

**2023**  
**SAMPLE COSTS TO ESTABLISH AND PRODUCE**  
**ENGLISH WALNUTS**



**In the Southern San Joaquin Valley**  
**Flood Irrigated**

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**SAMPLE COSTS TO ESTABLISH AND PRODUCE WALNUTS**

San Joaquin Valley – 2023

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**INTRODUCTION**

Sample costs to establish a walnut orchard and produce walnuts using flood irrigation in the 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 September 2023 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, Davis, Department of Agricultural and Resource Economics, at 530-752-4651 or [jmmurdock@ucdavis.edu](mailto:jmmurdock@ucdavis.edu). You can contact the local UCCE Advisor through the county offices: [http://ucanr.edu/County\\_Offices/](http://ucanr.edu/County_Offices/)

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

**Costs and Returns Study Program/Acknowledgements.** A costs and returns study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the area the study is based. The authors thank the cooperators, UC Cooperative Extension, the California Walnut Board, and other industry representatives who provided information, assistance, and expert advice. **The use of trade names and farming 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 of California, Division of Agriculture and Natural Resources (UC ANR) is an equal opportunity provider.

## ASSUMPTIONS

The assumptions refer to Tables 1 through 8 and pertain to sample costs to establish an orchard and produce walnuts under flood irrigation in the Southern San Joaquin Valley. The cultural practices described represent production operations and materials considered typical for a well-managed farm in the San Joaquin Valley. For consistency, the authors selected Chandler as the walnut variety. Costs, materials, and practices will not apply to all farms and should be adjusted to apply to specific varieties and locations. Cultural practices will vary by location and by season depending upon weather, soil, and insect and disease pressure. The study is intended as a guide only.

**Farm.** The hypothetical farm consists of 40 contiguous acres farmed by the owner. Walnuts are established on 38 acres; roads and farmstead occupy 2 acres.

### Establishment Cultural Practices and Material Inputs

**Site Preparation.** This orchard is established on ground previously planted to walnuts. A custom service removes the old orchard. The soil is ripped four feet deep in two directions to break up underlying hardpan and pull up old roots. The roots are removed by hand. The cost of root removal can vary greatly depending on tree variety and the associated size and volume of the root system. The orchard site is disced and triplaned four times to break up clods. The new orchard site is laser leveled to reduce or eliminate the possibility of standing water. Then the entire orchard is fumigated with Telone. Berms in the tree row are formed with a ridger, the row middles are smoothed/floated once to fill in borrow pits, and the irrigation system is installed underground. A contact herbicide strip spray is applied prior to planting in early spring. All operations that prepare the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

**Trees.** The Chandler variety of English walnut is planted in this study. Cost adjustments may be necessary for other cultivars. Isolated orchards often include 1 to 2 percent of a second variety for pollination. Clonal or seedling Paradox are the typical rootstocks in the San Joaquin Valley; clonal Paradox rootstock continues to gain popularity. Many variables determine spacing, including soil, rootstock and variety planted. In this study, 1/2" June-budded bare root Chandler trees on clonal Paradox rootstock are planted at 22 X 24 foot spacing, resulting in 82 trees per acre. The economic life of the orchard is assumed to be 30 years. Trees cost \$24.50 each and some clonal Paradox rootstocks have a \$1.00 royalty, which is not included as a cost in this study.

Because of the cost and/or limited availability of budded or grafted finished trees, many growers plant potted clonal Paradox rootstock in the fall or spring. These rootstocks grow during the summer and are field budded in August/September or grafted the following spring. For comparative costs to the June bud trees used in this study, potted trees cost \$19.00 each (\$1558/acre). The in-field budding service performed at the end of the first season after planting is included in the \$19 tree cost. After adding planting labor, the total cost per acre is approximately \$1,886 compared to \$2,449 per acre for planting bare root stock. Planting potted rootstock and fall budding or grafting the following spring adds an additional year in the training process, compared with finished trees. An even longer delay in the training process relative to planting finished trees occurs if there is the need for a second round of budding or grafting – for example because of deer browse or a sudden autumn freeze.

**Planting.** Planting in the spring (February/March) starts by surveying and marking tree sites with a small stake, digging holes, planting, staking the trees. The stakes are 10 feet long sucker rod. Research has shown that trees left unheaded after planting grow as well or better than those that are cut back at planting, therefore heading is not completed in this study. Trees are painted white to prevent sunburn and tree protectors are placed around the trees to protect them from contact herbicides. Some growers need plastic mesh tree protectors for deer, but the cost is not included in the study. In the second year, 4 percent of the orchard or about 2 trees per acre are replanted.

**Training/Pruning.** Training and pruning finished trees begin the same spring as planting. One shoot that forms the main trunk is selected and tied loosely up the tree stake. Summer training in the first leaf consists of tying the main trunk, tipping back competing shoots and suckering. In this study, the no heading method (unheaded with pruning limited to thinning cuts on lower branches) is used in years 1-4. This method often results in larger early tree size and earlier yield based on research in several counties over the last 18 years. Several growers have adopted this method because of the labor savings and early yields. Growers using this training approach usually start machine harvest in the third year, but harvest cost is not included until the fourth year in this study. Pruning and brush shredding costs are limited to the lower branches removed in years 2 and 3 primarily. The brush is placed in the row middles and chopped during mowing. There may be an additional cost if stake extensions are needed after the first year and applied in the dormant season to support tall leaders through the second leaf. They are not included in the costs. Five-foot-long 1-1 1/2 inch PVC extensions are used at a cost of \$3.50 each. A small hole is drilled in the PVC and a zip tie and green tape are used to secure it to the sucker rod stake. You can learn more about the no heading method at:

[sacvalleyorchards.com/walnuts/horticulture-walnuts/training-young-walnut-trees-minimum-pruning-vs-no-pruning-compared/](http://sacvalleyorchards.com/walnuts/horticulture-walnuts/training-young-walnut-trees-minimum-pruning-vs-no-pruning-compared/)

Many growers may still prefer the more expensive traditional pruning method. Using this method in a standard spaced orchard, the trunk is headed at 7 to 8 feet at the first dormant pruning. Dormant pruning and training during the second and third years develops primary and secondary scaffolds (respectively) and encourages the central leader. Heading cuts are made in the second and third year to tip or remove up to one-quarter of the current year's growth on scaffold branches. During the first three establishment years, the brush is placed in the row middles and chopped during mowing.

**Fertilization.** Nitrogen is the major nutrient required for tree growth and production. Some locations will require additional nutrients. For the first two years, two split applications of granular nitrogen (15-15-15) are hand-applied in May and July when roots are active, placed approximately 18 inches from the base of the tree. Beginning in the third year, liquid nitrogen fertilizer (UAN-32) is banded down the tree rows. (See Table A).

*Leaf Sampling.* Nutrition is determined by leaf analysis. Beginning in year four, leaf samples are collected in the first week of July at one sample per 40 acres. If soil conditions vary throughout the block, additional samples may be necessary. The samples are collected by a PCA and the costs shown are for the lab analysis.

Table A. Applied N		Table B. Evapotranspiration(ET)		Table C. Applied Water	
Year	Lbs N/Ac	Year	AcIn/Yr	Year	AcIn/Yr
1	20	1	14	1	15
2	45	2	21	2	15
3	60	3	38	3	32
4	75	4	42	4	36
5	90	5	42	5	36
6	105	6	42	6	36
7+	150	7+	42	7+	36

**Irrigation.** Tables B & C, above show the difference in applied water and the ET requirement of the orchard per year. Applied water is less depending upon the contribution from stored soil moisture and any rainfall. This study assumes six acre-inches of stored soil moisture and no effective rainfall during the growing season. A pressure chamber is used to measure stem water potential and verify irrigation adequacy. The orchard is flood irrigated.

*Water Costs.* In this study, water is a combination of surface water and pumped from a well assuming a cost of \$150 per acre-foot (\$12.50/acre-inch). Water charges will vary depending on the irrigation district, power source, well characteristics, and irrigation setup. Applied water for each year is estimated in Table C.

*Well Test/Water Analysis.* An annual well test is performed during the winter to monitor pumping level and efficiency (gallons/minute). A water analysis should be done annually to determine nitrate availability and to maintain regulatory records. A water sample is taken and analyzed for nitrogen. Chloride and/or boron should also be tested in areas with elevated levels, but these additional testing costs are not included in this study. Costs for these tests are allocated over the entire acreage the pump can service.

**Pest Management.** The pesticides and rates mentioned are listed in UC Integrated Pest Management Guidelines, Walnuts. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [ipm.ucanr.edu](http://ipm.ucanr.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office.

*Pest Control Adviser/Certified Crop Advisor (PCA/CCA).* Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisors. In addition, the PCA/CCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition; they may take leaf samples in July for fertilizer recommendations. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. For this study, a PCA monitors the orchard for disease and insect pests weekly for nine months annually. The PCA fee of \$35 per acre begins in year 1.

*Application Methods.* Pesticide and fertilizer applications are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by ATV mounted ground or spot sprayer or foliar-broadcast by tractor pulled air-blast sprayer. Check individual pesticide labels for compatibility, mixing and usage. Adjuvants are recommended for effective control of many pesticides and are an added cost. Adjuvants are not included as a cost in this study.

*Nematodes/Fumigation.* Prior to land preparation, the area is sampled (1 sample/20 acres) for nematodes injurious to walnuts to help make pre-plant soil fumigation decisions. Pre-plant fumigation may not be necessary on bare or row crop ground but is usually necessary where orchards follow orchards. Telone is applied by a custom applicator as a full coverage treatment. Application costs including materials are approximately \$1,800 per acre. The above rates are effective on light textured soils when the soils are properly ripped and dried prior to fumigation. Heavier textured soils may need additional efforts to dry and prepare the soil if the fumigation is to be effective.

See <http://ipm.ucanr.edu/PMG/r881200111.html>

*Vegetation Management.* Weed pressure, materials and application timing will vary by orchard and season. A foliar herbicide (Roundup PowerMAX) is applied pre-plant in February and a pre-emergence herbicide (Prowl H2O) is applied in April the first 3 years. A summer strip spray (Rely 280) is applied in August every year beginning in year 1. Also beginning in the first year, row middles typically are mowed five times, once in April, May, June, July, and August. Beginning in the fourth year a winter strip spray (December) using Alion, Matrix, and Roundup PowerMAX are applied.

*Diseases.* Botryosphaeria canker treatments begin in year 4. Refer to the production disease section on page 7.

*Insects and Mites.* In the first through third year, infestation of red humped caterpillars and other insects and mites is possible. For this study, it is assumed that on average, only one of these pests will occur in any one year. Under that assumption, insect and mite control begins in year four, with a Zeal application in July for mite control. The cost is assumed to be equivalent to the average cost of controlling many other insects. Winter sanitation for navel orangeworm begins in year 5.

*Vertebrate Pests.* Beginning in the first year, gophers are managed in May and July using a carbon monoxide gas application. Beginning in year 4 the treatments are reduced to once a year. This service cost \$75 per acre

for each treatment.

**Harvest.** Several variables influence when machine harvest begins including tree spacing, pruning method, variety, rootstock, soil type, and orchard management. Closer tree spacing and/or using the no pruning/no heading method are particularly important for earlier yields. Growers often can expect a machine harvestable crop in the fourth year in unheaded orchards, but in this study, economical harvest starts in the fifth year. A custom operator mechanically shakes, sweeps, collects and hauls walnuts to a facility for hulling and drying. Mature yield is reached in the seventh year. Refer to harvest section under the production assumptions.

### **Production Cultural Practices and Material Inputs**

**Pruning.** In mature orchards, pruning is done mainly to maintain light for healthy buds, and remove dead and undesired limbs. This cost study orchard is not a hedgerow configuration and predicts costs based on a standard planting configuration. Hand pruning is done each year in the summer to remove broken and dead limbs. Pruning towers are used to make cuts higher in the tree canopy. Pruning for light penetration and to maintain nut size is done every three years. Pruning should be done when no rain is predicted or when temperatures are below 50 degrees Fahrenheit to reduce the possibility of Botryosphaeria infection. Prunings are placed in the row middles and are pushed to the orchard edge for burning. The brush removal crew includes the tractor driver and one person on the ground.

**Fertilization.** Nitrogen (N) is applied through the irrigation system as described in Table A. Nitrogen (N) as (UAN 32) is banded by a custom applicator in equal amounts, two times between May and July for a seasonal total of 150 pounds of N per acre. Adjustments for nitrogen contributions from groundwater, manure, compost and cover crops should be accounted for in the season total. Since the major exporter of nitrogen is the crop, another way to estimate the nitrogen requirement is to use 35 - 40 pounds of nitrogen per dry ton of production and target a 70 percent application efficiency. Potassium levels are maintained by banding sulfate of potash (SOP) in the fall. One hundred and fifty pounds of SOP (75 pounds of K) are needed annually to support a 6,000 lb. walnut crop.

*Leaf/Tissue Samples.* Nutrition is determined by leaf analysis. Leaf sampling begins in the fourth year. Leaf samples, one per 40 acres, are taken in July for nutrient analysis. If soil conditions vary throughout the block, additional samples may be necessary. The samples are collected by the PCA. The cost shown is for the lab analysis.

**Irrigation.** In the San Joaquin Valley, annual ET is estimated at 42-acre inches of water per acre for full canopy walnuts (See Table B). Beginning in year six, we assume a soil moisture contribution of six acre-inches and no effective rainfall during the growing season, therefore 36 acre-inches of irrigation water is applied from May to October (See Table C). Irrigation costs include the water pumping costs and assumed labor. Tree water status is monitored throughout the season using a pressure chamber to measure stem water potential and verify first irrigation timing. By verifying mild water stress with the pressure chamber before the first irrigation, irrigation may begin in May or even June.

**Pest Management.** See the statements above, under the Pest Management section for establishment years.

*Vegetation Management.* During the production years, weeds are controlled in the row middles with mechanical mowing. The weeds within the tree rows typically are controlled with winter and in-season strip sprays using pre-emergent and post-emergent herbicides. Alion, Matrix and Roundup PowerMAX is a common program that is applied in December as a winter strip spray. This operation is charged on the previous year's budgets. Rely 280 is applied during the growing season in July or August as a strip spray.

*Disease.* Botryosphaeria canker (Botryosphaeria spp., known simply as "Bot") causes blighted spurs, shoots,



and branches and sometimes brown to black nuts appearing around harvest. In orchards with less Bot pressure, one spray applied in mid-June to early July has been effective. Research has yet to show value to applying a postharvest spray. This study assumes a single-fungicide spray program for Bot beginning in the fourth year with a May application of Merivon. Utilizing the leaf wetness model for Botryosphaeria risk may indicate more, or fewer sprays. See [http://ipm.ucanr.edu/PMG/FIG/Leaf\\_wetness\\_model.html](http://ipm.ucanr.edu/PMG/FIG/Leaf_wetness_model.html).

*Insects and Mites.* Insects and mites are typical problems for San Joaquin Valley walnut production. Each particular pest may not be a problem every year. The cost study assumes the most likely pests encountered are mites, codling moth, and walnut husk fly.

Codling moth (CM), a major pest, can cause damage resulting in off-grade nuts. CM is assumed to reach treatment levels by the sixth year. Three generations usually occur and are monitored using pheromone traps and insect degree days. See [ipm.ucanr.edu/WEATHER/index.html](http://ipm.ucanr.edu/WEATHER/index.html). The pheromone traps are furnished, installed and serviced by the PCA, therefore no cost is shown.

One combined treatment of Altacor for codling moth and Agri-Mek for mites is assumed in this study and is applied in June. Codling moth mating disruption using pheromone puffers or dispensers is an option particularly for larger contiguous walnut orchards. This cost study assumes a spray program for codling moth.

Navel orangeworm (NOW), is not a new pest of walnuts, but damage potential has been an increasing concern in recent years. Winter sanitation activities (mowing, disking, or shredding ground mummies and blowing berms) are assumed and begins in year 5. Navel orangeworm treatment are not needed if good winter sanitation practices are used.

Scale can be a serious problem and can predispose limbs to Botryosphaeria infection. Starting in year six, Seize 35WP is applied in February for scale insect management. Scale should be monitored to determine if annual sprays are needed. Often when using an insect growth regulator like Seize35WP, control will last two years or more.

Walnut husk fly (WHF) is a problem in most mature orchards and is monitored using yellow sticky traps with ammonium carbonate superchargers. This cost study assumes a low- to moderate-population and a 3-week interval between sprays. Using a short-residual insecticide plus bait will generally kill walnut husk fly for 7 to 10 days and with the egg development period added to this time, there is about 3 weeks of protection after an application. A spray plus bait is applied after an increase in trap catches occurs. In this study, a spray is applied in July using Assail.

*Vertebrate Pests.* Gopher control treatments are completed every other year. Gophers are managed in March using a carbon monoxide gas application. This service cost \$75 per acre for each treatment.

**Harvest.** Custom harvesters shake, sweep, collect, and truck the walnuts to a facility for hulling and drying. Labor for hand raking to collect walnuts missed by the sweeper is supplied by the grower. Hulling and drying costs are charged on a per-pound of dry-weight basis. Custom harvest operators may charge by the hour, acre or yield, but most have a minimum per-acre charge. A harvest of more than one ton per acre is charged at 20 cents per pound for harvest, hauling, hulling, and drying. In year 5, the 1500 pound harvest is charged a minimum per acre charge.

*Yields.* Annual yields for walnut varieties are measured as clean, dry, in-shell pounds per acre. The average yield over the remaining life of the orchard is assumed to be 6,000 pounds per acre. Yields can vary widely from year to year, site to site and grower to grower. See Table 5 for a ranging analysis of returns based on different yields.

*Returns.* The actual price of walnuts depends on a number of factors such as demand, supply, variety, nut size, and quality. For this study, a price of \$0.50 per pound is used in the tables. It does not reflect a price forecast for any specific year, and may not represent actual prices received in 2023. See Table 5 for a ranging analysis of returns based on different prices and yields.

*Assessments.* Under a state marketing order, the California Walnut Commission (CWC) collects mandatory assessment fees. The 2023 CWC assessment fee is \$0.01 per pound of dry in-shell nuts. This assessment is included in the study. A second assessment fee from the California Walnut Assessment Board, (CWAB), and Federal marketing order is paid by handlers, so it is not included in this study.

**Pickup/ATV.** The study assumes the pickup is for general farm use only, moving laborers, picking up supplies and parts. The ATV is used for weed spraying and baiting squirrels and gophers, and is included in those costs. Additional ATV uses for checking the orchard, diseases, and irrigation system are shown as a line item. The travel and time are estimated and not taken from any specific data.

### **Labor, Equipment, and Interest**

**Labor.** Hourly wages for workers are \$17.50 for machine operators and \$15.50 per hour non-machine labor. Adding 45 percent for the employer's share of federal and state payroll taxes, workers compensation insurance, for nut crops and other possible benefits gives the labor rates shown of \$25.38 and \$22.48 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers. The cost is based upon the average industry final rate as of September 2023. Labor for operations involving machinery are 20 percent higher than the actual operation time given 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. For businesses with 25 or fewer employees, the minimum wage rate is \$15.00 per hour in 2023 and \$15.50 for businesses with more than 25 employees.

**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. Prices for on-farm delivery of diesel and gasoline are \$4.80 and \$4.40 per gallon, respectively. The cost includes a 13.0 percent local sales tax on diesel fuel and 10.17 percent sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax.

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

**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 8.5 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 September 2023.

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

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs can include property taxes, interest on operating capital, office 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 0.710 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, \$621 is charged and covers the entire farm.

*Crop Insurance.* A significant number of growers purchase federal crop insurance in this region. In this study, the grower purchases crop insurance with 65% coverage for a cost of \$10.41 per acre. Crop insurance is available to walnut growers for unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as excessive heat, cool wet weather, freeze, frost, hail, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50-85% of the approved average yield as established by verifiable production records from the farm. <https://www.rma.usda.gov/Fact-Sheets/Davis-Regional-Office-Fact-Sheets/Walnuts-2017-CA>.

**Office Expense.** Office and business expenses are estimated at \$100 per acre annually. These expenses include office supplies, communication, bookkeeping, accounting and miscellaneous administrative costs.

**Sanitation Services.** Sanitation services provide portable toilets with wash basins for the orchard and cost the farm \$333 annually. This cost includes delivery and five months of monthly service.

**Regulatory Fees.** Regulatory compliance fees for Sustainable Groundwater Management Act (SGMA) and other programs are estimated at \$40 per acre annually.

**Supervisor/Management Salaries.** Wages for management are not included as a cash cost. Any returns above total costs are considered returns to management.

**Investment Repairs.** Annual repairs on investment or capital recovery items that require maintenance are calculated as 2 percent of the purchase price on investments listed in Table 6.

### **Non-Cash Overhead**

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

**Capital Recovery Costs.** Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase prices and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

*Salvage Value.* Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (e.g., 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 this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 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 7.00 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 September 2023.

**Building.** The 2,400 sq. ft. metal shop building is on a cement slab with an attached pole barn that is used for equipment storage.

**Land.** Land values range from \$18,000 to \$40,000. The orchard site is assumed to be on previously farmed orchard ground. The bare land value in this study is \$28,000 per acre.

**Well and Irrigation System.** The pumping cost is based on two 100-horsepower electric motors pumping from a depth of 400 feet. Price per acre-foot of water will vary by grower depending on power source, well characteristics, and irrigation district. In this study, electrical costs for pumping groundwater are calculated to cost \$150.00 per acre-foot or \$12.50 per acre-inch. The well is 600 feet deep.

**Fuel Tanks.** Two 500-gallon fuel tanks, one for diesel and one for gasoline, are placed on stands in a cement containment meeting federal, state, and local regulations.

**Tools.** Includes shop tools/equipment, hand tools, and field tools such as pruning equipment, rakes, shovels, etc.

**Pressure Chamber Instrument.** The instrument produces pressure in the chamber to take water potential readings. This provides data to determine timing of irrigation events. A separate pressure chamber monitoring cost has been included as an operating expense.

**Establishment Cost.** Costs to establish the orchard are used to determine the non-cash overhead expenses, capital recovery, and interest on investment for the production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing walnut trees through the first year nuts are harvested less returns from production. The *Accumulated Net Cash Cost* in the fourth year shown in Table 1 represents the establishment cost per acre. For this study, this cost is \$19,064 per acre or \$724,432 for the 38-acre orchard. Establishment cost is amortized beginning in the sixth year over the remaining 25 years of production.

**Equipment.** 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 shown in Table 6. 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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UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 1. COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD, OVER YEARS**  
 SAN JOAQUIN VALLEY - 2023

Codling Moth (CM), Walnut Husk Fly (WHF), Naval Orange Worm (NOW)		Cost Per Acre				
	Year:	Est/1st	2nd	3rd	4th	5th
Price: \$0.50/Lb.	Yield: Dry, In-Shell Pounds Per Acre:					1500
<b>Pre-Plant:</b>						
Nematode Sampling		1				
Orchard Removal/Grind/Spread		1,800				
Root Removal 2X		1,000				
Rip 4 ft. 2X		700				
Disc & Triplane 4X		200				
Laser Leveling		400				
Fumigate- (Telone Full Coverage)		1800				
Pull Berms-Tree Rows		95				
Float-Between Rows		50				
Weeds-Pre-Plant Strip Spray (RU PowerMax)		19				
Flood Irrigation Setup		800				
<b>TOTAL PRE-PLANT COSTS</b>		<b>6,865</b>				
<b>Planting:</b>						
Survey/Mark/Plant-82 Trees/Ac		2,449	57			
Paint/Stake/Wrap Trees		337	7			
<b>TOTAL PLANTING COSTS</b>		<b>2,786</b>	<b>64</b>			
<b>Cultural:</b>						
Well Test/Water Analysis		6	6	6	6	6
Train Trunk (Sucker 2X-1 <sup>st</sup> Yr.)		112				
Prune (Lower Limbs & Suckers)			112	112	56	56
Fertilize By Hand- 15-15-15 2X		114	201			
Fertilize: Fertigate UAN-32 2X				48	60	72
Fertilize: Leaf Analysis					1	1
Irrigate 10X		188	188	400	450	450
Irrigation Labor		67	67	67	67	67
Monitoring with Pressure Chamber		15	15	15	15	15
Weeds-Pre-emergent Strip Spray (Prowl H20)		49	49	49		
Weeds-Mow Middles 5X		90	90	90	90	90
Weeds-In-season Strip Spray (Rely 280)		30	30	30	30	30
Weeds-Winter Strip Spray (Yr. 4+ - Alion, Matrix & RU)					123	123
Pests-Disease-Bot					86	86
Pests-Mites (Zeal)					94	94
Vertebrate Pests: CO		150	150	150	75	75
Winter Sanitation (NOW)						25
PCA/CCA Fee		35	35	35	35	35
Pickup Truck-Farm Use		33	33	33	33	33
ATV-Farm Use		11	11	11	11	11
<b>TOTAL CULTURAL COSTS</b>		<b>902</b>	<b>988</b>	<b>1,048</b>	<b>1,234</b>	<b>1,271</b>
<b>Harvest Costs:</b>						<b>200</b>
Shake/Sweep/Pickup/Load						
Haul, Hull & Dry						120
California Walnut Commission Assessment						15
<b>TOTAL HARVEST COSTS</b>						<b>335</b>
Interest On Operating Capital @ 7.00%		703	35	33	49	41
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>11,256</b>	<b>1,087</b>	<b>1,081</b>	<b>1,283</b>	<b>1,647</b>

**TABLE 1. CONTINUED**  
**SAN JOAQUIN VALLEY - 2023**

	Costs per Acre				
	Year:	Est/1st	2nd	3rd	4th 5th
	Yield: Dry, In Shell - Pounds Per Acre				
					1500
<b>Cash Overhead Costs:</b>					
Office Expense		100	100	100	100
Liability Insurance		16	16	16	16
Sanitation Costs		9	9	9	9
Regulatory Compliance Fees		40	40	40	40
Property Taxes		326	326	326	326
Property Insurance		23	23	23	23
Investment Repairs		179	179	179	179
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>692</b>	<b>692</b>	<b>692</b>	<b>692</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>11,948</b>	<b>1,779</b>	<b>1,773</b>	<b>1,975 2,339</b>
<b>INCOME/ACRE FROM PRODUCTION</b>					<b>750</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>11,948</b>	<b>1,779</b>	<b>1,773</b>	<b>1,975 1,589</b>
<b>NET PROFIT/ACRE ABOVE CASH COSTS</b>					
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>11,948</b>	<b>13,727</b>	<b>15,500</b>	<b>17,475 19,064</b>
<b>Non-Cash Overhead (Capital Recovery):</b>					
Buildings		126	126	126	126
Fuel Tanks 2-500 gal		19	19	19	19
Shop/Field Tools		42	42	42	42
Well/Pumps/Filters		528	528	528	528
Land-Walnuts		1,960	1,960	1,960	1,960
Pressure Chamber Instrument		4	4	4	4
Equipment		9	7	7	7
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>2,687</b>	<b>2,685</b>	<b>2,685</b>	<b>2,685</b>
<b>TOTAL COST/ACRE FOR THE YEAR</b>		<b>14,635</b>	<b>4,464</b>	<b>4,458</b>	<b>4,660 5,024</b>
<b>INCOME/ACRE FROM PRODUCTION</b>					<b>750</b>
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		<b>14,635</b>	<b>4,464</b>	<b>4,458</b>	<b>4,660 4,274</b>
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>					
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		<b>14,635</b>	<b>19,099</b>	<b>23,557</b>	<b>28,217 32,491</b>



**TABLE 2. COSTS PER ACRE TO PRODUCE WALNUTS**

SAN JOAQUIN VALLEY – 2023

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:								
Sanitation- NOW	0.00	0	0	0	0	25	25	
Well Test/Water Analysis	0.00	0	0	0	0	6	6	
Vertebrate Control: CO (alt. years)	0.00	0	0	0	0	38	38	
Pests- Insects/Scale (alt. years)	0.00	0	0	0	23	25	48	
Weeds-Mow Middles 5X	0.00	0	0	0	0	90	90	
Disease-Bot	0.00	0	0	0	36	50	86	
Pressure Chamber Monitoring	0.00	0	0	0	0	15	15	
Irrigate 8X	0.00	0	0	0	450	0	450	
Fertigate UAN-32 2X	0.00	0	0	0	120	20	140	
Pests-Insects/WHF	0.00	0	0	0	48	50	98	
Leaf Analysis (1 per 50/acres)	0.00	0	0	0	0	1	1	
Pests-Insects-CM/Mites	0.00	0	0	0	59	50	109	
Prune (Dead Limb Removal/Push Br	0.23	52	4	1	0	0	58	
Pruning Tower (every 3rd Year)	0.00	0	0	0	0	54	54	
Weeds- In-Season Strip Spray	0.00	0	0	0	10	20	30	
Irrigation Labor	0.00	67	0	0	0	0	67	
Weeds- Winter Strip Spray	0.00	0	0	0	103	20	123	
Fertilize- Band Potassium (SOP)	0.00	0	0	0	74	10	84	
PCA/CCA Fee	0.00	0	0	0	0	35	35	
Pickup Truck-Farm Use	0.75	23	8	3	0	0	33	
ATV-Farm Use	0.33	10	1	0	0	0	11	
TOTAL CULTURAL COSTS	1.31	152	13	4	923	509	1,601	
Harvest:								
Harvest/Haul/Hull/Dry	0.00	0	0	0	0	1,200	1,200	
Assessment Fees	0.00	0	0	0	60	0	60	
TOTAL HARVEST COSTS	0.00	0	0	0	60	1,200	1,260	
Interest on Operating Capital at 8.50%							52	
TOTAL OPERATING COSTS/ACRE	1	152	13	4	983	1,709	2,913	

**TABLE 2. CONTINUED**  
**SAN JOAQUIN VALLEY – 2023**

Operation	Equipment	Labor	Fuel	Cash and Labor Costs per Acre			Total	Your
	Time (Hrs/A)	Cost		Lube & Repairs	Material Cost	Custom/ Rent	Cost	Cost
<b>CASH OVERHEAD:</b>								
Liability Insurance							16	
Office Expense							100	
Sanitation Services							9	
Regulatory Fees							40	
Crop Insurance (65% Coverage)							10	
Property Taxes							421	
Property Insurance							30	
Investment Repairs							179	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>							<b>804</b>	
<b>TOTAL CASH COSTS/ACRE</b>							<b>3,717</b>	
<b>NON-CASH OVERHEAD:</b>								
		Per Producing Acre		Annual Cost Capital Recovery				
Buildings 2400sqft.		1,579		126			126	
Fuel Tanks 2-500 gal		234		19			19	
Shop/Field Tools		526		42			42	
Well/Pumps/Filters		6,547		528			528	
Land Walnuts		28,000		1,960			1,960	
Orchard Establishment		19,064		1,636			1,636	
Pressure Chamber Instrument		42		4			4	
Equipment		59		9			9	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>56,052</b>		<b>4,323</b>			<b>4,323</b>	
<b>TOTAL COSTS/ACRE</b>							<b>8,040</b>	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS**  
 SAN JOAQUIN VALLEY – 2023

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Year 8+	6,000	Lb	0.50	3,000	
<b>TOTAL GROSS RETURNS</b>	6,000	Lb		3,000	
<b>OPERATING COSTS</b>					
<b>Herbicide:</b>				<b>114</b>	
Rely 280	12.00	floz	0.87	10	
Alion	3.50	floz	15.56	54	
Matrix SG	4.00	oz	8.99	36	
Roundup PowerMax	2.00	pt	6.50	13	
<b>Fungicide:</b>				<b>36</b>	
Merivon	4.00	floz	9.09	36	
<b>Insecticide:</b>				<b>129</b>	
Seize 35 WP	2.00	floz	11.50	23	
Assail 30 SG	8.00	oz	4.86	39	
Nu-Lure Bait	3.00	pt	2.99	9	
Altacor	4.50	floz	9.97	45	
Agri-Mek SC	4.00	floz	3.43	14	
<b>Custom:</b>				<b>1,709</b>	
Mow and Blow Berms	1.00	acre	25.00	25	
Well Test/Water Analysis	1.00	acre	6.00	6	
CO application for vertebrate	0.50	acre	75.00	38	
Pesticide Application- Custom	3.50	acre	50.00	175	
Mow Middles	5.00	acre	18.00	90	
Pressure Chamber Monitoring	1.00	acre	15.00	15	
Band/Shank Fertilizer Application	3.00	acre	10.00	30	
Leaf Analysis	0.02	each	50.00	1	
Prune w/Pruning Tower	0.33	acre	165.00	54	
Herbicide Application- Custom	2.00	acre	20.00	40	
Harvest/Haul/Hull/Dry	6000.00	lb	0.20	1,200	
PCA/CCA Fee (YR4-8)	1.00	acre	35.00	35	
<b>Irrigation:</b>				<b>450</b>	
Water-Pumped & District	36.00	acin	12.50	450	
<b>Fertilizer:</b>				<b>194</b>	
UAN-32	150.00	lb N	0.80	120	
SOP Fines, 0-0-50	150.00	lb	0.49	74	
<b>Assessment:</b>				<b>60</b>	
CWC	6000.00	lb	0.01	60	
<b>Labor</b>				<b>152</b>	
Equipment Operator Labor	1.58	hrs	25.38	40	
Non-Machine Labor	2.00	hrs	22.48	45	
Irrigation Labor	3.00	hrs	22.48	67	
<b>Machinery</b>				<b>17</b>	
Fuel-Gas	0.13	gal	4.40	1	
Fuel-Diesel	2.99	gal	4.00	12	
Lube				2	
Machinery Repair				3	
Interest on Operating Capital @ 8.50%				52	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>2,913</b>	
<b>TOTAL OPERATING COSTS/LB</b>				<b>0</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>87</b>	

**TABLE 3. CONTINUED**  
**SAN JOAQUIN VALLEY – 2023**

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS</b>					
Liability Insurance				16	
Office Expense				100	
Sanitation Services				9	
Regulatory Fees				40	
Crop Insurance (65% Coverage)				10	
Property Taxes				421	
Property Insurance				30	
Investment Repairs				179	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>804</b>	
<b>TOTAL CASH OVERHEAD COSTS/LB</b>				<b>0</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>3,717</b>	
<b>TOTAL CASH COSTS/LB</b>				<b>1</b>	
<b>NET RETURNS ABOVE CASH COSTS</b>				<b>-717</b>	
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Buildings 2400sqft				126	
Fuel Tanks 2-500gal				19	
Shop/Field Tools				42	
Well/Pumps/Filters				528	
Land Walnuts				1,960	
Orchard Establishment				1,636	
Pressure Chamber Instrument				4	
Equipment				9	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>4,323</b>	
<b>TOTAL NON-CASH OVERHEAD COSTS/LB</b>				<b>1</b>	
<b>TOTAL COST/ACRE</b>				<b>8,040</b>	
<b>TOTAL COST/LB</b>				<b>1</b>	
<b>NET RETURNS ABOVE TOTAL COST</b>				<b>-5,040</b>	

<b>Cost per Pound to Produce Walnuts</b>	
<b>TOTAL OPERATING COSTS/LB</b>	<b>49 cents</b>
<b>TOTAL CASH OVERHEAD COSTS/LB</b>	<b>13 cents</b>
<b>TOTAL CASH COSTS/LB</b>	<b>62 cents</b>
<b>TOTAL NON-CASH OVERHEAD COSTS/LB</b>	<b>72 cents</b>
<b>TOTAL COST/LB</b>	<b>134 cents</b>

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

**TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE WALNUTS**

SAN JOAQUIN VALLEY – 2023

	JAN 23	FEB 23	MAR 23	APR 23	MAY 23	JUN 23	JUL 23	AUG 23	SEP 23	OCT 23	NOV 23	DEC 23	Total
Cultural:													
Sanitation- NOW	25												25
Well Test/Water Analysis			6										6
Vertebrate Control: CO (alt. years)			38										38
Pests- Insects/Scale (alt. years)		48											48
Weeds-Mow Middles 5X				18	18	18	18	18					90
Disease-Bot					86								86
Pressure Chamber Monitoring					3	3	3	3	3				15
Irrigate 8X					88	88	88	100	50	38			450
Fertigate UAN-32 2X					70		70						140
Pests-Insects/WHF							98						98
Leaf Analysis (1 per 50/acres)							1						1
Pests-Insects-CM/Mites						109							109
Prune (Dead Limb Removal/Push Brush								58					58
Pruning Tower (every 3rd Year)								54					54
Weeds- In-Season Strip Spray								30					30
Irrigation Labor									67				67
Weeds- Winter Strip Spray												123	123
Fertilize- Band Potassium (SOP)											84		84
PCA/CCA Fee	3	3	3	3	3	3	3	3	3	3	3	3	35
Pickup Truck-Farm Use	3	3	3	3	3	3	3	3	3	3	3	3	33
ATV-Farm Use	1	1	1	1	1	1	1	1	1	1	1	1	11
<b>TOTAL CULTURAL COSTS</b>	<b>32</b>	<b>55</b>	<b>50</b>	<b>25</b>	<b>271</b>	<b>224</b>	<b>284</b>	<b>270</b>	<b>127</b>	<b>44</b>	<b>90</b>	<b>130</b>	<b>1,601</b>
Harvest:													
Harvest/Haul/Hull/Dry										1,200			1,200
Assessment Fees										60			60
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,260</b>	<b>0</b>	<b>0</b>	<b>1,260</b>
Interest on Operating Capital @8.50%	0	1	1	1	3	5	7	9	9	19	-2	-1	52
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>32</b>	<b>55</b>	<b>51</b>	<b>26</b>	<b>275</b>	<b>228</b>	<b>291</b>	<b>279</b>	<b>137</b>	<b>1,323</b>	<b>89</b>	<b>129</b>	<b>2,913</b>
CASH OVERHEAD													
Liability Insurance			16										16
Office Expense	8	8	8	8	8	8	8	8	8	8	8	8	100
Sanitation Services	1	1	1	1	1	1	1	1	1	1	1	1	9
Regulatory Fees	3	3	3	3	3	3	3	3	3	3	3	3	40
Crop Insurance (65% Coverage)			10										10
Property Taxes		211				211							421
Property Insurance		15				15							30
Investment Repairs	15	15	15	15	15	15	15	15	15	15	15	15	179
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>27</b>	<b>253</b>	<b>53</b>	<b>27</b>	<b>27</b>	<b>253</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>804</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>59</b>	<b>308</b>	<b>104</b>	<b>53</b>	<b>302</b>	<b>481</b>	<b>318</b>	<b>306</b>	<b>164</b>	<b>1,350</b>	<b>116</b>	<b>156</b>	<b>3,717</b>

**TABLE 5. RANGING ANALYSIS - WALNUTS**

SAN JOAQUIN VALLEY – 2023

COSTS PER ACRE AND PER LB AT VARYING YIELDS TO PRODUCE WALNUTS

	4,500.00	5,000.00	5,500.00	YIELD (LB) 6,000.00	6,500.00	7,000.00	7,500.00
OPERATING COSTS/ACRE:							
Cultural	1,601	1,601	1,601	1,601	1,601	1,601	1,601
Harvest	945	1,050	1,155	1,260	1,365	1,470	1,575
Interest on Operating Capital @ 8.50%	49	50	51	52	52	53	54
TOTAL OPERATING COSTS/ACRE	2,596	2,702	2,807	2,913	3,019	3,125	3,230
TOTAL OPERATING COSTS/LB	0.58	0.54	0.51	0.49	0.46	0.45	0.43
CASH OVERHEAD COSTS/ACRE	804	804	804	804	804	804	804
TOTAL CASH COSTS/ACRE	3,400	3,506	3,612	3,717	3,823	3,929	4,035
TOTAL CASH COSTS/LB	0.76	0.70	0.66	0.62	0.59	0.56	0.54
NON-CASH OVERHEAD COSTS/ACRE	4,323	4,323	4,323	4,323	4,323	4,323	4,323
TOTAL COSTS/ACRE	7,723	7,829	7,934	8,040	8,146	8,252	8,357
TOTAL COSTS/LB	2.00	2.00	1.00	1.00	1.00	1.00	1.00
<u>Net Return per Acre above Operating Costs for Walnuts</u>							
Walnuts	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.30	-1,246	-1,202	-1,157	-1,113	-1,069	-1,025	-980
0.35	-1,021	-952	-882	-813	-744	-675	-605
0.40	-796	-702	-607	-513	-419	-325	-230
0.50	-346	-202	-57	87	231	375	520
0.60	104	298	493	687	881	1,075	1,270
0.70	554	798	1,043	1,287	1,531	1,775	2,020
0.80	1,004	1,298	1,593	1,887	2,181	2,475	2,770
<u>Net Return per Acre above Cash Costs for Walnuts</u>							
Walnuts	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.30	-2,050	-2,006	-1,962	-1,917	-1,873	-1,829	-1,785
0.35	-1,825	-1,756	-1,687	-1,617	-1,548	-1,479	-1,410
0.40	-1,600	-1,506	-1,412	-1,317	-1,223	-1,129	-1,035
0.50	-1,150	-1,006	-862	-717	-573	-429	-285
0.60	-700	-506	-312	-117	77	271	465
0.70	-250	-6	238	483	727	971	1,215
0.80	200	494	788	1,083	1,377	1,671	1,965
<u>Net Return per Acre above Total Costs for Walnuts</u>							
Walnuts	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.30	-6,373	-6,329	-6,284	-6,240	-6,196	-6,152	-6,107
0.35	-6,148	-6,079	-6,009	-5,940	-5,871	-5,802	-5,732
0.40	-5,923	-5,829	-5,734	-5,640	-5,546	-5,452	-5,357
0.50	-5,473	-5,329	-5,184	-5,040	-4,896	-4,752	-4,607
0.60	-5,023	-4,829	-4,634	-4,440	-4,246	-4,052	-3,857
0.70	-4,573	-4,329	-4,084	-3,840	-3,596	-3,352	-3,107
0.80	-4,123	-3,829	-3,534	-3,240	-2,946	-2,652	-2,357



UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS**  
 SAN JOAQUIN VALLEY – 2023

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
23	90 HP 4WD Tractor	91,000	15	17,716	9,286	39	544	9,868
23	Pickup Truck 1/2 Ton	32,000	5	14,342	5,311	16	232	5,559
23	ATV-4WD	9,300	8	3,246	1,241	4	63	1,308
23	Brush Rake 9'	1,800	25	51	154	1	9	164
	TOTAL	134,100	-	35,354	15,992	60	847	16,899
	60% of New Cost*	80,460	-	21,213	9,595	36	508	10,139

\*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								
Buildings 2400sqft	60,000	30	4,200	4,791	23	321	1,200	6,335
Fuel Tanks 2-500gal	8,900	30	623	711	3	48	178	940
Shop/Field Tools	20,000	30	1,400	1,597	8	107	400	2,112
Well/Pumps/Filters	248,800	30	0	20,050	88	1,244	4,976	26,358
Land Walnuts	1,064,000	30	1,064,000	74,480	755	10,640	0	85,875
Orchard Establishment	724,432	25	0	62,164	257	3,622	0	66,043
Pressure Chamber Instrument	1,600	20	112	148	1	9	32	189
TOTAL INVESTMENT	2,127,732	-	1,070,335	163,940	1,135	15,990	6,786	187,852

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	38	acre	15.53	590
Office Expense	38	acre	100.00	3,800
Sanitation Services	38	acre	8.75	333
Regulatory Fees	38	acre	40.00	1,520
Crop Insurance (65% Coverage)	38	acre	10.41	396

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 7. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY – 2023

Yr.	Description	Walnuts Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
					Insurance	Taxes	Lube & Repairs	Fuel		
23	90 HP 4WD Tractor	10	1066	5.23	0.02	0.31	4.84	17.68	22.52	28.07
23	Pickup Truck 1/2 Ton	29	400	7.97	0.02	0.35	3.87	10.00	13.87	22.20
23	ATV-4WD	13	250	2.98	0.01	0.15	0.92	1.65	2.57	5.71
23	Brush Rake 9'	9	80	1.15	0.00	0.07	0.30	0.00	0.30	1.52

**TABLE 8. OPERATIONS WITH EQUIPMENT & MATERIALS**

SAN JOAQUIN VALLEY – 2023

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Sanitation- NOW	Jan			Equipment Operator Labor	0.18	hour
				Mow and Blow Berms	1.00	acre
Well Test/Water Analysis	Mar			Well Test/Water Analysis	1.00	acre
Vertebrate Control: CO	Mar			Equipment Operator Labor	0.14	hour
				CO application for vertebrate pe	0.50	acre
Pests- Insects/Scale	Feb			Pesticide Application- Custom	0.50	acre
				Seize 35 WP	2.00	floz
Weeds-Mow Middles 5X	Apr			Equipment Operator Labor	0.18	hour
				Mow Middles	1.00	acre
	May			Equipment Operator Labor	0.18	hour
				Mow Middles	1.00	acre
	June			Equipment Operator Labor	0.18	hour
				Mow Middles	1.00	acre
	July			Equipment Operator Labor	0.18	hour
				Mow Middles	1.00	acre
	Aug			Equipment Operator Labor	0.18	hour
				Mow Middles	1.00	acre
Disease-Bot	May			Pesticide Application- Custom	1.00	acre
				Merivon	4.00	floz
Pressure Chamber	May			Pressure Chamber Monitoring	0.20	acre
	June			Pressure Chamber Monitoring	0.20	acre
	July			Pressure Chamber Monitoring	0.20	acre
	Aug			Pressure Chamber Monitoring	0.20	acre
	Sept			Pressure Chamber Monitoring	0.20	acre
Irrigate 8X	May			Water-Pumped	7.00	acin
	June			Water-Pumped	7.00	acin
	July			Water-Pumped	7.00	acin
	Aug			Water-Pumped	8.00	acin
	Sept			Water-Pumped	4.00	acin
	Oct			Water-Pumped	3.00	acin
Fertigate UAN-32 2X	May			UAN-32	75.00	lb N
				Band/Shank Fertilizer	1.00	acre
	July			UAN-32	75.00	lb N
				Band/Shank Fertilizer	1.00	acre
Pests-Insects/WHF	July			Pesticide Application- Custom	1.00	acre
				Assail 30 SG	8.00	oz
				Nu-Lure Bait	3.00	pt
Leaf Analysis	July			Leaf Analysis	0.02	each
Pests-Insects-CM/Mites	June			Pesticide Application- Custom	1.00	acre
				Altacor	4.50	floz
				Agri-Mek SC	4.00	floz
Prune (Dead Limbs)	Aug	90 HP 4WD Tractor	Brush Rake 9'	Non-Machine Labor	2.00	hours
Pruning Tower	Aug			Prune w/ Pruning Tower	0.33	acres
Weeds- In-Season Strip	Aug			Equipment Operator Labor	0.20	hour
				Rely 280	12.00	floz
				Herbicide Application- Custom	1.00	acre
Irrigation Labor	Sept			Irrigation Labor	3.00	hours
Weeds- Winter Strip	Nov			Equipment Operator Labor	0.20	hour
				Alion	3.50	floz
				Matrix SG	4.00	oz
				Roundup PowerMax	2.00	pt
				Herbicide Application- Custom	1.00	acre
Fertilize- Band Potassium	Nov			SOP Fines, 0-0-50	150.00	lb
				Band/Shank Fertilizer	1.00	acre
PCA/CCA Fee	Nov			PCA/CCA Fee (YR4-8)	1.00	acre
Pickup Truck-Farm Us	Nov		Pickup Truck 1/2 Ton	Equipment Operator Labor	0.90	hour
ATV-Farm Use	Nov		ATV-4WD	Equipment Operator Labor	0.40	hour
Harvest/Haul/Hull/Dr	Oct			Harvest/Haul/Hull/Dry	6,000.00	lb
Assessment Fees	Oct			CWC	6,000.00	lb