UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2002

SAMPLE COSTS TO ESTABLISH A WALNUT ORCHARD AND PRODUCE

WALNUTS

English

SACRAMENTO VALLEY

Sprinkler Irrigated

Richard P. Buchner	UC Cooperative Extension Farm Advisor, Tehama-Shasta Counties
John P. Edstrom	UC Cooperative Extension Farm Advisor, Colusa County
Janine K. Hasey	UC Cooperative Extension Farm Advisor, Sutter-Yuba Counties
William H. Krueger	UC Cooperative Extension Farm Advisor, Glenn County
William H. Olson	UC Cooperative Extension Farm Advisor, Butte County
Wilbur O. Reil	UC Cooperative Extension Farm Advisor, Yolo-Solano County
Karen M. Klonsky	Extension Specialist, Department of Agricultural and Resource Economics, UC Davis
Richard L. De Moura	Staff Research Associate, Department of Agricultural and Resource Economics UC Davis

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

SAMPLE COST TO ESTABLISH a WALNUT ORCHARD and PRODUCE WALNUTS Sacramento Valley – 2002

CONTENTS

INTRODUCTION

Sample costs to establish a walnut orchard and produce walnuts under sprinkler irrigation in the Sacramento Valley are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Practices described are based on those production practices considered typical for the crop and area, but will not apply to every farm. 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 farming 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 can be obtained from selected county UC Cooperative Extension offices or downloaded from the department website at http://coststudies.ucdavis.edu.

ASSUMPTIONS

The following assumptions refer to tables 1 to 7 and pertain to sample costs to establish a walnut orchard (table 1) and produce walnuts in the Sacramento Valley (tables 2 to 7). Practices described are not University of California recommendations, but represent production practices considered typical for this crop and area. Some practices listed may not be needed or used during every production year, while practices not indicated may be needed. Cultural practices vary by grower and region, and differences can be significant. The practices and inputs used in the cost study serve as a guide only. **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**.

Farm. The hypothetical farm consists of 105 contiguous acres farmed by the owner. Smaller non-contiguous parcels may have additional costs for travel time and equipment re-calibration. Walnuts are established on 100 acres, and roads, irrigation systems and farmstead occupy five acres.

Establishment Cultural Practices and Material Inputs

Site Preparation. The orchard is being established on ground previously planted to another tree crop. The area is sampled (1 sample/10 acres) for nematodes prior to land preparation to determine the need for fumigation. The ground is ripped in two directions to a 3-foot depth to break up any underlying hardpan and pull up old roots. The ground is disced twice to break up clods, then floated twice to level and smooth the surface. The area is fumigated untarped with methyl bromide and chloropicrin. Berms in the tree row are formed with the grower's tractor and ridger. Contract or custom operators do both ripping and fumigation. All operations that prepare the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

Trees. No specific variety of English walnuts is planted in this study. Cultivars typically planted in the Sacramento Valley include Chandler, Hartley, Tulare, and Howard. Most orchards will include a small percentage of a second variety to insure pollen shedding and bloom period overlaps. Paradox is the common rootstock on these varieties. The variety planted determines spacing. In this study, the 5/8 inch 2 year old trees are planted on 28' X 28' spacing, 56 trees per acre. The life of the orchard at planting is estimated to be 35 years.

Planting. Planting in the spring starts by surveying and marking tree sites with a small stake, digging holes, planting, topping, and staking trees. Tree roots are sprayed with Galltrol for crown gall *(agrobacterium tumefaciens)* control prior to planting. Trees are also painted white for sunburn protection and tree wraps are placed around the tree for rodent protection. In the second year, 4% of the orchard or 2 trees per acre are replanted.

Pruning. Pruning and training begins in the first year, when the central leader that forms the trunk is selected and tied to the stake. Dormant pruning during the second and third year develops the scaffolds originating from the main trunk. In the fourth and succeeding years, heading cuts are made removing a portion of the current year's growth. Alternate year pruning begins in the seventh to ninth year. During the first two years, the brush is placed in the row middles and chopped during the first mowing. In the following years, the brush is chopped in a separate operation.

Fertilization. Nitrogen is the major nutrient required for tree growth and optimum yields. Some locations may require additional nutrients. Leaf samples at one sample per 25 acres are taken to determine nutrient (nitrogen, potassium, zinc) requirements. In the first two years, two equal applications of nitrogen are hand applied in dry form approximately 18 inches from the base of the tree. Beginning in year 3, nitrogen fertilizer is applied in liquid form as UN 32 through the irrigation system. Annual rates of actual N are shown in Table A.

Table A. Applied Nitrogen

Year	Actual N lbs/acre	UN 32 gal/acre
1	20	dry
2	50	dry
3	100	28.2
4	125	35.3
5	150	42.2
6+	200	56.4

Irrigation. Price per acre-foot of water will vary by grower depending on power source, well characteristics, and irrigation district. In this study, water is calculated to cost $40.20 per acre-foot or $3.35 per acre-inch. No assumption is made about effective rainfall. The water applied to the orchard is shown in Table B**.**

Table B. Applied Irrigation Water

Year	acft/year	$/acre
1	2.5	100.00
2-5	3.0	120.00
6+	3.5	140.00

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Walnuts.* See the Integrated Pest Management (IPM) website for other materials available.

Weeds. Weed pressure, materials and application timing will vary from season to season. In this study, a contact herbicide (Roundup) is applied to tree rows prior to planting and a preemergence herbicide (Prowl) applied shortly after planting. Inseason sprays using Roundup are applied to the tree row in June and August during years two to five and July only in years six to eight. Winter strip sprays (Prowl and Goal) are applied during the dormant period during the first two years. Winter strip sprays (Karmex and Princep) during years three to eight include a contact herbicide (Roundup).

Diseases. During the establishment years disease control for walnut blight is minimal. In this study, beginning in the fifth year, a copper fungicide (Kocide), is applied twice in April. In the eighth year, a third application is made in May.

Insects. In the first through third year, an infestation of redhumped caterpillars is treated in June with one application of Dipel. Codling moth is assumed to reach treatment levels by the fifth year. Lorsban is applied each year in July from the fifth through the eighth year for codling moth control. Beginning in the sixth year, miscellaneous pests such as husk fly, aphids, scale, or mites will occur, but on the average only one of the pest will occur in any one year. In this study, mites are treated in June with Omite. The cost is equivalent to the average costs of pesticides available to control the above pests.

Vertebrate Pests. Gophers are managed in the spring with the use of poison bait placed underground by a mechanical bait applicator. Squirrels and other vertebrates are not included in the study but can be a pest, and may need treatment every year.

Harvest Aid. Beginning in the eighth year, Ethrel, a plant regulator, is applied to 50 percent of the acres to prepare the orchard for one-shake harvest.

Harvest. Depending upon variety, harvest starts in the fourth or fifth establishment year (fourth year in this study). The first crop is not mechanically shaken, but is shaken by the wind and the windfall walnuts are picked up at the end of the season. Subsequently, a custom operator mechanically shakes and harvests the nuts. Yield maturity is reached in the eighth year. See harvest under the production assumptions.

Production Cultural Practices and Material Inputs

Pruning. Pruning to open the canopy, maintain healthy buds, lower tree height, remove dead and undesired limbs is done during the winter months in alternate years using hand crews and a pruning tower. One-half of the pruning costs are charged to the orchard each year. Prunings are placed in the row middles, pushed to the orchard edge and burned. Since trees in this orchard are planted at their final spacing, tree thinning is not required.

Fertilization. Tree nutrient status is determined by leaf analysis; sampling for nitrogen (N), potassium (K), and zinc (Zn) is done in July. Nitrogen at an annual rate of 200 pounds per acre is applied through the irrigation system. The nitrogen as UN 32, is applied in equal amounts in April and August.

Irrigation. The crop uses 42-acre inches of water which the grower applies. No assumption is made about effective rainfall. In this study, water is calculated to cost $40.20 per acre-foot or $3.35 per acre-inch. The amount of water applied to the mature orchard is shown in Table B in the Establishment section**.**

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Walnuts.* For more information on other pesticides available, 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 (PCA). In addition, the PCA monitors the field for pests and nutrition. Growers may hire private PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. 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 during the establishment years. Weeds are controlled in the tree row with winter and in-season strip sprays using preemergent/postemergent and contact herbicides. Princep, Karmex and Roundup are applied in November (winter strip spray). Roundup is applied during the growing season (inseason strip spray). Row middles are mowed five times from April through August.

Insect and Mite. Several insect and mite pests can be a problem. Codling moth (*Cydia pomonella*), a major pest, can cause damage resulting in offgrade nuts. Multiple generations occur and are controlled based on population monitoring. Two treatments are assumed, Lorsban is applied in June and Asana in July. Husk Fly, aphids, scale, and mites will not occur every year, but for purposes of this study, one treatment per year is considered necessary. Different materials are required to control each pest. Omite is applied in June and represents an average cost for controlling the above insects.

Disease. Walnut Blight (*Xanthomonas campestris* p.v. *juglandis)* is a spring disease that infects the nutlets and is the only disease treated in this study. Three treatments, two in April and one in May, with Kocide, a copper compound, and Manex are applied.

Vertebrate Pests. Gophers are controlled with rodent bait the same as in the establishment years.

Growth Regulator. A growth regulator (Ethrel) is used to prepare the crop for one-time harvest. The growth regulator is applied to approximately one-half of the acres.

Harvest. Custom harvesters shake, sweep, pick up, and haul the walnuts to the huller/dryer. Hand raking is needed to windrow walnuts missed by the sweeper. In this study, the grower furnishes the hand rakers. After drying, the walnuts are sold to processors. Hulling and drying costs are charged on a per pound, dry-weight basis. Custom harvest operators usually charge by the hour, but the costs in this study have been converted to per acre charges. Table C includes current rates for custom harvest operations in the region.

Table C. Sample contracted harvesting costs Sacramento Valley

	Rate	Harvest	
Operation	$/hour	acre/hour	$/acre
Shake	70	2	35
Sweep	35	2	15
Pickup	55	1	55

Yields. Annual yields for English varieties are measured in clean, dry, in-shell tons or pounds per acre. Typical Sacramento Valley yields are shown in Table D.

Table D. Annual yield per acre

	Yield (dry, In-shell)	
Year	ton/acre	lb/acre
4	0.25	500
5	0.50	1,000
6	0.75	1,500
7	1.40	2,800
8+	2.70	5,400

Returns. Actual price depends on a number of factors such as demand, size of the state crop, variety, nut size, and quality. An estimated price of $0.62 per pound is used in this study so that a ranging analysis for different yields and prices can be calculated.

Assessments. 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, advertising, and research programs. The CWC has a current fee of $0.01 per pound of dry in-shell nuts.

Labor. Hourly wages for workers are $9.00 for skilled labor and $7.00 per hour for unskilled. 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 $9.38 per hour for unskilled 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 and repair.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $1.26 and $1.51 per gallon, respectively. 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 selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

Interest On Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 7.40% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

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. Employee benefits, insurance, and payroll taxes are included in labor costs and not in overhead (see Labor).

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.

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 0.66% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs $767 for the entire farm.

Office Expense. Office and business expenses are estimated at $50 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, shop and office utilities and miscellaneous administrative costs.

Establishment Cost. Costs to establish the orchard are used to determine the non-cash overhead expenses, capital recovery, and interest on investment for the production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing walnut trees through the first year nuts are harvested less returns from production. The *Accumulated Net Cash Cost* in the fourth year shown in Table 1 represents the establishment cost per acre. For this study, the cost is $5,289 per acre or $528,900 for the 100-acre orchard. Establishment cost is amortized beginning in the fifth year over the remaining 31 years of production.

Sanitation Services. Sanitation services provide portable toilets for the orchard and cost the farm $1,080 annually. This cost includes delivery and 10 months of weekly service.

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

Fuel/Lube Pickup. See pickup under non-cash overhead.

Investment Repairs. Costs are calculated as 2% of the purchase price on investments listed in Table 5.

Non-cash Overhead (Investments). Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Although farm equipment used for walnuts may 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 the tables and 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). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((Purchase Price – Salvage Value) x Capital Recovery Factor) + (Salvage Value x Interest Rate).

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out 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 the purchase price because land does not depreciate. The purchase price and salvage value for 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 used and the life of the machine.

Interest Rate. The interest rate of 6.41% 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 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. In other words, the next best alternative use for these resources is in another agricultural enterprise.

Irrigation System. The cost is based on two 75-horsepower electric motors pumping from a depth of 75 feet. Water is pumped to the orchard, after running through a filtration station, into a permanent sprinkler system. For this study, a pump and well already exist, so the cost of the irrigation system is for recasing the well, refurbishing the pump and motor, installing 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 35 years.

Fuel Tanks. Two 500-gallon fuel tanks are placed on stands in cement containment meeting Federal,

State, and local regulations. Fuel is delivered to the equipment by gravity feed.

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

Pickup. The grower owns a one-half ton pickup that he uses for business and personal use. It is assumed that 12,000 miles per year is allocated to business expenses. Fuel and lube expenses shown in cash overhead are calculated using ASAE standards.

Equipment 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 repairs, fuel, and lubrication and are discussed under operating costs.

Risk. The risks associated with producing and marketing walnuts are high. 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 walnut production.

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

REFERENCES

American Society of Agricultural Engineers. (ASAE). 1992. *American Society of Agricultural Engineers Standards Yearbook*. St. Joseph, MO.

Boelje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, NY.

Buchner, Richard, John Edstrom, Janine Hasey, Bill Krueger, Bill Olson, Wilbur Reil, Karen Klonsky, and Pete Livingston. 1995. *Sample Costs to Establish and Produce Walnuts, Sacramento Valley*. University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.

Integrated Pest Management Education and Publications. "UC IPM Pest Management Guidelines: Walnut". In M. L. Flint (ed.) *UC IPM Pest Management Guidelines.* University of California. Division of Agriculture and Natural Resources. Oakland, CA. Publication 3339.

Ramos, David E. (ed.). *Walnut Production Manual*. University of California, Division of Agricultural and Natural Resources. Oakland, CA. Publication 3373.

Reil, Wilbur. 2001. *Walnut Production in Yolo and Solano Counties of California.* University of California Cooperative Extension. Woodland, CA.

Schwankl, Larry, Terry Prichard, Blaine Hanson, Ilene Wellman. 2000. *Costs of Pressurized Irrigation Systems for Tree Crops.* University of California, Division of Agriculture and Natural Resources. Oakland, CA. Publication 21585.

USDA-ERS. 2000. *Farm Sector: Farm Financial Ratios*. Agriculture and Rural Economics Division, ERS. USDA. Washington, DC http://www.ers.usda.gov/data/farmbalancesheet/fbsdmu.htm; Internet; accessed January 4, 2002.

For information concerning the above or other University of California publications, contact UC DANR Communications Services at 1-800-994-8849, online at www.ucop.edu, or your local county UC Cooperative Extension office.

UC COOPERATIVE EXTENSION

Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD

SACRAMENTO VALLEY - 2002

	Cost Per Acre							
Year:	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Dry, In-Shell Pounds Per Acre				500	1,000	1,500	2,800	5,400
Planting Costs:								
Nematode Sampling (10/100 acres)	3							
Land Preparation - Subsoil 2X	200							
Land Preparation - Disc 2X	8							
Land Preparation - Float 2X	14							
Land Preparation - Fumigate (100%, untarped)	1,500							
Land Prep-Berms	9							
Land Prep-Weed: Preplant Strip Spray	6							
Trees: 56 Per Acre @ $15.00 ea., (2 in 2nd year)	840	30						
Survey, Mark, Dig Holes & Plant	129	5						
Stake & Paint Trees (10.5 ft stake)	229							
TOTAL PLANTING COSTS	2,938	35						
Cultural Costs:								
Pruning, Training & Tying 3X	28	28	33	33	38	48	63	75
Brush Disposal			8	9	10	10	12	12
Fertilizer - Nitrogen (Dry Yr 1-2, Liquid Yr 3+)	14	22	29	36	43	58	58	58
Weed Control - Strip Spray	13							
Weed Control - Winter Strip Spray	34	31	17	16	16	16	16	16
Weed Control - Mow Middles 5X	28	28	28	28	28	28	28	28
Weed Control - In-Season Strip Spray 1X (2X-Yr 2-5)	8	17	17	17	17	9	9	9
Disease Control - Walnut Blight 2X (3X-Yr 8)					46	46	46	69
Irrigate	110	130	130	130	130	150	150	150
Insect Control - Caterpillar	12	12	12					
Insect Control - Miscellaneous Insects						36	36	36
Insect Control - Codling Moth					29	29	29	29
Harvest Aid & Application 50% acres								17
Rodent Control	10	10	10	10	10	10	10	10
ATV Use	45	45	45	45	45	45	45	45
Miscellaneous Labor	28	28	28	28	28	28	28	28
PCA Service	5	5	5	22	22	22	22	22
Leaf Analysis	1	1	1	1	1	1	1	1
TOTAL CULTURAL COSTS	336	357	364	374	464	536	553	605
Harvest Costs:								
Hand Pick				74				
Shake, Pick & Haul					113	116	126	145
Hand Rake					10	10	10	10
Hull Dry				30	60	90	168	324
California Walnut Commission Assessment Fee				5	10	15	28	54
TOTAL HARVEST COSTS				109	193	231	332	533
Interest On Operating Capital @ 7.40%	229	12	11	9	14	15	17	20
TOTAL OPERATING COSTS/ACRE	3,504	404	375	492	671	782	902	1,158
Cash Overhead Costs:								
Office Expense	50	50	50	50	50	50	50	50
Sanitation Fees	11	11	11	11	11	11	11	11
Liability Insurance	5	5	5	5	5	5	5	5
Property Taxes	62	61	61	60	60	61	61	61
Property Insurance	12	11	11	11	11	11	11	12
Investment Fuel/Lube-Pickup	17	17	17	17	17	17	17	17
Investment Repairs	51	51	51	51	51	51	51	51
TOTAL CASH OVERHEAD COSTS	208	206	206	205	205	206	206	207
TOTAL CASH COSTS/ACRE	3,711	610	581	697	876	988	1,108	1,365
INCOME/ACRE FROM PRODUCTION				310	620	930	1,736	3,348
NET CASH COSTS/ACRE FOR THE YEAR	3,711	610	581	387	256	58		
PROFIT/ACRE ABOVE CASH COSTS							628	1,983
ACCUMULATED NET CASH COSTS/ACRE	3,711	4,321	4,902	**5,289**	5,545	5,603	4,975	2,992

U.C. COOPERATIVE EXTENSION
Table 1. continued

	Cost Per Acre							
Year:	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Field Run - Pounds Per Acre				500	1,000	1,500	2,800	5,400
Capital Recovery								
Land @ $4,200/Producing Acre	282	282	282	282	282	282	282	282
Shop Building	47	47	47	47	47	47	47	47
Fuel Tanks 2-500 gal	3	3	3	3	3	3	3	3
Sprinkler Irrigation System	124	124	124	124	124	124	124	124
Shop/Hand Tools	17	17	17	17	17	17	17	17
Pickup 1/2 ton	46	46	46	46	46	46	46	46
Equipment	71	49	49	35	49	54	54	69
TOTAL INTEREST ON INVESTMENT	590	568	568	554	568	573	573	588
TOTAL COST/ACRE FOR THE YEAR	4,301	1,178	1,149	1,251	1,444	1,561	1,681	1,953
INCOME/ACRE FROM PRODUCTION				310	620	930	1,736	3,348
TOTAL NET COST/ACRE FOR THE YEAR	4,301	1,178	1,149	941	824	631		
NET PROFIT/ACRE ABOVE TOTAL COST							55	1,395
TOTAL ACCUMULATED NET COST/ACRE	4,301	5,479	6,628	7,569	8,393	9,024	8,969	7,574

UC COOPERATIVE EXTENSION

Table 2. COSTS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley - 2002

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre					
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Pruning – Alternate Years (50% cost)	3.50	51	26	0	0	77	
Pruning - Brush Disposal – Alternate Years	0.37	12	3	0	0	15	
Irrigate	1.00	9	0	141	0	150	
Fertilizer - Nitrogen 2X	0.00	0	0	58	0	58	
Fertilizer - Leaf Analysis-N, K, Zn	0.04	0	0	0	1	1	
Pest - PCA Service	0.00	0	0	0	22	22	
Weed Control - In-Season Strip Spray	0.25	4	2	3	0	9	
Weed Control - Dormant Strip Spray	0.25	4	2	10	0	16	
Weed Control - Mow Middles 5X	1.25	18	10	0	0	28	
Insect Control-Codling Moth 2X	0.50	7	5	39	0	51	
Insect Control - Misc. Insects	0.25	4	3	30	0	36	
Disease Control-Walnut Blight 3X	0.75	11	8	86	0	104	
Vertebrate Control - Gophers	0.50	5	0	6	0	10	
Growth Regulator (50% acres)	0.13	2	1	14	0	17	
ATV Use	2.85	41	4	0	0	45	
Miscellaneous Labor	3.00	28	0	0	0	28	
TOTAL CULTURAL COSTS	14.63	195	64	386	23	667	
Harvest:							
Shake, Pick, Haul	0.00	0	0	0	145	145	
Rake Walnuts	1.50	14	0	0	0	14	
Hull, Dry	0.00	0	0	0	324	324	
CWC Assessment Fee	0.00	0	0	54	0	54	
TOTAL HARVEST COSTS	1.50	14	0	54	469	538	
Interest on operating capital @ 7.40%						25	
TOTAL OPERATING COSTS/ACRE		209	64	440	492	1,230	
CASH OVERHEAD:							
Office						50	
Liability Insurance						5	
Sanitation Service						11	
Fuel/Lube Pickup						17	
Property Taxes						88	
Property Insurance						29	
Investment Repairs						51	
TOTAL CASH OVERHEAD COSTS						250	
TOTAL CASH COSTS/ACRE						1,481	
Non-cash Overhead:	Per producing Acre			Annual Cost Capital Recovery			
Buildings	520			47		47	
Fuel Tanks 2-500 gal	35			3		3	
Shop Tools	129			13		13	
Irrigation System	1,720			124		124	
Hand Tools	41			4		4	
Pickup 1/2 Ton	240			45		45	
Land	4,410			282		282	
Walnut Establishment	5,289			396		396	
Equipment	564			65		65	
TOTAL NON-CASH OVERHEAD COSTS	12,948			980		980	
TOTAL COSTS/ACRE						2,460	

UC COOPERATIVE EXTENSION

Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley - 2002

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Walnuts	5,400.00	lb	0.62	3,348	
OPERATING COSTS					
Rodenticide:					
Rodent Bait-Wilco	1.00	lb	5.62	6	
Fungicide:					
Kocide 101	24.00	lb	2.10	50	
Manex	14.40	pt	2.44	35	
Insecticide:					
Lorsban 4E	4.00	pt	5.59	22	
Asana XL	1.00	pt	16.65	17	
Omite 30W	5.00	lb	6.06	30	
Herbicide:					
Roundup Ultra	1.08	pt	5.40	6	
Princep Caliber 90	0.90	lb	4.56	4	
Karmex DF	0.68	lb	5.09	3	
Harvest Aid:					
Ethrel	2.50	pt	5.44	14	
Fertilizer:					
UN-32	200.00	lb N	0.29	58	
Irrigation:					
Water	42.00	acin	3.35	141	
Custom:					
Shake Walnuts	1.00	acre	35.00	35	
Sweep Walnuts	1.00	acre	15.00	15	
Pickup Walnuts	1.00	acre	55.00	55	
Haul Walnuts	2.70	ton	15.00	41	
Hull/Shell Walnuts	5,400.00	lb	0.06	324	
PCA Service	1.00	acre	22.00	22	
Leaf Analysis N	0.04	each	5.00	0	
Leaf Analysis K	0.04	each	5.00	0	
Leaf Analysis Zn	0.04	each	5.00	0	
Assessment:					
CA Walnut Commission	5,400.00	lb	0.01	54	
Labor (machine)	12.11	hrs	12.06	146	
Labor (non-machine)	6.74	hrs	9.38	63	
Fuel - Gas	13.46	gal	1.51	20	
Fuel - Diesel	15.16	gal	1.26	19	
Lube				6	
Machinery repair				18	
Interest on operating capital @ 7.40%				25	
TOTAL OPERATING COSTS/ACRE				1,230	
NET RETURNS ABOVE OPERATING COSTS				2,118	

Table 3. continued

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS:					
Office				50	
Liability Insurance				5	
Sanitation Service				11	
Fuel/Lube Pickup				17	
Property Taxes				88	
Property Insurance				29	
Investment Repairs				51	
TOTAL CASH OVERHEAD COSTS/ACRE				250	
TOTAL CASH COSTS/ACRE				1,481	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Buildings				47	
Fuel Tanks 2-500ga				3	
Shop Tools				13	
Irrigations System				124	
Hand Tools				4	
Pickup 1/2 Ton				45	
Land				282	
Walnut Establishment				396	
Equipment				65	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				980	
TOTAL COSTS/ACRE				2,460	
NET RETURNS ABOVE TOTAL COSTS				888	

UC COOPERATIVE EXTENSION

Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley - 2002

Beginning JAN 02 Ending DEC 02	JAN 02	FEB 02	MAR 02	APR 02	MAY 02	JUN 02	JUL 02	AUG 02	SEP 02	OCT 02	NOV 02	DEC 02	TOTAL
Cultural:													
Pruning – Alternate Yrs (50% of cost)		77											77
Brush Disposal – Alternate Yrs		15											15
Pest Control - Gophers			10										10
Weed Control - Mow Middle				6	6	6	6	6					28
Irrigate				16	30	37	47	19					150
Disease Control-Walnut Blight 3X				69	35								104
Insect Control-Codling Moth 2X						29	23						51
Fertilizer - Nitrogen 2X				29				29					58
Pest Control - Misc. Insects								36					36
Harvest Aid								17					17
Weed Control - In-Season Strip Spray							9						9
Weed Control - Dormant Strip Spray											16		16
ATV Use	4	4	4	4	4	4	4	4	4	4	4	4	45
Miscellaneous Labor	2	2	2	2	2	2	2	2	2	2	2	2	28
PCA Service		2	2	2	2	2	2	2	2	2	2		22
Leaf Analysis-N, K, Zn					1								1
TOTAL CULTURAL COSTS	6	100	19	128	80	80	93	115	8	8	24	6	667
Harvest:													
Shake, Pick & Haul										145			145
Rake Walnuts										14			14
Hull, Dry										324			324
CWC Assessment Fee										54			54
TOTAL HARVEST COSTS										538			538
Interest on operating capital	0	1	1	2	2	3	3	4	4	7	0	0	25
TOTAL OPERATING COSTS/ACRE	6	100	19	130	82	82	96	119	12	553	24	6	1,230
OVERHEAD:													
Office	4	4	4	4	4	4	4	4	4	4	4	4	50
Liability Insurance	5												5
Sanitation Service		1	1	1	1	1	1	1	1	1	1		11
Fuel/Lube Pickup		2	2	2	2	2	2	2	2	2	2		17
Property Taxes				44								44	88
Property Insurance	29												29
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	51
TOTAL CASH OVERHEAD COSTS	42	11	11	55	11	11	11	11	11	11	11	52	250
TOTAL CASH COSTS/ACRE	48	112	31	185	93	94	107	130	23	564	35	58	1,481

UC COOPERATIVE EXTENSION

Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD

Sacramento Valley - 2002

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
02	75HP JD5510N MFWD	42,000	15	8,177	4,097	166	251	4,514
02	ATV 4WD	3,861	7	386	656	14	21	691
02	Brush Rake	1,584	25	45	128	5	8	141
02	Loader Forks	810	15	78	82	3	4	90
02	Mower - Flail 10'	5,000	10	500	655	18	28	701
02	Orchard Sprayer 500 Gal	18,850	10	3,333	2,362	73	111	2,546
02	Pruning Tower	18,324	10	1,832	2,401	67	101	2,568
02	Weed Sprayer 100 Gal	3,550	10	628	445	14	21	479
TOTAL		93,979		14,979	10,826	360	545	11,730
	60% of New Cost *	56,387		8,987	6,496	216	327	7,038

*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
Buildings	52,000	20		4,682	172	260	781	5,895
Fuel Tanks 2-500 gal	3,500	35	1,295	242	16	24	70	352
Hand Tools	4,120	15	412	418	15	23	50	506
Shop Tools	12,903	15	1,161	1,315	46	70	232	1,664
Irrigation System	172,000	35		12,425	568	860	3,440	17,292
Land	441,000	35	441,000	28,224	-	4,410	-	32,634
Pickup 1/2 Ton	24,000	5	7,000	4,528	102	155	480	5,265
Walnut Establishment	528,900	31		39,644	1,745	2,644	-	44,033
TOTAL INVESTMENT	1,238,423		450,868	91,478	2,664	8,446	5,053	107,641

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Fuel/Lube Pickup	100	acre	17.36	1,736
Liability Insurance	100	acre	5.09	509
Office Expense	100	acre	50.00	5,000
Sanitation Service	100	acre	10.80	1,080

UC COOPERATIVE EXTENSION

Table 6. HOURLY EQUIPMENT COSTS

Sacramento Valley - 2002

			COSTS PER HOUR						
		Actual		Cash Overhead		Operating			
Yr	Description	Hours Used	Capital Recovery	Insur-ance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
02	75HP JD5510N MFWD	411.60	5.97	0.24	0.37	1.03	5.34	6.37	12.95
02	ATV 4WD	285.00	1.38	0.03	0.04	0.28	1.16	1.44	2.90
02	Brush Rake	36.70	2.09	0.09	0.13	0.27	0.00	0.27	2.58
02	Loader Forks	36.70	1.35	0.05	0.07	0.16	0.00	0.16	1.62
02	Mower – Flail 10’	25.00	3.14	0.09	0.13	1.09	0.00	1.09	4.45
02	Orchard Sprayer 500 Gal	162.50	8.72	0.27	0.41	3.19	0.00	3.19	12.59
02	Pruning Tower	385.00	3.74	0.10	0.16	1.57	5.21	6.78	10.78
02	Weed Sprayer 100 Gal	50.00	5.34	0.17	0.25	0.95	0.00	0.95	6.70

UC COOPERATIVE EXTENSION

Table 7. RANGING ANALYSIS

Sacramento Valley - 2002

COSTS PER ACRE AT **VARYING YIELDS** TO PRODUCE WALNUTS

	YIELD (lb/acre)						
	2,400	3,400	4,400	5,400	6,400	7,400	8,400
OPERATING COSTS							
Cultural Cost	667	667	667	667	667	667	667
Harvest Cost*	281	349	416	484	551	619	686
Assessment	24	34	44	54	64	74	84
Interest on operating capital	24	24	25	25	26	26	27
TOTAL OPERATING COSTS	996	1,074	1,152	1,230	1,308	1,386	1,464
Total Operating Costs/lb	0.42	0.32	0.26	0.23	0.20	0.19	0.17
CASH OVERHEAD COSTS	250	250	250	250	250	250	250
TOTAL CASH COSTS	1,247	1,325	1,403	1,481	1,559	1,637	1,715
Total Cash Costs/lb	0.52	0.39	0.32	0.27	0.24	0.22	0.20
NON-CASH OVERHEAD COSTS	980	980	980	980	980	980	980
TOTAL COSTS	2,226	2,304	2,382	2,460	2,538	2,616	2,694
Total Costs/lb	0.93	0.68	0.54	0.46	0.40	0.35	0.32

*Custom harvest cost charged by acre. Hauling charged by ton

NET RETURNS PER ACRE **ABOVE OPERATING COSTS** FOR WALNUTS

	YIELD (lb/acre)						
$/lb	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.47	132	524	916	1,308	1,700	2,092	2,484
0.52	252	694	1,136	1,578	2,020	2,462	2,904
0.57	372	864	1,356	1,848	2,340	2,832	3,324
0.62	492	1,034	1,576	2,118	2,660	3,202	3,744
0.67	612	1,204	1,796	2,388	2,980	3,572	4,164
0.72	732	1,374	2,016	2,658	3,300	3,942	4,584
0.77	852	1,544	2,236	2,928	3,620	4,312	5,004

NET RETURNS PER ACRE **ABOVE CASH COSTS** FOR WALNUTS

	YIELD (lb/acre)						
$/lb	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.47	-119	273	665	1,057	1,449	1,841	2,233
0.52	1	443	885	1,327	1,769	2,211	2,653
0.57	121	613	1,105	1,597	2,089	2,581	3,073
0.62	241	783	1,325	1,867	2,409	2,951	3,493
0.67	361	953	1,545	2,137	2,729	3,321	3,913
0.72	481	1,123	1,765	2,407	3,049	3,691	4,333
0.77	601	1,293	1,985	2,677	3,369	4,061	4,753

NET RETURNS PER ACRE **ABOVE TOTAL COSTS** FOR WALNUTS

	YIELD (lb/acre)						
$/lb	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.47	-1,098	-706	-314	78	470	862	1,254
0.52	-978	-536	-94	348	790	1,232	1,674
0.57	-858	-366	126	618	1,110	1,602	2,094
0.62	-738	-196	346	888	1,430	1,972	2,514
0.67	-618	-26	566	1,158	1,750	2,342	2,934
0.72	-498	144	786	1,428	2,070	2,712	3,354
0.77	-378	314	1,006	1,698	2,390	3,082	3,774