
1995

U.C. COOPERATIVE EXTENSION
SAMPLE COSTS
TO ESTABLISH A WALNUT ORCHARD AND PRODUCE
~WALNUTS~

English Variety & Sprinkler Irrigated
IN THE SACRAMENTO VALLEY

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U.C. COOPERATIVE EXTENSION

ESTABLISHING A WALNUT ORCHARD AND PRODUCING WALNUTS

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INTRODUCTION

Detailed costs of establishing a English walnut orchard and production of walnuts under sprinkler irrigated conditions in the Sacramento Valley are presented in this study. The hypothetical farm used in this report is 105 acres, 100 of which are being planted to walnuts.

This study consists of General Assumptions for Establishing an English Walnut Orchard and Producing English Walnuts and seven 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, Sample Costs To Produce English Walnuts** and **Table 3, Costs And Returns Per Acre to Produce English Walnuts**.

Tables included:

- Table 1. Costs Per Acre to Establish An English Walnut Orchard**
- Table 2. Costs Per Acre to Produce English Walnuts**
- Table 3. Monthly Cash Costs Per Acre to Produce English Walnuts**
- Table 4. Whole Farm Annual Equipment, Investment and Business Overhead**
- Table 5. Hourly Equipment Costs**
- Table 6. Ranging Analysis**
- Appendix 1. Detail of Costs Per Acre to Produce English Walnuts**

A companion study entitled, "Production Practices And Sample Costs For Organic Walnuts, Sacramento Valley, 1993 - 1995, Standard Spacing/Sprinkler Irrigated" is available for those interested in organic walnut production in the Sacramento Valley.

The study mentioned above and others can be requested through the Department of Agricultural Economics, U.C. Davis, or from selected county Cooperative Extension offices. For an explanation of calculations used for the study refer to the attached General Assumptions or call the Department of Agricultural Economics, Cooperative Extension, University of California, Davis, California, (530) 752-3563 or the farm advisor in the county of interest.

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GENERAL ASSUMPTIONS

The following is a description of some general assumptions pertaining to sample costs of English walnut orchard establishment and production in the Sacramento Valley. Practices described should not be considered recommendations by the University of California, but rather represent production procedures considered typical of a well managed orchard in this area. Some of these costs and practices may not be applicable to your situation nor used during every production year. Additional ones not indicated may be needed. Establishment and cultural practices for the production of walnuts 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.

1. LAND:

The farm consists of 105 acres of land. Of that 100 acres are planted with walnuts and five acres are occupied by roads, irrigation systems and farmstead. The orchard is farmed by the owner; additional management costs ranging from \$60 to \$100 per acre occur if practices are contracted. Property costs \$4,000 per acre. Because only 100 of the 105 acres is planted with walnuts land is valued at \$4,200 per producing acre.

2. TREES:

The specific varieties of English walnut trees planted in this study are not specified. A few of the cultivars representing the majority of walnut acreage in the Sacramento Valley that might be planted in this region include Chandler, Vina, Hartley, Tulare, and Howard. Most orchards will include a small percentage of a second variety to insure pollen shedding and bloom periods overlap. The rootstock most often used for the above mentioned varieties is Paradox. The trees are planted at 30' X 30' spacing, 48 trees per acre. Walnut trees have a long production life if well maintained. The life of the orchard at planting time in this study is estimated to be 40 years.

3. IRRIGATION SYSTEM:

Pumped water plus labor is the irrigation cost. The cost is based on using two 75 hp electric motors to pump 42 acre-inches from a depth of 75 feet over 100 acres. Water is pumped to the orchard after running through a filtration station into an underground, permanent sprinkler system in the tree rows. Since this was previously farmed open agricultural ground a pump and well already exist and the cost of the irrigation system is for the recasing of the well, refurbishment of the pump and motor in addition to the installation of a new filtration system and underground, permanent sprinklers. The new irrigation system is installed after the orchard has been laid out and prior to planting. The life of the irrigation system is estimated at 40 years.

The irrigation system is considered an improvement to the property and is not found as preplant operations in **Table 1**, establishment costs; rather it is shown in the non-cash overhead section of various tables and the Investments portion of **Table 5**. Since it is an investment it's cost appears as non-cash overhead: depreciation and interest on investment, and is separate from the orchard cash cost.

4. ESTABLISHMENT CULTURAL PRACTICES:

This orchard is established on ground that has been previously planted to other tree crops.

Site Preparation: Sample for nematodes prior to land preparation to determine the need for fumigation. Land preparation begins with deep ripping of the soil profile to 3 feet which breaks up any underlying hardpan to improve root and water penetration. The ground is disced once ripping has been completed. Discing helps break up large clods of soil and smooth the ground in advance of fumigation and tree planting. Following discing the ground is floated so high and low spots are removed in order to allow for uniform irrigation. If fumigation is needed a company is contracted. Both ripping and fumigation are performed by contract or custom operators. All operations that prepare the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

Planting, Training, And Pruning: Planting the orchard starts by surveying and marking tree sites with a small stake, holes are then dug, trees planted, topped, and staked. Before the trees are planted they are treated for control of crown gall. In the second year, 4% of the orchard or 2 trees per acre will have to be replanted. Regular training and pruning begins in the second year and hours required to perform these tasks as well as costs increase annually. Alternate year pruning begins in the 8th/9th years.

Fertilization: Nitrogen is the major nutrient required for proper tree growth and optimum yields. Nitrogen fertilizer is applied in a liquid form, UN 32 (32% nitrogen), at increasing rates during orchard establishment. Use of a liquid source of N allows it to be applied through the irrigation system. Annual rates of actual N are shown in **Table A**.

Year	Pounds Of N/Acre	Gallons Of UN 32/Acre
1	20	5.6
2	50	14.1
3	100	28.2
4	125	35.3
5	150	42.2
6+	200	56.4

Orchard Floor Management: Chemical weed control for the orchard begins immediately after planting with a pre-emergent residual strip spray followed later with a winter residual strip spray, both applied along tree rows. The second year adds additional herbicides for increased control. By the fourth year, winter residual herbicide costs decrease then remain the same for the balance of the orchard's life. Also in the fourth year an in-season, foliar-applied strip spray is added to provide longer control of orchard weeds down the tree rows. Since all strip sprays are applied only to an eight foot strip along the Tree rows they are effectively used on 27% of the total acreage.

Mowing is the mechanical weed control practice used to manage row middles. Five passes are made during the growing season.

Irrigation: Price per acre foot of water will vary by grower in this region depending on power source, cost, various well characteristics, and other irrigation factors. In this study, water is calculated to cost \$34.80 per acre foot. No assumption is made about effective rainfall. The amount of water applied to the orchard varies in the establishment years and is shown in **Table B**.

Year	AcFt/Year	\$/Acre
1	2.5	87.00
2-5	3.0	104.00
6+	3.5	122.00

Disease Management: During the developmental years disease control for walnut blight is minimal and, in this study, not used until the fifth year when a fixed copper is applied.

Insect and Arthropod Management: The first treatment for insects is assumed to occur in the third year with an infestation of redhumped caterpillars or other insects/mites and is managed by a pesticide application.

Codling moth is assumed to first reach treatment levels by the fifth year when the orchard is producing it's second crop. It is managed with a pesticide application.

Beginning in the sixth year, a complex of insects and mites are assumed to reach population levels that require management with pesticides.

Harvest Aid: In order to increase nut quality at harvest a growth regulator is applied beginning in the seventh year to advance harvest.

Vertebrate Pest Management: Gophers are the only vertebrate needing control and are managed in the spring with the use of poison bait placed underground by a mechanical bait applicator.

Establishment Cost: The cost to establish the orchard is used to determine the non-cash overhead expenses, depreciation and interest on investment, for 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 fruit is harvested minus any returns from production. 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 \$4,567 per acre or \$456,700 for the 100 acre orchard. Establishment cost is depreciated beginning in the fifth year over the remaining 36 years of the 40 years that the orchard is assumed to be in production.

5. PRODUCTION CULTURAL PRACTICES:

Pruning: In this study, alternate year pruning is done in the winter months with hand crews and pruning tower. It is assumed that each year half of the orchard is pruned and the half not pruned during one year would be pruned the following. Since half of the acreage is pruned each year, costs shown in **Tables 2** and **3** are averaged over the pruned and unpruned blocks. Prunings are placed into the row middles and pushed out of the orchard by a tractor with 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 200 pounds of N per acre through the irrigation system. Fertilizer is in a liquid form, UN 32, and applied in April and August, 50% and 50% respectively.

Orchard Floor Management: Weeds in mature orchards are controlled with the same combination of chemical and cultural (mowing) practices as orchards being established. Pre-emergent weeds are controlled in the tree row with winter and in-season strip sprays of residual and foliar applied herbicides. Row middles continue to be mowed five times during April through August.

Insect and Mite Management: Several insect and mite 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. Other unspecified insects and mites will also require treatment during the season. A growth regulator is used to advance harvest and maintain nut quality.

Winter sanitation provides additional control of navel orangeworms by knocking the nuts onto the ground, sweeping, and mowing them. The shaking and sweeping are contracted operations and are performed in November.

Disease Management: Walnut Blight is the only disease treated for in this study. Three applications of fixed copper are made: two in April and one in May.

Vertebrate Pest Management: Gophers are controlled the same as in the establishment years.

Pesticide Recommendations: For specific pesticides choices and rates consult the UC IPM pest management guidelines, 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.

6. HARVEST:

Harvest starts in the fourth or fifth year after the orchard is planted depending on variety. The first crop is hand harvested. Subsequently, trees are mechanically harvested. All costs for contracted harvest operations are charged per hour, but are shown on a per acre basis. **Table C** includes some of the rates for harvest operations currently charged by contract harvesters in this region. Yield maturity is reached in the eighth year. In this cost study, the crop is harvested and hauled by a contracted harvesting company. Hulling and drying costs are charged on per pound, dry-weight basis.

Table C. Sample contracted harvesting costs for the Sacramento Valley

Operation	\$/Hour		Acres/Hour/Pick	\$/Acre/Pick
	Range	Used		
Shake	35 - 70	70	2	35
Sweep	25 - 30	30	2	15
Pickup	35 - 80	80	1	80

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. 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 with grower performed harvest and hauling expense in harvest costs in **Tables 1 & 2**.

7. ASSESSMENTS:

Under a state marketing order, mandatory assessment fees are collected by the California Walnut Commission (CWC). These assessments are charged to the grower to pay for walnut marketing, advertising, and research programs. The CWC has a current fee of \$0.009 per pound of dry in-shell nuts.

8. YIELDS & RETURNS:

As noted in the Harvest section, English walnuts most often begin bearing a harvestable 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 D**. These yields are from the fourth year of orchard establishment to maturity.

Year	Yield	
	(Tons/Acre)	(Dry, In-shell Pounds/Acre)
4	0.15	300
5	0.45	900
6	0.70	1,400
7	1.40	2,800
8+	2.70	5,400

Current prices from handlers are not available due to market conditions, but the Walnut Bargaining Association (WBA) has developed price guidelines for the 1994 crop with a range for in-shell walnuts from \$0.54 to \$0.62 per pound. Actual price will depend on a number of factors such as demand, size of the state crop, variety of nuts, size, damage, and lightness of color. An estimated price of a \$0.62 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.

8. 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, and increase in interest rates. Due to the risk involved, access to a market is crucial. A market channel should be determined before any walnut orchards are planted and brought into production.

10. LABOR:

Hourly wages for workers are \$7.00, and \$5.12 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 \$9.38 per hour for skilled labor, and \$6.86 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. Any return above total costs is considered a return to management and risk.

11. 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.

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.

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 11.61% per year. A nominal interest rate is the going market cost of borrowed funds.

Insurance: Insurance for farm investments vary depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$336 for the entire farm.

Office Expense: Office and business expenses are estimated at \$40 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. Cash overhead costs are found in **Tables 1, 2, 3, 4, and 5**.

12. NON-CASH OVERHEAD:

Non-cash overhead is comprised of depreciation and interest charged on equipment and other investments. Although farm equipment on typical walnut orchard in the Sacramento Valley is often purchased used, this study shows the current purchase price for new equipment adjusted to 60% of new value to indicate a mix of new and used equipment. Annual equipment and investments costs are shown in **Tables 1, 2, 3, and 5**. They represent depreciation and opportunity cost for each investment on an annual per acre basis.

Depreciation is a reduction in market value of investments due to wear, obsolescence, and age, and is on a straight line basis. Annual depreciation is calculated as purchase price minus salvage value divided by years the investment is held. The purchase price and years of life are shown in **Table 5**.

Interest is charged on investments to account for income foregone (opportunity cost) that could be received from an alternative investment. The investments are assumed to be owned outright. Therefore, interest on investments is a non-cash cost. Investments include land, orchard establishment, buildings, and equipment. Interest is calculated as the average value of the investment during its useful life, multiplied by 3.72% per year. Average value for equipment and buildings equals new cost plus salvage value divided by 2 on a per acre basis.

The average value for land is equal to the purchase price because land does not depreciate. The interest rate used to calculate opportunity cost is estimated as a ten year average of the agricultural sector longrun 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.

13. 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 the equipment costs on a per acre basis, the following hourly charges are calculated first and shown in **Table 6**. 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. 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 for a given operation to account for setup time. Prices for on-farm delivery of diesel and gasoline are \$0.85 and \$1.17 per gallon, respectively.

Table 1.

U.C. COOPERATIVE EXTENSION
 SAMPLE COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD
 SACRAMENTO VALLEY - 1995

Year	Cost Per Acre							
	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Dry, In-Shell Pounds Per Acre				300	900	1,400	2,800	5,400
Planting Costs:								
Nematode Sampling	\$3							
Land Preparation - Subsoil	\$115							
Land Preparation - Disc	\$4							
Land Preparation - Float	\$6							
Land Preparation - Fumigate (100%, Tarped)	\$1,300							
Trees: 48 Per Acre @ \$13.00 ea. (2 in 2nd year)	\$624	\$26						
Survey, Mark, Dig Holes & Plant	\$148	6						
Stake Trees	\$112							
TOTAL PLANTING COSTS	\$2,309	\$32						
Cultural Costs:								
Pruning, Training & Tying	\$21	\$21	\$24	\$24	\$28	\$35	\$42	\$58
Brush Disposal			\$7	7	8	9	11	11
Fertilizer - Nitrogen	\$7	18	35	44	53	53	62	70
Weed Control - Pre-emergent Strip Spray	\$12							
Weed Control - Winter Residual Strip Spray	\$12	27	27	14	14	14	14	14
Weed Control - Mow Middles 5X	\$26	26	26	26	26	26	26	26
Weed Control - In-Season Strip Spray				\$8	8	8	8	12
Disease Control - Walnut Blight					\$84	84	84	84
Irrigate	\$90	107	107	107	107	125	125	125
Insect Control - Miscellaneous Insects			\$35			\$74	74	74
Insect Control - Codling Moth					\$39	78	78	78
Harvest Aid & Application								\$52
Rodent Control	\$7	7	7	7	7	7	7	7
Pickup Truck Use	\$50	50	50	50	50	50	50	50
ATV Use	\$37	37	37	37	37	37	37	37
Miscellaneous Labor	\$21	21	21	21	21	21	21	21
PCA Service	\$5	5	5	21	21	21	21	21
Leaf Analysis	\$1	1	1	1	1	1	1	1
TOTAL CULTURAL COSTS	\$289	\$320	\$382	\$367	\$504	\$643	\$661	\$741
Harvest Costs:								
Hand Pick				\$165				
Shake, Pick & Haul (1st pick)					\$145	\$145	\$145	\$145
Shake, Pick & Haul (2nd pick)								105
Hull Dry & Deliver				\$12	36	56	112	216
California Walnut Commission Assessment Fee				\$3	8	13	25	49
TOTAL HARVEST COSTS				\$180	\$189	\$214	\$282	\$515
Postharvest Costs:								
Shake Mummies From Trees					\$19	\$29	\$29	\$29
Sweep Mummies To Row Centers					\$45	45	45	45
Shred Mummies					\$5	5	5	5
TOTAL POSTHARVEST COSTS					\$69	\$79	\$79	\$79
Interest On Operating Capital @ 11.61%	\$290	\$17	\$17	\$15	\$23	\$29	\$31	\$35
TOTAL OPERATING COSTS/ACRE	\$2,888	\$369	\$399	\$562	\$785	\$965	\$1,053	\$1,370

Table 1. continued

Year	Cost Per Acre							
	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Field Run - Pounds Per Acre				300	900	1,400	2,800	5,400
Cash Overhead Costs:								
Office Expense	\$40	\$40	\$40	\$40	\$40	\$40	\$40	\$40
Sanitation Fees	\$7	7	7	7	7	7	7	7
Liability Insurance	\$3	3	3	3	3	3	3	3
Property Taxes	\$57	56	56	56	56	56	56	56
Property Insurance	\$41	40	40	40	40	40	40	40
Investment Repairs	\$17	17	17	17	17	17	17	17
TOTAL CASH OVERHEAD COSTS	\$165	\$163	\$163	\$163	\$163	\$163	\$163	\$163
TOTAL CASH COSTS/ACRE	\$3,053	\$532	\$562	\$725	\$948	\$1,128	\$1,216	\$1,533
INCOME/ACRE FROM PRODUCTION				\$186	\$558	\$868	\$1,736	\$3,348
NET CASH COSTS/ACRE FOR THE YEAR	\$3,053	\$532	\$562	\$539	\$390	\$260		
PROFIT/ACRE ABOVE CASH COSTS							\$520	\$1,815
ACCUMULATED NET CASH COSTS/ACRE	\$3,053	\$3,585	\$4,147	\$4,686	\$5,076	\$5,336	\$4,816	\$3,001
Depreciation:								
Shop Building	\$19	\$19	\$19	\$19	\$19	\$19	\$19	\$19
Fuel Tanks & Pumps	\$3	3	3	3	3	3	3	3
Sprinkler Irrigation System	\$43	43	43	43	43	43	43	43
Shop Tools	\$7	5	5	5	5	5	5	5
Hand Tools	\$2	2	2	2	2	2	2	2
Equipment	\$46	29	39	31	39	39	39	39
TOTAL DEPRECIATION	\$120	\$101	\$111	\$103	\$111	\$111	\$111	\$111
Interest On Investment @ 3.72%								
Land @ \$4,200/Producing Acre	\$156	\$156	\$156	\$156	\$156	\$156	\$156	\$156
Shop Building	\$7	7	7	7	7	7	7	7
Fuel Tanks & Pumps	\$1	1	1	1	1	1	1	1
Sprinkler Irrigation System	\$32	32	32	32	32	32	32	32
Shop Tools	\$2	2	2	2	2	2	2	2
Hand Tools	\$1	1	1	1	1	1	1	1
Equipment	\$12	7	9	7	9	9	9	9
TOTAL INTEREST ON INVESTMENT	\$211	\$206	\$208	\$206	\$208	\$208	\$208	\$208
TOTAL COST/ACRE FOR THE YEAR	\$3,384	\$839	\$881	\$1,034	\$1,267	\$1,447	\$1,535	\$1,852
INCOME/ACRE FROM PRODUCTION				\$186	\$558	\$868	\$1,736	\$3,348
TOTAL NET COST/ACRE FOR THE YEAR	\$3,384	\$839	\$881	\$848	\$709	\$579		
NET PROFIT/ACRE ABOVE TOTAL COST							\$201	\$1,496
TOTAL ACCUMULATED NET COST/ACRE	\$3,384	\$4,223	\$5,104	\$5,952	\$6,661	\$7,240	\$7,039	\$5,543

Table 2.

U C COOPERATIVE EXTENSION
 COSTS PER ACRE TO PRODUCE ENGLISH WALNUTS
 SACRAMENTO VALLEY - 1995

Labor Rate: \$9.38/hr. machine labor Interest Rate: 7.89%
 \$6.86/hr. non-machine labor Yield per Acre: 5400 Lb

Operation	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Pruning	2.40	43	15	0	0	58	
Brush Disposal	0.37	9	2	0	0	11	
Pest Control - Gophers	0.50	3	0	3	0	7	
Weed Control - Mow Middles 5X	1.50	17	9	0	0	26	
Irrigate	0.40	3	0	122	0	125	
Disease Control - Walnut Blight 3X	0.75	8	10	66	0	84	
Insect Control - Codling Moth 2X	0.50	6	7	66	0	78	
Fertilizer - Nitrogen	0.00	0	0	70	0	70	
Pest Control - Misc. Insects 2X	0.50	6	7	67	0	80	
Harvest Aid & Application	0.25	3	3	46	0	52	
Weed Control - In-Season Spray	0.25	3	2	4	0	8	
Weed Control - Dormant Strip Spray	0.25	3	2	11	0	15	
Pickup Truck Use	2.85	32	18	0	0	50	
ATV Use	2.85	32	5	0	0	37	
Miscellaneous Labor	3.00	21	0	0	0	21	
PCA Service	0.00	0	0	0	21	21	
Leaf Analysis	0.00	0	0	0	1	1	
TOTAL CULTURAL COSTS	16.36	188	79	454	22	744	
Harvest:							
Shake, Pick & Haul (1st pick)	0.00	0	0	0	145	145	
Shake, Pick & Haul (2nd pick)	0.00	0	0	0	145	145	
Hull, Dry, & Deliver	0.00	0	0	0	216	216	
TOTAL HARVEST COSTS	0.00	0	0	0	506	506	
Assessments:							
California Walnut Commission	0.00	0	0	49	0	49	
TOTAL ASSESSMENT COSTS	0.00	0	0	49	0	49	
Winter Sanitation:							
Shake Mummies	0.00	0	0	0	29	29	
Sweep Mummies	0.00	0	0	0	45	45	
Shred Mummies	0.30	3	2	0	0	5	
TOTAL WINTER SANITATION COSTS	0.30	3	2	0	74	79	
Interest on operating capital @ 11.61%							41
TOTAL OPERATING COSTS/ACRE		192	81	503	602	1419	
TOTAL OPERATING COSTS/LB							0.26
CASH OVERHEAD:							
Office Expense							40
Liability Insurance							3
Sanitation Services							7
Property Taxes							80
Property Insurance							57
Investment Repairs							17
TOTAL CASH OVERHEAD COSTS							204
TOTAL CASH COSTS/ACRE							1623
TOTAL CASH COSTS/LB							0.30

U C COOPERATIVE EXTENSION
Table 2. continued

NON-CASH OVERHEAD:

Investment	Per producing Acre	Annual Cost		
		Depreciation	Interest @ 3.72%	
Buildings	381	13	7	20
Fuel Tanks & Pumps	64	3	1	4
Shop Tools	113	7	2	9
Sprinkler Irrigation System	1720	43	32	75
Hand Tools	41	2	1	3
Land	4200		156	156
Orchard Establishment	4686	130	87	217
Equipment	549	49	11	60
TOTAL NON-CASH OVERHEAD COSTS	11754	247	298	545
TOTAL COSTS/ACRE				2168
TOTAL COSTS/LB				0.40

Table 3.

U C COOPERATIVE EXTENSION
 MONTHLY CASH COSTS PER ACRE TO PRODUCE ENGLISH WALNUTS
 SACRAMENTO VALLEY - 1995

Beginning JAN 94 Ending DEC 94	JAN 94	FEB 94	MAR 94	APR 94	MAY 94	JUN 94	JUL 94	AUG 94	SEP 94	OCT 94	NOV 94	DEC 94	TOTAL
Cultural:													
Pruning		58											58
Brush Disposal		11											11
Pest Control - Gophers				7									7
Weed Control - Mow Middle					5	5	5	5					26
Irrigate					25	25	25	25					125
Disease Control - Walnut Blight					56	28							84
Insect Control - Codling Moth						39	39						78
Fertilizer - Nitrogen					35			35					70
Pest Control - Misc. Insects						41		39					80
Harvest Aid & Application								52					52
Weed Control - In-Season Strip								8					8
Weed Control - Dormant Strip										15			15
Pickup Truck Use	4	4	4	4	4	4	4	4	4	4	4	4	50
ATV Use	3	3	3	3	3	3	3	3	3	3	3	3	37
Miscellaneous Labor	2	2	2	2	2	2	2	2	2	2	2	2	21
PCA Service		2	2	2	2	2	2	2	2	2	2	2	21
Leaf Analysis					1								1
TOTAL CULTURAL COSTS	9	80	18	132	109	82	80	175	11	11	26	11	744
Harvest:													
Shake, Pick & Haul (1st Pick)										145			145
Shake, Pick & Haul (2nd Pick)										145			145
Hull, Dry, & Deliver										216			216
TOTAL HARVEST COSTS										506			506
Assessments:													
California Walnut Commission										49			49
TOTAL ASSESSMENT COSTS										49			49
Winter Sanitation:													
Shake Mummies												29	29
Sweep Mummies												45	45
Shred Mummies												5	5
TOTAL WINTER SANITATION COSTS												79	79
Interest on oper. capital		1	1	2	3	4	5	7	7	12			41
TOTAL OPERATING COSTS/ACRE	9	81	18	134	112	86	85	182	17	578	26	90	1419
TOTAL OPERATING COSTS/LB	0.00	0.01	0.00	0.02	0.02	0.02	0.02	0.03	0.00	0.11	0.00	0.02	0.26
OVERHEAD:													
Office Expense	3	3	3	3	3	3	3	3	3	3	3	3	40
Liability Insurance	3												3
Sanitation Services		1	1	1	1	1	1	1	1	1	1	1	7
Property Taxes				40								40	80
Property Insurance	57												57
Investment Repairs	1	1	1	1	1	1	1	1	1	1	1	1	17
TOTAL CASH OVERHEAD COSTS	65	5	5	45	5	5	5	5	5	5	5	45	204
TOTAL CASH COSTS/ACRE	74	86	24	180	118	91	90	187	23	583	31	135	1623
TOTAL CASH COSTS/LB	0.01	0.02	0.00	0.03	0.02	0.02	0.02	0.03	0.00	0.11	0.01	0.03	0.30

Table 4.

U C COOPERATIVE EXTENSION
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SACRAMENTO VALLEY - 1995

ANNUAL EQUIPMENT COSTS

=====								
- Non-Cash Over. - - Cash Overhead -								
Yr	Description	Price	Yrs Life	Depre- ciation	Interest	Insur- ance	Taxes	Total

94	62 HP 2WD Tractor	25492	15	1530	522	100	140	2291
94	ATV 4WD	3861	7	496	79	15	21	612
94	Brush Rake - 10'	1453	25	52	30	6	8	96
94	Loader Forks	730	15	44	15	3	4	66
94	Mower - Flail 10'	5000	10	450	102	20	28	599
94	Orchard Sprayer - 500 Gal	17055	10	1535	349	67	94	2045
92	Pickup Truck - 1/2 Ton	16000	7	2057	327	63	88	2535
94	Pruning Tower	18324	10	1649	375	72	101	2197
94	Weed Sprayer - 100 Gal	3550	10	319	73	14	20	426

TOTAL		91465		8133	1871	359	503	10866

60% of New Cost *		54879		4880	1123	215	302	6520

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

ANNUAL INVESTMENT COSTS

=====									
- Non-Cash Over. - ----- Cash Overhead -----									
Description	Price	Yrs Life	Depre- ciation	Interest	Insur- ance	Taxes	Repairs	Total	

INVESTMENT									
Buildings	38110	30	1270	709	136	191	762	3068	
Fuel Tanks & Pumps	6355	20	286	130	25	35	125	601	
Hand Tools	4120	15	247	84	16	23	50	420	
Land	420000			15624	2995	4200	0	22819	
Shop Tools	11330	15	680	232	44	62	113	1131	
Sprinkler Irrigation System	172000	40	4300	3199	613	860	665	9637	
Orchard Establishment	468600	36	13017	8716	1671	2343	0	25746	

TOTAL INVESTMENT	1120515		19800	28694	5500	7713	1715	63422	
=====									

ANNUAL BUSINESS OVERHEAD COSTS

=====				
Description	Units/ Farm	Unit	Price/ Unit	Total Cost

Liability Insurance	105.00	Acre	3.20	336
Office Expense	100.00	Acre	40.00	4000
Sanitation Services	100.00	Acre	6.54	654
=====				

Table 5.

U C COOPERATIVE EXTENSION
 HOURLY EQUIPMENT COSTS
 SACRAMENTO VALLEY - 1995

Yr Description	Actual Hours Used	COSTS PER HOUR							Total Oper.	Total Costs/Hr.
		-Non-Cash Depre- ciation	Over- Interest	- Cash Insur- ance	Overhead Taxes	Repairs	Operating Fuel & Lube			
94 62 HP 2WD Tractor	485.2	1.89	0.64	0.12	0.17	1.53	2.98	4.51	7.34	
94 ATV 4WD	285.0	1.05	0.17	0.03	0.04	0.70	0.90	1.60	2.89	
94 Brush Rake - 10'	36.7	0.86	0.49	0.09	0.13	0.21	0.00	0.21	1.78	
94 Loader Forks	36.7	0.72	0.24	0.05	0.07	0.11	0.00	0.11	1.18	
94 Mower - Flail 10'	179.4	1.51	0.34	0.07	0.09	1.37	0.00	1.37	3.37	
94 Orchard Sprayer - 500 Gal	175.0	5.26	1.20	0.23	0.32	8.56	0.00	8.56	15.57	
92 Pickup Truck - 1/2 Ton	285.0	4.33	0.69	0.13	0.19	2.90	3.36	6.26	11.60	
94 Pruning Tower	264.0	3.75	0.85	0.16	0.23	1.57	4.04	5.61	10.60	
94 Weed Sprayer - 100 Gal	50.0	3.83	0.87	0.17	0.23	1.78	0.00	1.78	6.89	

Table 6.

U C COOPERATIVE EXTENSION
 RANGING ANALYSIS
 SACRAMENTO VALLEY - 1995

	COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WALNUTS							
	YIELD (LB/ACRE)							
	2500	3500	4500	5500	5600	7500	8500	
OPERATING COSTS/ACRE:								
Cultural Cost	744	744	744	744	744	744	744	
Harvest & Assessment Costs	257	359	462	565	575	770	873	
Winter Sanitation Cost	79	79	79	79	79	79	79	
Interest on operating capital	39	40	41	42	42	44	45	
TOTAL OPERATING COSTS/ACRE	1118	1222	1326	1429	1440	1637	1740	
TOTAL OPERATING COSTS/LB	0.45	0.35	0.29	0.26	0.26	0.22	0.20	
CASH OVERHEAD COSTS/ACRE								
	204	204	204	204	204	204	204	
TOTAL CASH COSTS/ACRE	1322	1426	1530	1634	1644	1841	1945	
TOTAL CASH COSTS/LB	0.53	0.41	0.34	0.30	0.29	0.25	0.23	
NON-CASH OVERHEAD COSTS/ACRE								
	545	545	545	545	545	545	545	
TOTAL COSTS/ACRE	1867	1971	2075	2179	2189	2386	2490	
TOTAL COSTS/LB	0.75	0.56	0.46	0.40	0.39	0.32	0.29	

U C COOPERATIVE EXTENSION

Table 6. Continued

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR WALNUTS

PRICE (DOLLARS PER LB)	YIELD (LB/ACRE)		YIELD (LB/ACRE)				
	2500	3500	4500	5500	5600	7500	8500
0.45	7	353	699	1046	1080	1738	2085
0.50	132	528	924	1321	1360	2113	2510
0.55	257	703	1149	1596	1640	2488	2935
0.60	382	878	1374	1871	1920	2863	3360
0.65	507	1053	1599	2146	2200	3238	3785
0.70	632	1228	1824	2421	2480	3613	4210
0.75	757	1403	2049	2696	2760	3988	4635

NET RETURNS PER ACRE ABOVE CASH COSTS FOR WALNUTS

PRICE (DOLLARS PER LB)	YIELD (LB/ACRE)		YIELD (LB/ACRE)				
	2500	3500	4500	5500	5600	7500	8500
0.45	-197	149	495	841	876	1534	1880
0.50	-72	324	720	1116	1156	1909	2305
0.55	53	499	945	1391	1436	2284	2730
0.60	178	674	1170	1666	1716	2659	3155
0.65	303	849	1395	1941	1996	3034	3580
0.70	428	1024	1620	2216	2276	3409	4005
0.75	553	1199	1845	2491	2556	3784	4430

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR WALNUTS

PRICE (DOLLARS PER LB)	YIELD (LB/ACRE)		YIELD (LB/ACRE)				
	2500	3500	4500	5500	5600	7500	8500
0.45	-742	-396	-50	296	331	989	1335
0.50	-617	-221	175	571	611	1364	1760
0.55	-492	-46	400	846	891	1739	2185
0.60	-367	129	625	1121	1171	2114	2610
0.65	-242	304	850	1396	1451	2489	3035
0.70	-117	479	1075	1671	1731	2864	3460
0.75	8	654	1300	1946	2011	3239	3885

Appendix 1.

DETAIL OF COSTS PER ACRE TO PRODUCE ENGLISH WALNUTS
SACRAMENTO VALLEY - 1995

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.

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
OPERATING COSTS					
Rodenticide:					
Rodent Bait	1.00	Lb	3.27	3	
Irrigation					
Water - Pumped	42.00	AcIn	2.90	122	
Fungicide: Kocide	24.00	Lb	2.73	66	
Insecticide:					
Lorsban 4 EC	8.00	Pint	8.24	66	
Guthion 50W	3.00	Lb	10.89	33	
Fertilizer:					
UN-32	200.00	Lb	0.352	70	
Acaracide:					
Omite 30 WP	5.00	Lb	6.94	35	
Harvest Aid:					
Ethrel	5.00	Pint	9.17	46	
Herbicide:					
Roundup	1.08	Pint	6.86	7	
Princep Caliber 90	0.51	Lb	5.31	3	
Karmex DF	0.62	Lb	6.71	4	
Custom:					
Shake Nuts	2.00	Acre	35.00	70	
Sweep Nuts	2.00	Acre	15.00	30	
Pickup Nuts	2.00	Acre	80.00	160	
Haul Nuts	2.00	Acre	15.00	30	
Hull, Dry, & Deliver	5400.00	Lb	0.04	216	
Shake Mummies	48.00	Tree	0.60	29	
Blow Mummies	1.00	Acre	45.00	45	
Assessment:CA.Walnut Commission	5400.00	Lb	0.009	49	
Contract:					
PCA Fees	1.00	Acre	21.00	21	
Leaf Analysis	1.00	Acre	1.00	1	
Labor (machine)	15.31	hrs	9.38	144	
Labor (non-machine)	7.00	hrs	6.86	48	
Fuel - Gas	16.93	gal	1.17	20	
Fuel - Diesel	15.62	gal	0.85	13	
Lube				5	
Machinery repair				43	
Interest on operating capital @ 11.61%				41	
TOTAL OPERATING COSTS/ACRE				1419	
TOTAL OPERATING COSTS/LB				0.26	
NET RETURNS ABOVE OPERATING COSTS				1929	
CASH OVERHEAD COSTS:					
Office Expense				40	
Liability Insurance				3	
Sanitation Services				7	
Property Taxes				80	
Property Insurance				57	
Investment Repairs				17	
TOTAL CASH OVERHEAD COSTS/ACRE				204	
TOTAL CASH COSTS/ACRE				1623	
TOTAL CASH COSTS/LB				0.30	