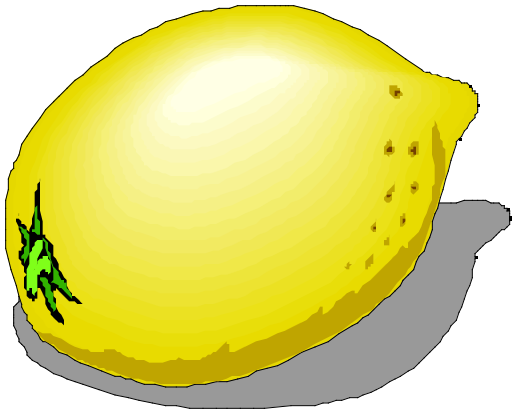
Establishment and Production Costs

Lemons

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

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INTRODUCTION

Detailed costs for establishment of groves and the production of lemons in Coachella Valley of 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 lemon grove establishment and production practices and costs that are considered typical in Riverside County. These production practices and costs are an amalgamation of costs and practices obtained from a 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. Whole Farm Equipment Prices and Investment Costs

Table 6. Hourly Equipment Costs

Table 7. Range Analysis

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 that is tiled for drainage. Because only 48 of the 50 acres are planted to lemons, 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 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 weeds and diseases, especially in groves that are planted back to citrus. However, in this study, the cost of grove fumigation is not included.

Planting: This study assumes that lemons are Lisbon variety on Macrophylla rootstock planted with 152 trees per acre on a 12 x 24 foot spacing. 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 varies from region to region within the county. Also, costs vary depending on if well or district water is used.

Lemon production in Riverside County is mainly in the desert areas/ Coachella Valley. Irrigation in this area is done year round. Actual irrigation amounts will

vary depending on the amount of rainfall, and the region. No assumptions were made about effective rainfall. In **Table A,** we provide the approximate amount of irrigation water applied by age of trees**.**

The cost of water is estimated at $25.00 per acre-foot. In addition labor cost is included for irrigation operations such as turning the system on, monitoring, and maintaining irrigation lines and sprinklers.

Table A. Applied Irrigation Water

Year	Yearly Water Applications
Year 1	24.00Ac In
Year 2	24.00 Ac In
Year 3	36.00 Ac In
Year 4	54.00 Ac In
Year 5	60.00 Ac In
Year 6 +	76.00 Ac In

Pruning: Hand pruning begins at age two of trees. The cost is estimated at $1.25 per tree per year until the trees reach age five. The operation consists of removing deadwood, which will facilitate the development of new shoots and laterals. This operation also creates access for easy harvest. From year six on, pruning is done every three years and is estimated to cost $1.75 per tree per three years. The annual cost is prorated over three years.

Mechanical hedging and trimming of lemon trees is done every year beginning when the trees reach age six. The cost of hedging and trimming is estimated at $150 per acre per year.

Insect and Disease Management: The primary pests concerning lemon 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 thrip 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 four pints per acre per year during the first four years of establishment and then at two pints per acre per year thereafter. Other desert lemon 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 Riverside County Agriculture Commissioner's Office. The

district maintains traps and treats infected areas. The cost of this service is $25.69 per 100 trees.

Many lemon growers in areas other than the desert may institute 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, applying poisonous bait, and painting tree trunks with liquid copper. In the desert areas, brown garden snails do not cause damage 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. 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 one quart per acre per year 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 establishment and production years is shown in **Table B**. Each year the fertilizer is applied four times in equal proportions, starting in December and ending in March.

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. at $^2/_3$ 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, Formula 1 applied annually at 2 qts. per acre per year from year five on, and phosphorous acid applied at 1 lb per acre per year from year five on.

Table B. Pounds of Nitrogen Fertilizer Applied in Lemon Production

Establishment Year	Pounds of N Per Tree	Pounds of N Per Acre
Year 1	0.50	76.00
Year 2	1.00	152.00
Year 3	2.50	380.00
Year 4	3.00	456.00
Year 5	3.50	532.00
Year 6+	3.50	532.00

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

Squirrels can also cause erosion problems by tunneling through the soil, especially on hillsides as well as 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: No growth regulators are used on lemons produced in the desert areas of Riverside County.

3. YIELD

Lemon trees can bear fruit in the second or 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 of production during the mature life of the trees. Yield is measured in boxes as shown in **Table C**.

Table C. Typical Yield of Lemons Per Acre in Riverside County

Age of Tree	Boxes Per Acre*
Year 1	0
Year 2	0
Year 3	38
Year 4	152
Year 5	304
Year 6 +	775 (Average)

*A box weighs approximately 50 pounds

4. HARVESTING AND MARKETING

Harvesting can start in the second or third year. In this study, harvest starts the third year and is done by contract labor. Harvesting consists of three to four picks per year and is typically done from August through January. 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 which 54% of the fruit is packed and marketed fresh, 44% is used as juice and 2% is discarded as rot. This average distribution is based on data from local packinghouses and the Riverside County Agricultural Production Report.

We used the following rates: $2.70 per field box for picking, hauling, forklift use and field overhead, $4.00 per field box for packing and marketing, $0.50 per field box for juice handling and $0.75 per field box for miscellaneous charges such as capital retention, washing, storage and door charge.

5. PRICES/RETURNS

We used a price/gross return of $10.75 per field box as a basis of our analysis. It is based on information obtained from 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 average wages paid by 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 wage 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 old 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 lemon 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 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 $6,647 per acre or $319,056 for the 48-acre grove. The establishment cost is spread over 25 productive years.

12. RISK

This study makes every effort to model a production system based on typical, real world practices of lemon production. However, it would not fully represent financial, agronomic, and market risks, which affect the profitability and economic viability, involved in lemon 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**.

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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

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Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A LEMON GROVE
RIVERSIDE COUNTY - 1998

Labor Rates:$12.40/hour
$10.00/hour

Interest Rate: 7.81%
Trees Per Acre: 152

	Cost Per Acre				
Year	1st	2nd	3rd	4th	5th
Yield: 50 Pound Field Boxes Per Acre			38	152	304
OPERATING COSTS:					
Pre-Planting Costs:					
Land Preparation - Clear Land	300				
Mark & Layout Grove	100				
Total Pre-Planting Costs	400				
Planting Costs:					
Plant Trees	380				
Lemon Trees	1,216				
Total Planting Costs	1,596				
Replanting Costs:					
Replant Trees: Labor		8			
Trees - 3		24			
Total Replanting Costs:		32			
Cultural Costs: (Materials & Labor & Fuel, Lube & Repair)					
Irrigation	205	205	230	268	280
Fertilization	9	18	46	55	64
Foliar Spray	25	26	27	28	47
Pruning		190	190	190	190
Chop Prunings					4
Herbicide - Field Spray	23	23			
Herbicide - Spot Spray		19	19	19	19
Herbicide - Pre-Emergent			56	56	56
Thrips Treatment	25	25	25	25	25
Red Scale Eradication District	39	39	39	39	39
Disease Treatment	15	15	15	15	15
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
Total Cultural Costs:	687	906	993	1,041	1,072
Harvests Costs:					
Pick, Haul & Field Overhead - $2.70 per 50 Pound Field Box			103	410	821
Packing - $4.00 per 50 Pound Field Box - 54% Crop			84	328	656
Juice - $0.50 per 50 Pound Field Box - 44% Crop			8	33	67
Miscellaneous Charges* - $0.75 per 50 Pound Field Box			28	114	228
Total Harvest Costs:			223	885	1,772
Interest on Operating Capital @ 10.00%	211	50	78	110	149
TOTAL OPERATING COSTS	2,894	988	1,294	2,036	2,993
Cash Overhead Costs:					
Liability Insurance	9	9	9	9	9
Office Expenses	50	50	50	50	50
Property Taxes	75	107	120	133	141
Property Insurance	54	76	86	95	100
Investment Repairs	94	94	94	94	94
TOTAL CASH OVERHEAD COSTS	282	336	359	381	394
TOTAL CASH COSTS	3,176	1,324	1,653	2,417	3,387
INCOME FROM PRODUCTION			408	1,634	3,268
NET CASH COSTS FOR THE YEAR	3,176	1,324	1,245	783	119
ACCUMULATED NET CASH COSTS	3,176	4,500	5,745	6,528	**6,647**

Table 1. continued

Year	Cost Per Acre 1st	2nd	3rd	4th	5th
Yield: 50 Pound Field Boxes Per Acre			38	152	304
Depreciation:					
Shop Building	9	9	9	9	9
Shop Tools	16	16	16	16	16
Fuel Tanks & Pumps	16	16	16	16	16
Irrigation System	45	45	45	45	45
Equipment	64	64	64	64	71
TOTAL DEPRECIATION	150	150	150	150	157
Interest on Investment:					
Shop Building	18	18	18	18	18
Shop Tools	11	11	11	11	11
Fuel Tanks & Pumps	11	11	11	11	11
Irrigation System	64	64	64	64	64
Land	448	448	448	448	448
Establishment Costs		248	351	449	510
Equipment	36	36	36	36	38
TOTAL INTEREST ON INVESTMENT	588	836	939	1,037	1,100
TOTAL COST FOR THE YEAR	3,914	2,310	2,742	3,604	4,644
INCOME FROM PRODUCTION			408	1,634	3,268
TOTAL NET COST FOR THE YEAR	3,914	2,310	2,334	1,970	1,376
TOTAL ACCUMULATED NET COST	3,914	6,224	8,558	10,528	11,904

*Miscellaneous Charges include capital retention, washing, storage and door charge by packing house.

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Table 2. COSTS PER ACRE TO PRODUCE LEMONS

RIVERSIDE COUNTY - 1998

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

Interest Rate: 10.00%
Yield per Acre: 775 Boxes

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:							
Irrigation	15.52	155	0	158	0	313	
Prune Trees	0.00	0	0	0	89	89	
Chop Brush	0.20	3	1	0	0	4	
Pre-Emergent Herbicicde	0.40	6	2	48	0	56	
Foliar Spray	0.80	12	5	24	0	41	
Fertilizer	0.20	3	1	65	0	69	
Spot Spray Herbicide	0.50	7	0	11	0	19	
Vertebrate Pest Management	0.00	0	0	0	10	10	
Thrips Treatment	0.77	11	4	16	0	32	
Disease Treatment	0.25	4	0	12	0	15	
Red Scale Eradication District	0.00	0	0	0	39	39	
Leaf Analysis	0.00	0	0	0	5	5	
Pick-Up Truck	7.50	112	34	0	0	146	
ATV	7.50	112	9	0	0	120	
Mechanical Hedging	0.00	0	0	0	150	150	
Ant Treatment	0.49	7	2	13	0	23	
Bordeaux Treatment	0.20	3	1	0	0	4	
Mite Control	0.47	7	2	8	0	17	
TOTAL CULTURAL COSTS	34.80	442	62	355	293	1,152	
Harvest:							
Harvest	0.00	0	0	4,521	0	4,521	
TOTAL HARVEST COSTS	0.00	0	0	4,521	0	4,521	
Interest on operating capital @ 10.00%						24	
TOTAL OPERATING COSTS/ACRE		442	62	4,876	293	5,697	
CASH OVERHEAD:							
Liability Insurance						9	
Office Expenses						50	
Property Taxes						112	
Property Insurance						80	
Investment Repairs						94	
TOTAL CASH OVERHEAD COSTS						345	
TOTAL CASH COSTS/ACRE						6,042	
NON-CASH OVERHEAD:							
Investment		Per producing Acre		-- Annual Cost -- Capital Recovery			
Shop Buildings		417		34		34	
Shop Tools		260		29		29	
Fuel Tanks & Pumps		260		29		29	
Land		5,730				0	
Irrigation System		1,500		129		129	
Lemon Orchard Establishment		6,647		603		603	
Equipment		873		110		110	
TOTAL NON-CASH OVERHEAD COSTS		15,687		935		935	
TOTAL COSTS/ACRE						6,977	

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Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE LEMON
RIVERSIDE COUNTY - 1998

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
GROSS RETURNS					
LEMONS	775	box	10.75	8,331	
TOTAL GROSS RETURNS FOR LEMONS				8,331	
OPERATING COSTS					
Water:					
Water	76.00	acin	2.08	158	
Contract:					
Prune Trees	1.00	acre	89.00	89	
Vertebrate Pest	1.00	acre	10.00	10	
Red Scale District	1.00	acre	39.05	39	
Leaf Analysis	1.00	acre	5.00	5	
Mechnical Hedging	1.00	acre	150.00	150	
Herbicide:					
Krovar	4.00	lb	11.99	48	
Roundup -Spot Spry	25.00	oz	0.46	11	
Fertilizer:					
Zinc Sulfate	5.00	lb	0.44	2	
Manganese Sulfate	5.00	lb	0.38	2	
Copper Sulfate	1.00	lb	1.11	1	
Formula1	2.00	qt	9.50	19	
Liquid N	532.00	lb N	0.12	64	
Phosphorous acid	1.00	lb	0.60	1	
Pest Control:					
Dimethoate	4.00	pint	4.08	16	
Lorsban - Ants	2.00	pint	6.50	13	
Sulfur	50.00	lb	0.16	8	
Fungicide:					
Ridomil	0.67	lb	17.28	12	
Harvest:					
Pick, Haul etc.	775.00	box	2.70	2,092	
Packing - 54% Crop	419.00	box	4.00	1,676	
Juice - 44% Crop	341.00	box	0.50	170	
Miscellaneous	776.00	box	0.75	582	
Labor (machine)	23.13	hrs	12.40	287	
Labor (non-machine)	15.52	hrs	10.00	155	
Fuel - Gas	23.73	gal	1.16	28	
Fuel - Diesel	11.79	gal	0.76	9	
Lube				5	
Machinery repair				20	
Interest on operating capita/ @10.00%				24	
TOTAL OPERATING COSTS/ACRE				5,697	
NET RETURNS ABOVE OPERATING COSTS				2,634	
CASH OVERHEAD COSTS:					
Liability Insurance				9	
Office Expenses				50	
Property Taxes				112	
Property Insurance				80	
Investment Repairs				94	
TOTAL CASH OVERHEAD COSTS/ACRE				345	
TOTAL CASH COSTS/ACRE				6,042	

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Table 3 continued

NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):	
Shop Buildings	34
Shop Tools	29
Fuel Tanks & Pumps	29
Land	0
Irrigation System	129
Lemon Orchard Establishment	603
Equipment	110
TOTAL NON-CASH OVERHEAD COSTS/ACRE	935
TOTAL COSTS/ACRE	6,977
NET RETURNS ABOVE TOTAL COSTS	1,354

UC COOPERATIVE EXTENSION

Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE LEMON
RIVERSIDE COUNTY - 1998

Beginning JAN 98 Ending DEC 98	JAN 98	FEB 98	MAR 98	APR 98	MAY 98	JUN 98	JUL 98	AUG 98	SEP 98	OCT 98	NOV 98	DEC 98	TOTAL
Cultural:													
Irrigation	23	23	23	23	23	32	32	32	32	23	23	23	313
Prune Trees			89										89
Chop Brush			4										4
Pre-Emergent Herbicicde		56											56
Foliar Spray					11				31				41
Fertilizer	17	16	16								4	16	69
Spot Spray Herbicide					9			9					19
Vertebrate Pest Management	1	1	1	1	1	1	1	1	1	1	1	1	10
Thrips Treatment			23	9									32
Disease Treatment			15										15
Red Scale Eradication District						39							39
Leaf Analysis									5				5
Pick-Up Truck	12	12	12	12	12	12	12	12	12	12	12	12	146
ATV	10	10	10	10	10	10	10	10	10	10	10	10	120
Mechanical Hedging			150										150
Ant Treatment			23										23
Bordeaux Treatment											4		4
Mite Control										17			17
TOTAL CULTURAL COSTS	63	118	366	55	66	94	55	64	91	63	54	62	1,152
Harvest:													
Harvest									1,806	1,806	455	455	4,521
TOTAL HARVEST COSTS									1,806	1,806	455	455	4,521
Interest on oper. capital	1	2	5	5	6	6	7	7	23	-24	-9	-5	24
TOTAL OPERATING COSTS/ACRE	63	120	370	60	72	100	62	72	1,920	1,845	501	512	5,697
OVERHEAD:													
Liability Insurance												9	9
Office Expenses												50	50
Property Taxes		56					56						112
Property Insurance		40					40						80
Investment Repairs	8	8	8	8	8	8	8	8	8	8	8	8	94
TOTAL CASH OVERHEAD COSTS	8	104	8	8	8	8	104	8	8	8	8	67	345
TOTAL CASH COSTS/ACRE	71	223	378	68	80	108	166	80	1,927	1,853	509	580	6,042

Table 5. U.C. COOPERATIVE EXTENSION

WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

RIVERSIDE COUNTY - 1998

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead Insur-ance	Taxes	Total
98	62 HP 2WD Tractor	25,492	20	2,549	2,503	100	140	2,743
98	ATV 4WD	3,861	7	386	693	15	21	730
97	Herbie Sprayer	170	10	17	24	1	1	26
98	Mower - Flail 6'	3,500	25	350	318	14	19	351
98	Orchard Sprayer - 500 Gal	17,055	15	1,706	1,906	67	94	2,066
98	Pickup Truck - 1/2 Ton	17,160	7	1,716	3,081	67	94	3,243
98	Weed Sprayer - 200 Gal	3,282	15	328	367	13	18	398
TOTAL		70,520		7,052	8,891	277	388	9,556
60% of New Cost*		42,312		4,231	5,335	166	233	5,733

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead Insur-ance	Taxes	Repairs	Total
INVESTMENT								
Fuel Tanks & Pumps	12,500	15	1,250	1,397	49	69	250	1,765
Irrigation System	72,000	30	7,200	6,215	282	396	3,600	10,494
Land	275,040				1,961	2,750	0	26,192
Lemon Orchard	319,056	25	31,905	28,956	1,251	1,755	0	31,962
Shop Buildings	20,000	40	2,000	1,635	78	110	400	2,223
Shop Tools	12,500	15	1,250	1,397	49	69	250	1,765
TOTAL INVESTMENT	711,096		43,605	39,601	3,671	5,149	4,500	74,401

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	1.00	Farm	455.00	455
Office Expenses	48.00	Acre	50.00	2,400

Table 6.

U.C. COOPERATIVE EXTENSION
HOURLY EQUIPMENT COSTS
RIVERSIDE COUNTY LEMON - 1998

		COSTS PER HOUR						
	Actual		Cash Overhead		Operating			
Yr Description	Hours Used	Capital Recovery	Insur-ance	Taxes	Repairs	Fuel & Lube	Total Oper.	Total Costs/Hr.
9862 HP 2WD Tractor	189.5	7.93	0.32	0.44	0.98	2.66	3.64	12.32
98ATV 4WD	360.0	1.16	0.03	0.04	0.28	0.89	1.17	2.39
97Herbie Sprayer	36.0	0.40	0.01	0.02	0.00	0.00	0.00	0.43
98Mower - Flail 6'	9.6	19.85	0.86	1.20	1.20	0.00	1.20	23.11
98Orchard Sprayer - 500 Gal	72.5	15.78	0.55	0.78	2.29	0.00	2.29	19.40
98Pickup Truck - 1/2 Ton	360.0	5.14	0.11	0.16	1.25	3.33	4.58	9.98
98Weed Sprayer - 200 Gal	90.2	2.44	0.09	0.12	0.44	0.00	0.44	3.09

Table 7.

UC COOPERATIVE EXTENSION
RANGING ANALYSIS
RIVERSIDE COUNTY - 1998

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE LEMON

	YIELD (BOX/ACRE)						
	542	620	698	775	852	930	1,007
OPERATING COSTS/ACRE:							
Cultural Cost	1,152	1,152	1,152	1,152	1,152	1,152	1,152
Harvest Cost	3,165	3,617	4,069	4,521	4,973	5,425	5,877
Interest on operating capital	30	28	26	24	22	20	18
TOTAL OPERATING COSTS/ACRE	4,346	4,797	5,247	5,697	6,147	6,597	7,048
TOTAL OPERATING COSTS/BOX	8.01	7.74	7.52	7.35	7.21	7.09	7.00
CASH OVERHEAD COSTS/ACRE	345	345	345	345	345	345	345
TOTAL CASH COSTS/ACRE	4,692	5,142	5,592	6,042	6,493	6,943	7,393
TOTAL CASH COSTS/BOX	8.65	8.29	8.02	7.80	7.62	7.47	7.34
NON-CASH OVERHEAD COSTS/ACRE	1,384	1,384	1,384	1,384	1,384	1,384	1,384
TOTAL COSTS/ACRE	6,075	6,526	6,976	7,426	7,876	8,326	8,777
TOTAL COSTS/BOX	11.20	10.53	10.00	9.58	9.24	8.95	8.71

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR LEMON

PRICE (DOLLARS/BOX)	YIELD (BOX/ACRE)						
LEMON	542	620	698	775	852	930	1,007
7.53	-261	-128	5	139	272	405	539
8.60	319	535	752	968	1,184	1,401	1,617
9.68	905	1,205	1,505	1,805	2,105	2,405	2,705
10.75	1,485	1,868	2,251	2,634	3,017	3,400	3,783
11.82	2,066	2,532	2,998	3,463	3,929	4,395	4,861
12.90	2,652	3,201	3,751	4,300	4,850	5,400	5,949
13.97	3,232	3,865	4,497	5,130	5,762	6,395	7,027

NET RETURNS ABOVE CASH COSTS FOR LEMON

PRICE (DOLLARS/BOX)	YIELD (BOX/ACRE)						
LEMON	542	620	698	775	852	930	1007
7.53	-607	-473	-340	-207	-73	60	194
8.60	-26	190	406	623	839	1055	1272
9.68	560	860	1160	1460	1760	2060	2360
10.75	1140	1523	1906	2289	2672	3055	3438
11.82	1721	2187	2652	3118	3584	4050	4516
12.90	2307	2856	3406	3955	4505	5054	5604
13.97	2887	3520	4152	4784	5417	6049	6682

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR LEMON

PRICE (DOLLARS/BOX)	YIELD (BOX/ACRE)						
LEMON	542	620	698	775	852	930	1007
7.53	-1990	-1857	-1724	-1590	-1457	-1323	-1190
8.60	-1410	-1194	-977	-761	-545	-328	-112
9.68	-824	-524	-224	76	376	676	976
10.75	-243	139	522	905	1288	1671	2054
11.82	337	803	1269	1735	2200	2666	3132
12.90	923	1472	2022	2572	3121	3671	4220
13.97	1503	2136	2768	3401	4033	4666	5298