
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2011

**SAMPLE COSTS TO ESTABLISH A MEDIUM-DENSITY OLIVE
ORCHARD AND PRODUCE BOTTLED**

OLIVE OIL



NORTH AND CENTRAL COASTS

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INTRODUCTION

The sample costs to establish a medium-density olive orchard and produce olives for oil including bottling on the North and Central Coasts of California are presented in this study. The study includes assumptions and costs for establishing an orchard and for producing olives and bottling oil 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 used to grow olives for oil on the North and Central Coasts. 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, 530-752-3589.

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Sample Cost of Production studies for current and archived commodities are available and can be downloaded from the department website <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis or obtained from selected county UC Cooperative Extension offices.

ASSUMPTIONS

The following assumptions pertain to sample costs to establish a medium-density, conventionally-farmed olive orchard and produce bottled olive oil on the North and Central Coasts of California. 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 15 acres of rolling hillside land. An olive orchard is established on 10 acres and the remaining five acres are used for roads, the irrigation system, unused land, and farmstead. Over all the counties included in the study areas, land values used for growing olives range from \$9,000 - \$50,000 per acre. In this study property costs \$15,000 per acre or \$22,500 per producing acre.

Trees. Specialty olive cultivars used in this study are Frantoio, Leccino, and Pendolino, which are typical of the coastal medium-density system. Other cultivars planted are: Coratina, Maurino, Mission, Arbequina, and Koroneiki. Depending on size and number of trees ordered, prices range from around \$4.00 for “tublets” to \$10.00 for one gallon trees. The cost of trees for this study is \$5.00 per tree. 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 9 X 18 foot spacing, 269 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 40 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 \$16.50 per acre-inch. Annual irrigation rates, shown in Table A, increase each year as the orchard matures. The trees are irrigated from May through October. The amount of water applied can vary significantly depending on rainfall, soil depth, soil water holding capacity, crop load, and if there is a cover crop present. Young trees require more water to increase vegetative growth and get the trees to fill their allotted space. Mature trees should be watered less to moderate vigor and enhance oil flavor. Because the orchard is planted on rolling hills and unlevel, water is delivered to the orchard through a drip irrigation system. Each tree is watered by two, one-gallon per hour emitters set three feet on each side of the trees. The drip tubing can be raised off the ground by placing it in the trees.

Table A. Annual Water Use	
Year	Acre-inches
1	4
2	8
3	12
4	16
5	20
6	24
7	28
8	32
9+ (Mature)	20

Labor. Labor rates of \$20.03 per hour for machine operators and \$12.50 for general labor includes payroll overhead of 36%. The basic hourly costs for labor are \$14.73 for machine operators and \$9.19 for general labor. The overhead includes the employers’ share of federal and California state payroll taxes, workers’ compensation insurance for orchards (code 0016), 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 2011 (California Department of Insurance). Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and 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 disced once and a cover crop planted in the fall. The ground is then disced in the spring to incorporate the cover crop and break up large clods and smooth the surface. Custom operators perform the subsoiling and discing work. In some orchards, rocks are removed to make orchard operations more efficient. 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 orchard is laid-out by marking the tree sites, digging holes, and planting the trees. Trees that die are replanted in the second year. Two percent of the trees are estimated to be replaced. An eight-foot high deer fence is custom installed to protect new growth and fruit.

Training and Pruning. A stake by each tree may or may not be necessary depending on the normal winds at the orchard site. This study uses a large bamboo stake at each tree for initial training during the first 4 to 5 years. Training the new trees starts by tying the tree to the bamboo stakes at planting and periodically during the growing season the first two years. Trees are tied 5 times the first year and 2 times the second year. Trees are trained to a single trunk for possible future trunk shaker harvest. Root suckers and water sprouts arising below 32 to 36 inches are removed each year to avoid foliage contact with weed sprays and to ease harvest. In year five, the center is opened up and the trees are trained to an open vase shape and is assumed to take a total of 18 hours per acre.

Insect and Disease Management. Control of insects and other diseases during the orchard establishment period in olive orchards normally are minimal.

Insects. The olive fruit fly is the major insect pest for olives in this region except in Lake County, where no treatment is necessary. Beginning in July of year four, McPhail pheromone traps are placed in the orchard at a density of one for every five acres and serviced every two weeks once fruit is set. Eight preventative insecticide treatments (GF120) are applied during the growing season from June until harvest in October once the trees start bearing fruit in the fourth year. One additional postharvest treatment is made in November for a total of nine sprays. Depending on the region and pest pressure more or fewer treatments may be required. Occasional control may be needed for the black scale insect, but is not included in this study.

Diseases. In dryer areas and many inland valleys peacock spot and olive knot are not significant enough pests so preventive sprays are not applied. In rainy areas where disease pressure exists, a fixed copper spray is normally applied each year before the first major fall rains and in February or March. In this study one application of Kocide (copper) is applied in early November.

Weed Management. Good weed control is important to prevent competition with young trees for nutrients and water. 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. This vegetation in the row middles is mowed three times during the growing season in all years, starting in the first year. A commercial cover crop may be planted in some orchards.

Table B. Weed Control Treatments	
Row middles	Within tree row
Mow 3X	Strip or spot spray Roundup 3X Dormant spray – Herbicide Mix 1X

An application of Roundup (or generic equivalent) is applied to a six foot wide strip (3 ft. on each side of the trees) immediately after planting to kill germinating weeds. Two more Roundup sprays are made during the growing season. Spot and/or strip treatments with Roundup are usually necessary within the tree row to clean up later emerging weeds. (Table B).

Fertilization. Nitrogen is the major nutrient required for proper tree growth and optimum yields. Young trees receive liquid nitrogen fertilizer three to four times per growing season (March – June) through the drip irrigation system at increasing rates depending on the age and size of the trees. Potassium (K) is sometimes needed but is not included in this study. Table C shows rates of actual nitrogen; rate of formulated material depends on the percentage of actual nitrogen in each product.

Table C. Nitrogen Applied	
Year	lbs N/acre
1	40-50
2	50-60
3	60-70
4	70-80
5	80-90
6-8	100
9+	40-100

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 fourth year. The *Total Accumulated Net Cash Cost* in the fourth year shown in Table 1 represents the establishment cost per acre. For this study, the cost is \$7,151 per acre or \$71,510 for the 10 acres planted to olives. Establishment cost normally is amortized over the remaining years of 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. In year 5 or when the trees reach greater than 6 feet wide, the central leader is sawed out. In years 6 to 9, one or two internal branches are removed each year to gradually form an open vase shape with 3 to 4 main scaffold branches. Normal pruning is conducted in April on trees that have a heavy bloom (“ON” year) and are expected to have a heavy crop by keeping the centers open and thinning out tall upright branches to an outward facing lateral. Pruning is assumed to take 36 hours per acre. Maximum tree height is kept at 14 feet. No pruning is conducted on “OFF” year trees with light bloom; consequently average pruning over the two years is 18 hours per acre per year. Prunings are placed into the row middles and shredded with an additional mowing.

Fertilization. Mature trees receive more N in “ON” years with heavy bloom and heavy crop set (100 lbs of actual N per acre) and much less (40 lbs of actual N per acre) in years with light bloom and low crop load (average 70 lbs per acre per year). The fertilizer is applied to the trees through the drip irrigation system from March through October.

Pest Management. Consult the *UC IPM Pest Management Guidelines for Olives* and the *Olive Production Manual* for specific pesticide choices and rates. 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 advisers. Contact the local county agricultural commissioner's office for information and pesticide use permits. Contact your county UC farm advisor for additional production information.

Weed Control. Weeds in mature orchards are controlled using a combination of herbicides and mowing. Weeds within the tree rows are controlled with a mixture of residual pre-emergent herbicides (Goal, Surflan) and a contact herbicide (Roundup) in the fall or winter. During the growing season, three strip or spot sprays are made within the tree row. In addition to shredding the prunings, the row centers are mowed three times during the spring and summer.

Insect and Disease Management. Regular control of the olive fruit fly (OLF) is necessary once fruiting begins, except in Lake County where OLF is not a problem. McPhail pheromone traps are placed in the orchard at a density of one for every five acres and serviced every two weeks once fruit is set. Spinosad (GF-120) bait is sprayed eight times (twice per month to alternate rows) from June/July thru November. A post harvest treatment is made to all rows in late November or early December to reduce overwintering populations - for a total of nine 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 with dense foliage, an insecticide treatment may be required to reduce the population to manageable levels. The fungal disease peacock spot and the bacterial disease olive knot usually require two copper sprays in rainy coastal areas. One spray after harvest and before the first major rains and again in February or March. In this study, Kocide (copper) is applied in November. Although they are not a significant problem on the Central Coast, monitoring the orchard for disease incidence is encouraged.

Vertebrate (Rodents). Gophers are controlled by baiting.

Harvest. While some production may occur in the third year, and may or may not be harvested, harvest begins in the fourth year in this study. Costs are for contracted harvest operations and are based on a set rate of \$500 per ton. The range in custom harvest costs can be from \$350 to \$1,000 per ton depending on the size of the orchard and steepness of the terrain. Olives are harvested by knocking, shaking, or raking fruit down onto nets. Fruit is picked at the color change (verasion) stage of yellow-green to red-purple skin color with white-green flesh in October to December. Care is taken when harvesting olives so that the skin of the fruit is not broken nor the flesh excessively bruised. Harvested olives are transported directly from the field for immediate processing.

Fruit Hauling. Most custom haulers charge \$85 per hour to haul fruit from the orchard to the mill. Using an average of 8 tons per load and 3 hours to load, haul, and unload equals a contracted hauling cost of \$35 per ton.

Yield. Medium-density planted olives begin bearing an economic crop in the fourth year after planting and maximum yield is reached in the ninth to tenth year. (Note: consistent yield is difficult to maintain in olive orchards due to normal alternate bearing and occasional detrimental weather that reduces fruit set.) In this study, olives yield 21% oil per fresh weight and the oil weighs 7.61 pounds per gallon. Most oil olives produce about 40 gallons per ton. Typical annual yields for olives are measured in tons per acre. Annual olive yield in tons, gallons, and retail bottles (375 ml size) are shown in Table D.

Year	Tons of fruit (Fresh weight)	Oil extracted (Gallons)	Retail Bottle (375 Milliliter)
		per acre	
4	1.00	40	403
5	1.25	50	504
6	1.50	60	605
7	2.00	80	807
8	2.50	100	1,008
9	3.00	120	1,211

Processing. The cost to mill fruit into oil varies from mill to mill and can range from \$250 to \$475 per ton. The average price used in this study (based on several mills) is \$380 per ton of fruit.

Bottling. The average cost to take the oil from bulk storage to a finished product ready for retail sale can vary considerably. Bottling labor costs listed below include bulk oil storage, oil transport, and storage of cased bottles. The

	Range \$	Average
	\$/bottle	
375 ml bottle	0.45 to 1.37	0.79
Label (s)	0.05 to 0.60	0.28
Closure	0.03 to 0.10	0.07
Capsule	0.02 to 0.04	0.04
Neck Tag	0.02 to 0.03	0.02
Boxes/Dividers	0.09 to 0.15	0.13
Labor (fill/pack)	0.34 to 1.25	0.71
TOTAL	1.40 to 3.07	2.04

cost of glass bottles is very different if sourced locally or from overseas. The quality of the label paper, printing, and if there is a back label can significantly change the costs and labor to apply. The following average prices have been used in this study, but also included for your information are a range of prices. (see Table E)

Returns and Prices. The olives in this study are destined to be processed into oil so a price of \$10.00 per 375 milliter (ml) bottle is used in Tables 3 and 5. Because most small-scale specialty oil olive growers in California make their own oil, 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 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 historically been paid for varieties with low oil content such as Sevillano (Gordal) and Ascolano, but also for later harvested Mission or Manzanillo if the fruit is damaged. 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 may have a lower value due to the recent plantings of large scale orchards with these varieties in California's Central Valley

Marketing and Distribution. Producers can sell oil directly through farmers markets, a tasting room, or internet sales and realize greater profit with lower marketing and distribution costs. As soon as a producer decides to sell via retail specialty stores, the marketing and distribution costs rise dramatically. Many retail stores work on a 50% margin for small-scale specialty items like olive oil, effectively doubling their purchase price. A retail store then would buy a 375 ml sized bottle for \$10 and sell it for \$20. Most wholesale distributors have some sales and merchandizing staff and this typically costs 25% or \$2.50 for a \$10 bottle of oil, effectively reducing the price to the producer to \$7.50 per bottle.

Risk The risks associated with planting an olive orchard to produce and market olive oil are significant. 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 may 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.* Crop insurance is a risk management tool available to growers, though not included in this study.

CASH OVERHEAD COSTS

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 7 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 \$2.60 and \$3.10 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 6.

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 5.75% 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 0.775% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$477 for the farm.

Office Expense. Office and business expenses are estimated at \$1,500 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 \$314 annually. The cost includes a single toilet, delivery and 3 months of weekly service.

NON-CASH OVERHEAD COSTS

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.

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 4.75% is used to calculate capital recovery cost is the effective long-term interest rate in January 2011. 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 20-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.

Building. Metal building on a cement slab.

Pruning Tools. Two electric pole (chainsaw type) pruners, five hand saws and five hand pruning shears.

Land. See Land paragraph on page 3.

Establishment Costs. See Establishment Cost paragraph on page 5.

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.

REFERENCES

- American Society of Agricultural Engineers. 1994. *American Society of Agricultural Engineers Standards Yearbook*. Russell H. Hahn and Evelyn E. Rosentreter (ed.) St. Joseph, MO. 41st edition.
- Boehlje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, NY
- California Chapter of American Society of Farm Managers and Rural Appraisers. *2010 Trends in Agricultural Land and Lease Values*. California Chapter of Farm Managers and Rural Appraisers, Woodbridge, CA.
- Sibbett, G. Steven and Joseph Connell. 1993. *Producing Olive Oil in California*. Pub. 21516. University of California, Division of Agriculture and Natural Resources. Oakland, CA.
- Statewide IPM Project. 2009. *UC Pest Management Guidelines, Olive*. In M. L. Flint (ed.) *UC IPM pest management guidelines*. Pub. 3339. IPM Education and Publ. University of California, Agriculture and Natural Resources. Oakland, CA. <http://www.ipm.ucdavis.edu/IPMPROJECT/pestmgmt.html>. Internet accessed June, 2010.
- University of California. 1995. *Olive Production Manual*. Pub. 3353. University of California, Division of Agriculture and Natural Resources. Oakland, CA.
- Vossen, Paul M., Joseph H. Connell, William H. Krueger, Karen M. Klonsky, and Pete Livingston. 2008. *Sample Costs to Establish a Super-MEDIUM-DENSITY Olive Orchard and Produce Olive Oil – Sacramento Valley*. University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.
- Vossen, Paul, Karen Klonsky, and Richard L. De Moura. 2001. *Sample Costs to Establish an Olive Orchard and Produce Olive Oil – Central Coast of California*. University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.

For information concerning the above or other University of California publications, contact UC DANR Communications Services at 1-800-994-8849, online at www.ucop.edu, or your local county UC Cooperative Extension office.

UC COOPERATIVE EXTENSION
Table 1. COSTS PER ACRE TO ESTABLISH A MEDIUM-DENSITY OLIVE OIL ORCHARD
 NORTH and CENTRAL COASTS 2011

	Year:	Cost Per Acre			
		1st	2nd	3rd	4th
Tons:					1.00
Gallons:					40.00
Bottles (375 ml):					403.00
Planting Costs:					
Land Prep: Subsoil 12 - 18"		250			
Land Prep: Plant Cover Crop		38			
Land Prep: Disc Cover Crop		34			
Land Prep: Finish Disc 2X		24			
Plant: Mark, Plant, Stake, Tie (labor, bamboo stakes, ties)		511			
Plant: Add Tree Protectors (labor & milk cartons)		91	11		
Tree: 269 per acre @ \$5 per tree		1,345	30		
Irrigation: Install Drip Tape (included in Irrigation Overhead)		0			
Install Deer Fence (labor & materials)		180			
TOTAL PLANTING COSTS		2,473	41		
Cultural Costs:					
Irrigate: (water & labor)		74	146	305	404
Fertilize: through drip (UN32)		52	59	67	67
Train: Sucker, Tie, Prune		13	19	19	25
Weed: Mow Middles 3X		25	25	25	25
Weed: Strip Spray 3X (Roundup)		86	86	86	86
Vertebrate: Gophers (bait)		24	24	24	24
Weed: Residual (Surflan, Goal, Roundup)		86	86	86	86
Prune: Shred Prunings				8	8
Insect: Pheromone (McPhail Traps)					24
Insect: Olive Fruit Fly (GF120) 9X					221
Disease: Peacock, Olive Knot (Kocide)					42
Pickup Use		114	114	114	114
ATV Use		96	96	96	96
TOTAL CULTURAL COSTS		568	654	829	1,220
Harvest Costs:					
Assisted Hand Pick, Olives					500
Haul Olives					35
Process Olives					380
Bottle, Label, Store					822
Marketing; Oil					1,008
TOTAL HARVEST COSTS					2,745
Interest On Operating Capital @ 5.75%		109	15	14	31
TOTAL OPERATING COSTS/ACRE		3,151	710	842	3,995
Cash Overhead Costs:					
Liability Insurance		47	47	47	47
Office Expense		150	150	150	150
Sanitation (portable toilets)		31	31	31	31
Property Taxes		282	278	278	285
Property Insurance		44	41	41	46
Investment Repairs		68	68	68	68
TOTAL CASH OVERHEAD COSTS		624	616	616	628
TOTAL CASH COSTS/ACRE		3,775	1,326	1,458	4,623
INCOME/ACRE FROM PRODUCTION					4,030
NET CASH COSTS/ACRE FOR THE YEAR		3,775	1,326	1,458	593
ACCUMULATED NET CASH COSTS/ACRE		3,775	5,100	6,558	7,151

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Table 1. continued

	Year:	Cost Per Acre			
		1st	2nd	3rd	4th
Bottles (375 ml):					403.00
Non-Cash Overhead Costs (Capital Recovery):					
Shop Buildings		55	55	55	55
Fuel Tanks (gravity feed)		49	49	49	49
Land		1,069	1,069	1,069	1,069
Irrigation System		98	98	98	98
Pruning Tools		12	12	12	12
Equipment		680	595	595	692
TOTAL NON-CASH OVERHEAD		1,964	1,879	1,879	1,976
TOTAL COST/ACRE FOR THE YEAR		5,739	3,204	3,337	6,599
INCOME/ACRE FROM PRODUCTION					4,030
TOTAL NET COST/ACRE FOR THE YEAR		5,739	3,204	3,337	2,569
TOTAL ACCUMULATED NET COST/ACRE		5,739	8,943	12,280	14,849

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE TO PRODUCE BOTTLED OLIVE OIL
 NORTH COAST & CENTRAL COAST 2011

	Operation	----- Cash and Labor Costs per Acre -----					
	Time	Labor	Fuel, Lube	Material	Custom/	Total	Your
Operation	(Hrs/A)	Cost	& Repairs	Cost	Rent	Cost	Cost
Cultural:							
Irrigate: (water & labor)	0.80	10	0	330	0	340	
Fertilize: Nitrogen (UN32)	0.80	10	0	52	0	62	
Prune: Prune & Sucker (alternate yrs)	18.00	225	0	0	0	225	
Prune: Shred Prunings (alternate yrs)	0.10	2	2	0	0	4	
Vertebrate: Gopher (bait)	1.00	13	0	11	0	24	
Weed: Mow Middles 3X	0.59	14	11	0	0	25	
Weed: Strip or Spot Spray 3X (Roundup)	0.65	16	9	61	0	86	
Insect: (McPhail Traps)	0.87	11	0	13	0	24	
Insect: Olive Fruit Fly 9X (GF120)	2.12	51	36	67	0	154	
Disease: Peacock, Olive Knot (Kocide)	0.42	10	7	24	0	42	
Weed: Residual (Goal, Surflan)	0.22	5	3	77	0	86	
Pickup Truck Use	3.56	86	28	0	0	114	
ATV Use	3.56	86	11	0	0	96	
TOTAL CULTURAL COSTS		32.69	538	107	636	0	1,280
Harvest:							
Assisted Hand Pick	0.00	0	0	0	1,500	1,500	
Transport Olives/Oil	0.00	0	0	0	105	105	
Process Olives	0.00	0	0	0	1,140	1,140	
Bottle, Label, Store Oil (1,211 bottles)	0.00	0	0	0	2,470	2,470	
Marketing	0.00	0	0	0	3,028	3,028	
TOTAL HARVEST COSTS		0.00	0	0	0	8,243	8,243
Interest on operating capital @ 5.75%							65
TOTAL OPERATING COSTS/ACRE			538	107	636	8,243	9,588
Cash Overhead:							
Liability Insurance							48
Office Expense							150
Sanitation (field toilets)							31
Property Taxes							320
Property Insurance							74
Investment Repairs							104
TOTAL CASH OVERHEAD COSTS							727
TOTAL CASH COSTS/ACRE							10,315
NON CASH OVERHEAD (Capital Recovery):							
	Per producing			-- Annual Cost --			
Investment	Acre			Capital Recovery			
Buildings	735			55			55
Fuel Tanks/Gravity Feed	651			49			49
Land	22,500			1,069			1,069
Irrigation System	1,749			98			98
Pruning Tools	37			12			12
Olive Orchard Establishment	7,151			418			418
Equipment	7,085			692			692
TOTAL CAPITAL RECOVERY COSTS			39,908	2,394			2,394
TOTAL COSTS/ACRE							12,710

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS TO PRODUCE BOTTLED OLIVE OIL
 NORTH COAST & CENTRAL COAST 2011

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Olive Oil	1,211.00	botl	10.00	12,110	-
OPERATING COSTS					
Irrigation:					
Water	20.00	acin	16.50	330	
Fertilizer:					
UN32	70.00	lb N	0.74	52	
Herbicide:					
Roundup WeatherMax	88.00	floz	0.92	81	
Surflan AS	1.85	pint	14.52	27	
Goal 2XL	1.85	pint	16.38	30	
Rodenticide:					
Gopher Bait	2.00	lb	5.62	11	
Insecticide:					
McPhail Trap	0.20	trap	14.00	3	
Tortula Yeast Tablet	0.40	lb	25.00	10	
GF-120	70.00	floz	0.96	67	
Custom:					
Harvest (hand)	3.00	ton	500.00	1,500	
Transport Olives	3.00	ton	35.00	105	
Process Olives	3.00	ton	380.00	1,140	
Bottle, Label, Store Oil	1,211.00	botl	2.04	2,470	
Marketing:					
Marketing Charge	1,211.00	botl	2.50	3,028	
Fungicide:					
Kocide 101	8.00	lb	3.06	24	
Labor (machine)	13.47	hrs	20.03	270	
Labor (non-machine)	21.47	hrs	12.50	268	
Fuel - Gas	8.32	gal	3.10	26	
Fuel - Diesel	16.62	gal	2.60	43	
Lube				10	
Machinery repair				27	
Interest on operating capital @ 5.75%				65	
TOTAL OPERATING COSTS/ACRE				9,588	
NET RETURNS ABOVE OPERATING COSTS				2,522	
CASH OVERHEAD COSTS:					
Liability Insurance				48	
Office Expense				150	
Sanitation (field toilets)				31	
Property Taxes				320	
Property Insurance				74	
Investment Repairs				104	
TOTAL CASH OVERHEAD COSTS/ACRE				727	
TOTAL CASH COSTS/ACRE				10,315	
NON-CASH OVERHEAD (Capital Recovery):					
Buildings				55	
Fuel Tanks/Gravity Feed				49	
Land				1,069	
Irrigation System				98	
Pruning Tools				12	
Olive Orchard Establishment				418	
Equipment				692	
TOTAL CAPITAL RECOVERY COSTS/ACRE				2,394	
TOTAL COSTS/ACRE				12,710	
NET RETURNS ABOVE TOTAL COSTS				-600	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY PER ACRE CASH COSTS TO PRODUCE BOTTLED OLIVE OIL
 NORTH COAST & CENTRAL COAST 2011

Beginning JAN 11 Ending DEC 11	JAN 11	FEB 11	MAR 11	APR 11	MAY 11	JUN 11	JUL 11	AUG 11	SEP 11	OCT 11	NOV 11	DEC 11	TOTAL
Cultural:													
Irrigate: (water & labor)			43	43	43	43	43	43	43	43			340
Fertilize: Nitrogen (UN32)			8	8	8	8	8	8	8	8			62
Prune: Prune & Sucker (alternate yrs)				225									225
Prune: Shred Prunings (alternate yrs)				4									4
Vertebrate: Gopher (bait)				24									24
Weed: Mow Middles 3X					8	8	8						25
Weed: Strip or Spot Spray 3X (Roundup)					29	29	29						86
Insect: (McPhail Traps)							14	3	3	3			24
Insect: Olive Fruit Fly 9X (GF120)							31	31	31	31	31		154
Disease: Peacock, Olive Knot (Kocide)											42		42
Weed: Residual (Goal, Surflan, Roundup)											86		86
Pickup Truck Use	9	9	9	9	9	9	9	9	9	9	9	9	114
ATV Use	8	8	8	8	8	8	8	8	8	8	8	8	96
TOTAL CULTURAL COSTS	17	17	68	321	105	105	149	102	102	102	176	17	1,280
Harvest:													
Assisted Hand Pick										1,500			1,500
Transport Olives/Oil										105			105
Process Olives										1,140			1,140
Bottle, Label, Store Oil										2,470			2,470
Marketing										3,028			3,028
TOTAL HARVEST COSTS										8,243			8,243
Interest on operating capital @ 5.75%	0	0	0	2	3	3	4	4	5	45	-1	0	65
TOTAL OPERATING COSTS/ACRE	18	18	68	323	107	108	153	106	106	8,389	175	17	9,588
CASH OVERHEAD:													
Liability Insurance			48										48
Office Expense	13	13	13	13	13	13	13	13	13	13	13	13	150
Sanitation (field toilets)			31										31
Property Taxes	160						160						320
Property Insurance	37						37						74
Investment Repairs	9	9	9	9	9	9	9	9	9	9	9	9	104
TOTAL CASH OVERHEAD COSTS	218	21	100	21	21	21	218	21	21	21	21	21	727
TOTAL CASH COSTS/ACRE	236	39	168	344	128	129	371	127	127	8,411	196	38	10,315

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 NORTH COAST & CENTRAL COAST 2011

	Yield Tons/Acre						
	1	2	3	4	5	6	7
	Yield (375ml Bottles/Acre)						
	403	807	1,211	1,614	2,015	2,418	2,821
OPERATING COSTS/ACRE:							
Cultural Cost	1,280	1,280	1,280	1,280	1,280	1,280	1,280
Harvest (Pick, Haul, Process, Bottle, Market)	2,743	5,493	8,243	10,986	13,716	16,459	19,202
Interest on operating capital @ 5.75%	38	52	65	78	91	104	117
TOTAL OPERATING COSTS/ACRE	4,061	6,825	9,588	12,344	15,087	17,843	20,599
TOTAL OPERATING COSTS/Bottle	10.08	8.46	7.92	7.65	7.49	7.38	7.30
CASH OVERHEAD COSTS/ACRE	727	727	727	727	727	727	727
TOTAL CASH COSTS/ACRE	4,788	7,552	10,315	13,071	15,814	18,570	21,326
TOTAL CASH COSTS/Bottle	11.88	9.36	8.52	8.10	7.85	7.68	7.56
NON-CASH OVERHEAD COSTS/ACRE	2,394	2,394	2,394	2,394	2,394	2,394	2,394
TOTAL COSTS/ACRE	7,182	9,946	12,709	15,465	18,208	20,964	23,720
TOTAL COSTS/Bottle	17.82	12.33	10.49	9.58	9.04	8.67	8.41

NET RETURNS ABOVE OPERATING COSTS

PRICE	Yield (375ml Bottles/Acre)						
\$/Bottle	403	807	1,211	1,614	2,015	2,418	2,821
7.00	-1,240	-1,176	-1,111	-1,046	-982	-917	-852
8.00	-837	-369	100	568	1,033	1,501	1,969
9.00	-434	438	1,311	2,182	3,048	3,919	4,790
10.00	-31	1,245	2,522	3,796	5,063	6,337	7,611
11.00	372	2,052	3,733	5,410	7,078	8,755	10,432
12.00	775	2,859	4,944	7,024	9,093	11,173	13,253
13.00	1,178	3,666	6,155	8,638	11,108	13,591	16,074
14.00	1,581	4,473	7,366	10,252	13,123	16,009	18,895

NET RETURNS ABOVE CASH COSTS

PRICE	Yield (375ml Bottles/Acre)						
\$/Bottle	403	807	1,211	1,614	2,015	2,418	2,821
7.00	-1,967	-1,903	-1,838	-1,773	-1,709	-1,644	-1,579
8.00	-1,564	-1,096	-627	-159	306	774	1,242
9.00	-1,161	-289	584	1,455	2,321	3,192	4,063
10.00	-758	518	1,795	3,069	4,336	5,610	6,884
11.00	-355	1,325	3,006	4,683	6,351	8,028	9,705
12.00	48	2,132	4,217	6,297	8,366	10,446	12,526
13.00	451	2,939	5,428	7,911	10,381	12,864	15,347
14.00	854	3,746	6,639	9,525	12,396	15,282	18,168

NET RETURNS ABOVE TOTAL COSTS

PRICE	Yield (375ml Bottles/Acre)						
\$/Bottle	403	807	1,211	1,614	2,015	2,418	2,821
7.00	-4,361	-4,297	-4,232	-4,167	-4,103	-4,038	-3,973
8.00	-3,958	-3,490	-3,021	-2,553	-2,088	-1,620	-1,152
9.00	-3,555	-2,683	-1,810	-939	-73	798	1,669
10.00	-3,152	-1,876	-599	675	1,942	3,216	4,490
11.00	-2,749	-1,069	612	2,289	3,957	5,634	7,311
12.00	-2,346	-262	1,823	3,903	5,972	8,052	10,132
13.00	-1,943	545	3,034	5,517	7,987	10,470	12,953
14.00	-1,540	1,352	4,245	7,131	10,002	12,888	15,774

UC COOPERATIVE EXTENSION
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 NORTH COAST & CENTRAL COAST 2011

ANNUAL EQUIPMENT COSTS								
Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	- Cash Overhead -		Total
						Insur- ance	Taxes	
11	75HP 4WD Tractor	48,103	16	8,616	3,988	220	284	4,492
11	ATV 4WD	7,942	7	3,013	987	42	55	1,084
11	Mower-Flail 9'	10,808	10	1,911	1,229	49	64	1,342
11	Orchard Sprayer 250 gal	21,102	20	1,100	1,623	86	111	1,820
11	Pickup	26,190	7	9,935	3,256	140	181	3,576
11	Weed Sprayer 100 gal	3,947	10	698	449	18	23	490
	TOTAL	118,092		25,273	11,532	556	717	12,805
	60% of New Cost *	70,855		15,164	6,919	333	430	7,683

* 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 (400 sqft)	7,350	20	735	555	31	40	202	828
Orchard Establishment	71,510	36		4,184	277	358	358	5,176
Fuel Tanks (gravity feed)	6,514	20	651	491	28	36	33	588
Irrigation System (includes drip)	17,488	40		985	68	87	437	1,577
Land	225,000	40	225,000	10,688	0	2,250	0	12,938
Pruning Tools	368	3	37	123	2	2	10	136
TOTAL INVESTMENT	328,230		226,423	17,025	406	2,773	1,040	21,243

ANNUAL BUSINESS OVERHEAD COSTS				
Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	15	acre	31.80	477
Office Expense	10	acre	150.00	1,500
Sanitation (Toilet Rental)	10	acre	31.40	314

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 NORTH COAST & CENTRAL COAST 2011

COSTS PER HOUR									
Yr	Description	Actual Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr
				Insur- ance	Taxes	Repairs	Fuel & Lube		
11	75HP 4WD Tractor	45.1	53.06	2.92	3.77	1.22	11.01	12.23	71.98
11	ATV 4WD	35.6	16.63	0.72	0.92	0.59	2.38	2.97	21.24
11	Mower-Flail 9'	6.9	106.26	4.26	5.50	4.55	0.00	4.55	120.57
11	Orchard Sprayer 250 gal	25.4	38.38	2.03	2.62	3.43	0.00	3.43	46.46
11	Pickup	35.6	54.84	2.36	3.04	1.94	5.94	7.88	68.12
11	Weed Sprayer 100 gal	8.7	31.02	1.24	1.61	1.06	0.00	1.06	34.93

UC COOPERATIVE EXTENSION
Table 8. COSTS AND RETURNS / BREAKEVEN ANALYSIS
 NORTH AND CENTRAL COASTS 2011

COSTS AND RETURNS PER ACRE

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Operating 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)
Olive Oil	12,110	9,588	2,522	10,315	1,795	12,710	-600

COSTS AND RETURNS - TOTAL ACREAGE

Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Operating 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)
Olive Oil	121,100	95,880	25,220	103,154	17,946	127,098	-5,998

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		
Olive Oil	1,211	Bottle	7.92	8.52	10.50

CROP	Yield Units	Base Price (\$/Unit)	Breakeven Yield To Cover		
			Operating Costs	Cash Costs	Total Costs
			Yield Units /Acre		
Olive Oil	Bottle	10	959	1,032	1,271

UC COOPERATIVE EXTENSION
Table 9. OPERATIONS WITH EQUIPMENT & MATERIALS
 NORTH & CENTRAL COASTS 2011

Operation	Month	Tractor	Implement	Material	Broadcast Rate/Acre	Material Unit
Cultural:						
Pruning & Suckering (alternate yrs)	February	Labor				
Prune: Mow Prunings (alternate yrs)	February	75HP	Mower Flail			
Rodent Control	April	Labor		Bait	2.00	lb
Insect: Olive Fly (alternate row every 2 wks.)	July	75 HP	Orchard Sprayer	GF120	14.00	floz
	August	75 HP	Orchard Sprayer	GF120	14.00	floz
	September	75 HP	Orchard Sprayer	GF120	14.00	floz
	October	75 HP	Orchard Sprayer	GF120	14.00	floz
	November	75 HP	Orchard Sprayer	GF120	14.00	floz
Insect: McPhail Traps 8X	July	ATV		McPhail Trap	0.20	each
	July	ATV		Tortula Yeast	0.10	lb
	August	ATV		Tortula Yeast	0.10	lb
	September	ATV		Tortula Yeast	0.10	lb
	October	ATV		Tortula Yeast	0.10	lb
Irrigate	March	Labor		Water	2.50	acin
	April	Labor		Water	2.50	acin
	May	Labor		Water	2.50	acin
	June	Labor		Water	2.50	acin
	July	Labor		Water	2.50	acin
	August	Labor		Water	2.50	acin
	September	Labor		Water	2.50	acin
	October	Labor		Water	2.50	acin
Fertilize: N through drip	March	Labor		UN32	8.75	lbs
	April	Labor		UN32	8.75	lbs
	May	Labor		UN32	8.75	lbs
	June	Labor		UN32	8.75	lbs
	July	Labor		UN32	8.75	lbs
	August	Labor		UN32	8.75	lbs
	September	Labor		UN32	8.75	lbs
	October	Labor		UN32	8.75	lbs
Weed: Mow Middles 3X	May	75HP	Mower Flail			
	June	75HP	Mower Flail			
	July	75HP	Mower Flail			
Weed: Strip Spray	May	75HP	Weed Sprayer	Roundup	22.00	floz
	June	75HP	Weed Sprayer	Roundup	22.00	floz
	July	75HP	Weed Sprayer	Roundup	22.00	floz
Harvest: Hand Pick	October	Contract		Olives	3.00	ton
Transportation: Olives	October	Contract		Olives	3.00	ton
Process Olives	October	Contract		Olives	3.00	ton
Bottle, Label, Store	October	Contract		Oil	1,211.00	botl
Marketing Oil	October	Labor		Oil	1,211.00	botl
Weed: Residual	November	75HP	Weed Sprayer	Surflan AS	1.85	pint
				Goal	1.85	pint
				Roundup	0.92	pint
Disease: Peacock Spot	November			Kocide 101	8.00	lb