	hour
				Dusting Sulfur	6.67	lb
Irrigate	Apr			Irrigation Labor	0.50	hour
				Water - District	5.14	AcIn
	May			Irrigation Labor	0.50	hour
				Water - District	5.86	AcIn
	June			Irrigation Labor	0.50	hour
				Water - District	6.50	AcIn
	July			Irrigation Labor	0.50	hour
				Water - District	7.00	AcIn
	Aug			Irrigation Labor	0.50	hour
				Water - District	7.50	AcIn
	Sept			Irrigation Labor	0.50	hour
				Water - District	2.00	AcIn
	Oct			Irrigation Labor	0.50	hour
				Water - District	2.00	AcIn
Fertigate: N, K, 2x	Apr			Irrigation Labor	0.50	hour
				Urea-Liquid 20-0-0	30.00	Lb N
				Potassium 0-0-25	50.00	Lb K
	June			Irrigation Labor	0.50	hour
				Urea-Liquid 20-0-0	30.00	Lb N
				Potassium 0-0-25	50.00	Lb K
Vertebrate: Gophers	May			Non-Machine Labor	0.25	hour
				Gopher Bait	2.50	Lb
	Oct			Non-Machine Labor	0.50	hour
				Gopher Bait	2.50	Lb
Chemigate: Mealybugs	May			Irrigation Labor	0.50	hour
				Admire Pro	10.00	floz
CM: Trim Vines-Skirting	June	75HP4WD Tractor Narrow	Vine Trimmer 11'	Equipment Operator Labor	0.75	hour
	Sept	75HP4WD Tractor Narrow	Vine Trimmer 11'	Equipment Operator Labor	0.75	hour
Disease/Insects:	June	87HP4WD Tractor Narrow	Orchard Sprayer 500 Gal	Equipment Operator Labor	0.43	hour
				Rally 40W	4.00	oz
				Platinum 75 SG	4.00	floz
				Movento	8.00	floz
	July	87HP4WD Tractor Narrow	Orchard Sprayer 500 Gal	Equipment Operator Labor	0.43	hour
				Flint	3.00	oz
				Acramite 50WS	16.00	Oz
Weeds: Summer Spot	June	UTV 4WD	SprayerUTV20 Gal	Equipment Operator Labor	0.21	hour
				Rely 280	1.50	Pint
Chemigate: N-pHuric	Oct			Irrigation Labor	0.50	hour
				N-pHuric Acid	0.12	Gal
Weeds: Dormant Strip	Dec	UTV 4WD	Weed Sprayer 200 Gal	Equipment Operator Labor	0.24	hour
				Goal 2XL	2.00	Pint
				Prowl H2O	4.00	Pint
				Roundup PowerMax	1.50	Pint
				Chateau	6.00	Oz
Pickup Truck Use	Dec	Pickup Truck 1/2 Ton		Equipment Operator Labor	1.20	hours
UTV Use	Dec	UTV 4WD		Equipment Operator Labor	1.10	hours
Harvest: Setup-In/Out Fee	Sept			Setup: In/Out Fee	1.00	Acre
Machine Harvest	Sept			Machine Harvest	1.00	Acre
Haul to Crusher	Sept			Haul to Crusher	20.00	Ton