
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURE AND NATURAL RESOURCES
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2016

SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE

ALMONDS



SAN JOAQUIN VALLEY NORTH MICRO SPRINKLER IRRIGATION

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 San Joaquin Valley North - 2016
 Micro Sprinkler Irrigation

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INTRODUCTION

Sample costs to establish an almond orchard and produce almonds under micro sprinkler irrigation in the Northern San Joaquin Valley are presented in this study. This study is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on early 2016 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 1 and 2 to enter your estimated costs.

For an explanation of calculations used in the study refer to the section titled Assumptions. For more information contact Christine Gutierrez or Donald Stewart: University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or cagut@ucdavis.edu, destewart@ucdavis.edu

Sample Cost of Production Studies for many commodities can be downloaded at <http://coststudies.ucdavis.edu>, Archived studies are also available on the website.

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ASSUMPTIONS

The assumptions refer to Tables 1 to 8 and pertain to sample costs to establish an orchard and produce almonds under micro sprinkler irrigation in the northern San Joaquin Valley. The cultural practices described represent production operations and materials considered typical for a well-managed farm in the region. Costs, materials, and practices in this study will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure. The study is intended as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

Farm. The hypothetical farm consists of 105 contiguous acres farmed by the owner. Smaller non-contiguous parcels may have additional costs for travel time and equipment re-calibration. Larger farms will have increased efficiencies and lower per acre costs. Almonds are being established on 100 acres; roads, irrigation systems and farmstead occupy five acres.

Establishment Cultural Practices and Material Inputs

Site Preparation. This 100-acre orchard is established on land previously planted to an orchard. The land is assumed to be well drained and either a class I or II soil. The existing well and main lines stay in place, while the sub-main lines, lateral lines and emitters are removed and replaced as part of the new micro-sprinkler irrigation system.

Orchard Removal/Land Preparation. Fifty percent of the cost to remove the old orchard is charged to this crop. A custom operator uses a dozer to push over the trees. A front end loader with a clamp grabs the trees and hauls them to the horizontal grinder to mulch the wood. The chips are spread over the entire orchard. The ground is cross-ripped to a 3 – 4 foot depth by a custom operator to break up hardpan and pull up remaining tree roots, disking twice, and fumigated in the fall, then left unattended over the winter. A custom operator fumigates the tree row area (11 foot strip) with Telone C35. Fumigation costs also include the grower disking and rolling in the tree row behind the custom fumigator. Prior to planting in January, using GPS, a custom operator makes berms and marks the planting sites. The irrigation system is installed and the area between the tree rows are floated/smoothed which also fills in the berms, borrow pits. Fall operations that prepare the orchard for planting are done the year prior to planting, but costs are shown in the first year.

Trees. No specific almond variety is planted in this study, but cultural practices are based on mid- season varieties. Almond orchards will include two or more varieties in which pollen shedding and bloom periods overlap to insure good pollination. Cultivars that might be planted in this region include: Mid-blooming; Nonpareil, Monterey and Aldrich. Independence-Almond self-cultivating variety is available. Planting densities may range from 75 to 180 trees per acre. In this study, 130 trees per acre are planted on a 16' X 21' spacing (tree x row). The life of the orchard at the time of planting is estimated to be 25 years.

Plant. In January, the trees are planted, topped, trimmed, painted, and a tree wrap placed around the trunk. The tree wrap, (carton) protects against above ground rodents, herbicide sprays, and sunburn. The trees are given 3-5 gallons of water at planting. Contract labor companies who specialize in orchard planting do the planting operation using a machine. In this study, the trees are not staked. In the second year, two trees per acre are replanted and this cost is reflected in the establishment costs.

Train/Prune. Training, which includes suckering and light pruning for shaping is done during February or March of the first three years. Tree tying, (training and for light penetration) is done late (November/December)

in the second year or early (January/February) in the third and fourth year. The tie (small rope) is made around the tree about one-third of the way from the top of the tree. The young trees are pruned late to avoid bacterial canker. In the fourth and following years, pruning is done in November – January, removing limbs for equipment access and safety.

Winter Sanitation. In December of the third year and subsequent years, the mummy nuts are shaken from the trees and blown into the row middles for shredding. A custom operator shakes and blows the mummies, which are shredded by the grower.

Fertilization. Beginning in the second year, leaf samples (5 per 100 acres) are taken in July for nutrient analysis. Fertilizers should be applied according to the analysis results. Fertilizer rates in this study are typical nutrient requirements, but do not take into account soil and water nitrogen. In the first year, equally applications of nitrogen (N) are made once per month starting in March and continuing through July. The fertilizer (15-15-15) is broadcast by hand near the base of the tree. In the second year, N is applied monthly from April to August through the irrigation system. CAN-17 (11% of N budget) is applied during the first two applications and UAN32 thereafter. In year three and the following years, UAN32 is applied monthly from March-July and potassium sulfate (K₂SO₄) is banded along the tree row in the fall. In years one and two, zinc is applied with the rust spray in late March and with the shot hole/scab spray in the following years. In October of the second and subsequent years, Solubor (boron) is applied as a foliar spray. Many orchards on the eastside of the northern San Joaquin Valley are boron deficient and additional boron may be required. Annual rates of actual N, K, and B used in this study are shown in Table A.

Table A. Fertilizer Applied-lbs./Ac				Table B. Annual Applied Water		Table C. Annual Yields	
Year	N	K ₂ SO ₄	B	Year	Acre- inch	Year	Kernel lbs.
1	35	0	0.0	1	11	3	400
2	60	0	0.4	2	21	4	800
3	90	80	1.0	3	32	5	1,600
4	120	160	1.0	4+	42	6+	2,200
5	160	320	1.0				

Sampling. Tree nutrient status is determined by leaf and hull analysis. Beginning in the third year, leaf samples are taken to determine nitrogen deficiencies. Hull samples for boron analysis (2.5/ 100 acres) are taken, immediately prior to or at harvest. The PCA uses an ATV to collect the samples. The PCA sends the samples to a commercial lab for analysis, the charges shown are for the lab analysis.

Irrigation. Water is pumped from a well and passes through an infiltration system into the micro-sprinklers. Water is applied to the orchard approximately twice a week from mid-March through mid-October. Price per acre-foot of water will vary by grower depending on water source – well or district water, well characteristics, and water district. In this study, irrigation pumping costs are estimated at \$100 per acre foot or \$8.33 per acre inch. Table B shows the applied water for each year in this study. Applied water values are substantially greater than the actual tree water requirement due to application inefficiency. Application efficiencies of 90 percent are used for all years and reflect the differences in evaporative loss due to canopy development. Effective rainfall has not been considered in this study because it is too variable; therefore it is assumed that the season begins with a full soil profile. A water analysis should be done annually to determine nitrate availability and to maintain regulatory records and is included in this study. Irrigation labor is listed as a separate line item.

Frost Protection. Frost protection begins in the fourth year and uses two acre-inches annually. Protection may be needed from February through March, not every year and amount of protection will vary. This study assumes two acre-inches of water will be applied annually. This water is in addition to the amounts of water shown in Table B.

Pollination. A commercial beekeeper sets out one-half hive per acre in the third year, one hive in the fourth year, two hives in the fifth year and two and one-half hives in the sixth year. Bee colony strength should be a standard 8 frames per hive and the cost ranges from \$150-\$225 per hive. For this study, \$180 per hive is charges.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Almonds*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. **Although growers commonly use the pesticides mentioned, many other pesticides are available. Check with your PCA and/or the UC IPM website for current recommendations.** For information and pesticide use permits, contact the local county agricultural commissioner's office. Pesticides with different active ingredients, mode of action, and sites of action should be rotated as needed to combat species shift and resistance. Adjuvants are recommended for use with many pesticides for effective control, but the adjuvants and their costs are not included in this study.

Pest Control Adviser (PCA/CCA). The PCA or crop consultant monitors the field for agronomic problems including pests and nutrition and writes pesticide recommendations. Growers may hire private PCAs or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. For this study, the PCA charge is \$20 per acre during the establishment years and \$35 per acre during the production years.

Bees: Bees are sensitive to pesticides and timing of applications must coordinate with bee pollinating activity. **See the individual pesticide labels, environmental hazards section, for these requirements in the following publication:** Oregon State University, “How to Reduce Bee Poisonings from Pesticides”: <https://catalog.extension.oregonstate.edu/pnw591>

Vegetation Management-Weeds. In the first year, Gramoxone and Prowl are applied to the tree row (strip spray) in February soon after planting. Also, the row middles are disked, floated and then mowed four times during the year. Spot sprays are usually applied as needed; in this study, Gramoxone is applied as a spot spray in the tree row during June.

In the second year, the row middles are mowed seven times, once per month from March through September and six times thereafter, March through August. Roundup is applied as a spot spray, once (April) during the growing season to the tree row in the second year, but is usually applied as needed. Prowl and Roundup are applied to the tree row during the dormant season (December).

Beginning in the third year, the dormant strip spray (Matrix and Roundup) is applied to the tree row in the fall, or winter (November). A pre-harvest spray (Roundup and Goal 2XL) is applied to the orchard floor starting in the third year to clean up the row middles prior to harvest. Although no cost is shown, ammonium sulfate may be used with all sprays to increase efficacy.

Insects. In May of the first and following years, mites are controlled with an Agri-Mek application. Beginning in July of the third year, ant bait (Clinch) is sprinkled on the berms for ant control. Navel orange worms (NOW) are treated with Intrepid beginning in July (hull split spray) of the third year.

Diseases. Rust control is done in the first and second year with an application of Abound (zinc included with spray). In the third and following years, brown rot is treated in February (60 to 80% bloom) with Vanguard; shot hole, scab and rust are treated in March (petal fall or afterwards) with Pristine or Abound (zinc included with spray). Bravo is applied at petal fall for shot hole, scab and anthracnose. Sprays are usually applied with a handgun sprayer during the first two years and with an air blast sprayer, thereafter. Materials are applied at

reduced volumes during the first three years, because of the small tree size.

Vertebrate Pests. Gophers are managed in the first three years with poison bait. In the spring of the first year, a tractor and bait applicator are used to apply poison bait for gopher control. In the spring of years two and three bait is applied using a hand applicator. Beginning in the fourth year, gophers are thought to be under control and spot treatment is necessary. Ground squirrels are controlled with traps along the perimeter of the orchard. The grower uses an ATV to check the traps. See the following websites for additional information.

http://ucanr.org/sites/Ground_Squirrel_BMP/.

<http://www.ipm.ucdavis.edu/PMG/menu.vertebrate.html>.

Harvest. Harvest starts in the third year using contract labor for hand harvest (knocking/poling). The nuts are swept into the centers and picked up mechanically. Mechanical harvesting, (shaking) by a custom operator begins in the fourth year. Typical annual yields for almonds are measured in meat (kernel) pounds per acre and are shown in Table C.

Production Cultural Practices and Material Inputs

(Tables 2-8)

Pruning. Maintenance hand pruning for safety and equipment access is done in November - January in this study, but can be done anytime from harvest through the dormant period. Prunings are stacked in the row middles and shredded by a custom operator. Tying and roping may continue to year 7 or 8 depending on previous training and variety.

Winter Sanitation. Winter (December) sanitation destroys over wintering sites for navel orange worm. The mummy nuts are shaken from the trees, dropped to the orchard floor, blown into the row middles and shredded with a flail mower. Winter sanitation operations except for the shredding are custom hired. Hand poling may be needed in low rainfall years.

Fertilization. Nitrogen (N) at 200 pounds per acre per season as UAN32 is applied monthly March through September through the irrigation system. Neutral zinc at five pounds per acre is foliar applied with an insecticide or fungicide spray at pink bud in March. Potassium sulfate is banded in the fall (October) along the tree row at 420 pounds K₂SO₄ per acre. Boron at 0.4 pounds per acre or two pounds of Solubor is foliar applied in October.

Sampling. Tree nutrient status is determined by leaf and hull analysis. Leaf samples at (5/100 acres) are taken in July. A hull sample at (2.5/100 acres) is taken from the windrow at harvest. The PCA uses an ATV to collect the samples. The PCA sends the samples to a commercial lab for analysis, the charges shown are for the lab analysis. A water analysis should be done annually to determine nitrate availability and to maintain regulatory records which is included in this study.

Irrigation/Frost Protection. Irrigation costs include pumping (water) and labor costs. The water is pumped from a well and passes through an infiltration system and fed into a micro-sprinkler system. Forty-two acre-inches of water are applied to the orchard based on 90 percent application efficiency from March to October. Applied water values are greater than the actual tree water requirement due to application inefficiency. No assumption is made about effective rainfall. An additional two acre inches are applied in February and/or March for frost protection. Water cost or pumping costs are \$8.33 per acre inch, (\$100/AcFt) inch based on current pumping rates. Rates will vary depending upon pump and well specifications and rate program selected.

Pollination. Two and half hives (8+ frames/hive) per acre are contracted for pollination and set in the orchard by the beekeeper prior to bloom (February).

Pest Management. See Pest Management in the previous section.

Vegetation Management-Weeds. A dormant strip spray is applied in November or December using pre-emergent and contact herbicides (Roundup, Matrix) to control weeds in the tree rows. Row middles are mowed six times, once per month March through August. Rely is applied as a strip or spot spray in April/May or as needed. A pre-harvest spray (Roundup, Goal 2XL) is applied in August to prepare the orchard floor for harvest.

Insect and Mite. Mites are sprayed with Agri-Mek in May. Clinch is applied on the berms in July for ant control. At the beginning of hull split in July, Intrepid is applied to control navel orange worm (NOW). NOW is also managed by early harvest and winter sanitation. Check for San Jose scale; in some year's dormant oil applications may be necessary, also if twig borers are present additional sprays may be needed.

Disease. Brown rot is controlled at 60 to 80 percent bloom in February with Vanguard. Shot hole, scab and rust treatments with Pristine or Abound, are made in March at petal fall or afterwards. Also at petal fall, brown rot, scab and anthracnose are controlled with an application of Bravo.

Vertebrate Pests. Spot treatment of gophers is necessary in March and August. The grower uses the ATV to move around the field and distribute the bait where needed. Ground squirrels are managed using traps. The traps are placed on two sides of the field and moved regularly. The grower uses an ATV to check the traps. The traps are checked weekly from March through June and again in September and October. The costs of the traps, \$8.50 per trap, are included in Shop/Field Tools under investments.

Harvest. A custom operator mechanically harvests the almond crop. The grower furnishes labor for hand raking to move nuts missed by the sweeper into the windrows. Harvest begins in August with the early maturing varieties and continues into October for late maturing varieties. In this study, harvest is in September. An inertia trunk shaker is the most common shaker in almonds. The shaker head attaches to the tree trunk to shake the nuts from the tree. The nuts fall to the ground and in a separate operation are blown from around the tree and swept into windrows to dry. A pickup machine gathers the nuts from the windrow and loads them into a cart or bankout wagon. In this study the nuts are elevated or dumped into bottom dump trailers with extended sides for delivery to the huller.

Yields. Typical annual yields for almonds are measured in pounds of kernels (meats) per acre and are shown in Table C. Yields will vary by location, grower, year, and age of orchard. For this study, it is assumed the orchard will average 2,200 pounds per acre for the life of the orchard.

Returns. In this study, the almond meats are sold for \$2.50 per pound based on reported current returns. A range of returns and yields are shown in the Ranging Analysis in Table 6.

Almond Hulls and By-Products. Growers can belong to a non-profit almond hull Cooperative. The hulls are high in fiber and can be sold as a feed additive. Other by-products include shells, almond hash, huller dust, and press cakes which all can be used as livestock feed. Wood for firewood, and wood chips for composting, from tree removal is another source of income from the orchard. No additional income from hull by-products are shown in this study.

Assessment. The Almond Board of California assesses all almonds commercially grown in the state to pay for almond promotions and research. The mandatory assessment is paid by processors and is not reflected in grower costs.

Pickup/ATV. The study assumes business use of 100 minutes per acre per year for the half-ton pickup. The ATV is charged at 50 minutes per acre per year. The ATV is used for spraying, baiting ants, gophers and checking squirrel traps. Each vehicle is shown as a separate line item.

Labor, Equipment, and Interest

Labor. Hourly wages for workers are \$14.00 for machine operators and \$12.00 per hour non-machine labor. Adding 40 percent for the employer's share of federal and state payroll taxes, workers compensation insurance, for nut crops (0045) and other possible benefits gives the labor rates shown of \$19.60 and \$16.80 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 2016. Labor time for operations involving machinery is 20 percent higher than the equipment time 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 diesel and gasoline are \$2.49 and \$2.77 per gallon, respectively. The cost includes a 2.5 percent local sales tax on diesel fuel and 7.5 percent sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income tax. 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 percent 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 4.25 percent 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 rate will vary depending upon various factors, but the rate in this study is considered a typical lending rate by a farm lending agency as of January 2016.

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 of almond production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner, in various combinations for a sustainable operation.

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 percent 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 percent of the average value of the property.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. This provides coverage for property loss and is charged at 0.843 percent of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, injury or damage to another's property. In this study, \$792 is charged and covers the entire farm.

Crop Insurance. This is available to Almond growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50-85 percent of the approved average yield as established by verifiable production records from the orchard. Actual insurance coverage is by unit, not by acre. A significant number of growers purchase crop insurance in this region. Due to variability in coverages no level is specified in this study.

Office Expense. Office and business expenses are estimated at \$60 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, shop and office utilities, and miscellaneous administrative charges. Office expenses are estimated and not taken from any collected data.

Environmental/Regulatory Costs. Various environmental fees are collected by the county and state. The fees will vary by county. For example there are fees assessed by the Air Resources Board (state agency) regulating air pollution, a Water Coalition Fee (local coalition), formerly called an Ag Waiver Fee for water discharges, and hazardous material storage fee (local coalition). The grower must also provide safety training, safety equipment, and maintain training records. For this study, a cost of \$10.00 per acre or \$1,000 for the farm is assumed.

Sanitation Services. Sanitation services provide one portable toilet and cost the farm \$800 annually or \$8 per acre. The cost includes one double toilet unit with washbasin, delivery and 4 months of weekly service.

Managers Salary. No salary is shown. The farm is owned and operated by the grower, therefore returns above cost are assumed to go to management (grower).

Investment Repairs. Annual maintenance is calculated as two percent of the purchase price, except for tree replacement in the orchard. The average tree replacement cost over the life of the orchard is assumed to be 0.10 percent of the establishment cost or \$633 (\$6.33 per acre) per year.

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 3.25 percent is used to calculate capital recovery. The rate will vary depending upon size of loan and other lending agency conditions, but is a suggested rate by a farm lending agency in January 2016.

Land. Land with available surface water, (TID, MID) ranges from \$16,500 to \$37,000 per acre. Land in this study is valued at \$25,000 per acre.

Establishment Cost. Costs to establish the orchard are used to determine capital recovery expenses, depreciation, and interest on investment for the production years. Establishment cost is the sum of the costs for land preparation, planting, trees, cash overhead and production expenses for growing the trees through the first year that almonds are harvested minus any returns from production. The Total Accumulated Net Cash Cost on Table 1, in the third year represents the establishment cost. For this study, the cost is \$6,526 per acre or \$652,600 for the 100-acre orchard. The establishment cost is spread over the remaining 22 years of the 25 years the orchard is in production. Establishment costs in this study are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations, and other factors.

Tree Replacement. One or more trees per acre may die each year and are replaced in late winter. Costs in this study are basic costs that will vary with each orchard and type of tree loss. Tree replacement is included in investment repairs under Cash Overhead.

Irrigation System. The pump and well cost is based on one 75 horsepower electric pump lifting from a water level depth of 75 feet. The pump and 300-foot deep well, already existed on the site. The cost of the irrigation system is for the recasing of the well and refurbishing the pump. The sprinkler system costs include the installation of new filtration and chemigation systems, buried main lines and micro-sprinklers. A separate 125 HP booster pump, is used to pump the water through the filtration station out into the sprinkler system. The capacity of this system can irrigate the entire orchard. The life of the irrigation system is estimated to be 25 years. The irrigation system is considered an improvement and is shown in the non-cash overhead sections of the tables and the investment portion of Table 7. An annual pump test is performed in December or January to

monitor pumping level and efficiency (gallons/minute) at a cost of \$200 per pump for the test. Both pumps are tested and the cost is spread out over the total acreage of the orchard.

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 percent to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 6. 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.

Shop/Pole Barn. The 2500 Sqft shop/pole barn is used for equipment storage. The building is located on the grower owned land.

Shop/Field Tools. This includes shop tools and equipment, hand tools, miscellaneous field tools, pruning equipment, and vertebrate traps. The frost protection alarm is also included in this cost.

Fuel Tanks. Two 1,000-gallon fuel tanks using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state, and county regulations.

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

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UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
Table 1. COSTS PER ACRE TO ESTABLISH AN ALMOND ORCHARD
 San Joaquin Valley-North 2016

Year:	Cost Per Acre				
	1st	2nd	3rd	4th	5th
Meat Pounds Per Acre: @ \$2.50/lb.			400	800	1,600
Pre-Plant:					
Orchard Removal-Grinder 50% Ac	375				
Spread Chips	125				
Rip-3' Depth-Root Removal 50% Ac	117				
Rip-4' Depth	150				
Disc & Roll 2X	50				
Laser Level	70				
Soil Fumigate-Tree Row Strip	1,400				
Make Berms/Tree Rows (GPS)	30				
Smooth/Float Between Rows	30				
TOTAL PRE-PLANT COSTS	2,347				
Plant:					
Dip Roots/Plant/Top	1,241				
Whitewash/Wrap/Irrigate	62				
TOTAL PLANTING COSTS	1,304				
Cultural:					
Frost Protection-Irrigate				17	17
Pollination-Bee Hives			90	180	360
Pest-Disease/Fertilize-(Zn)	20	35	48	50	69
Pests-Disease			60	60	60
Pests-Mites	8	11	19	21	21
Pests-Insects-NOW			44	44	44
Pests-Insects-Ants			3	12	12
Pests-Vertebrate/Gophers	16	23	23	14	14
Pests-Vertebrate/Squirrels				25	25
Irrigate	92	175	267	350	350
Irrigation Labor	60	63	54	81	81
Irrigation-Well/Water-Test/Analysis	5	5	5	5	5
Fertilize-Hand (15-15-15)	187				
Fertigate-(CAN17)/(UAN32)		40	52	70	93
Fertilize-Foliar (Boron)		6	11	11	11
Fertilize-Banded (K2SO4-50%)			35	64	122
Fertilize-Lab Analysis (Leaf/Hull)			2	2	2
Prune/Train/Sucker/Tie Ropes/Stack Brush	76	59	141	97	57
Shred Brush			20	20	20
Pests-Weeds-Disc Middles	9				
Pests-Weeds-Float Middles	9				
Pests-Weeds-Mow Middles	17	30	26	26	26
Pests-Weeds-Broadcast Spray-Pre-Harvest			29	32	32
Pests-Weeds-Spot Spray	5	10			
Pests-Weeds-Dormant-Strip Spray	35	30	38	38	38
Winter Sanitation-Shake/Blow/Mow			45	109	109
PCA Fee	20	20	20	35	35
Pickup 1/2 Ton Farm Use	41	55	55	55	55
ATV Farm Use	21	25	25	25	32
TOTAL CULTURAL COSTS	621	585	1,109	1,441	1,687

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

Table 1. CONTINUED
San Joaquin Valley-North 2016

Year	Cost Per Acre				
	1st	2nd	3rd	4th	5th
Meat Pounds Per Acre @ \$2.50/Lb.			400	800	1,600
Harvest:					
Pole Trees			46		
Shake Trees				94	94
Sweep Nuts				75	75
Hand Rake/Blow Nuts			15	4	10
Pick up/Haul Nuts			38	38	56
Hull/Shell Nuts			20	40	80
TOTAL HARVEST COSTS			119	250	315
Interest On Operating Capital @ 4.25%	147	10	17	20	25
TOTAL OPERATING COSTS/ACRE	4,419	595	1,245	1,711	2,027
Cash Overhead:					
Office Expense	60	60	60	60	60
Liability Insurance	8	8	8	8	8
Sanitation Fees	8	8	8	8	8
Environmental Fee	10	10	10	10	10
Property Taxes	264	264	265	297	297
Property Insurance	22	22	22	25	25
Investment Repairs	50	50	50	56	56
TOTAL CASH OVERHEAD COSTS	422	422	423	465	465
TOTAL CASH COSTS/ACRE	4,841	1,017	1,668	2,176	2,492
INCOME/ACRE FROM PRODUCTION			1,000	2,000	4,000
NET CASH COSTS/ACRE FOR THE YEAR	4,841	1,017	668		
PROFIT/ACRE ABOVE CASH COSTS				176	1,508
ACCUMULATED NET CASH COSTS/ACRE	4,841	5,858	6,526	6,350	4,842
NON-CASH OVERHEAD:					
Buildings 4000SqFt	34	34	34	34	34
Fuel Tanks 2-1,000Gal	7	7	7	7	7
Booster Pump 125HP	13	13	13	13	13
Shop/Field Tools	8	8	8	8	8
Irrigation System-Micro	89	89	89	89	89
Land SJV	813	813	813	813	813
Establishment Costs				420	420
Equipment	20	23	37	37	37
TOTAL NON-CASH OVERHEAD COST/ACRE	985	988	1,001	1,421	1,421
TOTAL COST/ACRE FOR THE YEAR	5,826	2,005	2,669	3,597	3,913
INCOME/ACRE FROM PRODUCTION			1,000	2,000	4,000
TOTAL NET COST/ACRE FOR THE YEAR	5,826	2,005	1,669	1,597	
NET PROFIT/ACRE ABOVE TOTAL COSTS					87
TOTAL ACCUMULATED NET COST/ACRE	5,826	7,831	9,500	11,097	11,010

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
Table 2. COSTS PER ACRE TO PRODUCE ALMONDS
 San Joaquin Valley-North 2016

Operation	Equipment Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:								
Prune-Dormant/Tie Ropes	0.00	34	0	0	15	0	49	
Pollination-Bee Hives	0.00	0	0	0	0	450	450	
Pests-Disease 2X	0.50	12	6	4	39	0	60	
Frost Protection-Irrigate	0.00	0	0	0	17	0	17	
Pest-Disease/Fertilize (Zn)	0.25	6	3	2	58	0	69	
Pests-Vertebrate/Gophers 2X	0.00	8	0	0	6	0	14	
Weeds-Mow Middles 6X	0.59	14	7	6	0	0	26	
Irrigate	0.00	0	0	0	350	0	350	
Irrigation labor	0.00	59	0	0	0	0	59	
Irrigation-Well/Water-Test/Analysis	0.00	0	0	0	0	5	5	
Pests-Vertebrate/Squirrels 6X	0.00	25	0	0	0	0	25	
Fertigate-UAN32 7X	0.00	0	0	0	116	0	116	
Pests-Mites	0.25	6	3	2	11	0	21	
Fertilize-Leaf Analysis	0.00	0	0	0	0	1	1	
Pests-Insects-NOW	0.25	6	3	2	33	0	44	
Pests-Insects Ants	0.00	0	0	0	3	0	3	
Pests-Weeds Pre-Harvest	0.20	5	0	1	26	0	32	
Fertilize-Foliar (Boron)	0.25	6	3	2	1	0	12	
Fertilize-Hull Analysis	0.00	0	0	0	0	1	1	
Fertilize-Banded (K2SO4 50%)	0.19	4	1	2	151	0	158	
Pests-Weeds Strip Spray Dormant	0.20	5	0	1	32	0	38	
Stack Brush	0.00	8	0	0	0	0	8	
Shred Brush	0.00	0	0	0	0	40	40	
PCA Fee	0.00	0	0	0	0	35	35	
Winter Sanitation-Shake/Blow/Mow	0.10	7	1	1	0	100	109	
Pickup Truck Use	1.67	39	10	5	0	0	55	
ATV Use	1.25	29	1	1	0	0	32	
TOTAL CULTURAL COSTS	5.69	272	38	28	857	632	1,827	
Harvest:								
Shake-Trees	0.00	0	0	0	0	125	125	
Sweep-Windrow Nuts	0.00	0	0	0	0	75	75	
Hand Rake/Blow Nuts	0.00	13	0	0	0	0	13	
Pickup/Haul Nuts	0.00	0	0	0	0	75	75	
Hull/Shell Nuts	0.00	0	0	0	0	110	110	
TOTAL HARVEST COSTS	0.00	13	0	0	0	385	398	
Interest on Operating Capital at 4.25%							27	
TOTAL OPERATING COSTS/ACRE	5.69	285	38	28	857	1,017	2,251	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
Table 2. CONTINUED
 San Joaquin Valley-North 2016

Operation	Cash and Labor Costs per Acre							Total Cost	Your Cost
	Equipment Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Costs	Custom/ Rent			
CASH OVERHEAD:									
Environmental Fees SJV								10	
Liability Insurance								8	
Office Expense								60	
Sanitation Fee SJV								8	
Property Taxes								297	
Property Insurance								25	
Investment Repairs								56	
TOTAL CASH OVERHEAD COSTS/ACRE								465	
TOTAL CASH COSTS/ACRE								2,715	
NON-CASH OVERHEAD:									
		Per Producing Acre		Annual Cost Capital Recovery					
Pole Barn 2500 SqFt		500		34				34	
Fuel Tanks 2-1,000Gal		110		7				7	
Booster Pump 125HP		230		13				13	
Shop/Field Tools		150		8				8	
Irrigation System-Micro SJV-N		1,500		89				89	
Land SJV		25,000		813				813	
Establishment Costs SJV-north		6,526		420				420	
Equipment		355		37				37	
TOTAL NON-CASH OVERHEAD COSTS		34,370		1,421				1,421	
TOTAL COSTS/ACRE								4,137	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMOND
 San Joaquin Valley-North 2016

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Almonds	2,200	Lb	2.50	5,500	
TOTAL GROSS RETURNS	2,200	Lb		5,500	
OPERATING COSTS					
Herbicide:				58	
Roundup Ultra Max	56.00	FlOz	0.27	15	
Goal 2XL	16.00	FlOz	1.08	17	
Matrix SG	4.00	Oz	6.37	25	
Fungicide:				91	
Vanguard WG	5.00	Oz	5.34	27	
Abound	14.00	FlOz	3.70	52	
Bravo-Weatherstik	48.00	FlOz	0.25	12	
Insecticide:				47	
Agri-Mek 0.15EC	15.00	FlOz	0.70	11	
Intrepid 2F	1.50	Pint	21.88	33	
Clinch	0.25	Lb	12.74	3	
Rodenticide:				6	
Vertebrate Pest Bait	3.00	Lb	1.92	6	
Tree Aids:				15	
Tree Tying Rope	500.00	Foot	0.03	15	
Custom:				1,017	
Pollination Fee	2.50	Hive	180.00	450	
Irrigation Pump Test	0.02	Each	200.00	4	
Irrigation Water Analysis	0.02	Each	50.00	1	
Leaf Analysis	0.03	Each	20.00	1	
Shake Trees	1.50	Hour	125.00	188	
Sweep	1.50	Hour	75.00	113	
Pickup/Haul Nuts SJV-N	1.00	Hour	75.00	75	
Hull/Shell Nuts SJV north	2200.00	Lb	0.05	110	
Hull Analysis	0.05	Each	20.00	1	
Shred Prunings	0.40	Hour	100.00	40	
PCA/CCA Fee (Prod Yrs.)	1.00	Acre	35.00	35	
Irrigation:				367	
Water-Pumped	44.00	AcIn	8.33	367	
Fertilizer:				285	
Neutral Zinc 50%	5.00	Lb	1.30	7	
UAN32 (32-0-0)	200.00	Lb N	0.58	116	
Solubor	2.00	Lb	0.72	1	
Potassium Sulfate-K2SO4	420.00	Lb	0.36	151	
Labor				285	
Equipment Operator Labor	6.83	hrs	19.60	134	
Pruning Labor	2.50	hrs	16.80	42	
Non-Machine Labor	3.00	hrs	16.80	50	
Irrigation Labor	3.50	hrs	16.80	59	
Machinery				65	
Fuel-Gas	0.62	gal	2.77	2	
Fuel-Diesel	14.54	gal	2.49	36	
Lube				6	
Machinery Repair				22	
Interest on Operating Capital @ 4.25%				27	
TOTAL OPERATING COSTS/ACRE				2,251	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. MONTHLY COSTS PER ACRE TO PRODUCE ALMOND
 San Joaquin Valley-North 2016

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Cultural:													
Prune-Dormant/Tie Ropes	49												49
Pollination-Bee Hives		450											450
Pests-Disease 2X		37		23									60
Frost Protection-Irrigate		8	8										17
Pest-Disease/Fertilize (Zn)			69										69
Pests-Vertebrate/Gophers 2X			7					7					14
Weeds-Mow Middles 6X			4	4	4	4	4	4					26
Irrigate			8	27	44	60	75	65	46	25			350
Irrigation labor			59										59
Irrigation-Well/Water-Test/Analysis			5										5
Pests-Vertebrate/Squirrels 6X			4	4	4	4			4	4			25
Fertigate-UAN32 7X			16	17	17	17	17	17	17				116
Pests-Mites					21								21
Fertilize-Leaf Analysis							1						1
Pests-Insects-NOW							44						44
Pests-Insects Ants							3						3
Pests-Weeds Pre-Harvest								32					32
Fertilize-Foliar (Boron)										12			12
Fertilize-Hull Analysis									1				1
Fertilize-Banded (K2SO4 50%)										158			158
Pests-Weeds Strip Spray Dormant											38		38
Stack Brush											8		8
Shred Brush											40		40
PCA Fee											35		35
Winter Sanitation-Shake/Blow/Mow												109	109
Pickup Truck Use	5	5	5	5	5	5	5	5	5	5	5	5	55
ATV Use	3	3	3	3	3	3	3	3	3	3	3	3	32
TOTAL CULTURAL COSTS	56	503	189	82	97	93	150	131	75	207	128	116	1,827
Harvest:													
Shake-									125				125
Sweep-Windrow Nuts									75				75
Hand Rake/Blow Nuts									13				13
Pickup/Haul Nuts									75				75
Hull/Shell Nuts									110				110
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	398	0	0	0	398
Interest on Operating Capital @ 4.25%	0	2	3	3	3	4	4	5	6	-1	-1	0	27
TOTAL OPERATING COSTS/ACRE	56	505	191	85	101	96	155	136	479	205	127	115	2,251
CASH OVERHEAD													
Environmental Fees SJV									10				10
Liability Insurance	1	1	1	1	1	1	1	1	1	1	1	1	8
Office Expense	5	5	5	5	5	5	5	5	5	5	5	5	60
Sanitation Fee SJV									8				8
Property Taxes		148							148				297
Property Insurance		12							12				25
Investment Repairs	5	5	5	5	5	5	5	5	5	5	5	5	56
TOTAL CASH OVERHEAD COSTS	10	171	10	10	10	10	10	10	189	10	10	10	465
TOTAL CASH COSTS/ACRE	66	676	202	95	111	107	165	146	668	215	138	126	2,716

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 5. RANGING ANALYSIS - ALMOND

San Joaquin Valley-North 2016

COSTS PER ACRE AND PER LB AT VARYING YIELDS TO PRODUCE ALMOND

	YIELD (LBS.)						
	1,000.00	1,400.00	1,800.00	2,200.00	2,600.00	3,000.00	3,400.00
OPERATING COSTS/ACRE:							
Cultural	1,827	1,827	1,827	1,827	1,827	1,827	1,827
Harvest	186	259	328	398	467	537	609
Interest on Operating Capital @ 4.25%	26.08	26.33	26.58	26.82	27.07	27.32	27.57
TOTAL OPERATING COSTS/ACRE	2,039	2,112	2,181	2,251	2,321	2,391	2,463
TOTAL OPERATING COSTS/LB	2.04	1.51	1.21	1.02	0.89	0.80	0.72
CASH OVERHEAD COSTS/ACRE	465	465	465	465	465	465	465
TOTAL CASH COSTS/ACRE	2,504	2,576	2,646	2,716	2,786	2,855	2,928
TOTAL CASH COSTS/LB	2.50	1.84	1.47	1.23	1.07	0.95	0.86
NON-CASH OVERHEAD COSTS/ACRE	1,421	1,421	1,421	1,421	1,421	1,421	1,421
TOTAL COSTS/ACRE	3,925	3,998	4,067	4,137	4,207	4,277	4,349
TOTAL COSTS/LB	3.93	2.86	2.26	1.88	1.62	1.43	1.28

Net Return per Acre above Operating Costs for Almond

PRICE (\$/lb)	YIELD (lbs./acre)						
Almonds	1000.00	1400.00	1800.00	2200.00	2600.00	3000.00	3400.00
1.00	-1,039	-712	-381	-51	279	609	937
1.50	-539	-12	519	1,049	1,579	2,109	2,637
2.00	-39	688	1,419	2,149	2,879	3,609	4,337
2.50	461	1,388	2,319	3,249	4,179	5,109	6,037
3.00	961	2,088	3,219	4,349	5,479	6,609	7,737
3.50	1,461	2,788	4,119	5,449	6,779	8,109	9,437
4.00	1,961	3,488	5,019	6,549	8,079	9,609	11,137

Net Return per Acre above Cash Costs for Almond

PRICE (\$/lb)	YIELD (lbs./acre)						
Almonds	1000.00	1400.00	1800.00	2200.00	2600.00	3000.00	3400.00
1.00	-1,504	-1,176	-846	-516	-186	145	472
1.50	-1,004	-476	54	584	1,114	1,645	2,172
2.00	-504	224	954	1,684	2,414	3,145	3,872
2.50	-4	924	1,854	2,784	3,714	4,645	5,572
3.00	496	1,624	2,754	3,884	5,014	6,145	7,272
3.50	996	2,324	3,654	4,984	6,314	7,645	8,972
4.00	1,496	3,024	4,554	6,084	7,614	9,145	10,672

Net Return per Acre above Total Costs for Almond

PRICE (\$/lb)	YIELD (lbs./acre)						
Almonds	1000.00	1400.00	1800.00	2200.00	2600.00	3000.00	3400.00
1.00	-2,925	-2,598	-2,267	-1,937	-1,607	-1,277	-949
1.50	-2,425	-1,898	-1,367	-837	-307	223	751
2.00	-1,925	-1,198	-467	263	993	1,723	2,451
2.50	-1,425	-498	433	1,363	2,293	3,223	4,151
3.00	-925	202	1,333	2,463	3,593	4,723	5,851
3.50	-425	902	2,233	3,563	4,893	6,223	7,551
4.00	75	1,602	3,133	4,663	6,193	7,723	9,251

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 San Joaquin Valley-North 2016

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
16	Air-Blast PTO 500Gal	25,000	8	5,645	2,970	13	153	3,136
16	Flail Mower 16'	13,203	10	2,335	1,366	7	78	1,451
16	ATV-4WD	8,500	10	2,511	793	5	55	852
16	ATV sprayer 200 gal 21'	9,700	10	1,715	1,004	5	57	1,066
16	Fertilizer Applicator PTO	15,000	10	2,653	1,552	7	88	1,648
16	Pickup Truck 1/2 Ton	28,000	5	12,549	3,806	17	203	4,026
16	85HP4WD Low-Profile Tractor	68,100	15	13,258	5,108	34	407	5,549
16	34HP4WD Tractor	29,452	12	7,363	2,492	16	184	2,691
TOTAL		196,955	-	48,028	19,091	103	1,225	20,419
60% of New Cost*		118,173	-	28,817	11,454	62	735	12,251

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
INVESTMENT								
Pole Barn 2500 SqFt	50,000	20	0	3,439	21	250	1,000	4,710
Fuel Tanks 2-1,000Gal	10,975	20	1,098	715	5	60	220	1,000
Booster Pump 125HP	23,000	25	1,610	1,315	10	123	460	1,909
Shop/Field Tools	15,000	25	1,500	846	7	83	300	1,235
Irrigation System-Micro SJV	150,000	25	0	8,856	63	750	3,000	12,669
Land SJV	2,500,000	25	2,500,000	81,250	2,108	25,000	0	108,358
Establishment Costs SJV	652,600	22	0	41,918	275	3,263	652	46,171
TOTAL INVESTMENT	3,401,575	-	2,504,208	138,402	2,489	29,429	5,632	176,052

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/Farm	Unit	Price/Unit	Total Cost
Environmental Fees SJV	100	Acre	10.00	1,000
Liability Insurance	100	Acre	7.92	792
Office Expense	100	Acre	60.00	6,000
Sanitation Fee SJV	100	Acre	8.00	800

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 7. HOURLY EQUIPMENT COSTS
 San Joaquin Valley-North 2016

Yr.	Description	Almond Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating		Total Costs/Hr.	
					Insurance	Taxes	Lube & Repairs	Fuel		Total Oper.
16	Air-Blast PTO 500Gal	150	250	7.13	0.03	0.37	4.41	0.00	4.41	11.94
16	Flail Mower 16'	68	200	4.10	0.02	0.23	5.68	0.00	5.68	10.03
16	ATV-4WD	165	200	2.38	0.01	0.17	0.78	1.04	1.82	4.38
16	ATV sprayer 200 gal 21'	40	150	4.02	0.02	0.23	2.64	0.00	2.64	6.90
16	Fertilizer Applicator PTO	19	120	7.76	0.04	0.44	5.86	0.00	5.86	14.10
16	Pickup Truck 1/2 Ton	167	400	5.71	0.03	0.30	3.03	6.23	9.26	15.30
16	85HP4WD Low-Profile	240	1066	2.88	0.02	0.23	3.36	10.39	13.76	16.88
16	34HP4WD Tractor	21	1000	1.49	0.01	0.11	2.01	4.16	6.17	7.79

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 8. OPERATIONS WITH EQUIPMENT & MATERIALS
 San Joaquin Valley-North 2016

Operation	Operation Month	Tractor	Implement	Labor Type/	Rate/acre	Unit
Prune-Dormant/Tie Ropes	Jan			Pruning Labor	2.00	hours
				Tree Tying Rope	500.00	Foot
Pollination-Bee Hive	Feb			Pollination Fee	2.00	Hive
Pests-Disease (2x)	Feb	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Vanguard WG	5.00	Oz
	Apr	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Bravo-Weatherstik	48.00	FIOz
Frost Protection-Irrigate	Feb - Mar			Water-Pumped	2.00	AcIn
Pest-Disease/Fertilizer	Mar	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Abound	14.00	FIOz
				Neutral Zinc 50%	5.00	Lb
Pests-Vertebrate/Gophers	Mar & Aug			Non-Machine Labor (2x)	0.25 (2x)	hour
				Vertebrate Pest Bait (2x)	1.50 (2x)	Lb
Weeds-Mow Middles 6X Irrigate	Mar – Aug (6x)	85HP4WD Low-Profile Tractor Mower 16'		Equipment Operator	0.12 (6x)	hour
	Mar			Water-Pumped	1.00	AcIn
	Apr			Water-Pumped	3.25	AcIn
	May			Water-Pumped	5.25	AcIn
	June			Water-Pumped	7.25	AcIn
	July			Water-Pumped	9.00	AcIn
	Aug			Water-Pumped	7.75	AcIn
	Sept			Water-Pumped	5.50	AcIn
	Oct			Water-Pumped	3.00	AcIn
	Irrigation Labor	Mar			Irrigation Labor	3.50
Irrigation-Well/Water-Test	Mar			Irrigation Pump Test	0.02	Each
				Irrigation Water	0.02	Each
Pests-Vertebrate/Squirrels	Mar – Oct (6x)			Non-Machine Labor (6x)	0.25 (6x)	hour
Fertigate-UAN32 (7x)	Mar – Sept (7x)			UAN32 (32-0-0) (7x)	28.40 (7x)	Lb N
Pests-Mites	May	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Agri-Mek 0.15EC	15.00	FIOz
Fertilize-Leaf Analysis	July			Leaf Analysis	0.20	Each
Pests-Insects-NOW	July	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Intrepid 2F	1.50	Pint
Pests-Insects Ants	July			Clinch	0.25	Lb
Pests-Weeds Pre-Harvest	Aug	ATV-4WD ATV sprayer 200 gal 21'		Equipment Operator	0.24	hour
				Roundup Ultra Max	32.00	FIOz
				Goal 2XL	16.00	FIOz
Fertilize-Foliar (Boron)	Oct	85HP4WD Low-Profile Tractor Air Blast PTO		Equipment Operator	0.30	hour
				Solubor	2.00	Lb
Fertilize-Hull Analysis	Sept			Hull Analysis	0.05	Each
Fertilize-Banded (K2SO4)	Oct	34HP4WD Tractor, Fertilizer Applicator PTO		Equipment Operator	0.22	hour
				Potassium Sulfate	420.00	Lb
Pests-Weeds Strip Spray	Nov	ATV-4WD		Equipment Operator	0.24	hour
				Roundup Ultra Max	24.00	FIOz
				Matrix SG	4.00	Oz
Stack Brush	Nov			Pruning Labor	0.50	hour
Shred Brush	Nov			Shred Prunings	0.40	Hour
PCA Fee	Nov			PCA/CCA Fee (Prod	1.00	Acre
Winter Sanitation	Dec	85HP4WD Low-Profile Tractor Mower 16'		Non-Machine Labor	0.25	hour
				Shake Trees	0.50	Hour
				Sweep	0.50	Hour