
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2008

**SAMPLE COSTS TO
ESTABLISH and PRODUCE
PISTACHIOS**



SAN JOAQUIN VALLEY - SOUTH

Low-Volume Irrigation

Robert H. Beede
Craig E. Kallsen
Brent A. Holtz
Louise Ferguson
Karen M. Klonsky

UC Cooperative Extension Farm Advisor, Kings County
UC Cooperative Extension Farm Advisor, Kern County
UC Cooperative Extension Farm Advisor, Madera County
UC Cooperative Extension Pomologist, Kearney Ag Center
UC Cooperative Extension Specialist, Department of Agricultural and Resource
Economics, UC Davis
Staff Research Associate, Department of Agricultural and Resource Economics,
UC Davis

Richard L. De Moura

UC COOPERATIVE EXTENSION

SAMPLE COSTS TO ESTABLISH AND PRODUCE PISTACHIOS

Low-Volume Irrigation

San Joaquin Valley - 2008

STUDY CONTENTS

ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs.....	3
Production Cultural Practices and Material Inputs.....	6
Labor, Equipment and Interest	9
Cash Overhead	10
Non-Cash Overhead.....	11
REFERENCES.....	13
Table 1. Costs Per Acre to Establish A Pistachio Orchard.....	14
Table 2. Materials and Custom Work Costs Per Acre – Establishment Years	16
Table 3. Costs per acre to Produce Pistachios.....	18
Table 4. Costs and Returns Per Acre to Produce Pistachios.....	20
Table 5. Monthly Cash Cost Per Acre to Produce Pistachios.....	22
Table 6. Ranging Analysis.....	24
Table 7. Whole Farm Annual Equipment, Investment, Business Overhead Costs.....	26
Table 8. Hourly Equipment Costs	27
Table 9. Costs Per Acre for Botryosphaeria Control.....	27
Table 10. Operations With Equipment.....	28

INTRODUCTION

Sample costs to establish a pistachio orchard and produce pistachios in the southern 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.

The University of California does not discriminate in any of its policies, procedures or practices. The university is an affirmative action/equal opportunity employer.

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 southern 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 study is intended as a guide only. **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 Cultural Practices and Material Inputs (Tables 1 & 2)

Land Preparation. The orchard is established on soil whose profile is relatively uniform in texture and previously planted to row crops. Soil profile assessment of individual subject properties by means of backhoe pits is critical prior to planting. An individual competent in evaluating soils for texture stratification or salinity problems is employed. Soil samples are also taken at selected and recorded depths for salinity analysis by a soils and water laboratory. This study uses one pit per 25 acres. 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 or stratified soil textures limit root development and water infiltration. Ground preparation is done the year prior to planting, but the costs are included in establishment year one (Table 1). The field is chiseled to a three foot depth in one direction across the entire field using a three-shank ripper. This is followed by slippowing down the tree row to a depth of four feet. Slippowing is followed by one pass with a stubble disk. 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.

Trees. 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. The trees are delivered to the grower's site by a custom hauler. The trucking fee (\$360 per load) is based on a 60 mile delivery radius from the nursery and 2,016 trees per load. The grower also rents a forklift to unload the trees.

Plant/Bud. Pistachios are planted on 17 ft X 20 ft (tree X row) spacing, with 128 trees per acre. *P. integerrima* or UCB-1 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. The stakes are removed in the fifth year (November). 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 late-July of the first year, the trees are commercially budded 28-32 inches above ground level. Failed buds on surviving rootstock are re-budded with two buds per

tree in September. No attempt is made to push the re-budded trees, because they are highly susceptible to killing frost in November. 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. Growers should know the source of the budwood, and confirm the cultivar is correct.

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), or when 6-8 inches of Kerman growth is achieved, a third pass is made to begin training the Kerman shoot up the stake (use 4 mil, half-inch green tape) and continue suppression of new rootstock growth by pinching off its terminals. 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 January of the second calendar 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, secondary, and tertiary 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 tertiary 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 vary from \$30 to \$50 for each pass through the field, and are dependent upon the tasks required. According to grower estimates, the typical cost is \$30 per pass per acre. Dormant pruning continues in the third and subsequent years.

Irrigation. The irrigation costs include water at \$10.50 per acre-inch (\$126 per acre foot), costs for pressurizing the irrigation system at \$2.25 per acre-inch (\$27 per acre-foot) and irrigation labor at 0.15 hours per acre per irrigation. A single line drip irrigation system is installed prior to planting and at the end of the fifth year a second line is installed. 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. Costs for the drip line and its installation are shown in the Non-Cash Overhead. 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 during normal water years 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.

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

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 (Table B). One-half of the N is applied in May, and the other half in July for the first two years. In subsequent years, N fertilization begins in May and is applied into August. Water nitrogen content should be tested and considered in the fertilizer program. The frequency of micro nutrient application strongly depends upon soil type and cropping history. For example, boron uptake efficiency varies greatly by soil texture and pH. In this study, boron, zinc, and copper are applied during the establishment years (Table 2). Boron (Solubor at 15 pounds per acre) is applied through the drip system in August of the first year. In the following years boron is foliar applied (3 lb Solubor per acre) in late April in combination with Copper EDTA (1/2 lb/ac), and zinc (2 lb Zinc 36% per acre). Boron (3 lb Solubor per acre) and zinc (2 lb Zinc 36% per acre) application is repeated in late May/early June in years 2 through 6. In addition, zinc sulfate at 40 pounds per acre in 100 gallons of water is foliar applied in late-October/early-November by an air-blast sprayer to supply zinc and force dormancy in all establishment years. In many areas of the San Joaquin Valley, soils are naturally high in boron and boron fertilization is not necessary.

Table B. Applied N

Year	Lbs of N/Acre
1	15
2	33
3	66
4	100
5	135
6	135
7+	200

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. Pesticides mentioned in the study are commonly used, but are not official recommendations.

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 acres). Hand weeding by a contract labor crew is done around the base of the trees in the first year (May). After the first year, Prowl and Goal are applied in the fall (November/December) in the tree row as a winter strip spray. In-season spot treatments using a post-emergent herbicide, Shark or Rely 200, 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 spot 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 row middles are disked three times (June, July, August) beginning in the first year.

Insects and Mites. Newly planted rootstock is monitored for aphids and false chinch bugs. After budding, aphids, ants, katydids, darkling ground beetles or false chinch bugs may require treatment to prevent loss of the emerging Kerman bud. Pounce, Brigade, Sevin, or Orthene may be required to control a specific pest. These pests and others may require treatment during the first three years between May and August. Brigade is budgeted for application in August of the first year. 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, leaf-footed bug, stinkbug) may be necessary between April and August. In this study, plantbugs are controlled with Brigade applied in April. Citrus flat mites may also require treatment and are controlled with wettable sulfur applied in July. All treatments are applied with a grower-owned sprayer.

Diseases. 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.

Vertebrates. 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. 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).

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. Almost all crop deliveries to the processor are by bulk trailers.

Production Cultural Practices and Material Inputs
(Tables 3 to 10)

Prune. Contract labor hand prunes the trees during the dormant season, usually from mid-November through February. 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 (February) sanitation disking.

Winter Sanitation. Mechanical trunk shaking is first done to remove the overwintering nuts (mummies) not removed during pruning. A hand poling crew may be sent through to remove the remaining nuts. The berms are blown free of mummy nuts and debris using a tractor-mounted blower supplied by the grower. The row centers are then disked to incorporate the mummies and shredded prunings.

Fertilization. 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. Nitrogen (N) is applied through the drip system beginning in late April, during early nut development. Nitrogen (UN32) is applied alone in April and in liquid blends (10-0-10 & 15-0-05)

Table C. Pistachio Production Nitrogen & Potassium Fertilization Program

Fertilizer	Lbs per Gallon of product	Gallons per Ton Product	Lbs Nutrient/Gallon of Product	
			Nitrogen	Potassium
UN32	11.06	181	3.54	0
10-0-10	9.70	206	0.97	0.97
15-0-5	9.70	206	1.46	0.49
Application Date	Fertilizer Source	Gallons (lbs) Per Acre	Lbs Nitrogen per Acre	Lbs Potassium per Acre
April	UN32	7.0 (77)	25	0
May	10-0-10	51.5 (500)	50	50
June	10-0-10	51.5 (500)	50	50
July	15-0-5	51.5 (500)	75	25
Total			200	125

combined with potassium (K). A total of 200 pounds of N and 125 pounds of (K⁺) is applied annually due to the high potassium requirement of pistachios (see Table C for monthly rates). Zinc (Zinc Sulfate 36%) is foliar applied in either late February or October (February in this study). Boron (Solubor) is applied with the zinc in February at bud swell to optimize flower nutrition.

Leaf Samples. Leaf tissue sampling should be done annually to determine needed adjustments in the nutritional program. Leaf samples are taken from non-fruiting spurs in August. The PCA collects one sample per 25 acres or 4 samples for this farm and sends to a lab for analysis.

Irrigation. Irrigation costs include water at \$10.50 per acre-inch (\$126 per acre-foot), costs for pressurizing the irrigation system at \$2.25 per acre-inch (\$27 per acre-foot) and irrigation labor at 0.15 hours per irrigation, except where additional time is required during the March irrigation. ATV use for all irrigations except the first is included in the ATV use operation. The first irrigation in March replenishes the water in the root zone and

prepares the system for use during the season. That irrigation includes costs for 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 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. In this study, a two-line system is employed, but there is no research available comparing single versus two-line systems. A properly designed, single-line system will meet the water requirements of mature trees. The selected system should be designed for 0.4 to 0.5 inches of water per acre per day. Four, one-gallon per hour emitters per tree delivers 0.45 inches of water per acre per day.

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. 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 local dealers in the region and considered typical retail for a 100 acre farm.

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 PCAs 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.

Weeds. Pre-emergent and post-emergent herbicides, Prowl, Goal, and Roundup (glyphosate) 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.

Insects and Mites. 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 July. 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, and can assist in NOW control, depending on the time of application.

Disease. Two foliar fungicide applications are targeted for Botryosphaeria Panicle and Shoot Blight (Botryosphaeria or '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 Pristine in June for botryosphaeria and/or alternaria control. See next paragraph for further 'Bot' control.

Disease Botryosphaeria. Botryosphaeria Panicle and Shoot Blight can be a serious problem in some areas and/or years. It is a panicle (nut cluster) 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 and one-year-old branches 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 early May to mid or late July. Costs for treating severe 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.

Harvest. Pistachio trees typically reach full production by the 12th or 13th year. Commercial harvest is done by either the “bulk” or “bin” method. The “bulk” method is now more common, and is used in this study. The costs are approximately the same for both methods. Pistachios are harvested mechanically using a shaker with tarpaulins supported above the horizontal shaker head. 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 tree trunk, dislodging the nuts onto the tarpaulins and receiver. The “bin” harvest system employs 4 foot x 4 foot x 3 foot wooden or plastic bins that are distributed throughout the field and carried four at a time on the receiver. Full bins are dropped back in the row and picked up six at a time by a bin carrier. The bins are delivered to a loading area where they are dumped into large bottom-dump trailers using a specialized forklift which picks up, clamps the bins, and then rotates the nuts into the trailers. The “bulk” harvest system utilizes a large trailer attached to the receiver which continuously conveys harvested nuts into the trailer until it approaches capacity. A mobile bankout wagon then butts up to the back of the receiver trailer, and actuates a lever which transfers the nuts into the bankout wagon by way of a cleated conveyor belt incorporated into the floor of the trailer. This eliminates the need for the harvesting equipment to stop for unloading. The bankout wagon then travels to a loading area. The nuts are dumped onto elevators which deposit the crop into large, bottom-dump type trailers for hauling by and to the processor. Upon arrival at the processor, the nuts are weighed, hulled, dried, graded, and packed.

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 are shown in Tables D. Yields in the study are divided into three categories: 80% split inshell (unstained and light stained split in-shell), 5% shelling stock (dark stained split nuts, nuts with adhering hull, loose kernels-and-shells, undersized, and shell damaged nuts as well as loose kernels), and 15% closed shells. Each category makes up a percentage of the total yields shown in Table D. Blanks and other unmarketable nuts (such as insect and vertebrate damage) are not included in the total yield. Shelling stock yields as they appear in Table D, include the weight of the kernel (i.e. nutmeat) and the shell. However, growers should be aware, that processors pay only for the kernel in the shelling stock and closed shell categories. Typically for payment, the yields are reduced by 50% to represent the kernel only.

Table D. Annual Yields

Year	Pounds/Acre			
	Total Yield	Split split-Inshell	Shelling Stock Inshell	Closed Shell
6	600	480	30	90
7	1,300	1,040	65	195
8	2,200	1,760	110	330
9+	2,800	2,240	140	420

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 included as such in Table D. The split inshell payment is for the shell plus kernel weight. The closed shell and shelling stock payment is based on the kernel price. For shelling stock and closed shell, the kernel weight is assumed to be 50% of the total nut weight (shell + kernel). Therefore the actual price received by the growers for closed shell and shelling stock is 50% of the split inshell price. The inshell weighted average price per pound of total yield (Table D, 80% split inshell + 20% shelling stock and closed shell) shown in Table E is used to calculate returns.

Grades	Split Inshell	Shelling Stock	Closed shell	Inshell Weighted Average
\$/lb	\$1.80	\$0.90 [†]	\$0.90	\$1.62

[†] Price is converted to kernel (nutmeat) weight of shelling stock and closed shell.

Assessments. Under a state marketing order, mandatory assessment fees are collected and administered by the California Pistachio Research Board. Growers are charged the assessment to pay for industry research programs. The current assessment rate is \$0.0025 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, Equipment, and Interest Costs

Labor. Labor rates of \$14.39 per hour for machine operators and \$11.65 for general labor includes payroll overhead of 37%. The basic hourly wages are \$10.50 for machine operators and \$8.50 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. For this study the cost is based upon the average industry final rate as of January 1, 2008 (California Department of Insurance, March 18, 2008, unreferenced). 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 \$100 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, labor, and approval of invoices payable by the grower.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural 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 red dye diesel and gasoline are \$3.54 (excludes excise taxes) and \$3.57 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include an 8% sales tax plus federal and state excise tax. Some federal and excise tax can

be refunded for on-farm use when filing your income tax. The costs are based on 2007-2008 (November to April) American Automobile Association (AAA) and Department of Energy (DOE) monthly data. 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 6.75% 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. The interest rate is the basic rate provided by a farm lending agency as of April, 2008.

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.

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 0.74% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$559 for the entire farm.

Office Expense. Office and business expenses are estimated at \$100 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 \$250 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. California regulations require one toilet and hand washing facility for each 20 employees of each sex, located within a quarter mile walk or if not feasible, at the closest point of vehicular access. Refer to Cal OSHA Field Sanitation Standard, Section 3457, Title 8, California Code of Regulations.

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 4.25% used to calculate capital recovery cost is the effective long term interest rate effective April 2008. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

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 pistachios 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 \$9,676 per acre or \$919,220 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. Single 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 fifth 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. Presently, no research has been conducted to evaluate single versus double-line drip on pistachio tree performance. Inclusion of double-line drip in this study is for budgeting purposes only, and does not constitute a recommendation.

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. Open crop land values range from \$2,700 to \$12,000 per acre (2008 Trends & Leases). Land in this study is valued at \$7,000 per acre or \$7,368 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.

REFERENCES

- American Society of Agricultural Engineers. 1992. *American Society of Agricultural Engineers Standards Yearbook*. St. Joseph, MI.
- American Society of Farm Managers and Rural Appraisers. 2008. *Trends in Agricultural Land & Lease Values*. California Chapter of the American Society of Farms Managers and Rural Appraisers. Woodbridge, CA.
- Beede, Robert H., Craig E. Kallsen, Mark W. Freeman, Louise Ferguson, Brent A. Holtz, Karen M. Klonsky, and Richard L. De Moura. 2004. *Sample Cost to Establish a Pistachio Orchard and Produce Pistachios in the San Joaquin Valley*. UC Cooperative Extension, University of California, Department of Agricultural and Resource Economics, Davis, CA.
- Boehlje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, NY
- California State Automobile Association. 2008. *Gas Price Averages 2007-08*. AAA Press Room, San Francisco, CA. Internet accessed April 2008. <http://www.csaa.com/portal/site/CSAA>
- California State Board of Equalization. *Fuel Tax Division Tax Rates*. Internet accessed January 2008. <http://www.boe.ca.gov/sptaxprog/spftdrates.htm>
- Doanes. 1984. *Facts and Figures for Farmers*. 1984. Doane Publishing, St. Louis, MO.
- Energy Information Administration. 2007- 08. *Weekly Retail on Highway Diesel Prices*. Internet accessed April 2008. <http://tonto.eia.doe.gov/oog/info/wohdp>
- Ferguson, Louise, Robert H. Beede, Mark W. Freeman, David R. Haviland, Brent A. Holtz and Craig E. Kallsen. 2005. *Pistachio Production Manual*. Department of Plant Sciences. University of California, Davis, CA.
- Kallsen, Craig E., *Pistachio Notes*. July 2000. Farm and Home Advisors Office, Kern County, Bakersfield, CA. <http://fruitsandnuts.ucdavis.edu/files/50692.pdf>
- University of California Statewide IPM Project. 2006. *UC Pest Management Guidelines, Pistachios*. University of California, Davis CA. <http://www.ipm.ucdavis.edu>

UC COOPERATIVE EXTENSION
Table 1. COSTS PER ACRE TO ESTABLISH A PISTACHIO ORCHARD
 SAN JOAQUIN VALLEY - 2008

	Cost Per Acre						
	Year:	1st	2nd	3rd	4th	5th	6th
Total Yield: Dry, In-Shell Pounds Per Acre							600
Land Preparation/Planting Costs:							
Land Prep: Backhoe (custom)		3					
Fertilize: Soil Analysis (samples from holes dug)		4					
Land Prep: Subsoil 3 ft (custom)		125					
Land Prep: Slipplow Tree Rows (custom)		97					
Land Prep: Stubble Disc 1X (custom)		35					
Land Prep: Disc & Float 2X		19					
Weed: Pre-plant on berms (Prowl, Goal)		37					
Plant: Survey, Mark, & Plant Trees		128	3				
Trees: 128 Per Acre (trees plus delivery) (1% replant in Year 2)		971	46				
Plant: Spread Stakes & Stake Trees		228					
Plant: Field Bud Trees		109					
Plant: Rebud (5% in 1st Year & 2% in 2nd Year)		5	3				
TOTAL LAND PREP/PLANTING COSTS		1,761	52				
Cultural :							
Irrigate: Water & Labor		247	325	371	494	560	621
Weed: Spot Spray 3X (Shark, Yr 1-2. Roundup, Goal, Yr 3+)		12	12	28	28	28	28
Train/Sucker: 6X Yr 1, 4X Yr 2-3, 3X Yr 4		210	120	120	90		
Vertebrate: Gophers Yr 1+ (Bait), Squirrel Yr 6+ (Bait)		25	25	25	25	25	41
Fertilize: Nitrogen injected through dripline (UN32)		14	31	62	94	127	127
Weed: Disk Middles 3X		25	25	25	25	25	25
Fertilize: Zinc (Zn 36%) Nutrition & Defoliation		49	49	49	49	49	49
Weed: Hand (contract)		50					
Insect: Ant, Aphid, Katydid (Brigade)		51					
Fertilize: Boron (Solubor) injected through dripline		14					
Fertilize: Boron (Solubor), Zinc (Zn 36%), Copper (Cu Chelate 14%)			26	26	26	26	26
Prune: Dormant & Season			50	75	100	125	150
Fertilize: Boron (Solubor), Zinc (Zn 36%) Foliar 2X			23	23	23	23	23
Insect: Chinch Bug/Aphid (Orthene)			27	27			
Weed: Winter Strip Spray (Prowl Goal)			33	33	33	33	33
Prune: Shred Prunings (custom)						28	28
Plant: Remove & Stack Tree Stakes						73	
Insect: Plant Bugs (Brigade)							51
Insect: Citrus Flat Mites (Wettable Sulfur)							29
Fertilize: Leaf Analysis (custom)		2	2	2	2	2	2
PCA/Consultant Service		10	10	10	10	10	25
Pickup Truck Use		73	73	73	73	73	73
ATV Use		60	60	60	60	60	60
TOTAL CULTURAL COSTS		842	890	1,008	1,131	1,265	1,390
Harvest:							
Bulk Harvest: Shake & Catch							205
Haul by processor							0
California Pistachio Research Board Assessment							2
TOTAL HARVEST COSTS							207
Interest On Operating Capital @ 6.75%		152	35	37	42	45	31
TOTAL OPERATING COSTS/ACRE		2,755	977	1,044	1,172	1,311	1,627

UC COOPERATIVE EXTENSION

Table 1. CONTINUED

SAN JOAQUIN VALLEY - 2008

	Cost Per Acre						
	Year:	1st	2nd	3rd	4th	5th	6th
Total Yield: Dry, In-Shell Pounds Per Acre							600
Cash Overhead:							
Office Expense		100	100	100	100	100	100
Liability Insurance		6	6	6	6	6	6
Sanitation Fees		32	32	32	32	32	32
Property Taxes		91	91	91	91	93	93
Property Insurance		13	13	13	13	14	14
Investment Repairs		49	49	49	49	55	55
TOTAL CASH OVERHEAD COSTS		291	291	291	291	299	299
TOTAL CASH COSTS/ACRE		3,046	1,268	1,335	1,463	1,610	1,926
INCOME/ACRE FROM PRODUCTION							972
NET CASH COSTS/ACRE FOR THE YEAR		3,046	1,268	1,335	1,463	1,610	954
PROFIT/ACRE ABOVE CASH COSTS							
ACCUMULATED NET CASH COSTS/ACRE		3,046	4,314	5,649	7,112	8,722	9,676
Non-Cash Overhead (Capital Recovery Costs):							
Buildings (shop & other)		53	53	53	53	53	53
Fuel Tanks		3	3	3	3	3	3
Shop Tools		11	11	11	11	11	11
Irrigation Drip Lines (1line Yrs 1-4, 2 lines Yr 5+)		37	37	37	37	75	75
Irrigation System (Booster Pump/Filtration System)		58	58	58	58	58	58
Land		313	313	313	313	313	313
Equipment		85	82	82	82	83	82
TOTAL INTEREST ON INVESTMENTS (Non-Cash Overhead)		560	558	558	558	596	596
TOTAL COSTS/ACRE FOR THE YEAR		3,607	1,826	1,893	2,021	2,206	2,522
INCOME/ACRE FROM PRODUCTION							972
TOTAL NET COSTS/ACRE FOR THE YEAR		3,607	1,826	1,893	2,021	2,206	1,550
NET PROFIT/ACRE ABOVE TOTAL COSTS							
TOTAL ACCUMULATED NET COST/ACRE		3,607	5,432	7,326	9,347	11,553	13,102

UC COOPERATIVE EXTENSION

Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS
SAN JOAQUIN VALLEY - 2008

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
			Total Per Acre											
			units	\$	units	\$	units	\$	units	\$	units	\$	units	\$
OPERATING COSTS														
Custom:														
Backhoe	hour	75.00	0.04	3										
Soil Analysis	each	55.00	0.08	4										
Chisel/Rip 3'	acre	125.00	1.00	125										
Slip Plow & Move In Fee	acre	97.00	1.00	97										
Disk - Stubble	acre	35.00	1.00	35										
Mark, Spread Trees, Plant	tree	1.00	128.00	128	3.00	3								
Stake Trees	tree	0.35	128.00	45										
Sucker Trees	acre	20.00	1.00	20										
Hand Weed	acre	50.00	1.00	50										
Leaf Analysis	each	55.00	0.04	2	0.04	2	0.04	2	0.04	2	0.04	2	0.04	2
Train Tree	acre	Various	6.00	190	4.00	120	4.00	120	3.00	90				
Prune	acre	Various			1.00	50	4.00	75	1.00	100	1.00	125	1.00	150
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	28	1.00	28
Harvest-Shake, Pickup	tree	1.60											128.00	205
Deliver Trees (60 mile radius)	load	360.00	0.06	22	0.06	22								
Rent:														
Forklift (for unloading trees)	day	140.00	0.01	1	0.01	1								
Forklift (delivery & pickup)	day	90.00	0.01	1	0.01	1							0.30	27
Tree/Tree Aids:														
Tree Unbudded	tree	7.40	128.00	947	3.00	22								
Bud Tree	tree	0.85	134.00	114	3.00	3								
Tree Stakes 2"x 2"x 6'	each	1.35	128.00	173										
Irrigation:														
Water - District	acin	10.50	18.00	189	24.00	252	27.59	290	37.20	391	42.00	441	46.81	492
Water - Pressurize System	acin	2.25	18.00	41	24.00	54	27.59	62	37.20	84	42.00	95	46.81	105
Fertilizer:														
Zinc Sulfate 36%	lb	0.75	40.00	30	44.00	33	44.00	33	44.00	33	44.00	33	44.00	33
Solubor (Boron)	lb	0.95	15.00	14	6.00	6	6.00	6	6.00	6	6.00	6	6.00	6
Copper Chelate 14%	lb	5.07		0	0.50	3	0.50	3	0.50	3	0.50	3	0.50	3
UN-32 (N)	lb N	0.94	15.00	14	33.00	31	66.00	62	100.00	94	135.00	127	135.00	127

UC COOPERATIVE EXTENSION
Table 2. CONTINUED
 SAN JOAQUIN VALLEY - 2008

	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
			Total Per Acre											
			units	\$	units	\$	units	\$	units	\$	units	\$	units	\$
Herbicide:														
Prowl H2O	pint	5.06	2.56	13	2.56	13	2.54	13	2.56	13	2.56	13	2.56	13
Goal 2 XL	pint	11.41	1.28	15	1.28	15	2.54	29	2.54	29	2.54	29	2.54	29
Shark EW	floz	7.17	0.60	4	0.60	4								
Roundup Power Max	pint	8.93					0.63	6	0.63	6	0.63	6	0.63	6
Insecticide:														
Traps NOW (Free)	acre	0.00												
Orthene 97	lb	10.14			0.75	8	0.75	8						
Brigade WSB	oz	1.62	20.00	32									20.00	32
Wettable Sulfur 92%	lb	0.50											20.00	10
Intrepid 2F	pint	39.94												
Fungicide:														
Topsin M	lb	23.09												
Abound 2EC	floz	2.59												
Rodenticide:														
Gopher Bait Wilco	lb	5.10	1.00	5	1.00	5	1.00	5	1.00	5	1.00	5	1.00	5
Squirrel Wilco	lb	5.67											1.00	6
Assessments:														
California Pistachio Research Board	lb	0.00											600.00	2
Labor (machine)	hrs	14.39	10.98	158	10.92	157	10.93	157	10.37	149	13.13	189	12.07	174
Labor (non-machine)	hrs	11.65	1.50	17	1.65	19	1.65	19	1.65	19	4.40	51	2.10	24
Fuel - Gas	gal	3.57	10.76	38	10.64	38	10.64	38	10.64	38	11.79	42	10.89	39
Fuel - Diesel	gal	3.54	10.41	37	11.31	40	11.31	40	9.20	33	9.20	33	13.41	47
Lube				11		12		12		11		11		13
Machinery repair				17		19		19		17		18		22
Operating Interest @ 6.75%				152		35		37		42		45		31
TOTAL OPERATING COSTS				2,756		977		1,045		1,172		1,311		1,654

UC COOPERATIVE EXTENSION
Table 3. COSTS PER ACRE TO PRODUCE PISTACHIOS
 SAN JOAQUIN VALLEY - 2008

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/Contract:								
Prune: Hand Prune & Stack (stack ~ \$25 per acre)	0.00	0	0	0	200	200		
Prune: Shred Prunings (Custom)	0.00	0	0	0	30	30		
Winter Sanitation: Shake, Rake, Blow, Chop	0.37	30	7	0	71	108		
Winter Sanitation: Disk (mummies & shredded prunings)	0.21	4	5	0	0	8		
Weed: Winter Strip (Goal, Prowl, Roundup)	0.25	4	5	33	0	43		
Fertilize: Zn (ZincSO4), Boron (Solubor)	0.46	8	11	25	0	44		
Irrigate: (Water, Labor)	2.75	35	1	599	0	635		
Insect: NOW, (PCA hang traps)	0.00	0	0	0	0	0		
Fertilize: N injected through drip system (UN32)	0.00	0	0	24	0	24		
Disease: Bot/Botrytis (Topsin)	0.46	8	11	29	0	47		
Insect: Plant Bugs (Brigade)	0.46	8	11	32	0	51		
Weed: Disk Middles 3X	0.63	11	14	0	0	25		
Vertebrate: Gopher (gopher bait)	1.50	26	4	8	0	37		
Vertebrate: Squirrel (squirrel bait)	0.50	9	1	6	0	16		
Fertilize: N & K injected through irrigation system (10-0-10)	0.00	0	0	180	0	180		
Weed: Spot Spray Tree Row 2X (Roundup)	0.25	4	1	4	0	9		
Disease: Bot/Alternaria (Pristine)	0.46	8	11	33	0	52		
Fertilize: N & K injected through irrigation system (15-0-05)	0.00	0	0	95	0	95		
Insect: Citrus Flat Mite (Sulfur) /Plant Bug (Brigade)	0.46	8	11	42	0	61		
Insect: NOW (Intrepid)	0.46	8	11	38	0	56		
Fertilize: Leaf Sampling (collected by PCA) & Analysis (custom)	0.00	0	0	0	2	2		
Pickup (general farm use)	2.00	35	38	0	0	73		
ATV Field Use (irrigation and miscellaneous)	3.00	52	8	0	0	60		
PCA/Consultant Service	0.00	0	0	0	30	30		
TOTAL CULTURAL COSTS	14.22	256	151	1,147	334	1,888		
Harvest:								
Harvest: Bulk (Shaker, Receiver, Bankout Wagon)	0.00	0	0	0	205	205		
Harvest: Haul by processor	0.00	0	0	0	0	0		
Assessments: CA Pistachio Research Board	0.00	0	0	8	0	8		
TOTAL HARVEST COSTS	0.00	0	0	8	205	213		
Interest on operating capital @ 6.75%						53		
TOTAL OPERATING COSTS/ACRE		256	151	1,155	539	2,154		
Cash Overhead:								
Office Expense						100		
Liability Insurance						6		
Sanitation						32		
Property Taxes						141		
Property Insurance						50		
Investment Repairs						55		
TOTAL CASH OVERHEAD COSTS						384		
TOTAL CASH COSTS/ACRE						2,538		

UC COOPERATIVE EXTENSION
Table 3. CONTINUED
 SAN JOAQUIN VALLEY - 2008

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	884			53			53	
Fuel Tanks	47			3			3	
Shop Tools	132			11			11	
Drip Lines	600			75			75	
Irrigation System (Filter/Booster Pump)	1,100			58			58	
Land	7,368			313			313	
Pistachio Establishment Cost	9,676			543			543	
Equipment	863			86			86	
TOTAL NON-CASH OVERHEAD COSTS		20,671		1,142			1,142	
TOTAL COSTS/ACRE							3,680	

UC COOPERATIVE EXTENSION
Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE PISTACHIOS
 SAN JOAQUIN VALLEY - 2008

	Quantity		Price or	Value or	Your
	Total/Acre	Unit	Cost/Unit	Cost/Acre	Cost
GROSS RETURNS					
Pistachios (Split-inshell, Shelling Stock, Closed Shell)	2,800	lb	1.62	4,536	
OPERATING COSTS					
Custom/Contract:					
Prune: Hand (prune & stack)	1.00	acre	200.00	200	
Shred Prunings	0.11	hour	275.00	30	
Winter Sanitation (shake trees)	0.75	hour	95.00	71	
Leaf Analysis	0.04	each	55.00	2	
Harvest-Bulk	128.00	tree	1.60	205	
PCA/Consultant Fee	1.00	acre	30.00	30	
Herbicide:					
Goal 2 XL	1.28	pint	11.41	15	
Prowl H20	2.56	pint	5.06	13	
Roundup Power Max	1.06	pint	8.93	9	
Fertilizer:					
Zinc Sulfate 36%	40.00	lb	0.50	20	
Solubor (Boron)	5.00	lb	0.95	5	
UN-32 (N)	25.00	lb N	0.94	24	
10-0-10	1,000.00	lb	0.18	180	
15-0-05	500.00	lb	0.19	95	
Irrigation:					
Water - District	47.00	acin	10.50	494	
Water - Pressurize System	47.00	acin	2.25	106	
Insecticide:					
Traps NOW (Free)	0.10	acre	0.00	0	
Brigade WSB	40.00	oz	1.62	65	
Wettable Sulfur 92%	20.00	lb	0.50	10	
Intrepid 2F	1.00	pint	37.50	38	
Fungicide:					
Topsin M	2.00	lb	14.25	29	
Pristine	12.00	oz	2.75	33	
Rodenticide:					
Gopher Bait Ag Wilco	1.50	lb	5.10	8	
Squirrel Wilco	1.00	lb	5.67	6	
Assessment:					
CA Pistachio Research Board (\$0.0025/lb)	2,800.00	lb	0.003	8	
Labor (machine)	14.36	hrs	14.39	207	
Labor (non-machine)	4.26	hrs	11.65	50	
Fuel - Gas	11.20	gal	3.57	40	
Fuel - Diesel	19.33	gal	3.54	68	
Lube				16	
Machinery repair				26	
Interest on operating capital @ 6.75%				53	
TOTAL OPERATING COSTS/ACRE				2,154	
NET RETURNS ABOVE OPERATING COSTS				2,382	

UC COOPERATIVE EXTENSION

Table 4. CONTINUED

SAN JOAQUIN VALLEY - 2008

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Cash Overhead:					
Office Expense				100	
Liability Insurance				6	
Sanitation				32	
Property Taxes				141	
Property Insurance				50	
Investment Repairs				55	
TOTAL CASH OVERHEAD COSTS/ACRE				384	
TOTAL CASH COSTS/ACRE				2,538	
Non-Cash Overhead (Capital Recovery)					
Buildings				53	
Fuel Tanks				3	
Shop Tools				11	
Drip Lines				75	
Irrigation System (Filter/Booster Pump)				58	
Land				313	
Pistachio Establishment Cost				543	
Equipment				86	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				1,142	
TOTAL COSTS/ACRE				3,680	
NET RETURNS ABOVE TOTAL COSTS				856	

UC COOPERATIVE EXTENSION

Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE PISTACHIOS

SAN JOAQUIN VALLEY - 2008

Beginning JAN 08	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 08	08	08	08	08	08	08	08	08	08	08	08	08	
Cultural:													
Prune: Hand Prune & Stack (stack ~ \$25 per acre)	200												200
Prune: Shred Prunings (Custom)	30												30
Winter Sanitation: Shake, Rake, Blow, Chop	108												108
Winter Sanitation: Disk (mummies & shredded prunings)		8											8
Weed: Winter Strip (Goal, Prowl, Roundup)		43											43
Fertilize: Zn (ZincSO4), Boron (Solubor)		44											44
Irrigate: (Water, Labor)				61	27	78	133	160	134	27	15		635
Insect: NOW, (PCA hang traps)			0										0
Fertilize: N injected through drip system (UN32)				24									24
Disease: Bot/Botrytis (Topsin)				47									47
Insect: Plant Bugs (Brigade)				51									51
Weed: Disk Middles 3X				8		8		8					25
Vertebrate: Gopher (gopher bait)				12				12			12		37
Vertebrate: Squirrel (squirrel bait)					16								16
Fertilize: N & K injected through irrigation system (10-0-10)					90	90							180
Weed: Spot Spray Tree Row 2X (Roundup)					4		4						9
Disease: Bot/Alternaria (Pristine)						52							52
Fertilize: N & K injected through irrigation system (15-0-05)							95						95
Insect: Citrus Flat Mite (Sulfur) /Plant Bug (Brigade)							61						61
Insect: NOW (Intrepid)								56					56
Leaf Sampling (collected by PCA) & Analysis (custom)								2					2
Pickup (general farm use)	6	6	6	6	6	6	6	6	6	6	6	6	73
ATV Field Use (irrigation and miscellaneous)	5	5	5	5	5	5	5	5	5	5	5	5	60
PCA/Consultant Service	3	3	3	3	3	3	3	3	3	3	3		30
TOTAL CULTURAL COSTS	352	109	75	184	202	297	334	228	41	28	26	11	1,888
Harvest:													
Harvest: Bulk (Shaker, Receiver, Bankout Wagon)									205				205
Harvest: Haul (hailed by processor)									0				0
Assessments: CA Pistachio Research Board									8				8
TOTAL HARVEST COSTS									213				213
Interest on operating capital @ 6.75%	2	3	3	4	5	7	9	10	11	0	0	0	53
TOTAL OPERATING COSTS/ACRE	354	111	78	188	207	304	343	238	266	28	26	11	2,154
TOTAL OPERATING COSTS/LB (based on 2,800 lbs)	0.13	0.04	0.03	0.07	0.07	0.11	0.12	0.08	0.09	0.01	0.01	0.00	0.77

UC COOPERATIVE EXTENSION
Table 5. CONTINUED
 SAN JOAQUIN VALLEY - 2008

Beginning JAN 08	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 08	08	08	08	08	08	08	08	08	08	08	08	08	
Cash Overhead:													
Office Expense	8	8	8	8	8	8	8	8	8	8	8	8	100
Liability Insurance									6				6
Sanitation	3	3	3	3	3	3	3	3	3	3	3		32
Property Taxes		71					71						141
Property Insurance		25					25						50
Investment Repairs	5	5	5	5	5	5	5	5	5	5	5	5	55
TOTAL CASH OVERHEAD COSTS	16	111	16	16	16	16	111	16	22	16	16	13	384
TOTAL CASH COSTS/ACRE	370	223	94	204	223	319	455	254	287	44	42	24	2,538
TOTAL CASH COSTS/LB (based on 2,800 lbs)	0.13	0.08	0.03	0.07	0.08	0.11	0.16	0.09	0.10	0.02	0.01	0.01	0.91

UC COOPERATIVE EXTENSION

Table 6. RANGING ANALYSIS

SAN JOAQUIN VALLEY - 2008

COSTS PER ACRE at VARYING YIELDS TO PRODUCE PISTACHIOS

	YIELD (Total lbs/acre)						
	2,000	2,200	2,400	2,600	2,800	3,000	3,200
OPERATING COSTS/ACRE:							
Cultural Cost	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Harvest Cost	205	205	205	205	205	205	205
Assessments	6	7	7	8	8	9	10
Interest on operating capital @ 6.75%	53	53	53	53	53	53	53
TOTAL OPERATING COSTS/ACRE	2,152	2,153	2,153	2,154	2,154	2,155	2,156
TOTAL Operating Costs/lb	1.08	0.98	0.90	0.83	0.77	0.72	0.67
CASH OVERHEAD COSTS/ACRE							
CASH OVERHEAD COSTS/ACRE	384	384	384	384	384	384	384
TOTAL CASH COSTS/ACRE	2,536	2,537	2,537	2,538	2,538	2,539	2,540
TOTAL Cash Costs/lb	1.27	1.15	1.06	0.98	0.91	0.85	0.79
NON-CASH OVERHEAD COSTS/ACRE							
NON-CASH OVERHEAD COSTS/ACRE	1,142	1,142	1,142	1,142	1,142	1,142	1,142
TOTAL COSTS/ACRE	3,678	3,679	3,679	3,680	3,680	3,681	3,682
TOTAL Costs/lb	1.84	1.67	1.53	1.42	1.31	1.23	1.15

NET RETURNS PER ACRE ABOVE OPERATING COSTS

*Inshell Weighted Average PRICE (\$/lb)	YIELD (lb/acre)						
	2,000	2,200	2,400	2,600	2,800	3,000	3,200
0.81	-532	-371	-209	-48	114	275	436
1.08	8	223	439	654	870	1,085	1,300
1.35	548	817	1,087	1,356	1,626	1,895	2,164
1.62	1,088	1,411	1,735	2,058	2,382	2,705	3,028
1.89	1,628	2,005	2,383	2,760	3,138	3,515	3,892
2.16	2,168	2,599	3,031	3,462	3,894	4,325	4,756
2.43	2,708	3,193	3,679	4,164	4,650	5,135	5,620

NET RETURNS PER ACRE ABOVE CASH COSTS

*Inshell Weighted Average PRICE (\$/lb)	YIELD (lb/acre)						
	2,000	2,200	2,400	2,600	2,800	3,000	3,200
0.81	-916	-755	-593	-432	-270	-109	52
1.08	-376	-161	55	270	486	701	916
1.35	164	433	703	972	1,242	1,511	1,780
1.62	704	1,027	1,351	1,674	1,998	2,321	2,644
1.89	1,244	1,621	1,999	2,376	2,754	3,131	3,508
2.16	1,784	2,215	2,647	3,078	3,510	3,941	4,372
2.43	2,324	2,809	3,295	3,780	4,266	4,751	5,236

UC COOPERATIVE EXTENSION

Table 6. CONTINUED

SAN JOAQUIN VALLEY - 2008

NET RETURNS PER ACRE ABOVE TOTAL COSTS

*Inshell Weighted Average PRICE (\$/lb)	YIELD (lb/acre)						
	2,000	2,200	2,400	2,600	2,800	3,000	3,200
0.81	-2,058	-1,897	-1,735	-1,574	-1,412	-1,251	-1,090
1.08	-1,518	-1,303	-1,087	-872	-656	-441	-226
1.35	-978	-709	-439	-170	100	369	638
1.62	-438	-115	209	532	856	1,179	1,502
1.89	102	479	857	1,234	1,612	1,989	2,366
2.16	642	1,073	1,505	1,936	2,368	2,799	3,230
2.43	1,182	1,667	2,153	2,638	3,124	3,609	4,094

*based on average of 80% inshell-splits + 20% shelling stock & closed shell

UC COOPERATIVE EXTENSION

Table 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

SAN JOAQUIN VALLEY - 2008

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
08	85 HP 4WD Tractor	55,000	25	4,651	3,506	221	298	4,025
08	ATV	7,500	3	3,971	1,446	42	57	1,546
08	Blower - Flory 2500	5,200	10	920	573	23	31	627
08	Disc Tandem 14'	14,269	12	1,976	1,413	60	81	1,554
08	Orchard Sprayer 500 Gal	22,000	8	4,967	2,767	100	135	3,002
08	Pickup Truck 1/2 Ton	28,000	7	10,621	3,374	143	193	3,710
08	ATV Spot Sprayer 20 Gal	511	10	90	56	2	3	62
08	Weed Sprayer 100 Gal	4,200	10	743	463	18	25	506
TOTAL		136,680		27,939	13,599	609	823	15,032
60% of New Cost *		82,008		16,763	8,160	365	494	9,019

*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 sqft	84,000	30		5,006	311	420	1,680	7,417
Drip Lines (2 lines)	57,000	10		7,115	211	285	1,140	8,751
Orchard Establishment Cost	919,220	34		51,600	3,401	4,596	0	59,597
Fuel Tanks 2-250 gal	4,500	20	450	324	18	25	90	457
Irrigation System (booster pumps, filters, etc.)	104,500	40		5,478	387	523	2,090	8,477
Land	700,000	40	700,000	29,750	0	7,000	0	36,750
Shop/Field Tools	12,500	15	1,250	1,083	51	69	250	1,452
TOTAL INVESTMENT	1,881,720	189	701,700	100,356	4,379	12,917	5,250	122,902

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	95	acre	5.88	559
Office Expense	95	acre	100.00	9,500
Sanitation Service	95	acre	31.58	3,000

UC COOPERATIVE EXTENSION
Table 8. HOURLY EQUIPMENT COSTS
 SAN JOAQUIN VALLEY - 2008

		COSTS PER HOUR							
Yr	Description	Actual Hours Used	Cash Overhead			Operating		Total Oper.	Total Costs/hr
			Capital Recovery	Insur- ance	Taxes	Repairs	Fuel & Lube		
08	85 HP 4WD Tractor	440	4.78	0.30	0.41	1.31	16.99	18.30	23.79
08	ATV	547	1.59	0.05	0.06	0.56	2.05	2.61	4.31
08	Blower - Flory 2500	35	9.87	0.39	0.53	0.16	0.00	0.16	10.95
08	Disc Tandem 14'	80	10.62	0.45	0.61	2.33	0.00	2.33	14.01
08	Orchard Sprayer 500 Gal	261	6.36	0.23	0.31	3.85	0.00	3.85	10.75
08	Pickup Truck 1/2 T	190	10.65	0.45	0.61	2.08	17.11	19.19	30.90
08	ATV Spot Sprayer 20 Gal	24	1.40	0.06	0.07	0.14	0.00	0.14	1.67
08	Weed Sprayer 100 Gal	24	11.52	0.45	0.61	1.13	0.00	1.13	13.71

UC COOPERATIVE EXTENSION
Table 9. COSTS PER ACRE for BOTRYOSPHEIRA CONTROL
 SAN JOAQUIN VALLEY - 2008

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	786	0	0	0	786		
Spray Fungicide - Pristine 3X	1.37	24	16	120	0	159		
Spray Fungicide - Flint 1X	0.46	8	5	39	0	52		
TOTAL CULTURAL COSTS	69.33	818	21	158	0	997		
Interest on operating capital @ 6.75%						46		
TOTAL OPERATING COSTS/ACRE		818	21	158	0	1,043		
Cash Overhead:								
Property Taxes						1.46		
Property Insurance						1.08		
TOTAL CASH OVERHEAD COSTS						2.54		
TOTAL CASH COSTS/ACRE						1,045		
Non-Cash Overhead:								
		Per producing Acre		Annual Cost Capital Recovery				
Equipment		238		27		27		
TOTAL NON-CASH OVERHEAD COSTS		238		27		27		
TOTAL COSTS/ACRE						1,072		

UC COOPERATIVE EXTENSION
Table 10. OPERATIONS WITH EQUIPMENT AND MATERIALS
 SAN JOAQUIN VALLEY 2008

Operation	Month	Equipment		Material	Rate/ Broadcast	
		Tractor	Implement		Acre	Unit
Cultural:						
Prune: Prune & Stack	January	Custom		Contract Labor		
Prune: Shred Prunings	January	Custom				
Winter Sanitation: Shake, Rake, Blow, Shred	February	85HP 4WD	Blower	Custom Shake Grower Labor-Rake	2.00	hr
Winter Sanitation: Disc	February	85HP 4WD	Disc-Tandem 14'			
Weed: Winter Strip	February	85HP 4WD	Weed Sprayer	Goal	1.28	pt
				Prowl	2.56	pt
				Roundup	0.64	pt
Irrigate	March			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
Vertebrate: Squirrel	May	ATV		Squirrel Bait	1.00	lbs
Vertebrate: Gopher	April	ATV		Gopher Bait	0.50	lbs
	August	ATV		Gopher Bait	0.50	lbs
	November	ATV		Gopher Bait	0.50	lbs
Insect: NOW	March			PCA Hang Traps		
Insect: NOW	August	85HP 4WD	Orchard Sprayer	Intrepid	1.00	pt
Insect: Plant Bugs	April	85HP 4WD	Orchard Sprayer	Brigade	20.00	oz
Insect: Citrus Flat Mite/Plant Bugs	July	85HP 4WD	Orchard Sprayer	Wettable Sulfur	20.00	lbs
				Brigade	20.00	oz
Disease: Bot/Botrytis	April	85HP 4WD	Orchard Sprayer	Topsin	2.00	lb
Disease: Bot/Alternaria	June	85HP 4WD	Orchard Sprayer	Pristine	12.00	oz
Fertilize: N (UN32) in irrigation	April			UN32	25.00	lb N
	May			10-0-10	500.00	lb
	June			10-0-10	500.00	lb
	July			15-0-05	500.00	lb
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			Lab Analysis		
Weed: Disc	April	85HP 4WD	Disc-Tandem 14'			
	June	85HP 4WD	Disc-Tandem 14'			
	August	85HP 4WD	Disc-Tandem 14'			
Weed-Spot Spray (Roundup)	May	ATV	Spot Sprayer	Roundup	0.21	pt
	July	ATV	Spot Sprayer	Roundup	0.21	pt
Pest Control Adviser	Annual	Custom				
Pickup	Annual	Pickup 1/2 T				
ATV Miscellaneous Use	Annual	ATV				
Harvest: Bulk (Shake & Catch)	September	Custom				
Harvest: Haul	September	Processor				

*Rates are per broadcast acre