
1998

U.C. COOPERATIVE EXTENSION

SAMPLE COSTS

TO ESTABLISH AN WALNUT ORCHARD AND

PRODUCE

~WALNUTS~



SOUTHERN SAN JOAQUIN VALLEY

Prepared by:

Karen Klonsky

U.C. Cooperative Extension Economist, Department of
Agricultural and Resource Economics, U.C. Davis

Mark Freeman

U.C. Cooperative Extension Farm Advisor, Fresno County

Bob Beede

U.C. Cooperative Extension Farm Advisor, Kings County

G. Steven Sibbett

U.C. Cooperative Extension Farm Advisor, Tulare County

Pete Livingston

U.C. Cooperative Extension Staff Research Associate,
Department of Agricultural and Resource Economics, U.C.
Davis

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

1998

**SAMPLE COSTS TO
ESTABLISH AN WALNUT ORCHARD AND PRODUCE WALNUTS
Southern San Joaquin Valley**

INTRODUCTION

Detailed costs of establishing a walnut orchard and production of walnuts under surface irrigated conditions in the Southern San Joaquin Valley are presented in this study. The hypothetical farm used in this report is 60 acres, 55 of which are planted to walnuts.

This study consists of General Assumptions for Establishing a Walnut Orchard and Producing Walnuts and eight tables. It is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices detailed in this study may not be applicable to every situation. A blank, Your Cost, column is provided to enter your actual costs on Table 2 Costs Per Acre To Produce Walnuts and Table 3 Costs And Returns Per Acre to Produce Walnuts.

Tables included:

- Table 1. Costs Per Acre to Establish A Walnut Orchard
- Table 2. Costs and Returns Per Acre to Produce Walnuts
- Table 3. Costs Per Acre to Produce Walnuts
- Table 4. Monthly Cash Costs Per Acre to Produce Walnuts
- Table 5. Whole Farm Annual Equipment, Investment and Business Overhead
- Table 6. Hourly Equipment Costs
- Table 7. Ranging Analysis
- Table 8. Cost and Returns/Breakeven Analysis

This and other studies can be obtained through the Department of Agricultural Economics, U.C. Davis (530 752-1515), or from selected county Cooperative Extension offices. For an explanation of calculations or assumptions used in this study refer to the attached Assumptions or call the Department of Agricultural Economics, Cooperative Extension, University of California, Davis, California, (530) 752-3589 or the farm advisor in the county of interest.

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SAMPLE COSTS TO ESTABLISH AN WALNUT ORCHARD AND PRODUCE WALNUTS Southern San Joaquin Valley

ASSUMPTIONS

The following is a description of some general assumptions pertaining to sample costs of establishing a walnut orchard and producing walnuts in the Southern San Joaquin Valley. Practices described should not be considered recommendations by the University of California, but rather represent production procedures considered typical for this crop and area. Costs and practices detailed in this study may not be applicable to all situations. Establishment and cultural practices for the production of prunes vary by grower and region. Variations can be significant. The practices and inputs used in this cost study serve only as a sample or guide. These costs are represented 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 farm consists of 60 acres of land that was a prior orchard. Of that 55 acres are planted with walnuts and five acres are occupied by roads, irrigation systems and farmstead. The owner farms the orchard; additional management costs ranging from \$60 to \$100 per acre occur if practices are contracted. Property cost \$5,000 per acre. Because only 55 of the 60 acres is planted with walnuts land is valued at \$5,455 per producing acre. Land is not depreciated.

Trees. The English walnut trees are grown on paradox rootstock and the variety planted in this study is not specified. A few of the cultivars representing the majority of walnut acreage in California that might be planted include Hartley, Serr, Ashley, Tehama, Tulare, Vina, Chandler, Chico, and Sunland. The trees are planted at 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 40 years.

Irrigation System. Water cost for irrigation is a blend of district and pumped water. Price per acre-foot for water will vary from grower to grower in this region depending on particular irrigation district, and/or 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	Method	Acre-Inches/Acre/Year
1	Furrow	20
2	Furrow	20
3	Flood	48
4+	Flood	56

Table A represent the amounts of water applied due to physical constraints and irrigation efficiency. I the first two years water amounts indicate 10 irrigations applying 2 acre-inches per acre each time. Water is delivered to the orchard in furrows along the tree rows during the first two years. At the end of the second year borders are put up creating permanent berms down the tree rows. Beginning In the third year water is flooded between the tree rows. No assumption is made about effective rainfall. The life of the irrigation system is estimated at 40 years.

ESTABLISHMENT CULTURAL PRACTICES

Site Preparation. This orchard is established on ground that has been previously planted to other orchards. Other costs may be incurred for removal of existing orchards prior to planting. The land is assumed to be deep, well drained, and either a class I or II soil. The orchard site allows for a gravity water flow (i.e. flood or furrow irrigation).

Land preparation begins with deep subsoiling or slip plowing the soil profile to 5 to 6 feet in order to break up any underlying hardpan or layered soils which would affect root and water penetration. Subsoiling is performed by contract operators. Following subsoiling the ground is disced twice to break up large clods of soil in advance of leveling. The site is leveled so high and low spots are removed in order to allow for efficient irrigation. After leveling a company is contracted to fumigate the orchard site to control soil-borne pathogens and pests. Fumigation is performed on 100% of the acreage and is tarped because the land is assumed to formerly been in walnuts and close to housing. Later a soil residual herbicide is applied for long term weed control. The ground is then disced once more to incorporate the herbicide and prepare a smooth bed prior to planting trees. All operations preparing 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 holes are dug, trees planted, and staked. Later trunks are treated with white, water-based paint so trees are protected from sunburn. New trees are topped soon after planting so that trunk development is encouraged. Beginning in the sixth year half of the orchard is pruned and the remaining trees are pruned the next year. This begins alternate pruning and costs reflect pruning for only half of the orchard. Pruning is performed in the winter months. In the second year, 0.5% of the trees or 1 tree in every four acre will have to be replaced.

Fertilization. Nitrogen is the major nutrient required for proper tree growth and optimum yields. Nitrogen fertilizer is applied through the irrigation water in a liquid form, UN 32 (32% nitrogen), 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 UN32/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 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 defense. 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. In this study, frost protection systems are not used.

Pest Management. Chemical weed control for the orchard begins in the fall with a residual herbicide sprayed on tree rows. In spring and summer a contact herbicide, Roundup® is used to control emerged weeds as 'spot sprays' where needed. Tillage and mowing of row middles helps manage vegetation on the orchard floor. Discing and mowing are the mechanical weed control practice used in this study, though orchard cultivators or other tillage equipment might also be used.

During the developmental years, pest and disease control are minimal and in this study, not needed except for mites beginning the first year and worm starting the sixth year. Walnut blight, a major disease, is caused by a bacteria, which infects fruit and young shoots. Affected fruit can drop from the tree or produce shrunken or stained kernels. In this study, Kocide® (copper) is used to control walnut blight beginning the fourth year.

Two major insect pests, navel orangeworm and codling moth, are managed with treatments of Guthion® and Lorsban®. Both insects can cause major damage to nuts in different stages of development. Additionally, Omite® is mixed in with the Guthion® application and sprayed in order to control various species of mites.

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 Total Accumulated Net Cash Cost in the fourth year shown in Table 1, represents the establishment cost per acre. For this study, this cost is \$5,968 per acre or \$328,240 for the 55 acre orchard. Orchard establishment cost is amortized over the remaining 36 years of the 40 years that the orchard is assumed to be in production.

PRODUCTION CULTURAL PRACTICES

Cultural practices for the production of English walnuts vary from grower to grower and region to region. For additional information contact the farm advisor in the county of interest.

Pruning. There are many pruning strategies for walnut trees. Each is dependent on several factors such as walnut variety and planting density. In this study, pruning is done in the winter months with the use of mechanical towers. Prunings are pushed out of the orchard by a tractor using a brush rake and burned. Since trees in this orchard are planted at their final spacing tree thinning is not required.

Fertilization. Tree nitrogen status is determined by leaf analysis; sampling for analysis is done in July. Nitrogen is applied at a rate of 150 pounds of N per acre. Fertilizer is in a liquid form (UN 32 - 32% nitrogen) and applied in April and late June at 66% and 34% respectively.

Weed Control. Weeds in mature orchards are controlled with the same combination of chemical and cultural (mowing) practices as one being established. Pre-emergent weeds are controlled in the tree row during the fall by a strip spray of residual herbicide. Persistent weeds that are not controlled by the fall residual spray receive 3 spot sprays of a contact herbicide. Control of vegetation in March, and April provides needed frost protection.

Insect and Disease Management. Several insect and disease pests are treated each year. 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. The first generation usually occurs in April and in this study, is controlled with Lorsban[®]. The second occurs in June. Guthion[®] is used to control this hatch and is mixed with Omite[®] for control of mites.

In order to prevent nut damage to by mold and navel orangeworm at harvest, the growth regulator, Ethrel[®] is sprayed on the trees. This advances harvest to insure high quality.

Pesticides, rates, and cultural practices mentioned in this cost study are a few of those listed in the UC IPM Walnut Pest Management Guidelines, Integrated Pest Management For Walnuts, and Walnut Orchard Management. 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.

Harvest. Harvest starts in the fourth or fifth year after the orchard is planted depending on variety. The first 2 years the orchard yields walnuts, they are hand harvested because the trees are not large enough to tolerate mechanical harvesting. Subsequently, trees are mechanically harvested. All costs for contracted harvest operations are charged on clean, dry, inshell tons. Yield maturity is reached in the tenth year. In this cost study, the crop is harvested and hauled by a contracted harvesting company, although some growers harvest their walnuts themselves. The grower pays drying costs.

Mature walnut orchards are harvested twice. The first pick usually collects 80% of the nuts. The second pick harvests the remaining walnuts about a week or two later. Mechanical harvesting begins by shaking the tree trunk or branches to drop the nuts. The sweeper windrows the walnuts into the middle of the orchard row so that the mechanical harvester can pick them up to dump into field trailers. The walnuts are hauled from the field to a dehydrator for drying. After drying, the walnuts are sold to processors. For growers that own harvesting equipment, the equipment used for harvesting operations should be added to the equipment and investment inventories on Table 5 and custom harvest charges should be replaced in Harvest costs in Tables 1 and 2, with the cost of grower performed harvest and hauling costs.

Under a state marketing order, the California Walnut Commission (CWC) collects mandatory assessment fees. These assessments are charged to the grower to pay for walnut marketing and advertising programs. The CWC has a current fee of \$0.005 per pound or \$0.50 per cwt (hundredweight) of processed nuts and is shown in this study as a harvest cost.

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

Table C. Annual Yield Per Acre

Year	Yield (Tons/Acre)	Yield (Dry, Inshell Pounds/Acre)
4	0.15	300
5	0.35	700
6	0.75	1,500
7	1.75	3,500
8+	2.00	4,000

An estimated price of a \$0.65 per pound of English walnuts is used in this study so that a ranging analysis for different yields and price can be calculated. Returns, shown in Table 7, will vary and the yields and prices used in this cost study are an estimate taking into consideration current situations.

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.

Risk is caused by various sources of uncertainty which include production, price, and financial. Examples of these are insect damage, a decrease in price, or an increase in interest rates. Due to the risk involved, access to a market is crucial. A market channel should be determined before walnut orchards are planted and brought into production.

Labor. Hourly wages for workers are \$8.00 and \$5.75 per hour for skilled, and field workers respectively. Adding 34% for Workers Compensation, Social Security, Medicare insurance, and other possible benefits gives the labor rates shown of \$10.72 per hour for skilled labor, and \$7.71 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. Wages for management are not included as a cash cost. Returns above total costs are considered a return to management and risk.

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 10.46% per year. A nominal interest rate is the going 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 7.13% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$469 for the entire farm.

Office Expense Office and business expenses are estimated at \$100 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

Sanitation Services Sanitation services provide portable toilets for the orchard and cost the farm \$654 annually. This cost includes delivery and servicing of toilets.

Management Services Management services cost \$75 per acre.

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 Southern 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 1-3, 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 downpayment 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. The calculation for the annual capital recovery costs is as follows.

$$\frac{\text{Purchase Price} - \text{Salvage Value}}{2} \times \frac{\text{Capital Recovery Factor}}{\text{Factor}} + \frac{\text{Salvage Value}}{2} \times \frac{\text{Interest Rate}}{\text{Rate}}$$

Salvage Value. Salvage value is an estimate of the remaining market value of an investment at the end of its useful life. It is calculated differently for different investments. For farm machinery (e.g., tractors and implements) the remaining value is a percentage of the new cost of the investment. Salvage value is calculated as

$$\text{New Price} \times \% \text{Remaining Value}$$

Salvage value for other investments including irrigation systems, buildings, and miscellaneous equipment is zero. The salvage value for land is equal to the purchase price because land does not depreciate from use. The purchase price and salvage value for certain equipment and investments are shown in Table 4.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. It is the function of the interest rate and years of life of the equipment.

Interest Rate. The interest rate of 7.81% 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.

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.

Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. The fuel 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. Prices for on-farm delivery of diesel and gasoline are \$0.97 and \$1.30 per gallon, respectively.

Acknowledgment. Appreciation is expressed to those growers and other cooperators who provided support for this study.

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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 AN ENGLISH WALNUT ORCHARD
 SOUTHERN SAN JOAQUIN VALLEY - 1998

Year	Labor Rate:		Trees Per Acre: 56				
	\$10.72/hr. machine labor \$7.71/hr. non-machine labor		Long Term Interest Rate: 10.46%				
	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	\$250						
Land Preparation - Disc 2X	11						
Land Preparation - Laser Level	140						
Land Preparation - Fumigate	1,485						
Weed Control - Preplant Herbicide	31						
Land Preparation - Finish Disc	5						
Trees: 56 Per Acre @ \$14.41 ea., (0.5 in 2nd year)	807	\$7					
Survey, Mark, Dig Holes & Plant	98	1					
Paint & Stake Trees	38	1					
TOTAL PLANTING COSTS	2,865	9					
Cultural Costs:							
Pruning	6	20	\$35	\$50	\$60	\$43	\$43
Brush Disposal			14	14	14	14	14
Weed Control - Spot Spray (2X Years 1 & 2; 3X Years 3+)	16	16	23	23	23	23	23
Weed Control - Winter Strip Spray	9	9	9	9	9	9	9
Disease Control - Walnut Blight				44	44	44	44
Disc 3X	26	26					
Mow 4X			42	42	42	42	42
Furrow Out 3X	20	20					
Irrigate 10X	109	109	190	215	215	215	215
Fertilizer & Application	3	8	12	20	39	39	59
Insect Control - Mites & Worms	18	21	62	62	62	96	96
Insect Control - Worms						50	50
Harvest Aid & Application							59
Put Up Borders		6					
Leaf Analysis				1	1	1	1
Pest Control Advising				15	15	15	15
Pickup Truck Use	98	98	98	98	98	98	98
TOTAL CULTURAL COSTS	305	333	485	593	622	689	768

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
Harvest Costs:							
Hand Pick				29	228		
Shake, Pick & Haul (1st pick)						69	159
Shake, Pick & Haul (2nd pick)						74	114
Hull Dry & Deliver				13	30	64	149
California Walnut Commission Assessment Fee				2	4	8	18
TOTAL HARVEST COSTS				44	262	215	440
Postharvest Costs:							
Shake Mummies From Trees						22	22
Sweep Mummies To Row Centers						4	4
Shred Mummies						6	6
TOTAL POSTHARVEST COSTS						32	32
Interest On Operating Capital @ 10.46%	327	14	18	23	26	31	36
TOTAL OPERATING COSTS/ACRE	3,497	356	503	660	910	967	1,276
Cash Overhead Costs:							
Office Expense	109	109	109	109	109	109	109
Sanitation Fees	4	4	4	4	4	4	4
Liability Insurance	9	9	9	9	9	9	9
Management Services	75	75	75	75	75	75	75
Property Taxes	67	67	68	68	68	68	68
Property Insurance	48	48	48	48	48	48	48
Investment Repairs	39	39	39	39	39	39	39
TOTAL CASH OVERHEAD COSTS	351	351	352	352	352	352	352
TOTAL CASH COSTS/ACRE	3,848	707	855	1,012	1,262	1,319	1,628
INCOME/ACRE FROM PRODUCTION				195	455	975	2,275
NET CASH COSTS/ACRE FOR THE YEAR	3,848	707	855	817	807	344	
PROFIT/ACRE ABOVE CASH COSTS							647
ACCUMULATED NET CASH COSTS/ACRE	3,848	4,555	5,410	6,227	7,034	7,378	6,731

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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							
Land @ \$5,455/Producing Acre	450	450	450	450	450	450	450
Shop Building	74	74	73	73	73	73	73
Flood Irrigation System	63	63	63	63	63	63	63
Shop Tools	24	24	24	24	24	24	24
Pruning Tools	1	1	1	1	1	1	1
Equipment	90	92	88	88	88	88	88
TOTAL CAPITAL RECOVERY	702	704	699	699	699	699	699
TOTAL COST/ACRE FOR THE YEAR	4,550	1,411	1,554	1,711	1,961	2,018	2,327
INCOME/ACRE FROM PRODUCTION				195	455	975	2,275
TOTAL NET COST/ACRE FOR THE YEAR	4,550	1,411	1,554	1,516	1,506	1,043	52
NET PROFIT/ACRE ABOVE TOTAL COST							
TOTAL ACCUMULATED NET COST/ACRE	4,550	5,961	7,515	9,031	10,537	11,580	11,632

Table 2.

COSTS PER ACRE TO PRODUCE WALNUTS
SOUTHERN SAN JOAQUIN VALLEY -1998

Labor Rate: \$11.73/hr. machine labor Operating Capital Interest Rate: 10.46%
\$7.71/hr. non-machine labor Yield per Acre: 4000 Lb

Operation	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Pruning	0.00	0	0	0	43	43	
Brush Disposal	0.33	12	2	0	0	14	
Weed Control - Mow 4X	2.00	28	14	0	0	42	
Weed Control - Spot Spray 3X	0.75	11	5	7	0	22	
Disease Control - Walnut Blight	0.00	0	0	24	20	44	
Irrigate 10X	5.00	39	0	176	0	215	
Pest Control - Worms	0.00	0	0	30	20	50	
Fertilizer - Nitrogen	0.00	0	0	60	0	60	
Pest Control - Mites/Worms	0.00	0	0	71	25	96	
Leaf Analysis	0.00	0	0	0	1	1	
Harvest Aid & Application	0.00	0	0	40	20	59	
Weed Control - Residual	0.25	4	2	4	0	9	
Pickup Truck Use	5.18	73	25	0	0	98	
PCA Fee	0.00	0	0	0	15	15	
TOTAL CULTURAL COSTS	13.52	166	47	412	143	769	
Harvest:							
Shake, Pick & Haul - 1st Pick	0.00	0	0	0	182	182	
Shake, Pick & Haul - 2nd Pick	0.00	0	0	0	123	123	
Hull, Dry & Deliver	0.00	0	0	0	170	170	
CWC Assessment Fee	0.00	0	0	36	0	36	
TOTAL HARVEST COSTS	0.00	0	0	36	475	511	
Winter Sanitation:							
Shake Mummies	0.00	0	0	0	22	22	
Blow Mummies To Middle	0.00	0	0	0	4	4	
Shred Mummies	0.00	0	0	0	6	6	
TOTAL WINTER SANITATION COSTS	0.00	0	0	0	32	32	
Interest on operating capital @ 10.46%							36
TOTAL OPERATING COSTS/ACRE		166	47	448	650	1348	
CASH OVERHEAD:							
Office Expense							109
Liability Insurance							9
Sanitation Fees							4
Management Service							75
Property Taxes							99
Property Insurance							70
Investment Repairs							39
TOTAL CASH OVERHEAD COSTS							405
TOTAL CASH COSTS/ACRE							1753

Table 2. Continued

NON-CASH OVERHEAD:			
Investment	Per producing Acre	-- Annual Cost -- Capital Recovery (7.81% Interest Rate)	
Land	5455	426	426
Buildings	714	72	72
Walnut Orchard Establishment	6227	521	521
Flood Irrigation System	733	60	60
Shop Tools	206	23	23
Pruning Tools	4	1	1
Equipment	773	95	95
TOTAL NON-CASH OVERHEAD COSTS	14111	1198	1198
TOTAL COSTS/ACRE			2951

Table 3.

U C COOPERATIVE EXTENSION
 COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
=====					
GROSS RETURNS					
Walnuts	4000.00	Lb	0.65	2600	

TOTAL GROSS RETURNS FOR WALNUTS				2600	

OPERATING COSTS					
Winter Sanitation:					
Shake Mummies	1.00	Acre	22.00	22	
Blow Mummies	1.00	Acre	4.00	4	
Shred Mummies	1.00	Acre	6.00	6	
Custom:					
Pruning	0.50	Acre	85.00	43	
Application - Cat 2	3.00	Acre	20.00	60	
Application - Cat 1	1.00	Acre	25.00	25	
Leaf Analysis	1.00	Acre	1.00	1	
PCA Fee	1.00	Acre	15.00	15	
Herbicide:					
Roundup	1.00	Pint	6.88	7	
Princep Caliber 90	1.00	Lb	4.22	4	
Fungicide:					
Kocide	8.00	Lb	2.99	24	
Irrigation:					
Water	56.00	AcIn	3.15	176	
Insecticide:					
Lorsban 4 E	4.00	Pint	7.40	30	
Guthion 50W	3.00	Lb	11.36	34	
Fertilizer:					
UN-32	150.00	Lb N	0.393	60	
Acaracide:					
Omite 30 WP	6.00	Lb	6.16	37	
Harvest aid:					
Ethrel	5.00	Pint	7.90	40	
Contract:					
1st Pick - Tonnage	1.40	Ton	130.00	182	
2nd Pick - Tonnage	0.60	Acre	130.00	78	
2nd Pick - Ac Fee	1.00	Acre	45.00	45	
Hull & Dry	2.00	Ton	85.00	170	

Table 3. Continued

U C COOPERATIVE EXTENSION
 COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
=====					
Assessment:					
CWC Assessment Fee	40.00	Cwt	0.90	36	
Labor (machine)	10.22	Hrs	11.73	120	
Labor (non-machine)	6.00	Hrs	7.71	46	
Fuel - Gas	12.95	Gal	1.22	16	
Fuel - Diesel	13.68	Gal	0.78	11	
Lube				4	
Machinery repair				17	
Interest on operating capital @ 10.46%				36	

TOTAL OPERATING COSTS/ACRE				1348	

NET RETURNS ABOVE OPERATING COSTS				1252	

CASH OVERHEAD COSTS:					
Office Expense				109	
Liability Insurance				9	
Sanitation Fees				4	
Management Service				75	
Property Taxes				99	
Property Insurance				70	
Investment Repairs				39	

TOTAL CASH OVERHEAD COSTS/ACRE				405	

TOTAL CASH COSTS/ACRE				1753	

NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate):					
Land				426	
Buildings				72	
Walnut Orchard Establishment				521	
Irrigation System				60	
Shop Tools				23	
Pruning Tools				1	
Equipment				95	

TOTAL NON-CASH OVERHEAD COSTS/ACRE				1198	
TOTAL COSTS/ACRE				2951	

NET RETURNS ABOVE TOTAL COSTS				-351	
=====					

Table 4.

U C COOPERATIVE EXTENSION
MONTHLY CASH COSTS PER ACRE TO PRODUCE WALNUTS
SOUTHERN SAN JOAQUIN VALLEY - 1998

Beginning JAN 98	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 98	98	98	98	98	98	98	98	98	98	98	98	98	
Cultural:													
Pruning	43												43
Brush Disposal	14												14
Weed Control - Mow 4X				11	21	11							42
Weed Control - Spot Spray				7	7		7						22
Disease Control - Walnut Blight				44									44
Irrigate 10X				21	43	64	43	21	21				215
Pest Control - Worms				50									50
Fertilizer - Nitrogen				29		31							60
Pest Control - Mites/Worm						96							96
Leaf Analysis							1						1
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	8	98
Harvest Aid & Application								59					59
Weed Control - Residual											9		9
PCA Fee	1	1	1	1	1	1	1	1	1	1	1	1	15
TOTAL CULTURAL COSTS	66	9	9	172	81	211	61	90	31	9	18	9	769
Harvest:													
Shake, Pick & Haul - 1st									182				182
Shake, Pick & Haul - 2nd									123				123
Hull, Dry & Deliver									170				170
CWC Assessment Fee									36				36
TOTAL HARVEST COSTS									511				511
Winter Sanitation:													
Shake Mummies	22												22
Blow Mummies To Middle	4												4
Shred Mummies	6												6
TOTAL WINTER SANITATION COSTS	32												32
Interest on oper. capital	1	1	1	3	3	5	6	6	11	-0	-0	-0	36
TOTAL OPERATING COSTS/ACRE	99	10	10	174	84	216	66	97	553	9	18	9	1348
OVERHEAD:													
Office Expense	9	9	9	9	9	9	9	9	9	9	9	9	109
Liability Insurance	9												9
Sanitation Fees	0	0	0	0	0	0	0	0	0	0	0	0	4
Management Service									75				75
Property Taxes	49						49						99
Property Insurance	35						35						70
Investment Repairs	3	3	3	3	3	3	3	3	3	3	3	3	39
TOTAL CASH OVERHEAD COSTS	106	13	13	13	13	13	97	13	88	13	13	12	405
TOTAL CASH COSTS/ACRE	205	23	23	187	97	229	164	110	641	22	31	22	1753

Table 5.

U C COOPERATIVE EXTENSION
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

ANNUAL EQUIPMENT COSTS								
- Cash Overhead -								
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur- ance	Taxes	Total
98	76 HP 2WD Tractor	33855	15	6591	3663	144	202	4010
98	Brush Rake - 10'	1584	25	45	145	6	8	159
98	Front End Loader	4852	15	466	543	19	27	588
98	Mower - Flail 10'	8380	10	1482	1135	35	49	1219
98	Pickup Truck - 1/2 Ton	18200	7	6904	2695	90	126	2910
98	Weed Sprayer - 100 Gal	3947	10	698	535	17	23	574
TOTAL		70818		16186	8716	310	435	9461
60% of New Cost *		42491		9712	5229	186	261	5677

* Used to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS								
----- Cash Overhead -----								
Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur- ance	Taxes	Repairs	Total
INVESTMENT								
Buildings	39253	20		3942	140	196	785	5063
Irrigation System	40325	40		3313	144	202	1210	4868
Land	300000	40	300000	23430	2139	3000	0	28569
Pruning Tools	200	3	20	71	1	1	50	123
Shop Tools	11330	15	1133	1266	44	62	113	1486
Walnut Orchard Establishment	342485	36		28660	1221	1712	0	31594
TOTAL INVESTMENT	733593		301153	60682	3689	5174	2158	71703

ANNUAL BUSINESS OVERHEAD COSTS				
Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	60.00	Acre	7.81	469
Management Service	55.00	Acre	75.00	4125
Office Expense	60.00	Acre	100.00	6000
Sanitation Fees	55.00	Acre	4.00	220

Table 6.

U C COOPERATIVE EXTENSION
 HOURLY EQUIPMENT COSTS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

Yr Description	Actual Hours Used	COSTS PER HOUR						Total Costs/Hr.
		Capital Recovery	Cash Overhead Insurance	Taxes	Repairs	Operating Fuel & Lube	Total Oper.	
98 76 HP 2WD Tractor	201.7	10.90	0.43	0.60	1.39	3.35	4.74	16.67
98 Brush Rake - 10'	18.3	4.76	0.19	0.27	0.21	0.00	0.21	5.42
98 Front End Loader	18.3	17.77	0.62	0.87	0.67	0.00	0.67	19.93
98 Mower - Flail 10'	110.0	6.19	0.19	0.27	1.79	0.00	1.79	8.44
98 Pickup Truck - 1/2 Ton	285.0	5.67	0.19	0.26	1.32	3.51	4.83	10.96
98 Weed Sprayer - 100 Gal	55.0	5.83	0.18	0.25	1.04	0.00	1.04	7.31

Table 7.

U C COOPERATIVE EXTENSION
 RANGING ANALYSIS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

	COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WALNUTS							
	YIELD (LB/ACRE)							
	2500	3000	3500	4000	4500	5000	5500	
OPERATING COSTS/ACRE:								
Planting Cost	15	15	15	15	15	15	15	
Cultural Cost	754	754	754	754	754	754	754	
Harvest Cost	336	395	453	511	569	627	686	
Winter Sanitation Cost	32	32	32	32	32	32	32	
Interest on operating capital	35	35	36	36	37	37	38	
TOTAL OPERATING COSTS/ACRE	1172	1230	1289	1348	1407	1465	1524	
TOTAL OPERATING COSTS/LB	0.47	0.41	0.37	0.34	0.31	0.29	0.28	
CASH OVERHEAD COSTS/ACRE								
	405	405	405	405	405	405	405	
TOTAL CASH COSTS/ACRE	1577	1635	1694	1753	1812	1870	1929	
TOTAL CASH COSTS/LB	0.63	0.55	0.48	0.44	0.40	0.37	0.35	
NON-CASH OVERHEAD COSTS/ACRE								
	1198	1198	1198	1198	1198	1198	1198	
TOTAL COSTS/ACRE	2775	2834	2893	2951	3010	3069	3128	
TOTAL COSTS/LB	1.11	0.94	0.83	0.74	0.67	0.61	0.57	

Table 7. Continued

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR WALNUTS								
PRICE (DOLLARS/LB)	YIELD (LB/ACRE)							
Walnuts	2500	3000	3500	4000	4500	5000	5500	
0.50	78	270	461	652	843	1035	1226	
0.55	203	420	636	852	1068	1285	1501	
0.60	328	570	811	1052	1293	1535	1776	
0.65	453	720	986	1252	1518	1785	2051	
0.70	578	870	1161	1452	1743	2035	2326	
0.75	703	1020	1336	1652	1968	2285	2601	
0.80	828	1170	1511	1852	2193	2535	2876	

NET RETURNS PER ACRE ABOVE CASH COSTS FOR WALNUTS								
PRICE (DOLLARS/LB)	YIELD (LB/ACRE)							
Walnuts	2500	3000	3500	4000	4500	5000	5500	
0.50	-327	-135	56	247	438	630	821	
0.55	-202	15	231	447	663	880	1096	
0.60	-77	165	406	647	888	1130	1371	
0.65	48	315	581	847	1113	1380	1646	
0.70	173	465	756	1047	1338	1630	1921	
0.75	298	615	931	1247	1563	1880	2196	
0.80	423	765	1106	1447	1788	2130	2471	

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR WALNUTS								
PRICE (DOLLARS/LB)	YIELD (LB/ACRE)							
Walnuts	2500	3000	3500	4000	4500	5000	5500	
0.50	-1525	-1334	-1143	-951	-760	-569	-378	
0.55	-1400	-1184	-968	-751	-535	-319	-103	
0.60	-1275	-1034	-793	-551	-310	-69	172	
0.65	-1150	-884	-618	-351	-85	181	447	
0.70	-1025	-734	-443	-151	140	431	722	
0.75	-900	-584	-268	49	365	681	997	
0.80	-775	-434	-93	249	590	931	1272	

Table 8.

U C COOPERATIVE EXTENSION
 COSTS AND RETURNS / BREAKEVEN ANALYSIS
 SOUTHERN SAN JOAQUIN VALLEY - 1998

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COSTS AND RETURNS - PER ACRE BASIS

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Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Walnuts	2600	1348	1252	1753	847	2951	-351

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COSTS AND RETURNS - TOTAL ACREAGE

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Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Walnuts	143000	74128	68872	96410	46590	162321	-19321

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BREAKEVEN PRICES PER YIELD UNIT

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CROP	Base Yield (Units/Acre)	Yield Units	----- Breakeven Price To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Walnuts	4000.0	Lb	0.34	0.44	0.74

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BREAKEVEN YIELDS PER ACRE

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CROP	Yield Units	Base Price (\$/Unit)	----- Breakeven Yield To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Walnuts	Lb	0.65	2073.5	2696.8	4540.5

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