
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.

STUDY CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs	4
Production Cultural Practices and Material Inputs	5
Cash Overhead Costs.....	7
Non-Cash Overhead Costs.....	8
REFERENCES	10
Table 1. COSTS PER ACRE TO ESTABLISH A MEDIUM-DENSITY OLIVE ORCHARD	11
Table 2. COSTS PER ACRE TO PRODUCE BOTTLED OLIVE OIL.....	13
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE BOTTLED OLIVE OIL	14
Table 4. MONTHLY PER ACRE CASH COSTS – BOTTLED OLIVE OIL.....	15
Table 5. RANGING ANALYSIS	16
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS	17
Table 7. HOURLY EQUIPMENT COSTS	17
Table 8. COSTS AND RETURNS/BREAKEVEN ANALYSIS.....	18
Table 9. OPERATIONS WITH EQUIPMENT AND MATERIALS.....	19

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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.

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.

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

	Cost Per Acre				
	Year:	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

UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre				
	Year:	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	Operation Time (Hrs/A)	----- Cash and Labor Costs per Acre -----					Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
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):								
Investment		Per producing Acre		-- Annual Cost -- 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	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 11	11	11	11	11	11	11	11	11	11	11	11	11	
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							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:							
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:							
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 \$/Bottle	Yield (375ml Bottles/Acre)						
	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 \$/Bottle	Yield (375ml Bottles/Acre)						
	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 \$/Bottle	Yield (375ml Bottles/Acre)						
	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

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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

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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
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
Olive Oil	Bottle	10	959	1,032	1,271

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

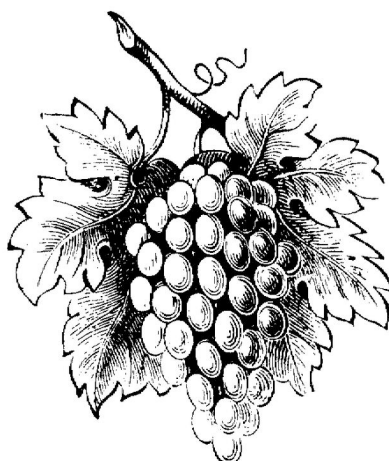
Operation	Month	Tractor	Implement	Material	Broadcast Rate/Acre	Material Unit	
Cultural:							
Pruning & Suckering (alternate yrs)	February	Labor					
Prune: Mow Prunings (alternate yrs)	February	75HP	Mower Flail				
Rodent Control	April	Labor		Bait	2.00	lb	
Insect: Olive Fly (alternate row every 2 wks.)	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	

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2010

**SAMPLE COSTS TO
ESTABLISH A VINEYARD AND PRODUCE
WINEGRAPES**

CABERNET SAUVIGNON



NORTH COAST REGION

Sonoma County

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
SAMPLE COSTS TO ESTABLISH A VINEYARD AND PRODUCE WINEGRAPES
Cabernet Sauvignon
NORTH COAST – Sonoma County 2010

CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs.....	3
Production Cultural Practices and Material Inputs	7
Labor, Interest & Equipment	10
Cash Overhead Costs.....	11
Non-Cash Overhead Costs.....	11
REFERENCES	13
Table 1. COSTS PER ACRE TO ESTABLISH A VINEYARD.....	14
Table 2. COSTS PER ACRE TO PRODUCE WINEGRAPES	16
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINEGRAPES	18
Table 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE WINEGRAPES	20
Table 5. RANGING ANALYSIS.....	22
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS.....	23
Table 7. HOURLY EQUIPMENT COSTS	24
Table 8. OPERATIONS WITH MATERIALS AND EQUIPMENT	25

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INTRODUCTION

Sample costs for vineyard establishment and wine grape production in Sonoma County are presented in this study. The hypothetical vineyard used in this report consists of 35 acres, 30 of which are being established and 5 acres in farmstead, roads and pumping stations. This study is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Practices described are based on production practices considered typical for the crop and area, but will not apply to every situation. A blank column titled *Your Costs* is provided in Tables 2 and 3 to enter your actual costs.

For an explanation of calculations used in the study refer to the Assumptions. For more information call the Department of Agricultural and Resource Economics, Cooperative Extension, University of California, Davis, California, at 530-752-3589 or Rhonda Smith, UC Cooperative Extension Sonoma County Farm Advisor, at 707-565-2621 or email rsmith@ucdavis.edu.

Cost of production studies can be downloaded from the department’s website <http://coststudies.ucdavis.edu>, or obtained from your county UC Cooperative Extension office. They may also be ordered from the Department of Agricultural and Resource Economics, at the above address or by calling 530-752-6887.

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ASSUMPTIONS

The following assumptions refer to Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce winegrapes in the North Coast Region - Sonoma County (Crush District 3). Practices described represent production procedures and materials that for the most part are considered typical of a well-managed vineyard in Sonoma County. However, some of the practices and costs described are not representative of all vineyard sites located in the county. Site characteristics that will have the greatest impact on farming practices and thus establishment and production costs include the following: slope, rocky, very clayey or shallow soils, natural drainage, soil chemistry characteristics that affect nutrient uptake, excessive wind, and soil pests and diseases such as nematodes and Armellaria root rot.

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.

Farm. The hypothetical vineyard is assumed to lie in the Alexander Valley American Viticultural Area, Sonoma County, CA. The farm is owned and operated by the grower with assistance from a part-time foreman. The site has less than a 5% natural slope and was previously planted to grapevines. The farm is 35 contiguous acres, 30 of which are planted. Roads, irrigation system, and farmstead occupy the other five acres. There is no home on the property. The land is valued at \$65,000 per acre.

Two moderate-to-high yielding clones of Cabernet Sauvignon are planted in the vineyard. The first crop is harvested in the third year and the vineyard is considered in full production by the fifth year. In this study, the average annual yield over the life of the mature vineyard is five tons per acre; however in reality, production is strongly influenced by the vineyard's specific location within the Alexander Valley and by weather that may significantly impact yield in some years.

The owner is responsible for making all of the production decisions, hiring the general laborers and operating the machinery. Basic hourly wages are \$12 for general labor and \$15 for machine labor. Payroll overhead is in addition to these wages.

Establishment Cultural Practices and Material Inputs (Table 1)

The following establishment descriptions are typical practices for many vineyards in Sonoma County, but may not be appropriate to individual circumstances.

Site Determination (Regulations). A site assessment done by the Sonoma County Agricultural Commissioner's office under the authority of the *Sonoma County Grading, Drainage and Vineyard and Orchard Site Development Ordinance* verified the area to be replanted as a "Level I". This designation does not require the installation of design features such as sediment basins or slope adjustment to manage surface flows from rainfall or prevent sediment movement. A \$944 fee is required for a Level 1 site for a new vineyard or replant greater than 10 acres and less than 50. This is paid in the first year only.

The purpose of the regulation is to reduce erosion and runoff in vineyards as well as establish setbacks from wetlands, blue line creeks and other waterways with a defined bed and bank. The ordinance requires growers notify the county Agricultural Commissioner of the intent to establish or replant a vineyard exceeding one-half acre in size. Documentation of natural slope, soil types, set backs and best management practices for reducing impacts verified with a site visit by the county results in the determination of the site's Level status. Depending

on the findings, an erosion and sediment control plan may be required prior to any site modifications. The fee charged by the county is dependent upon the Level determination, project size and required mitigation.

Site Preparation. Immediately prior to the removal of the old vineyard, the site is sampled to assess soil fertility and nematode populations. Both sample types are taken from areas of concern involving vine growth, thus the number of samples can be variable. In this vineyard, soil is collected from 3 different locations at 3 depths resulting in 9 soil samples and 3 soil-root samples for nematode analysis. Removal of the old vineyard and all land preparations up to planting the cover crop are contracted out to commercial companies. All of these activities, up to, but not including mowing the cover crop, occur in the fall of the year prior to planting. Although most operations that prepare the vineyard for planting are done in the year prior to planting, costs are shown in the first year that vines are planted in Table 1.

Costs to remove the old vineyard include separation and proper disposal of plastic, metal, and pressure treated wood that composed the old trellis and irrigation systems. Vines are pushed into a pile and burned. In practice, there are various methods used to physically modify soil in a replant site. Soil can be ripped with two wingless tines (shanks) in more than one direction to improve access to stored soil moisture and decrease compaction caused by previous farming activities. Alternatively, a single winged tine can be used to make a single pass down the future vine rows to purposely restrict rooting depth and access to total available water. In this vineyard, the ground is ripped in three different directions to a depth of four-feet to increase rooting depth and access to available water. After the first pass, lime, gypsum, and compost are each spread at a rate of five tons per acre. Old vine roots are removed by hand after each pass. After the final ripping pass, 4-6 passes with a disc to smooth the soil surface for planting follows.

Cover Crop. A cover crop seed mix that maximizes production of vegetative biomass is broadcast in the fall over the entire 30-acre site and a drag is used on the same seeding pass. Straw is hand applied to the edges of the vineyard including the turn-around areas, to comply with best management practices of the county ordinance previously described. In the spring of the following year, the cover crop is mowed one time with a flail mower then disced three times by the owner.

Vineyard Design. The vineyard is laid out in three blocks each containing 40 rows. There are two avenues between the four blocks with turn-around space for equipment at the end of the rows. The rows are 1,000 feet long and have 198 vines per row. Vine spacing is 8-foot by 5-foot (row-by-vine) and vines are trained to bilateral cordons and spur pruned.

Trellis System. The trellis system, installed by a commercial trellis company, is designed to support a bilateral cordon-trained, spur-pruned vineyard. The estimated cost includes all components and installation labor. The vineyard is laid out in the spring of the first year, and all T-stakes, in-line and end posts and wires are installed. Eight-foot, T-stakes are installed on five foot centers and 8-foot T-posts are installed on 15-foot centers between stakes. Stakes and posts are driven three feet into the ground. A ten-foot, 2-7/8 inch drill pipe with a single spade is set at the end of each row and driven 4.5 feet into the ground. The 14-gauge wire for supporting the drip irrigation lateral (black hose) is clipped to each T-stake 14 inches above the ground and secured to each end post. The drip lateral is attached to the drip wire with one K-curl per vine. A permanent, 12-gauge, high tensile, cordon wire is attached to each stake and T-post, 32 inches above the ground. One 6-inch and two 8-inch notched cross arms are installed on each T-post at 12, 24 and 36 inches above the cordon wire respectively. In the second year, two pairs of movable, 14-gauge, high tensile wires are secured to each endpost and draped on the cross arms. During the growing season, these movable wires are moved to the ends of the cross arms as shoot growth occurs and are held in position by notches. The trellis system is considered part of the vineyard since it will be removed at the time of vine removal and is shown in the vineyard establishment costs in Table 1.

Vines. Dormant, bench grafted Cabernet Sauvignon vines are planted in the early spring on an 8-foot X 5-foot spacing (row-by-vine) resulting in a planting density of 1,089 vines per acre. In June of the first year 2% or 21 vines per acre are replanted for those lost in the first year. In the second year 1% or 11 vines are replanted. Vines are trained during the second and third years and expected to begin yielding harvestable fruit in three years (third leaf). They will be productive for an additional 22 years.

Planting. After the site is mowed and disced in the spring, a contractor's crew lays out the vineyard. Each planting spot is marked with a plastic straw. This is followed by trellis installation. In late May, a contractor digs the holes by hand, and plants the vines. Long cartons are placed over each vine at the time of planting to protect against wind damage and chemical weed control sprays. In early summer 2% of the vines are replanted to replace weak or dead vines. One percent of the vines, or 11 vines per acre, are replaced in the second year.

Miscellaneous Labor. After planting general field labor does various field duties such as walking each row to check that irrigation water is reaching each vine through the spaghetti tubing and making necessary adjustments. They also check vines and flag dead vines for replanting in the fall.

Prune/Train/Sucker. Not all of the same practices that follow are used for other varieties or trellis systems. Also, the experienced vineyard owner or manager will modify these practices and still successfully develop the vineyard.

First Year. Vines are monitored for growth, but are not shoot thinned or trained in the first year.

Second Year. During the plants' first winter (February), the cartons are lifted and each vine is pruned to a single two bud spur. The carton is then replaced and retied to the stake as necessary. In spring and summer of the second growing season three passes are required to train the vines. In the first pass during late May/early June, the carton is lifted, vines are shoot-thinned to one shoot which is tied to the stake and the carton replaced. In the second pass in July, the carton is permanently removed; the vine is re-tied to the stake and topped. Because vines grow at different rates, a third pass is needed for slower growing vines, which are treated like those on the second pass. For the majority of vines on the third pass in August, lateral shoots are removed from the trunk and the top two laterals are loosely tied to the cordon wire. Additionally, on the final pass cordon shoots are topped and lateral shoots arising from the cordon shoots are stuffed inside the lower pair of moveable wires.

Third Year. In January of the second winter, pruning starts by cutting off all of the laterals from the cordons, and topping cordons if necessary. Later in January or in February, the head of the vine is re-tied to the stake and the cordon canes are tied to the cordon wire.

When rapid shoot growth occurs in early spring (April), the cordons are suckered. One shoot is left per spur position and up to six spur positions per cordon are selected. At the same time, cordon extensions on vines that require them are tied. The wires are moved in three passes (May, June, July). On the May pass, approximately one-quarter of the shoots arising from the cordons require stuffing between the lower pair of moveable wires. In June, spur positions continue to be selected to total six per cordon and cordon extensions are tied as needed. During the third pass in July, all shoots arising from the cordons will be stuffed between the appropriate pair of movable wires. Crop removal (fruit thinning) may occur in June during the same pass or a separate pass in the following manner: all clusters are removed on shoots that are shorter than 24 inches in length; one cluster is allowed to remain on shoots longer than 24 inches; however no more than 10-12 clusters are allowed to remain on a vine in the third year.

Costs that reflect training practices are only shown through the third year in this study (Table 1); however, slower growing vines may need to be trained for a longer period. In addition, pruning costs during the production years in this study are only presented for activities directed to fully trained vines (Table 2).

Pest Management. The pesticides and rates mentioned in this cost study as well as other materials are listed in *UC Integrated Pest Management Guidelines, Grapes*, available at www.ipm.ucdavis.edu. Pesticides mentioned in the study are commonly used, but are not recommendations.

Insect and Mite. A pest control adviser (PCA) monitors insect and mite pests, beneficial insect populations and looks for signs or symptoms of foliar diseases beginning in the third year to determine if control measures are necessary. The numbers of different lepidopteran (worm) pests are increasing in North Coast vineyards. These are monitored, but in this study, control treatments are not needed.

Disease. Foliar pathogens can cause disease in grapevines, but only powdery mildew, the major fungal disease, is addressed. Powdery mildew disease is closely related to temperature and leaf wetness in the spring, and to temperature in early summer; therefore weather conditions determine spray intervals and hence total number of fungicide applications per year. Weather will also play a role in the choice of materials. Disease control treatments are not made in the first and second year. Beginning in the third year, micronized sulfur (Thiolux) and copper (Champ) are tank mixed and applied in March and April followed by three sulfur dust applications – two in April and one in May – on alternate rows. Pristine, a product with two active ingredients each in different groups of fungicides is applied pre-bloom in May. That application is combined with foliar fertilizers. Dusting sulfur is again applied to alternate rows three times in June and once in July. One last powdery mildew treatment is made in July using Rally, a material in a third fungicide group. All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer.

Weed/Cover Crop (Vineyard Floor Management). Beginning in the first fall after the vines are planted, a cover crop is seeded. All centers will be mowed and disced each spring, and disced each summer of the establishment years. The specific herbicides used in the vineyard may be affected by the presence of a Ground Water Protection Area. For more information, contact the Sonoma County Agricultural Commissioner's office.

First Year. In April during site preparation, the grower mows once and discs three times before the contractor lays out the vineyard. In June, vine row weeds are controlled with one contact herbicide application (Buccaneer) followed by one hand weeding pass in late summer (July). In the fall, alternate row centers are disced once and a barley cover crop is seeded in disced centers with the grower's drill and roller.

Second Year. In the winter (January), vine row weeds are controlled with one application of a contact (Buccaneer) and pre-emergent herbicide (Prowl) mix. A second herbicide treatment is made with a contact material (Buccaneer) in the vine row in June. In March, all centers are mowed once and disced. They are disced a second time in June. In the fall (October), the same alternate row centers are disced once as were seeded the previous fall in preparation for planting a barley cover crop using the grower's drill.

Third Year. To control vine row weeds in the winter (January), a mixture of one preemergent (Chateau) and one post-emergent herbicide (Buccaneer) is applied. In June, the vine row is treated with Buccaneer. In March, the centers that had been seeded are mowed then disced. The alternate centers are mowed in March and June. In October, the same centers that had been seeded in the past are disced and now seeded with a grass-legume mix.

Fertilize. Fertilizer is applied through the drip irrigation system in all years of vineyard establishment. Soluble dry and liquid formulations are injected into the irrigation system using a fertilizer injector. In the first and second year, a liquid NPK fertilizer (3-18-18) is applied once in June, twice in July and once in August for a total of 93.7 pounds (8 gallons) of material. In the third year, 30 pounds of a highly soluble NPK fertilizer (12-26-26) is applied through the drip irrigation system once in April. A single application of two gallons of 3-18-18 is made in early June. A total of 4.2 pounds per acre N and 12 pounds per acre P and K were applied. Also in the third year, boron and zinc foliar micronutrients are tank mixed with the powdery mildew fungicide application that occurs just prior to bloom. One pound of actual boron (Solubor) and two pounds of actual zinc (Neutral Zinc) per acre are sprayed. Petiole samples are taken by the PCA in May for nutrient analysis.

Irrigation. The irrigation cost includes labor and water. Based on grower pumping data, pumped irrigation water is calculated to cost \$16.50 per acre-inch. The well is approximately 120 feet deep with a 10 HP pump and standing water at approximately 50 feet deep. Price per acre-foot of water will vary by grower in this region depending on quantity pumped, power cost, various well characteristics, and other irrigation factors. In the first year, the irrigation sub-mains, risers, drip lines are installed and a single, one-half gallon emitter with spaghetti tubing is punched into the drip lateral. Miscellaneous field labor walks each row to check that irrigation water is reaching each vine through the spaghetti tubing and making adjustments as necessary. In the second year, a second emitter per vine, without spaghetti tubing, is added to the drip line.

Irrigation water is applied weekly through August in years 1 and 2, beginning in late May or early June. Beginning in year 3, the start of the irrigation period will be in June and continue into September. No assumption is made about in-season rainfall or the irrigation system's emission uniformity. Applied water volume by year is shown in Table A. In practice, the amount of water applied in the production years can vary significantly due to rainfall amounts and timing in the month preceding bud break in spring.

Table A. Applied Irrigation Water –Drip

Year	Number of	
	months	AcIn/year
1	3	2.00
2	3	4.00
3+	4	6.00

Frost Protection. It is assumed that the vineyard will need frost protection during the months of March, April, and May for a total of ten nights beginning in the third year. The windmachines run for five hours per night.

Harvest. In this study, the first crop is harvested in the third leaf. If the vines had been trained in the first year and site conditions and vine growth warrant, it may be appropriate to take the first crop off in the second year. The vineyard contracts to have the grape crop custom harvested by hand in both the third and fourth years and is charged on a per ton basis. Assumed average yields in the Alexander Valley are shown in Table B. It is important to note that a yield of 5 tons per acre is not achieved in all years.

Table B. Annual Cabernet Yields
Sonoma County (District 3)

Year	Tons Per Acre
0	0.0
3	1.5
4	3.5
5+	5.0

Production Cultural Practices and Material Inputs (Tables 2-8)

Prune, Tie, and Sucker. Pruning and tying are done during the winter months (January/March) and the prunings are chopped in March during the first mowing. Cordons are retied as necessary in February. Cabernet Sauvignon tends to push very few trunk suckers thus there is no pass dedicated to remove these suckers. Cordons are suckered once a year in April with hired crew.

Canopy Management (CM) and Crop Adjustment. Wires are dropped during pruning. They are moved up a total of three times (May, June, July) during each growing season in order to vertically position the canopy. In June, leaves are mechanically removed and the vine shoots are mechanically hedged just above the top of the T-stakes. This is followed by a hand “clean up” near the vine heads.

In June, the crop level is adjusted by thinning. Fruit clusters are removed from shoots shorter than 18 inches in length. Two clusters are retained on shoots that are at least 30 inches long and one cluster is retained on shoots between 18 and 30 inches in length. In August at 95% veraison (i.e. 95% of the clusters have turned color), there is a single “green drop” pass to remove clusters that are not fully colored.

Fertilize. The fertilizers are applied through the drip system and as foliar sprays. CAN-17, a liquid fertilizer, is injected in the amount of 3.5 gallons (44 pounds of material) once in late April (one month after bud break) each year to deliver 7.5 pounds of nitrogen. An NPK fertilizer (12-26-26) is injected once at fruit set in early June in an amount that delivers 62.5 pounds of material. The total amount of nitrogen applied is 15 pounds per acre, and 16.2 pounds per acre each of phosphorus and potassium.

A pre-bloom foliar application of both zinc (Neutral Zinc) and boron (Solubor) is added to the (Pristine) spray application just prior to bloom in May. Two pounds of actual zinc and one-pound actual boron are applied. Each year, opposite cluster petioles are collected at bloom for tissue nutrient analyses. Every third year petioles are also collected in veraison (August) and post harvest (October). One third of the cost is included each year. Four samples per 30 acres or one sample per 7.5 acres is collected for analysis.

Irrigation. The cost includes labor and pumping costs based on using a 10 hp motor to pump from 150 feet deep over 30 acres. Based on grower input, pumped irrigation water cost \$16.50 per acre-inch. Price will vary by grower in this region depending on quantity pumped, power cost, various well characteristics, and other irrigation factors. Beginning in June, irrigation water is applied weekly through September. No assumption is made about in-season rainfall or the irrigation system’s emission uniformity.

Frost Protection. It is assumed that the vineyard will need frost protection for ten nights during March, April and May. The windmachines run for five hours per night.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. **Pesticides mentioned in the study are not recommendations, but those commonly used in the region.** For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu or contact the UC Cooperative Extension Sonoma County Viticulture Farm Advisor. To purchase pesticides for commercial use, a grower must be a Certified Private Applicator to obtain a Pesticide Identification number. For information regarding pesticide ID numbers and use permits, contact the Sonoma County Agricultural Commissioner's office.

Pest Control Adviser. The pest control adviser (PCA) monitors the field for pests, diseases, and nutritional status. PCAs are required to provide written recommendations for pesticides that they advise a grower to use. Growers may hire private (independent) PCAs or receive this service from PCAs who are employed by local retail agricultural chemical and fertilizer suppliers. In this study the grower hires a private PCA who monitors the field weekly.

Vineyard Floor Management/Weed/Cover Crop. Mowing and cultivation are used to manage vegetation in the centers and herbicides are used to control weeds in the vine rows. After the three-year establishment period, a three-year cover crop rotation is implemented with alternate row-middles. The cover crop middles (CC) and the non-cover crop (NC) middles are switched every time a new cover crop is seeded. Planting the cover crop in the fall every three years involves ripping the new CC row middles to a 24-inch depth with a winged tine. Three tons per acre of gypsum is applied and disced in, and a legume and grass seed mix is planted using the grower’s drill.

The cover crop residue is mowed then disced three times in the spring and early summer following the fall planting. In early summer (June) the NC middles are mowed and the CC middles are disced. In years when a cover crop is not planted, all rows are mowed three times in late spring and early summer to kill the vegetation and shred prunings. For operations not done every year, one-third or two-thirds of the costs are allocated to the vineyard each year.

Vine row weeds are controlled with a winter (January) dormant mix using the pre-emergent herbicide, Goal and a contact herbicide, Buccaneer, applied as a strip spray. In practice, a different pre-emergent herbicide will be applied every third year.

Insect and Mite Management. A PCA monitors the vineyard weekly. It is assumed that it is necessary to treat mites once every third year. One-third of the costs are charged to the vineyard each year. Acramite is applied for mite control. In Table 3, the rates and material costs reflect the fact that they are not used every year. In addition, there are no costs assigned to control vine mealybugs. If it becomes established in a vineyard, at least one pesticide application will be required in addition to sanitation measures. The grower has two vine mealybug traps (no trap costs shown) up from June through October which are read by the PCA.

Disease Management. In late March and early April, micronized sulfur (Thiolux) and copper (Champ) are tank mixed and applied. These sprays are followed by three applications of dusting sulfur at 10-day intervals (twice in April and once in May) in which alternate rows are driven. Pristine, a material with active ingredients in two fungicide groups (quinine outside inhibitors and succinate dehydrogenate inhibitors) is applied at pre-bloom in the second or third week of May. (The pre-bloom application is combined with foliar fertilizers). Dusting Sulfur is applied to all rows three times in June and once in July. One last powdery mildew treatment is made in July using Rally, a material in the sterol biosynthesis inhibitor group of fungicides. (Avoiding two or more applications in a season with fungicides in the same group will reduce the development of resistance.) All pesticide applications are made using a 60 HP tractor and a vineyard duster or sprayer.

There are no costs assigned to control Pierce's disease in this study. The incidence of this disease in Sonoma County vineyards is quite variable; however control measures and annual replanting costs can be significant in Pierce's disease "hot spots."

Harvest. Starting in the fourth year the fruit is mechanically harvested at a contract rate of \$450 per acre. It is assumed that the grapes are delivered to a winery within the county and the hauling cost included in the harvest cost.

Yields. Yield maturity is reached in the fifth year. An assumed average yield of 5 tons per acre over the vineyard life is used in this study. Yields can range, depending upon the environment and location, from 3 to 8 tons per acre.

Returns. Grape buyers determine return prices per ton for winegrapes according to variety, percent sugar, district grown and other factors. The mean weighted average price for Cabernet Sauvignon growers in Crush District 3 over the five-year period of 2005-2009 is \$2,236 per ton; therefore, that return price is used in Tables 1 and 3 in this study. A range of return prices are used in Table 5 for calculating net returns to growers at different yields.

Assessment. Grape growers in Sonoma County who sell a minimum of 25 tons are assessed 0.5% of the gross sales value of the crop under the authority of the California Winegrape Growers Commission Law under separate enabling statutes within the California Food and Agricultural Code, Division 22. Marketing Orders and Marketing Agreements are enabled under the California Marketing Act of 1937 (Division 21 of the California

Food and Agricultural Code). Grape sales assessments in Sonoma County are made available to the Sonoma County Winegrape Commission (SCWC), a non-profit marketing and educational organization established in 2006. The SCWC internet site can be accessed at <http://www.sonomawinegrape.org>.

Pickup/ATV. The grower uses the pickup for business and personal use. The assumed business use for the pickup is 3,000 miles per year for the ranch. In addition to spot spraying for weed control, the All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard and irrigating.

Post Harvest. In every third year, the cover crop centers are ripped with a winged tip shank (retro-ripped). When these centers are ripped, gypsum at three to four tons per treated acre is applied. One third of the ripping and gypsum costs are allocated to the budget each year.

Labor, Interest and Equipment

Labor. Labor rates of \$20.10 per hour for machine operators and \$16.08 for general labor include payroll overhead of 34%. The basic hourly wages are \$15.00 for machine operators and \$12.00 for general labor. The overhead includes the employer's 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. The cost is based on the average industry final rate as of January 1, 2010 (California Department of Insurance, unreferenced). 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.

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 \$2.04 (excludes excise taxes) and \$2.70 per gallon, respectively. The cost includes a 2.5% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include a 7.5% sales tax plus federal and state excise tax. Some federal excise tax can be refunded for on-farm use when filing your income tax. The costs are based on 2009 Department of Energy (DOE) monthly data. The fuel, lube, 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 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 5.75% 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 January 2010.

Risk. The risks associated with producing and marketing winegrapes 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 that affect the profitability and economic viability of winegrape production. A market channel should be determined before the vineyard is planted and brought into production. Though not used in this study, crop insurance is a risk management tool available to growers.

Cash Overhead Costs

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm, not to a particular operation.

Property Taxes. Counties in California 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. The salvage value for land is equal to the purchase price because land does not depreciate.

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 0.767% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$621 for the entire farm.

Office Expense. Office and business expenses for 30 acres are estimated at \$9,000 annually or \$300 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

Foreman Salary. The vineyard employs a single foreman to supervise work crews and production practices. Due to the small acreage, the vineyard employs the foreman 25% of the time and pays one quarter of the annual salary of \$50,000 plus 40% for payroll taxes and benefits.

Sanitation Services. Sanitation services provide portable toilets for the vineyard and cost the farm \$2,560 annually. This cost includes delivery and 10 months servicing the toilets.

Investment Repairs. Annual maintenance is calculated as 2% of the purchase price. For vineyard establishment, investment repairs are 0.10% or approximately \$40 per acre for trellis and vine repair.

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 because land does not depreciate.

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% used to calculate capital recovery cost is the effective long term interest rate effective January 1, 2010. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Building. The shop building is a 400 square foot metal building or buildings on a cement slab.

Land. Based on grower input, bare land is valued at \$65,000 per acre. This study assumes the land was purchased for replanting the vineyard and does not include the value of the vines. Because only 30 of the 35 acres are planted to grapes, land is valued at \$75,833 per planted acre. Price ranges for established vineyards and open land in Sonoma County are reported in “Trends in Agricultural Land & Lease Values” (California Chapter of the American Society of Farm Managers and Rural Appraisers).

Drip Irrigation System. Since the vineyard is established on land previously planted to grapevines it is assumed to have an existing well and an adequate water supply. A new pump, 10 horsepower (hp) motor, filter system, and fertilizer injector is installed along with the drip irrigation system prior to planting. The cost of these components plus drip laterals and the labor to install each are included in the irrigation system cost. Water and fertilizers are pumped to the vineyard through a filtration station into a mainline, sub-mains and then the drip laterals along the vine rows. In the first year, one, one-half gallon per minute emitter is punched into the lateral 18-inches from each stake. A second emitter is added in Year 2 so that each vine is centered between two emitters.

Frost Protection. Three windmachines are installed in the vineyard on cement pads in the second year and begin operation in the third year. The machines are propane powered and assumed to use 10-15 gallons per hour.

Fuel Tanks. A single 250-gallon fuel tank using gravity feed is on a metal stand. The tank is set up in a cement containment pad that meets federal, state, and county regulations.

Tools. This includes shop, hand, and miscellaneous field tools and supplies.

Establishment Cost. The establishment cost is the sum of the costs for land preparation, trellis system, vines, planting, cash overhead and production expenses for growing the vines through the first year that grapes are harvested. The vineyard establishment cost is used to determine the capital recovery cost, during the production years. The Total Accumulated Net Cash Cost on Table 1 in the third year represents the establishment cost. For this study the cost is \$30,826 per acre or \$924,770 for the 30-acre vineyard. The establishment cost is amortized over the remaining 22 years the vineyard is in production.

Equipment. Farm equipment is purchased either new or used. In Table 5, 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, Missouri. 41st edition.
- Boehlje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, New York
- California Chapter of the American Society of Farm Managers and Rural Appraisers. 2010. *Trends in Agricultural Land and Lease Values*. California Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. Woodbridge, CA. <http://calasfmra.com>
- California State Department of Food and Agriculture. 2005-2009. Table 10 of Final Grape Crush Report. California Department of Food and Agriculture. Sacramento, CA. Internet accessed 2010. http://www.nass.usda.gov/Statistics_by_State/California/Publications/Grape_Crush/
- California State Board of Equalization. *Fuel Tax Division Tax Rates*. Internet accessed January 2010. <http://www.boe.ca.gov/sptaxprog/spfdrates.htm>
- Energy Information Administration. 2009. *Weekly Retail on Highway Gasoline and Diesel Prices 2009*. Internet accessed January 2010. <http://tonto.eia.doe.gov/oog/info/wohdp>
- Smith, Rhonda, Karen M. Klonsky, and Richard L. De Moura. *Sample Costs to Establish A Vineyard And Produce Winegrapes, Chardonnay, Sonoma County – 2004*. University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.
- Sonoma County Winegrape Commission. Internet accessed March 29, 2010. <http://www.sonomawinegrape.org/>
- University of California, Division of Agriculture and Natural Resources. 1992. *Grape Pest Management*. Donald L. Flaherty, et. al. (ed.) Second Edition. University of California, Division of Agriculture and Natural Resources. Oakland, California. Publication 3343.
- University of California Statewide IPM Project. 2010. *UC Pest Management Guidelines, Grapes*. University of California, Davis, CA. Internet accessed January 2010. <http://www.ipm.ucdavis.edu>

UC COOPERATIVE EXTENSION
Table 1. COSTS PER ACRE TO ESTABLISH A VINEYARD
 NORTH COAST - Sonoma County 2010

	Cost Per Acre			1.50
	Year:	1st	2nd	
Tons Per Acre:				
Land Preparation Costs:				
Site Determination: Development Fee		31		
Site Prep: Soil Test (1 per 10 acres x 3 depths)		18		
Site Prep: Nematode Sampling (1 per 10 acres)		7		
Site Prep: Vineyard Removal		600		
Site Prep: Fertilize (Lime, Gypsum & Compost)		700		
Site Prep: Rip 3X		350		
Site Prep: Pull old vine roots, pickup rocks		350		
Site Prep: Disk 6X (smooth ground for planting)		150		
Cover Crop: Plant cover crop (Barley) & spread straw		50		
Cover Crop: Mow cover crop		18		
Cover Crop: Disk cover crop 3X		44		
Plant: Mark , Layout, Stake Vineyard		325		
Trellis: Install Trellis (over 2 years)		10,000		
Irrigation: Install Drip & Submains (includes materials)		3,200		
Plant: (vines, labor, cartons)		5,826		
TOTAL SITE PREP AND PLANTING COSTS		21,670		
Cultural Costs:				
Irrigate: (water & labor)		64	81	130
Weed: Vine Row Spray (Buccaneer)		27	25	25
Plant: Replant 2% Yr 1, 1% Yr 2 (vines, labor, cartons)		102	59	
Fertilize: (4X Yrs 1 & 2. 1X Yr 3) Through drip (3-18-18)		76	76	19
Weed: Hand Weed Vine Row		213		
Cover Crop: Disc CC centers (cover crop preparation)		8	8	8
Cover Crop: Plant & Roll CC centers (Yrs 1-2, Barley. Yr 3, Legume/Grass Mixture)		24	24	34
Labor: Miscellaneous labor after planting		250		
Train: Prune to 2 buds			603	
Train: Train vines & tie			1,000	
Weed: Vine Row Winter Spray (Yr 2 Buccaneer, Prowl) (Yr 3 Buccaneer, Chateau)			28	67
Weed: Mow CC & NC centers (Yr 3 includes shred prunings)			32	32
Weed: Disc Centers (Yr 2, CC & NC. Yr 3 CC)			33	8
Weed: Mow NC centers				16
Fertilize: 1X Through drip (12-26-26)				44
Prune: Winter				289
Frost Protection: 10X				240
Train: Tie Cordons				161
Sucker: Sucker Cordons				322
Disease: Mildew (Thiolux, Champ) 2X				91
Disease: Mildew (Sulfur Dust) Alternate Rows				42
Fertilize: Petiole Analysis				5
Train: Move Wires & Stuff Shoots 3X				498
Prune: Crop Adjustment (thin fruit)				64
Disease: Mildew @ Prebloom (Pristine). Fertilize: (Zn, B)				96
Disease: Mildew @ Preveraison (Rally)				68
PCA				70
Pickup Use		114	114	114
ATV Use		23	23	23
TOTAL CULTURAL COSTS		901	2,105	2,467
Harvest Costs:				
Harvest and Haul				473
TOTAL HARVEST COSTS				473
Assessments:				
Sonoma County Winegrape Commission				17
TOTAL ASSESSMENT COSTS				17
Interest On Operating Capital @ 5.75%		947	82	67
TOTAL OPERATING COSTS/ACRE		23,518	2,187	3,023

UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
Tons Per Acre:				1.50
CASH OVERHEAD:				
Liability Insurance		19	19	19
Office Expense		300	300	583
Sanitation Fees		85	85	300
Manager's Salary		583	583	85
Property Taxes		773	772	790
Property Insurance		11	11	24
Investment Repairs		15	15	75
TOTAL CASH OVERHEAD COSTS		1,787	1,786	1,878
TOTAL CASH COSTS/ACRE		25,306	3,973	4,901
INCOME/ACRE FROM PRODUCTION				3,354
NET CASH COSTS/ACRE FOR THE YEAR		25,306	3,973	1,547
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		25,306	29,279	30,826
NON-CASH OVERHEAD (Capital Recovery):				
Buildings		37	37	37
Land		3,602	3,602	3,602
Fuel Tanks		10	10	10
Shop Tools		11	11	11
Wind Machines				217
Equipment		172	156	216
TOTAL INTEREST ON INVESTMENT		3,832	3,816	4,093
TOTAL COST/ACRE FOR THE YEAR		29,138	7,789	8,994
INCOME/ACRE FROM PRODUCTION				3,354
TOTAL NET COST/ACRE FOR THE YEAR		29,138	7,789	5,640
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		29,138	36,927	42,567

CC=Cover Crop Centers, NC=Non Cover Crop Centers

Income = \$2,236 per ton

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST -Sonoma 2010

Operation	Operation Time (Hrs/A)	Cash and Labor Cost per acre				Total Cost	Your Cost
		Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:							
Weed: Spray Vine Row (Goal, Chateau)	0.84	20	2	102	0	124	
Prune: Winter Pruning	18.00	289	0	0	0	289	
CM: Tie Cordons	10.00	161	0	0	0	161	
Weed: Mow NC centers (shred prunings @ March mowing)	0.43	10	6	0	0	16	
Weed: Mow CC centers	0.43	10	6	0	0	16	
Weed: Disc CC centers 1X/3 Yrs	0.32	8	3	0	0	11	
Disease: Mildew (Thiolux [S], Champ [Cu]) 2X	0.76	18	9	64	0	91	
Frost Protection: Windmachines 10X	5.57	90	0	150	0	240	
CM: Cordon Sucker	20.00	322	0	0	0	322	
Disease: Mildew (Sulfur Dust)	1.18	28	11	12	0	51	
Weed: Disc & Roll CC centers 1X/3 Yrs	0.16	4	2	0	0	6	
Weed: Disc CC centers 2X/3 Yrs	0.32	8	3	0	0	11	
Fertilize: through drip (CAN17)	0.03	0	0	8	0	8	
Fertilize: Petiole Sampling & Analysis @ bloom	0.00	0	0	5	0	5	
CM: Move Wires	29.00	466	0	0	0	466	
Disease: Mildew (Pristine). Fertilize: Foliar (Solubor [B], Zinc [Zn])	1.15	28	13	55	0	96	
Weed: Vine Row (Buccaneer)	0.84	20	2	2	0	25	
Fertilize: through drip (12-26-26)	0.05	1	0	90	0	91	
Weed: Mow CC centers 2X/3 Yrs	0.57	14	7	0	0	21	
Weed: Mow NC centers	0.86	21	11	0	0	32	
CM: Leaf Removal (machine)	0.00	0	0	0	75	75	
CM: Hedge Vines (machine)	0.00	0	0	0	50	50	
CM: Clean Up (check if vines open)	6.00	96	0	0	0	96	
CM: Crop Adjustment (thin fruit)	12.50	201	0	0	0	201	
Irrigate: (water & labor)	3.30	53	0	99	0	152	
Insect: Mites (Acramite) 1X/3 Yrs. 1/3 cost each year	0.38	9	4	23	0	36	
Disease: Mildew @ veraison (Rally)	1.15	28	13	28	0	68	
CM: Crop Adjustment (green drop)	7.00	113	0	0	0	113	
Fertilize: Petiole Sampling & Analysis (at veraison) 1X/3 Yrs	0.00	0	0	2	0	2	
Pest Control Adviser	0.00	0	0	0	70	70	
Pickup Truck Use	3.33	80	33	0	0	114	
ATV	0.85	21	2	0	0	23	
TOTAL CULTURAL COSTS	124.14	2,098	120	630	195	3,083	
Harvest:							
Harvest-Hand Labor & Haul	0.00	0	0	0	450	450	
Assessment	0.00	0	0	56	0	56	
TOTAL HARVEST COSTS	0.00	0	0	56	450	506	
Postharvest:							
Fertilize: Petiole Sampling & Analysis 1X/3 Yrs	0.00	0	0	2	0	2	
Weed: Rip Cover Crop Centers (custom) 1X/3 Yrs	0.00	0	0	0	21	21	
Amendment: (Gypsum) CC centers 1X/3 Yrs	0.00	0	0	37	0	37	
Weed: Disc CC centers 1X/3 Yrs	0.16	4	2	0	0	6	
Weed: Plant Cover Crop in CC centers 1X/3 Yrs	0.08	2	1	9	0	11	
TOTAL POSTHARVEST COSTS	0.24	6	3	47	21	77	
Interest on operating capital @ 5.75%						78	
TOTAL OPERATING COSTS/ACRE		2,126	131	742	666	3,744	

UC COOPERATIVE EXTENSION

Table 2. Continued

Operation	Cash and Labor Cost per acre						Total Cost	Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent			
CASH OVERHEAD:								
Liability Insurance							21	
Manager's Salary							583	
Office Expense							300	
Sanitation Fees (Portable Toilets)							85	
Property Taxes							944	
Property Insurance							142	
Investment Repairs							115	
TOTAL CASH OVERHEAD COSTS							2,190	
TOTAL CASH COSTS/ACRE							5,934	
NON-CASH OVERHEAD:								
	Per producing	Annual Cost						
	Acres	Capital Recovery						
Building	533	37		37				
Land	75,833	3,602		3,602				
Wind Machines	3,000	217		217				
Fuel Tanks	150	10		10				
Shop Tools	83	11		11				
Vineyard Establishment	30,826	2,289		2,289				
Equipment	2,087	203		203				
TOTAL NON-CASH OVERHEAD COSTS	112,513	6,369		6,369				
TOTAL COSTS/ACRE				12,304				

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes. CC=Cover Crop, NC=Non Cover
 Costs for operations not done each year are allocated each year accordingly.

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Sonoma 2010

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Cabernet Sauvignon Winegrapes	5.00	ton	2,236.00	11,180	
OPERATING COSTS					
Herbicide:					
Goal 2XL	1.00	pint	17.25	17	
Chateau	10.00	oz	8.47	85	
Buccaneer	0.50	pint	4.37	2	
Fungicide:					
Champ 2 Flowable (copper)	7.20	pint	5.89	42	
Thiolux Micro Sul (sulfur)	24.00	lb	0.90	22	
Sulfur Dust	55.00	lb	0.21	12	
Pristine	10.00	oz	3.77	38	
Rally 40WS	5.00	oz	5.50	28	
Insecticide:					
Acramite 50 WS	0.33	lb	69.17	23	
Frost Protection:					
Wind Machine (Propane @ \$1.97 per gallon)	50.00	hr/ac	3.00	150	
Water:					
Water pumped	6.00	acin	16.50	99	
Fertilizer/Amendments:					
CAN-17 (17-0-0, 12.64 lbs/gal)	44.10	lb	0.18	8	
12-26-26 (water soluble)	62.50	lb	1.44	90	
Solubor (Boron)	4.90	lb	1.63	8	
Neutral Zinc	3.84	lb	2.50	10	
Gypsum (includes haul & spread)	0.83	ton	45.00	37	
Petiole Analysis	0.21	each	40.00	8	
Seed:					
Legume/Grass Mix (alternate centers, 1X/3 Yr)	17.00	lb	0.50	9	
Custom/Contract:					
PCA (pest, nutrition)	1.00	acre	70.00	70	
Leaf Removal	1.00	acre	75.00	75	
Hedge Vines	2.00	acre	25.00	50	
Harvest & Haul	1.00	acre	450.00	450	
Rip Cover Crop Centers	0.17	acre	125.00	21	
Assessment:					
Sonoma County Winegrape Commission (0.5% of gross)	0.01	gross	11,180.00	56	
Labor (machine)	16.59	hrs	20.10	333	
Labor (non-machine)	111.45	hrs	16.08	1,792	
Fuel - Gas	10.01	gal	2.67	27	
Fuel - Diesel	25.83	gal	2.04	53	
Lube				12	
Machinery repair				40	
Interest on operating capital @ 5.75%				78	
TOTAL OPERATING COSTS/ACRE				3,744	
NET RETURNS ABOVE OPERATING COSTS				7,436	
CASH OVERHEAD COSTS:					
Liability Insurance				21	
Manager's Salary				583	
Office Expense				300	
Sanitation Fees (Portable Toilets)				85	
Property Taxes				944	
Property Insurance				142	
Investment Repairs				115	
TOTAL CASH OVERHEAD COSTS/ACRE				2,190	
TOTAL CASH COSTS/ACRE				5,934	

UC COOPERATIVE EXTENSION

Table 3. Continued

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Building				37	
Land				3,602	
Wind Machines				217	
Fuel Tanks				10	
Shop Tools				11	
Vineyard Establishment				2,289	
Equipment				203	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				6,369	
TOTAL COSTS/ACRE				12,304	
NET RETURNS ABOVE TOTAL COSTS				-1,124	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY CASH COSTS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Sonoma 2010

Beginning JAN 10	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 10	10	10	10	10	10	10	10	10	10	10	10	10	
Cultural:													
Weed: Spray Vine Row (Goal, Chateau)	124												124
Prune: Winter Pruning	289												289
CM: Tie Cordons		161											161
Weed: Mow NC centers (shred prunings @ March mowing)			16										16
Weed: Mow CC centers			16										16
Weed: Disc CC centers 1X/3 Yrs			6			6							11
Disease: Mildew (Thiolux [S]. Champ [Cu]) 2X			46	46									91
Frost Protection: Windmachines 10X			72	96	72								240
CM: Cordon Sucker				322									322
Disease: Mildew (Sulfur Dust)				12	6	21	12						51
Weed: Disc & Roll CC centers 1X/3 Yrs				6									6
Weed: Disc CC centers 2X/3 Yrs				11									11
Fertilize: through drip (CAN17)				8									8
Fertilize: Petiole Sampling & Analysis					5								5
CM: Move Wires					129	177	161						466
Disease: Mildew (Pristine). Fertilize: Foliar (Solubor [B], Zinc [Zn])					96								96
Weed: Vine Row (Buccaneer)						25							25
Fertilize: through drip (12-26-26)						91							91
Weed: Mow CC centers 2X/3 Yrs						21							21
Weed: Mow NC centers						32							32
CM: Leaf Removal (machine)						75							75
CM: Hedge Vines (machine)						50							50
CM: Clean Up (check if vines open)						96							96
CM: Crop Adjustment (thin fruit)						201							201
Irrigate: (water & labor)						25	51	51	25				152
Insect: Mites (Acramite) 1X/3 Yrs. 1/3 cost each year						36							36
Disease: Mildew @ preveraison (Rally)							68						68
CM: Crop Adjustment (green drop)								113					113
Fertilize: Petiole Sampling & Analysis (at veraison) 1X/3 Yrs								2					2
Pest Control Adviser	7	7	7	7	7	7	7	7	7	7			70
Pickup Truck Use	9	9	9	9	9	9	9	9	9	9	9	9	114
ATV	2	2	2	2	2	2	2	2	2	2	2	2	23
TOTAL CULTURAL COSTS	432	179	173	519	326	874	310	183	44	18	11	11	3,083
Harvest:													
Harvest-Hand Labor & Haul									450				450
Assessment										56			56
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	450	56	0	0	506

UC COOPERATIVE EXTENSION

Table 4. Continued

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Beginning JAN 10													
Ending DEC 10	10	10	10	10	10	10	10	10	10	10	10	10	
Postharvest:													
Fertilize: Petiole Sampling & Analysis 1X/3 Yrs										2			2
Weed: Rip Cover Crop Centers (custom) 1X/3 Yrs										21			21
Amendment: (Gypsum) CC centers 1X/3 Yrs										37			37
Weed: Disc CC centers 1X/3 Yrs										6			6
Weed: Plant Cover Crop in CC centers 1X/3 Yrs										11			11
TOTAL POSTHARVEST COSTS	0	0	0	0	0	0	0	0	0	77	0	0	77
Interest on operating capital @ 5.75%	2	3	4	6	8	12	13	14	17	-1	0	0	78
TOTAL OPERATING COSTS/ACRE	434	182	177	525	334	886	324	198	510	151	11	11	3,744
Cash Overhead:													
Liability Insurance	21												21
Manager's Salary	49	49	49	49	49	49	49	49	49	49	49	49	583
Office Expense	25	25	25	25	25	25	25	25	25	25	25	25	300
Sanitation Fees (Portable Toilets)	9	9	9	9	9	9	9	9	9	9			85
Property Taxes	944												944
Property Insurance	71						71						142
Investment Repairs	10	10	10	10	10	10	10	10	10	10	10	10	115
TOTAL CASH OVERHEAD COSTS	1,127	92	92	92	92	92	163	92	92	92	83	83	2,190
TOTAL CASH COSTS/ACRE	1,561	274	269	617	426	978	487	289	602	242	94	94	5,934

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes.

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 NORTH COAST - Sonoma 2010

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE WINEGRAPES

	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COSTS:							
Cultural Cost	3,083	3,083	3,083	3,083	3,083	3,083	3,083
Harvest Cost	450	450	450	450	550	550	550
Assessment Cost	22	34	45	56	67	78	89
Postharvest Cost	77	77	77	77	77	77	77
Interest on operating capital @ 5.75%	79	79	78	78	79	79	79
TOTAL OPERATING COSTS/ACRE	3,711	3,723	3,733	3,744	3,856	3,867	3,878
Total Operating Costs/ton	1,855	1,241	933	749	643	552	485
CASH OVERHEAD COSTS/ACRE							
TOTAL CASH COSTS/ACRE	5,902	5,914	5,924	5,935	6,047	6,058	6,069
Total Cash Costs/ton	2,951	1,971	1,481	1,187	1,008	865	759
NON-CASH OVERHEAD COSTS/ACRE							
TOTAL COSTS/ACRE	12,271	12,283	12,293	12,304	12,416	12,427	12,438
Total Costs/ton	6,135	4,094	3,073	2,461	2,069	1,775	1,555

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	161	2,085	4,011	5,936	7,760	9,685	11,610
2,036	361	2,385	4,411	6,436	8,360	10,385	12,410
2,136	561	2,685	4,811	6,936	8,960	11,085	13,210
2,236	761	2,985	5,211	7,436	9,560	11,785	14,010
2,336	961	3,285	5,611	7,936	10,160	12,485	14,810
2,436	1,161	3,585	6,011	8,436	10,760	13,185	15,610
2,536	1,361	3,885	6,411	8,936	11,360	13,885	16,410

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	-2,030	-106	1,820	3,745	5,569	7,494	9,419
2,036	-1,830	194	2,220	4,245	6,169	8,194	10,219
2,136	-1,630	494	2,620	4,745	6,769	8,894	11,019
2,236	-1,430	794	3,020	5,245	7,369	9,594	11,819
2,336	-1,230	1,094	3,420	5,745	7,969	10,294	12,619
2,436	-1,030	1,394	3,820	6,245	8,569	10,994	13,419
2,536	-830	1,694	4,220	6,745	9,169	11,694	14,219

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/ton	YIELD (ton/acre)						
	2.00	3.00	4.00	5.00	6.00	7.00	8.00
1,936	-8,399	-6,475	-4,549	-2,624	-800	1,125	3,050
2,036	-8,199	-6,175	-4,149	-2,124	-200	1,825	3,850
2,136	-7,999	-5,875	-3,749	-1,624	400	2,525	4,650
2,236	-7,799	-5,575	-3,349	-1,124	1,000	3,225	5,450
2,336	-7,599	-5,275	-2,949	-624	1,600	3,925	6,250
2,436	-7,399	-4,975	-2,549	-124	2,200	4,625	7,050
2,536	-7,199	-4,675	-2,149	376	2,800	5,325	7,850

UC COOPERATIVE EXTENSION

Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
NORTH COAST -Sonoma 2010

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
10	60HP4WDNarrowTract	45,000	16	8,060	3,731	203	265	4,200
10	ATV 4WD	6,700	5	3,003	991	37	49	1,076
10	Brush Shredder 6 ft	8,500	15	816	767	36	47	849
10	Disc - Offset 5 ft	7,500	15	720	676	32	41	749
10	Duster - 3 pt	5,000	12	693	512	22	28	562
10	Air Blast Sprayer 300 gal	16,000	10	2,829	1,819	72	94	1,986
10	Pickup Truck 1/2 ton	32,000	7	12,139	3,978	169	221	4,368
10	Ringroller 5 ft	1,500	20	78	115	6	8	129
10	Seed Drill 5 ft	8,000	10	1,415	910	36	47	993
10	Sprayer ATV 20 gal	350	10	62	40	2	2	44
TOTAL		130,550		29,815	13,539	615	802	14,956
60% of New Cost *		78,330		17,889	8,123	369	481	8,974

*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	
Building 400 sq ft	16,000	25		1,107	61	80	320	1,568
Vineyard Establishment	924,770	22		68,663	3,546	4,624	1,200	78,033
Fuel Tanks 2-250 gallon	4,500	25		311	17	23	90	441
Land 35 Acres	2,275,000	25	2,275,000	108,062	0	22,750	0	130,812
Tools-Shop/Field/Fuel Tanks	2,500	10		320	10	13	50	392
Wind Machine	90,000	23		6,516	345	450	1,800	9,111
TOTAL INVESTMENT	3,312,770		2,275,000	184,979	3,980	27,939	3,460	220,358

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	30	acre	20.70	621
Manager's Salary	30	acre	583.33	17,500
Office Expense	30	acre	300.00	9,000
Sanitation	30	acre	85.33	2,560

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 NORTH COAST - Sonoma 2010

Yr	Description	COSTS PER HOUR							Total Costs/Hr.	
		Actual Hours Used	Capital Recovery	Cash Overhead			Operating			Total Oper.
				Insur- ance	Taxes	Repairs	Fuel & Lube			
10	60HP4WDNarrowTract	263	8.51	0.46	0.61	1.14	6.91	8.05	17.63	
10	ATV 4WD	400	1.49	0.06	0.07	0.50	2.05	2.55	4.17	
10	Brush Shredder 6 ft	69	6.67	0.31	0.41	3.97	0.00	3.97	11.36	
10	Disc - Offset 5 ft	29	13.95	0.65	0.85	1.19	0.00	1.19	16.64	
10	Duster - 3 pt	35	8.68	0.37	0.48	0.71	0.00	0.71	10.24	
10	Air Blast Sprayer 300 gal	103	10.58	0.42	0.55	2.75	0.00	2.75	14.30	
10	Pickup Truck 1/2 ton	285	8.37	0.36	0.46	2.36	7.68	10.04	19.23	
10	Ringroller 5 ft	7	9.42	0.49	0.64	0.17	0.00	0.17	10.72	
10	Seed Drill 5 ft	3	218.32	8.67	11.30	2.20	0.00	2.20	240.49	
10	Sprayer ATV 20 gal	50	0.48	0.02	0.02	0.10	0.00	0.10	0.62	

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Table 8. OPERATIONS WITH MATERIALS AND EQUIPMENT
 NORTH COAST - Sonoma 2010

Operation	Operation		Labor Hrs	Material	Broadcast Rate/acre	Unit
	Month	Tractor Implement				
Cultural:						
Weed: Winter, Vine Row	January	ATV ATV Sprayer		Goal Chateau	1.00 10.00	pt oz
Weed: Vine Row	June	ATV ATV Sprayer		Buccaneer	0.50	pt
Weed: Mow NC Centers (& Shred Prunings)	March	60HP Mower/Shredder				
Weed: Mow CC Centers	March	60HP Mower/Shredder				
Weed: Disc CC Centers 1X/3 Yrs	March	60HP Disc Offset				
Weed: Disc & Roll CC Centers 1X/3 Yrs	April	60HP Disc + Roller				
Weed: Disc CC Centers 2X/3 Yrs	April	60HP Disc Offset				
Weed: Disc CC Centers 1X/3 Yrs	June	60HP Disc Offset				
Weed: Mow CC Centers 2X/3 Yrs	June	60HP Mower/Shredder				
Weed: Mow NC Centers	June	60HP Mower/Shredder				
Weed: Disc CC Centers 1X/3 Yrs	October	60HP Disc Offset				
Prune: Winter Prune	January		18.00			
VM: Tie Cordons	February		10.00			
VM: Sucker Cordons	April		20.00			
VM: Move Wires	May		8.00			
	June		11.00			
	July		10.00			
VM: Leaf Removal	June	Custom				
VM: Vine Cleanup	June		6.00			
VM: Hedge	June	Custom				
VM: Crop Adjustment (Fruit Thin)	June		12.50			
VM: Crop Adjustment (Green Drop)	August		7.00			
Disease: Mildew	March	60HP Air Blast Sprayer		Thiolux Champ	12.00 3.60	lb pt
	April	60HP Air Blast Sprayer		Thiolux Champ	12.00 3.60	lb pt
Disease: Mildew 2X Alternate Rows	April	60HP Duster		Sulfur Dust	10.00	lb
Disease: Mildew 1X Alternate Rows	May	60HP Duster		Sulfur Dust	5.00	lb
Disease: Mildew. Fertilize: Foliar	May	60HP Air Blast Sprayer		Pristine Solubor (B) Neutral Zinc	10.00 4.90 3.84	oz lb lb
Disease: Mildew 3X	June	60HP Duster		Sulfur Dust	30.00	lb
Disease: Mildew 1X	July	60HP Duster		Sulfur Dust	10.00	lb
Disease: Mildew (preveraison)	July	60HP Air Blast Sprayer		Rally	5.00	oz
Insect: Mites 1X/3 Yrs	June	60HP Air Blast Sprayer		Acramite	0.33	lb
Frost Protection: Windmachines	March	Windmachine	1.67	Propane		
	April	Windmachine	2.23	Propane		
	May	Windmachine	1.67	Propane		
Fertilize: Petiole Analysis	May			Petiole Analysis		
Fertilize: Petiole Analysis 1X/3 Yrs	August			Petiole Analysis		
Fertilize: Petiole Analysis 1X/3 Yrs (Postharvest)	October			Petiole Analysis		
Fertilize: through drip.	April			CAN-17	44.10	lb
Fertilize: through drip.	June			12-26-26	62.50	lb
Fertilize: Foliar (see Disease/Fertilize above)	May					
Irrigate: 12X	June		0.55	Water	1.00	acin
	July		1.10	Water	2.00	acin
	August		1.10	Water	2.00	acin
	September		0.55	Water	1.00	acin
Harvest & Haul (Machine)	September	Custom				
Cover Crop: Rip Cover Crop Centers 1X/3 Yrs	October	Custom				
Amendment: Alternate Rows 1X/3 Yrs	October	Custom		Gypsum	0.83	ton
Cover Crop: Plant 1X/3 Yrs	October	60HP Drill + Roller		Seed	17.00	lb

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2009

SAMPLE COSTS TO
ESTABLISH A VINEYARD AND PRODUCE
WINEGRAPES

Cabernet Sauvignon



NORTH COAST REGION
NAPA COUNTY

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SAMPLE COSTS TO ESTABLISH A VINEYARD AND PRODUCE WINEGRAPES
Cabernet Sauvignon
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CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs.....	3
Production Cultural Practices and Material Inputs.....	6
Labor, Equipment and Interest Costs.....	8
Cash Overhead	8
Non-Cash Overhead.....	9
REFERENCES.....	11
Table 1. SAMPLE COSTS PER ACRE TO ESTABLISH A VINEYARD.....	12
Table 2. COSTS PER ACRE TO PRODUCE WINEGRAPES.....	14
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE WINEGRAPES.....	15
Table 4. MONTHLY PER ACRE CASH COSTS TO PRODUCE WINEGRAPES	16
Table 5. RANGING ANALYSIS – INCOME AND YIELD.....	17
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS.....	18
Table 7. HOURLY EQUIPMENT COSTS	19
Table 8. OPERATIONS WITH EQUIPMENT	20

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INTRODUCTION

Sample costs to establish a vineyard and produce winegrapes under drip irrigation in the North Coast Region, Napa County 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. Practices described are based on production practices considered typical for the crop and area, but these same practices will not apply to every situation. The sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, “*Your Costs*”, in Tables 2 and 3 is provided for entering your farming 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 are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis or downloaded from the department website at <http://coststudies.ucdavis.edu> or obtained from selected county UC Cooperative Extension offices.

ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish a vineyard and produce winegrapes in the North Coast – Napa County or Napa Valley Appellation. Within the Napa Valley Appellation are 13 subappellations. For district location and other related information see the websites www.napagrowers.org and www.napavintners.com. The cultural practices shown represent operations and materials considered typical in a well-managed vineyard in the region. The costs, materials, and practices shown in this study will not be applicable to all situations. Establishment and cultural practices vary by grower and the differences can be significant. The study is intended as a guide only. *The trade names and cultural practices shown in this report do not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of similar products or practices.*

Farm. The hypothetical farm, located on land with less than a 5% slope, is owned and operated by the grower. The 35 contiguous acre farm consists of 30 acres on which winegrapes are being replanted, and five acres occupied by roads, irrigation systems, fencing, and farmstead. Management companies farm approximately 40% of the farms in the area (NVG). In this study we incorporated information from both farmer and management company operations to present a farm managed by the owner. Management companies will charge a fee for their services, but farms operated by management companies will not have an equipment inventory as shown in Table 6.

Establishment Cultural Practices and Material Inputs

The following practices refer to table 1.

Environmental Preparation. The Napa County Conservation, Development, and Planning Department administer regulations for planting and replanting vineyard sites that have a 5% or greater slope. If planting on slopes, contact the Napa office for further information.

Vineyard Conversion and Site Preparation. The new vineyard is being planted on land that had an existing vineyard. A hand crew separates out the wood and steel components prior to vine removal. The old grapevines are removed, stacked and burned. Rock removal may be required on some new plantings, but is not accounted for in this study. A company is hired to collect, crush and remove the old steel trellis components. A hand crew cleans and hauls miscellaneous debris left in the field using the grower's tractor and trailer. The field is ripped four to five feet deep in three passes - line of planting, crossways, diagonally. The field is again hand cleaned using the grower's tractor and trailer to remove debris pulled up from the ripping. A custom operator then disks the land in two directions and landplanes the site. Landplaning is assumed to be necessary on the site. Soil amendments (lime or gypsum and compost) are commercially applied. A commercial company is hired to layout the field, mark/stake vine sites and irrigation lines. In the row middles, a cover crop (Bell bean, oat, vetch mix) is planted. The trellis system endposts and stakes are installed. All operations that prepare the vineyard for planting are done in the fall, beginning in the year prior to planting, but costs are shown in the first year.

Vines. Field-grown dormant benchgraft vines, Cabernet Sauvignon variety, are planted on 7 X 4-foot spacing at 1,555 vines per acre. Vines will be trained to a bilateral cordon and spur pruned. Cordons are the horizontal branches, and spurs are the bearing units on the cordon. The grapevines are assumed to begin yielding fruit in three years and to produce for an additional 22 years.

Planting. Planting in this study occurs in mid-April and is done by hand. Holes are dug and the dormant vines are planted to the appropriate depth. The hole is filled with soil, and the vine is protected with a milk carton. In the following year an average of 2% or 31 vines per acre will be replanted.

Trellis System. The trellis is a vertical shoot positioning system (VSP). The system in this study utilizes 3-inch X 8-foot notched steel line posts spaced 16-feet apart (every 4th vine), with three training stakes (1/2-inch rebar rod X 4-feet) at the vine locations in between. Two clips for each rebar. End posts are 3-7/8 inch X 10-foot steel tube (well casing) with a spade. No additional anchors are required. Seven permanent wires are secured to the end posts – 12-gauge fruit wire and 14 gauge drip wire, 2 pairs of 13 gauge canopy wires and a single canopy wire at the top. Grippers are put on all wires except the cordon wire and drip wires. The trellis is considered as part of the vineyard since it will be removed when the vines are removed. Therefore it is included in the establishment cost. The trellis system cost (materials and labor) are shown in the first year and is installed during the first 2 years as follows:

First Year. In the fall of the year prior to planting, end-posts and stakes are laid out by the grower and installed by a trellis company. The grower lays out the stakes and end-posts, using a tractor and trailer. Hauling the posts takes 2 men and 1 tractor driver approximately 0.83 hours per acre but uses a total of 2.5 man-hours per acre. The drip wire is installed after planting.

Second Year. Two pairs of canopy wires, a single canopy wire at the top and the fruit wire are installed.

Drip System (Irrigation). Mainlines are laid out in the fall prior to trellis installation. After planting the drip line is attached to the drip wire on the trellis system and emitters are punched. Drip system labor is included in the total drip system costs. The system is considered part of the vineyard since it will be removed when the vines are removed; therefore it is included in the establishment costs.

Training/Pruning. Training and pruning establish the vine framework and these techniques will vary with variety and trellis system. In this study training includes pruning, tying, suckering, and shoot positioning and thinning. The prunings are placed in between the vine rows and are incorporated during the first discing.

First Year. The vines are allowed to grow freely the first year with minimal pruning and training. A good root system should develop this year to support vine training in the second year. Twenty hours of hand labor (miscellaneous labor) are allocated to the budget for topping throughout the year.

Second Year. In February the vines are pruned back to two buds. In June, the vines are suckered to one shoot. Vines are trained by tying one shoot to the post to become the main trunk. Later in the season this shoot is topped at or slightly below the cordon wire. Two lateral shoots are selected from the trunk as the bilateral cordons. Any remaining lower laterals are removed. In July and August, two passes are made to top the vines, remove extra shoots (suckering) and tie the canes loosely on the wire.

Third Year. In February, cordons are pruned back to the appropriate length as determined by girth. These canes are then tied trimly to the fruiting wire. Training vines in the third year includes extending the cordons along the permanent cordon wire and selecting spur positions. Suckering is done in May; shoot positioning in June and July. Crop thinning is done in June and August to remove about 50% of the crop from these young vines. Slower growing vines continue to be trained; however, year three is the last year that the vines are trained in this study. After the vines are trained, canopy management begins and includes suckering trunks and cordons, shoot positioning, and thinning.

Irrigation. Pumping costs from grower input approximated \$16.50 per acre inch (\$0.0006 per gallon). During the first and second year, irrigation is from late May to late September/early October, a total of 20 weeks, (2 irrigations per week at 2.5 gallons per vine per irrigation). No assumption is made about effective rainfall. In the third year five gallons per week per vine at one irrigation per week are applied over a 20-week period (155,865 gallons per acre or 5.74 acre inches). Labor is calculated at 0.33 hours per acre per irrigation.

Frost Protection. Three propane powered wind machines are installed in the summer of the second year for frost protection. The machine begins operation in the third year. It is assumed that the wind machine will run 50 hours per season (March, April, May) at five hours per night.

Pest Management. The pesticides and rates mentioned in this cost study as well as other materials are listed in *UC Integrated Pest Management Guidelines, Grapes*, available at www.ipm.ucdavis.edu. Pesticides mentioned in the study are commonly used, but may not be university recommendations.

Insects. Leafhoppers and mites are the most common insect pests in the North Coast. In Napa County, populations are usually below treatment thresholds. In this study, we assume that no insecticides are needed.

Diseases. Many pathogens attack grapevines, but the major disease assumed is powdery mildew (*Uncinula necator*). Powdery mildew control begins in May of the second year with Stylet Oil (paraffinic oil), Rally (myclobutanil) in June, and Pristine (pyraclostrobin/boscalid) in July. In the third year, wettable sulfur is applied in March and mid-April, Stylet Oil in May, Rally in June, and Flint (trifloxystrobin) in July. All are applied by ground with the grower's equipment. A fungicide application may be made to pruning wounds in February for control of Eutypa, but is not included as a cost in this study.

Weeds. In late January/early February of the first year, prior to planting, Glyphos (glyphosate) is applied to the vine row (24-inch band) with an ATV and sprayer. In April the cover crop (middles) is mowed and then disked in early May and August. In July or August, Glyphos is sprayed around the vines. In the second year and third year, Glyphos is applied as a strip spray in February prior to pruning: the middles (cover crop) are mowed in April, disked in May, August and October (for cover crop seedbed).

Cover Crop. After land preparation in the fall of the year prior to planting, an annual cover crop is planted in the vine middles, mowed in March/April of the following year, and then disked in May. In the fall of the first and second year, an annual cover crop (bell bean, oat, vetch) is planted in October and disked in May of the second year. In October of the third year a permanent cover crop is planted and allowed to reseed thereafter in the spring.

Fertilization. Beginning in the first year, an NPK fertilizer, 8-8-8, is applied in equal amounts through the drip line in June, July, and September. A total of five gallons or 51 pounds of material per acre is applied. In the third year, the fertilizer is applied in May and in September after harvest.

Harvesting. Harvesting starts in the third year. In this study the crop is hand harvested. Labor costs are estimated at \$250 per ton for young vineyards. See Harvest in production section for operation explanations.

Yield. Average yields in the third year are assumed to be one ton per acre.

Production Cultural Practices and Material Inputs

Refers to tables 2 - 8

Pruning. Prepruning is done during the winter months (January) and final pruned in early March. The prunings are placed in the vine centers and chopped during the first mowing. Winter tying, where cordons are tied to the cordon wire with twine at the trunk and at each end of the cordons, is done in March. Pruning costs in this study are based on an hourly rate, although much of the pruning in the region may be done by piecework.

Canopy Management. Canopy management begins with trunk and cordon suckering in April. A second suckering pass in May also includes shoot thinning and positioning. Passes in June and July are made for leaf removal, lateral removal, and wire lifting. Crop thinning is done in two passes, once in July for color thin and once in August for crop thin. Shoot removal is the operation whereby weak shoots, which lack vigor and do not originate from the fruiting spur buds, are removed. In early June/July after fruit set, some basal leaves are removed in and around the fruit zone to allow for exposure and better air movement. Positioning and thinning shoots allows vines space to develop good fruit clusters, and opens the canopy to allow greater air movement through the vines and around the clusters. Canopy management varies among growers.

Irrigation. In this study 5.74 acre-inches (155,866 gallons per acre) are applied and water is calculated to cost \$16.50 per acre-inch. Once per week over 20 weeks, water at five gallons per vine is applied from late May to September/early October. Irrigation labor is calculated at 0.33 hours per acre per irrigation. No assumption is made about effective rainfall.

Frost Protection. It is assumed that the wind machines will run 50 hours per season, 5 hours per night during March, April and May.

Fertilization. An NPK fertilizer, 8-8-8, at 51 pounds per acre is applied through the irrigation system equally in May and in September after harvest.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Grapes*. **Pesticides mentioned in the study are not recommendations, but those commonly used in the region.** For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For additional information and pesticide use permits, contact the local county Agricultural Commissioner's office.

Pest Control Adviser. Written recommendations are required for many pesticides commercially applied and are made by licensed pest control advisers (PCAs). In addition the PCA will monitor the field for pests and nutrition. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. Management companies may have their own PCA. A PCA or PCAs are hired in this study to monitor the field for irrigation, nutrition and pests for \$100 per acre

Insects. Leafhoppers and mites are the most common insect pests in the North Coast. The PCA hangs one trap per 10 acres for mealybug monitoring. The Vine Mealybug and the Light Brown Apple Moth are both growing concerns in Napa Valley vineyards. In this study, we assume that no insecticides are needed.

Diseases. Powdery mildew treatments begin in mid-March with two wettable sulfur applications one during March and one in April. In addition, Stylet Oil (paraffinic oil) is applied in May, Rally (myclobutanil) in June, Flint (trifloxystrobin) in July and Pristine (pyraclostrobin/boscalid) in August. All applications are made with the grower's equipment. It is recommended that applicators use fungicides with different modes of action in order to avoid fungicide resistance in powdery mildew populations. Growers have the option of using contacts, sterol inhibitors (SI), quinolins, strobilurins, or sulfur, which are classes of fungicides with different modes of action. See the UC IPM website for further information.

Weeds. In this vineyard, vine row weeds are controlled with Glyphos (glyphosate) applied as a strip spray (28.6% of the acreage) in January and again in July. A permanent cover crop is planted in the row middles and is described under cover crop.

Permanent Cover Crop. In October of the third year a permanent cover crop is planted and allowed to reseed in the spring. The crop is mowed once in March and again in May after seed formation. The cover crop is dried down by late spring/early summer.

Harvest. The crop is hand picked by a labor contractor. In normal producing vineyards (4-5 tons), labor costs of \$150 per ton are assumed. Charges may be lower or higher due to yield, trellis system, and ground terrain. To determine number of pickers for harvest, an industry assumption is one-ton per day per picker, assuming an eight-hour day. Bin handling includes use of the grower owned tractor and three bin trailers with one-half ton bins, two tractors rented and a forklift rented each for two-weeks. The grapes are handpicked into the bins, loaded on the grower owned flatbed truck and delivered to the winery. The truck holds 16 bins and takes one hour per roundtrip delivery.

Yields. Yield maturity is reached in the fifth or sixth year. An assumed yield of 5 tons per acre is used to calculate returns in the production years. Typical yield range for Cabernet Sauvignon in Napa County is 3.5 to 6.5 tons per acre.

Returns. A price of \$4,082 per ton for Cabernet Sauvignon winegrapes is used to show a range of yields over a series of returns. The price is an average of the 2004 to 2008 weighted average grower returns as reported each year in Table 10 of the Final Grape Crush Report. Net returns at different yields and prices are shown in Table 5 in this study.

Assessments/Membership. The Napa Valley Grapegrowers, a voluntary organization, charges membership dues of \$12.50 per net acre planted, bearing and non-bearing, with a minimum annual fee of \$250 per member per year. The organization's mission is to "to promote and preserve Napa Valley's world-class vineyards". Membership in the organization is not included as a cost in this study. Other grower assessments not included are the Pierce's Disease/Glassy Winged Sharpshooter assessment in which growers are assessed \$1 per \$1,000 of crop returns; and the Napa County Pest and Disease Control District Board annual assessment which is \$5.59 per acre for 2009. Additionally, Napa growers are assessed \$10 per acre by the Napa County Housing Commission for operation of the Napa County farmworker housing facilities.

Pickup/ATV. The grower uses the pickup for business and personal use. The assumed business use for the pickup is 10,000 miles per year for the ranch. In addition to spot spraying for weed control, the All Terrain Vehicle (ATV) is used on the ranch for checking the vineyard and irrigating.

Labor, Equipment and Interest Costs

Labor. Labor rates of \$20.30 per hour for machine operators and \$17.69 for general labor includes payroll overhead of 45%. The basic hourly wages are \$14.00 for machine operators and \$12.20 for 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 participating growers' recommendations. 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.

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 \$3.70 (excludes excise taxes) and \$3.36 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 excise tax can be refunded for on-farm use when filing your income tax. The costs are based on 2008 (July thru December) American Automobile Association (AAA) and Department of Energy (DOE) monthly data. The fuel, lube, 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 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 5.75% 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 January 2009.

Risk. The risks associated with crop production 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 profitability and economic viability. Growers may purchase Federal crop insurance to reduce the production risk associated with specific natural hazards. Insurance policies vary and range from a basic catastrophic loss policy to one that insures losses for up to 75% of a crop. Insurance costs will depend on the type and level of coverage.

Cash Overhead

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.82% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$621 for the entire farm.

Sanitation Services. Sanitation services provide portable toilets for the vineyard and cost the farm \$3,150 annually. The cost includes one double toilet unit with washbasins, delivery and pickup, and five months of weekly servicing. Costs also include soap or other suitable cleansing agent, and single use towels. Separate potable water and single-use drinking cups are also supplied. Contract labor providers may include this service for their work force and therefore sanitation fees would not be a direct cost to the grower.

Management/Supervisor Wages. Salary is not included. Returns above costs are considered a return to management

Office Expense. Office and business expenses are estimated at \$300 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges.

Investment Repairs. Annual repairs on investments or capital recovery items that require maintenance are calculated as 2% of the purchase price. Repairs are not calculated for land and establishment costs.

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 Table 6.

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% used to calculate capital recovery cost is the effective long term interest rate effective January 1, 2009. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Establishment Costs. Costs to establish the vineyard 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, trellis system, drip system, planting, vines, cash overhead and production expenses for growing the vines through the first year that grapes are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study the cost is \$39,104 per acre or \$1,173,131 for the 30-acre vineyard. The establishment cost is spread over the remaining 22 years of the 25 years the vineyard is in production.

Irrigation System. The previous vineyard is assumed to have a well, pump, and filtration/injector stations that are included in the land cost.

Land. Based on local realtor information, bare land available for vineyard establishment is valued at \$150,000 per acre or \$175,000 per net plantable (30) acre. Land planted with resistant rootstock vines is valued from \$85,000 to \$180,000.

Building. The building complex is 400 square foot metal building or buildings on a cement slab.

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

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 in the Whole Farm Equipment, Investment and Business Overhead Tables. Equipment costs are composed of three parts: non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel, and lubrication and are discussed under operating costs.

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

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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 the American Society of Farm Managers and Rural Appraisers. 2008. *Trends in Agricultural Land and Lease Values*. California Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. Woodbridge, CA.
- California State Department of Food and Agriculture. 2004-2008. Table 10 of Final Grape Crush Report. California Department of Food and Agriculture. Sacramento, CA. Internet accessed March 30, 2009 <http://www.nass.usda.gov/ca/bul/crush/>
- California State Automobile Association. 2009. *Gas Price Averages July – December 2008*. AAA Press Room, San Francisco, CA. Internet accessed January 2009. <http://www.csaa.com/portal/site/CSAA>
- California State Board of Equalization. *Fuel Tax Division Tax Rates*. Internet accessed January 2009. <http://www.boe.ca.gov/sptaxprog/spftdrates.htm>
- Energy Information Administration. 2008. *Weekly Retail on Highway Diesel Prices July 2008 – December 2008*. Internet accessed January 2009. <http://tonto.eia.doe.gov/oog/info/wohdp>
- University of California Statewide IPM Project. 2008. *UC Pest Management Guidelines, Grapes*. University of California, Davis, CA. <http://www.ipm.ucdavis.edu>
- Weber, Edward A., Karen M. Klonsky and Richard L. De Moura, *Sample Costs to Establish a Vineyard and Produce Wine Grapes. North Coast Region - Napa*. 2003. University of California Cooperative Extension. Davis, CA.
- Weaver, Robert J. 1976. *Grape Growing*. John Wiley and Sons. New York, NY.

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UC COOPERATIVE EXTENSION
Table 1. COSTS PER ACRE TO ESTABLISH A VINEYARD
 NORTH COAST - Napa County 2009

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			1
Land Preparation Costs:				
Site Prep: Vineyard Removal		600		
Site Prep: Clean Field by Hand 2X (separate wood & metal, pickup debris)		848		
Site Prep: Rip 3X		525		
Site Prep: Disk 2X/Landplane 1X		375		
Site Prep: Apply Soil Amendments Gypsum or Lime and Compost		620		
Site Prep: Mark , Layout, Stake Vineyard		778		
Trellis: Install Trellis (includes labor & materials)		11,000		
Cover Crop: Plant		75		
TOTAL PRIOR YEAR LAND PREP COSTS		14,820		
Planting Costs:				
Weed: Spray Strip (Glyphos)		29		
Weed: Mow Middles		43		
Vines: 1,555 Per Acre (2% Replant In 2nd Year)		5,443	88	
Plant: Dig, Plant, Place Carton around vine		3,343	67	
Irrigate: Install Irrigation System (Drip)		3,200		
TOTAL PLANTING COSTS		12,058	155	
Cultural Costs:				
Weed: Disk Middles		61	91	122
Irrigate: (water & labor)		328	328	328
Miscellaneous Labor: (various hand operations)		283		
Fertilize: Through drip (8-8-8)		18	18	18
Weed: Spray Around Vines (Glyphos)		29		
Cover Crop: Plant		75	63	109
Weed: Spray Vine Row (Glyphos)			40	59
Train: Prune to 2 buds			230	
Weed: Mow Middles			43	43
Disease: Mildew (Oil)			63	83
Disease: Mildew (Rally)			54	63
Train: Sucker/Train/Tie			920	389
Disease: Mildew (Pristine)			70	
Train: Sucker/Train/Wrap on wire 2X			1,061	
Disease: Mildew (Sulfur)				87
Disease: Mildew (Flint)				74
Prune: Winter Prune				566
Train: Shoot Position				142
Prune: Thin Crop				142
Pickup Truck Use		269	269	269
ATV Use		26	26	26
TOTAL CULTURAL COSTS		1,091	3,278	2,520
Harvest Costs:				
Pick Fruit				250
Bin Handling				240
Haul To Crusher				4
TOTAL HARVEST COSTS				494
Interest On Operating Capital @ 5.75%		1,647	109	57
TOTAL OPERATING COSTS/ACRE		29,616	3,542	3,070

UC COOPERATIVE EXTENSION

Table 1. continued

	Cost Per Acre			
	Year:	1st	2nd	3rd
	Tons Per Acre:			1
Cash Overhead Costs:				
Office Expense		300	300	300
Liability Insurance		21	21	21
Sanitation Fees		140	140	140
Property Taxes		1,768	1,781	1,788
Property Insurance		14	26	31
Investment Repairs		23	73	73
TOTAL CASH OVERHEAD COSTS		2,266	2,341	2,353
TOTAL CASH COSTS/ACRE		31,881	5,882	5,423
INCOME/ACRE FROM PRODUCTION				4,082
NET CASH COSTS/ACRE FOR THE YEAR		31,881	5,882	1,341
PROFIT/ACRE ABOVE CASH COSTS				
ACCUMULATED NET CASH COSTS/ACRE		31,881	37,764	39,104
Non-Cash Overhead (Capital Recovery):				
Land		8,313	8,313	8,313
Buildings		37	37	37
Shop/Field Tools		21	21	21
Fuel Tanks		7	7	7
Wind Machines			181	181
Equipment		222	243	349
TOTAL INTEREST ON INVESTMENT		8,600	8,802	8,908
TOTAL COST/ACRE FOR THE YEAR		40,482	14,684	14,331
INCOME/ACRE FROM PRODUCTION				4,082
TOTAL NET COST/ACRE FOR THE YEAR		40,482	14,684	10,249
NET PROFIT/ACRE ABOVE TOTAL COST				
TOTAL ACCUMULATED NET COST/ACRE		40,482	55,166	65,415

UC COOPERATIVE EXTENSION
Table 2. COSTS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Napa County 2009

Operation	Cash and Labor Cost per acre						Total Cost	Your Cost
	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/Rent	Total Cost		
Cultural:								
Prune: Preprune	13.00	230	0	0	0	230		
Weed: Spray Vine Row (Glyphos)	2.00	49	4	6	0	59		
Prune: (Cordon spur pruned)	27.00	478	0	0	0	478		
Prune: Tie Canes	12.00	212	0	0	0	212		
Weed: Mow Middles	2.00	49	38	0	0	86		
Disease: Mildew (Sulfur)	2.00	49	33	5	0	87		
Frost Protection: Windmills	5.01	89	0	216	0	305		
CM: Trunk/Cordon Sucker	15.00	265	0	0	0	265		
Irrigate: (water & labor)	3.30	58	0	95	0	153		
Fertilize: through drip (8-8-8)	0.00	0	0	18	0	18		
Disease: Mildew (Oil)	1.00	24	17	42	0	83		
CM: Sucker/Shoot Thin/Shoot Position	10.00	177	0	0	0	177		
Disease: Mildew (Rally)	1.00	24	17	22	0	63		
CM: Leaf/Lateral Removal & Wire Lift	40.00	708	0	0	0	708		
Thin: Thin Crop (color thin)	10.00	177	0	0	0	177		
Disease: Mildew (Flint)	1.00	24	17	33	0	74		
Thin: Thin Crop (set thin)	18.00	318	0	0	0	318		
Disease: Mildew (Pristine)	1.00	24	17	38	0	79		
Pest Control/Water Management Adviser	0.00	0	0	0	100	100		
Pickup Use	6.06	148	122	0	0	269		
ATV	1.00	24	2	0	0	26		
TOTAL CULTURAL COSTS	170.37	3,128	265	474	100	3,967		
Harvest:								
Harvest-Hand Labor	0.00	0	0	0	750	750		
Harvest-Bin Handling	4.00	91	16	0	133	240		
Haul	0.31	8	3	0	0	10		
TOTAL HARVEST COSTS	4.31	98	18	0	883	1,000		
Interest on operating capital @ 5.75%						97		
TOTAL OPERATING COSTS/ACRE		3,226	283	474	983	5,063		
CASH OVERHEAD:								
Office Expense						300		
Liability Insurance						21		
Sanitation						140		
Property Taxes						1,981		
Property Insurance						190		
Investment Repairs						266		
TOTAL CASH OVERHEAD COSTS						2,898		
TOTAL CASH COSTS/ACRE						7,961		
NON-CASH OVERHEAD:								
		Per producing Acre		Annual Cost				
				Capital Recovery				
Land		175,000		8,313		8,313		
Building		533		37		37		
Tools		167		21		21		
Wind Machines		2,500		181		181		
Vineyard Establishment		39,104		2,903		2,903		
Equipment		3,130		322		322		
TOTAL NON-CASH OVERHEAD COSTS		220,434		11,778		11,778		
TOTAL COSTS/ACRE						19,738		

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes.

For Assessment/Membership costs, see page 7.

UC COOPERATIVE EXTENSION
Table 3. COSTS AND RETURNS PER ACRE to PRODUCE WINEGRAPES
 NORTH COAST - Napa County 2009

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Cabernet Sauvignon Winegrapes	5.00	ton	4,082.00	20,410	
OPERATING COSTS					
Herbicide:					
Glyphos	1.00	pint	6.17	6	
Fungicide:					
Wettable Sulfur 97	6.00	lb	0.75	5	
JMS Stylet Oil	2.00	gal	20.77	42	
Rally 40 WSP	4.00	oz	5.50	22	
Flint	2.00	oz	16.50	33	
Pristine	10.00	oz	3.77	38	
Frost Protection:					
Wind Machine (Propane @ \$3.60 per gallon)	50.00	hr/ac	4.32	216	
Water:					
Water pumped (155,866 gallons)	5.74	acin	16.50	95	
Fertilizer:					
8-8-8 (10.2 lbs per gallon)	51.00	lb	0.36	18	
Custom/Contract:					
PCA (pest, nutrition, water monitoring)	1.00	acre	100.00	100	
Harvest Labor	5.00	ton	150.00	750	
Rent:					
Tractors (2)	4.00	acwk	24.66	99	
Forklift (1)	2.00	acwk	17.33	35	
Labor (machine)	24.45	hrs	20.30	496	
Labor (non-machine)	154.31	hrs	17.69	2,730	
Fuel - Gas	28.77	gal	3.36	97	
Fuel - Diesel	29.48	gal	3.70	109	
Lube				31	
Machinery repair				47	
Interest on operating capital @ 5.75%				97	
TOTAL OPERATING COSTS/ACRE				5,063	
NET RETURNS ABOVE OPERATING COSTS				15,347	
CASH OVERHEAD COSTS:					
Office Expense				300	
Liability Insurance				21	
Sanitation				140	
Property Taxes				1,981	
Property Insurance				190	
Investment Repairs				266	
TOTAL CASH OVERHEAD COSTS/ACRE				2,898	
TOTAL CASH COSTS/ACRE				7,961	
NON-CASH OVERHEAD COSTS (Capital Recovery):					
Land				8,313	
Building				37	
Tools				21	
Wind Machine				181	
Vineyard Establishment				2,903	
Equipment				322	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				11,778	
TOTAL COSTS/ACRE				19,738	
NET RETURNS ABOVE TOTAL COSTS				672	

UC COOPERATIVE EXTENSION
Table 4. MONTHLY PER ACRE CASH COSTS to PRODUCE WINEGRAPES
 NORTH COAST - Napa County 2009

Beginning JAN 09	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending DEC 09	09	09	09	09	09	09	09	09	09	09	09	09	
Cultural:													
Prune: Preprune	230												230
Weed: Spray Vine Row (Glyphos)	29						29						59
Prune: (Cordon spur pruned)			478										478
Prune: Tie Canes			212										212
Weed: Mow Middles			43		43								86
Disease: Mildew (Sulfur)			43	43									87
Frost Protection: Windmills			94	116	94								305
CM: Trunk/Cordon Sucker				265									265
Irrigate: (water & labor)					15	31	31	31	31	15			153
Fertilize: through drip (8-8-8)					9				9				18
Disease: Mildew (Oil)					83								83
CM: Sucker/Shoot Thin/Shoot Position					177								177
Disease: Mildew (Rally)						63							63
CM: Leaf/Lateral Removal & Wire Lift						354	354						708
Thin: Thin Crop (color thin)							177						177
Disease: Mildew (Flint)							74						74
Thin: Thin Crop (set thin)									318				318
Disease: Mildew (Pristine)									79				79
Pest Control/Water Management Adviser	10	10	10	10	10	10	10	10	10	10			100
Pickup Truck Use	22	22	22	22	22	22	22	22	22	22	22	22	269
ATV	2	2	2	2	2	2	2	2	2	2	2	2	26
TOTAL CULTURAL COSTS	294	35	905	459	456	482	699	462	74	50	25	25	3,967
Harvest:													
Harvest-Hand Labor									750				750
Harvest-Bin Handling									240				240
Haul									10				10
TOTAL HARVEST COSTS									1,000				1,000
Interest on operating capital @ 5.75%	1	2	6	8	10	13	16	18	23	0	0	0	97
TOTAL OPERATING COSTS/ACRE	295	36	911	467	466	495	715	481	1,098	50	24	24	5,063
Cash Overhead:													
Office Expense	25	25	25	25	25	25	25	25	25	25	25	25	300
Liability Insurance		21											21
Sanitation	14	14	14	14	14	14	14	14	14	14			140
Property Taxes	991						991						1,981
Property Insurance	95						95						190
Investment Repairs	22	22	22	22	22	22	22	22	22	22	22	22	266
TOTAL CASH OVERHEAD COSTS	1,147	82	61	61	61	61	1,147	61	61	61	47	47	2,898
TOTAL CASH COSTS/ACRE	1,442	118	972	529	528	556	1,862	542	1,159	111	72	71	7,961

CM=Canopy Management. X=number of times as 2X= 2 times or 2 passes.

UC COOPERATIVE EXTENSION
Table 5. RANGING ANALYSIS
 NORTH COAST - Napa County 2009

COSTS PER ACRE AT VARYING YIELD TO PRODUCE WINEGRAPES

	YIELD in Tons/Acre						
	3.50	4.00	4.50	5.00	5.50	6.00	6.50
OPERATING COSTS:							
Cultural Cost	3,967	3,967	3,967	3,967	3,967	3,967	3,967
Harvest Cost	741	827	914	1,000	1,086	1,173	1,259
Interest on operating capital @ 5.75%	95	96	96	97	97	97	98
TOTAL OPERATING COSTS/ACRE	4,803	4,890	4,977	5,064	5,150	5,237	5,324
Total Operating Costs/ton	1,372	1,222	1,106	1,013	936	873	819
CASH OVERHEAD COSTS/ACRE	2,898	2,898	2,898	2,898	2,898	2,898	2,898
TOTAL CASH COSTS/ACRE	7,701	7,788	7,875	7,962	8,048	8,135	8,222
Total Cash Costs/ton	2,200	1,947	1,750	1,592	1,463	1,356	1,265
NON-CASH OVERHEAD COSTS/ACRE	11,778	11,778	11,778	11,778	11,778	11,778	11,778
TOTAL COSTS/ACRE	19,479	19,566	19,653	19,740	19,826	19,913	20,000
Total Costs/ton	5,565	4,891	4,367	3,948	3,605	3,319	3,077

For Assessment/Membership costs, see page 7

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.50	4.00	4.50	5.00	5.50	6.00	6.50
2,882	5,284	6,638	7,992	9,346	10,701	12,055	13,409
3,282	6,684	8,238	9,792	11,346	12,901	14,455	16,009
3,682	8,084	9,838	11,592	13,346	15,101	16,855	18,609
4,082	9,484	11,438	13,392	15,346	17,301	19,255	21,209
4,482	10,884	13,038	15,192	17,346	19,501	21,655	23,809
4,882	12,284	14,638	16,992	19,346	21,701	24,055	26,409
5,282	13,684	16,238	18,792	21,346	23,901	26,455	29,009

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.50	4.00	4.50	5.00	5.50	6.00	6.50
2,882	2,386	3,740	5,094	6,448	7,803	9,157	10,511
3,282	3,786	5,340	6,894	8,448	10,003	11,557	13,111
3,682	5,186	6,940	8,694	10,448	12,203	13,957	15,711
4,082	6,586	8,540	10,494	12,448	14,403	16,357	18,311
4,482	7,986	10,140	12,294	14,448	16,603	18,757	20,911
4,882	9,386	11,740	14,094	16,448	18,803	21,157	23,511
5,282	10,786	13,340	15,894	18,448	21,003	23,557	26,111

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE \$/ton	YIELD (ton/acre)						
	3.50	4.00	4.50	5.00	5.50	6.00	6.50
2,882	-9,392	-8,038	-6,684	-5,330	-3,975	-2,621	-1,267
3,282	-7,992	-6,438	-4,884	-3,330	-1,775	-221	1,333
3,682	-6,592	-4,838	-3,084	-1,330	425	2,179	3,933
4,082	-5,192	-3,238	-1,284	670	2,625	4,579	6,533
4,482	-3,792	-1,638	516	2,670	4,825	6,979	9,133
4,882	-2,392	-38	2,316	4,670	7,025	9,379	11,733
5,282	-992	1,562	4,116	6,670	9,225	11,779	14,333

UC COOPERATIVE EXTENSION
Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 NORTH COAST - Napa County 2009

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
09	60 HP 4WD Narrow Tract	45,000	15	8,761	3,849	220	269	4,338
09	Air Blast Gil 3Pt 200 gal	10,000	15	960	902	45	55	1,002
09	ATV 4WD	6,700	5	3,003	991	40	49	1,079
09	Bin 1/2 Ton 2Bins #1	500	10	88	57	2	3	62
09	Bin 1/2 Ton 2Bins #2	500	10	88	57	2	3	62
09	Bin 1/2 Ton 2Bins #3	500	10	88	57	2	3	62
09	Bin Trailer 2Bns #1	1,050	15	101	95	5	6	105
09	Bin Trailer 2Bns #2	1,050	15	101	95	5	6	105
09	Bin Trailer 2Bns #3	1,050	15	101	95	5	6	105
09	Mower-Flail 5'	8,000	15	768	722	36	44	801
09	Pickup Truck 1/2 Ton	32,000	7	12,139	3,978	181	221	4,380
09	Sprayer ATV 20gal	350	10	62	40	2	2	44
09	Truck Flatbed 20 ft 2 Ton	49,803	10	14,711	5,188	265	323	5,775
TOTAL		156,503		40,971	16,124	810	987	17,921
60% of New Cost *		93,902		24,583	9,674	486	592	10,752

*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	
Building 400 sq ft	16,000	25		1,107	66	80	512	1,765
Vineyard Establishment	1,173,131	22		87,103	4,810	5,866	5,866	103,645
Land 35 Acres	5,250,000	25	5,250,000	249,375	0	52,500	0	301,875
Tools-Shop/Field/Fuel Tanks	5,000	10		640	21	25	100	785
Wind Machine	75,000	23		5,430	308	375	1,500	7,612
TOTAL INVESTMENT	6,519,131		5,250,000	343,655	5,203	58,846	7,978	415,682

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	30	acre	20.70	621
Office Expense	30	acre	300.00	9,000
Sanitation	30	acre	140.00	4,200

UC COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 NORTH COAST - Napa County 2009

Yr	Description	COSTS PER HOUR							Total Costs/Hr.	
		Actual Hours Used	Capital Recovery	Cash Overhead			Operating			Total Oper.
				Insur- ance	Taxes	Repairs	Fuel & Lube			
09	60 HP 4WD Narrow Tract	297	7.78	0.45	0.54	1.15	12.54	13.69	22.46	
09	Air Blast Gil 3Pt 200 gal	180	3.01	0.15	0.18	1.67	0.00	1.67	5.01	
09	ATV 4WD	90	6.60	0.27	0.32	0.50	1.29	1.79	8.98	
09	Bin 1/2 Ton 2Bins #1	30	1.14	0.05	0.06	0.00	0.00	0.00	1.25	
09	Bin 1/2 Ton 2Bins #2	30	1.14	0.05	0.06	0.00	0.00	0.00	1.25	
09	Bin 1/2 Ton 2Bins #3	30	1.14	0.05	0.06	0.00	0.00	0.00	1.25	
09	Bin Trailer 2Bns #1	30	1.89	0.09	0.12	0.16	0.00	0.16	2.26	
09	Bin Trailer 2Bns #2	30	1.89	0.09	0.12	0.16	0.00	0.16	2.26	
09	Bin Trailer 2Bns #3	30	1.89	0.09	0.12	0.16	0.00	0.16	2.26	
09	Mower-Flail 5'	30	7.22	0.36	0.44	3.73	0.00	3.73	11.75	
09	Pickup Truck 1/2 Ton	182	13.13	0.60	0.73	2.36	17.71	20.07	34.53	
09	Sprayer ATV 20gal	60	0.40	0.02	0.02	0.10	0.00	0.10	0.54	
09	Truck Flatbed 20 ft 2 Ton	9	331.52	16.90	20.61	4.81	4.25	9.06	378.09	

UC COOPERATIVE EXTENSION
Table 8. OPERATIONS WITH EQUIPMENT
 NORTH COAST - Napa County 2009

Operation	Operation Month	Tractor	Implement	Labor Hrs	Material	Broadcast Rate/acre	Unit
Cultural:							
Prune: Preprune	Jan			13.00			
Prune: (Cordon-Spur pruned)	Mar			27.00			
Prune: Tie Canes	Mar			12.00			
CM: Trunk/Cordon Suckering	Apr			15.00			
CM: Sucker/Shoot Thin/Shoot Position	May			10.00			
CM: Leaf/Lateral Removal/ Wire Lift	June			20.00			
CM: Leaf/Lateral Removal/ Wire Lift	July			20.00			
CM: Thin Crop (color thin)	July			10.00			
CM: Thin Crop (set thin)	Aug			18.00			
Weed: Spray Vine Row	Jan	ATV	ATV Sprayer		Glyfos	0.50	pt
	July	ATV	ATV Sprayer		Glyfos	0.50	pt
Weed: Mow Middles	Mar	60HP	Mower 5'				
	May	60HP	Mower 5'				
Disease: Mildew	Mar	60HP	Air Blast Sprayer		Wettable Sulfur	3.00	lb
	Apr	60HP	Air Blast Sprayer		Wettable Sulfur	3.00	lb
	May	60HP	Air Blast Sprayer		Stylect Oil	2.00	gal
	June	60HP	Air Blast Sprayer		Rally	4.00	oz
	July	60HP	Air Blast Sprayer		Flint	2.00	oz
	Aug	60HP	Air Blast Sprayer		Pristine	10.00	oz
Frost Protection	Mar	Wind Machine		1.70	Propane	1.20	gal
	Apr	Wind Machine		1.70	Propane	1.20	gal
	May	Wind Machine		1.70	Propane	1.20	gal
Irrigate	May			0.30	Water	*0.57	acin
	June			0.70	Water	*1.15	acin
	July			0.70	Water	*1.15	acin
	Aug			0.70	Water	*1.15	acin
	Sept			0.70	Water	*1.15	acin
	Oct			0.30	Water	*0.57	acin
Fertilize: Through Drip	May				8-8-8	25.50	lb
Harvest:							
Harvest-Hand Labor	September						
Harvest-Bin Handling	September	60HP 4WD	Bin Trailer/Bins		Rented Tractor		
			Bin Trailer/Bins		Rented Tractor		
			Bin Trailer/Bins		Rented Forklift		
Haul	September	Truck Flatbed					

*0.57 acin = 15.478 gal per acre, 1.15 acin = 31,227 gal per acre.