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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2004

**SAMPLE COSTS TO  
ESTABLISH and PRODUCE  
PISTACHIOS**



**SAN JOAQUIN VALLEY**

*Low-Volume Irrigation*

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# UC COOPERATIVE EXTENSION

## SAMPLE COSTS TO ESTABLISH AND PRODUCE PISTACHIOS

Low-Volume Irrigation

**San Joaquin Valley - 2004**

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University of California and the United States Department of Agriculture, Risk Management Agency, Cooperating

### INTRODUCTION

Sample costs to establish a pistachio orchard and produce pistachios in the San Joaquin Valley are presented in this study. This study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. The production practices described in this study are those considered typical for pistachios in the San Joaquin Valley, but they will not apply to every situation. Sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “Your Costs”, in Tables 3 and 4 is provided to enter your farm costs.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study, call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589 or your local UC Cooperative Extension office.

Sample Cost of Production Studies for many commodities can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-4424 or obtained from the local county UC Cooperative Extension offices. Some archived studies are also available on the website.

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## ASSUMPTIONS

The assumptions refer to Tables 1 to 10 and pertain to sample costs to establish an orchard (Tables 1-2) and produce pistachios (Tables 3-10) in the San Joaquin Valley under low volume (drip) irrigation. The cultural practices described and materials used are considered typical for a well-managed orchard in the region. The costs, materials, and practices will not apply to all situations. Establishment and production practices vary by grower and the differences can be significant. **The use of trade names and cultural practices 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 or cultural practices.**

**Land.** The hypothetical farm consists of 100 contiguous acres. Orchard establishment and pistachio production are on 95 acres. Roads, irrigation filtration systems, loading and harvest equipment turning areas, and buildings occupy the remaining five acres.

### Establishment Operating Costs

**Land Preparation.** The orchard is established on soil whose profile is relatively uniform in texture and previously planted to row crops. In this study, the field is chiseled to a three foot depth in one direction across the entire field using a five-shank ripper. Chiseling is followed by one pass with a stubble disk pulled by a 100 horsepower, tire-wheeled tractor. Custom operators do the chiseling and stubble disking. The grower then finish disks and floats the ground twice to smooth the surface. The use of drip irrigation eliminates the need for land leveling. When hardpan exists in the subsoil, land preparation begins with custom soil modification to a depth of five feet at four-foot intervals. This deep ripping cost may be as high as \$750 per acre. Failure to modify any dense subsoil limits root development and water infiltration. Ground preparation is done the year prior to planting, but the costs are included in establishment year one.

**Trees.** Pistachios are planted on a 17 ft X 19 ft (tree X row) spacing, with 135 trees per acre. The Verticillium wilt tolerant species, *Pistachia integerrima*, or interspecific hybrids (UCB1) derived from *P. integerrima* and *P. atlantica* are used for rootstock. Kerman, the most widely grown cultivar, is field-budded to the rootstocks. Because pistachios are dioecious, male trees (Peters cultivar) must be uniformly distributed among the female trees. Currently, the industry buds 1 male tree to every 19 to 24 female trees. This study uses the ratio of 1:19. Pistachio trees have a long production life if well maintained. The economic life used in this cost analysis is 40 years.

**Plant/Bud.** *P. integerrima* rootstock, grown one year in the nursery, are planted as dormant, potted rootstocks in January or early February. The commercial planting costs include surveying the field, marking the tree sites, digging the holes and planting the unbudded rootstocks. Immediately after planting, 2-inch x 2-inch x 6-foot stakes are spread in the field and installed on the south side of the trees by contract labor. Tree stakes in this study are purchased new. Growers may have the option to purchase used stakes and/or the option to sell the stakes after use. In mid-July of the first year, the trees are commercially budded with a guarantee that 95% of the buds will take. Failed buds on surviving rootstock are rebudded with two buds per tree in September. In the second year, trees should be rebudded as soon as possible. The budding failure rate used for this study is 5% in the first year and 2% in the second.

**Replants.** In years one and two, replanted tree loss in each year is 1% or less. Nursery budded trees or unbudded trees are replanted as soon as possible so that all trees are budded in the current year. Replants placed in older orchards will have a higher failure rate due to irrigation and gopher damage.

**Train, Sucker, and Prune.** In April of the first year, a suckering crew removes any growth from the rootstock that is within 8 inches of the ground. In late July, 5 to 7 days after budding, the crew partially girdles (notches) the rootstock directly above the Kerman bud using a 24-tooth hacksaw blade. Simultaneously, 50 to 70% of the rootstock growth is also removed. Both operations encourage uniform and vigorous growth of the Kerman bud. Three weeks later (August), a third pass is made to begin training the Kerman shoot up the stake and continue suppression of new rootstock growth. The crew makes three more tree-training passes at 14-day intervals during August and September. This results in a total of six passes through the orchard by the end of September (suckering, notching, 4 training). Dormant pruning occurs in December of the first year when dormant Kerman shoots are headed to 42 inches and the rootstock lateral branches are removed. Both the rootstock and the dormant Kerman shoot are then tied to the stake. In the second growing season, training to develop the primary and secondary scaffolds takes four passes at 14 day intervals during May, June, and July. Dormant pruning in the second year involves removal of rootstock laterals, heading of the secondary branches, and cross-tying selected trees that have poorly positioned scaffolds. In the third and fourth years, training during May, June, and July is limited to rootstock sucker removal and cross tying of flat scaffold limbs. In this study it takes four passes in the third year and three passes in the fourth. The costs will vary for each pass through the field, but according to grower estimates, the average cost is \$25 per pass per acre. Dormant pruning continues in the third and subsequent years.

**Irrigation.** The irrigation costs include water at \$8.33 per acre-inch (\$100 per acre foot), costs for pressurizing the irrigation system at \$2.08 per acre-inch (\$25 per acre-foot) and irrigation labor at 0.15 hours per acre per irrigation. In the first year, the trees are irrigated in February, immediately after planting, and periodically throughout the growing season until early September. In the following years, irrigation is from mid-April to mid-September. At the end of the second year, the second drip line is laid out. Costs for the drip line and its installation are not shown in the second year, but are included in the overhead costs for the drip system. The amount of water applied to the orchard during establishment is much less than at maturity. Table A shows the **applied** water for each year in this study. Applied water values are substantially greater than the actual tree water requirement due to application inefficiency. Application efficiencies of 40%, 70%, and 90% are used for years 1, 2, and 3-7, respectively, and reflect the differences in evaporative loss due to canopy development. Effective rainfall has not been considered in this study because it is too variable. A large percentage of the present pistachio acreage receives surface water from state or federal canal systems. The water districts formed for orderly water distribution each have assessment costs in addition to the actual water price. These costs vary widely depending upon distribution overhead. The price of district water in the pistachio growing areas of the San Joaquin Valley ranges from \$50 to \$150 per acre-foot depending on the irrigation district. The cost of irrigation water obtained from on-site wells is dependent on energy costs, well characteristics, and other irrigation factors.

Table A. Total Applied Water

Year	Acre- inch
1	18.0
2	24.0
3	27.6
4	37.2
5	42.0
6	46.8
7+	47.0

**Pest Management.** The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC Integrated Pest Management Guidelines, Pistachios* available online at [www.imp.ucdavis.edu](http://www.imp.ucdavis.edu). Pesticides mentioned in the study are commonly used, but are not recommendations.

*Insects and Mites.* In August, shortly after budding, scotch tape is wrapped around the rootstock about six-inches above ground level to prevent darkling ground beetles from reaching and eating the bud. Aphids, ants, katydid, or false chinch bugs may require treatment during the first three years between May and August. In

August of the first year, Pounce is applied for their control. Orthene is applied for false chinch bugs in June during years two and three. During the sixth year, when the first commercial crop is expected, insecticide treatments to control plantbugs (lygus, leaffooted bug, stinkbug) may be necessary between April and August. In this study, plantbugs are controlled with Pounce applied in April. Citrus flat mite may also require treatment. In this study, it is controlled with wettable sulfur applied in July. All treatments are applied with a grower-owned sprayer.

*Disease.* Botrytis Blossom and Shoot Blight (Botrytis), Botryosphaeria Panicle and Shoot Blight (Botryosphaeria), and Alternaria Late Blight (Alternaria) do not typically occur at treatable levels during the establishment years. However, treatment for one or more of these diseases during April or July may be necessary in the event of severe, early season wet weather.

*Vertebrate.* Gophers and squirrels are a serious threat to young pistachio trees. Poison bait, fumigation, and/or trapping are used to control gophers and ground squirrels. In this study, poison bait is placed either in a bait station for squirrels or in the gopher’s burrow using a probe. Gophers are baited in April and November during the first five years. Beginning in the sixth year, squirrels are the primary pest and are baited in the spring (May).

*Weeds.* Prior to planting, the pre-emergence herbicides, Prowl and Goal, are sprayed in the tree row (6 ft wide berm or 32% of the acre). Hand weeding by a contract labor crew is done around the base of the trees in the first year. During the first five non-bearing years, Prowl and Goal are applied in the fall (November/December) in the tree row as a winter strip spray. In the sixth and subsequent years, Goal and Surflan are applied as the winter strip spray. In-season spot treatments using a post-emergent herbicide, Roundup, are made three times (April, June, July) during the spring and summer of the first two years. A Roundup and Goal combination is applied as spot sprays during the same period from the third to sixth year. The total area sprayed with spot sprays will vary with each application. In this study 11% of the total acres are sprayed. The herbicide sprays are applied with an All Terrain Vehicle (ATV) and ATV pull-type sprayer or a skid sprayer attached to the back of the ATV. The floor (row) middles are disked three times beginning in the first year.

**Fertilize.** Nitrogen, the major nutrient required for proper tree growth and optimum yields, is applied as UN-32 (32-0-0) through the drip system with the rate increased each year during the establishment years. See Table B. During August of the first year, Solubor (boron) at 15 pounds per acre is applied by hand beneath the emitters, but can also be applied through the drip system. Boron uptake efficiency varies greatly by soil texture and pH. In the following years it is foliar applied at 3 pounds Solubor per acre in late April. Copper EDTA (1/2 lb/ac), and zinc (2 lb Zinc 36%/ac) are added to the April boron spray in the second year. Boron (3 lb Solubor/ac) and zinc (2 lb Zinc 36%/ac) applications are repeated in May, June, and July. In the third year, copper, boron, and zinc are applied in April at the same rates as the second year, followed by boron and zinc in June. Frequency of application depends upon soil type. In late-October/early-November, zinc sulfate at 40 pounds per 100 gallons of water, is foliar applied by handgun in the first year to supply zinc and to force dormancy. The tractor driver operates the handgun with the hose connected to the outlet on the speed sprayer. Thirty-three acres are treated per day. After the first year, the fall zinc treatment is applied at 40 pounds per acre with the speed sprayer fan operating. Soil samples should be

Year	Lbs of N/Acre
1	0
2	33
3	66
4	100
5	135
6	135
7+	200

taken prior to planting and evaluated for salinity. Water nitrogen content should be taken into consideration for the fertilizer program.

**Harvest.** Commercial yields normally begin in the fifth or sixth year after the orchard is planted and may be bulk or bin harvested. In this study, harvest begins in the sixth year and the crop is bulk harvested. See harvest under Production Operating Costs.

### **Production Operating Costs**

**Prune.** Contract labor hand prunes the trees during the dormant season, usually in December and/or January. Tipping cuts on long, one-year-old fruitwood are made in combination with thinning cuts on older branches. The goal is to distribute fruitwood and allow sufficient light into the canopy center. The prunings are hand stacked in alternate row middles and shredded commercially, leaving the residue/debris on the orchard floor. The residue is later incorporated into the soil during the winter sanitation disking.

**Winter Sanitation.** Contract labor is hired to pole off the overwintering nuts (mummies) not removed during pruning. The berms are then blown free of mummy nuts and debris one at a time using a tractor-mounted blower supplied by the grower.. The row centers are then disked to incorporate the mummies and shredded prunings.

**Fertilization.** Zinc (Zinc Sulfate 36%) is foliar applied in either February or October, February in this study. Boron (Solubor) is applied in February at bud swell to optimize flower nutrition. Nitrogen (N) as UN32 is applied through the drip system beginning with the first irrigation in April. A total of 200 pounds of N is applied; 25% in April, 25% in May, 37.5% in July, and 12.5% in early August. Since pistachios are alternate bearing, nitrogen use in the “on” or high production years is greater than in the “off” or low production years. The nitrogen rate used in this study is assumed to be the average of the “on” and “off” years.

**Leaf Samples.** The nutritional program should be based on leaf analysis. Leaf samples are taken from non-fruiting spurs in August. The sampler collects 1 sample per 25 acres or 4 samples for this farm. The ATV is used to move around the field. It is assumed that it takes four hours to collect, label, and deliver the samples for analysis.

**Irrigation.** Irrigation costs include water at \$8.33 per acre-inch (\$100 per acre-foot), costs for pressurizing the irrigation system at \$2.08 per acre-inch (\$25 per acre-foot) and irrigation labor at 0.15 hours per irrigation, except where additional time is required during the February irrigation. ATV use for all irrigations other than February’s is included in the ATV use operation. The first irrigation in February replenishes the water in the root zone and prepares the system for use during the season. The February irrigation costs include use of the ATV, labor for cleaning the filters, repairing the lines and monitoring all the emitters. The irrigation in April is primarily for applying nitrogen fertilizer. The trees are assumed to have a seasonal consumptive water use of 42 acre-inches. The irrigation efficiency is 90%, therefore a total of 47 acre-inches is applied during the year.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Pistachios*. For more information on other pesticides available, pest identification, monitoring, and management visit the above UC IPM website at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu). Cultural practices are discussed in the *Pistachio Production Manual*. For information and pesticide use permits, contact the local county agricultural commissioner's office. Adjuvants are recommended for many pesticides for effective control and are an added cost. The adjuvants in this study are not included as a cost in the applications. Pesticide costs

may vary by location and grower volume. **Pesticide costs** in this study are taken from a single dealer and **shown as full retail**.

*Pest Control Adviser (PCA)*. Licensed pest control advisers provide the written recommendations required for many pesticides. In addition, the PCA monitors the orchard for pest, disease, and nutritional problems. Growers may hire private PCA's or receive the service as part of an agreement with an agricultural chemical and fertilizer company. In this study, the grower contracts with a private PCA. The PCA also hangs the NOW traps and monitors them on a weekly basis. The trap cost is included in the PCA monitoring fee.

*Insect*. In mid-March, the PCA hangs Navel Orangeworm (NOW) traps in the tree at one trap per 10 acres. The PCA monitors the traps weekly from mid-March to the end of June. From July to late-August, the field is monitored for NOW damage by observing early split nuts. During harvest, NOW egg-laying activity is monitored in split nuts and maturing hull tissue. In mid-August, Intrepid insecticide is applied as a NOW cover spray. Wettable sulfur is applied in July to control citrus flat mite. In April and July, Pounce is applied to control plant bugs (stink bug, lygus, leaf footed bug, *phytocoris spp.*, etc.). The July citrus flat mite and plant bug sprays are combined in this study.

*Disease*. Two foliar fungicide applications are targeted for Botryosphaeria Panicle and Shoot Blight, called 'Bot', Botrytis Blossom and Shoot Blight (Botrytis) and Alternaria Late Blight (Alternaria). Treatment timing is dependent on the disease or diseases most prevalent. Rain during bloom may cause Botryosphaeria or Botrytis infection. In this study, the grower applies Topsin fungicide in April for botryosphaeria and/or botrytis and Abound in June for botryosphaeria and/or alternaria control.

*Botryosphaeria*. Botryosphaeria Panicle and Shoot Blight (*Botryosphaeira dothidea*) can be a serious problem in some areas and/or years. It is a panicle and shoot disease, which can affect the fruit by invading it and causing deterioration. The cost to control 'Bot' with fungicides and pruning can range from \$200 to \$1,000 per acre. Pruning out infected clusters during the winter is tedious and expensive, but critical to controlling the disease. Topsin fungicide sprayed (sometimes applied as two sprays at one-half the top label rate) at bloom for Botrytis control reduces the primary 'Bot' inoculum. In addition to removing infected rachises during pruning, orchards with 'Bot' may require several fungicide applications beginning in late May to early June and continuing until harvest. Costs for treating severe 'Bot' infections are shown in Table 9. Growers treating for 'Bot' should add these costs to the cultural practices and overhead in Table 3.

*Vertebrate Pest*. Gophers are baited year-round – April, August, November in this study - and squirrels in May. The grower-supplied worker uses the ATV to move around the field for baiting purposes. Baiting can sometimes be incorporated with weed spot spraying. Bird damage to the maturing crop can be a major problem in some areas, but control costs are not shown because they are highly variable.

*Weed Control*. Pre-emergent and post-emergent herbicides, Surflan, Goal, and Roundup are applied as a winter strip spray to the tree row (6 ft berm) in February following winter sanitation. Weeds in the tree rows during the growing season are controlled with two spot sprays (May, July) with Roundup herbicide. Each application is assumed to be applied to 33% of the berm or 11% of the total acres. The row middles are disked three times: April, June, and August.

**Harvest**. Pistachio trees typically reach full production by the 12th or 13th year. Commercial harvest may be done by the "bulk" or "bin" method. The bulk method is used in this study, but the costs are approximately the

same for both methods. Pistachios are harvested mechanically using a shaker with tarpaulins supported above the machine. The shaker travels down one side of the tree in unison with a catch frame harvester (receiver) on the opposite side. The shaker hydraulically clamps and vibrates the base of the tree, dislodging the nuts onto the tarpaulins and receiver. They are then conveyed into 4 ft x 4 ft x 3 ft bins that are picked up six at a time by a bin carrier. The bins are delivered to a loading area for transport to the processor. The “bulk” harvest system substitutes a large bulk trailer for the bins, which periodically dumps its load into a mobile bankout wagon. The bankout wagon then travels to an unloading area where the nuts are elevated into large, bottom-dump type trailers for hauling to the processor. Upon arrival, the nuts are weighed, hulled, dried, graded, and packed. For bin harvests, the commercial harvests costs may be lower, but the grower must furnish a forklift with a bin turner, bin carriers, and additional labor. If the harvesting company furnishes the forklift, the cost is equivalent to bulk harvest.

**Yields.** Pistachios are an alternate bearing crop, having a high yield one year and a low yield the next year. Although an economic yield usually begins the sixth year, the alternate bearing cycle begins when the trees are between 10 to 12 years old. **An**

**average of the high-low yield cycle** is used for calculating grower returns in this study and these values appear in Tables C, 4 and 6. Yields in the study are divided into three categories; clean in-shell splits, shelling stock/closed shell nuts (dark stain, stick tights and

Table C. Annual Yields

Year	Pounds/Acre			
	Total Yield	Clean In-shell Splits	Shelling Stock In-shell	Loose Kernels
6	600	480	117	3
7	1,300	1,040	254	7
8	2,000	1,600	390	10
9+	2,500	2,000	488	12

shell damaged nuts), and loose kernels. Each category makes up a percentage of the total yields shown in Table C. Blanks and other unmarketable nuts (such as severe lesion) are not included in the total yield. Shelling stock yields as they appear in Table C, include the weight of the nutmeat and the shell. However, growers should be aware, that processors pay only for the nutmeat in the shelling stock and loose kernel categories.

**Returns.** Prices received by growers for their marketable products vary by category. Usually, there are not enough loose kernels (<.5%) to affect a grower’s return. Loose kernels are normally grouped with the shelling stock and are shown as such in Table 4. The first two categories yield approximately 80% and 20%, respectively. Estimated prices for the current year, based on current market prices, and shown in Table D are used in this study so that a ranging analysis for different yields and prices can be calculated. Prices for clean in shell nuts are for the total shell and nutmeat weight, whereas the price paid for shelling stock is for the weight of nutmeats only.

Table D. Prices paid to growers by grades

Grades	Clean	Shelling Stock/	Loose
	In-shell splits	Closed Shell	Kernels
\$/lb	\$1.20	\$0.60 <sup>†</sup>	\$0.60

<sup>†</sup> price is based on kernel (nutmeat) weight of shelling stock.

**Assessments.** Under a state marketing order, mandatory assessment fees are collected and administered by the California Pistachio Commission. Growers are charged the assessment to pay for industry research programs. The current assessment rate is \$0.035 per pound based on total production (clean, in-shell split nuts and shelling stock).

**Pickup/ATV.** The study assumes business use mileage of 4,500 miles per year for the pickup. The ATV is used for spot spraying, and rodent baiting and is included in those specific costs. Use of the ATV for monitoring



the orchard and checking the irrigation system is shown under the ATV operation and assumes a use of 3 hours per acre. ATV use is also included in the first irrigation, where it is used to monitor, check and repair the drip system for the season.

**Labor.** Labor rates of \$13.50 per hour for machine operators and \$9.11 for general labor includes payroll overhead of 35%. The basic hourly wages are \$10.00 for machine operators and \$6.75 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/nut crops (code 0045), and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 5, 2004 (California Department of Insurance). Labor for operations involving machinery are 20% higher than the operation time given in Table 3 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Wages for management are not included as a cash cost. Any return above total costs is considered a return to management and risk. However, growers wanting to account for management may wish to add a fee. Currently, professional management costs for an orchard of this size in the region is about \$90 per acre. Three-quarters of pistachio growers hire professional management services. The manager makes all production decisions including cultural practices, action to be taken on pest management recommendations, and labor.

**Equipment Operating Costs.** Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agriculture Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$1.45 and \$1.88 per gallon, respectively. The fuel prices are averaged based on four California delivery locations plus \$0.24 per gallon, which is one-half the difference between the high and low price for regular gasoline in 2003 from the California State Automobile Association Monthly Survey. The cost includes a 2.25% sales tax (effective September 2001) on diesel fuel and 7.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which can be refunded for on-farm use when filing your income tax. The fuel, lube, and repair cost per acre for each operation in Table 3 is determined by multiplying the total hourly operating cost in Table 8 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

**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 6.89% per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post harvest operations is discounted back to the last harvest month using a negative interest charge.

**Risk.** Production risks 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 pistachio 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, equipment repairs, and management.

**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.

**Insurance.** Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.676% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$645 for the entire farm.

**Office Expense.** Office and business expenses are estimated at \$50 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges. The cost is a general estimate and not based on any actual data.

**Sanitation Services.** Sanitation services provide double portable toilets, washbasins, soap, and towels for the orchard and cost the farm \$218 per month. The monthly service charge is an average of four to six California sanitation companies and locations. The cost includes delivery and 12 months of weekly service.

**Management/Supervisor Salaries.** The grower farms the orchard; therefore no salaries are included for management. Returns above costs are considered a return to management.

**Investment Repairs.** Annual maintenance is calculated as two percent of the purchase price.

### **Non-cash Overhead**

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

**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). It is equivalent to the annual payment on a loan for the investment with the down payment 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 formula for the calculation of the annual capital recovery costs is  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

*Salvage Value.* Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASAE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASAE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in the tables.

*Capital Recovery Factor.* Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

*Interest Rate.* The interest rate of 6.23% 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.

**Establishment Cost.** Costs to establish the orchard are used to determine capital recovery expenses, depreciation, and interest on investment for the production years. Establishment cost is the sum of the costs for land preparation, planting, trees, cash overhead and production expenses for growing the trees through the first year that almonds are harvested minus any returns from production. In Table 1, the Total Accumulated Net Cash Cost in the sixth year represents the establishment cost. For this study the cost is \$8,007 per acre or \$760,665 for the 95-acre orchard. The establishment cost is spread over the remaining 34 producing years of the 40 years of orchard life.

**Drip Lines.** Drip lines are laid out prior to planting. The labor cost for laying out the line is included in the irrigation system cost. A second line is installed during the second year and the materials and labor are included in the overall costs. The cost for the drip line layout is calculated from basic information provided by an irrigation company, and does not represent any specific system.

**Irrigation System.** The water is delivered from an irrigation district. The system cost includes a booster pump, filtration, fertilizer injector, and main lines. Costs are a general estimate for the system and not for any specific layout.

**Land.** Land costs range from \$2,000 to \$5,000 per acre. Land in this study is valued at \$4,000 per acre or \$4,211 per producing acre..

**Building.** The buildings total 2,400 square feet and are metal building/buildings on a cement slab.

**Tools.** This includes shop tools, hand tools, and miscellaneous field tools such as pruning tools.

**Fuel Tanks.** Two 250-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

**Equipment.** Farm equipment is purchased new or used, but the 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 for equipment and other investments are shown in the Whole Farm Annual Equipment, Investment, and Business Overhead Costs table. 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 repairs, fuel, and lubrication and are discussed under operating costs.

**Table Values.** Due to rounding, the totals may be slightly different from the sum of the components.

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UC COOPERATIVE EXTENSION  
**Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A PISTACHIO ORCHARD**  
 SAN JOAQUIN VALLEY - 2004

	Cost Per Acre						
	Year:	1st	2nd	3rd	4th	5th	6th
<b>Total Yield: Dry, In-Shell Pounds Per Acre</b>							<b>600</b>
<b>Planting Costs:</b>							
Land Prep: Chisel 3 ft deep		100					
Land Prep: Stubble Disk 1X		20					
Land Prep: Disk & Float 2X		13					
Weed: Pre-plant (Prowl)		40					
Trees: 135 Per Acre (1% replant in Year 2)		864	6				
Plant: Survey, Mark, & Plant Trees		135	1				
Plant: Spread Stakes & Stake Trees		182					
Bud: Field Bud Trees		108	2				
Train: Notch and Tip Rootstock		20	1				
Rebud: 5% Yr 1; 2% Yr 2		6					
<b>TOTAL PLANTING COSTS</b>		<b>1,488</b>	<b>10</b>				
<b>Cultural Costs:</b>							
Train/Sucker: 5X Yr 1; 4X Yr 2-3; 3X Yr 4		125	100	100	75		
Prune: Dormant		50	75	100	125	150	200
Prune: Disk Prunings		6					
Prune: Shred Prunings			20	20	30	30	30
Fertilize: Boron (Solubor) under emitters		15					
Fertilize: Boron (Solubor), Zinc (Zn 36%) Foliar 3X Yr 1; 1X Yr 2+			52	17	17	17	17
Fertilize: Boron (Solubor), Zinc (Zn 36%), Copper (Cu Chelate 14%)			20	20	20	20	20
Fertilize: Zinc (Zn 36%) Defoliation		32	32	32	32	32	32
Fertilize: Nitrogen (UN32) see Table B, pg 5			13	27	41	55	55
Weed: Spot Spray 3X (Roundup Yr 1-2; Roundup, Goal Yr 3+)		20	20	41	41	41	41
Weed: Winter Strip Spray (Goal, Prowl Yr 1-5; Goal, Surflan Yr 6+)		38	38	38	38	38	59
Weed: Disk Middles 3X		17	17	17	17	17	17
Weed: Hand - Contract		40					
Insect: Plant Bugs (Pounce)							29
Insect: Citrus Flat Mites (Wettable Sulfur)							18
Insect: Ant, Aphid, Katydid, (Pounce)		26					
Insect: Aphid, Chinch Bug (Orthene)			28	28			
Insect: Ground Beetle (Scotch Tape)		30					
Vertebrate: Gophers Yr 1+, Squirrel Yr 6+ (Bait)		22	22	22	22	22	45
Remove Stakes						62	
Irrigate: (Water, Labor) see Table A, pg 4		201	265	302	402	456	506
Pickup Truck Use		54	54	54	54	54	54
ATV Field Use (irrigation and miscellaneous)		53	53	53	53	53	53
PCA/Consultant Service		10	10	10	10	10	25
Fertilizer: Leaf Samples & Analysis		3	3	3	3	3	3
<b>TOTAL CULTURAL COSTS</b>		<b>742</b>	<b>822</b>	<b>884</b>	<b>980</b>	<b>1,060</b>	<b>1,204</b>
<b>Harvest Costs:</b>							
Shake & Catch: Bulk Harvest							155
Haul							3
Assessment: California Pistachio Commission							20
<b>TOTAL HARVEST COSTS</b>							<b>178</b>
Interest On Operating Capital @ 6.89%		85	10	10	10	8	12
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>2,315</b>	<b>842</b>	<b>894</b>	<b>990</b>	<b>1,068</b>	<b>1,394</b>

## UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre						
	Year:	1st	2nd	3rd	4th	5th	6th
Total Yield: Dry, In-Shell Pounds Per Acre							600
Cash Overhead Costs:							
Office Expense		50	50	50	50	50	50
Liability Insurance		5	5	5	5	5	5
Sanitation Fees		28	28	28	28	28	28
Property Taxes		57	57	57	57	57	57
Property Insurance		10	10	10	10	10	10
Investment Repairs		42	42	42	42	42	42
<b>TOTAL CASH OVERHEAD COSTS</b>		192	192	192	192	192	192
<b>TOTAL CASH COSTS/ACRE</b>		2,507	1,034	1,086	1,182	1,260	1,586
<b>INCOME/ACRE FROM PRODUCTION</b>							648
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		2,507	1,034	1,086	1,182	1,260	938
<b>PROFIT/ACRE ABOVE CASH COSTS</b>							0
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		2,507	3,541	4,627	5,809	7,069	<b>8,007</b>
Non-Cash Overhead (Capital Recovery Costs):							
Shop Building		47	47	47	47	47	47
Fuel Tanks & Pumps		3	3	3	3	3	3
Shop Tools		12	12	12	12	12	12
Drip Lines		69	69	69	69	69	69
Irrigation System (Booster Pump/Filtration System)		55	55	55	55	55	55
Land		262	262	262	262	262	262
Equipment		87	86	86	86	86	86
<b>TOTAL INTEREST ON INVESTMENT</b>		535	534	534	534	534	534
<b>TOTAL COST/ACRE FOR THE YEAR</b>		3,042	1,568	1,620	1,716	1,794	2,121
<b>INCOME/ACRE FROM PRODUCTION</b>							648
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		3,042	1,568	1,620	1,716	1,794	1,473
<b>NET PROFIT/ACRE ABOVE TOTAL COST</b>							0
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		3,042	4,610	6,230	7,946	9,740	11,213

UC COOPERATIVE EXTENSION  
**Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS**  
 SAN JOAQUIN VALLEY - 2004

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
			Total Per Acre											
			units	\$	units	\$	units	\$	units	\$	units	\$	units	\$
<b>Custom:</b>														
Chisel 3'	acre	100.00	1.00	100										
Disk - Stubble	acre	20.00	1.00	20										
Mark, Spread Trees, Plant	tree	1.00	135.00	135	1.00	1								
Stake Trees	tree	0.25	135.00	34										
Tape Tree for ground beetle	acre	30.00	1.00	30										
Hand Weed	acre	40.00	1.00	40										
Notch & Tip Trees	tree	0.15	135.00	20	7.00	1								
Sucker Trees	acre	25.00	1.00	25										
Train Trees	acre	25.00	4.00	100	4.00	100	4.00	100	3.00	75				
Prune	acre	Various	1.00	50	1.00	75	1.00	100	1.00	125	1.00	150	1.00	200
PCA/Consultant Fee	acre	Various	1.00	10	1.00	10	1.00	10	1.00	10	1.00	10	1.00	25
Shred Prunings	acre	Various			1.00	20	1.00	20	1.00	30	1.00	30	1.00	30
Harvest-First Harvest	tree	1.15											135.00	155
Haul Nuts	ton	10.00											0.30	3
<b>Tree/Tree Aids:</b>														
Tree Unbudded	tree	6.40	135.00	864	1.00	6								
Bud Tree	tree	0.80	135.00	108	3.00	2								
Rebud Tree	tree	0.80	7.00	6										
Tree Stakes 2"x 2"x 6'	each	1.10	135.00	149										
<b>Irrigation:</b>														
Water - District	acin	8.33	18.00	150	24.00	200	27.59	230	37.20	310	42.00	350	46.81	390
Water - Pressurize System	acin	2.08	18.00	37	24.00	50	27.59	57	37.20	77	42.00	87	46.81	97
<b>Fertilizer:</b>														
Zinc Sulfate 36%	lb	0.46	40.00	18	48.00	22	44.00	20	44.00	20	44.00	20	44.00	20
Solubor (Boron)	lb	0.90	15.00	14	12.00	11	6.00	5	6.00	5	6.00	5	6.00	5
Copper Chelate 14%	lb	4.54			0.50	2	0.50	2	0.50	2	0.50	2	0.50	2
UN-32 (N)	lb N	0.41			33.00	13	66.00	27	100.00	41	135.00	55	135.00	55
<b>Herbicide:</b>														
Prowl 3.3 EC	pint	3.82	6.14	23	3.07	12	3.07	12	3.07	12	3.07	12		
Goal 2 XL	pint	16.25	2.56	42	1.28	21	2.54	41	2.54	41	2.54	41	2.54	41
Surflan 4AS	pint	13.07											2.56	33
Roundup Ultra Max	pint	8.58	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5
<b>Insecticide:</b>														
Traps NOW (in PCA fee)	acre	0.00												
Orthene 97	lb	18.49			0.75	14	0.75	14						
Pounce 3.2 EC	floz	1.56	8.00	12									10.00	16
Wettable Sulfur 92%	lb	0.21											20.00	4
<b>Rodenticide:</b>														
Gopher Bait Wilco	lb	4.05	1.00	4	1.00	4	1.00	4	1.00	4	1.00	4	1.50	6
Squirrel Wilco	lb	3.38											1.00	3
Labor (machine)	hrs	13.50	11.59	156	12.70	172	11.61	157	11.03	149	13.79	186	13.39	181
Labor (non-machine)	hrs	9.11	1.71	16	1.65	15	1.65	15	1.65	15	4.40	40	2.10	19
Fuel - Gas	gal	1.88	10.89	20	10.89	20	10.89	20	10.89	20	12.04	23	11.39	21
Fuel - Diesel	gal	1.45	11.65	17	16.16	23	11.74	17	9.53	14	9.53	14	13.95	20
Lube			6		7		6		5		5		6	
Machinery repair			16		23		18		16		17		21	

UC COOPERATIVE EXTENSION  
**Table 3. COST PER ACRE TO PRODUCE PISTACHIOS**  
 SAN JOAQUIN VALLEY - 2004

Operation	Operation	Cash and Labor Costs per Acre					Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
Cultural:								
Prune: Hand	0.00	0	0	0	270	270		
Brush: Stack (hand labor), Shred (Custom)	1.08	10	0	0	30	40		
Winter Sanitation: Pole, Rake, Blow, Chop	0.37	24	3	0	50	78		
Winter Sanitation: Disk mummies & shredded prunings	0.21	3	2	0	0	6		
Weed: Winter Strip (Goal, Surflan, Roundup)	0.27	4	3	60	0	67		
Fertilize: Zn (ZincSO4), Boron (Solubor)	0.48	8	6	24	0	38		
Irrigate: (water, labor)	2.75	29	1	489	0	519		
Insect: NOW, (PCA hang traps)	0.01	0	0	0	0	0		
Fertilize: N (UN32)	0.00	0	0	81	0	81		
Disease: Bot/Botrytis (Topsin)	0.48	8	6	46	0	60		
Pest: Plant Bugs (Pounce)	0.48	8	6	19	0	32		
Weed: Disk Middles 3X	0.63	10	7	0	0	17		
Vertebrate: Gopher (gopher bait)	1.50	24	2	6	0	33		
Vertebrate: Squirrel (squirrel bait)	0.50	8	1	3	0	12		
Weed: Spot Spray Tree Row 2X (Roundup)	0.50	8	1	4	0	13		
Disease: Bot/Alternaria (Abound)	0.48	8	6	36	0	49		
Pest: Citrus Flat Mite (Sulfur) /Plant Bug (Pounce)	0.48	8	6	23	0	37		
Pest: NOW (Intrepid)	0.48	8	6	40	0	54		
Leaf Sampling & Analysis	0.05	1	0	0	2	3		
Pickup (general farm use)	2.00	32	22	0	0	54		
ATV Field Use (irrigation and miscellaneous)	3.00	49	5	0	0	53		
PCA/Consultant Service	0.00	0	0	0	30	30		
<b>TOTAL CULTURAL COSTS</b>	<b>15.76</b>	<b>250</b>	<b>82</b>	<b>831</b>	<b>382</b>	<b>1,544</b>		
Harvest:								
Harvest: Bulk (Shaker, Receiver & Bankout Wagon)	0.00	0	0	0	196	196		
Harvest: Haul	0.00	0	0	0	13	13		
Assessments: Pistachio Commission	0.00	0	0	88	0	88		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>88</b>	<b>208</b>	<b>296</b>		
Interest on operating capital @ 6.89%						48		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>250</b>	<b>82</b>	<b>918</b>	<b>590</b>	<b>1,889</b>		
CASH OVERHEAD:								
Office Expense						50		
Liability Insurance						5		
Sanitation						28		
Property Taxes						97		
Property Insurance						37		
Investment Repairs						42		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>260</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>2,148</b>		



UC COOPERATIVE EXTENSION

Table 3. Continued

Operation	Operation		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent			
NON-CASH OVERHEAD: (Capital Recovery)		Per producing Acre		Annual Cost Capital Recovery				
Buildings		632		47			47	
Fuel Tanks		37		3			3	
Shop Tools		119		12			12	
Drip Lines		500		69			69	
Irrigation System (Filter/Booster Pump)		800		55			55	
Land		4,211		262			262	
Orchard Establishment Cost		8,007		572			572	
Equipment		801		90			90	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>			15,106	1,110			1,110	
<b>TOTAL COSTS/ACRE</b>							3,258	

UC COOPERATIVE EXTENSION  
**Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE PISTACHIOS**  
 SAN JOAQUIN VALLEY - 2004

	Quantity		Price or	Value or	Your
	Total/Acre	Unit	Cost/Unit	Cost/Acre	Cost
<b>GROSS RETURNS</b>					
Clean Splits	2,000.00	lb	1.20	2,400	
Shelling Stock (includes Loose Kernels)	500.00	lb	0.60	300	
<b>TOTAL GROSS RETURNS</b>				<b>2,700</b>	
<b>Operating Costs:</b>					
<b>Custom:</b>					
Prune	1.00	acre	270.00	270	
Shred Prunings	1.00	acre	30.00	30	
Winter Sanitation (Pole Nuts)	1.00	acre	50.00	50	
Harvest-Bulk	135.00	tree	1.45	196	
Haul Nuts	1.25	ton	10.00	13	
PCA/Consultant Fee	1.00	acre	30.00	30	
<b>Herbicide:</b>					
Goal 2 XL	1.28	pint	16.25	21	
Surflan	2.56	pint	13.07	33	
Roundup Ultra Max	1.06	pint	8.58	9	
<b>Fertilizer:</b>					
Zinc Sulfate 36%	40.00	lb	0.50	20	
Solubor (Boron)	5.00	lb	0.81	4	
UN-32 (N)	200.00	lb N	0.41	81	
<b>Irrigation:</b>					
Water - District	47.00	acin	8.33	392	
Water - Pressurize System	47.00	acin	2.08	98	
<b>Insecticide:</b>					
Traps NOW (Free, included in PCA fee)	0.10	acre	0.00	0	
Pounce 3.2 EC	24.00	floz	1.56	37	
Wettable Sulfur 92%	20.00	lb	0.21	4	
Intrepid 2F	1.00	pint	39.94	40	
<b>Fungicide:</b>					
Topsin M	2.00	lb	23.09	46	
Abound 2EC	13.75	floz	2.59	36	
<b>Rodenticide:</b>					
Gopher Bait Wilco	1.50	lb	4.05	6	
Squirrel Wilco	1.00	lb	3.38	3	
<b>Contract:</b>					
Leaf Analysis	1.00	acre	2.00	2	
<b>Assessment:</b>					
CA Pistachio Commission	2,500.00	lb	0.04	88	
Labor (machine)	14.90	hrs	13.50	201	
Labor (non-machine)	5.34	hrs	9.11	49	
Fuel - Gas	11.35	gal	1.88	21	
Fuel - Diesel	20.04	gal	1.45	29	
Lube				8	
Machinery repair				24	
Interest on operating capital @ 6.89%				48	
<b>TOTAL OPERATING COSTS/ACRE</b>				<b>1,889</b>	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				<b>811</b>	

UC COOPERATIVE EXTENSION

Table 4. Continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				50	
Liability Insurance				5	
Sanitation				28	
Property Taxes				97	
Property Insurance				37	
Investment Repairs				42	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>260</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>2,148</b>	
<b>NON-CASH OVERHEAD COSTS</b>					
Buildings				47	
Fuel Tanks				3	
Shop Tools				12	
Drip Lines				69	
Irrigation System (Filter/ Booster Pump)				55	
Land				262	
Orchard Establishment Cost				572	
Equipment				90	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,110</b>	
<b>TOTAL COSTS/ACRE</b>				<b>3,258</b>	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				<b>-558</b>	

UC COOPERATIVE EXTENSION  
**Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE PISTACHIOS**  
 SAN JOAQUIN VALLEY - 2004

Beginning JAN 04	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 04	04	04	04	04	04	04	04	04	04	04	04	04	04
Cultural:													
Prune: Hand (December + January Costs)	270												270
Brush: Stack (hand labor), Shred (Custom)		40											40
Winter Sanitation: Pole, Rake, Blow, Chop		78											78
Winter Sanitation: Disk mummies & prunings		6											6
Weed: Winter Strip (Goal Surflan Roundup)		67											67
Fertilize: Zn (ZincSO4), Boron (Solubor)		38											38
Irrigate: (Water, Labor)		50		22	64	108	130	110	22	12			519
Insect: NOW, (PCA hang traps)			0										0
Fertilize: N (UN32)				20	20		30	10					81
Disease: Bot/Botrytis (Topsin)				60									60
Pest: Plant Bugs (Pounce)				32									32
Weed: Disk Middles 3X				6		6		6					17
Vertebrate: Gopher (gopher bait)				11				11			11		33
Vertebrate: Squirrel (squirrel bait)					12								12
Weed: Spot Spray Tree Row 2X (Roundup)					6		6						13
Disease: Bot/Alternaria (Abound)							49						49
Pest: Citrus Flat Mite (Sulfur) /Plant Bug (Pounce)								37					37
Pest: NOW (Intrepid)									54				54
Leaf Sampling & Analysis									3				3
Pickup (general farm use)	5	5	5	5	5	5	5	5	5	5	5	5	54
ATV Field Use (irrigation and miscellaneous)	4	4	4	4	4	4	4	4	4	4	4	4	53
PCA/Consultant Service	3	3	3	3	3	3	3	3	3	3	3	3	30
<b>TOTAL CULTURAL COSTS</b>	<b>282</b>	<b>280</b>	<b>12</b>	<b>163</b>	<b>114</b>	<b>175</b>	<b>215</b>	<b>205</b>	<b>34</b>	<b>23</b>	<b>23</b>	<b>9</b>	<b>1,534</b>
Harvest:													
Harvest: Bulk (Shaker Receiver, Bankout)									196				196
Harvest: Haul									13				13
Assessments: Pistachio Commission									88				88
<b>TOTAL HARVEST COSTS</b>									<b>296</b>				<b>296</b>
Interest on operating capital	2	3	3	4	5	6	7	8	10	0	0	0	48
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>283</b>	<b>293</b>	<b>15</b>	<b>167</b>	<b>119</b>	<b>181</b>	<b>223</b>	<b>213</b>	<b>340</b>	<b>23</b>	<b>22</b>	<b>9</b>	<b>1,889</b>
<b>TOTAL OPERATING COSTS/LB</b>	<b>0.11</b>	<b>0.12</b>	<b>0.01</b>	<b>0.07</b>	<b>0.05</b>	<b>0.07</b>	<b>0.09</b>	<b>0.09</b>	<b>0.14</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.76</b>
OVERHEAD:													
Office Expense	4	4	4	4	4	4	4	4	4	4	4	4	50
Liability Insurance	5												5
Sanitation	3	3	3	3	3	3	3	3	3	3			28
Property Taxes		49					49						97
Property Insurance		19					19						37
Investment Repairs	3	3	3	3	3	3	3	3	3	3	3	3	42
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>16</b>	<b>78</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>78</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>260</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>299</b>	<b>371</b>	<b>25</b>	<b>177</b>	<b>129</b>	<b>191</b>	<b>300</b>	<b>223</b>	<b>350</b>	<b>33</b>	<b>33</b>	<b>16</b>	<b>2,148</b>
<b>TOTAL CASH COSTS/LB</b>	<b>0.12</b>	<b>0.15</b>	<b>0.01</b>	<b>0.07</b>	<b>0.05</b>	<b>0.08</b>	<b>0.12</b>	<b>0.09</b>	<b>0.14</b>	<b>0.01</b>	<b>0.01</b>	<b>0.01</b>	<b>0.86</b>

## UC COOPERATIVE EXTENSION

**Table 6. RANGING ANALYSIS**

SAN JOAQUIN VALLEY - 2004

## COSTS PER ACRE at VARYING YIELDS TO PRODUCE PISTACHIOS

	TOTAL YIELD Clean-in-Shell Splits + Shelling Stock (lbs/acre)						
	1,750	2,000	2,250	2,500	2,750	3,000	3,250
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	1,544	1,544	1,544	1,544	1,544	1,544	1,544
Harvest Cost	204	206	207	208	210	211	212
Assessments	61	70	79	88	96	105	114
Interest on operating capital	48	49	49	49	49	49	49
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>1,857</b>	<b>1,869</b>	<b>1,879</b>	<b>1,889</b>	<b>1,899</b>	<b>1,909</b>	<b>1,919</b>
<b>TOTAL Operating Costs/lb</b>	<b>1.06</b>	<b>0.93</b>	<b>0.84</b>	<b>0.76</b>	<b>0.69</b>	<b>0.64</b>	<b>0.59</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>260</b>	<b>260</b>	<b>260</b>	<b>260</b>	<b>260</b>	<b>260</b>	<b>260</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>2,117</b>	<b>2,129</b>	<b>2,139</b>	<b>2,149</b>	<b>2,159</b>	<b>2,169</b>	<b>2,179</b>
<b>TOTAL Cash Costs/lb</b>	<b>1.21</b>	<b>1.06</b>	<b>0.95</b>	<b>0.86</b>	<b>0.79</b>	<b>0.72</b>	<b>0.67</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,110</b>	<b>1,110</b>	<b>1,110</b>	<b>1,110</b>	<b>1,110</b>	<b>1,110</b>	<b>1,110</b>
<b>TOTAL COSTS/ACRE</b>	<b>3,227</b>	<b>3,239</b>	<b>3,249</b>	<b>3,259</b>	<b>3,269</b>	<b>3,279</b>	<b>3,289</b>
<b>TOTAL Costs/lb</b>	<b>1.84</b>	<b>1.62</b>	<b>1.44</b>	<b>1.30</b>	<b>1.19</b>	<b>1.09</b>	<b>1.01</b>

## UC COOPERATIVE EXTENSION

Table 6. continued

## NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE (\$/lb)		YIELD (lb/acre)						
Clean Splits		1,400	1,600	1,800	2,000	2,200	2,400	2,600
	Shelling Stock	350	400	450	500	550	600	650
0.90	0.45	-440	-249	-57	136	329	521	714
1.00	0.50	-282	-69	146	361	576	791	1,006
1.10	0.55	-125	111	349	586	824	1,061	1,299
1.20	0.60	33	291	551	811	1,071	1,331	1,591
1.30	0.65	191	471	754	1,036	1,319	1,601	1,884
1.40	0.70	348	651	956	1,261	1,566	1,871	2,176
1.50	0.75	506	831	1,159	1,486	1,814	2,141	2,469

## NET RETURNS ABOVE CASH COSTS

PRICE (\$/lb)		YIELD (lb/acre)						
Clean Splits		1,400	1,600	1,800	2,000	2,200	2,400	2,600
	Shelling Stock	350	400	450	500	550	600	650
0.90	0.45	-700	-509	-317	-124	69	261	454
1.00	0.50	-542	-329	-114	101	316	531	746
1.10	0.55	-385	-149	89	326	564	801	1,039
1.20	0.60	-227	31	291	551	811	1,071	1,331
1.30	0.65	-70	211	494	776	1,059	1,341	1,624
1.40	0.70	88	391	696	1,001	1,306	1,611	1,916
1.50	0.75	246	571	899	1,226	1,554	1,881	2,209

## NET RETURNS PER ACRE ABOVE TOTAL COST

PRICE (\$/lb)		YIELD (lb/acre)						
Clean Splits		1,400	1,600	1,800	2,000	2,200	2,400	2,600
	Shelling Stock	350	400	450	500	550	600	650
0.90	0.45	-1,810	-1,619	-1,427	-1,234	-1,042	-849	-657
1.00	0.50	-1,652	-1,439	-1,224	-1,009	-794	-579	-364
1.10	0.55	-1,495	-1,259	-1,022	-784	-547	-309	-71
1.20	0.60	-1,337	-1,079	-819	-559	-299	-39	221
1.30	0.65	-1,180	-899	-617	-334	-52	231	514
1.40	0.70	-1,022	-719	-414	-109	196	501	806
1.50	0.75	-865	-539	-212	116	444	771	1,099

UC COOPERATIVE EXTENSION

**Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS  
SAN JOAQUIN VALLEY - 2004**

ANNUAL EQUIPMENT COSTS

Yr Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
					Insur- ance	Taxes	
04 85 HP 4WD Tractor	55,000	25	4,651	4,315	202	298	4,815
04 ATV	5,790	3	3,066	1,214	30	44	1,289
04 Blower - Flory 2500	4,611	10	3,066	572	18	27	618
04 Disk Tandem 14'	10,388	12	815	1,171	40	59	1,270
04 Orchard Sprayer 500 Gal	19,741	8	1,439	2,761	82	121	2,964
04 Pickup Truck 1/2 Ton	26,800	7	4,457	3,637	125	185	3,947
04 ATV Spot Sprayer 20 Gal	511	10	90	63	2	3	68
04 Weed Sprayer 100 Gal	3,947	10	698	490	16	23	529
<b>TOTAL</b>	<b>126,788</b>		<b>25,382</b>	<b>14,224</b>	<b>514</b>	<b>761</b>	<b>15,499</b>
60% of New Cost *	76,073		15,229	8,534	309	457	9,300

\*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	
Buildings 2,400 sq ft	60,000	30		4,467	203	300	1,200	6,170
Drip Lines	47,500	10		6,524	161	238	950	7,872
Orchard Establishment Cost	760,665	34		54,353	2,571	3,803	0	60,727
Fuel Tanks 2-250 gal	3,500	20	350	302	13	19	70	404
Irrigation System (booster pumps, filters, etc.)	76,000	40		5,198	257	380	1,520	7,355
Land	400,000	40	400,000	24,920	0	4,000	0	28,920
Shop/Field Tools	11,330	15	1,133	1,136	42	62	226	1,467
<b>TOTAL INVESTMENT</b>	<b>1,358,995</b>		<b>401,483</b>	<b>96,900</b>	<b>3,246</b>	<b>8,802</b>	<b>3,966</b>	<b>112,915</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm		Price/ Unit	Total Cost
	Unit	Unit		
Liability Insurance	95	acre	5.43	516
Office Expense	95	acre	50.00	4,750
Sanitation Service	95	acre	27.53	2,615

UC COOPERATIVE EXTENSION  
**Table 8. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY - 2004

Yr Description	COSTS PER HOUR							Total Costs/hr
	Actual Hours Used	Cash Overhead			Operating			
		Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube	Total Oper.	
04 85 HP 4WD Tractor	456.20	5.67	0.27	0.39	1.20	6.96	8.16	14.49
04 ATV	574.70	1.27	0.03	0.05	0.43	1.08	1.51	2.86
04 Blower - Flory 2500	34.90	9.85	0.32	0.47	0.14	0.00	0.14	10.77
04 Disk Tandem 14'	79.80	8.80	0.30	0.44	1.65	0.00	1.65	11.20
04 Orchard Sprayer 500 Gal	274.70	6.03	0.18	0.26	3.36	0.00	3.39	9.86
04 Pickup Truck 1/2 T	190.00	11.49	0.39	0.58	1.96	9.01	10.97	23.44
04 ATV Spot Sprayer 20 Gal	47.50	0.80	0.03	0.04	0.14	0.00	0.14	1.00
04 Weed Sprayer 100 Gal	25.40	11.59	0.37	0.55	1.06	0.00	1.06	13.56

UC COOPERATIVE EXTENSION  
**Table 9. COSTS PER ACRE for BOTRYOSPHEIRA CONTROL**  
 SAN JOAQUIN VALLEY - 2004

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
Cultural:								
Botryosphaeria Pruning	67.50	615	0	0	0	615		
Spray Fungicide - Abound 3X	1.45	23	10	108	0	141		
Spray Fungicide - Flint 1X	0.48	8	3	62	0	73		
<b>TOTAL CULTURAL COSTS</b>	<b>69.43</b>	<b>646</b>	<b>13</b>	<b>170</b>	<b>0</b>	<b>829</b>		
Interest on operating capital @ 6.89%						37		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>646</b>	<b>13</b>	<b>170</b>	<b>0</b>	<b>866</b>		
CASH OVERHEAD:								
Property Taxes						1		
Property Insurance						1		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>2</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>869</b>		
NON-CASH OVERHEAD:								
Equipment		Per producing Acre		Annual Cost Capital Recovery				
		236		30		30		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>236</b>		<b>30</b>		<b>30</b>		
<b>TOTAL COSTS/ACRE</b>						<b>899</b>		



UC COOPERATIVE EXTENSION  
**Table 10. OPERATIONS WITH EQUIPMENT**  
 SAN JOAQUIN VALLEY 2004

Operation	Month	Equipment		Material	Treated	Rate/	Rate/	Unit	
		Tractor	Implement		Acres	Treated	Broadcast		
					%	Acre	Acre		
Pruning	January			Contract Labor					
Prunings: Stack, Shred	February	Custom Shred		Grower Labor-Stack			1.10	hr	
Winter Sanitation: Pole, Rake, Blow, Shred	February	85HP 4WD	Blower	Contract Labor-Pole					
				Grower Labor-Rake			2.00	hr	
Winter Sanitation: Disk	February	85HP 4WD	Disk-Tandem 14'						
Weed: Winter Strip	February	85HP 4WD	Weed Sprayer	Goal	32.00	4.00	1.28	pt	
				Surflan			2.56	pt	
				Roundup	32.00	2.00	0.64	pt	
Irrigate	February			Water			4.00	acin	
	April			Water			2.00	acin	
	May			Water			6.00	acin	
	June			Water			10.00	acin	
	July			Water			12.00	acin	
	August			Water			10.00	acin	
	September			Water			2.00	acin	
	October			Water			1.00	acin	
Pest: Vertebrate-Squirrel	May	ATV		Squirrel Bait			1.00	lbs	
Pest: Vertebrate-Gopher	April	ATV		Gopher Bait			0.50	lbs	
	August	ATV		Gopher Bait			0.50	lbs	
	November	ATV		Gopher Bait			0.50	lbs	
Pest: Insect-NOW	March			PCA Hang Traps					
Pest: Insect-NOW	August	85HP 4WD	Orchard Sprayer	Intrepid			1.00	pt	
Pest: Insect-Plant Bugs	April	85HP 4WD	Orchard Sprayer	Pounce			12.00	floz	
Pest: Insect-Citrus Flat Mite/Plant Bugs	July	85HP 4WD	Orchard Sprayer	Wettable Sulfur			20.00	lbs	
				Pounce			12.00	floz	
Pest: Disease Bot/Botrytis	April	85HP 4WD	Orchard Sprayer	Topsin			2.00	lb	
Pest: Disease Bot/Alternaria	June	85HP 4WD	Orchard Sprayer	Abound			13.75	floz	
Fertilize: N (UN32) in irrigation	April			UN32			50.00	lb N	
	May			UN32			50.00	lb N	
	July			UN32			75.00	lb N	
	August			UN32			25.00	lb N	
Fertilize: Zinc, Boron (Foliar)	February	85HP 4WD	Orchard Sprayer	Zinc Sulfate			40.00	lb	
				Solubor			5.00	lb	
Fertilize: Leaf Samples 1/25 acres	August	ATV		Grower Labor			0.05	hrs	
Weed: Disk	April	85HP 4WD	Disk-Tandem 14'						
	June	85HP 4WD	Disk-Tandem 14'						
	August	85HP 4WD	Disk-Tandem 14'						
Weed-Spot Spray (Roundup)	May	ATV	Spot Sprayer	Roundup	10.56	4.00	0.21	pt	
	July	ATV	Spot Sprayer	Roundup	10.56	4.00	0.21	pt	
Pest Control Advisers	Annual	Custom							
Pickup	Annual	Pickup 1/2 T							
ATV Miscellaneous Use	Annual	ATV							
Harvest: Bulk (Shake & Catch)	September	Custom							
Harvest: Haul	September	Custom							