
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2010

**SAMPLE COSTS TO ESTABLISH AN
ORCHARD AND PRODUCE**

LEMONS



SAN JOAQUIN VALLEY - South

Low Volume Irrigation

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INTRODUCTION

Sample costs to establish a lemon orchard and produce lemons under low volume irrigation in the southern San Joaquin 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 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 3 and 4 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.

Sample Cost of Production Studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-3589. 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 assumptions refer to Tables 1 to 9 and pertain to sample costs to establish a lemon orchard and produce lemons in the southern San Joaquin Valley. The cultural practices shown represent production operations and materials considered typical of a well-managed orchard 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 variety, weather, soil, and insect and disease pressure. **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 65 contiguous acres. Establishment and production costs are based on the 10 acres being planted to lemons. Mature orange trees are on 50 acres and the remaining five acres are roads, equipment and shop area, and homestead. The grower owns and farms the orchards.

Establishment Cultural Practices and Material Inputs Tables 1 & 2

Land Preparation. The orchard is established on ground previously planted to another tree crop. Land preparation begins by removing the old orchard. Orchard removal costs include pushing, stacking, and burning or shredding the trees, and a hand cleanup of the area. After removal, deep ripping (slip plowing) of the soil profile 4 to 6 feet is done to break up stratified layers that affect root and water penetration. The ground is disced two times to break up large clods and then leveled (triplaned). All land preparation operations are contracted and done in the year prior to planting. Contracted or custom operation costs will vary depending upon acreage size. Small acreage (10 in this case) may have a minimum fee or additional equipment delivery charges. Some of these costs are included.

Planting. Planting the orchard starts by marking tree sites (layout orchard). Holes are then dug and the trees planted in February. The trunks are wrapped with a foam wrap to shield them from sunburn and to reduce sucker development. Also, 2% of the trees or 2 trees per acre are assumed to be replaced in the second year.

Trees. The major lemon variety grown in the San Joaquin Valley is Lisbon. Tree costs are for the standard varieties. The trees are planted on 20 X 20-foot spacing, 109 trees per acre. Tree spacing and densities in orchards vary. Lemon trees have a long production life if they are well maintained. The life of the orchard is assumed to be 40 years.

Table A. Sucker/Prune
Operation Time

Year	Operation	Hours
1	Sucker	3.00
2	Sucker	3.00
3	Sucker/Prune	5.00
4	Prune	7.00
5	Prune	12.00

Pruning. Suckering is done twice a year, April and July, during the first and second year. Light pruning is done in April after harvest from the third year until the trees are mature. Also in the third year some suckering may be done during the pruning. See Table A for estimated pruning/suckering times for the establishment years.

Irrigation. District water is delivered via canal to the farm at a cost of \$129.00 per acre-foot or \$10.75 per acre-inch. Water costs are highly variable among districts. Irrigation costs include the water and the labor for system operation and monitoring. No assumption is made about effective rainfall, runoff, evaporation, winter water requirements or rainfall stored in the soil profile, tree size or tree health. In the first year, an irrigation is applied in March shortly after planting.

Table B. Water applied

Year	Acre-Inches
1	3.0
2	7.0
3	13.0
4	22.0
5	27.0
6+	33.0

Irrigation water is generally applied from April through October. The amount of water applied to different aged trees is shown in Table B. Values are based on an irrigation system delivering water with a distribution uniformity of 85%.

Frost Protection. Lemons are highly susceptible to freezing. Damage begins at a higher temperature than oranges; therefore, the wind machines are started in some instances at temperatures that are two to three degrees Fahrenheit higher than when started for oranges. This study assumes that weed/cover crop management and 2.2 acre-inches of water are used for frost protection during November, December and January except for the first year. Wind machines are installed in the first year and begin operation in the winter (November & December) of the first year to which the costs are allocated, while the January costs are allocated to the second year. The costs are based on a calendar year. Except for the first year, water and wind machine use remains constant for frost protection. Table C illustrates this study's frost protection methods.

In this region three methods are used to protect fruit and trees from frost or freeze during late winter and early spring. (1) Orchard floors are kept free of vegetation (or if a cover crop is used it is maintained as low as possible during freezing weather by planting late in the fall). The low vegetation allows the soil to act as a reservoir for heat from solar radiation during the day. This heat is released at night which raises the air temperature (vegetation tends to reflect solar radiation during the day and consequently less heat is stored in the soil to be released at night). (2) Water is applied to the orchard floor. This also provides heat that is released to the trees as air temperature falls. (3) Wind machines are used to pull the warm air above the trees into the orchard and mix it with colder resident air resulting in a temperature increase. A single machine will cover about 10 acres, effectively.

Table C. Frost Protection Procedures

Year	water	acin	floor management	wind machine
1	Yes	1.5	Discing & contact herbicide	66 hours
2	Yes	2.2	Residual & contact herbicide	100 hours
3	Yes	2.2	Residual & contact herbicide	100 hours
4	Yes	2.2	Residual & contact herbicide	100 hours
5+	Yes	2.2	Residual & contact herbicide	100 hours

Protection from yield losses due to freeze damage will help maintain an orchard's economic viability. Several protection strategies have been outlined above, but other options are available (e.g. crop insurance). Methods for determining the best frost protection strategy for individual orchards are discussed in the publication *Reducing Citrus Revenue Losses for Frost Damage: Wind Machines and Crop Insurance*.

Fertilization. Nitrogen (N) is the major nutrient required for proper tree growth and optimum yields. Beginning in the first year, UN32 is applied through the low volume or drip system and low biuret urea plus micronutrients - zinc sulfate and manganese (Tecmangam) - are applied in March as a foliage spray. Beginning in the third year, low biuret urea (46-0-0) is applied twice as a foliar spray, once with the micronutrients in March and applied alone in May. Nitrogen fertilizer rates from orchard establishment through maturity are shown in Table D. If groundwater is used for irrigation, water should be tested for nitrogen and the content taken into consideration in the fertilization program.

Table D. Applied N (nitrogen)

Year	per tree	per acre	Lbs of N	
			dripline	foliar
1	0.09	10.00	8.5	1.15
2	0.20	22.00	19.7	2.30
3	0.31	34.00	30.50	3.45
4	0.48	52.00	37.00	15.00
5	0.69	75.00	52.50	22.50
6	0.92	100.00	70.00	30.00
7+	1.20	130.00	100.00	30.00

Soil Amendments. Beginning in the third year, soluble gypsum is applied through the drip lines at each irrigation. A total of one-ton per acre per year is applied each season. Gypsum, calcium, or lime is applied for improving water infiltration and soil pH, and use should be based on soil and water tests. Although not included in this study, compost may be added to enhance soil organic matter.

Pest Management. The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC Integrated Pest Management Guidelines, Citrus*. Pesticides mentioned in the study are commonly used, but are not presented as a recommendation.

Weeds. Chemical weed control begins the first year with three spot sprays in the tree row during the spring and summer using Roundup herbicide. In the first year a custom operator discs the floor middles three times. In the second and subsequent years, residual/pre-emergent herbicides, Karmex and Princep, are applied to the orchard floor in the fall and in the spring using half of the maximum rate for each application. These materials are regulated under the Groundwater Protection Regulations and under some conditions may require a pesticide permit from the agricultural commissioner’s office.

Insects. Insects treated in this study are katydids, ants, and scale. Beginning in the fourth year, katydids (*Scudderia furcata*) are treated with Success insecticide plus oil in May at petal fall. A spray may be needed every other year for katydid or soft scale; katydid is treated every year in this study. Thrips and worms normally do not damage lemon fruit and are not treated in this study. Pesticides are sprayed at full rates in the fourth and fifth years, but are applied at a lower volume per acre to account for the small tree size. In the fourth year 50% and in the fifth, 75% of the recommended spray volume is applied. California red scale (*Aonidiella aurantii*) is not treated on young trees as it is only an economic problem when found on the fruit. Therefore treatment begins in the fourth year in July alternating each year with Esteem and Lorsban.

Fire ant (*Solenopsis xyloni*) control is needed through the third year, especially if nests are still present. Clinch or Esteem ant bait is applied in late spring to early summer (June in this study) with the grower owned ATV and a bait applicator furnished by the chemical company. After careful monitoring, spot treatments with Lorsban granules may be needed, but are not included in this study.

Diseases. Beginning in the third year, brown rot (*Phytophthora spp.*) and septoria spot (*Septoria spp.*), which can be a problem are regulated with a Kocide (copper) and hydrated lime application. A custom applicator applies the insect and disease materials by ground with an air blast sprayer.

Vertebrates. Voles and gophers can damage and kill young trees and should be monitored and controlled. No costs are included.

Nematodes and Phytophthora. Nematodes (*Tylenchulus semipenetrans*), phytophthora root rot (*Phytophthora citrophthora* and *P. parasitica*) and phytophthora gummosis (*Phytophthora ssp*) can be severe problems. If the field was previously planted to citrus, phytophthora and nematode samples should be taken to detect the presence and population levels of the organisms prior to planting. Management strategies include resistant rootstocks, irrigation management, and chemical applications. All pest management strategies need to be tailored to meet specific orchard requirements and should be discussed with a certified pest control adviser or local farm advisor.

Harvest, Yields and Returns. Commercial yields normally begin in the third or fourth establishment year. A contracted operator harvests the field. Annual yields are shown in Table E. See Returns in Production section.

Year	Field Bins (900 lbs)	Field Boxes (56 lbs)	Total Crtns/bin (37.5 lbs)	Packed Cartons (37.5 lbs)
3	10.2	164	244	195
4	17.0	273	407	326
5	27.0	436	651	521
6	37.3	600	895	716
7	42.4	681	1,017	814
8+	47.5	763	1,139	912

Production Cultural Practices and Material Inputs

Table 3 to 9

Pruning. Pruning methods and frequencies vary widely on mature trees. Pruning is generally started in April after harvest. In this study, pruning includes topping, hedging, hand pruning, and shredding. Pruning operations are done every year: (1) top all trees, stack, shred, (2) hedge every row, stack, shred, (3) hand prune, stack, shred. Topping maintains tree height to augment adequate spray coverage and facilitate harvest operations. Hedging tree rows reduces fruit damage from orchard traffic and minimizes disruption of sprays applied to the orchard. Hand pruning of dead wood and suckering enhances spray deposition which is particularly important in the case of red scale. Hand pruning can also increase the amount of fruit inside the tree.

Fertilization. Nitrogen as UN-32 is applied through the irrigation system (not necessarily with a scheduled irrigation) in several applications during February, March, and April. A foliar application of N as low biuret urea plus minor nutrients, zinc sulfate and manganese (Tecmangam), are applied in March. A second low biuret urea application is made in May with the katydid spray. The nutritional program should be based on leaf analysis. Leaf samples are taken in the fall from spring flush, non-fruiting, 5-7 month old leaves. In this study, one sample is taken per 10 acres or 0.10 samples per acre.

Soil Amendments. Each year beginning with the first irrigation, gypsum is injected through the irrigation system with each irrigation; this results in a total application of one-ton per acre for the season. The cost includes the gypsum and the labor to operate and fill the gypsum machine. The machine is listed under the Non-Cash Overhead section of the tables.

Irrigation. Typically, water is applied each year from April through October. Thirty-three acre-inches of district water, delivered via canal, is applied to the orchard at a cost of \$129.00 per acre-foot or \$10.75 per acre-inch. Water costs are highly variable among districts. From grower and district information, costs may go over \$160 per acre-foot. The irrigation operation costs include the water and labor. Irrigation labor includes operating and monitoring the system. No assumption is made about effective rainfall, runoff, and evaporation.

Frost Protection. Protection is required from late winter to early spring (November through January in this study). In this study, chemical vegetation control on the orchard floor and 2.2 acre-inches of water are used for frost protection. Also, wind machines are operated on nights with threatening minimum temperatures. See Table C. Each wind machine protects approximately 10 acres and uses 15 gallons of propane per hour. The frost protection cost includes the fuel use and labor to operate the machines and to apply the water.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Citrus* and *Reducing Insecticide Use and Energy Costs in Citrus Pest Management*. For more information on other pesticides available, 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. Check with your farm advisor, PCA and/or the UC IPM website for current recommendations. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from local dealers.

Pest Control Adviser (PCA). Written recommendations are required for many pesticides and are made by licensed pest control advisers. In addition the PCA can monitor the field for agronomic problems including pests and nutrition. Growers may hire private PCAs or receive the service as part of a service agreement with

an agricultural chemical and fertilizer company. In this study, a private PCA monitors the crops for pest, disease, and nutrition.

Weeds. Pre-emergent herbicides (Karmex, Princep) are applied to the orchard floor (tree row and middles) in split applications, one in the fall and one in the spring, using one-half the maximum rate per application. Surviving weeds are controlled with three spot sprays – April, June, August – with Roundup. Karmex and Princep are regulated under the Groundwater Protection Regulations. Check with your farm advisor or PCA prior to applying.

Insects. On the average, katydids or soft scales are concerns every other year. In this study katydids are treated each year in May with Success insecticide and oil. Low biuret urea is mixed with the katydid spray. A spray is applied in July for California red scale alternating each year with Esteem (insect growth regulator) and Lorsban. All insect and disease treatments are applied by a commercial applicator. The custom application costs vary by pest, material applied, volume of water used, and sprayer speed.

Disease. Brown rot is the primary preharvest disease of fruit that occurs in this study and is controlled by spraying Kocide (copper) and hydrated lime mixture during October or November. The same fungicide mixture also controls Septoria spot. Brown rot develops in the fall initially on fruit that is close to the ground. The pathogen is normally found in the soil and is splashed onto the low hanging fruit by rain. Symptoms usually appear during cool, wet periods on mature or nearly mature fruit.

Snails. Brown garden snails (*Helix aspera*) cause fruit damage. Control options for brown garden snails include predaceous snails, skirt pruning, trunk banding, and chemical baits. However, in this study snails are assumed not to be a problem.

Vertebrate. Roof rats may affect mature trees. They can girdle trees and cause fruit damage. Contact your local agricultural commissioner or farm advisor for controls available.

Insect and Disease Management Options. There are two fundamental approaches to using synthetic pesticides in citrus production. (1) Several applications of broad-spectrum pesticides are made to prevent pest damage. While these pesticides control a wide range of insect and mite pests, the pesticides persist to provide control for long periods of time; these attributes can also create additional pest problems. Long-term use has increased pest resistance to many of these pesticides, resulting in increased pesticide applications. Since broad-spectrum pesticides affect many species of insects and mites, those sprays decrease the levels of beneficial populations, that can assist in controlling many pests. Pest resurgence and secondary outbreaks can be the result of parasite and predator suppression by these pesticide applications. For example, treatment for orangeworms or citrus thrips can cause an increase of citrus red mite. (2) Use of selective pesticides and natural enemies (beneficial predators) as control measures. Selective pesticides are toxic to a narrow range of pests and are usually less harmful to the natural enemies. Their use requires careful monitoring of pests and more precise timing and application to be effective. Many selective pesticides do not persist for long-term control. Preserving beneficial predatory and parasitic populations can reduce the potential resurgence and secondary outbreaks of pests. However, some minor pests such as citricola scale may become economic pests once broad spectrum pesticides are not used. Pest management practices used in this study follow the first strategy described (currently this is the more typical pest management program used in this region).

Growth Regulators. Gibberellic acid (Gib Gro) and 2,4-D (Citrus Fix) treatments are made on mid-to-late harvested lemons. Gibberellic acid is not applied to early ripening lemons, those picked in October and November. Gibberellic acid maintains a juvenile rind and 2,4-D applied in October/November minimizes pre-

harvest fruit drop. In this study gibberellic acid is sprayed in October and 2,4-D in November to affect fruit harvested in January and later.

Harvest. Lemon trees typically reach full production by the eighth year. In this cost study, the crop is hand picked and hauled by a contracted harvesting company.

Typically one-third of the orchard is picked in each of three harvests over the growing season. Lemons are picked and graded by size and normally harvested from mid October through March. Lemons are hand picked and put into field bins that hold 900 pounds (24 carton equivalent) of fruit. The lemons are hauled from the field to a packinghouse where they are washed, graded, sized, and packed. Picking, hauling, packing, and marketing costs from the field to the packinghouse are paid by the grower. Current rates for these services vary; picking and hauling costs are \$3.18 per carton and the packinghouse cost are \$4.89 per carton. Delivering outside the local area will increase hauling costs. The packing house costs includes costs for the carton, packing, marketing and some miscellaneous fees charged by the packer. The costs are based on typical costs as received from packinghouses and growers in the region.

Yields. Typical annual yields for lemons are measured in 900-pound field bins per acre, but are typically sold by packed cartons weighing 37.5 pounds, although the industry often refers to them as 40-pound cartons. A 900-pound bin is calculated as either 23 or 24 cartons. Packed cartons represent 80% of the fruit picked. The remaining 20% may go to juices or a small percentage may be culls. Yields from the third year to full production for field bins, boxes, and cartons are shown in Table E.

Table E. Annual Lemon Yields Per Acre

Year	Field Bins (900 lbs)	Field Boxes (56 lbs)	Total Crtns/bin (37.5 lbs)	Packed Cartons (37.5 lbs)
3	10.2	164	244	195
4	17.0	273	407	326
5	27.0	436	651	521
6	37.3	600	895	716
7	42.4	681	1,017	814
8+	47.5	763	1,139	912

Returns. An estimated price based on the 2007 and 2008 Agricultural Commissioner Crop Reports, and the 2007 and 2008 January Market reports of \$20.00 per carton, fob packinghouse, are used in this study. Returns over a range of yields are shown in Table 6.

Assessments. Commercial lemon producers pay two assessments.

State Marketing Order. Under a state marketing order, mandatory assessment fees are collected and administered by the grower-directed Citrus Research Board. This assessment, currently \$0.07 per 55-pound field box equivalent, is used to fund industry research programs.

Central California Tristeza Eradication Agency. Tristeza disease can result in damage ranging from lower fruit quality to the death of the tree. The Central California Tristeza Eradication Agency (CCTEA) manages an eradication program to keep the Central Valley tristeza-free. The assessment varies by pest control district and not all districts participate. Although not all growers participate in this program and pay assessments, an average of \$9.20 per acre is charged in this study. The charges are paid in the property assessment bill, but are shown as a line item cost in this study

Pickup/ATV. The grower uses the pickup for business and personal use. It is assumed that 5,000 miles are for business use. The all terrain vehicle (ATV) cost is for checking and monitoring the field, irrigating, and checking the irrigation system. The cost is estimated and not based on any specific data. The grower also uses the ATV for weed control and the operation cost is included in that cost.

Labor. Labor rates of \$14.49 per hour for machine operators and \$11.04 for general labor includes payroll overhead of 38%. The basic hourly wages are \$10.50 for machine operators and \$8.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/fruit crops (code 0016), and a percentage for other possible benefits. Workers' compensation costs will vary among growers. For this study the cost is based upon the average industry final rate as of January 1, 2009 (personal email from California Department of Insurance, March 2009). Labor for operations involving machinery are 20% higher than the operation time given in Table 3 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 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 \$2.04 and \$2.67 per gallon, respectively. The cost includes a 2.5% local sales tax on diesel fuel and 7.5% 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 3 is determined by multiplying the total hourly operating cost in Table 8 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. Fuel prices have fluctuated considerably and may be higher or lower on any given day.

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 post harvest operations is discounted back to the last harvest month using a negative interest charge. The interest rate will vary depending upon various factors. The rate in this study is considered a typical lending rate by a farm lending agency as of January 2010.

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. Crop insurance is a risk management tool available to growers.

Cash Overhead Costs

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.

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 0.82% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$621 for the entire farm.

Crop Insurance. Crop insurance is available and is desirable due to the freezes in the San Joaquin Valley, but is not included as a cost in this study.

Office Expense. Office and business expenses are estimated at \$125 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, miscellaneous administrative charges, and complying with environmental regulations.

Management/Supervisor Salaries. The grower farms the orchard, so no cash cost is allocated to management. Returns above costs are considered a return to management.

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price, except for orchard establishment at 0.50% to account for tree replacement and orchard repairs.

Non-Cash Overhead Costs

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.

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

Interest Rate. The interest rate of 4.75% used to calculate capital recovery cost is the suggested basic rate by a farm lending agency as of January 2010. The rate will vary depending upon loan amount and other lending agency conditions.

Establishment Cost. Costs to establish the orchard are used to determine capital recovery expenses, depreciation, and interest on investment for the production years. Establishment cost is the sum of the costs for land preparation, planting, trees, cash overhead and production expenses for growing the trees through the first year that lemons are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$3,951 per acre or \$39,513 for the 10-acre orchard. The establishment cost is spread over the remaining 37 years of the 40 years the

orchard is in production. Establishment costs in this study are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations, and other factors. For example, development on marginal soils will require additional land preparation and soil amendments. Management/Development companies will have additional labor costs.

Irrigation System. Water is delivered under pressure to the orchard through a low-volume irrigation system. Low-volume emitters discharge 10 gallons per hour and are spaced at one per tree. The cost for the low-volume irrigation system includes the cost of a pump, filtration system, hoses, emitters, and installation. The life of the irrigation system is estimated at 40 years. The above ground portion of the irrigation system will probably have to be replaced once per ten years, but is not separated out in this study.

Land. Land values for bare or row crop land range from \$5,000 to \$12,000 per acre, depending on available water. Citrus orchards range from \$8,000 to \$15,000. Current real estate listing for bare land ranges from \$5,500 to \$9,500 per acre. Being that the orchard is established on land previously planted to tree crops, the land in this study is valued at \$7,500 per acre.

Building. The shop building is a 1,800 square foot metal building or buildings on a cement slab.

Tools. This includes shop tools, hand tools, and miscellaneous field tools such as pruning tools.

Fuel Tanks. Two 500-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

Wind Machines. Each machine will cover approximately 10-acres. The cost includes 6 machines – 1 in the new planting, 5 on the remaining acres. Cost includes installation of the propane-powered machines. The machines are assumed to use 15 gallons of propane per hour.

Gypsum Machine. The machine is used to inject the soluble gypsum into the irrigation system. The machine costs are allocated to the 10-acres of newly established lemons.

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. 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 A LEMON ORCHARD
 SAN JOAQUIN VALLEY – SOUTH 2010

	YEAR	Costs per Acre				
		1st	2nd	3rd	4th	5th
PACKOUT YIELD (37.5 lb Cartons/Acre):				195	326	521
Planting Costs						
Land Preparation: Remove Old Orchard & Chip		350				
Land Preparation: Subsoil		390				
Land Preparation: Disc 2X		110				
Land Preparation: Level (Triplane)		175				
Trees @ \$9/tree (Replant 2% of Trees in 2nd Year)		981	18			
Plant: Layout, Plant , Stake & Wrap Trees		172	3			
TOTAL PLANTING COSTS		2,178	21			
Cultural Costs:						
Sucker (Yr 1-2) Prune (Yr 3+)		33	33	55	77	132
Irrigate (water & labor)		76	114	178	291	345
Frost Protection (Water & Wind Machines)		230	347	347	347	347
Fertilize: Foliar Spray (N, Mn, Zn)		37	38	39	43	46
Fertilize: N (through drip)		9	15	26	29	36
Fertilize: Foliar (N) Yrs 1-5. Insect: Katydid (Success, oil) Yr 5					42	73
Insect: Scale (Esteem)						194
Insect: Ants (Clinch)		4	4	4		
Weed: Orchard Floor (Karmex, Princep)			59	59	59	59
Weed: Spot Spray (Roundup)		18	18	18	18	18
Weed: Disc 3X (Custom)		165				
Disease: Brown Rot (Lime, Kocide) rates increase each yr				54	63	73
Soil Amendments: Soluble Gypsum						145
Pickup Truck Use		90	90	90	90	90
ATV Use		62	62	62	62	62
Fertilize: Leaf Analysis (1 sample/10 acre)					7	7
PCA/Consultant Services		35	35	35	35	35
TOTAL CULTURAL COSTS		760	814	968	1,163	1,662
Harvesting Costs:						
Pick and Haul				776	1,294	2,070
Sort & Pack				954	1,594	2,548
Assessments				19	25	34
TOTAL HARVEST COSTS				1,748	2,913	4,652
Interest on operating capital @ 5.75%		169	25	41	49	83
TOTAL OPERATING COSTS PER ACRE		3,107	860	2,756	4,125	6,397
Cash Overhead Costs:						
Office Expense		125	125	125	125	125
Liability Insurance		10	10	10	10	10
Property Taxes		111	111	111	111	114
Property Insurance		25	24	24	24	27
Investment Repairs		105	105	105	105	117
TOTAL CASH OVERHEAD COSTS		376	376	376	375	393
TOTAL CASH COSTS		3,483	1,236	3,132	4,500	6,790
INCOME FROM PRODUCTION				3,900	6,520	10,420
NET CASH COSTS FOR THE YEAR		3,483	1,236			
PROFIT ABOVE CASH COSTS				768	2,020	3,630
TOTAL ACCUMULATED NET CASH COSTS		3,483	4,719	3,951	1,932	

UC COOPERATIVE EXTENSION
Table 1. CONTINUED
 SAN JOAQUIN VALLEY – SOUTH 2010

	Costs per Acre					
	YEAR	1st	2nd	3rd	4th	5th
Non-Cash Overhead Costs:						
Buildings	66	66	66	66	66	66
Drip Irrigation System	87	87	87	87	87	87
Shop Tools	24	24	24	24	24	24
Land	386	386	386	386	386	386
Fuel Tanks	3	3	3	3	3	3
Gypsum Machine						138
Wind Machine	177	177	177	177	177	177
Equipment	41	38	39	38	38	38
TOTAL NON-CASH OVERHEAD COSTS	784	781	782	781	781	919
TOTAL COST FOR THE YEAR	4,267	2,017	3,914	5,282	7,709	7,709
INCOME FROM PRODUCTION			3,900	6,520	10,420	10,420
NET TOTAL COST FOR THE YEAR	4,267	2,017	14			
NET PROFIT FOR THE YEAR				1,238	2,711	2,711
ACCUMULATED NET TOTAL COST	4,267	6,284	6,298	5,060	2,349	2,349

UC COOPERATIVE EXTENSION
Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS
 SAN JOAQUIN VALLEY – SOUTH 2010

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$	units	\$
			units	\$	units	\$	units	\$				
OPERATING COSTS												
Custom/Contract:												
Orchard Removal	acre	350.00	1.00	350								
Slip Plow	acre	390.00	1.00	390								
Disc	acre	55.00	5.00	275								
Level - Triplane	acre	175.00	1.00	175								
Layout, Plant, Wrap	tree	0.83	109.00	90	2.00	2						
Ground Spray - Copper	acre	35.00	1.00	35	1.00	35	2.00	70	1.00	35	1.00	35
Ground Spray - Katydid	acre	35.00							1.00	35	1.00	35
Ground Spray - Nutrients	acre	35.00							1.00	35	1.00	35
Ground Spray - Scale	acre	85.00									1.00	85
Harvest: Pick & Haul	crtn	3.18					244.00	776	407.00	1294	651.00	2,070
Harvest: Sort & Pack	crtn	4.89					195.00	954	326.00	1594	521.00	2,548
Leaf Analysis (Nutrients)	each	68.00							0.10	7	0.10	7
PCA	acre	35.00	1.00	35	1.00	35	1.00	35	1.00	35	1.00	35
Assessments:												
Citrus Research (55 lb lug)	lug	0.07					133.00	9	222.00	16	355.00	25
Tristeza Eradication	acre	9.20					1.00	9	1.00	9	1.00	9
Tree/Tree Aids:												
Lemon Tree	tree	9.00	109.00	981	2.00	18						
Tree Wraps	each	0.75	109.00	82	2.00	2						
Irrigation/Frost Protection:												
Wind Machine Operation	hour	3.00	66.00	198	100.00	300	100.00	300	100.00	300	100.00	300
Water Frost Protection	acin	10.75	1.50	16	2.20	24	2.20	24	2.20	24	2.20	24
Water (growing season)	acin	10.75	3.00	32	7.00	75	13.00	140	22.00	237	27.00	290
Fertilizer:												
UN32	lb N	0.46	8.50	4	19.70	9	30.50	14	37.00	17	52.50	24
Urea Low Biuret (46-0-0)	lb N	0.91	1.15	1	2.30	2	3.45	3	15.00	14	22.50	20
Zinc Sulfate 36%	lb	0.64	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Tecmangam (Mn)	lb	0.74	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Soluble Gypsum (Soil Amendment)	ton	133.00									1.00	133
Herbicide:												
Roundup Original Max	pint	5.15	0.60	3	0.60	3	0.60	3	0.60	3	0.60	3
Princep 90S	lb	6.07			4.00	24	4.00	24	4.00	24	4.00	24
Karmex DF	lb	6.17			4.00	25	4.00	25	4.00	25	4.00	25

UC COOPERATIVE EXTENSION
Table 2. CONTINUED
 SAN JOAQUIN VALLEY -SOUTH 2010

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$		
			units	\$	units	\$	units	\$			units	\$
Insecticide:												0
Clinch Ant Bait	lb	12.15	0.33	4	0.33	4	0.33	4				0
Esteem	floz	8.52									12.75	109
Success	oz	5.66									4.50	25
Spray Oil 415	gal	4.43									0.50	2
Fungicide:												0
Hydrated Lime	lb	0.25					5.00	1	7.50	2	10.00	3
Kocide 20/20	lb	3.53					5.00	18	7.50	26	10.00	35
Labor (machine)	hrs	14.49	8.93	129	9.53	138	9.53	138	9.50	138	9.50	138
Labor (non-machine)	hrs	11.04	8.90	98	9.10	100	11.70	129	15.22	168	21.27	235
Fuel - Gas	gal	2.67	9.16	24	9.26	25	9.26	25	9.26	25	9.26	25
Lube				4		4		4		4		3.7
Machinery repair				10		11		11		11		10.63
Interest @ 5.75%				169		25		41		49		83.41
Total Operating Costs/Acre				3,107		860		2,756		4,125		6,397

UC COOPERATIVE EXTENSION
Table 3. COSTS PER ACRE TO PRODUCE LEMONS
 SAN JOAQUIN VALLEY - SOUTH 2010

Operation	Operation	Cash and Labor Costs per acre					Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	
Cultural:							
Frost Protection (water & wind machine)	2.10	23	0	324	0	347	
Fertilize: N (through drip line)	1.10	12	0	46	0	58	
Weed: Orchard Floor (Princep, Karmex) 2X	0.50	9	1	49	0	59	
Fertilize: Foliar (N Mn Zn)	0.00	0	0	16	35	51	
Prune: Top Trees, Stack & Shred Prunings	0.00	0	0	0	94	94	
Prune: Hedge , Stack & Shred Prunings	0.00	0	0	0	43	43	
Prune: Hand Prune & Stack, Shred Prunings	0.00	0	0	0	253	253	
Irrigate: (water & labor)	5.65	62	0	355	0	417	
Soil Amendment:(Soluble Gypsum) w/irrigation	1.75	19	0	133	0	152	
Weed: Spot Spray (Roundup) 3X	0.75	13	1	3	0	18	
Fertilizer: Foliar N. Insect: Katydid (Success, Oil)	0.00	0	0	50	35	85	
Insect: Scale (Esteem)	0.00	0	0	145	85	230	
Fertilize: Leaf Analysis (1 sample/10 acres)	0.05	0	0	0	7	7	
Disease: Brown Rot (Lime, Kocide)	0.00	0	0	38	35	73	
Growth Regulator: (GibGro or GA)	0.00	0	0	19	53	72	
Growth Regulator: (Citrus Fix)	0.00	0	0	6	53	58	
Pickup Truck Use	3.33	58	33	0	0	90	
ATV Use	3.33	58	4	0	0	62	
PCA/Consultant Services	0.00	0	0	0	35	35	
TOTAL CULTURAL COSTS	18.56	255	39	1,183	726	2,204	
Harvest:							
Pick & Haul Fruit	0.00	0	0	0	3,622	3,622	
Pack Fruit	0.00	0	0	0	4,460	4,460	
Assessments	0.00	0	0	53	0	53	
TOTAL HARVEST COSTS	0.00	0	0	53	8,082	8,135	
Interest on operating capital @ 5.75%						250	
TOTAL OPERATING COSTS/ACRE		255	39	1,236	8,808	10,588	
Cash Overhead:							
Office Expense						125	
Liability Insurance						10	
Property Taxes						134	
Property Insurance						43	
Investment Repairs						138	
TOTAL CASH OVERHEAD COSTS						451	
TOTAL CASH COSTS/ACRE						11,039	
Non-Cash Overhead:							
		Per producing Acre		Annual Cost			
				Capital Recovery			
Buildings 1,800 sqft		1,050		66		66	
Fuel Tanks 2-500 gal		109		8		8	
Shop Tools		250		24		24	
Land		8,125		386		386	
Gypsum Machine (1)		600		138		138	
Orchard Establishment		3,951		229		229	
Drip Irrigation		1,550		87		87	
Wind Machine (6)		2,340		177		177	
Equipment		375		40		40	
TOTAL NON-CASH OVERHEAD COSTS		18,350		1,155		1,155	
TOTAL COSTS/ACRE						12,193	

UC COOPERATIVE EXTENSION
Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE LEMONS
 SAN JOAQUIN VALLEY - SOUTH 2010

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Lemons (37..5 lb crtn)	912.00	crtn	20.00	18,240	
OPERATING COSTS					
Frost Protection:					
Water	2.20	acin	10.75	24	
Wind Machine Operation	100.00	hour	3.00	300	
Fertilizer:					
UN 32	100.00	lb N	0.46	46	
Urea Low Biuret	30.00	lb N	0.91	27	
Zinc Sulfate 36%	2.00	lb	0.64	1	
Tecmangam (31% Mn)	2.00	lb	0.74	1	
Assessment:					
Citrus Research/55lb box	622.00	box	0.07	44	
Tristeza Eradication	1.00	acre	9.20	9	
Herbicide:					
Princep 90S	4.00	lb	6.07	24	
Karmex	4.00	lb	6.17	25	
Roundup Original Max	0.60	pint	5.15	3	
Insecticide:					
Success	6.00	oz	5.66	34	
Spray Oil 415	0.50	gal	4.43	2	
Esteem	17.00	floz	8.52	145	
Custom/Contract:					
Prune-Top	1.00	acre	45.00	45	
Prune-Hedge	1.00	acre	32.50	33	
Prune - Hand Prune & Stack	1.00	acre	238.00	238	
Prune - Stack Toppings	1.00	acre	26.00	26	
Prune - Stack Hedgings	1.00	acre	5.00	5	
Prune - Shred Toppings	1.00	acre	23.00	23	
Prune - Shred Hedgings	1.00	acre	5.00	5	
Prune - Shred Hand Prunings	1.00	acre	15.00	15	
Spray Ground -N/Katydid	1.00	acre	35.00	35	
Spray Ground -N & minor nutrients	1.00	acre	35.00	35	
Spray Ground - Scale	1.00	acre	85.00	85	
Spray Ground - Copper or Fertilizer	1.00	acre	35.00	35	
Spray Ground - Growth Regulator	2.00	acre	52.50	105	
Leaf Analysis	0.10	acre	68.00	7	
Harvest Pick & Haul	1,139.00	crtn	3.18	3,622	
Harvest Pack	912.00	crtn	4.89	4,460	
PCA Fees	1.00	acre	35.00	35	
Irrigation:					
Water	33.00	acin	10.75	355	
Soil Amendment:					
Gypsum Soluble	1.00	ton	133.00	133	
Fungicide:					
Hydrated Lime	10.00	lb	0.25	3	
Kocide 20/20	10.00	lb	3.53	35	
Growth Regulator:					
Citrus Fix	1.25	floz	4.56	6	
Gib Gro 4LS	32.00	gram	0.60	19	

UC COOPERATIVE EXTENSION
Table 4. CONTINUED
 SAN JOAQUIN VALLEY - SOUTH 2010

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Labor (machine)	9.50	hrs	14.49	138	
Labor (non-machine)	10.65	hrs	11.04	118	
Fuel - Gas	9.26	gal	2.67	25	
Lube				4	
Machinery repair				11	
Interest on operating capital @ 5.75%				250	
TOTAL OPERATING COSTS/ACRE				10,588	
NET RETURNS ABOVE OPERATING COSTS				7,652	
CASH OVERHEAD COSTS:					
Office Expense				125	
Liability Insurance				10	
Property Taxes				134	
Property Insurance				43	
Investment Repairs				138	
TOTAL CASH OVERHEAD COSTS/ACRE				451	
TOTAL CASH COSTS/ACRE				11,039	
NON-CASH OVERHEAD COSTS					
Buildings 1,800 sqft				66	
Fuel Tanks 2-500 gal				8	
Shop Tools				24	
Land				386	
Gypsum Machine				138	
Orchard Establishment				229	
Drip Irrigation				87	
Wind Machine (6)				177	
Equipment				40	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,155	
TOTAL COSTS/ACRE				12,193	
NET RETURNS ABOVE TOTAL COSTS				6,047	

UC COOPERATIVE EXTENSION
Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE LEMONS
 SAN JOAQUIN VALLEY - SOUTH 2010

Beginning JAN 10	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 10	10	10	10	10	10	10	10	10	10	10	10	10	
Cultural:													
Frost Protection (water & wind machine)	115										118	115	347
Fertilize: N (through drip line)		21	21	16									58
Weed: Orchard Floor (Princep, Karmex) 2X			29						29				59
Fertilize: Foliar (N Mn Zn)			51										51
Prune: Top Trees, Stack & Shred Prunings				94									94
Prune: Hedge , Stack & Shred Prunings				43									43
Prune: Hand Prune & Stack, Shred Prunings				253									253
Irrigate: (water & labor)				41	55	71	83	83	55	29			417
Soil Amendment:(Soluble Gypsum) w/irrigation				17	21	25	31	25	21	11			152
Weed: Spot Spray (Roundup) 3X				6		6		6					18
Fertilizer: Foliar N. Insect: Katydid (Success, Oil)					85								85
Insect: Scale (Esteem)							230						230
Fertilize: Leaf Analysis (1 sample/10 acres)									7				7
Disease: Brown Rot (Lime, Kocide)										73			73
Growth Regulator: (GibGro or GA)										72			72
Growth Regulator: (Citrus Fix)											58		58
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	8	90
ATV Use	5	5	5	5	5	5	5	5	5	5	5	5	62
PCA/Consultant Services	3	3	3	3	3	3	3	3	3	3	3	3	35
TOTAL CULTURAL COSTS	130	36	117	486	177	118	359	130	129	200	191	130	2,204
Harvest:													
Pick & Haul Fruit			1,205							1,208		1,208	3,622
Pack			1,487							1,487		1,487	4,460
Assessments			18							18		18	53
TOTAL HARVEST COSTS			2,709							2,713		2,713	8,135
Interest on operating capital @ 5.75%	1	1	14	17	18	18	20	20	21	35	36	50	250
TOTAL OPERATING COSTS/ACRE	131	37	2,841	503	194	136	379	150	150	2,947	227	2,893	10,588
OVERHEAD:													
Office Expense	10	10	10	10	10	10	10	10	10	10	10	10	125
Liability Insurance	10												10
Property Taxes	67						67						134
Property Insurance	22						22						43
Investment Repairs	11	11	11	11	11	11	11	11	11	11	11	11	138
TOTAL CASH OVERHEAD COSTS	121	22	22	22	22	22	111	22	22	22	22	22	451
TOTAL CASH COSTS/ACRE	252	59	2,863	524	216	158	490	172	172	2,969	249	2,914	11,039

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS of Yield & Income
 SAN JOAQUIN VALLEY - SOUTH 2010

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE LEMONS

	*YIELD (cartons/acre)						
	612	712	812	912	1,012	1,112	1,212
OPERATING COSTS/ACRE:							
Cultural Cost	2,204	2,204	2,204	2,204	2,204	2,204	2,204
Harvest Cost (Pick, Haul, Sort, Pack)	5,423	6,309	7,196	8,082	8,968	9,854	10,740
Assessment Cost	39	43	48	53	58	62	67
Interest on operating capital @ 5.75%	190	210	230	250	270	290	310
TOTAL OPERATING COSTS/ACRE	7,856	8,766	9,678	10,589	11,500	12,410	13,321
TOTAL OPERATING COSTS/CRTN	12.84	12.31	11.92	11.61	11.36	11.16	10.99
CASH OVERHEAD COSTS/ACRE							
TOTAL CASH COSTS/ACRE	8,307	9,217	10,129	11,040	11,951	12,861	13,772
TOTAL CASH COSTS/CRTN	13.57	12.94	12.47	12.11	11.81	11.57	11.36
NON-CASH OVERHEAD COSTS/ACRE							
TOTAL COSTS/ACRE	9,462	10,372	11,284	12,195	13,106	14,016	14,927
TOTAL COSTS/CRTN	15.46	14.57	13.90	13.37	12.95	12.60	12.32

*cartons = 37.5 pounds

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE	*YIELD (cartons/acre)							
	\$/carton	612	712	812	912	1,012	1,112	1,212
14.00		712	1,202	1,690	2,179	2,668	3,158	3,647
16.00	1,936	2,626	3,314	4,003	4,692	5,382	6,071	6,760
18.00	3,160	4,050	4,938	5,827	6,716	7,606	8,495	9,384
20.00	4,384	5,474	6,562	7,651	8,740	9,830	10,919	12,008
22.00	5,608	6,898	8,186	9,475	10,764	12,054	13,343	14,632
24.00	6,832	8,322	9,810	11,299	12,788	14,278	15,767	17,256
26.00	8,056	9,746	11,434	13,123	14,812	16,502	18,191	19,880

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE	*YIELD (cartons/acre)							
	\$/carton	612	712	812	912	1,012	1,112	1,212
14.00		261	751	1,239	1,728	2,217	2,707	3,196
16.00	1,485	2,175	2,863	3,552	4,241	4,931	5,620	6,310
18.00	2,709	3,599	4,487	5,376	6,265	7,155	8,044	8,934
20.00	3,933	5,023	6,111	7,200	8,289	9,379	10,468	11,558
22.00	5,157	6,447	7,735	9,024	10,313	11,603	12,892	14,182
24.00	6,381	7,871	9,359	10,848	12,337	13,827	15,316	16,806
26.00	7,605	9,295	10,983	12,672	14,361	16,051	17,740	19,430

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE	*YIELD (cartons/acre)							
	\$/carton	612	712	812	912	1,012	1,112	1,212
14.00		-894	-404	84	573	1,062	1,552	2,041
16.00	330	1,020	1,708	2,397	3,086	3,776	4,465	5,155
18.00	1,554	2,444	3,332	4,221	5,110	6,000	6,889	7,778
20.00	2,778	3,868	4,956	6,045	7,134	8,224	9,313	10,402
22.00	4,002	5,292	6,580	7,869	9,158	10,448	11,737	13,026
24.00	5,226	6,716	8,204	9,693	11,182	12,672	14,161	15,650
26.00	6,450	8,140	9,828	11,517	13,206	14,896	16,585	18,274

UC COOPERATIVE EXTENSION
Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY - SOUTH 2010

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
10	ATV 4WD	6,700	15	1,304	573	33	40	646
10	Pickup Truck 1/2 Ton	28,000	7	10,621	3,481	158	193	3,832
10	Weed Sprayer-Pull, ATV 55 gal	2,500	20	130	192	11	13	216
TOTAL		35,800	37,200		12,055	4,246	202	246
60% of new cost*		22,320		7,233	2,548	121	148	2,817

*Used to reflect a mix of new and used equipment

Note: Additional equipment may be needed for farming other crops on the farm.

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
Buildings 1,800 sqft	63,000	30		3,982	258	315	1,260	5,816
Drip Irrigation (10 acres)	15,500	40		873	64	78	310	1,324
Orchard Establishment (10 acres)	39,513	37		2,288	162	198	198	2,845
Fuel Tanks 2-500 gal	6,514	40	400	499	28	35	130	692
Gypsum Machine (1)	6,000	5		1,376	24	30	120	1,551
Land (65 acres)	487,500	40	487,500	23,156	0	4,875	0	28,031
Shop Tools	15,000	15		1,421	62	75	300	1,857
Wind Machine (6)	140,400	20	14,040	10,593	633	772	2,808	14,806
TOTAL INVESTMENT	773,427		501,940	44,188	1,231	6,377	5,126	56,922

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/		Total Cost
	Farm	Unit	Unit	Unit	
Liability Insurance	60	acre	10.35		621
Office Expense	60	acre	125.00		7,500

UC COOPERATIVE EXTENSION
Table 8. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - SOUTH 2010

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Cash Overhead			Operating			
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
10	ATV 4WD	133	2.59	0.15	0.18	0.64	0.61	1.25	4.17
10	Pickup Truck 1/2 Ton	265	7.87	0.36	0.44	2.07	7.68	9.75	18.42
10	Weed Sprayer-Pull, ATV 55 gal	75	1.55	0.09	0.11	0.65	0.00	0.65	2.40

UC COOPERATIVE EXTENSION
Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS - LEMONS
 SAN JOAQUIN VALLEY - SOUTH 2010

Operation	Operation		Field Labor Hr/Acre	Material	Broadcast Rate/Acre	Unit
	Month	Tractor				
Frost Protection (water & wind machine)	Jan		0.70	Water	0.73	acin
				Wind Machine	33.00	hr
	Nov		0.70	Water	0.73	acin
				Wind Machine	33.00	hr
Fertilize: N (through drip line)	Dec			Water	0.74	acin
				Wind Machine	33.00	hr
	Feb		0.50	UN32	33.30	lb N
	Mar		0.50	UN32	33.30	lb N
Weed: Pre-emergent (Princep, Karmex) 2X	Apr		0.10	UN32	33.40	lb N
	Mar	ATV		Princep	2.00	lb
				Karmex	2.00	lb
Weed: Pre-emergent (Princep, Karmex) 2X	Sept	ATV		Princep	2.00	lb
				Karmex	2.00	lb
Fertilize: foliar (N, Mn, Zn)	Mar	Custom		Urea LB	15.00	lb N
				Zinc Sulfate	2.00	lb
				Tecmangam (Mn)	2.00	lb
Irrigate	Apr		0.50	Water	3.30	acin
	May		0.80	Water	4.29	acin
	June		1.00	Water	5.61	acin
	July		1.10	Water	6.60	acin
	Aug		1.10	Water	6.60	acin
	Sept		0.80	Water	4.29	acin
	Oct		0.40	Water	2.31	acin
Prune: Top Trees, Stack & Shred Prunings	Apr	Custom				
Prune: Hedge All. Rows, Shred Prunings	Apr	Custom				
Prune: Hand Prune & Stack, Shred Prunings	Apr	Custom				
Soil Amendment:(Soluble Gypsum) w/irrigation	Apr		0.30	Gypsum	0.11	ton
	May		0.30	Gypsum	0.14	ton
	June		0.30	Gypsum	0.17	ton
	July		0.30	Gypsum	0.21	ton
	Aug		0.30	Gypsum	0.17	ton
	Sept		0.30	Gypsum	0.14	ton
	Oct		0.30	Gypsum	0.06	ton
Weed: Spot Spray (Roundup) 3X	Apr	ATV		Roundup	0.20	pt
	June	ATV		Roundup	0.20	pt
	Aug	ATV		Roundup	0.20	pt

UC COOPERATIVE EXTENSION
Table 9. CONTINUED
 SAN JOAQUIN VALLEY - South 2010

Operation	Operation		Implement	Field Labor	Material	Broadcast	
	Month	Tractor		Hr/Acre		Rate/acre	Unit
Fertilizer: foliar (N). Insect: Katydid (Success, Oil)	May	Custom			Success	6.00	oz
					415 Oil	0.50	gal
					Urea LB	15.00	lb N
Insect: Scale (Esteem)	July	Custom			Esteem	17.00	floz
Leaf Analysis (1 sample/10 acres)	Sept	Custom		0.10	Analysis	31.00	ea
Disease: Brown Rot (Lime, Kocide)	Oct	Custom			Lime	10.00	lb
					Kocide	10.00	lb
					Gib Gro	32.00	gram
Growth Regulators: (GibGro or GA)	Oct	Custom			Citrus Fix	1.25	floz
Growth Regulator: (Citrus Fix)]	Nov	Custom					
Harvest: Pick & Haul	Apr	Custom				379.00	crtn
	Oct	Custom				380.00	crtn
	Dec	Custom				380.00	crtn
Harvest: Pack	Apr	Custom				304.00	crtn
	Oct	Custom				304.00	crtn
	Dec	Custom				304.00	crtn