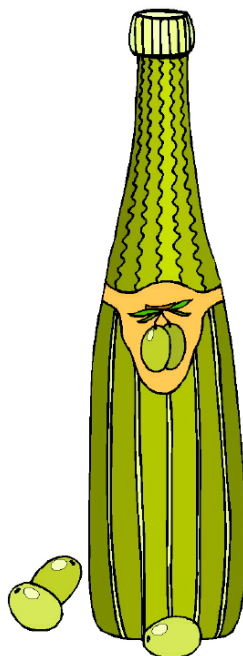


**UNIVERSITY OF CALIFORNIA COOPERATIVE  
EXTENSION**

**2004**

**SAMPLE COSTS TO ESTABLISH  
A SUPER-HIGH DENSITY OLIVE ORCHARD  
AND PRODUCE**

**OLIVE OIL**



**Sacramento Valley**

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## INTRODUCTION

The sample costs to establish a super-high-density olive orchard planting on a trellis system and produce olives for oil in the Sacramento Valley of California are presented in this study. The super-high-density system is new to California and its long term performance is not known. The study includes assumptions and costs for establishing an orchard and for producing olives after establishment. 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. Practices described are based on those production procedures currently being tried for super-high density olive production in the Sacramento Valley. Sample costs for labor, materials, equipment and custom services are based on current figures. Some costs and practices presented in this study may not be applicable to your situation. A blank column, “*Your Costs*”, is provided in Tables 2 and 3 to enter your 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, 530-752-2414.

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Sample Cost of Production studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, 530-752-2414. Current studies, those produced during the last five years, can be obtained from selected county UC Cooperative Extension offices or downloaded from the department website <http://coststudies.ucdavis.edu>.

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## ASSUMPTIONS

The following assumptions pertain to sample costs to establish a super-high density olive orchard and produce olives for oil in the Sacramento Valley of California. The super-high-density system is new to California and its long term performance is not known. Some costs, practices, and materials may not be applicable to your situation nor used every year. Additional practices not indicated may be needed. Establishment and cultural practices vary by grower and region, and variations can be significant. These costs are on an annual, per acre basis. *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 35 acres of land. An olive orchard is established on 30 acres and the remaining five acres are used for roads, the irrigation system, unused land, and farmstead. Property costs \$3,000 per acre or \$3,500 per producing acre.

**Trees.** The olive cultivar used in this study is Arbequina because it is the best adapted to the super-high-density system and over-the-row mechanical harvest. Cultivars traditionally planted in California for table fruit and oil production include Mission, Manzanillo, Sevillano, and Ascolano. Traditional European oil varieties that have been established in limited plantings in the state are: Aglandau, Arbosana, Bouteillan, Coratina, Frantoio, Kalamon, Koroneiki, Leccino, Maurino, Moraiolo, Pendolino, and Picholine. Only Arbosana and Koroneiki are well adapted to the super-high-density system due to their growth habits. The cost of trees for this study ranges from \$4 to \$15 per tree depending upon variety and size. A more inclusive list of oil producing varieties and their characteristics can be found in the *Olive Production Manual*. Olive oil cultivars will produce between 30 to 50 gallons of oil per ton. The trees are planted on 5' X 13' spacing, 670 trees per acre. Olive trees have a long production life if they are well maintained. The life of the orchard at the time of planting in this study is estimated to be 30 years.

**Irrigation.** The water cost for irrigation is the pumping charge. The cost per acre-foot for water will vary by grower in the region depending on well characteristics and other irrigation factors. In this study, water is calculated to cost \$47.16 per acre-foot. Irrigation rates, shown in Table A, increase each year as the orchard matures. Because the orchard is planted on rolling hills and not leveled, water is delivered to the orchard by two, one-half gallon per minute inline emitters per tree. The orchard is made up of three 10 acre blocks for irrigation efficiency and management.

Table A. Annual water use

Year	Acre inches/yr	Acre feet/yr
1	8	0.67
2	16	1.33
3+	24	2.00

**Labor.** Labor rates of \$10.85 per hour for machine operators and \$9.78 for general labor includes payroll overhead of 34%. The basic hourly costs for labor are \$8.10 for machine operators and for \$7.30 general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for vineyards (code 0040), and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers, but for

this study the cost is based upon the average industry final rate as of January 1, 2004 (California Department of Insurance). Labor for operations involving machinery are 20% higher than the operation time given in Table 1, 2, and 4 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

## ESTABLISHMENT CULTURAL PRACTICES AND MATERIAL INPUTS

**Site Preparation.** Land is bare ground with resident vegetation. Preparation begins in the fall by subsoiling the soil to a depth of 12–18 inches twice in a crossing pattern to break up compaction. The ground is then disced twice to break up large clods and smooth the surface. Custom operators perform the subsoiling and discing work. All operations that prepare the orchard for planting are done in the same year when planted. In this study, the costs are included in the first year.

**Planting.** In the spring, the tree sites are marked, holes dug, and the trees planted. Later the trees are tied to six-foot bamboo stakes. Trees that die are replanted in the first year. Two percent of the trees are estimated to be replaced.

**Trellis System.** The trellis is a single, horizontal wire, which supports a bamboo stake at each tree and helps support the trees during the first few years of mechanical harvest. It is installed after the trees are planted in the first year. The trellis consists of two nine-foot, metal end posts held by 12-gauge wire attached to an anchor screwed into the ground. A single strand of 12-gauge wire is strung between the two end posts to keep the trees aligned for mechanical harvesting. Every 50 feet a six-foot, metal T-post is placed into the ground and the 12-gauge wire is clipped to it to maintain a straight tree row. There is a six-foot bamboo stake placed right next to each tree, which is buried only a few inches and is attached to the horizontal wire for training the tree upwards.

**Training and Pruning.** Training the new trees starts by tying the tree to the bamboo stake periodically after planting as the central leader grows. Three ties are made during the first growing season. Two additional ties are made in the second year. The trees are trained to be upright with a single central leader trunk. Some larger side branches can be left the first three years to help fill the space and produce more fruit early, but are removed in the fourth year to avoid excessive shading. Regular spring (April) pruning begins in the third year. Side branches larger than about 1/2 inch in diameter are removed with hand shears. Suckers and any shoots arising from below about 32 inches are pruned off. Tree skirts are pruned starting in the summer of the third year with a sickle bar to allow for good catch frame seal around the trunks during harvest and to avoid foliage contact with weed control sprays. Skirt pruning is done every other year. Also beginning in the third year trees are topped in the summer every other year with a hedging machine to maintain a height of about 9-10 feet for the mechanical harvester. Prunings are placed into the row middles and shredded during the first mowing.

**Insect and Disease Management.** Peacock spot and olive knot are the major olive diseases that infect leaves and shoots, causing defoliation and shoot death. Control begins in the first year with two sprays in April and October. Control of insects and other diseases during the orchard establishment period in olive orchards normally are minimal. Occasional control may be needed for the black scale insect.

Regular control of the olive fruit fly is necessary once fruiting begins. Because the olive fruit fly is a new pest to California and there is no current information suggesting that a reduced amount of pesticide use will coincide with the smaller size of young trees, a full rate of pesticide is applied. Further research may recommend a rate that is based on tree size. Nine preventative pesticide bait treatments are made during the growing season from June until harvest in October. One postharvest treatment is made in November for a total of ten sprays.

**Weed Management.** Orchard floors are managed differently within and between the tree rows. Resident vegetation is allowed to grow between the tree rows to maintain a cover crop. This vegetation in the row middles is mowed three times during the growing season in all years, starting in the first year.

Immediately after planting an application of Surflan is applied to prevent weed germination in a six foot wide strip (3 ft. on each side of the trees). This will effectively prevent the growth of most weeds, but will not cause phytotoxicity if there is some contact with the young trees. Spot treatments with Roundup are usually necessary within the tree row to clean up later emerging weeds. When the trees get larger the strip spray treatment includes an application of Karmex alone in the spring and a second application of Goal plus Roundup in the late fall or early winter. Good weed control is important to prevent competition with young trees for nutrients and water. (see table B).

Year	Weed control treatments	
	Row middles	Within tree row
1	Mow 3X	Strip spray Surflan 1X Strip spray Goal 1X Spot spray Roundup 1X
2+	Mow 3X	Strip spray Goal + Roundup 1X Strip spray Karmex 1X Spot spray Roundup 1X

**Fertilization.** Nitrogen is the major nutrient required for proper tree growth and optimum yields. Young trees receive liquid nitrogen fertilizer three to four times through the drip irrigation system at increasing rates during orchard establishment as shown in Table C. Rates are for actual nitrogen. Rates for the amount of material depends on the percentage of actual nitrogen in each product. Potassium as potassium sulfate is dissolved and injected into the drip irrigation system starting the fourth year and applied monthly during the irrigation season at a rate of 150 pounds per acre every other year.

Year	Pounds of N	Pounds of K
	----- per acre -----	
1	20	0
2	28	0
3	38	0
4+	45	150

**Establishment Cost.** The establishment cost is the sum of cash costs for land preparation, trees, planting, production expenses, and cash overhead for growing olive trees until oil is produced, minus any returns. In this study, production begins the 3rd year. The *Total Accumulated Net Cash Cost* in the third year shown in Table 1, represents the establishment cost per acre. For this study, the cost is \$6,164 per acre or \$184,920 for the 30 acres planted to olives. Establishment cost is amortized over the remaining 28 years that the orchard is assumed to be in production. Establishment cost is used to determine the non-cash overhead, orchard capital recovery expense for production years.

## PRODUCTION CULTURAL PRACTICES AND MATERIAL INPUTS

**Pruning.** Pruning manipulates tree growth to facilitate mechanical harvest and to maintain fruit production. The prunings are placed in the row middles and shredded. Skirt pruning and topping are done every other year so only half of the annual cost shows in the annual production cost tables. All skirt pruning and topping are contracted out.

**Fertilization.** A combination of fertilizers is used to apply 45 pounds of actual nitrogen per acre to the trees through the drip irrigation system. Potassium as potassium sulfate is dissolved in water and injected on the orchard at a rate of 150 pounds of material per acre every other year.

**Pest Management.** For specific pesticide choices and rates consult the *UC IPM Pest Management Guidelines for Olives* and the *Olive Production Manual*. For more information on pest identification, monitoring, and management visit the UC IPM website at <http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html>. Written recommendations are required for many pesticides and are made by licensed pest control advisors. For information and pesticide use permits, contact the local county agricultural commissioner's office. Contact your county Farm Advisor for additional production information.

**Weed Control.** Weeds in mature orchards are controlled with a combination of chemicals and mowing. Weeds within the tree rows are controlled with a mixture of residual pre-emergent herbicides and a contact herbicide in the fall or winter. During the growing season a single spot spray is made within the tree row. Row centers are mowed three times during the spring and summer.

**Insect and Disease Management.** Regular control of the olive fruit fly is necessary once fruiting begins. Olive fruit fly is treated with a Spinosad and bait application nine times from June thru October. A post harvest treatment is made in November for a total of 10 applications.

Black scale is occasionally a concern to olive growers, but specific control measures are not included in this study. Pruning will control the black scale insect in most years. Following cool years or in orchards that have become dense, an insecticide treatment may be required to reduce the population to manageable levels. To prevent the fungal disease, peacock spot, and the bacterial disease, olive knot, two copper sprays are required. The first is applied just after harvest, and the second in March prior to bloom.

**Harvest.** Harvest starts in the third year and is done by a contracted harvesting company. Costs for contracted harvest operations are based on a set rate per acre. Olives for oil are mechanically picked at the color change stage of yellow-green to red-purple skin color with white-green flesh in October to December. An over-the-row harvester is employed to shake the fruit off of the trees and convey them into field bins. Harvested olives are taken straight from the field for immediate processing. Care must be taken when harvesting olives so that the skin of the fruit is not broken nor the flesh excessively bruised.

**Yields.** In this study super-high-density planted olives begin bearing an economic crop in the third year after planting and maximum yield is reached in the fifth year. In this study, olives yield 21% oil per fresh weight and the oil weighs 7.61 pounds per gallon. Arbequina olives produce about 45 gallons of oil per ton of olives. Typical annual yields for olives are measured in tons per acre. Annual olive yield tonnage and gallons are shown in Table D.

Table D. Annual olive and oil yields per acre

Year	Tons of fruit (Fresh weight)	Oil extracted (Gallons)
----- per acre -----		
3	2.7	121.5
4	4.0	180.0
5+	5.0	225.0

**Returns and Prices** Growers selling their olives for cannery processing typically receive in the range of 500 to \$800 per ton fresh weight. A price of \$450 per ton is used in Table 8 for these oil olives. Table 7 includes a range from \$300 to \$600 per ton. Most small-scale specialty oil olive growers in California make their own oil, consequently their olives are never traded in the open market, making it difficult to determine historical prices. Olives that do enter the market are sold at prices that are based on supply and demand. The value of raw olives on the farm depends primarily on the variety and the condition of the fruit. The lowest prices have been paid for varieties with low oil content such as Sevillano (Gordal) and Ascolano, but also for later harvested Mission or Manzanillo, if there has been some damage to the fruit. The highest prices have been paid for small quantities of specialty varieties such as those that go into the Tuscan-style blend (Frantoio, Leccino, Pendolino, Maurino, and Moraiolo). The varieties, Arbequina, Arbosana, and Koroneiki normally have a higher value, within the price range, due to scarcity and recognized superior quality characteristics.

**Risk.** The risks associated with planting a super-high-density olive oil orchard to produce and market olives for oil are significant. While this study makes every effort to model a production system based on typical, real world practices. The super-high-density system is new to California and its long term sustainability is not known. The study cannot fully represent financial, agronomic and market risks, which affect the profitability and economic viability of olives for oil production. *A market channel should be determined before olives are planted and brought into production.* Though, not used in this study, crop insurance is a risk management tool available to growers.

## CASH OVERHEAD COSTS

(Tables 1-7)

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, management services, and equipment repairs.

**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 Agricultural Engineers (ASAE). Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. The fuel and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 3 for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time. Prices for on-farm delivery of diesel and gasoline are \$1.45 and \$1.88 per gallon,

**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. Costs and salvage value for investments are shown in Table 2.

**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 rate for borrowed funds.

**Management.** Wages for management are not included in this study. Any return above total costs is considered a return to management.

**Insurance.** Insurance for farm investments vary depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.676% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$516 for the farm.

**Office Expense.** Office and business expenses are estimated at \$5,000 annually. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, etc.

**Sanitation Services.** Sanitation services provide portable toilets for the orchard and cost the farm \$218 annually. The cost includes a double toilet, delivery and 3 months of weekly service.

## **NON-CASH OVERHEAD COSTS**

(Tables 1-3,5-7)

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:

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

*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.

*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. In other words, the next best alternative use for these resources is in another agricultural enterprise.

**Irrigation System.** The cost of the irrigation system includes re-casing the existing 6-inch well, installation of a submersible 10 hp pump, control valves, electrical panel, filters, mainlines, laterals, and drip tubing with emitters. Pumping costs are based on delivering 24-acre inches to the orchard from a 300-foot well, pumping from a 150 foot depth and 30 pounds per square inch (psi) operating pressure. The irrigation system is installed and completed before the trees are planted. The pump, filter station, and mainlines have an expected useful life of 40 years. The life of the drip irrigation lines and emitters is estimated at 10 years. The irrigation system is considered an improvement to the property and is shown in the capital recovery or investment sections of the tables.

**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. 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.

**Acknowledgements.** Appreciation is expressed to those growers and cooperators who provided information for this study.

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Table 1.

UC COOPERATIVE EXTENSION  
 COSTS PER ACRE TO ESTABLISH A SUPER HIGH DENSITY OIL OLIVE ORCHARD  
 SACRAMENTO VALLEY - 2004  
 ARBEQUINA VARIETY

Labor Rate: \$10.85/hr. machine labor  
 \$9.87/hr. non-machine labor

Trees Per Acre: 670  
 Long Term Interest Rate: 6.23%

Year	Cost Per Acre			
	1st	2nd	3rd	4th
Tons Per Acre			2.7	4.0
<b>Planting Costs:</b>				
Land Preparation - Subsoil: contract	\$165			
Land Preparation - Disc 2X	40			
Survey, Mark, Dig & Plant Orchard	737			
Trees: 670 Per Acre @ \$4.00 per tree	2,680			
Wrap Trees	106			
Install Trellis System	491			
Replant (2% in 2nd year)	0	72		
<b>TOTAL PLANTING COSTS</b>	<b>4,219</b>	<b>72</b>	<b>0</b>	<b>0</b>
<b>Cultural Costs:</b>				
Weed Control - Pre-emergent Strip Spray (Year 1)	11			
Winter/Spring Pruning/Training	11	8	\$8	\$156
Irrigate 8X	39	71	102	102
Fertilize – Nitrogen	16	18	23	26
Weed Control – Strip Spray Within Tree Rows (Year 2+)		6	6	6
Weed Control - Mow Middles 3X	52	52	52	52
Pest Control - Olive Knot & Peacock Spot Spray 1X	40	27	27	27
Pest Control - Olive Fruit Fly 9X (Starting 3rd Year)			140	140
Weed Control - Spot Spray	3	3	3	3
Skirt Olive Trees (Every Two Years Starting 4 <sup>th</sup> year)			6	
Top Olive Trees (Every Two Years Starting 4 <sup>th</sup> year)			13	
Pickup Truck Use	162	162	162	162
<b>TOTAL CULTURAL COSTS</b>	<b>334</b>	<b>347</b>	<b>542</b>	<b>674</b>
<b>Harvest Costs:</b>				
Harvest – Mechanical			135	135
Haul Fruit	0	0	41	60
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>176</b>	<b>195</b>
<b>Postharvest Costs:</b>				
Disease Control - Olive Knot & Peacock Spray 1X		27	27	27
Weed Control - Winter Strip Spray	13	13	13	13
Pest Control - Olive Fruit Fly 1X	0	0	16	16
<b>TOTAL POSTHARVEST COSTS</b>	<b>13</b>	<b>40</b>	<b>56</b>	<b>56</b>
Interest On Operating Capital @ 6.89%	476	13	14	20
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>5,042</b>	<b>472</b>	<b>788</b>	<b>945</b>
<b>Cash Overhead Costs:</b>				
Office Expense	167	167	167	167
Liability Insurance	15	15	15	15
Sanitation Fees	7	7	7	7
Property Taxes	77	77	77	77
Property Insurance	52	52	52	52
Investment Repairs	41	41	41	41
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>359</b>	<b>359</b>	<b>359</b>	<b>359</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>5,401</b>	<b>831</b>	<b>1,147</b>	<b>1,304</b>
<b>INCOME/ACRE FROM PRODUCTION</b>			<b>1,215</b>	<b>1,800</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>	<b>5,401</b>	<b>831</b>		
<b>PROFIT/ACRE ABOVE CASH COSTS</b>			<b>68</b>	<b>496</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>	<b>5,401</b>	<b>6,232</b>	<b>6,164</b>	<b>5,668</b>

U.C. COOPERATIVE EXTENSION  
Table 1. continued

Year	Cost Per Acre			
	1st	2nd	3rd	4th
Tons Per Acre			2.7	4.0
Capital Recovery Cost:				
Land @ \$3,000 Per Acre	218	218	218	218
Shop Building - 1,200 SqFt	67	67	67	67
Shop Tools	4	4	4	4
Fuel Tank & Pump	28	28	28	28
Drip Irrigation System	258	258	258	258
Equipment	<u>272</u>	<u>272</u>	<u>272</u>	<u>272</u>
TOTAL CAPITAL RECOVERY COST	847	847	847	847
TOTAL COST/ACRE FOR THE YEAR	6,248	1,678	1,994	2,151
INCOME/ACRE FROM PRODUCTION			1,215	1,800
TOTAL NET COST/ACRE FOR THE YEAR	6,248	1,678	779	351
TOTAL ACCUMULATED NET COST/ACRE	6,248	7,926	8,705	9,056

Table 2.

UC COOPERATIVE EXTENSION  
 COSTS to PRODUCE SUPER-HIGH DENSITY OLIVES for OIL  
 SACRAMENTO VALLEY – 2004  
 ARBEQUINA VARIETY

Labor Rate: \$10.85/hr. machine labor  
 \$9.87/hr. non-machine labor

Trees Per Acre: 670  
 Long Term Interest Rate: 6.23%

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:								
Spring Pruning	20.00	196	0	0	0	196		
Weed Control - Strip Spray	0.19	3	0	1	0	4		
Weed Control - Mow Middles 3X	1.00	13	11	0	0	24		
Disease Control - Olive Knot & Peacock Spray	0.33	4	3	19	0	27		
Weed Control - Spot Spray	0.19	3	0	1	0	4		
Irrigate	0.80	8	0	94	0	102		
Fertilizer - Nitrogen	0.80	8	0	18	0	25		
Skirt Prune Trees (1 of 2 Years)	0.00	0	0	0	3	3		
Pest Control - Olive Fruit Fly 9X	3.00	39	30	72	0	140		
Top Prune Trees (1 of 2 Years)	0.00	0	0	0	7	7		
Pickup Truck Use	4.83	63	35	0	0	98		
<b>TOTAL CULTURAL COSTS</b>	<b>31.16</b>	<b>336</b>	<b>79</b>	<b>205</b>	<b>10</b>	<b>630</b>		
Harvest:								
Harvest	0.00	0	0	0	135	135		
Haul Fruit to Processor	0.00	0	0	0	75	75		
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>210</b>	<b>210</b>		
Postharvest:								
Disease Control - Olive Knot & Peacock Spray	0.33	4	3	19	0	27		
Weed Control - Residual Weed Spray	0.19	3	0	8	0	11		
Pest Control - Olive Fruit Fly 1X	0.33	4	3	8	0	16		
<b>TOTAL POSTHARVEST COSTS</b>	<b>0.86</b>	<b>11</b>	<b>7</b>	<b>35</b>	<b>0</b>	<b>53</b>		
Interest on operating capital @ 6.89%						19		
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>347</b>	<b>86</b>	<b>240</b>	<b>219</b>	<b>911</b>		
CASH OVERHEAD:								
Office Expense						167		
Liability Insurance						13		
Sanitation Fees						7		
Property Taxes						92		
Property Insurance						62		
Investment Repairs						41		
<b>TOTAL CASH OVERHEAD COSTS</b>						<b>382</b>		
<b>TOTAL CASH COSTS/ACRE</b>						<b>1,294</b>		
NON-CASH OVERHEAD:								
		Per producing Acre		-- Annual Cost -- Capital Recovery				
Investment								
Shop Building - 1,200 SqFt		920		67		67		
Fuel Tank & Pump		50		4		4		
Shop Tools		217		28		28		
Land @ \$3,000 Per Acre		3,000		187		187		
Drip Irrigation System		3,800		258		258		
Olive Orchard Establishment Cost		6,164		430		430		
Equipment		647		81		81		
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>14,798</b>		<b>1,056</b>		<b>1,056</b>		
<b>TOTAL COSTS/ACRE</b>						<b>2,349</b>		

Table 3.

UC COOPERATIVE EXTENSION  
 COSTS and RETURNS to PRODUCE SUPER-HIGH DENSITY OLIVES for OIL  
 SACRAMENTO VALLEY – 2004  
 ARBEQUINA VARIETY

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Olive for Oil	5.0	Ton	450	<u>2,250</u>	
<b>TOTAL GROSS RETURNS FOR OLIVE OIL</b>				2,250	
<b>OPERATING COSTS</b>					
Herbicide:					
Karmex DF	0.25	Lb	5.09	1	
Roundup Ultra	0.40	Pint	6.06	2	
Goal 2 XL	0.50	Pint	13.32	7	
Fungicide:					
Kocide 101	20.00	Lb	1.90	38	
Water:					
Water - Pumped	24.00	AcIn	3.93	94	
Fertilizer:					
UN-32	45.04	Lb N	0.391	18	
Custom:					
Skirt Pruning	1.00	Acre	3.00	3	
Top Pruning	1.00	Acre	6.50	7	
Hauling	5.00	Ton	15.00	75	
Insecticide:					
GF-120	140.00	FlOz	0.57	80	
Contract:					
Harvest-Mechanical	1.00	Acre	135.00	135	
Labor (machine)	12.50	hrs	10.85	136	
Labor (non-machine)	21.60	hrs	9.78	211	
Fuel - Gas	12.47	gal	1.88	23	
Fuel - Diesel	14.87	gal	1.45	22	
Lube				7	
Machinery repair				35	
Interest on operating capital @ 6.89%				<u>19</u>	
<b>TOTAL OPERATING COSTS/ACRE</b>				911	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				1,339	
<b>CASH OVERHEAD COSTS:</b>					
Office Expense				167	
Liability Insurance				13	
Sanitation Fees				7	
Property Taxes				92	
Property Insurance				62	
Investment Repairs				<u>41</u>	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				382	
<b>TOTAL CASH COSTS/ACRE</b>				1,294	
<b>NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):</b>					
Buildings: 1,200 SqFt				67	
Fuel Tank: 1-100 Gallon				4	
Shop Tools				28	
Land				187	
Drip Irrigation System				258	
Olive Orchard Establishment Cost				430	
Equipment				<u>81</u>	
<b>TOTAL NON-CASH OVERHEAD COST/ACRE</b>				1,056	
<b>TOTAL COSTS/ACRE</b>				2,349	
<b>NET RETURNS ABOVE TOTAL COSTS</b>				-99	

Table 4.

UC COOPERATIVE EXTENSION  
MONTHLY CASH COSTS to PRODUCE SUPER-HIGH DENSITY OLIVES for OIL  
SACRAMENTO VALLEY - 2004  
ARBEQUINA VARIETY

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	
<b>Cultural:</b>													
Spring Hand Pruning				98	98								196
Weed Control –													
- Strip Spray				4									4
Weed Control –													
- Mow Middle 3X				8		16							24
Disease Control –													
- Olive Knot & Peacock Spray 1X				27									27
Weed Control - Spot Spray					4								4
Irrigate					13	26	26	13	13	13			102
Fertilizer - Nitrogen					3	6	6	3	3	3			25
Mechanically Skirt Prune Trees -													
- (1 of 2 Years)					3								3
Pest Control –													
- Olive Fruit Fly 9X						16	31	31	31	31			140
Mechanically Top Prune Trees -													
- (1 of 2 Years)							7						7
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	8	98
<b>TOTAL CULTURAL COSTS</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>145</b>	<b>129</b>	<b>71</b>	<b>78</b>	<b>55</b>	<b>55</b>	<b>55</b>	<b>8</b>	<b>8</b>	<b>630</b>
<b>Harvest:</b>													
Harvest										135			135
Haul Fruit to Processor										75			75
<b>TOTAL HARVEST COSTS</b>										<b>210</b>			<b>210</b>
<b>Post Harvest:</b>													
Disease Control –													
- Olive Knot & Peacock Spray 1X											27		27
Weed Control –													
- Winter Weed Spray											11		11
Pest Control –													
- Olive Fruit Fly 1X											16		16
<b>TOTAL POSTHARVEST COSTS</b>											<b>53</b>		<b>53</b>
Interest on oper. Capital @ 6.89%	0	0	0	2	2	2	3	3	3	5	0	0	19
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>147</b>	<b>131</b>	<b>74</b>	<b>80</b>	<b>58</b>	<b>59</b>	<b>270</b>	<b>61</b>	<b>8</b>	<b>911</b>
<b>OVERHEAD:</b>													
Office Expense										167			167
Liability Insurance	13												13
Sanitation Fees	7												7
Property Taxes	46						46						92
Property Insurance	31						31						62
Investment Repairs	3	3	3	3	3	3	3	3	3	3	3	3	41
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>101</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>81</b>	<b>3</b>	<b>3</b>	<b>170</b>	<b>3</b>	<b>3</b>	<b>382</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>109</b>	<b>13</b>	<b>120</b>	<b>155</b>	<b>36</b>	<b>77</b>	<b>161</b>	<b>62</b>	<b>62</b>	<b>440</b>	<b>64</b>	<b>11</b>	<b>1,302</b>

Table 5.

UC COOPERATIVE EXTENSION  
 WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, and BUSINESS OVERHEAD COSTS  
 SACRAMENTO VALLEY - 2004  
 ARBEQUINA VARIETY

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	-- Cash Overhead --		Total
						Insur- ance	Taxes	
04	55 HP 2WD Tractor	32,269	12	8,068	3,426	136	202	3,764
04	ATV 4WD	7,430	7	2,818	1,008	35	51	1,094
04	Mower - Flail 10'	10,272	10	1,817	1,275	41	60	1,376
04	Orchard Sprayer - 500 Gallon	19,741	10	3,491	2,449	79	116	2,644
04	Pickup Truck - 1/2 Ton	24,500	7	9,294	3,325	114	169	3,608
04	Weed Sprayer - 50 Gallon	1,500	10	265	186	6	9	201
TOTAL		95,712		25,753	11,670	411	607	12,688
60% of New Cost *		57,427		15,452	7,002	246	364	7,613

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

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	----- Cash Overhead -----			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Buildings: 1,200 SqFt	27,600	30	2,760	2,021	103	152	552	2,828
Drip Irrigation System	114,000	40	11,400	7,728	424	627	513	9,292
Olive Orchard Establishment Cost	184,920	37		12,899	625	925	0	14,449
Fuel Tank: 1-100 Gallon	1,500	20	150	137	6	8	30	181
Land	105,000	60	105,000	7,234	710	1,050	0	8,994
Shop Tools	6,500	10	650	873	24	36	130	1,063
TOTAL INVESTMENT	439,520		119,960	30,163	1,891	2,797	1,225	36,076

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	30	Acre	14.74	442
Office Expense	30	Acre	166.67	5,000
Sanitation Fees	30	Acre	7.27	218



Table 6.

UC COOPERATIVE EXTENSION  
 HOURLY EQUIPMENT COSTS  
 \SACRAMENTO VALLEY - 2004  
 ARBEQUINA VARIETY

Description	Actual Hours Used	COSTS PER HOUR						Total Oper.	Total Costs/Hr.
		Capital Recovery	Insur- ance	- Cash Overhead - Taxes	----- Operating ----- Repairs	Fuel & Lube	Total		
55 HP 4WD Tractor	939.0	2.19	0.09	0.13	1.43	4.50	5.93	8.34	
ATV 4WD	278.5	2.17	0.07	0.11	0.55	1.44	1.99	4.34	
Mower - Flail 10'	200.0	3.82	0.12	0.18	4.25	0.00	4.25	8.38	
Orchard Sprayer - 500 Gallon	190.0	7.74	0.25	0.37	3.34	0.00	3.34	11.69	
Pickup Truck - 1/2 Ton	285.0	7.00	0.24	0.36	1.79	5.40	7.19	14.79	
Weed Sprayer - 50 Gallon	143.5	0.78	0.02	0.04	0.40	0.00	0.40	1.24	

Table 7.

UC COOPERATIVE EXTENSION  
RANGING ANALYSIS  
SACRAMENTO VALLEY – 2004  
ARBEQUINA VARIETY

	YIELD(TON/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
<b>OPERATING COSTS/ACRE:</b>							
Cultural Cost	630	630	630	630	630	630	630
Harvest Cost	188	195	203	210	217	225	233
Post Harvest Cost	53	53	53	53	53	53	53
Interest on operating capital	18	19	19	19	19	19	19
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>889</b>	<b>896</b>	<b>904</b>	<b>911</b>	<b>919</b>	<b>927</b>	<b>934</b>
<b>TOTAL OPERATING COSTS/TON</b>	<b>254</b>	<b>224</b>	<b>201</b>	<b>182</b>	<b>167</b>	<b>154</b>	<b>144</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>382</b>	<b>382</b>	<b>382</b>	<b>382</b>	<b>382</b>	<b>382</b>	<b>382</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>1,271</b>	<b>1,279</b>	<b>1,286</b>	<b>1,294</b>	<b>1,301</b>	<b>1,309</b>	<b>1,316</b>
<b>TOTAL CASH COSTS/TON</b>	<b>363</b>	<b>320</b>	<b>286</b>	<b>259</b>	<b>237</b>	<b>218</b>	<b>203</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>1,056</b>	<b>1,056</b>	<b>1,056</b>	<b>1,056</b>	<b>1,056</b>	<b>1,056</b>	<b>1,056</b>
<b>TOTAL COSTS/ACRE</b>	<b>2,327</b>	<b>2,334</b>	<b>2,342</b>	<b>2,349</b>	<b>2,357</b>	<b>2,364</b>	<b>2,372</b>
<b>TOTAL COSTS/TON</b>	<b>665</b>	<b>584</b>	<b>520</b>	<b>470</b>	<b>429</b>	<b>394</b>	<b>365</b>

**NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR SUPER-HIGH DENSITY OLIVES FOR OIL**

PRICE (DOLLARS/TON) Olives for Oil	YIELD (TONS/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
	----- \$/Acre -----						
300	161	304	446	589	731	873	1,016
350	336	504	671	839	1,006	1,173	1,341
400	511	704	896	1,089	1,281	1,473	1,666
450	686	904	1,121	1,339	1,556	1,773	1,991
500	861	1,104	1,346	1,589	1,831	2,073	2,316
550	1,036	1,304	1,571	1,839	2,106	2,373	2,641
600	1,211	1,504	1,796	2,089	2,381	2,673	2,966

**NET RETURNS PER ACRE ABOVE CASH COSTS FOR SUPER-HIGH DENSITY OLIVES FOR OIL**

PRICE (DOLLARS/TON) Olives for Oil	YIELD (TONS/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
	----- \$/Acre -----						
300	-221	-79	64	206	349	491	634
350	-46	121	289	456	624	791	959
400	129	321	514	706	899	1,091	1,284
450	304	521	739	956	1,174	1,391	1,609
500	479	721	964	1,206	1,449	1,691	1,934
550	654	921	1,189	1,456	1,724	1,991	2,259
600	829	1,121	1,414	1,706	1,999	2,291	2,584

**NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR SUPER-HIGH DENSITY OLIVES FOR OIL**

PRICE (DOLLARS/TON) Olives for Oil	YIELD (TONS/ACRE)						
	3.5	4.0	4.5	5.0	5.5	6.0	6.5
	----- \$/Acre -----						
300	-	-1,134	-992	-849	-707	-564	-422
350	1,102	-934	-767	-599	-432	-264	-97
400	-927	-734	-542	-349	-157	36	228
450	-752	-534	-317	-99	118	336	553
500	-577	-334	-92	151	393	636	878
550	-402	-134	133	401	668	936	1,203
600	-227	66	358	651	943	1,236	1,528

Table 8.

UC COOPERATIVE EXTENSION  
 COSTS and RETURNS/BREAKEVEN ANALYSIS  
 SACRAMENTO VALLEY – 2004  
 ARBEQUINA VARIETY

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Olives for Oil	2,250	911	1,339	1,294	956	2,349	-99

COSTS AND RETURNS - TOTAL ACREAGE

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Olives for Oil	67,500	27,344	40,156	38,810	28,690	70,482	-2,982

BREAKEVEN PRICES PER YIELD UNIT

CROP	Base Yield (Units/Acre)	Yield Units	Breakeven Price to Cover		
			Operating Costs	Cash Costs	Total Costs
\$ per Yield Unit					
Olives for Oil	5.0	Ton	182.29	258.73	469.88

BREAKEVEN YIELD PER ACRE

CROP	Yield Units	Base Price (\$/Unit)	Breakeven Yield to Cover		
			Operating Costs	Cash Costs	Total Costs
Yield Units/Acre					
Olives for Oil	Ton	450	2.0	2.9	5.2

Table 9.

UC COOPERATIVE EXTENSION  
OPERATIONS BY MONTH  
SACRAMENTO VALLEY - 2004  
ARBEQUINA VARIETY

Operation	Operation Month	Tractor/ Power Unit	Implement	Material	Broadcast Rate/acre	Material Unit
Cultural:						
Spring Prune	April	Labor				
	May	Labor				
Irrigate	May			Water	3.0	AcIn
	June			Water	6.0	AcIn
	July			Water	6.0	AcIn
	August			Water	4.0	AcIn
	September			Water	3.0	AcIn
	October			Water	2.0	AcIn
Fertilizer - Nitrogen	May			UN-32	11.3	Lbs
- <i>Injected into Irrigation System</i>	June			UN-32	11.3	Lbs
	July			UN-32	5.63	Lbs
	August			UN-32	5.63	Lbs
	September			UN-32	5.63	Lbs
	October			UN-32	5.63	Lbs
Weed Control - <i>Strip Spray</i>	April	ATV 4WD	Weed Sprayer - 50 Gallon	Karmex	0.25	Lbs
Weed Control- <i>Spot Spray</i>	May			Roundup	0.20	Pint
Weed Control - <i>Mow Middles 1X</i>	April	55 HP 2WD Tractor	Mower - Flail 10'			
- <i>1X</i>	May	55 HP 2WD Tractor	Mower - Flail 10'			
- <i>1X</i>	June	55 HP 2WD Tractor	Mower - Flail 10'			
Disease Control - <i>Olive Knot &amp;</i>	April	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	Kocide 101	10.0	Lbs
- <i>Peacock Spot Spray 2X</i>	November	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	Kocide 101	10.0	Lbs
Pest Control - 10X Total						
- <i>Olive Fruit Fly 1 - 1X</i>	June	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	14.0	Fl Oz
- <i>2X</i>	July	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	28.0	Fl Oz
- <i>2X</i>	August	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	28.0	Fl Oz
- <i>2X</i>	September	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	28.0	Fl Oz
- <i>2X</i>	October	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	28.0	Fl Oz
- <i>1X - Post Harvest</i>	November	55 HP 2WD Tractor	Orchard Sprayer - 500 Gallon	GF-120	14.0	Fl Oz
Skirt Prune Trees ( <i>1 of 2 Years</i> )	May			Custom		
Top Prune Trees ( <i>1 of 2 Years</i> )	July			Custom		
Harvest	October			Contract		
Haul Fruit to Processor	October			Custom		
Fertilizer - <i>Potassium</i>	November	Labor		Potassium Sulfate	200.0	Lbs
- <i>Injected into Irrigation System</i>						
Weed Control - <i>Winter Strip Spray</i>	November	ATV 4WD	Weed Sprayer - 50 Gallon	Goal	0.80	Pint
				Roundup	0.20	Pint
Pickup Truck Use	Annual	Pickup 1/2 ton				