

Can You Make Money Growing Cherimoya in the Coastal Regions of California?

A Sample of Establishment and Production Costs and Profitability Analysis

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Cherimoya production in the coastal regions of California has been developing, and several farm advisors at the University of California have been gathering information regarding production practices and the economic feasibility of the crop. In this article, I provide estimates of the costs and capital needs for producing cherimoya in the coastal regions of California, as well as a basis for evaluating profitability using gross and net margins to determine economic profit. Because values of land and water vary tremendously within the region, I also provide guidelines to adjust gross and net margins to accommodate such variations.

Determining Establishment and Production Costs

Establishment and production costs for cherimoya in the coastal regions of California are determined based on information gathered from growers and shippers. In addition, growers and farm advisors suggest that some of the cost information from a recent study conducted for lemon production in Ventura County (Takele et al., 1997) will be applicable to cherimoya production. The following data and assumptions have been used in determining the cost of cherimoya production.

Operating assumptions and costs

Preplant and Planting: Land preparation costs \$816/acre. Land preparation is performed on a custom basis and includes removing trees, subsoiling, and leveling. To determine planting costs, I based this analysis on 134 trees per acre (18' x 18' space planting). The cost of planting is calculated at \$14.20/tree (\$12.20 to purchase the tree and \$2.00 for labor to plant trees). I am assuming there is a loss of 2 trees/acre in the first season. These are replanted in year 2.

Irrigation: Based on the lemon production cost study, the average cost of water purchased from the Coastal region of Ventura Co. is \$190 per acre-foot. The amount of water applied is estimated to be 4 to 9 acre-inches/acre during the first two years of establishment and 16 to 20 acre-inches/acre during years three to five. After the trees have reached full production, water application is assumed at an annual rate of 24 acre-inches/acre.

Prune and Sucker: We calculated pruning and suckering costs based on data we have for lemon production. These operations cost about \$100/acre during the first and second years of establishment, \$220/acre during the third and fourth years, and about \$500/acre during the fifth and production years. Because these operations are usually performed on a contract or custom basis, they are charged on a per acre basis.

Pest Control: Insect control during both the establishment and production years includes a biological control program using deccolate snails for snail control at \$50/acre/year and chemical and or traps for ants and rodents at \$150/acre/year.

Weed control: Weed control includes hand weeding, which was estimated to take 20 hours/acre/year during both establishment and production. Costs of hand weeding are calculated at labor rate. Also chemical herbicide control may be used. In this analysis, we used Roundup at 1qt/acre/year during both establishment and production.

Fertilization: According to growers surveyed, the rate of nitrogen (N) applied ranged from 17 lb/acre in the first year to about 204 lb/acre in production years. In addition, micronutrients (zinc sulfate and manganese sulfate) are each applied at the rate of 8 lb/acre each year during both establishment and production periods. The cost of N is approximately \$0.17/lb and micronutrients cost an average of \$0.37/lb. Fertilization is through the irrigation system.

Pollination: Hand pollination is required for production of cherimoya in California. Hand pollination is estimated to take about one hour/acre for each application of pollen during years four and five of the establishment period and two hours/acre for each application of pollen during the production years. Annually, pollination is done every other day for about two months. This brings the total time for pollination to 30 hours/acre each year during establishment years and 60 hours/acre each year during production. Costs of pollination are calculated at labor rate.

Labor: The average cost of labor is estimated to be \$8.65/hour (the same rate used in lemon production costs) for both machine and non-machine workers. However, labor wage payrolls carry benefits including Workers Compensation, Social Security, and Medicare, or any other health insurance and benefits. Based on averages of growers surveyed for the lemon study, benefits are estimated to raise wages by 34%, which brings the total labor wage to \$11.70/hour.

Fuel, Repairs, and Machinery Repairs: Our estimate for fuel and repairs of farm machinery and equipment is approximately \$90/acre/year during both establishment and production. There are slight variations from year to year depending on activities, however, in general \$90/acre/year is a good approximation for the production practices assumed in this analysis.

Interest on Operating Capital: Interest on operating capital is calculated at 11.61%, the average short-term rate provided in our survey of lemon growers. Interest on operating capital may not be a cash expense if capital is not borrowed, however, capital used in a certain activity has an opportunity cost that is forgone by not spending it in alternative ventures. In other words capital used in cherimoya production could have been put in alternative investments that provide returns. In our analysis interest reflects that all capital is borrowed.

In most cases, interest on operating capital is charged until the crop is harvested. However, it should be noted that receipts do not usually come right at the time of harvest. Therefore we calculated interest on operating capital not only on the money spent on growing, but also on that spent on harvesting till the day of receipt. The day of receipt is approximated to be two months from final harvest during the year.

Harvesting: Picking and hauling costs of cherimoya are estimated at \$0.12/lb.

Total Operating Costs: Using the above assumptions, total operating costs include \$3,862 during the first year, \$1,116 during the second year, \$1,335 during the third year, \$1,743 during the fourth year, \$2,100 during the fifth year of establishment. In production operating costs is estimated to be \$2,666/acre/year.

Cash Overhead Assumptions and Costs

Office Expenses: I used \$100/acre/year for office expenses. This amount was based on the lemon study where the total farm office expenses were equally distributed to all enterprises. Expenses include office supplies, telephone, fax, copier, computer, bookkeeping, accounting, legal fees, etc.

Property Taxes and Insurance: County property taxes are typically charged at 1% of the average value of all property (land, machinery, buildings, fuel tanks, pumps and tools). Growers also carry insurance for property protection, which is typically calculated at 0.713% of the average value of the assets. In addition, a farm with 50 acres would carry a liability insurance of at least \$650/ year to cover accidents in the whole grove.

Foreman and Fieldwork Wages: Some growers also indicated that a grove size of 50 acres would require a foreman or a fieldwork leader. We included wages/salaries of a foreman at \$670/acre/year. This is estimated using \$16.00/hour wages and 2,088 annual working hours for 50 acres grove.

Investment Repairs: Investment repairs (for shop buildings, irrigation, fuel tanks and pumps) are calculated at \$104/acre/year using repair coefficients established by engineering studies of various farm investments.

Total Cash Overhead Costs: Estimates of per acre total cash overhead costs includes \$1,337 during the first year, \$1,404 during the second year, \$1,445 during the third year, \$1,471 during the fourth year, and \$1,515 during the fifth year of establishment. In production, cash overhead expenses would be \$1,460/acre.

Investment assumptions and ownership costs

Land Value: Land value in Ventura county ranged from \$20,000 to \$25,000/acre (California Chapter of the American Society of Farm Managers and Rural Appraiser). I used \$23,400/acre, the same value used in our lemon study. Land rent was charged at 7.81%. This rate represents the rate of return to California's agricultural production assets from current income. This rate is higher than the national average but better reflects the cost of capital items in California.

Equipment, Irrigation, Buildings and Tools: The cherimoya industry is still developing and therefore there are only a few acres planted to cherimoya in each farm. For this study, equipment and long-term investments are assumed to be shared with other tree crop enterprises in a 50-acre farm (48 acres planted). The equipment used in this farm consists of a 55 HP 4WD Tractor, 4 WD ATV, 600 gallon sprayer, 8' mower/chopper, and ½ ton pickup truck with a total value of \$84,760 for the 48 acres or \$1,766/acre in 1998 prices. This set of equipment is assumed to be adequate for grove sizes 50 acres or above. Since farms would use a mix of old and new equipment, we evaluated the value of the equipment at 60% of new prices. Other investments consist of \$1,563/acre for a micro irrigation system, \$1,054/acre for shop buildings and tools.

Establishment of Trees: Establishment costs of trees constitute \$13,808/acre (Table 1), a cumulative of five years operating and overhead costs less value of production. Value of production is estimated at a price of \$1.00/lb less \$0.12/lb for harvesting. Yield includes 1,500 lbs./acre during the fourth year and 2,500 lbs./acre during the fifth year.

Ownership Costs (Non-cash overhead costs): The example's farm annualized total ownership costs of depreciation and interest on investment for equipment, irrigation system, shop buildings, tools and trees amounts to approximately \$3,231/acre. The purchase price less salvage value distributed over the life of a capital item provided value of depreciation. We assumed 10% of the value of the capital item for salvage value. Interest on investment was calculated at 7.81% rate of return times average value of property (investment). Average value of a depreciable property equals the sum of its purchase price and salvage value divided by 2.

Total Production costs: The total production cost estimate of the sum of cultural (excluding pick and haul), cash overhead and ownership costs amounts to about \$7,358/acre (Tables 2). It includes 36% in operating/cultural costs of irrigation, pollination, weeding, fertilization etc., 20% in cash overhead of office expense, property taxes and insurance, foreman wages and investment repairs, 19% in ownership costs of depreciation and interest on equipment, irrigation, trees, buildings and tools, and 25% in land rent. It should be noted that the total cost did not include management fees.

Profitability Analysis

Gross Margin: Gross margin measures returns above cash costs of production (i.e. cultural and cash overhead costs). It is often what growers refer to as "profit" if there is no debt on the farming operation. It approximates the return to management and investment. If one deducts depreciation, it also approximates "taxable income". Another way of looking at gross margin is that it represents the minimum that a farm must generate to stay in business. A farm must have a positive gross margin to continue to operate at least in the short run.

We analyzed gross margin break-even prices for yield levels ranging from 4,500 lb./acre to 7,500 lb./acre (Table 3). Given our assumptions and estimates of cash costs, gross margin break-even prices will range from \$1.08/lb. for yield level of 4,500 lb./acre to \$0.70/lb. for yield level of 7,500 lbs./acre (Table 3). Positive gross margins will be attained if prices are higher than break-even levels.

Prices received by growers of tree crops differ depending on services shippers/ packinghouses provide to growers. Free On Board (FOB) price is an overall market price before any service charges are deducted. Packinghouse door price is FOB minus packing, marketing and processing charges and on tree price is FOB price minus picking, hauling, packing, marketing and processing charges. In our analysis, picking and hauling is assumed to be performed by the owner/operator, therefore break-even prices reflect packinghouse door prices.

Net Margin/Economic Profit: A positive gross margin does not necessarily mean that the farm is profitable or does it ensure the long-term viability of the farm. An actual measure of profitability or long-term viability is reflected only

after all costs including ownership costs are accounted for. Any return above total cost is referred to as economic profit. Economic profit 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 are included (assumed paid) in the production cost.

Total cost break-even prices ranged from \$1.80/lb. for yield level of 4,500 lbs./acre to \$1.13/lb. for yield level of 7,500 lbs./acre (Table 3). In our estimate of production costs, management fees are not included. Therefore, positive returns to management will be realized if prices are higher than the total cost break-even levels.

Impacts of Variation of Input Costs on Profits

The break-even prices and returns to management in this analysis should be interpreted in consideration of the costs assumed for certain inputs particularly water and land. It should be noted that water cost varies tremendously depending on location and whether a district or well water is used. To estimate the impacts of water price variation, growers can adjust the break-even prices in Table 3 by \$0.015 for every \$50.00/ acre foot change in water price.

Land rent calculated at \$23,400 per acre might overstate or understate some situations. I estimated that an adjustment of the total cost break-even prices (Table 3) by \$0.01/lb will account for \$1,000/ acre change in value of land.

Also, in some cases, machinery costs calculated at 60% of new value might overstate production costs. However, variation in equipment value will cause very little change in the estimates of costs and returns.

Summary

This analysis provides an estimate of production costs and returns of growing cherimoya in the coastal regions of California using data collected from growers and farm advisors. The estimates and information are intended to provide capital requirements, production loans and overall profitability of growing cherimoya. Also to evaluate a grower's own costs and profitability, they can use the methodology and format we provided.

References

California Chapter of the American Society of Farm Managers and Rural Appraiser: Trends in Agricultural land & Lease values, Spring Ag. Outlook Forum, March 25, 1998.
Takele, E., N. Sakovich and D. Walton. 1998. Establishment and Production Costs: Lemons and Valencia Oranges, Ventura County, 1997.

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Table 1. Estimates of costs per acre to establish a cherimoya grove in the coastal regions of California, 1998/99.

Type of Cost	Establishment Period (\$/Acre)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Pre-plant and Planting					
Land Preparation	816				
Trees and Planting	1903	28			
Cultural ¹	871	1004	1241	1621	1953
Interest on Operating Capital	271	78	94	122	147
Total Operating Cost	3862	1116	1335	1743	2100
Cash Overhead	1337	1404	1445	1471	1515
Total Cash Costs	5198	2520	2780	3214	3615
Less Income from Production (after harvest cost)	0	0	0	-1320	-2200
Total Net Cash Costs	5198	2520	2780	1894	1415
Total Accumulated Tree Establishment	5198	7713	10499	12393	13808

¹ Cultural includes all production practices, materials, labor, fuel and repair of machines for fertilization, irrigation, pruning, and pest control.

Table 2. Estimates of costs per acre of inputs to produce cherimoya in the coastal regions of California, 1998/99.

OPERATING COSTS	Quantity/Acre	Unit	Price or Cost/Unit	Total Cost/Acre¹
Irrigation:				
Water	24.01	Ac In	15.83	380
Contract:				
Prune & Sucker	1	Acre	496	496
Leaf Analysis	1	Acre	5	5
Pest Control:	1	Acre	50	50
Snails (Biological Control)				
Rodents	1	Acre	75	75
Insects	1	Acre	80	80
Weed Control:				
Row Spray Roundup	1	Qt	13.25	13
Spot Spray Roundup	25.6	Oz	0.45	12
Hand Weeding	20	Hr	11.7	234
Fertilization:				
Soluble N	204	Lb N	0.17	35
Manganese Sulfate	8	Lb	0.38	3
Zinc Sulfate	8	Lb	0.35	3
Hand Pollination	60	Hr	11.7	702
Labor:	17.81	hrs	11.7	208
Labor (machine)				
Labor (non-machine)	7	hrs	11.7	82
Fuel, Lube, and Machinery Re-	18.53	gal	1.2	22
pairs:				
Gas				
Diesel	10.35	gal	1.15	12
Lube				5
Machinery repair				50
Interest on Operating Capital				199
TOTAL OPERATING COSTS/ACRE				2666
CASH OVERHEAD COSTS:				
Office Expense				100
Liability Insurance				14
Property Taxes				334
Property Insurance				238
Investment Repairs				104
Foreman				670
TOTAL CASH OVERHEAD COSTS/ACRE				1460
TOTAL CASH COSTS/ACRE				4126
NON-CASH OVERHEAD COSTS (VALUE, DEPRECIATION & INTEREST/ACRE):				
	Value	Deprecia- tion	Interest on Invest.	Total
Shop Building	794	48	34	82
Shop Tools	260	16	11	27
Fuel Tanks & Pumps	260	16	11	27
Irrigation	1563	56	67	123
Land	23400		1828	1828
Grove Establishment	13808	355	593	948
Equipment	1766	121	76	197
TOTAL NON-CASH OVERHEAD COSTS/A	41852	611	2620	3231
TOTAL COSTS/ACRE				7358

¹Figures are rounded to the nearest whole number.

Table 3. Expected breakeven prices of production costs for cherimoya at various yield levels.

	YIELD (LB/ACRE)						
	4500	5000	5500	6000	6500	7000	7500
OPERATING COSTS/ACRE:							
Cultural Cost	2666	2666	2666	2666	2666	2666	2666
Harvest Cost	540	600	660	720	780	840	900
Interest on operating capital	210	211	212	213	214	215	217
TOTAL OPERATING COSTS/ACRE	3416	3477	3538	3599	3660	3722	3783
TOTAL OPERATING COSTS/LB	0.76	0.70	0.64	0.60	0.56	0.53	0.50
CASH OVERHEAD COSTS/ACRE	1460	1460	1460	1460	1460	1460	1460
TOTAL CASH COSTS/ACRE	4876	4937	4998	5059	5120	5182	5243
TOTAL CASH COSTS/LB	1.08	0.99	0.91	0.84	0.79	0.74	0.70
NON-CASH OVERHEAD COSTS/ACRE	3231	3231	3231	3231	3231	3231	3231
TOTAL COSTS/ACRE	8107	8168	8229	8291	8352	8413	8474
TOTAL COSTS/LB	1.80	1.63	1.50	1.38	1.28	1.20	1.13