UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2012

SAMPLE COSTS TO ESTABLISH A WALNUT ORCHARD AND PRODUCE

WALNUTS

Chandler

NORTH COAST- Lake County

HOMESITE – Twenty-Acre Farm

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SAMPLE COSTS TO ESTABLISH A WALNUT ORCHARD AND PRODUCE CHANDLER WALNUTS NORTH COAST –Lake County 2012

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INTRODUCTION

Sample costs to establish a walnut orchard and produce Chandler walnuts on 20 acres (8.01 hectare) purchased as a homesite in the North Coast – Lake County 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. Production practices described are 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 titled, "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 at University of California, Davis by phone, at (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 at UC Davis by phone, at (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 through 8 and pertain to sample costs to establish and produce a Chandler walnut orchard on a 20 acre (8.01 hectare) homesite in the North Coast – Lake County. Practices described represent production practices and materials considered typical of a well-managed orchard in the region. The costs, materials, and practices shown in this study will not be applicable to all situations. Establishment and cultural practices vary by grower and differences can be significant. For further cultural practice information, see the UC publication, *Walnut Production Manual* (Publication 3373). **The use of trade names and cultural practices in this report do 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 20 contiguous acres (8.01 hectare) purchased for a homesite. Walnuts are established on 19 acres (7.69 hectare). The homesite and other buildings are established on one acre (0.32 hectare). The owner farms the orchard, but the main income is from off-farm sources.

Establishment Operating Costs
Table 1

Site Preparation. Soil samples to determine presence of nematodes and nutrient problems should be taken prior to final planting decisions. Costs for soil sampling and mitigating problems prior to planting are not included in this study. A custom operator rips the ground in two directions, three-feet deep, to break up underlying hardpan and open the soil for good root development. The grower discs twice to break up clods, and then floats twice to level and smooth the surface. All operations that prepare the orchard for planting are done in the summer and early fall prior to planting, but costs are shown in the first year.

Trees. Chandler, a late leafing English walnut cultivar, is planted in this study. A late-leafing cultivar is assumed to have less exposure to frost and reduce walnut blight. Paradox is the recommended rootstock in new plantings. The cultivar and soil type will determine tree spacing. In this study, three-quarter inch, 2 year old nursery-grafted trees, are planted on 24 X 28 foot (7.32 X 8.53 meter) spacing, 65 trees per acre (0.405 hectare). Other spacings used for Chandler on Paradox rootstock in Lake County are 15' X 30' (4.57 X 9.14 meter), 26' X 26'-28' (7.92 X 7.92-8.53 meter), and 30' X 30' (9.14 X 9.14 meter). Although not shown in this study, tree costs may be reduced nearly one-half by planting Paradox seedling rootstock on the farm and grafting in place in the same or next season. The life of the orchard at planting is estimated to be 35 years.

Planting. The grower starts planting in the spring. The process consists of surveying, marking the tree sites with a small stake, digging holes, planting, topping, and staking trees. Trees are painted white immediately for sunburn protection. The grower rents a PTO driven auger to make the tree holes. In the second year, 5% of the orchard, or three trees per acre, are replanted.

Fertilization. Nitrogen is the major nutrient required for tree growth and optimum yields, but some locations may require additional nutrients. Beginning in the second year, nitrogen fertilizer is applied in liquid form as UN 32 through the irrigation system. Projected annual rates of actual N are shown in Table A. In the sixth year and every third year thereafter, leaf samples are taken to determine actual nutrient requirements. One third of the leaf sample cost is charged to the orchard each year.

Table A. Applied N

Year	Actual N lbs/acre	Actual N kg/0.4 h
1	0	0
2	50	22.68
3	50	22.68
4	50	22.68
5	50	22.68
6	60	27.22

Pruning. Pruning and training begin 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 through eighth year, heading cuts are made to remove a portion of the current year's growth. The prunings are placed in the row middles and chopped during the first discing for the first four years. Subsequently, the prunings are pushed to edge of the field, then stacked and burned.

7	75	34.02
8	100	45.36
9	125	56.70
10+	150	68.04

Irrigation. Price per acre-foot of water will vary, depending on power source, well characteristics, and irrigation district. In this study, water is calculated to cost $63.24 per acre-foot, or $5.27 per acre-inch. Normal annual rainfall of 25-35 inches is assumed. The water applied to the orchard is shown in Table B.

Table B. Applied Water

Year	acin/year
1-4	12
5-9	15
10+	24

1 acre-foot = 1233 cubic meter.
1 acre-inch = 102.79 cubic meter.
25-35 inches = 63.5-88.9 cm.

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 can vary each season. In this study, the tree row is sprayed in January prior to planting with pre-emergent (Goal) and contact (Roundup) herbicides. In-season sprays using Roundup are applied to the tree row in July. Winter strip sprays (Roundup and Goal) are applied during the dormant period (January) beginning in year two. The row middles are mowed or disced five times, starting in year one. In the first two years of discing, the grower makes three passes per middle and in subsequent years, two passes. An alternative non-tillage approach utilizes herbicides sprayed in the tree row.

Diseases. During the establishment years, disease control for walnut blight is minimal. Beginning in the sixth year, a copper fungicide (Badge 2X) is applied once in April. Materials are not applied at full rate on the young trees, resulting in lower costs.

Insects. Walnut husk fly (WHF) is assumed to reach treatment levels by the sixth year. Trapping for WHF begins in late June using one trap per ten acres. Four applications of Success and Nu Lure insect bait are applied by the grower; once in July and September and twice in August. The materials are applied using an ATV with sprayer and wand. Several other materials are available for WHF. Contact your PCA or farm advisor for more information.

Rodents. Squirrels can be a menace in the orchard, especially in producing orchards, by eating and storing nuts. Gophers can chew on the bark of the trees below the soil line and girdle them. In this study, treatment begins in the third year, or the year prior to crop production for squirrels, and in the first year for gophers. The squirrels are baited from March to December, and gopher monitoring and trapping is done from March through December, depending on rainfall timing and amounts.

Table C. Annual Yields

Year	Dry In-shell Lbs./acre
4	100
5	150
6	200
7	400

Harvest. Depending upon variety, harvest starts in the fourth or fifth establishment year (fourth year in this study). A custom operator mechanically shakes, sweeps and picks up the nuts. Depending upon the yield and to save costs, the first and possibly the second crop may be mechanically shaken by a custom operator, and then the walnuts picked up by hand and put into a bin. Yield maturity is reached in the eleventh year. Estimated

yields are shown in Table C.

8	800
9	2,000
10	4,000
11+	5,000

Table C. Annual Yields

Year	Dry In-shell Kg/0.4 hectare	Dry In-shell Kg/hectare
4	45.36	113.40
5	68.04	170.10
6	90.72	226.80
7	181.44	453.60
8	362.88	907.20
9	907.20	2268.00
10	1814.40	4536.00
11+	2268.00	5670.00

Production Operating Costs

Tables 2 – 8

Pruning. The trees are pruned during the winter months (January in this study) to open the canopy, maintain healthy buds, lower tree height, and remove dead and undesired limbs. Prunings are placed in the row middles, pushed to the edge of the field using a tractor with forks into a stack, after which they are burned. A burn permit is required, which currently costs $20 in Lake County, but the permit cost is not included in this study.

Fertilization. Tree nutrient status is determined from leaf samples taken in July. Samples are taken every third year, and one-third of the cost is charged to the orchard each year. Nitrogen (N) at 150 pounds (68.04 kg) actual N per acre (0.4 hectare) is applied through the irrigation system equally split into two applications of 75 pounds (34.02 kg) in June and July.

Irrigation. The grower applies 24-acre inches (2467 cubic meter)of water during the season. Normal winter and early spring rainfall of 25 to 35 inches (63.5-88.9 cm.) is assumed. Irrigation through the sprinkler system begins in late June with an average of six-acre inches (617 cubic meter) applied each irrigation. Two irrigations are also applied in July, and one in August.

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 http://www.ipm.ucdavis.edu. Adjuvants are recommended for use with many pesticides for effective control, but this cost is not included in this study. Pesticide costs may vary by location, brand, and grower volume.

Pest Control Adviser. Written recommendations are required for many pesticides and are made by a licensed pest control adviser (PCA). In addition, the PCA monitors the field for pests and nutrition. Growers may hire a private PCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. For information about pesticide use permits, contact the local county agricultural commissioner's office.

Weeds. Weeds in mature orchards are controlled with the same chemicals and cultural practices as during the establishment years. Weeds are controlled in the tree row with winter and in-season strip sprays using pre-emergent, post-emergent and contact herbicides. Goal and Roundup are applied in January (winter strip spray), Roundup is applied in July during the growing season (in-season strip spray), and row middles are disced five times from April through August (two passes per middle with an eight-foot disc).

Insects. Walnut husk fly (*Rhagoletis completa)* infestation can lead to shriveled and darkened kernels. The fly is controlled with an application of Success and Nu Lure bait: once in July, twice in August, and once in September. A fifth spray in early October may be needed if hull-split is late, which is not included in this study. The grower uses an ATV with a sprayer and a hand wand to apply the material.

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. One treatment with Badge 2X, a copper compound, is applied in April.

Rodents. Ground squirrels feed on young nuts in the trees, as well as mature nuts on the ground or in the tree. They can also damage plastic irrigations lines by gnawing on them and their burrows can disrupt irrigation and cause erosion. In this study, squirrels are baited once per month from March through December. Four bait traps holding three pounds of bait are placed around the orchard. Additionally, gopher monitoring and trapping is done from March through December, depending on rainfall timing and amounts. It is assumed that the laborer or grower uses an ATV to check and bait the traps, which takes one hour each month.

Harvest. The crop is harvested in October by custom harvesters who shake, sweep, hand rake, pick up, and haul the walnuts to the huller/dryer. Hand raking is needed to windrow walnuts missed by the sweeper. After drying, the walnuts are sold to processors. Harvesting costs are normally charged by the hour; but for this study, they are converted to a per ton cost basis. Hulling and drying costs are charged on a per ton, dry-weight basis.

Yields. Yields are measured in clean, dry, in-shell tons or pounds per acre. The average yield based on grower data over the remaining years of the orchard is 5,000 pounds per acre (5604 kg per hectare), although some recorded yields have exceeded 6,000 pounds per acre (6725 kg per hectare) in well-managed, irrigated orchards.

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, based on the 2011 Lake County Agricultural Commissioner's Annual Report, of $1.25 per pound ($1.25 per 0.45 kg., or $2.76 per kg.) average for all cultivars is used in this study. A ranging analysis calculated for different yields and prices is provided in Table 5, on page 16.

Assessments. Under a state marketing order, the California Walnut Commission (CWC) collects a mandatory assessment fee. The assessment is charged to the grower to pay for walnut marketing, advertising, and research programs. The CWC has a current fee of $0.009 per pound ($0.02 per kg.) of dry in-shell nuts.

Pickup/ATV. Business mileage for the pickup is estimated at 2,500 total miles (4000 km.) per year. The ATV is used to apply the walnut husk fly spray and is included in that cost. In addition, it is assumed that the grower uses the ATV three hours per acre per year to check the orchard and monitor the irrigation system.

Labor. Labor rates of $20.40 per hour for machine operators and $13.60 for general labor includes payroll overhead of 36%. The basic hourly wages are $15.00 for machine operators and $10.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/fruit crops, and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of May, 2012 (personal email from California Department of Insurance, May 2012, 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.

Wages for management are not included as a cash cost. Any return above total costs is considered a return to management and risk. However, growers wanting to account for management wages may wish to add a fee. The manager makes all production decisions including cultural practices, action to be taken on pest management recommendations, and labor.

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 Take Off (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $3.43 and $3.82 per gallon $0.91 and $1.01 per liter), 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 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 5.75% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of postharvest operations is discounted back to the last harvest month using a negative interest charge.

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.

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 expenses, liability and property insurance, and equipment repairs.

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

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Liability insurance covers accidents on the 20-acre (8.09 hectare) farm and costs $494 for the entire farm. Small hobby farms may have additional insurance costs.

Office Expenses. Office and business expenses are estimated at $125 per producing acre or $2,375 per farm. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop utilities and miscellaneous administrative costs.

Sanitation Services. Sanitation services provide a single portable toilet, washbasin, soap, and towels for the orchard and costs $153 per month. The monthly service charge is an average of three California sanitation companies and locations. The cost includes delivery and ten months of weekly service. Growers using contract labor may not have a cost because many labor contractors provide their own sanitation facilities.

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 $6,601 per acre ($16,311 per hectare) or $125,419 for the 19-acre (7.69 hectare) orchard. Establishment cost is amortized beginning in the fifth year over the remaining 31 years of production.

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 6.

Non-cash Overhead (Investments).

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 ((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 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 Long Term. The interest rate of 4.75% used to calculate capital recovery. 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.

Sprinkler Irrigation System. The cost includes the sprinklers, filtration system, installation and materials for the sprinklers.

Fuel Tanks. Two 250-gallon (946 liter) fuel tanks are placed on stands in cement containment meeting Federal, State, and local regulations. Fuel is delivered to the equipment by gravity feed.

Land. Bare land in Lake County ranges from $6,000 to $10,000 per acre ($14,826 to $24,710 per hectare). Land in this study is valued at $8,500 per acre ($21,003 per hectare) or $8,947 per producing acre ($22,108 per producing hectare). Smaller parcels, 30 acres (12.14 hectare) and under, may have a homesite value of $150,000 to $200,000 per acre ($370,650 to $494,200 per hectare) and the remaining acreage an agricultural value. For this study 20 acres (8.09 hectare) purchased for $311,500 less the homesite value of $150,000 for an acre (0.404 hectare) yields an agricultural value of $8,500 per acre ($21,004 per hectare) on the remaining 19 acres (7.69 hectares).

Equipment Costs. Equipment costs are comprised 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. 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 40% 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.

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Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A CHANDLER WALNUT ORCHARD

NORTH COAST - Lake County 2012

	Cost Per Acre							
Year:	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Dry, In-Shell Pounds Per Acre				100	150	200	400	800
Planting Costs:								
Land preparation: Rip 2X	175							
Land preparation: Disc 2X	30							
Land preparation: Float 2X	22							
Survey, mark, dig holes & plant	192	7						
Trees: 65 per acre @ $16.35 ea., (replant 5% in 2nd year)	1,063	49						
Stake & paint trees	331	9						
TOTAL PLANTING COSTS	1,813	65						
Cultural Costs:								
Pruning, training & tying 3X (Grower)	9	27	41	48	48	48	54	68
Prune: Brush disposal (push & burn)					17	21	21	21
Rodent: Squirrel (bait)			74	74	74	74	74	74
Rodent: Gopher (trap)	66	66	66	66	66	66	66	65
Fertilizer: Nitrogen (UN32)		20	20	20	20	25	31	41
Weed: Winter strip spray (Roundup, Goal)	27	27	28	28	28	28	28	28
Weed: Disc middles 5X (years 1-2; 3 passes/middle)	80	80	52	52	52	52	52	52
Weed: In-season strip spray (Roundup)	8	8	9	9	9	9	9	9
Disease: Walnut blight (Badge X2)						27	31	37
Irrigate: Water & labor	88	88	88	88	110	110	110	110
Insect: Walnut husk fly (trap)						16	16	16
Insect: Walnut husk fly (Success, Nu Lure bait)						55	55	55
Pickup truck use	162	162	162	162	162	162	162	162
ATV use	83	83	83	83	83	83	83	83
Leaf analysis						1	1	1
TOTAL CULTURAL COSTS	522	561	622	630	669	777	794	823
Harvest Costs:								
Shake, pick, sweep, rake				32	32	32	32	64
Haul				1	1	2	3	6
Hull & dry				10	15	20	40	80
California Walnut Commission assessment fee				1	1	2	4	7
TOTAL HARVEST COSTS				44	49	55	79	157
Interest on operating capital at 5.75%	99	14	12	9	13	14	15	16
TOTAL OPERATING COSTS/ACRE	2,435	640	634	683	731	847	887	996
Cash Overhead Costs:								
Liability insurance	26	26	26	26	26	26	26	26
Office expense	125	125	125	125	125	125	125	125
Sanitation fees	81	81	81	81	81	81	81	81
Property taxes	125	125	125	125	158	165	165	165
Property insurance	101	101	100	100	127	133	133	133
Investment repairs	126	126	126	126	126	126	126	126
TOTAL CASH OVERHEAD COSTS	584	584	584	583	643	656	656	656
TOTAL CASH COSTS/ACRE	3,019	1,223	1,218	1,266	1,374	1,503	1,544	1,652
INCOME/ACRE FROM PRODUCTION				125	188	250	500	1,000
NET CASH COSTS/ACRE FOR THE YEAR	3,019	1,223	1,218	1,141	1,187	1,253	1,044	652
PROFIT/ACRE ABOVE CASH COSTS								
ACCUMULATED NET CASH COSTS/ACRE	3,019	4,242	5,460	**6,601**	7,788	9,041	10,085	10,737

Table 1. continued

	Cost Per Acre							
Year:	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield: Dry, In-Shell Pounds Per Acre				100	150	200	400	800
TOTAL DEPRECIATION								
Capital Recovery								
Building 2,400 sq. ft.	266	266	266	266	266	266	266	266
Fuel tanks	12	12	12	12	12	12	12	12
Land	404	404	404	404	404	404	404	404
Sprinkler irrigation system	67	67	67	67	67	67	67	67
Shop/hand tools	71	71	71	71	71	71	71	71
Equipment	112	112	110	110	111	210	210	210
Establishment Cost					411	411	411	411
TOTAL NON-CASH OVERHEAD COST PER ACRE	932	932	930	930	1,342	1,441	1,441	1,441
TOTAL COST/ACRE FOR THE YEAR	3,951	2,155	2,148	2,196	2,716	2,944	2,985	3,094
INCOME/ACRE FROM PRODUCTION				125	188	250	500	1,000
TOTAL NET COST/ACRE FOR THE YEAR	3,951	2,155	2,148	2,071	2,529	2,694	2,485	2,094
NET PROFIT/ACRE ABOVE TOTAL COST				-	-	-	-	-
TOTAL ACCUMULATED NET COST/ACRE	3,951	6,106	8,254	10,324	12,853	15,548	18,032	20,126

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Table 2. COSTS PER ACRE TO PRODUCE CHANDLER WALNUTS

NORTH COAST - Lake County 2012

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:								
Weed: Dormant strip (Roundup, Goal)	0.18	4	2	1	22	0	28	
Prune: Dormant	6.00	82	0	0	0	0	82	
Prune: Push & burn prunings	0.42	16	4	1	0	0	21	
Rodent: Squirrel (bait)	0.53	13	1	0	60	0	74	
Rodent: Gopher (trap)	2.10	51	5	1	8	0	66	
Weed: Mow middles 5X (2 passes/middle)	0.92	22	9	4	0	0	35	
Disease: Walnut blight (Badge X2)	0.20	5	2	1	39	0	47	
Fertilize: Nitrogen (UN32)	0.25	6	1	0	9	0	16	
Insect: Walnut husk fly (Traps)	0.00	0	0	0	61	0	61	
Irrigate: Water & labor	3.60	49	0	0	126	0	175	
Insect: Walnut husk fly (Success, NuLure)	1.05	26	3	1	27	0	55	
Weed: In-season spray (Roundup)	0.18	4	2	1	2	0	9	
Fertilize: Leaf analysis 1X/3 years	0.04	1	0	0	0	1	1	
ATV Use	3.00	73	7	2	0	0	83	
Pickup Use	4.39	107	42	13	0	0	162	
TOTAL CULTURAL COSTS	22.84	460	76	25	354	1	915	
Harvest:								
Harvest: Shake, pickup and hand rake (custom)	0.00	0	0	0	0	400	400	
Harvest: Haul (custom)	0.00	0	0	0	0	38	38	
Harvest: Hull, dry (custom)	0.00	0	0	0	0	500	500	
CWC Assessment fee	0.00	0	0	0	45	0	45	
TOTAL HARVEST COSTS	0.00	0	0	0	45	938	983	
Interest on operating capital at 5.75%							26	
TOTAL OPERATING COSTS/ACRE	22.84	460	76	25	399	938	1,924	
Cash Overhead:								
Liability insurance							26	
Office expense							125	
Sanitation fee							81	
Property taxes							158	
Property insurance							127	
Investment repairs							126	
TOTAL CASH OVERHEAD COSTS							644	
TOTAL CASH COSTS/ACRE							2,568	
Non-cash Overhead:		Per producing Acre		Annual Cost Capital Recovery				
Building - 2,400 sq. ft .		4,211		266			266	
Orchard establishment		6,601		411			411	
Fuel tanks - 350 gallons (2)		184		12			12	
Land		8,500		404			404	
Sprinkler system		1,134		67			67	
Shop/field tools		789		71			71	
Equipment		1,397		114			114	
TOTAL NON-CASH OVERHEAD COSTS		22,816		1,345			1,345	
TOTAL COSTS/ACRE							3,912	

UC COOPERATIVE EXTENSION

Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE CHANDLER WALNUTS

NORTH COAST - Lake County 2012

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS: Walnuts	5,000	Lb.	1.25	6,250	
OPERATING COSTS					
Fungicide:				39	
Badge X2	5.25	lb	7.50	39	
Insecticide:				35	
Walnut husk fly traps	0.50	each	17.50	9	
Success	2.56	floz	7.89	20	
Nu Lure insect bait	1.60	pt	4.02	6	
Fertilizer:				61	
UN-32	13.64	gal	4.50	61	
Irrigation:				126	
Water	24.00	acin	5.27	126	
Herbicide:				24	
Goal 2XL	1.75	pt	11.15	20	
Roundup Ultra Max	1.20	pt	3.50	4	
Rodenticide:				68	
Bait Station - Squirrel	0.20	each	30.00	6	
Squirrel Bait - Wilco	6.30	lb	8.50	54	
Gopher Trap - Maccabee	0.80	each	10.00	8	
Custom:				938	
Fertilize - Leaf analysis (1X/3 yrs)	0.02	each	35.00	1	
Harvest - Shake, sweep, pickup	2.50	ton	160.00	400	
Harvest - Haul walnuts	2.50	ton	15.00	38	
Harvest - Hull/dry	2.50	ton	200.00	500	
Assessment:				45	
CA Walnut Commission	5,000.00	lb	0.01	45	
Labor:				460	
Labor (machine)	15.84	hrs	20.40	323	
Labor (non-machine)	6.45	hrs	13.60	88	
Labor (irrigation)	3.60	hrs	13.60	49	
Machinery:				101	
Fuel - Gas	15.29	gal	3.82	58	
Fuel - Diesel	5.11	gal	3.43	18	
Lube				11	
Machinery repair				13	
Interest on operating capital at 5.75%				26	
TOTAL OPERATING COSTS/ACRE				1,924	
NET RETURNS ABOVE OPERATING COSTS				4,326	
CASH OVERHEAD COSTS:					
Liability insurance				26	
Office expense				125	
Sanitation fee				81	
Property taxes				158	
Property insurance				127	
Investment repairs				126	
TOTAL CASH OVERHEAD COSTS/ACRE				644	
TOTAL CASH COSTS/ACRE				2,568	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building - 2,400 sq. ft.				266	
Orchard establishment				411	
Fuel tanks - 350 gallons (2)				12	
Land				404	
Sprinkler system				67	
Shop/field tools				71	
Equipment				114	
TOTAL NON-CASH OVERHEAD COSTS\ACRE				1,345	
TOTAL COSTS/ACRE				3,912	
NET RETURNS ABOVE TOTAL COSTS				2,338	

UC COOPERATIVE EXTENSION

Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE CHANDLER WALNUTS

NORTH COAST - Lake County 2012

Beginning JAN 12 Ending DEC 12	JAN 12	FEB 12	MAR 12	APR 12	MAY 12	JUN 12	JUL 12	AUG 12	SEP 12	OCT 12	NOV 12	DEC 12	TOTAL
Weed: Dormant strip (Roundup, Goal)	28												28
Prune: Dormant	82												82
Prune: Push brush & burn		21											21
Rodent: Squirrel (bait)			7	7	7	7	7	7	7	7	7	7	74
Rodent: Gopher (trap)			7	7	7	7	7	7	7	7	7	7	66
Weed: Mow middles 5X (1 pass/middle)				7	7	7	7	7					35
Disease: Walnut blight (Badge X2)				47									47
Insect: Walnut husk fly (trap)						3	3	3	3	3			16
Fertilize: Nitrogen (UN32)						31	31						61
Irrigate: Water &labor						44	88	44					175
Insect: Walnut husk fly (Success, NuLure)							14	28	14				55
Weed: In-season spray (Roundup)							9						9
Fertilize: Leaf analysis 1X/3yr							1						1
ATV Use	7	7	7	7	7	7	7	7	7	7	7	7	83
Pickup Use	14	14	14	14	14	14	14	14	14	14	14	14	162
TOTAL CULTURAL COSTS	130	41	34	88	41	150	156	116	51	38	34	34	915
Harvest:													
Harvest: Shake, pickup and hand rake (custom)										400			400
Harvest: Haul (custom)										38			38
Harvest: Hull, dry (custom)										500			500
CWC assessment fee										45			45
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	0	983	0	0	983
Interest on operating capital at 5.75%	1	1	1	1	2	2	3	4	4	9	0	0	26
TOTAL OPERATING COSTS/ACRE	131	42	35	90	43	121	190	120	55	1,029	34	34	1,924
CASH OVERHEAD:													
Liability insurance													26
Office expense													125
Sanitation fee													81
Property taxes													158
Property insurance	64					64							127
Investment repairs	11	11	11	11	11	11	11	11	11	11	11	11	126
TOTAL CASH OVERHEAD COSTS	74	11	11	11	11	74	11	11	11	11	11	11	644
TOTAL CASH COSTS/ACRE	205	53	46	100	53	195	200	130	66	1,039	45	45	2,568

UC COOPERATIVE EXTENSION

Table 5. RANGING ANALYSIS

NORTH COAST – Lake County 2012

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

	YIELD (lbs/acre – dry inshell)						
	1,000	2,000	3,000	4,000	**5,000**	6,000	7,000
OPERATING COST							
Cultural cost	915	915	915	915	915	915	915
Harvest cost & assessment	197	393	590	786	983	1,179	1,376
Interest on operating capital	23	24	25	26	26	27	28
TOTAL OPERATING COST/acre	1,134	1,332	1,529	1,727	1,924	2,122	2,319
Total operating cost/lb.	1.13	0.67	0.51	0.43	0.38	0.35	0.33
CASH OVERHEAD COST	644	644	644	644	644	644	644
TOTAL CASH COST/acre	1,778	1,975	2,173	2,370	2,568	2,765	2,963
Total cash cost/lb.	1.78	0.99	0.72	0.59	0.51	0.46	0.42
NON-CASH OVERHEAD COST	1,345	1,345	1,345	1,345	1,345	1,345	1,345
TOTAL COST/acre	3,123	3,320	3,517	3,715	3,912	4,110	4,307
Total cost/lb.	3.12	1.66	1.17	0.93	0.78	0.68	0.62

NET RETURNS PER ACRE **ABOVE OPERATING** COSTS

	YIELD (lbs./acre – dry in-shell)						
$/lb.	1,000	2,000	3,000	4,000	**5,000**	6,000	7,000
0.88	-259	418	1,096	1,773	2,451	3,128	3,806
1.00	-134	668	1,471	2,273	3,076	3,878	4,681
1.13	-9	918	1,846	2,773	3,701	4,628	5,556
1.25	116	1,168	2,221	3,273	4,326	5,378	6,431
1.38	241	1,418	2,596	3,773	4,951	6,128	7,306
1.50	366	1,668	2,971	4,273	5,576	6,878	8,181
1.63	491	1,918	3,346	4,773	6,201	7,628	9,056

NET RETURNS PER ACRE **ABOVE CASH** COSTS

	YIELD (lbs./acre – dry in-shell)						
$/lb.	1,000	2,000	3,000	4,000	**5,000**	6,000	7,000
0.88	-903	-225	452	1,130	1,807	2,485	3,162
1.00	-778	25	827	1,630	2,432	3,235	4,037
1.13	-653	275	1,202	2,130	3,057	3,985	4,912
1.25	-528	525	1,577	2,630	3,682	4,735	5,787
1.38	-403	775	1,952	3,130	4,307	5,485	6,662
1.50	-278	1,025	2,327	3,630	4,932	6,235	7,537
1.63	-153	1,275	2,702	4,130	5,557	6,985	8,412

NET RETURNS PER ACRE **ABOVE TOTAL** COSTS

	YIELD (lbs./acre – dry in-shell)						
$/lb.	1,000	2,000	3,000	4,000	**5,000**	6,000	7,000
0.88	-2,248	-1,570	-892	-215	463	1,140	1,818
1.00	-2,123	-1,320	-517	285	1,088	1,890	2,693
1.13	-1,998	-1,070	-142	785	1,713	2,640	3,568
1.25	-1,873	-820	233	1,285	2,338	3,390	4,443
1.38	-1,748	-570	608	1,785	2,963	4,140	5,318
1.50	-1,623	-320	983	2,285	3,588	4,890	6,193
1.63	-1,498	-70	1,358	2,785	4,213	5,640	7,068

UC COOPERATIVE EXTENSION

Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD

NORTH COAST - Lake County 2012

ANNUAL EQUIPMENT COSTS

					Cash Overhead		
Yr. Description	Price	Years Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Total
12 65 HP 2 WD tractor	41,233	20	6,151	3,048	190	237	3,475
12 ATV	7,099	15	1,382	607	34	42	684
12 ATV sprayer 50 gallons, 28'	1,085	10	192	123	5	6	135
12 Brush rake	2,000	25	317	132	9	12	152
12 Disc: Harrow 8'	12,458	20	1,400	935	56	69	1,060
12 Loader forks	400	30	162	23	2	3	28
12 Orchard sprayer 500 gallons	21,000	20	4,712	1,503	103	129	1,735
12 Pickup truck 1/2 ton	31,730	10	9,373	3,306	165	206	3,676
12 Weed sprayer 100 gallons	4,000	20	208	308	17	21	346
TOTAL	121,005		23,897	9,984	582	725	11,291
40% of new cost*	48,402		9,559	3,994	233	290	4,516

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Years Life	Salvage Value	Capital Recovery	Insur-ance	Taxes	Repairs	Total
Building - 2,400 sq.ft .	80,000	30	0	5,057	321	400	1,600	7,378
Orchard establishment	125,419	31	0	7,811	504	627	0	8,941
Fuel tanks - 350 gallons (2)	3,500	25	710	227	17	21	70	335
Land	161,500	35	161,500	7,671	1,297	1,615	0	10,583
Sprinkler system	21,538	35	0	1,274	86	108	431	1,899
Shop/field tools	15,000	15	1,500	1,350	66	83	300	1,799
TOTAL INVESTMENT	406,957		163,710	23,389	2,291	2,853	2,401	30,935

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability insurance	19	acre	26.00	494.00
Office expense	19	acre	125.00	2,375.00
Sanitation fee	19	acre	80.53	1,530.07

UC COOPERATIVE EXTENSION

Table 7. HOURLY EQUIPMENT COSTS

NORTH COAST - Lake County 2012

		COSTS PER HOUR						
			Cash Overhead		Operating			
Yr Description	Actual Hours Used	Capital Recovery	Insur-ance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr.
65HP 2WD tractor	40	2.03	0.13	0.16	2.44	8.42	10.86	13.18
ATV	132	1.83	0.10	0.13	0.70	2.39	3.08	5.14
ATV sprayer - 50 gallon	22	0.16	0.01	0.01	0.00	0.00	0.00	0.18
Brush rake	8	0.66	0.05	0.06	0.25	0.00	0.25	1.01
Disc - Harrow 8'	17	3.74	0.22	0.28	1.28	0.00	1.28	5.52
Loader forks	8	0.14	0.01	0.02	0.05	0.00	0.05	0.21
Orchard sprayer - 500 gallon	4	6.01	0.41	0.51	2.27	0.00	2.27	9.21
Pickup - 1/2 ton	83	6.61	0.33	0.41	2.98	9.55	12.53	19.88
Weed sprayer - 100 gallon	7	7.24	0.40	0.49	0.45	0.00	0.45	8.58

Table 8. PRODUCTION OPERATIONS WITH EQUIPMENT & MATERIALS

NORTH COAST - Lake County 2012

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Broadcast Rate/acre	Unit
Weed: Dormant strip spray	Jan	65 HP 2WD tractor	Weed sprayer 100 gal	Equipment Operator Labor	0.22	hour
				Goal 2XL	1.75	pt
				Roundup Powermax	0.60	pt
Prune	Jan			Non-Machine Labor	6.00	hours
Prune: Brush disposal	Feb	65 HP 2WD tractor	Loader forks	Machine Labor	0.41	hour
			Brush rake			
Rodent: Squirrel	Mar		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Apr		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	May		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	June		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	July		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Aug		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Sept		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Oct		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Nov		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
	Dec		ATV	Equipment Operator Labor	0.06	hour
				Squirrel Bait Station	0.02	each
				Squirrel Bait-Wilco	0.63	lb
Rodent: Gopher	Mar		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Apr		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	May		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	June		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	July		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Aug		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Sept		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Oct		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Nov		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each
	Dec		ATV	Equipment Operator Labor	0.25	hour
				Gopher Trap - Maccabee	0.08	each

Table 8. Continued
NORTH COAST - Lake County 2012

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Broadcast Rate/acre	Unit
Weed: Disc middles (5X)	Apr	65 HP 2WD tractor	Disc-harrow 8'	Equipment Operator Labor	0.22	hour
	May	65 HP 2WD tractor	Disc-harrow 8'	Equipment Operator Labor	0.22	hour
	June	65 HP 2WD tractor	Disc-harrow 8'	Equipment Operator Labor	0.22	hour
	July	65 HP 2WD tractor	Disc-harrow 8'	Equipment Operator Labor	0.22	hour
	Aug	65 HP 2WD tractor	Disc-harrow 8'	Equipment Operator Labor	0.22	hour
Disease: Walnut blight	Apr	65 HP 2WD tractor	Orch. sprayer 500 gal	Equipment Operator Labor	0.24	hour
				Badge X2	5.25	lb
Insect: Walnut husk fly trap	June		ATV	Equipment Operator Labor	0.06	hour
				WHF Traps	0.10	each
	July		ATV	Equipment Operator Labor	0.06	hour
				WHF Traps	0.10	each
	Aug		ATV	Equipment Operator Labor	0.06	hour
				WHF Traps	0.10	each
	Sept		ATV	Equipment Operator Labor	0.06	hour
				WHF Traps	0.10	each
	Oct		ATV	Equipment Operator Labor	0.06	hour
				WHF Traps	0.10	each
Fertilize: Nitrogen	June			UN-32	13.64	gal
Irrigate	June			Irrigation Labor	0.90	hour
				Water-Walnut CCSB	6.00	acin
	July			Irrigation Labor	0.90	hour
				Water-Walnut CCSB	6.00	acin
	July			Irrigation Labor	0.90	hour
				Water-Walnut CCSB	6.00	acin
	Aug			Irrigation Labor	0.90	hour
				Water-Walnut CCSB	6.00	acin
Insect: Walnut husk fly	July		ATV	Equipment Operator Labor	0.31	hour
				Success	0.64	floz
			ATV sprayer 50 gal-28'	Nu Lure Insect Bait	0.40	pt
	Aug		ATV	Equipment Operator Labor	0.31	hour
				Success	0.64	floz
			ATV sprayer 50 gal-28'	Nu Lure Insect Bait	0.40	pt
	Aug		ATV	Equipment Operator Labor	0.31	hour
				Success	0.64	floz
			ATV sprayer 50 gal-28'	Nu Lure Insect Bait	0.40	pt
	Sept		ATV	Equipment Operator Labor	0.31	hour
				Success	0.64	floz
			ATV sprayer 50 gal-28'	Nu Lure Insect Bait	0.40	pt
Weed: In-season spray	July	65 HP 2WD tractor	Weed sprayer 100 gal	Equipment Operator Labor	0.22	hour
				Roundup Powermax	0.60	pt
Harvest: Shake, pickup, rake	Oct			Shake, Sweep, Pickup	2.50	ton
Haul	Oct			Haul Nuts	2.50	ton
Harvest: Hull, dry	Oct			Hull/Dry Walnuts	2.50	ton
CWC assessment fee	Oct			CA Walnut Commission	5,000.00	lb
Leaf analysis 1X/3yr	July			Non-Machine Labor	0.04	hour
				Leaf Analysis	0.02	each
	July		ATV	Equipment Operator Labor	3.60	hours
Pickup	July		Pickup truck 1/2 ton	Equipment Operator Labor	5.26	hours