
**UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURE AND NATURAL RESOURCES
AGRICULTURAL ISSUES CENTER**

2015

**SAMPLE COSTS TO ESTABLISH AND PRODUCE
ENGLISH WALNUTS**



**In the Sacramento Valley
Micro Sprinkler Irrigated**

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AGRICULTURE AND NATURAL RESOURCES-AGRICULTURAL ISSUES CENTER
SAMPLE COSTS TO ESTABLISH AND PRODUCE WALNUTS
Sacramento Valley – 2015

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INTRODUCTION

Sample costs to establish a walnut orchard and produce walnuts under micro-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 Cost*”, in Tables 2 and 3 is provided to enter your farming costs.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or explanation of calculations used in the study call the Department of Agricultural and Resource Economics, (ARE) University of California, Davis, (530) 752-4651 or destewart@ucdavis.edu.

Sample Cost of Production studies for many commodities are available and can be downloaded from the ARE Department website, <http://coststudies.ucdavis.edu>. Archived studies are also available on the website.

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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. For consistency, the authors selected Chandler as the cost study variety. Costs, materials, and practices in this study will not apply to all farms and should be adjusted to apply to specific varieties and locations. Timing of and types of cultural practices will vary by location and by season depending upon weather, soil, and 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. Fifty percent of the cost to remove the old orchard is charged to this crop. The soil is ripped 5-feet deep in two directions to break up underlying hardpan and pull up old roots. The roots are removed by hand. The orchard site is disced and rolled twice to break up clods. The new orchard site is laser leveled to reduce or eliminate the possibility of standing water. Then the entire field is fumigated, untarped, with Telone C35. Berms in the tree row are formed with a ridger, the area between the trees, row middles are smoothed/floated once to fill in borrow pits, and the irrigation system is installed underground. A herbicide strip spray is applied prior to planting in early spring. 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. The Chandler variety of English walnut is planted in this study. Cost adjustments may be necessary for other cultivars. Isolated orchards often include 2 to 3 percent of a second variety for pollination. Cisco and/or Franquette are typical Chandler pollinizers. Seedling Paradox is the typical rootstock in the Sacramento Valley, clonal Paradox rootstock is gaining popularity. Many variables determine spacing including soil, rootstock and variety planted. In this study, 1/2" June-budded Chandler trees on clonal Paradox rootstock are planted at 26 X 26 foot spacing, resulting in 64 trees per acre. The economic life of the orchard is assumed to be 30 years. Trees cost \$17.30 each and some clonal Paradox rootstocks have \$1.00 royalty, which is not included as a cost in this study.

Planting. Planting in the spring (February/March) starts by surveying and marking tree sites with a small stake, digging holes, planting, staking the trees, and heading trees back to 3 to 5 buds. Trees are painted white to prevent sunburn and tree wraps are placed around the trees to protect them from contact herbicides. Then a float is ran down the row middles to smooth the surface. In the second year, 4 percent of the orchard or about 2 trees per acre are replanted.

Training/Pruning. Training and pruning begins in the spring, April after planting. One shoot that forms the main trunk is selected and tied up the tree stake. Summer training in the first year consists of tying the main trunk, tipping back competing shoots and suckering. Dormant pruning/training during the second and third years develops primary and secondary, (third year) scaffolds and encourages the central leader using minimal

pruning. Heading cuts are made to remove about one-quarter of the current year's growth on scaffold branches until trees fill in their spaces. During the first three establishment years, the brush is placed in the row middles and chopped during mowing. Minimal pruning is assumed in this cost study.

Research in Colusa County continues to suggest that walnut trees can be grown with no pruning (other than lower branches) in years 1-6 without detrimental effects on tree size, yield or quality. The no prune method costs are not included in this study.

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 (15-15-15) are hand-applied in May and July when roots are active, placed approximately 18 inches from the base of the tree. Beginning in the third year, liquid nitrogen fertilizer (UAN32) is injected through the irrigation system. (See Table A).

Table A. Applied N		Table B. Applied Water		Table C. Evapotranspiration (ET)	
<u>Year</u>	<u>Lbs N/Ac</u>	<u>Year</u>	<u>AcIn/Yr</u>	<u>Year</u>	<u>AcIn/Yr</u>
1	20	1	8	1	14
2	50	2	15	2	21
3	100	3	32	3	38
4	125	4	36	4	42
5	150	5	36	5	42
6+	200	6+	36	6+	42

Irrigation. Tables B & C, above show the difference in applied water and the ET requirement of the orchard per year. Applied water is less depending upon the contribution from stored soil moisture and any rainfall. This study assumes six acre inches of stored soil moisture and no effective rainfall during the growing season. Pressure chambers are used to measure Stem Water Potential and verify irrigation adequacy. All irrigations are with the micro-sprinkler irrigation system.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management for walnuts and UC Pest Management Guidelines for walnuts*. For information on other pesticides available, pest identification, monitoring, and management, visit the UC IPM website at www.ipm.ucdavis.edu. **Pest control costs can vary considerably each year depending upon local conditions and pest populations in any given year.** For information and pesticide use permits, contact the local county Agricultural Commissioner's office. **Pesticides mentioned in this study are not recommendations, but those commonly used in the region.**

Nematodes/Fumigation. Prior to land preparation, the area is sampled (1 sample/20 acres) for nematodes injurious to walnuts to help make preplant soil fumigation decisions. Pre-plant fumigation may not be necessary on bare or row crop ground, but is usually necessary where orchards follow orchards. Telone C35, is applied, by a custom applicator down the tree rows (10 ft strip) at 44 gallons per acre. A second pass (16 ft strip) is made down the aisles using Telone II at 31 gallons per acre. This will treat the entire orchard, 100 percent of the ground. Application costs including materials are approximately \$1,400 per acre. 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. See <http://ucipm.ucdavis.edu/PMG/PESTNOTES/pn7489.html>.

Vegetation Management. Weed pressure, materials and application timing will vary by orchard and season. For this study, a contact herbicide (Roundup) is applied pre-plant in February and a pre-emergence herbicide (Prowl H2O) is applied in April. Beginning in the first year, row middles are mowed five times, once in April, May, June, July, and August. During the late fall, November of the first two years, strip sprays using Prowl and Goal 2XL are applied. In-season spot-sprays using Roundup or Rely 280 are applied to tree rows in July of the first year and in June of years two and three.

Diseases. During the establishment years, trees usually do not have enough crop to protect from walnut blight until the fourth or fifth year. In this study, no disease control costs are included during the establishment years because Chandler is late leafing and less susceptible to walnut blight.

Insects and Mites. In the first through third year, infestation of red humped caterpillars, other insects and mites is possible. For this study, it is assumed that on the average, only one of these pests will occur in any one year. Under that assumption, insect and mite control begins in year three, with a Zeal application in July for mite control. The cost is assumed to be equivalent to the average cost of controlling many 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.

Pesticide and fertilizer applications are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), ATV ground sprayer, or tractor-towed, PTO air-blast sprayer. Insecticides and fungicides can be tank-mixed and applied to the crop in the same operation. Check individual pesticide labels for compatibility, mixing and usage. Some pesticides are applied to a portion of the acreage. Pesticides with different modes of action and different active ingredients should be rotated to avoid resistance development by the targeted pests. See tables 3 and 8 for a list of chemicals used for the applications. Adjuvants are recommended for effective control of many pesticides and are an added cost. Adjuvants are not included as a cost in this study.

Pest Control Adviser/Certified Crop Advisor (PCA/CCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition, the PCA/CCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition; they may take leaf samples in July for fertilizer recommendations. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. For this study, \$10 per acre charge during establishment and \$30 per acre charge during the production years, is shown for the PCA/CCA.

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, collects and hauls walnuts to a facility for hulling and drying. Mature yield is reached in the eighth year. See harvest section under the production assumptions.

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

Pruning. In mature orchards, pruning is done mainly to maintain light for healthy buds, and remove dead and undesired limbs. Although mechanical hedging is effectively used in the Sacramento Valley this cost study orchard is not a hedge row configuration and predicts costs based on a standard planting configuration. Hand pruning is done each year in the summer to remove low, broken, and dead limbs. Pruning towers are used to

make cuts higher in the tree canopy. Pruning should be done when it is dry and no rain is predicted or temperatures are below 50 degrees Fahrenheit to reduce the possibility of *Botryosphaeria* infection. Prunings are placed in the row middles and are pushed to the orchard edge for burning. The brush removal crew includes the tractor driver and one person on the ground.

Fertilization. Nitrogen (N) is applied through the irrigation system as described in Table A. The nitrogen source is UAN 32 injected through the irrigation system in equal amounts in May and July. Labor for the fertilizer application is included in the irrigation labor. Since the major exporter of nitrogen is the crop, another way to estimate the nitrogen requirement is to figure 35 - 40 pounds of nitrogen per dry ton of production and assume a 50 percent application efficiency and account for any N in irrigation water.

Leaf/Tissue Samples. Nutrition is determined by leaf analysis. Leaf sampling begins in the fourth year. Leaf samples, at one sample per 20 acres, are taken in July for nutrient analysis. The samples are collected by the PCA. The cost shown is for the lab analysis.

Irrigation. In the Sacramento Valley annual ET is estimated at 42-acre inches of water per acre, once established for full canopy walnuts, (See Table C). For this study, beginning in year six, we assume a soil moisture contribution of 6 acre-inches and no effective rain fall during the growing season, therefore 36 acre-inches of irrigation water is applied from April to August, (See Table B). Irrigation costs include the water pumping costs and assumed labor. Tree water status is monitored throughout the season using a pressure chamber to measure Stem Water Potential and verify first irrigation timing.

Pest Management. See the statements above, under the Pest Management section.

Vegetation Management. During the production years, weeds are controlled in the row middles with mechanical mowing. The weeds within the tree rows are controlled with winter and in-season strip sprays using pre-emergent and post-emergent contact herbicides. Chateau, Prowl and Roundup are applied in November as a winter strip spray. This operation is charged on the previous year's budgets. Rely 280 is applied during the growing season in July or August as a strip spray.

Disease. *Botryosphaeria* canker and blight, (*Botryosphaeria spp.*) known simply as (Bot), has been increasing in Sacramento Valley walnut orchards over the last several years. Growers have been noticing this disease in the form of blighted spurs, shoots, and branches and sometimes brown to black nuts appearing around harvest. Research is underway to evaluate spray timing and Bot management. This study assumes a two fungicide spray program for Bot beginning in the fourth year with a May application of Merivon and a June spray of Quadris Top.

Walnut blight (*Xanthomonas arboricola pv juglandis*), is a spring disease that affects all green tissue including nutlets. Depending on rainfall, earlier leafing varieties typically require more sprays than later leafing varieties like Chandler used in this study. Starting in year four, the first treatment is applied in mid-April using a copper compound, Kocide 3000 tank mixed with Manzate Prostick and a second treatment is applied 7-10 days later depending on rainfall, with the same chemicals.

Insects and Mites. Insects and mites are typical problems for Sacramento Valley walnut production. Each particular pest is not a problem in every year. The cost study assumes the most likely pest encountered.

Aphids and 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 given year and the costs reflect one treatment per year. Starting in year three and continuing, Zeal is applied in July for mite control.

Codling moth (CM), a major pest, can cause damage resulting in off-grade nuts. CM is assumed to reach treatment levels by the fifth year. Three generations usually occur and are monitored using pheromone traps and insect degree days. See <http://www.ipm.ucdavis.edu/WEATHER/index.html>. The pheromone traps are furnished and installed and serviced by the PCA, therefore no cost is shown. One treatment for codling moth is assumed for the second flight and Altacor is applied in July. A May spray is often applied for earlier leafing varieties. Codling Moth mating disruption using pheromone puffers or dispensers is an option particularly for larger contiguous walnut orchards. This cost study assumes a spray program for Codling moth.

Starting in year six, Seize 35WP is applied in March for scale insect control. Walnut husk fly (WHF) is a problem in most orchards and is monitored using yellow sticky traps with ammonium carbonate superchargers. Also in the sixth year, WHF first spray is applied in July using Leverage plus Nu-Lure and again in August with Assail plus Nu-Lure. This cost study assumes a two spray program for WHF. More WHF sprays may be needed in certain years depending on WHF trap catch information.

Vertebrate Pests. Gophers require control and maintenance treatments are necessary. Spot treatments with gopher bait are made in March of each year. Squirrels are managed using anti-coagulant bait stations on the field perimeter beginning in the fourth year and are maintained during May, June, September and October. See http://ucanr.org/sites/Ground_Squirrel_BMP/.

Promoting Early Harvest. Ethephon, a growth regulator that enhances hull-split, is applied at packing tissue brown (an indicator of kernel maturity), to promote early harvest. In this study, Ethephon is applied to one-half of the orchard in September to stagger the Chandler harvest for more efficient huller and dryer management. Ethephon can also be used to promote one shake harvest by applying it 10 days before the normal harvest date.

Harvest. Custom harvesters shake, sweep, collect, and truck the walnuts to a facility for hulling and drying. Labor for hand raking to collect walnuts missed by the sweeper is supplied by the grower. Hulling and drying costs are charged on a per-pound of 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 5,500 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. A projected price of \$1.25 per pound, is used in the tables, for this study. See Table 5 for a range of yields over a range of prices. The average return price for walnuts in the Sacramento Valley from the National Agriculture Statistics Service, 2012-2013 is \$1.69 per pound.

Assessments. Under a state marketing order, the California Walnut Commission (CWC) collects mandatory assessment fees. The 2015 CWC assessment fee is \$0.01 per pound of dry in-shell nuts. The 2015 assessment fee from the California Walnut Assessment Board, (CWAB), and Federal marketing order is \$3.79 per hundred weight.

Pickup/ATV. The study assumes the pickup is for general farm use only, moving laborers, picking up supplies and parts. The ATV is used for weed spraying and 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 \$14.00 per hour for machine operators and \$12.00 per hour for non-machine labor. Adding 36 percent 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 \$19.04 and \$16.32 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 2015 (California Department of Insurance).

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 \$3.17 and \$3.41 per gallon, respectively. The costs are based on June 2015 Energy Information Administration, (EIA) monthly data. The cost includes a 2.5 percent local sales tax on diesel fuel and 7.5 percent 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 percent 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 percent 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 2015.

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 of walnut production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner and in various combinations for a sustainable operation.

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 can include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1 percent 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 percent of the average value of the property.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. This provides coverage for property loss and is charged at 0.843 percent of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, injury or damage to another's property. In this study, \$792 is charged and covers the entire farm.

Crop Insurance. This is available to walnut growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50-85 percent of the approved average yield as established by verifiable production records from the orchard. Actual insurance coverage is by unit, not by acre. A significant number of growers purchase crop insurance in this region. Due to variability in coverages no level is specified in this study.

Office Expense. Office and business expenses are estimated at \$75 per acre annually. These expenses include office supplies, communication, bookkeeping, accounting and miscellaneous administrative costs.

Sanitation Services. Sanitation services provide portable toilets with wash basins for the orchard and cost the farm \$510 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. Annual repairs on investment or capital recovery items that require maintenance are calculated as 2 percent of the purchase price on investments listed in Table 6.

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 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. An interest rate of 4.75 percent 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 2015.

Land. Land values range from \$18,000 to \$40,000. The orchard site is assumed to be on previously farmed orchard ground. The basic land value in this study is \$23,000 per acre.

Irrigation System. The pumping cost is based on two 75-horsepower electric motors pumping from a depth of 75 feet. 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 groundwater are calculated to cost \$90.00 per acre-foot or \$7.50 per acre-inch. Water is pumped through a filtration system, into the buried main lateral lines, and out into the orchard and micro-sprinklers. The well and pump already exist, so the cost of the irrigation system is for the new well casing, refurbishing the pump and motor, and installing a new, automated filtration system. The main laterals and micro-sprinklers are installed separately, after the orchard has been laid out and prior to planting. The life of the irrigation system is estimated to be 30 years.

Fuel Tanks. Two 500-gallon fuel tanks, one for diesel and one for gasoline, are placed on stands in a cement containment meeting federal, state, and local regulations.

Tools. Includes shop tools/equipment, hand tools, and field tools such as pruning equipment, rakes, shovels, 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 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 \$7,212 per acre or \$721,200 for the 100-acre orchard. Establishment cost is amortized beginning in the fourth year over the remaining 30 years of production. Tree replacement or repairs is \$7.81 per acre based on 0.10 percent 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 percent 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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UC COOPERATIVE EXTENSION
TABLE 1. COSTS PER ACRE TO ESTABLISH AN ENGLISH WALNUT ORCHARD, OVER YEARS
 SACRAMENTO VALLEY - 2015

CM: Codling Moth, WHF; Walnut Husk Fly	Year:	Cost Per Acre						
		Est/1st	2nd	3rd	4th	5th	6th	7th
Price: \$1.25/Lb.	Yield: Dry, In-Shell Pounds Per Acre:	500	1,000	2,000	4,700			
Pre-Plant:								
Nematode Sampling		1						
Orchard Removal/Cleanup 50% Ac		150						
Ripping 5'/Root Removal-2X		433						
Disc & Roll 2X		50						
Laser Leveling		70						
Soil Fumigate		1400						
Make Berms-Tree Rows		30						
Float-Between Rows		30						
Install Irrigation System (Labor)		114						
Weeds-Pre-Plant Strip Spray		6						
TOTAL PRE-PLANT COSTS		2,284						
Planting:								
Survey/Mark/Plant-64 Trees/Ac		1,281	38					
Head/Paint/Stake/Wrap Trees		203	5					
TOTAL PLANTING COSTS		1,484	43					
Cultural:								
Float-Between Rows		30						
Prune-(Sucker Trees 4X-1 st Yr.)		163						
Prune/Stack/Alt-Rows (1/3 Ac)			71	64	40	40	40	40
Push Brush-Field Edge/Burn					15	15	15	15
Fertilize: 15-15-15 2X		58	240					
Fertilize-Chemigation UAN32 2X				70	88	105	140	140
Fertilize-Leaf Analysis				3	3	3	3	3
Irrigate 10X		60	113	240	270	270	270	270
Irrigation Labor		49	49	49	49	49	49	49
Weeds-Mow Middles 5X		36	36	36	36	36	36	36
Weeds-Spot Spray 25% Ac		2	2	2				
Weeds-Strip Spray 2X		18	11	11	40	41	41	41
Pests-Diseases-Walnut Blight 2X					118	118	118	118
Pests-Diseases-Bot 2X					109	109	109	109
Pests-Scale							62	62
Pests-Mites				59	59			
Pests-Insects-CM/WHF/Mites						110	125	125
Pests-Insects-WHF 50% Ac							26	26
Pests-Gophers		7	7	7	7	7	7	7
Pests-Squirrels (Bait) 4X					44	45	45	45
PCA/CCA Fee		10	10	10	30	30	30	30
Pickup Truck-Farm Use		26	26	26	26	26	26	26
ATV-Farm Use		8	8	8	8	8	8	8
TOTAL CULTURAL COSTS		525	634	584	942	1,012	1,151	1,151
Harvest Costs:								
Shake/Sweep/Pickup/Haul					35	70	140	329
Harvest Aid-Ethephon 50% Ac							28	28
Hull & Dry					35	70	140	329
California Walnut Commission Assessment					24	48	95	223
TOTAL HARVEST COSTS					94	188	403	909
Interest On Operating Capital @ 5.75%		229	18	13	16	16	19	17
TOTAL OPERATING COSTS/ACRE		4,521	634	597	1,051	1,216	1,573	2,077

UC COOPERATIVE EXTENSION
TABLE 1. CONTINUED
 SACRAMENTO VALLEY - 2015

	Costs per Acre							
	Year:	Est/1st	2nd	3rd	4th	5th	6th	7th
	Yield: Dry, In Shell - Pounds Per Acre				500	1,000	2,000	4,700
Cash Overhead Costs:								
Office Expense		75	75	75	75	75	75	75
Liability Insurance		8	8	8	8	8	8	8
Sanitation Costs		5	5	5	5	5	5	5
Property Taxes		260	260	260	296	296	296	296
Property Insurance		21	21	21	24	24	24	24
Investment Repairs		118	118	118	118	118	118	118
TOTAL CASH OVERHEAD COSTS		487	487	487	526	526	526	526
TOTAL CASH COSTS/ACRE		5,008	1,120	1,084	1,577	1,742	2,099	2,602
INCOME/ACRE FROM PRODUCTION					625	1,250	2,500	5,875
NET CASH COSTS/ACRE FOR THE YEAR		5,008	1,120	1,084	952	492		
NET PROFIT/ACRE ABOVE CASH COSTS							401	3,273
ACCUMULATED NET CASH COSTS/ACRE		5,008	6,128	7,212	8,164	8,656	8,255	4,982
Non-Cash Overhead (Capital Recovery):								
Buildings		38	38	38	38	38	38	38
Fuel Tanks 2-500 gal		3	3	3	3	3	3	3
Shop/Field Tools		12	12	12	12	12	12	12
Irrigation System-Micro		178	178	178	178	178	178	178
Well/Pumps/Filters 100Ac		139	139	139	139	139	139	139
Land-Walnuts 100 Acres		1,093	1,093	1,093	1,093	1,093	1,093	1,093
Orchard Establishment					456	456	456	456
Equipment		16	14	14	16	16	16	16
TOTAL NON-CASH OVERHEAD COSTS		1,480	1,477	1,477	1,935	1,935	1,935	1,935
TOTAL COST/ACRE FOR THE YEAR		6,488	2,597	2,561	3,512	3,677	4,034	4,538
INCOME/ACRE FROM PRODUCTION					625	1,250	2,500	5,875
TOTAL NET COST/ACRE FOR THE YEAR		6,488	2,597	2,561	2,887	2,427	1,534	
NET PROFIT/ACRE ABOVE TOTAL COST								1,337
TOTAL ACCUMULATED NET COST/ACRE		6,488	9,085	11,646	14,533	16,960	18,494	17,108

UC COOPERATIVE EXTENSION
TABLE 2. COSTS PER ACRE TO PRODUCE WALNUTS
 SACRAMENTO VALLEY – 2015

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/Stack/Alt-Rows 1/3 Ac	0.00	0	0	0	0	40	40	
Push Brush-Field Edge/Burn	0.25	10	4	1	0	0	15	
Pests-Gophers	0.11	3	1	0	4	0	7	
Pests-Insects Scale	0.00	0	0	0	37	25	62	
Irrigate 10X	0.00	0	0	0	270	0	270	
Weeds-Mow Middles 5X	0.74	17	11	8	0	0	36	
Disease-Walnut Blight 2X	0.00	0	0	0	93	25	118	
Pests-Squirrels (Bait) 4X	0.00	13	0	0	32	0	45	
Disease-Bot 2X	0.00	0	0	0	59	50	109	
Fertilize-Chemigation 2X	0.00	0	0	0	140	0	140	
Fertilize-Leaf Analysis	0.00	0	0	0	0	3	3	
Pests-Insects-CM/WHF/Mites	0.00	0	0	0	100	25	125	
Pests-Insects-WHF 50% Ac	0.00	0	0	0	14	13	26	
Weeds-Strip Spray 2X	0.33	7	0	1	32	0	41	
Irrigation Labor	0.00	49	0	0	0	0	49	
PCA/CCA Fee	0.00	0	0	0	0	30	30	
Pickup Truck-Farm Use	0.75	17	6	2	0	0	26	
ATV-Farm Use	0.33	8	0	0	0	0	8	
TOTAL CULTURAL COSTS	2.51	123	23	13	782	210	1,151	
Harvest:								
Harvest Aid-Ethephon 50% Ac	0.00	0	0	0	15	13	28	
Shake/Sweep/Pickup/Haul	0.00	0	0	0	0	385	385	
Hull & Dry	0.00	0	0	0	0	385	385	
Assessment Fees	0.00	0	0	0	261	0	261	
TOTAL HARVEST COSTS	0.00	0	0	0	277	783	1,059	
Interest on Operating Capital at 5.75%							31	
TOTAL OPERATING COSTS/ACRE	3.00	123	23	13	1,058	993	2,241	

UC COOPERATIVE EXTENSION
TABLE 2. CONTINUED
 SACRAMENTO VALLEY – 2015

Operation	Operation	Cash and Labor Costs per Acre						Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent			
CASH OVERHEAD:									
Liability Insurance								8	
Office Expense								75	
Sanitation Services								5	
Property Taxes								296	
Property Insurance								24	
Investment Repairs								118	
TOTAL CASH OVERHEAD COSTS/ACRE								526	
TOTAL CASH COSTS/ACRE								2,767	
NON-CASH OVERHEAD:									
		Per Producing Acre		Annual Cost Capital Recovery					
Buildings 2400sqft		600		38				38	
Fuel Tanks 2-500gal		55		3				3	
Shop/Field Tools		200		12				12	
Irrigation System-Micro		2,818		178				178	
Well/Pumps/Filters 100Ac		2,200		139				139	
Land Walnuts		23,000		1,093				1,093	
Orchard Establishment		7,212		456				456	
Equipment		146		16				16	
TOTAL NON-CASH OVERHEAD COSTS		36,231		1,935				1,935	
TOTAL COSTS/ACRE								4,703	

UC COOPERATIVE EXTENSION
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE WALNUTS
 SACRAMENTO VALLEY – 2015

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
	5,500	Lb	1.25	6,875	
TOTAL GROSS RETURNS					
	5,500	Lb		6,875	
OPERATING COSTS					
Herbicide:					32
Rely 280	12.00	floz	0.86	10	
Chateau SW	2.00	oz	8.49	17	
Prowl H2O	0.50	pt	4.49	2	
Roundup UltraMax	8.00	floz	0.27	2	
Fungicide:					152
Manzate Pro Stick	4.80	lb	3.20	15	
Kocide 3000	10.00	lb	7.80	78	
Merivon	4.00	floz	6.59	26	
Quadris Top	12.00	floz	2.72	33	
Insecticide:					151
Seize 35WP	4.00	floz	9.34	37	
Zeal	2.00	oz	17.00	34	
Nu-Lure Bait	3.75	pt	3.04	11	
Altacor	4.50	floz	11.25	51	
Leverage 360	2.80	floz	2.30	6	
Assail 30 SP	0.75	oz	15.38	12	
Rodenticide:					36
Vertebrate Pest Bait	10.00	lb	1.92	19	
Bait Stations	2.00	each	8.50	17	
Tree Aids:					15
Ethephon 2SL	2.00	pt	7.71	15	
Custom:					993
Stack/Alt-Rows 1/3 Ac	2.00	acre	20.00	40	
Spray Ground - Air Blast Sprayer	6.00	acre	25.00	150	
Leaf Analysis	0.05	each	50.00	3	
Shake Sweep Pickup Haul	5500.00	lb	0.07	385	
Dry/Hull	5500.00	lb	0.07	385	
PCA/CCA Fee	1.00	acre	30.00	30	
Irrigation:					270
Water-Pumped	36.00	acin	7.50	270	
Fertilizer:					140
UAN32 (32-0-0)	200.00	lb N	0.70	140	
Assessment:					261
CWC	5500.00	lb	0.01	55	
CWAB	55.00	cwt	3.75	206	
Labor					123
Equipment Operator Labor	3.01	hrs	19.04	57	
Non-Machine Labor	1.05	hrs	16.32	17	
Irrigation Labor	3.00	hrs	16.32	49	
Machinery					36
Fuel-Gas	0.25	gal	3.41	1	
Fuel-Diesel	6.88	gal	3.17	22	
Lube				3	
Machinery Repair				10	
Interest on Operating Capital @ 5.75%					31
TOTAL OPERATING COSTS/ACRE				2,241	

UC COOPERATIVE EXTENSION
TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE WALNUTS
 SACRAMENTO VALLEY – 2015

	MAR 15	APR 15	MAY 15	JUN 15	JUL 15	AUG 15	SEP 15	OCT 15	NOV 15	Total
Cultural:										
Push Brush-Field Edge/Bum	15									15
Prune/Stack/Alt-Rows 1/3 Ac					40					40
Pests-Gophers	7									7
Pests-Insects Scale	62									62
Irrigate 10X		30	53	53	53	53	30			270
Weeds-Mow Middles 5X		7	7	7	7	7				36
Disease-Walnut Blight 2X		72	47							118
Pests-Squirrels (Bait) 4X			24	7			7	7		45
Disease-Bot 2X			51	58						109
Fertilize-Chemigation 2X			70		70					140
Fertilize-Leaf Analysis					3					3
Pests-Insects-CM/WHF/Mites					125					125
Pests-Insects-WHF 50% Ac						26				26
Weeds-Strip Spray 2X						15			26	41
Irrigation Labor							49			49
PCA/CCA Fee	3	3	3	3	3	3	3	3	3	30
Pickup Truck-Farm Use	3	3	3	3	3	3	3	3	3	26
ATV-Farm Use	1	1	1	1	1	1	1	1	1	8
TOTAL CULTURAL COSTS	92	116	259	132	304	108	93	14	33	1,151
Harvest:										
Harvest Aid-Ethephon 50% Ac							28			28
Shake/Sweep/Pickup/Haul								385		385
Hull & Dry								385		385
Assessment Fees								261		261
TOTAL HARVEST COSTS	0	0	0	0	0	0	28	1,031	0	1,059
Interest on Operating Capital @ 5.75%	0	1	2	3	4	5	5	10	0	31
TOTAL OPERATING COSTS/ACRE	92	117	261	134	309	113	127	1,056	33	2,241
CASH OVERHEAD										
Liability Insurance	8									8
Office Expense	8	8	8	8	8	8	8	8	8	75
Sanitation Services	1	1	1	1	1	1	1	1	1	5
Property Taxes					148					296
Property Insurance					12					24
Investment Repairs	13	13	13	13	13	13	13	13	13	118
TOTAL CASH OVERHEAD COSTS	30	22	22	22	182	22	22	22	22	526
TOTAL CASH COSTS/ACRE	122	139	283	156	491	135	148	1,078	55	2,767

UC COOPERATIVE EXTENSION
TABLE 5. RANGING ANALYSIS - WALNUTS
 SACRAMENTO VALLEY – 2015

COSTS PER ACRE AND PER LB AT VARYING YIELDS TO PRODUCE WALNUTS

	YIELD (LBS.)						
	2,500.00	3,500.00	4,500.00	5,500.00	6,500.00	7,500.00	8,500.00
OPERATING COSTS/ACRE:							
Cultural	1,151	1,151	1,151	1,151	1,151	1,151	1,151
Harvest	482	674	867	1,059	1,252	1,444	1,637
Interest on Operating Capital @ 5.75%	29	30	30	31	32	33	34
TOTAL OPERATING COSTS/ACRE	1,661	1,854	2,048	2,241	2,435	2,629	2,822
TOTAL OPERATING COSTS/LB	0.66	0.53	0.46	0.41	0.37	0.35	0.33
CASH OVERHEAD COSTS/ACRE	526	526	526	526	526	526	526
TOTAL CASH COSTS/ACRE	2,187	2,380	2,574	2,767	2,961	3,154	3,348
TOTAL CASH COSTS/LB	0.87	0.68	0.57	0.50	0.46	0.42	0.39
NON-CASH OVERHEAD COSTS/ACRE	1,935	1,935	1,935	1,935	1,935	1,935	1,935
TOTAL COSTS/ACRE	4,122	4,316	4,509	4,703	4,896	5,090	5,283
TOTAL COSTS/LB	2.00	1.00	1.00	1.00	1.00	1.00	1.00

Net Return per Acre above Operating Costs for Walnuts

PRICE (\$/lb)	YIELD (lbs./acre)						
	2500.00	3500.00	4500.00	5500.00	6500.00	7500.00	8500.00
0.80	339	946	1,552	2,159	2,765	3,371	3,978
0.95	714	1,471	2,227	2,984	3,740	4,496	5,253
1.10	1,089	1,996	2,902	3,809	4,715	5,621	6,528
1.25	1,464	2,521	3,577	4,634	5,690	6,746	7,803
1.40	1,839	3,046	4,252	5,459	6,665	7,871	9,078
1.55	2,214	3,571	4,927	6,284	7,640	8,996	10,353
1.70	2,589	4,096	5,602	7,109	8,615	10,121	11,628

Net Return per Acre above Cash Costs for Walnuts

PRICE (\$/lb)	YIELD (lbs./acre)						
	2500.00	3500.00	4500.00	5500.00	6500.00	7500.00	8500.00
0.80	-187	420	1,026	1,633	2,239	2,846	3,452
0.95	188	945	1,701	2,458	3,214	3,971	4,727
1.10	563	1,470	2,376	3,283	4,189	5,096	6,002
1.25	938	1,995	3,051	4,108	5,164	6,221	7,277
1.40	1,313	2,520	3,726	4,933	6,139	7,346	8,552
1.55	1,688	3,045	4,401	5,758	7,114	8,471	9,827
1.70	2,063	3,570	5,076	6,583	8,089	9,596	11,102

Net Return per Acre above Total Costs for Walnuts

PRICE (\$/lb)	YIELD (lbs./acre)						
	2500.00	3500.00	4500.00	5500.00	6500.00	7500.00	8500.00
0.80	-2,122	-1,516	-909	-303	304	910	1,517
0.95	-1,747	-991	-234	522	1,279	2,035	2,792
1.10	-1,372	-466	441	1,347	2,254	3,160	4,067
1.25	-997	59	1,116	2,172	3,229	4,285	5,342
1.40	-622	584	1,791	2,997	4,204	5,410	6,617
1.55	-247	1,109	2,466	3,822	5,179	6,535	7,892
1.70	128	1,634	3,141	4,647	6,154	7,660	9,167

UC COOPERATIVE EXTENSION
TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SACRAMENTO VALLEY – 2015

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
15	Brush Rake 9'	1,800	25	51	123	1	9	133
15	90 HP 4WD Tractor	76,839	15	14,959	6,572	39	459	7,070
15	34HP2WD Tractor	21,261	12	5,316	2,026	11	133	2,170
15	ATV-4WD	8,500	12	2,125	810	4	53	868
15	Flail Mower 14'	12,790	10	2,262	1,454	6	75	1,536
15	ATV sprayer 200 gal 26'	9,700	10	1,715	1,103	5	57	1,165
15	Bait Applicator	2,473	10	437	281	1	15	297
15	Pickup Truck 1/2 Ton	28,000	5	12,549	4,140	17	203	4,360
TOTAL		161,363	-	39,414	16,511	85	1,004	17,599
60% of New Cost*		96,818	-	23,649	9,906	51	602	10,559

*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 2400sqft	60,000	30	0	3,793	25	300	1,200	5,318
Fuel Tanks 2-500gal	5,488	30	0	347	2	27	120	496
Shop/Field Tools	20,000	30	1,500	1,241	9	108	400	1,757
Irrigation System-Micro	281,849	30	0	17,816	0	1,409	5,637	24,862
Well/Pumps/Filters 100Ac	220,000	30	0	13,906	93	1,100	4,400	19,499
Land Walnuts	2,300,000	30	2,300,000	109,250	1,939	23,000	0	134,189
Orchard Establishment	721,200	30	0	45,587	304	3,606	8	49,504
TOTAL INVESTMENT	3,608,537	-	2,301,500	191,938	2,372	29,550	11,765	235,625

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	100	acre	7.92	792
Office Expense	100	acre	75.00	7,500
Sanitation Services	100	acre	5.10	510

UC COOPERATIVE EXTENSION
TABLE 7. HOURLY EQUIPMENT COSTS
 SACRAMENTO VALLEY – 2015

Yr	Description	Walnuts	Total	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr.
		Hours Used	Hours Used		Insur- ance	Taxes	Lube& Repairs	Fuel	Total Oper.	
15	90 HP 4WD Tractor	109	1066	3.70	0.02	0.26	4.06	14.01	18.07	22.05
15	34HP2WD Tractor	12	1000	1.22	0.01	0.08	1.77	5.29	7.06	8.36
15	Pickup Truck 1/2 Ton	75	400	6.21	0.03	0.30	3.28	7.93	11.20	17.74
15	Flail Mower 14'	74	200	4.36	0.02	0.23	6.24	0.00	6.24	10.85
15	ATV-4WD	53	166	2.93	0.02	0.19	0.81	1.28	2.09	5.22
15	ATV sprayer 200 gal 26'	20	150	4.41	0.02	0.23	2.61	0.00	2.61	7.27
15	Bait Applicator	11	120	1.41	0.01	0.07	0.96	0.00	0.96	2.44
15	Brush Rake 9'	25	80	0.93	0.01	0.07	0.33	0.00	0.33	1.33

UC COOPERATIVE EXTENSION
TABLE 8. OPERATIONS WITH EQUIPMENT & MATERIALS
 SACRAMENTO VALLEY – 2015

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Push Brush-Field Edge	Mar	90 HP 4WD Tractor	Brush Rake 9'	Non-Machine Labor	0.25	hour
	Mar	34HP2WD Tractor	Bait Applicator	Equipment Operator Labor	0.14	hour
Pests-Gophers				Vertebrate Pest Bait	2.00	lb
				Air Blast Sprayer	1.00	acre
				Seize 35WP	4.00	floz
Pests-Insects Scale	Mar			Water-Pumped	4.00	acin
Irrigate 10X	Apr			Water-Pumped	7.00	acin
	May			Water-Pumped	7.00	acin
	June			Water-Pumped	7.00	acin
	July			Water-Pumped	7.00	acin
	Aug			Water-Pumped	7.00	acin
Weeds-Mow Middles 5X	Sept			Water-Pumped	4.00	acin
	Apr	90 HP 4WD Tractor	Flail Mower 14'	Equipment Operator Labor	0.18	hour
	May	90 HP 4WD Tractor	Flail Mower 14'	Equipment Operator Labor	0.18	hour
	June	90 HP 4WD Tractor	Flail Mower 14'	Equipment Operator Labor	0.18	hour
	July	90 HP 4WD Tractor	Flail Mower 14'	Equipment Operator Labor	0.18	hour
Disease-Walnut Blight	Aug	90 HP 4WD Tractor	Flail Mower 14'	Equipment Operator Labor	0.18	hour
	Apr			Air Blast Sprayer	1.00	acre
				Manzate Pro Stick	2.40	lb
				Kocide 3000	5.00	lb
	May			Kocide 3000	5.00	lb
Pests-Squirrels (Bait)	May			Manzate Pro Stick	2.40	lb
				Non-Machine Labor	0.20	hour
				Vertebrate Pest Bait	2.00	lb
				Bait Stations	2.00	each
	June			Non-Machine Labor	0.20	hour
Disease-Bot 2X	Sept			Vertebrate Pest Bait	2.00	lb
	Oct			Non-Machine Labor	0.20	hour
				Vertebrate Pest Bait	2.00	lb
	May			Air Blast Sprayer	1.00	acre
	June			Merivon	4.00	floz
Fertilize-Chemigation	May			Air Blast Sprayer	1.00	acre
	July			Quadris Top	12.00	floz
	July			UAN32 (32-0-0)	100.00	lb N
Fertilize-Leaf Analysis	July			UAN32 (32-0-0)	100.00	lb N
Prune/Stack/Alt-Rows	July			Leaf Analysis	0.05	each
Pests-Insects-CM/WHF	July			Stack/Alt-Rows 1/3 Ac	1.00	acre
Pests-Insects-WHF	Aug			Air Blast Sprayer	1.00	acre
				Zeal	2.00	oz
				Nu-Lure Bait	3.00	pt
				Altacor	4.50	floz
				Leverage 360	2.80	floz
				Nu-Lure Bait	0.75	pt
				Assail 30 SP	0.75	oz
Weeds-Strip Spray 2X	Aug		ATV-4WD	Air Blast Sprayer	0.50	acre
				Equipment Operator Labor	0.20	hour
				Rely 280	12.00	floz
	Nov		ATV sprayer 200 gal 26'	Equipment Operator Labor	0.20	hour
			ATV-4WD	Chateau SW	2.00	oz
Irrigation Labor	Sept			Prowl H2O (pint)	0.50	pt
	Sept			Roundup UltraMax	8.00	floz
	Sept			Irrigation Labor	3.00	hours
	Sept			Pickup Truck 1/2 Ton	1.00	acre
	Sept			ATV-Farm Use	0.90	hour
Harvest Aid-Ethephon	Sept		ATV-4WD	Equipment Operator Labor	0.40	hour
				Air Blast Sprayer	0.50	acre
				Ethephon 2SL	2.00	pt
Shake/Sweep/Pickup/Haul Hull & Dry	Oct			Shake Sweep Pickup Haul	5,500.00	lb
	Oct			Dry/Hull	5,500.00	lb