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UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES  
COOPERATIVE EXTENSION  
AGRICULTURAL ISSUES CENTER  
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

**2019**

**SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE  
ALMONDS**



**SAN JOAQUIN VALLEY NORTH**  
Micro-Sprinkler Irrigation

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 San Joaquin Valley North - 2019

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**INTRODUCTION**

Sample costs to establish an almond orchard and produce almonds are presented in this Study. This analysis does not represent any single farm and 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 August 2019 figures. The same sample costs (ex. Labor rates) are used from establishment through the production years, knowing that costs will change from year to year. A blank column titled Your Costs is provided in Tables 1, 2 and 3 for your convenience.

For an explanation of calculations used refer to the section titled Assumptions. For more information contact Donald Stewart; University of California Agriculture and Natural Resources, Agricultural Issues Center, Department of Agricultural and Resource Economics, at 530-752-4651 or [destewart@ucdavis.edu](mailto:destewart@ucdavis.edu). To discuss this study with a local northern San Joaquin valley extension advisor contact your county cooperative extension office. [ucanr.edu/County\\_Offices/](http://ucanr.edu/County_Offices/)

Sample Cost of Production studies for many commodities are available and can be downloaded from the Department website, [coststudies.ucdavis.edu](http://coststudies.ucdavis.edu). Archived studies are also available on the website.

**Costs and Returns Study Program/Acknowledgements.** A “costs and returns” study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region the study is based. The authors thank the farmer cooperators, UC Cooperative Extension and other industry representatives who provided information, assistance, and expert advice. **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. *The University is an affirmative action/equal opportunity employer.***

## ASSUMPTIONS

The assumptions contain background in developing 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 are based on production practices considered typical for the crop and area, but will not apply to every situation.

This study explains the annual costs associated with an ongoing operation, under the assumptions that the farm was operated this way in prior years and will continue in subsequent years. The 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.

**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.* As soon as possible after the last harvest, orchard removal begins with the extraction of the irrigation system. Once the lateral and emitter lines are removed, a custom operator uses a dozer to push over the trees. A front end loader with a clamp grasps the trees and hauls them to the horizontal grinder to mulch the wood. The chips are spread over the entire orchard. The ground is ripped at a 3-foot depth down the tree rows. The field is cross-ripped (or at 45° angle) to a 6-foot depth to break up hardpan and pull up remaining tree roots. The field is disced twice and laser leveled then left unattended until a custom operator is hired to fumigate and tarp each tree row area (11-foot strip) with Telone C35.

**Planting.** Prior to planting in January, using GPS, a custom operator marks the planting sites. The tree row berms are created with the mechanical planter when planting the trees. After planting, the irrigation lines are laid out 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.

In January, the trees are topped, planted, trimmed and a tree wrap is 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 (by hand) at planting to settle the soil around the roots. Contract labor companies who specialize in orchard planting do the planting operation using a machine. The trees are not staked. In the second year, two trees per acre are replanted and this cost is reflected in the establishment costs.

**Trees.** No specific almond variety is planted. The trees are grown in pots at the nursery. Almond orchards will include two or more varieties in which bloom periods overlap to insure good pollination. Self-fertile varieties

are available. Having two or more varieties in the orchard can affect cultural practices including harvest. The varieties do not mature at the same time. The custom crew will harvest one variety and will have to come back to harvest the other variety. Cost of the trees include scion wood and rootstock patents. Planting densities range from 75 to 180 trees per acre. For 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.

**Train/Prune.** Training, which includes suckering and light pruning for shaping is done from September-February of the first non-bearing years. Tree tying, to prevent scaffold breakage after pruning is done late in the second year or early in the third and fourth years. The tie (using 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.

**Fertilization.** Fertilizer rates shown below are typical nutrient requirements, but do not consider soil and water nitrogen. In the first year, equal applications of a granular fertilizer 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. Although potassium and phosphorous fertilizers are generally not necessary for new trees, 15-15-15 is often used because it is safer than straight nitrogen fertilizers.

Table A has the recommended amount of nitrogen for the first and following years. Incorporating the chips into the soil will tie-up nitrogen. After planting in the first year, additional nitrogen if required from tie up in the soil, could be applied through the irrigation system. Research has not shown increased nitrogen rates are required for the second and third year old trees in orchards with incorporated wood chips.

In the second year, N is applied monthly from April to August through the irrigation system. CAN-17 (10% 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-May, with one additional after harvest application of N. Potassium sulfate (K<sub>2</sub>SO<sub>4</sub>) 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 applied are shown below.

**Table A. Production Information.**

Year	Yields	Fertilizer Lbs /Acre			Irrigation	Pollination
	*Lbs./Acre	N	K <sub>2</sub> SO <sub>4</sub>	B	Acre-Inches	Hives/Acre
1	-	35	-	-	11	-
2	-	60	-	0.4	21	-
3	400	90	65	0.4	32	0.5
4	800	120	130	0.4	42	1.0
5	1,600	160	260	0.4	42	2.0
6+	2,200	220	350	0.4	42	2.0

\*Yield is measured in kernel (meat) lbs. per acre.

**Sampling.** Tree nutrient status is determined by leaf and hull analysis. In years 1-3, leaf samples are taken to determine nitrogen deficiencies. Hull samples for boron analyses are taken from the windrow at harvest. 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 a filtration 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. Irrigation pumping costs are estimated at \$100 per acre-foot or \$8.33 per acre-inch. Table A shows the applied water for each year. 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 is not considered because it is too variable. It is assumed that the season begins with a full soil profile.

*Sustainable Groundwater Management Act (SGMA)*. SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. For detailed information visit the website; [water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management](http://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management)

*Frost Protection*. Frost protection begins in the fourth year and uses two acre-inches annually. Protection may be needed from February through March; however, it may not be needed every year and the amount of protection will vary. This water is in addition to the amounts of water shown in Table A, with Table 3 showing total water applied.

*Irrigation System Maintenance*. The micro-sprinkler irrigation system requires chemical flushing to retard calcium buildup and emitter clogging. This operation is performed annually after harvest with N-pHuric acid applied through the system with 0.25 acre-inches of water.

**Pollination**. A commercial beekeeper sets out one-half hive per acre in the third year, one hive in the fourth year and two hives in the fifth year and following production years (Table A). Bee colony strength should be a standard 8 frames per hive and the cost is \$200 per hive.

*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 more information visit the websites listed below. [ipm.ucanr.edu/bee precaution/](http://ipm.ucanr.edu/bee precaution/)  
[honeybeehealthcoalition.org/wp-content/uploads/2017/05/HBHC\\_grower\\_flyer\\_v9.pdf](http://honeybeehealthcoalition.org/wp-content/uploads/2017/05/HBHC_grower_flyer_v9.pdf)

The Almond Board of California recently refreshed the BMPs, (Honey Bee Best Management Practices) incorporating new tips and resources that growers and other stakeholders can use to protect honey bees and plan for a productive pollination. [almonds.com/pollination](http://almonds.com/pollination)

**Pest Management**. The pesticides and rates mentioned in this cost study, as well as other materials available, are listed in the *UC Integrated Pest Management Guidelines for Almonds* and the *2017 Fungicide Efficacy and Treatment Timing for Almonds* publication located on the UC IPM website at [ipm.ucanr.edu](http://ipm.ucanr.edu). For information on other pesticides available, pest identification, monitoring, and management, check with your PCA and/or visit the UC IPM website. For information and pesticide use permits, contact the local county agricultural commissioner's office.

*Pest Control Adviser/Certified Crop Advisor (PCA/CCA)*. The PCA/CCA monitors the field for agronomic problems including pests and nutrition and writes recommendations for pesticide applications. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. The PCA/CCA does not charge any fees for monitoring the orchard. The costs are reflected in the price of fertilizer and chemicals as part of the service contract between the grower and the PCA.

*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. 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.

*Insects and Mites.* In May of the first and following years, mites are controlled with an Abamectin application using a handgun and UTV sprayer. Starting in the second year an Air-blast sprayer is used to apply the materials. Beginning in July of the third year, ant bait (Clinch) is sprinkled on the berms for ant control.

Beginning in the third year and in subsequent years, navel orangeworm, *Amyelois transitella* (NOW) is monitored using pheromone traps with lures as well as egg traps (& female traps in many orchards). The traps are placed in the orchard in March or April to monitor insect flights through hull-split. Insecticide applications of Intrepid 2F for NOW is applied twice, (two varieties) in separate applications at hull split in July. These applications are dependent on pest pressure, more or fewer applications may be needed. Other insecticides and timing may be utilized depending upon insect type and pressure. All the traps are monitored by the PCA/CCA and the costs are included in their fees.

*Winter Sanitation.* Winter sanitation, November - January destroys overwintering sites and spring food sources for NOW, begins in the third year and continues for the life of the orchard. A custom operator shakes and sweeps the mummies. The mummy nuts are either hand-poled (this operation is not very common) or shaken from the trees and swept/blown into the row middle. The nuts are left on the ground and shredding/mowing occurs February or March by the grower.

Some years, mummy nuts stick worse than others ensuing that more labor for hand polling may be required. This study shows the hand labor charges combined and split over two years.

*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.* Treatments will vary depending upon rodent populations and orchard location. Gophers are managed the first three years with bait. Beginning in the fourth year, gophers are thought to be under control and spot treatments are used as necessary. Ground squirrels are controlled with traps along the perimeter of the orchard. The grower uses a UTV to check the traps. See the following websites for additional information.

[ucanr.org/sites/Ground\\_Squirrel\\_BMP/](http://ucanr.org/sites/Ground_Squirrel_BMP/).

[ipm.ucdavis.edu/PMG/menu\\_vertibrate.html](http://ipm.ucdavis.edu/PMG/menu_vertibrate.html).

**Harvest.** Mechanical harvesting, (shaking) by a custom operator starts in the third year; albeit, great care is taken when shaking the trees in the first harvest year as to not damage the root system. The nuts are swept/blown into the row middles and picked up mechanically. Typical annual yields for almonds are measured in meat (kernel) pounds per acre and are shown in Table A.

### **Production Cultural Practices and Material Inputs**

**Pruning.** After the establishment years, only maintenance hand pruning for safety and equipment access is necessary. This is usually completed in November – January 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.

**Fertilizer.** Nitrogen (N) at 220 pounds per acre per season as UAN-32 is applied monthly March through September, with one application after harvest (October) 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 after harvest (October) along the tree row at 350 pounds K<sub>2</sub>SO<sub>4</sub> per acre. Boron, at 0.4 pounds per acre, using Solubor (20.5%), is foliar applied in October.

*Sampling.* Leaf samples are collected by the PCA in July to analyze tree nutrient status. Hull sample are taken from the windrow at harvest. If this sample shows a boron deficiency, a post-harvest boron application should be applied before leaf drop. The PCA collects and sends the samples to a commercial lab for analysis. The charges shown are for the lab analysis.

A water analysis is done annually to determine nitrate availability, maintain regulatory records and monitor toxic elements (chlorine and sodium). A well test to determine pumping rates is also done at this time. The charges are shown in combination.

**Irrigation.** Irrigation costs include pumping (water) and labor costs. The water is pumped from a well and a booster pressurizing pump pushes the water through the filtration system and out into the 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. Water cost or pumping costs are \$8.33 per acre-inch, (\$100/AcFt) based on current pumping rates. Rates will vary depending upon pump and well specifications and rate program selected. Irrigation labor is listed as a separate line item.

*Frost Protection.* Frost protection may not be required every year and the amount of protection needed will vary. An additional two acre-inches (in addition to the amounts shown in Table A.) are applied in February and/or March for frost protection.

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

**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 [ipm.ucanr.edu](http://ipm.ucanr.edu).

*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.

*Insects and Mites.* Mites are sprayed with Abamectin in May. Clinch is applied on the berms in July for ant control. Dormant oil applications may be necessary if San Jose scale reaches a treatable level. Additional sprays may be needed for occasional pests like peach twig borer or plant bugs.

Insecticide applications of Intrepid 2F for navel orangeworm (NOW) is applied twice, (two varieties) in separate applications at hull split in July. These applications are dependent on pest pressure, more or fewer applications may be needed. Other insecticides and timing may be utilized depending upon insect type and pressure.

Pheromone traps with lures as well as egg traps (& female traps in many orchards) are used to monitor NOW. The traps are placed in the orchard in March or April to monitor insect flights through hull-split. All the traps are monitored by the PCA/CCA and the costs are included in their fees.

*Winter Sanitation.* Winter sanitation, November - January destroys overwintering sites and spring food sources for NOW, begins in the third year and continues for the life of the orchard. A custom operator shakes and sweeps the mummies. The mummy nuts are either hand-poled (this operation is not very common) or shaken from the trees and swept/blown into the row middle. The nuts are left on the ground and shredding/mowing occurs February or March by the grower.

Some years, mummy nuts stick worse than others ensuing that more labor for hand polling may be required. This study shows the hand labor charges combined and split over two years.

*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 using bait to control gophers is necessary in March and August. Ground squirrels are managed using traps. The traps are placed on two sides of the field and moved regularly. 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, Yields and Revenue**

**Harvest.** A custom operator mechanically harvests the almond crop. Harvest begins in August with the early maturing varieties and continues into October for late maturing varieties. 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 are allowed to dry for about a week. In a separate operation, the nuts are swept into windrows to be picked up. The grower furnishes labor for hand raking to move nuts missed by the sweeper into the windrows. A pickup machine gathers the nuts from the windrow and loads them into a cart or bankout wagon. The nuts are then elevated into trailers for delivery to the huller.

Orchards have more than one variety that mature separately. The custom operator harvests the earlier variety and will come back a few weeks later to harvest the later maturing variety. Some varieties can be harvested together. Added costs for a second harvest are not shown since this study is based on per acre charges.

**Yields.** Typical annual yields for almonds are measured in pounds of kernels (meats) per acre and are shown in Table A. Yields will vary by location, grower, year, and age of orchard. The assumption is the orchard will average 2,200 pounds per acre for the life of the orchard.



**Revenue.** The almond meats are sold for \$2.50 per pound based on reported current returns, Table 3.

*Ranging Analysis.* Table 5 shows a range of yields, 1,000 – 3,400 kernel pounds per acre over a range of prices, \$1.00 - \$4.00 per pound. Almond producers target yields and prices such that in general, lower yields tend to be associated with higher prices. Therefore, the ranging analysis does not show the cases of very high yields with very high return prices or very low yields with very low return prices.

*Almond Hulls and By-Products.* The hulls are high in fiber and can be sold as a feed additive, normally for dairy cows. No additional income from hull by-products are shown.

*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. [ams.usda.gov/rules-regulations/almonds-grown-california-increased-assessment-rate](https://ams.usda.gov/rules-regulations/almonds-grown-california-increased-assessment-rate)

### **Labor, Equipment, and Operating Interest**

**Labor.** Hourly wages for workers are \$14.50 for machine operators and \$12.50 per hour non-machine labor. Adding 41.72 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 \$20.55 and \$17.72 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers, the cost is based upon the average industry final rate as of August 2019. 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.

**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).

**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 (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are \$3.95 and \$3.63 per gallon, respectively. The cost includes a 13.0 percent sales tax on diesel fuel and 2.25 percent sales tax on gasoline. The cost also includes state excise tax for diesel and gasoline at \$0.36 and \$0.42, which are refundable for on-farm use when filing your income tax. Federal Highway tax and local district sales taxes are not included.

*Fuel/Lube/Repairs.* 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.

**Pickup Truck/Utility Vehicle, (UTV).** The half-ton pickup is used around the farm to monitor the orchard and for hauling tools and supplies. The UTV is used for herbicide spraying, baiting ants, checking irrigation and vertebrate traps.

**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 5.25 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 is

considered a typical lending rate by a farm lending agency as of August 2019.

**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 expenses, 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. 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 8.86 percent per \$1,000 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. This fee is charged at \$833 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. <https://www.rma.usda.gov/policies/>.

**Office Expenses.** Office and business expenses are estimated at \$60 per acre. These expenses include office supplies, telephone/internet, bookkeeping, accounting, 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. A cost of \$10.00 per acre or \$1,000 for the farm is assumed.

**Miscellaneous Costs.** Included expenses for employee safety training, continuing education for pesticide use, materials and applications for unique fields or special conditions.

**Sanitation Services.** Sanitation services cost \$8.60 per acre. The cost includes one double toilet unit with washbasin, delivery and 4 months of weekly service.

**Investment Repairs.** Annual maintenance is calculated as two percent of the purchase price, except for tree replacement in the orchard.

*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. The average tree replacement cost over the life of the orchard is assumed to be 0.10 percent of the establishment cost or \$912.90 (\$9.13 per acre) per year.

### **Non-Cash Overhead**

Non-cash overhead, shown on an annual per acre basis 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 prices 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 (ASABE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE 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 6 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 August 2019.

**Land.** Bare cropland with available water, (well water, SEWD, CSJWCD, TID & MID) plantable to almonds ranges from \$11,500 to \$32,000 per acre. For this study, bare cropland is valued at \$24,000 per acre, (\$25,200 per producing acre), \$2,520,000 for the 105 acres. Established almond orchards in this region range in value from \$20,000 - \$40,000 per acre (2019 Trends).

**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. The cost is \$9,129 per acre or \$912,900 for the 100-acre orchard. The establishment cost is amortized beginning in the fourth year over the remaining 22 years the orchard is in production. The establishment costs added to the bare land value is consistent with the value of an established mature orchard ( $\$24,000 + \$9,129 = \$33,129$ ). Establishment costs are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations, and other factors.

**Irrigation System.** The irrigation system is based on one 175 horsepower electric pump lifting from a water level depth of 120 feet. The pump and 500-foot deep well, already existed on the site. Costs shown are for re-casing of the well and refurbishing the pump. The micro-sprinkler irrigation system costs include the installation of new filtration tanks and chemigation systems, buried sub-main lines and micro-sprinklers. A separate 75 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 narrative and the investment portion of Table 6. 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 are spread out over the total acreage each pump can service.

**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 and shown in Table 7.

**Field/Service Tools.** This includes an air compressor/welder and the tool boxes for the ranch truck. Also, field tools such as pruning equipment, bait stations, backpack blowers, rakes, and shovels. The frost protection alarms are also included in this cost.

**Fuel Tanks.** Two 1,000-gallon fuel tanks, one for diesel and one for gasoline, 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 2019

Operation:	Year:	Cost Per Acre				
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
Meat Pounds Per Acre: @ \$2.50/lb.				400	800	1,600
<b>Pre-Plant:</b>						
Irrigation System Removal		89				
Orchard Removal: Chip		1,200				
Spread Chips		125				
Rip-3' Depth (Root Removal)		285				
Rip-6' Depth (Root Removal)		377				
Disc & Roll 2x		130				
Laser Level		75				
Soil Fumigate/Tarp: Tree Row (Strip 11')		1,200				
Weeds: Strip Spray		31				
<b>TOTAL PRE-PLANT COSTS</b>		<b>3,512</b>				
<b>Plant:</b>						
Survey/Mark Site		125				
Plant: Top, Transplant-Mechanical (130 trees/acre)		1,645				
Wrap/Irrigate (by hand)		77				
Irrigation System Layout		53				
Smooth/Float Between Rows		35				
<b>TOTAL PLANTING COSTS</b>		<b>1,935</b>				
<b>Cultural:</b>						
Weeds: Dormant-Strip Spray			26	68	68	68
Frost Protection: Irrigate					17	17
Pollination: Bee Hives				100	200	400
Disease/Fertilize (Zn)	16	27	45	47	47	47
Diseases			77	77	77	77
Mites	15	25	25	25	25	25
Insects-NOW (Yr. 3 + 2x)			131	131	131	131
Insects-Ants			10	10	10	10
Vertebrate: Gophers	34	34	34	27	27	27
Vertebrate: Squirrels				32	32	32
Irrigate	92	175	267	350	350	350
Irrigation Labor	64	66	57	85	85	85
Irrigation: Well Test/Water Analysis	5	5	5	5	5	5
Irrigation: System Flush	12	12	12	12	12	12
Fertilize: Hand (15-15-15)	189					
Fertigate: (CAN17)/(UAN32)		31	50	67	123	
Fertilize: Foliar (Solubor)		26	37	37	37	
Fertilize: Banded (K <sub>2</sub> SO <sub>4</sub> 50%)			39	71	135	
Fertilize: Lab Analysis (Leaf/Hull)	2	2	3	3	3	
Prune/Train/Sucker/Tie Ropes/Stack Brush	80	62	159	115	73	
Shred Brush			28	33	33	
Weeds: Disc Middles	15					
Weeds: Float Middles	12					
Weeds: Mow Middles	43	48	59	59	59	
Weeds: Broadcast Spray-Pre-Harvest			34	34	34	
Weeds: Spot Spray	6	13				
Insects: NOW Winter Sanitation: Shake (Pole)/Sweep/Labor			135	194	217	
Pickup 1/2 Ton Farm Use	63	63	63	63	63	
UTV Farm Use	62	62	44	44	44	
<b>TOTAL CULTURAL COSTS</b>		<b>710</b>	<b>679</b>	<b>1,481</b>	<b>1,806</b>	<b>2,095</b>

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

**Table 1. CONTINUED**  
San Joaquin Valley-North 2019

Operation:	Year:	Cost Per Acre				
		1st	2nd	3rd	4th	5th
Meat Pounds Per Acre @ \$2.50/Lb.				400	800	1,600
Harvest:						
Shake Trees				53	90	113
Sweep/Windrow Nuts				26	64	64
Hand Rake/Blow Nuts				13	13	18
Pick up/Haul Nuts				24	40	60
Hull/Shell Nuts				28	56	112
<b>TOTAL HARVEST COSTS</b>				<b>143</b>	<b>263</b>	<b>366</b>
Interest on Operating Capital @ 5.25%		296	21	26	31	37
<b>TOTAL OPERATING COSTS/ACRE</b>		<b>6,453</b>	<b>700</b>	<b>1,650</b>	<b>2,099</b>	<b>2,498</b>
Cash Overhead:						
Office Expense		60	60	60	60	60
Liability Insurance		8	8	8	8	8
Sanitation Fees		9	9	9	9	9
Environmental Fee		10	10	10	10	10
Miscellaneous Costs		20	20	20	20	20
Property Taxes		256	256	257	303	303
Property Insurance		23	23	23	27	27
Investment Repairs		57	57	57	102	102
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>442</b>	<b>442</b>	<b>443</b>	<b>538</b>	<b>538</b>
<b>TOTAL CASH COSTS/ACRE</b>		<b>6,895</b>	<b>1,141</b>	<b>2,093</b>	<b>2,638</b>	<b>3,036</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>-</b>	<b>-</b>	<b>1,000</b>	<b>2,000</b>	<b>4,000</b>
<b>NET CASH COSTS/ACRE FOR THE YEAR</b>		<b>6,895</b>	<b>1,141</b>	<b>1,093</b>	<b>638</b>	<b>-</b>
<b>PROFIT/ACRE ABOVE CASH COSTS</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>964</b>
<b>ACCUMULATED NET CASH COSTS/ACRE</b>		<b>6,895</b>	<b>8,036</b>	<b>9,129</b>	<b>9,767</b>	<b>8,803</b>
NON-CASH OVERHEAD:						
Fuel Tanks 2-1,000 Gallon		10	10	10	10	10
Well/Pump Refurbish		43	43	43	43	43
Shop/Field Tools		11	11	11	11	11
Irrigation System: Micro-sprinkler		156	156	156	156	156
Land SJV-North		1,440	1,440	1,440	1,440	1,440
Orchard Establishment					758	758
Equipment		29	28	51	51	50
<b>TOTAL NON-CASH OVERHEAD COST/ACRE</b>		<b>1,689</b>	<b>1,689</b>	<b>1,712</b>	<b>2,470</b>	<b>2,469</b>
<b>TOTAL COST/ACRE FOR THE YEAR</b>		<b>8,584</b>	<b>2,830</b>	<b>3,805</b>	<b>5,108</b>	<b>5,505</b>
<b>INCOME/ACRE FROM PRODUCTION</b>		<b>-</b>	<b>-</b>	<b>1,000</b>	<b>2,000</b>	<b>4,000</b>
<b>TOTAL NET COST/ACRE FOR THE YEAR</b>		<b>8,584</b>	<b>2,830</b>	<b>2,805</b>	<b>3,108</b>	<b>1,505</b>
<b>NET PROFIT/ACRE ABOVE TOTAL COSTS</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL ACCUMULATED NET COST/ACRE</b>		<b>8,584</b>	<b>11,414</b>	<b>14,219</b>	<b>17,327</b>	<b>18,832</b>

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**Table 2. COSTS PER ACRE TO PRODUCE ALMONDS**  
 San Joaquin Valley-North 2019

Operation	Equipment Time (Hrs/Ac)	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	35	0	0	20	0	55	
Stack Brush	0 00	18	0	0	0	0	18	
Shred Brush	0 00	0	0	0	0	55	55	
Pollination: Bee Hives	0 00	0	0	0	0	400	400	
Disease 2x	0 50	12	9	5	46	0	73	
Frost Protection: Irrigate	0 00	0	0	0	17	0	17	
Disease/Fertilize (Zn)	0 25	6	5	2	34	0	47	
Vertebrate: Gophers 2x	0 00	18	0	0	7	0	25	
Weeds: Mow Middles 6x	1 10	27	20	12	0	0	59	
Irrigate	0 00	0	0	0	350	0	350	
Fertigate: (UAN32) 7x	0 00	0	0	0	123	0	123	
Irrigation labor	0 00	85	0	0	0	0	85	
Irrigation: Well Test/Water Analysis	0 00	0	0	0	0	5	5	
Vertebrate: Squirrels 6x	0 00	53	0	0	0	0	53	
Insects: Mites	0 30	7	5	3	9	0	25	
Fertilize: Leaf Analysis	0 00	0	0	0	0	2	2	
Insects: NOW 2x	0 50	12	9	5	105	0	134	
Insects: Ants	0 00	4	0	0	6	0	10	
Weeds: Broadcast Spray Pre-Harvest	0 16	4	1	0	29	0	34	
Fertilize: Hull Analysis	0 00	0	0	0	0	1	1	
Fertilize: Foliar (Solubor)	0 25	6	5	2	21	0	34	
Fertilize: Banded (K <sub>2</sub> SO <sub>4</sub> )	0 19	5	1	2	172	0	179	
Weeds: Strip Spray Dormant	0 16	4	1	0	63	0	68	
Insects: NOW Winter Sanitation	0 00	18	0	0	0	235	253	
Irrigation: System Flush	0 00	4	0	0	8	0	12	
Pickup Truck Use	1 67	41	16	6	0	0	63	
UTV Use	1 42	35	8	1	0	0	44	
<b>TOTAL CULTURAL COSTS</b>	<b>6 50</b>	<b>396</b>	<b>80</b>	<b>38</b>	<b>1,013</b>	<b>698</b>	<b>2,225</b>	
Harvest:								
Shake Trees	0 00	0	0	0	0	128	128	
Sweep/Windrow Nuts	0 00	0	0	0	0	78	78	
Hand Rake/Blow Nuts	0 00	18	0	0	0	0	18	
Pickup/Haul Nuts	0 00	0	0	0	0	77	77	
Hull/Shell Nuts	0 00	0	0	0	0	154	154	
<b>TOTAL HARVEST COSTS</b>	<b>0 00</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>437</b>	<b>454</b>	
Interest on Operating Capital @ 5.25%							37 95	
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>6 50</b>	<b>414</b>	<b>80</b>	<b>38</b>	<b>1,013</b>	<b>1,135</b>	<b>2,717</b>	



UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

**Table 2. CONTINUED**  
San Joaquin Valley-North 2019

Operation			Total Cost	Your Cost
<b>CASH OVERHEAD:</b>				
Environmental Fees			10	
Liability Insurance			8	
Office Expense			60	
Sanitation Fee			9	
Miscellaneous Costs			20	
Property Taxes			303	
Property Insurance			27	
Investment Repairs			102	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>			<b>538</b>	
<b>TOTAL CASH COSTS/ACRE</b>			<b>3,256</b>	
<b>NON-CASH OVERHEAD:</b>				
	Per Producing Acre	Annual Cost Capital Recovery		
Land SJV-North	24,000	1,440	1,440	
Fuel Storage Tanks/Pumps 2-1,000 Gallon	125	10	10	
Well/Pump Refurbish	560	43	43	
Shop/Field Tools	150	11	11	
Irrigation System: Micro-sprinkler	2,000	156	156	
Orchard Establishment	9,129	758	758	
Equipment	410	51	51	
<b>TOTAL NON-CASH OVERHEAD COSTS</b>			<b>2,469</b>	
<b>TOTAL COSTS/ACRE</b>			<b>5,725</b>	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS**  
 San Joaquin Valley-North 2019

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS RETURNS</b>					
Almonds	2,200	Lb	2 50	5,500	
<b>TOTAL GROSS RETURNS</b>				5,500	
<b>OPERATING COSTS</b>					
<b>Herbicide:</b>					<b>92</b>
Roundup PowerMax	3 00	Pint	3 75	11	
Goal 2XL	16.00	FlOz	1 43	23	
Matrix SG	4 00	Oz	14 39	58	
<b>Fungicide:</b>					<b>74</b>
Vanguard WG	5 00	Oz	4 95	25	
Pristine	8 00	FlOz	3 40	27	
Bravo-Weatherstik	48.00	FlOz	0 45	22	
<b>Insecticide:</b>					<b>123</b>
Abamectin 0.15 EC	5 00	FlOz	1 87	9	
Intrepid 2F	48 00	Oz	2 25	108	
Clinch	0 50	Lb	11 80	6	
<b>Rodenticide:</b>					<b>7</b>
Vertebrate Pest Bait	4 00	Lb	1 84	7	
<b>Tree Aids:</b>					<b>20</b>
Tree Tying Rope	500 00	Foot	0 04	20	
<b>Custom:</b>					<b>1,135</b>
Shred Prunings	0 50	Hour	110 00	55	
Pollination Fee	2 00	Hive	200 00	400	
Irrigation Pump Test	0 02	Each	200 00	4	
Irrigation Water Analysis	0 02	Each	50 00	1	
Leaf Analysis	1 00	Each	2 25	2	
Hull Analysis	1 00	Each	1 00	1	
Shake Trees: Harvest	0 85	Hour	150 00	128	
Sweep: Harvest	0 92	Hour	85 00	78	
Pickup/Haul Nuts	0 96	Hour	80 00	77	
Hull/Shell Nuts	2,200 00	Lb	0 07	154	
Shake Trees: Sanitation	1 00	Hour	150 00	150	
Sweep: Sanitation	1 00	Hour	85 00	85	
<b>Irrigation:</b>					<b>374</b>
Water-Pumped	44.25	AcIn	8 33	369	
N-pHuric Acid	0 12	Gal	47 54	6	
<b>Fertilizer:</b>					<b>322</b>
Neutral Zinc (50%)	5 00	Lb	1 30	7	
UAN-32 (32-0-0)	220 00	Lb N	0 56	123	
Solubor (20.5%)	8 20	Lb	2 58	21	
Potassium Sulfate-K <sub>2</sub> SO <sub>4</sub> (50%)	350 00	Lb	0 49	172	
<b>Labor:</b>					<b>414</b>
Equipment Operator Labor	7 80	hrs	20 55	160	
Pruning Labor	3 00	hrs	17 72	53	
Non-Machine Labor	6 25	hrs	17 72	111	
Irrigation Labor	5 05	hrs	17 72	89	
<b>Machinery:</b>					<b>118</b>
Fuel-Gas	2 62	gal	3 63	10	
Fuel-Diesel	17 83	gal	3 95	70	
Lube				12	
Machinery Repair				26	
Interest on Operating Capital @ 5.25%				37 95	
<b>TOTAL OPERATING COSTS/ACRE</b>				2,717	
<b>TOTAL OPERATING COSTS/LB</b>				1 24	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				2,783	

## UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

**TABLE: 3 CONTINUED**  
San Joaquin Valley-North 2019

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS</b>					
Environmental Fees				10	
Liability Insurance				8	
Office Expense				60	
Sanitation Fee				9	
Miscellaneous Costs				20	
Property Taxes				303	
Property Insurance				27	
Investment Repairs				102	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>538</b>	
<b>TOTAL CASH OVERHEAD COSTS/LB</b>				<b>0.24</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>3,256</b>	
<b>TOTAL CASH COSTS/LB</b>				<b>1.48</b>	
<b>NET RETURNS ABOVE CASH COSTS</b>				<b>2,244</b>	
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Land SJV-North				1,440	
Fuel Tanks 2-1,000 Gallon				10	
Well/Pump Refurbish				43	
Shop/Field Tools				11	
Irrigation System: Micro-sprinkler				156	
Establishment Costs				758	
Equipment				51	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>2,469</b>	
<b>TOTAL NON-CASH OVERHEAD COSTS/LB</b>				<b>1.12</b>	
<b>TOTAL COST/ACRE</b>				<b>5,725</b>	
<b>TOTAL COST/LB</b>				<b>2.60</b>	
<b>NET RETURNS ABOVE TOTAL COST</b>				<b>-225</b>	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE ALMONDS**  
 San Joaquin Valley-North 2019

	JAN 19	FEB 19	MAR 19	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	NOV 19	Total
<b>Cultural:</b>												
Prune: Dormant/Tie Ropes	55											55
Stack Brush		18										18
Shred Brush		55										55
Pollination: Bee Hives		400										400
Disease 2x		38		35								73
Frost Protection: Irrigate		8	8									17
Disease/Fertilize (Zn)			47									47
Vertebrate: Gophers 2x			13					12				25
Weeds: Mow Middles 6x			12	11	9	9	9	9				59
Irrigate: Water		8	27	27	44	60	75	65	46	25		350
Fertigate: (UAN32)			31	31	31					31		123
Irrigation labor			85									85
Irrigation: Well Test/Water Analysis			5									5
Vertebrate: Squirrels 6x			9	9	9	9			9	9		53
Insects: Mites					25							25
Fertilize: Leaf Analysis							2					2
Insects: NOW 2x							134					134
Insects: Ants							10					10
Weeds: Broadcast Spray Pre-Harvest								34				34
Fertilizer: Hull Analysis									1			1
Fertilize: Foliar (Solubor)										34		34
Fertilize: Banded (K <sub>2</sub> SO <sub>4</sub> )										179		179
Weeds: Strip Spray Dormant											68	68
Insects: NOW Winter Sanitation											253	253
Irrigation: System Flush										12		12
Pickup Truck Use	6	6	6	6	6	6	6	6	6	6	6	63
UTV Use	4	4	4	4	4	4	4	4	4	4	4	44
<b>TOTAL CULTURAL COSTS</b>	<b>65</b>	<b>529</b>	<b>229</b>	<b>122</b>	<b>127</b>	<b>88</b>	<b>240</b>	<b>129</b>	<b>65</b>	<b>300</b>	<b>331</b>	<b>2,225</b>
<b>Harvest:</b>												
Shake Trees									128			128
Sweep/Windrow Nuts									78			78
Hand Rake/Blow Nuts									18			18
Pickup/Haul Nuts									77			77
Hull/Shell Nuts									154			154
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>454</b>	<b>0</b>	<b>0</b>	<b>454</b>
Interest on Operating Capital @ 5.25%	0.29	2.60	3.60	4.13	4.69	5.07	6.13	6.69	8.96	-2.76	-1.45	37.95
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>66</b>	<b>531</b>	<b>232</b>	<b>126</b>	<b>132</b>	<b>93</b>	<b>247</b>	<b>135</b>	<b>529</b>	<b>297</b>	<b>330</b>	<b>2,717</b>

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 4. CONTINUED**  
 San Joaquin Valley-North 2019

	JAN 19	FEB 19	MAR 19	APR 19	MAY 19	JUN 19	JUL 19	AUG 19	SEP 19	OCT 19	NOV 19	Total
CASH OVERHEAD												
Environmental Fees									10			10
Liability Insurance	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	60
Sanitation Fees									9			9
Miscellaneous Costs									20			20
Property Taxes		303										303
Property Insurance		13							13			27
Investment Repairs	9	9	9	9	9	9	9	9	9	9	9	102
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>15</b>	<b>331</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>67</b>	<b>15</b>	<b>15</b>	<b>538</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>81</b>	<b>863</b>	<b>248</b>	<b>141</b>	<b>147</b>	<b>108</b>	<b>262</b>	<b>151</b>	<b>596</b>	<b>313</b>	<b>345</b>	<b>3,256</b>

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 5. RANGING ANALYSIS**  
 San Joaquin Valley-North 2019

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALMONDS

	YIELD (LBS. /ACRE)						
	1,000	1,400	1,800	2,200	2,600	3,000	3,400
<b>OPERATING COSTS/ACRE:</b>							
Cultural	2,225	2,225	2,225	2,225	2,225	2,225	2,225
Harvest	207	289	372	454	536	619	701
Interest on Operating Capital @ 5.25%	36 87	37 22	37 59	37 95	38 30	38 67	39 03
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>2,469</b>	<b>2,552</b>	<b>2,635</b>	<b>2,717</b>	<b>2,799</b>	<b>2,883</b>	<b>2,965</b>
<b>TOTAL OPERATING COSTS/LB</b>	<b>2 47</b>	<b>1 82</b>	<b>1 46</b>	<b>1 24</b>	<b>1 08</b>	<b>0 96</b>	<b>0 87</b>
<b>CASH OVERHEAD COSTS/ACRE</b>	<b>538</b>	<b>538</b>	<b>538</b>	<b>538</b>	<b>538</b>	<b>538</b>	<b>538</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>3,008</b>	<b>3,090</b>	<b>3,173</b>	<b>3,256</b>	<b>3,338</b>	<b>3,421</b>	<b>3,503</b>
<b>TOTAL CASH COSTS/LB</b>	<b>3 01</b>	<b>2 21</b>	<b>1 76</b>	<b>1 48</b>	<b>1 28</b>	<b>1 14</b>	<b>1 03</b>
<b>NON-CASH OVERHEAD COSTS/ACRE</b>	<b>2,469</b>	<b>2,469</b>	<b>2,469</b>	<b>2,469</b>	<b>2,469</b>	<b>2,469</b>	<b>2,469</b>
<b>TOTAL COSTS/ACRE</b>	<b>5,477</b>	<b>5,559</b>	<b>5,643</b>	<b>5,725</b>	<b>5,807</b>	<b>5,891</b>	<b>5,973</b>
<b>TOTAL COSTS/LB</b>	<b>5 48</b>	<b>3 97</b>	<b>3 13</b>	<b>2 60</b>	<b>2 23</b>	<b>1 96</b>	<b>1 76</b>

Net Return per Acre above Operating Costs for Almonds

PRICE (\$/lb)	YIELD (lbs./acre)						
	1,000	1,400	1,800	2,200	2,600	3,000	3,400
Almonds							
1 00	-1,469	-1,152	-835	-517	-199	117	435
1 50	-969	-452	65	583	1,101	1,617	2,135
2 00	-469	248	965	1,683	2,401	3,117	3,835
2 50	31	948	1,865	2,783	3,701	4,617	5,535
3 00	531	1,648	2,765	3,883	5,001	6,117	7,235
3 50	1,031	2,348	3,665	4,983	6,301	7,617	8,935
4 00	1,531	3,048	4,565	6,083	7,601	9,117	10,635

Net Return per Acre above Cash Costs for Almonds

PRICE (\$/lb)	YIELD (lbs./acre)						
	1,000	1,400	1,800	2,200	2,600	3,000	3,400
Almonds							
1 00	-2,008	-1,690	-1,373	-1,056	-738	-421	-103
1 50	-1,508	-990	-473	44	562	1,079	1,597
2 00	-1,008	-290	427	1,144	1,862	2,579	3,297
2 50	-508	410	1,327	2,244	3,162	4,079	4,997
3 00	-8	1,110	2,227	3,344	4,462	5,579	6,697
3 50	492	1,810	3,127	4,444	5,762	7,079	8,397
4 00	992	2,510	4,027	5,544	7,062	8,579	10,097

Net Return per Acre above Total Costs for Almonds

PRICE (\$/lb)	YIELD (lbs./acre)						
	1,000	1,400	1,800	2,200	2,600	3,000	3,400
Almonds							
1 00	-4,477	-4,159	-3,843	-3,525	-3,207	-2,891	-2,573
1 50	-3,977	-3,459	-2,943	-2,425	-1,907	-1,391	-873
2 00	-3,477	-2,759	-2,043	-1,325	-607	109	827
2 50	-2,977	-2,059	-1,143	-225	693	1,609	2,527
3 00	-2,477	-1,359	-243	875	1,993	3,109	4,227
3 50	-1,977	-659	657	1,975	3,293	4,609	5,927
4 00	-1,477	41	1,557	3,075	4,593	6,109	7,627

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS**  
 San Joaquin Valley-North 2019

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insurance	Taxes	
19	85HP4WD Low-Profile Tractor	76,000	15	14,796	7,189	40	454	7,684
19	34HP4WD Tractor	31,000	12	7,750	3,238	17	194	3,449
19	Fertilizer Applicator PTO	15,000	10	2,653	1,837	8	88	1,933
19	Flail Mower 16'	13,900	10	2,458	1,702	7	82	1,791
19	UTV Sprayer System 100 Gallon	3,460	10	612	424	2	20	446
19	Air-Blast PTO 500 Gallon	28,000	8	6,322	3,870	15	172	4,057
19	UTV-4WD	8,350	8	2,914	1,050	5	56	1,112
19	Pickup Truck 1/2 Ton	28,000	5	12,549	4,421	18	203	4,642
TOTAL		203,710	-	50,054	23,732	112	1,269	25,113
60% of New Cost*		122,226	-	30,032	14,239	67	761	15,068

\*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								
Land SJV	2,500,000	30	2,500,000	151,200	2,233	25,200	0	178,633
Fuel Tanks 2-1,000 Gallon	12,500	25	875	962	6	67	250	1,285
Well/Pump Refurbish	56,000	25	3,920	4,309	27	300	1,120	5,755
Shop/Field Tools	15,000	25	1,500	1,146	7	83	300	1,536
Irrigation System Micro-sprinkler	200,000	25	0	15,645	89	1,000	4,000	20,734
Orchard Establishment	912,900	22	0	75,812	404	4,565	4,565	85,346
TOTAL INVESTMENT	3,716,400	-	2,526,295	249,075	2,766	31,213	10,235	293,288

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/Farm	Unit	Price/Unit	Total Cost
Environmental Fees	100	Acre	10.00	1,000
Liability Insurance	105	Acre	7.93	833
Office Expense	100	Acre	60.00	6,000
Sanitation Fee	100	Acre	8.60	860
Miscellaneous Costs	100	Acre	20.00	2,000

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 7. HOURLY EQUIPMENT COSTS**  
 San Joaquin Valley-North 2019

Yr.	Description	Almond Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
				Insurance	Taxes	Lube & Repairs	Fuel		
19	85HP4WD Low-Profile Tractor	319	4.05	0.02	0.26	4.35	16.49	20.84	25.16
19	Air-Blast PTO 500 Gallon	180	9.29	0.04	0.41	4.82	0.00	4.82	14.56
19	UTV-4WD	175	1.01	0.00	0.05	1.00	5.45	6.45	7.51
19	Pickup Truck 1/2 Ton	167	6.63	0.03	0.30	3.56	9.88	13.43	20.40
19	Flail Mower 16'	110	5.11	0.02	0.25	5.77	0.00	5.77	11.14
19	UTV Sprayer System 100 Gallon	33	1.69	0.01	0.08	0.92	0.00	0.92	2.71
19	34HP4WD Tractor	21	1.94	0.01	0.12	2.37	6.60	8.97	11.04
19	Fertilizer Applicator PTO	19	9.18	0.04	0.44	5.76	0.00	5.76	15.43

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 8. OPERATIONS WITH EQUIPMENT & MATERIALS**  
 San Joaquin Valley-North 2019

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Prune-Dormant	Jan			Pruning Labor	2.00	hours
				Tree Tying Rope	500.00	Foot
Stack Brush	Feb			Pruning Labor	1.00	hour
Shred Brush	Feb			Shred Prunings	0.50	Hour
Pollination	Feb			Pollination Fee	2.00	Hive
Pests: Disease	Feb	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Vanguard WG	5.00	Oz
	Apr	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Bravo-Weatherstik	48.00	FIOz
Frost Protection	Feb			Water-Pumped	1.00	AcIn
	Mar			Water-Pumped	1.00	AcIn
Disease/Fertilize	Mar	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Pristine	8.00	FIOz
				Neutral Zinc 50%	5.00	Lb
Vertebrate: Gophers	Mar			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	2.50	Lb
	Aug			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	1.50	Lb
Weeds: Mow Middles	Mar	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.28	hour
	Apr	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.24	hour
	May	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.20	hour
	June	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.20	hour
	July	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.20	hour
	Aug	85HP4WD	Low-Profile Tractor Mower 16'	Equipment Operator Labor	0.20	hour
Irrigate	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
Fertigate	Mar			UAN32 (32-0-0)	55.00	Lb N
	Apr			UAN32 (32-0-0)	55.00	Lb N
	May			UAN32 (32-0-0)	55.00	Lb N
	Oct			UAN32 (32-0-0)	55.00	Lb N
Irrigation labor	Mar			Irrigation Labor	4.80	hours
Irrigation-Well/Water	Mar			Irrigation Pump Test	0.02	Each
				Irrigation Water Analysis	0.02	Each
Vertebrate: Squirrels	Mar			Non-Machine Labor	0.50	hour
	Apr			Non-Machine Labor	0.50	hour
	May			Non-Machine Labor	0.50	hour
	June			Non-Machine Labor	0.50	hour
	Sept			Non-Machine Labor	0.50	hour
	Oct			Non-Machine Labor	0.50	hour
Pests: Mites	May	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.36	hour
				Abamectin 0.15 EC	5.00	FIOz
Fertilize: Leaf Analysis	July			Leaf Analysis	1.00	Acre
Insects: NOW	July	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Intrepid 2F	24.00	Oz
	July	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Intrepid 2F	24.00	Oz
Insects: Ants	July			Non-Machine Labor	0.25	hour
				Clinch	0.50	Lb
Weeds: Pre-Harvest	Aug	UTV	UTV Sprayer System 100 Gal	Equipment Operator Labor	0.20	hour
				Roundup PowerMax	1.50	Pint
				Goal 2XL	16.00	FIOz
Fertilizer: Hull Analysis	Sept			Hull Analysis	1.00	Acre
Fertilize: Foliar	Oct	85HP4WD	Low-Profile Tractor Air-blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Solubor (20.5%)	8.20	Lb
Fertilize: Banded	Oct	34HP4WD	Tractor Fertilizer Applicator PTO	Equipment Operator Labor	0.22	hour
				Potassium Sulfate-K <sub>2</sub> SO <sub>4</sub>	350.00	Lb
Weeds: Strip Spray	Nov	UTV	UTV Sprayer System 100 Gal	Equipment Operator Labor	0.20	hour
				Roundup PowerMax	1.50	Pint
				Matrix SG	4.00	Oz



UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER  
**TABLE 8. CONTINUED**  
 San Joaquin Valley-North 2019

Operation	Month	Tractor	Implement	Labor Type/Material	Rate/Acre	Units
Winter Sanitation	Nov			Shake Trees: Sanitation	1.00	Hour
				Sweep: Sanitation	1.00	Hour
				Non-Machine Labor	1.00	hour
Irrigation: System Flush	Oct			Irrigation Labor	0.25	hour
				Water-Pumped	0.25	AcIn
				N-pHuric Acid	0.12	Gal
Pickup Truck Use	Oct	Pickup Truck 1/2 Ton		Equipment Operator Labor	2.00	hours
UTV Use	Oct	UTV		Equipment Operator Labor	1.70	hours
Shake-Trees	Sept			Shake Trees: Harvest	0.85	Hour
Sweep-Windrow Nuts	Sept			Sweep: Harvest	0.92	Hour
Hand Rake/Blow Nuts	Sept			Non-Machine Labor	1.00	hours
Pickup/Haul Nuts	Sept			Pickup/Haul Nuts	0.96	Hour
Hull/Shell Nuts	Sept			Hull/Shell Nuts	2,200.00	Lb