

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2005

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

ORANGES

Navels & Valencias



SAN JOAQUIN VALLEY - South

Low Volume Irrigation

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and PRODUCE ORANGES
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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 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 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 (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 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. 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.

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

Irrigation. District water is delivered via canal to the farm at a cost of \$90.00 per acre-foot or \$7.50 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. Irrigation water applied from April through October for different aged trees is approximated 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. 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

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, effectively.

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. In the first three years, ammonium nitrate (34-0-0) is spread by hand near the base of the trees, and low biuret urea plus micronutrients - zinc sulfate and manganese (Tecmangam) - are applied in March as a foliage spray. Beginning in the fourth year, UN-32 (32-0-0) is applied though the drip lines and low biuret urea (46-0-0) and 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.

Year	lbs of N applied				
	per tree	per acre	hand	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

Soil Amendments. In this study, 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 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. From the second year on 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 citrus thrips (*Scirtothrips citri*), katydids (*Scudderia furcata*), orangeworms [citrus cutworm (*Xylomyges curialis*) and fruittree leafroller (*Archips argyrosphilus*)]. 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 sprayed at full rates for orangeworms 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. 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 (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 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.*) 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 contracted operator harvests the field. Annual yields are shown in Table E.

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 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 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 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 \$90.00 per acre-foot or \$7.50 per acre-inch. Water costs are highly variable among districts. From grower and district information, costs may go as high as \$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.

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. Worms are sprayed primarily in March with Dipel insecticide. Citrus thrips and katydids are treated in May and citrus thrips 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 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 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. Growth regulators are applied to mature Navel orange trees only. Gibberellic acid (Gib Gro) and 2,4-D (Hivolt 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 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 mid-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 \$1.05 per carton and the packinghouse cost are \$4.00 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 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. Yields from the third year to full production for field bins, boxes, and cartons are shown in Table E.

Table E. Annual Orange Yields Per Acre

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. An estimated price based on current returns of \$8.75 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 \$0.028 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 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 \$14.30 per hour for machine operators and \$9.65 for general labor includes payroll overhead of 43%. The basic hourly wages are \$10.00 for machine operators and \$6.75 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 5, 2005 (California Department of Insurance). 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 \$2.00 and \$2.25 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel and 8% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 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 2005 and may be higher or lower on any given day. The price used is based upon grower deliveries in May.

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 7.65% 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. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1% 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 0.690% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$529 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 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 6.01% used to calculate capital recovery cost is the USDA-ERSs ten-year average of California's agricultural sector long-run rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can be used effectively in the agricultural sector.

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 \$5,612 per acre or \$56,120 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 \$1,300 to \$5,500 per acre, depending on available water. Citrus orchards range from \$5,000 to \$10,000. Being that the orchard is established on land previously planted to tree crops, the land in this study is valued at \$6,000 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.

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 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 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 2005

	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		240				
Land Preparation: Subsoil		390				
Land Preparation: Disc 2X		90				
Land Preparation: Level (Triplane)		125				
Trees @ \$9/tree (Replant 2% of trees in 2nd Year)		990	18			
Plant: Layout, Plant , Stake & Wrap Trees (includes wrap costs)		121	3			
TOTAL PLANTING COSTS		1,956	20			
Cultural Costs:						
Sucker (Yr 1-3) Prune (Yr 4+)		26	41	48	30	58
Irrigate		54	72	91	132	158
Frost Protection (Water & Wind Machines)		21	21	21	314	316
Fertilizer: Foliar Spray N, Mn, Zn		31	32	32		
Fertilizer: N by Hand, Yr 1-3, (34-0-0); w/irrigation Yr 4+ (UN32)		10	15	30	13	14
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /Foliar (N)					48	59
Insect/Fertilizer: Worms (Dipel) / Foliar (N, Mn, Zn)					34	39
Insect: Ants (Clinch)		5	5	5		
Weed: Pre-emergent – orchard floor (Karmex, Princep)			45	45	45	45
Weed: Spot Spray (Roundup) 3X		17	17	17	17	17
Weed: Disc 3X (Custom)		135				
Disease: Brown Rot (Lime, Kocide)				41	46	51
Soil Amendments: Soluble Gypsum						130
Pickup Truck Use		86	86	86	86	86
ATV Use		61	61	61	61	61
Leaf Analysis (1 sample/10 acres)					4	4
PCA/Consultant Services		35	35	35	35	35
TOTAL CULTURAL COSTS		481	430	512	865	1,073
Harvesting Costs:						
Pick and Haul					36	279
Pack					112	852
Assessments					11	15
TOTAL HARVEST COSTS					159	1,146
Interest on operating capital @ 7.65%		166	17	17	34	46
TOTAL OPERATING COSTS PER ACRE		2,603	467	529	1,058	2,265
Cash Overhead Costs:						
Office Expense		120	120	120	120	120
Liability Insurance		9	9	9	9	9
Property Taxes		80	80	91	92	94
Property Insurance		11	10	18	18	20
Investment Repairs		50	50	92	92	103
TOTAL CASH OVERHEAD COSTS		270	270	330	331	346
TOTAL CASH COSTS		2,873	736	859	1,389	2,611
INCOME FROM PRODUCTION					245	1,864
NET CASH COSTS FOR THE YEAR		2,873	736	859	1,144	747
PROFIT ABOVE CASH COSTS					0	0
TOTAL ACCUMULATED NET CASH COSTS		2,873	3,609	4,468	5,612	6,359

UC COOPERATIVE EXTENSION
Table 1. continued
 SAN JOAQUIN VALLEY – SOUTH 2005

	Costs per Acre				
	YEAR:	1st	2nd	3rd	4th
Non-Cash Overhead Costs:					
Buildings	73	73	73	73	73
Drip Irrigation System	83	83	83	83	83
Shop Tools	21	21	21	21	21
Land	391	391	391	391	391
Fuel Tanks & Pumps	4	4	4	4	4
Gypsum Machine					131
Wind Machine			175	175	175
Equipment	43	39	41	38	39
TOTAL NON-CASH OVERHEAD COSTS	615	611	788	785	917
TOTAL COST FOR THE YEAR	3,488	1,347	1,647	2,174	3,528
INCOME FROM PRODUCTION				245	1,864
NET TOTAL COST FOR THE YEAR	3,488	1,347	1,647	1,929	1,664
NET PROFIT FOR THE YEAR				0	0
ACCUMULATED NET TOTAL COST	3,488	4,835	6,482	8,411	10,075

UC COOPERATIVE EXTENSION
Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS
 SAN JOAQUIN VALLEY – SOUTH 2005

	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	240.00	1.00	240								
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	30.00	1.00	30	1.00	30	2.00	60	1.00	30	1.00	30
Ground Spray – Worm	acre	25.00							1.00	25	1.00	25
Ground Spray – Thrips	acre	25.00							1.00	25	1.00	25
Harvest: Pick & Haul	crtn	1.05							34.00	36	266.00	279
Harvest: Pack	crtn	4.00							28.00	112	213.00	852
Leaf Analysis (Nutrients)	each	31.00							0.10	3	0.10	3
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	0.03							23.00	1	182.00	5
Tristeza Eradication	acre	10.00							1.00	10	1.00	10
Tree/Tree Aids:												
Orange Tree	tree	9.00	110.00	990	2.00	18						
Tree Wraps (foam type)	each	0.40	110.00	44	2.00	1						
Irrigation/Frost Protection:												
Wind Machine Operation	hour	2.92							100.00	292	100.00	292
Water Frost Protection	acin	7.50	2.20	17	2.20	17	2.20	17	2.20	17	2.20	17
Water (growing season)	acin	7.50	2.00	15	4.50	34	7.00	53	10.50	79	14.00	105

UC COOPERATIVE EXTENSION
Table 2. continued
 SAN JOAQUIN VALLEY – SOUTH 2005

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$	units	\$
			units	\$	units	\$	units	\$				
Fertilizer:												
Ammonium Nitrate (34-0-0)	lb N	0.52	8.50	4	19.50	10	30.50	16				
UN32	lb N	0.44							29.00	13	32.50	14
Urea Low Biuret (46-0-0)	lb N	0.48	1.15	1	2.30	1	3.45	2	15.00	7	22.50	11
Zinc Sulfate 36%	lb	0.56	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Techmagnum (Mn)	lb	0.63	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Soluble Gypsum (Soil Amendment)	ton	120.00									1.00	120
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	3.27			4.00	13	4.00	13	4.00	13	4.00	13
Karmex DF	lb	5.62			4.00	22	4.00	22	4.00	22	4.00	22
Insecticide:												
Clinch Ant Bait	lb	13.94	0.33	5	0.33	5	0.33	5				
Dipel ES	pint	5.11							1.00	5	1.50	8
Success	oz	5.86							3.00	18	4.50	26
Spray Oil 415	gal	3.87							0.50	2	0.50	2
Fungicide:												
Hydrated Lime	lb	0.20					5.00	1	7.50	2	10.00	2
Kocide 20/20	lb	1.90		0		0	5.00	10	7.50	14	10.00	19
Labor (machine)	hrs	14.30	8.96	128	9.56	137	10.13	145	9.50	136	9.50	136
Labor (non-machine)	hrs	9.65	7.71	74	9.29	90	10.00	97	9.26	89	13.30	128
Fuel - Gas	gal	2.25	9.17	21	9.27	21	9.36	21	9.26	21	9.26	21
Lube				3		3		3		3		3
Machinery repair				9		10		10		10		10
Interest @ 7.65%				166		17		17		34		46
Total Operating Costs/Acre				2,601		467		528		1,056		2,263

UC COOPERATIVE EXTENSION
Table 3. COSTS PER ACRE TO PRODUCE ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2005

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)	2.19	21	0	309	0	330	
Fertilize: N (through drip line)	0.30	3	0	35	0	38	
Weed: Pre-emergent (Princep, Karmex) 2X	0.50	9	1	36	0	45	
Insect/Fertilizer: Worm (Dipel)/N Mn Zn	0.00	0	0	20	25	45	
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr	0.00	0	0	0	26	26	
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr	0.00	0	0	0	20	20	
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr	0.00	0	0	0	89	89	
Irrigate: (water & labor)	5.55	54	0	225	0	279	
Soil Amendment:(Soluble Gypsum) w/irrigation	8.75	84	0	120	0	204	
Weed: Spot Spray (Roundup) 3X	0.75	13	1	3	0	17	
Insect/Fertilizer: Thrips Katydid (Success, Oil) /N	0.00	0	0	44	25	69	
Insect: Thrips (Success, Oil)	0.00	0	0	37	25	62	
Insect: Scale (Esteem)	0.00	0	0	98	75	173	
Leaf Analysis (1 sample/10 acres)	0.05	0	0	0	3	4	
Disease: Brown Rot (Lime, Kocide)	0.00	0	0	21	30	51	
Growth Regulator: (Hivol) [Navel Only]	0.00	0	0	11	45	56	
Growth Regulators (GibGro or GA) [Navel Only]	0.00	0	0	28	45	73	
Pickup Truck Use	3.33	57	28	0	0	86	
ATV Use	3.33	57	3	0	0	61	
PCA/Consultant Services	0.00	0	0	0	35	35	
TOTAL CULTURAL COSTS	24.64	298	34	987	443	1,761	
Harvest:							
Pick & Haul Fruit	0.00	0	0	0	720	720	
Pack Fruit	0.00	0	0	0	2,200	2,200	
Assessments	0.00	0	0	23		23	
TOTAL HARVEST COSTS	0.00	0	0	23	2,920	2,943	
Interest on operating capital *						140	
TOTAL OPERATING COSTS/ACRE		298	34	1,010	3,363	4,845	
Cash Overhead:							
Office Expense						120	
Liability Insurance						9	
Property Taxes						122	
Property Insurance						39	
Investment Repairs						131	
TOTAL CASH OVERHEAD COSTS						421	
TOTAL CASH COSTS/ACRE						5,266	
Non-Cash Overhead:							
		Per producing Acre		Annual Cost		Capital Recovery	
Buildings 1800 sqft		1,000		73		73	
Fuel Tanks 2-250g		58		4		4	
Shop Tools		215		21		21	
Land		6,500		391		391	
Gypsum Machine (1)		550		131		131	
Orchard Establishment		5,612		384		384	
Drip Irrigation		1,250		83		83	
Wind Machine (6)		2,070		175		175	
Equipment		350		41		41	
TOTAL NON-CASH OVERHEAD COSTS		17,605		1,303		1,303	
TOTAL COSTS/ACRE						6,569	

*Interest based on May 04 through April 05 Crop Year

UC COOPERATIVE EXTENSION
Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2005

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Oranges	550.00	*crtn	8.75	4,813	
OPERATING COSTS					
Frost Protection:					
Water	2.20	acin	7.50	17	
Wind Machine Operation	100.00	hour	2.93	293	
Fertilizer:					
UN 32 (32-0-0)	80.00	lb N	0.44	35	
Urea Low Biuret (46-0-0)	30.00	lb N	0.48	14	
Zinc Sulfate 36%	2.00	lb	0.56	1	
Tecmangam (31% Mn)	2.00	lb	0.63	1	
Soil Amendment:					
Gypsum Soluble	1.00	ton	120.00	120	
Herbicide:					
Princep 90S	4.00	lb	3.27	13	
Karmex	4.00	lb	5.62	22	
Roundup Original Max	0.60	pint	4.38	3	
Insecticide:					
Dipel ES	2.00	pint	5.11	10	
Success	12.00	oz	5.86	70	
Spray Oil 415	1.00	gal	3.87	4	
Esteem	17.00	floz	5.76	98	
Contract:					
Harvest - Pick & Haul	686.00	crtn	1.05	720	
Harvest - Pack	550.00	crtn	4.00	2,200	
Prune - by Hand & Stack	0.25	acre	330.00	83	
PCA Fees	1.00	acre	35.00	35	
Custom:					
Prune-Top (1X/4 Yr)	0.25	acre	43.00	11	
Prune-Hedge (2X/4 Yr, Alt. Rows = 1/2 field each time)	0.25	acre	30.00	8	
Shred Prunings (hand prunings 1X/4 Yr & hedge prunings 2X/4 Yr)	0.75	acre	25.00	19	
Stack & Shred Prunings (top prunings) 1X/4 Yr	0.25	acre	60.00	15	
Spray Ground -Thrips	2.00	acre	25.00	50	
Spray Ground - Scale	1.00	acre	75.00	75	
Spray Ground -Worm	1.00	acre	25.00	25	
Spray Ground - Copper or Fertilizer	1.00	acre	30.00	30	
Spray Ground - Growth Regulator	2.00	acre	45.00	90	
Leaf Analysis (\$31/sample, 1/10 acres)	0.10	acre	31.00	3	
Irrigation:					
Water	30.00	acin	7.50	225	
Fungicide:					
Hydrated Lime	10.00	lb	0.20	2	
Kocide 20/20	10.00	lb	1.90	19	
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	13	
Tristeza Eradication	1.00	acre	10.00	10	

UC COOPERATIVE EXTENSION
Table 4. continued
 SAN JOAQUIN VALLEY - SOUTH 2005

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Labor (machine)	9.50	hrs	14.30	136	
Labor (non-machine)	16.84	hrs	9.65	163	
Fuel - Gas	9.26	gal	2.25	21	
Lube				3	
Machinery repair				10	
Interest on operating capital @ 7.65%				140	
TOTAL OPERATING COSTS/ACRE				4,845	
NET RETURNS ABOVE OPERATING COSTS				-32	
CASH OVERHEAD COSTS:					
Office Expense				120	
Liability Insurance				9	
Property Taxes				122	
Property Insurance				39	
Investment Repairs				131	
TOTAL CASH OVERHEAD COSTS/ACRE				421	
TOTAL CASH COSTS/ACRE				5,266	
NON-CASH OVERHEAD COSTS					
Buildings 1800 sqft				73	
Fuel Tanks 2-250g				4	
Shop Tools				21	
Land				391	
Gypsum Machine				131	
Orchard Establishment				384	
Drip Irrigation				83	
Wind Machine (6)				175	
Equipment				41	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,303	
TOTAL COSTS/ACRE				6,569	
NET RETURNS ABOVE TOTAL COSTS				-1,756	

*carton = 37.5 lbs

UC COOPERATIVE EXTENSION
Table 5. MONTHLY CASH COSTS - ORANGES
 SAN JOAQUIN VALLEY - SOUTH 2005

Beginning JAN 05	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 05	05	05	05	05	05	05	05	05	05	05	05	05	
Cultural:													
Frost Protection (water & wind machine)	109										112	109	330
Fertilize: N (through drip line)		13	13	13									38
Weed: Pre-emergent Orchard Floor (Princep, Karmex) 2X				22					22				45
Insect/Fertilizer: Worm (Dipel)/N Mn Zn			45										45
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr				26									26
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr				20									20
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr				89									89
Irrigate: (water & labor)				31	38	47	59	47	38	18			279
Soil Amendment:(Soluble Gypsum) w/irrigation				25	29	32	37	32	29	19			204
Weed: Spot Spray (Roundup) 3X				6		6		6					17
Insect/Fertilizer: Thrips Katydid (Success, Oil) /N					69								69
Insect: Thrips (Success, Oil)						62							62
Insect: Scale (Esteem)							173						173
Leaf Analysis (1 sample/10 acres)									4				4
Disease: Brown Rot (Lime, Kocide)										51			51
Growth Regulator: (Hivol) [Navel Only]										56			56
Growth Regulators (GibGro or GA) [Navel Only]											73		73
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	86
ATV Use	5	5	5	5	5	5	5	5	5	5	5	5	61
PCA/Consultant Services	3	3	3	3	3	3	3	3	3	3	3	3	35
TOTAL CULTURAL COSTS	124	28	95	224	151	162	285	100	108	160	200	124	1,761
Harvest:													
Pick & Haul Fruit		240		240							240		721
Pack Fruit		732		732							736		2,200
Assessments		8		8							8		23
TOTAL HARVEST COSTS		980		980							984		2,944
Interest on operating capital @ 7.65%*	15	22	22	30	1	2	4	4	5	6	14	15	140
TOTAL OPERATING COSTS/ACRE	139	1,030	117	1,234	152	164	288	105	113	166	1,198	139	4,846
OVERHEAD:													
Office Expense	10	10	10	10	10	10	10	10	10	10	10	10	120
Liability Insurance	9												9
Property Taxes	61						61						122
Property Insurance	20						20						39
Investment Repairs	11	11	11	11	11	11	11	11	11	11	11	11	131
TOTAL CASH OVERHEAD COSTS	110	21	21	21	21	21	102	21	21	21	21	21	421
TOTAL CASH COSTS/ACRE	250	1,050	138	1,255	173	185	390	126	134	187	1,219	160	5,267

*Interest based on crop year starting in May

UC COOPERATIVE EXTENSION
Table 6. RANGING ANALYSIS
 SAN JOAQUIN VALLEY - SOUTH 2005

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORANGES

	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
OPERATING COSTS/ACRE:							
Cultural Cost	1,761	1,761	1,761	1,761	1,761	1,761	1,761
Harvest Cost	2,143	2,410	2,677	2,943	3,210	3,477	3,743
Interest on operating capital	123	129	134	140	146	151	157
TOTAL OPERATING COSTS/ACRE	4,027	4,300	4,572	4,844	5,117	5,389	5,661
TOTAL OPERATING COSTS/CRTN	10.07	9.56	9.14	8.81	8.53	8.29	8.09
CASH OVERHEAD COSTS/ACRE	421	421	421	421	421	421	421
TOTAL CASH COSTS/ACRE	4,448	4,721	4,993	5,265	5,538	5,810	6,082
TOTAL CASH COSTS/CRTN	11.12	10.49	9.99	9.57	9.23	8.94	8.69
NON-CASH OVERHEAD COSTS/ACRE	1,303	1,303	1,303	1,303	1,303	1,303	1,303
TOTAL COSTS/ACRE	5,751	6,024	6,296	6,568	6,841	7,113	7,385
TOTAL COSTS/CRTN	14.38	13.39	12.59	11.94	11.40	10.94	10.55

*cartons = 37.5 pounds

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
5.75	-1,727	-1,713	-1,697	-1,682	-1,667	-1,652	-1,636
6.75	-1,327	-1,263	-1,197	-1,132	-1,067	-1,002	-936
7.75	-927	-813	-697	-582	-467	-352	-236
8.75	-527	-363	-197	-32	133	299	464
9.75	-127	88	303	519	733	949	1,164
10.75	273	538	803	1,069	1,333	1,599	1,864
11.75	673	988	1,303	1,619	1,933	2,249	2,564

NET RETURN PER ACRE ABOVE CASH COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
5.75	-2,148	-2,134	-2,118	-2,103	-2,088	-2,073	-2,057
6.75	-1,748	-1,684	-1,618	-1,553	-1,488	-1,423	-1,357
7.75	-1,348	-1,234	-1,118	-1,003	-888	-773	-657
8.75	-948	-784	-618	-453	-288	-123	43
9.75	-548	-334	-118	98	312	528	743
10.75	-148	117	382	648	912	1,178	1,443
11.75	252	567	882	1,198	1,512	1,828	2,143

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
5.75	-3,451	-3,437	-3,421	-3,406	-3,391	-3,376	-3,360
6.75	-3,051	-2,987	-2,921	-2,856	-2,791	-2,726	-2,660
7.75	-2,651	-2,537	-2,421	-2,306	-2,191	-2,076	-1,960
8.75	-2,251	-2,087	-1,921	-1,756	-1,591	-1,426	-1,260
9.75	-1,851	-1,637	-1,421	-1,206	-991	-776	-560
10.75	-1,451	-1,187	-921	-656	-391	-126	140
11.75	-637	-737	-421	-106	209	525	840

UC COOPERATIVE EXTENSION
Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 SAN JOAQUIN VALLEY - SOUTH 2005

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
05	ATV 4WD	5,700	15	1,110	540	23	34	597
05	Pickup Truck 1/2 Ton	28,000	7	10,621	3,753	133	193	4,079
05	Weed Sprayer-Pull, ATV 55 gal	2,100	20	109	180	8	11	199
TOTAL		35,800		11,840	4,473	164	238	4,875
60% of new cost*		21,480		7,104	2,684	99	143	2,925

*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		4,364	207	300	1,200	6,071
Drip Irrigation (10 acres)	12,500	40		832	43	63	250	1,187
Orchard Establishment (10 acres)	56,120	36		3,843	194	280	280	4,596
Fuel Tanks 2-250g	3,500	40	350	231	13	19	70	333
Gypsum Machine (1)	5,500	5		1,306	19	28	110	1,463
Land (65 acres)	390,000	40	390,000	23,439	0	3,900	0	27,339
Shop Tools	12,879	15	1,288	1,272	49	71	258	1,649
Wind Machine (6)	124,170	20	12,417	10,497	471	683	2,483	14,134
TOTAL INVESTMENT	664,669		404,055	45,783	996	5,343	4,651	56,773

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	60	acre	8.82	529
Office Expense	60	acre	120.00	7,200

UC COOPERATIVE EXTENSION
Table 8. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - SOUTH 2005

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Cash Overhead			Operating			
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
05	ATV 4WD	133	2.44	0.11	0.15	0.53	0.52	1.05	3.75
05	Pickup Truck 1/2 Ton	265	8.49	0.30	0.44	2.05	6.47	8.52	17.75
05	Weed Sprayer-Pull, ATV 55 gal	75	1.45	0.06	0.09	0.54	0.00	0.54	2.14

UC COOPERATIVE EXTENSION

Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS
SAN JOAQUIN VALLEY - South 2005

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	Sept	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 2005

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