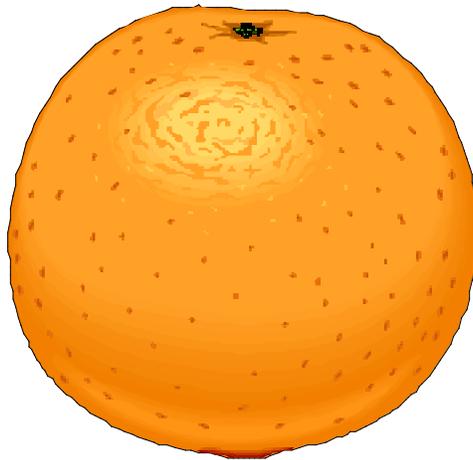


# Establishment and Production Costs

## Valencia Oranges

### Coachella Valley Riverside County, 1998



**Etaferahu Takele**

Area Farm Advisor, Agricultural Economics/Farm Management  
University of California Cooperative Extension, Southern Region

And

**Peggy Mauk**

Farm Advisor, Subtropical Horticulture  
University of California Cooperative Extension, Riverside County

# **Establishment and Production Costs for Valencia Oranges Coachella Valley, Riverside County, 1998**

## **INTRODUCTION**

Detailed costs for Valencia orange grove establishment and production in Riverside County are presented in this study. The hypothetical grove used in this report consists of a total of 50 acres, 48 of which are being either newly established, or replanted, and the remaining two acres are in buildings and roads.

We base this study on assumptions of production practices and costs that are considered typical for Valencia orange grove establishment and production in Riverside County. These production practices and costs are an amalgamation of costs and practices obtained from survey of growers and other agricultural institutions in the region. Sample costs given for labor, materials, equipment and contract services are based on 1998 prices. This study is intended as a guide. It can be used in making production decisions, determining potential returns, preparing budgets and evaluating production loans.

Costs are presented in seven tables. All costs are presented on a per acre basis.

Table 1. Establishment Costs

Table 2. Production Costs

Table 3. Production Costs and Returns

Table 4. Monthly Cash Costs of Production

Table 5. Farm Equipment Prices and Investment Costs

Table 6. Hourly Equipment Costs

Table 7. Range Analysis

A blank *Your Cost* column is provided to enter your actual costs in Tables 2 and 3.

For questions, call the Southern Region Agricultural Economics/Farm Management Advisor, Etaferahu Takele, University of California Cooperative Extension, at (909) 683-6491 ext. 243 or call the Riverside County Subtropical Horticulture Farm Advisor, Peggy Mauk, (909) 683-6491 ext. 224.

## ASSUMPTIONS

The following is a description of the assumptions used in the preparation of this cost study.

### 1. LAND

The grove is established on ground that is currently open land. The land is assumed to have sandy to sandy loam soils that are adequately drained and moderately fertile.

Value of land in southern California varies by region. In this study, we assumed a value of \$5,500 per acre for open land. Value is for land that has already been tilled for drainage. Because only 48 of the 50 acres are planted to Valencia oranges, land is valued at \$5,730 per planted acre.

### 2. CULTURAL PRACTICES

The practices described below represent only the hypothetical grove in this study, which is based on typical practices for many groves in Riverside County. However, it may not apply to every situation.

Also, pesticides, rates, and cultural practices mentioned in this cost study are listed in the *University of California Integrated Pest Management Guideline for Citrus*. Written recommendations by licensed pest control advisors (PCA) are required for many pesticides. Information for pesticide regulation and pesticide use permits can be obtained from the local county Agricultural Commissioner's office in Riverside. For additional production information contact the Riverside County citrus farm advisor.

**Land Preparation:** The land is ripped twice with a three-foot ripper, leveled with a land scraper and slip plow followed by marking and layout. The approximate per acre custom cost of the operations include \$300 for ripping and leveling and \$100 for marking and layout. All ground preparations are done in the year prior to planting, but costs are shown in the first year of establishment.

Fumigation with Methyl Bromide or Vapam has beneficial effects for controlling nematodes, diseases and weeds, especially in groves that are planted back to citrus. However, in this study, the cost of grove fumigation is not included.

**Planting:** In this study we assumed a planting space of 12 x 24 foot with 152 trees per acre. In the second year of establishment, we assumed that 2% of the original stand or 3 trees per acre would need replacement. Planting is done using contract labor.

**Irrigation:** The amount and cost of water to irrigate crops in Riverside County vary greatly from region to region within the county. Also, costs vary depending on if well or district water is used.

Valencia orange production in Riverside County is mainly in the Coachella Valley and the western region of the county. The amount of water to irrigate the Valencia orange crop varies greatly within these regions. Estimates of water application for these regions is shown in **Table A**. Actual irrigation amounts will vary greatly depending on the amount of rainfall and region. We made no assumptions about effective rainfall. Also we did not include irrigation that may be used for several days for frost protection.

The charge of district water also varies within the county. In this study, costs and cultural practices reflect production in the Coachella valley. We calculated the costs of establishment and production using an estimated water cost of \$25 per acre-foot for Coachella Valley. Growers in other areas need to recalculate their costs based on their specific situation.

In addition, labor cost is included for turning the system on, monitoring and maintaining irrigation lines and sprinklers. Irrigation in the Coachella valley is done year round.

**Table A. Per Acre Water Applications by Age of Tree**

Year	Inland	Desert
Year 1	6.00 Ac In	24.00 Ac In
Year 2	9.00 Ac In	24.00 Ac In
Year 3	13.00 Ac In	28.00 Ac In
Year 4	24.00 Ac In	36.00 Ac In
Year 5	36.00 Ac In	54.00 Ac In
Year 6 +	48.00 Ac In	60.00 Ac In

**Pruning:** Hand pruning normally begins in the second year of establishment. It is done annually until the trees reach age 5. Hand pruning of young trees is estimated to take about 5 minutes per tree. The operation consists of removing deadwood, which will facilitate the development of new shoots and laterals. This operation also creates access for easy harvest.

Hand pruning of trees of age six and older takes place about every fifth year and is estimated to cost \$300/acre. The annual cost of pruning is determined by prorating the cost over five years.

Mechanical hedging and trimming of Valencia orange trees is done every four years beginning when the trees reach age 6. The cost of hedging and trimming is estimated at \$150/acre. The annual cost is determined by prorating the total cost over the four years.

**Insect, snails and Disease Management:** The primary pests affecting Valencia orange production in Riverside County are thrips and ants. Treatment for thrips typically includes an application of Dimethoate once or twice a year depending on the population. Dimethoate is applied at 4 pints per acre per year during both the establishment and production years. Sabadilla is another common insecticide used to treat thrips infestations.

Ants are controlled with Lorsban. It is applied once a year to the lower trunk of the tree, as well as the soil at the base of the trunk and directly to anthills. Lorsban is applied at the rate of 4 pints per acre per year during the first four years of establishment and then at 2 pints per acre per year thereafter. Other desert Valencia orange insect pests (the cost of which is not included in this study) are whitefly and to some extent mites.

Citrus grown in the desert regions of Riverside County is located within a Red Scale Eradication District. Participation in the district program is mandatory and is governed through the Office of the Riverside County Agriculture Commissioner. The district maintains traps and treats infested areas. The cost of this service is \$25.69 per 100 trees.

Many Valencia orange growers in areas other than the desert may use a biological control program consisting of beneficial insects. This is done once the trees have reached maturity, and have developed sufficient canopy.

Brown garden snails can become a problem in some parts of Riverside County. Infestations can be prevented, or contained, using several methods including the use of predatory decollate snails and applying poisonous bait and painting tree trunks with liquid copper. In the desert areas, brown garden snails are not major problems and therefore costs are not included in this study.

Phytophthora root rot and gummosis are two fungal diseases common to citrus trees grown in Riverside County. A spot treatment of fungicide is applied to infected trees. Common fungicides used are Aliette and Ridomil. In this study, we used a yearly fixed amount of two-third pounds per acre per

year of Ridomil application. However, treatment amounts can vary from year to year depending on the extent of infection.

**Grove Floor Management:** Weed control of broad leaf grasses begins in the first year of establishment by applying Roundup in each tree row. It is applied at 1 quart per acre during years one and two of grove establishment. It is important not to spray Roundup on the trunks of young trees. In the second year and throughout production, a spot spray of Roundup, at approximately 25 ounces per acre per year is used to control sporadic weed growth.

In the desert areas of Riverside County, it is most common to keep tree row middles clear/bare. Starting in the third year of establishment, and continuing through mature production, a pre-emergent herbicide is used to control weeds in tree rows. In this study, Krovar is applied once per year at the rate of 4 lbs. per acre in early spring.

**Fertilization:** Nitrogen (N) fertilizer is applied through the irrigation system. The approximate amount of fertilizer applied during the establishment and production years is shown in Table B. Each year the fertilizer is applied three times in equal proportions, twice in the spring and once in late summer.

Citrus trees grown in the southern region of California can often be deficient in micronutrients. In this study, two foliar sprays of a micro-mineral fertilizer of zinc sulfate and manganese sulfate are annually applied to a new flush of leaves before they are fully expanded (i.e.<sup>2/3</sup> expansion) in spring and late summer. The nutrients are applied at 2 lbs. per acre in year one, 3 lbs. per acre in year two, 4 lbs. per acre in year three and 5 lbs. per acre from year four on. Other nutrients include copper sulfate applied at 1 lb. per acre per year both during establishment and production, Formula1 applied annually at 2 qt. per acre per year from year 5 on. Also, phosphorous acid is applied at 1 lb. per acre per year from year 5 on and Potassium Nitrate is applied at the rate of 40 lbs./acre during production.

**Table B. Pounds of Nitrogen Fertilizer Applied in Valencia Orange Production**

Establishment Year	Pounds of N Per Tree	Pounds of N Per Acre
Year 1	0.50	76.00
Year 2	0.50	76.00
Year 3	1.00	152.00
Year 4	1.00	152.00
Year 5	1.00	190.00
Year 6+	1.25	228.00

**Vertebrate Pest Management:** Vertebrate pests require constant control in Valencia orange groves. The principal pest is gophers. Gophers can cause severe damage to a tree by feeding on the root system and the bark of tree below the soil line.

Squirrels can also cause erosion problems by tunneling through the soil, especially on hillsides as well as occasionally gnawing on fruit and irrigation tubing. In this study, trapping and baiting are used to control gopher and squirrel populations. We estimated about \$10 per acre per year would be required for gopher and squirrel control.

**Growth Regulators:** 2,4-D may be applied to mature groves to delay harvest, which also increases fruit size. In this study, 2,4-D is applied at a rate of 30 g. a. i (grams actual ingredient) per acre.

### 3. YIELD

Valencia orange trees begin bearing fruit in the third year after planting. We consider years 1 to 5 as establishment and year 6+ as mature production. The yield at year 6 reflects an estimated average during the mature life of trees. Yield is measured in boxes as shown in Table C.

**Table C. Typical Yield of Valencia Oranges Per Acre in Riverside County**

Age of Tree	Boxes Per Acre*
Year 1	0
Year 2	0
Year 3	60
Year 4	140
Year 5	360
Year 6 +	600 (Average)

\*A box weighs approximately 50 pounds

### 4. HARVESTING AND MARKETING

Harvesting starts in the third year. In this study, harvesting is done using contracted labor crew. Harvesting consists of three to four picks per year and is typically done from January through April. Growers also contract hauling to a local packinghouse.

Charges for picking, hauling, packing and marketing are approximations obtained from several packinghouses in the region during the 1995 to 1998 seasons. Costs are based on an average distribution of 61% of the fruit is packed and marketed fresh, 36% is used as juice and 3% is discarded as rot.

These distributions are based on data from packinghouses and the Riverside County Agricultural Production Report.

We used the following rates: \$1.65 per field box for picking, hauling, forklift use and field overhead, \$3.70 per field box for packing and marketing and \$0.50 per field for juice handling.

## 5. PRICES/RETURNS

We used a price / gross returns of \$8.00 per field box as a basis of our analysis. It is based on information obtained from some packinghouses and the Riverside County Agricultural Production Report for the 1995 to 1998 seasons. However, to cover a broader scenario of productivity and prices, we provided a range analysis in **Table 7**.

## 6. LABOR

Labor hours for machinery operation is calculated at 20% higher than the actual operation time to account for such activities as equipment setup, moving, maintenance and repair.

We used hourly wage rates of \$9.25 for machine labor and \$7.45 for non-machine workers. This is based on wages paid by the growers in this study. Growers also pay for benefits including, Workers Compensation, Social Security, Medicare, insurance, and other possible benefits. In this study, we added 34% to the hourly wages to account for benefits. This brings the hourly rate to \$12.40 for machine labor and \$10.00 for non-machine workers.

## 7. MANAGEMENT

This study does not include management charges. Users of this cost study should include their own management charges.

## 8. CASH OVERHEAD

**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 going market cost of borrowed funds.

**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 at 1% of the value of land. County taxes are also calculated at 1% of the average value of equipment, buildings and improvements. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

**Property Insurance:** Property insurance for farm investments vary depending on the assets included and the amount and type of coverage. In this study, property insurance is calculated at 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$455 for the entire farm.

**Office Expense:** We included office and business expenses at \$50 per acre. These expenses are to account for office supplies, telephone, computer, fax, copier, bookkeeping, accounting, legal fees, etc.

## **9. NON-CASH OVERHEAD**

Non-cash overhead costs include depreciation and interest charged on equipment and other investments. Typically, farm equipment in Riverside County is a mixture of new and older equipment. To reflect such mix in this study, the current purchase price for new equipment is reduced by 40%.

**Depreciation:** Depreciation is a reduction in market value of investments due to wear, obsolescence, and age. Depreciation in this study is calculated on a straight-line basis, i.e. purchase price minus salvage value divided by years of life of ownership. The purchase price and years of life are shown in **Table 5**.

**Interest On Investment:** The interest charge for the use of capital in Valencia orange production is calculated by multiplying the value of land and average investments in equipment, buildings, trees, etc. (described in **Table 5**) by 7.81%, the long-run average rate of return to California's agricultural production assets from current income. Average investment for equipment, building and improvements equals the new cost plus salvage value divided by 2.

## **10. EQUIPMENT OPERATING COSTS**

Equipment operating costs consist of fuel, lubrication, and repairs. These costs are first calculated on a per hour basis and then converted to a per acre basis. The hourly charges are shown in **Table 6**.

Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used.

Fuel and repair costs per acre for each operation are determined by multiplying the number of hours required for each operation by the hourly operating costs for that piece of equipment. Operation times are determined

based on the equipment width, speed of operation, and efficiency. Tractor time is calculated at 10% higher than implement time to account for setup.

Prices for fuel include on-farm delivery charges of \$0.76 per gallon for diesel and \$1.16 per gallon for gasoline.

## **11. ESTABLISHMENT COST**

The establishment period included five years in our study. This is because trees are assumed not to reach mature production until year six. This is different from the establishment years in the United States Tax Code, which includes only through year four of establishment. For tax purposes growers should consult the Farmer's Tax Guide or a tax accountant. For this study, the Total Accumulated Net Cash Cost on **Table 1**, in the fifth year represents the establishment cost. The cost is \$6,253 per acre or \$300,144 for the 48-acre grove. The establishment cost is spread over 35 productive years.

## **12. RISK**

This study makes every effort to model a production system based on typical, real world practices of Valencia orange production. However, it would not fully represent financial, agronomic, and market risks, which affect the profitability and economic viability, involved in Valencia orange production. Risk is caused by various sources of uncertainty such as insect damage, severe frost and disease that affect production, as well as a decrease in price, and increase in interest rates. Because of the risk involved, access to information on production practices, prices, and markets are crucial.

## **13. ADDENDUM**

1. Due to rounding, totals may be slightly different from the sum of components.
2. The per acre equipment costs in **Table 1** reflect both the value and the level of use (hours and years of use) of the machinery complement. Therefore this cost could be different from the per acre value of the machinery complement in **Table 4**.

## REFERENCES

1. American Society of Agricultural Engineers. 1992. American Society of Agricultural Engineers Standards Yearbook. St. Joseph, MI.
2. Boelje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, NY.
3. University of California, Statewide IPM Project. 1991. Integrated Pest Management for Citrus, 2nd Edition. Publication 3303. University of California Statewide IPM Project. Division of Agriculture and Natural Resources. Oakland, CA.
4. Haney, Phillip B., Joseph G. Morse, Robert F. Luck, Harry Griffiths, Elizabeth E. Grafton-Cardwell, and Neil V. O'Connell. 1992. Reducing insecticide use and energy costs in citrus pest management. University of California IPM Publication 15. University of California Statewide IPM Project. Division of Agriculture and Natural Resources. Oakland, CA.
5. Riverside County Agricultural Commissioner and Weights & Measures. Agricultural Production Report 1986-1997. Office of the Agricultural Commissioner, Riverside County. Riverside, CA.
6. Takele, Etaferahu, N. Sakovich, D. Walton. Establishment and Production Costs, Lemons And Valencia Oranges Ventura County, 1997. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.
7. Takele, Etaferahu, G. Bender, D. Walton. Establishment and Production Costs, Lemons, San Diego County, 1998. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.
8. Takele, Etaferahu, G. Bender, D. Walton. Establishment and Production Costs, Valencia Oranges, San Diego County, 1998. University of California Cooperative Extension, Southern Region. Farm Management Economics Program. Moreno Valley, CA.

Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VALENCIA ORANGE GROVE  
RIVERSIDE COUNTY

Year	Cost Per Acre				
	1st	2nd	3rd	4th	5th
<b>Yield: 50 Pound Field Boxes Per Acre</b>			60	140	360
<b>OPERATING COSTS:</b>					
<b>Pre-Planting Costs:</b>					
Land Preparation - Clear Land	300				
Mark & Layout Grove	100				
<b>Total Pre-Planting Costs</b>	<b>400</b>				
<b>Planting Costs:</b>					
Plant Trees	380				
Orange Tree	1,216				
<b>Total Planting Costs</b>	<b>1,596</b>				
<b>Replanting Costs:</b>					
Replant Trees: Labor		8			
Trees - 3		24			
<b>Total Replanting Costs:</b>		<b>32</b>			
<b>Cultural Costs: (Materials &amp; Labor &amp; Fuel, Lube &amp; Repair)</b>					
Irrigation	205	205	213	230	268
Fertilization	9	9	18	18	23
Foliar Spray	25	26	27	47	47
Pruning		130	130	130	130
Herbicide - Field Spray	23	23			
Herbicide - Spot Spray		19	19	19	19
Herbicide - Pre-Emergent			56	56	56
Red Scale Eradication District	39	39	39	39	39
Fungicide - Ridomil	15	15	15	15	15
Thrips Treatment	25	25	25	25	25
Vertebrate Pest Control	10	10	10	10	10
Leaf Analysis	5	5	5	5	5
Ant Treatment	47	47	47	47	34
Pick-Up Truck Use	160	160	160	160	160
ATV Use	124	124	124	124	124
<b>Total Cultural Costs:</b>	<b>687</b>	<b>869</b>	<b>888</b>	<b>925</b>	<b>955</b>
<b>Harvests Costs:</b>					
Pick, Haul & Field Overhead - \$1.65 per 50 Pound Field Box			99	231	594
Packing - \$3.70 per 50 Pound Field Box - 61% Crop			137	315	814
Juice - \$0.50 per 50 Pound Field Box - 36% Crop			10	25	65
<b>Total Harvest Costs:</b>			<b>246</b>	<b>571</b>	<b>1,473</b>
<b>Interest on Operating Capital @ 10.00%</b>	<b>212</b>	<b>48</b>	<b>21</b>	<b>33</b>	<b>66</b>
<b>TOTAL OPERATING COSTS</b>	<b>2,895</b>	<b>917</b>	<b>1,155</b>	<b>1,529</b>	<b>2,494</b>

Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VALENCIA ORANGE GROVE (cont.)  
RIVERSIDE COUNTY

Year	1st	2nd	3rd	4th	5th
<b>Yield: 50 Pound Field Boxes Per Acre</b>			60	140	360
<b>Cash Overhead Costs:</b>					
Liability Insurance	9	9	9	9	9
Office Expenses	50	50	50	50	50
Property Taxes	75	107	120	130	138
Property Insurance	54	76	85	93	98
Investment Repairs	94	94	94	94	94
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>282</b>	<b>336</b>	<b>358</b>	<b>376</b>	<b>389</b>
<b>TOTAL CASH COSTS</b>	<b>3,177</b>	<b>1,253</b>	<b>1,513</b>	<b>1,905</b>	<b>2,883</b>
<b>INCOME FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>480</b>	<b>1,120</b>	<b>2,880</b>
<b>NET CASH COSTS FOR THE YEAR</b>	<b>3,177</b>	<b>1,253</b>	<b>1,033</b>	<b>785</b>	<b>3</b>
<b>ACCUMULATED NET CASH COSTS</b>	<b>3,177</b>	<b>4,430</b>	<b>5,463</b>	<b>6,248</b>	<b>6,253</b>
<b>Depreciation:</b>					
Shop Building	9	9	9	9	9
Shop Tools	16	16	16	16	16
Fuel Tanks & Pumps	16	16	16	16	16
Irrigation	45	45	45	45	45
Equipment	64	64	64	64	64
<b>TOTAL DEPRECIATION</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>
<b>Interest on Investment:</b>					
Shop Building	18	18	18	18	18
Shop Tools	11	11	11	11	11
Fuel Tanks & Pumps	11	11	11	11	11
Irrigation	64	64	64	64	64
Land	448	448	448	448	448
Establishment Costs		248	346	427	488
Equipment	36	36	36	36	36
<b>TOTAL INTEREST ON INVESTMENT</b>	<b>588</b>	<b>836</b>	<b>934</b>	<b>1,015</b>	<b>1,076</b>
<b>TOTAL COST FOR THE YEAR</b>	<b>3,915</b>	<b>2,239</b>	<b>2,597</b>	<b>3,070</b>	<b>4,109</b>
<b>INCOME FROM PRODUCTION</b>	<b>0</b>	<b>0</b>	<b>480</b>	<b>1,120</b>	<b>3,024</b>
<b>TOTAL NET COST FOR THE YEAR</b>	<b>3,915</b>	<b>2,239</b>	<b>2,117</b>	<b>1,950</b>	<b>2,880</b>
<b>TOTAL ACCUMULATED NET COST</b>	<b>3,915</b>	<b>6,154</b>	<b>8,271</b>	<b>10,221</b>	<b>13,101</b>

Table 2. COSTS PER ACRE TO PRODUCE VALENCIA ORANGES  
RIVERSIDE COUNTY

Labor Rate: \$12.40/hr. machine labor  
\$10.00/hr. non-machine labor

Interest Rate: 10.00%  
Yield Per Acre: 600.00 Boxes

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>							
Irrigation	15.52	155	0	125	0	280	
Fertilization	0.00	0	0	47	0	47	
Foliar Spray	0.80	12	11	4	0	27	
Pruning	0.00	0	0	0	60	60	
Topping & Hedging	0.00	0	0	0	38	38	
Herbicide - Pre-Emergent	0.40	6	3	48	0	56	
Herbicide - Spot Spray	0.50	7	0	11	0	19	
Red Scale Eradication District	0.00	0	0	0	39	39	
Fungicide - Ridomil	0.25	4	0	12	0	15	
Thrips Treatment	0.30	4	4	16	0	25	
Vertebrate Pest Management	0.00	0	0	0	10	10	
Leaf Analysis	0.00	0	0	0	5	5	
Ant Treatment	0.49	7	3	13	0	23	
Bordeaux Treatment	0.30	4	4	1	0	10	
Potassium Nitrate	0.40	6	5	11	0	22	
Growth Regulator	0.40	6	5	0	0	11	
Pick-Up Truck	7.50	112	48	0	0	160	
ATV	7.50	112	12	0	0	124	
<b>TOTAL CULTURAL COSTS</b>	<b>34.36</b>	<b>436</b>	<b>95</b>	<b>289</b>	<b>152</b>	<b>971</b>	
<b>Harvest:</b>							
Harvest (Pick & Haul)	0.00	0	0	2,452	0	2,452	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>2,452</b>	<b>0</b>	<b>2,452</b>	
Interest on operating capital @ 10.00%						106	
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>436</b>	<b>95</b>	<b>2,741</b>	<b>152</b>	<b>3,529</b>	
<b>TOTAL OPERATING COSTS/BOX</b>						<b>6</b>	
<b>CASH OVERHEAD:</b>							
Liability Insurance						9	
Office Expense						50	
Property Taxes						110	
Property Insurance						78	
Investment Repairs						94	
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>341</b>	
<b>TOTAL CASH COSTS/ACRE</b>						<b>3,870</b>	
<b>TOTAL CASH COSTS/BOX</b>						<b>6</b>	

Table 2. COSTS PER ACRE TO PRODUCE VALENCIA ORANGES, (cont.)  
RIVERSIDE COUNTY

Labor Rate: \$12.40/hr. machine labor  
\$10.00/hr. non-machine labor

Interest Rate: 10.00%  
Yield Per Acre: 600.00 Boxes

NON-CASH OVERHEAD:	Per	Annual Cost		Total Cost
	Producing Acre	Depreciation	Interest@7.81%	
Investment				
Shop Building	417	9	18	27
Shop Tools	260	16	11	27
Fuel Tanks & Pumps	260	16	11	27
Irrigation	1,500	45	64	109
Land	5,730		448	448
Establishment Costs	6,253	161	269	429
Equipment	<u>838</u>	<u>64</u>	<u>36</u>	<u>100</u>
<b>TOTAL NON-CASH OVERHEAD COSTS</b>	15,258	310	857	1,167
<b>TOTAL COSTS/ACRE</b>				5,137
<b>TOTAL COSTS/BOX</b>				8.39

Table 3. COSTS AND RETURNS TO PRODUCE VALENCIA ORANGES  
RIVERSIDE COUNTY

Labor Rate: \$12.40/hr. machine labor  
\$10.00/hr. non-machine labor

Interest Rate: 10.00%

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>	600.00	Box	8.00	4800	
<b>OPERATING COSTS</b>					
Water:					
Water	60.00	AcIn	2.08	125	
Contract:					
Pruning	1.00	Acre	60.00	60	
Topping & Hedging	1.00	Acre	37.50	38	
Vertebrate Pest	1.00	Acre	10.00	10	
Red Scale Eradication District	1.00	Acre	39.05	39	
Leaf Analysis	1.00	Acre	5.00	5	
Fertilizer:					
Zinc Sulfate	5.00	Lb	0.44	2	
Manganese Sulfate	5.00	Lb	0.38	2	
Liquid N	228.00	Lb N	0.12	28	
Formula1	2.00	Qt	9.50	19	
Phosphorous acid	1.00	Lb	0.60	1	
Copper Sulfate	1.00	Lb	1.11	1	
Potassium Nitrate	40.00	Lb	0.28	11	
Herbicide:					
Krovar	4.00	Lb	11.99	48	
Roundup -Spot Spry	25.00	Oz	0.46	11	
Insecticide:					
Lorsban - Ants	2.00	Pint	6.50	13	
Dimethoate	4.00	Pint	4.08	16	
Growth Regulator:					
2, 4D	2.50	Oz	0.11	0	
Fungicide:					
Ridomil	0.67	Lb	17.28	12	
Harvest:					
Pick, Haul etc.	600.00	Box	1.65	990	
Packing - 61% Crop	366.00	Box	3.70	1354	
Juice - 44% Crop	216.00	Box	0.50	108	
Labor (machine)	22.61	hrs	12.40	280	
Labor (non-machine)	15.52	hrs	10.00	155	
Fuel - Gas	23.73	gal	1.16	28	
Fuel - Diesel	10.34	gal	0.76	8	
Lube				5	
Machinery repair				54	
Interest on operating capital @ 10.00%				105	
<b>TOTAL OPERATING COSTS /ACRE</b>				<b>3529</b>	
<b>TOTAL OPERATING COSTS/BOX</b>				<b>5.88</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>1,271</b>	

Table 3. COSTS AND RETURNS TO PRODUCE VALENCIA ORANGES, (cont.)  
RIVERSIDE COUNTY

Labor Rate: \$12.40/hr. machine labor  
\$10.00/hr. non-machine labor

Interest Rate: 10.00%

<b>CASH OVERHEAD COSTS:</b>	
Office Expense	50
Liability Insurance	9
Property Taxes	110
Property Insurance	78
Investment Repairs	94
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>	<b>341</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>3,870</b>
<b>TOTAL CASH COSTS/BOX</b>	<b>6.45</b>
<b>NON-CASH OVERHEAD COSTS (DEPRECIATION &amp; INTEREST):</b>	
Shop Building	27
Shop Tools	27
Fuel Tanks & Pumps	27
Land	448
Irrigation	109
Establishment Costs	429
Equipment	100
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,167</b>
<b>TOTAL COSTS/ACRE</b>	<b>5,037</b>
<b>TOTAL COSTS/BOX</b>	<b>8.39</b>
<b>NET RETURNS ABOVE TOTAL COSTS</b>	<b>-237</b>

Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE VALENCIA ORANGES  
RIVERSIDE COUNTY

Beginning:	JAN 97	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending:	DEC 97	97	97	97	97	97	97	97	97	97	97	97	97	
<b>Cultural:</b>														
Irrigation		20	20	20	20	20	29	29	29	29	20	20	20	280
Pruning				60										60
Topping & Hedging				38										38
Foliar Spray						15				11				27
Fertilizer					9		9		29					47
Herbicide - Pre-Emergent			56											56
Herbicide - Spot Spray							9		9					19
Vertebrate Pest Management		1	1	1	1	1	1	1	1	1	1	1	1	10
Ant Treatment				23										23
Thrips Treatment				25										25
Red Scale Eradication District							39							39
Leaf Analysis										5				5
Bordeaux Treatment												10		10
Potassium Nitrate													22	22
Growth Regulator											11			11
Fungicide - Ridomil				15										15
Pick-Up Truck		13	13	13	13	13	13	13	13	13	13	13	13	160
ATV		10	10	10	10	10	10	10	10	10	10	10	10	124
<b>TOTAL CULTURAL COSTS</b>		<b>45</b>	<b>101</b>	<b>206</b>	<b>54</b>	<b>60</b>	<b>111</b>	<b>54</b>	<b>92</b>	<b>70</b>	<b>56</b>	<b>54</b>	<b>67</b>	<b>971</b>
<b>Harvest:</b>														
Harvest		123	980	980	369									2,452
<b>TOTAL HARVEST COSTS</b>		<b>123</b>	<b>980</b>	<b>980</b>	<b>369</b>									<b>2,452</b>
Int. on operating capital @ 10%		1	10	20	24	24	25							105
<b>TOTAL OPERATING COSTS/ACR</b>		<b>169</b>	<b>1,092</b>	<b>1,206</b>	<b>447</b>	<b>84</b>	<b>172</b>	<b>54</b>	<b>127</b>	<b>70</b>	<b>56</b>	<b>54</b>	<b>67</b>	<b>3,600</b>
<b>TOTAL OPERATING COSTS/BOX</b>		<b>0.28</b>	<b>1.82</b>	<b>2.01</b>	<b>0.74</b>	<b>0.14</b>	<b>0.23</b>	<b>0.09</b>	<b>0.15</b>	<b>0.12</b>	<b>0.09</b>	<b>0.09</b>	<b>0.11</b>	<b>5.88</b>
<b>OVERHEAD:</b>														
Office Expense													50	50
Liability Insurance													9	9
Property Taxes			55					55						110
Property Insurance			39					39						78
Investment Repairs		8	8	8	8	8	8	8	8	8	8	8	8	94
<b>TOTAL CASH</b>		<b>8</b>	<b>102</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>102</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>67</b>	<b>341</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>177</b>	<b>1,194</b>	<b>1,214</b>	<b>455</b>	<b>92</b>	<b>144</b>	<b>155</b>	<b>100</b>	<b>78</b>	<b>64</b>	<b>62</b>	<b>134</b>	<b>3,870</b>
<b>TOTAL CASH COSTS/BOX</b>		<b>0.29</b>	<b>1.99</b>	<b>2.02</b>	<b>0.76</b>	<b>0.15</b>	<b>0.24</b>	<b>0.26</b>	<b>0.17</b>	<b>0.13</b>	<b>0.11</b>	<b>0.10</b>	<b>0.22</b>	<b>6.45</b>

Table 5. WHOLE FARM EQUIPMENT LIST, PRICES, ANNUAL INVESTMENT, AND BUSINESS OVERHEAD COSTS  
RIVERSIDE COUNTY

ANNUAL EQUIPMENT COST

Description	Price	Yrs Life	Non-Cash Overhead		Cash Overhead		Total
			Depreciation	Interest	Insurance	Taxes	
98 62 HP 2WD Tractor	25,492	20	1,147	1,095	100	140	2,482
97 ATV 4WD	3,861	7	496	166	15	21	699
97 Herbie Sprayer	170	10	15	7	1	1	24
98 Orch.Sprayer 500 G	17,055	15	1,023	733	67	94	1,917
97 Pickup Truck 1/2 T	17,160	7	2,206	737	67	94	3,105
98 Weed Sprayer 200 G	3,282	15	197	141	13	18	369
<b>TOTAL</b>	<b>67,020</b>		<b>5,085</b>	<b>2,879</b>	<b>263</b>	<b>369</b>	<b>8,596</b>
60% of New Cost *	40,212		3,051	1,727	158	221	5,157

\* Used to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Non-Cash Overhead		Cash Overhead			Total
			Depreciation	Interest	Insurance	Taxes	Repairs	
<b>INVESTMENT</b>								
Fuel Tanks & Pumps	12,500	15	750	537	49	69	250	1,655
Irrigation	72,000	30	2,160	3,093	282	396	3,600	9,531
Land	275,040			21,481	1,961	2,750	0	26,192
Establishment Costs	300,144	35	7,718	12,893	1,177	1,651	0	23,438
Shop Building	20,000	40	450	859	78	110	400	1,898
Shop Tools	12,500	15	750	537	49	69	250	1,655
<b>TOTAL INVESTMENT</b>	<b>692,184</b>		<b>11,828</b>	<b>39,399</b>	<b>3,597</b>	<b>5,045</b>	<b>4,500</b>	<b>64,368</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	1	Farm	455	455
Office Expenses	48	Acre	50	2,400

Table 6. HOURLY EQUIPMENT COSTS  
RIVERSIDE COUNTY

Yr Description	COSTS PER HOUR								
	Actual Hours Used	Non-Cash Overhead		Cash Overhead			Operating		Total Costs/Hr.
		Depreciation	Interest	Insurance	Taxes	Repairs	Fuel & Lube	Total Oper.	
98 62 HP 2WD Tractor	163	4.21	4.02	0.37	0.52	1.53	2.66	4.19	13.31
97 ATV 4WD	360	0.83	0.28	0.03	0.04	0.70	0.89	1.59	2.76
97 Herbie Sprayer	36	0.26	0.12	0.01	0.02	0.00	0.00	0.00	0.40
98 Orch.Sprayer 500 G	106	5.81	4.16	0.38	0.53	8.56	0.00	8.56	19.45
97 Pickup Truck 1/2 T	360	3.68	1.23	0.11	0.16	3.11	3.33	6.44	11.62
98 Weed Sprayer 200 G	43	2.76	1.97	0.18	0.25	1.64	0.00	1.64	6.81

Table 7. RANGING ANALYSIS OF COSTS AND RETURNS TO PRODUCE VALENCIA ORANGES  
RIVERSIDE COUNTY

	COSTS PER ACRE AT VARYING YIELDS TO PRODUCE VALENCIA ORANGES						
	YIELD (BOXES/ACRE)						
	420	480	540	600	660	720	780
OPERATING COST/ACRE							
Cultural Cost	971	971	971	971	971	971	971
Harvest Cost	1,717	1,962	2,207	2,452	2,697	2,943	3,188
Interest on operating capital @ 10.00%	79	88	97	105	114	123	132
TOTAL OPERATING COSTS/ACRE	2,766	3,020	3,274	3,529	3,783	4,037	4,291
TOTAL OPERATING COSTS/BOX	6.59	6.29	6.06	5.88	5.73	5.61	5.50
CASH OVERHEAD COSTS/ACRE	341	341	341	341	341	341	341
TOTAL CASH COSTS/ACRE	3,107	3,362	3,616	3,870	4,124	4,378	4,632
TOTAL CASH COSTS/BOX	7.40	7.00	6.70	6.45	6.25	6.08	5.94
NON-CASH OVERHEAD COSTS/ACRE	1,167	1,167	1,167	1,167	1,167	1,167	1,167
TOTAL COSTS/ACRE	4,274	4,528	4,782	5,037	5,291	5,545	5,799
TOTAL COSTS/BOX	10.18	9.43	8.86	8.39	8.02	7.70	7.43

PRICE (\$ PER BOX)	NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR VALENCIA ORANGES						
	YIELD (BOXES/ACRE)						
	420	480	540	600	660	720	780
5.60	-414	-332	-250	-169	-87	-5	77
6.40	-78	52	182	311	441	571	701
7.20	258	436	614	791	969	1,147	1,325
8.00	594	820	1,046	1,271	1,497	1,723	1,949
8.80	930	1,204	1,478	1,751	2,025	2,299	2,573
9.60	1,266	1,588	1,910	2,231	2,553	2,875	3,197
10.40	1,602	1,972	2,342	2,711	3,081	3,451	3,821

PRICE (\$ PER BOX)	NET RETURNS PER ACRE ABOVE CASH COSTS FOR VALENCIA ORANGES						
	YIELD (BOXES/ACRE)						
	420	480	540	600	660	720	780
5.60	-755	-674	-592	-510	-428	-346	-264
6.40	-419	-290	-160	-30	100	230	360
7.20	-83	94	272	450	628	806	984
8.00	253	478	704	930	1,156	1,382	1,608
8.80	589	862	1,136	1,410	1,684	1,958	2,232
9.60	925	1,246	1,568	1,890	2,212	2,534	2,856
10.40	1,261	1,630	2,000	2,370	2,740	3,110	3,480

PRICE (\$ PER BOX)	NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR VALENCIA ORANGES						
	YIELD (BOXES/ACRE)						
	420	480	540	600	660	720	780
5.60	-1,922	-1,840	-1,758	-1,677	-1,595	-1,513	-1,431
6.40	-1,586	-1,456	-1,326	-1,197	-1,067	-937	-807
7.20	-1,250	-1,072	-894	-717	-539	-361	-183
8.00	-914	-688	-462	-237	-11	215	441
8.80	-578	-304	-30	243	517	791	1,065
9.60	-242	80	402	723	1,045	1,367	1,689
10.40	94	464	834	1,203	1,573	1,943	2,313

## **ACKNOWLEDGMENT**

We express our appreciation to those growers and other cooperators who provided data for the development of this cost study. Also we acknowledge Delos Walton for his involvement as Staff Research Associate on the initial stages of these studies.

The use of trade names 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.

### **University of California Cooperative Extension**

**Etaferahu Takele**  
Area Farm Advisor, Agriculture Economics  
Southern Region  
21150 Box Springs Road  
Moreno Valley, CA 92557-8718  
Phone: (909) 683-6491 x 243  
Fax: (909) 788-2615  
E-Mail: takele@ucrac1.ucr.edu

**Peggy Mauk**  
Farm Advisor, Subtropical Horticulture  
Riverside County  
21150 Box Springs Road  
Moreno Valley, CA 92557-8718  
Phone: (909) 683-6491 x 224  
Fax: (909) 788-2615  
E-Mail: pamauk@ucdavis.edu

*The University of California prohibits discrimination against or harassment of any person employed by or seeking employment with the University on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized).*

*University Policy is intended to be consistent with the provisions of applicable State and Federal laws.*

*Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 1111 Franklin, 6th Floor, Oakland, CA 94607-5200 (510) 987-0096.*

**University of California and the United States Department of Agriculture  
cooperating.**  
*Published October 1999*