

**Appendix H**

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**Ag Burn Information Provided  
By the Agricultural Industry**

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# Wine Grapes

## Wine Grape

<b>Winter</b>		<b>Associated Cost/acre</b>
Pruning		\$180.00
Fertilizer Application		\$17.00
Fix Stakes and wires		\$32.00
Plant layers		\$11.00
Shred Prunings		\$8.00
<b>Spring</b>		
<b>Action</b>		
Irrigation		\$170.00
Weed Control		\$151.00
Cultivation		\$25.00
Shoot Removal		\$20.00
Fungicide Application		\$115.00
Pest Control		\$102.00
<b>Summer</b>		
Mow Weeds/Cut Canes		\$15.00
<b>Fall</b>		
Harvest & Haul		\$345.00
Plant Cover Crop		
<b>Overhead Expenses</b>		
Cash: Taxes, Insurance, Office, etc.		\$415.00
Non-Cash Overhead Expenses		\$1,153.00
<b>Total Cost</b>		<b>\$2,834.00</b>
<b>Total Income</b>		<b>\$2,616.00</b>
Average Tons/acre	11.1	
Average Price	\$236	
<b>Net Return/acre</b>		<b>(\$218.00)</b>

\*Vineyard prunings are not burned, they are shredded in the vineyard.

Source:

Cost & Return Data, Agricultural Economics UC Davis

<http://coststudies.ucdavis.edu/files/grapewinesjv2005.pdf>

**Historical Yield & Pricing**

Yield (Dist. 12-14)	All Raisin Yield	Chardonnay	French Colombard	Muscat	Barbera	Cabernet Sauvignon	Grenache	Merlot	Rubired	Syrah	Zinfandel
2009											
2008	11.3	10.9	12.6	18.3	8.8	9.8	11.9	9.8	16.4	11.3	16.2
2007	9.4	10.8	12.2	18.8	10.6	11.4	10.7	11.0	14.3	13.1	13.8
2006	7.8	8.4	11.4	13.8	10.0	10.3	13.6	10.0	15.1	11.6	10.4
2005	9.5	9.8	11.4	16.8	10.3	13.1	12.3	11.2	15.8	13.5	12.7
2004	8.4	7.6	9.0	10.1	6.6	8.4	11.4	7.3	14.2	9.6	9.2
2003	8.7	8.8	10.0	10.9	8.5	9.5	7.9	7.9	11.4	12.4	10.4
2002	11.4	11.4	9.1	10.7	9.5	10.2	11.5	8.7	14.9	12.6	11.7
2001	9.4	9.6	9.0	10.0	9.1	11.8	9.9	7.9	12.5	13.8	9.9
2000	10.4	10.3	10.4	11.8	11.4	12.5	10.8	8.8	12.5	15.7	11.6
Revenue Per Acre (Dist. 12-14)	All Raisins	Chardonnay	French Colombard	Muscat	Barbera	Cabernet Sauvignon	Grenache	Merlot	Rubired	Syrah	Zinfandel
2009											
2008	\$2,550.34	\$4,316.53	\$2,911.27	\$5,316.91	\$2,114.76	\$3,516.81	\$2,808.58	\$3,345.18	\$4,161.52	\$4,107.09	\$4,309.59
2007	\$1,456.45	\$3,228.79	\$2,239.00	\$4,372.93	\$2,242.47	\$2,637.78	\$2,033.98	\$2,674.78	\$3,113.36	\$3,032.36	\$3,772.20
2006	\$1,206.33	\$2,587.54	\$2,143.86	\$3,590.57	\$2,203.27	\$2,546.31	\$2,610.65	\$2,678.72	\$3,088.96	\$2,801.66	\$2,862.24
2005	\$1,561.42	\$3,223.69	\$2,497.03	\$4,571.88	\$2,394.15	\$3,568.15	\$2,728.74	\$3,403.85	\$3,488.46	\$3,950.73	\$4,154.48
2004	\$1,670.49	\$2,268.87	\$1,788.32	\$3,159.30	\$1,529.44	\$2,251.74	\$2,373.27	\$2,556.51	\$3,001.05	\$2,444.45	\$2,868.31
2003	\$827.06	\$2,101.58	\$1,267.33	\$1,974.35	\$1,563.07	\$2,092.69	\$1,367.05	\$2,154.50	\$1,805.71	\$2,556.29	\$2,220.24
2002	\$854.88	\$2,889.21	\$1,014.72	\$1,540.80	\$1,707.47	\$2,807.62	\$1,558.65	\$2,317.21	\$2,505.86	\$2,925.65	\$2,377.87
2001	\$810.60	\$2,821.68	\$1,137.64	\$1,718.32	\$1,727.04	\$3,574.41	\$1,384.21	\$2,742.20	\$2,349.63	\$3,710.74	\$2,576.23
2000	\$1,304.02	\$3,531.78	\$1,519.67	\$2,458.22	\$2,393.23	\$4,244.34	\$1,698.66	\$3,278.80	\$3,201.12	\$5,442.01	\$2,983.75
Average from 2000 -2008	\$1,360.18	\$2,996.63	\$1,835.43	\$3,189.25	\$1,986.10	\$3,026.65	\$2,062.64	\$2,794.64	\$2,968.41	\$3,441.22	\$3,124.99

Source: Allied Grape Growers

**Pullout Costs**

<b>Chipping (1)</b>	
	Cost/Acre
Remove Trellis & Post (Labor & Equipment)	\$509
Cut Wire & Remove from Field (Cordon Wire) (Labor and Equipment) Could be multiple wires @ \$180/wire	\$266
Push and Pile Cost	\$160
Chip Stacked Piles 20 acres/day (varies)	\$200
Dust Control ~\$400/day	\$20
<b>Remove and Dump Roots and Stumps after Chipping</b>	
~4 tons/acre	
Deliver and dump container at Composter (\$225/load)	\$90
\$25.00/ton Composting	\$100
Tractor /labor to load roots into Container	\$54
Loader to compress roots into container	
<b>Total Cost of Chipping</b>	<b>\$1,398.64</b>

(1) - Commercial grinders state that if they remove non-vegetative material cost = 1,000/acre+, which does not include root and stump removal

<b>Burning</b>	
Cut Wire	\$3.60
Move Roots and Stumps to Piles Before Burn ~4 tons/acre	
Tractor/trailer/labor to load roots into piles	\$54.00
Push and Pile Cost	\$160.00
Burn Control (supervise burn)	\$11.82
Burn Permit Fee	\$26.00
Remove Steel after Burn 20 acres/8 hour	\$11.82
<b>Total Cost of Burning</b>	<b>\$267.24</b>
If steel is removed before burn, cost would increase	

## Wine Grapes

**Methodology:** Cost Study data was collected based on the farming costs of an average wine vineyard in the South and North San Joaquin Valley, which runs from the Grapevine to Highway 12. The cost study data is from 2005, though growers estimate that the farming costs have increased 10 to 15% since then. The main areas of cost increases have been in fuel, labor, and water. Costs are generally consistent across varieties.

The non-cash overhead costs are based on the repayment of the establishment and other long-term costs of the vineyard. Costs associated with non-cash overhead include: land purchase, tools, fuel tanks, irrigation system, establishment costs, and equipment. Land and establishment costs are based over the 25 years of assumed production of the vineyard. 25 years is the standard production lifetime for a vineyard; after 25 years, the production deteriorates. Many vineyards continue to be in production past the 25 year mark, because growers cannot afford the up-front costs of establishing a new vineyard. The cost study information makes note of the fact that their costs do not take into account the cost of paying the owner a salary. The owner is assumed to be paid on any positive return at the end of the year.

Pullout Costs were calculated based on conversations with growers, chippers, and farm labor contractors. The vineyard trellis system would have a combination of metal stakes and cross arms, as well as multiple support wires which would have to be removed before the vineyard can be chipped. The labor rate used was \$8.00 per hour (the state minimum wage), plus 35% to take into account all state and federal taxes, social security deductions, and worker's compensation insurance. The labor rate may be higher depending on the labor conditions. Another issue with chipping is that chippers are not always able to do their work on the farmer's schedule. It can take weeks or even months to have a field chipped, at which point it may be too late to plant for the next season.

The stakes would be removed by three workers operating a loader in the field. Two workers would use chains to remove the stakes and one employee would operate the loader. These workers would be able to complete approximately one acre in an 8 hour workday. When burning, the stakes are piled with the vines, and removed after the burn.

Wire must also be removed from the vineyard before it can be chipped. Depending on the chipper's equipment, wire must be removed completely from the vineyard or must be present only in very short lengths. This presents an issue for vineyards where a cordon is created by wrapping the vine around the wire in the second year. As the vine grows, the wire becomes more and more embedded in the vine, making it impossible to remove. In some trellis systems, there may be as many as four wires embedded in the cordon. Chippers reported this wire causing problems and getting wrapped around the moving parts of their machinery. It was also reported that the bio mass facilities prefer not to receive material with wire, because the wire causes havoc with their equipment.

Wire removal is based on the cutting and removal of the wire from the field. For the chipping calculation, the wire removal cost estimate is significantly higher than the wire removal from burning. When wire is removed from a chipped vineyard, the wire has to be cut at every point where it is



exposed. An individual wire would be cut between 700 and 800 times (depending on the number of vines in a row) per quarter mile. When burning, the wire has to be cut only once every 4-6 vines. This is only 45-60 per wire per row. The other issue for chipping is the removal of the clips or dog ears that hold the wire in place. These have to be removed from every stake in order to pull out the wire. Additionally, loose wire must also be picked up before the equipment can come into the field. Growers and contractors relayed that the wire removal for a single wire (the main wire) would take approximately 20 man-hours, as well as the use of a tractor or ATV to drive around picking up buckets full of pieces of wire. Each additional wire in the trellis system would cost \$180 per wire. A typical trellis system for wine grapes would have between 3-6 wires. Growers who are able to burn do not have this issue, as the wire stays with the vine until burned, and can then be picked up with a loader or forklift from the piles. This wire is then loaded onto a truck and taken to a recycling center.

Root removal also differs with regards to chipping or burning. Roots and stumps must be removed from the field before it can be replanted. In a typical vineyard, there will be approximately 4 tons of roots and stumps remaining in the field when the vines are laid over and piled. These roots will have to be excavated using a chisel to get them out of the ground, and hand and machine labor to remove them from the field. When burning, the roots and stumps can be placed into the burn piles along with the above-ground material. When chipping, the roots must be hauled from the field to either a composter or dump. Chippers stated that they do not like to chip roots because of the amount of dirt that is associated. This volume of dirt negatively affects the machinery and causes wear and tear. The rates listed on the attached sheets are for the most cost-effective removal and disposal of the roots. The roots and stumps would be hauled by truck to the composter that charges \$25 per ton for the material. This compares favorably to the \$60 per ton that was quoted at the waste disposal site.

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2005

**SAMPLE COSTS TO  
ESTABLISH AND PRODUCE  
WINE GRAPES**



SAN JOAQUIN VALLEY

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## UC COOPERATIVE EXTENSION

### SAMPLE COSTS TO ESTABLISH AND PRODUCE WINE GRAPES San Joaquin Valley - 2005

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#### INTRODUCTION

Sample costs to establish and produce wine grapes 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 considered typical for the crop and area, but these practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering your farm 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 can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-4424 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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## ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish the vineyard and produce wine grapes in the San Joaquin Valley. The cultural practices described represent production operations and materials considered typical on a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The study does not represent a single farm and is intended as a guide only. **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 vineyard, owned and operated by the grower, is located on previously farmed land in the San Joaquin Valley. The farm is comprised of 120 acres, 40 acres of wine grapes being established and 75 acres of raisin grapes. Roads, irrigation systems, and farmstead occupy the remaining five acres.

### Establishment Operating Costs (Table 1)

**Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from vines or trees should be fallowed for two years except for possible grain crops. The land is assumed to be fairly level. A custom operator chisels (subsoil) the ground twice to a depth of 4 to 5 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disced twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in vines or trees and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Trellis System.** A commercial company installs the trellis system in December of the first year or January of the second year (January in this report). The trellis system is a vertical two-wire design. Trellis materials include 1.25 lb x 7-ft T-posts, 4 lb x 9.5-ft rail end posts, 1/4 x 40-inch rod, 12.5 gauge fruit and catch wires. Also a 14-gauge wire is strung at 24-inches to hold the drip tubing.

**Planting.** Planting starts by laying out and marking vine sites in late winter. In the spring, holes are dug and the vines are planted and protected with an open carton placed over the vine. The vines are planted on a 7-ft x 11-ft (vine x row) spacing at 565 vines per acre. In the second year 2% or 11 vines per acre are replanted for those lost in the first year.

**Vines.** No specific variety is planted in this study, but the data refers to spur pruned varieties, such as white varieties - French Colombard, Chenin Blanc - and red varieties - Rubired, Ruby Cabernet, Barbera. The vines in this report are purchased as dormant vines that have been bench grafted or field budded onto nematode/phylloxera resistant rootstock. The life of the vineyard at planting is expected to be 25 years and the grapevines are expected to begin yielding fruit in three years.

**Training/Pruning.** Training and pruning to establish the vine framework will vary with variety and trellis system. Training includes tying, shoot thinning, shoot positioning and pruning. Bilateral cordon training and spur pruning is the selection of the main shoot and its upper laterals or branches that form the trunk and cordon. They are tied to the stake and cordon wire while unwanted shoots are removed, including any suckers arising from the rootstock. Quadrilateral cordon training requires the addition of crossarms. Dormant pruning

begins in January of the second year. The young vines are pruned back to a 2-bud spur. Shoot thinning is done twice a month in April and May, shoot thinning and cordon training twice a month in June and July. In the third year, shoot thinning and shoot positioning are done in April and May, respectively. For more information on trellis and training systems please refer to *Wine Grape Varieties in California*, UC publication 3419.

**Irrigation.** In this study, the water is assumed to cost \$5.67 per acre-inch or \$68.00 per acre-foot. Water costs plus labor constitute the irrigation cost. Water costs vary considerably among districts and the water cost in this report represents a cost within that range. Irrigations occur during the growing season from March through September. No assumption is made about effective rainfall or runoff. The amount of water applied to the vines during the establishment years is shown in Table A. The drip irrigation system is described under Non-Cash Overhead.

Table A. Applied Irrigation Water

Year	AcIn/Year
1	8
2	18
3+	30

**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, Grapes*. Pesticides mentioned in the study are commonly used, but other materials may be available.

**Insects.** Beginning in the third year, Kryocide insecticide is applied in early May at bloom (combined with Rubigan and zinc) to control worms (grape leaffolder, omnivorous leafroller, western grapeleaf skeletonizer). Provado insecticide is applied in July to control leafhoppers. Additionally, insects such as mealybugs should be monitored each year and may add additional costs if found. If mealybugs are found during vineyard establishment, the grower should consult with a PCA, farm advisor, and/or Ag commissioner to develop management strategies.

**Diseases.** The major disease treated in this study is powdery mildew. A dusting and spraying program for these diseases begins the third year with a wettable sulfur application soon after budbreak in late March or early April. Dusting sulfur is applied twice in April and once in June. A sterol inhibitor (SI) - Rubigan in this study - is applied in May during early bloom (combined with worm and zinc spray) and once in June, two weeks after bloom.

**Weeds.** Treflan herbicide is applied and incorporated during land preparation in the fall of the first year prior to planting. Vineyard floor management begins in late winter, February of the second year, with a strip spray in the vine row with Roundup, Surflan, and Goal. In the first year, the middles are mowed twice and disced twice. In the second and subsequent years, the row middles are disced in April and mowed in March, May, June, and August. The vine rows are spot treated with Roundup in late April and late July or early August.

**Fertilization.** Liquid nitrogen fertilizer - UN32, containing 32% nitrogen (N) - is applied in equal amounts through the drip system in May and June. Five pounds of N is applied in the first year, 10 in the second year, and 20 in the third year. Zinc as neutral zinc is applied with the bloom spray (Kryocide and Rubigan).

**Harvest.** Harvest begins the third year. The crop is mechanically harvested by a custom harvest operator and hauled to the processor by a custom hauler.

**Yields.** The average vineyard yields are six-tons per acre in the third year and 10-tons in the fourth.

**Returns.** In this study, the grapes are sold to a winery for which the grower receives \$200 per ton, the current estimated market price

## Production Years Operating Costs

**Pruning.** Pruning is done during the winter months – December and/or January. The vines are mechanically hedged or box pruned, followed with hand pruning to touch-up and clean the vines. The prunings are mechanically raked from the vine row, then shredded during the first mowing and incorporated into the soil with the April discing. Canopy skirting (mechanical) is done with the grower's equipment in June and in July.

**Trellis/Vines.** Trellis repairs are done annually (January in this study) and the cost is not taken from any specific data. Weak or missing vines are replaced by layering. One year-old canes from neighboring vines are buried (layered) in the soil next to the stake and allowed to root. After rooting, the canes are cut and the plant is trained on the trellis. Trellis repair and vine replacement increases with vineyard age.

**Fertilization.** Forty pounds per acre of nitrogen (N) as UN32 is divided and applied through the drip lines in equal amounts in May and June. Neutral zinc at five pounds of material per acre is applied in May with the disease and insect application.

**Irrigation.** Water costs plus labor, which includes checking the drip lines, constitute the irrigation cost. Irrigation labor includes servicing the clock and filters, set-up and injection of chemicals, checking, replacing, and repairing drip lines and laterals. In this study, water is calculated to cost \$5.67 per acre-inch or \$68.00 per acre-foot. Water costs vary considerably among districts and the water cost in this report represents a cost within that range. Thirty acre-inches are applied during the growing season from April through late September. No assumption is made about effective rainfall and runoff. Deficit irrigation may be used in mature vineyards in the San Joaquin Valley, but is not addressed in this study.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). Information and pesticide use permits are available through the local county agricultural commissioner's office. Pesticides mentioned in this study are used to calculate rates and costs. Although growers commonly use the pesticides mentioned, many other pesticides are available. Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are from a single dealer and shown as full retail.

**Pest Control Adviser (PCA).** Written recommendations are required for many commercially applied 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 PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. No costs for a PCA are included in this report.

**Weeds.** Surflan, Goal and Roundup herbicides are applied as a winter strip spray to the vine row in February. Vine row weeds that germinate during the growing season are controlled with two Roundup spot sprays – April, July. The row middles are mowed four times – March for frost control and to shred prunings, May, June, and August prior to harvest. The middles are also disced in April for weed control and to incorporate the vine prunings.

**Insects.** Vine Mealybug (*Pseudococcus sp.*) is treated with Lorsban insecticide in late February to early March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated at bloom with Kryocide in late April or early May (combined with powdery mildew and foliar fertilizer spray). Provado insecticide is applied in July to control grape leafhoppers (*Erythroneura elegantula*). The materials are applied with the

grower's equipment. Growers with heavy mealybug infestations may apply split applications of Admire insecticide through the drip line around bloom to fruit set (mid-May) and then again 21-45 days later on light to medium textured soils. See the UC IPM guidelines for alternative management strategies if heavier soils are involved. A calculated cost for the split Admire applications is \$130 per acre. It may be necessary to use multiple insecticides to control some mealybug species. Wineries may have restrictions on the use of some insecticides, so growers should consult with their winery prior to application.

**Diseases.** The major disease considered in this study is powdery mildew (*Uncinula necator*). Wettable sulfur is applied soon after budbreak in late March or early April. A second application is made in April. Dusting sulfur is applied once in April, in May, and in June. A sterol inhibitor, Rubigan, is applied in May at early bloom (with the worm and zinc spray) and a strobilurin fungicide, Flint, in June two weeks after bloom. Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. Growers have the option of using sterol inhibitors (SI), quinolins, strobilurins, or sulfur (micronized, wettable, dust, flowable), as well as other fungicides to control powdery mildew. These materials are classes of fungicides with different modes of action. Check the IPM website under grapes for management options to control powdery mildew. It is recommended that applicators use fungicides with different modes of action in order to avoid fungicide resistance in powdery mildew populations. Growers should consult with wineries to determine cut-off dates for fungicide restrictions.

**Harvest.** A custom operator mechanically harvests the crop. Harvest costs in this report are \$225 per acre, which is a mid-range of costs provided by the growers. A commercial trucker hauls the grapes to the processor for \$10 per ton. Hauling costs will vary depending upon the hauling distance.

**Yields.** An average yield of 12-tons per acre is assumed over the remaining life of the vineyard.

**Returns.** The market price in this report, based on *2003 Final Grape Crush Report*, CDFA Agricultural Statistics Branch, depending on variety ranges from \$124 to \$270 per ton. An average of \$200 per ton for both white and red varieties is used in this report to show a range of returns over various yields (Table 5).

**Pickup/ATV.** It is assumed that the grower uses the pickup for business and personal use. Estimated business mileage for the ranch is 3,300 miles. The all terrain vehicle (ATV) is used for spot spraying weeds and is included in that cost. It is assumed that the ATV will be used another two-hours per acre for checking the vineyards including the irrigation system.

**Labor.** Labor rates of \$12.73 per hour for machine operators and \$11.05 for general labor includes payroll overhead of 34%. The basic hourly wages are \$9.50 for machine operators and \$8.25 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for vineyards (code 0040), and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2004 (California Department of Insurance). Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life and repair coefficients formulated by the American Society of Agriculture Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$1.50 and \$1.95 per gallon, respectively. The fuel prices are averaged based on two California delivery locations. The cost includes a 2% sales tax on diesel

fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**Interest On Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Crop insurance is not included in this report, but insurance costs will depend on the type and level of coverage.

### 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 \$661 per year for the entire farm.

**Office Expense.** Office and business expenses for 120 acres are estimated at \$75 per producing acre or \$8,625 annually for the farm. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc. The cost is assumed and not taken from any specific data.

**Sanitation Services.** Sanitation services provide double portable toilets with washbasins for 10 months. The cost includes delivery and weekly cleaning service. The number of sanitation facilities and length of time the service is required will vary depending upon local regulations and size of labor force. In many cases labor contractors furnish the sanitation facilities for their crews and the cost is included in the contractor's labor overhead.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management.

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.



## Non-Cash Overhead Costs

Non-cash overhead is calculated as the annual capital recovery cost for ownership of equipment and other farm investments.

**Capital Recovery Costs.** Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

**Salvage Value.** Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

**Interest Rate.** The interest rate of 6.01% used to calculate capital recovery cost is the USDA-ERS's 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 only be used effectively in the agricultural sector. In other words, the next best alternative use for these resources is in another agricultural enterprise.

**Establishment Cost.** Costs to establish the vineyard are used to determine capital recovery expenses on investment for the production years. Establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$7,104 per acre or \$284,160 for the 40-acre vineyard. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**Irrigation System.** The previous vineyard is assumed to have an irrigation system that has been refurbished. The drip line is laid on the ground prior to planting. After the trellis system is installed, the drip line is clipped to the bottom trellis wire. The system includes the installation labor, filters, fertilizer injector, time clock, and valves. Although the materials will have a useful life equivalent to the vineyard, the irrigation system can be included in the vineyard establishment costs or as in this case an improvement to the property with a 25-year life.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land in the San Joaquin Valley for grape production ranges from \$4,500 to \$6,500 per acre (CA Association of Farm Manager and Real Estate Appraisers). For this report, a land value of \$5,800 per acre or \$6,052 per producing acre is used (five of the 120 acres are not planted). It is assumed the grower originally purchased the land with an established vineyard. The annual cost of land is interest only since land does not depreciate.

**Building.** The metal buildings are on a cement slab and comprise 2,400 square feet.

**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.

**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. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in a previous section. 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 A VINEYARD**  
 SAN JOAQUIN VALLEY - 2005

	Cost Per Acre			
	Year:	1st	2nd	3rd
Tons Per Acre:	0.0	0.0	6.0	
<b>Planting Costs:</b>				
Land Prep: Chisel 2X (Custom)		300		
Land Prep: Level (Float)		7		
Land Prep: Disc/Apply Herbicide (Treflan) 1st pass		12		
Land Prep: Disc (Incorporate Herbicide) 2nd pass		7		
Plant: Survey & Layout Vineyard		76		
Plant: Dig, Plant, Place Vines Guards		170	2	
Vines: 565 Per Acre (2% Replant In 2nd Year)		1,497	29	
Install Trellis System			3,000	
<b>TOTAL PLANTING COSTS</b>		<b>2,069</b>	<b>3,031</b>	<b>0</b>
<b>Cultural Costs:</b>				
Prune: Dormant			55	133
Prune/Training: (Sucker, Tie & Train)			442	110
Fertilize: applied through drip line (UN32)	3	5		9
Irrigate: (water & labor)	79	132		204
Weed: Winter Strip-vine row- Spray (Goal, Surflan, Roundup)			79	79
Weed: Disc Middles Yr 1, 2X. Yr 2+, 1X.	14	7		7
Weed: Spot Spray (Roundup) 2X.			28	28
Weed: Mow Middles Yr 1 2X. Yr 2+ 4X.	16	25		25
Weed: Hand Hoe	33			
Insect: Leafhoppers (Provado)				54
Disease: Mildew (Wettable Sulfur) 2X				44
Disease: Mildew (Dusting Sulfur) 3X				26
Disease: Mildew (Flint)				46
Insect: Worms (Kryocide,). Disease: Mildew (Rubigan). Fertilize: (Zn)				54
Pickup: Business Use	41	41		41
ATV: General Use	33	33		33
<b>TOTAL CULTURAL COSTS</b>	<b>219</b>	<b>847</b>	<b>893</b>	
<b>Harvest Costs:</b>				
Harvest: (Machine) & Haul				285
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>285</b>	
Interest On Operating Capital	102	201		26
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>2,390</b>	<b>4,079</b>	<b>1,204</b>	
<b>Cash Overhead Costs:</b>				
Office Expense	75	75		75
Liability Insurance	6	6		6
Sanitation Services	20	20		20
Property Taxes	70	70		71
Property Insurance	6	7		8
Investment Repairs	32	32		32
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>209</b>	<b>210</b>	<b>212</b>	
<b>TOTAL CASH COSTS/ACRE</b>	<b>2,599</b>	<b>4,289</b>	<b>1,416</b>	
<b>INCOME/ACRE FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>1,200</b>	
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>2,599</b>	<b>4,289</b>	<b>216</b>	
<b>PROFIT/ACRE ABOVE CASH COSTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	<b>2,599</b>	<b>6,888</b>	<b>7,104</b>	

UC COOPERATIVE EXTENSION  
Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:	0	0	6.0
Capital Recovery Cost:				
Land		364	364	364
Drip Irrigation System		74	74	74
Shop Building		46	46	46
Shop Tools		10	10	10
Fuel Tank & Pump		2	2	2
Equipment		25	26	60
TOTAL CAPITAL RECOVERY COST		521	522	556
TOTAL COST/ACRE FOR THE YEAR		3,120	4,811	1,972
INCOME/ACRE FROM PRODUCTION		0	0	1,200
TOTAL NET COST/ACRE FOR THE YEAR		3,120	4,811	772
NET PROFIT/ACRE ABOVE TOTAL COST		0	0	0
TOTAL ACCUMULATED NET COST/ACRE		3,120	7,931	8,703

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE WINE GRAPES**  
 SAN JOAQUIN VALLEY - 2005

Operation	Cash and Labor Cost per acre					
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost
<b>Cultural:</b>						
Vines: Layering Missing Vines	1.00	11	0	0	0	11
Trellis: Repair	2.00	22	0	10	0	32
Prune: (mechanical)	0.00	0	0	0	85	85
Prune: Clean Up Vines (hand prune)	4.00	44	0	0	0	44
Prune: Rake Prunings (mechanical)	0.23	4	2	0	0	5
Weed: Winter Strip Spray (Roundup, Goal, Surflan)	0.54	8	4	67	0	79
Irrigate: (water & labor)	3.05	34	0	170	0	204
Weed: Mow 4X	0.94	14	8	0	0	22
Insect: Mealybug (Lorsban)	0.83	13	8	27	0	49
Weed: Spot Spray 20% acres 2X (Roundup)	1.15	18	2	9	0	28
Weed: Disc	0.31	5	2	0	0	7
Disease: Mildew (Wettable Sulfur)	1.67	25	17	1	0	44
Disease: Mildew (Dusting Sulfur)	0.92	14	7	5	0	26
Fertilize: through drip (UN32)	0.10	1	0	16	0	17
Insect: Skeletonizer (Kryocide). Disease: Mildew (Rubigan). Fertilizer: (Zn)	0.83	13	8	33	0	54
Prune: Skirt Vines (mechanical)	0.50	8	4	0	0	11
Disease: Mildew (Flint)	0.83	13	8	25	0	46
Insect: Leaf Hopper (Provado)	0.83	13	8	33	0	54
Pickup: Business use for vineyard	1.50	23	18	0	0	41
ATV: Miscellaneous vineyard use	2.00	31	2	0	0	33
<b>TOTAL CULTURAL COSTS</b>	<b>23.24</b>	<b>312</b>	<b>100</b>	<b>396</b>	<b>85</b>	<b>893</b>
<b>Harvest:</b>						
Harvest: Machine Harvest & Haul	0.00	0	0	0	345	345
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>345</b>	<b>345</b>
Interest on operating capital						28
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>312</b>	<b>100</b>	<b>396</b>	<b>430</b>	<b>1,265</b>
<b>Cash Overhead:</b>						
Office Expense						75
Liability Insurance						6
Sanitation						20
Property Taxes						107
Property Insurance						32
Investment Repairs						174
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>415</b>
<b>TOTAL CASH COSTS/ACRE</b>						<b>1,680</b>
<b>Non-Cash Overhead:</b>						
		Per producing Acre		Annual Cost	Capital Recovery	
Land		6,052		364		364
Drip Irrigation System		950		74		74
Buildings		522		46		46
Tools-Shop/Field		104		10		10
Fuel Tanks		30		2		2
Vineyard Establishment		7,104		590		590
Equipment		496		67		67
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>15,259</b>		<b>1,153</b>		<b>1,153</b>
<b>TOTAL COSTS/ACRE</b>						<b>2,834</b>

UC COOPERATIVE EXTENSION  
**Table 3. COSTS AND RETURNS to PRODUCE WINE GRAPES**  
 SAN JOAQUIN VALLEY - 2005

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Wine Grapes	12.00	Ton	200.00	2,400	
<b>OPERATING COSTS</b>					
<b>Trellis System:</b>					
Trellis Materials	1.00	acre	10.00	10	
<b>Custom:</b>					
Prune Mechanical	1.00	acre	85.00	85	
Machine Harvest	1.00	acre	225.00	225	
Haul to Crusher	12.00	ton	10.00	120	
<b>Herbicide:</b>					
Roundup Ultra Max	1.66	pint	8.56	14	
Goal 2XL	1.00	pint	16.21	16	
Surflan 4 AS	2.64	pint	16.96	45	
<b>Irrigation:</b>					
Water	30.00	acin	5.67	170	
<b>Fungicide:</b>					
Wettable Sulfur	6.00	lb	0.21	1	
Dusting Sulfur	30.00	lb	0.18	5	
Rubigan EC	4.00	floz	2.50	10	
Flint	1.50	oz	16.49	25	
<b>Fertilizer:</b>					
UN 32	40.00	lb N	0.41	16	
Neutral Zinc 50%	5.00	lb	0.92	5	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.86	27	
Kryocide	6.00	lb	3.00	18	
Provado 1.6 Solupak	0.75	oz	43.96	33	
Labor (machine)	15.71	hrs	12.73	200	
Labor (non-machine)	10.15	hrs	11.05	112	
Fuel - Gas	7.93	gal	1.95	15	
Fuel - Diesel	27.34	gal	1.50	41	
Lube				8	
Machinery repair				35	
Interest on operating capital @ 7.65%				28	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>1,265</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>1,135</b>	
<b>Cash Overhead:</b>					
Office Expense				75	
Liability Insurance				6	
Sanitation				20	
Property Taxes				107	
Property Insurance				32	
Investment Repairs				174	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>				<b>415</b>	
<b>TOTAL COSTS/ACRE</b>				<b>1,680</b>	
<b>Non-Cash Overhead:</b>					
Land				364	
Drip Irrigation System				74	
Buildings				46	
Tools-Shop/Field				10	
Fuel Tanks				2	
Vineyard Establishment				590	
Equipment				67	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>				<b>1,153</b>	
<b>TOTAL COSTS/ACRE</b>				<b>2,834</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>-434</b>	

UC COOPERATIVE EXTENSION  
**Table 4. MONTHLY CASH to PRODUCE WINE GRAPES**  
 SAN JOAQUIN VALLEY - 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:													
Vines: Layering Missing Vines	11												11
Trellis: Repair	32												32
Prune (mechanical)	85												85
Prunc: Clean Up Vines (hand prune)	44												44
Prunc: Rake Prunings (mechanical)	5												5
Wced: Winter Strip Spray (Roundup, Goal, Surflan)		79											79
Irrigate: (water & labor)			11	15	22	46	52	32	26				204
Weed: Mow 4X (March includes shred prunings)			8		5	5		5					22
Insect: Mcalybug, (Lorsban)			49										49
Weed: Spot Spray 20% acres (Roundup)				14			14						28
Weed: Disc				7									7
Disease: Mildew (Wettable Sulfur)				44									44
Disease: Mildew (Dusting Sulfur)				9	9	9							26
Fertilize: through drip (UN32)					9	9							17
Insect: Worms (Kryocide). Disease: Mildew (Rubigan). Fertilizer: (Zn)					54								54
Prunc: Skirt Vines						6	6						11
Disease: Mildew (Flint)						46							46
Insect: Leaf Hopper (Provado)							54						54
Pickup: Business use for vineyard	3	3	3	3	3	3	3	3	3	3	3	3	41
ATV 4WD: Miscellaneous vineyard use	3	3	3	3	3	3	3	3	3	3	3	3	33
<b>TOTAL CULTURAL COSTS</b>	<b>184</b>	<b>85</b>	<b>74</b>	<b>94</b>	<b>104</b>	<b>126</b>	<b>132</b>	<b>43</b>	<b>32</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>893</b>
Harvest:													
Harvest: Machine Harvest & Haul								345					345
<b>TOTAL HARVEST COSTS</b>								<b>345</b>					<b>345</b>
Interest on operating capital @ 7.65%	1	2	2	3	3	4	5	8	0	0	0	0	28
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>185</b>	<b>87</b>	<b>76</b>	<b>97</b>	<b>108</b>	<b>131</b>	<b>137</b>	<b>395</b>	<b>32</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>1,265</b>
Cash Overhead:													
Office Expense	6	6	6	6	6	6	6	6	6	6	6	6	75
Liability Insurance	6												6
Sanitation	2	2	2	2	2	2	2	2	2				20
Property Taxes	54						54						107
Property Insurance	16						16						32
Investment Repairs	15	15	15	15	15	15	15	15	15	15	15	15	174
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>	<b>99</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>93</b>	<b>23</b>	<b>23</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>415</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>284</b>	<b>110</b>	<b>99</b>	<b>120</b>	<b>131</b>	<b>154</b>	<b>230</b>	<b>418</b>	<b>55</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>1,680</b>



UC COOPERATIVE EXTENSION  
**Table 5. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY - 2005

COSTS PER ACRE AT VARYING YIELD TO PRODUCE WINE GRAPES

	YIELD (ton/acre)						
	8.00	9.00	10.00	11.00	12.00	13.00	14.00
<b>OPERATING COSTS:</b>							
Cultural Cost	893	893	893	893	893	893	893
Harvest Cost	305	315	325	335	345	355	365
Interest on operating capital	27	27	28	28	28	28	28
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>1,225</b>	<b>1,235</b>	<b>1,246</b>	<b>1,256</b>	<b>1,266</b>	<b>1,276</b>	<b>1,286</b>
<i>Total Operating Costs/ton</i>	153	137	125	114	106	98	92
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>415</b>	<b>415</b>	<b>415</b>	<b>415</b>	<b>415</b>	<b>415</b>	<b>415</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>1,640</b>	<b>1,650</b>	<b>1,661</b>	<b>1,671</b>	<b>1,681</b>	<b>1,691</b>	<b>1,701</b>
<i>Total Cash Costs/ton</i>	205	183	166	152	140	130	122
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,153</b>	<b>1,153</b>	<b>1,153</b>	<b>1,153</b>	<b>1,153</b>	<b>1,153</b>	<b>1,153</b>
<b>TOTAL COSTS/ACRE</b>	<b>2,793</b>	<b>2,803</b>	<b>2,814</b>	<b>2,824</b>	<b>2,834</b>	<b>2,844</b>	<b>2,854</b>
<i>Total Costs/ton</i>	349	311	281	257	236	219	204

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE	YIELD (ton/acre)						
	8.00	9.00	10.00	11.00	12.00	13.00	14.00
\$/ton							
100.00	-425	-335	-246	-156	-66	24	114
125.00	-225	-110	4	119	234	349	464
150.00	-25	115	254	394	534	674	814
175.00	175	340	504	669	834	999	1,164
200.00	375	565	754	944	1,134	1,324	1,514
225.00	575	790	1,004	1,219	1,434	1,649	1,864
250.00	775	1,015	1,254	1,494	1,734	1,974	2,214

NET RETURNS PER ACRE ABOVE CASH COST

PRICE	YIELD (ton/acre)						
	8.00	9.00	10.00	11.00	12.00	13.00	14.00
\$/ton							
100.00	-840	-750	-661	-571	-481	-391	-301
125.00	-640	-525	-411	-296	-181	-66	49
150.00	-440	-300	-161	-21	119	259	399
175.00	-240	-75	89	254	419	584	749
200.00	-40	150	339	529	719	909	1,099
225.00	160	375	589	804	1,019	1,234	1,449
250.00	360	600	839	1,079	1,319	1,559	1,799

NET RETURNS PER ACRE ABOVE TOTAL COST

PRICE	YIELD (ton/acre)						
	8.00	9.00	10.00	11.00	12.00	13.00	14.00
\$/ton							
100.00	-1,993	-1,903	-1,814	-1,724	-1,634	-1,544	-1,454
125.00	-1,793	-1,678	-1,564	-1,449	-1,334	-1,219	-1,104
150.00	-1,593	-1,453	-1,314	-1,174	-1,034	-894	-754
175.00	-1,393	-1,228	-1,064	-899	-734	-569	-404
200.00	-1,193	-1,003	-814	-624	-434	-244	-54
225.00	-993	-778	-564	-349	-134	81	296
250.00	-793	-553	-314	-74	166	406	646

UC COOPERATIVE EXTENSION  
**Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT,  
 SAN JOAQUIN VALLEY - 2005**

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
05	60HP 4WD Narrow Tractor	36,000	15	7,009	3,408	149	215	3,772
05	ATV 4WD	6,700	5	3,003	1,058	34	49	1,140
05	Brush Rake	6,500	10	1,149	796	27	38	861
05	Brush Shredder 6 ft	9,000	15	864	890	34	49	974
05	Cane Cutter	2,500	20	130	215	9	13	237
05	Disc - Tandem 8 ft	6,800	10	1,203	833	28	40	901
05	Duster - 3 Pt	5,000	5	1,629	898	23	33	954
05	Mower-Rotary 6 ft	2,050	10	363	251	8	12	272
05	Vine Sprayer 500 gal	20,378	5	6,638	3,662	94	135	3,890
05	Pickup Truck 1/2 Ton	26,000	7	9,863	3,484	124	179	3,788
05	Sprayer ATV 20 gal	350	10	62	43	1	2	46
05	Weed Sprayer 3PT 100 gal	3,500	10	619	429	14	21	464
TOTAL		124,778		32,532	15,968	545	787	17,300
60% of New Cost *		74,867		19,519	9,581	327	472	10,380

\* 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	
Building 2,400 sqft	60,000	20		5,235	208	300	1,200	6,943
Drip Irrigation System	38,000	25		2,975	132	190	760	4,057
Vineyard Establishment	284,160	22		23,619	985	1,421	5,683	31,707
Fuel Tanks 2-250 gal	3,500	30	350	250	13	19	70	353
Land	696,000	25	696,000	41,830	0	6,960	0	48,790
Tools: Shop/Field	12,000	15	1,133	1,188	46	66	240	1,539
TOTAL INVESTMENT	1,093,660		697,483	75,097	1,383	8,956	7,953	93,389

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm		Price/ Unit	Total Cost
	Unit	Unit		
Liability Insurance	115	acre	5.74	660
Office Expense	115	acre	75.00	8,625
Sanitation Fee	115	acre	20.43	2,349

UC COOPERATIVE EXTENSION  
**Table 7. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - 2005

Yr Description	COSTS PER HOUR							
	Actual	Cash Overhead			Operating			Total
	Hours	Capital	Insur-	Taxes	Repairs	Fuel &	Total	
Used	Recovery	ance			Lube	Oper.	Costs/Hr.	
05 60HP 4WD Narrow Tractor	1,066	1.96	0.08	0.12	.89	5.08	5.97	8.09
05 ATV 4WD	400	1.59	0.05	0.07	0.50	0.75	1.25	2.96
05 Brush Rake	250	1.91	0.06	0.09	0.91	0.00	0.91	2.98
05 Brush Shredder 6 ft	131	4.03	0.15	0.22	4.04	0.00	4.06	8.47
05 Cane Cutter	100	1.29	0.05	0.08	0.95	0.00	0.95	2.38
05 Disc - Tandem 8 ft	200	2.51	0.08	0.12	1.10	0.00	1.10	3.81
05 Duster - 3 Pt	240	2.25	0.06	0.08	0.73	0.00	0.73	3.12
05 Mower-Rotary 6 ft	200	0.75	0.03	0.04	0.98	0.00	0.98	1.79
05 Vine Sprayer 500 gal	401	5.49	0.14	0.20	3.59	0.00	3.59	9.42
05 Pickup Truck 1/2 Ton	285	7.34	0.26	0.38	1.91	10.28	12.19	20.16
05 Sprayer ATV 20 gal	150	0.17	0.01	0.01	0.10	0.00	0.10	0.28
05 Weed Sprayer 3PT 100 gal	200	1.28	0.04	0.06	0.61	0.00	0.61	1.99

UC COOPERATIVE EXTENSION  
**Table 8. OPERATIONS WITH EQUIPMENT**  
 SAN JOAQUIN VALLEY - WINE GRAPES 2005

Operation	Operation			Material	Broadcast Rate/acre	Unit
	Month	Tractor	Implement			
<b>Cultural:</b>						
Vines: Layer vines	January			Labor	1.00	hrs
Trellis: Repair	January			Labor	2.00	hrs
				Materials	10.00	ac
Prune (mechanical)	January	Custom				
Prune: Clean up vines (hand prune)	January			Labor	4.00	hrs
Prune: Rake Prunings (mechanical)	January	60HP 4WD	Brush Rake			
Prune: Skirt Vines (mechanical)	June	60HP 4WD	Cane Cutter			
	July	60HP 4WD	Cane Cutter			
Weed: Winter Strip	February	60HP 4WD	Weed Sprayer 3 Pt	Roundup	0.66	pt
				Goal	1.00	pt
				Surflan	2.64	pt
Weed: Mow	March	60HP 4WD	Shredder			
	May	60HP 4WD	Mower - Rotary			
	June	60HP 4WD	Mower - Rotary			
	August	60HP 4WD	Mower - Rotary			
Weed: Spot Spray	April	ATV	ATV Sprayer	Roundup	0.50	pt
	July	ATV	ATV Sprayer	Roundup	0.50	pt
Weed: Disc	April	60HP 4WD	Disc - Tandem			
Irrigate:	March			Water	1.00	acin
	April			Water	2.00	acin
	May			Water	3.00	acin
	June			Water	7.00	acin
	July			Water	8.00	acin
	August			Water	5.00	acin
	September			Water	4.00	acin
Disease: Mildew	April	60HP 4WD	Vine Sprayer	Wettable Sulfur	3.00	lb
	April	60HP 4WD	Vine Sprayer	Wettable Sulfur	3.00	lb
	April	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	May	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	June	60HP 4WD	Vine Sprayer	Flint	1.50	oz
	June	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
Insect. Disease. Fertilize	May	60HP 4WD	Vine Sprayer	Kryocide (Skeletonizer)	6.00	lb N
				Rubigan (Mildew)	4.00	floz
				Neutral Zinc	5.00	lb
Insect: Mealybug	March	60HP 4WD	Vine Sprayer	Lorsban	6.00	pint
Insect: Leafhopper	July			Provado	0.75	oz
Fertilize: through drip	May			UN32	20.00	lb N
	June			UN32	20.00	lb N
Harvest: Machine Pick and Haul	August	Custom				

# Table Grapes

## Table Grape

<b>Winter</b>		<b>Associated Cost/acre</b>
Pruning		\$309.00
Fertilizer Application		\$28.00
Trellis Maintenance		\$32.00
Plant layers		\$11.00
Shred Prunings*		\$8.00
<b>Spring</b>		
<b>Action</b>		
Irrigation		\$165.00
Weed Control		\$151.00
Cultivation		\$25.00
Leaf & Shoot Removal		\$532.00
Thinning		\$213.00
Gibberellic Acid		\$179.00
Girdling		\$131.00
Fungicide Application		\$241.00
Pest Control		\$102.00
<b>Summer/Fall</b>		
Mow Weeds/Cut Canes		\$15.00
Harvest & Market		\$5,450.00
<b>Overhead Expenses</b>		
Cash: Taxes, Insurance, Office, Electricity, Permit Fees		\$305.00
Non-Cash Overhead Expenses		\$1,472.25
<b>Total Cost</b>		<b>\$9,662.25</b>
<b>Total Income</b>		<b>\$10,022.05</b>
Avg. Price/box	\$11.35	
Avg. Box/acre	883	
<b>Net Return/acre</b>		<b>\$359.80</b>

**Cost Data:**

Cost & Return Data, Agricultural Economics UC Davis  
 Cost & Return Data, Agricultural Economics UC Davis  
 Cost & Return Data, Agricultural Economics UC Davis  
 Cost & Return Data, Agricultural Economics UC Davis

[http://coststudies.ucdavis.edu/files/grapets\\_vs2007.pdf](http://coststudies.ucdavis.edu/files/grapets_vs2007.pdf)  
<http://coststudies.ucdavis.edu/files/grapecrimsonvs2007.pdf>  
[http://coststudies.ucdavis.edu/files/graperedglobe\\_vs2007.pdf](http://coststudies.ucdavis.edu/files/graperedglobe_vs2007.pdf)  
[http://coststudies.ucdavis.edu/files/grapeflame\\_vs2007.pdf](http://coststudies.ucdavis.edu/files/grapeflame_vs2007.pdf)

## Income

Year	Yield Per Acre (Tons)	Yield Per Acre (lb)	Boxes Per Acre (21 lb = 1 box)	Bearing Acreage	Total Boxes	Avg. Box Price
2000	8.7	17,400	829	89,000	81,524,000	
2001	8.07	16,140	769	88,000	74,712,000	\$11.07
2002	8.44	16,880	804	88,000	78,144,000	\$10.55
2003	8.61	17,220	820	85,000	77,070,000	\$11.09
2004	9.28	18,560	884	83,000	81,257,000	\$11.36
2005	10.4	20,800	990	83,000	90,885,000	\$11.48
2006	8.64	17,280	823	83,000	75,447,000	\$12.24
2007	9.65	19,300	919	82,000	83,312,000	\$11.99
2008	11.7	23,400	1,114	83,000	102,256,000	\$11.00
<b>Average</b>	9.28	18,533	<b>883</b>			<b>\$11.35</b>

**Yield Per Acre:** USDA-NASS Noncitrus Fruits & Nuts Summary (2006-08); <http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2009/NoncFruNu-07-08-2009.pdf>  
Noncitrus Fruits & Nuts Summary (2003-05); <http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2005/NoncFruNu-07-06-2005.pdf>  
Noncitrus Fruits & Nuts Summary (2000-02); [http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2003/NoncFruNu-07-08-2003\\_Annual\\_Summary.pdf](http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2003/NoncFruNu-07-08-2003_Annual_Summary.pdf)

**Bearing Acreage:** USDA-NASS Noncitrus Fruits & Nuts Summary (2006-08); <http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2009/NoncFruNu-07-08-2009.pdf>  
Noncitrus Fruits & Nuts Summary (2003-05); <http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2005/NoncFruNu-07-06-2005.pdf>  
Noncitrus Fruits & Nuts Summary (2000-02); [http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2003/NoncFruNu-07-08-2003\\_Annual\\_Summary.pdf](http://usda.mannlib.cornell.edu/usda/nass/NoncFruNu//2000s/2003/NoncFruNu-07-08-2003_Annual_Summary.pdf)

## **Pullout Costs**

<b><u>Chipping (1)</u></b>	
	Cost/Acre
Remove Trellis & Stakes (Labor & Equipment)	\$508.64
Labor - \$259.20, Equipment - \$250	
Cut Wire & Remove from Field	\$266.00
Labor - \$216, Equipment - \$50	
Could be multiple wires @ \$180/wire	
Push and Pile Cost	\$160.00
Chip Stacked Piles	\$200.00
20 acres/day (varies)	
Dust Control ~\$400/day	\$20.00
<b><u>Remove and Dump Roots and Stumps after Chipping</u></b>	
~4 tons/acre	
Deliver and dump container at Composter (\$225/load)	\$90.00
10 tons/load	
\$25.00/ton Composting	\$100.00
Tractor /labor to load roots into Container	\$54.00
<b><i>Total Cost of Chipping</i></b>	<b><i>\$1,398.64</i></b>



## **Pullout Costs**

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	Cost/Acre
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Tractor /labor to load roots into Container	\$54.00
<b><i>Total Cost of Chipping</i></b>	<b><i>\$1,398.64</i></b>

(1) - Commercial grinders state that if they remove non-vegetative material cost = 1,000/acre+, which does not include root and stump removal

<b><u>Burning</u></b>	
	Cost/Acre
Cut Wire	\$5.40
Push and Pile Cost	\$160.00
Burn Permit Fee	\$26.00
Burn Control (supervise burn)	\$11.82
Remove Roots and Stumps before Burn ~4 tons/acre	
Tractor/trailer/labor to load roots into piles	\$54.00
Remove Steel after Burn 20 acres/8 hour	\$11.82
<b><i>Total Cost of Burning</i></b>	<b><i>\$269.04</i></b>

If steel is removed before burn, cost would increase

Burning and chipping costs are derived from growers, chippers, and farm labor contractors.

## Table Grapes

**Methodology:** Cost Study data was collected based on the four most common varieties of table grapes (Thompson Seedless, Crimson Seedless, Red Globe, and Flame). These four varieties constitute approximately 70% of the total shipments of table grapes<sup>1</sup>. The cost study data is from 2007 and the four varieties are the only varieties for which the data exists. Costs are generally consistent across varieties, with the exception of pruning and harvesting. In these cases, costs were averaged across the four varieties to determine the cost for this exercise. In all cases, costs were verified by multiple growers. The cost study data for table grapes is based on 2007 data. Growers estimated that costs have increased approximately 10% since then, with higher costs for water, labor, and fuel being the main factors.

The non-cash overhead costs are based on the repayment of the establishment and other long-term costs of the vineyard. Costs associated with non-cash overhead include: land purchase, tools, fuel tanks, irrigation system, establishment costs, and equipment. Land and establishment costs are based over the 25 years of assumed production of the vineyard. 25 years is the standard production lifetime for a vineyard; after 25 years, the production deteriorates. Many vineyards continue to be in production past the 25 year mark, because growers cannot afford the up-front costs of establishing a new vineyard. The cost study information makes note of the fact that their costs do not take into account the cost of paying the owner a salary. The owner is assumed to be paid on any positive return at the end of the year.

Pullout Costs were calculated based on conversations with growers, chippers, and farm labor contractors. The vineyard trellis system would have a combination of metal stakes and cross arms, as well as multiple support wires which would have to be removed before the vineyard can be chipped. The labor rate used was \$8.00 per hour (the state minimum wage), plus 35% to take into account all state and federal taxes, social security deductions, and worker's compensation insurance. The labor rate may be higher depending on the labor conditions. Another issue with chipping is that chippers are not always able to do their work on the farmer's schedule. It can take weeks or even months to have a field chipped, at which point it may be too late to plant for the next season.

The stakes would be removed by three workers operating a loader in the field. Two workers would use chains to remove the stakes and one employee would operate the loader. These workers would be able to complete approximately one acre in an 8 hour workday. When burning, the stakes are piled with the vines, and removed after the burn.

Wire must also be removed from the vineyard before it can be chipped. Depending on the chipper's equipment, wire must be removed completely from the vineyard or must be present only in very short lengths. This presents an issue for vineyards where a cordon is created by wrapping the vine around the wire in the second year. As the vine grows, the wire becomes more and more embedded in the vine, making it impossible to remove. In some trellis systems, there may be as many as four wires embedded in the cordon. Chippers reported this wire causing problems and getting wrapped around the moving

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<sup>1</sup> Source: California Table Grape Commission, Total Shipments – 2008.

parts of their machinery. It was also reported that the bio mass facilities prefer not to receive material with wire, because the wire causes havoc with their equipment.

Wire removal is based on the cutting and removal of the wire from the field. For the chipping calculation, the wire removal cost estimate is significantly higher than the wire removal from burning. When wire is removed from a chipped vineyard, the wire has to be cut at every point where it is exposed. An individual wire would be cut between 700 and 800 times (depending on the number of vines in a row) per quarter mile. When burning, the wire has to be cut only once every 4-6 vines. This is only 45-60 per wire per row. The other issue for chipping is the removal of the clips or dog ears that hold the wire in place. These have to be removed from every stake in order to pull out the wire. Additionally, loose wire must also be picked up before the equipment can come into the field. Growers and contractors relayed that the wire removal for a single wire (the main wire) would take approximately 20 man-hours, as well as the use of a tractor or ATV to drive around picking up buckets full of pieces of wire. Each additional wire in the trellis system would cost \$180 per wire. A typical trellis system for table grapes would have between 4-8 wires. Growers who are able to burn do not have this issue, as the wire stays with the vine until burned, and can then be picked up with a loader or forklift from the piles. This wire is then loaded onto a truck and taken to a recycling center.

Root removal also differs with regards to chipping or burning. Roots and stumps must be removed from the field before it can be replanted. In a typical vineyard, there will be approximately 4 tons of roots and stumps remaining in the field when the vines are laid over and piled. These roots will have to be excavated using a chisel to get them out of the ground, and hand and machine labor to remove them from the field. When burning, the roots and stumps can be placed into the burn piles along with the above-ground material. When chipping, the roots must be hauled from the field to either a composter or dump. Chippers stated that they do not like to chip roots because of the amount of dirt that is associated. This volume of dirt negatively affects the machinery and causes wear and tear. The rates listed on the attached sheets are for the most cost-effective removal and disposal of the roots. The roots and stumps would be hauled by truck to the composter that charges \$25 per ton for the material. This compares favorably to the \$60 per ton that was quoted at the waste disposal site.

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

**SAMPLE COSTS TO  
ESTABLISH AND PRODUCE  
TABLE GRAPES**

**FLAME SEEDLESS**



**SAN JOAQUIN VALLEY - SOUTH**

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UC COOPERATIVE EXTENSION

**SAMPLE COSTS TO ESTABLISH AND PRODUCE TABLE GRAPES**

Flame Seedless

**San Joaquin Valley – South 2007**

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**INTRODUCTION**

Sample costs to establish a vineyard and produce Flame Seedless table grapes 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 these same practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering 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 can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1517 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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The University of California and the United States Department of Agriculture, Risk Management Agency, cooperating.

## ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce Flame Seedless table grapes in the San Joaquin Valley. The cultural practices shown represent production operations and materials considered typical of a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as 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.**

**Farm.** The hypothetical farm consists of 120 contiguous acres. Vineyard establishment and Flame Seedless table grape production is on 40 acres. Other vineyards are on 75 acres and roads, irrigation systems, and farmstead occupy five acres. The farm is owned and managed by the grower.

### Establishment Cultural Practices & Material Inputs (Table 1)

**Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from vines or trees should be fallowed for two years except for a possible grain crop. The land is assumed to be fairly level. A custom operator chisels the ground (subsoils) twice to a depth of 4-5 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disced twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in vines or trees and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Plant.** Planting the vineyard starts by laying out and marking vine sites in early spring. Holes are dug and vines planted and a two-inch by two-inch cardboard carton placed around the vine. In the second year, 2% or 10 vines per acre are replaced.

**Vines.** The Flame Seedless plants are dormant, bench-grafted rootstock vines purchased from a commercial nursery. The grapevines are planted during the first spring on a 7-foot x 12-foot spacing (vine x row) with 518 vines per acre. Vines are trained during the first and second years to quadrilateral cordons. The grapevines will begin yielding fruit in the third year and then be productive for an additional 22 years.

**Trellis System.** A commercial company installs the trellis system in the second year. The trellis system will be removed when the vineyard is removed; therefore it is considered part of the vineyard and included in the establishment costs. Materials for the open gable trellis are as follows: (1) Stakes with V structure are placed every 24-feet down the row. Metal stakes (2 lbs/ft strength) are 8.5-feet long and placed in the ground 3-feet. The open gable is 72-inches wide from tip to tip. (2) End assemblies consist of 9.5-foot metal post (4 lb/ft) with a V that matches those within the row and with 10-inch helix anchor. (3) Eight wires, 12.5 gauge high tensile, are used for canopy and cordon support; three wires, 14 gauge high tensile, are used for movable catch wires and drip hose support. For growers planting and training vines in the first year for harvest in the second year, trellis installation should be completed in the first year and the cost shown accordingly.

**Train/Prune.** Vines are pruned to one two bud spur in the first dormant season (December to February, January in this study).

**Train.** The following spring (second year), a single shoot is selected and trained up the stake to form the permanent structure of the vine. Training consists of tying the shoot; removing lateral shoots from the base and tipping the shoot when it reaches desired cordon height. Most of the training costs occur during the second summer. The third summer is devoted to training missing vines or vines delayed in growth.

**Prune.** In the third year (January), vines are pruned much like an established vine. The exception is that in the third year the cordons are essentially canes; therefore, short spurs or no spurs are left at node positions. With mature vines 6 two bud spurs are retained on each of the four cordons. Prunings are placed in the row middles and shredded. Selecting and tying canes to fruiting wires is required each year for the life of the vineyard. Suckers from vine trunks are removed in April, a practice that continues each year but diminishes as the vineyard matures.

**Irrigate.** Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet deep. The vineyard is irrigated during the growing season from April through October during the establishment years. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors. The amount of water applied to the vineyard varies through the establishment years and is shown in Table A.

Year	Ach/Year
1	8
2	18
3+	36

**Fertilize.** Liquid nitrogen fertilizer, UN32, is applied through the irrigation system in April of the first year at five pounds of N per acre. A single application is made in April of the second year. The amount of nitrogen applied each year increases as the vineyard matures and is shown in Table B. It is important to identify sources of nitrogen in order to properly manage the nitrogen budget. For example, sources of nitrogen such as irrigation well water should be calculated to determine future irrigation and fertilizer needs.

Year	Lbs of N
1	5
2	25
3+	50

**Pest Management.** For pest identification, monitoring, management and pesticide information, visit the UC IPM website at [www.imp.ucdavis.edu](http://www.imp.ucdavis.edu). Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on pesticide use permits, contact the local county Agricultural Commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.**

**Weeds (Vineyard Floor Management).** In October of the year prior to planting, Treflan is applied to the vineyard floor and incorporated by discing. After planting, weeds in the vine rows and middles are managed with discing, mowing, and/or herbicides. From March through July of the first year, the row middles are disced twice and mowed twice. The vine rows are hand weeded in April. The row middles are mowed three to four times during the growing season starting the second year. The vine rows are sprayed (strip spray) in January of the second year with Roundup and Surflan. The strip spray is applied to 30% of the acreage. Also in the second year, spot sprays using Roundup are applied to the vine row in April, June, and July. The spot sprays (weedy spots or areas) are applied using an all terrain vehicle (ATV) with a sprayer attached.

**Insects.** Beginning in the second year, western grapeleaf skeletonizer (*Harrisina brillians*) is controlled in April with an application of Kryocide insecticide (mixed with micronized sulfur sprays). Additionally insects such as mealybugs are monitored each year beginning in the spring and may increase production costs if found.



If mealybugs (*Pseudococcus sp.*) are found during vineyard establishment, the grower should consult with a PCA, farm advisor, and/or ag commissioner to develop management strategies.

**Diseases.** Although many pathogens attack grapevines, phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*) are the two diseases managed in this study. In April of the second and third years, Microthiol plus Abound (strobilurin) are applied for phomopsis and mildew control. Mildew is controlled with various fungicide applications at 7 to 21 day intervals in the third year, depending on the fungicide used. For this study, the grower applies Kocide (copper), Rubigan (SI) mixture, and two Microthiol applications (one with Kryocide) in April; one Rubigan (SI) application and two dusting sulfur applications in May; one Rubigan (SI) application and two dusting sulfur applications in June. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to avoid powdery mildew populations from developing fungicide resistance.

**Vertebrate.** Rabbits, gophers, squirrels and coyotes are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or building a rabbit fence are utilized as necessary throughout the year. For this study no specific control is used, but an estimated cost for one or two management practices are shown in March. **Endangered Species:** It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest/Yield/Returns.** Growers sometimes plant and train vines in the same year, which produces a harvestable Flame Seedless table grape crop in the second year. Yields in the third year are approximately 50 to 75% of mature production. For this study, 400 boxes (19 pounds per box) of table grapes are assumed in the third year. If the crop in the third year is harvested for wine, a labor contractor may be needed.

### **Mature Production Cultural Practices and Material Inputs** (Tables 2-8)

**Prune/Sucker/Canopy Management (CM).** The quad-cordon trained vines are spur-pruned during the winter months (January) and the prunings are placed in the row middles and shredded. Suckers and sterile shoots are removed from the vine trunks and crowns in early April. Shoot thinning, shoot positioning and basal leaf removal are done by hand in April. Mechanical cane cutting (canopy skirting) is done in June with the grower's equipment.

**Fruit Management (FM).** Gibberellic acid (GA), a growth regulator, is applied at 6 grams per acre during bloom in May for blossom thinning (combined with mildew spray). GA is applied two times at 48 grams per acre for each application to increase berry size. The first application is applied at completion of shatter, about two weeks after full bloom (June) (combined with mildew spray) and the second spray is applied a week later (combined with mildew and insect spray). Gibberellic acid rates should be reduced for berry sizing when color development has been a historical problem. Vines are girdled to increase berry size 2 to 3 weeks after full bloom (June). Cluster tipping and hand thinning are done in late May to early June to loosen clusters and adjust cluster length and crop load. The growth regulator, Ethrel, is applied in late June to color the fruit.

**Trellis/Vines.** Trellis repairs are done annually (January in this study) and the cost is not taken from any specific data. Weak or missing vines are replaced by layering which is usually not an issue until the vineyard is over 10 years old. One year-old canes from neighboring vines are buried (layered) in the soil next to the stake. These vines are trained the following spring. The layer is severed after 3 to 4 years when the new vine is fully established. Trellis repair and vine replacement increases with vineyard age.

**Irrigate.** The vineyard is irrigated during the growing season from April through October. Deficit irrigation (80% ET) may be applied post harvest to promote vine growth and vine maturity. Deficit irrigation may also be applied three to four weeks before harvest to advance maturity and decrease decay. Deficit irrigation may not work well on weak or low vigor vineyards. Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet depth and pressurized to 20 psi. A total of 36 acre-inches is applied to the vineyard. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors.

**Fertilize.** Nitrogen (N) at 50 pounds per acre as UN32 is applied through the irrigation drip system in April or post harvest. Neutral zinc is applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

**Pest Control Adviser (PCA).** Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a PCA are not included in this study.

**Weeds (Vineyard Floor Management).** Vineyard middles are mowed three times each season: March, May, July. Surflan and Roundup herbicides are applied to the vine row/berm in February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in June.

**Insects.** Mealybugs (*Pseudococcus sp.*) are treated with Lorsban insecticide in March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated with Kryocide (mixed with Microthiol, Flint) during the first bloom spray in May. Grape leafhoppers (*Erythroneura elegantula*) are controlled with Provado insecticide (mixed with GA, Microthiol, Rally) during the second berry sizing spray in June. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. If mealybugs are found, they should be identified in order to determine if additional management strategies will be needed.

**Diseases.** Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*). Phomopsis and powdery mildew are both treated in late March (shoot length averages 2-inches) with Abound and Microthiol (micronized sulfur). Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. In this study, sulfur dust is applied three times - April, June, July. Microthiol and Rally, an SI, (with zinc) are applied in late April. Microthiol and Flint (with Kryocide) are applied with the first bloom spray in May. Microthiol (with GA) is applied at the second bloom spray in May. Rally and Microthiol (with GA) are applied during the first berry sizing in June and Microthiol and Rally (with GA, Provado) during the second berry size spray in June. Growers have the option of using sterol inhibitors (SI), quinolins, strobilurins, or sulfur (micronized, wettable, dust, flowable), as well as other fungicides to control powdery mildew. These materials are classes of fungicides with different modes of action. Check the IPM website under grapes for management options to control powdery mildew. It is recommended that applicators use fungicides with different modes of action in order to avoid fungicide resistance in powdery mildew populations.

**Vertebrate.** Gophers, squirrels coyotes and birds are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or shooting are utilized as necessary throughout the year. For this study no specific control is used, but per acre costs are shown from March through October and are an estimate not based on any specific data. **Endangered Species:** It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest.** The crop is picked beginning in July or August and packed in the field. Harvest crews work in teams of three or four. Depending on crop quality, the team can pick and pack an average of 3 to 6 boxes per hour per individual. For this study, we use four packed boxes per hour per individual. Two or three pickers field pick and trim the grapes, and put them in reusable field boxes. Approximately four field boxes are loaded on a wheelbarrow type cart and delivered to the packing person who trims, puts them in bags that are then placed in shipping boxes. The box holds 9 bags and weighs 19 pounds when filled. The packed boxes are loaded on a truck and hauled to storage. The swamp and haul cost includes the boxes, plastic bags, hauling and related labor. Pre cooling and palletization (P&P) costs may in some cases be a grower cost but are generally charged to the buyer. After 30 days of cold storage, the grower is charged approximately \$0.35 per box per month (\$0.25-0.45) until the fruit is sold. Brokerage fees are paid by the grower and range from 7 to 10% of the selling price. A figure of 9% of the selling price is used in this study.

Average Yields	
Year	Tons/Acre (boxes)
2002	8.13 (856)
2003	7.60 (800)
2004	7.76 (815)
2005	11.34 (1,194)
2006	9.66 (1,016)

Source: Fresno County Crop Reports, 2002-2006.  
Boxes = 19 lbs.

**Yields.** This study uses an average yield of 700, 19-pound boxes over the productive life of the vineyard to calculate returns. Average county yields for all table grape varieties are shown in Table C. The averages include all vineyards in production regardless of maturity and varieties.

**Returns.** Return prices for grapes at different yields and prices are shown in Table 5. Based on grower information, an estimated price of \$12 per box for Flame grapes is used in this study.

**Assessments/Inspection.** The California Table Grape Commission (CTGC) assesses \$0.1156 per 19-pound box or \$0.006087 per pound. Early in the season, growers often have the county Agricultural Commissioner inspect their fruit for maturity at a cost of \$0.035 per box. Approximately one-third of the entire crop is inspected to determine that maturity requirements are met, which includes soluble solids:acid ratios (20:1) and color.

**Pickup/ATV.** It is assumed that the grower uses the pickup for business and personal use. Estimated business mileage for the ranch is 5,250 miles. The all terrain vehicle (ATV) is used for spot spraying weeds and is included in that cost. It is assumed that the ATV will be used two hours per acre for checking the vineyards including the irrigation system.

**Labor.** Hourly wages for workers are \$11.00 for machine operators and \$8.50 per hour non-machine labor. Adding 33% for the employer's share of federal and state payroll taxes, workers compensation insurance for vine crops (0040) and other possible benefits gives the labor rates shown of \$14.63 and \$11.31 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 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 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agriculture Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum 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 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**Interest on Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 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. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2007.

**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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation.

**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 \$674 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$80 per producing acre or \$9,200 annually for the ranch. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Sanitation Services.** Sanitation services provide double portable toilets with washbasins for 10 months. The cost includes delivery and weekly cleaning service. The number of sanitation facilities will vary depending upon local regulations and size of labor force. In many cases labor contractors furnish the sanitation facilities for their crews and the costs are included in the contractor's labor overhead.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.

#### **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. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

**Interest Rate.** An interest rate of 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.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land in the San Joaquin Valley with table grape production ranges from \$6,000 to \$13,400 per acre (depending on vineyard age, variety and location). Cropland with district or well water in the area ranges from \$2,500 to \$12,000. For this study, the land value was established based on 2007 real estate values (2007 Trends & Leases); therefore a cost of \$7,000 per acre or \$7,304 per producing acre is used.

**Tools.** This is an assumed value for shop, hand, and miscellaneous field tools and not based on any grower's tool inventory.

**Fuel Tanks.** Two 300-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.

**Drip Irrigation System.** The drip lines, filters, booster pump and the labor to install the components are included in the irrigation system cost. The previous vineyard is assumed to have a pumping system that had been refurbished and therefore is not included as a cost. Water is delivered from a 130-foot depth using a 40-horsepower pump. The drip irrigation lines are laid directly on the ground prior to planting and the labor cost is included in the drip irrigation system cost.

**Establishment Cost.** The establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the third year, the first year that grapes are harvested. It is used to determine the non-cash overhead expense, capital recovery cost, during the production years. In this study, no crop was produced in the second year; therefore, the Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$7,207 per acre or \$288,280 for the 40 producing acres. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**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. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.

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For information concerning the above or other University of California publications, contact your local county UC Cooperative Extension office or UC DANR Communications Services online at <http://ucanr.org>.

UC COOPERATIVE EXTENSION  
**Table 1. COSTS PER ACRE TO ESTABLISH A FLAME SEEDLESS TABLE GRAPE VINEYARD**  
 SAN JOAQUIN VALLEY SOUTH - 2007

	Cost Per Acre			
	Year:	1st	2nd	3rd
Boxes Per Acre:	0	0	400	
<b>Planting Costs:</b>				
Site Prep: Subsoil 2X		400		
Site Prep: Float (Level)		12		
Site Prep: Disc/Apply Herbicide (Treflan)		17		
Site Prep: Disc/Incorporate Herbicide		12		
Plant: Survey & Layout Vineyard		70		
Plant: Plant, Wrap Vines		166	2	
Vines: 518 Per Acre (2% Replant In 2nd Year)		1,606	31	
Trellis: Trellis System (custom)			4,000	
<b>TOTAL PLANTING COSTS</b>		<b>2,282</b>	<b>4,033</b>	
<b>Cultural Costs:</b>				
Vertebrate: (Rabbit, Gopher, Squirrel)		40	15	15
Fertilize: Nitrogen (UN32)		3	12	23
Irrigate: Water/Labor		54	107	181
Weed: Disc Middle - 2X/Yr 1		16		
Weed: Mow Middle - 2X/Yr 1, 4X/Yr 2, 3X/Yr 3		16	31	24
Weed: Hand Hoe		34		
Prune: Dormant			73	79
Training: (Sucker, Tie)			271	136
Insect: Skeletonizer (Kryocide). Disease: Mildew (Microthiol)			36	36
Weed: Spot Spray (Roundup)			42	42
Weed: Winter Strip Spray (Roundup, Surflan)			53	53
Prune: Shred prunings				15
Disease: Phomopsis (Microthiol, Abound)				51
Disease: Mildew Control (Microthiol)				20
Insect: Leafhoppers 1X (Provado)				46
Disease: Mildew (Kocide, Rubigan)				50
Disease: Mildew 4X (Sulfur Dust)				39
Disease: Mildew 2X, (Rubigan)				56
Pickup: Business use		82	82	82
ATV: Field use		30	38	38
<b>TOTAL CULTURAL COSTS</b>		<b>274</b>	<b>761</b>	<b>985</b>
<b>Harvest Costs:</b>				
Pick & Field Pack (labor)				1,131
Spread/Stack boxes, Swamp, Haul (includes boxes, bags, labor)				921
Brokerage Fee				432
Assessment & Inspection Fees				51
<b>TOTAL HARVEST COSTS</b>				<b>2,535</b>
Interest On Operating Capital @ 10.00%		210	373	54
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,539</b>	<b>5,163</b>	<b>3,573</b>
<b>Cash Overhead Costs:</b>				
Office Expense		80	80	80
Liability Insurance		6	6	6
Sanitation Service		19	19	19
Property Taxes		85	87	88
Property Insurance		9	10	11
Investment Repairs (non-cash overhead items)		42	42	42
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>242</b>	<b>244</b>	<b>246</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>2,781</b>	<b>5,407</b>	<b>3,819</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>4,800</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>2,781</b>	<b>5,407</b>	<b>0</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		<b>0</b>	<b>0</b>	<b>981</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>2,781</b>	<b>8,187</b>	<b>7,207</b>



UC COOPERATIVE EXTENSION  
Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
Boxes Per Acre:	0	0	400	400
Non-Cash Overhead Costs (Capital Recovery):				
Land	530	530	530	530
Irrigation System	110	110	110	110
Shop Building	57	57	57	57
Shop Tools	14	14	14	14
Fuel Tank & Pump	2	2	2	2
Equipment	37	74	90	90
<b>TOTAL CAPITAL RECOVERY COST</b>	751	787	803	803
<b>TOTAL COST/ACRE FOR THE YEAR</b>	3,531	6,194	4,623	4,623
<b>INCOME/ACRE FROM PRODUCTION</b>	0	0	4,800	4,800
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>	3,531	6,194	0	0
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>	0	0	177	177
<b>TOTAL ACCUMULATED NET COST/ACRE</b>	3,531	9,726	9,548	9,548

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE FLAME TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

Operation	Cash and Labor Cost per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent		
<b>Operation Bold indicates corresponding section in assumptions</b>							
<b>Cultural:</b>							
Vine: Layering Missing Vines	1.00	11	0	0	0	11	
Prune: Vines	15.00	170	0	0	0	170	
Prune: Brush Disposal	0.50	9	7	0	0	15	
Trellis: Repair	2.00	23	0	10	0	33	
Weed: Winter Strip (Surflan, Roundup)	0.49	9	5	40	0	53	
Vertebrate: Gopher, Squirrel, Coyote, Bird (various methods)	0.00	0	0	15	0	15	
Insect: Mealybug (Lorsban)	0.50	9	7	25	0	41	
Disease: Phomopsis (Abound)/Mildew (Microthiol)	0.50	9	7	35	0	51	
Weed: Mow Middles 3X	0.74	13	11	0	0	24	
Disease: Mildew 3X (Dusting Sulfur)	0.84	15	9	6	0	30	
Sucker: Remove Trunk Suckers	2.00	23	0	0	0	23	
Disease: Mildew (Rally, Microthiol). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	9	7	28	0	44	
Fertilize: N through drip system (UN32)	0.00	0	0	23	0	23	
Irrigate: (Water)	2.55	29	0	165	0	194	
*CM: Shoot Thin/Position & Leaf Removal	50.00	566	0	0	0	566	
Disease: Mildew (Microthiol, Flint). Insect: Skeletonizer (Kryocide)	0.50	9	7	52	0	68	
*FM: Bloom Thin (GA). Disease: Mildew (Microthiol)	0.50	9	7	12	0	27	
FM: Berry Size (GA). Disease: Mildew (Rally, Microthiol)	0.50	9	7	103	0	119	
CM: Cane Cutting (Mechanical)	0.29	5	3	0	0	8	
FM: Cluster Tipping and Thinning	20.00	226	0	0	0	226	
FM: Girdling	12.00	136	0	0	0	136	
FM: Berry Size:(GA). Disease: Mildew (Rally, Microthiol). Insect: Leafhopper (Provado)	0.50	9	7	147	0	163	
Weed: Spot Spray (Roundup)	0.53	9	1	4	0	14	
FM: Color Fruit (Ethrel)	0.50	9	7	8	0	24	
Pickup: Business Use	2.39	42	40	0	0	82	
ATV: Irrigation and other	2.00	35	3	0	0	38	
<b>TOTAL CULTURAL COSTS/ACRE</b>	<b>116.33</b>	<b>1,389</b>	<b>132</b>	<b>675</b>	<b>0</b>	<b>2,196</b>	
<b>TOTAL CULTURAL COSTS/Box</b>		<b>1.98</b>	<b>0.19</b>	<b>0.96</b>	<b>0.00</b>	<b>3.14</b>	
<b>Harvest (400 boxes/acre):</b>							
Pick and Field Pack	175.00	1,979	0	0	0	1,979	
Boxes, Spread, Swamp & Haul	1.25	254	10	1,341	0	1,604	
Brokerage Fee	0.00	0	0	0	756	756	
Assessment & Inspection Fees	0.00	0	0	89	0	89	
<b>TOTAL HARVEST COSTS/ACRE</b>	<b>176.25</b>	<b>2,233</b>	<b>10</b>	<b>1,430</b>	<b>756</b>	<b>4,429</b>	
<b>TOTAL HARVEST COSTS/Box</b>		<b>3.19</b>	<b>0.01</b>	<b>2.04</b>	<b>1.08</b>	<b>6.33</b>	
<b>Interest on operating capital @ 10.00%</b>							
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>3,622</b>	<b>142</b>	<b>2,104</b>	<b>756</b>	<b>6,739</b>	
<b>TOTAL OPERATING COSTS/Box</b>		<b>5.17</b>	<b>0.20</b>	<b>3.01</b>	<b>1.08</b>	<b>9.63</b>	
<b>CASH OVERHEAD:</b>							
Office Expense							80
Liability Insurance							6
Sanitation Fees							19
Property Taxes							125
Property Insurance							37
Investment Repairs							42
<b>TOTAL CASH OVERHEAD COSTS</b>							<b>309</b>
<b>TOTAL CASH COSTS/ACRE</b>							<b>7,048</b>

\*CM = Canopy Management. FM = Fruit Management.

\*\*To find cost per box divide by 700

UC COOPERATIVE EXTENSION  
Table 2. continued

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
NON-CASH OVERHEAD:		Per producing Acre		-- Annual Cost -- Capital Recovery			
Land		7,304		530		530	
Drip Irrigation System		1,250		110		110	
Building		696		57		57	
Tools-Shop/Field		130		14		14	
Fuel Tanks 2-300G		30		2		2	
Vineyard Establishment		7,207		665		665	
Equipment		765		103		103	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>17,383</b>		<b>1,481</b>		<b>1,481</b>	
<b>TOTAL COSTS/ACRE</b>						<b>8,529</b>	
<b>TOTAL COSTS/box</b>						<b>12.18</b>	

UC COOPERATIVE EXTENSION  
**Table 3. MATERIAL & CUSTOM COSTS & NET RETURN PER ACRE FOR FLAME TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Flame Seedless Table Grapes (19 lb box)	700.00	box	12.00	8,400	
<b>OPERATING COSTS</b>					
<b>Trellis System:</b>					
Miscellaneous Repair Materials	1.00	acre	10.00	10	
<b>Herbicide:</b>					
Surflan 4 AS	2.40	pint	14.52	35	
Roundup Ultra Max	1.10	pint	7.80	9	
<b>Fungicide:</b>					
Abound (Strobilurin)	12.00	floz	2.86	34	
Microthiol Disperss (micronized wettable sulfur)	10.00	lb	0.83	8	
Dusting Sulfur	30.00	lb	0.22	6	
Rally 40W (Sterol Inhibitor)	12.00	oz	5.23	63	
Flint (Strobilurin)	2.00	oz	16.50	33	
<b>Vertebrate Control:</b>					
Shoot, Bait, Trap	1.00	acre	15.00	15	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.35	25	
Kryocide	6.00	lb	3.08	18	
Provado 1.6 Solupak	1.00	oz	44.21	44	
<b>Fertilizer:</b>					
Neutral Zinc 50% (foliar)	5.00	lb	1.08	5	
UN 32	50.00	lb N	0.46	23	
<b>Water:</b>					
Water Pumped	36.00	acin	4.59	165	
<b>Growth Regulator:</b>					
ProGibb 4% (Gibberelic Acid)	102.00	grams	1.68	171	
Ethrel	1.00	pint	8.04	8	
<b>Harvest Supplies:</b>					
Box 19 lb	700.00	box	1.60	1,120	
Plastic Bags 9/box	6,300.00	box	0.04	221	
<b>Contract:</b>					
Brokerage Fee (9% of selling price)	700.00	box	1.08	756	
<b>Assessment:</b>					
Table Grape Commission	700.00	box	0.12	81	
Quality Inspection (1/3 of yield)	233.00	box	0.04	8	
Labor (machine)	15.63	hrs	14.63	229	
Labor (non-machine)	300.05	hrs	11.31	3,394	
Fuel - Gas	11.78	gal	2.80	33	
Fuel - Diesel	23.49	gal	2.30	54	
Lube				13	
Machinery repair				42	
Interest on operating capital @ 10.00%				114	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>6,739</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>1,661</b>	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				80	
Liability Insurance				6	
Sanitation				19	
Property Taxes				125	
Property Insurance				37	
Investment Repairs				42	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>309</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>7,048</b>	

UC COOPERATIVE EXTENSION  
Table 3. continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Land				530	
Drip Irrigation System				110	
Building				57	
Tools-Shop/Field				14	
Fuel Tanks 2-300G				2	
Establishment Costs				665	
Equipment				103	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,481	
TOTAL COSTS/ACRE				8,529	
NET RETURNS ABOVE TOTAL COSTS				-129	

UC COOPERATIVE EXTENSION  
**Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE FLAME TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

Beginning JAN 07	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 07	07	07	07	07	07	07	07	07	07	07	07	07	
Cultural: <b>Bold</b> = see section in assumptions													
Vine: Layering Missing Vines	11												11
Prune: Vines	170												170
Prune: Brush Disposal	15												15
Trellis: Repair	33												33
Weed: Winter Strip (Surflan, Roundup)		53											53
Vertebrate: Gopher, Squirrel, Coyote, Bird (various methods)			2	2	2	2	2	2	2	2			15
Insect: Mealybug (Lorsban)			41										41
Disease: Phomopsis (Abound)/Mildew (Microthiol)			51										51
Weed: Mow Middles 3X			8		8		8						24
Disease: Mildew 3X (Dusting Sulfur)				10		10	10						30
Sucker: Remove Trunk Suckers				23									23
Disease: Mildew (Rally, Microthiol). Fertilize: Foliar Zinc (Neutral Zinc)				44									44
Fertilize: N through drip system (UN32)				23									23
Irrigate: (Water)				6	22	37	48	44	31	6			194
*CM: Shoot Thin/Position & Leaf Removal				566									566
Disease: Mildew (Microthiol, Flint). Insect: Skeletonizer (Kryocide)					68								68
*FM: Bloom Thin (GA). Disease: Mildew (Microthiol)					27								27
FM: Berry Size (GA). Disease: Mildew (Rally, Microthiol)						119							119
CM: Cane Cutting (Mechanical)						8							8
FM: Cluster Tipping and Thinning						226							226
FM: Girdling						136							136
FM: Berry Size:(GA). Disease: Mildew (Rally, Microthiol). Insect: Leafhopper (Provado)						163							163
Weed: Spot Spray (Roundup)						14							14
FM: Color Fruit (Ethrel)						24							24
Pickup: Business Use	7	7	7	7	7	7	7	7	7	7	7	7	82
ATV: Irrigation and other	3	3	3	3	3	3	3	3	3	3	3	3	38
<b>TOTAL CULTURAL COSTS</b>	<b>239</b>	<b>63</b>	<b>111</b>	<b>683</b>	<b>137</b>	<b>749</b>	<b>78</b>	<b>55</b>	<b>43</b>	<b>18</b>	<b>10</b>	<b>10</b>	<b>2,196</b>
Harvest:													
Pick & Field Pack**								1,979					1,979
Boxes, Sprcad, Swamp & Haul								1,604					1,604
Commission (precool, palletize, store, sell)								756					756
Assessment & Inspection Fees								89					89
<b>TOTAL HARVEST COSTS</b>								<b>4,429</b>					<b>4,429</b>
Interest on operating capital	2	3	3	9	10	17	17	55	-1	0	0	0	114
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>241</b>	<b>66</b>	<b>115</b>	<b>692</b>	<b>147</b>	<b>765</b>	<b>95</b>	<b>4,539</b>	<b>42</b>	<b>18</b>	<b>10</b>	<b>10</b>	<b>6,739</b>
OVERHEAD:													
Office Expense	7	7	7	7	7	7	7	7	7	7	7	7	80
Liability Insurance									6				6
Sanitation Fees	2	2	2	2	2	2	2	2	2	2			19
Property Taxes	62						62						125
Property Insurancc	18						18						37
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	42
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>93</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>93</b>	<b>12</b>	<b>18</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>309</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>334</b>	<b>78</b>	<b>127</b>	<b>704</b>	<b>159</b>	<b>777</b>	<b>188</b>	<b>4,551</b>	<b>60</b>	<b>30</b>	<b>20</b>	<b>20</b>	<b>7,048</b>

\*CM = Canopy Management. FM = Fruit Management \*\*In some areas of the valley, the majority of the harvest is in July

UC COOPERATIVE EXTENSION  
**Table 5. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY SOUTH - 2007

COSTS PER ACRE AT VARYING YIELD TO PRODUCE FLAME SEEDLESS TABLE GRAPES

	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
<b>OPERATING COSTS:</b>							
Cultural Cost	2,196	2,196	2,196	2,196	2,196	2,196	2,196
Harvest Cost	2,048	2,560	3,072	3,583	4,095	4,607	5,119
Brokerage Fee	432	540	648	756	864	972	1080
Assessment/Inspection Cost	51	64	77	89	102	115	128
Interest on operating capital	99	104	109	114	120	125	130
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>4,826</b>	<b>5,464</b>	<b>6,102</b>	<b>6,738</b>	<b>7,377</b>	<b>8,015</b>	<b>8,653</b>
Total Operating Costs/box	12.07	10.93	10.17	9.63	9.22	8.91	8.65
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>308</b>	<b>308</b>	<b>308</b>	<b>309</b>	<b>309</b>	<b>309</b>	<b>309</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>5,134</b>	<b>5,772</b>	<b>6,410</b>	<b>7,047</b>	<b>7,686</b>	<b>8,324</b>	<b>8,962</b>
Total Cash Costs/box	12.84	11.54	10.68	10.07	9.61	9.25	8.96
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,472</b>	<b>1,475</b>	<b>1,478</b>	<b>1,481</b>	<b>1,484</b>	<b>1,486</b>	<b>1,489</b>
<b>TOTAL COSTS/ACRE</b>	<b>6,606</b>	<b>7,247</b>	<b>7,888</b>	<b>8,528</b>	<b>9,170</b>	<b>9,810</b>	<b>10,451</b>
Total Costs/box	16.52	14.49	13.15	12.18	11.46	10.90	10.45

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
7.00	-1,626	-1,464	-1,302	-1,138	-977	-815	-653
8.00	-1,226	-964	-702	-438	-177	85	347
9.00	-826	-464	-102	262	623	985	1,347
10.00	-426	36	498	962	1,423	1,885	2,347
11.00	-26	536	1,098	1,662	2,223	2,785	3,347
12.00	374	1,036	1,698	2,362	3,023	3,685	4,347
13.00	774	1,536	2,298	3,062	3,823	4,585	5,347

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
7.00	-1,934	-1,772	-1,610	-1,447	-1,286	-1,124	-962
8.00	-1,534	-1,272	-1,010	-747	-486	-224	38
9.00	-1,134	-772	-410	-47	314	676	1,038
10.00	-734	-272	190	653	1,114	1,576	2,038
11.00	-334	228	790	1,353	1,914	2,476	3,038
12.00	66	728	1,390	2,053	2,714	3,376	4,038
13.00	466	1,228	1,990	2,753	3,514	4,276	5,038

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
7.00	-3,406	-3,247	-3,088	-2,928	-2,770	-2,610	-2,451
8.00	-3,006	-2,747	-2,488	-2,228	-1,970	-1,710	-1,451
9.00	-2,606	-2,247	-1,888	-1,528	-1,170	-810	-451
10.00	-2,206	-1,747	-1,288	-828	-370	90	549
11.00	-1,806	-1,247	-688	-128	430	990	1,549
12.00	-1,406	-747	-88	572	1,230	1,890	2,549
13.00	-1,006	-247	512	1,272	2,030	2,790	3,549

UC COOPERATIVE EXTENSION  
**Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, & 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	60 HP 4WD Narrow Tractor	47,000	15	9,150	4,885	200	281		5,366
07	ATV 4WD	6,700	5	3,003	1,125	35	49		1,209
07	Brush Shredder 6 ft	8,000	15	768	862	31	44		937
07	Cane Cutter	3,500	20	182	333	13	18		364
07	Duster - 3 Pt 12'	5,500	5	1,792	1,040	26	36		1,103
07	Mower-Flail 8'	10,500	15	1,008	1,132	41	58		1,230
07	Orchard/Vine Sprayer 500 gal	21,000	5	6,840	3,973	99	139		4,211
07	Pickup Truck 1/2 T	28,000	7	10,621	4,023	138	193		4,354
07	Sprayer ATV 20 gal	350	10	62	46	1	2		50
07	Truck - Flatbed (10 ton)	56,000	10	16,542	6,882	259	363		7,504
07	Weed Sprayer 3 PT 100 gal	4,000	10	707	526	17	24		566
<b>TOTAL</b>		<b>190,550</b>		<b>50,675</b>	<b>24,827</b>	<b>861</b>	<b>1,206</b>		<b>26,894</b>
<b>60% of New Cost *</b>		<b>114,330</b>		<b>30,405</b>	<b>14,896</b>	<b>517</b>	<b>724</b>		<b>16,136</b>

\* 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	
Building 2,400 sqft.	80,000	20		6,610	286	400	1,600	8,895
Drip Irrigation System 115 acres	50,000	25		4,388	179	250	1,000	5,816
Vineyard Establishment	288,280	22		26,605	1,029	1,441	0	29,075
Fuel Tanks 2-300 gal	3,500	30	350	286	14	19	70	389
Land	840,000	25	840,000	60,900	0	8,400	0	69,300
Tools-Shop/Field	15,000	15	1,500	1,614	59	83	300	2,056
<b>TOTAL INVESTMENT</b>	<b>1,276,780</b>		<b>841,850</b>	<b>100,402</b>	<b>1,566</b>	<b>10,593</b>	<b>2,970</b>	<b>115,531</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	115	acre	5.86	674
Office Expense	115	acre	80.00	9,200
Sanitation Fee	115	acre	19.35	2,225

UC COOPERATIVE EXTENSION  
**Table 7. 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 Opera.	
07	60 HP 4WD Narrow Tractor	1,065	2.75	0.11	0.16	1.12	7.79	8.91	11.93
07	ATV 4WD	400	1.69	0.05	0.07	0.49	1.07	1.56	3.37
07	Brush Shredder 6 ft	134	3.88	0.14	0.20	3.49	0.00	3.49	7.71
07	Cane Cutter	100	1.99	0.08	0.11	1.29	0.00	1.29	3.47
07	Duster - 3 Pt 12'	240	2.60	0.07	0.09	0.79	0.00	0.79	3.55
07	Mower-Flail 8'	133	5.12	0.19	0.26	4.58	0.00	4.58	10.15
07	Orchard/Vine Sprayer 500 gal	400	5.96	0.15	0.21	3.67	0.00	3.67	9.99
07	Pickup Truck 1/2 T	286	8.46	0.29	0.41	2.04	14.76	16.80	25.96
07	Sprayer ATV 20 gal	150	0.18	0.01	0.01	0.09	0.00	0.09	0.29
07	Truck - Flatbed (10 ton)	200	20.65	0.78	1.08	5.30	2.64	7.94	30.45
07	Weed Sprayer 3 PT 100 gal	200	1.58	0.05	0.07	0.68	0.00	0.68	2.38



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**Table 8. OPERATIONS WITH EQUIPMENT**  
 SAN JOAQUIN VALLEY SOUTH - FLAME TABLE GRAPES 2007

Operation	Operation			Material	Broadcast Rate/acre	Unit
	Month	Tractor	Implement			
<b>Weed: Winter Strip</b>	March	60HP 4WD	Weed Sprayer	Surflan	2.40	pt
				Roundup	0.60	pt
<b>Weed: Mow Middles</b>	March	60HP 4WD	Mower Flail 8'			
	May	60HP 4WD	Mower Flail 8'			
	July	60HP 4WD	Mower Flail 8'			
	August	60HP 4WD	Mower Flail 8'			
<b>Weed: Spot Spray</b>	June	ATV 4WD	Weed Sprayer	Roundup	0.50	pt
<b>Fertilizer through Drip</b>	April			UN 32	50.00	lb N
<b>Irrigation</b>	April			Water	1.00	acin
	May			Water	4.00	acin
	June			Water	7.00	acin
	July			Water	9.00	acin
	August			Water	8.00	acin
	September			Water	6.00	acin
	October			Water	1.00	acin
	<b>Disease: Phomopsis/Mildew</b>	March	60HP 4WD	Air Blast Sprayer	Abound	12.00
Microthiol					1.00	lb
<b>Vertebrate: Squirrel, Gopher, Coyote, Bird</b>	Mar – Oct			Various Methods	15.00	acre
<b>Disease: Mildew 3X</b>	April	60HP 4WD	Duster	Sulfur Dust	10.00	lb
	June	60HP 4WD	Duster	Sulfur Dust	10.00	lb
	July	60HP 4WD	Duster	Sulfur Dust	10.00	lb
	April	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
<b>Disease: Mildew. Fertilize: Zinc</b>	April	60HP 4WD	Air Blast Sprayer	Rally (Mildew)	4.00	oz
				Neutral Zinc	5.00	lb
				Microthiol (Mildew)	1.00	lb
<b>Disease: Mildew. Insect: Skeletonizer</b>	May	60HP 4WD	Air Blast Sprayer	Flint (Mildew)	2.00	oz
				Kryocide (Skeletonizer)	6.00	lb
				GA (Thin)	6.00	floz
<b>FM: Bloom Thin. Disease: Mildew</b>	May	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Flint (Mildew)	2.00	oz
				GA (Size)	48.00	floz
<b>FM: Berry Size. Disease: Mildew</b>	June	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				GA (Size)	48.00	floz
				Microthiol (Mildew)	2.00	lb
<b>FM: Berry Size. Disease: Mildew. Insect: Leafhopper</b>	June	60HP 4WD	Air Blast Sprayer	Rally (Mildew)	4.00	oz
				GA (Size)	48.00	floz
				Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				Provado (Leafhopper)	1.00	oz
<b>FM: Color Fruit (Ethrel)</b>				Ethrel	1.00	pt
<b>Trellis: Repair</b>	January			Labor	2.00	hrs
				Trellis Materials	10.00	acre
<b>Vine: Layering Vines</b>	January			Labor	1.00	hrs
<b>Prune: Dormant</b>	January			Labor	20.00	hrs
<b>Prune: Shred Brush</b>	January	60HP 4WD	Mower Flail 8'			
<b>Insect: Mealybug</b>	March	60HP 4WD	Air Blast Sprayer	Lorsban	4.00	pt
<b>CM: Shoot Thin/Position &amp; Leaf Removal</b>	April			Labor	50.00	hrs
<b>CM: Cane Cutting (Mechanical)</b>	June	60HP 4WD	Cane Cutter			
<b>Sucker: Remove Trunk Suckers</b>	April			Labor	2.00	hrs
<b>FM: Cluster Tipping &amp; Thinning</b>	June			Labor	20.00	hrs
<b>FM: Girdle</b>	June			Labor	12.00	hrs
<b>Pickup: Truck Use</b>	Annual	Pickup 1/2 ton				
<b>ATV:</b>	Annual	ATV				
<b>Harvest: Pick &amp; Pack</b>	August			Labor	175.00	hrs
<b>Harvest: Swamp, Spread, Haul</b>	August	Truck Flatbed		Labor	20.50	hrs
				Boxes	700.00	boxes
				Plastic bags	6,300	bags

\*CM = Canopy Management. FM = Fruit Management

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

**SAMPLE COSTS TO  
ESTABLISH AND PRODUCE  
TABLE GRAPES**

**REDGLOBE**



**SAN JOAQUIN VALLEY - SOUTH**

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UC COOPERATIVE EXTENSION

SAMPLE COSTS TO ESTABLISH AND PRODUCE TABLE GRAPES

Redglobe

San Joaquin Valley South - 2007

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INTRODUCTION

Sample costs to establish and produce Redglobe table grapes 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 these same practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering 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 can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1517 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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## ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish the vineyard and produce Redglobe table grapes in the San Joaquin Valley. The cultural practices described represent production operations and materials considered typical of a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as 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.**

**Farm.** The hypothetical farm consists of 120 contiguous acres. Redglobe table grape vineyard establishment and production are on 40 acres. Other table grape varieties are on 75 acres and roads, irrigation systems, and farmstead occupy five acres. The farm is owned and managed by the grower.

### Establishment Cultural Practices & Material Inputs (Table 1)

**Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from vines or trees should be fallowed for two years except for a possible grain crop. The land is assumed to be fairly level. A custom operator chisels the ground (subsoils) twice to a depth of 4-5 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disced twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in vines or trees and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Plant.** Planting the vineyard starts by laying out and marking vine sites in early spring. Holes are dug and vines planted and a two-inch by two-inch cardboard carton placed around the vine. In the second year, 2% or 10 vines per acre are replaced.

**Vines.** The Redglobe plants are dormant, bench-grafted rootstock vines purchased from a commercial nursery. The grapevines are planted during the first spring on a 7-foot x 12-foot spacing (vine x row) with 518 vines per acre. Vines are trained during the first and second years to quadrilateral cordons. The grapevines will begin yielding fruit in the third year and then be productive for an additional 22 years.

**Trellis System.** A commercial company installs the trellis system in the second year. The trellis system will be removed when the vineyard is removed; therefore it is considered part of the vineyard and included in the establishment costs. Materials for the open gable trellis are as follows: (1) Stakes with V structure are placed every 24-feet down the row. Metal stakes (2 lbs/ft strength) are 8.5-feet long and placed in the ground 3-feet. The open gable is 72-inches wide from tip to tip. (2) End assemblies consist of 9.5-foot metal post (4 lb/ft) with a V that matches those within the row and with 10-inch helix anchor. (3) Eight wires, 12.5 gauge high tensile, are used for fruit and cordon support; three wires, 14 gauge high tensile, are used for movable catch wires and drip hose support. For growers planting and training vines in the first year to harvest in the second year, trellis installation should be completed in the first year and the cost shown accordingly.

**Train/Prune.** Vines are pruned to one two bud spur in the first dormant season (December to February, January in this study).

**Train.** The following spring (second year), a single shoot is selected and trained up the stake to form the permanent structure of the vine. Training consists of tying the shoot; removing lateral shoots from the base and tipping the shoot when it reaches desired cordon height. Most of the training costs occur during the second summer. The third summer is devoted to training missing vines or vines delayed in growth.

**Prune.** In the third year (January), vines are pruned much like an established vine. The exception is that in the third year the cordons are essentially canes; therefore, short spurs or no spurs are left at node positions. With mature vines 6 two bud spurs are retained on each of the four cordons. Prunings are placed in the row middles and shredded. Selecting and tying canes to fruiting wires is required each year for the life of the vineyard. Suckers from vine trunks are removed in April, a practice that continues each year, but diminishes as the vineyard matures.

**Irrigate.** Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet deep. The vineyard is irrigated during the growing season from April through October during the establishment years. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors. The amount of water applied to the vineyard varies through the establishment years and is shown in Table A.

Table A. Irrigation Water Applied

Year	AcIn/Year
1	8
2	18
3+	36

**Fertilize.** Liquid nitrogen fertilizer, UN32, is applied through the irrigation system in April of the first year at five pounds of N per acre. A single application is made in April of the second year. The amount of nitrogen applied each year increases as the vineyard matures and is shown in Table B. It is important to identify sources of nitrogen in order to properly manage the nitrogen budget. For example, sources of nitrogen such as irrigation well water should be calculated to determine future irrigation and fertilizer needs.

Table B. Applied Nitrogen (N) Per Acre

Year	Lbs of N
1	5
2	25
3+	50

**Pest Management.** For pest identification, monitoring, management and pesticide information, visit the UC IPM website at [www.imp.ucdavis.edu](http://www.imp.ucdavis.edu). Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on pesticide use permits, contact the local county Agricultural Commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.**

**Weeds (Vineyard Floor Management).** In October of the year prior to planting, Treflan is applied to the vineyard floor and incorporated by discing. After planting, weeds in the vine rows and middles are managed with discing, mowing, and/or herbicides. From March through July of the first year, the row middles are disced twice and mowed twice. The vine rows are hand weeded in April. The row middles are mowed three to four times during the growing season starting the second year. The vine rows are sprayed (strip spray) in January of the second year with Roundup and Surflan. The strip spray is applied to 30% of the acreage. Also in the second year, spot sprays using Roundup are applied to the vine row in April, June, and July. The spot sprays (weedy spots or areas) are applied using an all terrain vehicle (ATV) with a sprayer attached.

**Insects.** Beginning in the second year, western grapeleaf skeletonizer (*Harrisina brillians*) is controlled in April with an application of Kryocide insecticide (mixed with micronized sulfur sprays). Additionally insects such as mealybugs are monitored each year beginning in the spring and may increase production costs if found.

If mealybugs (*Pseudococcus sp.*) are found during vineyard establishment, the grower should consult with a PCA, farm advisor, and/or ag commissioner to develop management strategies.

**Diseases.** Although many pathogens attack grapevines, phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Uncinula necator*) are the two diseases managed in this study. In April of the second and third years, Microthiol plus Abound (strobilurin) are applied for phomopsis and mildew control. Mildew is controlled with various fungicide applications at 7 to 21 day intervals in the third year, depending on the fungicide used. For this study, the grower applies a Kocide (copper) and Rubigan (SI) combination, and two Microthiol applications (one with Kryocide) in April; one Rubigan (SI) application and two dusting sulfur applications in May; one Rubigan (SI) application and two dusting sulfur applications in June. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to avoid powdery mildew populations from developing fungicide resistance.

**Vertebrate.** Rabbits, gophers, squirrels and coyotes are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or building a rabbit fence are utilized as necessary throughout the year. For this study no specific control is used, but an estimated cost for one or two management practices are shown in March. Endangered Species: It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest/Yield/Returns.** Growers sometimes plant and train vines in the same year, which produces a harvestable RedGlobe table grape crop in the second year. Yields in the third year are approximately 50 to 75% of mature production. If the crop in the third year is harvested for wine, a labor contractor may be needed. For this study, 500 boxes (19 pounds per box) of table grapes are assumed in the third year.

### **Mature Production Cultural Practices and Material Inputs** (Tables 2-8)

**Prune/Sucker/Canopy Management (CM).** The quad-cordon trained vines are spur-pruned during the winter months (January) and the prunings are placed in the row middles and shredded. Suckers and sterile shoots are removed from the vine trunks and crowns during April. Shoot thinning, shoot positioning and basil leaf removal are done by hand in April. Mechanical cane cutting (canopy skirting) is done in June with the grower's equipment.

**Fruit Management (FM).** Girdling of the trunk or bases of individual canes (trunk in this study) to increase berry size is done by hand in June. Cluster tipping and hand thinning are done in late May to early June after girdling to adjust berry set, cluster length, and crop load. Girdling is not recommended in weak vineyards and should be closely supervised to avoid deep cuts into the xylem.

**Trellis/Vines.** Trellis repairs are done annually (January in this study) and the cost is not taken from any specific data. Weak or missing vines are replaced by layering which is usually not an issue until the vineyard is over 10 years old. One year-old canes from neighboring vines are buried (layered) in the soil next to the stake. These vines are trained the following spring. The layer is severed after 3 to 4 years when the new vine is fully established. Trellis repair and vine replacement increases with vineyard age.

**Irrigate.** The vineyard is drip irrigated during the growing season from April through October. Deficit irrigation may also be applied three to four weeks before harvest to advance maturity and decrease decay. Deficit irrigation may not work well on weak or low vigor vineyards. Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet depth and pressurized to 20 psi. A total of 36 acre-inches is applied to the vineyard. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors.

**Fertilize.** Nitrogen (N) at 50 pounds per acre as UN32 is applied through the irrigation drip system in April. Neutral zinc is applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

**Pest Control Adviser (PCA).** Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a PCA are not included in this study.

**Weeds (Vineyard Floor Management).** Vineyard middles are mowed three times each season: March, May, July. Surflan and Roundup herbicides are applied to the vine row/berm in February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in June.

**Insects.** Mealybugs (*Pseudococcus* sp.) are treated with Lorsban insecticide in early March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated with Kryocide (mixed with Microthiol) during the second disease spray (bloom) in May. Leafhoppers are controlled with Provado insecticide (mixed with Microthiol, Rally) during the second disease spray in June. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. It may be necessary to use multiple insecticides to control some mealybug species.

**Diseases.** Diseases treated in this study are phomopsis and powdery mildew. Phomopsis and powdery mildew are both treated in late March (shoots average 2-inches) with Abound and Microthiol (micronized sulfur). Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. In this study, sulfur dust is applied three times - April, June, July. Microthiol and Rally (with zinc fertilizer) are applied in late April. Microthiol and Flint are applied in May during bloom. Microthiol (Kryocide insecticide included) is applied at the second spray in May. Rally and Microthiol are applied twice in June (Provado insecticide included with second application). Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes

of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to prevent powdery mildew populations from developing fungicide resistance.

**Vertebrate.** Gophers, squirrels, coyotes and birds are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or shooting are utilized as necessary throughout the year. For this study no specific control is used, but per acre costs are shown from March through October and are an estimate not based on any specific data. **Endangered Species:** It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest.** The grapes are picked for table grapes in August and packed in the field. Harvesting crews work in teams of three or four. Depending on fruit quality, the team can pick and pack an average of 3 to 6 boxes per hour per individual and for this study; the picker picks four shipping boxes per hour. Two or three pickers field pick and trim the grapes, and put them in reusable field boxes. Approximately four field boxes are loaded on a wheelbarrow type cart and delivered to the packing person who trims, puts them in bags that are then placed in shipping boxes. The box holds 12 bags and weighs 21-pounds when filled. The packed boxes are loaded on a truck and hauled to storage. The swamp and haul cost includes the boxes, plastic bags, hauling and related labor. Pre cooling and palletization (P&P) costs may in some cases be a grower cost but are generally charged to the buyer. After 30 days of cold storage, the grower is charged approximately \$0.35 per box per month (\$0.25-0.45) until the fruit is sold. Brokerage fees are paid by the grower and range from 7 to 10% of the selling price. A figure of 9% of the selling price is used in this study.

Table C: Table Grapes (all varieties)

Average Yields	
Year	Tons/Acre (boxes)
2002	8.13 (856)
2003	7.60 (800)
2004	7.76 (815)
2005	11.34 (1,194)
2006	9.66 (1,016)

Source: Fresno County Crop Reports, 2002-2006.  
Boxes = 19 lbs

**Yields.** This study uses a yield of 900, 21-pound boxes to calculate returns. Average county yields for all table grape varieties are shown in Table C. The averages include all vineyards in production regardless of maturity and varieties.

**Returns.** Return prices for grapes at different yields and price are shown in Table 5. Based on grower information, an estimated price of \$12 per box for Redglobe grapes is used in this study.

**Assessments/Inspection.** The California Table Grape Commission (CTGC) assesses \$0.1278 per 21-pound box or \$0.006087 per pound. Table grapes are inspected for quality control and charged an additional \$0.035 per box. Early in the season, growers often have the county Agricultural Commissioner inspect their fruit for maturity at a cost of \$0.035 per box. Approximately one-third of the entire crop is inspected to determine that maturity requirements are met, which includes soluble solids:acid ratios (20:1) and color.

**Pickup/ATV.** It is assumed that the grower uses the pickup for business and personal use. Estimated business mileage for the ranch is 5,250 miles. The all terrain vehicle (ATV) is used for spot spraying weeds and is included in that cost. It is assumed that the ATV will be used two hours per acre on the ranch for checking the vineyards including the irrigation system.

**Labor.** Hourly wages for workers are \$11.00 for machine operators and \$8.50 per hour non-machine labor. Adding 33% for the employer's share of federal and state payroll taxes, workers compensation insurance for vine crops (0040) and other possible benefits gives the labor rates shown of \$14.63 and \$11.31 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 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 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agriculture Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum 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 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**Interest on Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 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. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2007.

**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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation.

**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 \$674 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$80 per producing acre or \$9,200 annually for the ranch. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Sanitation Services.** Sanitation services provide double portable toilets with washbasins for 10 months. The cost includes delivery and weekly cleaning service. The number of sanitation facilities will vary depending upon local regulations and size of labor force. In many cases labor contractors furnish the sanitation facilities for their crews and the costs are included in the contractor's labor overhead.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.

### **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. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

**Interest Rate.** An interest rate of 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.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land in the San Joaquin Valley with table grape production ranges from \$6,000 to \$13,400 per acre (depending on vineyard age, variety and location). Cropland with district or well water in the area ranges from \$2,500 to \$12,000. For this study, the land value was established based on 2007 real estate values (2007 Trends & Leases); therefore a cost of \$7,000 per acre or \$7,304 per producing acre is used.

**Tools.** This is an assumed value for shop, hand, and miscellaneous field tools and not based on any grower's tool inventory.

**Fuel Tanks.** Two 300-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.

**Drip Irrigation System.** The drip lines, filters, booster pump and the labor to install the components are included in the irrigation system cost. The previous vineyard is assumed to have a pumping system that had been refurbished and therefore is not included as a cost. Water is delivered from a 130-foot depth using a 40-horsepower pump. The drip irrigation lines are laid directly on the ground prior to planting and the labor cost is included in the drip irrigation system cost.

**Establishment Cost.** The establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the third year the first year that grapes are harvested. It is used to determine the non-cash overhead expense, capital recovery cost, during the production years. In this study, no crop was produced in the second year; therefore, the Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$6,642 per acre or \$265,680 for the 40 producing acres. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**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. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION  
**Table 1. COSTS PER ACRE TO ESTABLISH A RED GLOBE TABLE GRAPE VINEYARD**  
 SAN JOAQUIN VALLEY SOUTH - 2007

	Cost Per Acre			
	Year:	1st	2nd	3rd
Boxes Per Acre:	0	0	500	
<b>Planting Costs:</b>				
Site Prep: Subsoil 2X		400		
Site Prep: Float (Level)		12		
Site Prep: Disc/Apply Herbicide (Treflan)		17		
Site Prep: Disc/Incorporate Herbicide		12		
Plant: Survey & Layout Vineyard		70		
Plant: Plant, Wrap Vines		166	2	
Vines: 518 Per Acre (2% Replant In 2nd Year)		1,606	31	
Trellis: Trellis System (custom)			4,000	
<b>TOTAL PLANTING COSTS</b>		<b>2,282</b>	<b>4,033</b>	
<b>Cultural Costs:</b>				
Vertebrate: (Rabbit, Gopher, Squirrel)		40	15	15
Fertilize: Nitrogen (UN32)		3	12	23
Irrigate: Water/Labor		54	107	181
Weed: Disc Middle - 2X/Yr 1		16		
Weed: Mow Middle - 2X/Yr 1, 4X/Yr 2, 3X/Yr 3		16	31	24
Weed: Hand Hoe		34		
Prune: Dormant			73	79
Training: (Sucker, Tie)			271	136
Insect: Skeletonizer (Kryocide). Disease: Mildew (Microthiol)			36	36
Weed: Spot Spray (Roundup)			42	42
Weed: Winter Strip Spray (Roundup, Surflan)			53	53
Prune: Shred prunings				15
Disease: Phomopsis (Microthiol, Abound)				51
Disease: Mildew Control (Microthiol)				20
Insect: Leafhoppers 1X (Provado)				46
Disease: Mildew (Kocide, Rubigan)				50
Disease: Mildew 4X (Sulfur Dust)				39
Disease: Mildew 2X, (Rubigan)				56
Pickup: Business use		82	82	82
ATV: Field use		30	38	38
<b>TOTAL CULTURAL COSTS</b>		<b>274</b>	<b>761</b>	<b>985</b>
<b>Harvest Costs:</b>				
Pick & Field Pack (labor)				1,414
Spread/Stack boxes, Swamp, Haul (includes boxes, bags, labor)				1,147
Brokerage Fee				540
Assessment & Inspection Fees				64
<b>TOTAL HARVEST COSTS</b>				<b>3,165</b>
Interest On Operating Capital @ 10.00%		210	373	59
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,539</b>	<b>5,163</b>	<b>4,208</b>
<b>Cash Overhead Costs:</b>				
Office Expense		80	80	80
Liability Insurance		6	6	6
Sanitation Service		19	19	19
Property Taxes		85	87	88
Property Insurance		9	10	11
Investment Repairs (non-cash overhead items)		42	42	42
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>242</b>	<b>244</b>	<b>246</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>2,781</b>	<b>5,407</b>	<b>4,455</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>6,000</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>2,781</b>	<b>5,407</b>	<b>0</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		<b>0</b>	<b>0</b>	<b>1,545</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>2,781</b>	<b>8,187</b>	<b>6,642</b>

UC COOPERATIVE EXTENSION  
**Table 1. continued**

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Boxes Per Acre:	0	0	500
<b>Non-Cash Overhead Costs (Capital Recovery):</b>				
Land		530	530	530
Irrigation System		110	110	110
Shop Building		57	57	57
Shop Tools		14	14	14
Fuel Tank & Pump		2	2	2
Equipment		37	74	95
<b>TOTAL CAPITAL RECOVERY COST</b>		<b>751</b>	<b>787</b>	<b>809</b>
<b>TOTAL COST/ACRE FOR THE YEAR</b>		<b>3,531</b>	<b>6,194</b>	<b>5,263</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>6,000</b>
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		<b>3,531</b>	<b>6,194</b>	<b>0</b>
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>		<b>0</b>	<b>0</b>	<b>737</b>
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		<b>3,531</b>	<b>9,726</b>	<b>8,989</b>

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE REDGLOBE TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
<b>Cultural:</b>							
Vine: Layering Missing Vines	1.00	11	0	0	0	11	
Prune: Vines	15.00	170	0	0	0	170	
Prune: Brush Disposal	0.50	9	7	0	0	15	
Trellis: Repair	2.00	23	0	10	0	33	
Weed: Winter Strip (Surflan, Roundup)	0.49	9	5	40	0	53	
Vertebrate: Gopher, Squirrel, Coyote, Bird (various methods)	0.00	0	0	15	0	15	
Insect: Mealybug (Lorsban)	0.50	9	7	25	0	41	
Disease: Phomopsis (Abound)/Mildew (Sulfur)	0.50	9	7	35	0	51	
Weed: Mow Middles 4X	0.74	13	11	0	0	24	
Disease: Mildew 3X (Dusting Sulfur)	0.84	15	9	6	0	30	
Sucker: Remove Trunk Suckers	2.00	23	0	0	0	23	
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	9	7	28	0	44	
Fertilize: N through drip system (UN32)	0.00	0	0	23	0	23	
Irrigate: (Water)	2.55	29	0	165	0	194	
*CM: Shoot Thin/Position & Leaf Removal	40.00	452	0	0	0	452	
Disease: Mildew (Sulfur, Flint)	0.50	9	7	34	0	49	
Disease: Mildew (Sulfur). Insect: Skeletonizer (Kryocide)	0.50	9	7	19	0	35	
Disease: Mildew (Sulfur, Rally)	0.50	9	7	23	0	38	
CM: Cane Cutting (Mechanical)	0.29	5	3	0	0	8	
*FM: Cluster Tipping and Thinning	25.00	283	0	0	0	283	
FM: Girdling	12.00	136	0	0	0	136	
Disease: Mildew (Rally, Sulfur)/Insect: Leafhopper (Provado)	0.50	9	7	67	0	82	
Weed: Spot Spray (Roundup)	0.53	9	1	4	0	14	
Pickup: Business Use	2.39	42	40	0	0	82	
ATV: Irrigation and other	2.00	35	3	0	0	38	
<b>**TOTAL CULTURAL COSTS/ACRE</b>	<b>110.83</b>	<b>1,324</b>	<b>126</b>	<b>494</b>	<b>0</b>	<b>1,944</b>	
<b>TOTAL CULTURAL COSTS/Box</b>		<b>1.47</b>	<b>0.14</b>	<b>0.55</b>	<b>0.00</b>	<b>2.16</b>	
<b>Harvest (900 boxes/acre):</b>							
Pick and Field Pack	225.00	2,545	0	0	0	2,545	
Boxes, Spread, Swamp & Haul	1.75	325	14	1,818	0	2,157	
Brokerage Fee	0.00	0	0	0	972	972	
Assessment & Inspection Fees	0.00	0	0	126	0	126	
<b>TOTAL HARVEST COSTS/ACRE</b>	<b>226.75</b>	<b>2,870</b>	<b>14</b>	<b>1,944</b>	<b>972</b>	<b>5,799</b>	
<b>TOTAL HARVEST COSTS/Box</b>		<b>3.19</b>	<b>0.02</b>	<b>2.16</b>	<b>1.08</b>	<b>6.44</b>	
Interest on operating capital @ 10.00%						117	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>4,193</b>	<b>140</b>	<b>2,438</b>	<b>972</b>	<b>7,860</b>	
<b>TOTAL OPERATING COSTS/Box</b>		<b>4.66</b>	<b>0.16</b>	<b>2.71</b>	<b>1.08</b>	<b>8.73</b>	
<b>CASH OVERHEAD:</b>							
Office Expense						80	
Liability Insurance						6	
Sanitation Fees						19	
Property Taxes						122	
Property Insurance						35	
Investment Repairs						42	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>305</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>8,165</b>	

\*CM = Canopy Management. FM = Fruit Management

\*\*To find cost per box divide by 900

UC COOPERATIVE EXTENSION  
Table 2. continued

Operation	Operation	Cash and Labor Cost per acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent			
NON-CASH OVERHEAD:		Per producing						
Investment		<u>Acre</u>				<u>Capital Recovery</u>		
Land		7,304				530	530	
Drip Irrigation System		1,250				110	110	
Building		696				57	57	
Tools-Shop/Field		130				14	14	
Fuel Tanks 2-300G		30				2	2	
Vineyard Establishment		6,642				613	613	
Equipment		820				109	109	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>16,872</b>				<b>1,435</b>	<b>1,435</b>	
<b>TOTAL COSTS/ACRE</b>							<b>9,600</b>	
<b>TOTAL COSTS/box</b>							<b>10.67</b>	



UC COOPERATIVE EXTENSION  
**Table 3. MATERIAL & CUSTOM COSTS & NET RETURN PER ACRE FOR REDGLOVE TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Redglobe Table Grapes (21 lb box)	900	box	12.00	10,800	
<b>OPERATING COSTS</b>					
<b>Trellis System:</b>					
Miscellaneous Repair Materials	1.00	acre	10.00	10	
<b>Herbicide:</b>					
Surflan 4 AS	2.40	pint	14.52	35	
Roundup Ultra Max	1.10	pint	7.80	9	
<b>Vertebrate Control:</b>					
Shoot, Bait, Trap	1.00	acre	15.00	15	
<b>Fungicide:</b>					
Abound (Strobilurin)	12.00	froz	2.86	34	
Microthiol Disperss (micronized wettable sulfur)	9.00	lb	0.83	7	
Dusting Sulfur	30.00	lb	0.22	6	
Rally 40W (Sterol Inhibitor)	12.00	oz	5.23	63	
Flint (Strobilurin)	2.00	oz	16.50	33	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.35	25	
Kryocide	6.00	lb	3.08	18	
Provado 1.6 Solupak	1.00	oz	44.21	44	
<b>Fertilizer:</b>					
Neutral Zinc 50% (foliar)	5.00	lb	1.08	5	
UN 32	50.00	lb N	0.46	23	
<b>Water:</b>					
Water Pumped SJV	36.00	acin	4.59	165	
<b>Harvest Supplies:</b>					
Box 21 lb	900.00	box	1.60	1,440	
Plastic Bags 12/box	10,800.00	bags	0.04	378	
<b>Contract:</b>					
Brokerage Fee (9% of selling price)	900.00	box	1.08	972	
<b>Assessment:</b>					
Table Grape Commission	900.00	box	0.13	115	
Quality Inspection (1/3 of yield)	300.00	box	0.04	11	
Labor (machine)	15.63	hrs	14.63	229	
Labor (non-machine)	350.55	hrs	11.31	3,965	
Fuel - Gas	11.78	gal	2.80	33	
Fuel - Diesel	22.37	gal	2.30	51	
Lube				13	
Machinery repair				43	
Interest on operating capital @ 10.00%				117	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>7,861</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>2,939</b>	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				80	
Liability Insurance				6	
Sanitation				19	
Property Taxes				122	
Property Insurance				35	
Investment Repairs				42	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>305</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>8,165</b>	

UC COOPERATIVE EXTENSION  
**Table 3. continued**

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Land				530	
Drip Irrigation System				110	
Building				57	
Tools-Shop/Field				14	
Fuel Tanks 2-300G				2	
Establishment Costs				613	
Equipment				109	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,435</b>	
<b>TOTAL COSTS/ACRE</b>				<b>9,600</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>1,200</b>	

UC COOPERATIVE EXTENSION  
**Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE REDGLOBE TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

Beginning JAN 07	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 07	07	07	07	07	07	07	07	07	07	07	07	07	
<b>Cultural:</b>													
Vine: Layering Missing Vines	11												11
Prune: Vines	170												170
Prune: Brush Disposal	15												15
Trellis: Repair	33												33
Weed: Winter Strip (Surflan)		53											53
Vertebrate: Gopher, Squirrel, Coyote, Bird (various methods)			2	2	2	2	2	2	2	2			15
Insect: Mealybug (Lorsban)			41										41
Disease: Phomopsis (Abound)/Mildew (Sulfur)			51										51
Weed: Mow Middles 3X			8		8		8						24
Disease: Mildew (Sulfur Dust)				10		10	10						30
Sucker: Trunk				23									23
Disease: Mildew (Sulfur Rally)/Fertilize: (Zn)				44									44
Fertilize: (UN32) through drip				23									23
Irrigate: (water & labor)				6	22	37	48	44	31	6			194
*CM: Shoot Thin/Position & Leaf Removal				452									452
Disease: Mildew (Sulfur, Flint)					49								49
Disease: Mildew (Sulfur). Insect: Skeletonizer (Kryocide)					35								35
Disease: Mildew (Rally, Sulfur)						38							38
CM: Cane Cutting (Mechanical)						8							8
*FM: Cluster Tipping & Thinning						283							283
FM: Girdle						136							136
Disease: Mildew (Rally, Sulfur). Insect: Leafhopper (Provado)						82							82
Weed: Spot Spray (Roundup)						14							14
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	82
ATV	3	3	3	3	3	3	3	3	3	3	3	3	38
<b>TOTAL CULTURAL COSTS</b>	<b>239</b>	<b>63</b>	<b>111</b>	<b>570</b>	<b>126</b>	<b>620</b>	<b>78</b>	<b>55</b>	<b>43</b>	<b>18</b>	<b>10</b>	<b>10</b>	<b>1,944</b>
<b>Harvest:</b>													
Pick & Field Pack								2,545					2,545
Boxes, Spread, Swamp & Haul								2,157					2,157
Brokerage Fee								972					972
Assessment & Inspection Fees								126					126
<b>TOTAL HARVEST COSTS</b>								<b>5,799</b>					<b>5,799</b>
Interest on operating capital @ 10.00%	2	3	3	8	9	14	15	64	0	0	0	0	117
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>241</b>	<b>66</b>	<b>115</b>	<b>578</b>	<b>135</b>	<b>635</b>	<b>93</b>	<b>5,918</b>	<b>42</b>	<b>18</b>	<b>10</b>	<b>10</b>	<b>7,861</b>
<b>OVERHEAD:</b>													
Office Expense	7	7	7	7	7	7	7	7	7	7	7	7	80
Liability Insurance									6				6
Sanitation Fees	2	2	2	2	2	2	2	2	2	2			19
Property Taxes	61						61						122
Property Insurance	18						18						35
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	42
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>91</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>91</b>	<b>12</b>	<b>18</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>305</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>332</b>	<b>78</b>	<b>127</b>	<b>590</b>	<b>147</b>	<b>647</b>	<b>184</b>	<b>5,931</b>	<b>60</b>	<b>30</b>	<b>20</b>	<b>20</b>	<b>8,165</b>

\* CM = Canopy Management. FM = Fruit Management. \*\* To find cost per box divide by 900

UC COOPERATIVE EXTENSION  
**Table 5. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY SOUTH - 2007

COSTS PER ACRE AT VARYING YIELD TO PRODUCE REDGLOBE TABLE GRAPES

	YIELD (21 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
<b>OPERATING COSTS:</b>							
Cultural Cost	1,944	1,944	1,944	1,944	1,944	1,944	1,944
Harvest Cost	3,134	3,657	4,179	4,701	5,224	5,746	6,269
Brokerage Fee	648	756	864	972	1,080	1,188	1,296
Assessment/Inspection Cost	84	98	112	126	140	154	168
Interest on operating capital @ 10.00%	101	107	112	117	123	128	134
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>5,911</b>	<b>6,562</b>	<b>7,211</b>	<b>7,860</b>	<b>8,511</b>	<b>9,160</b>	<b>9,811</b>
Total Operating Costs/box	9.85	9.37	9.01	8.73	8.51	8.33	8.18
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>304</b>	<b>304</b>	<b>304</b>	<b>305</b>	<b>305</b>	<b>305</b>	<b>305</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>6,215</b>	<b>6,866</b>	<b>7,515</b>	<b>8,165</b>	<b>8,816</b>	<b>9,465</b>	<b>10,116</b>
Total Cash Costs/box	10.36	9.81	9.39	9.07	8.82	8.60	8.43
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,426</b>	<b>1,429</b>	<b>1,432</b>	<b>1,435</b>	<b>1,437</b>	<b>1,440</b>	<b>1,442</b>
<b>TOTAL COSTS/ACRE</b>	<b>7,641</b>	<b>8,295</b>	<b>8,947</b>	<b>9,600</b>	<b>10,253</b>	<b>10,905</b>	<b>11,558</b>
Total Costs/box	12.73	11.85	11.18	10.67	10.25	9.91	9.63

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/box	YIELD (21 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
8.00	-1,111	-962	-811	-660	-511	-360	-211
9.00	-511	-262	-11	240	489	740	989
10.00	89	438	789	1,140	1,489	1,840	2,189
11.00	689	1,138	1,589	2,040	2,489	2,940	3,389
12.00	1,289	1,838	2,389	2,940	3,489	4,040	4,589
13.00	1,889	2,538	3,189	3,840	4,489	5,140	5,789
14.00	2,489	3,238	3,989	4,740	5,489	6,240	6,989

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/box	YIELD (21 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
8.00	-1,415	-1,266	-1,115	-965	-816	-665	-516
9.00	-815	-566	-315	-65	184	435	684
10.00	-215	134	485	835	1,184	1,535	1,884
11.00	385	834	1,285	1,735	2,184	2,635	3,084
12.00	985	1,534	2,085	2,635	3,184	3,735	4,284
13.00	1,585	2,234	2,885	3,535	4,184	4,835	5,484
14.00	2,185	2,934	3,685	4,435	5,184	5,935	6,684

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/box	YIELD (21 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
8.00	-2,841	-2,695	-2,547	-2,400	-2,253	-2,105	-1,958
9.00	-2,241	-1,995	-1,747	-1,500	-1,253	-1,005	-758
10.00	-1,641	-1,295	-947	-600	-253	95	442
11.00	-1,041	-595	-147	300	747	1,195	1,642
12.00	-441	105	653	1,200	1,747	2,295	2,842
13.00	159	805	1,453	2,100	2,747	3,395	4,042
14.00	759	1,505	2,253	3,000	3,747	4,495	5,242

UC COOPERATIVE EXTENSION  
**Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT,**  
 SAN JOAQUIN VALLEY SOUTH - 2007

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
						Insur- ance	Taxes		
07	60 HP 4WD Narrow Tractor	47,000	15	9,150	4,885	200	281		5,366
07	ATV 4WD	6,700	5	3,003	1,125	35	49		1,209
07	Brush Shredder 6 ft	8,000	15	768	862	31	44		937
07	Cane Cutter	3,500	20	182	333	13	18		364
07	Duster - 3 Pt 12'	5,500	5	1,792	1,040	26	36		1,103
07	Mower-Flail 8'	10,500	15	1,008	1,132	41	58		1,230
07	Orchard/Vine Sprayer 500 gal	21,000	5	6,840	3,973	99	139		4,211
07	Pickup Truck 1/2 T	28,000	7	10,621	4,023	138	193		4,354
07	Sprayer ATV 20 gal	350	10	62	46	1	2		50
07	Truck Flatbed (10 ton)	56,000	10	16,542	6,882	259	363		7,504
07	Weed Sprayer 3 PT 100 gal	4,000	10	707	526	17	24		566
<b>TOTAL</b>		<b>190,550</b>		<b>50,675</b>	<b>24,827</b>	<b>861</b>	<b>1,206</b>		<b>26,894</b>
60% of New Cost *		114,330	0	30,405	14,896	517	724		16,136

\* 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	
Building 2,400 sqft	80,000	20		6,610	286	400	1,600	8,895
Drip Irrigation System 115 acres	50,000	25		4,388	179	250	1,000	5,816
Vineyard Establishment	265,680	23		24,519	948	1,328	0	26,796
Fuel Tanks 2-300 gal	3,500	30	350	286	14	19	70	389
Land	840,000	25	840,000	60,900	0	8,400	0	69,300
Tools-Shop/Field	15,000	15	1,500	1,614	59	83	300	2,056
<b>TOTAL INVESTMENT</b>	<b>1,254,180</b>		<b>841,850</b>	<b>98,316</b>	<b>1,485</b>	<b>10,480</b>	<b>2,970</b>	<b>113,252</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.86	674
Office Expense	115	acre	80.00	9,200
Sanitation Fee	115	acre	19.35	2,225

UC COOPERATIVE EXTENSION  
**Table 7. 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 Opera.	
07	60 HP 4WD Narrow Tractor	1,066	2.75	0.11	0.16	1.12	7.79	8.91	11.93
07	ATV 4WD	400	1.69	0.05	0.07	0.49	1.07	1.56	3.37
07	Brush Shredder 6 ft	133	3.89	0.14	0.20	3.49	0.00	3.49	7.72
07	Cane Cutter	100	1.99	0.08	0.11	1.29	0.00	1.29	3.47
07	Duster - 3 Pt 12'	240	2.60	0.07	0.09	0.79	0.00	0.79	3.55
07	Mower-Flail 8'	133	5.12	0.19	0.26	4.58	0.00	4.58	10.15
07	Orchard/Vine Sprayer 500 gal	400	5.96	0.15	0.21	3.67	0.00	3.67	9.99
07	Pickup Truck 1/2 T	286	8.46	0.29	0.41	2.04	14.76	16.80	25.96
07	Truck Flatbed (10 ton)	150	0.18	0.01	0.01	0.09	0.00	0.09	0.29
07	Sprayer ATV 20 gal	200	20.65	0.78	1.09	5.30	2.64	7.94	30.46
07	Weed Sprayer 3 PT 100 gal	200	1.58	0.05	0.07	0.68	0.00	0.68	2.38

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**Table 8. OPERATIONS WITH EQUIPMENT FOR RED GLOBE TABLE GRAPES**  
 SAN JOAQUIN VALLEY SOUTH - 2007

Operation	Operation			Material	Broadcast Rate/acre	Unit
	Month	Tractor	Implement			
<b>Weed: Winter Strip</b>	March	60HP 4WD	Weed Sprayer	Surflan	2.40	pt
				Roundup	.60	pt
<b>Weed: Mow Middles</b>	March	60HP 4WD	Mower Flail 8'			
	May	60HP 4WD	Mower Flail 8'			
	July	60HP 4WD	Mower Flail 8'			
<b>Weed: Spot Spray</b>	June	ATV 4WD	Weed Sprayer	Roundup	0.50	pt
<b>Fertilizer through Drip</b>	April			UN 32	50.00	lb N
<b>Irrigation</b>	April			Water	1.00	acin
	May			Water	4.00	acin
	June			Water	7.00	acin
	July			Water	9.00	acin
	August			Water	8.00	acin
	September			Water	6.00	acin
	October			Water	1.00	acin
<b>Disease:Phomopsis/Mildew</b>	March	60HP 4WD	Air Blast Sprayer	Abound	12.00	floz
				Microthiol	1.00	lb
<b>Vertebrate Control:</b>	Mar – Oct			Various Methods	15.00	acre
<b>Disease: Mildew 3X</b>	April	60HP 4WD	Duster	Sulfur Dust	10.00	lb
	June	60HP 4WD	Duster	Sulfur Dust	10.00	lb
	July	60HP 4WD	Duster	Sulfur Dust	10.00	lb
<b>Disease: Mildew. Fertilize: Zinc</b>	April	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				Neutral Zinc	5.00	lb
<b>Disease: Mildew</b>	May	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Flint (Mildew)	2.00	oz
<b>Disease: Mildew. Insect: Skeletonizer</b>	May	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	1.00	lb
				Kryocide (Skeletonizer)	6.00	lb
<b>Disease: Mildew</b>	June	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
<b>Disease: Mildew. Insect: Leafhopper</b>	June	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				Provado (Leafhopper)	1.00	oz
<b>Trellis: Repair</b>	January			Labor	2.00	hrs
				Trellis Materials	10.00	acre
<b>Vine: Layering Vines</b>	January			Labor	1.00	hrs
<b>Prune: Dormant</b>	January			Labor	20.00	hrs
<b>Prune: Shred Brush</b>	January	60HP 4WD	Mower Flail 8'			
<b>Insect: Mealybug</b>	March	60HP 4WD	Air Blast Sprayer	Lorsban	4.00	pt
<b>*CM: Shoot Thin/Position &amp; Leaf Removal</b>	April			Labor	40.00	hrs
<b>CM: Cane Cutting (Mechanical)</b>	June	60HP 4WD	Cane Cutter			
<b>Sucker: Remove Trunk Suckers</b>	April			Labor	2.00	hrs
<b>*FM: Cluster Tipping &amp; Thinning</b>	June			Labor	25.00	hrs
<b>FM: Girdle</b>	June			Labor	12.00	hrs
<b>Pickup: Truck Use</b>	Annual	Pickup 1/2 ton				
<b>ATV:</b>	Annual	ATV				
<b>Harvest: Pick &amp; Pack</b>	August			Labor	175.00	hrs
<b>Harvest: Swamp, Spread, Haul</b>	August	Truck Flatbed		Labor	26.00	hrs
				Boxes	900.00	boxes
				Plastic bags	10,800	bags

\*CM = Canopy Management. FM = Fruit Management

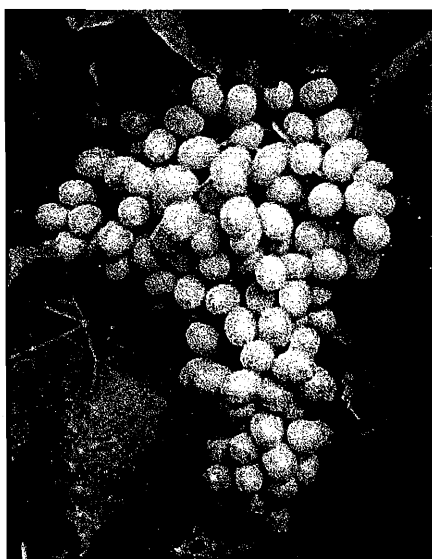
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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

SAMPLE COSTS TO  
ESTABLISH AND PRODUCE  
**TABLE GRAPES**  
THOMPSON SEEDLESS



**SAN JOAQUIN VALLEY - South**

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UC COOPERATIVE EXTENSION

**SAMPLE COSTS TO ESTABLISH A VINEYARD  
AND PRODUCE TABLE GRAPES**

Thompson Seedless  
San Joaquin Valley – South 2007

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**INTRODUCTION**

Sample costs to establish a vineyard and produce Thompson Seedless table grapes 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 these same practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering 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 can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1517 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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## ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce Thompson Seedless table grapes in the San Joaquin Valley. The cultural practices described and materials used are considered typical for a well-managed vineyard in the region. The costs, materials, and practices will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as 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.**

**Farm.** The hypothetical farm consists of 120 contiguous acres. Thompson Seedless vineyard establishment and table grape production is on 40 acres. Other varieties are on 75 acres and roads, irrigation systems, and farmstead occupy five acres. The farm is owned and managed by the grower.

### Establishment Cultural Practices & Material Inputs (Table 1)

**Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from vines or trees should be fallowed for two years except for a possible grain crop. The land is assumed to be fairly level. A custom operator chisels the ground (subsoils) twice to a depth of 4 to 5 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disced twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in vines or trees and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Plant.** Planting the vineyard starts by laying out and marking vine sites in early spring. Holes are dug and vines planted and a two-inch by two-inch cardboard carton placed around the vine. The grapevines are planted during the first spring on an 8-foot x 12-foot spacing (vine x row) with 454 vines per acre. In the second year, 2% or 9 vines per acre are replaced.

**Vines.** The Thompson Seedless plants are dormant, bench-grafted rootstock vines purchased from a commercial nursery. Vines are trained during the second and third years. The grapevines are expected to begin yielding fruit in three years and then be productive for an additional 22 years.

**Trellis System.** A commercial company installs the trellis system in the second year. The trellis system will be removed when the vineyard is removed; therefore it is considered part of the vineyard and included in the establishment costs. Materials for the open gable trellis are as follows: (1) Stakes with V structure are placed every 24-feet down the row. Metal stakes (2 lbs/ft strength) are 8.5-foot long and placed in the ground 3-feet. The open gable is 72-inches wide from tip to tip. (2) End assemblies consist of 9.5-foot metal post (4 lb/ft) with a V that matches those within the row and with 10-inch helix anchor. (3) Eight wires, 12.5 gauge high tensile, are used for fruit and canopy support, and three wires, 14 gauge high tensile, are used for movable catch wires and drip hose support.

**Train/Prune.** Vines are pruned to one two bud spur in the first dormant season (December to February). Pruning costs are shown in January in this study.

**Train.** The following spring (second year), a single shoot is selected and trained up the stake to form the permanent structure of the vine. Training consists of tying the shoot, removing lateral shoots from the base and tipping the shoot when it reaches the top of the stake to form the head of the vine. Most of the training costs

occur during the second summer. The third summer is devoted to replacing and training missing vines or vines delayed in growth.

**Prune.** In the third year (January), vines are pruned much like an established vine. The exception being the number of canes retained – 2-3 canes on young vines and 5-8 canes on mature vines. Prunings are placed in the row middles and shredded. Selecting and tying canes to fruiting wires is required each year for the life of the vineyard. Suckers from vine trunks are removed in April, a practice that continues each year but diminishes as the vineyard matures.

**Irrigate.** Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet deep. The vineyard is irrigated during the growing season from April through October during the establishment years. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors. The amount of water applied to the vineyard varies through the establishment years and is shown in Table A.

Table A. Irrigation Water Applied

Year	AcIn/Year
1	8
2	18
3+	36

**Fertilize.** Liquid nitrogen fertilizer, UN32, is applied through the irrigation system in April of the first year at five pounds of N per acre. A single application is made in April of the second year and equally split applications in May and June of the third year. The amount of nitrogen applied each year increases as the vineyard matures and is shown in Table B. It is important to identify sources of nitrogen in order to properly manage the nitrogen budget. For example, sources of nitrogen found in irrigation well water should be calculated to determine future irrigation and fertilizer needs.

Table B. Applied Nitrogen (N) Per Acre

Year	Lbs of N
1	5
2	20
3	40
4+	50

**Pest Management.** For pest identification, monitoring, management and pesticide information, visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on pesticide use permits, contact the local county Agricultural Commissioner’s office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.**

**Weeds (Vineyard Floor Management).** In October of the year prior to planting, Treflan is applied to the vineyard floor and incorporated by discing. After planting, weeds in the vine rows and middles are managed with discing, mowing, and/or herbicides. From March through July of the first year, the row middles are disced twice and mowed twice. The vine rows are hand weeded in April. The row middles are mowed four times in the second year and three times in the third year. The vine rows are sprayed (strip spray) in January of the second year with Roundup and Surflan. The strip spray is applied to 30% of the acreage. Also in the second year, spot sprays using Roundup are applied to the vine row in April, June, and July. The spot sprays (weedy spots or areas) are applied using an all terrain vehicle (ATV) with a sprayer attached.

**Insects.** Western grapeleaf skeletonizer (*Harrisina brillians*) is controlled in April of the second and third years with an application of Kryocide insecticide (mixed with micronized sulfur disease sprays). In the third year, Provado insecticide is applied in June to control grape leafhoppers (*Erythroneura elegantula*). Insects such as mealybugs (*Pseudococcus sp.*) are monitored each year beginning in the spring and may increase production costs if found.

**Diseases.** Although many pathogens attack grapevines, phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*) are the two diseases managed in this study. In the second year, Microthiol (micronized sulfur) for mildew is applied (with Kryocide insecticide application) in April. In March of the third year, Microthiol plus Abound (strobilurin) are applied for phomopsis and mildew control. Mildew is controlled with various fungicide applications at 7 to 21 day intervals in the third year, depending on the fungicide used. For this study, the grower applies Kocide (copper) and Rubigan (SI), and two Microthiol applications (one with Kryocide) in April; one Rubigan (SI) application and two dusting sulfur applications in May; one Rubigan (SI) application and three dusting sulfur applications in June. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to avoid powdery mildew populations from developing fungicide resistance.

**Vertebrate.** Rabbits, gophers, squirrels and coyotes are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or building a rabbit fence are utilized as necessary throughout the year. For this study no specific control is used, but an estimated cost for one or two management practices are shown in March. **Endangered Species:** It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest/Yield/Returns.** Harvest begins the third year and the fruit is picked for wine. A contractor hand harvests the crop for \$60 per ton. Harvest includes hand picking the grapes into bins that are furnished by the contractor. Hauling to the winery will vary depending on the hauling distance. For this study, the haul is less than 20 miles and cost \$10 per ton. A six-ton per acre yield is assumed in the third year.

### **Mature Production Cultural Practices and Material Inputs** (Tables 2-8)

**Prune/Sucker/Canopy Management (CM).** The vines are cane-pruned during the winter months (December to early February) and the prunings are placed in the row middles and shredded. In mid February, the canes are tied to a trellis wire(s) by wrapping around the trellis wire and tying with twist-ties. Suckers are removed from the vine trunks and crowns beginning in April. Shoot positioning is done in May. Cane cutting is done as needed beginning in June (June only in this study) with the grower's equipment.

**Fruit Management (FM).** Gibberellic acid (GA), a plant growth regulator, is applied four times. Two times in May during bloom for thinning at 12 grams per acre per application and two times in June, two weeks after full bloom and one week later for berry sizing at 60 grams per acre per application (disease and insect materials are included with these applications). A third sizing application (not included in this study) at 40 grams per acre is sometimes applied about one-week later to delay maturity. Vines are girdled in June at berry set, two to three weeks after full bloom. Cluster tipping and hand thinning are done after berry set in late May to early June to loosen clusters, and adjust cluster length and crop load.

**Trellis/Vines.** Trellis repairs are done annually and the cost is not taken from any specific data. Sick vines are replaced by layering. One year-old canes from vines are buried in the soil next to the stake and allowed to root. After rooting the canes are cut and the plant trained on the trellis. Trellis repair and vine replacement costs increase with vineyard age.

**Irrigate.** The vineyard is drip irrigated during the growing season from April through October. Deficit irrigation (80% ET) is applied post-harvest to control vine growth and promote cane maturity. Deficit irrigation may also be applied three to four weeks before harvest to advance maturity and decrease decay, but should be used with caution. Vineyards with poor root systems or high populations of soil pests should be monitored closely under deficit irrigation. Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet deep pressurized to 20 pounds per square inch (PSI). A total of 36 acre-inches is applied to the vineyard. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors. In some years, irrigation may be needed in March for frost protection.

**Fertilize.** Nitrogen (N) at 50 pounds per acre as UN32 is applied through the irrigation drip system in April (or can be applied post harvest). Neutral zinc is applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

**Pest Control Adviser (PCA).** Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a PCA are not included in this study.

**Weeds (Vineyard Floor Management).** Vineyard middles are mowed three times each season: March, May, July. Surflan and Roundup herbicides are applied to the vine row in February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in June.

**Insects.** Mealybug (*Pseudococcus* sp.) is treated with Lorsban insecticide in early March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated with Kryocide (mixed with a GA and/or sulfur application) during the second bloom thinning spray in May. Grape leafhoppers (*Erythroneura elegantula*) are controlled with Provado insecticide (mixed with GA, Microthiol, Flint) during the second berry size spray in June. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. It may be necessary to use multiple insecticides to control some mealybug species.

**Diseases.** Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*). Phomopsis and powdery mildew are both treated in late March (shoot length 2 inches) with Microthiol (micronized sulfur) and Abound (strobilurin). Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. In this study, Dusting Sulfur is applied three times - April, June, July. Microthiol and Rally, an SI (with zinc) are applied in late April. Microthiol and Flint, a strobilurin (with GA) are applied with the first May bloom thin

spray. Microthiol (with GA and Kryocide) is applied with the second bloom thin spray in May. Microthiol and Rally, an SI (with GA) are applied with the first berry size spray in June and Microthiol and Flint, a strobilurin (with GA and Provado) with the second berry size spray in June. Growers have the option of using sterol inhibitors (SI), quinolins, strobilurins, or sulfur (micronized, wettable, dust, flowable), as well as other fungicides to control powdery mildew. These materials are classes of fungicides with different modes of action. Check the IPM website under grapes for management options to control powdery mildew. It is recommended that applicators use fungicides with different modes of action in order to avoid fungicide resistance in powdery mildew populations.

**Vertebrate.** Rabbits, gophers, squirrels coyotes and birds are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or building a rabbit fence are utilized as necessary throughout the year. For this study no specific control is used, but per acre costs are shown from March through October and are an estimate not based on any specific data. Endangered Species: It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest.** Beginning in the fourth year, the grapes are harvested for table grapes and packed in the field. Harvest crews work in teams of three or four people. Depending upon fruit quality, a crew can pick 3 to 6 boxes per hour per individual. In this cost analysis it is assumed that each individual packs four boxes per hour. Two or three crew members field pick and trim grape clusters and place them into boxes, which are then palletized. Approximately four field boxes are loaded on a wheelbarrow and delivered to the packer who finish trims and bags the bunches, which are then placed in shipping boxes. The box holds 9 bags of grapes and contains 19 pounds of fruit. The filled boxes are loaded on a flat bed truck and hauled to a cold storage facility. The swap and haul costs includes the boxes, plastic bags and related labor. Pre cooling and palletization (P&P) costs may in some cases be a grower cost but are generally charged to the buyer. After 30 days of cold storage, the grower is charged approximately \$0.35 per box per month (\$0.25-0.45) until the fruit is sold. Brokerage fees are paid by the grower and range from 7 to 10% of the selling price. A figure of 9% of the selling price is used in this study.

**Yields.** This study based on grower input uses an average yield of 800 19-pound boxes over the remaining life of the vineyard. Average yields shown in Table C are the average of all table grape varieties.

**Returns.** Return prices for grapes at different yields and price are shown in Table 5. Based on grower input, an estimated price of \$12 per box for Thompson Seedless grapes is used in this study.

**Assessments/Inspection.** The California Table Grape Commission (CTGC) assesses \$0.1156 per 19-pound box or \$0.006087 per pound. Early in the season, growers often have the county Agricultural Commissioner inspect their fruit for maturity at a cost of \$0.035 per box. Approximately one-third of the entire crop is inspected to determine that maturity requirements are met, which includes soluble solids:acid ratios (20:1) and color.

**Pickup/ATV.** It is assumed that the grower uses the pickup for business and personal use. Estimated business mileage for the ranch is 5,250 miles. The all terrain vehicle (ATV) is used for spot spraying weeds and is included in that cost. It is assumed that the ATV will be used another 800 miles on the ranch for checking the vineyards including the irrigation system.

Table C. Table Grapes

Average Yields	
Year	Tons/Acre (boxes)
2002	8.13 (856)
2003	7.60 (800)
2004	7.76 (815)
2005	11.34 (1,194)
2006	9.66 (1,016)

Source: Fresno County Crop Reports, 2002-2006.  
Boxes = 19 lbs.

**Labor.** Hourly wages for workers are \$11.00 for machine operators and \$8.50 per hour non-machine labor. Adding 33% for the employer's share of federal and state payroll taxes, workers compensation insurance for vine crops (0040) and other possible benefits gives the labor rates shown of \$14.63 and \$11.31 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 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 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$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 costs per acre for each operation in Table 2 are 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.

**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. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2007.

**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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office 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 0.714% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$674 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$80 per producing acre or \$9,200 annually for the ranch. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc. The cost is assumed and not taken from any specific data.

**Sanitation Services.** Sanitation services provide double portable toilets with washbasins for 10 months. The cost includes delivery and weekly cleaning service. The number of sanitation facilities will vary depending upon local regulations and size of labor force. In many cases labor contractors furnish the sanitation facilities for their crews and it is included in the contractor's labor overhead.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.

### **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. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

**Interest Rate.** An interest rate of 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.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land values in the San Joaquin Valley with table grape production ranges from \$6,000 to \$13,400 per acre (depending on vineyard age, variety and location). Cropland with district or well water in the area ranges from \$2,500 to \$12,000. For this study, the land value was established based on 2007 real estate values (2007 Trends & Leases); therefore a cost of \$7,000 per acre or \$7,304 per producing acre is used.

**Tools.** This is an assumed value for shop, hand, and miscellaneous field tools and not based on any grower's tool inventory.

**Fuel Tanks.** Two 300-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.

**Drip Irrigation System.** The drip lines, filters, booster pump and the labor to install the components are included in the irrigation system cost. The previous vineyard is assumed to have a pumping system that had been refurbished and therefore is not included as a cost. Water is delivered from a 130-foot depth using a 40-horsepower pump. The drip irrigation lines are laid directly on the ground prior to planting and the labor cost is included in the drip irrigation system cost.

**Establishment Cost.** The establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested (year three). It is used to determine the non-cash overhead expense, capital recovery cost, during the production years. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$8,999 per acre or \$359,960 for the 40 producing acres. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**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. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.



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For information concerning the above or other University of California publications, contact your local county UC Cooperative Extension office or UC DANR Communications Services online at <http://ucanr.org>.

UC COOPERATIVE EXTENSION

**Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A TABLE GRAPE VINEYARD-Thompson Seedless  
SAN JOAQUIN VALLEY - SOUTH 2007**

	Year:	Cost Per Acre		
		1st	2nd	3rd
Tons Per Acre:		0	0	6.00
<b>Planting Costs:</b>				
Site Prep: Subsoil 2X		400		
Site Prep: Float (Level)		12		
Site Prep: Disc/Apply Herbicide (Treflan)		17		
Site Prep: Disc/Incorporate Herbicide		12		
Plant: Survey & Layout Vineyard		61		
Plant: Plant, Wrap Vines		145	2	
Vines: 454 Per Acre (2% Replant In 2nd Year)		1,407	28	
Trellis: Install Trellis System			4,000	
<b>TOTAL PLANTING COSTS</b>		<b>2,055</b>	<b>4,030</b>	
<b>Cultural Costs:</b>				
Vertebrate: Rabbit, Squirrel, Gopher (various methods)		40	15	15
Fertilize: Nitrogen		3	9	18
Irrigate: Water/Labor		54	109	161
Weed: Disc Middle - 2X/Yr 1		16		
Weed: Mow Middle - 2X/Yr 1, 4X/Yr 2, 3X/Yr 3		16	31	24
Weed: Hand Hoe		34		
Prune: ( & Tie): Dormant			73	147
Training: (Sucker, Tie)			271	113
Insect: Skeletonizer (Kryocide). Disease: Mildew (Microthiol)			36	36
Weed: Spot Spray (Roundup)			42	42
Weed: Winter Strip Spray (Roundup, Surflan)			53	53
Prune: Shred Prunings (every middle)				15
Disease: Phomopsis (Microthiol, Abound)				51
Disease: Mildew Control (Microthiol)				20
Insect: Leafhoppers 1X (Provado)				46
Disease: Mildew - (Kocide, Rubigan)				50
Disease: Mildew 5X (Sulfur Dust)				48
Disease: Mildew 2X, (Rubigan)				56
Pickup Truck Use		82	82	82
ATV Use		30	38	38
<b>TOTAL CULTURAL COSTS</b>		<b>274</b>	<b>760</b>	<b>1,016</b>
<b>Harvest Costs:</b>				
Harvest: Contract				420
<b>TOTAL HARVEST COSTS</b>				<b>420</b>
Interest On Operating Capital @ 10.00%		213	355	50
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,542</b>	<b>5,144</b>	<b>1,485</b>
<b>Cash Overhead Costs:</b>				
Office Expense		80	80	80
Liability Insurance		6	6	6
Sanitation Service		19	19	19
Property Taxes		85	86	87
Property Insurance		9	9	10
Investment Repairs		42	42	42
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>242</b>	<b>242</b>	<b>245</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>2,783</b>	<b>5,386</b>	<b>1,730</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>900</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>2,783</b>	<b>5,386</b>	<b>830</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		<b>0</b>	<b>0</b>	<b>0</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>2,783</b>	<b>8,169</b>	<b>8,999</b>

UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:	0	0	6.00
Non Cash Overhead (Capital Recovery) Cost:				
Land		530	530	530
Irrigation System		110	110	110
Shop Building		57	57	57
Shop Tools		14	14	14
Fuel Tank & Pump		2	2	2
Equipment		37	41	76
TOTAL CAPITAL RECOVERY COST		751	755	789
TOTAL COST/ACRE FOR THE YEAR		3,534	6,141	2,519
INCOME/ACRE FROM PRODUCTION		0	0	900
NET COST/ACRE FOR THE YEAR		3,534	6,141	1,619
NET PROFIT/ACRE ABOVE TOTAL COST		0	0	0
TOTAL ACCUMULATED NET COST/ACRE		3,534	9,675	11,294

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE TABLE GRAPES – Thompson Seedless**  
 SAN JOAQUIN VALLEY - SOUTH 2007

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
<b>Cultural:</b>							
Vines: Layering Missing Vines	1.00	11	0	0	0	11	
Prune: Vines	35.00	396	0	0	0	396	
Prune: Brush Disposal (Every Middle)	0.50	9	7	0	0	15	
Trellis: Repair	2.00	23	0	10	0	33	
*CM: Tie Canes	9.00	102	0	14	0	115	
Weed: Winter Strip (Surflan, Roundup)	0.49	9	5	40	0	53	
Vertebrate: Gopher, Squirrel, Coyotes, Birds (various methods)	0.00	0	0	15	0	15	
Disease: Phomopsis (Abound)/Mildew (Microthiol)	0.50	9	7	35	0	51	
Insect: Mealybug (Lorsban)	0.50	9	7	25	0	41	
Weed: Mow Middles 3X	0.74	13	11	0	0	24	
Disease: Mildew 3X (Dusting Sulfur)	0.84	15	9	6	0	30	
Sucker: Remove Trunk Suckers	2.00	23	0	0	0	23	
Disease: Mildew (Rally, Microthiol). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	9	7	28	0	44	
Fertilize: N through drip system (UN32)	0.00	0	0	23	0	23	
Irrigate: (Water)	2.55	29	0	165	0	194	
CM: Shoot Positioning	10.00	113	0	0	0	113	
FM: Bloom Thin: (GA). Disease: Mildew (Microthiol, Flint)	0.50	9	7	55	0	70	
FM: Bloom Thin: (GA). Disease: Mildew (Microthiol). Insect: Skeletonizer (Kryocide)	0.50	9	7	40	0	56	
FM: Berry Size (GA). Disease: Mildew (Rally, Microthiol)	0.50	9	7	123	0	139	
FM: Cluster Tipping and Thinning	50.00	566	0	0	0	566	
FM: Girdling	12.00	136	0	0	0	136	
CM: Cane Cutting (Mechanical)	0.31	5	3	0	0	9	
FM: Berry Size (GA). Disease: Mildew (Flint, Microthiol). Insect: Leafhopper (Provado)	0.50	9	7	180	0	195	
Weed: Spot Spray (Roundup)	0.53	9	1	4	0	14	
Pickup: Business Use	2.39	42	40	0	0	82	
ATV Use	2.00	35	3	0	0	38	
<b>TOTAL CULTURAL COSTS/ACRE</b>	<b>134.85</b>	<b>1,596</b>	<b>126</b>	<b>764</b>	<b>0</b>	<b>2,485</b>	
<b>TOTAL CULTURAL COSTS/Box</b>		<b>1.99</b>	<b>0.16</b>	<b>0.95</b>	<b>0.00</b>	<b>3.11</b>	
<b>Harvest: (800 boxes per acre)</b>							
Pick and Field Pack	200.00	2,262	0	0	0	2,262	
Boxes, Spread, Swamp & Haul	1.50	292	12	1,532	0	1,836	
Brokerage Fees	0.00	0	0	0	864	864	
Assessment & Inspection Fees	0.00	0	0	102	0	102	
<b>TOTAL HARVEST COSTS/ACRE</b>	<b>201.50</b>	<b>2,554</b>	<b>12</b>	<b>1,634</b>	<b>864</b>	<b>5,064</b>	
<b>TOTAL HARVEST COSTS/Box</b>		<b>3.19</b>	<b>0.01</b>	<b>2.04</b>	<b>1.08</b>	<b>6.33</b>	
Interest on operating capital @ 10.00%						131	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>4,150</b>	<b>138</b>	<b>2,398</b>	<b>864</b>	<b>7,681</b>	
<b>TOTAL OPERATING COSTS/Box</b>		<b>5.19</b>	<b>0.17</b>	<b>3.00</b>	<b>1.08</b>	<b>9.60</b>	
<b>CASH OVERHEAD:</b>							
Office Expense						80	
Liability Insurance						6	
Sanitation Fees						19	
Property Taxes						134	
Property Insurance						43	
Investment Repairs						42	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>324</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>8,005</b>	

\*CM = Canopy Management. FM = Fruit Management

UC COOPERATIVE EXTENSION  
**Table 2. continued**

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
NON-CASH OVERHEAD (Capital Recovery):		Per producing Acre	Annual Cost Capital Recovery				
Land		7,304		530		530	
Drip Irrigation System		1,250		110		110	
Building		696		57		57	
Tools-Shop/Field		130		14		14	
Fuel Tanks 2-300G		30		2		2	
Vineyard Establishment Costs		8,999		831		831	
Equipment		779		104		104	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>19,189</b>		<b>1,647</b>		<b>1,647</b>	
<b>TOTAL COSTS/ACRE</b>						<b>9,652</b>	
<b>TOTAL COSTS/Box</b>						<b>12.07</b>	

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**Table 3. COSTS AND RETURNS PER ACRE to PRODUCE TABLE GRAPES – Thompson Seedless**  
 SAN JOAQUIN VALLEY - SOUTH 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Table Grapes Fresh (box = 19 lbs)	800.00	box	12.00	9,600	
<b>OPERATING COSTS</b>					
<b>Trellis System:</b>					
Miscellaneous Repair Materials	1.00	acre	10.00	10	
<b>Vine Aids:</b>					
Tying Materials	4,540.00	each	0.00	14	
<b>Herbicide:</b>					
Surflan 4 AS	2.40	pint	14.52	35	
Roundup Ultra Max	1.10	pint	7.80	9	
<b>Fungicide:</b>					
Abound (Strobilurin)	12.00	floz	2.86	34	
Microthiol Disperss (micronized wettable sulfur)	11.00	lb	0.83	9	
Dusting Sulfur	30.00	lb	0.22	6	
Rally 40W (Sterol Inhibitor)	8.00	oz	5.23	42	
Flint (Strobilurin)	4.00	oz	16.50	66	
<b>Vertebrate Control:</b>					
Shooting, Trapping, Baiting	1.00	acre	15.00	15	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.35	25	
Kryocide	6.00	lb	3.08	18	
Provado 1.6 Solupak	1.00	oz	44.21	44	
<b>Fertilizer:</b>					
Neutral Zinc 50% (foliar)	5.00	lb	1.08	5	
UN 32	50.00	lb N	0.46	23	
<b>Water:</b>					
Water Pumped	36.00	acin	4.59	165	
<b>Growth Regulator:</b>					
ProGibb 4% Solution (Gibberelic Acid)	144.00	grams	1.68	242	
<b>Harvest Supplies:</b>					
Box (19 lb)	800.00	box	1.60	1,280	
Plastic Bags (9/box)	7,200.00	each	0.04	252	
<b>Contract:</b>					
Brokerage Fees (9% of selling price)	800.00	box	1.08	864	
<b>Assessment:</b>					
Table Grape Commission	800.00	box	0.12	93	
Quality Inspection (1/3 of yield)	264.00	box	0.04	9	
Labor (machine)	15.36	hrs	14.63	225	
Labor (non-machine)	347.05	hrs	11.31	3,925	
Fuel - Gas	11.78	gal	2.80	33	
Fuel - Diesel	22.19	gal	2.30	51	
Lube				13	
Machinery repair				41	
Interest on operating capital @ 10.00%				131	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>7,681</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>1,919</b>	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				80	
Liability Insurance				6	
Sanitation				19	
Property Taxes				134	
Property Insurance				43	
Investment Repairs				42	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>324</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>8,005</b>	

UC Cooperative Extension  
**Table 3. continued**

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Land				530	
Drip Irrigation System				110	
Building				57	
Tools-Shop/Field				14	
Fuel Tanks 2-300G				2	
Vineyard Establishment Costs				831	
Equipment				104	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,647</b>	
<b>TOTAL COSTS/ACRE</b>				<b>9,652</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>-52</b>	

UC COOPERATIVE EXTENSION  
**Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE TABLE GRAPES – Thompson Seedless**  
 SAN JOAQUIN VALLEY - SOUTH 2007

	JAN 07	FEB 07	MAR 07	APR 07	MAY 07	JUN 07	JUL 07	AUG 07	SEP 07	OCT 07	NOV 07	DEC 07	TOTAL
Beginning JAN 07													
Ending DEC 07													
Cultural:													
Vine: Layering Missing Vines	11												11
Prune: Vines	396												396
Prune: Brush Disposal	15												15
Trellis: Repair	33												33
*CM: Tie Canes		115											115
Weed: Winter Strip (Surflan, Roundup)		53											53
Vertebrate: Gopher, Squirrel, Coyotes, Birds (various methods)			2	2	2	2	2	2	2	2			15
Disease: Phomopsis (Abound)/Mildew (Microthiol)			51										51
Insect: Mealybug (Lorsban)			41										41
Weed: Mow Middles 3X			8		8		8						24
Disease: Mildew (Dusting Sulfur)				10		10	10						30
Sucker: Trunk				23									23
Disease: Mildew (Rally, Microthiol)/Fertilize: Foliar Zinc (Neutral Zinc)				44									44
Fertilize: (UN32) through drip				23									23
Irrigate: Water & Labor				6	22	37	48	44	31	6			194
CM: Shoot Position					68		45						113
FM: Bloom Thin (GA). Disease: Mildew (Microthiol, Flint)					70								70
FM: Bloom Thin (GA). Disease: Mildew (Microthiol). Insect: Skeletonizer (Kryocide)					56								56
FM: Berry Size (GA). Disease: Mildew (Rally, Microthiol)						139							139
FM: Cluster Tipping & Thinning						566							566
FM: Girdle						136							136
CM: Cane Cutting (Mechanical)						9							9
FM: Berry Size (GA). Disease: Mildew (Flint, Microthiol). Insect: Leafhopper (Provado)						195							195
Weed: Spot Spray (Roundup)						14							14
Pickup: Business Use	7	7	7	7	7	7	7	7	7	7	7	7	82
ATV:	3	3	3	3	3	3	3	3	3	3	3	3	38
TOTAL CULTURAL COSTS	465	179	111	117	236	1,117	123	55	43	18	10	10	2,485
Harvest: (800 box/acre)								2,262					2,262
Pick & Field Pack								1,836					1,836
Spread, Swamp, Haul & Boxes								864					864
Brokerage Fees								102					102
Assessment & Inspection Fees								5,064					5,064
**TOTAL HARVEST COSTS								9,028					9,028
Interest on operating capital @ 10.00%	4	5	6	7	9	19	20	62	0	0	0	0	131
TOTAL OPERATING COSTS/ACRE	469	184	118	125	245	1,136	143	5,182	42	18	10	10	7,681



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 Table 4. Continued  
 SAN JOAQUIN VALLEY - SOUTH 2007

	JAN 07	FEB 07	MAR 07	APR 07	MAY 07	JUN 07	JUL 07	AUG 07	SEP 07	OCT 07	NOV 07	DEC 07	TOTAL
Beginning JAN 07													
Ending DEC 07	7	7	7	7	7	7	7	7	7	7	7	7	80
OVERHEAD:													
Office Expense													6
Liability Insurance	2	2	2	2	2	2	2	2	2	2			19
Sanitation Fees	67						67						134
Property Taxes	22						22						43
Property Insurance	4	4	4	4	4	4	4	4	4	4	4	4	42
Investment Repairs	101	12	12	12	12	12	101	12	18	12	10	10	324
TOTAL CASH OVERHEAD COSTS	570	196	130	137	257	1,148	243	5,194	60	30	20	20	8,005
TOTAL CASH COSTS/ACRE													

UC COOPERATIVE EXTENSION  
**Table 5. RANGING ANALYSIS for TABLE GRAPES – Thompson Seedless**  
 SAN JOAQUIN VALLEY - SOUTH 2007

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE TABLE GRAPES

	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
<b>OPERATING COSTS:</b>							
Cultural Cost	2,485	2,485	2,485	2,485	2,485	2,485	2,485
Harvest Cost (pick, pack, stack, swamp, haul)	2,049	2,561	3,074	3,586	4,098	4,610	5,123
Brokerage Fees	432	540	648	756	864	972	1080
Assessment/Inspection Cost	51	64	77	89	102	115	128
Interest on operating capital	110	115	121	126	131	136	142
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>5,127</b>	<b>5,765</b>	<b>6,405</b>	<b>7,042</b>	<b>7,680</b>	<b>8,318</b>	<b>8,958</b>
(Total Operating Costs/box)	12.82	11.53	10.68	10.06	9.60	9.24	8.96
<b>CASH OVERHEAD COSTS/ACRE</b>							
	323	323	324	324	324	325	325
<b>TOTAL CASH COSTS/ACRE</b>	<b>5,450</b>	<b>6,088</b>	<b>6,729</b>	<b>7,366</b>	<b>8,004</b>	<b>8,643</b>	<b>9,283</b>
(Total Cash Costs/box)	13.63	12.18	11.22	10.52	10.01	9.60	9.28
<b>NON-CASH OVERHEAD COSTS/ACRE</b>							
	1,635	1,638	1,642	1,645	1,647	1,650	1,652
<b>TOTAL COSTS/ACRE</b>	<b>7,085</b>	<b>7,726</b>	<b>8,371</b>	<b>9,011</b>	<b>9,651</b>	<b>10,293</b>	<b>10,935</b>
(Total Costs/box)	17.71	15.45	13.95	12.87	12.06	11.44	10.94

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
9.00	-1,527	-1,265	-1,005	-742	-480	-218	42
10.00	-1,127	-765	-405	-42	320	682	1,042
11.00	-727	-265	195	658	1,120	1,582	2,042
12.00	-327	235	795	1,358	1,920	2,482	3,042
13.00	73	735	1,395	2,058	2,720	3,382	4,042
14.00	473	1,235	1,995	2,758	3,520	4,282	5,042
15.00	873	1,735	2,595	3,458	4,320	5,182	6,042

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
9.00	-1,850	-1,588	-1,329	-1,066	-804	-543	-283
10.00	-1,450	-1,088	-729	-366	-4	357	717
11.00	-1,050	-588	-129	334	796	1,257	1,717
12.00	-650	-88	471	1,034	1,596	2,157	2,717
13.00	-250	412	1,071	1,734	2,396	3,057	3,717
14.00	150	912	1,671	2,434	3,196	3,957	4,717
15.00	550	1,412	2,271	3,134	3,996	4,857	5,717

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	400	500	600	700	800	900	1,000
9.00	-3,485	-3,226	-2,971	-2,711	-2,451	-2,193	-1,935
10.00	-3,085	-2,726	-2,371	-2,011	-1,651	-1,293	-935
11.00	-2,685	-2,226	-1,771	-1,311	-851	-393	65
12.00	-2,285	-1,726	-1,171	-611	-51	507	1,065
13.00	-1,885	-1,226	-571	89	749	1,407	2,065
14.00	-1,485	-726	29	789	1,549	2,307	3,065
15.00	-1,085	-226	629	1,489	2,349	3,207	4,065

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**Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, & 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 60 HP 4WD Narrow Tractor	47,000	15	9,150	4,885	200	281		5,366
07 ATV 4WD	6,700	5	3,003	1,125	35	49		1,209
07 Brush Shredder 6'	8,000	15	768	862	31	44		937
07 Cane Cutter 12'	3,500	20	182	333	13	18		364
07 Duster - 3 Point 12'	5,500	5	1,792	1,040	26	36		1,103
07 Mower-Flail 8'	10,500	15	1,008	1,132	41	58		1,230
07 Orchard/Vine Sprayer 500 gal	21,000	5	6,840	3,973	99	139		4,211
07 Pickup Truck 1/2 T	28,000	7	10,621	4,023	138	193		4,354
07 Sprayer ATV 20 gal	350	10	62	46	1	2		50
07 Truck Flatbed (10 ton)	56,000	10	16,542	6,882	259	363		7,504
07 Weed Sprayer 3 Point 100 gal	4,000	10	707	526	17	24		566
<b>TOTAL</b>	<b>190,550</b>		<b>50,675</b>	<b>24,826</b>	<b>861</b>	<b>1,206</b>		<b>26,894</b>
60% of New Cost *	114,330		30,405	14,896	517	724		16,136

\* 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	
Building 2400 sqft	80,000	20		6,610	286	400	1,600	8,895
Drip Irrigation System 40 acres	50,000	25		4,388	179	250	1,000	5,816
Vineyard Establishment	359,960	22		33,220	1,285	1,800	0	36,305
Fuel Tanks 2-300 gal	3,500	30	350	286	14	19	70	389
Land	840,000	25	840,000	60,900	0	8,400	0	69,300
Tools-Shop/Field	15,000	15	1,500	1,614	59	83	300	2,056
<b>TOTAL INVESTMENT</b>	<b>1,348,460</b>		<b>841,850</b>	<b>107,017</b>	<b>1,822</b>	<b>10,952</b>	<b>2,970</b>	<b>122,761</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.86	674
Office Expense	115	acre	80.00	9,200
Sanitation Fee	115	acre	19.35	2,225

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**Table 7. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - SOUTH 2007

Yr Description	Actual Hours Used	COSTS PER HOUR							Total Costs/Hr.
		Cash Overhead				Operating			
		Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Opera.		
07 60 HP 4WD Narrow Tractor	1,066	2.75	0.11	0.16	1.12	7.79	8.91	11.93	
07 ATV 4WD	400	1.69	0.05	0.07	0.49	1.07	1.56	3.37	
07 Brush Shredder 6'	133	3.91	0.14	0.20	3.49	0.00	3.49	7.74	
07 Cane Cutter 12'	101	1.97	0.08	0.11	1.29	0.00	1.29	3.45	
07 Duster - 3 Pt 12'	240	2.60	0.07	0.09	0.79	0.00	0.79	3.55	
07 Mower-Flail 8'	133	5.12	0.19	0.26	4.58	0.00	4.58	10.15	
07 Orchard/Vine Sprayer 500 gal	400	5.96	0.15	0.21	3.67	0.00	3.67	9.99	
07 Pickup Truck 1/2 T	286	8.46	0.29	0.41	2.04	14.76	16.80	25.96	
07 Sprayer ATV 20 gal	148	0.19	0.01	0.01	0.09	0.00	0.09	0.30	
07 Truck Flatbed (10 ton)	200	20.65	0.78	1.09	5.30	2.64	7.94	30.46	
07 Weed Sprayer 3 PT 100 gal	199	1.59	0.05	0.07	0.68	0.00	0.68	2.39	

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**Table 8. OPERATIONS WITH EQUIPMENT for TABLE GRAPES – Thompson Seedless**  
 SAN JOAQUIN VALLEY - SOUTH 2007

Operation	Operation			Broadcast		
	Month	Tractor	Implement	Material	Rate/acre	Unit
<b>Weed: Winter Strip</b>	March	60HP 4WD	Weed Sprayer	Surflan	2.40	pt
				Roundup	0.60	pt
<b>Weed: Mow Middles</b>	March	60HP 4WD	Mower Flail 8'			
	May	60HP 4WD	Mower Flail 8'			
	July	60HP 4WD	Mower Flail 8'			
<b>Weed: Spot Spray</b>	June	ATV 4WD	ATV Sprayer	Roundup	0.50	pt
<b>Fertilize: N through drip</b>	April			UN 32	50.00	lb N
<b>Irrigation</b>	April			Water	1.00	acin
	May			Water	4.00	acin
	June			Water	7.00	acin
	July			Water	9.00	acin
	August			Water	8.00	acin
	September			Water	6.00	acin
	October			Water	1.00	acin
	<b>Disease: Phomopsis/Mildew</b>	March	60HP 4WD	Air Blast Sprayer	Abound	12.00
Microthiol					1.00	lb
<b>Vertebrate: Squirrels, Gophers, Coyotes, Birds</b>	Mar – Oct			Various methods	15.00	acre
<b>Disease: Mildew 3X</b>	April	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	June	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	July	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
<b>Disease: Mildew. Fertilize: Foliar Zinc</b>	April	60HP 4WD	Air Blast Sprayer	Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				Neutral Zinc	5.00	lb
<b>*FM: Bloom Thin. Disease: Mildew</b>	May	60HP 4WD	Air Blast Sprayer	GA (Thin)	12.00	floz
				Microthiol (Mildew)	2.00	lb
				Flint (Mildew)	2.00	oz
<b>FM: Bloom Thin. Disease: Mildew. Insect: Skeletonizer</b>	May	60HP 4WD	Air Blast Sprayer	GA (Thin)	12.00	floz
				Microthiol (Mildew)	2.00	lb
				Kryocide (Skeletonizer)	6.00	lb
<b>FM: Berry Size. Disease: Mildew</b>	June	60HP 4WD	Air Blast Sprayer	GA (Thin)	60.00	floz
				Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
<b>FM: Berry Size. Disease: Mildew. Insect: Leafhopper</b>	June	60HP 4WD	Air Blast Sprayer	GA (Thin)	60.00	floz
				Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	4.00	oz
				Flint (Mildew)	2.00	oz
				Provado (Leafhopper)	1.00	oz
<b>Insect: Mealybug</b>	March	60HP 4WD	Air Blast Sprayer	Lorsban	4.00	pt
<b>FM: Cluster Tipping &amp; Thinning</b>	June			Labor	50.00	hrs
<b>FM: Girdle</b>	June			Labor	12.00	hrs
<b>Trellis: Repair</b>	January			Labor	2.00	hrs
				Trellis Materials	10.00	acre
<b>Vine: Layering Vines</b>	January			Labor	1.00	hrs
<b>Prune</b>	January			Labor	35.00	hrs
<b>Prune: Shred Brush</b>	January	60HP 4WD	Brush Shredder 6'			
<b>Sucker: Remove Trunk Suckers</b>	April			Labor	2.00	hrs
<b>CM: Tie Canes</b>	February			Labor	7.00	hrs
				Materials	11.50	acre
<b>CM: Shoot Positioning</b>	May			Labor	6.00	hrs
	July			Labor	4.00	hrs
<b>CM: Cane Cutting</b>	June	60HP 4WD	Cane Cutter			
<b>Pickup: Business Use</b>	Annual		Pickup 1/2 ton			
<b>ATV</b>	Annual		ATV			
<b>Harvest: Pick &amp; Field Pack</b>	August			Labor	200.00	hrs
<b>Harvest: Swamp, Spread, Haul</b>	August	Truck Flatbed		Labor	23.50	hrs
				Boxes	800.00	boxes
				Plastic Bags	7,200.00	bags

\*CM = Canopy Management. FM = Fruit Management

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2007

**SAMPLE COSTS TO  
ESTABLISH AND PRODUCE  
TABLE GRAPES**

**CRIMSON SEEDLESS**



**SAN JOAQUIN VALLEY - SOUTH**

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UC COOPERATIVE EXTENSION

**SAMPLE COSTS TO ESTABLISH AND PRODUCE TABLE GRAPES**

Crimson Seedless

**San Joaquin Valley – South 2007**

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**INTRODUCTION**

Sample costs to establish and produce Crimson Seedless table grapes 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 considered typical for the crop and area, but these practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering your farm 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 can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-1517 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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The University of California and the United States Department of Agriculture, Risk Management Agency, cooperating.

## ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish the vineyard and produce Crimson Seedless table grapes in the San Joaquin Valley. The cultural practices described represent production operations and materials considered typical on a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as 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.**

**Farm.** The hypothetical farm consists of 120 contiguous acres. Crimson Seedless vineyard establishment and table grape production is on 40 acres. Other table grape varieties are on 75 acres; roads, irrigation systems, and farmstead occupy five acres. The farm is owned and managed by the grower.

### Establishment Cultural Practices & Material Inputs (Table 1)

**Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from vines or trees should be fallowed for two years except for a possible grain crop. The land is assumed to be fairly level. A custom operator chisels the ground (subsoils) twice to a depth of 4-5 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disced twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in vines or trees and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Plant.** Planting the vineyard starts by laying out and marking vine sites in early spring. Holes are dug and vines planted and a two-inch by two-inch cardboard carton placed around the vine. In the second year, 2% or 10 vines per acre are replaced.

**Vines.** The Crimson Seedless plants are dormant, bench-grafted rootstock vines purchased from a commercial nursery. The grapevines are planted during the spring on a 7-foot x 12-foot spacing (vine x row) with 518 vines per acre. Vines are trained during the first and second years. The grapevines are expected to begin yielding fruit in the third year and then be productive for an additional 22 years.

**Trellis System.** A commercial company installs the trellis system in the second year. The trellis system will be removed when the vineyard is removed; therefore it is considered part of the vineyard and included in the establishment costs. Materials for the open gable trellis are as follows: (1) Stakes with V structure are placed every 24-feet down the row. Metal stakes (2 lbs/ft strength) are 8.5-foot long and placed in the ground 3-feet. The open gable is 72-inches wide from tip to tip. (2) End assemblies consist of 9.5-foot metal post (4 lb/ft) with a V that matches those within the row and with 10-inch helix anchor. (3) Eight wires, 12.5 gauge high tensile, are used for fruit and canopy support; three wires, 14 gauge high tensile, are used for movable catch wires and drip hose support. For growers planting and training vines in the first year with the intention to harvest in the second year, trellis installation should be completed in the first year and the cost shown accordingly.

**Train/Prune.** Vines are pruned to one two bud spur in the first dormant season (December to February, January in this study).

**Train.** The following spring (second year), a single shoot is selected and trained up the stake to form the permanent structure of the vine. Training consists of tying the shoot, removing lateral shoots from the base and tipping the shoot when it reaches desired head height. Most of the training costs occur during the second summer. The third summer is devoted to training missing vines or vines delayed in growth.

**Prune.** In the third year (January), vines are pruned much like an established vine. The exception being the number of canes retained: 2-3 canes on young vines and 5-8 canes on mature vines. Prunings are placed in the row middles and shredded. Selecting and tying canes to fruiting wires is required each year for the life of the vineyard. Suckers from vine trunks are removed in April, a practice that continues each year but diminishes as the vineyard matures. It should be noted that Crimson Seedless is often trained to quadrilateral cordons and spur pruned, but in this study, vines are head trained and cane pruned.

**Irrigate.** Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$4.59 per acre-inch or \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet deep. The vineyard is irrigated during the growing season from April through October during the establishment years. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors. The amount of water applied to the vineyard varies through the establishment years and is shown in Table A.

Table A. Irrigation  
Water Applied

Year	AcIn/Year
1	8
2	18
3+	36

**Fertilize.** Liquid nitrogen fertilizer, UN32, is applied through the irrigation system in April of the first year at five pounds of N per acre. A single application is made in April of the second year. The amount of nitrogen applied each year increases as the vineyard matures and is shown in Table B. It is important to identify sources of nitrogen in order to properly manage the nitrogen budget. For example, sources of nitrogen such as irrigation well water should be calculated to determine future irrigation and fertilizer needs.

Table B. Applied  
Nitrogen (N) Per Acre

Year	Lbs of N
1	5
2	25
3+	50

**Pest Management.** For pest identification, monitoring, management and pesticide information, visit the UC IPM website at [www.imp.ucdavis.edu](http://www.imp.ucdavis.edu). Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on pesticide use permits, contact the local county Agricultural Commissioner’s office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.**

**Weeds (Vineyard Floor Management).** In October of the year prior to planting, Treflan is applied to the vineyard floor and incorporated by discing. After planting, weeds in the vine rows and middles are managed with discing, mowing, and/or herbicides. From March through July of the first year, the row middles are disced twice and mowed twice. The vine rows are hand weeded in April. The row middles are mowed three to four times during the growing season starting the second year. The vine rows are sprayed (strip spray) in January of the second year with Roundup and Surflan. The strip spray is applied to 30% of the acreage. Also in the second year, spot sprays using Roundup are applied to the vine row in April, June, and July. The spot sprays (weedy spots or areas) are applied using an all terrain vehicle (ATV) with a sprayer attached.

**Insects.** Beginning in the second year, western grapeleaf skeletonizer (*Harrisina brillians*) is controlled in April with an application of Kryocide insecticide (mixed with micronized sulfur sprays). Additionally insects such as mealybugs are monitored each year beginning in the spring and may increase production costs if found.



If mealybugs (*Pseudococcus sp.*) are found during vineyard establishment, the grower should consult with a PCA, farm advisor, and/or Ag commissioner to develop management strategies.

**Diseases.** Although many pathogens attack grapevines, phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Uncinula necator*) are the two diseases managed in this study. In April of the second and third years, Microthiol plus Abound (strobilurin) are applied for phomopsis and mildew control. Mildew is controlled with various fungicide applications at 7 to 21 day intervals in the third year, depending on the fungicide used. For this study, the grower applies Kocide (copper) and Rubigan (SI), and two Microthiol applications (one with Kryocide) in April; one Rubigan (SI) application and two dusting sulfur applications in May; one Rubigan (SI) application and two dusting sulfur applications in June. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to avoid powdery mildew populations from developing fungicide resistance.

**Vertebrate.** Rabbits, gophers, squirrels and coyotes are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and/or building a rabbit fence are utilized as necessary throughout the year. For this study no specific control is used, but an estimated cost for one or two management practices are shown in March. **Endangered Species:** It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest/Yield/Returns.** The table grapes in this study are first harvested in the third year and the yields are 50% to 75% of mature producing vines. An assumed yield of 600 nineteen pound boxes is used for calculating income. If the crop is harvested for wine, a labor contractor may be needed. Growers sometimes plant and train vines in the same year, which produces a harvestable Crimson Seedless table grape crop in the second year.

### **Mature Production Cultural Practices and Material Inputs** (Tables 2-8)

**Prune/Sucker/Canopy Management (CM).** The vines are cane-pruned during the winter months (December to early February) in January and the prunings are placed in the row middles and shredded. In mid February, the canes are tied by wrapping on the trellis wire and tying with twist-ties. Suckers are removed from the vine trunks in early April. Shoot positioning and removal are done in late April. The canes are mechanically cut in June to improve canopy microclimate, allowing for sunlight penetration and proper coverage of pesticides.

**Fruit Management (FM).** Gibberellic acid (GA), a plant growth regulator, is applied two times: one time in May for thinning during bloom at one gram per acre and a second time for berry sizing three to four weeks after full bloom (June) at eight grams per acre (disease and insect materials are included with these applications). Applying GA to Crimson Seedless for sizing increases berry weight less than 10%. GA applied at this time decreases fruit color. Tradeoffs should be considered before application. Vines are girdled to increase berry size two to three weeks after full bloom (June). Cluster tipping and hand thinning are done in late May to early June to loosen and adjust cluster length and crop load. Leaf removal for fruit exposure is done in June. Ethrel, a second plant growth regulator, is applied to the vineyard in August to enhance color development in the fruit. Some growers cover canopies late in the season with plastic to protect fruit from fall rains, but the value of the practice is open for debate.

**Trellis/Vines.** Trellis repairs are done annually (January in this study) and the cost is not taken from any specific data. Weak or missing vines are replaced by layering. One year-old canes from neighboring vines are buried (layered) in the soil next to the stake and allowed to root. After rooting the canes are cut and the plant trained on the trellis. Trellis repair and vine replacement increases with vineyard age.

**Irrigate.** The vineyard is drip irrigated during the growing season from April through October. Deficit irrigation (70% ET) is applied three to five weeks prior to harvest to slow shoot growth and promote fruit maturity. Deficit irrigation may not work well on weak or low vigor vineyards. If deficit irrigation is used, these vineyards should be monitored closely. Water pumping costs plus labor constitute the irrigation cost. In this study, water is calculated to cost \$ \$4.59 per acre-inch or \$ \$55.08 per acre-foot. The pumping cost is based on a 40 horsepower (HP) motor to pump from 130 feet depth and pressurized to 20 pounds per square inch (PSI). A total of 36 acre-inches is applied to the vineyard. Price per acre-foot of water will vary by grower in this region depending on quantity used, water district, power cost, various well characteristics, and other irrigation factors.

**Fertilize.** Nitrogen (N) at 50 pounds per acre as UN32 is applied through the irrigation drip system in April or post-harvest. Neutral zinc is applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

*Pest Control Adviser (PCA).* Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a PCA are not included in this study.

*Weeds (Vineyard Floor Management).* Vineyard middles are mowed three times each season: March, May, July. Surflan and Roundup herbicides are applied to the vine row/berm in February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in June.

*Insects.* Mealybug (*Pseudococcus sp.*) is treated with Lorsban insecticide in early March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated with Kryocide (mixed with a GA and/or sulfur application) during the bloom thinning spray in May. Grape leafhoppers (*Erythroneura elegantula*) are controlled with Provado insecticide (mixed with GA, Microthiol, Rally) during the berry size spray in June. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. It may be necessary to use multiple insecticides to control some mealybug species.

*Diseases.* Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Erysiphe necator*). Phomopsis and powdery mildew are both treated in late March (shoot

length averages 2-inches) with Abound and Microthiol (micronized sulfur). Mildew is controlled with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. In this study, Dusting Sulfur is applied three times – April, June, July. Microthiol and Rally, an SI, (with zinc) are applied in late April. Microthiol (with GA and Kryocide) is applied with the May bloom thin spray. Rally and Microthiol are applied in June. Microthiol and Rally (with GA and Provado) are applied with the berry size spray in June. Microthiol and Rally are applied in July. Dusting Sulfur is applied two times in September and two times in October to control powdery mildew on the stems. The mildew does not grow on the grapes at this stage of maturity. Vanguard fungicide is applied in October to protect grapes from Botrytis Bunch Rot. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to prevent powdery mildew populations from acquiring fungicide resistance.

*Vertebrate.* Gophers, squirrels coyotes and birds are pests that can cause damage to the vines and irrigation lines. Various forms of control such as baiting, trapping and shooting are utilized as necessary throughout the year. For this study no specific control is used, but per acre costs are shown from March through October and are an estimate not based on any specific data. *Endangered Species:* It is important to know if your vineyard is located in an area where endangered species reside (i.e. San Joaquin Kit Fox). Trapping and killing endangered species can result in fines. Contact your County Agricultural Commissioner for additional information.

**Harvest.** Beginning in the October, the grapes are harvested for table grapes and packed in the field. The field is picked two to three times. Harvesting crews work in teams of three or four. Depending on fruit quality, the team can pick 3 to 6 boxes per hour per individual. For this study, the picker picks four shipping boxes per hour per individual. Two or three pickers field pick and trim the grapes, and put them in a reusable field box. After the fruit is picked and trimmed, the field boxes are loaded on a harvest wheelbarrow and delivered to the packer who places the fruit in bags and places them in shipping boxes. The box holds 9 bags and weighs 19 pounds when filled. The empty boxes are stacked along row ends and when filled, they are loaded on a truck and hauled to storage. The swamp and haul cost includes the boxes, plastic bags and related labor. Pre cooling and palletization (P&P) costs may in some cases be a grower cost but are generally charged to the buyer. After 30 days of cold storage, the grower is charged approximately \$0.35 per box per month (\$0.25-0.45) until the fruit is sold. Brokerage fees are paid by the grower and range from 7 to 10% of the selling price. A figure of 9% of the selling price is used in this study.

*Yields.* This study uses an average yield of 1,000, 19-pound boxes over the productive life of the vineyard to calculate returns. Average yields for all table grape varieties are shown in Table C. The averages include all vineyards in production regardless of maturity.

*Returns.* Return prices for grapes at different yields and prices are shown in Table 5. Based on grower information, an estimated price of \$14 per box for Crimson Seedless grapes is used in this study.

Table C. Table Grapes

Average Yields	
Year	Ton/Acre (boxes)
2002	8.13 (856)
2003	7.60 (800)
2004	7.76 (815)
2005	11.34 (1,194)
2006	9.66 (1,016)

Source: Fresno County Crop Reports, 2002-2006

Box = 19 lbs.

*Assessments/Inspection.* The California Table Grape Commission (CTGC) assesses \$0.1156 per 19-pound box or \$0.006087 per pound. Early in the season, growers often have the county Agricultural Commissioner inspect their fruit for maturity at a cost of \$0.035 per box. Approximately one-third of the entire crop is inspected to determine that maturity requirements are met, which includes soluble solids:acid ratios (20:1) and color.

**Pickup/ATV.** It is assumed that the grower uses the pickup for business and personal use. Estimated business mileage for the ranch is 5,250 miles. The all terrain vehicle (ATV) is used for spot spraying weeds and is included in that cost. It is assumed that the ATV will be used another 800 miles on the ranch for checking the vineyards including the irrigation system.

**Labor.** Hourly wages for workers are \$11.00 for machine operators and \$8.50 per hour non-machine labor. Adding 33% for the employer's share of federal and state payroll taxes, workers compensation insurance for vine crops (0040) and other possible benefits gives the labor rates shown of \$14.63 and \$11.31 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 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 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agriculture Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$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 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**Interest on Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 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. The rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2007.

**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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

### **Cash Overhead**

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office 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 0.714% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$ 674 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$80 per producing acre or \$9,200 annually for the ranch. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

**Sanitation Services.** Sanitation services provide double portable toilets with washbasins for 10 months. The cost includes delivery and weekly cleaning service. The number of sanitation facilities will vary depending upon local regulations and size of labor force. In many cases labor contractors furnish the sanitation facilities for their crews and are included in the contractor's labor overhead.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price.

#### **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. The purchase price and salvage value for equipment and investments are shown in Table 6.

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

**Interest Rate.** An interest rate of 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.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land in the San Joaquin Valley with table grape production ranges from \$6,000 to \$13,400 per acre (depending on vineyard age, variety and location). Cropland with district or well water in the area ranges from \$2,500 to \$12,000. For this study, the land value was established based on 2007 real estate values (2007 Trends & Leases); therefore a cost of \$7,000 per acre or \$7,304 per producing acre is used.

**Tools.** This is an assumed value for shop, hand, and miscellaneous field tools and not based on any grower's tool inventory.

**Fuel Tanks.** Two 300-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.

**Drip Irrigation System.** The drip lines, filters, booster pump and the labor to install the components are included in the irrigation system cost. The previous vineyard is assumed to have a pumping system that had been refurbished and therefore is not included as a cost. Water is delivered from a 130-foot depth using a 40-horsepower pump. The drip irrigation lines are laid directly on the ground prior to planting and the labor cost is included in the drip irrigation system cost.

**Establishment Cost.** The establishment cost is the sum of the costs for land preparation, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year (third planted year in this study) that grapes are harvested. It is used to determine the non-cash overhead expense, (capital recovery cost) during the production years. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment costs. For this study the cost is \$5,247 per acre or \$209,880 for the 40 producing acres. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**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. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION

Table 1. COSTS PER ACRE TO ESTABLISH A CRIMSON TABLE GRAPE VINEYARD  
SAN JOAQUIN VALLEY SOUTH - 2007

	Cost Per Acre			
	Year:	1st	2nd	3rd
Boxes Per Acre:	0	0	600	
<b>Planting Costs:</b>				
Site Prep: Subsoil 2X		400		
Site Prep: Float (Level)		12		
Site Prep: Disc/Apply Herbicide (Treflan)		17		
Site Prep: Disc/Incorporate Herbicide		12		
Plant: Survey & Layout Vineyard		70		
Plant: Plant, Wrap Vines		166	2	
Vines: 518 Per Acre (2% Replant In 2nd Year)		1,606	31	
Trellis: Trellis System (custom)			4,000	
<b>TOTAL PLANTING COSTS</b>		<b>2,282</b>	<b>4,033</b>	
<b>Cultural Costs:</b>				
Vertebrate: (Rabbit, Gopher, Squirrel)		40	15	15
Fertilize: Nitrogen (UN32)		3	12	23
Irrigate: Water/Labor		54	107	181
Weed: Disc Middles - 2X/Yr 1		16		
Weed: Mow Middles - 2X/Yr 1, 4X/Yr 2, 3X/Yr 3		16	31	24
Weed: Hand Hoe		34		
Prune: Dormant			73	90
Training: (Sucker, Tie)			271	136
Insect: Skeletonizer (Kryocide). Disease: Mildew (Microthiol)			36	36
Weed: Spot Spray (Roundup)			42	42
Weed: Winter Strip Spray (Roundup, Surflan)			53	53
Prune: Shred prunings				15
Disease: Phomopsis (Microthiol, Abound)				51
Disease: Mildew Control (Microthiol)				20
Insect: Leafhoppers 1X (Provado)				46
Disease: Mildew (Kocide, Rubigan)				50
Disease: Mildew 4X (Sulfur Dust)				39
Disease: Mildew 2X, (Rubigan)				56
Pickup: Business use		82	82	82
ATV: Field use		30	38	38
<b>TOTAL CULTURAL COSTS</b>		<b>274</b>	<b>761</b>	<b>996</b>
<b>Harvest Costs:</b>				
Pick & Field Pack (labor)				1,697
Spread/Stack boxes, Swamp, Haul (includes boxes, bags, labor)				1,372
Brokerage Fee				756
Assessment & Inspection Fees				77
<b>TOTAL HARVEST COSTS</b>				<b>3,901</b>
Interest On Operating Capital @ 10.00%		233	355	83
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,788</b>	<b>5,148</b>	<b>4,980</b>
<b>Cash Overhead Costs:</b>				
Office Expense		80	80	80
Liability Insurance		6	6	6
Sanitation Service		19	19	19
Property Taxes		85	86	88
Property Insurance		9	9	11
Investment Repairs (non-cash overhead items)		42	42	42
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>242</b>	<b>242</b>	<b>246</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>3,030</b>	<b>5,390</b>	<b>5,227</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>8,400</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>3,030</b>	<b>5,390</b>	<b>0</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		<b>0</b>	<b>0</b>	<b>3,173</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>3,030</b>	<b>8,420</b>	<b>5,247</b>



UC COOPERATIVE EXTENSION  
**Table 1. continued**

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Boxes Per Acre:	0	0	600
Non-Cash Overhead Costs (Capital Recovery):				
Land		530	530	530
Irrigation System		110	110	110
Shop Building		57	57	57
Shop Tools		14	14	14
Fuel Tank & Pump		2	2	2
Equipment		37	41	95
<b>TOTAL CAPITAL RECOVERY COST</b>		750	755	809
<b>TOTAL COST/ACRE FOR THE YEAR</b>		3,780	6,145	6,035
<b>INCOME/ACRE FROM PRODUCTION</b>		0	0	8,400
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		3,780	6,145	0
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>		0	0	2,365
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		3,780	9,925	7,560

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE CRIMSON TABLE GRAPES**  
 SAN JOAQUIN VALLEY - 2007

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
<b>Cultural:</b>							
Vine: Layering Missing Vines	1.00	11	0	0	0	11	
Prune: Vines	38.00	430	0	0	0	430	
Prune: Shred Prunings (Every Middle)	0.50	9	7	0	0	15	
Trellis: Repair	2.00	23	0	10	0	33	
*CM: Tie Canes	8.00	90	0	14	0	104	
Weed: Winter Strip (Surflan, Roundup)	0.49	9	5	40	0	53	
Vertebrate: (gopher, squirrel, coyote, bird) various methods	0.00	0	0	15	0	15	
Disease: Phomopsis (Abound)/Mildew (Microthiol)	0.50	9	7	35	0	51	
Insect: Mealybug (Lorsban)	0.50	9	7	25	0	41	
Weed: Mow Middles 3X	0.74	13	11	0	0	24	
Disease: Mildew 3X (Dusting Sulfur)	0.84	15	9	6	0	30	
Sucker: Remove Trunk Suckers	2.00	23	0	0	0	23	
Disease: Mildew (Rally, Microthiol). Fertilize: (Neutral Zinc)	0.50	9	7	28	0	44	
Fertilize: N through drip (UN32)	0.00	0	0	23	0	23	
Irrigate: (Water)	2.55	29	0	165	0	194	
CM: Shoot Position & Removal	15.00	170	0	0	0	170	
FM: BloomThin (GA). Disease: Mildew (Microthiol). Insect: Skeletonizer (Kryocide)	0.50	9	7	22	0	37	
FM: Fruit Exposure/Leaf Removal	50.00	566	0	0	0	566	
Disease: Mildew (Rally, Sulfur)	0.50	9	7	23	0	38	
FM: Cluster Thinning	10.00	113	0	0	0	113	
FM: Girdle	12.00	136	0	0	0	136	
FM: Berry Size (GA). Disease: Mildew (Microthiol, Rally). Insect: Leafhopper (Provado)	0.50	9	7	80	0	96	
CM: Cane Cutting (Mechanical)	0.29	5	3	0	0	8	
Weed: Spot Spray (Roundup)	0.53	9	1	4	0	14	
Disease: Mildew (Rally, Microthiol)	0.50	9	7	23	0	38	
FM: Color Fruit (Ethrel)	0.50	9	7	8	0	24	
Disease: Mildew on Stem 4X (Dusting Sulfur)	1.12	20	12	9	0	40	
Disease: Botrytis (Vanguard)	0.50	9	7	47	0	62	
Pickup Truck Use	2.39	42	40	0	0	82	
ATV	2.00	35	3	0	0	38	
<b>TOTAL CULTURAL COSTS</b>	<b>153.95</b>	<b>1,825</b>	<b>151</b>	<b>576</b>	<b>0</b>	<b>2,552</b>	
<b>TOTAL CULTURAL COSTS/Box</b>		<b>1.82</b>	<b>0.15</b>	<b>0.58</b>	<b>0.00</b>	<b>2.55</b>	
<b>Harvest (1,000 boxes per acre):</b>							
Pick and Field Pack	250.00	2,828	0	0	0	2,828	
Boxes, Spread/Stack, Swamp & Haul (includes boxes, bags)	2.00	363	16	1,915	0	2,294	
Brokerage Fee	0.00	0	0	0	1,260	1,260	
Assessment & Inspection Fees	0.00	0	0	128	0	128	
<b>TOTAL HARVEST COSTS/ACRE</b>	<b>252.00</b>	<b>3,191</b>	<b>16</b>	<b>2,043</b>	<b>1,260</b>	<b>6,509</b>	
<b>TOTAL HARVEST COSTS/Box</b>		<b>3.19</b>	<b>0.02</b>	<b>2.04</b>	<b>1.26</b>	<b>6.51</b>	
<b>Interest on operating capital @ 10.00%</b>						<b>187</b>	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>5,015</b>	<b>167</b>	<b>2,618</b>	<b>1,260</b>	<b>9,248</b>	
<b>TOTAL OPERATING COSTS/Box</b>		<b>5.02</b>	<b>0.17</b>	<b>2.62</b>	<b>1.26</b>	<b>9.25</b>	
<b>CASH OVERHEAD:</b>							
Office Expense						80	
Liability Insurance						6	
Sanitation Fees						19	
Property Taxes						116	
Property Insurance						31	
Investment Repairs						42	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>294</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>9,542</b>	

UC COOPERATIVE EXTENSION  
**Table 2. continued**

Operation	Operation	Cash and Labor Cost per acre				Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent		
NON-CASH OVERHEAD ( Capital Recovery):		Per producing Acre		-- Annual Cost --			
Land		7,304		530		530	
Drip Irrigation System		1,250		110		110	
Building		696		57		57	
Tools-Shop/Field		130		14		14	
Fuel Tanks 2-300G		30		2		2	
Vineyard Establishment		5,247		484		484	
Equipment		968		129		129	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>15,626</b>		<b>1,326</b>		<b>1,326</b>	
<b>TOTAL COSTS/ACRE</b>							<b>10,868</b>
<b>TOTAL COSTS/Box</b>							<b>10.87</b>

\*CM = Canopy Management. FM = Fruit Management  
 To find cost per box divide by 1,000

UC COOPERATIVE EXTENSION  
**Table 3. MATERIAL & CUSTOM COSTS & NET RETURN PER ACRE FOR CRIMSON TABLE GRAPES**  
 SAN JOAQUIN VALLEY - SOUTH 2007

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Crimson Table Grapes (19 lb box)	1,000.00	box	14.00	14,000	
<b>OPERATING COSTS</b>					
<b>Trellis System:</b>					
Miscellaneous Repair Materials	1.00	acre	10.00	10	
<b>Vine Aids:</b>					
Tying Materials (twist-ems) (\$0.003 each)	4,540.00	each	0.00	14	
<b>Herbicide:</b>					
Surflan 4 AS	2.40	pint	14.52	35	
Roundup Ultra Max	1.10	pint	7.80	9	
<b>Vertebrate Control:</b>					
Shoot, Bait, Trap	1.00	acre	15.00	15	
<b>Fungicide:</b>					
Abound (Strobilurin)	12.00	floz	2.86	34	
Microthiol Disperss (micronized wettable sulfur)	11.00	lb	0.83	9	
Dusting Sulfur	70.00	lb	0.22	15	
Rally 40W (Sterol Inhibitor)	16.00	oz	5.23	84	
Vanguard WG	10.00	oz	4.66	47	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.35	25	
Kryocide	6.00	lb	3.08	18	
Provado 1.6 Solupak	1.00	oz	44.21	44	
<b>Fertilizer:</b>					
Neutral Zinc 50% (foliar)	5.00	lb	1.08	5	
UN 32	50.00	lb N	0.46	23	
<b>Water:</b>					
Water Pumped	36.00	acin	4.59	165	
<b>Growth Regulator:</b>					
ProGibb 4% (Gibberelic Acid)	9.00	gram	1.68	15	
Ethrel	1.00	pint	8.04	8	
<b>Harvest Supplies:</b>					
Box (19 lb)	1,000.00	box	1.60	1,600	1.5
Plastic Bags (9/box)	9,000.00	each	0.04	315	
<b>Contract:</b>					
Commission (9% of selling price)	1,000.00	box	1.26	1,260	1.2 <sup>n</sup>
<b>Assessment:</b>					
Table Grape Commission	1,000.00	box	0.12	116	
Quality Inspection (1/3 of yield)	333.00	box	0.04	12	
Labor (machine)	18.48	hrs	14.63	270	
Labor (non-machine)	419.55	hrs	11.31	4,745	
Fuel - Gas	11.78	gal	2.80	33	
Fuel - Diesel	29.50	gal	2.30	68	
Lube				15	
Machinery repair				51	
Interest on operating capital @ 10.00%				187	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>9,248</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>4,752</b>	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				80	
Liability Insurance				6	
Sanitation				19	
Property Taxes				116	
Property Insurance				31	
Investment Repairs				42	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>294</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>9,542</b>	

UC COOPERATIVE EXTENSION  
Table 3. continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Land				530	
Drip Irrigation System				110	
Building				57	
Tools-Shop/Field				14	
Fuel Tanks 2-300G				2	
Establishment Costs				484	
Equipment				129	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,326</b>	
<b>TOTAL COSTS/ACRE</b>				<b>10,868</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>3,132</b>	

**UC COOPERATIVE EXTENSION**  
**Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE CRIMSON TABLE GRAPES**  
**SAN JOAQUIN VALLEY - SOUTH 2007**

Beginning JAN 07	JAN 07	FEB 07	MAR 07	APR 07	MAY 07	JUN 07	JUL 07	AUG 07	SEP 07	OCT 07	NOV 07	DEC 07	TOTAL
Ending DEC 07													
Cultural: <b>Bold</b> see section in assumptions													
Vine: Layering Missing Vines	11												11
Prune: Vines	430												430
Prune: Shred Prunings (all middles)	15												9
Trellis: Repair	33												33
*CM: Tie Canes		104											104
Weed: Wincr Strip (Surflan, Roundup)		53											53
Vertebrate: (gophers, squirrels, coyotes, birds)			2	2	2	2	2	2	2	2			15
Disease: Phomopsis (Abound)/Mildew (Microthiol)			51										51
Insect: Mealybug (Lorsban)			41										41
Weed: Mow Middles 3X			8		8		8						24
Disease: Mildew (Dusting Sulfur)				10		10	10						30
Sucker: Trunk				23									23
Disease: Mildew (Microthiol, Rally). Fertilize: (Zn)				44									44
Fertilize: (UN32) through drip				23									23
Irrigate: (Water/Labor)				6	22	37	48	44	31	6			194
*CM: Shoot Position & Removal				170									170
*FM: Bloom Thin (GA). Disease: Mildew (Microthiol). Insect: Skeletonizer (Kryocide)					37								37
FM: Fruit Exposure/Leaf Removal						566							566
Disease: Mildew (Rally, Microthiol)						38							38
FM: Cluster Thinning						113							113
FM: Girdle						136							136
FM: Berry Sizing (GA). Disease: Mildew (Microthiol, Rally). Insect: Leafhopper (Provado)						96							96
CM: Canc Cutting (Mechanical)						8							8
Weed: Spot Spray (Roundup)						14							14
Disease: Mildew (Rally, Microthiol)							38						38
FM: Color Fruit (Ethrel)								24					24
Disease: Mildew on stem 4X (Dusting Sulfur)									20	20			40
Disease: Botrytis (Vanguard)										62			62
Pickup Truck Use	7	7	7	7	7	7	7	7	7	7	7	7	82
ATV	3	3	3	3	3	3	3	3	3	3	3	3	38
<b>TOTAL CULTURAL COSTS</b>	499	167	111	287	79	1,030	116	79	63	100	10	10	2,552
Harvest:													
Pick & Field Pack										2,828			2,828
Boxes, Spread, Swamp & Haul										2,294			2,294
Brokerage Fcc										1,260			1,260
Assessment & Inspection Fees										128			128
<b>**TOTAL HARVEST COSTS</b>										6,509			6,509
Interest on operating capital @ 10.00%	4	6	6	9	10	18	19	20	20	75	0	0	187
<b>TOTAL OPERATING COSTS/ACRE</b>	503	173	118	296	88	1,048	135	99	83	6,685	10	10	9,248

UC COOPERATIVE EXTENSION

Table 4. continued

	JAN 07	FEB 07	MAR 07	APR 07	MAY 07	JUN 07	JUL 07	AUG 07	SEP 07	OCT 07	NOV 07	DEC 07	TOTAL
Beginning JAN 07													
Ending DEC 07	7	7	7	7	7	7	7	7	7	7	7	7	80
CASH OVERHEAD:													
Office Expense													6
Liability Insurance	2	2	2	2	2	2	2	2	2	2			19
Sanitation Fees	58						58						116
Property Taxes	15						15						31
Property Insurance	4	4	4	4	4	4	4	4	4	4	4	4	42
Investment Repairs													
TOTAL CASH OVERHEAD COSTS	86	12	12	12	12	12	86	12	18	12	10	10	294
TOTAL CASH COSTS/ACRE	589	185	130	308	101	1,060	221	111	101	6,697	20	20	9,542

\*CM = Canopy Management. FM = Fruit Management

\*\* To find cost per box divide by 1,000

UC COOPERATIVE EXTENSION  
**Table 5. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY – SOUTH 2007

COSTS PER ACRE AT VARYING YIELD TO PRODUCE CRIMSON TABLE GRAPES

	YIELD (19 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
<b>OPERATING COSTS:</b>							
Cultural Cost	2,552	2,552	2,552	2,552	2,552	2,552	2,552
Harvest Cost (pick, pack, haul)	3,073	3,585	4,097	4,609	5,121	5,634	6,146
Brokerage Fee	756	882	1008	1134	1260	1386	1512
Assessment/Inspection Cost	77	89	102	115	128	140	153
Interest on operating capital	165	171	176	181	187	192	198
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>6,623</b>	<b>7,279</b>	<b>7,935</b>	<b>8,591</b>	<b>9,248</b>	<b>9,904</b>	<b>10,561</b>
Total Operating Costs/box	11.04	10.40	9.92	9.55	9.25	9.00	8.80
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>293</b>	<b>293</b>	<b>294</b>	<b>294</b>	<b>294</b>	<b>294</b>	<b>295</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>6,916</b>	<b>7,572</b>	<b>8,229</b>	<b>8,885</b>	<b>9,542</b>	<b>10,198</b>	<b>10,856</b>
Total Cash Costs/box	11.53	10.82	10.29	9.87	9.54	9.27	9.05
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,315</b>	<b>1,318</b>	<b>1,321</b>	<b>1,324</b>	<b>1,326</b>	<b>1,329</b>	<b>1,331</b>
<b>TOTAL COSTS/ACRE</b>	<b>8,231</b>	<b>8,890</b>	<b>9,550</b>	<b>10,209</b>	<b>10,868</b>	<b>11,527</b>	<b>12,187</b>
Total Costs/box	13.72	12.70	11.94	11.34	10.87	10.48	10.16

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
10.00	-623	-279	65	409	752	1,096	1,439
11.00	-23	421	865	1,309	1,752	2,196	2,639
12.00	577	1,121	1,665	2,209	2,752	3,296	3,839
13.00	1,177	1,821	2,465	3,109	3,752	4,396	5,039
14.00	1,777	2,521	3,265	4,009	4,752	5,496	6,239
15.00	2,377	3,221	4,065	4,909	5,752	6,596	7,439
16.00	2,977	3,921	4,865	5,809	6,752	7,696	8,639

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
10.00	-916	-572	-229	115	458	802	1,144
11.00	-316	128	571	1,015	1,458	1,902	2,344
12.00	284	828	1,371	1,915	2,458	3,002	3,544
13.00	884	1,528	2,171	2,815	3,458	4,102	4,744
14.00	1,484	2,228	2,971	3,715	4,458	5,202	5,944
15.00	2,084	2,928	3,771	4,615	5,458	6,302	7,144
16.00	2,684	3,628	4,571	5,515	6,458	7,402	8,344

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/box	YIELD (19 lb box/acre)						
	600	700	800	900	1,000	1,100	1,200
10.00	-2,231	-1,890	-1,550	-1,209	-868	-527	-187
11.00	-1,631	-1,190	-750	-309	132	573	1,013
12.00	-1,031	-490	50	591	1,132	1,673	2,213
13.00	-431	210	850	1,491	2,132	2,773	3,413
14.00	169	910	1,650	2,391	3,132	3,873	4,613
15.00	769	1,610	2,450	3,291	4,132	4,973	5,813
16.00	1,369	2,310	3,250	4,191	5,132	6,073	7,013



UC COOPERATIVE EXTENSION  
**Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, & BUSINESS OVERHEAD**  
 SAN JOAQUIN VALLEY – SOUTH 2007

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
07	60 HP 4WD Narrow Tractor	47,000	15	9,150	4,885	200	281	5,366
07	ATV 4WD	6,700	5	3,003	1,125	35	49	1,209
07	Brush Shredder 6'	8,000	15	768	862	31	44	937
07	Cane Cutter	3,500	20	182	333	13	18	364
07	Duster - 3 Pt 12'	5,500	5	1,792	1,040	26	36	1,103
07	Mower-Flail 8'	10,500	15	1,008	1,132	41	58	1,230
07	Orchard/Vine Sprayer 500 gal	21,000	5	6,840	3,973	99	139	4,211
07	Pickup Truck 1/2 T	28,000	7	10,621	4,023	138	193	4,354
07	Sprayer ATV 20 gal	350	10	62	46	1	2	50
07	Truck-Flatbed (10 ton)	56,000	10	16,542	6,882	259	363	7,504
07	Weed Sprayer 3 PT 100 gal	4,000	10	707	526	17	24	566
TOTAL		190,550		50,675	24,827	861	1,206	26,894
60% of New Cost *		114,330		30,405	14,896	517	724	16,136

\* 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	
Building 2,400 sqft	80,000	30		6,610	286	400	1,600	8,895
Drip Irrigation System 40 acres	50,000	25		4,388	179	250	1,000	5,816
Vineyard Establishment	209,880	22		19,369	749	1,049	0	21,168
Fuel Tanks 2-300 gal	3,500	30	350	286	14	19	70	389
Land	840,000	25	840,000	60,900	0	8,400	0	69,300
Tools-Shop/Field	15,000	15	1,500	1,614	59	83	300	2,056
TOTAL INVESTMENT	1,198,380		841,850	93,167	1,286	10,201	2,970	107,624

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.86	674
Office Expense	115	acre	80.00	9,200
Sanitation Fee	115	acre	19.35	2,225

UC COOPERATIVE EXTENSION  
**Table 7. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - 2007

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Cash Overhead			Operating			
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Opera.	
07	60 HP 4WD Narrow Tractor	1,066	2.75	0.11	0.16	1.11	7.79	8.90	11.92
07	ATV 4WD	400	1.69	0.05	0.07	0.49	1.07	1.56	3.37
07	Brush Shredder 6'	134	3.88	0.14	0.20	3.49	0.00	3.49	7.71
07	Cane Cutter	100	1.99	0.08	0.11	1.29	0.00	1.29	3.47
07	Duster - 3 Pt 12'	240	2.60	0.07	0.09	0.79	0.00	0.79	3.55
07	Mower-Flail 8'	133	5.12	0.19	0.26	4.58	0.00	4.58	10.15
07	Orchard/Vine Sprayer 500 gal	400	5.96	0.15	0.21	3.67	0.00	3.67	9.99
07	Pickup Truck 1/2 T	286	8.46	0.29	0.41	2.04	14.76	16.80	25.96
07	Sprayer ATV 20 gal	148	0.19	0.01	0.01	0.09	0.00	0.09	0.30
07	Truck - Flatbed (10 ton)	200	20.65	0.78	1.09	5.30	2.64	7.94	30.46
07	Weed Sprayer 3 PT 100 gal	199	1.59	0.05	0.07	0.68	0.00	0.68	2.39

UC COOPERATIVE EXTENSION  
**Table 8. OPERATIONS WITH EQUIPMENT – CRIMSON TABLE GRAPES**  
 SAN JOAQUIN VALLEY 2007

Operation	Operation Month	Tractor	Implement	Material	Broadcast Rate/acre	Unit
<b>Weed:</b> Winter Strip (Surflan, Roundup)	February	60HP 4WD	Weed Sprayer	Surflan	2.40	pt
				Roundup	.60	pt
<b>Weed:</b> Mow Middles 4X	March	60HP 4WD	Mower Flail 8'			
	May	60HP 4WD	Mower Flail 8'			
	July	60HP 4WD	Mower Flail 8'			
<b>Weed:</b> Spot Spray (Roundup)	June	ATV 4WD	Weed Sprayer	Roundup	0.50	pt
<b>Irrigation:</b> (Water)	April			Water	1.00	acin
	May			Water	4.00	acin
	June			Water	7.00	acin
	July			Water	9.00	acin
	August			Water	8.00	acin
	September			Water	6.00	acin
<b>Irrigation:</b> Post Harvest	October			Water	1.00	acin
<b>Fertilize:</b> N through Drip (UN32)	April			UN 32	50.00	lb N
<b>Disease:</b> Mildew/Fertilize: Zn	April	60HP 4WD	Air Blast Sprayer	Microthiol (mildew)	2.00	lb
				Rally (mildew)	4.00	oz
				Neutral Zinc	5.00	lb
<b>Disease:</b> Phomopsis/Mildew	March	60HP 4WD	Air Blast Sprayer	Abound (phom/mildew)	12.00	floz
				Microthiol(phom/mildew)	1.00	lb
<b>Vertebrate:</b> (gopher, squirrel, coyote, and/or birds)	Mar - Oct			Various as needed	15.00	acre
<b>Disease:</b> Mildew 3X (Dusting Sulfur)	April	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	June	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	July	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
<b>*FM:</b> Bloom Thin. <b>Disease:</b> Mildew. <b>Insect:</b> Skeletonizer	May	60HP 4WD	Air Blast Sprayer	GA(thin)	1.00	floz
				Microthiol (mildew)	2.00	lb
				Kryocide (skeletonizer)	6.00	lb
<b>Disease:</b> Mildew (Rally, Sulfur)	June	60HP 4WD	Air Blast Sprayer	Rally (mildew)	4.00	oz
				Microthiol (mildew)	2.00	lb
	July	60HP 4WD	Air Blast Sprayer	Rally (mildew)	4.00	oz
				Microthiol (mildew)	2.00	lb
<b>Disease:</b> Mildew on Stem 4X (Dusting Sulfur)	September	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	September	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	October	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
	October	60HP 4WD	Duster	Dusting Sulfur	10.00	lb
<b>Disease:</b> Botrytis (Vanguard)	October	60HP 4WD	Duster	Vanguard	10.00	oz
<b>FM:</b> Berry Size/ <b>Disease:</b> Mildew/ <b>Insect:</b> Leafhopper	June	60HP 4WD	Air Blast Sprayer	GA (size)	8.00	floz
				Microthiol (Mildew)	2.00	lb
				Rally (Mildew)	1.00	oz
				Provado (Leafhopper)	1.00	oz
<b>Insect:</b> Mealybug	March	60HP 4WD	Air Blast Sprayer	Lorsban	4.00	pt
<b>Trellis:</b> Repair	January			Labor	2.00	hrs
				Trellis Materials	10.00	acre
<b>Vine:</b> Layering Vines	January			Labor	1.00	hrs
<b>Prune</b>	January			Labor	38.00	hrs
<b>Prune:</b> Shred prunings	January	60HP 4WD	Brush Shredder			
<b>CM;</b> Tie Canes	February			Labor	8.00	hrs
				Materials	11.50	acre
<b>CM:</b> Shoot Positioning & Removal	April			Labor	15.00	hrs
<b>Sucker:</b> Remove Trunk Suckers	April			Labor	2.00	hrs
<b>CM:</b> Cane Cutting	June	60HP 4WD	Cane Cutter			
<b>FM:</b> Cluster Thinning	June			Labor	10.00	hrs
<b>FM:</b> Girdle	June			Labor	12.00	hrs
<b>FM:</b> Fruit Exposure/Leaf Removal	June			Labor	50.00	hrs
<b>FM:</b> Color Fruit	Aug	60HP 4WD	Air Blast Sprayer	Ethrel	1.00	pint
<b>Pickup:</b> Farm Use	Annual	Pickup 1/2 ton				
<b>ATV:</b> Farm Use	Annual	ATV				
<b>Harvest:</b> Pick & Pack	October			Labor	250.00	hrs
<b>Harvest:</b> Swamp, Spread, Haul	October	Truck-Flatbed		Labor	29.00	hrs

\* CM = Canopy Management. FM = Fruit Management

# Raisin Grapes

## Raisin Grape

<b>Winter</b>		<b>Associated Cost/acre</b>
Pruning		\$163.01
Tying		\$67.00
Fertilizer Application		\$60.00
Fix Stakes and wires		\$32.00
Shred Prunings		\$8.00
<b>Spring</b>		
<b>Action</b>		
Irrigation		\$170.00
Weed Control/Cultivation		\$160.00
Shoot Removal		\$14.00
Fungicide/Pest Control	Spring/Summer	\$217.00
<b>Summer</b>		
Mow Weeds/Cut Canes		\$15.00
Cultivation		\$24.00
<b>Fall</b>		
Harvest & Haul		\$627.00
Trays, picking, rolling, pick-up, hauling, equipment		
<b>Overhead Expenses</b>		
Taxes, Insurance, Office, Electricity		\$304.00
Non-Cash Overhead Expense		\$1,131.00
<b>Total Cost</b>		<b>\$3,281.00</b>
<b>Total Income</b>		
		<b>\$1,903.82</b>
Tons/acre	2.132	
Ten Year Avg. Price	\$892.98	
<b>Net Return/acre</b>		<b>(\$1,377.18)</b>

Source: Cost & Return Data, Agricultural Economics UC Davis (2006)

**Income**

Historical Pricing	Pricing/ton	Free Tonnage %	Grower Receives/ton	Avg. Ton/Acre	Gross Income
2000	\$ 877.50	53%	\$ 603.00	2.31	\$ 1,392.93
2001	\$ 880.00	63%	\$ 651.00	2.1	\$ 1,367.10
2002	\$ 745.00	53%	\$ 519.00	2.53	\$ 1,313.07
2003	\$ 810.00	70%	\$ 567.00	1.94	\$ 1,099.98
2004	\$ 1,210.00	100%	\$ 1,210.00	1.86	\$ 2,250.60
2005	\$ 1,210.00	83%	\$ 998.00	2.12	\$ 2,115.76
2006	\$ 1,210.00	90%	\$ 1,089.00	1.74	\$ 1,894.86
2007	\$ 1,210.00	85%	\$ 1,028.50	2.09	\$ 2,149.57
2008	\$ 1,310.00	87%	\$ 1,139.70	2.52	\$ 2,872.04
2009 (est.)	\$ 1,323.00	85%	\$ 1,124.55	2.11	\$ 2,372.80
<b>Average:</b>	<b>\$ 1,078.55</b>	<b>77%</b>	<b>\$ 892.98</b>	<b>2.132</b>	<b>\$ 1,903.82</b>

Source: Raisin Bargaining Association

**Pullout Costs**

<b><u>Chipping (1)</u></b>	
	Cost/Acre
Remove Stakes & Stakes	\$508.64
Labor - \$259.20, Equipment - \$250	
Cut Wire & Remove from Field (Labor and Equipment)	\$212.00
Push and Pile Cost	\$160.00
Chip Stacked Piles (2) 20 acres/day (varies)	\$200.00
Dust Control ~\$400/day	\$20.00
<b><u>Remove and Dump Roots and Stumps after Chipping</u></b>	
~4 tons/acre	
Deliver and dump container at Composter (\$225/load)	\$90.00
\$25.00/ton Composting	\$100.00
Tractor /labor to load roots into Container	\$54.00
<b>Total Cost of Chipping</b>	<b>\$1,344.64</b>

\*Vineyard prunings are not burned, they are shredded in the vineyard.

(1) - Commercial grinders state that if they remove non-vegetative material cost = 1,000/acre+, which does not include root and stump removal

(2) - Cost may be as high as \$400/acre depending on method of chipping (wind row vs. stacked piles)

**Burning**

	Cost/Acre
Cut Wire	\$2.70
Push and Pile Cost	\$160.00
Burn Permit Fee (1)	\$26.00
Burn Control (supervise burn)	\$11.82
Remove Roots and Stumps before Burn ~4 tons/acre	
Tractor/trailer/labor to load roots into piles	\$54.00
Remove Steel after Burn 20 acres/8 hour	\$11.82
<b>Total Cost of Burning</b>	<b>\$266.34</b>

If steel is removed before burn, cost would increase

(1) - Flat fee per site

## Raisin Grapes

**Methodology:** Cost Study data was collected based on the farming costs of an average raisin vineyard in the San Joaquin Valley. The cost study data is from 2006, though growers estimate that the farming costs have increased 10 to 15% since then. The main areas of cost increases have been in fuel, labor, and water. Costs are generally consistent across varieties.

The non-cash overhead costs are based on the repayment of the establishment and other long-term costs of the vineyard. Costs associated with non-cash overhead include: land purchase, tools, fuel tanks, irrigation system, establishment costs, and equipment. Land and establishment costs are based over the 25 years of assumed production of the vineyard. 25 years is the standard production lifetime for a vineyard; after 25 years, the production deteriorates. Many vineyards continue to be in production past the 25 year mark, because growers cannot afford the up-front costs of establishing a new vineyard. The cost study information makes note of the fact that their costs do not take into account the cost of paying the owner a salary. The owner is assumed to be paid on any positive return at the end of the year.

Pullout Costs were calculated based on conversations with growers, chippers, and farm labor contractors. The vineyard trellis system would have a combination of metal stakes and cross arms, as well as multiple support wires which would have to be removed before the vineyard can be chipped. The labor rate used was \$8.00 per hour (the state minimum wage), plus 35% to take into account all state and federal taxes, social security deductions, and worker's compensation insurance. The labor rate may be higher depending on the labor conditions. Another issue with chipping is that chippers are not always able to do their work on the farmer's schedule. It can take weeks or even months to have a field chipped, at which point it may be too late to plant for the next season.

The stakes would be removed by three workers operating a loader in the field. Two workers would use chains to remove the stakes and one employee would operate the loader. These workers would be able to complete approximately one acre in an 8 hour workday. When burning, the stakes are piled with the vines, and removed after the burn.

Wire must also be removed from the vineyard before it can be chipped. Depending on the chipper's equipment, wire must be removed completely from the vineyard or must be present only in very short lengths. Raisin vineyards are pruned in such a way that the remaining canes are wrapped around the vineyard wire to support the crop. This wire has to be pulled out from every vine. Chippers reported this wire causing problems and getting wrapped around the moving parts of their machinery. It was also reported that the bio mass facilities prefer not to receive material with wire, because the wire causes havoc with their equipment.

Wire removal is based on the cutting and removal of the wire from the field. For the chipping calculation, the wire removal cost estimate is significantly higher than the wire removal from burning. When wire is removed from a chipped vineyard, the wire has to be cut at every point where it is exposed. An individual wire would be cut between 150 and 200 times (depending on the number of vines in a row) per quarter mile. When burning, the wire has to be cut only once every 4-6 vines. This is



only 45-60 per wire per row. The other issue for chipping is the removal of the clips or dog ears that hold the wire in place. These have to be removed from every stake in order to pull out the wire. Additionally, loose wire must also be picked up before the equipment can come into the field. Growers and contractors relayed that the wire removal for a single wire (the main wire) would take approximately 20 man-hours, as well as the use of a tractor or ATV to drive around picking up buckets full of pieces of wire. Each additional wire in the trellis system would cost \$180 per wire. A typical trellis system for raisin grapes would have between 1-4 wires. Growers who are able to burn do not have this issue, as the wire stays with the vine until burned, and can then be picked up with a loader or forklift from the piles. This wire is then loaded onto a truck and taken to a recycling center.

Root removal also differs with regards to chipping or burning. Roots and stumps must be removed from the field before it can be replanted. In a typical vineyard, there will be approximately 4 tons of roots and stumps remaining in the field when the vines are laid over and piled. These roots will have to be excavated using a chisel to get them out of the ground, and hand and machine labor to remove them from the field. When burning, the roots and stumps can be placed into the burn piles along with the above-ground material. When chipping, the roots must be hauled from the field to either a composter or dump. Chippers stated that they do not like to chip roots because of the amount of dirt that is associated. This volume of dirt negatively affects the machinery and causes wear and tear. The rates listed on the attached sheets are for the most cost-effective removal and disposal of the roots. The roots and stumps would be hauled by truck to the composter that charges \$25 per ton for the material. This compares favorably to the \$60 per ton that was quoted at the waste disposal site.

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2006

SAMPLE COSTS TO ESTABLISH A VINEYARD  
AND PRODUCE GRAPES FOR  
**RAISINS**



TRAY DRIED RAISINS  
**SAN JOAQUIN VALLEY**

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UC COOPERATIVE EXTENSION

**SAMPLE COST TO ESTABLISH A VINEYARD  
AND PRODUCE RAISINS  
San Joaquin Valley - 2006**

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**INTRODUCTION**

Sample costs to establish a vineyard to produce raisins 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 these same practices will not apply to every farming operation. The 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 for entering 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) 752-4424. Current studies can be downloaded from the department website at <http://coststudies.ucdavis.edu> 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 the vineyard and produce raisin grapes in the San Joaquin Valley. The cultural practices described represent production operations and materials considered typical on a well-managed vineyard in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of establishment and cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The study does not represent a single farm and is intended as a guide only. **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 120 contiguous acre farm is owned and operated by the grower. Vines for raisin production are being established on 40 acres and 75 acres are mature vines for raisin or wine production. Roads, irrigation systems, and farmstead occupy the remaining five acres. The establishment and production costs in this study are based on the 40 acres.

### Establishment Operating Costs

**Land/Site Preparation.** This vineyard is established on ground previously planted to vineyards or orchards. Land coming from trees or vines should be fallowed for two years except for a possible grain crop. The land is assumed to be fairly level. A custom operator chisels the ground twice to a depth of 2 to 3 feet. The grower floats the land to smooth and level the surface. Afterwards the ground is disked twice to apply and incorporate preplant herbicide. Nematode samples should be taken from land formerly in trees or vines and fumigated if necessary. Most operations that prepare the vineyard for planting are done in the year prior to planting, but costs are shown in the first year.

**Vines.** During the first spring following fall land preparation, Thompson Seedless vines are planted on 7 x 12-foot spacing with 519 vines per acre. Plants are dormant Thompson Seedless grafted onto a rootstock like Freedom or Harmony. Fiesta, Selma Pete and DOVine are early ripening cultivars– that can also be used for establishing a new raisin vineyard. Establishment and production costs for Thompson Seedless and the other cultivars are similar when tray drying. Thompson Seedless is used in this study because it is the primary cultivar used for tray dried raisins. Vines will be trained up the t-post during the second and third years. The grapevines are expected to begin yielding fruit in three years and then be productive for an additional 22 years.

**Trellis System.** The trellis cost is provided by a trellis company and is an approximate estimate for the described trellis system. The trellis system is a two-wire 24-inch crossarm design and is installed by a custom trellis company in the second year. Once the vineyard is laid out, an eight-foot wooden end post is placed at each end of the rows. In between the end posts, a six-foot steel stake is installed at each vine. Each stake has a single 24 inch crossarm attached to support the two 13 gauge fruiting wires. A third wire is added to the lower portion of the trellis to hold the drip lines. The trellis system is considered part of the vineyard since it would be removed at the time of vine removal and is shown in the vineyard establishment costs. Trellis and vine repairs of \$1,332 or \$33 per acre are shown in Table 7 (Annual Investment Costs) and included in Investment Repairs under Cash Overhead in the various tables. A 36-inch crossarm may increase raisin yields, but raisins need to be harvested prior to September 1 to successfully dry with the wider trellis. The larger crossarm may cause some shading in the drying row.

**Planting.** Planting starts by laying out and marking vine sites in late winter. In the spring, holes are dug and the vines are planted and protected with an open carton placed over the vine. In the second year 2% or 10 vines per acre are replanted for those lost in the first year.

**Train/Prune.** In the first year, the vines are allowed to grow without any training. During the second year (first dormant season), the vines are pruned back to two buds. In the spring, a shoot is selected and trained up the stake to form head trained vines. Additional training plus tying and suckering are done once in April and twice in May. Standard pruning begins in the third year (second dormant season) leaving three canes per vine. In January, the vines are pruned and in January or February, the canes are tied to the wires. The dormant season prunings are shredded beginning in the third year. Mechanical cane cutting or skirting begins and is done in June and August. In the fourth year, the vines are considered mature and pruned to four or more canes per vine. Besides training the selected canes, training also includes suckering and tying canes. Suckering is the removal of water sprouts from the trunk. Selecting and tying canes to the fruiting wires is required each year for the life of the vineyard. Vines that are replanted (replacement vines) show training costs in the third year.

**Irrigation.** The drip line is laid on the ground prior to planting. After the trellis is installed, the drip line is clipped to the bottom trellis wire. In this study, the pumped water is calculated to cost \$5.67 per acre-inch or \$68.00 per acre-foot. Water pumping costs plus labor constitute the irrigation cost. Price per acre-foot of water will vary, depending on quantity used, water district, power cost, well characteristics, and other irrigation factors. Water is applied immediately after planting and during the growing season from April through September. No assumption is made about effective rainfall or runoff. The amount of water applied to the vines each year is shown in Table A.

Table A. Applied Irrigation Water

Year	AcIn/Year
1	12
2	24
3+	28

**Fertilize.** Liquid nitrogen fertilizer, UN32, is applied through the irrigation system in April of the first year at five pounds of nitrogen (N) per acre. A single application is made in April of the second year and equally split applications in May and June of the third year. The amount of nitrogen applied each year increases as the vineyard matures and is shown in Table B. It is important to identify sources of nitrogen in order to properly manage the nitrogen budget. Sources of nitrogen such as irrigation well water should be calculated to determine the need to irrigate and fertilize.

Table B. Applied Nitrogen (N) Per Acre

Year	Lbs of N
1	5
2	20
3+	40

**Pest Management.** For pest identification, monitoring, management and pesticide information, visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). Written recommendations are required for many commercially applied pesticides, and are available from licensed pest control advisers (PCAs). For information on pesticide use permits, contact the local county Agricultural Commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.**

Table A. PESTICIDE PROGRAM- Establishment Years

MONTH	MILDEW	PHOMOP-SIS	LEAF HOPPER	SKELETON-IZER	MEALY BUG	OTHER	YEAR
April	Microthiol			Kryocide			2
March					Lorsban		3
March	Microthiol	Abound					3
April	Dusting Sulfur						3
April	Microthiol + Rally					Zinc	3
May	Microthiol + Flint			Kryocide			3
June	Microthiol + Rally						3
June			Provado				3
June	Dusting Sulfur						3
June	Dusting Sulfur						3

**Insects.** Western grapeleaf skeletonizer (*Harrisina brillians*) is controlled in April of the second and third years with an application of Kryocide insecticide (applied with Microthiol sulfur spray). In the third year, Lorsban is applied in early March to control mealybugs (*Pseudococcus* and *Planococcus* spp.) and Provado insecticide is applied in June to control the grape leafhoppers (*Erythroneura elegantula*).

**Diseases.** Although many pathogens attack grapevines, phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Uncinula necator*) are the two diseases managed in this study. In the second year, Microthiol (micronized sulfur) for mildew is applied (with Kryocide application) in April. In March of the third year, Microthiol plus Abound (strobilurin) are applied for phomopsis and mildew control. Mildew is controlled with various fungicide applications at 7 to 21 day intervals in the third year, depending on the fungicide used. For this study, the grower applies Microthiol and Rally (SI) (with zinc application) in April, Dusting Sulfur in April, Microthiol and Flint (with Kryocide application) in May. Microthiol and Rally in June and two applications of Dusting Sulfur in June. Growers have the option of using sulfur (dust, wettable, flowable or micronized), sterol inhibitors (SIs), or strobilurins, as well as other fungicides to control powdery mildew. Sterol inhibitors and strobilurins are two classes of fungicides with different modes of action than sulfur against powdery mildew. It is recommended that fungicides with different modes of action be used to avoid powdery mildew populations from acquiring fungicide resistance.

**Weeds (Vineyard Floor Management).** In October of the year prior to planting, Treflan is applied to the vineyard floor and incorporated by disking. After planting, weeds in the vine rows and middles are managed with disking, mowing, and/or herbicides. In the first year, the row middles are disked two times – July, September. The vine rows are hand weeded in May and August. The row middles are disked three times – March, June, September - in the second year and disked two times – March, May - in the third year. (See Terrace for additional disking.) The vine rows are sprayed (strip spray) beginning in January of the second year with Roundup and Surflan. The strip spray is applied to 30% of the acreage. Also beginning in the second year, spot sprays using Roundup are applied to the vine row in April, June, and July. The spot sprays (weedy spots or areas) are applied using an all terrain vehicle (ATV) with a sprayer attached.

**Terrace.** The middles are disked three times during August and September to form and remove the drying terrace. See related paragraph under Production section.

**Harvest.** Harvest begins the third year and the fruit is picked for raisins. See harvest in the production section for description

**Yields.** The vineyard yields approximately 1.5 tons of raisins per acre (equivalent to 6.75-tons of fresh grapes) in year three.

**Returns.** In this study, the raisins are sold for \$1,150 per ton.

### **Production Operating Costs**

**Prune/Tie/Sucker.** The vines are pruned during the winter months and the prunings, placed in row middles, are shredded and disked (see weeds). The vines are cane pruned with renewal spurs in January; canes are tied in February to the trellis wire(s) by twisting around the trellis wire and attaching with twist-ems. The canes are mechanically cut (skirted) in June and August to open the canopy and prevent canes from crossing rows.

**Irrigation.** The vineyard is drip irrigated using 28 acre-inches of applied water during the growing season from April through September. During June, July, and August, irrigations are applied frequently with no more than four days between irrigations. Daily irrigations during this period are preferable. Deficit irrigation (50% ET) is applied during the three week period in late August to mid September when fruit is drying on the trays. Drip irrigation may be withheld completely during this period if there is a risk of dripline hoses rupturing or water running on the trays. After raisins are removed from the field, irrigation resumes at full ET (Evapotranspiration) to replenish the soil profile. Irrigation amounts are based on vineyard ET and can vary from season to season. Water pumping costs plus labor, which includes checking the drip lines, constitute the irrigation cost. In this study, water is calculated to cost \$5.67 per acre-inch or \$68.00 per acre-foot. The pumping cost is based on using 40 horsepower motor to pump from 130 feet deep. Price per acre-foot of water will depend on quantity used, water district, power cost, various well characteristics, and other irrigation factors. No assumption is made about effective rainfall and runoff. In some years frost protection may be required and water applications may be necessary in March.

**Fertilize.** Nitrogen (N) at 40 pounds per acre as UN32 is applied through the irrigation drip system during April (or can be applied post harvest). Neutral zinc is foliar applied to prevent zinc deficiencies and is combined with the late April mildew (Microthiol, Rally) application.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** Adjuvants are recommended for use with many pesticides for effective control, but the adjuvant and their costs are not included in this study. Pesticide costs may vary by location, brand, and grower volume. Pesticide costs in this study are taken from a single dealer and shown as full retail.

**Pest Control Adviser (PCA).** Written recommendations are required for many commercially applied pesticides and are written by licensed pest control advisers. In addition the PCA will monitor the field for agronomic problems including pests, diseases, and nutritional status. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Costs for a PCA are not included in this study.

**Weeds (Vineyard Floor Management).** Vineyard middles are disked two times each season: March and May. (See Terrace for additional disking) Surflan and Roundup herbicides are applied to the vine row in January or early February. Roundup, a contact herbicide, is applied as a spot spray to the vine row in April, June and July.

**Insects.** Mealybugs (*Pseudococcus and Planococcus spp.*) are treated at delayed dormant with Lorsban insecticide in early March (dormant vines). Western grapeleaf skeletonizer (*Harrisina brillians*) is treated with Kryocide (mixed with a GA and/or sulfur application) during the bloom spray in May. Grape leafhoppers (*Erythroneura elegantula*) are controlled with Provado

Table B. PESTICIDE PROGRAM— Production Years

MONTH	MILDEW	PHOMOP	LEAF HOPPER	SKELE-TONIZER	MEALY BUG	OTHER
March					Lorsban	
March	Microthiol	Abound				
April	Dusting Sulfur					
April	Microthiol + Rally					Zinc
May	Microthiol + Flint			Kryocide		ProGibb (GA)
June	Microthiol + Rally					
June			Provado			Ethrel
June	Dusting Sulfur					
June	Dusting Sulfur					

insecticide (mixed with Ethrel application) in late June or early July. An effective alternative material for mealybugs is to apply Admire insecticide through the drip system, but at a higher cost than a Lorsban application. It may be necessary to use multiple insecticides to control some mealybug species.

**Diseases.** Diseases treated in this study are phomopsis cane and leafspot (*Phomopsis viticola*) and powdery mildew (*Uncinula necator*). Phomopsis and powdery mildew are both treated in late March (shoot length 2 inches) with Microthiol (micronized sulfur) and Abound (strobilurin). Mildew is controlled during the season with various fungicide applications at 7 to 21 day intervals, depending on the fungicide used. In this study, Microthiol and Rally, an SI (mixed with zinc application) are applied in late April. Microthiol and Flint (mixed with Kryocide and GA application) are applied with the spray in May. Microthiol and Rally, an SI are applied in June. Dusting Sulfur is applied once in early April and two times in June. Growers have the option of using sterol inhibitors (SI), quinolins, strobilurins, or sulfur (micronized, wettable, dust, flowable), as well as other fungicides to control powdery mildew. Materials that represent classes of fungicides with different modes of action should be incorporated into your powdery mildew program to avoid resistance problems.

**Fruit Management (FM).** Gibberellic acid (GA), a plant growth regulator, is applied one time in May during bloom for thinning. Ethrel is applied at veraison in late June or early July to accelerate grape maturity. GA is applied with the mildew/skeletonizer spray in May and Ethrel with the leafhopper spray in June.

**Terrace.** Terraces are formed to provide an angled area facing the sun to dry the grapes. After the last irrigation in July or August, the middles are disked twice. Four to five days prior to harvest, the south facing terraces are formed using a tractor with a rear blade. After the raisins are boxed, a pass is made with the blade reversed (terrace back) to remove the terrace, followed by one disking and an irrigation. Forming the terrace is considered a preharvest operation and some growers will consider the operation as a harvest cost.

**Harvest.** The grapes are typically picked from mid August through mid September. The grower contracts to have the crop custom hand harvested for raisins at a rate of \$0.35 per tray. Based on a two ton raisin yield, one man can pick approximately one-third acre per 10-hour day or one raisin ton (4.5 tons fresh grapes) per 15 hours. For this study we are assuming a crew of 20. Harvest consists of hand picking the grapes into pans. Paper trays are placed by the picker on the upper one-half of the terrace and the grapes are spread evenly on the paper trays. On average, about 18 to 20 pounds of fresh fruit are placed on each tray. Once dry this will amount to 4.5 pounds of raisins. Raisins are rolled at 16-18% moisture, allowed to equilibrate and then boxed when moisture is 14% or less. The grower rents for two weeks, a tractor to pull the second bin trailer and a forklift for loading and unloading the bins. The crop is dumped into bins that hold 1,000 to 1,200 pounds of raisins, a process referred to as boxing. The bins are furnished free by the packer. At 2.00 tons of raisins per acre, approximately 4 bins per acre are needed. Labor costs include a tractor driver for pulling the bin trailer with 4 bins and one person who rides the bin trailer and removes the paper trays, and two persons to pickup the rolled raisins and throw them into the bins. Papers are burned at the end of the row when weather conditions permit. The forklift operator works in the staging area unloading/loading bins and transporting the loaded and empty bin trailers to and from the boxing crew. Before raisins are delivered to the packer, they are run across the grower owned shaker to remove sand, leaves, and other debris. This is not always required, but is shown as a cost in this study. Shaking operations consist of a forklift operator in the staging area that loads and unloads the bins on the shaker and two men removing debris from the raisins on the shaker. Costs also include renting the forklift for an additional week. Shaking takes about five minutes per bin. It is assumed that all drivers and operators work hour's equivalent to the harvest time. The filled bins are hauled to the packer by a contract trucker. The shaking and transport operations may not occur at the same time as harvest, but at a later date. Depending on the market each year, growers have the option to produce the grapes for raisins or wine.



**Yields.** Raisin vineyards reach maturity in the fourth year and over the remaining years the vineyard will average 2.00 dry tons per acre based on California Department of Food and Agriculture 1995 to 2004 data. The drying ratio of green fruit to raisins is 4.1 to 4.5:1. Two tons per acre is the industry average for Thompson Seedless; new vineyards planted to new cultivars may have higher yields.

**Returns.** The estimated return for this study based on current raisin markets gives a final return (free + reserve tonnage) of \$1,150 per ton. The raisin grape market is regulated by a federal marketing order administered by the Raisin Administrative Committee (RAC). Each year, the RAC sets minimum crop standards. In addition, the RAC regulates, on a percentage basis, the amount of the harvested crop that is offered for immediate sale (free tonnage), and the amount of the harvested crop that is held in reserve for later sale (the reserve pool), to control the overall supply of raisin grapes on the market.

**Assessments.** The California Raisin Marketing Board assesses a \$16.20 per ton fee to support and promote use of California grown raisins.

**Packers.** Packing costs are not included in this study. The United States Department of Agriculture (USDA) inspects the raisins for maturity, quality, and moisture. The Raisin Administrative Committee (RAC), the administrative arm of the federal marketing order for raisins, sets industry standards. Fees are associated with both the USDA inspections and RAC administrative responsibilities; the packer pays for tonnage fees. Growers receive payment for the free tonnage (commercial sales) portion of their crop from the packer. The reserve tonnage portion (export sales and government purchases) is paid by the RAC. In most cases, the packer retains control of the raisin crop for marketing purposes after inspection.

**Pickup/ATV.** The grower uses the pickup for business and personal use. The assumed business use is 5,200 miles per year for the ranch. In addition to spot spraying for weed control, the All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard and irrigating.

### **Labor, Equipment, Interest and Risk**

**Labor.** Hourly wages for workers are \$9.50 for machine operators and \$8.25 per hour non-machine labor. Adding 34% for the employer's share of federal and state payroll taxes, insurance, and other possible benefits gives the labor rates shown of \$12.73 and \$11.05 per hour for machine labor and non-machine labor, respectively. 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.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$2.00 and \$2.55 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include an 8% sales tax plus federal and state excise tax. Some federal and excise tax can be refunded for on-farm use when filing your income tax. The costs are based on 2005 American Automobile Association (AAA) and Department of Energy (DOE) monthly data. The fuel, lube, and repair cost per acre for each operation in Table 3 is determined by multiplying the total hourly operating cost in Table 8 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**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 9.25% per year. A nominal interest rate is the typical market cost of borrowed funds. Interest in years one and two are calculated for the entire year; beginning in the third year, interest is calculated through harvest. Interest in year one in this study begins with the first operation in the fall of the previous year – total accumulated interest is for 15 months. 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. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. For raisin growers, income loss from bad weather during field drying is a major risk.

**Crop Insurance.** Crop insurance is available, but not included in this study. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage. Coverage levels range from 50% to 75%. According to one insurer, premium and fees at the 60% level for 80 acres in Fresno County are \$16.87 per ton for a \$660 per ton guarantee.

### 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 0.70% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$661 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$80 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges.

**Sanitation Services.** Sanitation services provide portable toilets for the vineyard and cost the farm \$1,900 annually. The cost includes two double toilet units with washbasins, delivery and pickup, and five months of weekly servicing. Costs also include soap or other suitable cleansing agent, and single use towers. Separate potable water and single-use drinking cups are also supplied.

**Management/Supervisor Wages.** Salary is not included. Returns above costs are considered a return to management

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price, except for the vineyard establishment which is calculated as 0.50% to cover vine and trellis repairs and/or replacement.

## 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 prices and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

**Salvage Value.** Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 7.

**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 6.25% used to calculate capital recovery cost is the effective long term interest rate in January 2006. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

**Establishment Cost.** Costs to establish the vineyard 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, trellis system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$6,746 per acre or \$269,840 for the 40-acre vineyard. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

**Irrigation System.** The previous vineyard is assumed to have an irrigation system that has been refurbished. A new pump, motor, and filtration/injector station is being installed along with the drip irrigation system during planting. The filtration station, fertilizer injector system, drip lines and the labor to install the components are included in the irrigation system cost. Water is pumped from a 130-foot depth with a 40 horsepower pump and supplies water to the 40 established acres and to other acres on the ranch. Another 40 horsepower pump and irrigation set-up supplies the rest of the ranch, but is not included. The irrigation system is considered an improvement to the property and has a 25-year life. An alternative is to include the drip system in the establishment costs because it will be removed when the vineyard is removed.

**Land.** The land was formerly a vineyard, but has been out of production for two years. The open land was planted to grain crops. Land for raisin production is valued at \$5,500 per acre. This study assumes the land was purchased. Because only 115 of the 120 acres are planted to grapes, land is valued at \$5,739 per planted acre.

**Building.** The metal buildings are on a cement slab and comprise 2,400 square feet.

**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.

**Shaker/Screeners.** The shaker is located in the harvest staging area on a cement slab and is used for removing debris from the raisins. The machine cost does not include a bin dumper.

**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. Annual ownership costs for equipment and other investments are shown in Table 7. 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 A RAISIN VINEYARD**  
 SAN JOAQUIN VALLEY - 2006

	Cost Per Acre			
	Year:	1st	2nd	3rd
Raisin Tons Per Acre:				1.5
<b>Planting Costs:</b>				
Land Preparation - Chisel 2X (Custom)		300		
Land Preparation - Float		10		
Land Preparation - Disk/Apply Herbicide (Treflan)		15		
Land Preparation - Disk (Incorporate Herbicide)		10		
Survey & Layout Vineyard		70		
Dig, Plant, Wrap Vines		156	2	
Vines: 519 Per Acre (2% Replant In 2nd Year)		1,479	28	
Install Trellis System			2,700	
<b>TOTAL PLANTING COSTS</b>		<b>2,040</b>	<b>2,730</b>	
<b>Cultural Costs:</b>				
Prune: Prune & Tie Dormant Period			55	141
Prune: Shred Prunings				7
Weed: Winter Strip (Roundup, Surflan)			58	58
Weed: Disk Middles (2X Yr 1 & 3. 3X Yr 2)	14	21		14
Insect: Mealybug (Lorsban)				41
Disease: Phomopsis/Mildew (Microthiol, Abound)				47
Disease: Mildew (Dusting Sulfur) 3X Alternate Rows				21
Irrigate: (water & labor)	96	191		214
Weed: - Spot Spray (Roundup)			40	40
Disease: Mildew (Rally, Microthiol). Fertilizer: (Zinc)				39
Prune: Training (Sucker, Tie & Train) Yr 2. Replacement Vines Yr 3			286	22
Disease: Mildew (Microthiol, Flint). Insect: Skeletonizer (Kryocide).			33	66
Fertilize: (UN32) through drip	3	8		16
Disease: Mildew (Rally, Microthiol)				35
Insect: Leafhopper (Provado).				44
Weed: Hand Hoe	66			
Prune: Skirt Canes (Mechanical)				14
Terrace: Disk Middles 3X				21
Terrace: Terrace Make & Terrace Back				21
ATV Use	26	34		34
Pickup Truck Use	73	73		73
<b>TOTAL CULTURAL COSTS</b>		<b>278</b>	<b>799</b>	<b>968</b>
<b>Harvest Costs:</b>				
Hand Pick				270
Roll Trays				34
Haul/Box				112
Shake				34
Haul to Processor				20
Assessments				24
<b>TOTAL HARVEST COSTS</b>		<b>0</b>	<b>0</b>	<b>494</b>
<b>Interest On Operating Capital @ 9.25%*</b>		<b>186</b>	<b>302</b>	<b>43</b>
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,504</b>	<b>3,831</b>	<b>1,505</b>

## UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Raisin Tons Per Acre:			1.5
<b>Cash Overhead Costs:</b>				
Office Expense		80	80	80
Liability Insurance		6	6	6
Sanitation Services		17	17	17
Property Taxes		67	67	69
Property Insurance		7	7	8
Investment Repairs		33	33	33
<b>TOTAL CASH OVERHEAD COSTS</b>		209	210	213
<b>TOTAL CASH COSTS/ACRE</b>		2,712	4,041	1,718
<b>INCOME/ACRE FROM PRODUCTION</b>		0	0	1,725
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		2,712	4,041	0
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		0	0	7
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		2,712	6,753	6,746
<b>Non-Cash Overhead (Capital Recovery Cost):</b>				
Land		359	359	359
Drip Irrigation System		64	64	64
Shop Building		52	52	52
Shop Tools		11	11	11
Fuel Tank & Pump		2	2	2
Shaker/Screener				4
Equipment		29	33	68
<b>TOTAL CAPITAL RECOVERY COST</b>		516	521	560
<b>TOTAL COST/ACRE FOR THE YEAR</b>		3,229	4,562	2,277
<b>INCOME/ACRE FROM PRODUCTION</b>		0	0	1,725
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		3,229	4,562	552
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>		0	0	0
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		3,229	7,791	8,343

\*Interest calculated: Yr. 1 over 15 months, Yr 2 over 12 months, Yr 3 through harvest.

UC COOPERATIVE EXTENSION  
**Table 2. MATERIAL COSTS TO ESTABLISH RAISIN GRAPES**  
 SAN JOAQUIN VALLEY 2006

MATERIAL	COST	UNIT	YEAR 1		YEAR 2		YEAR 3	
			RATE	COST	RATE	COST	RATE	COST
<b>Herbicide:</b>								
Treflan HFP	4.74	pint	1.00	5				
Suflan 4AS	16.96	pint			2.40	41	2.40	41
Roundup Ultra Max	8.56	pint			2.10	18	2.10	18
<b>Insecticide:</b>								
Kryocide	3.00	lb			6.00	18	6.00	18
Lorsban 4E	6.86	pint					4.00	27
Provado 1.6 Solupak	43.96	lb					0.70	31
<b>Fungicides:</b>								
Microthiol Special	0.80	lb			2.00	2	7.00	6
Abound	2.70	floz					12.00	32
Dusting Sulfur	0.18	lb					15.00	3
Rally 40W	4.89	oz					8.00	39
Flint	16.49	oz					2.00	33
<b>Fertilizer:</b>								
UN32	0.41	lb N	5.00	2	20.00	8	40.00	16
Neutral Zinc 50%	0.92	lb					5.00	5
<b>Water:</b>								
Water Pumped	5.67	acin	12.00	68	24.00	136	28.00	159
<b>Vine:</b>								
Dormant Bench	2.85	each	519.00	1,479	10.00	29		
<b>Vine Aids:</b>								
Wraps	0.12	each	519.00	62				
Twist-ems	0.00	each			5,100.00	20	2,000.00	8
Trellis System	2,700.00	acre			1.00	2,700		
Trays 20 lb	0.05	each					675.00	34
<b>Rentals:</b>								
Forklift	850.00	week					0.08	68
Tractor	640.00	week					0.05	32
<b>Assesments:</b>								
CA Raisin Marketing Board	16.20	ton					1.50	24
<b>Custom:</b>								
Rip/Subsoil	150.00	acre	2.00	300				
Mark/Stake	0.14	each	519.00	70				
Plant Vines	0.18	each	519.00	93	10.00	2		
Pick Raisin (Hand)	0.35	tray					675.00	236
Roll Raisin (Hand)	0.05	tray					675.00	34
Haul to Processor	13.00	ton					1.50	20
Labor-Machine	12.76	hr	6.91	88	9.37	120	16.68	213
Labor-Non Machine	11.05	hr	8.55	94	34.00	376	21.95	243
Fuel-Gas	2.55	gal	11.41	29	12.08	31	12.08	31
Fuel-Diesel	2.00	gal	5.90	12	5.99	12	25.71	51
Lube				6		6		12
Machinery Repair				9		11		30
Interest				186		302		43
<b>TOTAL COSTS</b>				<b>2,504</b>		<b>3,830</b>		<b>1,505</b>



UC COOPERATIVE EXTENSION  
**Table 3. COSTS PER ACRE TO PRODUCE TRAY DRIED RAISINS**  
 SAN JOAQUIN VALLEY - 2006

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
<b>Cultural:</b>							
Prune: Vines	24.00	265	0	0	0	265	
Prune: Brush Disposal (Every Middle)	0.26	4	3	0	0	7	
Prune: Tie Canes	4.50	50	0	8	0	58	
Weed: Winter Strip (Surflan, Roundup)	0.49	8	4	46	0	58	
Insect: Mealybugs (Lorsban)	0.50	8	6	27	0	41	
Disease: Phomopsis (Abound)/Mildew (Sulfur)	0.50	8	6	33	0	47	
Weed: Disk Middles 2X	0.57	9	5	0	0	14	
Disease: Mildew (Dusting Sulfur) 3X (alternate rows)	0.75	11	7	3	0	21	
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)	0.50	8	6	26	0	39	
Fertilize: N through drip system (UN32)	0.00	0	0	16	0	16	
Irrigate: (Water)	5.50	61	0	159	0	220	
Weed: Spot Spray (Roundup)	1.59	24	3	13	0	40	
Disease: Mildew (Sulfur, Flint). Insect: Skeletonizer (Kryocide). Bloom Thin (GA)	0.50	8	6	63	0	76	
Disease: Mildew (Rally, Sulfur)	0.50	8	6	21	0	35	
Prune: Skirt Canes (Mechanical) 2X	0.57	9	5	0	0	14	
Insect: Leafhopper (Provado). FM*: Fruit Set (Ethrel)	0.50	8	6	51	0	65	
Terrace**: Disk Middles	0.86	13	8	0	0	21	
Terrace**: Build Terrace & Terrace Back	0.88	13	8	0	0	21	
Pickup: Business Use	2.39	36	37	0	0	73	
ATV Use	2.00	31	3	0	0	34	
<b>TOTAL CULTURAL COSTS/ACRE</b>	<b>47.36</b>	<b>580</b>	<b>120</b>	<b>466</b>	<b>0</b>	<b>1,165</b>	
<b>Harvest</b>							
Pick Grapes (contract) (includes trays)	0.00	0	0	45	315	360	
Roll Raisins (contract)	0.00	0	0	0	45	45	
Box Raisins	0.75	45	7	0	75	126	
Shake Raisins (includes forklift rental)	1.00	11	0	0	26	37	
Haul Raisins (contract)	0.00	0	0	0	26	26	
Assessment	0.00	0	0	32	0	32	
<b>TOTAL HARVEST COSTS/ACRE</b>	<b>1.75</b>	<b>56</b>	<b>7</b>	<b>77</b>	<b>486</b>	<b>626</b>	
Interest on operating capital @ 9.25%						56	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>635</b>	<b>126</b>	<b>543</b>	<b>486</b>	<b>1,846</b>	
<b>CASH OVERHEAD:</b>							
Office Expense						80	
Liability Insurance						6	
Sanitation Fees						17	
Property Taxes						103	
Property Insurance						32	
Investment Repairs						67	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>304</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>2,150</b>	

UC COOPERATIVE EXTENSION  
**Table 3. continued**  
 SAN JOAQUIN VALLEY - 2006

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
<b>NON-CASH OVERHEAD:</b>		Per producing Acre		Annual Cost Capital Recovery			
Land		5,739		359		359	
Drip Irrigation System		800		64		64	
Building		696		52		52	
Tools-Shop/Field		104		11		11	
Fuel Tanks 2-300G		30		2		2	
Vineyard Establishment Costs		6,746		572		572	
Shaker/Screeners		43		4		4	
Equipment		516		67		67	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>14,675</b>		<b>1,131</b>		<b>1,131</b>	
<b>TOTAL COSTS/ACRE</b>							<b>3,281</b>

\* FM = fruit management.

\*\*May be considered a harvest cost by some growers.

UC COOPERATIVE EXTENSION  
**Table 4. COSTS AND RETURNS to PRODUCE TRAY DRIED RAISINS**  
 SAN JOAQUIN VALLEY - 2006

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Raisins	2.00	ton	1,150.00	2,300	
<b>OPERATING COSTS</b>					
<b>Vine Aids:</b>					
Twist-ems	2,000.00	each	0.00	8	
<b>Herbicide:</b>					
Surflan 4 AS	2.40	pint	16.96	41	
Roundup Ultra Max	2.10	pint	8.56	18	
<b>Fungicide:</b>					
Abound (Strobilurin)	12.00	froz	2.70	32	
Microthiol Disperss (micronized wettable sulfur)	7.00	lb	0.80	6	
Dusting Sulfur	15.00	lb	0.18	3	
Rally 40W (Sterol Inhibitor)	8.00	oz	4.89	39	
Flint (Strobilurin)	2.00	oz	16.49	33	
<b>Insecticide:</b>					
Lorsban 4E	4.00	pint	6.86	27	
Kryocide	6.00	lb	3.00	18	
Provado 1.6 Solupak	1.00	oz	43.96	44	
<b>Fertilizer:</b>					
Neutral Zinc 50% (foliar)	5.00	lb	0.92	5	
UN 32	40.00	lb N	0.41	16	
<b>Water:</b>					
Water Pumped SJV	28.00	acin	5.67	159	
<b>Growth Regulator:</b>					
Pro-Gibb 4% (Gibberelic Acid) 1oz=1g	6.00	froz	1.67	10	
Ethrel	1.00	Pint	7.00	7	
<b>Rent:</b>					
Tractor	0.05	week	640.00	32	
Forklift (2 wks @ harvest + 1 wk @ shaking)	0.08	week	850.00	68	
<b>Harvest Aids:</b>					
Trays 20 lb	900.00	tray	0.05	45	
<b>Assessment:</b>					
California Raisin Marketing Board	2.00	ton	16.20	32	
<b>Custom/Contract:</b>					
Pick Grapes (hand)	900.00	tray	0.35	315	
Roll Grapes (hand)	900.00	tray	0.05	45	
Haul Raisins to Processor	2.00	ton	13.00	26	
<b>Labor (machine)</b>	16.93	hrs	12.73	216	
<b>Labor (non-machine)</b>	38.00	hrs	11.05	420	
<b>Fuel - Gas</b>	12.14	gal	2.55	31	
<b>Fuel - Diesel</b>	26.35	gal	2.00	53	
Lube				13	
Machinery repair				30	
Interest on operating capital @ 9.25%				56	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>1,846</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>454</b>	

UC COOPERATIVE EXTENSION  
**Table 4. continued**  
 SAN JOAQUIN VALLEY - 2006

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				80	
Liability Insurance				6	
Sanitation Fees				17	
Property Taxes				103	
Property Insurance				32	
Investment Repairs				67	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>304</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>2,150</b>	
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Land				359	
Drip Irrigation System				64	
Building				52	
Tools-Shop/Field				11	
Fuel Tanks 2-300G				2	
Vineyard Establishment Costs				572	
Shaker/Screener				4	
Equipment				67	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,131</b>	
<b>TOTAL COSTS/ACRE</b>				<b>3,281</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>-981</b>	

UC COOPERATIVE EXTENSION  
**Table 5. MONTHLY CASH to PRODUCE TRAY DRIED RAISINS**  
 SAN JOAQUIN VALLEY - 2006

Beginning JAN 06	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 06	06	06	06	06	06	06	06	06	06	06	06	06	
Cultural:													
Prune: Vines	265												265
Prune: Brush Disposal (Every Middle)	7												7
Prune: Tic Canes		58											58
Weed: Winter Strip (Surflan, Roundup)		58											58
Insect: Mealybug (Lorsban)				41									41
Disease: Phomopsis (Abound)/Mildew (Sulfur)				47									47
Weed: Disk Middles 2X			7		7								14
Disease: Mildew (Dusting Sulfur) 3X (alternate rows)					7		14						21
Disease: Mildew (Rally, Sulfur). Fertilize: Foliar Zinc (Neutral Zinc)					39								39
Fertilize: N through drip system (UN32)					16								16
Irrigate: (Water)					15	29	43	51	41	40			220
Weed: Spot Spray (Roundup)					13		13	13					40
Disease: Mildew (Sulfur, Flint). Insect: Skeleton (Kryocide). Thin (GA)						76							76
Disease: Mildew (Rally, Sulfur)							35						35
Prune: Skirt Canes (Mechanical)							7		7				14
Insect: Leafhopper (Provado). FM: at Veraison (Ethrel)							65						65
Terrace: Disk Middles									14	7			21
Terrace: Build Terrace & Terrace Back									11	11			21
Pickup: Business Use	6	6	6	6	6	6	6	6	6	6	6	6	73
ATV Use	3	3	3	3	3	3	3	3	3	3	3	3	33
<b>TOTAL CULTURAL COSTS</b>	<b>281</b>	<b>124</b>	<b>104</b>	<b>100</b>	<b>121</b>	<b>186</b>	<b>73</b>	<b>82</b>	<b>67</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>1,165</b>
Harvest:													
Pick Grapes (contract) (includes trays)									360				360
Roll Raisins (contract)									45				45
Box Raisins									126				126
Shake Raisins (includes forklift rental)									37				37
Haul Raisins (contract)									26				26
Assessment									32				32
<b>TOTAL HARVEST COSTS</b>									<b>626</b>				<b>626</b>
Interest on operating capital @ 9.25%	2	3	4	5	6	7	8	8	14	0	0	0	56
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>283</b>	<b>128</b>	<b>108</b>	<b>104</b>	<b>127</b>	<b>193</b>	<b>81</b>	<b>90</b>	<b>706</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>1,846</b>

UC COOPERATIVE EXTENSION  
**Table 5. continued**  
 SAN JOAQUIN VALLEY - 2006

Beginning JAN 06	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 06	06	06	06	06	06	06	06	06	06	06	06	06	
OVERHEAD:													
Office Expense	7	7	7	7	7	7	7	7	7	7	7	7	80
Liability Insurance									6				6
Sanitation Fees	2	2	2	2	2	2	2	2	2				16
Property Taxes	51						51						103
Property Insurance	16						16						32
Investmct Repairs	6	6	6	6	6	6	6	6	6	6	6	6	67
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>81</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>81</b>	<b>14</b>	<b>20</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>304</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>365</b>	<b>142</b>	<b>122</b>	<b>119</b>	<b>141</b>	<b>207</b>	<b>162</b>	<b>104</b>	<b>726</b>	<b>21</b>	<b>21</b>	<b>21</b>	<b>2,150</b>

UC COOPERATIVE EXTENSION  
**Table 6. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY - 2006

COSTS PER ACRE AT VARYING YIELD TO PRODUCE TRAY DRIED RAISINS

	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
<b>OPERATING COSTS:</b>							
Cultural Cost	1,165	1,165	1,165	1,165	1,165	1,165	1,165
Harvest (pick, roll, box, shake, haul)	464	529	593	658	723	787	852
Assessment	24	28	32	36	41	45	49
Interest on operating capital @ 9.25%	55	55	56	56	57	57	58
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>1,708</b>	<b>1,777</b>	<b>1,846</b>	<b>1,915</b>	<b>1,986</b>	<b>2,054</b>	<b>2,124</b>
Total Operating Costs/ton	1,139	1,015	923	851	794	747	708
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>304</b>	<b>304</b>	<b>304</b>	<b>304</b>	<b>304</b>	<b>304</b>	<b>304</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>2,012</b>	<b>2,081</b>	<b>2,150</b>	<b>2,219</b>	<b>2,290</b>	<b>2,358</b>	<b>2,428</b>
Total Cash Costs/ton	1,341	1,189	1,075	986	916	857	809
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,130</b>	<b>1,130</b>	<b>1,130</b>	<b>1,130</b>	<b>1,130</b>	<b>1,130</b>	<b>1,130</b>
<b>TOTAL COSTS/ACRE</b>	<b>3,142</b>	<b>3,211</b>	<b>3,280</b>	<b>3,349</b>	<b>3,420</b>	<b>3,488</b>	<b>3,558</b>
Total Costs/ton	2,095	1,835	1,640	1,488	1,368	1,268	1,186

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-433	-289	-146	-2	139	284	426
950	-283	-114	54	223	389	559	726
1,050	-133	61	254	448	639	834	1,026
1,150	17	236	454	673	889	1,109	1,326
1,250	167	411	654	898	1,139	1,384	1,626
1,350	317	586	854	1,123	1,389	1,659	1,926
1,450	467	761	1,054	1,348	1,639	1,934	2,226

NET RETURN PER ACRE ABOVE CASH COST

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-737	-593	-450	-306	-165	-20	122
950	-587	-418	-250	-81	85	255	422
1,050	-437	-243	-50	144	335	530	722
1,150	-287	-68	150	369	585	805	1,022
1,250	-137	107	350	594	835	1,080	1,322
1,350	13	282	550	819	1,085	1,355	1,622
1,450	163	457	750	1,044	1,335	1,630	1,922

NET RETURNS PER ACRE ABOVE TOTAL COST

PRICE \$/ton	YIELD (tons/acre)						
	1.50	1.75	2.00	2.25	2.50	2.75	3.00
850	-1,867	-1,723	-1,580	-1,436	-1,295	-1,150	-1,008
950	-1,717	-1,548	-1,380	-1,211	-1,045	-875	-708
1,050	-1,567	-1,373	-1,180	-986	-795	-600	-408
1,150	-1,417	-1,198	-980	-761	-545	-325	-108
1,250	-1,267	-1,023	-780	-536	-295	-50	192
1,350	-1,117	-848	-580	-311	-45	225	492
1,450	-967	-673	-380	-86	205	500	792

UC COOPERATIVE EXTENSION  
**Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT,**  
 SAN JOAQUIN VALLEY - 2006

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
06	60 HP 4WD Narrow Tractor	36,000	15	7,009	3,472	151	215	3,838
06	ATV 4WD	6,700	5	3,003	1,071	34	49	1,154
06	Bin Trailer	2,100	10	371	261	9	12	282
06	Bin Trailer	2,100	10	371	261	9	12	282
06	Cane Cutter 12'	2,500	20	130	219	9	13	241
06	Disk - Tandem 8'	6,800	10	1,203	845	28	40	913
06	Duster - 3 Pt 12'	5,000	5	1,629	908	23	33	964
06	Mower-Flail 8'	9,600	15	922	966	37	53	1,056
06	Orchard/Vine Sprayer 500 gal	20,378	5	6,638	3,699	95	135	3,928
06	Pickup Truck 1/2 T	26,000	7	9,863	3,533	126	179	3,837
06	Rear Blade 8'	3,000	20	156	263	11	16	290
06	Sprayer ATV 20 gal	350	10	62	43	1	2	47
06	Weed Sprayer 3 PT 100 gal	3,500	10	619	435	14	21	470
<b>TOTAL</b>		<b>124,028</b>		<b>31,976</b>	<b>15,975</b>	<b>546</b>	<b>780</b>	<b>17,302</b>
<b>60% of New Cost *</b>		<b>74,417</b>		<b>19,186</b>	<b>9,585</b>	<b>328</b>	<b>468</b>	<b>10,381</b>

\* 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	
Building 2400 sqft	80,000	20		5,968	280	400	1,600	8,248
Drip Irrigation System 115 acres	92,000	25		7,369	322	460	1,840	9,991
Vineyard Establishment	269,840	22		22,899	944	1,349	1,350	26,542
Fuel Tanks 2-300 gal	3,500	30	350	257	13	19	70	360
Land	660,000	25	660,000	41,250	0	6,600	0	47,850
Shaker/Screener	5,000	20	0	445	18	25	100	587
Tools-Shop/Field	12,000	15	1,133	1,208	46	66	240	1,560
<b>TOTAL INVESTMENT</b>	<b>1,122,340</b>		<b>661,483</b>	<b>79,395</b>	<b>1,623</b>	<b>8,919</b>	<b>5,200</b>	<b>95,138</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	115	acre	5.75	661
Office Expense	115	acre	80.00	9,200
Sanitation Fees	115	acre	16.51	1,899



UC COOPERATIVE EXTENSION  
**Table 8. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - 2006

Yr	Description	COSTS PER HOUR							Total Costs/Hr.	
		Actual Hours Used	Capital Recovery	Cash Overhead			Operating			Total Oper.
				Insur- ance	Taxes	Repairs	Fuel & Lube			
06	60 HP 4WD Narrow Tractor	1,068	1.95	0.08	0.12	0.88	6.78	7.66	9.81	
06	ATV 4WD	401	1.61	0.05	0.07	0.50	0.98	1.48	3.21	
06	Bin Trailer	300	0.52	0.02	0.02	0.32	0.00	0.32	0.88	
06	Bin Trailer	300	0.52	0.02	0.02	0.32	0.00	0.32	0.88	
06	Cane Cutter 12'	98	1.32	0.06	0.08	0.95	0.00	0.95	2.41	
06	Disk - Tandem 8'	200	2.55	0.08	0.12	1.10	0.00	1.10	3.85	
06	Duster - 3 Pt 12'	240	2.26	0.06	0.08	0.73	0.00	0.73	3.13	
06	Mower-Flail 8'	133	4.35	0.17	0.24	4.30	0.00	4.30	9.06	
06	Orchard/Vine Sprayer 500 gal	400	5.55	0.14	0.20	3.58	0.00	3.58	9.47	
06	Pickup Truck 1/2 T	286	7.43	0.26	0.38	1.91	13.44	15.35	23.42	
06	Rear Blade 8'	100	1.57	0.07	0.09	0.44	0.00	0.44	2.17	
06	Sprayer ATV 20 gal	151	0.17	0.01	0.01	0.10	0.00	0.10	0.29	
06	Weed Sprayer 3 PT 100 gal	200	1.31	0.04	0.06	0.61	0.00	0.61	2.02	

UC COOPERATIVE EXTENSION  
**Table 9. OPERATIONS PRODUCTION YEAR FOR TRAY DRIED RAISINS**  
 SAN JOAQUIN VALLEY 2006

MONTH	OPERATION	TRACTOR	IMPLEMENT	OPERATION Minutes/acre	LABOR Hrs/acre	MATERIAL	RATE/ ACRE	UNIT
Jan	Prune				24.00			
Jan	Brush Disposal/Shred	60 HP	Shredder 6'	15.48				
Feb	Tie Canes				4.50	Twist-ems	2,000.00	each
Feb	Weed: Winter Strip	60 HP	Sprayer	29.46		Surflan	2.40	pt
						Roundup	0.60	pt
March	Insect: Mealybug	60 HP	Vine Sprayer	30.00		Lorsban	4.00	pt
March	Disease: Mildew/Phomopsis	60 HP	Vine Sprayer	30.00		Abound	12.00	floz
						Microthhiol	1.00	lb
March	Disk Middles	60 HP	Disk 8'	17.16				
April	Disease: Mildew Alternate Rows	60 HP	Duster	15.00		Dusting Sulfur	5.00	lb
April	Disease: Mildew. Fert: Zinc	60 HP	Vine Sprayer	30.00		Microthhiol	2.00	lb
						Rally	4.00	oz
						Neutral Zinc	5.00	lb
April	Fertilize					UN32	40.00	lb N
April	Irrigate				0.50	Water	1.67	acin
April	Spot Spray	ATV	ATV Sprayer	31.74		Roundup	0.50	pt
May	Disk Middles	60 HP	Disk 8'	17.16				
May	Disease: Mildew. Insect: Skeletonizer. FM: Thin	60 HP	Vine Sprayer	30.00		Microthhiol	2.00	lb
						Flint	2.00	oz
						Kryocide	6.00	lb
						ProGibb	6.00	grams
May	Irrigate				1.00	Water	3.11	acin
June	Mildew	60 HP	Vine Sprayer	30.00		Rally	4.00	oz
						Microthiol	2.00	lb
June	Skirt Canes	60 HP	Cane Cutter	17.16				
June	Insect: Leafhopper. FM: Maturity	60 HP	Vine Sprayer	30.00		Ethrel	1.00	pt
						Provado	1.00	oz
June	Irrigate				1.00	Water	5.70	acin
June	Spot Spray	ATV	ATV Sprayer	31.74		Roundup	0.50	pt
June	Disease: Mildew Alternate Rows	60 HP	Duster	15.00		Dusting Sulfur	10.00	lb
June	Disease: Mildew Alternate Rows	60 HP	Duster	15.00		Dusting Sulfur	10.00	lb
July	Spot Spray	ATV	ATV Sprayer	31.74		Roundup	0.50	pt
July	Irrigate				1.00	Water	7.11	acin
Aug	Irrigate				1.00	Water	5.29	acin
Aug	Skirt Canes	60 HP	Cane Cutter	17.16				
Aug	Terrace: Disk Middles	60 HP	Disk 8'	17.16				
Aug	Terrace: Disk Middles	60 HP	Disk 8'	17.16				
Aug	Terrace: Make Terrace	60 HP	Blade	26.46				
Sept	Harvest Pick	Custom				Trays	900.00	trays
Sept	Roll Trays	Custom						
Sept	Box Raisins	60 HP	Bin Trailer	45	3.00	Forklift Rent	0.05	wk
			Bin Trailer			Rented Tractor	0.05	wk
Sept	Shake Raisins	Shaker			1.00	Forklift Rent	0.03	week
Sept	Haul	Custom				Haul @ \$13	2.00	ton
Sept	Terrace Back	60 HP	Blade	26.46				
Sept	Terrace: Disk Middles	60 HP	Disk 8'	17.16				
Sept	Irrigate				1.00	Water	5.12	acin

**Citrus**

**CALIFORNIA ORANGES  
ECONOMIC DATA 1999 - 2009**

Year	Cartons	Utilization	Cartons	Packinghouse Door-Return <sup>1</sup>	Net on Tree <sup>2</sup>	Gross per Acre	Minus Pick & Hauling Fee <sup>1</sup>	Gross per Acre	Minus Cultural Cost <sup>3</sup>	Sub-Net per Acre	Minus Cash/Non-Cash Overhead Cost <sup>3</sup>	Net per Acre
1999-2000	600	75%	450	\$2.70		\$1,215	\$600	\$615	\$1,357	-\$742	\$1,766	-\$2,508
2000-2001	600	75%	450	\$4.72		\$2,124	\$600	\$1,524	\$1,357	\$167	\$1,766	-\$1,599
2001-2002	600	75%	450	\$5.55		\$2,498	\$600	\$1,898	\$1,357	\$541	\$1,766	-\$1,225
2002-2003	600	82%	492		\$2.74			\$1,348	\$1,549	-\$201	\$1,582	-\$1,783
2003-2004	621	81%	503		\$3.86			\$1,941	\$1,549	\$392	\$1,582	-\$1,190
2004-2005	683	71%	484		\$4.64			\$2,245	\$1,549	\$696	\$1,582	-\$886
2005-2006	719	67%	481		\$3.74			\$1,798	\$1,761	\$37	\$1,724	-\$1,687
2006-2007	FREEZE YEAR <sup>4</sup>		0		\$0			\$0	\$0	\$0	\$0	\$0
2007-2008	728	70%	509		\$3.75			\$1,909	\$1,961	-\$52	\$2,080	-\$2,132
2008-2009	518	80%	414		\$4.65			\$1,925	\$2,065	-\$140	\$1,790	-\$1,930

Sub-Net Average per acre       \$78  
NET Average per acre      -\$1,660

**USDA AGRICULTURAL STATISTICS BOARD, NATIONAL AGRICULTURAL STATISTICS SERVICE**

USDA prices are based on a 75 pound carton. (Refer to Marketing Season and Net Weight per Box attachment.) The California citrus industry uses a 37.5 pound carton. Returns are adjusted accordingly for this data submission.

<sup>1</sup> Packinghouse Door-Return includes sorting, grading, packing, cooling and marketing fees. It does NOT include pick and haul (P&H) charges. For years 1999-2002 the P&H charge was \$1.00 per carton equivalent.

<sup>2</sup> Net on Tree return includes pick/haul and all packinghouse door charges.

<sup>3</sup> Cultural Costs and Cash/Non-Cash Overhead costs are derived from the University of California Cooperative Extension Service studies. See attached summaries. Complete studies available upon request. In general, UCCE updates the economic data biennially.

<sup>4</sup> Did not use data from the 2006-2007 crop year due to the freeze.

**Pullout Costs**

<b>Chipping</b>	
	Cost/Acre
Push and Pile Cost	\$250.00
Chip Stacked Piles 10 acres/day (varies) \$5,000 Move-in charge	\$310.00
Dust Control ~\$400/day	\$20.00
<b>Remove and Dump Roots and Stumps after Chipping</b>	
~1 tons/acre	
Deliver and dump container at Composter (\$225/load)	\$22.50
\$25.00/ton Composting	\$25.00
Tractor /labor to load roots into Container	\$27.00
Loader to compress roots into container (Cost open)	
<b>Total Cost of Chipping</b>	<b>\$654.50</b>

## Burning

	Cost/Acre
Remove Roots and Stumps before Burn ~1 tons/acre	
Tractor/trailer/labor to load roots into piles	\$27.00
Push and Pile Cost	\$250.00
Burn Permit Fee (1)	\$26.00
Burn Control (supervise burn)	\$11.82
<b>Total Cost of Burning</b>	<b>\$314.82</b>

(1) - Flat fee per site

**Oranges: Price and Value by State and Crop, 2000-02**

State, Crop and Season	Price per Box <sup>1 2</sup>			Value of Production		
	Fresh	Processed	All	Fresh	Processed	Total
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>1,000 Dollars</i>	<i>1,000 Dollars</i>	<i>1,000 Dollars</i>
<b>AZ</b>						
Navel and Misc.						
1999-00	9.58	-0.08	6.89	4,148	-13	4,135
2000-01	10.14	-0.14	6.54	3,164	-24	3,140
2001-02	16.50	-0.15	12.74	3,449	-9	3,440
Valencia						
1999-00	3.19	-0.13	2.35	1,190	-17	1,173
2000-01	5.06	-0.18	5.04	2,115	0	2,115
2001-02	3.42		3.42	855		855
All						
1999-00	6.62	-0.10	4.83	5,338	-30	5,308
2000-01	7.23	-0.14	5.84	5,279	-24	5,255
2001-02	9.38	-0.15	8.26	4,304	-9	4,295
<b>CA</b>						
Navel and Misc.						
1999-00	8.48	-0.08	6.55	262,880	-720	262,160
2000-01	11.64	-0.14	9.98	355,020	-700	354,320
2001-02	14.80	-0.15	12.89	438,820	-653	438,167
Valencia						
1999-00	6.69	-0.13	3.48	84,963	-1,469	83,494
2000-01	10.16	0.76	8.43	157,480	2,660	160,140
2001-02	10.02	0.74	8.37	181,362	2,886	184,248
All						
1999-00	7.96	-0.11	5.40	347,843	-2,189	345,654
2000-01	11.14	0.23	9.44	512,500	1,960	514,460
2001-02	12.99	0.27	11.11	620,182	2,233	622,415
<b>FL</b>						
Early, Midseason						
1999-00	7.60	4.97	5.10	49,438	633,650	683,088
2000-01	6.10	4.48	4.56	37,973	545,552	583,525
2001-02	6.50	4.41	4.51	41,756	536,150	577,906
Valencia						
1999-00	7.00	6.26	6.28	20,216	601,661	621,877
2000-01	6.90	5.99	6.02	23,991	550,020	574,011
2001-02	7.10	6.06	6.09	22,010	599,334	621,344
All						
1999-00	7.42	5.52	5.60	69,654	1,235,311	1,304,965
2000-01	6.39	5.13	5.18	61,964	1,095,572	1,157,536
2001-02	6.70	5.15	5.21	63,766	1,135,484	1,199,250

<sup>1</sup> Equivalent packinghouse-door returns.

<sup>2</sup> See page 17 for price per box calculations.

## Marketing Year Average Prices and Value of Production

State level marketing year average (MYA), or price per box, for fresh and processed sales are the weighted average of monthly sales that occur during a crop's marketing season, adjusted to the packinghouse-door level. The "all" sales MYA price is derived by dividing the "all" sales value by the "all" sales boxes. MYA prices at the U.S. level for commodities with different State box weights are computed as follows:

$$\text{Fresh Market MYAP} = \frac{(\text{State Fresh Value} * \text{State Box Weight})}{(\text{State Fresh Boxes} * \text{State Box Weight})}$$

$$\text{Process Market MYAP} = \frac{(\text{State Process Value} * \text{State Box Weight})}{(\text{State Process Boxes} * \text{State Box Weight})}$$

$$\text{"All" Sales MYAP} = \frac{(\text{State All Value} * \text{State Box Weight})}{(\text{State All Boxes} * \text{State Box Weight})}$$

For commodities with the same box weights across all states, the U.S. MYA's are derived by dividing the sum of State's values by the sum of States' boxes.

U.S. value of production for a given commodity is the sum of the State's values for that commodity. The State level value of production for each commodity is computed as follows:

$$\text{Fresh Market Value} = \text{Fresh Market MYAP} * \text{Fresh Market Boxes}$$

$$\text{Process Market Value} = \text{Process Market MYAP} * \text{Process Market Boxes}$$

$$\text{"All" Sales Value} = \text{Fresh Market Value} + \text{Process Market Value}$$

Citrus prices are based on weighted average f.o.b. packed prices received for fresh fruit and weighted average prices received at the processing plant door for processing fruit. Equivalent returns for fresh and processed fruit are calculated at the packinghouse-door level by deducting sorting, grading, packing, cooling, marketing, and other costs from the two base prices. In some cases, this results in negative returns.



## Marketing Seasons and Net Weight per Box

### Oranges:

Arizona	November 1 to August 31	75 pounds
California Navels	November 1 to June 15	75 pounds
California Valencias	March 15 to December 20	75 pounds
Florida Early and Midseason	October 1 to April 15	90 pounds
Florida Valencia	February 1 to July 31	90 pounds
Texas	September 25 to May 15	85 pounds

### Grapefruit:

Arizona	November 1 to July 31	67 pounds
California (Desert)	November 15 to July 15	67 pounds
California (Other Areas)	March 20 - October 30	67 pounds
Florida	September 10 to July 31	85 pounds
Texas	October 1 to May 30	80 pounds

### K-Early Citrus Fruit:

Florida	October 1 to November 30	90 pounds
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### Lemons:

Arizona	August 15 to March 1	76 pounds
California	August 1 to July 31	76 pounds

### Limes:

Florida	April 1 to March 31	88 pounds
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### Tangelos:

Florida	October 15 to April 15	90 pounds
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### Tangerines:

Arizona	November 1 to February 1	75 pounds
California	November 1 to May 15	75 pounds
Florida	October 1 to April 1	95 pounds

### Temps:

Florida	December 1 to May 1	90 pounds
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**Oranges: Average Prices and Equivalent Returns, California  
September 2002 - August 2005**

State, Month, and Year	F.O.B. Packed	Equiv. P.H.D.			Equiv. On-Tree		
		All	Fresh	Proc.	All	Fresh	Proc.
<b>CA</b>							
	<b>All Oranges</b>						
	<i>Dollars per box</i>	<i>Dollars per box</i>	<i>Dollars per box</i>	<i>Dollars per box</i>	<i>Dollars per box</i>	<i>Dollars per box</i>	<i>Dollars per box</i>
Sep 2002	15.50	7.72	8.72	0.74	5.33	6.33	-1.65
Oct	15.80	7.78	9.02	0.74	5.39	6.63	-1.65
Nov	20.70	11.95	13.46	0.40	9.54	11.05	-2.01
Dec	17.90	9.84	10.66	0.40	7.43	8.25	-2.01
Jan 2003	15.30	6.95	8.06	0.40	4.54	5.65	-2.01
Feb	13.90	5.52	6.67	0.40	3.11	4.26	-2.01
Mar	16.10	7.02	8.86	0.40	4.61	6.45	-2.01
Apr	18.00	8.72	10.83	0.40	6.30	8.41	-2.02
May	18.20	9.04	11.07	0.39	6.62	8.65	-2.03
Jun	16.50	7.97	9.52	0.37	5.53	7.09	-2.06
Jul	14.70	6.22	7.80	0.35	3.78	5.36	-2.09
Aug	15.00	6.15	8.08	0.34	3.71	5.64	-2.10
Sep	14.30	5.44	7.38	0.34	3.00	4.94	-2.10
Oct	14.20	4.27	7.28	0.34	1.83	4.84	-2.10
Nov	22.00	12.91	14.62	0.39	10.45	12.16	-2.07
Dec	19.80	11.59	12.42	0.39	9.13	9.96	-2.07
Jan 2004	18.30	9.93	10.92	0.39	7.47	8.46	-2.07
Feb	18.40	9.88	10.99	0.39	7.42	8.53	-2.07
Mar	19.90	10.97	12.58	0.38	8.50	10.11	-2.08
Apr	19.60	9.90	12.23	0.39	7.43	9.77	-2.08
May	19.90	10.54	12.63	0.38	8.08	10.16	-2.08
Jun	21.10	12.51	13.97	0.34	10.03	11.49	-2.14
Jul	19.60	11.18	12.54	0.32	8.69	10.05	-2.17
Aug	21.00	13.14	13.94	0.32	10.65	11.45	-2.17
Sep	25.40	18.34	18.34		15.85	15.85	
Oct	31.20	23.94	23.94		21.44	21.44	
Nov	23.00	13.48	15.47	0.38	10.97	12.96	-2.13
Dec	20.40	11.09	12.87	0.38	8.58	10.36	-2.13
Jan 2005	19.50	9.91	11.97	0.38	7.40	9.46	-2.13
Feb	19.00	9.27	11.45	0.38	6.76	8.94	-2.13
Mar	19.40	9.19	11.97	0.37	6.69	9.47	-2.13
Apr	20.50	9.09	13.08	0.37	6.59	10.58	-2.13
May	20.60	10.19	13.27	0.37	7.69	10.77	-2.14
Jun	19.10	10.43	12.06	0.33	7.94	9.57	-2.16
Jul	17.50	9.04	10.44	0.32	6.55	7.95	-2.17
Aug	16.80	7.39	9.74	0.32	4.90	7.25	-2.17

**Oranges: Average Prices and Equivalent Returns, California**  
**September 2006 - August 2009**

State, Month, and Year	F.O.B. Packed	Equiv. P.H.D.			Equiv. On-Tree		
		All	Fresh	Proc.	All	Fresh	Proc.
CA							
All Oranges							
	<i>Dollars per Box</i>	<i>Dollars per Box</i>	<i>Dollars per Box</i>	<i>Dollars per Box</i>	<i>Dollars per Box</i>	<i>Dollars per Box</i>	<i>Dollars per Box</i>
Sep 2006	32.40	20.45	24.53	1.41	17.96	22.04	-1.08
Oct	24.90	13.66	16.99	1.46	11.16	14.49	-1.04
Nov	19.90	10.82	11.99	1.48	8.32	9.49	-1.02
Dec	22.80	13.18	14.89	1.48	10.68	12.39	-1.02
Jan 2007	22.80	13.12	14.89	1.48	10.62	12.39	-1.02
Feb	35.10	6.91	27.18	1.48	4.41	24.68	-1.02
Mar	33.10	13.53	25.21	1.48	11.03	22.71	-1.02
Apr	33.20	12.18	25.24	1.49	9.68	22.74	-1.01
May	32.50	8.84	24.51	1.52	6.32	21.98	-0.99
Jun	28.60	12.16	20.57	1.64	9.62	18.03	-0.90
Jul	27.40	11.10	19.37	1.64	8.56	16.83	-0.90
Aug	25.20	11.52	17.17	1.64	8.98	14.63	-0.90
Sep	23.40	10.38	15.37	1.64	7.84	12.83	-0.90
Oct	25.30	12.95	17.28	1.60	10.41	14.74	-0.95
Nov	25.90	15.21	17.82	1.48	12.66	15.27	-1.07
Dec	21.60	11.84	13.53	1.46	9.29	10.98	-1.09
Jan 2008	20.10	10.60	12.03	1.46	8.05	9.48	-1.09
Feb	18.90	8.87	10.83	1.46	6.32	8.28	-1.09
Mar	19.00	8.73	10.96	1.47	6.18	8.40	-1.08
Apr	18.30	7.89	10.16	1.47	5.34	7.61	-1.08
May	20.00	9.17	11.84	1.49	6.61	9.28	-1.07
Jun	21.70	10.11	13.59	1.56	7.53	11.01	-1.02
Jul	18.50	8.14	10.31	1.62	5.55	7.72	-0.97
Aug	18.50	6.91	10.31	1.62	4.32	7.72	-0.97
Sep	21.00	8.51	12.81	1.62	5.92	10.22	-0.97
Oct	20.90	6.55	12.71	1.62	3.96	10.12	-0.97
Nov	27.00	16.07	18.80	1.50	13.47	16.20	-1.10
Dec	24.20	13.99	15.97	1.44	11.39	13.37	-1.16
Jan 2009	25.20	15.10	16.97	1.44	12.50	14.37	-1.16
Feb	23.90	14.09	15.64	1.44	11.49	13.04	-1.16
Mar	23.60	13.22	15.39	1.64	10.62	12.79	-0.97
Apr	21.10	10.89	12.86	1.54	8.28	10.25	-1.07
May	22.30	11.60	14.03	1.05	8.98	11.41	-1.56
Jun	23.20	11.58	14.86	0.65	8.95	12.23	-1.98
Jul	21.50	10.11	13.15	( <sup>1</sup> )	7.47	10.51	( <sup>1</sup> )
Aug	21.60	11.22	13.25	( <sup>1</sup> )	8.58	10.61	( <sup>1</sup> )

<sup>1</sup> Price not published to avoid disclosure of individual firms.

## Marketing Seasons and Net Weight per Box

### Oranges:

Arizona navel and miscellaneous	November 1 to March 31	75 pounds
Arizona Valencia	February 1 to June 30	75 pounds
California navel and miscellaneous	November 1 to June 15	75 pounds
California Valencia	March 15 to December 20	75 pounds
Florida early, midseason, and navel <sup>1/</sup>	October 1 to April 1	90 pounds
Florida Valencia	January 1 to July 31	90 pounds
Texas early and midseason	September 25 to February 15	85 pounds
Texas Valencia	January 15 to May 15	85 pounds

### Grapefruit:

Arizona	November 1 to June 30	67 pounds
California	November 1 to October 31	67 pounds
Florida	September 10 to July 1	85 pounds
Texas	October 1 to May 30	80 pounds

### Lemons:

Arizona	September 1 to March 31	76 pounds
California	August 1 to July 31	76 pounds

### Tangelos:

Florida	October 15 to March 1	90 pounds
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### Tangerines and Mandarins:

Arizona	November 1 to April 30	75 pounds
California	November 1 to May 15	75 pounds
Florida	October 1 to May 1	95 pounds

<sup>1/</sup> Including Temples

UC COOPERATIVE EXTENSION  
**Table 3. COSTS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY - SOUTH 2009

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
<b>Cultural:</b>								
Frost Protection (water & wind machine)	2.19	24	0	324	0	348		
Fertilize: N (UN32 through drip line)	0.30	3	0	37	0	40		
Weed: Pre-emergent (Princep, Karmex) 2X	0.50	9	1	49	0	59		
Insect/Fertilizer: Orangeworm (Dipel)/N Mn Zn	0.00	0	0	27	35	62		
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr	0.00	0	0	0	25	25		
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr	0.00	0	0	0	24	24		
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr	0.00	0	0	0	75	75		
Irrigate: (water & labor)	5.55	61	0	323	0	384		
Soil Amendment: (Soluble Gypsum) w/irrigation	8.75	97	0	133	0	230		
Weed: Spot Spray (Roundup) 3X	0.75	13	2	3	0	18		
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /N	0.00	0	0	50	35	85		
Insect: Thrips (Success, Oil)	0.00	0	0	36	35	71		
Insect: Scale (Esteem)	0.00	0	0	145	85	230		
Leaf Analysis (1 sample/10 acres)	0.05	1	0	0	7	7		
Disease: Brown Rot (Lime, Kocide)	0.00	0	0	38	35	73		
Growth Regulator: (Fruit Fix) [Navel Only]	0.00	0	0	11	53	64		
Growth Regulator: (GibGro or GA) [Navel Only]	0.00	0	0	24	53	77		
Pickup Truck Use	3.33	58	40	0	0	98		
ATV Use	3.33	58	5	0	0	63		
PCA/Consultant Services	0.00	0	0	0	35	35		
<b>TOTAL CULTURAL COSTS</b>	<b>24.75</b>	<b>324</b>	<b>47</b>	<b>1,199</b>	<b>496</b>	<b>2,065</b>		
<b>Harvest:</b>								
Pick & Haul Fruit	0.00	0	0	0	926	926		
Pack Fruit	0.00	0	0	0	2,668	2,668		
Assessments	0.00	0	0	42	0	42		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>3,594</b>	<b>3,635</b>		
Interest on operating capital @ 5.75%						160		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>324</b>	<b>47</b>	<b>1,240</b>	<b>4,089</b>	<b>5,860</b>		
<b>Cash Overhead:</b>								
Office Expense						125		
Liability Insurance						10		
Property Taxes						147		
Property Insurance						54		
Investment Repairs						149		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>485</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>6,346</b>		
<b>Non-Cash Overhead:</b>								
		Per producing		Annual Cost				
		Acre		Capital Recovery				
Buildings 1800 sqft		1,050		66		66		
Fuel Tanks 2-250g		58		3		3		
Shop Tools		250		24		24		
Land		8,125		386		386		
Gypsum Machine (1)		600		138		138		
Orchard Establishment		6,509		381		381		
Drip Irrigation		1,550		87		87		
Wind Machine (6)		2,340		177		177		
Equipment		405		44		44		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>20,887</b>		<b>1,305</b>		<b>1,305</b>		
<b>TOTAL COSTS/ACRE</b>						<b>7,651</b>		

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

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
<b>Cultural:</b>								
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		
<b>TOTAL CULTURAL COSTS</b>	<b>24.75</b>	<b>317</b>	<b>40</b>	<b>1,100</b>	<b>504</b>	<b>1,961</b>		
<b>Harvest:</b>								
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		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>3,277</b>	<b>3,302</b>		
Interest on operating capital *						203		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>317</b>	<b>40</b>	<b>1,125</b>	<b>3,781</b>	<b>5,466</b>		
<b>Cash Overhead:</b>								
Office Expense						120		
Liability Insurance						9		
Property Taxes						136		
Property Insurance						43		
Investment Repairs						137		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>446</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>5,912</b>		
<b>Non-Cash Overhead:</b>								
		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		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>19,357</b>		<b>1,634</b>		<b>1,634</b>		
<b>TOTAL COSTS/ACRE</b>						<b>7,546</b>		

\*Interest based on May 06 through April 07 Crop Year

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

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
<b>Cultural:</b>								
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		
<b>TOTAL CULTURAL COSTS</b>	<b>24.64</b>	<b>298</b>	<b>34</b>	<b>987</b>	<b>443</b>	<b>1,761</b>		
<b>Harvest:</b>								
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		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>2,920</b>	<b>2,943</b>		
Interest on operating capital *						140		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>298</b>	<b>34</b>	<b>1,010</b>	<b>3,363</b>	<b>4,845</b>		
<b>Cash Overhead:</b>								
Office Expense						120		
Liability Insurance						9		
Property Taxes						122		
Property Insurance						39		
Investment Repairs						131		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>421</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>5,266</b>		
<b>Non-Cash Overhead:</b>								
		Per producing		Annual Cost				
		Acres		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		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>17,605</b>		<b>1,303</b>		<b>1,303</b>		
<b>TOTAL COSTS/ACRE</b>						<b>6,569</b>		

\*Interest based on May 04 through April 05 Crop Year

UC COOPERATIVE EXTENSION  
**Table 2. COSTS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY - SOUTH 2002

Operation	Cash and Labor Costs per acre						Total Cost	Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost		
<b>Cultural:</b>								
Frost Protection	2.19	20	0	200	0	220		
Irrigate	5.44	49	0	200	0	249		
Weed - Pre-emergent	0.50	7	1	41	0	49		
Weed - Spot Spray	0.75	24	2	4	0	30		
Top Trees 1X/4 Yr	0.00	0	0	0	11	11		
Hedge Trees 1X/4 Yr	0.30	3	0	0	6	8		
Prune - Hand 1X/4 Yr	0.00	0	0	0	88	88		
Shred Brush	0.00	0	0	0	18	18		
Fertilize - Nitrogen	0.30	3	0	21	0	24		
Pest/Fertilizer: Worm/N Mn Zn	0.00	0	0	19	22	41		
Pest/Fertilizer: Thrips Katydid/N	0.00	0	0	41	22	62		
Pest - Thrips Katydid	0.00	0	0	36	22	57		
Pest - Scale	0.00	0	0	84	60	144		
Pest - Brown Rot	0.00	0	0	15	25	40		
Leaf Analysis	0.05	0	0	0	3	3		
Soil Amendment: Soluble Gypsum w/irrigation	8.75	79	0	95	0	174		
Soil Ammendments: Compost	0.00	0	0	80	0	80		
Growth Regulators	0.00	0	0	13	90	103		
Pickup Truck Use	3.33	45	19	0	0	64		
ATV Use	3.33	45	4	0	0	49		
PCA/Consultant Services	0.00	0	0	0	35	35		
<b>TOTAL CULTURAL COSTS</b>	<b>24.95</b>	<b>275</b>	<b>26</b>	<b>849</b>	<b>399</b>	<b>1,549</b>		
<b>Harvest:</b>								
Pick & Haul Fruit	0.00	0	0	0	755	755		
Pack & Assessment	0.00	0	0	0	2,090	2,090		
Assessments	0.00	0	0	21	0	21		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>2,845</b>	<b>2,866</b>		
Interest on operating capital @ 7.40% <sup>1</sup>						77		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>275</b>	<b>26</b>	<b>870</b>	<b>3,244</b>	<b>4,492</b>		
<b>CASH OVERHEAD:</b>								
Office Expense						110		
Liability Insurance						8		
Property Taxes						111		
Property Insurance						33		
Investment Repairs						85		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>351</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>4,842</b>		
<b>Non-cash Overhead</b>								
		Per producing Acre		Annual Cost	Capital Recovery			
Buildings 30'X60'		800		61		61		
Fuel Tanks 2-250g		58		4		4		
Shop Tools		215		22		22		
Land		6,000		385		385		
Gypsum Machine		482		116		116		
Establishment Costs		4,937		354		354		
Drip Irrigation		1,200		84		84		
Wind Machine (6)		1,695		148		148		
Equipment		422		57		57		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>15,809</b>		<b>1,231</b>		<b>1,231</b>		
<b>TOTAL COSTS/ACRE</b>						<b>6,074</b>		



Table 2.

U.C. COOPERATIVE EXTENSION  
 COSTS PER ACRE TO PRODUCE ORANGES  
 SAN JOAQUIN VALLEY - 1999

Operation	Operation Time (Hrs/A)	Cash and Labor			Custom/ Rent	Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost			
<b>Cultural:</b>							
Frost Protection	2.19	16	0	186	0	201	
Fertilize - Nitrogen	0.00	0	0	16	0	16	
Weed Control - Pre-emergent	0.50	6	1	54	0	61	
Pest Control - Worms & Urea	0.00	0	0	21	27	48	
Top Trees (1 In 5 Years)	0.00	0	0	0	8	8	
Hedge Trees (1 In 5 Years)	0.30	2	0	0	4	6	
Prune - Hand (1 In 5 Years)	0.00	0	0	0	56	56	
Shred Brush	0.00	0	0	0	15	15	
Irrigate	4.93	35	0	159	0	194	
Pest Control - Worms	0.00	0	0	9	27	36	
Weed Control - Spot Spray	0.50	13	1	4	0	18	
Pest Control - Thrips & Urea	0.00	0	0	45	27	72	
Apply Soil Amendments (1 in 3 Years)	0.00	0	0	73	0	73	
Pest Control - Thrips	0.00	0	0	28	27	55	
Pest Control - Scale	0.00	0	0	60	56	116	
Leaf Analysis	1.00	7	0	0	5	12	
Pest Control - Whitewash	0.00	0	0	18	28	46	
Apply Growth Regulators	0.00	0	0	52	114	166	
Pickup Truck Use	4.75	56	21	0	0	77	
ATV Use	4.75	56	5	0	0	61	
PCA/Consultant Services	0.00	0	0	0	21	21	
<b>TOTAL CULTURAL COSTS</b>	<b>18.92</b>	<b>191</b>	<b>28</b>	<b>724</b>	<b>415</b>	<b>1,357</b>	
<b>Harvest:</b>							
Pick & Haul Fruit	0.00	0	0	0	547	547	
Pack & Assessment	0.00	0	0	0	2,188	2,188	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>2,735</b>	<b>2,774</b>	
<b>Assessments:</b>							
State Marketing Order	0.00	0	0	11	0	11	
Central California Tristeza Eradication Agency	0.00	0	0	28	0	28	
<b>TOTAL ASSESSMENT COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>2,735</b>	<b>2,774</b>	
Interest on operating capital @ 9.69% <sup>1/</sup>						-126	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>191</b>	<b>28</b>	<b>762</b>	<b>3,150</b>	<b>4,005</b>	
<b>CASH OVERHEAD:</b>							
Office Expense						105	
Liability Insurance						6	
Property Taxes						118	
Property Insurance						84	
Investment Repairs						60	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>373</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>4,377</b>	
<b>NON-CASH OVERHEAD:</b>							
<b>Investment</b>		<b>Per producing Acre</b>		<b>-- Annual Cost -- Capital Recovery</b>			
Buildings		654		57		57	
Fuel Tanks & Pumps		230		22		22	
Shop Tools		215		23		23	
Land		6,000		444		444	
Pruning Equipment		23		3		3	
Frost Alarm		10		1		1	
Establishment Cost		5,255		421		421	
Drip Irrigation System		2,436		202		202	
Wind Machine (5)		1,865		177		177	
Equipment		292		42		42	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>16,980</b>		<b>1,393</b>		<b>1,393</b>	
<b>TOTAL COSTS/ACRE</b>						<b>5,770</b>	

<sup>1/</sup> Postharvest operation costs are discounted back to the time of the first harvest

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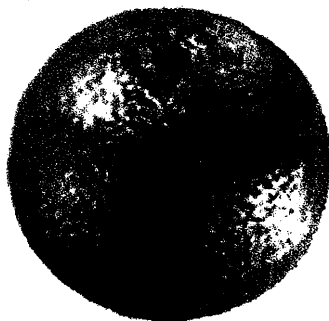
**UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION**

**2009**

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

**ORANGES**

Navels & Valencias



**SAN JOAQUIN VALLEY - South**  
Low Volume Irrigation

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**UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION**

**SAMPLE COSTS TO ESTABLISH an ORANGE ORCHARD  
and PRODUCE ORANGES  
San Joaquin Valley South - 2009**

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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) 752-1515 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 (triplanēd). 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.

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 \$129 per acre-foot or \$10.75 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%.

Table B. Water applied

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 (N) 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 orangeworm spray. Additional urea is also applied with the May katydid/thrips spray. Nitrogen fertilizer rates from orchard establishment

Table D. Applied N for Orange Orchards

Year	per tree	per acre	dripline		foliar
			Lbs. of N		
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	

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.

**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, 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*), and larvae of Lepidoptera species (orangeworms) such as citrus cutworm (*Xylomyges curialis*) and fruittree leafroller (*Archips argyrospilus*). See UC IPM website <http://ipm.ucdavis.edu/PMG/selectnewpest.citrus.html> for full orangeworm list. 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.

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.** 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 (N) 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 orangeworm 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 \$129 per acre-foot or \$10.75 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) and 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 (\$1.97 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](http://www.ipm.ucdavis.edu). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Growers with fruit destined for the export market, must use registered products that meet maximum residue limits (MRL) for that country.** Check the MRLs at [www.calcitrusquality.org](http://www.calcitrusquality.org).

*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.* Orangeworms (Lepidoptera) 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 orangeworm 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. 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 (Citrus Fix) 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 \$1.35 per carton and the packinghouse cost are \$4.85 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 past returns of \$10 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 \$0.07 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 \$9.20 per acre is charged in this study. The charges are paid in the property assessment bill, but are shown as a line item cost in this study

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

### **Labor, Equipment and Interest**

**Labor.** Labor rates of \$14.49 per hour for machine operators and \$11.04 for general labor includes payroll overhead of 38%. The basic hourly wages are \$10.50 for machine operators and \$8.00 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/fruit crops (code 0016), and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2009 (personal email from California Department of Insurance, March 2009, 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 red dye diesel and gasoline are \$3.70 (excludes excise tax) and \$3.56 per gallon, respectively. Fuel costs are derived from American Automobile Association (AAA) and Energy Information Administration 2008 July to December 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.

**Interest On Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 5.75% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge. The interest rate will vary depending upon various factors. The rate in this study is considered a typical lending rate by a farm lending agency as of January 2009.

**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 \$125 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, miscellaneous administrative charges, and complying with environmental regulations.

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

**Investment Repairs.** Annual maintenance is calculated as 2% of the purchase price, except 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 4.75% 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 2009.

**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 \$6,509 per acre or \$65,088 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 \$5,000 to \$12,000 per acre (Trends & Leases), depending on available water. Land with citrus orchards ranges from \$8,000 to \$15,000 per acre. Current real estate listings for bare land values range from \$5,500 to \$9,500. The land on which the orchard is planted in this study is valued at \$7,500 per acre.

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

**Tools.** This includes shop tools, hand tools, and miscellaneous field tools such as pruning tools. 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. COSTS PER ACRE TO ESTABLISH AN ORANGE ORCHARD**  
 SAN JOAQUIN VALLEY – SOUTH 2009

	Costs per Acre					
	YEAR:	1st	2nd	3rd	4th	5th
<b>PACKOUT YIELD (37.5 lb Cartons/Acre):</b>					28	213
<b>Planting Costs</b>						
Land Preparation: Remove Old Orchard (Dig, Stack, Chip)		350				
Land Preparation: Subsoil		390				
Land Preparation: Disc 2X		110				
Land Preparation: Level (Triplane)		175				
Trees @ 110 per acre (Replant 2% of trees in 2nd Year)		1,155	21			
Plant: Layout, Plant, Stake & Wrap Trees (includes wrap costs)		149	3			
<b>TOTAL PLANTING COSTS</b>		<b>2,329</b>	<b>24</b>			
<b>Cultural Costs:</b>						
Sucker (Yr 1-3) Prune (Yr 4+)		30	47	55	35	66
Irrigate		66	93	119	173	211
Frost Protection (Yr 1-3, water. Yr 4+, water & wind machines)		27	40	40	330	337
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)					61	73
Insect/Fertilizer: Orangeworms (Dipel) / Foliar (N, Mn, Zn)					48	54
Insect: Ants (Clinch)		4	4	4		
Weed: Pre-emergent – orchard floor (Karmex, Princep)			59	59	59	59
Weed: Spot Spray (Roundup) 3X		18	18	18	18	18
Weed: Disc 3X (Custom)		165				
Disease: Brown Rot (Lime, Kocide)				54	63	73
Soil Amendments: Soluble Gypsum						145
Pickup Truck Use		98	98	98	98	98
ATV Use		63	63	63	63	63
Leaf Analysis (1 sample/10 acres)					7	7
PCA/Consultant Services		35	35	35	35	35
<b>TOTAL CULTURAL COSTS</b>		<b>546</b>	<b>504</b>	<b>598</b>	<b>1,003</b>	<b>1,252</b>
<b>Harvesting Costs:</b>						
Pick and Haul					46	359
Pack					136	1,033
Assessments					11	22
<b>TOTAL HARVEST COSTS</b>					<b>193</b>	<b>1,414</b>
Interest on operating capital @ 5.75%		173	17	18	20	32
<b>TOTAL OPERATING COSTS PER ACRE</b>		<b>3,047</b>	<b>545</b>	<b>616</b>	<b>1,216</b>	<b>2,698</b>
<b>Cash Overhead Costs:</b>						
Office Expense		125	125	125	125	125
Liability Insurance		10	10	10	10	10
Property Taxes		99	98	111	111	114
Property Insurance		14	14	25	25	27
Investment Repairs		58	58	105	105	117
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>307</b>	<b>306</b>	<b>376</b>	<b>376</b>	<b>394</b>
<b>TOTAL CASH COSTS</b>		<b>3,354</b>	<b>851</b>	<b>992</b>	<b>1,592</b>	<b>3,092</b>
<b>INCOME FROM PRODUCTION</b>					<b>280</b>	<b>2,130</b>
<b>NET CASH COSTS FOR THE YEAR</b>		<b>3,354</b>	<b>851</b>	<b>992</b>	<b>1,312</b>	<b>962</b>
<b>PROFIT ABOVE CASH COSTS</b>						
<b>TOTAL ACCUMULATED NET CASH COSTS</b>		<b>3,354</b>	<b>4,204</b>	<b>5,197</b>	<b>6,509</b>	<b>7,470</b>

UC COOPERATIVE EXTENSION  
**Table 1. continued**  
 SAN JOAQUIN VALLEY – SOUTH 2009

	Costs per Acre					
	YEAR:	1st	2nd	3rd	4th	5th
<b>Non-Cash Overhead Costs:</b>						
Buildings		66	66	66	66	66
Drip Irrigation System		87	87	87	87	87
Shop Tools		24	24	24	24	24
Land		386	386	386	386	386
Fuel Tanks & Pumps		3	3	3	3	3
Gypsum Machine						138
Wind Machine				177	177	177
Equipment		45	42	42	42	42
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>612</b>	<b>608</b>	<b>785</b>	<b>785</b>	<b>922</b>
<b>TOTAL COST FOR THE YEAR</b>		<b>3,966</b>	<b>1,459</b>	<b>1,778</b>	<b>2,377</b>	<b>4,014</b>
<b>INCOME FROM PRODUCTION</b>					<b>280</b>	<b>2,130</b>
<b>NET TOTAL COST FOR THE YEAR</b>		<b>3,966</b>	<b>1,459</b>	<b>1,778</b>	<b>2,097</b>	<b>1,884</b>
<b>NET PROFIT FOR THE YEAR</b>						
<b>ACCUMULATED NET TOTAL COST</b>		<b>3,966</b>	<b>5,424</b>	<b>7,202</b>	<b>9,298</b>	<b>11,182</b>



UC COOPERATIVE EXTENSION  
**Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS**  
 SAN JOAQUIN VALLEY – SOUTH 2009

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre									
			units	\$	units	\$	units	\$	units	\$	units	\$
<b>OPERATING COSTS</b>												
<b>Custom:</b>												
Orchard Removal & Chip	acre	350.00	1.00	350								
Slip Plow	acre	390.00	1.00	390								
Disc	acre	55.00	5.00	275								
Level - Triplane	acre	175.00	1.00	175								
Layout, Plant, Wrap	tree	0.77	110.00	85	2.00	2						
Ground Spray – Copper / Fertilizer	acre	35.00	1.00	35	1.00	35	2.00	70	1.00	35	1.00	35
Ground Spray – Orangeworm	acre	35.00							1.00	35	1.00	35
Ground Spray – Thrips	acre	35.00							1.00	35	1.00	35
Harvest: Pick & Haul	crtm	1.35							34.00	46	266.00	359
Harvest: Pack	crtm	4.85							28.00	136	213.00	1033
Leaf Analysis (Nutrients)	each	68.00							0.10	7	0.10	7
PCA	acre	35.00	1.00	35	1.00	35	1.00	35	1.00	35	1.00	35
<b>Assessments:</b>												
Citrus Research (55 lb lug)	lug	0.07							23.00	2	182.00	13
Tristeza Eradication	acre	9.20							1.00	9	1.00	9
<b>Tree/Tree Aids:</b>												
Orange Tree	tree	10.50	110.00	1,155	2.00	21						
Tree Wraps (foam type)	each	0.58	110.00	64	2.00	1						
<b>Irrigation/Frost Protection:</b>												
Wind Machine Operation	hr/ac	3.00							100.00	300	100.00	300
Water Frost Protection	acin	10.75	1.46	16	2.20	24	2.20	24	2.20	24	2.20	24
Water (growing season)	acin	10.75	2.00	22	4.50	48	7.00	75	10.50	113	14.00	151

UC COOPERATIVE EXTENSION  
**Table 2. continued**  
 SAN JOAQUIN VALLEY – SOUTH 2009

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Total Per Acre						units	\$	units	\$
			units	\$	units	\$	units	\$				
<b>Fertilizer:</b>												
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	0.91	1.15	1	2.30	2	3.45	3	15.00	14	22.50	20
Zinc Sulfate 36%	lb	0.64	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Tecmangam (31% Mn)	lb	0.74	0.50	0	0.50	0	0.50	0	0.50	0	0.50	0
Soluble Gypsum (Soil Amendment)	ton	133.00									1.00	133
<b>Herbicide:</b>												
Roundup Original Max	pint	5.15	0.60	3	0.60	3	0.60	3	0.60	3	0.60	3
Princep 90S	lb	6.07			4.00	24	4.00	24	4.00	24	4.00	24
Karmex DF	lb	6.17			4.00	25	4.00	25	4.00	25	4.00	25
<b>Insecticide:</b>												
Clinch Ant Bait	lb	12.15	0.33	4	0.33	4	0.33	4				
Dipel ES	pint	5.10							1.00	5	1.50	8
Success	oz	5.66							3.00	17	4.50	25
Spray Oil 415	gal	4.43							0.50	2	0.50	2
<b>Fungicide:</b>												
Hydrated Lime	lb	0.25					5.00	1	7.50	2	10.00	3
Kocide 20/20	lb	3.53					5.00	18	7.50	26	10.00	35
Labor (machine)	hrs	14.49	8.93	129	9.53	138	9.53	138	9.50	138	9.50	138
Labor (non-machine)	hrs	11.04	7.71	85	9.80	108	10.50	116	9.26	102	13.77	152
Fuel - Gas	gal	3.36	9.17	31	9.26	31	9.26	31	9.25	31	9.25	31
Lube				5		5		5		5		5
Machinery repair				11		12		12		12		12
Operating Interest @ 5.75%				173		17		18		20		32
<b>Total Operating Costs/Acre</b>			3,048		545		616		1,216		2,698	

UC COOPERATIVE EXTENSION  
**Table 3. COSTS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY - SOUTH 2009

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
<b>Cultural:</b>								
Frost Protection (water & wind machine)	2.19	24	0	324	0	348		
Fertilize: N (UN32 through drip line)	0.30	3	0	37	0	40		
Weed: Pre-emergent (Princep, Karmex) 2X	0.50	9	1	49	0	59		
Insect/Fertilizer: Orangeworm (Dipel)/N Mn Zn	0.00	0	0	27	35	62		
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr	0.00	0	0	0	25	25		
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr	0.00	0	0	0	24	24		
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr	0.00	0	0	0	75	75		
Irrigate: (water & labor)	5.55	61	0	323	0	384		
Soil Amendment: (Soluble Gypsum) w/irrigation	8.75	97	0	133	0	230		
Weed: Spot Spray (Roundup) 3X	0.75	13	2	3	0	18		
Insect/Fertilizer: Thrips, Katydid (Success, Oil) /N	0.00	0	0	50	35	85		
Insect: Thrips (Success, Oil)	0.00	0	0	36	35	71		
Insect: Scale (Esteem)	0.00	0	0	145	85	230		
Leaf Analysis (1 sample/10 acres)	0.05	1	0	0	7	7		
Disease: Brown Rot (Lime, Kocide)	0.00	0	0	38	35	73		
Growth Regulator: (Fruit Fix) [Navel Only]	0.00	0	0	11	53	64		
Growth Regulator: (GibGro or GA) [Navel Only]	0.00	0	0	24	53	77		
Pickup Truck Use	3.33	58	40	0	0	98		
ATV Use	3.33	58	5	0	0	63		
PCA/Consultant Services	0.00	0	0	0	35	35		
<b>TOTAL CULTURAL COSTS</b>	<b>24.75</b>	<b>324</b>	<b>47</b>	<b>1,199</b>	<b>496</b>	<b>2,065</b>		
<b>Harvest:</b>								
Pick & Haul Fruit	0.00	0	0	0	926	926		
Pack Fruit	0.00	0	0	0	2,668	2,668		
Assessments	0.00	0	0	42	0	42		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>3,594</b>	<b>3,635</b>		
Interest on operating capital @ 5.75%						160		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>324</b>	<b>47</b>	<b>1,240</b>	<b>4,089</b>	<b>5,860</b>		
<b>Cash Overhead:</b>								
Office Expense						125		
Liability Insurance						10		
Property Taxes						147		
Property Insurance						54		
Investment Repairs						149		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>485</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>6,346</b>		
<b>Non-Cash Overhead:</b>								
		Per producing Acre		Annual Cost Capital Recovery				
Buildings 1800 sqft		1,050		66		66		
Fuel Tanks 2-250g		58		3		3		
Shop Tools		250		24		24		
Land		8,125		386		386		
Gypsum Machine (1)		600		138		138		
Orchard Establishment		6,509		381		381		
Drip Irrigation		1,550		87		87		
Wind Machine (6)		2,340		177		177		
Equipment		405		44		44		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>20,887</b>		<b>1,305</b>		<b>1,305</b>		
<b>TOTAL COSTS/ACRE</b>						<b>7,651</b>		

UC COOPERATIVE EXTENSION  
**Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY - SOUTH 2009

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Oranges	550.00	*crtn	10.00	5,500	
<b>OPERATING COSTS</b>					
<b>Frost Protection:</b>					
Water	2.20	acin	10.75	24	
Wind Machine Operation (propane @ \$1.97/gal)	100.00	hr/ac	3.00	300	
<b>Fertilizer:</b>					
UN 32 (32-0-0)	80.00	lb N	0.46	37	
Urea Low Biuret (46-0-0)	30.00	lb N	0.91	27	
Zinc Sulfate 36%	2.00	lb	0.64	1	
Tecmangam (31% Mn)	2.00	lb	0.74	1	
<b>Soil Amendment:</b>					
Gypsum Soluble	1.00	ton	133.00	133	
<b>Herbicide:</b>					
Princep 90S	4.00	lb	6.07	24	
Karmex	4.00	lb	6.17	25	
Roundup Original Max	0.60	pint	5.15	3	
<b>Insecticide:</b>					
Dipel ES	2.00	pint	5.10	10	
Success	12.00	oz	5.66	68	
Spray Oil 415	1.00	gal	4.43	4	
Esteem	17.00	froz	8.52	145	
<b>Contract/Custom:</b>					
Harvest - Pick & Haul	686.00	crtn	1.35	926	
Harvest - Pack	550.00	crtn	4.85	2,668	
Prune - by Hand & Stack (1X/4 Yr)	0.25	acre	270.00	68	
PCA Fees	1.00	acre	35.00	35	
Prune-Top (1X/4 Yr)	0.25	acre	35.00	35	
Prune-Hedge (2X/4 Yr, Alt. Rows = 1/2 field each time)	0.25	acre	35.00	9	
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	35.00	70	
Spray Ground - Scale	1.00	acre	85.00	85	
Spray Ground - Orangeworm	1.00	acre	35.00	35	
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	68.00	7	
<b>Irrigation:</b>					
Water	30.00	acin	10.75	323	
<b>Fungicide:</b>					
Hydrated Lime	10.00	lb	0.25	3	
Kocide 20/20	10.00	lb	3.53	35	
<b>Growth Regulator:</b>					
Fruit Fix (2, 4-D) [Navel Only]	2.50	froz	4.56	11	
Gib Gro 4LS (gibberalic acid) [Navel Only]	40.00	gram	0.60	24	
<b>Assessment:</b>					
Citrus Research/55lb box	464.00	box	0.07	32	
Tristeza Eradication	1.00	acre	9.20	9	

UC COOPERATIVE EXTENSION  
**Table 4. continued**  
 SAN JOAQUIN VALLEY - SOUTH 2009

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>Labor (machine)</b>	9.50	hrs	14.49	138	
<b>Labor (non-machine)</b>	16.84	hrs	11.04	186	
<b>Fuel - Gas</b>	9.26	gal	3.36	31	
Lube				5	
Machinery repair				12	
Interest on operating capital @ 5.75%				160	
<b>TOTAL OPERATING COSTS/ACRE</b>				5,860	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				-360	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				125	
Liability Insurance				10	
Property Taxes				147	
Property Insurance				54	
Investment Repairs				149	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				485	
<b>TOTAL CASH COSTS/ACRE</b>				6,346	
<b>NON-CASH OVERHEAD COSTS</b>					
Buildings 1800 sqft				66	
Fuel Tanks 2-250g				3	
Shop Tools				24	
Land				386	
Gypsum Machine				138	
Orchard Establishment				381	
Drip Irrigation				87	
Wind Machine (6)				177	
Equipment				44	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				1,305	
<b>TOTAL COSTS/ACRE</b>				7,651	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				-2,151	

\*carton = 37.5 lbs

UC COOPERATIVE EXTENSION  
**Table 5. MONTHLY PER ACRE CASH COSTS - ORANGES**  
 SAN JOAQUIN VALLEY - SOUTH 2009

Beginning JAN 09	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 09	09	09	09	09	09	09	09	09	09	09	09	09	
<b>Cultural:</b>													
Frost Protection (water & wind machine)	115										118	115	348
Fertilize: N (through drip line)		13	13	13									40
Weed: Pre-emergent Orchard Floor (Princep, Karmex) 2X				29						29			59
Insect/Fertilizer: Orangeworm (Dipel)/N Mn Zn			62										62
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr				25									25
Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr				24									24
Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr				75									75
Irrigate: (water & labor)				43	52	65	82	65	52	25			384
Soil Amendment: (Soluble Gypsum) w/irrigation				28	32	36	42	36	32	22			230
Weed: Spot Spray (Roundup) 3X				6		6		6					18
Insect/Fertilizer: Thrips Katydid (Success, Oil) /N					85								85
Insect: Thrips (Success, Oil)						71							71
Insect: Scale (Esteem)							230						230
Leaf Analysis (1 sample/10 acres)									7				7
Disease: Brown Rot (Lime, Kocide)										73			73
Growth Regulator: (Fruit Fix) [Navel Only]										64			64
Growth Regulators (GibGro or GA) [Navel Only]											77		77
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	8	98
ATV Use	5	5	5	5	5	5	5	5	5	5	5	5	63
PCA/Consultant Services	3	3	3	3	3	3	3	3	3	3	3	3	35
<b>TOTAL CULTURAL COSTS</b>	<b>131</b>	<b>30</b>	<b>121</b>	<b>231</b>	<b>185</b>	<b>195</b>	<b>370</b>	<b>123</b>	<b>108</b>	<b>229</b>	<b>211</b>	<b>131</b>	<b>2,065</b>
<b>Harvest:</b>													
Pick & Haul Fruit		309		308							309		926
Pack Fruit		888		888							892		2,668
Assessments		14		14							14		42
<b>TOTAL HARVEST COSTS</b>		<b>1,210</b>		<b>1,209</b>							<b>1,216</b>		<b>3,635</b>
Interest on operating capital @ 5.75%	1	7	7	14	15	16	18	18	19	20	27	-1	160
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>132</b>	<b>1,247</b>	<b>128</b>	<b>1,454</b>	<b>200</b>	<b>210</b>	<b>388</b>	<b>142</b>	<b>127</b>	<b>249</b>	<b>1,453</b>	<b>131</b>	<b>5,860</b>
<b>OVERHEAD:</b>													
Office Expense	10	10	10	10	10	10	10	10	10	10	10	10	125
Liability Insurance	10												10
Property Taxes	73						73						147
Property Insurance	27						27						54
Investment Repairs	12	12	12	12	12	12	12	12	12	12	12	12	150
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>134</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>123</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>486</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>265</b>	<b>1,269</b>	<b>151</b>	<b>1,477</b>	<b>223</b>	<b>233</b>	<b>511</b>	<b>165</b>	<b>150</b>	<b>272</b>	<b>1,476</b>	<b>154</b>	<b>6,346</b>

UC COOPERATIVE EXTENSION  
**Table 6. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY - SOUTH 2009

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ORANGES

	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	2,065	2,065	2,065	2,065	2,065	2,065	2,065
Harvest Cost	2,646	2,976	3,306	3,635	3,965	4,295	4,624
Interest on operating capital	130	140	150	160	170	180	190
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>4,841</b>	<b>5,181</b>	<b>5,521</b>	<b>5,860</b>	<b>6,200</b>	<b>6,540</b>	<b>6,879</b>
<b>TOTAL OPERATING COSTS/CRTN</b>	<b>12.10</b>	<b>11.51</b>	<b>11.04</b>	<b>10.65</b>	<b>10.33</b>	<b>10.06</b>	<b>9.83</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>485</b>	<b>485</b>	<b>485</b>	<b>485</b>	<b>485</b>	<b>485</b>	<b>485</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>5,326</b>	<b>5,666</b>	<b>6,006</b>	<b>6,345</b>	<b>6,685</b>	<b>7,025</b>	<b>7,364</b>
<b>TOTAL CASH COSTS/CRTN</b>	<b>13.32</b>	<b>12.59</b>	<b>12.01</b>	<b>11.54</b>	<b>11.14</b>	<b>10.81</b>	<b>10.52</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,305</b>	<b>1,305</b>	<b>1,305</b>	<b>1,305</b>	<b>1,305</b>	<b>1,305</b>	<b>1,305</b>
<b>TOTAL COSTS/ACRE</b>	<b>6,631</b>	<b>6,971</b>	<b>7,311</b>	<b>7,650</b>	<b>7,990</b>	<b>8,330</b>	<b>8,669</b>
<b>TOTAL COSTS/CRTN</b>	<b>16.58</b>	<b>15.49</b>	<b>14.62</b>	<b>13.91</b>	<b>13.32</b>	<b>12.82</b>	<b>12.38</b>

\*cartons = 37.5 pounds

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
7.00	-2,041	-2,031	-2,021	-2,010	-2,000	-1,990	-1,979
8.00	-1,641	-1,581	-1,521	-1,460	-1,400	-1,340	-1,279
9.00	-1,241	-1,131	-1,021	-910	-800	-690	-579
10.00	-841	-681	-521	-360	-200	-40	121
11.00	-441	-231	-21	190	400	610	821
12.00	-41	219	479	740	1,000	1,260	1,521
13.00	359	669	979	1,290	1,600	1,910	2,221

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
7.00	-2,526	-2,516	-2,506	-2,495	-2,485	-2,475	-2,464
8.00	-2,126	-2,066	-2,006	-1,945	-1,885	-1,825	-1,764
9.00	-1,726	-1,616	-1,506	-1,395	-1,285	-1,175	-1,064
10.00	-1,326	-1,166	-1,006	-845	-685	-525	-364
11.00	-926	-716	-506	-295	-85	125	336
12.00	-526	-266	-6	255	515	775	1,036
13.00	-126	184	494	805	1,115	1,425	1,736

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/carton	*YIELD (cartons/acre)						
	400	450	500	550	600	650	700
7.00	-3,831	-3,821	-3,811	-3,800	-3,790	-3,780	-3,769
8.00	-3,431	-3,371	-3,311	-3,250	-3,190	-3,130	-3,069
9.00	-3,031	-2,921	-2,811	-2,700	-2,590	-2,480	-2,369
10.00	-2,631	-2,471	-2,311	-2,150	-1,990	-1,830	-1,669
11.00	-2,231	-2,021	-1,811	-1,600	-1,390	-1,180	-969
12.00	-1,831	-1,571	-1,311	-1,050	-790	-530	-269
13.00	-637	-1,121	-811	-500	-190	120	431

UC COOPERATIVE EXTENSION  
**Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS**  
 SAN JOAQUIN VALLEY - SOUTH 2009

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
09	ATV 4WD	6,700	15	1,304	573	33	40	646
09	Pickup Truck 1/2 Ton	32,000	7	12,139	3,978	181	221	4,380
09	Weed Sprayer-Pull, ATV 55 gal	2,500	20	130	192	11	13	216
<b>TOTAL</b>		<b>41,200</b>		<b>13,573</b>	<b>4,743</b>	<b>225</b>	<b>274</b>	<b>5,242</b>
*60% of new cost		24,720		8,144	2,846	135	164	3,145

\*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	63,000	30		3,982	258	315	1,260	5,816
Drip Irrigation (10 acres)	15,500	40		873	64	78	310	1,324
Orchard Establishment (10 acres)	65,088	36		3,808	267	325	325	4,725
Fuel Tanks 2-250g	3,500	40	350	194	16	19	70	299
Gypsum Machine (1)	6,000	5		1,376	25	30	120	1,551
Land (65 acres)	487,500	40	487,500	23,156	0	4,875	0	28,031
Shop Tools	15,000	15		1,421	62	75	300	1,857
Wind Machine (6)	140,400	20	14,040	10,593	633	772	2,808	14,806
<b>TOTAL INVESTMENT</b>	<b>795,988</b>		<b>501,890</b>	<b>45,403</b>	<b>1,324</b>	<b>6,489</b>	<b>5,193</b>	<b>58,409</b>

ANNUAL BUSINESS OVERHEAD COSTS

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

UC COOPERATIVE EXTENSION  
**Table 8. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - SOUTH 2009

Yr	Description	COSTS PER HOUR							Total Costs/Hr.
		Actual Hours Used	Cash Overhead			Operating			
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
09	ATV 4WD	133	2.59	0.15	0.18	0.64	0.77	1.41	4.33
09	Pickup Truck 1/2 Ton	265	9.00	0.41	0.50	2.36	9.66	12.02	21.93
09	Weed Sprayer-Pull, ATV 55 gal	75	1.55	0.09	0.11	0.65	0.00	0.65	2.40



UC COOPERATIVE EXTENSION  
**Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS**  
 SAN JOAQUIN VALLEY - South 2009

Operation	Operation		Implement	Field Labor		Material Broadcast	
	Month	Tractor		Hr/Acre	Rate/Acre	Unit	
Frost Protection (water & wind machine)	Jan			0.70	Water	0.73	acin
	Nov			0.70	Wind Machine	33.00	hr
	Dec				Water	0.73	acin
Fertilize: N (through drip line)	Feb			0.10	Wind Machine	33.00	hr
	Mar			0.10	Water	0.74	acin
	Apr			0.10	Wind Machine	33.00	hr
Weed: Pre-emergent (Princep, Karmex) 2X	Mar	ATV	Weed Sprayer		Wind Machine	26.60	lb N
	Oct	ATV	Weed Sprayer		UN32	26.70	lb N
	Mar	ATV	Weed Sprayer		UN32	26.70	lb N
Insect/Fertilizer: Orangeworm (Dipel)/ Foliar (N, Mn, Zn)	Mar	Custom			Princep	2.00	lb
					Karmex	2.00	lb
					Princep	2.00	lb
Irrigate	Apr			0.50	Karmex	2.00	lb
	May			0.80	Princep	2.00	lb
	June			1.00	Karmex	2.00	lb
	July			1.10	Princep	2.00	lb
	Aug			1.00	Karmex	2.00	lb
	Sept			0.80	Dipel	2.00	pt
	Oct			0.30	Urea LB	15.00	lb N
	Apr	Custom			Zinc Sulfate	2.00	lb
	Apr	Custom			Tecmangam (Mn)	2.00	lb
	Apr	Custom			Water	3.50	acin
Prune: Top Trees, Stack & Shred Prunings 1X/4 Yr Prune: Hedge Alt. Rows, Shred Prunings 2X/4Yr Prune: Hand Prune & Stack, Shred Prunings 1X/4 Yr Soil Amendment:(Soluble Gypsum) w/irrigation	Apr			0.50	Water	4.00	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
	Apr	Custom			Gypsum	0.11	ton
	Apr	Custom			Gypsum	0.14	ton
	Apr	Custom			Gypsum	0.17	ton
Weed: Spot Spray (Roundup) 3X	May			1.30	Gypsum	0.21	ton
	June			1.30	Gypsum	0.17	ton
	July			1.30	Gypsum	0.17	ton
	Aug			1.30	Gypsum	0.14	ton
	Sept			1.30	Gypsum	0.06	ton
	Oct			1.30	Roundup	0.20	pt
	Apr	ATV	Weed Sprayer		Roundup	0.20	pt
	June	ATV	Weed Sprayer		Roundup	0.20	pt
	Aug	ATV	Weed Sprayer		Roundup	0.20	pt
	Aug	ATV	Weed Sprayer		Roundup	0.20	pt

UC COOPERATIVE EXTENSION  
**Table 9. continued**  
 SAN JOAQUIN VALLEY - South 2009

Operation	Operation		Field Labor Hr/Acre	Material	Broadcast Rate/acre	Unit
	Month	Tractor Implement				
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: (Fruit Fix) [Navel Only]	Oct	Custom		Fruit Fix	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

# Nut Crops

## Impact of Almond Chips/Shreddings in the Orchard to an Almond Huller

In discussions with almond hullers, the impact of almond prunings or chips has been problematic. These chips are picked up with the almonds during the harvest process. These chips pass by the “detwiggers” which remove the larger sticks and branches that may get knocked down during the typical harvest process (shaking, sweeping and pick-up). Almond hullers/shellers separate the hull and shell from the almonds. The hull has significant feed value to dairies, and hulls with 15% fiber content or less are considered “prime hull” and receive the highest value. The next product is “hull and shell” which is limited to a fiber content of between 15% and 29%. And lastly, the shell or any product that has > 29% fiber content has little value and hardly any market. The almond hullers we spoke with estimate a 5% to 11% loss in prime hull revenue due to the presence of chips. Obviously, prices vary from year to year, but prime hull sells for significantly more than hull and shell.

For example, when we conducted the survey last year for the purposes of developing comments for this rule, prime hull was selling for \$75 per ton, while hull and shell was selling for \$45 to \$50 per ton. Chips are high fiber content and when picked up with the hulls during the hulling process, they can significantly shift the fiber content. One huller estimated that he 4,000 tons out of 35,000 expected tons were shifted from “prime hull” to “hull and shell” due to the existence of chips. This was an 11.4% loss amounting to \$120,000 in lost revenue. Another huller lost an estimated 5% of their “prime hull sales” due to the existence of the chips.

## Impact of Walnut Prunings Being Shredded or Chipped in the Orchard

In discussions with walnut growers and walnut processors, the primary issue is plugging of the chips in the lines at the processor, especially under wet conditions. Walnuts are typically harvested from mid September through mid November. About half of the time, fall rains begin before the harvest can be completed. Since the prunings occur in the winter, it is impossible to get a chipper into the orchard until after the rains subside. The chips do not decompose in the 6 to 7 months between the pruning and the beginning of harvest. This is where the plugging occurs. The wet chips impede the ability to move the walnuts through the ductwork at a huller/dehydrator and processor, as the chips are picked up with the walnuts.

Walnut processors have also expressed concern with the chips being left in the orchard due to concerns over food safety. Since the chips are an organic material, they are subject to mold growth. If this mold is picked up during harvest, it can create a significant food safety issue in terms of the potential for aflatoxin. Food safety has become the number one issue of concern for the tree nut industry, and any issue that would confound food safety would be problematic.

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# Diseased Crops



## County of Fresno

DEPARTMENT OF AGRICULTURE  
CAROL N. HAFNER  
AGRICULTURAL COMMISSIONER/  
SEALER OF WEIGHTS & MEASURES

Date: January 27, 2010  
To: Manuel Cunha, Nisei Farmers League  
From: Carol Hafner, Agricultural Commissioner/Sealer *Carol Hafner*  
Subject: Control Measures for Fireblight, *Erwinia amylovora*

Fireblight, *Erwinia amylovora*, is a bacterial disease that infects apples, pears, quince, raspberries and other plants in the Rosaceae family. This disease can destroy an entire orchard in a single season if left uncontrolled. The bacterium can be easily transmitted to susceptible tissue by contact. The unrestricted movement of infected tissue will cause the disease to spread rapidly and under certain environmental conditions (hot and wet). Containment of the infected tissue is an essential element for control. Options for controlling this disease that is becoming resistant to chemical means of control with Streptomycin are burning on site or disposal by placing infected plant material in double plastic bags for burial.



# Raisin Trays

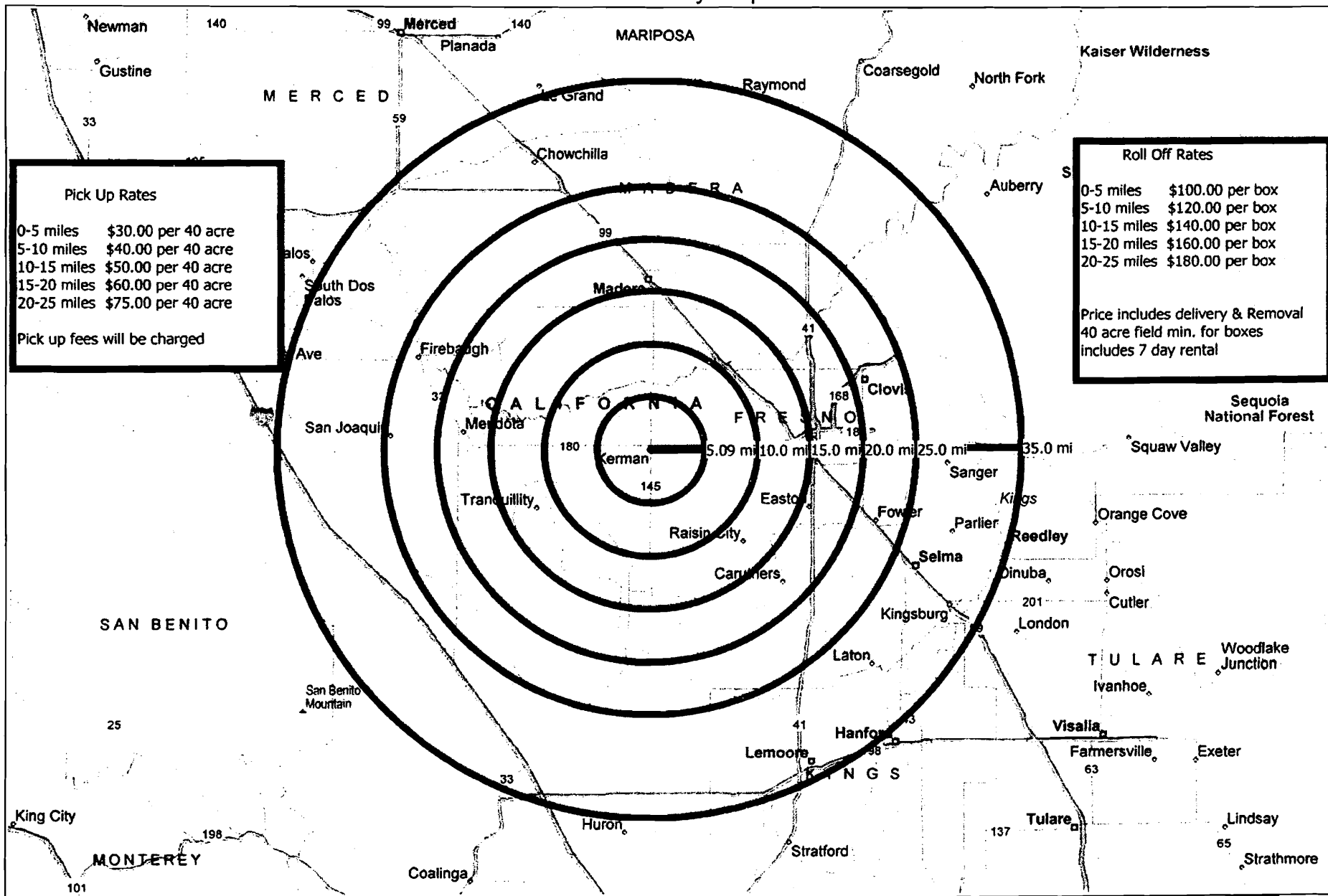
## Raisin Tray Paper Volume History

### Year

- 1990 – Raisin production 395,000 tons minus 5% mechanized (DOV)  
375,000 tons produced on trays @ 4# tray =  
188,000,000 million trays
- 2000 – Raisin production 432,000 tons minus 10% mechanized  
(DOV and continuous)  
389,000 tons produced on trays @ 4#=  
195,000,000 million trays
- 2009 – Raisin production 300,000 tons minus 40% mechanized  
(DOV and continuous)  
180,000 tons produced on trays @ 4#=  
90,000,000 million trays
- 2010 – Recommended practices for burning of raisin trays:
- **All burning locations must be attended at all times** when the paper raisin trays are burning, by able bodied adults with adequate tools or equipment to control a fire from escaping.
  - **All burn locations must have adequate clearance to avoid escape.** The burn area should be a "fire safety zone" away from dry fields, homes, shops, garages, utility poles or utility supply lines, and other buildings or equipment. A rule to remember is to remove all combustible materials from 30 or more feet around the burn area.

- **Paper raisin trays must be burned in a container** to avoid escape of burning embers or ash, such as a wire cage. A wire cage may be constructed out of hardware cloth or chicken wire provided that the mesh is no larger than a ½ inch opening. The cage should never be filled beyond half and should be placed in a “fire safe zone”. Using a burn barrel for burning anything is illegal.
- **Don't burn on windy days.**
- **Avoid burning near a highway or roadway.** Ashes or heavy smoke can create a very dangerous situation for drivers and winds caused by vehicles could cause the fire to escape from the fire safety zone.
- **Don't cause a smoke nuisance to your neighbors.**
- **Additional measures for further discussion**

# Raisin Tray Map



Pick Up Rates	
0-5 miles	\$30.00 per 40 acre
5-10 miles	\$40.00 per 40 acre
10-15 miles	\$50.00 per 40 acre
15-20 miles	\$60.00 per 40 acre
20-25 miles	\$75.00 per 40 acre
Pick up fees will be charged	

Roll Off Rates	
0-5 miles	\$100.00 per box
5-10 miles	\$120.00 per box
10-15 miles	\$140.00 per box
15-20 miles	\$160.00 per box
20-25 miles	\$180.00 per box
Price includes delivery & Removal 40 acre field min. for boxes includes 7 day rental	

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STATE WATER RESOURCES CONTROL BOARD

# PORTER-COLOGNE WATER QUALITY CONTROL ACT

WITH ADDITIONS AND AMENDMENTS EFFECTIVE JANUARY 1, 2010

Compiled by the Office of Chief Counsel  
State Water Resources Control Board  
Additions and amendments from the 2009 legislative session are underlined  
deletions are in strikeout

An official copy of the current Water Code is available at  
<http://leginfo.ca.gov/calaw.html>

Every effort has been made to ensure the accuracy of this document.

Please report errors to: Philip G. Wyels, Assistant Chief Counsel  
[pwuels@waterboards.ca.gov](mailto:pwuels@waterboards.ca.gov)  
(916) 341-5178

For an electronic copy of the State Water Resources Control Board Porter – Cologne  
Water Quality Control Act please refer to the SWRCB website at:

[http://www.swrcb.ca.gov/laws\\_regulations/docs/portercologne.pdf](http://www.swrcb.ca.gov/laws_regulations/docs/portercologne.pdf)