
1998

UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION
SAMPLE COSTS
TO ESTABLISH AN ALMOND ORCHARD AND PRODUCE

~ALMONDS~



NORTHERN SAN JOAQUIN VALLEY
MICRO-SPRINKLER IRRIGATION

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Northern San Joaquin Valley Micro-Sprinkler Irrigation

INTRODUCTION

Detailed costs of establishing an almond orchard and production of almonds under micro-sprinkler 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 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 Economics, Cooperative Extension, University of California, Davis, California, (530-752-3589) or the farm advisor in the county of interest.

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SAMPLE COSTS TO ESTABLISH AN ALMOND ORCHARD AND PRODUCE ALMONDS Northern San Joaquin Valley Micro-Sprinkler Irrigation

ASSUMPTIONS

The following are assumptions pertaining to sample costs of establishing an almond orchard and producing almonds 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 micro-sprinkler irrigation system. Water is delivered to the orchard from the district ditch and pressurized with a pump into the micro-sprinkler irrigation system. The life of the irrigation system is estimated at 25 years. The irrigation system is installed before the orchard is planted. The irrigation system is considered an improvement to the property and is shown in the non-cash overhead sections of Tables 1-3 and the Investments portion of Table 5.

Labor. Hourly wages for workers are \$8.75, and \$5.75 per hour for skilled, and field workers respectively. 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.

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. All operations that prepare the orchard for planting are 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. Holes are dug and trees are planted, painted, and covered with a milk carton. The milk cartons are placed around trees 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, potassium, and boron 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. Split applications of potassium in the form of potassium sulfate is made beginning the third year. Boron is supplied to the trees as a foliar spray in October. Annual rates of N, potassium, and boron used in this study are shown in Table A.

Table A. Applied nitrogen, potassium, and boron during establishment years

Year	Lbs Of N/ Acre	Lbs Of N/ Tree	Lbs Of Potassium Sulfate/ Acre	Lbs Of B/Acre
1	20	0.18	20	0
2	40	0.36	40	2
3	80	0.73	80	2
4	100	0.91	100	2
5	140	1.27	140	2
6+	175	1.59	175	2

Orchard Floor Management. Weeds are controlled by mowing the orchard floor, 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. A spring spot spray cleans 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.

Row middles are mowed to control vegetation on the orchard floor up to preharvest herbicide application. In the first two years the orchard floor is mowed three times and seven passes are made from the third year on.

Irrigation and Frost Protection. Water for irrigation is supplied by water district and pumped from the ditch into the micro-sprinkler system. Water pumped directly from wells may have higher cost per acre-foot depending on the amount of water pumped, energy source and various well characteristics. Different irrigation districts have different costs. In this study water costs \$26.57 per acre-foot. No assumption is made about effective rainfall. Frost protection begins in the third year and uses 3 acre-inches annually. The amount of water applied to the orchard varies in the establishment years and is shown in Table B.

Table B. Applied irrigation water

Year	AcIn/Year
1	10
2	20
3	30
4+	40

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 and the Almond Production Manual for further information.

Insect control in the first and second year include an in-season and one dormant spray applied with a sprayer and handgun. The in-season spray includes mite control or miscellaneous insect control. The dormant spray includes oil and an insecticide to control peach twig borer (PTB), San Jose scale (SJS), and early season mites. Zinc is added to the in-season sprays for nutritional needs.

During the second year dormant and nutrient sprays are added to the pest management program. In the third year a fungicide is applied during pink bud stage to prevent brown rot. By the fourth year a hull split spray is made to manage navel orangeworm (NOW) prior to harvest. These first two year's pest and disease sprays are applied by a sprayer with a handgun instead of with an airblast sprayer is due to the small size of the trees. Because of the minor tree size, less material per acre required to effectively treat the trees. Starting in the fourth year these materials are sprayed using an airblast sprayer.

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 \$3,635 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, blowing the nuts into the row middles with a blower, sweeper, raking, 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. Bucking and disposal are done during the winter months. One tree per acre was assumed to die and would need to be replaced. It is removed and replanted in the late winter or spring.

Irrigation and Frost Protection. Forty acre-inches of water is applied for irrigation purposes and an additional three acre-inches is used for frost protection for a total of 43 acre inches of water applied during the year. Thirty-seven acre-inches of irrigation water is applied during the growing season and three acre-inches is applied postharvest. The sprinkler system is also used to provide water for frost protection and is usually applied in the months of February and March. No assumption is made about effective rainfall.

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-July. Nitrogen is applied periodically through the micro-sprinklers. In this study half of the nitrogen is applied by early spring after leaves have emerged to aid shoot development and the remaining 100 pounds of N per acre is added in late spring or summer. A liquid fertilizer is used as the nitrogen source and is injected through the micro-sprinklers. Potassium is also injected into the irrigation system. One hundred and seventy five pounds are mixed with irrigation water in March, April, and May. Boron is foliar applied in October at two pounds per acre.

Orchard Floor Management. There are many different and acceptable ways of controlling weeds and orchard 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 peach twig borer, San Jose scale, and certain mite eggs. The dormant spray of horticultural oil and insecticide is made, December through January, before bud swell. A second in-season spray may be needed for ant, leafhopper, or worm control. At the beginning of hull split, an in-season spray mix to control navel orangeworm (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 different diseases also cause 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. The brown rot treatment is made in February, sometime between popcorn and full bloom stage. Shot hole treatments are made after leaf emergence

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 publications Integrated Pest Management for Almonds and Almond Production Manual. Written recommendations are required for many 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 custom harvested. All of the harvest operations are done mechanically except for hand raking. If needed, hand raking, also known as check raking, moves nuts that were missed by the sweeper into the windrows. Harvest begins with early maturing varieties in August and continues into October for 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 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 *New Price × %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.

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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
 MICRO-SPRINKLER IRRIGATION

Labor Rate: \$11.73/hr. machine labor

Interest Rate: 10.46%

\$7.71/hr. non-machine labor

Year	Cost Per Acre					
	1st	2nd	3rd	4th	5th	6th
Meat Pounds Per Acre			400	800	1,600	1,800
Planting Costs:						
Land Preparation - Backhoe Tree Holes	242					
Land Preparation - Fumigate	600					
Land Preparation - Disc & Float 2X	17					
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				
TOTAL PLANTING COSTS	1,443	11	5			
Cultural Costs:						
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
Frost Protection			8	8	8	8
Disease Control - Shothole/Nutrient		25	42	73	73	73
Insect Control - Pinkbud			39	39	39	39
Pollination			40	80	100	100
Fertilizer - Potassium			11	13	18	23
Vertebrate Control - Rodents	41	41	41	41	41	41
Fertilizer - Nitrogen	9	17	31	39	56	70
Weed Control - Mow (3X in Yrs 1-2 & 7X Yr 3+)	20	20	51	51	51	51
Irrigate 7X	28	53	74	94	94	94
Weed Control - Spot Spray Tree Rows 2X	16	21	21	21	21	21
Insect Control - Ants 2X			19	21	21	21
Insect Control - Worms & Mites	26	51	70	90	90	90
Weed Control - Preharvest Spray			16	16	16	16
Fertilizer - Boron (Foliar)		14	14	14	14	14
Miscellaneous Labor	27	27	27	27	27	27
Pickup Truck Use	54	54	54	54	54	54
ATV Truck Use	44	44	44	44	44	44

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
TOTAL CULTURAL COSTS	341	515	797	1,092	1,134	1,153
Harvest Costs:						
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
TOTAL HARVEST COSTS			111	203	242	264
Interest On Operating Capital @ 10.46%	64	19	43	63	65	66
TOTAL OPERATING COSTS/ACRE	1,848	545	956	1,358	1,441	1,483
Cash Overhead Costs:						
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	91	90	90	90	90	90
Property Insurance	65	64	64	64	64	64
Investment Repairs	22	22	22	22	22	22
TOTAL CASH OVERHEAD COSTS	291	289	289	289	289	289
TOTAL CASH COSTS/ACRE	2,139	834	1,245	1,647	1,730	1,772
INCOME/ACRE FROM PRODUCTION			560	1,120	2,240	2,520
NET CASH COSTS/ACRE FOR THE YEAR	2,139	834	685	527		
PROFIT/ACRE ABOVE CASH COSTS					510	748
ACCUMULATED NET CASH COSTS/ACRE	2,139	2,973	3,658	4,185	3,675	2,927
Non-Cash Overhead Costs:						
Capital Recovery Cost:						
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
Sprinkler Irrigation System	99	99	99	99	99	99
Pruning Equipment	2	2	2	2	2	2
Equipment	73	57	64	61	61	57
TOTAL NON-CASH OVERHEAD COST/ACRE	852	836	843	840	840	836
TOTAL COST/ACRE FOR THE YEAR	2,991	1,670	2,088	2,487	2,570	2,608
INCOME/ACRE FROM PRODUCTION			560	1,120	2,240	2,520
TOTAL NET COST/ACRE FOR THE YEAR	2,991	1,670	1,528	1,367	330	88
NET PROFIT/ACRE ABOVE TOTAL COST						
TOTAL ACCUMULATED NET COST/ACRE	2,991	4,661	6,189	7,556	7,886	7,974

Table 2.

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

Labor Rate: \$11.73/hr. machine labor Operating Capital Interest Rate: 10.46%
 \$7.71/hr. non-machine labor Yield per Acre: 2000 Lb

Operation	Operation Time (Hrs/A)	Labor Cost	Fuel,Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your 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	0.50	4	0	45	0	49	
- Shread 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	
Frost Protection	0.25	2	0	6	0	8	
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	0.15	1	0	22	0	23	
Pest Control - Gopher & Squirrel	2.00	15	0	26	0	41	
Fertilize N - 220 Lbs N/Acre	0.10	1	0	69	0	70	
Weed Control - Mow 7X	2.33	33	18	0	0	51	
Irrigate 7X	1.28	10	0	86	0	96	
Weed Control - Spot Spray 2X	0.60	8	3	9	0	21	
Pest Control - Ants 2X	0.20	3	1	15	0	19	
Pest Control - Worm/Mite	0.29	4	1	79	6	90	
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	
TOTAL CULTURAL COSTS	32.13	318	50	630	125	1123	
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	

U C COOPERATIVE EXTENSION

Table 2. Continued

Postharvest:						
Fertilize - Boron (Foliar)	0.33	5	1	2	6	14
	-----	-----	-----	-----	-----	-----
TOTAL POSTHARVEST COSTS	0.33	5	1	2	6	14
<hr/>						
Interest on operating capital @ 10.46%						68
TOTAL OPERATING COSTS/ACRE		339	51	632	401	1491
<hr/>						
CASH OVERHEAD:						
Office Expense						105
Liability Insurance						5
Sanitation Fees						3
Property Taxes						108
Property Insurance						77
Investment Repairs						22

TOTAL CASH OVERHEAD COSTS						321
TOTAL CASH COSTS/ACRE						1812
<hr/>						
NON-CASH OVERHEAD:						
	Per producing	-- Annual Cost --				
	Acres	Capital Recovery - 7.81% Interest Rate				
Investment						
-----	-----	-----				
Buildings	413		41			41
Land	7895		617			617
Fuel Tanks & Pumps	69		7			7
Shop Tools	119		13			13
Sprinkler Irrigation System	1074		99			99
Pruning Equipment	14		2			2
Almond Orchard Establishment	3635		351			351
Equipment	464		61			61
	-----		-----			-----
TOTAL NON-CASH OVERHEAD COSTS	13683		1191			1191
TOTAL COSTS/ACRE						3003
<hr/>						

Table 3.

U C COOPERATIVE EXTENSION
 COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS
 NORTHERN SAN JOAQUIN VALLEY - 1998
 MICRO-SPRINKLER 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	1.20	Pint	7.84	9	
Insecticide:					
Lorsban 4 E	8.00	Pint	7.40	59	
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	5.00	Acre	6.00	30	
Irrigation:					
Water	43.00	AcIn	2.143	92	
Fertilizer:					
Neutral Zinc	5.00	Lb	1.53	8	
Potassium Sulfate	175.00	Lb	0.123	22	
UN-32	175.00	Lb N	0.393	69	
Boron	2.00	Lb	0.91	2	
Contract:					
Pollination Fee	2.50	Hive	40.00	100	
Rodenticide:					
Gopher Bait	3.00	Lb	3.76	11	
Squirrel Bait	3.00	Lb	4.82	14	
Acaracide:					
Omite 30 WP	8.00	Lb	6.16	49	

Table 3. Continued

U C COOPERATIVE EXTENSION

Custom:				
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
Miscellaneous:				
Miscellaneous	1.00	acre	12.00	12
Labor (machine)	13.66	hrs	11.73	160
Labor (non-machine)	23.13	hrs	7.71	178
Fuel - Gas	9.02	gal	1.22	11
Fuel - Diesel	19.77	gal	0.78	15
Lube				4
Machinery repair				21
Interest on operating capital @ 10.46%				<u>68</u>
<u>TOTAL OPERATING COSTS/ACRE</u>				<u>1491</u>
<u>NET RETURNS ABOVE OPERATING COSTS</u>				<u>1309</u>
CASH OVERHEAD COSTS:				
Office Expense				105
Liability Insurance				5
Sanitation Fees				3
Property Taxes				108
Property Insurance				77
Investment Repairs				<u>22</u>
TOTAL CASH OVERHEAD COSTS/ACRE				321
<u>TOTAL CASH COSTS/ACRE</u>				<u>1812</u>
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY - 7.81% Interest Rate):				
Buildings				41
Land				617
Fuel Tanks & Pumps				7
Shop Tools				13
Sprinkler Irrigation System				99
Pruning Equipment				2
Almond Orchard Establishment				351
Equipment				<u>61</u>
<u>TOTAL NON-CASH OVERHEAD COSTS/ACRE</u>				<u>1191</u>
<u>TOTAL COSTS/ACRE</u>				<u>3003</u>
<u>NET RETURNS ABOVE TOTAL COSTS</u>				<u>-203</u>

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.

Table 4.

U C COOPERATIVE EXTENSION
MONTHLY CASH COSTS PER ACRE TO PRODUCE ALMONDS
NORTHERN SAN JOAQUIN VALLEY - 1998
SPRINKLER 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	49												49
- Shred Mummies	7												7
Weed Control - Winter Strip		66											66
Pest Control - Dormant		33	33										66
Frost Protection			8										8
Pest Control													
- Shothole/Nutrient			73										73
Pest Control - Pinkbud			39										39
Pollination			100										100
Fertilize													
- Potassium Sulfate				8	8	8							23
Pest Control													
- Gopher & Sulfate				19					22				41
Fertilize N - 220 Lbs N/Acre					52					18			70
Weed Control - Mow 7X					7	7	7	7	15	7			51
Irrigate 7X					15	13	27	27	13				96
Weed Control - Spot Spray					11		11						21
Pest Control - Ants 2X							9	9					19
Pest Control - Worm/Mite								90					90
Miscellaneous - Other Costs	2	2	2	2	2	2	2	2	2	2	2	2	27
Pickup Truck Use	5	5	5	5	5	5	5	5	5	5	5	5	54
ATV Use	4	4	4	4	4	4	4	4	4	4	4	4	44
Leaf Analysis	1												1
TOTAL CULTURAL COSTS	248	110	264	38	103	40	65	145	62	36	11		1123
Harvest:													
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
TOTAL HARVEST COSTS										286			286

U C COOPERATIVE EXTENSION

Table 4. Continued

Postharvest:													
Fertilize - Boron (Foliar)											14	14	
-----											14	14	
TOTAL POSTHARVEST COSTS											14	14	
Interest on oper. capital	2	3	5	6	7	7	8	9	9	12	-0	68	
TOTAL OPERATING COSTS/ACRE	250	113	269	44	110	47	73	154	71	335	25	1491	
OVERHEAD:													
Office Expense	10	10	10	10	10	10	10	10	10	10	10	105	
Liability Insurance			5									5	
Sanitation Fees		3										3	
Property Taxes		54						54				108	
Property Insurance		39						39				77	
Investment Repairs	2	2	2	2	2	2	2	2	2	2	2	22	

TOTAL CASH OVERHEAD COSTS	11	108	16	11	11	11	11	104	11	11	11	2	321
TOTAL CASH COSTS/ACRE	262	221	285	55	121	58	84	258	82	346	36	2	1812

Table 5.

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

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	- Cash Overhead -		Total
						Insur- ance	Taxes	
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
TOTAL		87101		15211	11098	365	512	11974
60% of New Cost *		52261		9127	6659	219	307	7184

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

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	----- Cash Overhead -----			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Almond Orchard Establishment	345325	22		33346	1231	1727	0	36303
Buildings	39253	20		3942	140	196	785	5063
Fuel Tanks & Pumps	6546	20		657	23	33	131	844
Land	750000	22	750000	58575	5348	7500	0	71422
Pruning Equipment	1325	10	133	187	5	7	25	224
Shop Tools	11330	15	1133	1266	44	62	113	1486
Sprinkler Irrigation System	102000	25		9401	364	510	1020	11294
TOTAL INVESTMENT	1255779		751266	107373	7155	10035	2074	126637

U C COOPERATIVE EXTENSION

Table 5. Continued

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
 SPRINKLER IRRIGATION

Yr Description	Actual Hours Used	----- COSTS PER HOUR -----					Operating Fuel & Lube	Total Oper.	Total Costs/Hr.
		Capital Recovery	- Cash Overhead - Insur- ance	Taxes	Repairs				
98 35 HP 4WD Tractor	88.2	16.74	0.66	0.92	0.40	1.54	1.94	20.26	
98 66 HP 2WD Tractor	486.8	3.32	0.13	0.18	1.03	2.91	3.94	7.57	
98 ATV 4WD	285.0	1.32	0.04	0.06	0.31	0.94	1.25	2.67	
98 Brush Rake - 10'	36.0	2.42	0.10	0.14	0.21	0.00	0.21	2.87	
98 Front End Loader	36.0	9.05	0.32	0.44	0.67	0.00	0.67	10.48	
98 Mower - Flail 10'	199.6	3.41	0.11	0.15	3.40	0.00	3.40	7.06	
98 Pickup - 1/2 Ton	285.0	6.24	0.14	0.19	1.20	3.51	4.71	11.27	
98 Weed Sprayer - 100 Gal	124.0	2.59	0.08	0.11	1.04	0.00	1.04	3.82	

Table 7.

U C COOPERATIVE EXTENSION
RANGING ANALYSIS
NORTHERN SAN JOAQUIN VALLEY - 1998
SPRINKLER IRRIGATION

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALMONDS

	YIELD (LB/ACRE)						
	1400	1600	1800	2000	2200	2400	2600
OPERATING COSTS/ACRE:							
Cultural Cost	1123	1123	1123	1123	1123	1123	1123
Harvest Cost	249	261	274	286	299	311	324
Postharvest Cost	14	14	14	14	14	14	14
Interest on operating capital	68	68	68	68	68	68	68
TOTAL OPERATING COSTS/ACRE	1453	1466	1478	1491	1504	1516	1529
TOTAL OPERATING COSTS/LB	1.04	0.92	0.82	0.75	0.68	0.63	0.59
CASH OVERHEAD COSTS/ACRE	321	321	321	321	321	321	321
TOTAL CASH COSTS/ACRE	1774	1786	1799	1812	1824	1837	1850
TOTAL CASH COSTS/LB	1.27	1.12	1.00	0.91	0.83	0.77	0.71
NON-CASH OVERHEAD COSTS/ACRE	1191	1191	1191	1191	1191	1191	1191
TOTAL COSTS/ACRE	2964	2977	2990	3003	3015	3028	3041
TOTAL COSTS/LB	2.12	1.86	1.66	1.50	1.37	1.26	1.17

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR ALMONDS

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
	1400	1600	1800	2000	2200	2400	2600
Almonds							
0.80	-333	-186	-38	109	256	404	551
1.00	-53	134	322	509	696	884	1071
1.20	227	454	682	909	1136	1364	1591
1.40	507	774	1042	1309	1576	1844	2111
1.60	787	1094	1402	1709	2016	2324	2631
1.80	1067	1414	1762	2109	2456	2804	3151
2.00	1347	1734	2122	2509	2896	3284	3671

U C COOPERATIVE EXTENSION

Table 7. Continued

NET RETURNS PER ACRE ABOVE CASH COSTS FOR ALMONDS

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
Almonds	1400	1600	1800	2000	2200	2400	2600
0.80	-654	-506	-359	-212	-64	83	230
1.00	-374	-186	1	188	376	563	750
1.20	-94	134	361	588	816	1043	1270
1.40	186	454	721	988	1256	1523	1790
1.60	466	774	1081	1388	1696	2003	2310
1.80	746	1094	1441	1788	2136	2483	2830
2.00	1026	1414	1801	2188	2576	2963	3350

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR ALMONDS

PRICE (DOLLARS/LB)	YIELD (LB/ACRE)						
Almonds	1400	1600	1800	2000	2200	2400	2600
0.80	-1844	-1697	-1550	-1403	-1255	-1108	-961
1.00	-1564	-1377	-1190	-1003	-815	-628	-441
1.20	-1284	-1057	-830	-603	-375	-148	79
1.40	-1004	-737	-470	-203	65	332	599
1.60	-724	-417	-110	197	505	812	1119
1.80	-444	-97	250	597	945	1292	1639
2.00	-164	223	610	997	1385	1772	2159

Table 8.

UC COOPERATIVE EXTENSION
 COSTS AND RETURNS / BREAKEVEN ANALYSIS
 NORTHERN SAN JOAQUIN VALLEY - 1998
 SPRINKLER 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	1491	1309	1812	988	3003	-203

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	112000	59638	52362	72466	39534	120103	-8103

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	0.91	1.50

BREAKEVEN YIELDS PER ACRE

CROP	Yield Units	Base Price (\$/Unit)	----- Breakeven Yield To Cover -----		
			Operating Costs	Cash Costs	Total Costs
Almonds	Lb	1.40	1065.0	1294.0	2144.7