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1998

UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

SAMPLE COSTS  
TO ESTABLISH AN ALMOND ORCHARD AND PRODUCE

# ~ALMONDS~



**NORTHERN SAN JOAQUIN VALLEY  
FLOOD IRRIGATION**

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## SAMPLE COSTS TO ESTABLISH AN ALMOND ORCHARD AND PRODUCE ALMONDS Northern San Joaquin Valley Flood Irrigation

### INTRODUCTION

Detailed costs of establishing an almond orchard and production of almonds under flood irrigated conditions in the Northern San Joaquin Valley are presented in this study. The hypothetical farm used in this report is 100 acres, 95 of which are planted to almonds.

This study consists of Assumptions for Establishing an Almond Orchard and Producing Almonds and eight tables. It is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices detailed in this study may not be applicable to every situation. A blank, *Your Cost*, column is provided to enter your actual costs on Table 2 Costs Per Acre To Produce Almonds and Table 3 Costs And Returns Per Acre to Produce Almonds.

Tables included:

Table 1.	Costs Per Acre to Establish An Almond Orchard
Table 2.	Costs and Returns Per Acre to Produce Almonds
Table 3.	Costs Per Acre to Produce Almonds
Table 4.	Monthly Cash Costs Per Acre to Produce Almonds
Table 5.	Whole Farm Annual Equipment, Investment and Business Overhead
Table 6.	Hourly Equipment Costs
Table 7.	Ranging Analysis
Table 8.	Cost and Returns/Breakeven Analysis

This and other studies can be obtained through the Department of Agricultural and Resource Economics, U.C. Davis (530-752-1515), or from selected county Cooperative Extension offices. For an explanation of calculations or assumptions used in this study refer to the attached General Assumptions or call the Department of Agricultural and Resource Economics, Cooperative Extension, University of California, Davis, California, (530-752-3589) or the farm advisor in the county of interest.

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### ASSUMPTIONS

The following are general assumptions pertaining to sample costs of establishing an almond orchard and producing almonds using micro-sprinkler irrigation in the Northern San Joaquin Valley. Practices described are not recommendations by the University of California, but represent production procedures and materials considered typical of a well managed orchard for the Northern San Joaquin Valley. Costs and practices detailed in this study may not be applicable to all situations. Establishment and cultural practices vary by grower and region; variations can be significant. These costs are on an annual, per acre basis. *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.*

**Land.** The farm consists of 100 acres of land. Of that, a mature almond orchard covers 55 acres, 40 acres are being established, and five acres are occupied by roads, irrigation systems and farmstead. The orchard is farmed by the owner. Additional management costs ranging from \$60 to \$100 per acre may occur if additional practices are contracted. The orchard is in land previously planted to other field and row crops. Land is valued at \$7,500 per acre. Because only 95 of the 100 acres is planted with almonds the land cost is \$7,895 per producing acre.

**Trees.** No specific varieties of almond trees are assumed in this study. Orchards will include at least two varieties (and preferably three) in which pollen shedding and bloom periods overlap. At least two varieties are included within each orchard to insure good pollination. A few of the cultivars representing the majority of almond acreage in California that might be planted in this region include: A) Early blooming \_ Sonora; B) Mid-blooming \_ Nonpareil, Carmel, Monterey, Price, and Fritz; and C) Later blooming \_ Mission, Padre, and Butte. The trees are planted at 110 trees per acre. The life of the orchard at the time of planting in this study is estimated to be 25 years. The annual report by the Almond Board of California contains the current acreage trends by varieties.

**Irrigation System.** The orchard is irrigated using a flood irrigation system with permanent berms (raised rows) on which the trees are planted. Berms are not ridged up or knocked down during the remaining life of the orchard. Irrigating the orchard during the first few establishment years is accomplished by running water down furrows made along each side of the tree rows. This type of application could reduce water applied during the early years, but is not assumed in this study.

Water is delivered to the orchard from the district ditch through an underground pipe and alfalfa valve system. The life of the irrigation system is estimated to be 25 years. The irrigation system is installed before the orchard is planted. The irrigation system is considered an improvement to the property and is represented in Table 5 in the Annual Investment Costs section.

**Labor.** Hourly wages for workers are \$8.75 for skilled and \$5.75 per hour for field workers. Adding 34% for Workers Compensation, Social Security, Medicare insurance, and other possible benefits gives the labor rates shown of \$11.73 per hour for skilled labor, and \$7.71 per hour for field labor. Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and repair. Wages for management are not included as a cash cost. Returns above total costs is considered a return to management and risk.

### **Orchard Establishment Cultural Practices and Material Inputs**

**Site Preparation.** This orchard is established on ground that has been previously planted to field and row crops. The land is assumed to be well drained and either a class I or II soil. Growers should have nematode sampling done before deciding whether to fumigate or not.

The site is first leveled so high and low spots are removed in order to allow for efficient irrigation. Tree holes are dug by a contract backhoe service. After the holes are dug, a contract fumigation company treats the site for soil-borne disease and pests. The fumigation is made only down the strip where the trees will be planted. Subsequently, the orchard site is disked and floated twice. Following the discing and floating, berms are constructed in the tree rows to maintain irrigations between the rows. All operations that prepare the orchard for planting are normally done the year prior to planting, but costs are shown in the first year.

**Planting, Training, And Pruning.** Planting the orchard starts by surveying and marking tree sites. Trees are planted, painted, and covered with a milk carton. The milk cartons are placed around trees and trunks are painted for protection against above ground rodents, herbicide sprays, and sunburn. In the second year, 2 trees per acre will have to be replanted and in the third year an additional tree will be replaced. Pruning, training, and suckering begin the first year and labor time required for pruning increases in the subsequent years.

**Fertilization.** Nitrogen and potassium fertilizers are applied for tree growth and nut production. Nitrogen is applied along the tree rows beginning the first year. Split applications of N are made between spring and fall. A postharvest application of potassium in the form of potassium sulfate is made in the third year. Annual rates of N and potassium used in this study are shown in Table A.

Year	Lbs Of N/Acre	Lbs Of N/Tree	Lbs Of Potassium Sulfate/Acre
1	27.5	0.25	0
2	55	0.5	0
3	110	1.0	110
4	150	1.4	150
5	180	1.6	180
6	220	2.0	220

**Irrigation.** Water for irrigation is supplied by a water district. The price per acre or acre-foot varies by district in this region. In this study district water costs \$10.83 per acre-foot. Growers pumping well water for irrigation may have higher cost per acre-foot depending on the amount of water pumped, energy source and various well characteristics.

A total of 48 acre-inches of water is applied during the growing season and post-harvest. Post-harvest irrigations are essential, especially for early harvested varieties, through mid October. No assumption is made about effective rainfall. Frost damage can occur, but not on a regular basis. If protection is needed the ground is irrigated.

**Orchard Floor Management.** Weeds are controlled in the first two years by four annual cultivations in the row centers, one dormant strip spray applied in either fall, winter, or spring, and one foliar-applied herbicide for spot spraying persistent weeds. Since the strip spray is applied only to a narrow portion along the tree rows it is effectively used on 25% of the total acreage. The strip spray is applied at half rate in the first year and at the full rate thereafter. Beginning the second year, the spring spot spray is applied twice to clean up weeds missed by the dormant strip spray in the tree row. A preharvest weed control spray is applied starting in the third year to clean up the orchard floor in preparation for harvest.

Beginning the third year mowing is used to manage the resident vegetation. Row middles are mowed seven times to control vegetation on the orchard floor up to the preharvest herbicide application.

**Insect, Mite, and Disease Management.** The management of almond pests and diseases occurs at different times during the year. This study refers to the months that certain pest sprays are applied, but the actual timing of these control sprays is determined by the tree growth or life cycle of the pest. Some of the typical flowering stages mentioned are pink bud, popcorn, and full bloom. Refer to the publication UC Integrated Pest Management for Almonds or the Almond Production Manual for further information.

The first two year's pest and disease sprays are applied by a sprayer with a handgun instead of with an airblast sprayer due to the small size of the trees. Starting in the third year these materials are sprayed using an airblast sprayer.

Worms and mite control in the first year includes a single dormant spray applied with a sprayer. The dormant spray includes oil and an insecticide to control peach twig borer (PTB), San Jose scale (SJS), and early season mites. An in-season spray is also made the first year for worms and late in the growing season for mites. The application rates increase during the establishment years from 25% of full rate the first year to 50% in the second, 75% in the third, and 100% from the fourth year on. Ants become a problem when nuts are produced. Treatment for ants begins in the third year with an insecticide application.

In the third year a fungicide is applied during pink bud stage to prevent brown rot and shot hole. Zinc is added for nutritional needs. The shothole/nutrient spray is applied at 25% of full rate the second year, 50% in the third year, and full rate beginning the fourth.

**Vertebrate Pest Management.** Gophers can cause major losses to trees. Gophers are managed with the use of poison bait applied in the spring by a mechanical bait applicator. Ground squirrels are managed by late winter fumigation and the use of anti-coagulant bait in above-ground bait stations during the growing season.

**Establishment Cost.** The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing almond trees through the first year nuts are harvested minus any returns from production. The *Total Accumulated Net Cash Cost* in the third year shown in Table 1, represents the establishment cost per acre. For this study, the cost is \$3,365 per acre or \$345,325 for the 95 acres planted to almonds. Establishment cost is amortized over the remaining 22 years that the orchard is assumed to be in production. Establishment cost is used to determine the non-cash overhead, orchard capital recovery expense for production years.

## Production Cultural Practices and Material Inputs

**Winter Sanitation.** Winter sanitation practices includes removal of the mummy nuts from the trees and their destruction. This reduces overwintering sites for navel orangeworm. Operations for sanitation include; knocking the mummy nuts off the tree with a shaker, moving the nuts into the row middles with a sweeper and shredding the mummies. Winter sanitation operations are custom hired from December through January. Hand polling may be needed in low rainfall years.

**Pruning.** In this study, pruning is done from October through early December before heavy rainfall with hand crews. Prunings are stacked in the center of the row middles and bucked (pushed) out of the orchard by a tractor with a brush rake and burned or otherwise disposed of. Bucking and disposal are done during the winter months.

**Pollination.** Pollination is one of the most important cultural practices required for good nut set. Having strong, healthy hives in the orchard during bloom increases the probability of higher yields. Two and one half hives (each hive should have 5+ frames of bees) per acre are contracted for pollination and are set in the orchard by the beekeeper before bloom starts. All hives should be moved out of the orchard before insecticide spraying occurs to avoid any contact between pesticides and bees.

**Fertilization.** Tree nitrogen status is determined by leaf analysis; sampling for analysis is done in June. Half of the nitrogen is applied by early spring after leaves have emerged to aid shoot development. The remaining 110 pounds of N per acre is added in late spring or summer. A liquid fertilizer is used as the nitrogen source. Potassium is applied in October in a band along the tree rows at two pounds per tree.

**Orchard Floor Management.** There are many different and acceptable ways of controlling weeds and ground floor management. In this study, the raised berms are treated differently from the orchard middles. One dormant strip spray of pre-emergent and post emergent herbicides to control weeds in the tree rows can be applied after the first significant winter rain. Weed control continues with two monthly post emergent spot sprays on the berms and, where needed, to control perennial weeds. Resident species are allowed to grow and become ground cover in the centers, between the tree rows. Row middles are mowed seven times to control resident vegetation during spring and summer. Frost damage can increase due to cooling effect caused by ground covers on orchard temperature. Injury to the almond buds can be mitigated by keeping the orchard vegetation mowed low during the bloom period. Mowing the orchard floor will reduce the number of blossoms which compete with almond blossoms for bee visitation. A preharvest weed control spray is used to prepare the orchard floor for harvest.

**Insect and Mite Management.** Pest control is achieved by a variety of management techniques. Insect and mite management begins with a dormant spray for control of PTB, SJS, and certain mite eggs. The dormant spray of horticultural oil and insecticide is made before bud swell during December and January. An in-season spray is needed for ants prior to harvest in June and July. At the beginning of hull split, an in-season spray mix to control NOW and various mites is applied. NOW is also managed by early and timely harvest and winter sanitation. If harvest occurs too early green nuts may be picked up which can lead to postharvest problems.

**Disease Management.** Control of bloom and foliar disease problems becomes more critical at maturity. Brown rot and shothole are the two main diseases, but more diseases are causing damage. Three applications of fungicides are made for control of diseases. These sprays are timed for pink bud, full bloom, or petal fall and after petal fall, but before a rain. Fungicide treatments are often mixed with zinc nutrient sprays.

**Vertebrate Pest Management.** Gophers are managed with the use of poison bait applied in the spring by a mechanical applicator. Ground squirrels are managed by late winter fumigation and/or the use of anti-coagulant baits on above ground bait stations during the growing season when rodents accept grain.

**Pesticide Recommendations.** For specific pesticides choices and rates consult the publication UC IPM Pest Management Guidelines, Almonds. Cultural practices are discussed in the publication Integrated Pest Management for Almonds. Written recommendations are required for pesticides and are made by licensed pest control advisors. For information and pesticide use permits, contact the local county Agricultural Commissioner's office.

**Harvest.** Harvest starts in the third year after the orchard is planted. Yield maturity is reached in the seventh year. In this cost study the grower contracts to have the almond crop harvested. All of the harvest operations are done mechanically except for raking. If needed, hand raking, also known as check raking, moves nuts that were missed by the sweeper into the windrows. Harvest begins with the early maturing varieties in August and continues into October for pollenizers and other late maturing varieties.

For growers who own harvesting equipment, the equipment used for harvesting operations should be added to the equipment and investment inventories on Table 5 and custom harvest charges should be replaced in Harvest costs in Tables 1 and 2, with grower performed harvest and hauling costs.

**Assessment.** The Almond Board of California (ABC) assesses all almonds commercially grown in the state to pay for almond promotions and research. The mandatory assessment is paid by processors and is not reflected in grower costs.

**Yields and Returns.** Almonds begin bearing an economic crop in the third year after planting. Typical annual yields for almonds are measured in meat pounds per acre and are shown in Table C. Yields are from the third year of orchard establishment to maturity. An estimated price of a \$1.40 per pound of almonds is used in this study to determine potential profits/losses. Returns, shown in Table 7, will vary and the yields and prices used in this cost study are estimates taking into consideration current situations.

Table C. Annual yield per acre

Year	Pounds of Nut Meats
3	400
4	800
5	1,600
6	1,800
7+	2,000

**Risk.** The risks associated with producing and marketing almonds should not be minimized. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks which affect the profitability and economic viability of almond production. A market channel should be determined before almond orchards are planted and brought into production.

**Cash Overhead.** Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, and equipment repairs.

*Property Taxes* Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis. Salvage value for investments will vary.

*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 10.46% per year. A nominal interest rate is the going market cost of borrowed funds.

*Insurance* Insurance for farm investments vary depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged 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* Office and business expenses are estimated at \$40 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

*Sanitation Services* Sanitation services provide portable toilets for the orchard and cost the farm \$327 annually. This cost includes delivery and servicing of toilets. Cash overhead costs are included in Tables 1-5.

**Non-Cash Overhead.** Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Although farm equipment on almond orchards in the Northern San Joaquin Valley might be purchased new or used, this study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs (Equipment and Investments) are shown in Tables 1-3, and 5. They represent the capital recovery cost for investments on an annual per acre basis.

*Capital Recovery Costs.* Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). Put another way, it is equivalent to the annual payment on a loan for the investment with the downpayment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman).

The calculation for annual capital recovery costs is as follows.

$$\frac{\text{Purchase Price} - \text{Salvage Value}}{\text{Capital Recovery Factor}} + \frac{\text{Salvage Value} \times \text{Interest Rate}}$$

*Salvage Value.* Salvage value is an estimate of the remaining market value of an investment at the end of its useful life. It is calculated differently for different investments. For farm machinery (e.g., tractors and implements) the remaining value is a percentage of the new cost of the investment. Salvage value is calculated as

$$\text{New Price} \times \% \text{Remaining Value}$$



Salvage value for other investments including irrigation systems, buildings, and miscellaneous equipment is zero. The salvage value for land is equal to the purchase price because land does not depreciate from use. The purchase price and salvage value for certain equipment and investments are shown in Table 4.

*Capital Recovery Factor.* Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. It is the function of the interest rate and years of life of the equipment.

*Interest Rate.* The interest rate of 7.81% used to calculate capital recovery cost is the USDA-ERS's ten year average of California's agricultural sector long-run rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector. In other words, the next best alternative use for these resources is in another agricultural enterprise.

**Equipment Cash Costs.** Equipment costs are composed of three parts; non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of fuel, lubrication, and repairs.

Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. The fuel and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time (Operation Time) for a given operation to account for fueling, moving equipment, and setup time. Prices for on-farm delivery of diesel and gasoline are \$0.78 and \$1.22 per gallon, respectively.

**Acknowledgment.** Appreciation is expressed to those growers and other cooperators who provided support for this study.

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For information concerning the above mentioned University of California publications contact UC DANR Communications Services (1-800-994-8849) or your local county Cooperative Extension office.

Table 1.

U.C. COOPERATIVE EXTENSION  
 SAMPLE COSTS PER ACRE TO ESTABLISH AN ALMOND ORCHARD  
 NORTHERN SAN JOAQUIN VALLEY - 1998 FLOOD IRRIGATION

Labor Rate: \$10.72/hr. machine labor Interest Rate: 10.46%  
 \$6.90/hr. non-machine labor Trees per Acre: 110

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
Meat Pounds Per Acre			400	800	1,600	1,800
<b>Planting Costs:</b>						
Land Preparation - Laser Level	\$75					
Land Preparation - Backhoe Tree Holes	242					
Land Preparation - Fumigate	492					
Land Preparation - Disc & Float 2X	17					
Land Preparation - Put Up Borders	12					
Survey and Plant Trees	83	\$9	\$4			
Trees: 110 Per Acre (1% Replant In 2nd Year)	479	2	1			
Paint And Put Trunk Guards Trees	22	1				
<b>TOTAL PLANTING COSTS</b>	<b>1,422</b>	<b>11</b>	<b>5</b>			
<b>Cultural Costs:</b>						
Training, Pruning, & Suckering	39	29	43	\$100	\$100	\$100
Stack Brush			12	12	12	12
Buck Brush			5	5	5	5
Burn Brush			2	2	2	2
Winter Sanitation:						
Knock Mummies				61	61	61
Blow & Rake Mummies				47	47	47
Shred Mummies				7	7	7
Weed Control - Dormant Strip	36	66	66	66	66	66
Insect Control - Dormant		52	66	66	66	66
Disease Control - Shothole/Nutrient		25	42	73	73	73
Insect Control - Pinkbud			39	39	39	39
Pollination			40	80	100	100
Fertilizer - Potassium			18	33	36	41
Vertebrate Control - Rodents	21	21	21	21	21	21
Fertilizer - Nitrogen	34	45	77	82	94	109
Weed Control - Cultivate 4X	17	17				
Weed Control - Mow 7X			51	51	51	51
Irrigate 7X	61	61	61	61	61	61
Weed Control - Spot Spray Tree Rows 2X	16	21	21	21	21	21
Insect Control - Ants 2X			21	21	21	21
Insect Control - Worms & Mites	26	51	70	90	90	90
Weed Control - Preharvest Spray			16	16	16	16
Miscellaneous Labor	27	27	27	27	27	27
Pickup Truck Use	54	54	54	54	54	54
ATV Truck Use	45	45	45	45	45	45
Leaf Analysis	1	1	1	1	1	1

Table 1. CONTINUED

## U C COOPERATIVE EXTENSION

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
Meat Pounds Per Acre			400	800	1,600	1,800
<b>TOTAL CULTURAL COSTS</b>	377	515	798	1,081	1,116	1,136
<b>Harvest Costs:</b>						
Pole Trees			21	12	13	13
Shake Trees				61	61	61
Sweep Nuts				45	45	45
Hand Rake			21	2	2	2
Pick Up and Haul			56	58	61	63
Hull Nuts			13	25	60	80
<b>TOTAL HARVEST COSTS</b>			111	203	242	264
<b>Interest On Operating Capital @ 10.46%</b>	63	19	45	63	69	70
<b>TOTAL OPERATING COSTS/ACRE</b>	1,862	545	959	1,347	1,427	1,470
<b>Cash Overhead Costs:</b>						
Office Expense	105	105	105	105	105	105
Liability Insurance	5	5	5	5	5	5
Sanitation Fees	3	3	3	3	3	3
Property Taxes	87	87	88	88	88	88
Property Insurance	62	62	63	63	63	63
Investment Repairs	21	21	21	21	21	21
<b>TOTAL CASH OVERHEAD COSTS</b>	283	283	285	285	285	285
<b>TOTAL CASH COSTS/ACRE</b>	2,145	828	1,244	1,632	1,712	1,755
<b>INCOME/ACRE FROM PRODUCTION</b>			560	1,120	2,240	2,520
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	2,145	828	684	512		
<b>PROFIT/ACRE ABOVE CASH COSTS</b>					528	765
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	2,145	2,973	3,657	4,169	3,641	2,876
<b>Non-Cash Overhead Costs:</b>						
<b>Capital Recovery Cost:</b>						
Shop Building	41	41	41	41	41	41
Land @ \$7,500/Acre	617	617	617	617	617	617
Fuel Tank & Pump	7	7	7	7	7	7
Shop Tools	13	13	13	13	13	13
Flood Irrigation System	42	42	42	42	42	42
Pruning Equipment	2	2	2	2	2	2
Equipment	58	52	73	69	69	54
<b>TOTAL NON-CASH OVERHEAD COST/ACRE</b>	780	774	795	791	791	776
<b>TOTAL COST/ACRE FOR THE YEAR</b>	2,925	1,602	2,039	2,423	2,503	2,531
<b>INCOME/ACRE FROM PRODUCTION</b>			560	1,120	2,240	2,520
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>	2,925	1,602	1,479	1,303	263	11
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>						
<b>TOTAL ACCUMULATED NET COST/ACRE</b>	2,925	4,527	6,006	7,309	7,572	7,583

Table 2.

U C COOPERATIVE EXTENSION  
 COSTS PER ACRE TO PRODUCE ALMONDS  
 NORTHERN SAN JOAQUIN VALLEY - 1998  
 FLOOD IRRIGATION

Labor Rate: \$11.73/hr. machine labor  
 \$7.71/hr. non-machine labor

Operating Capital Interest Rate: 10.00%  
 Yield per Acre: 2000 Lb

Operation	Cash and Labor Costs per Acre						Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost	
Cultural:							
Prune, Train, & Sucker	13.00	100	0	0	0	100	
Stack Brush	1.50	12	0	0	0	12	
Buck Brush	0.30	4	1	0	0	5	
Burn Brush	0.30	2	0	0	0	2	
Winter Sanitation:							
- Knock Mummies	0.00	0	0	61	0	61	
- Blow and Rake Mummies	0.25	2	0	45	0	47	
- Shred Mummies	0.33	5	3	0	0	7	
Weed Control - Winter Strip	0.30	4	2	60	0	66	
Pest Control - Dormant	0.33	5	1	53	6	66	
Pest Control - Shothole/Nutrient	0.33	5	1	61	6	73	
Pest Control - Pinkbud	0.33	5	1	27	6	39	
Pollination	0.00	0	0	0	100	100	
Fertilize - Potassium Sulfate	0.00	0	0	27	14	41	
Pest Control - Gopher & Squirrel	1.00	8	0	13	0	21	
Fertilize N - 220 Lbs N/Acre	0.80	11	2	86	10	109	
Weed Control - Mow 7X	2.33	33	18	0	0	51	
Irrigate 7X	2.25	17	0	43	0	61	
Weed Control - Spot Spray 2X	0.60	8	3	9	0	21	
Pest Control - Ants 2X	0.60	8	2	7	0	18	
Pest Control - Worm/Mite	0.29	4	1	79	6	90	
Weed Control - Preharvest Spray	0.30	4	1	16	0	21	
Miscellaneous - Other Costs	2.00	15	0	12	0	27	
Pickup Truck Use	2.85	40	13	0	0	54	
ATV Use	2.85	40	4	0	0	44	
Leaf Analysis	0.00	0	0	0	1	1	
<b>TOTAL CULTURAL COSTS</b>	<b>32.85</b>	<b>333</b>	<b>53</b>	<b>600</b>	<b>149</b>	<b>1135</b>	

Table 2. CONTINUED U C COOPERATIVE EXTENSION

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Harvest:								
Shake	0.00	0	0	0	61	61		
Pole Trees	1.75	13	0	0	0	13		
Sweep	0.00	0	0	0	45	45		
Hand Rake Nuts	0.30	2	0	0	0	2		
Pickup and Haul Nuts	0.00	0	0	0	65	65		
Hull and Shell Nuts	0.00	0	0	0	100	100		
TOTAL HARVEST COSTS	2.05	16	0	0	271	286		
Interest on operating capital @ 10.46%						68		
TOTAL OPERATING COSTS/ACRE		349	53	600	420	1490		
CASH OVERHEAD:								
Office Expense						105		
Liability Insurance						5		
Sanitation Fees						3		
Property Taxes						106		
Property Insurance						75		
Investment Repairs						21		
TOTAL CASH OVERHEAD COSTS						316		
TOTAL CASH COSTS/ACRE						1806		
NON-CASH OVERHEAD:								
Investment	Per producing Acre	-- Annual Cost --		Capital Recovery - 7.81% Interest Rate				
Buildings	413	41		41				
Land	7895	617		617				
Fuel Tanks & Pumps	69	7		7				
Shop Tools	119	13		13				
Flood Irrigation System	516	42		42				
Pruning Equipment	14	2		2				
Almond Orchard Establishment Equipment	3657	353		353				
	471	62		62				
TOTAL NON-CASH OVERHEAD COSTS	13154	1138		1138				
TOTAL COSTS/ACRE						2944		

Table 3.

U C COOPERATIVE EXTENSION  
 COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS  
 NORTHERN SAN JOAQUIN VALLEY - 1998  
 FLOOD IRRIGATION

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
=====					
GROSS RETURNS					
Almonds	2000.00	Lb	1.40	2800	
				-----	
TOTAL GROSS RETURNS FOR ALMOND				2800	
-----					
OPERATING COSTS					
Winter Sanitation:					
Shake Trees	110.00	Tree	0.55	61	
Sweep Nuts	1.00	Acre	45.00	45	
Herbicide:					
Goal 2 XL	2.00	Pint	14.48	29	
Surflan 4 AS	3.00	Pint	10.46	31	
Roundup Ultra	3.20	Pint	7.84	25	
Insecticide:					
Lorsban 4 E	7.00	Pint	7.40	52	
Dormant Oil	7.00	Gal	2.95	21	
Fungicide:					
Kocide	8.00	Lb	2.99	24	
Ziram WDG 76	8.00	Lb	3.31	26	
Rovral	2.00	Lb	23.60	47	
Rent:					
Sprayer Rental	6.00	Acre	6.00	34	
Fertilizer:					
Neutral Zinc	5.00	Lb	1.53	8	
Potassium Sulfate	220.00	Lb	0.123	27	
UN-32	220.00	Lb N	0.393	86	
Contract:					
Pollination Fee	2.50	Hive	40.00	100	
Custom:					
Ground Application	3.00	Acre	4.75	14	
Shake Trees	110.00	Tree	0.55	61	
Sweep Nuts	1.00	Acre	45.00	45	
Pickup Nuts	1.00	Acre	55.00	55	
Haul Nuts	2000.00	Lb	0.005	10	
Hull & Shell Nuts	2000.00	Lb	0.05	100	
Leaf Analysis	1.00	Acre	1.00	1	
Rodenticide:					
Gopher Bait	1.50	Lb	3.76	6	
Squirrel Bait	1.50	Lb	4.82	7	
-----					

Table 3. Continued

## U.C. COOPERATIVE EXTENSION

-----				
Irrigation:				
Water - District	48.00	AcIn	0.903	43
Acaracide:				
Omite 30 WP	8.00	Lb	6.16	49
Miscellaneous:				
Miscellaneous	1.00	Acre	12.00	12
Labor (machine)	15.06	Hrs	11.73	177
Labor (non-machine)	22.35	Hrs	7.71	172
Fuel - Gas	9.02	Gal	1.22	11
Fuel - Diesel	21.08	Gal	0.78	16
Lube				4
Machinery repair				22
Interest on operating capital @ 10.46%				68
				-----
TOTAL OPERATING COSTS/ACRE				1490
-----				
NET RETURNS ABOVE OPERATING COSTS				1310
-----				
CASH OVERHEAD COSTS:				
Office Expense				105
Liability Insurance				5
Sanitation Fees				3
Property Taxes				106
Property Insurance				75
Investment Repairs				21
				-----
TOTAL CASH OVERHEAD COSTS/ACRE				316
-----				
TOTAL CASH COSTS/ACRE				1806
-----				
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate):				
Buildings				41
Land				617
Fuel Tanks & Pumps				7
Shop Tools				13
Flood Irrigation System				42
Pruning Equipment				2
Almond Orchard Establishment				353
Equipment				62
				-----
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1138
-----				
TOTAL COSTS/ACRE				2944
-----				
NET RETURNS ABOVE TOTAL COSTS				-144
-----				



Table 4.

U C COOPERATIVE EXTENSION  
MONTHLY CASH COSTS PER ACRE TO PRODUCE ALMONDS  
NORTHERN SAN JOAQUIN VALLEY - 1998  
FLOOD IRRIGATION

Beginning DEC 97	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending NOV 98	97	98	98	98	98	98	98	98	98	98	98	98	
-----													
Cultural:													
Prune, Train, & Sucker	100												100
Stack Brush	12												12
Buck Brush	5												5
Burn Brush	2												2
Winter Sanitation:													
- Knock Mummies	61												61
- Blow and Rake Mummies	47												47
- Shred Mummies	7												7
Weed Control													
- Winter Strip		66											66
Pest Control - Dormant		33	33										66
Pest Control													
- Shothole/Nutrient			73										73
Pest Control - Pinkbud			39										39
Pollination			100										100
Fertilize													
- Potassium Sulfate				14	14	14							41
Pest Control													
- Gopher & Squirrel				9					11				21
Fertilize N - 220 Lbs N/Acre					76					33			109
Weed Control - Mow 7X					7	7	7	7	15	7			51
Irrigate 7X					9	9	17	17	9				61
Weed Control - Spot Spray					11		11						21
Pest Control - Ants 2X							9	9					18
Pest Control - Worm/Mite								90					90
Weed Control - Preharvest										21			21
Miscellaneous - Other Costs	3	3	3	3	3	3	3	3	3	3			27
Pickup Truck Use	5	5	5	5	5	5	5	5	5	5			54
ATV Use	4	4	4	4	4	4	4	4	4	4			44
Leaf Analysis	1												1
-----													
TOTAL CULTURAL COSTS	247	111	257	36	129	42	56	136	47	74			1135
-----													

Table 4. Continued

## U C COOPERATIVE EXTENSION

Beginning DEC 97	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending NOV 98	97	98	98	98	98	98	98	98	98	98	98	98	
Shake										61			61
Pole Trees										13			13
Sweep										45			45
Hand Rake Nuts										2			2
Pickup and Haul Nuts										65			65
Hull and Shell Nuts										100			100
<b>TOTAL HARVEST COSTS</b>										<b>286</b>			<b>286</b>
Interest on oper. capital	2	3	5	6	7	7	8	9	9	12			68
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>250</b>	<b>115</b>	<b>262</b>	<b>41</b>	<b>136</b>	<b>49</b>	<b>64</b>	<b>145</b>	<b>56</b>	<b>372</b>			<b>1490</b>
<b>OVERHEAD:</b>													
Office Expense	11	11	11	11	11	11	11	11	11	11			105
Liability Insurance			5										5
Sanitation Fees		3											3
Property Taxes		53						53					106
Property Insurance		38						38					75
Investment Repairs	2	2	2	2	2	2	2	2	2	2	2	2	21
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>12</b>	<b>106</b>	<b>17</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>103</b>	<b>12</b>	<b>12</b>	<b>2</b>	<b>2</b>	<b>316</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>262</b>	<b>221</b>	<b>279</b>	<b>54</b>	<b>148</b>	<b>62</b>	<b>76</b>	<b>248</b>	<b>68</b>	<b>385</b>	<b>2</b>	<b>2</b>	<b>1806</b>

Table 5.

U C COOPERATIVE EXTENSION  
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS  
 NORTHERN SAN JOAQUIN VALLEY - 1998 FLOOD IRRIGATION

ANNUAL EQUIPMENT COSTS

=====

- Cash Overhead -

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur- ance	Taxes	Total
98	35 HP 4WD Tractor	22737	15	4426	2460	97	136	2693
98	66 HP 2WD Tractor	24882	15	4844	2692	106	149	2947
98	ATV 4WD	4219	7	1600	625	21	29	675
98	Brush Rake - 10'	1584	25	45	145	6	8	159
98	Front End Loader	4852	15	466	543	19	27	588
98	Mower - Flail 10'	8380	10	1482	1135	35	49	1219
98	Pickup - 1/2 Ton	16500	7	1650	2963	65	91	3118
98	Weed Sprayer - 100 Gal	3947	10	698	535	17	23	574
<b>TOTAL</b>		<b>87101</b>		<b>15211</b>	<b>11098</b>	<b>365</b>	<b>512</b>	<b>11974</b>
60% of New Cost *		52261		9127	6659	219	307	7184

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

ANNUAL INVESTMENT COSTS

=====

----- Cash Overhead -----

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Insur- ance	Taxes	Repairs	Total
<b>INVESTMENT</b>								
Buildings	39253	20		3942	140	196	785	5063
Flood Irrigation System	49042	40		4029	175	245	980	5429
Fuel Tanks & Pumps	6546	20		657	23	33	131	844
Land	750000	22	750000	58575	5348	7500	0	71422
Orchard Establishment	347415	22		33548	1239	1737	0	36523
Pruning Equipment	1325	10	133	187	5	7	25	224
Shop Tools	11330	15	1133	1266	44	62	113	1486
<b>TOTAL INVESTMENT</b>	<b>1204911</b>		<b>751266</b>	<b>102203</b>	<b>6974</b>	<b>9781</b>	<b>2034</b>	<b>120992</b>

ANNUAL BUSINESS OVERHEAD COSTS

=====

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	100.00	Acre	4.55	455
Office Expense	100.00	Acre	100.00	10000
Sanitation Fees	100.00	Acre	3.27	327

=====

Table 6.

U C COOPERATIVE EXTENSION  
 HOURLY EQUIPMENT COSTS  
 NORTHERN SAN JOAQUIN VALLEY - 1998  
 FLOOD IRRIGATION

Yr Description	Actual Hours Used	COSTS PER HOUR							Total Costs/Hr.
		Capital Recovery	Cash Overhead Insurance	Taxes	Repairs	Operating Fuel & Lube	Total Oper.		
98 35 HP 4WD Tractor	321.0	4.60	0.18	0.25	0.40	1.54	1.94	6.98	
98 66 HP 2WD Tractor	593.4	2.72	0.11	0.15	1.03	2.91	3.94	6.92	
98 ATV 4WD	284.7	1.32	0.04	0.06	0.31	0.94	1.25	2.67	
98 Brush Rake - 10'	36.5	2.39	0.10	0.13	0.21	0.00	0.21	2.83	
98 Front End Loader	36.5	8.92	0.31	0.44	0.67	0.00	0.67	10.34	
98 Mower - Flail 10'	189.5	3.59	0.11	0.16	3.40	0.00	3.40	7.26	
98 Pickup - 1/2 Ton	284.7	6.24	0.14	0.19	1.20	3.51	4.71	11.28	
98 Weed Sprayer - 100 Gal	149.0	2.15	0.07	0.09	1.04	0.00	1.04	3.36	

Table 7.

RANGING ANALYSIS  
 NORTHERN SAN JOAQUIN VALLEY - 1998 FLOOD IRRIGATION  
 COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALMOND

	YIELD (LB/ACRE)						
	1400	1600	1800	2000	2200	2400	2600
OPERATING COSTS/ACRE:							
Cultural Cost	1135	1135	1135	1135	1135	1135	1135
Harvest Cost	249	261	274	286	299	311	324
Interest on operating capital	68	68	68	68	69	69	69
TOTAL OPERATING COSTS/ACRE	1452	1465	1478	1490	1503	1516	1528
TOTAL OPERATING COSTS/LB	1.04	0.92	0.82	0.75	0.68	0.63	0.59
CASH OVERHEAD COSTS/ACRE							
TOTAL CASH COSTS/ACRE	1768	1781	1793	1806	1819	1831	1844
TOTAL CASH COSTS/LB	1.26	1.11	1.00	0.90	0.83	0.76	0.71
NON-CASH OVERHEAD COSTS/ACRE							
TOTAL COSTS/ACRE	2905	2918	2931	2944	2956	2969	2982
TOTAL COSTS/LB	2.08	1.82	1.63	1.47	1.34	1.24	1.15

Table 7. CONTINUED

U C COOPERATIVE EXTENSION  
NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ALMOND

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
Almonds	1400	1600	1800	2000	2200	2400	2600
0.80	-332	-185	-38	110	257	404	552
1.00	-52	135	322	510	697	884	1072
1.20	228	455	682	910	1137	1364	1592
1.40	508	775	1042	1310	1577	1844	2112
1.60	788	1095	1402	1710	2017	2324	2632
1.80	1068	1415	1762	2110	2457	2804	3152
2.00	1348	1735	2122	2510	2897	3284	3672

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ALMOND

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
Almonds	1400	1600	1800	2000	2200	2400	2600
0.80	-648	-501	-353	-206	-59	89	236
1.00	-368	-181	7	194	381	569	756
1.20	-88	139	367	594	821	1049	1276
1.40	192	459	727	994	1261	1529	1796
1.60	472	779	1087	1394	1701	2009	2316
1.80	752	1099	1447	1794	2141	2489	2836
2.00	1032	1419	1807	2194	2581	2969	3356

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ALMOND

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
Almonds	1400	1600	1800	2000	2200	2400	2600
0.80	-1785	-1638	-1491	-1344	-1196	-1049	-902
1.00	-1505	-1318	-1131	-944	-756	-569	-382
1.20	-1225	-998	-771	-544	-316	-89	138
1.40	-945	-678	-411	-144	124	391	658
1.60	-665	-358	-51	256	564	871	1178
1.80	-385	-38	309	656	1004	1351	1698
2.00	-105	282	669	1056	1444	1831	2218

Table 8.

UC COOPERATIVE EXTENSION  
 COSTS AND RETURNS / BREAKEVEN ANALYSIS  
 NORTHERN SAN JOAQUIN VALLEY - 1998  
 FLOOD IRRIGATION

COSTS AND RETURNS - PER ACRE BASIS

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Almonds	2800	1490	1310	1806	994	2944	-144

COSTS AND RETURNS - TOTAL ACREAGE

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Almonds	154000	81963	72037	99331	54669	161896	-7896

BREAKEVEN PRICES PER YIELD UNIT

CROP	Base Yield (Units/Acre)	Yield Units	----- Breakeven Price To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Almonds	2000.0	Lb	0.75	0.90	1.47

BREAKEVEN YIELDS PER ACRE

CROP	Yield Units	Base Price (\$/Unit)	----- Breakeven Yield To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Almonds	Lb	1.40	1064.5	1290.0	2102.5