
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

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

ORANGES

Navels & Valencias



SAN JOAQUIN VALLEY - South

Low Volume Irrigation

Prepared by

Neil V. O'Connell
Craig E. Kallsen
Mark W. Freeman
Karen M. Klonsky

UC Cooperative Extension Farm Advisor, Tulare County
UC Cooperative Extension Farm Advisor, Kern County
UC Cooperative Extension Farm Advisor, Fresno County
UC Cooperative Extension Economist, Department of Agricultural and Resource
Economics, UC Davis

Richard L. De Moura UC Cooperative Extension Staff Research Associate, Department of Agricultural and
Resource Economics, UC Davis

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San Joaquin Valley South - 2007

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INTRODUCTION

Sample costs to establish an orange orchard and produce oranges 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 all current and many archived commodities are available at <http://coststudies.ucdavis.edu> or can be requested from the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1517 or obtained from selected county UC Cooperative Extension offices.

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ASSUMPTIONS

The assumptions refer to Tables 1 to 9 and pertain to sample costs to establish an orange orchard and produce oranges 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 ten acres being planted to oranges. 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 Operating Costs 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 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 acres (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 two major orange varieties grown in the San Joaquin Valley are Navels and Valencias. Navels are grouped into three types by harvest timing – early, mid and late season. Tree costs are for the standard varieties. A royalty fee is added to the cost on patented varieties, Most cultural and management practices for the two varieties are the same except where noted in pruning, growth regulators, and harvest. The trees are planted on 18 X 22-foot spacing, 110 trees per acre. Tree spacing and densities in orchards vary. Many new orchards are planted closer for earlier production, but historical data shows that the trees begin to crowd at 8 to 9 years with tree removal consideration warranted. Orange trees have a long production life if they are well maintained. The life of the orchard is assumed to be 40 years.

Pruning. Suckering is done during the first through the third year. Light pruning is done from the fourth year until mature. See Table A for estimated pruning/suckering times for the establishment years.

Table A. Sucker/Prune

Operation Time		
Year	Operation	Hours
1	Sucker	2.71
2	Sucker	4.29
3	Sucker	5.00
4	Prune	3.14
5	Prune	6.00

Irrigation. Irrigation water is applied from April through October. District water is delivered via canal to the farm at a cost of \$102.96 per acre-foot or \$8.58 per acre-inch. Water costs are variable among districts with the cost shown being approximately mid-range between the high and low. Irrigation costs include the water and the labor for system operation and monitoring. No assumption is made about effective rainfall, runoff, and evaporation. The water applied for different aged trees is approximated and shown in Table B. Values are based on an irrigation system delivering water with a distribution uniformity of 85%.

Year	Acre-Inches
1	2.0
2	4.5
3	7.0
4	10.5
5	14.0
Maturity	30.0

Frost Protection. This study assumes that only weed/cover crop management and 2.2 acre-inches of water are used for frost protection during the first three years. Frost protection is in effect from November to February. Wind machines are installed in the third year and begin operation in the fourth year. Water use remains constant for frost protection in all years. 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

Table C. Frost Protection Procedures

Year	water	acin	floor management	wind machine
1	Yes	2.2	Discing & contact herbicide	No
2	Yes	2.2	Residual & contact herbicide	No
3	Yes	2.2	Residual & contact herbicide	No
4	Yes	2.2	Residual & contact herbicide	100 hours
5+	Yes	2.2	Residual & contact herbicide	100 hours

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. Wind machine installation is often delayed until significant fruit is produced, sometimes as late as the seventh or eighth establishment year. A single machine will cover about 10 acres.

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 is the major nutrient required for proper tree growth and optimum yields. Beginning in the first year, UN32 is injected through the drip line and low biuret urea plus micronutrients - zinc sulfate and manganese (Tecmangam) - are applied in March as a foliage spray. Beginning in the fourth year, the micronutrients are applied as a foliar fertilizer with the March worm spray. Additional urea is also applied with the May katydid/thrips spray. 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 for Orange Orchards

Year	per tree	per acre	Lbs. of N	
			dripline	foliar
1	0.1	9.65	8.5	1.15
2	0.2	21.80	19.5	2.30
3	0.3	33.95	30.5	3.45
4	0.4	44.00	29.0	15.00
5	0.5	55.00	32.5	22.50
6	0.6	66.00	36.0	30.00
7+	0.8	110.00	80.0	30.00

Leaf/Tissue Sampling. Leaf samples are taken by the PCA sometime from August through October for nutrition analysis. For this study, one sample per 10 acres is taken.

Soil Amendments. Beginning in the fifth 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, manures or 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 (April, June, August) 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 (April, May, June). From the second year on residual/pre-emergent herbicides, Karmex and Princep, are applied to the orchard floor in the fall (October) and in the spring (March) 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 citrus thrips (*Scirtothrips citri*), katydids (*Scudderia furcata*), orangeworms [citrus cutworm (*Xylomyges curialis*) and fruittree leafroller (*Archips argyrospilus*)]. Control for citrus thrips, orangeworms, and katydids begin in the fourth year. Orangeworms are controlled (control is generally required every other year) in March with one application of Dipel insecticide. Pesticides are applied at a lower volume per acre in the early years to account for the small tree size. In the fourth year 50% and in the fifth, 75% of the recommended spray volume is applied. Thrips and katydids are treated with Success insecticide plus oil in May at petal fall. Although a common industry practice is to apply multiple sprays on non-bearing trees for thrips, protection in this study begins in the fourth year for fruit protection rather than foliage protection. California red scale (*Aonidiella aurantii*) is not treated on young trees as it is only an economic problem when found on the fruit.

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

Diseases. Beginning in October of the third year, brown rot (*Phytophthora spp.*) and septoria spot (*Septoria spp.*) 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.

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 and Yields. Commercial yields normally begin in the third or fourth establishment year. New plantings with close spacing may have commercial yields in the second or third year. A custom operator harvests the field. Annual yields are shown in Table E.

Year	Field Bins (900 lbs)	Field Boxes (55 lbs)	Total Crtns/bin (37.5 lbs)	Packed Cartons (37.5 lbs)
4	1.4	23	34	28
5	11.1	182	266	213
6	18.9	309	454	363
7	24.0	393	576	460
8	26.4	432	634	508
9	27.7	453	665	532
10+	28.6	468	686	550

Returns. See Returns in Production section.

Production Operating Costs

Table 3 to 9

Pruning. Pruning methods and frequencies vary widely on mature trees. In this study, pruning includes topping, hedging, hand pruning, and shredding. Pruning operations are done on a four-year cycle: (1) hedge alternate rows – each tree is hedged one side only, (2) top all trees, (3) hedge alternate rows - those not hedged previously, (4) hand prune. In this study, one-fourth of the costs are allocated to the orchard each year. 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. Pruning is generally done after harvest. Because of increased risk from frost damage, pruning should be discontinued by mid-August to allow trees to enter the frost season in a reduced physiological state less susceptible to freezing. Pruning for Navels is normally done in the spring while Valencias are pruned in the summer. Pruning is done in April in this study. The prunings generally require shredding. The prunings from topping are stacked in alternate row middles by the custom shredder prior to shredding; the hand prunings are stacked by the pruners in alternate row middles and shredded by a custom shredder. The prunings from hedging fall in a manner that does not require hand stacking. Although, the custom operator shreds alternate rows, the charge is based on total acres.

Fertilization. Nitrogen as UN-32 is applied through the irrigation system (not necessarily with an irrigation) in several applications during February, March, and April. Foliar applications of N as low biuret urea plus minor nutrients, zinc sulfate and manganese (Tecmangam), are mixed and sprayed with the March worm treatment. A second low biuret urea application is made with the May thrips and katydid spray. The nutritional program should be based on leaf analysis.

Leaf/Tissue Sampling. 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 (0.10 samples per acre) by the PCA sometime from August through October. The cost shown is for lab analysis.

Soil Amendments. Each year from April through October, 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 as an investment under the Non-Cash Overhead section of the tables.

Irrigation. In this study, water is applied April through October. Thirty acre-inches of district water, delivered via canal, is applied to the orchard at a cost of \$103 per acre-foot or \$8.58 per acre-inch. Water costs are highly variable among districts and the cost shown is approximately mid-range. No assumption is made about effective rainfall, runoff, evaporation, winter water requirements or rainfall stored in the soil profile, tree size or tree health. The irrigation operation costs include the water and labor for irrigating, operating and monitoring the system.

Frost Protection. Protection is required from late winter to early spring (November through February); in this study protection is shown for November, December and January. In this study, chemical vegetation control on the orchard floor and 2.2 acre-inches of water are used for frost protection during the season. 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 (\$2.40 per gallon) 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.

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 (October) and one in the spring (March), 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. Worms are sprayed primarily in March with Dipel insecticide. Citrus thrips and katydids are treated in May and citrus thrips only in June. Success insecticide and oil are used in both applications. Urea and micronutrients are mixed with the worm spray, and urea only, with the thrips and katydid spray. A spray is applied in July for California red scale and citricola scale alternating each year with Esteem (insect growth regulator) and Lorsban. Esteem controls red scale only and Lorsban controls both scales. 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. The grower should alternate materials in order to reduce the potential for the development of insect resistance to pesticides used.

Disease. Brown rot is the primary preharvest disease of fruit that occurs in this study and is controlled by spraying a Kocide (copper) and hydrated lime mixture during October or November. The same fungicide mixture also controls Septoria spot, primarily a problem in Valencia orange. 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.

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 and 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 for Navels. Growth regulators are applied to mature Navel orange trees only. Gibberellic acid (Gib Gro) and 2,4-D (Hivol 44) treatments are made on mid-to-late harvested Navels. Gibberellic acid maintains a juvenile rind and 2,4-D applied in October/November minimizes pre-harvest fruit drop. In this study gibberellic acid (GA) is sprayed in October and 2,4-D in November. Growth regulators are applied to 70% of the orchard, because 30% of the orchard was picked earlier.

Harvest. Orange trees typically reach full production by the 10th or 11th 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. Navels are normally harvested from November to June while Valencias are harvested April through September. Oranges are hand picked and put into field bins that hold 900 pounds (24 carton equivalent) of fruit. The oranges 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 \$1.37 per carton and the packinghouse cost are \$4.25 per carton. Delivering outside the local area will increase hauling costs. The packing house cost 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 the Navel and Valencia varieties 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.

Returns. An estimated price based on current returns (2006-07) of \$9.25 per carton, fob packinghouse, is used in this study. There is basically no income for juice products in Navels, but there may be a small amount in Valencias. Returns over a range of yields are shown in Table 6.

Assessments. Commercial orange 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 \$0.03 per 55-pound field box, 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 \$10.50 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 \$13.80 per hour for machine operators and \$11.04 for general labor includes payroll overhead of 38%. The basic hourly wages are \$10.00 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, but for this study the cost is based upon the average industry final rate as of January 1, 2007 (personal email from California Department of Insurance, May 18, 2007, unreferenced). Labor for operations involving machinery are 20% higher than the operation time given in Table 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 \$2.30 and \$2.80 per gallon, respectively. Fuel costs are derived from American Automobile Association (AAA) and Energy Information Administration 2006 monthly data. The cost includes a 2% local sales tax on diesel fuel and 8% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 3 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time. Fuel prices have fluctuated considerably in 2007 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 10.00% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

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 0.714% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$539 for the entire farm.

Crop Insurance. Crop insurance is available to growers, but is not included as a cost in this study.

Office Expense. Office and business expenses are estimated at \$120 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 orchard establishment is calculated 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. An interest rate of 7.25% is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2007.

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 oranges are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the fourth year represents the establishment cost. For this study the cost is \$6,075 per acre or \$60,750 for the 10-acre orchard. The establishment cost is spread over the remaining 36 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 \$2,500 to \$12,000 per acre (Trends & Leases), depending on available water. Land with citrus orchards ranges from \$8,000 to \$15,000 per acre. The land on which the orchard is planted in this study is valued at \$7,000 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. The value is estimated and not taken from any specific data.

Fuel Tanks. Two 250-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 six machines on the farm with one being in the new planting and five on the remaining acres. Cost includes installation of the propane-powered machines. The machines are assumed to use 15 gallons of propane per hour over 10 acres.

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 oranges.

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. SAMPLE COSTS PER ACRE TO ESTABLISH AN ORANGE ORCHARD
 SAN JOAQUIN VALLEY – SOUTH 2007

	Costs per Acre					
	YEAR:	1st	2nd	3rd	4th	5th
PACKOUT YIELD (37.5 lb Cartons/Acre):					28	213
Planting Costs						
Land Preparation: Remove Old Orchard		250				
Land Preparation: Subsoil		390				
Land Preparation: Disc 2X		90				
Land Preparation: Level (Triplane)		125				
Trees @ \$9.25/tree (Replant 2% of trees in 2nd Year)		1,018	19			
Plant: Layout, Plant, Stake & Wrap Trees (includes wrap costs)		129	2			
TOTAL PLANTING COSTS		2,001	21			
Cultural Costs:						
Sucker (Yr 1-3) Prune (Yr 4+)		30	47	55	35	66
Irrigate		61	83	104	150	181
Frost Protection (Yr 1-3, water. Yr 4+, water & wind machines)		24	35	35	386	392
Fertilizer: Foliar Spray N, Mn, Zn		37	38	39		
Fertilizer: N w/irrigation, (UN32)		4	9	14	13	15
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /Foliar (N)					56	69
Insect/Fertilizer: Worms (Dipel) / Foliar (N, Mn, Zn)					42	48
Insect: Ants (Clinch)		5	5	5		
Weed: Pre-emergent – orchard floor (Karmex, Princep)			47	47	47	47
Weed: Spot Spray (Roundup) 3X		16	16	16	16	16
Weed: Disc 3X (Custom)		135				
Disease: Brown Rot (Lime, Kocide)				49	57	64
Soil Amendments: Soluble Gypsum						118
Pickup Truck Use		89	89	89	89	89
ATV Use		59	59	59	59	59
Leaf Analysis (1 sample/10 acres)					6	6
PCA/Consultant Services		40	40	40	40	40
TOTAL CULTURAL COSTS		500	469	554	997	1,209
Harvesting Costs:						
Pick and Haul					47	364
Pack					119	905
Assessments					11	16
TOTAL HARVEST COSTS					177	1,286
Interest on operating capital @ 10.00%		260	28	29	34	52
TOTAL OPERATING COSTS PER ACRE		2,761	518	583	1,208	2,547
Cash Overhead Costs:						
Office Expense		120	120	120	120	120
Liability Insurance		9	9	9	9	9
Property Taxes		92	92	103	103	106
Property Insurance		11	11	19	19	21
Investment Repairs		53	53	95	95	106
TOTAL CASH OVERHEAD COSTS		286	285	346	346	363
TOTAL CASH COSTS		3,047	804	929	1,554	2,910
INCOME FROM PRODUCTION					259	1,970
NET CASH COSTS FOR THE YEAR		3,047	804	929	1,295	940
PROFIT ABOVE CASH COSTS						
TOTAL ACCUMULATED NET CASH COSTS		3,047	3,851	4,780	6,075	7,014

UC COOPERATIVE EXTENSION
Table 1. continued
 SAN JOAQUIN VALLEY – SOUTH 2007

	Costs per Acre					
	YEAR:	1st	2nd	3rd	4th	5th
Non-Cash Overhead Costs:						
Buildings		83	83	83	83	83
Drip Irrigation System		108	108	108	108	108
Shop Tools		23	23	23	23	23
Land		550	550	550	550	550
Fuel Tanks & Pumps		4	4	4	4	4
Gypsum Machine						147
Wind Machine				194	194	194
Equipment		47	43	44	43	43
TOTAL NON-CASH OVERHEAD COSTS		815	811	1,006	1,005	1,153
TOTAL COST FOR THE YEAR		3,862	1,615	1,935	2,559	4,063
INCOME FROM PRODUCTION					259	1,970
NET TOTAL COST FOR THE YEAR		3,862	1,615	1,935	2,300	2,092
NET PROFIT FOR THE YEAR						
ACCUMULATED NET TOTAL COST		3,862	5,477	7,412	9,712	11,805

UC COOPERATIVE EXTENSION
Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS
 SAN JOAQUIN VALLEY – SOUTH 2007

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$	units	\$
			units	\$	units	\$	units	\$				
OPERATING COSTS												
Custom:												
Orchard Removal	acre	250.00	1.00	250								
Slip Plow	acre	390.00	1.00	390								
Disc	acre	45.00	5.00	225								
Level - Triplane	acre	125.00	1.00	125								
Layout, Plant, Wrap	tree	0.70	110.00	77	2.00	1						
Ground Spray – Copper / Fertilizer	acre	35.00	1.00	35	1.00	35	2.00	70	1.00	35	1.00	35
Ground Spray – Worm	acre	30.00							1.00	30	1.00	30
Ground Spray – Thrips	acre	30.00							1.00	30	1.00	30
Harvest: Pick & Haul	crtn	1.37							34.00	47	266.00	364
Harvest: Pack	crtn	4.25							28.00	119	213.00	905
Leaf Analysis (Nutrients)	each	55.00							0.10	6	0.10	6
PCA	acre	40.00	1.00	40	1.00	40	1.00	40	1.00	40	1.00	40
Assessments:												
Citrus Research (55 lb lug)	lug	0.03							23.00	1	182.00	5
Tristeza Eradication	acre	10.50							1.00	11	1.00	11
Tree/Tree Aids:												
Orange Tree	tree	9.25	110.00	1,018	2.00	19						
Tree Wraps (foam type)	each	0.47	110.00	52	2.00	1						
Irrigation/Frost Protection:												
Wind Machine Operation	hr/ac	3.60							100.00	360	100.00	360
Water Frost Protection	acin	8.58	1.46	13	2.20	19	2.20	19	2.20	19	2.20	19
Water (growing season)	acin	8.58	2.00	17	4.50	39	7.00	60	10.50	90	14.00	120

UC COOPERATIVE EXTENSION
Table 2. continued
 SAN JOAQUIN VALLEY – SOUTH 2007

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$	units	\$
			units	\$	units	\$	units	\$				
Fertilizer:												
UN32 (32-0-0)	lb N	0.46	8.50	4	19.50	9	30.50	14	29.00	13	32.50	15
Urea Low Biuret (46-0-0)	lb N	0.82	1.15	1	2.30	2	3.45	3	15.00	12	22.50	18
Zinc Sulfate 36%	lb	0.92	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Tecmangam (31% Mn)	lb	0.47	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Soluble Gypsum (Soil Amendment)	ton	106.00									1.00	106
Herbicide:												
Roundup Original Max	pint	4.38	0.60	3	0.60	3	0.60	3	0.60	3	0.60	3
Princep 90S	lb	3.54			4.00	14	4.00	14	4.00	14	4.00	14
Karmex DF	lb	5.91			4.00	24	4.00	24	4.00	24	4.00	24
Insecticide:												
Clinch Ant Bait	lb	15.02	0.33	5	0.33	5	0.33	5				
Dipel ES	pint	5.57							1.00	6	1.50	8
Success	oz	5.96							3.00	18	4.50	27
Spray Oil 415	gal	4.93							0.50	2	0.50	2
Fungicide:												
Hydrated Lime	lb	0.15					5.00	1	7.50	1	10.00	2
Kocide 20/20	lb	2.68					5.00	13	7.50	20	10.00	27
Labor (machine)	hrs	13.80	8.93	123	9.53	132	9.53	132	9.50	131	9.50	131
Labor (non-machine)	hrs	11.04	7.71	85	9.80	108	10.50	116	9.26	102	13.77	152
Fuel - Gas	gal	2.80	9.17	26	9.27	26	9.36	26	9.25	26	9.25	26
Lube				4		4		3.9		4		4
Machinery repair				9		10		10		10		10
Interest @ 10.00%				260		28		29		34		52
Total Operating Costs/Acre				2,761		518		583		1,208		2,546

UC COOPERATIVE EXTENSION
Table 3. COSTS PER ACRE TO PRODUCE ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2007

Operation	Cash and Labor Costs per acre						Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost	
Cultural:							
Frost Protection (water & wind machine)	2.19	24	0	379	0	403	
Fertilize: N (UN32 through drip line)	0.30	3	0	37	0	40	
Weed: Pre-emergent (Princep, Karmex) 2X	0.50	8	1	38	0	47	
Insect/Fertilizer: Worm (Dipel)/N Mn Zn	0.00	0	0	26	30	56	
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr	0.00	0	0	0	28	28	
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr	0.00	0	0	0	23	23	
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr	0.00	0	0	0	98	98	
Irrigate: (water & labor)	5.55	61	0	257	0	319	
Soil Amendment:(Soluble Gypsum) w/irrigation	8.75	97	0	106	0	203	
Weed: Spot Spray (Roundup) 3X	0.75	12	1	3	0	16	
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /N	0.00	0	0	51	30	81	
Insect: Thrips (Success, Oil)	0.00	0	0	38	30	68	
Insect: Scale (Esteem)	0.00	0	0	98	80	178	
Leaf Analysis (1 sample/10 acres)	0.05	1	0	0	6	6	
Disease: Brown Rot (Lime, Kocide)	0.00	0	0	29	35	64	
Growth Regulator: (Hivol) [Navel Only]	0.00	0	0	11	53	64	
Growth Regulators (GibGro or GA) [Navel Only]	0.00	0	0	28	53	81	
Pickup Truck Use	3.33	55	34	0	0	89	
ATV Use	3.33	55	4	0	0	59	
PCA/Consultant Services	0.00	0	0	0	40	40	
TOTAL CULTURAL COSTS	24.75	317	40	1,100	504	1,961	
Harvest:							
Pick & Haul Fruit	0.00	0	0	0	940	940	
Pack Fruit	0.00	0	0	0	2,338	2,338	
Assessments	0.00	0	0	24		24	
TOTAL HARVEST COSTS	0.00	0	0	24	3,277	3,302	
Interest on operating capital *						203	
TOTAL OPERATING COSTS/ACRE		317	40	1,125	3,781	5,466	
Cash Overhead:							
Office Expense						120	
Liability Insurance						9	
Property Taxes						136	
Property Insurance						43	
Investment Repairs						137	
TOTAL CASH OVERHEAD COSTS						446	
TOTAL CASH COSTS/ACRE						5,912	
Non-Cash Overhead:							
		Per producing Acre		Annual Cost			
				Capital Recovery			
Buildings 1800 sqft		1,000		83		83	
Fuel Tanks 2-250g		58		4		4	
Shop Tools		215		23		23	
Land		7,583		550		550	
Gypsum Machine (1)		600		147		147	
Orchard Establishment		6,075		479		479	
Drip Irrigation		1,400		108		108	
Wind Machine (6)		2,070		194		194	
Equipment		356		45		45	
TOTAL NON-CASH OVERHEAD COSTS		19,357		1,634		1,634	
TOTAL COSTS/ACRE						7,546	

*Interest based on May 06 through April 07 Crop Year

UC COOPERATIVE EXTENSION
Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Oranges	550.00	*crtm	9.25	5,088	
OPERATING COSTS					
Frost Protection:					
Water	2.20	acin	8.58	19	
Wind Machine Operation (propane @ \$2.40/gal)	100.00	hr/ac	3.60	360	
Fertilizer:					
UN 32 (32-0-0)	80.00	lb N	0.46	37	
Urea Low Biuret (46-0-0)	30.00	lb N	0.82	25	
Zinc Sulfate 36%	2.00	lb	0.92	2	
Tecmangam (31% Mn)	2.00	lb	0.47	1	
Soil Amendment:					
Gypsum Soluble	1.00	ton	106.00	106	
Herbicide:					
Princep 90S	4.00	lb	3.54	14	
Karmex	4.00	lb	5.91	24	
Roundup Original Max	0.60	pint	4.38	3	
Insecticide:					
Dipel ES	2.00	pint	5.57	11	
Success	12.00	oz	5.96	72	
Spray Oil 415	1.00	gal	4.93	5	
Esteem	17.00	floz	5.76	98	
Contract:					
Harvest - Pick & Haul	686.00	crtm	1.37	940	
Harvest - Pack	550.00	crtm	4.25	2,338	
Prune - by Hand & Stack	0.25	acre	360.00	90	
PCA Fees	1.00	acre	40.00	40	
Custom:					
Prune-Top (1X/4 Yr)	0.25	acre	45.00	11	
Prune-Hedge (2X/4 Yr, Alt. Rows = 1/2 field each time)	0.25	acre	33.00	8	
Shred Prunings (hand prunings 1X/4 Yr & hedge prunings 2X/4 Yr)	0.75	acre	30.00	23	
Stack & Shred Prunings (top prunings) 1X/4 Yr	0.25	acre	65.00	16	
Spray Ground -Thrips	2.00	acre	30.00	60	
Spray Ground - Scale	1.00	acre	80.00	80	
Spray Ground -Worm	1.00	acre	30.00	30	
Spray Ground - Copper or Fertilizer	1.00	acre	35.00	35	
Spray Ground - Growth Regulator	2.00	acre	52.50	105	
Leaf Analysis (1 per 10 acres)	0.10	each	55.00	6	
Irrigation:					
Water	30.00	acin	8.58	257	
Fungicide:					
Hydrated Lime	10.00	lb	0.15	2	
Kocide 20/20	10.00	lb	2.68	27	
Growth Regulator:					
Hivol 44 (2, 4-D) [Navel Only]	2.50	floz	4.46	11	
Gib Gro 4LS (gibberalic acid) [Navel Only]	40.00	gram	0.70	28	
Assessment:					
Citrus Research/55lb box	464.00	box	0.03	14	
Tristeza Eradication	1.00	acre	10.50	11	

UC COOPERATIVE EXTENSION
Table 4. continued
 SAN JOAQUIN VALLEY - SOUTH 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Labor (machine)	9.50	hrs	13.80	131	
Labor (non-machine)	16.84	hrs	11.04	186	
Fuel - Gas	9.26	gal	2.80	26	
Lube				4	
Machinery repair				10	
Interest on operating capital @ 10.00%				203	
TOTAL OPERATING COSTS/ACRE				5,466	
NET RETURNS ABOVE OPERATING COSTS				-378	
CASH OVERHEAD COSTS:					
Office Expense				120	
Liability Insurance				9	
Property Taxes				136	
Property Insurance				43	
Investment Repairs				137	
TOTAL CASH OVERHEAD COSTS/ACRE				446	
TOTAL CASH COSTS/ACRE				5,911	
NON-CASH OVERHEAD COSTS					
Buildings 1800 sqft				83	
Fuel Tanks 2-250g				4	
Shop Tools				23	
Land				550	
Gypsum Machine				147	
Orchard Establishment				479	
Drip Irrigation				108	
Wind Machine (6)				194	
Equipment				45	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,634	
TOTAL COSTS/ACRE				7,546	
NET RETURNS ABOVE TOTAL COSTS				-2,458	

*carton = 37.5 lbs

UC COOPERATIVE EXTENSION
Table 5. MONTHLY CASH COSTS - ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2007

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Beginning JAN 07													
Ending DEC 07	07	07	07	07	07	07	07	07	07	07	07	07	
Cultural:													
Frost Protection (water & wind machine)	133										137	133	403
Fertilize: N (through drip line)		13	13	13									40
Weed: Pre-emergent Orchard Floor (Princep, Karmex) 2X			23							23			47
Insect/Fertilizer: Worm (Dipel)/N Mn Zn			56										56
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr				28									28
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr				23									23
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr				98									98
Irrigate: (water & labor)				36	43	54	68	54	43	21			319
Soil Amendment:(Soluble Gypsum) w/irrigation				25	29	32	36	32	29	20			203
Weed: Spot Spray (Roundup) 3X				5		5		5					16
Insect/Fertilizer: Thrips Katydid (Success, Oil) /N					81								81
Insect: Thrips (Success, Oil)						68							68
Insect: Scale (Esteem)							178						178
Leaf Analysis (1 sample/10 acres)									6				6
Disease: Brown Rot (Lime, Kocide)										64			64
Growth Regulator: (Hivol) [Navel Only]										64			64
Growth Regulators (GibGro or GA) [Navel Only]											81		81
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	89
ATV Use	5	5	5	5	5	5	5	5	5	5	5	5	59
PCA/Consultant Services	3	3	3	3	3	3	3	3	3	3	3	3	40
TOTAL CULTURAL COSTS	149	29	109	244	168	175	298	107	94	207	233	149	1,960
Harvest:													
Pick & Haul Fruit		314		314							312		940
Pack Fruit		778		778							782		2,338
Assessments		8		8							8		24
TOTAL HARVEST COSTS		1,100		1,100							1,103		3,302
Interest on operating capital @ 10.00%*	22	32	33	44	1	3	5	6	7	9	20	21	203
TOTAL OPERATING COSTS/ACRE	171	1,160	141	1,387	169	178	303	113	101	216	1,355	170	5,465
OVERHEAD:													
Office Expense	10	10	10	10	10	10	10	10	10	10	10	10	120
Liability Insurance	9												9
Property Taxes	68						68						136
Property Insurance	22						22						43
Investment Repairs	11	11	11	11	11	11	11	11	11	11	11	11	137
TOTAL CASH OVERHEAD COSTS	120	21	21	21	21	21	111	21	21	21	21	21	446
TOTAL CASH COSTS/ACRE	291	1,182	163	1,409	191	199	414	135	122	237	1,377	191	5,911

*Interest based on crop year starting in May

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
 SAN JOAQUIN VALLEY - SOUTH 2007

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORANGES

	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
OPERATING COSTS/ACRE:							
Cultural Cost	1,961	1,961	1,961	1,961	1,961	1,961	1,961
Harvest Cost	2,404	2,703	3,003	3,302	3,601	3,900	4,199
Interest on operating capital	178	187	195	203	212	220	228
TOTAL OPERATING COSTS/ACRE	4,543	4,851	5,159	5,466	5,774	6,081	6,388
TOTAL OPERATING COSTS/CRTN	11.36	10.78	10.32	9.94	9.62	9.36	9.13
CASH OVERHEAD COSTS/ACRE	446	446	446	446	446	446	446
TOTAL CASH COSTS/ACRE	4,989	5,297	5,605	5,912	6,220	6,527	6,834
TOTAL CASH COSTS/CRTN	12.47	11.77	11.21	10.75	10.37	10.04	9.76
NON-CASH OVERHEAD COSTS/ACRE	1,634	1,634	1,634	1,634	1,634	1,634	1,634
TOTAL COSTS/ACRE	6,623	6,931	7,239	7,546	7,854	8,161	8,468
TOTAL COSTS/CRTN	16.56	15.40	14.48	13.72	13.09	12.56	12.10

*cartons = 37.5 pounds

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
6.25	-2,043	-2,039	-2,034	-2,029	-2,024	-2,019	-2,013
7.25	-1,643	-1,589	-1,534	-1,479	-1,424	-1,369	-1,313
8.25	-1,243	-1,139	-1,034	-929	-824	-719	-613
9.25	-843	-689	-534	-379	-224	-69	87
10.25	-443	-239	-34	172	376	582	787
11.25	-43	212	466	722	976	1,232	1,487
12.25	357	662	966	1,272	1,576	1,882	2,187

NET RETURN PER ACRE ABOVE CASH COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
6.25	-2,489	-2,485	-2,480	-2,475	-2,470	-2,465	-2,459
7.25	-2,089	-2,035	-1,980	-1,925	-1,870	-1,815	-1,759
8.25	-1,689	-1,585	-1,480	-1,375	-1,270	-1,165	-1,059
9.25	-1,289	-1,135	-980	-825	-670	-515	-359
10.25	-889	-685	-480	-275	-70	136	341
11.25	-489	-235	20	276	530	786	1,041
12.25	-89	216	520	826	1,130	1,436	1,741

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
6.25	-4,123	-4,119	-4,114	-4,109	-4,104	-4,099	-4,093
7.25	-3,723	-3,669	-3,614	-3,559	-3,504	-3,449	-3,393
8.25	-3,323	-3,219	-3,114	-3,009	-2,904	-2,799	-2,693
9.25	-2,923	-2,769	-2,614	-2,459	-2,304	-2,149	-1,993
10.25	-2,523	-2,319	-2,114	-1,909	-1,704	-1,499	-1,293
11.25	-2,123	-1,869	-1,614	-1,359	-1,104	-849	-593
12.25	-637	-1,419	-1,114	-809	-504	-199	107

UC COOPERATIVE EXTENSION
Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY - SOUTH 2007

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
07	ATV 4WD	5,800	15	1,129	603	25	35	662
07	Pickup Truck 1/2 Ton	28,000	7	10,621	4,023	138	193	4,354
07	Weed Sprayer-Pull, ATV 55 gal	2,500	20	130	238	9	13	260
TOTAL		36,300		11,880	4,863	172	241	5,276
*60% of new cost		21,780		7,128	2,918	103	145	3,166

*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	
Buildings 1800 sqft	60,000	30		4,957	214	300	1,200	6,671
Drip Irrigation (10 acres)	14,000	40		1,081	50	70	280	1,481
Orchard Establishment (10 acres)	60,750	36		4,790	217	304	304	5,615
Fuel Tanks 2-250g	3,500	40	350	269	14	19	70	372
Gypsum Machine (1)	6,000	5		1,473	21	30	120	1,645
Land (65 acres)	455,000	40	455,000	32,988	0	4,550	0	37,538
Shop Tools	12,879	15	1,288	1,386	51	71	258	1,766
Wind Machine (6)	124,170	20	12,417	11,655	488	683	2,483	15,308
TOTAL INVESTMENT	736,299		469,055	58,598	1,054	6,027	4,715	70,394

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	60	acre	8.98	539
Office Expense	60	acre	120.00	7,200

UC COOPERATIVE EXTENSION
Table 8. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - SOUTH 2007

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Cash Overhead			Operating			
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
07	ATV 4WD	133	2.72	0.11	0.16	0.53	0.64	1.17	4.17
07	Pickup Truck 1/2 Ton	265	9.10	0.31	0.44	2.04	8.05	10.09	19.94
07	Weed Sprayer-Pull, ATV 55 gal	75	1.91	0.08	0.11	0.63	0.00	0.63	2.72

UC COOPERATIVE EXTENSION
Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS
 SAN JOAQUIN VALLEY - South 2007

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		0.10	UN32	26.60	lb N
	Mar		0.10	UN32	26.70	lb N
Weed: Pre-emergent (Princep, Karmex) 2X	Apr		0.10	UN32	26.70	lb N
	Mar	ATV		Princep	2.00	lb
				Karmex	2.00	lb
Weed: Pre-emergent (Princep, Karmex) 2X	Oct	ATV		Princep	2.00	lb
				Karmex	2.00	lb
Insect/Fertilizer: Worm (Dipel)/ Foliar (N, Mn, Zn)	Mar	Custom		Dipel	2.00	pt
				Urea LB	15.00	lb N
				Zinc Sulfate	2.00	lb
				Tecmangam (Mn)	2.00	lb
Irrigate	Apr		0.50	Water	3.50	acin
	May		0.80	Water	4.00	acin
	June		1.00	Water	5.00	acin
	July		1.10	Water	6.50	acin
	Aug		1.00	Water	5.00	acin
	Sept		0.80	Water	4.00	acin
	Oct		0.30	Water	2.00	acin
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr	Apr	Custom				
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr	Apr	Custom				
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr	Apr	Custom				
Soil Amendment:(Soluble Gypsum) w/irrigation	Apr		1.30	Gypsum	0.11	ton
	May		1.30	Gypsum	0.14	ton
	June		1.30	Gypsum	0.17	ton
	July		1.30	Gypsum	0.21	ton
	Aug		1.30	Gypsum	0.17	ton
	Sept		1.30	Gypsum	0.14	ton
	Oct		1.30	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 2007

Operation	Operation		Implement	Field Labor	Material	Broadcast	Unit
	Month	Tractor		Hr/Acre		Rate/acre	
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /N	May	Custom			Success	6.00	oz
					415 Oil	0.50	gal
					Urea LB	15.00	lb N
Insect: Thrips (Success, Oil)	June	Custom			Success	6.40	oz
					415 Oil	0.50	gal
Insect: Scale (Esteem)	July	Custom			Esteem	17.00	floz
Leaf Analysis (1 sample/10 acres)	July	Custom		0.10	Analysis	31.00	ea
Disease: Brown Rot (Lime, Kocide)	Oct	Custom			Lime	10.00	lb
					Kocide	10.00	lb
Growth Regulator: (Hivol) [Navel Only]	Oct	Custom			Hivol	2.50	floz
Growth Regulators: (GibGro or GA) [Navel Only]	Nov	Custom			Gib Gro	40.00	gram
Harvest: Pick & Haul	Feb	Custom				229.00	crtn
	Apr	Custom				228.00	crtn
	Nov	Custom				229.00	crtn
Harvest: Pack	Feb	Custom				183.00	crtn
	Apr	Custom				183.00	crtn
	Nov	Custom				184.00	crtn