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

2021
**SAMPLE COSTS TO ESTABLISH A VINEYARD
AND PRODUCE WINEGRAPES**



Chardonnay Variety
Livermore Valley – Alameda County
CRUSH DISTRICT 6

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INTRODUCTION

Sample costs to establish a vineyard and produce winegrapes in the Livermore 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 January 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. ucanr.edu/CountyOffices/.

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 7 and pertain to sample costs to establish the vineyard and produce chardonnay winegrapes in the Livermore Valley – Crush District 6 of Alameda County. 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 40 contiguous acre farm is located on land with less than a three percent slope. The absentee owner makes no management decisions and does not work in the vineyard. The vineyard is operated by a hired, professional vineyard management company. Eighteen acres of chardonnay winegrapes are being established and are the basis of this study. In addition, 18 acres of mature vineyards are in production, and roads, irrigation systems, and building occupy the remaining 4 acres.

Vineyard Management. Vineyard management companies (VMC) farm the majority of the vineyards in the Livermore Valley. The VMC is a licensed labor contractor and supervises all labor associated with the operations, provides employee safety training, pays labor rates that meet or exceed those required by state law and required health insurance, (See section on labor). The VMC is responsible for maintaining federal, state and local licenses and permits as required by law and regulations. Management fees associated with management companies vary widely depending on individual site challenges, size of vineyard property, and other factors. The VMC charges a management fee of \$771 per acre during the establishment years and the production years.

The VMC is a licensed Pest Control Business. The owner/operator holds a Qualified Applicators License, (QAL) and is a licensed Pest Control Adviser/Certified Crop Adviser, (PCA/CCA). These licenses are issued from CalEPA/DPR. An individual who is licensed as a PCA and/or a CCA may monitor the field for pests and disease and collect samples for nutrient analyses. A CCA emphasizes fertilizer and plant nutrient management issues. If pest management advice is provided or an application is made by the VMC under this license, that individual is required to provide written recommendations and use reports for those pesticides that are applied. In this region, a written recommendation by a CCA for applying fertilizers is currently not required. cdpr.ca.gov/docs/license/liccert.htm

All operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

Fumigation: Because of costs and governmental restrictions, fumigation is not considered as a cost in this study. Fumigation costs may range from \$1,200 to \$4,000 per acre depending on materials and methods and may be useful for controlling oak root fungus or nematodes

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 including compost and gypsum are spread and disced into the soil. The land is then ripped 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 and rolled three times. The field is leveled with a landplane.

Vines. Chardonnay clone 8 plant stock (\$3.55 each) are planted on an 8-foot x 5-foot spacing at 1,089 vines per acre. Vines will be trained to a bilateral cordon and spur pruned. Cordons are the horizontal branches, and spurs are the bearing units on the cordon. The grapevines are assumed to yield a harvestable crop of fruit in the third year and to produce for an additional 27 years.

Planting. The field is marked and laid out in the fall or spring (April). Planting occurs in the spring (May) and is done by hand. Holes are dug, vines are wrapped, staked and planted to the appropriate depth. In the following years an average of 5 percent or 54 vines per acre will be replanted the 2nd year and 2 percent or 22 vines per acre will be transplanted the 3rd year. Greenvines can be transplanted from late May into August. In some vineyards with early transplanting, good vine vigor and proper training a harvest of economic importance can be achieved in the second year. For this study, the vine training and the other establishment operations are based on the first harvest in the 3rd year of growth.

To protect the young vines from herbicide applications after transplanting, cardboard cartons, nursery wraps or grow tubes are used to avoid getting spray on the young green vines. These covers are placed on the vines at planting.

Trellis System. The trellis is a vertical shoot positioning system (VSP). The system utilizes 3- inch X 8-foot notched steel line posts spaced 15-feet apart (every 3rd vine), with three training stakes (1/2-inch rebar rod X 4- feet) at the vine locations in between. Two clips for each rebar. End posts are 3-7/8-inch X 10- foot steel tube (well casing) with a spade. No additional anchors are required. Two crossarms (8-inch) are installed at two different levels. Six wires are secured to the end posts – 12-gauge fruit wire, 14-gauge drip wire, and 2 pairs of 13-gauge movable canopy wires. Gripples are put on all wires except the cordon wire and drip wires. The trellis is considered as part of the vineyard since it will be removed when the vines are removed. Therefore, it is included in the establishment cost.

In the fall of the year prior to planting, end-posts and stakes are installed by a trellis company. The drip wire and cordon (fruit) wire are installed after planting. The second year, two pairs of canopy wire are installed.

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 are placed in the vine row middles and are mowed.

First Year. The vines are allowed to grow freely with no attempt at training. A good root system should develop this year to support vine training in the second year.

Second Year. In February the vines are pruned back to two buds. In June, the vines are suckered and trained to one shoot, which become the main trunk. Later in 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 removed. In July and August, two passes are made to top the vines and to remove extra shoots (suckering).

Third Year. In February, cordons are pruned back to the appropriate length as determined by girth. These canes are then tied to the fruiting wire. Training vines in the third year includes extending the cordons along the permanent cordon wire and selecting spur positions. Suckering is done in May and shoot

positioning in June and July. Fruit thinning is done in the summer if vine growth is weak, but fruit thinning is not included in this study.

Irrigation. Irrigation costs include water delivered by Zone 7 water district, electricity to pressurize the water through the drip system, and labor associated with irrigating. Water is calculated to cost \$200.00 per acre-foot (\$16.67 per acre inch). Between 15 to 20 inches of annual winter/spring rainfall is assumed which is within the range of average annual rainfall. During the first two years, irrigations begin in May and end around September. In the third year, additional irrigations are made. In this study, 1 acre-foot of water is applied to each vineyard acre in year 3 and thereafter.

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 and raised off the ground. 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 (material and labor) is included in the vineyard establishment cost. The drip irrigation installation labor includes laying out the line and hanging it on the bottom trellis wire.

Chemical Injections/Acid Flush. All the fertilizer and some of the pesticides are injected through the drip system by the VMC. The drip irrigation system requires chemical flushing to retard chemical buildup and emitter clogging. The flushing is performed after harvest with N-pHuric acid applied through the drip system with an additional 0.10 acre- inches of water.

Pest Management. The pesticides and rates mentioned are listed in *UC Integrated Pest Management Guidelines, Grapes*, available at ipm.ucdavis.edu. Pesticides mentioned in the study are commonly used, but may not be university 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 and mites are the most common insect pests in the region. Leafhoppers (*Erythroneura elegantula* and *E. variabilis*) can cause serious problems and are controlled with Platinum insecticide beginning in June of the third year. Increasing insect pressure from vine mealybug (VMB) and European Grapevine Moth (EGVM) has forced treatments of these insects. Intrepid and Altacor are applied 2-5 times per year (beginning in May) for EGVM and Movento, or neonicotinoids may be applied to manage VMB, generally starting in June. Beginning in the third year, Intrepid is applied in May for EGVM. In June Movento for VMB and Altacor for EGVM are applied. The materials are applied with the fungicides when possible.

Diseases. Several 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 every 10 to 14 days from April to July. Rally, a sterol inhibitor is applied at bloom one time and Flint, a strobilurine, is applied at cluster closure. The usage of a di-methyl inhibitor (dbi) can also be rotated with a strobilurine (sbi). Stylet oil is applied in May. Also, *Eutypa* dieback sensitive varieties, such as Cabernet Sauvignon, benefit from Rally applied immediately after pruning dormant canes beginning in the second year.

The vineyard has to be scouted for viruses in the fall. The actual cost for virus testing will vary depending on the percentage of infected plants. Virus testing can cost \$300 per sample. Virus testing costs are not included in this study. The virus detection program begins the first year.

Vineyard Floor Management/Weeds. A volunteer cover crop is allowed to grow in the row middles for beneficial habitat and dust control. The ground cover is mowed twice a year in March and May. To manage weeds in the vine rows, strip sprays are applied in the spring, summer, and winter. Additionally, in the first two years of vineyard establishment, Roundup is spot sprayed.

Vertebrate. Gophers and squirrels are the major pest problem. Infestation varies greatly between vineyard blocks. Areas with heavy gopher pressure may have replant rates as high as 15% annually. No vertebrate control costs are included in this study.

Fertilization. Beginning in the first year, an NPK fertilizer, 8-8-8, is applied in equal amounts through the drip line in June, July, and September. A total of five gallons or 51 pounds of material per acre is applied. In the third year, the fertilizer is applied in March, May and post-harvest 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. In this study, a yield of 3 tons is assumed in year three.

Production Cultural Practices and Material Inputs

Pruning. Pruning is done mechanically with a precision pruning machine during the winter months (January) with a final pruning by hand in February. The precision pruner reduces the hand pruning labor significantly. Precision pruning also reduces the need for hedging in the summer due to more shoots, which slows shoot growth. Hedging in the summer is not included in the study for this reason. The prunings are placed in the vine middles and chopped during the first mowing. Winter tying, where cordons are tied to the cordon wire at the trunk, and at each end of the cordons, is done every other year in March. Pruning costs are based on an hourly rate, although much of the pruning in the region may be done by piecework.

Vine Canopy Management. Canopy management begins with trunk and cordon suckering and shoot thinning in April. A second pass is made in July. Shoot positioning and wire lift is done in April, May and June. Passes in June and July are made for leaf removal, lateral removal, and wire lifting. Shoot removal is the operation whereby weak shoots, which lack vigor and do not originate from the fruiting spur buds, are removed. In early June/July after fruit set, some basal leaves are removed mechanically around the fruit zone to allow for exposure and better air movement. Positioning and thinning shoots allows vines space to develop full fruit clusters, and opens the canopy to allow greater air movement through the vines and around the clusters, which reduces humidity and fungal disease pressure. Chardonnay does not require mechanical leaf removal. This operation has not been included in this study.

Fertilization. An NPK fertilizer, 8-8-8, at 50 pounds per acre is applied through the irrigation system equally in March, July and in October after harvest.

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 5 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. Water costs are \$200.00 per acre-foot (\$16.67/acre-inch), and the water is sourced from the Zone 7 water district. 12 acre-inches are applied during the growing season from May through October. N-pHeric acid is injected into the irrigation system in October to prevent scale buildup during the winter months. The labor to inject N-pHeric 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*. **Pesticides mentioned in the study are not recommendations, but those commonly used in the region.** For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at ipm.ucdavis.edu.

For additional information and pesticide use permits, contact the local county Agricultural Commissioner's office. **The vineyard owner/manager who applies pesticides to his or her property may need to hold a valid private applicator certificate that is issued by the 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, however, adjuvants and their costs are not included.

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 & 7 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 Prowl H₂O, Goal, and Roundup applied in January. Rely herbicide is used for summer weed control in the vine row as a strip spray. Volunteer cover crop in the row middles is managed with mowing twice a year.

Insects. Platinum is applied in June (combined with mildew spray) to control leafhoppers. The PCA hangs one trap per 10 acres for vine mealybug monitoring. The vine mealybug (VMB) is an invasive insect of increasing concern. Intrepid and/or Altacor are applied 2-5 times per year (beginning in May) for EGVM and Movento, or neonicotinoids, may be applied to manage VMB, generally starting in June. Intrepid is applied in May and Altacor in June. The materials are applied with fungicides when possible.

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 10 to 14 day intervals, and by two fungicide applications (Rally and Flint), each with different modes of action. Rally (sterol inhibitor) is applied in June and Flint (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 \$250 per acre. Local hauling to the winery/crusher is an additional \$18.00 per ton. Additional charges will apply to hauls considered being out of the local area.

Yields. Yield maturity is reached in the fifth or sixth year. An assumed average yield of 8.0 tons per acre is used to calculate returns over the production years.

Revenue. Return prices per ton for Chardonnay winegrapes vary and are determined by quality and markets. The price used in this study is \$1,400 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. Agricultural producers target yield 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 5 to 11 tons per acre and a price range of \$950 to \$1,850 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 have not been included in this study.

Assessments: The Pierce's Disease/Glassy Sharpshooter Board (*PD/GWSS Board*), State Acre Survey Fee, State Inspection Fee, and State Crush Report Fee assessments have been included in this study. Also, the voluntary American Vineyard Foundation assessment is included.

Risk. The risks associated with wine grape production should not be underestimated. 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 agricultural production. Because of 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 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).

Labor, Equipment, and Interest

Labor. The labor rate for this study is \$22.84. This labor rate averages all types of labor; machine, hand, irrigation, pruning, and canopy management. This labor rate includes all associated costs and relevant fees such as payroll overhead, supervisors, insurance, surcharges, and benefits.

Labor for operations involving machinery is 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 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. The minimum wage rate increases \$1.00 per hour each year 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. 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 www.dir.ca.gov/dlse/faq_minimumwage.htm

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 2021 data from the Energy Information Administration are \$3.75 and \$3.40 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 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 January 2021.

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, property taxes are calculated as 1

percent of the average value of the property and are not influenced by the Williamson Act or additional county taxes. Average value equals new cost, plus salvage value divided by 2 on a per acre basis.

The Williamson Act. California Land Conservation Act has helped preserve agricultural and open space lands since 1965. Local governments and landowners enter into voluntary contracts to restrict enrolled lands to agricultural and open space uses in exchange for property tax reductions. The impact of the Williamson Act on property taxes will vary from year to year and property to property. This is due to how it is annually calculated and then compared to its Proposition 13 (factored base year value). The lower of the two is used for their annual assessment. boe.ca.gov/proptaxes/pdf/lta19029.pdf
boe.ca.gov/proptaxes/faqs/changeinownership.htm

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 \$621 for the entire farm or \$16 per acre.

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 25-85 percent of the approved average yield as established by verifiable production records from the vineyard. Actual insurance coverage is by unit, not by acre. A significant number of growers purchase crop insurance in this region. The cost for crop insurance is not included in this study.

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 \$40 per acre. The cost includes a double trailer mounted toilet, sinks for hand washing, delivery, and 9 months of weekly toilet and garbage service.

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 $((\text{Purchase Price} - \text{Salvage Value}) \times (\text{Capital Recovery Factor})) + (\text{Salvage Value} \times \text{Interest Rate})$.

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 5.50 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 January 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 \$28,663 per acre or \$515,934 for the 18-acre vineyard. The establishment cost is amortized over the remaining 27 years of the vineyard's projected 30-year life span. Annual vineyard maintenance (vines and trellis) is calculated at 0.5 percent of the establishment costs.

Irrigation System. Single line drip system with pump for system pressurization, filter, and injection system. The irrigation system is included in the vineyard establishment cost.

Land. Crop land with surface water availability in the Livermore Valley is valued at \$25,000 per acre for this study. The producing acreage estimated worth is; \$53,663 per acre. It is the crop land value plus the establishment cost ($\$25,000 + \$28,663 = \$53,663$).

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.

REFERENCES

American Society of Agricultural and Biological Engineers, (ASABE). Amended-2015. *American Society of Agricultural & Biological Engineers Standards Yearbook*. St. Joseph, Missouri. asabe.org/

Bettiga, L.J. (technical ed) 2013. *Grape Pest Management, 3rd ed.* University of California Division of Agriculture and Natural Resources (DANR) Publication number 3343.

Boehlje, M., and V.R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, New York

California State Department of Food and Agriculture. 2014-2018. Table 10 of Final Grape Crush Report. California Department of Food and Agriculture. Sacramento, CA. nass.usda.gov/ca/bul/crush/

Kurtural, Sahap K., D. A. Sumner, D. Stewart. “*Sample Costs to Establish and Produce Wine grapes, Cabernet Sauvignon, Napa Coast Region, Napa County – 2020*”. University of California, Cooperative Extension. Agricultural Issues Center. Department of Agricultural and Resource Economics. Davis, CA. coststudies.ucdavis.edu/en/

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

Trends in Agricultural Land and Lease Values, 2020. California Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. Woodbridge, CA. calasfmra.com

United States Department of Agriculture (USDA) Economic Research Service (ERS). ers.usda.gov/Data/.

University of California Statewide Integrated Pest Management Program. *UC Pest Management Guidelines, Grapes*, 2020. UC Division of Agriculture and Natural Resources (UCANR) Publication 3448. ipm.ucanr.edu

"U.S. Gasoline and Diesel Retail Prices." U.S. Energy Information Administration (EIA). eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_m.htm

Verdegaal, Paul, S., D. A. Sumner, J. Murdock. “*Sample Costs to Establish and Produce Winegrapes, Cabernet Sauvignon, San Joaquin Valley North, San Joaquin and Sacramento Counties – 2016*”. University of California, Cooperative Extension. Agricultural Issues Center. Department of Agricultural and Resource Economics. Davis, CA. coststudies.ucdavis.edu/en/

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

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD - CHARDONNAY
 LIVERMORE VALLEY, Crush District 6 - 2021

	Wine Grape price per Ton = \$1,400		
	Year:	Cost Per Acre	
	1st	2nd	3rd
Tons Per Acre:			3.0
Pre-Planting Costs:			
Vineyard Removal	2,225		
Compost/Soil Amendments	1,325		
Disc 3X	450		
Rip/Slip Plow 2X	1,700		
Disc & Roll 3X	750		
Land Level	200		
Weeds: Pre-plant Strip Spray	40		
Trellis Install (materials & labor)	6,948		
Drip Irrigation Install (materials & labor)	1,650		
TOTAL PRE-PLANTING COSTS	15,288		
Planting Costs:			
Mark & Layout Vineyard	327		
Plant, Place Cartons, & Wrap Vines	2,124	105	43
Vines: 1089 Per Acre (5% Replant in 2nd Yr., 2% in 3 rd Yr.)	3,866	192	78
TOTAL PLANTING COSTS	6,316	297	121
Cultural Costs (All Operations are Conducted by a VMC):			
Prune: Prune Vines by Hand		137	525
Irrigation: Canal Water & Labor	175	207	310
Irrigation: Acid Flush	30	30	30
Fertilizer: 8-8-8	5	13	13
Train/Sucker (Year 2)		1,370	
Tie & Train (Year 3)			411
Sucker			91
Shoot Positioning/Move Wires 3X			480
Shoot Thinning 2X			228
Weeds: Winter Strip Spray (Yrs 1-3, Prowl, Goal, Roundup)		68	68
Weeds: Hand Weed/Misc. Labor	91		
Mow Middles: Native Cover Crop 2X	18	18	18
Weeds: Summer Strip Spray (Rely) Yr. 1 (1X), Yr. 2 & 3 (2X)	40	80	80
Weeds: Spot Spray RU	4	4	
Disease: Eutypa (Rally)		56	56
Insects: EGVM (Intrepid)			64
Insects: EGVM & VMB (Altacor & Movento)			132
Insects: Leafhoppers (Platinum)			69
Insects: Mites (Acramite)			109
Disease: Mildew 6X (Dusting Sulfur)			113
Disease: Mildew (Stylet Oil)		45	45
Disease: Mildew 1X (Rally)		56	56
Disease: Mildew 1X (Flint)		68	68
VMC Management Fee	771	771	771
TOTAL CULTURAL COSTS	1135	2,923	3,737
Harvest Costs:			
Mechanical Harvest Fruit			250
Haul Fruit to Crusher			54
TOTAL HARVEST COSTS			304
Assessments:			
PD/GWSS, AVF, State Acre Survey, State Inspection, & State Crush Report			12
TOTAL ASSESSMENT COSTS			12
Interest On Operating Capital @ 5.25%	874	48	74
TOTAL OPERATING COSTS/ACRE	23,614	3,268	4,248

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 1. CONTINUED
 LIVERMORE VALLEY, Crush District 6 – 2021

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			3.0
Cash Overhead Costs:				
Office Expense		156	156	156
Liability Insurance		16	16	16
Sanitation Fees		40	40	40
Property Taxes		264	265	267
Property Insurance		23	24	24
Investment Repairs		52	53	53
Safety Training		12	12	12
Misc. Training		13	13	13
TOTAL CASH OVERHEAD COSTS		575	578	580
TOTAL CASH COSTS/ACRE		24,189	3,846	4,828
INCOME/ACRE FROM PRODUCTION				4,200
NET CASH COSTS/ACRE FOR THE YEAR		24,189	3,846	628
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		24,189	28,035	28,663
Non-Cash Overhead (Capital Recovery):				
Building- 2400 sq. ft.		138	138	138
Fuel Tanks- 2, 500 gallon		18	18	18
Shop/Field Tools		39	39	39
Land- Livermore Valley		1,375	1,375	1,375
TOTAL INTEREST ON INVESTMENT		1,570	1,570	1,570
TOTAL COST/ACRE FOR THE YEAR		25,759	5,416	6,398
INCOME/ACRE FROM PRODUCTION				4,200
TOTAL NET COST/ACRE FOR THE YEAR		25,759	5,416	2,198
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		25,759	31,175	33,373

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 2. COSTS PER ACRE TO PRODUCE WINEGRAPES- CHARDONNAY
 LIVERMORE VALLEY, Crush District 6 – 2021

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:								
Weeds: Winter Strip Spray	0.00	0	0	0	68	0	68	
Prune: Mechanical Precision	0.00	0	0	0	56	0	56	
Hand Prune	0.00	228	0	0	0	0	228	
Disease: Eutypa (Rally)	0.00	0	0	0	56	0	56	
Tie Canes (every other year)	0.00	160	0	0	15	0	175	
Fertigate 8-8-8 (3X)	0.00	55	0	0	96	0	151	
Weeds: Strip Spray	0.00	0	0	0	40	0	40	
Trunk Suckering	0.00	91	0	0	0	0	91	
Shoot Thinning 2X	0.00	320	0	0	0	0	320	
Shoot Positioning/Move Wires 3X	0.00	480	0	0	0	0	480	
Petiole Sample/Analysis 3X	0.00	0	0	0	0	10	10	
Disease: Mildew (Sulfur) 6X	0.00	0	0	0	113	0	113	
Irrigate	0.00	73	0	0	117	0	190	
Mow Middles: Volunteer C.C. 2X	0.00	0	0	0	18	0	18	
Disease: Mildew (Stylect Oil)	0.00	0	0	0	45	0	45	
Insects: EGVM	0.00	0	0	0	65	0	65	
Disease: Mildew (Rally)	0.00	0	0	0	56	0	56	
Insects: VMB/EGVM	0.00	0	0	0	131	0	131	
Insects: Leafhopper	0.00	0	0	0	69	0	69	
Weeds: Summer Strip Spray	0.00	0	0	0	40	0	40	
Insects: Mites	0.00	0	0	0	109	0	109	
Disease: Mildew (Flint)	0.00	0	0	0	68	0	68	
Irrigation Acid Flush	0.00	23	0	0	7	0	30	
VMC Management Fee	0.00	0	0	0	771	0	771	
TOTAL CULTURAL COSTS	0.00	1,430	0	0	1,942	10	3,382	
Harvest:								
Machine Harvest Fruit	0.00	0	0	0	0	250	250	
Haul Fruit to Crusher	0.00	0	0	0	0	144	144	
TOTAL HARVEST COSTS	0.00	0	0	0	0	394	394	
Assessment:								
Assessments	0.00	0	0	0	33	0	33	
TOTAL ASSESSMENT COSTS	0.00	0	0	0	33	0	33	
Interest on Operating Capital at 5.25%							72	
TOTAL OPERATING COSTS/ACRE	0	1,430	0	0	1,975	404	3,881	

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 2. CONTINUED
 LIVERMORE VALLEY, Crush District 6 – 2021

Operation	Equipment		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
CASH OVERHEAD:								
Liability Insurance							16	
Office Expense							156	
Sanitation							40	
Safety Training							12	
Misc. Training							13	
Property Taxes							407	
Property Insurance							36	
Investment Repairs							196	
TOTAL CASH OVERHEAD COSTS/ACRE							875	
TOTAL CASH COSTS/ACRE							4,756	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost Capital Recovery				
Building 40'X60'		2,000		138			138	
Fuel Tanks 2X500 gallon		243		18			18	
Land		25,000		1,375			1,375	
Tools-Shop/Field		389		38			38	
Vineyard Establishment		28,663		2,062			2,062	
TOTAL NON-CASH OVERHEAD COSTS		56,295		3,630			3,630	
TOTAL COSTS/ACRE							8,387	

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINEGRAPES
 LIVERMORE VALLEY, Crush District 6 – 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Wine Grape - Chardonnay	8	Ton	1400.00	11,200	
TOTAL GROSS RETURNS	8	Ton		11,200	
OPERATING COSTS					
Herbicide:					103
Goal 2XL	2.40	Pint	12.43	30	
Prowl H2O	3.84	Pint	4.79	18	
Roundup PowerMax	1.20	Pint	3.75	5	
Rely 280	24.00	floz	2.10	50	
Insecticide:					219
Intrepid 2F	12.00	floz	2.19	26	
Movento	8.00	floz	6.88	55	
Altacor	3.50	floz	10.61	37	
Platinum 75 SG	4.00	floz	7.59	30	
Acramite 50WS	16.00	oz	4.36	70	
Fungicide:					117
Rally 40WSP	10.00	oz	3.49	35	
Sulfur DF	30.00	Lb	1.57	47	
JMS Stylet Oil	2.00	Pint	3.11	6	
Flint	2.00	oz	14.49	29	
Fertilizer:					13
08-08-08	50.00	lb	0.26	13	
Water:					202
Water- Zone 7 Canal	12.10	acin	16.67	202	
Irrigation System Aids:					6
N-pHuric Acid	0.12	Gal	47.54	6	
Custom:					404
Petiole Tissue Analysis	0.17	Each	60.00	10	
Machine Harvest & Haul	1.00	Acre	250.00	250	
Haul to Crusher	8.00	Ton	18.00	144	
VMC Operations:					1,268
Weeds: Strip Spray	3.00	Acre	15.00	45	
Prune: Mechanical Precision	1.00	Acre	56.00	56	
Air Blast	8.00	Acre	39.00	312	
Dusting Sulfur	6.00	Acre	11.00	66	
Mow Volunteer Cover Crop	2.00	Acre	9.00	18	
Management Fee	1.00	Acre	771.00	771	
Vine Aids:					15
Tying Materials	1.00	Acre	15.00	15	
Assessment:					33
American Vineyard Foundation	1,600.00	GVal	0.00	16	
Pierce Disease	1,600.00	GVal	0.00	16	
State Acre Survey Fee	8.00	Ton	0.04	0	
State Inspection Fee	8.00	Ton	0.04	0	
State Crush Report Fee	8.00	Ton	0.04	0	
Labor					1,430
Equipment Operator Labor	**	hrs	22.84	0	
Pruning Labor	21.00	hrs	22.84	480	
Irrigation Labor	6.60	hrs	22.84	151	
Canopy Management Labor	35.00	hrs	22.84	799	
Machinery					0
Fuel-Gas	0.00	gal	3.40	0	
Fuel-Diesel	0.00	gal	3.75	0	
Lube				0	
Machinery Repair				0	
Interest on Operating Capital @ 5.25%				72	
TOTAL OPERATING COSTS/ACRE				3,881	
TOTAL OPERATING COSTS/TON				485	
NET RETURNS ABOVE OPERATING COSTS				7,319	

** Equipment operator labor costs are included in the individual VMC operation charges

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. CONTINUED
 LIVERMORE VALLEY, Crush District 6 – 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Liability Insurance				16	
Office Expense				156	
Sanitation				40	
Safety Training				12	
Misc. Training				13	
Property Taxes				407	
Property Insurance				36	
Investment Repairs				196	
TOTAL CASH OVERHEAD COSTS/ACRE				875	
TOTAL CASH OVERHEAD COSTS/TON				109	
TOTAL CASH COSTS/ACRE				4,756	
TOTAL CASH COSTS/TON				595	
NET RETURNS ABOVE CASH COSTS				6,444	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building 40'X60'				138	
Fuel Tanks 2X500 gallon				18	
Land				1,375	
Tools-Shop/Field				38	
Vineyard Establishment				2,062	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				3,630	
TOTAL NON-CASH OVERHEAD COSTS/TON				454	
TOTAL COST/ACRE				8,387	
TOTAL COST/TON				1,048	
NET RETURNS ABOVE TOTAL COST				2,813	

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE WINEGRAPE- CHARDONNAY
 LIVERMORE VALLEY, Crush District 6 – 2021

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
	21	21	21	21	21	21	21	21	21	21	21	21	
Cultural:													
Weeds: Winter Strip Spray	68												68
Prune: Mechanical Precision		56											56
Hand Prune		228											228
Disease: Eutypa (Rally)		56											56
Tie Canes (every other year)			175										175
Fertigate 8-8-8 (3X)			39				73			39			151
Weeds: Strip Spray				40									40
Trunk Suckering				91									91
Shoot Thinning 2X				160			160						320
Shoot Positioning/Move Wires 3X				160	160	160							480
Petiole Sample/Analysis 3X				3			3			3			10
Disease: Mildew (Sulfur) 6X				19	38	38	19						113
Irrigate				35	52	52		52					190
Mow Middles: Volunteer C.C. 2X					9		9						18
Disease: Mildew (Stylet Oil)					45								45
Insects: EGVM					65								65
Disease: Mildew (Rally)						56							56
Insects: VMB/EGVM						131							131
Insects: Leafhopper						69							69
Weeds: Summer Strip Spray						40							40
Insects: Mites							109						109
Disease: Mildew (Flint)							68						68
Irrigation Acid Flush										30			30
VMC Management Fee	64	64	64	64	64	64	64	64	64	64	64	64	771
TOTAL CULTURAL COSTS	132	405	278	573	433	611	505	116	64	137	64	64	3,382
Harvest:													
Machine Harvest Fruit									250				250
Haul Fruit to Crusher									144				144
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	394	0	0	0	394
Assessment:													
Assessments									33				33
TOTAL ASSESSMENT COSTS	0	0	0	0	0	0	0	0	33	0	0	0	33
Interest on Operating Capital @ 5.25%	1	2	4	6	8	11	13	13	16	-1	-1	0	71
TOTAL OPERATING COSTS/ACRE	133	407	282	579	441	621	518	129	507	136	64	64	3,880
CASH OVERHEAD													
Liability Insurance		16											16
Office Expense	13	13	13	13	13	13	13	13	13	13	13	13	156
Sanitation	4	4	4	4	4	4	4	4	4	4			40
Safety Training	1	1	1	1	1	1	1	1	1	1			12
Misc. Training	1	1	1	1	1	1	1	1	1	1			13
Property Taxes		407											407
Property Insurance		36											36
Investment Repairs	16	16	16	16	16	16	16	16	16	16	16	16	196
TOTAL CASH OVERHEAD COSTS	36	494	36	36	36	36	36	36	36	36	29	29	875
TOTAL CASH COSTS/ACRE	168	902	318	615	477	657	553	165	543	172	93	93	4,756

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 5. RANGING ANALYSIS
 LIVERMORE VALLEY, Crush District 6 – 2021

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

	YIELD (TON)						
	5.00	6.00	7.00	8.00	9.00	10.00	11.00
OPERATING COSTS/ACRE:							
Cultural	3,382	3,382	3,382	3,382	3,382	3,382	3,382
Harvest	394	394	394	394	394	394	394
Assessment	21	25	29	33	37	41	45
Interest on Operating Capital @ 5.25%	72	72	72	72	72	72	72
TOTAL OPERATING COSTS/ACRE	3,869	3,873	3,877	3,881	3,885	3,890	3,894
TOTAL OPERATING COSTS/TON	773.76	645.49	553.87	485.15	431.71	388.95	353.97
CASH OVERHEAD COSTS/ACRE	875	875	875	875	875	875	875
TOTAL CASH COSTS/ACRE	4,744	4,748	4,752	4,756	4,761	4,765	4,769
TOTAL CASH COSTS/TON	948.80	791.36	678.90	594.55	528.95	476.47	433.53
NON-CASH OVERHEAD COSTS/ACRE	3,630	3,630	3,630	3,630	3,630	3,630	3,630
TOTAL COSTS/ACRE	8,374	8,378	8,383	8,387	8,391	8,395	8,399
TOTAL COSTS/TON	1,675.00	1,396.00	1,198.00	1,048.00	932.00	839.00	764.00

Net Return per Acre above Operating Costs for Chardonnay

Wine Grape	YIELD (ton/acre)						
	5.00	6.00	7.00	8.00	9.00	10.00	11.00
950.00	881	1,827	2,773	3,719	4,665	5,610	6,556
1100.00	1,631	2,727	3,823	4,919	6,015	7,110	8,206
1250.00	2,381	3,627	4,873	6,119	7,365	8,610	9,856
1400.00	3,131	4,527	5,923	7,319	8,715	10,110	11,506
1550.00	3,881	5,427	6,973	8,519	10,065	11,610	13,156
1700.00	4,631	6,327	8,023	9,719	11,415	13,110	14,806
1850.00	5,381	7,227	9,073	10,919	12,765	14,610	16,456

Net Return per Acre above Cash Costs for Chardonnay

Wine Grape	YIELD (ton/acre)						
	5.00	6.00	7.00	8.00	9.00	10.00	11.00
950.00	6	952	1,898	2,844	3,789	4,735	5,681
1100.00	756	1,852	2,948	4,044	5,139	6,235	7,331
1250.00	1,506	2,752	3,998	5,244	6,489	7,735	8,981
1400.00	2,256	3,652	5,048	6,444	7,839	9,235	10,631
1550.00	3,006	4,552	6,098	7,644	9,189	10,735	12,281
1700.00	3,756	5,452	7,148	8,844	10,539	12,235	13,931
1850.00	4,506	6,352	8,198	10,044	11,889	13,735	15,581

Net Return per Acre above Total Costs for Chardonnay

Wine Grape	YIELD (ton/acre)						
	5.00	6.00	7.00	8.00	9.00	10.00	11.00
950.00	-3,624	-2,678	-1,733	-787	159	1,105	2,051
1100.00	-2,874	-1,778	-683	413	1,509	2,605	3,701
1250.00	-2,124	-878	367	1,613	2,859	4,105	5,351
1400.00	-1,374	22	1,417	2,813	4,209	5,605	7,001
1550.00	-624	922	2,467	4,013	5,559	7,105	8,651
1700.00	126	1,822	3,517	5,213	6,909	8,605	10,301
1850.00	876	2,722	4,567	6,413	8,259	10,105	11,951

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

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	4,954	32	360	1,440	6,786
Fuel Tanks 2X500 gallon	8,750	25	613	640	4	47	175	866
Land	450,000	30	450,000	24,750	399	4,500	0	29,649
Tools-Shop/Field	14,000	15	980	1,351	7	75	280	1,713
Vineyard Establishment	515,934	27	0	37,123	229	2,580	2,580	42,511
TOTAL INVESTMENT	1,060,684	-	451,593	68,818	670	7,561	4,475	81,524

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	18	Acre	15.52	279
Office Expense	18	Acre	156.00	2,808
Sanitation	18	Acre	40.00	720
Safety Training	18	acre	12.00	216
Misc. Training	18	acre	12.95	233

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 7. OPERATIONS WITH EQUIPMENT AND MATERIAL INPUTS
 LIVERMORE VALLEY, Crush District 6 – 2021

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit		
Weeds: Winter Strip	Jan			Equipment Operator Labor	0.52	hour		
				Goal 2XL	2.40	Pint		
				Prowl H2O	3.84	Pint		
				Roundup PowerMax	1.20	Pint		
				Weeds: Strip Spray	1.00	Acre		
Prune: Mechanical	Feb			Equipment Operator Labor	1.00	hour		
				Prune: Mechanical Precision	1.00	Acre		
Hand Prune	Feb			Pruning Labor	10.00	hours		
Disease: Eutypa	Feb			Rally 40WSP	5.00	oz		
				Air Blast	1.00	Acre		
Tie Canes	Mar			Pruning Labor	7.00	hours		
				Tying Materials	1.00	Acre		
Fertigate 8-8-8 (3X)	Mar			Irrigation Labor	0.80	hour		
				Water- Zone 7 Canal	1.00	acin		
				08-08-08	17.00	lb		
	July				Irrigation Labor	0.80	hour	
					Water- Zone 7 Canal	3.00	acin	
					08-08-08	17.00	lb	
	Oct				Irrigation Labor	0.80	hour	
					Water- Zone 7 Canal	1.00	acin	
					08-08-08	16.00	lb	
					Equipment Operator Labor	0.52	hour	
Weeds: Strip Spray	Apr			Rely 280	12.00	floz		
				Weeds: Strip Spray	1.00	Acre		
Trunk Suckering	Apr			Pruning Labor	4.00	hours		
				Canopy Management Labor	7.00	hours		
Shoot Thinning 2X	July			Canopy Management Labor	7.00	hours		
				Canopy Management Labor	7.00	hours		
Shoot Positioning	Apr			Canopy Management Labor	7.00	hours		
				Canopy Management Labor	7.00	hours		
				Canopy Management Labor	7.00	hours		
Petiole Sample/Analysis	Apr			Petiole Tissue Analysis	0.06	Each		
				Petiole Tissue Analysis	0.06	Each		
				Petiole Tissue Analysis	0.06	Each		
				Equipment Operator Labor	0.37	hour		
Disease: Mildew (Sulfur)	Apr			Sulfur DF	5.00	Lb		
				Dusting Sulfur	1.00	Acre		
	May				Equipment Operator Labor	0.73	hour	
					Sulfur DF	10.00	Lb	
	June				Dusting Sulfur	2.00	Acre	
					Equipment Operator Labor	0.73	hour	
	July				Sulfur DF	10.00	Lb	
					Dusting Sulfur	2.00	Acre	
	Irrigate	Apr				Equipment Operator Labor	0.37	hour
						Sulfur DF	5.00	Lb
May						Dusting Sulfur	1.00	Acre
						Irrigation Labor	0.80	hour
June						Water- Zone 7 Canal	1.00	acin
						Irrigation Labor	0.80	hour
Aug						Water- Zone 7 Canal	2.00	acin
						Irrigation Labor	0.80	hour
Mow Middles: Volunteer		May				Equipment Operator Labor	0.25	hour
						Mow Volunteer Cover Crop	1.00	Acre
	July					Equipment Operator Labor	0.25	hour
						Mow Volunteer Cover Crop	1.00	Acre
						Equipment Operator Labor	0.94	hour
Disease: Mildew	May				JMS Stylet Oil	2.00	Pint	
					Air Blast	1.00	Acre	
					Equipment Operator Labor	0.94	hour	
Insects: EGVM	May				Intrepid 2F	12.00	floz	
					Air Blast	1.00	Acre	
Disease: Mildew	June				Equipment Operator Labor	0.94	hour	
					Rally 40WSP	5.00	oz	
					Air Blast	1.00	Acre	
Insects: VMB/EGVM	June				Equipment Operator Labor	0.94	hour	
					Movento	8.00		

UC COOPERATIVE EXTENSION
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 7. CONTINUED
 LIVERMORE VALLEY, Crush District 6 – 2021

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Weeds: Summer Strip	June			Air Blast	1.00	Acre
				Rely 280	12.00	floz
				Weeds: Strip Spray	1.00	Acre
Insects: Mites	July			Equipment Operator Labor	0.94	hour
				Acramite 50WS	16.00	oz
Disease: Mildew	July			Air Blast	1.00	Acre
				Equipment Operator Labor	0.94	hour
				Flint	2.00	oz
Irrigation Acid Flush	Oct			Air Blast	1.00	Acre
				Irrigation Labor	1.00	hour
				Water- Zone 7 Canal	0.10	acin
				N-pHuric Acid	0.12	Gal
VMC Management Fee	Oct			Management Fee	1.00	Acre
Machine Harvest Fruit	Sept			Machine Harvest & Haul	1.00	Acre
Haul Fruit to Crusher	Sept			Haul to Crusher	8.00	Ton