
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2001

SAMPLE COSTS TO ESTABLISH
A WALNUT ORCHARD AND PRODUCE

WALNUTS



NORTHERN SAN JOAQUIN VALLEY

Late leafing – lateral bearing
Sprinkler irrigation

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INTRODUCTION

The sample costs to establish a walnut orchard and produce walnuts under sprinkler irrigation in the Northern San Joaquin Valley are presented in this study. This study is intended as a guide only, and can be used in making production decisions, determining potential returns, preparing budgets and evaluating production loans. Practices described are based on those production practices considered typical for the crop and area, but will not apply to every situation. Sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided to enter your costs.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589 or your local UC Cooperative Extension office.

Sample Cost of Production Studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1515. Current studies, those produced during the last five years, can be obtained from selected county UC Cooperative Extension offices or downloaded from the department website <http://www.agecon.ucdavis.edu/outreach/crop/cost.htm>.

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ASSUMPTIONS

The following assumptions pertain to costs to establish a walnut orchard and produce walnuts in the Northern San Joaquin Valley. Practices described should not be considered recommendations by the University of California, but are production procedures considered typical for the crop and area. Costs and practices described in this study may not be applicable to all situations. Establishment and cultural practices for walnut production vary by grower and region, and can be significant. The practices and inputs used in this cost study serve only as a sample or guide. The costs are presented on an annual, per acre basis. **The use of trade names 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.**

Land. The hypothetical farm consists of 100 contiguous acres of land. Of that, 40 acres are being established to walnuts, 20 are in mature walnuts, 35 are planted to other crops (almonds, grapes, sweet potatoes, tomatoes, and/or beans) and 5 acres are roads, irrigation system and farmstead.

Trees. The walnut trees are a late leafing, lateral bearing variety grown on paradox rootstock. The trees are planted on a 28' X 28' spacing, 56 trees per acre. Walnut trees have a long production life if they are well maintained. The life of the orchard at the time of planting in this study is estimated to be 30 years.

Irrigation System. Water cost for irrigation is a blend of district and pumped water. Price per acre-foot for water will vary among growers in this region depending on the irrigation district, the various well characteristics, and other irrigation factors. In this study, water is calculated to cost \$37.80 per acre-foot. The amount of water applied to the orchard during the establishment period varies each year and is shown in Table A.

Table A. Water Use for Walnuts	
Year	Acre-inches/acre/year
1	20
2	20
3-5	36
6+	42

Establishment Cultural Practices and Material Inputs

Site Preparation. The orchard is being established on ground that had been previously planted to other non-tree crops. The land is assumed to be deep, well drained, and either a class I or II soil. The orchard site had previously been laser leveled for the production of other crops. Orchards that are planted on previous orchard ground will incur costs for removal of the existing orchard prior to planting.

Land preparation begins with subsoiling in two directions to a depth of 6 feet to break up any underlying hardpan or layered soils which would affect root and water penetration. Contract operators do the subsoiling. Following subsoiling the ground is disced twice to break up large clods. The site is then leveled and smoothed in two directions with a triplane. After leveling, an orchard site is usually fumigated with methyl bromide to control soil-borne pathogens and pests. Methyl Bromide fumigation cost have been steadily rising and the current cost of \$1,400 to \$1,600 per acre is expected to reach \$2,000 per acre in the near future. In this study, Telone C-17 a soil fungicide and nematicide is applied on 60% of the acres (tree row) at a cost of \$600 per acre. Berms are established and preemergence herbicides are applied for long-term weed control. All operations preparing the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

Planting. Planting the orchard starts by marking tree sites with a small nursery stake then digging holes, planting trees, and staking trees. Later trunks are treated with white, water-based paint to protect the trees from sunburn. In the second year, 2% of the trees or an average of 1.12 trees per acre will be replaced.

Pruning. New trees are topped soon after planting so that trunk development is encouraged. Trees are pruned annually in years 1 through 6 to develop the permanent structural framework of the trees. Pruning is done mainly in the winter months. Costs shown for pruning in years 1 and 2 include a small amount of summer pruning to train the tree trunk and remove rootstock suckers and other unwanted growth.

Fertilization. Nitrogen is the major nutrient required for proper tree growth and optimum yields. Nitrogen fertilizer as UN-32 is applied through the irrigation water at increasing rates during orchard establishment. Annual rates of actual N are shown in Table B.

Table B. Applied Nitrogen during Establishment Years

Year	Pounds of N/acre	Gallons of UN-32/acre
1	8	2.2
2	20	5.6
3	30	8.5
4	50	14.1
5	100	28.2
6	100	28.2
7+	150	42.2

Frost Protection. In many orchard crops the use of mechanical aids or irrigation water for frost protection is essential. For English walnuts, however, cover crop management during the spring blossom period of March and April provides this protection. Orchards that keep floor vegetation as low as possible or free of vegetation collect more heat during the day and lose it much slower during the night than those with a heavy cover.

Weeds. Chemical weed control is done in the fall with preemergence herbicides, Goal and Surflan, sprayed on the berms (tree rows). In the spring and summer a contact herbicide, Roundup, is used to control emerged weeds as 'spot sprays' on approximately 20% of the orchard where needed. Discing and mowing the orchard floor are used to control weeds in this study, though orchard cultivators or other tillage equipment might also be used.

Insects and Diseases. During the establishment years, pest and disease controls are minimal. In this study, mites are treated beginning the first year. Walnut blight, a major disease, is caused by a bacterium, which infects nuts and young leaves. Affected fruit can drop from the tree or produce shrunken or stained kernels. Copper based bactericide Kocide and Manex fungicide are used to control walnut blight beginning the fifth year. In the sixth year a single application of Lorsban or Imidan is applied to control codling moth. Additional costs may be incurred if walnut husk fly and walnut aphid control is needed.

Production Cultural Practice and Material Inputs

Cultural practices for the production of walnuts 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, and planting density as determined by row spacing. In this study, pruning is done in alternate years during the winter months using mechanical towers. One-half of the cost is charged to the operation each year. Prunings are pushed out of the orchard by a tractor using a brush rake and burned. Due to environmental regulations, in the future burning will probably be banned and the prunings will be shredded in the field. Since trees in this orchard are planted at their final spacing tree thinning is not required.

Fertilization. Nitrogen is applied at a rate of 150 pounds of N per acre with 66% applied in April and 34% in June. The liquid fertilizer, UN-32, is applied through the irrigation system. Fertilizer rates should be adjusted according to need as indicated through tissue testing.

Pest Management. For specific pesticide choices and rates consult the *UC IPM Pest Management Guidelines: Walnuts*, and the *Walnut Production Manual*. For more information on pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. Written recommendations are required for many pesticides and are made by licensed pest control advisors. For information and pesticide use permits, contact the local county agricultural commissioner's office.

Weeds. Weeds in mature orchards are controlled with the same combination of chemical and cultural (mowing) practices as when being established. Weeds are controlled in the tree row with a fall strip spray of preemergence herbicides Goal and Surflan. Weeds not controlled by the fall spray receive 3 spot sprays with a contact herbicide, Roundup, during the growing season. Mowing the vegetation in the row middles in March, and April also provides frost protection.

Insect and Disease. Several insect and disease pests are treated each year. In this study mites are controlled in June with Omite. Codling moth is the most significant insect pest of early blooming varieties. Multiple generations occur and are controlled based on careful monitoring of the population. In this study, codling moth is controlled with two applications, one each of Lorsban and Imidan.

Harvest. Harvest starts in the fourth or fifth year after the orchard is planted depending on variety and tree growth and reaches yield maturity in the tenth year. In the first two years of harvest the orchard is hand harvested because the trees are not large enough to tolerate mechanical harvesting. Subsequently, trees are mechanically harvested. Custom harvest operators normally charge by the hour. For this study the charges are converted to pound or acre costs based on clean, dry, in-shell tons. In this cost study, the crop is harvested and hauled by a contracted harvesting company. The grower pays the drying costs.

The study assumes that the orchard is harvested twice. The first pick usually collects 80% of the walnuts. The second pick harvests the remaining walnuts about a week or two later. Mechanical harvesting begins by shaking the tree trunk or branches to remove the walnuts. The sweeper windrows the walnuts into the middle of the orchard row so that the mechanical harvester can pick them up to dump into trailers. The walnuts are hauled from the orchard to a hulling and dehydrating facility. After drying, the walnuts are sold to processors. For growers that own harvesting equipment, the equipment used for harvesting operations is added to the equipment and investment inventories in Table 5 and custom harvest charges replaced in harvest costs in Tables 2 and 3, with the grower's harvest and hauling costs.

Assessments. Under state law, the California Walnut Commission (CWC) collects mandatory assessment fees from growers to pay for walnut marketing and advertising programs. The CWC has a current fee of \$0.01 per in-shell pound of nuts.

Yields. As noted in the previous section, English walnuts often begin bearing an economic crop in the fourth year after planting. Typical annual yields for English varieties are measured in clean, dry, in-shell tons or pounds per acre and are shown in Table C. The yields are from the fourth year of orchard establishment to maturity.

Table C.

Yield Year	Annual Yield Per Acre	
	Yield (dry in-shell)	
	ton/acre	pound/acre
4	0.15	300
5	0.35	700
6	0.75	1,500
7	1.75	3,500
8+	2.00	4,000

Returns. An estimated price of a \$0.70 per pound in-shell of English walnuts is used in this study. A ranging analysis showing returns at various yields and prices is shown in Table 7.

Labor. Hourly wages for workers are \$9.00 per hour for skilled labor and \$6.75 per hour for field labor. Adding 34% for the employers share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$12.06 per hour for skilled labor, and \$9.05 per hour for field labor. Labor for operations involving machinery are 20% 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 repair.

Risk. The risks associated with producing and marketing walnuts 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 the profitability and economic viability of English walnut production. Due to the risks involved, a market channel should be determined before walnut orchards are planted and brought into production.

Overhead

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 include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, and equipment repairs. Cash overhead costs are included in Tables 1-5.

Property Taxes. Counties charge a base property tax rate of 1% 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% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis. Salvage value for investments will vary.

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 10.51% per year. A nominal interest rate is the typical market cost of borrowed funds.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.666% of the average value

of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$509 for the entire farm.

Office Expense. Office and business expenses are estimated at \$50 per acre or \$4,750 for the farm. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

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.

Sanitation Services. Sanitation services provide portable toilet units with washing facilities for the orchard and cost the farm \$1,236 annually. The cost includes delivery and weekly servicing of the units.

Irrigation System. The system cost is based on a solid set 40-acre sprinkler system, installed prior to planting. Well and surface water was already available and is not included in the cost. The cost of the system is based on a 75-hp electric pump motor that is available for use on the entire farm, to pump from a well depth of 115 feet. The water is pumped through a filtration system and into the underground solid set (or “impact”) sprinkler system. A pressure of 50 psi is maintained at the pump and an 85% irrigation efficiency. These are full coverage systems and wet the entire orchard floor. The sprinkler heads are located in the tree row and are operated as two 20-acre sets. No assumption is made about effective rainfall. The life of the irrigation system is estimated at 30 years.

Non-Cash Overhead. Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Although farm equipment on walnut orchards in the Northern San Joaquin Valley might be purchased new or used, this study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs (equipment and investments) are shown in Tables 1 to 3, and 5. They represent the capital recovery cost for investments on an annual per acre basis.

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). Put another way, 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 calculation for the annual capital recovery costs is as follows:

$$\left[\left(\frac{\text{Purchase Price} - \text{Salvage Value}}{\text{Price Value}} \right) \times \left(\frac{\text{Capital Recovery}}{\text{Factor}} \right) \right] + \left[\frac{\text{Salvage Value} \times \text{Interest Rate}}{\text{Value Rate}} \right]$$

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 Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wearout life, as given by ASAE 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 equal to the purchase price because land does not depreciate. The purchase price and salvage value for certain equipment and investments are shown in

Table 5.

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 and the life of the equipment.

Interest Rate. The interest rate of 6.70% used to calculate capital recovery cost is the United States Department of Agriculture-Economic Reporting Service's (USDA-ERS) ten year average of California's agricultural sector long-run real rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector, not including inflation. In other words, the next best alternative use for these resources is in another agricultural enterprise.

Land Value. Property cost \$6,000 per acre or \$6,315 per producing acre for Class I soil.

Establishment Cost. The cost to establish the orchard is used to determine non-cash overhead expenses, depreciation, and interest on investment for production years. The establishment cost are the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing walnut trees through the first year fruit is harvested. 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 \$4,650 per acre or \$186,000 for the 40-acre orchard. Orchard establishment cost is amortized over the remaining 26 years of the 30 years that the orchard is assumed to be in production.

Equipment Cash Costs. 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 fuel, lubrication, and repairs. In allocating equipment costs on a per acre basis, the hourly charges are calculated first and shown in Table 6. 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 6 for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time (Operation Time) for a given operation to account for fueling, moving equipment, and setup time.

Repair, Fuel, Lube. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. Prices for on-farm delivery of diesel and gasoline are \$1.26 and \$1.51 per gallon, respectively.

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

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For information concerning the above mentioned University of California publications contact UC DANR Communications Services (1-800-994-8849) or your local county Cooperative Extension office.

Table 1. U.C. COOPERATIVE EXTENSION
SAMPLE COSTS PER ACRE TO ESTABLISH A WALNUT ORCHARD
NORTHERN SAN JOAQUIN VALLEY - 2001

Year	Cost Per Acre						
	1st	2nd	3rd	4th	5th	6th	7th
Yield: Field Run - Pounds Per Acre				300	700	1,500	3,500
Planting Costs:							
Land Preparation - Subsoil	350						
Land Preparation - Disc 2X	8						
Land Preparation - Triplane 2X	85						
Land Preparation - Fumigate (Telone 60% strip)	600						
Weed Control - Preplant Herbicide	54						
Land Preparation - Make berms	3						
Trees: 56 Per Acre @ \$14.00 ea., (2% in 2nd year)	784	16					
Survey, Mark, Dig Holes & Plant	98	1					
Paint & Stake Trees	88	1					
TOTAL PLANTING COSTS	2,070	18					
Cultural Costs:							
Pruning	5	10	23	41	59	88	88
Brush Disposal			6	44	44	44	44
Weed Control - Spot Spray (2X Yrs 2 & 3, 3X Yrs 4+)	7	14	14	20	20	20	20
Weed Control - Winter Strip Spray	48	48	48	48	48	48	48
Disease Control - Walnut Blight					140	151	145
Disc 3X	12	12	12				
Mow 5X				17	17	17	17
Rodent Control	9	9	9	9	9	9	9
Irrigate 10X - Fertilize	120	125	129	178	198	217	217
Insect Control - Mites	23	24	24	60	60	60	60
Insect Control - Codling Moth						53	53
Leaf Analysis					2	2	2
Pickup Truck Use	105	85	85	85	85	85	85
TOTAL CULTURAL COSTS	329	327	350	502	682	794	788
Harvest Costs:							
Hand Pick				130	354		
Shake, Pickup, Haul (1st pick) 80% crop						158	158
Shake, Pickup, Haul (2nd pick) 20% crop						94	94
Hull, Dry				16	37	80	185
California Walnut Commission Assessment Fee				3	7	15	35
TOTAL HARVEST COSTS				149	398	347	472
Interest On Operating Capital @ 10.71%	229	13	13	19	30	35	36
TOTAL OPERATING COSTS/ACRE	2,628	358	363	670	1,110	1,176	1,296
Cash Overhead Costs:							
Office Expense	50	50	50	50	50	50	50
Sanitation Fees	13	13	13	13	13	13	13
Liability Insurance	5	5	5	5	5	5	5
Property Taxes	74	73	74	75	98	99	99
Property Insurance	49	49	49	50	65	66	66
Investment Repairs	19	19	19	19	19	19	19
TOTAL CASH OVERHEAD COSTS	210	209	210	212	250	252	252
TOTAL CASH COSTS/ACRE	2,838	567	573	882	1,360	1,428	1,548
INCOME/ACRE FROM PRODUCTION				210	490	1,050	2,450
NET CASH COSTS/ACRE FOR THE YEAR	2,838	567	573	672	870	378	
PROFIT/ACRE ABOVE CASH COSTS							902
ACCUMULATED NET CASH COSTS/ACRE	2,838	3,405	3,978	4,650	5,520	5,898	4,996

U.C. COOPERATIVE EXTENSION
Table 1. continued

Year	Cost Per Acre						
	1st	2nd	3rd	4th	5th	6th	7th
Yield: Field Run - Pounds Per Acre				300	700	1,500	3,500
Non-Cash Overhead Costs (Capital Recovery)							
Pumping Plant	12	12	12	12	12	12	12
Sprinkler Irrigation System (Impact)	78	78	78	78	78	78	78
Land @ \$6,315/Producing Acre	423	423	423	423	423	423	423
Shop Building	38	38	38	38	38	38	38
Shop Tools	14	14	14	14	14	14	14
Pruning Tools	1	1	1	1	1	1	1
Equipment	54	35	40	59	58	75	78
TOTAL CAPITAL RECOVERY	620	601	606	625	624	629	644
TOTAL COST/ACRE FOR THE YEAR	3,458	1,168	1,179	1,507	1,984	2,060	2,192
INCOME/ACRE FROM PRODUCTION				210	490	1,050	2,450
TOTAL NET COST/ACRE FOR THE YEAR	3,458	1,168	1,179	1,297	1,494	1,010	
NET PROFIT/ACRE ABOVE TOTAL COST							258
TOTAL ACCUMULATED NET COST/ACRE	3,458	4,626	5,805	7,102	8,596	9,606	9,348

Table 2.

UC COOPERATIVE EXTENSION
COSTS PER ACRE TO PRODUCE WALNUTS
Northern San Joaquin Valley - 2001

Operation	Operation	Cash and Labor Costs per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Cultural:								
Pruning	4.00	58	26	0	0	84		
Brush Disposal	0.50	39	5	0	0	44		
Weed Control - Spot Spray 3X	0.75	11	3	6	0	20		
Irrigate 10X	5.00	45	0	132	0	178		
Fertilize - Nitrogen 2X	0.00	0	0	59	0	59		
Rodent Control	0.20	3	1	6	0	9		
Weed Control - Mow 5X	0.63	9	7	0	0	17		
Disease Control - Blight 3X	0.00	0	0	93	53	145		
Insect Control - CM 2X	0.00	0	0	81	35	116		
Pest Control - Mites	0.00	0	0	43	18	60		
Pickup Truck Use	4.20	61	25	0	0	85		
Weed Control - Preemergent	0.25	4	1	43	0	48		
TOTAL CULTURAL COSTS	15.53	229	68	462	105	864		
Harvest:								
Shake, pickup, haul 80% crop	0.00	0	0	0	158	158		
Shake, pickup, haul 20% crop	0.00	0	0	0	94	94		
Hull, Dry	0.00	0	0	0	212	212		
CA Walnut Commission	0.00	0	0	40	0	40		
TOTAL HARVEST COSTS	0.00	0	0	40	464	504		
Interest on operating capital @ 10.51%						39		
TOTAL OPERATING COSTS/ACRE		229	68	502	569	1,407		
Cash Overhead:								
Office Expense						50		
Liability Insurance						5		
Sanitation Fees						13		
Property Taxes						98		
Property Insurance						65		
Investment Repairs						19		
TOTAL CASH OVERHEAD COSTS						250		
TOTAL CASH COSTS/ACRE						1,657		
Non-cash Overhead:								
Investment	Per producing			Annual Cost				
	acre			Capital Recovery				
Land	6,315			423		423		
Buildings	411			38		38		
Establishment Costs	4,650			382		382		
Irrigation System - Sprinklers	1,000			78		78		
Irrigation System - Pump/Filters	158			12		12		
Shop Tools	136			14		14		
Pruning Tools	3			1		1		
Equipment	490			59		59		
TOTAL NON-CASH OVERHEAD COSTS	13,164			1,009		1,009		
TOTAL COSTS/ACRE						2,665		

Table 3. UC COOPERATIVE EXTENSION
COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
NORTHERN SAN JOAQUIN VALLEY - 2001

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Walnuts	4,000.00	lb	0.70	2,800	
OPERATING COSTS					
Herbicide:					
Roundup Ultra	1.00	pt	5.68	6	
Surflan 4 AS	1.15	qt	22.56	26	
Goal 2XL	1.15	pt	15.01	17	
Fungicide/Bactericide:					
Kocide 101	18.00	lb	2.55	46	
Manex	19.20	pt	2.44	47	
Insecticide:					
Lorsban 4 E	4.00	pt	6.86	27	
Imidan 70WSP	6.00	lb	8.89	53	
Miticide:					
Omite 30 WP	6.00	lb	7.15	43	
Rodenticide:					
Rodent Bait-Wilco	1.00	lb	5.62	6	
Fertilizer:					
UN-32	150.00	lb N	0.39	59	
Irrigation:					
Water	42.00	acin	3.15	132	
Assessment:					
CA Walnut Commission	4,000.00	lb	0.01	40	
Custom:					
Spray Walnuts	6.00	acre	17.50	105	
Shake Nuts	2.00	acre	35.00	70	
Sweep Nuts	2.00	acre	20.00	40	
Pickup Nuts	2.00	acre	56.00	112	
Haul Nuts	2.00	acre	15.00	30	
Hull and Dry	4,000.00	lb	0.05	212	
Labor (machine)	12.63	hrs	12.06	152	
Labor (non-machine)	8.50	hrs	9.05	77	
Fuel - Gas	10.51	gal	1.51	16	
Fuel - Diesel	20.62	gal	1.26	26	
Lube				6	
Machinery repair				20	
Interest on operating capital @ 10.51%				39	
TOTAL OPERATING COSTS/ACRE				1,407	
NET RETURNS ABOVE OPERATING COSTS				1,393	
CASH OVERHEAD COSTS:					
Office Expense				50	
Liability Insurance				5	
Sanitation Fees				13	
Property Taxes				98	
Property Insurance				65	
Investment Repairs				19	
TOTAL CASH OVERHEAD COSTS/ACRE				250	
TOTAL CASH COSTS/ACRE				1,657	

UC Cooperative Extension
Table 3 continued

	Quantity		Price or	Value or	Your
	/Acre	Unit	Cost/Unit	Cost/Acre	Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Land				423	
Buildings				38	
Establishment Costs				382	
Irrigation System - Sprinklers				78	
Irrigation System - Pump/Filters				12	
Shop Tools				14	
Pruning Tools				1	
Equipment				59	
TOTAL NON-CASH OVERHEAD COST/ACRE				1,009	
TOTAL COSTS/ACRE				2,665	
NET RETURNS ABOVE TOTAL COSTS				135	

Table 4.

UC COOPERATIVE EXTENSION
MONTHLY CASH COSTS PER ACRE TO PRODUCE WALNUTS
NORTHERN SAN JOAQUIN VALLEY - 2001

Beginning JAN 01	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 01	01	01	01	01	01	01	01	01	01	01	01	01	
Cultural:													
Pruning	84												84
Brush Disposal	44												44
Weed Control - Spot Spray				7	7		7						20
Irrigate 10X				18	36	40	36	31	18				178
Fertilize - Nitrogen 2X				29				29					59
Rodent Control				9									9
Weed Control - Mow 5X				3	3	3	3	3					17
Disease Control - Blight				89	56								145
Insect Control - CM 2X					45		71						116
Pest Control - Mites						60							60
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	85
Weed Control - Preemergent												48	48
TOTAL CULTURAL COSTS	135	7	7	162	154	111	123	71	25	7	55	7	864
Harvest:													
Shake, pickup, haul 80% crop									158				158
Shake, pickup, haul 20% crop									94				94
Hull & Dry									212				212
CA Walnut Commission									40				40
TOTAL HARVEST COSTS									504				504
Interest on operating capital	1	1	1	3	4	5	6	7	11	0	-1	0	39
TOTAL OPERATING COSTS/ACRE	136	8	8	165	158	116	129	77	540	7	54	7	1,407
OVERHEAD:													
Office Expense	4	4	4	4	4	4	4	4	4	4	4	4	50
Liability Insurance	5												5
Sanitation Fees											13		13
Property Taxes	49						49						98
Property Insurance	33						33						65
Investment Repairs	2	2	2	2	2	2	2	2	2	2	2	2	19
TOTAL CASH OVERHEAD COSTS	92	6	6	6	6	6	87	6	6	6	19	6	250
TOTAL CASH COSTS/ACRE	228	14	14	171	163	122	217	83	546	12	73	13	1,657

UC COOPERATIVE EXTENSION
Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD
NORTHERN SAN JOAQUIN VALLEY - 2001

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
01	30 HP 2WD Tractor	17,699	12	4,425	1,941	74	111	2,125
01	90 HP 2WD Tractor	36,068	12	9,017	3,956	150	225	4,331
01	Bait Applicator	1,046	10	104	139	4	6	149
01	Brush Rake - 10'	1,584	25	45	132	5	8	145
01	Front End Loader	4,852	25	137	403	17	25	444
01	Mower/Chopper 8'	6,713	10	1,187	855	26	40	921
01	Pickup Truck 1/2 T	20,565	5	9,217	3,363	99	149	3,611
01	Pruning Tower	18,324	15	1,832	1,899	67	101	2,067
01	Weed Sprayer 100 G	3,550	10	628	452	14	21	487
TOTAL		110,401		26,592	13,141	456	685	14,282
60% of New Cost *		66,241		15,955	7,884	274	411	8,569

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Buildings	39,063	20		3,602	130	195	781	4,708
Establishment Costs	185,800	26		15,279	619	929	-	16,826
Land	600,000	30	600,000	40,200	3,996	6,000	-	50,196
Pruning Tools	200	3	20	70	1	1	50	121
Irrigation System - Sprinklers	40,000	30		3,127	133	200	267	3,727
Irrigation System - Pump/Filters	15,000	30		1,173	50	75	100	1,398
Shop Tools	12,903	15	1,161	1,343	47	70	232	1,692
TOTAL INVESTMENT	892,966		601,181	64,792	4,976	7,471	1,430	78,668

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	100	acre	4.55	455
Office Expense	95	acre	50.00	4,750
Sanitation Fees	95	acre	13.01	1,236

Table 6.

UC COOPERATIVE EXTENSION
HOURLY EQUIPMENT COSTS
NORTHERN SAN JOAQUIN VALLEY - 2001

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Capital Recovery	Cash Overhead			Operating		
				Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
01	30 HP 2WD Tractor	352.80	3.30	0.13	0.19	0.78	2.13	2.91	6.52
01	90 HP 2WD Tractor	349.60	6.79	0.26	0.39	1.58	6.40	7.98	15.42
01	Bait Applicator	24.00	3.48	0.10	0.14	0.40	0.00	0.40	4.12
01	Brush Rake - 10'	30.00	2.63	0.11	0.16	0.22	0.00	0.22	3.12
01	Front End Loader	80.00	3.02	0.12	0.19	0.68	0.00	0.68	4.02
01	Mower/Chopper 8'	125.10	4.10	0.13	0.19	3.17	0.00	3.17	7.59
01	Pickup Truck 1/2 T	400.00	5.04	0.15	0.22	1.52	4.34	5.86	11.28
01	Pruning Tower	266.00	4.28	0.15	0.23	1.57	4.35	5.92	10.58
01	Weed Sprayer 100 G	122.00	2.22	0.07	0.10	0.94	0.00	0.94	3.34

Table 7.

UC COOPERATIVE EXTENSION
RANGING ANALYSIS
NORTHERN SAN JOAQUIN VALLEY - 2001

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WALNUTS

	YIELD (lb/acre)						
	2,800	3,200	3,600	4,000	4,400	4,800	5,200
OPERATING COSTS/ACRE:							
Cultural Cost	864	864	864	864	864	864	864
Harvest Cost* (shake, pickup, haul, hull, dry)	400	422	443	464	485	506	528
Assessment	28	32	36	40	44	48	52
Interest on operating capital	38	38	38	39	39	39	39
TOTAL OPERATING COSTS/ACRE	1,330	1,356	1,381	1,407	1,432	1,457	1,483
TOTAL OPERATING COSTS/lb	0.48	0.42	0.38	0.35	0.33	0.30	0.29
CASH OVERHEAD COSTS/ACRE	250	250	250	250	250	250	250
TOTAL CASH COSTS/ACRE	1,580	1,606	1,631	1,657	1,682	1,707	1,733
TOTAL CASH COSTS/lb	0.56	0.50	0.45	0.41	0.38	0.36	0.33
NON-CASH OVERHEAD COSTS/ACRE	1,009	1,009	1,009	1,009	1,009	1,009	1,009
TOTAL COSTS/ACRE	2,589	2,615	2,640	2,666	2,691	2,716	2,742
TOTAL COSTS/lb	0.92	0.82	0.73	0.67	0.61	0.57	0.53

*Custom harvest cost charged by acre. Hulling charged by lb.

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR WALNUTS

\$/lb	YIELD (lb/acre)						
	2,800	3,200	3,600	4,000	4,400	4,800	5,200
0.49	42	212	383	553	724	895	1,065
0.56	238	436	635	833	1,032	1,231	1,429
0.63	434	660	887	1,113	1,340	1,567	1,793
0.70	630	884	1,139	1,393	1,648	1,903	2,157
0.77	826	1,108	1,391	1,673	1,956	2,239	2,521
0.84	1,022	1,332	1,643	1,953	2,264	2,575	2,885
0.91	1,218	1,556	1,895	2,233	2,572	2,911	3,249

NET RETURNS PER ACRE ABOVE CASH COSTS FOR WALNUTS

YIELD (lb/acre)							
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\$/lb	2,800	3,200	3,600	4,000	4,400	4,800	5,200
0.49	-208	-38	133	303	474	645	815
0.56	-12	186	385	583	782	981	1,179
0.63	184	410	637	863	1,090	1,317	1,543
0.70	380	634	889	1,143	1,398	1,653	1,907
0.77	576	858	1,141	1,423	1,706	1,989	2,271
0.84	772	1,082	1,393	1,703	2,014	2,325	2,635
0.91	968	1,306	1,645	1,983	2,322	2,661	2,999

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR WALNUTS

\$/lb	YIELD (lb/acre)						
	2,800	3,200	3,600	4,000	4,400	4,800	5,200
0.49	-1,217	-1,047	-876	-706	-535	-364	-194
0.56	-1,021	-823	-624	-426	-227	-28	170
0.63	-825	-599	-372	-146	81	308	534
0.70	-629	-375	-120	134	389	644	898
0.77	-433	-151	132	414	697	980	1,262
0.84	-237	73	384	694	1,005	1,316	1,626
0.91	-41	297	636	974	1,313	1,652	1,990