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

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SAMPLE COSTS TO ESTABLISH A VINEYARD AND PRODUCE WINEGRAPES



Cabernet Sauvignon Variety

San Joaquin Valley North – San Joaquin and Sacramento Counties

CRUSH DISTRICT 11

Quadrilateral Trellis

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AND PRODUCE CABERNET SAUVIGNON WINEGRAPES
San Joaquin Valley - North 2021
Crush District 11 of San Joaquin and Sacramento Counties**

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INTRODUCTION

Sample costs to establish a vineyard and produce winegrapes using drip irrigation in the northern San Joaquin Valley are presented in this study. The study is intended as a guide only. It can be used to 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 October 2021 figures. Practices described are based on production practices considered typical for the crop and area, but will not apply to every situation. A blank column titled Your Costs is provided in Tables 2 and 3 to enter your estimated costs.

For an explanation of calculations used in the study refer to the section titled Assumptions. For more information contact Jeremy Murdock; University of California Agriculture and Natural Resources, Department of Agricultural and Resource Economics, at 530-752-4651 or jmmurdock@ucdavis.edu. To discuss this study with a local county extension farm advisor, contact your county cooperative extension office. https://ucanr.edu/sites/UCANR/County_Offices/

Sample Cost of Production studies for many commodities are available and can be down loaded from the website, <http://coststudies.ucdavis.edu>. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A cost and returns study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region. The authors thank 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 following assumptions refer to Tables 1 to 8 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 described practices are not University of California recommendations, but represent operations and materials considered typical of a well-managed vineyard in the region. The costs, materials, and practices shown in this study are based on the assumptions and are not applicable to all farms. Establishment and cultural practices vary by farm and the differences can be significant.

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 Table 1

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 up to 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 (tri-planed) two times. All operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year. The following spring the ground is cultivated (disced) two times with a pre-emergent, residual herbicide applied during the first discing and the material is further incorporated with the second discing. Custom or contract operators do all operations except the spring discing and herbicide application.

Fumigation: The entire vineyard area is fumigated with Telone at a cost of \$1,000 per acre for controlling oak root fungus or nematodes. The risk of disease is too great to not fumigate.

Vines. Potted bench graft vines (Cabernet Sauvignon variety) are planted on a 5-foot x 11-foot spacing at 792 vines per acre. Vines are trained to a quadrilateral cordon height at 60 inches above ground and spur pruned. Cordons are the horizontal branches (separated between 24 and 36 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 spring (April). Planting starts in the spring (May) and is done by hand. The potted plants are placed in the planting hole and the soil is formed around the

roots. The following year an average of 2 percent or 16 vines per acre will be replanted in May. Second year replants are provided by the nursery at no cost.

Trellis System. A commercial trellis company installs the system. The cost is for complete installation and includes materials and labor. The system is assumed to be installed between February and June and the 36-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 7 ft. metal T-stakes at each vine with eight ten-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. 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.

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. New vines will be loosely tied to a stake to keep from growing into the row middles and getting damaged during cultivation or herbicide application.

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 7.0 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 188 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 68 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 20 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 including shoot positioning, thinning, and suckering trunks and cordons is done in June and takes 12.5 hours. The vines are mechanically trimmed in September prior to harvest.

Irrigation. Irrigation costs in the tables include pumped water plus labor. Irrigation costs do not include district water fees or Sustainable Groundwater Management Act (SGMA) fees which the grower may incur. Water is calculated to cost \$180.00 per acre-foot (\$15.00 per acre inch). Assume six inches of stored rainfall from an average of 17 inches of annual winter/spring rains. During the first two years, irrigations begin in May and end around September. In the third year additional irrigations are made post-harvest. The amount of water applied to the vineyard varies each year as shown in Table A.

| Table A. Applied Irrigation Water | | | |
|-----------------------------------|------------------|--------------|-------|
| Year | Acre-inches/year | | |
| | Pre-harvest | Post-harvest | Total |
| 1 | 6 | 0 | 6 |
| 2 | 12 | 0 | 12 |
| 3+ | 15 | 3 | 18 |

Drip System. Prior to planting mainlines are laid out in the fall. 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 pre-irrigated to ease the hand digging for the planting hole. The drip system includes the tape or drip line, laterals, fertilizer injectors, and filters. The cost for the drip irrigation system is categorized under Non-Cash Overhead (Investments). The drip irrigation installation labor includes laying out the line and hanging it on the bottom trellis wire. The irrigation system installation labor is included as a 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*. Pesticides mentioned in the study are commonly used, but are not UCCE recommendations.

Insects. Nursery materials should be checked to prevent introduction of invasive species such as vine mealy bug (VMB), light brown apple moth (LBAM), and European grapevine moth (EGVM). 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 first year. A miticide is applied in the summer of the second and third years for mite control. In some situations, it is necessary to apply a miticide the first year. All materials are applied with the grower's tractor and vineyard sprayer.

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. Also in the third year sulfur dust is applied six times and Rally, a sterol inhibitor, one time and a strobilurine (sbi), one time. The usage of a dimethyl inhibitor (dbi) can also be rotated with a sbi. Also, *Eutypa* dieback sensitive varieties, such as Cabernet Sauvignon, benefit from Rally/Topsin-M applied immediately after pruning dormant canes beginning in the second year.

The vineyard has to 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. The actual cost for virus testing will vary depending on the percentage of infected plants.

Weeds. Prior to planting, Treflan, a pre-emergent 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 4.00 hours per acre 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 Rely 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. The cost of protecting the vines with cartons is included in vineyard planting cost, so no additional vertebrate control costs have been included in this study.

Fertilization. Liquid fertilizer, 5-0-12, (9.6 lbs/gal), is applied through the drip irrigation system at 226 pounds (23.5 gallons) per acre the first year, 417 pounds (43.5 gallons) the second year, and 696 pounds (72.5 gallons) the third year. 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 equally and applied monthly in April, May, and June during years one and two. In year three, the fertilizer is split into four equal parts and is applied in April, May, and June, with an additional post-harvest application in October. 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 applications may be necessary.

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.

Yield. Typical annual yields for Cabernet Sauvignon in Crush District 11 are shown in Table B. In this study, a year three annual yield of 5 tons was used.

| Table B. Annual Yields for Cabernet Sauvignon | | |
|---|---|----|
| Year: | 3 | 4+ |
| Tons Per Acre: | 5 | 10 |

Production Cultural Practices and Material Inputs

Refers to Tables 2 - 8

Vine Management (VM)/Prune. Hand pruning at 33 hours per acre is done during the winter months (February). The prunings are placed in the row middles and incorporated into the soil with a flail mower in March. Also in March, winter tying at 3 hours of labor per acre is completed. Cordons are tied to the cordon wire with twine at the trunk and at each end of the cordons. Subsequently, trunk suckering (5.0 hours) is done in April; shoot removal (15 hours) in May. 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. 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. Cluster thinning is not included in this study. Other varieties may require cluster thinning due to compactness. 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 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, assuming a 10 ton yield, fertilizer (5-0-12) containing nitrogen (Urea) and potassium (KTS) is applied equally in April, May, June, and October at 31.25 gallons per acre. The total amount of fertilizer applied per year is 125 gallons, 60 pounds of N and 144 pounds of K. Labor costs for applying the fertilizer are assumed to be included in the irrigation labor.

Sampling. Petiole samples are taken at bloom, between bud closure and veraison, and at the end of the growing season to monitor micronutrient (particularly manganese and magnesium) and potassium levels. One sample is taken for every 30 acres. Additional soil amendments that may be needed to address plant nutrient deficiencies are not included in the study. The cost of petiole tissue analysis has been included in this study.

Irrigation. Irrigation costs in the tables include pumped water and irrigation labor. The water is calculated to cost \$180.00 per acre-foot (\$15.00/acre-inch) based on pumping costs as provided by the growers. Fifteen acre-inches are applied during the growing season beginning in April and three acre-inches are applied post-harvest (October/November). 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. 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.

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. **Although growers commonly use the pesticides mentioned, many other pesticides are available. Check with your 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, mode 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 (PCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition, the PCA or an independent consultant will monitor the field during the growing season for fertilizer recommendations. Growers may hire a private PCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Separate costs for a PCA are not included in this study.

Application Methods. Pesticide and fertilizer applications are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by tractor mounted ground sprayer or foliar-broadcast with tractor mounted air blast sprayer. Insecticides and fungicides can be tank mixed and applied to the crop in the same operation. Check individual pesticide labels for compatibility, mixing requirements and usage. Some pesticides are applied to a portion of the acreage. See tables 3 & 8 for a list of chemicals used for the applications.

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, 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 discings per season – March, April, June, and October.

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 through the irrigation in April for mealybug control. Movento is sprayed in June for mealybug control. Incidental pests such as omnivorous leafroller (OLR), light brown apple moth (LBAM), leafhopper, grape mealybug, grape leafhopper (*Erythroneura elegantula*), variegated leafhopper (*Erythroneura variabilis*), virginia creeper leafhopper and thrips are controlled by the treatments stated above.

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 applications at 7 to 14 day intervals, and by two fungicide applications (Rally and Luna Experience), each with different modes of action. Rally (sterol inhibitor) is applied in June and Luna Experience (strobilurine) in July. Dusting sulfur is applied six times from April to July.

Harvest, Yields, and Revenue

Harvest. The crop is machine harvested by a custom operator and costs \$425 per acre. Hauling to the winery/crusher is contracted and the grower pays \$22 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 10.0 tons per acre is used to calculate yields over the production years. Yield range for Cabernet Sauvignon in Crush District 11 is 8.0 to 12.0 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.

Revenue. Return prices per ton for winegrapes are determined by variety and percent sugar (Brix). The price used in this study is \$600 per ton for Cabernet Sauvignon winegrapes.

Ranging Analysis. Table 5 has a range of return prices used for calculating net returns per acre at different yields. Table 5 includes a yield range of 7 tons to 13 tons per acre and a price range of \$450 to \$750 per ton.

Marketing. Various approaches are used by growers to market their grapes including making wine samples, printing materials, networking events, hosting lunches/dinners with potential buyers, maintaining a website and social media presence, as well as business travel). The costs associated with marketing winegrapes has not been included in this study.

Assessment Fees.

- **Lodi Winegrape Commission.** The LWC 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).
- **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.
- **Irrigated Lands Regulatory Program (ILRP).** 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 samples are collected and analyzed by an independent laboratory for containments of concern. Results are reported to the RWQCB. The fee is \$5.00 per acre

- *County Agricultural Commissioner (CAC) 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.
- *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 \$1000 of gross crop returns

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

Labor, Equipment, and Interest

Labor. Hourly wages for workers are \$16.50 for machine operators and \$14.50 per hour for non-machine labor. Adding 40 percent for the employers' share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$23.10 and \$20.30 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 October 2021. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

California Minimum Wage and Overtime Rules. In 2016, The California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for 2018 is \$11.00 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 \$10.50 per hour for 2018 and increases to \$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.

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. Average prices for on-farm delivery of diesel and gasoline based on October 2021 data from the Energy Information Administration are \$3.73 and \$2.70 per gallon, respectively. The cost includes a 9.25 percent sales tax, a \$0.13/gal excise tax on diesel fuel, an 8 percent sales tax, and a \$0.30/gal excise tax on gasoline. It is noted that federal and state excise taxes are refundable for on-farm use when filing the farm income tax return.

Fuel Lube & Repair. The fuel, lube, and repair cost per acre for each operation is determined by multiplying the total hourly operating cost 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.

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 4 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 October 2021.

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).

Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. 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. These costs can include property taxes, interest on operating capital, office expense, 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 0.886 percent of the

average 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 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, injury or damage to another's property. In this study, liability insurance costs \$930 for the entire farm.

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. A significant number of growers purchase crop insurance in this region. The cost of \$655 per unit (variety) is the basic catastrophic rate paid by the growers in the region of this study. This study has included a cost of \$655 or \$11 per acre for crop insurance.

Office Expense. Office and business expenses are estimated at \$156 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, shop and office utilities, and miscellaneous administrative charges.

Sanitation Services. Sanitation services provide portable toilets and garbage disposal for the vineyard at annual cost of \$30 per acre. The cost includes a double trailer mounted toilet, sinks for hand washing, delivery, and 9 months of weekly toilet and garbage service.

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 \$81,600 per year that includes 39 percent for payroll overhead and insurance benefits is used in this study. The total cost for a farm manager is \$408 per acre or \$24,480 for management of the 60 acres included in this study.

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 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 ((Purchase Price – Salvage Value) x (Capital Recovery Factor)) + (Salvage Value x 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 4.75 percent 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 October 2021.

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 \$26,313 per acre or \$1,578,780 for the 60-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.

Irrigation System. The well and a 40 horsepower (HP) pump are included as a non-cash overhead cost. The 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. This study includes an additional operating cost for an annual well test and water analysis. The irrigation system is included as a separate non-cash overhead cost and is considered an improvement to the property with a 25-year life.

Land. Based on grower input, crop land with irrigation availability plantable to wine grape vineyards is valued at \$21,000 per acre. For this study, the producing acreage estimated worth is; \$47,313 per acre. It is the crop land value plus the establishment cost ($\$21,000 + \$26,313 = \$47,313$).

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 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.

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

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TABLE 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD

SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

| | Wine Grape price per Ton = \$600 | | |
|---|----------------------------------|---------------|--------------|
| | Year: | Cost Per Acre | |
| | 1st | 2nd | 3rd |
| Tons Per Acre: | | | 5.0 |
| Planting Costs: | | | |
| Vineyard Removal | 1,200 | | |
| Rip/Slip Plow 2X | 1,200 | | |
| Disc 2X | 150 | | |
| Triplane 2X | 140 | | |
| Fumigate | 1,000 | | |
| Apply Pre-emergent Herbicide & Incorporate | 46 | | |
| Mark & Layout Vineyard | 238 | | |
| Plant, Place Cartons, & Wrap Vines | 277 | 49 | |
| Vines: 792 Per Acre (2% Replant In 2nd Year) (No cost for replants) | 3,168 | | |
| TOTAL PLANTING COSTS | 7,419 | 49 | |
| Trellis & Drip System Costs: | | | |
| Trellis Materials (stakes, wire, and end posts) | 5,259 | | |
| Install Trellis Labor | 809 | | |
| Install Irrigation (custom, single-line drip, injector, filter, and labor) | 2,600 | | |
| TOTAL TRELLIS & DRIP SYSTEM COSTS | 8,668 | | |
| Cultural Costs: | | | |
| Prune- Prune Vines by Hand | | 142 | 406 |
| Irrigate- Pumping & Labor | 162 | 269 | 384 |
| Irrigation- Well Test/Water Analysis | 4 | 4 | 4 |
| Irrigation System Maintenance- N-pHuric Acid | 6 | 6 | 6 |
| Fertilizer- 5-0-12 | 65 | 120 | 200 |
| Chemigate- Mealybug & Leafhopper (Platinum) | 30 | 30 | 30 |
| Train- Green Tie (Sucker, Tie & Train) | 250 | 3,861 | 1,471 |
| Weeds- Winter Strip Spray (Yrs 1-2, Prowl, Goal, Roundup. Yr 3, Surflan, Goal, Roundup) | 65 | 65 | 95 |
| Weeds- Hand Weed | 81 | 81 | |
| Weeds- Disc (3X 1st Year, 5X Year 2+) | 71 | 118 | 118 |
| Weeds- Summer Strip Spray (Rely) | | 45 | 45 |
| Disease- Eutypa (Rally, Topsin) | | 45 | 45 |
| Insect- Mites | | 77 | 77 |
| Train- Shoot Positioning/Thin | | | 386 |
| Disease- Mildew 6X (Dusting Sulfur) | | | 66 |
| Disease- Mildew 1X (Rally) | | | 31 |
| Disease- Mildew: 1X | | | 78 |
| Train- Trim Vines (Mechanical) | | | 19 |
| Pickup Truck Use | 43 | 43 | 43 |
| ATV Use | 25 | 25 | 25 |
| TOTAL CULTURAL COSTS | 803 | 4932 | 3,529 |
| Harvest Costs: | | | |
| Pick Fruit | | | 425 |
| Haul To Crusher | | | 110 |
| TOTAL HARVEST COSTS | | | 535 |
| Assessments: | | | |
| LWC, ILRP, CAC Pesticide Storage, 3 rd Party Inspection, GWSS, & CARB | | | 25 |
| TOTAL ASSESSMENT COSTS | | | 25 |
| Interest On Operating Capital @ 4.00% | 507 | 100 | 53 |
| TOTAL OPERATING COSTS/ACRE | 17,398 | 5,081 | 4,142 |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 1. CONTINUED
 SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

| | Cost Per Acre | | | |
|---|---------------|---------------|---------------|---------------|
| | Year: | 1st | 2nd | 3rd |
| Tons Per Acre: | | | | 5 |
| Cash Overhead Costs: | | | | |
| Office Expense | | 156 | 156 | 156 |
| Liability Insurance | | 5 | 5 | 5 |
| Sanitation Fees | | 30 | 30 | 30 |
| Managers Salary | | 408 | 408 | 408 |
| Property Taxes | | 220 | 220 | 220 |
| Property Insurance | | 19 | 19 | 20 |
| Investment Repairs | | 34 | 34 | 34 |
| Safety Training | | 12 | 12 | 12 |
| Misc. Training | | 13 | 13 | 13 |
| TOTAL CASH OVERHEAD COSTS | | 897 | 897 | 898 |
| TOTAL CASH COSTS/ACRE | | 18,295 | 5,978 | 5,040 |
| INCOME/ACRE FROM PRODUCTION | | | | 3,000 |
| NET CASH COSTS/ACRE FOR THE YEAR | | 18,295 | 5,978 | 2,040 |
| PROFIT/ACRE ABOVE CASH COSTS | | | | |
| ACCUMULATED NET CASH COSTS/ACRE | | 18,295 | 24,273 | 26,313 |
| Non-Cash Overhead (Capital Recovery): | | | | |
| Building- 2400 sq. ft. | | 23 | 23 | 23 |
| Fuel Tanks- 2X500 gallons | | 3 | 3 | 3 |
| Shop/Field Tools | | 7 | 7 | 7 |
| Pumping Station (pump, well) | | 85 | 85 | 85 |
| Land- Lodi | | 998 | 998 | 998 |
| Equipment | | 28 | 43 | 65 |
| TOTAL INTEREST ON INVESTMENT | | 1,143 | 1,158 | 1,180 |
| TOTAL COST/ACRE FOR THE YEAR | | 19,437 | 7,107 | 6,220 |
| INCOME/ACRE FROM PRODUCTION | | | | 3,000 |
| TOTAL NET COST/ACRE FOR THE YEAR | | 19,437 | 7,136 | 3,220 |
| NET PROFIT/ACRE ABOVE TOTAL COST | | | | |
| TOTAL ACCUMULATED NET COST/ACRE | | 19,437 | 26,573 | 29,793 |

TABLE 2. COSTS PER ACRE TO PRODUCE WINE GRAPES
SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

| Operation | Equipment Time (Hrs/A) | Labor Cost | Fuel | Cash and Labor Costs per Acre | | | Total Cost | Your Cost |
|--|------------------------------|---------------|-----------|-------------------------------|------------------|-----------------|---------------|--------------|
| | | | | Lube & Repairs | Material Cost | Custom/ Rent | | |
| Cultural: | | | | | | | | |
| Well Test/Water Analysis | 0.00 | 0 | 0 | 0 | 4 | 0 | 4 | |
| Prune- Hand | 0.00 | 670 | 0 | 0 | 0 | 0 | 670 | |
| Prune- Chop Prunings | 0.19 | 5 | 4 | 2 | 0 | 0 | 11 | |
| Pests- Weeds/Disc 4X | 1.72 | 48 | 35 | 12 | 0 | 0 | 94 | |
| Winter Tie | 0.00 | 61 | 0 | 0 | 15 | 0 | 76 | |
| Trunk Suckering | 0.00 | 102 | 0 | 0 | 0 | 0 | 102 | |
| Petiole Tissue Sample/Analysis | 0.00 | 0 | 0 | 0 | 0 | 6 | 6 | |
| Pests- Disease/Mildew (Dust) 6X | 1.20 | 33 | 8 | 4 | 21 | 0 | 66 | |
| Irrigate | 0.00 | 130 | 0 | 0 | 270 | 0 | 400 | |
| Fertigate- 5-0-12 (4X) | 0.00 | 0 | 0 | 0 | 345 | 0 | 345 | |
| Shoot Removal/Positioning | 0.00 | 305 | 0 | 0 | 0 | 0 | 305 | |
| Chemigate- Mealybug & Leafhopper | 0.00 | 0 | 0 | 0 | 30 | 0 | 30 | |
| Trim Vines- Mechanical 2X | 0.63 | 17 | 13 | 8 | 0 | 0 | 38 | |
| Pests- Mildew, Leafhopper, & Mealybug | 0.36 | 10 | 7 | 3 | 65 | 0 | 86 | |
| Pests- Weeds/Summer Strip Spray | 0.43 | 12 | 3 | 1 | 29 | 0 | 45 | |
| Pests- Insects/Mites & Mildew | 0.36 | 10 | 7 | 3 | 90 | 0 | 110 | |
| Chemigate- N-pHuric Acid | 0.00 | 0 | 0 | 0 | 6 | 0 | 6 | |
| Pests- Weeds/Winter Strip Spray | 0.43 | 12 | 3 | 1 | 75 | 0 | 91 | |
| Pickup Truck Use | 0.86 | 24 | 15 | 5 | 0 | 0 | 44 | |
| ATV Use | 0.86 | 24 | 1 | 1 | 0 | 0 | 26 | |
| TOTAL CULTURAL COSTS | 7.03 | 1,462 | 96 | 39 | 950 | 6 | 2,553 | |
| Harvest: | | | | | | | | |
| Machine Harvest Fruit | 0.00 | 0 | 0 | 0 | 0 | 425 | 425 | |
| Haul to Crusher | 0.00 | 0 | 0 | 0 | 0 | 220 | 220 | |
| TOTAL HARVEST COSTS | 0.00 | 0 | 0 | 0 | 0 | 645 | 645 | |
| Assessment: | | | | | | | | |
| Assessments | 0.00 | 0 | 0 | 0 | 45 | 0 | 45 | |
| TOTAL ASSESSMENT COSTS | 0.00 | 0 | 0 | 0 | 45 | 0 | 45 | |
| Interest on Operating Capital at 4.00% | | | | | | | 43 | |
| TOTAL OPERATING COSTS/ACRE | 7 | 1,462 | 96 | 39 | 995 | 651 | 3,286 | |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 2. CONTINUED
 SAN JOAQUIN VALLEY NORTH, Crush District 11 – 2021

| Operation | Equipment | Labor Cost | Fuel | Cash and Labor Costs per Acre | | | Total Cost | Your Cost |
|---------------------------------------|-----------------|-------------------------------|------|---|------------------|-----------------|---------------|--------------|
| | Time (Hrs/A) | | | Lube & Repairs | Material Cost | Custom/ Rent | | |
| CASH OVERHEAD: | | | | | | | | |
| Crop Insurance (\$655/variety) | | | | | | | 11 | |
| Liability Insurance | | | | | | | 5 | |
| Manager Salary (include P/R OH) | | | | | | | 408 | |
| Office Expense | | | | | | | 156 | |
| Sanitation | | | | | | | 30 | |
| Safety Training | | | | | | | 12 | |
| Misc. Training | | | | | | | 13 | |
| Property Taxes | | | | | | | 352 | |
| Property Insurance | | | | | | | 31 | |
| Investment Repairs | | | | | | | 166 | |
| TOTAL CASH OVERHEAD COSTS/ACRE | | | | | | | 1,183 | |
| TOTAL CASH COSTS/ACRE | | | | | | | 4,469 | |
| NON-CASH OVERHEAD: | | | | | | | | |
| | | <u>Per Producing Acre</u> | | <u>Annual Cost Capital Recovery</u> | | | | |
| Building 40'X60' | | 360 | | 23 | | | 23 | |
| Fuel Tanks 2X500 gallons | | 44 | | 3 | | | 3 | |
| Land | | 21,000 | | 998 | | | 998 | |
| Pumping Station (pump, well) | | 1,250 | | 85 | | | 85 | |
| Tools-Shop/Field | | 70 | | 6 | | | 6 | |
| Vineyard Establishment | | 26,313 | | 1,954 | | | 1,954 | |
| Equipment | | 510 | | 54 | | | 54 | |
| TOTAL NON-CASH OVERHEAD COSTS | | 49,546 | | 3,122 | | | 3,122 | |
| TOTAL COSTS/ACRE | | | | | | | 7,591 | |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINE GRAPES
 SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

| | Quantity/ Acre | Unit | Price or Cost/Unit | Value or Cost/Acre | Your Cost |
|--|-------------------|------|-----------------------|-----------------------|--------------|
| GROSS RETURNS | | | | | |
| Wine Grape | 10 | Ton | 600.00 | 6,000 | |
| TOTAL GROSS RETURNS | | | | 6,000 | |
| OPERATING COSTS | | | | | |
| Herbicide: | | | | 104 | |
| Rely 280 | 64.00 | floz | 0.45 | 29 | |
| Goal 2XL | 2.40 | Pint | 12.43 | 30 | |
| Prowl H2O | 4.00 | Pint | 4.19 | 17 | |
| Roundup PowerMax | 1.20 | Pint | 2.56 | 3 | |
| Chateau | 6.00 | Oz | 4.22 | 25 | |
| Insecticide: | | | | 142 | |
| Platinum 75 SG | 4.00 | floz | 7.59 | 30 | |
| Movento | 8.00 | floz | 6.88 | 55 | |
| Acramite 50WS | 16.00 | oz | 3.52 | 56 | |
| Fungicide: | | | | 65 | |
| Dusting Sulfur | 90.00 | lb | 0.23 | 21 | |
| Rally 40WSP | 4.00 | oz | 2.57 | 10 | |
| Luna Experience | 6.40 | Oz | 5.27 | 34 | |
| Fertilizer: | | | | 345 | |
| 05-00-12 | 0.60 | Ton | 575.00 | 345 | |
| Water: | | | | 274 | |
| Well/Pump Test | 0.02 | Each | 200.00 | 3 | |
| Water Analysis | 0.02 | Each | 50.00 | 1 | |
| Water Pumped | 18.00 | acin | 15.00 | 270 | |
| Irrigation System Aids: | | | | 6 | |
| N-pHuric Acid | 0.12 | Gal | 47.54 | 6 | |
| Custom: | | | | 651 | |
| Petiole Tissue Analysis | 0.10 | Each | 60.00 | 6 | |
| Machine Harvest | 1.00 | Acre | 425.00 | 425 | |
| Haul to Crusher | 10.00 | Ton | 22.00 | 220 | |
| Vine Aids: | | | | 15 | |
| Tying Materials | 1.00 | Acre | 15.00 | 15 | |
| Assessment: | | | | 45 | |
| Lodi Winegrape Commission | 6.00 | GVal | 4.50 | 27 | |
| ILRP | 1.00 | Acre | 5.00 | 5 | |
| CAC Pesticide Storage | 1.00 | Acre | 0.50 | 1 | |
| 3rd Party Inspection Fee | 10.00 | Ton | 0.42 | 4 | |
| GWSS | 6.00 | GVal | 1.25 | 8 | |
| CARB | 1.00 | Acre | 0.50 | 1 | |
| Labor | | | | 1,462 | |
| Equipment Operator Labor | 8.44 | hrs | 23.10 | 195 | |
| Pruning Labor | 41.00 | hrs | 20.30 | 832 | |
| Irrigation Labor | 6.40 | hrs | 20.30 | 130 | |
| Canopy Management Labor | 15.00 | hrs | 20.30 | 305 | |
| Machinery | | | | 135 | |
| Fuel-Gas | 4.25 | gal | 3.90 | 17 | |
| Fuel-Diesel | 19.10 | gal | 4.15 | 79 | |
| Lube | | | | 14 | |
| Machinery Repair | | | | 25 | |
| Interest on Operating Capital @ 4.00% | | | | 43 | |
| TOTAL OPERATING COSTS/ACRE | | | | 3,286 | |
| TOTAL OPERATING COSTS/TON | | | | 329 | |
| NET RETURNS ABOVE OPERATING COSTS | | | | 2,714 | |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 3. CONTINUED

SAN JOAQUIN VALLEY NORTH, Crush District 11 – 2021

| | Quantity/ Acre | Unit | Price or Cost/Unit | Value or Cost/Acre | Your Cost |
|---|-------------------|------|-----------------------|-----------------------|--------------|
| CASH OVERHEAD COSTS | | | | | |
| Crop Insurance (\$655/variety) | | | | 11 | |
| Liability Insurance | | | | 5 | |
| Manager Salary (include P/R OH) | | | | 408 | |
| Office Expense | | | | 156 | |
| Sanitation | | | | 30 | |
| Safety Training | | | | 12 | |
| Misc. Training | | | | 13 | |
| Property Taxes | | | | 352 | |
| Property Insurance | | | | 31 | |
| Investment Repairs | | | | 166 | |
| TOTAL CASH OVERHEAD COSTS/ACRE | | | | 1,183 | |
| TOTAL CASH OVERHEAD COSTS/TON | | | | 118 | |
| TOTAL CASH COSTS/ACRE | | | | 4,469 | |
| TOTAL CASH COSTS/TON | | | | 447 | |
| NET RETURNS ABOVE CASH COSTS | | | | 1,531 | |
| NON-CASH OVERHEAD COSTS (Capital Recovery) | | | | | |
| Building 40'X60' | | | | 23 | |
| Fuel Tanks 2X500 gallons | | | | 3 | |
| Land | | | | 998 | |
| Pumping Station (pump, well) | | | | 85 | |
| Tools-Shop/Field | | | | 6 | |
| Vineyard Establishment | | | | 1,954 | |
| Equipment | | | | 54 | |
| TOTAL NON-CASH OVERHEAD COSTS/ACRE | | | | 3,122 | |
| TOTAL NON-CASH OVERHEAD COSTS/TON | | | | 312 | |
| TOTAL COST/ACRE | | | | 7,591 | |
| TOTAL COST/TON | | | | 759 | |
| NET RETURNS ABOVE TOTAL COST | | | | -1,591 | |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE WINE GRAPE
 SAN JOAQUIN VALLEY NORTH, Crush District 11 – 2021

| | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | Total |
|---------------------------------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|------------|--------------|
| | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | |
| Cultural: | | | | | | | | | | | | |
| Well Test/Water Analysis | 4 | | | | | | | | | | | 4 |
| Prune- Hand | 670 | | | | | | | | | | | 670 |
| Prune- Chop Prunings | | 11 | | | | | | | | | | 11 |
| Pests- Weeds/Disc 4X | | 24 | 24 | | 24 | | | | 24 | | | 94 |
| Winter Tie | | 76 | | | | | | | | | | 76 |
| Trunk Suckering | | | 102 | | | | | | | | | 102 |
| Petiole Tissue Sample/Analysis | | | 2 | | | 2 | | | | 2 | | 6 |
| Pests- Disease/Mildew (Dust) 6X | | | 11 | 33 | 11 | 11 | | | | | | 66 |
| Irrigate | | | 50 | 58 | 73 | 69 | 69 | 39 | 43 | | | 400 |
| Fertigate- 5-0-12 (4X) | | | 86 | 86 | 86 | | | | 86 | | | 345 |
| Shoot Removal/Positioning | | | | 305 | | | | | | | | 305 |
| Chemigate- Mealybug & Leafhopper | | | 30 | | | | | | | | | 30 |
| Trim Vines- Mechanical 2X | | | | | 19 | | | 19 | | | | 38 |
| Pests- Mildew, Leafhopper, & Mealybug | | | | | 86 | | | | | | | 86 |
| Pests- Weeds/Summer Strip Spray | | | | | 45 | | | | | | | 45 |
| Pests- Insects/Mites & Mildew | | | | | | 110 | | | | | | 110 |
| Chemigate- N-pHuric Acid | | | | | | | | | 6 | | | 6 |
| Pests- Weeds/Winter Strip Spray | | | | | | | | | | | 91 | 91 |
| Pickup Truck Use | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 44 |
| ATV Use | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 26 |
| TOTAL CULTURAL COSTS | 680 | 117 | 311 | 488 | 349 | 198 | 75 | 64 | 167 | 6 | 97 | 2,553 |
| Harvest: | | | | | | | | | | | | |
| Machine Harvest Fruit | | | | | | | | 425 | | | | 425 |
| Haul to Crusher | | | | | | | | 220 | | | | 220 |
| TOTAL HARVEST COSTS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 645 | 0 | 0 | 0 | 645 |
| Assessment: | | | | | | | | | | | | |
| Assessments | | | | | | | | 45 | | | | 45 |
| TOTAL ASSESSMENT COSTS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 45 |
| Interest on Operating Capital @4.00% | 2 | 3 | 4 | 5 | 6 | 7 | 7 | 10 | 0 | 0 | 0 | 43 |
| TOTAL OPERATING COSTS/ACRE | 683 | 119 | 315 | 493 | 356 | 205 | 82 | 764 | 166 | 6 | 97 | 3,286 |
| CASH OVERHEAD | | | | | | | | | | | | |
| Crop Insurance (\$655/variety) | | | 11 | | | | | | | | | 11 |
| Liability Insurance | 5 | | | | | | | | | | | 5 |
| Manager Salary (include P/R OH) | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 408 |
| Office Expense | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 156 |
| Sanitation | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 30 |
| Safety Training | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Misc. Training | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 13 |
| Property Taxes | 352 | | | | | | | | | | | 352 |
| Property Insurance | 31 | | | | | | | | | | | 31 |
| Investment Repairs | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 166 |
| TOTAL CASH OVERHEAD COSTS | 454 | 67 | 78 | 67 | 67 | 67 | 67 | 67 | 67 | 67 | 67 | 1,183 |
| TOTAL CASH COSTS/ACRE | 1,137 | 187 | 393 | 560 | 423 | 273 | 150 | 831 | 233 | 73 | 164 | 4,469 |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 5. RANGING ANALYSIS
 SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

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

| | YIELD (TON) | | | | | | |
|---------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 |
| OPERATING COSTS/ACRE: | | | | | | | |
| Cultural | 2,553 | 2,553 | 2,553 | 2,553 | 2,553 | 2,553 | 2,553 |
| Harvest | 579 | 601 | 623 | 645 | 667 | 689 | 711 |
| Assessment | 31 | 36 | 40 | 45 | 49 | 54 | 58 |
| Interest on Operating Capital @ 4.00% | 43 | 43 | 43 | 43 | 43 | 43 | 44 |
| TOTAL OPERATING COSTS/ACRE | 3,206 | 3,233 | 3,259 | 3,286 | 3,312 | 3,339 | 3,365 |
| TOTAL OPERATING COSTS/TON | 458.01 | 404.07 | 362.13 | 328.57 | 301.11 | 278.23 | 258.87 |
| CASH OVERHEAD COSTS/ACRE | | | | | | | |
| TOTAL CASH COSTS/ACRE | 4,389 | 4,416 | 4,442 | 4,469 | 4,496 | 4,522 | 4,549 |
| TOTAL CASH COSTS/TON | 627.05 | 551.99 | 493.61 | 446.90 | 408.69 | 376.84 | 349.90 |
| NON-CASH OVERHEAD COSTS/ACRE | | | | | | | |
| TOTAL COSTS/ACRE | 7,511 | 7,538 | 7,564 | 7,591 | 7,617 | 7,644 | 7,670 |
| TOTAL COSTS/TON | 1,073.00 | 942.00 | 840.00 | 759.00 | 692.00 | 637.00 | 590.00 |

Net Return per Acre above Operating Costs for Wine Grape

| PRICE (\$/ton) | YIELD (Ton/acre) | | | | | | |
|----------------|------------------|-------|-------|-------|-------|-------|-------|
| | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 |
| Wine Grape | | | | | | | |
| 450.00 | -56 | 367 | 791 | 1,214 | 1,638 | 2,061 | 2,485 |
| 500.00 | 294 | 767 | 1,241 | 1,714 | 2,188 | 2,661 | 3,135 |
| 550.00 | 644 | 1,167 | 1,691 | 2,214 | 2,738 | 3,261 | 3,785 |
| 600.00 | 994 | 1,567 | 2,141 | 2,714 | 3,288 | 3,861 | 4,435 |
| 650.00 | 1,344 | 1,967 | 2,591 | 3,214 | 3,838 | 4,461 | 5,085 |
| 700.00 | 1,694 | 2,367 | 3,041 | 3,714 | 4,388 | 5,061 | 5,735 |
| 750.00 | 2,044 | 2,767 | 3,491 | 4,214 | 4,938 | 5,661 | 6,385 |

Net Return per Acre above Cash Costs for Wine Grape

| PRICE (\$/ton) | YIELD (Ton/acre) | | | | | | |
|----------------|------------------|-------|-------|-------|-------|-------|-------|
| | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 |
| Wine Grape | | | | | | | |
| 450.00 | -1,239 | -816 | -392 | 31 | 454 | 878 | 1,301 |
| 500.00 | -889 | -416 | 58 | 531 | 1,004 | 1,478 | 1,951 |
| 550.00 | -539 | -16 | 508 | 1,031 | 1,554 | 2,078 | 2,601 |
| 600.00 | -189 | 384 | 958 | 1,531 | 2,104 | 2,678 | 3,251 |
| 650.00 | 161 | 784 | 1,408 | 2,031 | 2,654 | 3,278 | 3,901 |
| 700.00 | 511 | 1,184 | 1,858 | 2,531 | 3,204 | 3,878 | 4,551 |
| 750.00 | 861 | 1,584 | 2,308 | 3,031 | 3,754 | 4,478 | 5,201 |

Net Return per Acre above Total Costs for Wine Grape

| PRICE (\$/ton) | YIELD (Ton/acre) | | | | | | |
|----------------|------------------|--------|--------|--------|--------|--------|--------|
| | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 |
| Wine Grape | | | | | | | |
| 450.00 | -4,361 | -3,938 | -3,514 | -3,091 | -2,667 | -2,244 | -1,820 |
| 500.00 | -4,011 | -3,538 | -3,064 | -2,591 | -2,117 | -1,644 | -1,170 |
| 550.00 | -3,661 | -3,138 | -2,614 | -2,091 | -1,567 | -1,044 | -520 |
| 600.00 | -3,311 | -2,738 | -2,164 | -1,591 | -1,017 | -444 | 130 |
| 650.00 | -2,961 | -2,338 | -1,714 | -1,091 | -467 | 156 | 780 |
| 700.00 | -2,611 | -1,938 | -1,264 | -591 | 83 | 756 | 1,430 |
| 750.00 | -2,261 | -1,538 | -814 | -91 | 633 | 1,356 | 2,080 |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

ANNUAL EQUIPMENT COSTS

| Yr. | Description | Price | Yrs. Life | Salvage Value | Capital Recovery | Cash Overhead | | Total |
|------------------|--------------------------|---------|--------------|------------------|---------------------|---------------|-------|--------|
| | | | | | | Insurance | Taxes | |
| 21 | 30 HP 4WD Tractor | 26,450 | 15 | 5,149 | 2,262 | 14 | 158 | 2,434 |
| 21 | ATV 4WD | 9,250 | 5 | 4,146 | 1,368 | 6 | 67 | 1,441 |
| 21 | Pickup Truck 1/2 T | 35,000 | 7 | 13,277 | 4,351 | 21 | 241 | 4,614 |
| 21 | Weed Sprayer 200 G | 4,800 | 5 | 1,564 | 817 | 3 | 32 | 851 |
| 21 | Disc - Tandem 8' | 11,000 | 10 | 1,945 | 1,251 | 6 | 65 | 1,321 |
| 21 | Mower-Flail 8' | 12,000 | 15 | 1,152 | 1,082 | 6 | 66 | 1,154 |
| 21 | Vine Trimmer 8' | 18,000 | 10 | 3,183 | 2,047 | 9 | 106 | 2,162 |
| 21 | 90 HP 4WD Tractor | 78,000 | 15 | 15,185 | 6,671 | 41 | 466 | 7,178 |
| 21 | Duster - 3 Pt 11' | 8,000 | 10 | 1,415 | 910 | 4 | 47 | 961 |
| 21 | Vineyard Sprayer 500 Gal | 26,000 | 10 | 4,598 | 2,957 | 14 | 153 | 3,123 |
| TOTAL | | 228,500 | - | 51,614 | 23,715 | 124 | 1,401 | 25,240 |
| 60% of New Cost* | | 137,100 | - | 30,968 | 14,229 | 74 | 840 | 15,144 |

*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 | | | | | | | | |
| Building 40'X60' | 72,000 | 30 | 0 | 4,551 | 32 | 360 | 1,440 | 6,383 |
| Fuel Tanks 2X500ga | 8,750 | 25 | 613 | 592 | 4 | 47 | 175 | 818 |
| Land | 1,260,000 | 40 | 1,260,000 | 59,850 | 1,116 | 12,600 | 0 | 73,566 |
| Pumping Station (pump, well) | 75,000 | 25 | 5,250 | 5,075 | 36 | 401 | 1,500 | 7,012 |
| Tools-Shop/Field | 14,000 | 15 | 980 | 1,280 | 7 | 75 | 280 | 1,641 |
| Vineyard Establishment | 1,578,780 | 22 | 0 | 117,222 | 699 | 7,894 | 7,894 | 133,709 |
| TOTAL INVESTMENT | 3,008,530 | - | 1,266,843 | 188,570 | 1,894 | 21,377 | 11,289 | 223,130 |

ANNUAL BUSINESS OVERHEAD COSTS

| Description | Units/ Farm | Unit | Price/ Unit | Total Cost |
|---------------------------------|----------------|------|----------------|---------------|
| Crop Insurance (\$655/variety) | 60.00 | Acre | 10.92 | 655 |
| Liability Insurance | 60.00 | Acre | 4.65 | 279 |
| Manager Salary (include P/R OH) | 60.00 | acre | 408.00 | 24,480 |
| Office Expense | 60.00 | Acre | 156.00 | 9,360 |
| Sanitation | 60.00 | Acre | 30.00 | 1,800 |
| Safety Training | 60.00 | acre | 12.00 | 720 |
| Misc. Training | 60.00 | acre | 12.95 | 777 |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 7. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY NORTH, Crush District 11 - 2021

| Yr. | Description | Hours Used | Total Hours Used | Capital Recovery | Cash Overhead | | | Operating | | Total Oper. | Total Costs/Hr. |
|-----|--------------------------|---------------|------------------------|---------------------|---------------|-------|------------------|-----------|-------|----------------|--------------------|
| | | | | | Insurance | Taxes | Lube& Repairs | Fuel | | | |
| 21 | 30 HP 4WD Tractor | 136 | 800 | 1.70 | 0.01 | 0.12 | 1.42 | 6.11 | 7.54 | 9.36 | |
| 21 | ATV 4WD | 52 | 400 | 2.05 | 0.01 | 0.10 | 0.89 | 1.30 | 2.19 | 4.35 | |
| 21 | Pickup Truck 1/2 T | 52 | 285 | 9.16 | 0.05 | 0.51 | 5.27 | 17.88 | 23.14 | 32.86 | |
| 21 | Weed Sprayer 200 G | 52 | 240 | 2.04 | 0.01 | 0.08 | 0.70 | 0.00 | 0.70 | 2.83 | |
| 21 | Disc - Tandem 8' | 103 | 200 | 3.75 | 0.02 | 0.19 | 1.81 | 0.00 | 1.81 | 5.78 | |
| 21 | Mower-Flail 8' | 11 | 133 | 4.88 | 0.03 | 0.30 | 5.60 | 0.00 | 5.60 | 10.80 | |
| 21 | Vine Trimmer 8' | 38 | 200 | 6.14 | 0.03 | 0.32 | 7.59 | 0.00 | 7.59 | 14.08 | |
| 21 | 90 HP 4WD Tractor | 214 | 1066 | 3.75 | 0.02 | 0.26 | 4.74 | 18.34 | 23.08 | 27.12 | |
| 21 | Duster - 3 Pt 11' | 72 | 200 | 2.73 | 0.01 | 0.14 | 1.40 | 0.00 | 1.40 | 4.28 | |
| 21 | Vineyard Sprayer 500 Gal | 43 | 120 | 14.78 | 0.07 | 0.76 | 3.71 | 0.00 | 3.71 | 19.33 | |

UC COOPERATIVE EXTENSION – AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 8. OPERATIONS WITH EQUIPMENT AND MATERIAL INPUTS
 SAN JOAQUIN VALLEY NORTH, Crush District 11 – 2021

| Operation | Operation Month | Tractor | Implement | Labor Type/ Material | Rate/ acre | Unit |
|--------------------------|-----------------|-------------------|--------------------------|---------------------------|---------------|-------|
| Well Test/Water Analysis | Feb | | | Well/Pump Test | 0.02 | Each |
| | | | | Water Analysis | 0.02 | Each |
| Prune- Hand | Feb | | | Pruning Labor | 33.00 | hours |
| Prune- Chop Prunings | Mar | 90 HP 4WD Tractor | Mower-Flail 8' | Equipment Operator Labor | 0.23 | hour |
| Pests- Weeds/Disc 4X | Mar | 90 HP 4WD Tractor | Disc - Tandem 8' | Equipment Operator Labor | 0.52 | hour |
| | Apr | 90 HP 4WD Tractor | Disc - Tandem 8' | Equipment Operator Labor | 0.52 | hour |
| | June | 90 HP 4WD Tractor | Disc - Tandem 8' | Equipment Operator Labor | 0.52 | hour |
| | Oct | 90 HP 4WD Tractor | Disc - Tandem 8' | Equipment Operator Labor | 0.52 | hour |
| Winter Tie | Mar | | | Pruning Labor | 3.00 | hours |
| | | | | Tying Materials | 1.00 | Acre |
| Trunk Suckering | Apr | | | Pruning Labor | 5.00 | hours |
| Petiole Tissue Samples | Apr | | | Petiole Tissue Analysis | 0.03 | Each |
| | July | | | Petiole Tissue Analysis | 0.03 | Each |
| | Oct | | | Petiole Tissue Analysis | 0.03 | Each |
| Pests- Disease/Mildew | Apr | 30 HP 4WD Tractor | Duster - 3 Pt 11' | Equipment Operator Labor | 0.24 | hour |
| | | | | Dusting Sulfur | 15.00 | lb |
| | May | 30 HP 4WD Tractor | Duster - 3 Pt 11' | Equipment Operator Labor | 0.72 | hour |
| | | | | Dusting Sulfur | 45.00 | lb |
| | June | 30 HP 4WD Tractor | Duster - 3 Pt 11' | Equipment Operator Labor | 0.24 | hour |
| | | | | Dusting Sulfur | 15.00 | lb |
| | July | 30 HP 4WD Tractor | Duster - 3 Pt 11' | Equipment Operator Labor | 0.24 | hour |
| | | | | Dusting Sulfur | 15.00 | lb |
| Irrigate | Apr | | | Irrigation Labor | 1.00 | hour |
| | | | | Water Pumped | 2.00 | acin |
| | May | | | Irrigation Labor | 1.00 | hour |
| | | | | Water Pumped | 2.50 | acin |
| | June | | | Irrigation Labor | 1.00 | hour |
| | | | | Water Pumped | 3.50 | acin |
| | July | | | Irrigation Labor | 0.80 | hour |
| | | | | Water Pumped | 3.50 | acin |
| | Aug | | | Irrigation Labor | 0.80 | hour |
| | | | | Water Pumped | 3.50 | acin |
| | Sept | | | Irrigation Labor | 0.80 | hour |
| | | | | Water Pumped | 1.50 | acin |
| | Oct | | | Irrigation Labor | 1.00 | hour |
| | | | | Water Pumped | 1.50 | acin |
| Fertigate- 5-0-12 | Apr | | | 05-00-12 | 0.15 | Ton |
| | May | | | 05-00-12 | 0.15 | Ton |
| | June | | | 05-00-12 | 0.15 | Ton |
| | Oct | | | 05-00-12 | 0.15 | Ton |
| Shoot Removal/Position | May | | | Canopy Management Labor | 15.00 | hours |
| Chemigate- Mealybug | Apr | | | Platinum 75 SG | 4.00 | floz |
| Trim Vines 2X | June | 90 HP 4WD Tractor | Vine Trimmer 8' | Equipment Operator Labor | 0.38 | hour |
| | Sept | 90 HP 4WD Tractor | Vine Trimmer 8' | Equipment Operator Labor | 0.38 | hour |
| Pests- Mildew | June | 90 HP 4WD Tractor | Vineyard Sprayer 500 Gal | Equipment Operator Labor | 0.43 | hour |
| | | | | Rally 40WSP | 4.00 | oz |
| | | | | Movento | 8.00 | floz |
| Pests- Weeds/Summer | June | 30 HP 4WD Tractor | Weed Sprayer 200 G | Equipment Operator Labor | 0.52 | hour |
| | | | | Rely 280 | 64.00 | floz |
| Pests- Insects/Mites | July | 90 HP 4WD Tractor | Vineyard Sprayer 500 Gal | Equipment Operator Labor | 0.43 | hour |
| | | | | Luna Experience | 6.40 | Oz |
| | | | | Acramite 50WS | 16.00 | oz |
| Chemigate- N-phuric | Oct | | | N-phuric Acid | 0.12 | Gal |
| Pests- Weeds/Winter | Dec | 30 HP 4WD Tractor | Weed Sprayer 200 G | Equipment Operator Labor | 0.52 | hour |
| | | | | Goal 2XL | 2.40 | Pint |
| | | | | Prowl H2O | 4.00 | Pint |
| | | | | Roundup PowerMax | 1.20 | Pint |
| | | | | Chateau | 6.00 | Oz |
| Pickup Truck Use | Dec | | Pickup Truck 1/2 T | Equipment Operator Labor | 1.04 | hours |
| ATV Use | Dec | | ATV 4WD | Equipment Operator Labor | 1.04 | hours |
| Machine Harvest Fruit | Sept | | | Machine Harvest | 1.00 | Acre |
| Haul to Crusher | Sept | | | Haul to Crusher | 10.00 | Ton |
| Assessments | Sept | | | Lodi Winegrape Commission | 6.00 | GVal |
| | | | | ILRP | 1.00 | Acre |
| | | | | CAC Pesticide Storage | 1.00 | Acre |
| | | | | 3rd Party Inspection Fee | 10.00 | Ton |
| | | | | GWSS | 6.00 | GVal |
| | | | | CARB | 1.00 | Acre |