Avocado Sample Establishment and Production Costs and Profitability Analysis for San Diego and Riverside Counties

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Based on 2001 Data Collected in San Diego and Riverside Counties, California

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> To simplify information, trade names of some products have been used in this report. No endorsement of named products is intended, nor criticism implied of similar products that are not mentioned.

The avocado industry of California constituted about 58,600 acres in 2000 according to the California Avocado Commission (CAC). Acreage declined from over 70,000 at the beginning of the 1990s. San Diego and Riverside Counties are among the major avocado producers in California. Currently they constitute a little over 25,400 acres in San Diego and about 6,900 in Riverside a total of about 32,300 to 32,860 acres (depending on the source of estimates) which is about 55% to 56% of the avocado acreage in California.

Many of the orchards in San Diego and Riverside Counties are old and several are being considered for replanting. We present this study to growers, prospective growers, agricultural lenders, and others concerned with the avocado industry to use as an information source for production practices and to estimate financial requirements of establishing and maintaining avocado groves.

The study is based on assumptions of avocado grove establishment and production practices that are considered typical in San Diego and Riverside Counties. While the assumptions outlined in this study may not fit all conditions, they represent current trends of production and the methodology can be easily adapted to address individual situations and to analyze costs, profits, and investments not only in San Diego and Riverside Counties but also in other production areas throughout California. Most of the information in this cost study is collected in San Diego County, however, certain changes are necessary to reflect the costs for Riverside County. Whereas there could be some differences in almost all costs, we assumed that the major changes come from water prices, land values, and avocado prices. When practices deviate from those given in this publication, growers can enter and substitute their own costs for comparison with ours in the "Your cost" column in tables 2 and 3. *Please note that because of rounding, the totals given in tables 1 through 7 may differ slightly from the sums of their constituent numbers.*

Following is a discussion of the assumptions and calculation methods we used in this study. Cultural practices and cost data are presented in detail in seven tables:

ASSUMPTIONS

1. ORCHARD SPECIFICATION

We based this study on a grove size of 11 acres located on sloped land. Ten acres will be in the actual avocado production and one acre in roads and farmstead.

2. ESTABLISHMENT AND PRODUCTION PRACTICES

Land preparation for orchard establishment. In San Diego and Riverside Counties new avocado orchards are commonly planted on previous avocado ground thus all the roads and drainage systems are in place except for a few repairs and maintenances that may be needed. However, we want this study to represent plantings on new/open land in which case all the land preparation costs are included.

Land preparation for new orchard layout includes the following. In hillside plantings, brush is first crushed into the slope by a crawler tractor to leave organic residue on the surface and to help with erosion control. In steeper areas, hand clearing of brush may be necessary. Roads required for travel and harvest are constructed before planting. Tree orientation is usually designed to suit the irrigation and drainage system, slope and grading for erosion control. Irrigation lateral lines run along the contour of the slopes. Erosion control methods include paving the roads, installing drainage systems and seeding the exposed areas of the slope.

Many of the land preparation operations are done under contract by orchard management services.

Planting. There are several types of planting spaces. In recent years there have been some high-density plantings which include spacings of 6’ x 6’, 8’ x 8’, 10’ x 10’ etc. However, this study is based on the most common planting space of about 20' x 15' with 145 trees per acre.

More than 90% of the plantings in San Diego and Riverside Counties are the Hass variety. For this study we used Hass grafted onto clonal rootstock; these trees cost almost twice that of trees on seedling rootstock. Clonals are important for replanting in potential root-rot infested areas. Trees are planted and trunks are wrapped to prevent sunburn and to reduce rodent damage. After planting mulch is added around the base so that moisture loss is decreased and weeds are contained. The mulch application also helps with erosion control. At planting a stake is placed

beside each tree for support. In this study we assumed 2% or 3 trees per acre are being replaced during the second year.

Pruning. Pruning begins at around year 4 of establishment. Pruning consists of removing deadwood, and creation and maintenance of a desirable tree structure and size. This operation also creates access for easy harvest.

Irrigation. In this study we obtained water price information from the University of California Cooperative Extension (UCCE) farm advisors in San Diego County and the Rancho California Water District for Riverside County. Water costs used in this study are $600 per acre-foot for San Diego and about $420 per acre-foot for Riverside County.

The irrigation system is installed before planting in year 1. During the first two years of establishment, the orchard is irrigated using drip emitters.

In the third year the drip emitters are replaced with micro sprinklers. One micro sprinkler, emitting 12 to 15 gallons per hour, is used per tree. Water is not allowed to wet the tree trunk.

The frequency and amount of irrigation depends on weather and rainfall. In some years irrigation is needed every month of the year, and in other years irrigation may not be required during the winter and early spring. In this study we assumed irrigation taking place throughout the year with frequency of two times a week in year one and one time per week from year 2 on. During very hot summer months, i.e. July and August more that one irrigation per week may be needed.

Irrigation cost also includes labor to inspect the system for water flow and to fix any problems such as breaks, leaks or emitter clogging.

Water requirement estimates at various ages of trees is provided in table A.

Table A. Applied irrigation water in San Diego and Riverside Counties avocado production

Year	Acre-inches per acre per year	Gallons per tree per year
1	6	1,124
2	11	2,060
3	16	2,997
4	21	3,933
5	26	4,870
6	30	5,619
7 +	36	6,743

Pest Management. Beneficial insects are used to control omnivorous looper and amorbia moth. A pest control advisor (PCA) monitors pest population levels in the orchard and release beneficial insects as needed. Persea mite is generally under biological control, however, in some cases other control measures may be required. In this study we used VeratranD sprayed for thrips control three times just after fruit set. Thrips control should only be done if recommended by a licensed PCA.

Gopher and squirrel controls are needed early during the first three or four years of tree establishment. Gophers can cause serious damage to young trees and ground

squirrels can cause erosion problems by tunneling through the soil. Baits are used for the control of gophers and squirrels.

Other pests may be present in the orchard. Growers can adjust their costs of pest management as applicable. For information and pesticide use permits, contact your county Agricultural Commissioner's office. You can also find pest management information from the University of California on the UC Statewide Integrated Pest Management Project website, http://www.ipm.ucdavis.edu/PMG/selectnewpest.avocado.html.

Weed Management. Controlling weeds includes spraying several times (three times in this study) a year and cutting weeds using weed whips once a year, usually during spring. As trees grow larger, the shade will reduce weed growth.

Fertilization. The amount of fertilizer applied increases with age of trees. Table B provides the typical amounts of nitrogen (N) applied by growers. Nitrogen is injected through the irrigation line during the course of the year. Additionally, zinc sulfate is applied beginning year 3.

Table B. Pounds of nitrogen fertilizer applied in San Diego and Riverside Counties avocado production

Year	Pounds of N per acre	Pounds of N per tree
1	22	0.15
2	44	0.30
3	65	0.45
4	87	0.60
5	109	0.75
6	131	0.90
7	153	1.05

Pollination. Contracting with beekeepers to provide beehives for pollination begins in the third year of establishment.

3. HARVESTING, MARKETING, AND INSPECTION

Harvesting begins at the end of the third year of establishment. Weather and market conditions dictate the period of harvest. Hass avocados are generally size picked from January through August. In this study we assumed that harvesting takes place in the months of January, March, and June.

Harvesting costs include picking and hauling to a nearby packinghouse. There are also marketing order fee by the California Avocado Commission (CAC) and inspection fee by the California Department of Food and Agriculture (CDFA). Picking and hauling costs are based on pounds of production. CAC marketing order fee is based on pounds of avocados sold. CDFA inspection fee is for maturity and quality standards. Picking and hauling costs for this study were provided by the UCCE San Diego County farm advisor. The CAC marketing order fee was obtained from the CAC. The inspection fee was provided by CDFA.

Risk. There are several risks associated with producing and marketing avocados. Production risk can be caused by various sources of uncertainty including high winds, insect damage, diseases, and severe frost. Frost is the main production risk

in San Diego and Riverside Counties. The market and prices of avocados are also very volatile. They are caused by factors such as a decrease in the demand for avocados, and or an oversupply in the national and international production.

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 the profitability and economic viability of all producers. Access to information on production practices, prices, and markets are crucial for those involved in avocado production and marketing.

4. YIELD AND PRICES

Yield. Fruit bearing begins in the third year of establishment of the avocado trees. We used the yield assumptions provided in table C to estimate income during the establishment years. During the production years, we used the average between 5,000 of 10,000 lbs as the basis of our analysis. However, we analyzed the effects of a range of yield on returns and profitability (tables 6 and 7).

Table C. Typical yield assumptions of avocados in San Diego and Riverside Counties

Year	Yield (lbs/acre)
3	725
4	2,900
5	4,350
6	5,510
7+ (Maturity)	5,000 to 10,000

Prices/Returns: We used a five-year average price (Agricultural Crop Reports for the 1996 to 2000 period) for San Diego and Riverside Counties (appendix table) to estimate gross returns, respectively. However, we included a range of prices to analyze returns and profitability in the production years (tables 6 and 7).

5. INTEREST ON OPERATING CAPITAL

We calculated interest on operating capital using a nominal rate of a three-year average (1999 to 2001) of 9 percent per year. Interest on operating capital reflects the costs of borrowing money or an opportunity cost for using in-house funds. Interest on operating capital is charged until income is received from the crop at harvest.

6. LABOR

Labor cost includes both owner and hired services at the same wage rate. Labor wages vary by operation, location and type of benefits included. We used $12 per hour wage rate including benefits based on information we obtained from some growers in San Diego and Riverside Counties.

7. CASH OVERHEAD

Office expenses. Expenses in this category cover office supplies, telephone services, operating costs for a fax machine, photo copier, and computer, bookkeeping, accounting, legal fees, and so on.

Property taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property, including land, equipment, buildings, and improvements. Special assessment districts in some counties charge additional

taxes on property. For our study we calculated county taxes at 1 percent of the value of the property.

Property insurance. Growers also carry insurance for property protection, which is typically calculated at 0.713 percent of the average value of assets. In addition, a farm of the size specified in this report would carry liability insurance of $367 per year to cover accidents on the entire farm.

Investment repairs. Investment repairs and maintenances are calculated at 1 to 3.5 percent of the investment values as suggested in some farm management books. The repair rate for the irrigation system, however, are calculated at 10% for sprinkler and dripper emitters and 5% for the main system based on local information.

Interest on establishment. Interest on establishment is calculated at the nominal rate to reflect the accruing of charges on loans or returns forgone during the establishment years.

Other expenses. These expenses include root rot analysis, liability insurance, leaf analysis, soil/water analysis conducted each year, sanitation fee, and interest on operating capital (cash overhead). Sanitation fee includes rent for portable field toilets during harvest time.

8. NON-CASH OVERHEAD COSTS

The non-cash overhead costs of assets include land rent and ownership costs of other investments like building, tools, irrigation system, and amortized establishment costs.

Land rent. In most cases, in San Diego and Riverside Counties, groves are being re-planted on previous avocado land, therefore most growers may not be incurring land mortgage. However, we place an opportunity cost for the use of land in avocado production. That is to show that the land could have been used in other return (interest) yielding alternatives. The land rent is to reflect the return foregone from those alternatives.

Land rent is calculated at an opportunity cost rate of 6.5% of the value of land. This rate is the ten year average of rates of return to production assets from current income of the California's agricultural sector. The idea is that the use of the land should at least earn this rate.

The value of land is calculated from orchard values published in the California Chapter of the American Society of Farm Managers and Rural Appraisers for year 2000. We were told by local appraisers that the value of land will constitute about 40% to 65% of the orchards value. For this study, we calculated the land value to account for 60% of the value of orchards for San Diego and Riverside Counties. This value equals $7,680 per acre for San Diego and $6,150 per acre for Riverside County. Since there are 10 acres in the actual avocado orchard with another 1 acre of roads and farmstead on which avocados are grown, this increases the cost of land to $8,450 per producing acre in San Diego and $6,770 in Riverside County.

Ownership costs of investments. This costs are calculated using the capital recovery method. This method allows growers to calculate an annual amount of money to charge the enterprise so that the value of assets will be recovered within a specified period of time at a designated rate of interest. The rate of interest used to calculate ownership cost is 6.5 percent -- California's long-term rate of return on agricultural production assets from current income.

Amortized establishment cost. We used the first six years as periods of establishment. We made the assumption that after year six the orchard is considered mature.

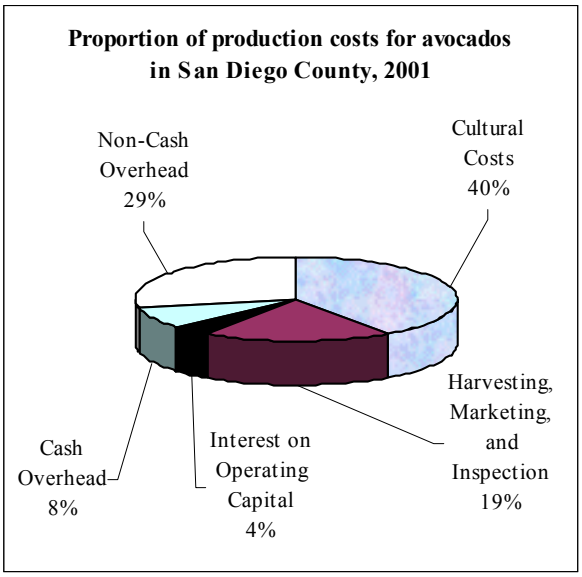
Our estimate of the total six-year tree establishment costs is $18,991 per acre for San Diego County and $17,557 per acre for Riverside County. This amount is the accumulated cost of establishment less the gross income over the six-year period.

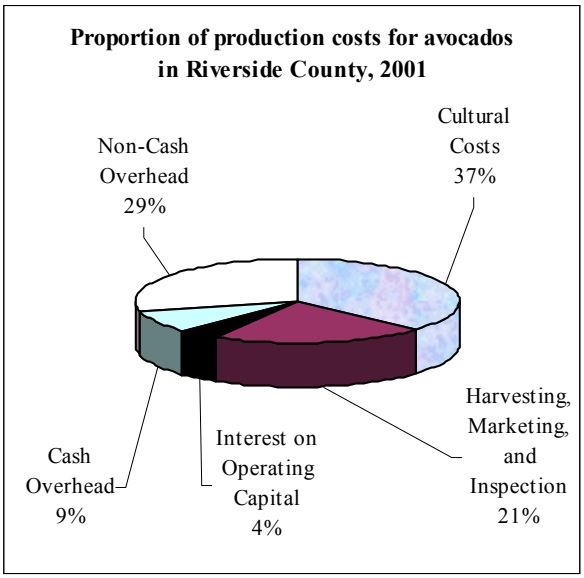
The value of trees is amortized at the long-term average rate of return on agricultural production assets from current income over a 30-year productive life to determine the annual amount that must be recovered from the investment.

9. SUMMARY OF PRODUCTION COSTS

Our estimates of total annual production cost for avocados in San Diego and Riverside Counties are $7,618 and $6,795 per acre (tables 2 and 3), respectively. Table 2 presents costs by type of activity and table 3 present costs by type of input.

The pie graphs that follows shows the proportion of costs by category. Cultural costs include items such as drain cleaning, weed control, pruning, pollination, road repair, pest control, fertilization, and irrigation. Harvesting, marketing, and inspection costs include picking, hauling, and CAC assessment and CDFA inspection fees. Interest on operating capital includes all financial charges or opportunity costs. Cash overhead costs include items such as root rot analysis, liability insurance, leaf analysis, soil analysis, sanitation fee, office expenses, property taxes, property insurance, and investment repair. Non-cash overhead or annual ownership costs include land rent, buildings, tools, irrigation system, and amortization of the accumulated tree establishment.





10. PROFITABILITY ANALYSIS

We analyzed profitability using break-even costs per pound for various yield levels as well as using gross and economic margins at various combinations of yield and prices.

Break-even costs allow growers to compare expected market prices with the unit cost of production. Break-even cost is calculated as the cost of production per acre

divided by yield per acre. Gross margin (or returns above cash costs) is what growers often refer to as *profit* if there is no debt on the farming operation. It approximates the return to management and investment. If you deduct depreciation, it also approximates taxable income. Gross margin is calculated as gross returns (price times yield) minus cash costs of production.

Economic profit (or returns above total cost including management) is a very useful measure of how attractive the enterprise is for potential investors and entrants into the business. Economic profit can be positive or zero. A zero economic profit should not be alarming if all costs, including the owners' labor and management fees, are included in the production cost. In this study we do not include management charges, so the return after all costs are deducted reflects return to management. Returns to management is calculated as gross returns minus cash and non-cash costs of production.

Crop yield and prices received by growers vary from individual to individual. We have provided a range analyses of price and yield variations on profitability so that each grower can find figures that best match his or her specific situation. The range analyses include break-even costs at various yields as well as gross margins and returns to management at various yields and price combinations (tables 6 and 7).

REFERENCES

American Society of Agricultural Engineers. 1992. American Society of Agricultural Engineers Standards Yearbook. St. Joseph, MI.: ASAE.

Bender, G. S. 1999. Avocado Fertilization. University California Cooperative Extension. San Diego, CA.

Bender, G. S. 1999. Avocado Irrigation Guide. University California Cooperative Extension. San Diego, CA.

Bender, G. S. Orchard Operations for Avocados in San Diego County. University California Cooperative Extension. San Diego, CA.

Boehlje, M. D., and V. R. Eidman. 1984. Farm Management. John Wiley and Sons. New York, NY.

California Avocado Crop Statistics. 2000. California Avocado Commission. Santa Ana, CA.

Integrated Pest Management Education and Publications. 2001. UC IPM Pest Management Guidelines, Avocados. In Faber, B. A., P.A. Phillips, L. J. Marais, B. B. Westerdahl, and U.C. Kodira (ed.). University of California. Division of Agriculture and Natural Resources. Oakland, CA.
http://www.ipm.ucdavis.edu/PMG/selectnewpest.avocado.html

Riverside County Agricultural Commissioner and Weights & Measures. Agricultural Crop Reports 1996-2000. Riverside, CA.

San Diego Department of Agricultural, Weights, and Measures. Crop Statistics and Annual Reports 1996-2000. San Diego, CA.

Schwankel, L., T. Prichard, B. Hanson, and I. Wellman. 2000. Costs of Pressurized Irrigation Systems for Tree Crops. University of California Agriculture and Natural Resources. Oakland, CA.

Trends in Agricultural Land and Lease Values. 2001. Californian Chapter or the American Society of Farm Managers and Rural Appraisers. Sacramento, CA.
http://www.calasfmra.com/landvalues/index.htm

Unites States Department of Agriculture-Economic Reporting Service. 2001. Farm Financial Ratios Indicating Solvency and Profitability 1960 – 2000, California.
www.ers.usda.gov/data/farmbalancesheet/fbsdmu.htm

Table 1. Sample costs per acre to establish an avocado grove in San Diego County, based on 2001 data

	Cost Per Acre					
Year	1st	2nd	3rd	4th	5th	6th
OPERATING COSTS:						
Pre-Planting Costs:						
Clear land & road building	2,000					
Orchard layout	96					
TOTAL PRE-PLANTING COSTS	2,096					
Planting Costs:						
Avocado tree	2,755					
Digging, planting, wrapping, & mulching	392					
Staking	376					
TOTAL PLANTING COSTS	3,522					
Replanting Costs:						
Replaced trees - 2%		57				
Digging, planting, wrapping, & mulching replaced trees - 2%		8				
Staking replaced trees - 2%		8				
TOTAL REPLANTING COSTS		73				
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)						
Erosion control - clean drain	10	10	10	10	10	10
Weed control - Roundup (3x)	114	114	114	114	114	114
Orchard pruning				64	128	255
Pollination			84	84	84	84
Road repair		38		38		38
Weed control - weed whip (1x)	24	24	24	24	24	6
Rodent control - gopher traps (2x)	15	15	15			
Rodent control - gopher bait (2x)	16	16	16			
Pest control - VeratranD Air Spray (3x)			285	285	285	285
Fertilize - Zinc Sulfate 12% (1x)			2	3	5	7
Fertilize CAN 17	19	38	57	76	94	113
Irrigate & walk lines	492	646	896	1,146	1,396	1,596
Pest control advisor			60	60	60	60
Rodent control (squirrels)	25	25	25			
TOTAL CULTURAL COSTS	715	926	1,588	1,904	2,201	2,568
Harvesting, Marketing, and Inspection Costs:						
Picking - $0.16 per pound			76	464	696	882
Hauling - $0.004 per pound			3	12	17	22
CAC assessment fee - $0.035 per pound			25	102	152	193
CDFA inspection fee - $0.001 per pound			1	3	4	6
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS			105	580	870	1,102
Interest on Operating Capital @ 9%:	486	54	95	144	179	216
TOTAL OPERATING COSTS	6,820	1,052	1,788	2,628	3,250	3,887

Table 1. Sample costs per acre to establish an avocado grove in San Diego County, based on 2001 data (cont.)

	1st	2nd	3rd	4th	5th	6th
Cash Overhead Costs:						
Root rot analysis	3	3	3	3	3	3
Liability insurance	37	37	37	37	37	37
Leaf analysis	5	5	5	5	5	5
Soil analysis	5	5	5	5	5	5
Sanitation fee			22	22	22	22
Office expenses	180	180	180	180	180	180
Property taxes	96	133	144	157	164	168
Property insurance	8	34	43	52	57	60
Investment repairs	83	83	91	91	91	91
Interest on operating capital (cash overhead)	23	27	34	35	36	37
Interest on establishment		721	995	1,293	1,488	1,619
TOTAL CASH OVERHEAD COSTS	440	1,227	1,559	1,880	2,088	2,226
TOTAL CASH COSTS	7,260	2,280	3,347	4,508	5,339	6,113
INCOME FROM PRODUCTION	0	0	769	3,074	4,611	5,841
NET CASH COSTS FOR THE YEAR	7,260	2,280	2,578	1,434	728	272
ACCUMULATED NET CASH COSTS	7,260	9,540	12,118	13,552	14,279	14,552
Non-cash Overhead:						
Land rent	549	549	549	549	549	549
Building	73	73	73	73	73	73
Tools (shovels, picking bags, saws, etc.)	31	31	31	31	31	31
Irrigation system	68	68	68	68	68	68
Drippers	36	36				
Sprinklers			11	11	11	11
TOTAL NON-CASH OVERHEAD COSTS	757	757	732	732	732	732
TOTAL NET COST FOR THE YEAR	8,016	3,036	3,310	2,166	1,459	1,004
TOTAL ACCUMULATED NET COST	8,016	11,053	14,362	16,528	17,987	18,991

Table 2. Costs per acre to produce avocados in San Diego County, 2001

Operation	Operation time (hrs/ac)	Costs per acre ($) Labor cost	Fuel, lube, & repairs	Material cost	Custom/ rent	Total cost	Your cost ($)
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)							
Erosion control - clean drain	0.83	10	0	0	0	10	
Weed control - Roundup (3x)	9.00	108	0	6	0	114	
Orchard pruning	35.77	429	0	0	0	429	
Pollination	0	0	0	0	84	84	
Road repair	0	0	0	0	38	38	
Weed control - weed whip (1x)	0.50	6	0	0	0	6	
Pest control - VeratranD Air Spray (3x)	0	0	0	0	285	285	
Fertilize - Zinc Sulfate 12% (1x)	0	0	0	9	0	9	
Fertilize CAN17 (9x)	0	0	0	132	0	132	
Irrigate & walk lines	8.00	96	0	1,800	0	1,896	
Pest control advisor	0	0	0	0	60	60	
TOTAL CULTURAL COSTS	**54.10**	**649**	**0**	**1,947**	**467**	**3,063**	
Harvesting, Marketing, and Inspection Costs:							
Picking - $0.16 per pound	0	0	0	0	1,160	1,160	
Hauling - $0.004 per pound	0	0	0	0	29	29	
CAC assessment fee - $0.035 per pound	0	0	0	0	254	254	
CDFA inspection fee - $0.001 per pound	0	0	0	0	7	7	
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS	**0**	**0**	**0**	**0**	**1,450**	**1,450**	
Interest on operating capital @ 9%						269	
TOTAL OPERATION COSTS/ACRE		**649**	**0**	**1,947**	**1,917**	**4,782**	
Cash Overhead Costs:							
Root rot analysis						3	
Liability insurance						37	
Leaf analysis						5	
Soil analysis						5	
Sanitation fee						22	
Office expenses						180	
Property taxes						192	
Property insurance						76	
Investment repairs						91	
TOTAL CASH OVERHEAD COSTS						**611**	
Interest on operating capital (cash overhead) @ 9%						**40**	
TOTAL CASH COSTS/ACRE						**5,432**	

Table 2. Costs per acre to produce avocados in San Diego County, 2001 (cont.)

	Cost per producing acre	Annual cost: capital recovery	Total cost	Your cost ($)
Non-cash Overhead:				
Land rent	8,450	549	549	
Building	1,000	73	73	
Tools (shovels, picking bags, saws, etc.)	300	31	31	
Irrigation system	944	68	68	
Sprinklers	145	11	11	
Amortized establishment cost	18,991	1,454	1,454	
TOTAL NON-CASH OVERHEAD COSTS	**29,830**	**2,186**	**2,186**	
TOTAL COST/ACRE			**7,618**	

Table 3. Costs and returns per acre to produce avocados in San Diego County, 2001

	Quantity per acre	Unit	Price or cost per unit ($)	Value or cost per acre ($)	Your cost ($)
Gross Returns	7,250.00	pound	1.06	7,685	
TOTAL GROSS RETURNS FOR AVOCADOS					
Operating Costs:					
Herbicide:					
Roundup (3x)	1.00	pint	6.45	6	
Rent:					
Bee hives	2.00	hive	42.00	84	
Miscellaneous:					
Road repair	1.00	acre	37.50	38	
Harvest, Market, and Inspection:					
Pick (3x)	7,250.00	pound	0.160	1,160	
Pack (3x)	7,250.00	pound	0.004	29	
CAC assessment (3x)	7,250.00	pound	0.035	254	
CDFA inspection (3x)	7,250.00	pound	0.001	7	
Pest Management:					
VeratranD Air Spray (3x)	1.00	acre	285.00	285	
Pest control advisor	1.00	acre	60.00	60	
Fertilize:					
CAN 17 (9x)	71.01	gallon	1.86	132	
Zinc Sulfate 12%	5.00	gallon	1.73	9	
Water:					
Water	36.00	acre-inch	50	1,800	
Labor (non-machine):	54.10	hours	12.00	649	
Interest on operating capital @ 9%:				269	
TOTAL OPERATING COSTS/ACRE				**4,782**	
NET RETURNS ABOVE OPERATING COSTS				**2,903**	
Cash Overhead Costs:					
Root rot analysis				3	
Liability insurance				37	
Leaf analysis				5	
Soil analysis				5	
Sanitation fee				22	
Office expenses				180	
Property taxes				192	
Property insurance				76	
Investment repairs				91	
Interest on operating capital (cash overhead) @ 9%:				40	
TOTAL CASH OVERHEAD COSTS				**650**	
TOTAL CASH COSTS/ACRE				**5,432**	

Table 3. Costs and returns per acre to produce avocados in San Diego County, 2001 (cont.)

	Quantity per acre	Unit	Price or cost per unit ($)	Value or cost per acre ($)	Your cost ($)
Non-cash Overhead:					
Land rent				549	
Building				73	
Tools (shovels, picking bags, saws, etc.)				31	
Irrigation system				68	
Sprinklers				11	
Amortized establishment cost				1,454	
TOTAL NON-CASH OVERHEAD COSTS				**2,186**	
TOTAL COST/ACRE				**7,618**	
NET RETURNS ABOVE TOTAL COSTS				**67**	

Table 4. Monthly cash costs per acre to produce avocados in San Diego County, 2001

	Costs per acre ($)												
Beginning Jan 2001 **Ending Dec 2002**	**Jan 2001**	**Feb 2001**	**Mar 2001**	**Apr 2001**	**May 2001**	**Jun 2001**	**Jul 2001**	**Aug 2001**	**Sep 2001**	**Oct 2001**	**Nov 2001**	**Dec 2002**	**TOTAL**
Cultural Costs: (Materials, Labor, Fuel, Lube, & Repair)													
Erosion control - clean drain	10												10
Weed control - Roundup (3x)		38			38			38					114
Orchard pruning			429										429
Pollination			84										84
Road repair			38										38
Weed control - weed whip (1x)			6										6
Pest control - VeratranD Air Spray (3x)			95	95	95								285
Fertilize - Zinc Sulfate 12% (1x)					9								9
Fertilize CAN17 (9x)		15	15	15	15	15	15	15	15	15			132
Irrigate & walk lines	40	80	120	172	224	264	303	264	211	120	60	40	1,896
Pest control advisor	5	5	5	5	5	5	5	5	5	5	5	5	60
TOTAL CULTURAL COSTS	**55**	**138**	**791**	**286**	**386**	**283**	**322**	**321**	**231**	**139**	**65**	**45**	**3,063**
Harvesting, Marketing, and Inspection Costs:													
Picking - $0.16 per pound	290		290			580							1,160
Hauling - $0.004 per pound	7		7			15							29
CAC assessment fee - $0.035 per pound	64		64			127							254
CDFA inspection fee - $0.001 per pound	2		2			4							7
TOTAL HARVESTING, MARKETING, AND INSPECTION COSTS	**363**	**0**	**363**	**0**	**0**	**725**	**0**	**0**	**0**	**0**	**0**	**0**	**1,450**
Interest on operating capital @ 9%	3	4	13	15	18	25	28	30	32	33	34	34	269
TOTAL OPERATION COSTS/ACRE	**421**	**142**	**1,166**	**301**	**403**	**1,034**	**350**	**352**	**263**	**172**	**99**	**79**	**4,782**
Cash Overhead Costs:													
Root rot analysis					3								3
Liability insurance						37							37
Leaf analysis									5				5
Soil analysis									5				5
Sanitation fee	7		7			7							22
Office expenses	15	15	15	15	15	15	15	15	15	15	15	15	180
Property taxes	96					96							192
Property insurance	38					38							76
Investment repairs	8	8	8	8	8	8	8	8	8	8	8	8	91
TOTAL CASH OVERHEAD COSTS	**164**	**23**	**30**	**23**	**26**	**201**	**23**	**23**	**33**	**23**	**23**	**23**	**611**
Interest on operating capital (cash overhead) @ 9%	1.34	1.51	1.85	2.02	2.21	3.82	3.99	4.16	4.41	4.58	4.75	4.92	40
TOTAL CASH COSTS/ACRE	**586**	**166**	**1,198**	**326**	**431**	**1,238**	**377**	**378**	**300**	**199**	**126**	**107**	**5,432**

Table 5. Farm investment values and annual costs based on 10 annual farmed acres in San Diego County, 2001

Description	2001 Price ($)	Life (yrs)	Salvage value ($)	Capital recovery ($)	Insurance	Taxes	Repairs	Total
Investment:								
Land rent	84,500	36	84,500	5,493	0	845	0	6,338
Building	10,000	36		725	36	50	225	1,036
Tools (hand tools, shovels, picking bags, saws, etc.)	3,000	15	300	307	12	17	68	402
Irrigation system	9,440	36		685	34	47	472	1,237
Sprinklers	1,450	34		107	5	7	145	264
Amortized establishment cost	189,910	30		14,543	677	950	0	16,169
TOTAL INVESTMENT	**298,300**		**84,800**	**21,858**	**763**	**1,916**	**910**	**25,447**

Description	Enterprise/ farm size	Unit	Price per unit ($)	Total cost ($)
Business Overhead:				
Root rot analysis	10	acre	3	30
Liability insurance	10	acre	36.7	367
Leaf analysis	10	acre	5	50
Soil analysis	10	acre	5	50
Sanitation fee	10	acre	22.29	223
Office expenses	10	acre	180	1,800

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

Table 6. Range analyses of avocado production costs and returns in San Diego County, 2001

	Yield in pounds/acre								
	3,000	**4,000**	**5,000**	**6,000**	**7,000**	**7,250**	**8,000**	**9,000**	**10,000**
	----------$/acre----------								
Part A. Costs per acre and per pound at varying yields									
Operating costs/acre:									
Cultural Costs	3,063	3,063	3,063	3,063	3,063	3,063	3,063	3,063	3,063
Harvesting Costs	600	800	1,000	1,200	1,400	1,450	1,600	1,800	2,000
Interest on operating capital	211	225	238	252	265	269	279	292	306
TOTAL OPERATING COSTS/ACRE	**3,874**	**4,088**	**4,301**	**4,515**	**4,728**	**4,782**	**4,942**	**5,155**	**5,369**
TOTAL OPERATING COSTS/POUND	**1.29**	**1.02**	**0.86**	**0.75**	**0.68**	**0.66**	**0.62**	**0.57**	**0.54**
CASH OVERHEAD COSTS/ACRE	**650**	**650**	**650**	**650**	**650**	**650**	**650**	**650**	**650**
TOTAL CASH COSTS/ACRE	**4,524**	**4,738**	**4,952**	**5,165**	**5,379**	**5,432**	**5,592**	**5,806**	**6,019**
TOTAL CASH COSTS/POUND	**1.51**	**1.18**	**0.99**	**0.86**	**0.77**	**0.75**	**0.70**	**0.65**	**0.60**
NON-CASH OVERHEAD COSTS/ACRE	**2,186**	**2,186**	**2,186**	**2,186**	**2,186**	**2,186**	**2,186**	**2,186**	**2,186**
TOTAL COSTS/ACRE	**6,710**	**6,924**	**7,137**	**7,351**	**7,564**	**7,618**	**7,778**	**7,991**	**8,205**
TOTAL COSTS/POUND	**2.24**	**1.73**	**1.43**	**1.23**	**1.08**	**1.05**	**0.97**	**0.89**	**0.82**
Part B. Returns per acre above operating costs									
Price ($/pound):									
0.76	-1,594	-1,048	-501	45	592	728	1,138	1,685	2,231
0.86	-1,294	-648	-1	645	1,292	1,453	1,938	2,585	3,231
0.96	-994	-248	499	1,245	1,992	2,178	2,738	3,485	4,231
1.06	-694	152	999	1,845	2,692	2,903	3,538	4,385	5,231
1.16	-394	552	1,499	2,445	3,392	3,628	4,338	5,285	6,231
1.26	-94	952	1,999	3,045	4,092	4,353	5,138	6,185	7,231
1.36	206	1,352	2,499	3,645	4,792	5,078	5,938	7,085	8,231
Part C. Returns per acre above all cash costs (gross margin)									
Price ($/pound):									
0.76	-2,244	-1,698	-1,152	-605	-59	78	488	1,034	1,581
0.86	-1,944	-1,298	-652	-5	641	803	1,288	1,934	2,581
0.96	-1,644	-898	-152	595	1,341	1,528	2,088	2,834	3,581
1.06	-1,344	-498	348	1,195	2,041	2,253	2,888	3,734	4,581
1.16	-1,044	-98	848	1,795	2,741	2,978	3,688	4,634	5,581
1.26	-744	302	1,348	2,395	3,441	3,703	4,488	5,534	6,581
1.36	-444	702	1,848	2,995	4,141	4,428	5,288	6,434	7,581

Table 6. Range Analysis of avocado production costs and returns in San Diego County, 2001 (cont.)

	Yield in pounds/acre								
	3,000	4,000	5,000	6,000	7,000	7,250	8,000	9,000	10,000
	…….$/Acre ……								
Part D. Returns per acre above total costs (returns to management)									
Price ($/pound)									
0.76	-4,430	-3,884	-3,338	-2,791	-2,245	-2,108	-1,698	-1,152	-658
0.86	-4,130	-3,484	-2,838	-2,191	-1,545	-1,383	-898	-252	395
0.96	-3,830	-3,084	-2,338	-1,591	-845	-658	-98	648	1,395
1.06	-3,530	-2,684	-1,838	-991	-145	67	702	1,548	2,395
1.16	-3,230	-2,284	-1,338	-391	555	792	1,502	2,448	3,395
1.26	-2,930	-1,884	-838	209	1,255	1,517	2,302	3,348	4,395
1.36	-2,630	-1,484	-338	809	1,955	2,242	3,102	4,248	5,395

Table 7. Range analyses of avocado production costs and returns in Riverside County, 2001

	Yield in pounds/acre								
	3,000	**4,000**	**5,000**	**6,000**	**7,000**	**7,250**	**8,000**	**9,000**	**10,000**
	----------$/acre----------								
Part A. Costs per acre and per pound at varying yields									
Operating costs/acre:									
Cultural Costs	2,517	2,517	2,517	2,517	2,517	2,517	2,517	2,517	2,517
Harvesting Costs	600	800	1,000	1,200	1,400	1,450	1,600	1,800	2,000
Interest on operating capital	185	199	212	226	239	242	253	266	280
TOTAL OPERATING COSTS/ACRE	**3,302**	**3,516**	**3,729**	**3,942**	**4,156**	**4,209**	**4,369**	**4,583**	**4,796**
TOTAL OPERATING COSTS/POUND	**1.10**	**0.88**	**0.75**	**0.66**	**0.59**	**0.58**	**0.55**	**0.51**	**0.48**
CASH OVERHEAD COSTS/ACRE	**619**	**619**	**619**	**619**	**619**	**619**	**619**	**619**	**619**
TOTAL CASH COSTS/ACRE	**3,921**	**4,135**	**4,348**	**4,562**	**4,775**	**4,829**	**4,989**	**5,202**	**5,416**
TOTAL CASH COSTS/POUND	**1.31**	**1.03**	**0.87**	**0.76**	**0.68**	**0.67**	**0.62**	**0.58**	**0.54**
NON-CASH OVERHEAD COSTS/ACRE	**1,967**	**1,967**	**1,967**	**1,967**	**1,967**	**1,967**	**1,967**	**1,967**	**1,967**
TOTAL COSTS/ACRE	**5,888**	**6,102**	**6,315**	**6,528**	**6,742**	**6,795**	**6,955**	**7,169**	**7,382**
TOTAL COSTS/POUND	**1.96**	**1.53**	**1.26**	**1.09**	**0.96**	**0.94**	**0.87**	**0.80**	**0.74**
Part B. Returns per acre above operating costs									
Price ($/pound):									
0.67	-1,292	-836	-379	78	534	648	991	1,447	1,904
0.77	-992	-436	121	678	1,234	1,373	1,791	2,347	2,904
0.87	-692	-36	621	1,278	1,934	2,098	2,591	3,247	3,904
0.97	-392	364	1,121	1,878	2,634	2,823	3,391	4,147	4,904
1.07	-92	764	1,621	2,478	3,334	3,548	4,191	5,047	5,904
1.17	208	1,164	2,121	3,078	4,034	4,273	4,991	5,947	6,904
1.27	508	1,564	2,621	3,678	4,734	4,998	5,791	6,847	7,904
Part C. Returns per acre above all cash costs (gross margin)									
Price ($/pound):									
0.67	-1,911	-1,455	-998	-542	-85	29	371	828	1,284
0.77	-1,611	-1,055	-498	58	615	754	1,171	1,728	2,284
0.87	-1,311	-655	2	658	1,315	1,479	1,971	2,628	3,284
0.97	-1,011	-255	502	1,258	2,015	2,204	2,771	3,528	4,284
1.07	-711	145	1,002	1,858	2,715	2,929	3,571	4,428	5,284
1.17	-411	545	1,502	2,458	3,415	3,654	4,371	5,328	6,284
1.27	-111	945	2,002	3,058	4,115	4,379	5,171	6,228	7,284

Table 7. Range analyses of avocado production costs and returns in Riverside County, 2001 (cont.)

	Yield in pounds/acre								
	3,000	**4,000**	**5,000**	**6,000**	**7,000**	**7,250**	**8,000**	**9,000**	**10,000**
	----------$/acre----------								
Part D. Returns per acre above total costs (returns to management)									
Price ($/pound):									
0.67	-3,878	-3,422	-2,965	-2,508	-2,052	-1,938	-1,595	-1,139	-682
0.77	-3,578	-3,022	-2,465	-1,908	-1,352	-1,213	-795	-239	318
0.87	-3,278	-2,622	-1,965	-1,308	-652	-488	5	661	1,318
0.97	-2,978	-2,222	-1,465	-708	48	237	805	1,561	2,318
1.07	-2,678	-1,822	-965	-108	748	962	1,605	2,461	3,318
1.17	-2,378	-1,422	-465	492	1,448	1,687	2,405	3,361	4,318
1.27	-2,078	-1,022	35	1,092	2,148	2,412	3,205	4,261	5,318

Appendix

Harvested acreage, average yield, average price, and average value per acre for avocados, San Diego County, 1996-2000

Year	Harvested acreage	Total pounds per acre	Price per pound	Value per acre
1996	23,947	6,751	0.78	5,266
1997	22,600	5,710	0.95	5,425
1998	26,347	5,217	1.00	5,217
1999	26,347	4,252	1.33	5,655
2000	25,997	4,717	1.23	5,802
Average	25,048	5,329	1.06	5,473

Harvested acreage, average yield, average price, and average value per acre for avocados, Riverside County, 1996-2000

Year	Harvested acreage	Total pounds per acre	Price per pound	Value per acre
1996	7,063	4,914	0.88	4,324
1997	6,719	5,460	0.96	5,242
1998	7,020	5,486	0.96	5,267
1999	7,040	5,330	0.96	5,117
2000	6,863	5,616	1.06	5,953
Average	6,941	5,361	0.97	5,180

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