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UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

2017

**SAMPLE COSTS TO ESTABLISH AN ORCHARD
AND PRODUCE WALNUTS**



SAN JOAQUIN VALLEY – NORTH
Late leafing – lateral bearing

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INTRODUCTION

Sample costs to establish a walnut orchard and produce walnuts under sprinkler irrigation in the northern San Joaquin Valley are presented in this study. Note that this 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 July 2017 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, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or jmmurdock@ucdavis.edu. The local extension office can be contacted through Joe Grant, jagrant@ucanr.edu, UCCE, San Joaquin County, David Doll, dadoll@ucanr.edu, UCCE, Merced County, or Janet Caprile, jlcaprile@ucanr.edu, UCCE, Contra Costa County.

Sample Cost of Production studies for many commodities are available and can be downloaded from the website, <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

region the study is based. The authors thank the growers, input suppliers, and other industry representatives who provided information, assistance, and expert advice. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.** *The University is an affirmative action/equal opportunity employer.*

ASSUMPTIONS

The following assumptions refer to Tables 1 to 8 and pertain to sample costs to establish an orchard and produce walnuts under sprinkler irrigation in the northern San Joaquin Valley. The cultural practices described represent production operations and materials considered typical for a well-managed farm in the region. Costs, materials, and practices in this study will not apply to all farms. Timing and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, insect and disease pressure.

Land. The hypothetical farm consists of 100 contiguous acres of land. Of that, 60 acres are being established to walnuts, 35 are planted to other permanent or annual crops, and five acres are roads, irrigation system and farmstead. The farm is managed by the owner.

Establishment Cultural Practices and Material Inputs

Site Preparation. The orchard is being established on land previously planted to walnuts. The land is assumed to be deep, well drained, and either a class I or II soil.

Orchard removal is done by an orchard removal company in November and field cleanup following tree removal is done by the grower. During November and December, the field is ripped in six passes in which the roots (and irrigation pipe from the former orchard) are removed by the grower. Ripping begins at a two foot depth and gets progressively deeper, ending at 3.5 to 4.5 feet. Some of the passes might be deferred to late spring (after grain/grass crop) if rains come early and/or the soil is too wet. A winter grain/grass crop is grown on the field during December to June. It is assumed that this will yield a zero net cost, therefore no cost is shown. The field is ripped to six feet deep in July, disked three times and landplanned in August. Berms are made in September and the field fumigated in September. All operations preparing the orchard for planting are done in the years prior to planting, but costs are shown in the first year.

Trees. The walnut trees are a late leafing, lateral bearing variety. The $\frac{3}{4}$ inch caliber nursery grafted trees on Paradox rootstock are planted on 24 X 24 foot spacing, resulting in 76 trees per acre. The economic life of the orchard is estimated to be 25 years.

Planting. Planting in the early spring (February) starts by marking tree sites then digging holes and planting. This study assumes hand rather than machine planting. After or at planting, the trees are topped, the trunks are treated with white, water-based latex paint to protect the trees from sunburn and the trees are staked with ten-foot stakes. In the second year, 2 percent of the trees or an average of 1.5 trees per acre are replanted.

Pruning. New trees are topped at planting or soon thereafter so that trunk development is encouraged. During the first year, the trunk is tied to the stake to prevent it from breaking, growing crooked or leaning. Trees are pruned annually during the winter in years one through seven to develop the permanent structural framework of the trees. Pruning costs in years one and two include winter pruning, and summer pruning to train the tree trunk, to prevent shoot breakage and to remove rootstock suckers and other

unwanted growth. Suckering is done 3 to 4 times per season (May – July) during the first two years. Orchard prunings are stacked, chipped or shredded by a custom operator, in every fourth middle in the third year, alternate middles during the fourth and fifth year and all middles thereafter.

Irrigation. Water is pumped from a well and passes through a filtration system to the full coverage sprinkler system. This study assumes that a well and pump existing from the former orchard required refurbishing to meet the water demands and pressure requirements of the new orchard. Refurbishing costs include inspection of the well, replacement of the motor and pump, upgrading of the electrical service, and installation of new filters. The orchard is irrigated from late-April to mid-September. The first irrigation event should be no earlier than late-April, except for the year that the orchard is planted. Price per acre-foot for water will vary among orchards in this region depending on the various well characteristics, irrigation district, and other factors. Water is calculated to cost \$7.50 per acre-inch (\$90 per acre-foot). The amount of water applied to the orchard during the establishment period is shown in Table A.

Table A. Annual Applied Water

Year	Acre-Inches
1	20
2	20
3-5	36
6+	42

Table B. Applied Nitrogen Per Acre

Year	Lbs N
1	10
2	25
3	50
4	75
5	100
6	150
7+	200

Fertilization. Nitrogen (N) is the major nutrient required for proper tree growth and optimum yields. During the first two years, 15-15-15 is applied by hand around the base of the young tree, once in March and once in June or July. Beginning in the third year, nitrogen fertilizer as UAN-32 is injected through the sprinkler system from April to late July/early August. Annual rates of actual N are shown in Table B.

Tissue Testing. Beginning in the third year, leaf samples at one sample per 20 acres are taken by the PCA in July for tissue analysis to determine nutrient status. The cost shown are for the lab analysis.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Walnuts*. See the Integrated Pest Management (IPM) website <http://ipm.ucdavis.edu> for other materials available.

Fumigation. Prior to removal of the previous orchard, the orchard site soil is sampled (1 sample/20 acres) and if nematodes injurious to walnuts are found to be present, the site will be fumigated. Pre-plant fumigation may not be necessary on bare or row crop ground, but is often necessary where orchards follow orchards. Telone II, a soil fumigant, is applied as a broadcast treatment at a rate of 33.7 gallons per acre. This will treat the entire orchard, 100 percent of the ground. After the broadcast application, chloropicrin is applied down the tree rows (11 ft) at a rate of 200 lbs/treated acre. Application costs including materials are approximately \$1,400 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. Contact your local farm advisor for more information about fumigation.

Weeds (Orchard Floor Management). Beginning in the first year, pre-emergent and post-emergent herbicide applications are made under the tree rows (strip spray) in the fall (November) and again in spring (March). These treatments cover one-fourth of the orchard floor. Prior to the fall herbicide application a pass is made with a blower/sweeper to remove debris from the berm. This prevents the pre-

emergent herbicide from binding to organic matter. Two post-emergent summer spot sprays are completed in May and August to control emerged weeds. Growers are now encouraged to rotate herbicides with different modes of action to prevent resistance. Orchard row middles are disced three times (April, May, and August) during the first year and thereafter mowed five times each year (April, May, June, July, and August).

Diseases. During the establishment years (1 through 7), pest and disease controls are minimal. Control of walnut blight disease begins in the third year with an application in April. Phytophthora and botryosphaeria (Bot) control begins in the fourth year. Control of phytophthora consists of a spring application in March and a fall application in October. Control of Bot consists of a single fungicide application in June. All insect and disease sprays are applied by a custom applicator.

Insects. Although many orchards are not treated for mites during the establishment years, mites are treated in this study in July of the second and third year. Scale control begins in the fourth year with an insecticide treatment in March. Control of codling moth (CM), walnut husk fly (WHF), mites, and aphids also begins in the fourth year. The first of two CM spray is in late June. The second CM spray is in July and consists of an insecticide that also controls WHF and aphids, a bait for WHF, and a miticide. WHF control continues in August with an alternate row insecticide plus bait application. All insect sprays are applied by a custom applicator.

Vertebrate pests. Gopher and squirrel abatement begins in the third year. Gophers are controlled with a burrow fumigant in May and June. Ground squirrel burrows are fumigated in April and bait stations are maintained around the perimeter with ground squirrel bait from mid-May thru June.

Harvest. Harvest starts in the fourth or fifth year depending on variety and tree growth. If the trees are not large enough at the first harvest to tolerate mechanical harvesting, they are hand harvested. In this study the first harvest is in year four and hand harvested in year four and five. Hand harvesting is performed by manually hitting the tree with rubber mallets. Once the nuts are on the ground the remaining harvest operations are mechanical. Beginning in year six the harvest is performed mechanically, consisting of shaking, windrowing, picking up, and hauling the nuts to the hulling & dehydrating facility.

Yields and Returns. Estimated yields are shown in Table C. See Harvest in the Production section for more information on returns.

Table C. Per Acre Yields

Yield Year	Yield (dry in-shell)	
	Ton	lbs.
4	0.30	600
5	0.60	1,200
6	1.20	2,400
7	2.50	5,000
8+	3.00	6,000

Mature Orchard Cultural Practices and Material Inputs

This section outlines the cultural practices used for the production of walnuts once the orchard is mature. These vary among growers and regions. For additional information contact the farm advisor in the county of interest.

Pruning. Pruning methods will vary depending on variety, rootstock, and planting density as determined by row spacing. Pruning is done “by hand” in alternate years during the dormant period (January/February) by a custom operator using mechanical towers. Prunings are placed in the row

middles and chipped or shredded by a custom operator. One-half of the cost of the pruning, stacking and shredding is charged to the operation each year.

Irrigation. Irrigation costs include pumping (water) and labor costs. The water is pumped from a well and passes through a filtration system and fed into the full coverage sprinkler system. Forty-two acre-inches of water are applied from mid-April to mid-September. Although not shown in this study, a post-harvest irrigation may be needed from late September through October. Irrigations will vary according to tree size and soil type. A water pumping cost of \$7.50 per acre inch is based on current PG&E rates. Tensiometers, water budgeting using evapotranspiration estimates, stem water potential measurements, or other established methods are used to monitor orchard water status and schedule irrigations. The monitoring may be done by the grower or by a private irrigation consultant. The monitoring is done by the grower at no additional cost. Labor is calculated at 0.06 hours per irrigation and includes time for maintaining the lines.

Fertilization. Beginning with the first irrigation, a total of 200 pounds of nitrogen per season as UAN-32 is injected through the sprinklers from April to late July/early August. Labor costs for the fertilizer applications are included in the irrigation costs. Fertilizer rates should be adjusted according to need as indicated by leaf analysis results.

Tissue Testing. Leaf samples are taken in July by the PCA at one sample per 20 acres for tissue analysis to determine nutrient status. The cost shown is for the lab analysis.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *Integrated Pest Management for Walnuts* and *UC Pest Management Guidelines*. **Pesticides mentioned in this study are not recommendations, but those commonly used in the region.** For information and pesticide use permits, contact the local county Agricultural Commissioner's office. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at www.ipm.ucdavis.edu. **Pest control costs can vary considerably each year depending upon local conditions and pest populations in any given year.** Adjuvants are recommended for many pesticides for effective control and are not included as a cost in this study.

Pest Control Adviser (PCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition the PCA or an independent consultant will monitor the field during the growing season for fertilizer recommendations. Growers may hire a private PCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. In this study, the grower has a full service agreement with a company.

Weeds (Orchard Floor Management). Weeds are controlled in the tree row with pre-emergent and post-emergent strip sprays in the fall (November) and again in the spring (Mid-March). A pass with the blower/sweeper is necessary to remove debris from the berms prior to the application in November. This prevents pre-emergent herbicides from binding to organic matter. A post-emergent material is applied in May and August as a spot spray to control emerging weeds that were not controlled by the previous sprays. A pre-harvest herbicide application is also made in July. The row middles are mowed five times, once per month from April to August. Mowing the vegetation in the row middles in April also provides frost protection. Winter cover crops can be planted in the row middles in fall and mowed in the spring, but this practice and the associated costs are not included in this study.

Insects. Several insect pests are treated each year. Insect and disease applications are done by a custom operator. Multiple generations of codling moth occur and are controlled with carefully timed sprays based on developmental models and population monitoring. A first seasonal treatment for codling moth is applied in late June. A second spray for codling moth is made in mid-July. This spray consists of an

insecticide that controls walnut husk fly (WHF) and walnut aphid, a bait for WHF, and a miticide. WHF control continues with an alternate row insecticide plus bait sprays in August. Scale is controlled with a single insecticide treatment in March.

Disease. Walnut blight disease is controlled with a single pesticide application in April. Phytophthora is controlled with two pesticide applications; a spring application in March and a fall application in October. Botryosphaeria is controlled with a single fungicide application in June. All disease sprays are applied by a custom applicator.

Vertebrate pests. Gophers are controlled with a burrow fumigant beginning in May and June of the third year. Ground squirrel burrows are fumigated in April and bait stations are maintained around the perimeter with ground squirrel bait from mid-May thru June.

Harvest. The crop is harvested (shaken, windrowed, raked, and picked up) and hauled by a contracted custom harvesting operation. The orchard is harvested once. The grower pays the hulling and dehydrating costs. Mechanical harvesting begins by shaking the tree trunk or branches to remove the walnuts. Sweepers windrow the walnuts in the orchard middles so that the pick-up machine can gather and dump them into trailers. Hand labor for raking nuts from around the trees missed by the sweeper is included in the custom harvest. The walnuts are hauled from the orchard to a hulling and dehydrating facility.

Yields. Typical annual yields for Walnut varieties are measured in clean, dry, in-shell tons or pounds per acre and are shown in Table C. The average yield over the life of the orchard in this study is 6,000 pounds.

Returns. Actual price depends on a number of factors such as demand, crop size, variety, nut size, and quality. An estimated price of \$1.20 per dehydrated in-shell pound is used in this study.

Ranging Analysis. Table 5 has a range of return prices used for calculating net returns per acre with different yields. For this analysis, crop yields ranged from 4,500 to 7,500 pounds per acre and crop prices ranged from \$0.60 to \$1.80 per ton.

Assessments. Under state law, the California Walnut Commission (CWC) collects mandatory assessment fees from growers to pay for walnut related activities. The CWC assessment for the 2017 crop year is \$0.01 per pound of in-shell nuts. The California Walnut Board (CWB) collects an assessment fee from walnut handlers. The CWB handler assessment for 2017 is \$0.0465 per pound of shelled nuts. The CWB assessment is not included in this study because it is not paid by the grower.

Pickup/ATV-Mule. The study assumes pickup business use mileage of two hours per acre per year for the farm. The ATV-Mule use for checking the orchard, diseases and irrigation system are shown as a line item. The travel and time for the pickup and ATV-Mule are estimated and not taken from any specific data.

Labor, Equipment, and Interest

Labor. Hourly wages for workers are \$15.50 for machine operators and \$11.00 per hour non-machine labor. Adding 39 percent for the employers' share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$21.55 and \$15.29 per hour for machine labor and non-machine labor, respectively. The overhead includes the employer's share of federal and California state payroll taxes, workers' compensation insurance for orchards and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers. The cost is based on the average

industry rate as of January, 2017. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

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 July 2017 data from the Energy Information Administration are \$2.92 and \$3.18 per gallon, respectively. The cost includes a 9.25 percent sales tax, a \$0.16/gal excise tax on diesel fuel, a 2.25% sales tax, and a \$0.28/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 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 4.50 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 is considered a typical lending rate by a farm lending agency as of January 2017.

Risk. The risks associated with crop 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 walnut 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 0.846 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 \$640 for the entire farm or \$6.40 per acre.

Office Expense. Office and business expenses are estimated at \$75 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, shop and office utilities, and miscellaneous administrative charges.

Regulatory Costs. Various environmental fees are collected by the county and state. The fees will vary by county. For example the Air Resources Board (state agency) charges \$100 per plan to deal with air pollution and the Ag Waiver Fee (county agency) cost \$2.00 per acre. The grower must also provide safety training, safety equipment, and maintain training records. A cost of \$5.26 per producing acre or \$500 for the farm is shown. This includes an annual coliform test of the well water at a cost of \$22.00.

Sanitation Services. Sanitation services provide portable single toilet units with washing facilities for the orchard and cost the farm (orchard) \$300 annually. The cost includes delivery and two months of weekly service.

Management/Supervisor Wages. Wages for management are not included as a cash cost. Returns above total costs are considered a return to management and risk.

Investment Repairs. Annual maintenance/repairs on investments (Non-cash Overhead) is calculated as two percent of the purchase price, except for tree replacement in the orchard. The average tree replacement cost over the life of the orchard is assumed to be 0.10 percent of the establishment cost.

Non-Cash Overhead

Non-cash overhead 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 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 wearout 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 7.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

Interest Rate. An interest rate of 5.00 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 January 2017.

Land Value. Bare crop land for walnut production is estimated to cost \$24,000. Values will vary according to soil type and water source. For this study, the producing acreage estimated worth is; \$35,771 per acre. It is the crop value plus the establishment cost (\$24,000 + \$11,771).

Sprinkler Irrigation System. The sprinkler system is a full coverage system using Nelson Rotator® R2000 sprinklers with buried PVC laterals. The system is installed in the tree row on the 60 walnut acres and includes a filtration/injection system located near the pumping plant.

Irrigation Pumping System. The 200 foot deep well with a pumping level at 125 – 150 feet on the site and a 125 horsepower pump to irrigate the 60 acres was refurbished at a cost of \$70,000 (from local well/pump company). Refurbishing costs include inspection of the well, replacement of the motor and pump, upgrading of the electrical service, and installation of new filters.

Fuel Tanks. Two 500-gallon fuel tanks are placed on stands in cement containment meeting Federal, State, and local regulations. Fuel is delivered to the equipment by gravity feed.

Tools. Includes shop tools/equipment, hand tools and field tools such as pruning equipment.

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 \$11,771 per acre or \$706,260 for the 60-acre orchard. Establishment cost is amortized beginning in the fifth year over the remaining 21 years of production. Tree replacement or repair is based on 0.10 percent of the establishment cost.

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 ISSUES CENTER
TABLE 1. SAMPLE COSTS PER ACRE TO ESTABLISH A WALNUT ORCHARD
 SAN JOAQUIN VALLEY NORTH – 2017

	Year:	Cost Per Acre						
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
Yield: Pounds Per Acre:				600	1,200	2,400	5,000	
Pre-Plant Costs:								
Orchard Removal (includes woodchip removal)		750						
Fumigation: Nematode Sample (1/20 acres)		2						
Subsoil 6X (field cleanup, root & pipe removal)		1,200						
Level/seed bed preparation for cover crop		70						
Dec – June (grain/grass grows) (no costs shown)								
Subsoil/Rip to 6 ft. depth		300						
Disc 3X & landplane		100						
Make Berms		30						
Fumigation: Broadcast (Telone) & 11' Tree rows (Chloropicrin)		1,400						
Irrigation System Installation		350						
TOTAL PRE-PLANT COSTS		4,202						
Planting Costs:								
Survey, Mark, Dig Holes & Plant (includes 76 trees)		1,577	31					
Head, Stake & Paint Trees (includes stakes)		232	3					
TOTAL PLANTING COSTS		1,809	34					
Cultural Costs:								
Prune/Sucker: (Yrs. 1-2, prune & sucker, Yrs. 3+, prune) (Yr. 7- alternate years)		141	20	60	70	70	70	70
Fertilize: Hand applied (15-15-15) Yr. 1-2. Injected through sprinklers (UAN) Yr. 3+		57	99	30	45	60	90	120
Irrigate: (water & labor) (fertigation labor included)		168	168	288	288	288	333	333
Well Test/ Water Test (including coliform test)		4	4	4	4	4	4	4
Weed: Spring Strip Spray (Prowl, Roundup)		29	29	29	29	29	29	29
Weed: Disc 3X (Yr. 1) Mow 5X (Yr. 2+)		20	46	46	46	46	46	46
Weed: Summer Spot Spray 2X (Roundup, Treevix, MSO)		73	73	73	73	73	73	73
Weed: Pre-Harvest Strip Spray (Roundup, Goal 2XL)					28	28	28	28
Remove Debris from Berm with Blower/Sweeper					5	5	5	5
Weed: Fall Strip Spray (Matrix, Alion, Roundup)		85	85	85	85	85	85	85
Insect: Mites (Zeal)			76	76				
Vertebrate: Ground squirrels (Weevil-Cide in burrows)				4	4	4	4	4
Vertebrate: Ground squirrels (baited traps)				25	25	25	25	25
Vertebrate: Gophers (Weevil-Cide)				11	11	11	11	11
Disease: Walnut blight (Kocide, Manex, Zinc Sulfate)				136	136	136	136	136
Disease: Phytophthora (K-Phite) 2X					97	97	97	97
Disease: Botryosphaeria (Pristine)					84	84	84	84
Leaf samples/Tissue Analysis				3	3	3	3	3
Prune: Stack & shred prunings (4 th middle) Yr. 3. (alternate) Yr. 4-5. (all middles) Yr. 6+.				50	60	60	120	120
Insect: Scale (Seize 35 WP)					72	72	72	72
Insect: Codling Moth (Altacor)					76	76	76	76
Insect: Walnut Husk Fly, Codling Moth, Aphids, Mites (Assail, NuLure, Onager)					210	210	210	210
Insect: Walnut Husk Fly (Assail) (alternate rows)					114	114	114	114
ATV use		28	28	28	28	28	28	28
Pickup use		73	73	73	73	73	73	73
TOTAL CULTURAL COSTS		678	701	1021	1,666	1,681	1,816	1,846
Harvest Costs:								
Shake, pick, sweep, haul					45	90	180	350
Dry and Hull					42	84	168	350
California Walnut Commission Assessment					6	12	24	50
TOTAL HARVEST COSTS					93	186	372	750
Interest On Operating Capital @ 4.50%		393	15	23	24	25	29	30
TOTAL OPERATING COSTS/ACRE		7,082	750	1,044	1,783	1,892	2,217	2,626

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. CONTINUED
 SAN JOAQUIN VALLEY NORTH – 2017

	Year:	Cost Per Acre							
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	
Yield: Pounds Per Acre:		600					1,200	2,400	5,000
Cash Overhead Costs:									
Office Expense		75	75	75	75	75	75	75	
Liability Insurance		6	6	6	6	6	6	6	
Sanitation Service		5	5	5	5	5	5	5	
Regulatory Fees		5	5	5	5	5	5	5	
Property Taxes		262	262	262	262	321	321	321	
Property Insurance		22	22	22	22	27	27	27	
Investment Repairs		83	83	83	83	95	95	95	
TOTAL CASH OVERHEAD COSTS		458	458	458	458	534	534	534	
TOTAL CASH COSTS/ACRE		7,540	1,208	1,502	2,241	2,426	2,751	3,160	
INCOME/ACRE FROM PRODUCTION					720	1,440	2,880	6,000	
NET CASH COSTS/ACRE FOR THE YEAR		7,540	1,208	1,502	1,521	986			
PROFIT/ACRE ABOVE CASH COSTS							129	2,840	
ACCUMULATED NET CASH COSTS/ACRE		7,540	8,748	10,250	11,771	12,757	12,628	9,788	
Non-Cash Overhead Costs (Capital Recovery)									
Buildings (2400 sq. ft.)		55	55	55	55	55	55	55	
Fuel Tanks: 2-500 Gallon		11	11	11	11	11	11	11	
Solid Set Sprinkler System with Filter		118	118	118	118	118	118	118	
Pump/Well		76	76	76	76	76	76	76	
Land		1200	1200	1200	1200	1200	1200	1200	
Shop/Field Tools		14	14	14	14	14	14	14	
Bait Stations (60)				2	2	2	2	2	
Equipment		25	28	28	31	31	31	31	
Orchard Establishment						918	918	918	
TOTAL CAPITAL RECOVERY		1499	1,502	1,504	1,507	2,425	2,425	2,425	
TOTAL COST/ACRE FOR THE YEAR		9,039	2,710	3,006	3,748	4,851	5,176	5,585	
INCOME/ACRE FROM PRODUCTION					720	1,440	2,880	6,000	
TOTAL NET COST/ACRE FOR THE YEAR		9,039	2,710	3,006	3,028	3,411	2,296		
NET PROFIT/ACRE ABOVE TOTAL COST								415	
TOTAL ACCUMULATED NET COST/ACRE		9,039	11,749	14,755	17,783	21,194	23,490	23,075	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. COSTS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY NORTH – 2017

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:								
Well & Water Test (includes Coliform Test)	0.00	0	0	0	0	4	4	
Pruning: Alt. Year (half of cost shown)	0.00	0	0	0	0	130	130	
Pruning: Stack and Shred (Alt. Years)	0.00	0	0	0	0	120	120	
Disease: Scale	0.00	0	0	0	47	25	72	
Weeds: Spring Strip Spray	0.18	5	0	0	23	0	29	
Irrigate 10X	0.00	18	0	0	315	0	333	
Disease: Phytophthora 2X	0.00	0	0	0	47	50	97	
Ground Squirrels: Weevil-Cide in Burrows	0.00	3	0	0	1	0	4	
Fertigate: UAN-32	0.00	0	0	0	120	0	120	
Weeds: Mow Middles 5X	0.92	24	13	9	0	0	46	
Disease: Blight	0.00	0	0	0	111	25	136	
Weeds: Summer Spot Spray 2X	0.36	9	0	1	63	0	73	
Gophers: Weevil-Cide	0.00	8	0	0	3	0	11	
Ground Squirrels: Bait Traps	0.00	5	0	0	21	0	25	
Insects: Codling Moth (CM)	0.00	0	0	0	51	25	76	
Disease: Botryosphaeria	0.00	0	0	0	59	25	84	
Leaf Tissue Analysis	0.00	0	0	0	0	3	3	
Insects: CM/WHF/Aphids/Mites	0.00	0	0	0	185	25	210	
Weeds: Pre-Harvest Strip Spray	0.18	5	0	0	23	0	28	
Insects: WHF (Alt. Row)	0.00	0	0	0	101	13	114	
Clear Berms of Plant Residue	0.14	4	1	0	0	0	5	
Weeds: Fall Strip Spray	0.18	5	0	0	79	0	85	
Pickup Truck Use	2.00	52	15	7	0	0	73	
ATV Use	1.00	26	1	1	0	0	28	
TOTAL CULTURAL COSTS	4.97	162	31	19	1,250	444	1,906	
Harvest:								
Harvest & Haul	0.00	0	0	0	0	420	420	
Hull & Dry	0.00	0	0	0	0	420	420	
CA Walnut Commission	0.00	0	0	0	60	0	60	
TOTAL HARVEST COSTS	0.00	0	0	0	60	840	900	
Interest on Operating Capital at 4.50%							33	
TOTAL OPERATING COSTS/ACRE	5	162	31	19	1,310	1,284	2,839	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2. CONTINUED
SAN JOAQUIN VALLEY NORTH – 2017

Operation	Cash and Labor Costs per Acre							
	Operation Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Liability Insurance							6	
Office Expense							75	
Regulatory Fees							5	
Sanitation Service							5	
Property Taxes							321	
Property Insurance							27	
Investment Repairs							95	
TOTAL CASH OVERHEAD COSTS/ACRE							535	
TOTAL CASH COSTS/ACRE							3,374	
NON-CASH OVERHEAD:								
		<u>Per Producing Acre</u>		<u>Annual Cost Capital Recovery</u>				
Buildings (2400sq. ft.)		842		55			55	
Fuel Tanks: 2-500Gal		116		11			11	
Solid Set Sprinkler w/ Filter		1,850		118			118	
Land Walnuts		24,000		1,200			1,200	
Pump/Well		1,167		76			76	
Shop/Field Tools		158		14			14	
Bait Stations (60)		9		2			2	
Orchard Establishment		11,771		918			918	
Equipment		267		31			31	
TOTAL NON-CASH OVERHEAD COSTS		40,179		2,426			2,426	
TOTAL COSTS/ACRE							5,800	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY NORTH – 2017

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Production	6,000	Lb.	1.20	7,200	
TOTAL GROSS RETURNS				7,200	
OPERATING COSTS					
Herbicide:				188	
Prowl H2O	4.00	pt	4.49	18	
Roundup PowerMax	10.00	pt	2.75	28	
MSO (Oil Concentrate)	12.80	floz	0.14	2	
Treevix	2.00	floz	24.86	50	
Goal 2XL	16.00	floz	1.08	17	
Alion	3.50	floz	13.84	48	
Matrix SG	4.00	oz	6.37	25	
Fungicide:				217	
K-Phite	4.00	qt	11.84	47	
Kocide 3000	10.00	lb	10.89	109	
Manex	2.34	oz	0.47	1	
Pristine	14.50	floz	4.08	59	
Insecticide:				384	
Seize 35 WP	5.00	oz	9.34	47	
Altacor 35 WG	4.50	oz	11.25	51	
Assail 30 SG	12.00	oz	15.38	185	
Nu-Lure Bait	6.00	pt	3.04	18	
Onager	24.00	oz	3.48	84	
Rodenticide:				25	
Weevil-Cide (tablets)	56.00	each	0.08	4	
Ground Squirrel Bait	10.80	lb	1.92	21	
Custom:				1,284	
Well/Water Test	0.02	each	240.00	4	
Prune (alt. years)	1.00	acre	130.00	130	
Stack/Shred Prunings (alt. years)	1.00	acre	120.00	120	
Spray Ground – Air Blast Sprayer	7.50	acre	25.00	188	
Leaf Analysis	0.05	each	50.00	3	
Harvest/ Haul	6000.00	lb	0.07	420	
Dry/Hull	6000.00	lb	0.07	420	
Irrigation:				315	
Water – Pump	42.00	acin	7.50	315	
Fertilizer:				121	
UAN32 (32-0-0)	200.00	lb N	0.60	120	
Zinc Sulfate 36%	1.00	lb	0.95	1	
Assessment:				60	
CA Walnut Commission	6000.00	lb	0.01	60	
Labor				162	
Equipment Operator Labor	5.96	hrs	21.55	129	
Non-Machine Labor	2.17	hrs	15.29	33	
Machinery				50	
Fuel-Gas	0.71	gal	3.18	2	
Fuel-Diesel	9.95	gal	2.92	29	
Lube				5	
Machinery Repair				14	
Interest on Operating Capital @ 4.50%				33	
TOTAL OPERATING COSTS/ACRE				2,839	
TOTAL OPERATING COSTS/LB				0	
NET RETURNS ABOVE OPERATING COSTS				4,361	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 3. CONTINUED

SAN JOAQUIN VALLEY NORTH – 2017

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Liability Insurance				6	
Office Expense				75	
Regulatory Fees				5	
Sanitation Service				5	
Property Taxes				321	
Property Insurance				27	
Investment Repairs				95	
TOTAL CASH OVERHEAD COSTS/ACRE				535	
TOTAL CASH OVERHEAD COSTS/LB				0	
TOTAL CASH COSTS/ACRE				3,374	
TOTAL CASH COSTS/LB				1	
NET RETURNS ABOVE CASH COSTS				3,826	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Buildings (2400sq. ft.)				55	
Fuel Tanks: 2-500Gal				11	
Solid Set Sprinkler w/ Filter				118	
Land Walnuts				1,200	
Pump/Well				76	
Shop/Field Tools				14	
Bait Stations (60)				2	
Orchard Establishment				918	
Equipment				31	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				2,426	
TOTAL NON-CASH OVERHEAD COSTS/LB				0	
TOTAL COST/ACRE				5,800	
TOTAL COST/LB				1	
NET RETURNS ABOVE TOTAL COST				1,400	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY NORTH - 2017

	JAN 17	FEB 17	MAR 17	APR 17	MAY 17	JUN 17	JUL 17	AUG 17	SEP 17	OCT 17	NOV 17	Total
Cultural:												
Well & Water Test (includes Coliform Test)	4											4
Pruning: Alt. Year (half of cost shown)	130											130
Pruning: Stack and Shred, Alt. Years		120										120
Disease: Scale			72									72
Weeds: Spring Strip Spray			29									29
Irrigate 10X				33	67	67	67	67	33			333
Disease: Phytophthora 2X				49						49		97
Ground Squirrels: Weevil-Cide in Burrows				4								4
Fertigate: UAN-32				24	24	24	24	24				120
Weeds: Mow Middles 5X				9	9	9	9	9				46
Disease: Blight				136								136
Weeds: Summer Spot Spray 2X					37			37				73
Gophers: Weevil-Cide					5	5						11
Ground Squirrels: Bait Traps					8	17						25
Insects: Codling Moth (CM)						76						76
Disease: Botryosphaeria						84						84
Leaf Tissue Analysis							3					3
Insects: CM/WHF/Aphids/Mites							210					210
Weeds: Pre-Harvest Strip Spray							28					28
Insects: WHF (Alt. Row)								114				114
Clear Berms of Plant Residue											5	5
Weeds: Fall Strip Spray											85	85
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	73
ATV Use	3	3	3	3	3	3	3	3	3	3	3	28
TOTAL CULTURAL COSTS	143	129	110	264	159	291	350	259	43	58	99	1,906
Harvest:												
Harvest & Haul									420			420
Hull & Dry									420			420
CA Walnut Commission									60			60
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	900	0	0	900
Interest on Operating Capital @4.50%	1	1	1	2	3	4	5	6	10	-1	0	33
TOTAL OPERATING COSTS/ACRE	144	130	111	267	162	295	355	266	952	57	99	2,839
CASH OVERHEAD												
Liability Insurance			6									6
Office Expense	7	7	7	7	7	7	7	7	7	7	7	75
Regulatory Fees			5									5
Sanitation Service	0	0	0	0	0	0	0	0	0	0	0	5
Property Taxes		161					161					321
Property Insurance		14					14					27
Investment Repairs	9	9	9	9	9	9	9	9	9	9	9	95
TOTAL CASH OVERHEAD COSTS	16	190	28	16	16	16	190	16	16	16	16	535
TOTAL CASH COSTS/ACRE	160	320	139	282	178	311	545	282	968	73	115	3,374

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 5. RANGING ANALYSIS – WALNUTS

SAN JOAQUIN VALLEY NORTH - 2017

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

	YIELD (LB)						
	4,500.00	5,000.00	5,500.00	6,000.00	6,500.00	7,000.00	7,500.00
OPERATING COSTS/ACRE:							
Cultural	1,906	1,906	1,906	1,906	1,906	1,906	1,906
Harvest	675	750	825	900	975	1,050	1,125
Interest on Operating Capital @ 4.50%	32	33	33	33	34	34	34
TOTAL OPERATING COSTS/ACRE	2,613	2,688	2,764	2,839	2,914	2,989	3,065
TOTAL OPERATING COSTS/LB	0.58	0.54	0.50	0.47	0.45	0.43	0.41
CASH OVERHEAD COSTS/ACRE	535	535	535	535	535	535	535
TOTAL CASH COSTS/ACRE	3,148	3,223	3,298	3,374	3,449	3,524	3,600
TOTAL CASH COSTS/LB	0.70	0.64	0.60	0.56	0.53	0.50	0.48
NON-CASH OVERHEAD COSTS/ACRE	2,426	2,426	2,426	2,426	2,426	2,426	2,426
TOTAL COSTS/ACRE	5,574	5,649	5,724	5,800	5,875	5,950	6,025
TOTAL COSTS/LB	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Net Return per Acre above Operating Costs for Walnuts

PRICE (\$/lb)	YIELD (lb/acre)						
	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
Production	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.60	87	312	536	761	986	1,211	1,435
0.80	987	1,312	1,636	1,961	2,286	2,611	2,935
1.00	1,887	2,312	2,736	3,161	3,586	4,011	4,435
1.20	2,787	3,312	3,836	4,361	4,886	5,411	5,935
1.40	3,687	4,312	4,936	5,561	6,186	6,811	7,435
1.60	4,587	5,312	6,036	6,761	7,486	8,211	8,935
1.80	5,487	6,312	7,136	7,961	8,786	9,611	10,435

Net Return per Acre above Cash Costs for Walnuts

PRICE (\$/lb)	YIELD (lb/acre)						
	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
Production	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.60	-448	-223	2	226	451	676	900
0.80	452	777	1,102	1,426	1,751	2,076	2,400
1.00	1,352	1,777	2,202	2,626	3,051	3,476	3,900
1.20	2,252	2,777	3,302	3,826	4,351	4,876	5,400
1.40	3,152	3,777	4,402	5,026	5,651	6,276	6,900
1.60	4,052	4,777	5,502	6,226	6,951	7,676	8,400
1.80	4,952	5,777	6,602	7,426	8,251	9,076	9,900

Net Return per Acre above Total Costs for Walnuts

PRICE (\$/lb)	YIELD (lb/acre)						
	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
Production	4500.00	5000.00	5500.00	6000.00	6500.00	7000.00	7500.00
0.60	-2,874	-2,649	-2,424	-2,200	-1,975	-1,750	-1,525
0.80	-1,974	-1,649	-1,324	-1,000	-675	-350	-25
1.00	-1,074	-649	-224	200	625	1,050	1,475
1.20	-174	351	876	1,400	1,925	2,450	2,975
1.40	726	1,351	1,976	2,600	3,225	3,850	4,475
1.60	1,626	2,351	3,076	3,800	4,525	5,250	5,975
1.80	2,526	3,351	4,176	5,000	5,825	6,650	7,475

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY NORTH - 2017

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
17	Pickup Truck 1/2 T	32,000	5	14,342	4,796	20	232	5,047
17	Weed Sprayer 100 G	5,000	10	884	577	2	29	609
17	90 HP 4WD Tractor	60,500	15	11,778	5,283	31	361	5,675
17	Mower Flail 10'	12,000	10	2,122	1,385	6	71	1,462
17	ATV-Mule	9,000	12	2,250	874	5	56	935
17	Sweeper/Blower	62,000	15	5,952	5,697	29	340	6,066
TOTAL		180,500	-	37,329	18,613	92	1,089	19,794
60% of New Cost*		108,300	-	22,397	11,168	55	653	11,876

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
INVESTMENT								
Buildings 2400sqft	80,000	30	0	5,204	34	400	1,600	7,238
Fuel Tanks 2-500Gal	10,975	15	768	1,022	5	59	220	1,305
Solid Set Sprinkler w/ Filter	111,000	30	7,770	7,104	50	594	2,220	9,968
Land Walnuts	1,440,000	30	1,440,000	72,000	1,218	14,400	0	87,618
Pump/Well 60Ac	70,000	30	0	4,554	30	350	1,400	6,333
Shop/Field Tools	15,000	15	1,500	1,376	7	83	300	1,765
Bait Stations (60)	510	5	0	118	0	3	10	131
Orchard Establishment	706,260	21	0	55,086	299	3,531	706	59,622
TOTAL INVESTMENT	2,433,745	-	1,450,038	146,462	1,643	19,419	6,456	173,980

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	60.00	acre	6.40	384
Office Expense	60.00	acre	75.00	4,500
Regulatory Fees	60.00	acre	5.26	316
Sanitation Service	60.00	acre	5.00	300

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 7. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY NORTH - 2017

Yr.	Description	Walnuts Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating		Total Costs/Hr.	
					Insurance	Taxes	Lube & Repairs	Fuel		Total Oper.
17	Pickup Truck 1/2 T	120	400	7.19	0.03	0.35	3.48	7.30	10.78	18.35
17	Weed Sprayer 100 G	54	150	2.31	0.01	0.12	1.34	0.00	1.34	3.78
17	90 HP 4WD Tractor	61	1066	2.97	0.02	0.20	3.47	12.91	16.37	19.57
17	Mower Flail 10'	55	200	4.16	0.02	0.21	5.83	0.00	5.83	10.21
17	ATV-Mule	114	166	3.16	0.02	0.20	0.83	1.19	2.02	5.40
17	Sweeper/Blower	9	250	13.67	0.07	0.82	2.50	8.76	11.26	25.82

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 8. WALNUT OPERATIONS WITH EQUIPMENT & MATERIAL INPUTS
 SAN JOAQUIN VALLEY NORTH - 2017

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Well & Water Test	Jan			Well/Water Test	0.02	each
Pruning: Alt. Year	Jan			Prune (Alt Yrs.)	1.00	acre
Pruning: Stack and Shred	Feb			Stack&Shred Prunings Alt Yr.	1.00	acre
Disease: Scale	Mar			Seize 35 WP	5.00	oz
Weeds: Spring Strip	Mar		ATV-Mule	Spray Ground - Air Blast Sprayer	1.00	acre
				Equipment Operator Labor	0.22	hour
				Prowl H2O	4.00	pt
Irrigate 10X	Apr		Weed Sprayer 100 G	Roundup PowerMax	2.00	pt
				Non-Machine Labor	0.12	hour
	Water - Pump			4.20	acin	
	May			Non-Machine Labor	0.24	hour
				Water - Pump	8.40	acin
	June			Non-Machine Labor	0.24	hour
				Water - Pump	8.40	acin
	July			Non-Machine Labor	0.24	hour
				Water - Pump	8.40	acin
	Aug			Non-Machine Labor	0.24	hour
Water - Pump		8.40	acin			
Sept	Non-Machine Labor	0.12	hour			
	Water - Pump	4.20	acin			
Disease: Phytophthora	Apr			K-Phite	2.00	qt
	Oct			Spray Ground - Air Blast Sprayer	1.00	acre
Ground Squirrels	Apr			K-Phite	2.00	qt
				Spray Ground - Air Blast Sprayer	1.00	acre
Fertigate: UAN-32	Apr			Non-Machine Labor	0.17	hour
	May			Weevil-Cide (tablets)	16.00	each
	June			UAN32 (32-0-0)	40.00	lb N
	July			UAN32 (32-0-0)	40.00	lb N
	Aug			UAN32 (32-0-0)	40.00	lb N
	Aug			UAN32 (32-0-0)	40.00	lb N
Weeds: Mow Middles 5X	Apr	90 HP 4WD Tractor	Mower Flail 10'	Equipment Operator Labor	0.22	hour
	May	90 HP 4WD Tractor	Mower Flail 10'	Equipment Operator Labor	0.22	hour
	June	90 HP 4WD Tractor	Mower Flail 10'	Equipment Operator Labor	0.22	hour
	July	90 HP 4WD Tractor	Mower Flail 10'	Equipment Operator Labor	0.22	hour
	Aug	90 HP 4WD Tractor	Mower Flail 10'	Equipment Operator Labor	0.22	hour
Disease: Blight	Apr			Kocide 3000	10.00	lb
				Manex	2.34	oz
				Spray Ground - Air Blast Sprayer	1.00	acre
				Zinc Sulfate 36%	1.00	lb
Weeds: Summer Spot	May		ATV-Mule	Equipment Operator Labor	0.22	hour
				Roundup PowerMax	2.00	pt
				MSO (Oil Concentrate)	6.40	floz
	Aug			Treevix	1.00	floz
				Equipment Operator Labor	0.22	hour
				Roundup PowerMax	2.00	pt
Gophers: Weevil-Cide	May			MSO (Oil Concentrate)	6.40	floz
				Treevix	1.00	floz
				Non-Machine Labor	0.25	hour
Ground Squirrels: Bait	May			Weevil-Cide (tablets)	20.00	each
				Non-Machine Labor	0.10	hour
				Ground Squirrel Bait	3.60	lb
Insects: Codling Moth	June			Non-Machine Labor	0.20	hour
				Ground Squirrel Bait	7.20	lb
Disease: Botryosphaeria	June			Altacor 35 WG	4.50	oz
				Spray Ground - Air Blast Sprayer	1.00	acre
Leaf Tissue Analysis	July			Pristine	14.50	floz
Insects: CM/WHF/Aphid	July			Spray Ground - Air Blast Sprayer	1.00	acre
				Leaf Analysis	0.05	each
				Assail 30 SG	6.00	oz
Weeds: Pre-Harvest	July		ATV-Mule	Nu-Lure Bait	3.00	pt
				Onager	24.00	oz
				Spray Ground - Air Blast Sprayer	1.00	acre
Insects: WHF (Alt. Row)	Aug		Weed Sprayer 100 G	Equipment Operator Labor	0.22	hour
				Roundup PowerMax	2.00	pt
				Goal 2XL	16.00	floz
				Assail 30 SG	6.00	oz

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 8. CONTINUED
 SAN JOAQUIN VALLEY NORTH - 2017

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Clear Berms of Plant	Nov		Sweeper/Blower	Nu-Lure Bait	3.00	pt
				Spray Ground - Air Blast Sprayer	0.50	acre
Weeds: Fall Strip Spray	Nov		ATV-Mule	Equipment Operator Labor	0.17	hour
				Alion	3.50	floz
				Roundup PowerMax	2.00	pt
				Matrix SG	4.00	oz
Pickup Truck Use	Nov		Pickup Truck 1/2 T	Equipment Operator Labor	2.40	hours
ATV Use	Nov		ATV-Mule	Equipment Operator Labor	1.20	hours
Harvest & Haul	Sept			ShkSwpPkHl MatOrch	6,000.00	lb
Hull & Dry	Sept			Dry/Hull	6,000.00	lb
CA Walnut Commission	Sept			CA Walnut Commission	6,000.00	lb