
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

**SAMPLE COSTS TO ESTABLISH
A WALNUT ORCHARD AND PRODUCE**

WALNUTS

English Walnuts



SACRAMENTO VALLEY

Sprinkler Irrigated

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CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs.....	3
Production Cultural Practices and Material Inputs.....	5
Labor, Interest and Equipment.....	7
Cash Overhead	8
Non-Cash Overhead.....	8
REFERENCES.....	10
Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A WALNUT ORCHARD	11
Table 2. COSTS PER ACRE TO PRODUCE WALNUTS.....	13
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS.....	15
Table 4. MONTHLY CASH COSTS – WALNUTS	17
Table 5. RANGING ANALYSIS.....	18
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS.....	19
Table 7. HOURLY EQUIPMENT COSTS	19
Table 8. OPERATIONS WITH EQUIPMENT & MATERIAL INPUTS	20

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 assumptions section describes the hypothetical farm operation, production practices, overhead, and calculations. 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 are available for many commodities. Current and archived studies can be downloaded from the Agricultural and Resource Economics website at UC Davis <http://coststudies.ucdavis.edu>. These studies as well as archived studies not on the website can be requested through the department by calling (530) 752-1517.

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ASSUMPTIONS

The assumptions refer to Tables 1 through 8 and pertain to sample costs to establish an orchard and produce walnuts under micro sprinkler or low volume irrigation in the Sacramento Valley. The cultural practices described represent production operations and materials considered typical for a well managed farm in the Sacramento Valley. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of cultural practices will vary by location and by season depending upon weather, soil, insect and disease pressure. The study is intended as a guide only. **The use of trade names and cultural practices does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

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; roads, irrigation systems and farmstead occupy five acres.

Establishment Cultural Practices and Material Inputs (Table 1)

Site Preparation. This orchard is established on ground previously planted to another tree crop. The soil is ripped 3-foot deep in two directions to break up underlying hardpan and pull up old roots. The orchard site 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. An herbicide is then applied prior to planting. 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, Howard and Tulare. Many orchards include a small percentage of a second variety for pollination. Paradox is the typical rootstock in the Sacramento Valley. Many variables determine spacing including soil, rootstock and variety planted. In this study, 3/4 inch caliber nursery grafted trees are planted at a 24 X 28 foot spacing, resulting in 65 trees per acre. The economic life of the orchard is assumed to be 35 years.

Planting. Planting in the spring (February) starts by surveying and marking tree sites with a small stake, digging holes, planting, topping, and staking the trees. Trees are painted white to prevent sunburn and tree wraps are placed around the tree for rodent and tree protection. In the second year, 4% of the orchard or 2 trees per acre are replanted.

Pruning. Pruning and training begins in February of the first year, when one shoot that forms the main trunk is selected and tied up the tree stake. Dormant pruning/training (February) during the second and third years develops primary scaffolds and encourages the central leader. Starting in February of the fourth year, pruning towers are used to make cuts higher in the tree canopy. Heading cuts are made to remove a portion of the current year's growth until trees fill in their spaces. Alternate year pruning is done starting in the seventh year. During the first two establishment 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 production. Some locations will require additional nutrients. For the first two years, two equal applications of granular nitrogen are hand applied in April and August approximately 18 inches from the base of the tree. Beginning in third year, liquid nitrogen fertilizer (UN32) is injected through the irrigation system. Estimated annual rates of actual N are shown in Table A.

Year	Actual N lbs/acre
1	20
2	50
3	100
4	125
5	150
6+	200

Leaf Samples. Leaf sampling begins in the fourth year. One leaf sample per 25 acres is taken in July for tissue analysis to determine orchard nutritional status. Samples are collected using an ATV to move through the orchard. Time assumed is 0.04 hours per acre to collect and package the samples.

Irrigation. Price per acre-foot of water will vary by grower depending on power source, well characteristics, and irrigation district. In this study, electrical costs for pumping ground water are calculated to cost \$37.20 per acre-foot or \$3.10 per acre-inch. No assumption is made about effective rainfall. The estimated water applied each year is shown in Table B.

Year	acft/year
1	1.5
2-5	2.5
6+	3.5

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.

Nematodes/Fumigation. Prior to land preparation, the area is sampled (1 sample/10 acres) for nematodes. The grower uses the ATV for moving around the field. Two hours per 100 acres are assumed for collecting and packaging the samples. Fumigation (methyl bromide and chloropicrin) is done untarped by a custom applicator. Fumigation may be necessary where orchards follow orchards, but not be necessary following bare or row crop ground.

Weeds. Weed pressure, materials and application timing will vary by orchard and season. In this study, a contact herbicide (Roundup) is applied to the tree rows in February prior to planting and a preemergence herbicide (Prowl) is applied in April. Beginning in the first year, the row middles are mowed five times - April, May, June, July, August. During the first two years, early winter (November) strip sprays using Prowl and Goal are applied. Inseason sprays using Roundup are applied to tree rows in July of the first year and in June and August during year's two to five. In subsequent years, Prowl, Goal, and Roundup are applied as winter (November) strip sprays. Inseason strip sprays using Roundup are applied in July for weed control in year's six to eight.

Diseases. During the establishment years, trees have only a few walnuts to protect from walnut blight. In this study, blight sprays begin in April of the fifth year. Two applications are made using a copper fungicide (Kocide) and Manex tank mix.

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 once in July for codling moth control. Beginning in the sixth year, walnut husk fly is treated in July and August with Malathion and NuLure bait. Also, other insects such as aphids, scale, or mites can reach treatment levels. For this study it is assumed that on the average, only one of these pests will occur in any one

year. Under that assumption, mites are treated in June with Omite. The cost is assumed to be equivalent to the average costs of controlling the other insects.

Vertebrate Pests. Beginning in the first year, gophers are managed in the spring (March) using poison bait placed underground by a mechanical bait applicator. It is assumed that gophers are under control by the end of the third year and in subsequent years only spot treatments are necessary. Squirrels are managed using anti-coagulant bait stations on the field perimeter beginning in the fifth year and are maintained during May, June, September and October.

Harvest. Depending upon variety and orchard management, harvest usually starts in the fourth or fifth year. In this study, economical harvest starts in the fourth year. A custom operator mechanically shakes, sweeps, picks up and hauls walnuts to a facility for hulling and drying. Mature yield is reached in the eighth year. See harvest under the production assumptions.

Year	Yield (dry, In-shell)	
	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

Production Cultural Practices and Material Inputs (Table 2 – 8)

Pruning. Pruning to open the canopy, maintain healthy buds, lower tree height, remove dead and undesired limbs is done during the winter months. The trees are hedged by a custom operator between December and March (February in this study) once every three years and one-third of the cost is included each year. Hand pruning is done each year in July to remove low and broken limbs. In both cases, prunings are placed in the row middles and are pushed to the orchard edge for burning. Brush removal includes the tractor driver and one man on the ground.

Fertilization. Nitrogen (N) at an annual rate of 200 pounds per acre of actual N is applied through the irrigation system. The nitrogen source is UN 32 injected through the irrigation system in equal amounts in April and August. Labor for the fertilizer application is included in the irrigation labor.

Leaf Samples. Nutrition is determined by leaf analysis. Leaf samples at one sample per 25 acres are taken in July for tissue analysis. The grower uses the ATV to move around the field. Time assumed is 0.04 hours per acre to collect and package the samples.

Irrigation. Irrigation costs include the water pumping costs and assumed labor. The crop uses 42-acre inches of water per acre applied from April to August. No assumption is made about effective rainfall. In this study, water costs based on grower input are \$37.14 per acre-foot or \$3.10 per acre-inch.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Walnuts*. For additional information on suggested pesticides, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For information and pesticide use permits, contact the local county agricultural commissioner's office. Adjuvants or surfactants may be recommended for use with some pesticides, but are not included in this study. Pesticide costs vary by location and amount purchased. Pesticide costs in this study are taken from a single dealer and shown as full retail.

Pest Control Adviser (PCA). In this study a PCA monitors for pest problems including but not limited to insects, weeds and nutrition and writes specific pesticide recommendations. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company.

Weeds. Weeds are controlled in the tree row with winter and in-season strip sprays using preemergent/postemergent and contact herbicides. Goal, Prowl and Roundup are applied in November (winter strip spray). Roundup is applied during the growing season (inseason strip spray) in July. Row middles are mowed five times from April through August.

Insects. Several insects and mites can be a problem. Codling moth, a major pest, can cause damage resulting in off grade nuts. Three generations usually occur and are monitored using pheromone traps and insect degree days (IPM web site). The pheromone traps are furnished, installed and serviced by the PCA, therefore no cost is shown. Two treatments for codling moth are assumed, Lorsban is applied in June and Asana in July. Walnut husk fly is a problem in most orchards and is monitored using yellow sticky traps with ammonium carbonate superchargers. Husk fly is treated in July and August with Malathion and NuLure Bait. Aphids, scale, and/or mites generally do not occur every year in every orchard. In this study, it is assumed on the average only one of these pests will appear in any year and one treatment per year is considered necessary. Although different materials are required to control each pest, Omite for mites is applied in June and represents the average cost for controlling the other insects. Growers should rotate pesticides used for pest control to prevent resistance buildup.

Disease. Walnut Blight is a spring disease that infects all green tissue including the nutlets and is the only disease treated in this study. Three treatments are applied, two in April and one in May, using a copper compound (Kocide) tank mixed with Manex.

Vertebrate Pests. Gophers are assumed to be under control and only maintenance treatments are necessary. Spot treatments with gopher bait are made in March. Squirrels are managed using anti-coagulant bait stations on the field perimeter and are maintained during May, June, September and October. In both situations, the grower uses an ATV to move around the field.

Growth Regulator. Ethrel is applied to one-half of the orchard to promote one shake harvest. The growth regulator (Ethrel) is applied at packing tissue browning (an indicator of kernel maturity) to promote earlier harvest or applied about 10 days before the regular harvest to encourage one time shake on the treated side.

Harvest. The custom harvesters shake, sweep, pick up, and truck the walnuts to a processor for hulling and drying. Hand raking is needed to windrow walnuts missed by the sweeper and the rakers are supplied by the grower. Hulling and drying costs are charged on a per pound, dry-weight basis. Custom harvest operators may charge by the hour, acre or yield, but most have a minimum per acre charge.

Yields. Annual yields for walnut varieties are measured as clean, dry, in-shell pounds per acre. The average yield over the remaining life of the orchard is assumed to be 5,400 pounds per acre.

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 \$0.85 per pound based on 2006 prices is used in this study.

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 \$0.0079 per pound of dry in-shell nuts.

Miscellaneous Labor. Labor that may be used for short periods assisting various operations. The operation was completed before the end of the workday; therefore the grower may assign miscellaneous duties such as weeding around the shop or equipment yard. Also covers extra labor that may be needed in one of the operations or in the shop and has not been accounted for in that specific operation.

Pickup/ATV. The study assumes business use mileage of 3,000 miles per year for the pickup. The ATV is used for weed spraying, baiting squirrels and gophers and is included in those costs. Additional ATV uses for checking the orchard, diseases and irrigation system are shown as a line item. The travel and time are estimated and not taken from any specific data.

Labor, Equipment, and Interest

Labor. Hourly wages for workers are \$12.00 for machine operators and \$8.00 per hour non-machine labor. Adding 38% for the employer's share of federal and state payroll taxes, workers compensation insurance for nut crops (code 0045) and other possible benefits results in labor rates of \$16.56 and \$11.04 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2005 (California Department of Insurance). 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 field repair.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$2.30 and \$2.80 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel and 8% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% 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 10.00% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2007.

Risk. The risks associated with crop production 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 profitability and economic viability.

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. 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 two 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 0.714% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$674 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, shop and office utilities and miscellaneous administrative costs.

Sanitation Services. Sanitation services provide portable toilets with wash basins for the orchard and cost the farm \$1,125 annually. This cost includes delivery and five 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.

Investment Repairs. Costs are calculated as 2% of the purchase price on investments listed in Table 5 except for establishment costs are 0.10% to account for tree replacement.

Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$.

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life

in years is estimated by dividing the wearout life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

Interest Rate. An interest rate of 7.25% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2007.

Land. Crop or bare land values range from \$3,000 to \$6,500. The orchard site is assumed to be on previously farmed orchard ground. The basic land value in this study is \$5,500 per acre.

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. 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 micro 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, field tools such as pruning equipment, traps, etc.

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 almond trees through the first year nuts are harvested less returns from production. The *Accumulated Net Cash Cost* in the third year shown in Table 1 represents the establishment cost per acre. For this study, this cost is \$6,897 per acre or \$689,700 for the 100-acre orchard. Establishment cost is amortized beginning in the fifth year over the remaining 31 years of production. Tree replacement or repairs is \$6.90 per acre based on 0.10% of the establishment cost.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

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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.

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Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A WALNUT ORCHARD
 SACRAMENTO VALLEY - 2007

	Year:	Cost Per Acre						
		1st	2nd	3rd	4th	5th	6th	7th
Yield: Dry, In-Shell Pounds Per Acre					500	1,000	1,500	2,800
Planting Costs:								
Nematode Sampling (10/100 acres)		4						
Land Preparation: Subsoil 2X, Disk 2X, Float 2X*		350						
Land Preparation - Fumigate (100%, untarped)		1,500						
Land Prep-Berms		12						
Land Prep-Weed: Preplant Strip Spray (Roundup)		9						
Trees: 65 Per Acre @ \$16.50 ea., (2% in 2nd year)		1,073						
Survey, Mark, Dig Holes & Plant		138	4					
Stake & Paint Trees		313	33					
TOTAL PLANTING COSTS		3,398	37					
Cultural Costs:								
Prune (Yrs 1-3 prune/train. Yrs 4+ prune, Yr 7 – 9 prune alternate yrs)		50	50	56	180	240	300	75
Fertilizer: Nitrogen (Urea, Yr 1-2, UN32, Yr 3+)		34	49	50	63	75	100	100
Weed: Strip Spray (Prowl)		16						
Weed: Dormant Strip (Yr 1-2, Goal, Prowl. Yr 3+, Goal Prowl, Roundup)		62	62	73	73	73	73	73
Weed: Mow Middles 5X		38	38	38	38	38	38	38
Weed: In-Season Strip Spray (Roundup, Yrs 1, 6, 7, 1X. Yr 2-5, 2X)		12	25	25	25	25	12	12
Irrigate (water & labor)		76	105	105	105	105	143	143
Vertebrate: Gophers (Bait)		10	10	10	3	3	3	3
Insect: Caterpillar (Dipel)		19	19	19				
Brush Disposal				11	11	11	11	5
Leaf Analysis					2	2	2	2
Insect: Codling Moth (Lorsban)						34	34	34
Vertebrate: Squirrels (Bait)						7	7	7
Disease: Blight (Kocide, Manex) 2X						112	112	112
Insect: Miscellaneous Insects (Omite for mites)							50	50
Insect: Husk Fly (Malathion, Nu Lure Bait)							50	50
Pickup Use		28	28	28	28	28	28	28
ATV use		45	45	45	45	45	45	45
Miscellaneous Labor		37	37	37	37	37	37	37
PCA Services		5	5	5	25	25	25	25
TOTAL CULTURAL COSTS		433	474	503	635	861	1,070	840
Harvest Costs:								
Shake, Sweep, Pickup					150	150	150	150
Hand Rake					9	12	12	12
Haul Walnuts to Dryer					4	8	11	21
Dry and Hull					30	60	90	168
California Walnut Commission Assessment					4	8	12	22
TOTAL HARVEST COSTS					197	238	276	374
Interest On Operating Capital @ 10.00%		416	29	27	22	35	43	29
TOTAL OPERATING COSTS/ACRE		4,239	539	530	855	1,133	1,389	1,242
Cash Overhead Costs:								
Office Expense		100	100	100	100	100	100	100
Liability Insurance		7	7	7	7	7	7	7
Sanitation Costs		11	11	11	11	11	11	11
Property Taxes		77	77	77	76	77	77	77
Property Insurance		14	14	14	13	14	14	14
Investment Repairs		81	81	81	81	81	81	81
TOTAL CASH OVERHEAD COSTS		290	290	290	289	290	290	290
TOTAL CASH COSTS/ACRE		4,529	829	820	1,143	1,423	1,679	1,532
INCOME/ACRE FROM PRODUCTION					425	850	1,275	2,380
NET CASH COSTS/ACRE FOR THE YEAR		4,529	829	820	718	573	404	
PROFIT/ACRE ABOVE CASH COSTS								848
ACCUMULATED NET CASH COSTS/ACRE		4,529	5,358	6,178	6,897	7,470	7,874	7,026

UC COOPERATIVE EXTENSION

Table 1. continued

	Year:	Cost Per Acre						
		1st	2nd	3rd	4th	5th	6th	7th
Yield: Dry, In-Shell Pounds Per Acre:					500	1,000	1,500	2,800
Non-Cash Overhead (Capital Recovery):								
Buildings		77	77	77	77	77	77	77
Fuel Tanks		3	3	3	3	3	3	3
Shop/Field Tools		17	17	17	17	17	17	17
Sprinkler Irrigation System		136	136	136	136	136	136	136
Land		419	419	419	419	419	419	419
Equipment		110	109	109	90	107	107	107
TOTAL INTEREST ON INVESTMENT		762	761	761	742	759	759	759
TOTAL COST/ACRE FOR THE YEAR		5,291	1,590	1,581	1,885	2,182	2,438	2,291
INCOME/ACRE FROM PRODUCTION					425	850	1,275	2,380
TOTAL NET COST/ACRE FOR THE YEAR		5,291	1,590	1,581	1,460	1,332	1,163	
NET PROFIT/ACRE ABOVE TOTAL COST								89
TOTAL ACCUMULATED NET COST/ACRE		5,291	6,881	8,461	9,922	11,253	12,416	12,327

*X = times (2X = two times)

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE TO PRODUCE WALNUTS
 Sacramento Valley - 2007

Operation	Operation	Cash and Labor Costs per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Cultural:								
Prune: Dormant (Hedge 1X/3 Yr)	0.00	0	0	0	20	20		
Prune: Brush Disposal 1X/3 Yr	0.16	5	2	0	0	7		
Vertebrate: Gopher	0.08	2	0	2	0	3		
Weed: Mow Middles 5X	1.17	23	15	0	0	38		
Irrigate: (water & labor)	1.00	12	0	130	0	143		
Disease: Blight (Kocide, Manex) 3X	0.75	15	12	141	0	167		
Fertilize: N through sprinklers (UN32)	0.00	0	0	100	0	100		
Vertebrate: Squirrels	0.16	3	0	3	0	7		
Insect: Mites, Misc. (Omite)	0.25	5	4	41	0	50		
Insect: Codling Moth (Lorsban)	0.25	5	4	25	0	34		
Insect: Codling Moth (Asana)	0.25	5	4	17	0	26		
Prune: Summer	2.00	25	0	0	0	25		
Prune: Brush Disposal	0.50	16	6	0	0	22		
Insect: Husk Fly (Malathion, NuLure)	0.50	10	8	33	0	50		
Leaf Analysis	0.02	0	0	0	1	2		
Weed: In-Season Strip Spray (Roundup)	0.25	5	3	5	0	13		
Growth Regulator: 50% acres (Ethrel)	0.17	3	3	20	0	25		
Weed: Dormant Strip (Goal, Prowl, Roundup)	0.25	5	3	65	0	73		
Pickup 1/2 Ton	1.00	20	8	0	0	28		
ATV	2.00	40	5	0	0	45		
Miscellaneous Labor	3.00	37	0	0	0	37		
PCA Service	0.00	0	0	0	25	25		
TOTAL CULTURAL COSTS	13.75	237	77	581	46	941		
Harvest:								
Shake, Sweep, Pickup	0.00	0	0	0	150	150		
Rake Walnuts	1.50	19	0	0	0	19		
Haul to Dryer	0.00	0	0	0	41	41		
Hull, Dry	0.00	0	0	0	324	324		
CWC Assessment Fee	0.00	0	0	43	0	43		
TOTAL HARVEST COSTS	1.50	19	0	43	515	576		
Interest on operating capital @ 10.00%						33		
TOTAL OPERATING COSTS/ACRE		255	77	625	560	1,550		
CASH OVERHEAD:								
Office						100		
Liability Insurance						7		
Sanitation Service						11		
Property Taxes						112		
Property Insurance						38		
Investment Repairs						88		
TOTAL CASH OVERHEAD COSTS						356		
TOTAL CASH COSTS/ACRE						1,906		

UC COOPERATIVE EXTENSION

Table 2. continued
Sacramento Valley - 2007

Operation	Operation	Cash and Labor Costs per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Non-Cash Overhead (Capital Recovery)	Per producing Acre			Annual Cost				
				Capital Recovery				
Buildings		800		77		77		
Fuel Tanks		35		3		3		
Shop/Field Tools		150		17		17		
Irrigation System		1,720		136		136		
Land		5,775		419		419		
Walnut Establishment		6,897		565		565		
Equipment		938		109		109		
TOTAL NON-CASH OVERHEAD COSTS		16,315		1,325		1,325		
TOTAL COSTS/ACRE						3,231		

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 Sacramento Valley - 2007

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Walnuts	5,400.00	lb	0.85	4,590	
OPERATING COSTS					
Rodenticide:					
Gopher Getter Ag-Wilco	0.25	lb	6.50	2	
Ground Squirrel Bait - Wilco	0.60	lb	5.40	3	
Irrigation:					
Water	42.00	acin	3.10	130	
Fungicide:					
Kocide 101	30.00	lb	3.62	109	
Manex	10.86	pt	2.97	32	
Insecticide:					
Lorsban 4E	4.00	pt	6.29	25	
Asana XL	1.00	pt	17.33	17	
Omite 30W	5.00	lb	8.23	41	
Malathion 5EC	4.00	pt	4.07	16	
Nu Lure Bait	4.00	pt	4.08	16	
Fertilizer:					
UN-32	200.00	lb N	0.50	100	
Harvest Aid:					
Ethrel	2.50	pt	7.81	20	
Herbicide:					
Roundup Ultra Max	1.84	pt	8.58	16	
Goal 2XL	2.50	pt	16.45	41	
Prowl 3.3EC	3.13	pt	4.10	13	
Custom:					
Shake, Sweep, Pickup	1.00	acre	150.00	150	
Haul Walnuts	2.70	ton	15.00	41	
Dry/Hull Walnuts	5,400.00	lb	0.06	324	
PCA Service	1.00	acre	25.00	25	
Leaf Analysis	0.04	each	30.00	1	
Hedge Trees (1X/3 Yr)	0.33	acre	60.00	20	
Assessment:					
CA Walnut Commission (\$0.0079/lb)	5,400.00	lb	0.01	43	
Labor (machine)	9.30	hrs	16.56	154	
Labor (non-machine)	8.16	hrs	12.42	101	
Fuel - Gas	3.41	gal	2.80	10	
Fuel - Diesel	17.93	gal	2.30	41	
Lube				8	
Machinery repair				18	
Interest on operating capital @ 10.00%				33	
TOTAL OPERATING COSTS/ACRE				1,550	
NET RETURNS ABOVE OPERATING COSTS				3,040	

UC COOPERATIVE EXTENSION

Table 3. continued
Sacramento Valley - 2007

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS:					
Office				100	
Liability Insurance				7	
Sanitation Service				11	
Property Taxes				112	
Property Insurance				39	
Investment Repairs				88	
TOTAL CASH OVERHEAD COSTS/ACRE				356	
TOTAL CASH COSTS/ACRE				1,906	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Buildings				77	
Fuel Tanks				3	
Shop/Field Tools				17	
Irrigation System				136	
Land				419	
Walnut Establishment				565	
Equipment				109	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,325	
TOTAL COSTS/ACRE				3,231	
NET RETURNS ABOVE TOTAL COSTS				1,359	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WALNUTS
 Sacramento Valley - 2007

Beginning JAN 07	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 07	07	07	07	07	07	07	07	07	07	07	07	07	
Cultural:													
Prune: Dormant (Hedge 1X/3 Yr)		20											20
Prune: Brush Disposal 1X/3 Yr		7											7
Vertebrate: Gopher			3										3
Weed: Mow Middles 5X				8	8	8	8	8					38
Irrigate				29	29	29	29	29					143
Disease: Blight (Kocide, Manex) 3X				112	56								167
Fertilize: N through sprinklers (UN32)					50			50					100
Vertebrate: Squirrels					2	2			2	2			7
Insect: Mites, Misc. (Omite)						50							50
Insect: Codling Moth (Lorsban)						34							34
Insect: Codling Moth (Asana)							26						26
Prune: Summer							25						25
Prune: Brush Disposal							22						22
Insect: Husk Fly (Malathion, NuLure)							25	25					50
Leaf Analysis							2						2
Weed: In-Season Strip Spray (Roundup)								13					13
Growth Regulator: 50% acres (Ethrel)								25					25
Weed: Dormant Strip (Goal, Prowl, Roundup)											73		73
Pickup 1/2 Ton	2	2	2	2	2	2	2	2	2	2	2	2	28
ATV	4	4	4	4	4	4	4	4	4	4	4	4	45
Miscellaneous Labor	3	3	3	3	3	3	3	3	3	3	3	3	37
PCA Service	2	2	2	2	2	2	2	2	2	2	2	2	25
TOTAL CULTURAL COSTS	11	38	15	159	155	133	148	161	13	13	85	9	941
Harvest:													
Shake, Sweep, Pickup									150				150
Rake Walnuts									19				19
Haul to Dryer									41				41
Hull, Dry									324				324
CWC Assessment Fee									43				43
TOTAL HARVEST COSTS									576				576
Interest on operating capital @ 10.00%	0	0	1	2	3	4	6	7	12	-1	-1	0	33
TOTAL OPERATING COSTS/ACRE	12	39	15	161	158	138	153	168	601	12	84	9	1,550
OVERHEAD:													
Office	8	8	8	8	8	8	8	8	8	8	8	8	100
Liability Insurance		7											7
Sanitation Service				11									11
Property Taxes				56								56	112
Property Insurance	38												38
Investment Repairs	7	7	7	7	7	7	7	7	7	7	7	7	88
TOTAL CASH OVERHEAD COSTS	54	22	16	83	16	16	16	16	16	16	16	71	356
TOTAL CASH COSTS/ACRE	66	61	31	244	174	153	169	183	617	28	100	80	1,906

UC COOPERATIVE EXTENSION

Table 5. RANGING ANALYSIS

Sacramento Valley - 2007

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	941	941	941	941	941	941	941
Harvest Cost (Shake, Sweep, Pickup, Rake)	169	169	169	169	169	169	169
Haul to Dryer	18	25	33	41	48	56	63
Dry and Hull	144	204	264	324	384	444	504
Assessment	19	27	35	43	51	59	67
Interest on operating capital	31	31	32	33	33	34	35
TOTAL OPERATING COSTS	1322	1397	1474	1551	1626	1703	1779
Total Operating Costs/lb	0.55	0.41	0.33	0.29	0.25	0.23	0.21
CASH OVERHEAD COSTS	356	356	356	356	356	356	356
TOTAL CASH COSTS	1678	1753	1830	1907	1982	2059	2135
Total Cash Costs/lb	0.70	0.52	0.42	0.35	0.31	0.28	0.25
NON-CASH OVERHEAD COSTS	1325	1325	1325	1325	1325	1325	1325
TOTAL COSTS	3003	3078	3155	3232	3307	3384	3460
Total Costs/lb	1.25	0.91	0.72	0.60	0.52	0.46	0.41

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

NET RETURNS PER ACRE ABOVE OPERATING COSTS

\$/lb	YIELD (lb/acre)						
	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.60	118	643	1,166	1,689	2,214	2,737	3,261
0.68	310	915	1,518	2,121	2,726	3,329	3,933
0.77	526	1,221	1,914	2,607	3,302	3,995	4,689
0.85	718	1,493	2,266	3,039	3,814	4,587	5,361
0.94	934	1,799	2,662	3,525	4,390	5,253	6,117
1.02	1,126	2,071	3,014	3,957	4,902	5,845	6,789
1.10	1,318	2,343	3,366	4,389	5,414	6,437	7,461

NET RETURNS PER ACRE ABOVE CASH COSTS

\$/lb	YIELD (lb/acre)						
	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.60	-238	287	810	1,333	1,858	2,381	2,905
0.68	-46	559	1,162	1,765	2,370	2,973	3,577
0.77	170	865	1,558	2,251	2,946	3,639	4,333
0.85	362	1,137	1,910	2,683	3,458	4,231	5,005
0.94	578	1,443	2,306	3,169	4,034	4,897	5,761
1.02	770	1,715	2,658	3,601	4,546	5,489	6,433
1.10	962	1,987	3,010	4,033	5,058	6,081	7,105

NET RETURNS PER ACRE ABOVE TOTAL COSTS

\$/lb	YIELD (lb/acre)						
	2,400	3,400	4,400	5,400	6,400	7,400	8,400
0.60	-1,563	-1,038	-515	8	533	1,056	1,580
0.68	-1,371	-766	-163	440	1,045	1,648	2,252
0.77	-1,155	-460	233	926	1,621	2,314	3,008
0.85	-963	-188	585	1,358	2,133	2,906	3,680
0.94	-747	118	981	1,844	2,709	3,572	4,436
1.02	-555	390	1,333	2,276	3,221	4,164	5,108
1.10	-363	662	1,685	2,708	3,733	4,756	5,780

UC COOPERATIVE EXTENSION

Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD
Sacramento Valley - 2007

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
07	65HP 2WD Tractor	46,230	12	11,558	5,262	206	289	5,757
07	75HP MFWD Tractor	43,500	15	8,469	4,521	186	260	4,967
07	All Terrain Vehicle (ATV)	5,790	12	1,448	659	26	36	721
07	Brush Rake 9 ft	2,000	25	57	175	7	10	192
07	Loader Forks	810	15	78	87	3	4	95
07	Mower-Flail 10 ft	5,000	10	500	684	20	28	732
07	Orchard Sprayer 500 Gal	21,000	10	3,714	2,759	88	124	2,971
07	Pickup 1/2 ton	28,000	10	8,271	3,441	129	181	3,752
07	Weed Sprayer 100 Gal	4,000	10	707	526	17	24	566
TOTAL		156,330		34,802	18,114	682	956	19,752
60% of New Cost *		93,798		20,881	10,868	409	573	11,851

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Buildings 2400 sqft	80,000	20		7,699	286	400	1,600	9,984
Establishment (Orchard)	689,700	31		56,450	2,462	3,449	689	63,050
Fuel Tanks 2 - 250 gal	3,500	35	1,295	269	17	24	70	380
Irrigation System	172,000	35		13,648	614	860	3,440	18,562
Land	577,500	35	577,500	41,869	0	5,775	0	47,644
Shop/Field Tools	15,000	15		1,673	54	75	3,000	4,802
TOTAL INVESTMENT	1,537,700		578,795	121,607	3,433	10,582	8,799	144,421

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	100	acre	6.74	674
Office Expense	100	acre	100.00	10,000
Sanitation Service	100	acre	11.25	1,125

UC COOPERATIVE EXTENSION

Table 7. HOURLY EQUIPMENT COSTS
Sacramento Valley - 2007

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	
				Insur- ance	Taxes	Repairs	Fuel & Lube		
07	65HP 2WD Tractor	55	57.40	2.25	3.15	2.01	8.44	10.45	73.25
07	75HP MFWD Tractor	439	6.18	0.25	0.35	1.04	9.74	10.78	17.56
07	All Terrain Vehicle (ATV)	226	1.75	0.07	0.10	0.41	2.01	2.42	4.34
07	Brush Rake 9 ft	66	1.59	0.07	0.09	0.32	0.00	0.32	2.07
07	Loader Forks	66	0.79	0.03	0.04	0.16	0.00	0.16	1.02
07	Mower-Flail 10 ft	117	3.52	0.10	0.14	1.07	0.00	1.07	4.83
07	Orchard Sprayer 500 Gal	217	7.64	0.24	0.34	3.52	0.00	3.52	11.74
07	Pickup 1/2 ton	100	20.65	0.78	1.09	2.00	6.44	8.44	30.96
07	Weed Sprayer 100 Gal	50	6.31	0.20	0.28	1.06	0.00	1.06	7.85

UC COOPERATIVE EXTENSION
Table 8. OPERATIONS WITH EQUIPMENT
 SACRAMENTO VALLEY - 2007

Operation	Operation Month	Equipment Tractor	Implement	Non-Mach Labor hrs/acre	Material	Broadcast Rate/acre	Unit
Cultural:							
Prune: Hedge 1X/3 yr	Feb	Custom					
Prune: Summer Prune	July			2.00			
Prune: Brush Disposal 1X/3 yr	Feb	75HP MFWD	Forks & Brush Rake	0.16			
Prune: Brush Disposal	July	75HP MFWD	Forks & Brush Rake				
Vertebrate: Gopher	Mar	ATV			Gopher Bait	0.25	lb
Weed: Mow Middles	Apr	75HP MFWD	Mower - Flail				
	May	75HP MFWD	Mower - Flail				
	June	75HP MFWD	Mower - Flail				
	July	75HP MFWD	Mower - Flail				
	Aug	75HP MFWD	Mower - Flail				
Vertebrate: Squirrel	May	ATV			Squirrel Bait	0.15	lb
	June	ATV			Squirrel Bait	1.15	lb
	Sept	ATV			Squirrel Bait	2.15	lb
	Oct	ATV			Squirrel Bait	3.15	lb
Irrigate:	Apr			0.20	Water	8.40	acin
	May			0.20	Water	8.40	acin
	June			0.20	Water	8.40	acin
	July			0.20	Water	8.40	acin
	Aug			0.20	Water	8.40	acin
Disease: Blight	Apr	75HP MFWD	Orchard Sprayer		Kocide	10.00	lb
					Manex	7.24	pt
	Apr	75HP MFWD	Orchard Sprayer		Kocide	10.00	lb
					Manex	7.24	pt
	May	75HP MFWD	Orchard Sprayer		Kocide	10.00	lb
					Manex	7.24	pt
Fertilize: N (through irrigation system)	May				UN32	100.00	lb N
	Aug				UN32	100.00	lb N
Insect: Mites, Misc.	June	75HP MFWD	Orchard Sprayer		Omite	5.00	lb
Insect: Codling Moth	June	75HP MFWD	Orchard Sprayer		Lorsban	4.00	pt
	July	75HP MFWD	Orchard Sprayer		Asana	1.00	pt
Fertilize: Leaf Sampling	July	ATV			Analysis	0.04	each
Weed: In-season spray	Aug	65HP	Weed Sprayer		Roundup	0.54	pt
Insect: Husk Fly	July	75HP MFWD	Orchard Sprayer		Malathion	2.00	pt
					NuLure	2.00	pt
	Aug	75HP MFWD	Orchard Sprayer		Malathion	2.00	pt
					NuLure	2.00	pt
Growth Regulator on 50% of acres	Aug	75HP MFWD	Orchard Sprayer		Ethrel	2.50	pt
Harvest: Shake, Sweep, Pickup	Sept	Custom					
Harvest: Hand Rake	Sept			1.50			
Harvest: Haul to Dryer	Sept	Custom					
Harvest: Dry/Hull	Sept	Custom					
Weed: Dormant Strip	Nov	65HP	Weed Sprayer		Goal	2.50	pt
					Prowl	3.13	pt
					Roundup	1.30	pt