
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

SAMPLE COSTS TO ESTABLISH
A WALNUT ORCHARD AND PRODUCE

WALNUTS



SAN JOAQUIN VALLEY - North

Late leafing – lateral bearing
Micro-sprinkler Irrigation

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INTRODUCTION

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

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

Current and many archived Sample Cost of Production Studies for several commodities can be downloaded from the Agricultural and Resource Economics website at UC Davis <http://coststudies.ucdavis.edu> or obtained from your local UC Cooperative Extension office. These studies as well as other archived studies not on the website can also be requested through the department by calling (530) 752-1517.

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ASSUMPTIONS

The following assumptions refer to Tables 1 to 8 and pertain to sample costs to establish an orchard and produce walnuts under micro-sprinkler or low volume irrigation in the northern San Joaquin Valley. The cultural practices described represent production operations and materials considered typical for a well managed farm in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, insect and disease pressure. The study is intended as a guide only. **The use of trade names and cultural practices 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 or cultural practices.**

Land. The hypothetical farm consists of 100 contiguous acres of land. Of that, 60 acres are being established to walnuts, 35 are planted to other permanent or annual crops, and five acres are roads, irrigation system and farmstead.

Establishment Cultural Practices and Material Inputs (Table 1)

Site Preparation. The orchard is being established on land previously planted to tree crops. The land is assumed to be deep, well drained, and either a class I or II soil.

Orchard removal and field cleanup after removal are done by an orchard removal company. Land preparation begins with subsoiling in two directions to a depth of 4-5 feet to allow deep fumigant penetration and pull up old roots. Custom operators do the subsoiling. Following subsoiling the ground is disced twice to break up large clods. The site is then leveled and smoothed in two directions with a triplane. After leveling, the orchard site is fumigated to control nematodes. Berms are established and preemergence herbicides are applied for long-term weed control. All operations preparing the orchard for planting are done in the year prior to planting, but costs are shown in the first year.

Trees. The walnut trees are a late leafing, lateral bearing variety. The 3/4 inch caliber nursery grafted trees on Paradox rootstock are planted on 28 X 28 foot spacing, resulting in 56 trees per acre. The economic life of the orchard at the time of planting is estimated to be 25 years.

Planting. Planting in the early spring (February) starts by marking tree sites with a small nursery stake then digging holes, planting, and topping. After or at planting, the trunks are treated with white, water-based latex paint to protect the trees from sunburn and the trees are staked with six to eight foot stakes. The trunk is loosely tied to the stake to prevent it from breaking, crooked growth or leaning. In the second year, 2% of the trees or an average of 1.12 trees per acre are replanted.

Pruning. New trees are topped at planting so that trunk development is encouraged. Trees are pruned annually during the winter in years one through seven to develop the permanent structural framework of the trees. Pruning costs in years one and two include winter pruning, a small amount of summer pruning to train the tree trunk, to prevent shoot breakage and to remove rootstock suckers and other unwanted growth. Suckering is done 3 to 4 times per season (May – July) during the first two years. Shredding or chipping by a custom operator is done on alternate middles during the third to fifth year and all middles thereafter.

Irrigation. Water is pumped from a well and passes through a filtration system to the micro-sprinklers.

The orchard is irrigated from mid-April to mid-September. Price per acre-foot for water will vary among growers in this region depending on the various well characteristics, irrigation district, and other irrigation factors. In this study, water is calculated to cost \$4.67 per acre-inch. The amount of water applied to the orchard during the establishment period is shown in Table A.

Year	Acre-Inches
1	20
2	20
3-5	36
6+	42

Frost Protection. The orchard floor is mowed very low in spring or kept free of winter vegetation to reduce the risk of spring frost damage.

Fertilization. Nitrogen is the major nutrient required for proper tree growth and optimum yields. Nitrogen fertilizer as UN-32 is injected through the irrigation system with each irrigation from April to late July. Annual rates of actual N are shown in Table B.

Year	Lbs N
1	8
2	20
3	30
4	50
5	100
6	100
7+	150

Leaf Samples. Beginning in the sixth year, leaf samples at one sample per 20 acres are taken by the PCA in July for tissue analysis to determine nutrient status. The cost shown is for the lab analysis.

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.

Fumigation. Prior to removal of the previous orchard, the orchard site is sampled (1 sample/20 acres) and found positive for nematodes. Therefore, Telone, a soil fumigant, is applied at 33.7 gallons per acre to the entire field. Application costs are approximately \$50 per acre plus material. Preplant fumigation may not be necessary on bare or row crop ground, but is often necessary where orchards follow orchards. The above rates are effective on light textured soils when the soils are properly ripped and dried prior to fumigation. Heavier textured soils may need additional efforts to dry and prepare the soil if the fumigation is to be effective. Contact your local farm advisor for more information about fumigation.

Weeds. After the berms are made in the fall and prior to planting, Goal and Surflan, are applied for long term weed control. Thereafter, Goal and Surflan are sprayed in the tree rows each year in the fall (November). In the spring and summer, Roundup, is used as a 'spot spray' to control emerged weeds; once (July) in the first year, twice (April, July) in the second and third years, and three times (April, May, July) in the fourth and subsequent years. The middles are disced three times (April, May, August) during the first four years and thereafter mowed five times (April, May, June, July, August). Growers are now encouraged to rotate herbicides with different modes of action to prevent resistance.

Insects and Diseases. During the establishment years, pest and disease controls are minimal. Although many orchards are not treated for mites during the establishment years, mites are treated in this study with Omite beginning in July of the second year. Copper based bactericide Kocide and Manex fungicide are applied twice in April and once in May to control walnut blight beginning in the fifth year. During the sixth and seventh year a single application of Lorsban or Imidan is applied in June to control codling moth. Malathion and Nu Lure bait are applied in July for walnut husk fly. All insect and disease sprays are applied by a custom applicator.

Vertebrate pests. Gophers are controlled beginning in March of the first year using a tractor and bait applicator to apply bait.

Harvest. Harvest starts in the fourth or fifth year after the orchard is planted depending on variety and tree growth. Trees reach yield maturity in the eighth year. If the trees are not large enough at the first harvest to tolerate mechanical harvesting, they are hand harvested. In this study, the trees are harvested mechanically and on young trees, harvesting costs per pound are slightly higher than for mature trees.

Yield Year	Yield (dry in-shell)	
	ton	lbs.
4	0.30	600
5	0.60	1,200
6	1.20	2,400
7	2.50	5,000
8+	3.00	6,000

Yields and Returns. Yields are shown in Table C. See Harvest in the Production section for more information on returns.

Mature Orchard Cultural Practices and Material Inputs (Tables 2 -8)

This section outlines the cultural practices used in this study for the production of walnuts once the orchard is mature. These will vary among growers and regions. For additional information contact the farm advisor in the county of interest.

Pruning. Pruning methods will vary depending on variety, rootstock, and planting density as determined by row spacing. In this study, pruning is done in alternate years during the dormant period (February) by a custom operator using mechanical towers. Prunings are placed in the row middles and chipped or shredded by a custom operator. One-half of the cost of the pruning and shredding is charged to the operation each year.

Irrigation. Irrigation costs include pumping (water) and labor costs. The water is pumped from a well and passes through a filtration system and fed into the micro-sprinkler system. Forty-two acre inches of water are applied from mid-April to mid-September. Although not shown in this study, many growers apply a postharvest irrigation sometime from late September through October. Irrigations will vary according to tree size and soil type. It is assumed in this study that the orchard irrigations will average once per week over the season. A water pumping cost of \$4.67 per acre inch is based on current PG&E rates. Tensiometers, water budgeting using evapotranspiration estimates, stem water potential measurements, or other established methods are used to monitor orchard water status and schedule irrigations. The monitoring may be done by the grower or by a private Irrigation Specialist. A cost is not included for monitoring. Water from winter rains and runoff are not taken into account. Labor is calculated at 0.06 hours per irrigation and includes time for maintaining the lines.

Fertilization. Beginning with the first irrigation, a total of 150 pounds of nitrogen per season as UN32 is injected in equal amounts through the micro-sprinklers from April to late July. Labor costs for fertilizer application are included in the irrigation costs. Fertilizer rates should be adjusted according to need as indicated by leaf analysis results.

Tissue Testing. Leaf samples are taken in July by the PCA at one sample per 20 acres for tissue analysis to determine nutrient status. The cost shown is for the lab analysis.

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, organic options, 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 grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

Pest Control Adviser (PCA). The PCA or crop consultant monitors the field for agronomic problems including pests and nutrition and writes pesticide recommendations. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. The PCA service in this study is provided by the chemical/fertilizer company that supplies the grower.

Weeds. Weeds are controlled in the tree row with a fall strip spray (November) of preemergent herbicides, Goal and Surflan. Three sprays (April, May, July) using Roundup are applied as spot sprays to control emerging weeds that were not controlled by the fall spray. The middles are mowed five times, once per month from April to August. Mowing the vegetation in the row middles in April also provides frost protection.

Insects. Several insect and disease pests are treated each year. Insect and disease applications are done by a custom operator. In this study mites are controlled in July with Omite. Multiple generations of codling moth occur and are controlled based on careful monitoring of the population. In this study, codling moth is controlled with two applications, one each of Imidan (May) and Lorsban (July). The Lorsban spray in July also provides aphid control. Walnut husk fly is treated in July and August with Malathion and Nu-Lure bait.

Disease. The copper-based bactericide Kocide 101 and Manex fungicide are applied twice in April and once in May to control walnut blight. The use of Manex is dependent upon the annual granting of a Section 18 request.

Vertebrate Pests. Gophers are assumed to be under control and only maintenance treatments are necessary. Treatments with gopher bait are made in March using a tractor and bait applicator.

Harvest. In this cost study, the crop is harvested (shake, sweep, rake, pickup) and hauled by a contracted custom harvesting operation. The grower pays the drying costs. The study assumes that the orchard is harvested twice. The first harvest usually collects 80% of the walnuts. The second harvests collects the remaining walnuts about a week or two later. Mechanical harvesting begins by shaking the tree trunk or branches to remove the walnuts. The sweeper windrows the walnuts into the orchard row middles so that the pick up machine can gather them up to dump into trailers. Hand labor for raking nuts from around the trees missed by the sweeper is included in the custom harvest. The walnuts are hauled from the orchard to a hulling and dehydrating facility.

Yields. Typical annual yields for English varieties are measured in clean, dry, in-shell tons or pounds per acre and are shown in Table C. The average yield over the life of the orchard in this study is 6,000 pounds.

Returns. Actual price depends on a number of factors such as demand, crop size, variety, nut size, and quality. An estimated price of \$0.85 per pound based on 2006 prices is used in this study so that a ranging analysis for different yields and prices can be calculated.

Assessments. Under state law, the California Walnut Commission (CWC) collects mandatory assessment fees from growers to pay for walnut marketing and advertising programs. The CWC has a current fee of \$0.0079 per in-shell pound of nuts.

Pickup/ATV. The study assumes pickup business use mileage of 7,200 miles per year for the farm. The ATV use for checking the orchard, diseases and irrigation system are shown as a line item. The travel and time for the pickup and ATV 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 35% for the employer's share of federal and state payroll taxes, workers compensation insurance for nut crops (0045) and other possible benefits gives the labor rates shown of \$16.20 and \$10.80 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, 2007 (personal email from California Department of Insurance, May 18, 2007, unreferenced). 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. Fuel costs are derived from American Automobile Association (AAA) and Energy Information Administration 2006 monthly data. 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 costs per acre for each operation in Table 2 are 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.

Property Taxes. Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis. Salvage value for investments will vary.

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 \$539 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, shop and office utilities, and miscellaneous administrative charges. Office expenses are estimated and not taken from any collected data.

Regulatory Costs. Various environmental fees are collected by the county and state. The fees will vary by county. For example the Air Resources Board (state agency) charges \$100 per plan to deal with air pollution and the Ag Waiver Fee (county agency) cost \$2.00 per acre. The grower must also provide safety training, safety equipment, and maintain training records. For this study, a cost of \$5.26 per producing acre or \$500 for the farm is assumed.

Sanitation Services. Sanitation services provide portable single toilet units with washing facilities for the orchard and cost the farm \$190 annually. The cost includes delivery and two months of weekly service.

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

Investment Repairs. Annual maintenance/repairs on investments (Non-cash Overhead) is calculated as two percent of the purchase price, except for tree replacement in the orchard. The average tree replacement cost over the life of the orchard is assumed to be 0.10% of the establishment cost.

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 Value. Bare crop land for walnut production is estimated to cost \$12,000 per acre or \$12,632 per producing acre. Values will vary according to soil type and water source. Values for land with established walnut orchards in the northern San Joaquin Valley ranges from \$9,000 to \$18,000 per acre (2007 Trends & Leases).

Sprinkler Irrigation System. The sprinkler system consists of micro-sprinklers installed in the tree row on the 60 walnut acres and includes a filtration/injection system located near the pumping plant.

Irrigation Pumping System. A 200 foot deep well with a pumping level at 125 – 150 feet is drilled on the site and a new 75 horsepower pump installed to irrigate the 60 acres.

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.

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 third year shown in Table 1 represents the establishment cost per acre. For this study, this cost is \$5,705 per acre or \$342,300 for the 60-acre orchard. Establishment cost is amortized beginning in the fifth year over the remaining 21 years of production. Tree replacement or repairs is 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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Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD
 SAN JOAQUIN VALLEY – NORTH 2007

	Cost Per Acre							
	Year:	1st	2nd	3rd	4th	5th	6th	7th
Yield - Pounds Per Acre:					600	1,200	2,400	5,000
Planting Costs:								
Land Prep: Orchard Removal & Field Cleanup		384						
Land Prep: Subsoil 2X		300						
Land Prep: Disc 2X		10						
Land Prep: Triplane (smooth & level)		125						
Fumigation: Nematode Sample (1/20 acres)		4						
Fumigation: (Telone II CA)		600						
Land Prep: Make Berms		4						
Weed: Preplant (Goal, Surflan)		48						
Plant: Survey, Mark, Dig Holes & Plant		112	2					
Trees: (late leafing 3/4 inch @ \$16.50 each)		924	18					
Plant: Stake & Paint Trees		197	3					
TOTAL PLANTING COSTS		2,708	24					
Cultural Costs:								
Prune/Sucker: (Yrs 1-2 prune & sucker. Yrs 3+ prune.)		22	27	27	49	70	120	120
Irrigate: (water & labor). Fertilize: N (UN32)		111	116	195	204	227	255	278
Weed: Yrs 1-4 Disc 3X. Yrs 5+ Mow 5X)		16	16	16	16	24	24	24
Vertebrate: Gopher (bait)		12	12	12	12	12	12	12
Weed: Spot Spray (Roundup) (Yr 1, 1X. Yrs 2-3, 2X. Yrs 4+, 3X)		7	15	15	20	21	21	21
Weed: Winter Strip Spray (Surflan, Goal)		56	56	56	56	56	56	56
Insect: Mites (Omite) (Yrs 2-3, reduced spray volume)			27	27	69	69	69	69
Prune: Shred Prunings (Yrs 3-5, alternate middles)				14	14	14	27	27
Disease: Walnut Blight (Kocide, Manex)						183	183	183
Insect: Codling Moth (Imidan)							94	94
Fertilizer: Leaf Samples/Tissue Analysis							3	3
Insect: Walnut Husk Fly (Malathion, Nu Lure bait)							36	36
ATV use		42	42	42	42	42	42	42
Pickup use		112	112	112	112	112	112	112
TOTAL CULTURAL COSTS		379	423	516	594	830	1,055	1,078
Harvest Costs:								
Shake, Pick, Sweep, Haul					45	90	180	375
Dry and Hull					39	72	156	325
California Walnut Commission Assessment					5	10	19	40
TOTAL HARVEST COSTS					89	172	355	740
Interest On Operating Capital @ 10.00%		345	22	26	18	30	41	45
TOTAL OPERATING COSTS/ACRE		3,432	469	542	701	1,032	1,451	1,863
Cash Overhead Costs:								
Office Expense		50	50	50	50	50	50	50
Liability Insurance		6	6	6	6	6	6	6
Sanitation Service		3	3	3	3	3	3	3
Regulatory Fees		5	5	5	5	5	5	5
Property Taxes		142	141	142	141	141	141	141
Property Insurance		12	11	11	11	11	11	11
Investment Repairs		51	51	51	51	51	51	51
TOTAL CASH OVERHEAD COSTS		269	267	268	267	267	267	267
TOTAL CASH COSTS/ACRE		3,701	737	809	968	1,299	1,719	2,130
INCOME/ACRE FROM PRODUCTION					510	1,020	2,040	4,250
NET CASH COSTS/ACRE FOR THE YEAR		3,701	373	809	458	279		
PROFIT/ACRE ABOVE CASH COSTS							321	2,119
ACCUMULATED NET CASH COSTS/ACRE		3,701	4,438	5,247	5,705	5,984	5,663	3,543

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Table 1. continued

	Cost Per Acre							
	Year:	1st	2nd	3rd	4th	5th	6th	7th
Yield - Pounds Per Acre:					600	1,200	2,400	5,000
Non-Cash Overhead Costs (Capital Recovery)								
Buildings (2400 sqft)		70	70	70	70	70	70	70
Fuel Tanks		7	7	7	7	7	7	7
Irrigation System with micro sprinklers		99	99	99	99	99	99	99
Pump/Well		23	23	23	23	23	23	23
Land		916	916	916	916	916	916	916
Shop/Field Tools		17	17	17	17	17	17	17
Equipment		68	48	53	47	46	48	48
TOTAL CAPITAL RECOVERY		1,200	1,180	1,185	1,179	1,178	1,180	1,180
TOTAL COST/ACRE FOR THE YEAR		4,901	1,917	1,995	2,147	2,478	2,900	3,311
INCOME/ACRE FROM PRODUCTION					510	1,020	2,040	4,250
TOTAL NET COST/ACRE FOR THE YEAR		4,901	1,917	1,995	1,637	1,458	859	
NET PROFIT/ACRE ABOVE TOTAL COST								939
TOTAL ACCUMULATED NET COST/ACRE		4,901	6,818	8,813	10,450	11,908	12,767	11,827

X = number of times (2X = two times)

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY - NORTH 2007

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:							
Prune: Dormant (alternate years)	0.00	0	0	0	64	64	
Prune: Brush Disposal (alternate years)	0.00	0	0	0	14	14	
Vertebrate: Gopher (Bait)	0.20	4	1	7	0	12	
Weed: Spot Spray (Roundup) 3X	0.54	11	1	8	0	21	
Irrigate: (water & labor)	1.20	13	0	196	0	209	
Fertilize: N through sprinklers (UN32)	0.00	0	0	69	0	69	
Weed: Mow 5X	0.63	12	12	0	0	24	
Disease: Blight (Kocide, Manex) 3X	0.00	0	0	123	60	183	
Insect: Codling Moth (Imidan)	0.00	0	0	74	20	94	
Insect: Codling Moth / Aphid (Lorsban)	0.00	0	0	25	20	45	
Fertilize: Leaf Sampling	0.00	0	0	0	2	2	
Insect: Mites (Omite)	0.00	0	0	49	20	69	
Insect: Husk Fly (Malathion, Nu Lure)	0.00	0	0	33	40	73	
Weed: Dormant Strip (Goal, Surflan)	0.18	4	0	52	0	56	
Pickup 1/2 Ton ATV	4.00 2.00	78 39	35 3	0 0	0 0	112 42	
TOTAL CULTURAL COSTS	8.75	160	53	637	239	1,089	
Harvest:							
Shake, Sweep, Pickup, Haul (1st & 2d harvest)	0.00	0	0	0	420	420	
Hull, Dry	0.00	0	0	0	390	390	
CWC Assessment Fee	0.00	0	0	48	0	48	
TOTAL HARVEST COSTS	0.00	0	0	48	810	858	
Interest on operating capital @ 10.00%						43	
TOTAL OPERATING COSTS/ACRE		160	53	685	1,049	1,990	
Cash Overhead:							
Office						50	
Liability Insurance						6	
Sanitation Service						3	
Regulatory Fees						5	
Property Taxes						170	
Property Insurance						31	
Investment Repairs						57	
TOTAL CASH OVERHEAD COSTS						322	
TOTAL CASH COSTS/ACRE						2,312	
Non-cash Overhead:							
		Per producing Acre		Annual Cost Capital Recovery			
Buildings		842		70		70	
Fuel Tanks		69		7		7	
Shop/Field Tools		158		17		17	
Irrigation: Micro-sprinkler System		1,200		99		99	
Pump/Well		283		23		23	
Land		12,632		916		916	
Walnut Establishment		5,705		537		537	
Equipment		315		45		45	
TOTAL NON-CASH OVERHEAD COSTS		21,204		1,715		1,715	
TOTAL COSTS/ACRE						4,027	

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY - NORTH 2007

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Walnuts	6,000.00	lb	0.85	5,100	
OPERATING COSTS					
Rodenticide:					
Gopher Getter Ag-Wilco	1.00	lb	6.50	7	
Irrigation:					
Water	42.00	acin	4.67	196	
Fungicide:					
Kocide 101	24.00	lb	3.62	87	
Manex	12.00	pt	2.97	36	
Insecticide:					
Lorsban 4E	4.00	pt	6.35	25	
Omite 30W	6.00	lb	8.23	49	
Imidan 70 WSP	6.00	lb	12.39	74	
Malathion 5EC	4.00	pt	4.07	16	
Nu Lure Bait	4.00	pt	4.08	16	
Fertilizer:					
UN-32	150.00	lb N	0.46	69	
Herbicide:					
Roundup Ultra Max	0.99	pt	8.58	8	
Surflan AS	2.30	pt	14.52	33	
Goal 2XL	1.15	pt	16.45	19	
Custom:					
Prune	2.00	hrs	32.00	64	
Shred Prunings	0.50	acre	27.00	14	
Spray-Ground	8.00	acre	20.00	160	
Leaf Analysis	0.05	each	30.00	2	
Shake, Sweep, Pickup, Haul	6,000.00	lb	0.07	420	
Dry/Hull Nuts (\$0.065/lb)	6,000.00	lb	0.07	390	
Assessment:					
CA Walnut Commission (\$0.0079/lb)	6,000.00	lb	0.01	47	
Labor (machine)	9.06	hrs	16.20	147	
Labor (non-machine)	1.20	hrs	10.80	13	
Fuel - Gas	1.02	gal	2.80	3	
Fuel - Diesel	13.37	gal	2.30	31	
Lube				5	
Machinery repair				15	
Interest on operating capital @ 10.00%				43	
TOTAL OPERATING COSTS/ACRE				1,990	
NET RETURNS ABOVE OPERATING COSTS				3,110	
Cash Overhead:					
Office				50	
Liability Insurance				6	
Sanitation Service				3	
Regulatory Fees				5	
Property Taxes				170	
Property Insurance				31	
Investment Repairs				57	
TOTAL CASH OVERHEAD COSTS/ACRE				322	
TOTAL CASH COSTS/ACRE				2,312	

UC COOPERATIVE EXTENSION

Table 3. continued

	Quantity /Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Non-Cash Overhead (Capital Recovery):					
Buildings				70	
Fuel Tanks				7	
Shop/Field Tools				17	
Irrigation: Micro-sprinkler System				99	
Pump/Well				23	
Land				916	
Walnut Establishment				538	
Equipment				45	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,715	
TOTAL COSTS/ACRE				4,027	
NET RETURNS ABOVE TOTAL COSTS				1,073	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WALNUTS
 SAN JOAQUIN VALLEY - NORTH 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 (alternate years)		64											64
Prune: Brush Disposal (alternate years)		14											14
Vertebrate: Gopher (Bait)			12										12
Weed: Spot Spray (Roundup) 3X				7	7		7						21
Irrigate: (water & labor)				21	42	42	42	42	21				209
Fertilize: N through sprinklers (UN32)				10	20	20	20						69
Weed: Mow 5X				5	5	5	5	5					24
Disease: Blight (Kocide, Manex) 3X				122	61								183
Insect: Codling Moth (Imidan)					94								94
Insect: Codling Moth / Aphid (Lorsban)							45						45
Fertilize: Leaf Sampling							2						2
Insect: Mites (Omite)							69						69
Insect: Husk Fly (Malathion, Nu Lure)							36	36					73
Weed: Dormant Strip (Goal, Surflan)											56		56
Pickup 1/2 Ton	9	9	9	9	9	9	9	9	9	9	9	9	112
ATV	4	4	4	4	4	4	4	4	4	4	4	4	42
TOTAL CULTURAL COSTS	13	90	24	177	241	79	239	96	34	13	69	13	1,089
Harvest:													
Shake, Sweep, Pickup, Haul (1st & 2d harvest)									420				420
Hull, Dry									390				390
CWC Assessment Fee									48				48
TOTAL HARVEST COSTS									858				858
Interest on operating capital @ 10.00%	0	1	1	3	5	5	7	8	15	-1	-1	0	43
TOTAL OPERATING COSTS/ACRE	13	91	26	180	246	85	246	104	907	12	69	13	1,990
Cash Overhead:													
Office	4	4	4	4	4	4	4	4	4	4	4	4	50
Liability Insurance		6											6
Sanitation Service		2							2				3
Regulatory Fees									5				5
Property Taxes	85						85						170
Property Insurance	16						16						31
Investment Repairs	5	5	5	5	5	5	5	5	5	5	5	5	57
TOTAL CASH OVERHEAD COSTS	109	16	9	9	9	9	109	9	16	9	9	9	322
TOTAL CASH COSTS/ACRE	122	107	34	188	255	93	355	113	923	21	77	21	2,312

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 SAN JOAQUIN VALLEY - NORTH 2007

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WALNUTS

	YIELD (lb/acre)						
	3,000	4,000	5,000	6,000	7,000	8,000	9,000
OPERATING COSTS							
Cultural Cost	1,089	1,089	1,089	1,089	1,089	1,089	1,089
Harvest Cost (Shake, Sweep, Pickup, Rake, Haul)	210	280	350	420	490	560	630
Dry and Hull	195	260	325	390	455	520	585
Assessment	26	32	40	48	56	64	72
Interest on operating capital @ 10%	40	41	42	43	45	46	47
TOTAL OPERATING COSTS	1,560	1,702	1,846	1,990	2,135	2,279	2,423
Total Operating Costs/lb	0.52	0.43	0.37	0.33	0.30	0.28	0.27
CASH OVERHEAD COSTS							
	322	322	322	322	322	322	322
TOTAL CASH COSTS	1,882	2,024	2,168	2,312	2,457	2,601	2,745
Total Cash Costs/lb	0.63	0.51	0.43	0.39	0.35	0.33	0.30
NON-CASH OVERHEAD COSTS							
	1,715	1,715	1,715	1,715	1,715	1,715	1,715
TOTAL COSTS	3,597	3,739	3,883	4,027	4,172	4,316	4,460
Total Costs/lb	1.20	0.93	0.78	0.67	0.60	0.54	0.50

NET RETURNS PER ACRE ABOVE OPERATING COSTS

\$/lb	YIELD (lb/acre)						
	3,000	4,000	5,000	6,000	7,000	8,000	9,000
0.55	90	498	904	1,310	1,715	2,121	2,527
0.65	390	898	1,404	1,910	2,415	2,921	3,427
0.75	690	1,298	1,904	2,510	3,115	3,721	4,327
0.85	990	1,698	2,404	3,110	3,815	4,521	5,227
0.95	1,290	2,098	2,904	3,710	4,515	5,321	6,127
1.05	1,590	2,498	3,404	4,310	5,215	6,121	7,027
1.15	1,890	2,898	3,904	4,910	5,915	6,921	7,927

NET RETURNS PER ACRE ABOVE CASH COSTS

\$/lb	YIELD (lb/acre)						
	3,000	4,000	5,000	6,000	7,000	8,000	9,000
0.55	-232	176	582	988	1,393	1,799	2,205
0.65	68	576	1,082	1,588	2,093	2,599	3,105
0.75	368	976	1,582	2,188	2,793	3,399	4,005
0.85	668	1,376	2,082	2,788	3,493	4,199	4,905
0.95	968	1,776	2,582	3,388	4,193	4,999	5,805
1.05	1,268	2,176	3,082	3,988	4,893	5,799	6,705
1.15	1,568	2,576	3,582	4,588	5,593	6,599	7,605

NET RETURNS PER ACRE ABOVE TOTAL COSTS

\$/lb	YIELD (lb/acre)						
	3,000	4,000	5,000	6,000	7,000	8,000	9,000
0.55	-1,947	-1,539	-1,133	-727	-322	84	490
0.65	-1,647	-1,139	-633	-127	378	884	1,390
0.75	-1,347	-739	-133	473	1,078	1,684	2,290
0.85	-1,047	-339	367	1,073	1,778	2,484	3,190
0.95	-747	61	867	1,673	2,478	3,284	4,090
1.05	-447	461	1,367	2,273	3,178	4,084	4,990
1.15	-147	861	1,867	2,873	3,878	4,884	5,890

UC COOPERATIVE EXTENSION
Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD
 SAN JOAQUIN VALLEY - NORTH 2007

ANNUAL EQUIPMENT COSTS

Yr	Description	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total	
					Insur- ance	Taxes		
07	30HP 2WD Tractor	17,100	12	4,275	1,946	76	107	2,129
07	90HP 2WD Tractor	55,217	15	10,750	5,739	236	330	6,304
07	All Terrain Vehicle (ATV)	5,790	12	1,448	659	26	36	721
07	Bait Applicator	2,500	10	442	328	11	15	354
07	Mower-Flail 8'	10,500	10	1,857	1,379	44	62	1,485
07	Pickup 1/2 ton	28,000	5	12,549	4,703	145	203	5,051
07	Weed Sprayer 100 Gal	4,000	10	707	526	17	24	566
TOTAL		123,107		32,028	15,281	554	776	16,611
		73,864		19,217	9,169	332	465	9,966

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENTS COSTS

Description	Price	Yrs	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
Buildings 2400 sqft	80,000	30		6,610	286	400	1,600	8,895
Fuel Tanks 2 - 500 gal	6,514	15	651	701	26	36	130	893
Irrigation: Micro Sprinklers	72,000	30		5,949	257	360	1,440	8,006
Land	1,200,000	30	1,200,000	87,000	0	12,000	0	99,000
Orchard Establishment	342,300	21		32,228	1,222	1,712	342	35,503
Pump/Well for 60 acres	17,000	30		1,405	61	85	340	1,890
Shop/Field Tools	15,000	15	1,500	1,614	59	83	300	2,056
TOTAL INVESTMENT	1,732,814		1,202,151	135,506	1,910	14,675	4,152	156,243

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	100	acre	5.39	539
Office Expense	95	acre	50.00	4,750
Regulatory Fees	95	acre	5.26	500
Sanitation Service	60	acre	3.16	190

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - NORTH 2007

Yr	Description	COSTS PER HOUR							
		Actual Hours Used	Cash Overhead			Operating			Total Costs/Hr.
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
07	30HP 2WD Tractor	513	2.28	0.09	0.12	0.74	3.90	4.64	7.13
07	90HP 2WD Tractor	541	6.36	0.26	0.37	1.32	11.69	13.01	20.00
07	All Terrain Vehicle (ATV)	166	2.38	0.09	0.13	0.41	1.21	1.62	4.22
07	Bait Applicator	36	5.47	0.18	0.25	0.95	0.00	0.95	6.85
07	Mower-Flail 8'	138	6.02	0.19	0.27	4.91	0.00	4.91	11.39
07	Pickup 1/2 ton	400	7.06	0.22	0.30	2.07	6.61	8.68	16.26
07	Weed Sprayer 100 Gal	163	1.93	0.06	0.09	1.06	0.00	1.06	3.14

UC COOPERATIVE EXTENSION
Table 8. OPERATIONS WITH EQUIPMENT
 SAN JOAQUIN VALLEY - NORTH 2007

Operation	Operation Month	Equipment Tractor	Implement	Non-Mach Labor hrs/acre	Material	Broadcast Rate/acre	Unit
Cultural:							
Prune: Prune (alternate years)	Feb	Custom					
Prune: Brush Disposal (alternate years)	Feb	Custom					
Vertebrate: Gopher	Mar	ATV	Bait Applicator		Bait	1.00	lb
Weed: Spot Spray	Apr	ATV	Weed Sprayer		Roundup	0.33	pt
	May	ATV	Weed Sprayer		Roundup	0.33	pt
	July	ATV	Weed Sprayer		Roundup	0.33	pt
Weed: Mow Middles	Apr	90HP 2WD	Mower-Flail 8'				
	May	90HP 2WD	Mower-Flail 8'				
	June	90HP 2WD	Mower-Flail 8'				
	July	90HP 2WD	Mower-Flail 8'				
	Aug	90HP 2WD	Mower-Flail 8'				
Irrigate:	Apr			0.12	Water	4.20	acin
	May			0.24	Water	8.40	acin
	June			0.24	Water	8.40	acin
	July			0.24	Water	8.40	acin
	Aug			0.24	Water	8.40	acin
	Sept			0.12	Water	4.20	acin
Disease: Blight	Apr	Custom			Kocide	8.00	lb
					Manex	4.00	pt
	Apr	Custom			Kocide	8.00	lb
					Manex	4.00	pt
	May	Custom			Kocide	8.00	lb
					Manex	4.00	pt
Fertilize: N (through irrigation system)	Apr				UN32	21.48	lb N
	May				UN32	42.84	lb N
	June				UN32	42.84	lb N
	July				UN32	42.84	lb N
Insect: Mites	July				Omite	6.00	lb
Insect: Codling Moth	May	Custom			Imidan	6.00	lb
Insect: Codling Moth & Aphid	July	Custom			Lorsban	4.00	pt
Fertilize: Leaf Sampling	July	PCA			Analysis	0.05	each
Insect: Husk Fly	July	Custom			Malathion	2.00	pt
					NuLure	2.00	pt
	Aug	Custom			Malathion	2.00	pt
					NuLure	2.00	pt
Harvest: Shake, Sweep, Pickup, Haul	Sept	Custom					
Harvest: Dry/Hull	Sept	Custom					
Weed: Dormant Strip	Nov	ATV	Weed Sprayer		Goal	2.30	pt
					Surflan	1.15	pt