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

2024

SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE ALMONDS

(Photo curtesy of Luke Milliron)

SACRAMENTO VALLEY

Micro-Sprinkler Irrigation

Franz Niederholzer	UCCE, Farm Advisor, Colusa and Sutter/Yuba Counties
Jaime Ott	UCCE, Farm Advisor, Tehama-Shasta Counties
Katherine S. Jarvis-Shean	UCCE, Farm Advisor, Sacramento, Solano and Yolo Counties
Becky Wheeler-Dykes	UCCE, Farm Advisor, Glenn, Butte & Tehama Counties
Curt Pierce	UCCE, Area Irrigation and Water Resources Advisor, Glenn, Tehama, Colusa, and Shasta Counties
Sudan Gyawaly	UCCE, Area IPM Advisor, Sacramento Valley & Stanislaus Counties
Luke Milliron	UCCE, Farm Advisor, Butte, Glenn, & Tehama Counties
Domena Agyeman	UCCE, Agriculture and Natural Resources Economics Advisor, Butte, Tehama, Glenn Counties
Jeremy Murdock	Staff Research Associate, Department of Agricultural & Resource Economics, UC Davis
Paul Long	Staff Research Associate, Department of Agricultural & Resource Economics, UC Davis
Sam Davison	Student Research Associate, Department of Agricultural & Resource Economics, UC Davis
Brittney Goodrich	UCCE Specialist, Assistant Professor, Department of Agricultural & Resource Economics, UC Davis

Funding Source: This cost study was funded by the Almond Board of California.

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

SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE ALMONDS

Sacramento Valley – 2024
Micro-Sprinkler Irrigation

CONTENTS

INTRODUCTION	2
ASSUMPTIONS	3
Establishment Cultural Practices and Material Inputs	3
Table A. Production Information	5
Production Cultural Practices and Material Inputs	7
Harvest, Yield and Revenue	9
Labor, Equipment and Operating Interest	10
Cash Overhead	10
Non-Cash Overhead	11
REFERENCES	14
Table 1. COSTS PER ACRE TO ESTABLISH AN ALMOND ORCHARD	15
Table 2. COSTS PER ACRE TO PRODUCE ALMONDS	17
Table 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS	19
Table 4. MONTHLY CASH COST PER ACRE TO PRODUCE ALMONDS	21
Table 5. RANGING ANALYSIS	22
Table 6. WHOLE FARM EQUIPMENT, INVESTMENT & BUSINESS OVERHEAD	23
Table 7. HOURLY EQUIPMENT COSTS	23
Table 8. OPERATIONS WITH EQUIPMENT AND MATERIALS	24

INTRODUCTION

Sample costs to establish an almond orchard and produce almonds under micro-sprinkler irrigation in the Sacramento Valley 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 January 2024 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 2, 3 and 4 for your convenience.

For an explanation of calculations used in the study, refer to the section titled Assumptions. For more information contact Jeremy Murdock or Paul Long, University of California, Davis Department of Agricultural and Resource Economics, at 530-752-4651 or Pmlong@ucdavis.edu. To discuss this study with a local Sacramento Valley extension advisor, contact your county cooperative extension office. 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. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A cost and return study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region where the study is based. The authors thank the farmer cooperators, 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 the omission of other similar products or cultural practices. *The University of California, Division of Agriculture and Natural Resources (UC ANR) is an equal opportunity provider.*

ASSUMPTIONS

The assumptions contain background information used in developing Tables 1 to 8 and pertain to sample costs to establish an orchard and produce almonds under micro-sprinkler irrigation in the Sacramento Valley. The cultural practices described represent production operations and materials considered typical for a well-managed farm in the region.

This study explains the annual costs associated with an ongoing operation, under the assumption that the farm was operated this way in prior years and will continue in subsequent years. The costs, materials, and practices 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, 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 ground previously planted to another tree crop. The land is assumed to be well drained and either 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 tractor with a dozer blade 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 into chips. The chips can be burnt, integrated into the soil or transported to another offsite area for disposal. Some incentive programs are available to help offset the cost of chip integration ("Whole Orchard Recycling"), but those have not been included here. The ground is ripped to 6-feet. A second ripping pass, at a 45- or 90-degree angle to the first pass at 6-feet deep, breaks up underlying hardpan and pulls up remaining roots. The roots are removed by hand. The orchard site is disced and rolled twice to break up clods.

Fumigation, if needed based on nematode test results and site disease pressure, is done in the fall using Telone II or Telone C35. Many blocks of land in the Sacramento Valley do not require soil fumigation; these charges are not included in this study. A survey crew is hired to mark the orchard site. Berms for the tree rows are formed with a ridger using GPS. The irrigation system is installed after the tree sites are marked. The row middles are then smoothed/floated to fill in borrow pits. The berms are strip sprayed with Gramoxone SL and Prodiamine 4L. All operations that prepare the orchard for planting are completed in the fall and winter of the year prior, but these costs are shown in the first year.

Compost. Compost integration at orchard establishment has become increasingly common, particularly given incentive programs, though whether it is beneficial/necessary will vary depending on the soil health of the planting site. Here it is assumed that compost is incorporated into the berms during orchard establishment and spread mechanically at an average rate of 5 tons per acre. The compost will be spread on the berm before the fall using a

compost spreader. Many types of composts are available for this use, with the most common one being green waste compost for high organic matter. Animal waste manure compost is also available and provides higher nutrient content, but it is generally harder to obtain and more expensive.

Planting. The trees, grown in pots at the nursery, are planted in February or March by a commercial planting crew. The crew plants the trees by hand, puts on cartons, tops and stakes trees and applies 3-5 gallons of water to each tree. The tree's trunks are painted by the grower when cartons are removed in Year 2 or 3. Note: for tree support, in east-west plantings, the trees are typically staked, which may have higher costs. On north-south rows, the trees are typically trellised and the cost would include the tree ties and tying of the trees by the planting crew.

Trees. Almond orchards may be planted with one self-fertile variety, or two to three varieties which have overlapping bloom periods to ensure adequate pollination. Having two or more varieties in the orchard can affect cultural practices, including harvest, because 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 varieties. Planting densities may range from 123 to 198 trees per acre depending on site history, soil type, rootstock, etc. For this study 130 trees per acre are planted on a 16-foot x 22 foot spacing (tree x row spacing). The life of the orchard at the time of planting is estimated at 25 years. Contact the local UCCE advisor or a commercial nursery for varieties and rootstocks that are available.

Tree Replacement. One or more trees per acre may die each year and are replaced in late winter. Costs will vary with each orchard and type of tree loss. In the first 5 years of the orchard, 1 percent of the orchard will be replaced due to tree loss. After year 5, no new trees will be planted do to shade out and economic life of the orchard.

Train/Prune. Pruning begins in the first year when newly planted trees are topped by the planting crew and is included in the planting costs. In early summer of that year, the trees are suckered. Prunings in the first year are placed in the row middles and shredded with the regular mowing. From year two onward, minimal pruning is required, aside from light hand pruning in December to allow for equipment access and safety. Starting in year two, prunings are pushed to the edge of the orchard and burned.

Fertilizer. Triple fifteen (15-15-15), is applied through the drip line near the trunk of the trees in March, April and June during the first year. In the second year, liquid UAN-32 is applied through the irrigation system in equal amounts in April/May and June. Once production begins (3rd leaf), separate applications in April (33% of annual budget), May (33% annual budget), June (33% annual budget). (See Nitrogen Best Management Practices Publication from the Almond Board of California for detailed information on almond orchard nitrogen nutrition). Annual rates of assumed nitrogen (N) applied are shown in Table A, however actual application should be based on anticipated yield in a given block in a given year. Beginning in the fall of the second year, zinc sulfate is applied as a foliar spray and boron (Solubor, boric acid, etc.) may be added if hull sample analysis results show need. Beginning in year two, potassium sulfate (K_2SO_4) is banded along the tree row in the fall using a pull type fertilizer applicator. Other applications may be indicated from foliar sample analyses but are not included here.

Table A. Production Information.

	Yields	Fertilizer Lbs./Acre			Irrigation	Pollination
Year	*Lbs./Acre	N	K_2SO_4	B	Acre-Inches	Hives/Acre
1	-	30	-	-	18	-
2	-	30	40	0.4	18	-
3	400	60	80	0.4	26	0.5
4	800	120	160	0.4	32	1.0
5	1,400	160	280	0.4	38	2.0
6	2,000	220	400	0.4	38	2.0
7+	2,200	220	400	0.4	38	2.0

Sampling. Starting in the third year, leaf samples are collected by the PCA in July to analyze tree nutrient status. Post-harvest N application may be changed based on leaf analysis results. Hull samples are collected by the PCA from the windrow at harvest. If this sample shows a boron deficiency, a post-harvest boron application should be applied before leaf drop.

Irrigation. The cost for water is calculated at $200 per acre-foot or $16.66 per acre-inch. Price per acre-foot of water will vary by grower depending on water source – well or district water, well characteristics, and water district. It is assumed that 6 acre-inches of soil stored water from rainfall will supply a portion of the early season water requirements. The field is irrigated an average of twice per week from April to October. The average, annual water assumed to be applied to this orchard is shown in Table A, however actual amounts will vary each month and year depending upon the weather. Irrigation labor costs are provided as a separate line item.

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. This may eventually influence water application for some orchards in a way that would vary from the above assumptions. For detailed information visit the website:
water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

Water Analysis/Well Test. An annual water analysis to determine nitrate availability, maintain regulatory records and monitor levels of potentially toxic elements like chlorine, boron and sodium is shown and the costs are combined with the annual well test. The well test is completed annually at a cost of $750 dollars. This test is generally completed in the spring before irrigation starts.

The micro-sprinkler irrigation system requires chemical flushing to retard calcium buildup in the lines and prevent emitter clogging in many parts of the Sacramento Valley. This operation is performed annually in the fall or after harvest with N-pHuric acid applied through the system with .25 acre-inches of water.
In year 2, the irrigation sprinklers will need to be moved for better water coverage and hats will need to be removed from the sprinklers. This is a one-time charge of 114.00 per acre in year 2.

Frost Protection. Frost is an issue for some farmers, particularly in the northern Sacramento Valley, but it is not included in this study.

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 the rest of the production years. Bee colony strength is assumed to be a standard eight frames per hive and the cost ranges from $200-$220 per hive. For this study, the pollination fee is $210 per hive.

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 *2023 Fungicide Efficacy and Treatment Timing for Almonds* publication located on the UC IPM website at 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.

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/beeprecaution/
honeybeehealthcoalition.org/wp-content/uploads/2017/05/HBHC_grower_flyer_v9.pdf

The Almond Board of California recently refreshed their 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

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 charge is $35 per acre.

Vegetation Management. In the first year, weeds are controlled in the row middles by mowing in May, June and August. The tree row (strip spray) is sprayed with Gramoxone SL in April, June and August.

In the second calendar year, the row middles are mowed three times, February and June, and August the tree row is sprayed with a dormant strip spray using Surflan and Roundup in January. Two spot or strip sprays with Roundup tank mixed with Rely 280 are applied to the tree row twice, once in April and again in July. Trunk protectors must be in place for Rely 280 to be used in the 2nd leaf.

From the third year on, the row middles are mowed five times in February, April, May, June and August. A dormant season strip spray with Alion, Matrix and Roundup is applied in January. Roundup and Rely 280 are applied as a strip spray in May to pick up escaped weeds. A pre-harvest weed spray in July, again with Roundup and Rely 280 are applied to the entire orchard floor (row middles and tree row).

Insects and Mites. In the first year, sprays are applied using a sprayer with a handgun due to the small tree size; the applied rate is 10 percent of recommended total volume. An insecticide treatment of Altacor and Intrepid for peach twig borer (PTB) control and AgriMek for mites is made in May.

Starting in the second year an air-blast sprayer is used to apply the materials. It is assumed that a B.t.-based biological insecticide such as Dipel, is applied at bloom and post bloom to control peach twig borer (PTB). Annual dormant spur monitoring should be done to confirm that treatment for scale is not needed. For PTB in the third, fourth, fifth, and sixth years, Dipel is added to the brown rot materials (more details in Disease section); two treatments are made, one at bloom in February and one at petal fall in early March.

Beginning in the third year and in subsequent years, navel orangeworm (NOW), *Amyelois transitella* 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 to monitor insect flights through hull-split. Insecticide applications of Altacor for NOW are applied twice at hull-split. An application of Vigilant, for mite control, is assumed to be included in one of the NOW applications, though this may not be necessary in all orchards and years, depending on beneficial insect populations, weather and irrigation stress. All the traps are monitored by the PCA/CCA and the costs are included

in their fees. This study includes 120 per acre cost for NOW mating disruption, application, and monitoring starting in year 3.

Winter Sanitation. Winter sanitation, November-January destroys overwintering sites and spring food sources for NOW. The trees containing mummy nuts are mechanically shaken and poled by hand to drop the mummies to the orchard floor where they are swept into the middles and shredded with a flail mower. The shaking and sweeping operations are custom hired and the grower does the shredding. This operation begins in the third year and continues for the life of the orchard. Some years, mummy nuts stick worse than others, resulting in additional labor costs than shown here. This study shows the hand labor charges combined and split over two years.

Diseases. In the third, fourth, and fifth years, Vanguard WG is applied in February to control brown rot. In the fourth and fifth year, Ziram is applied in March/April to control shot hole, scab, and anthracnose. In the sixth year, brown rot may be controlled with Vanguard in February and shot hole with Merivon, Luna, or Bravo (this study applies Bravo) in early March and Ziram in late March. Additional fungicide sprays may be applied in April or later (approximately 5 weeks after petal fall) for control of scab, rust, and Alternaria and/or with the first hull-split spray for hull rot control, depending on weather in a given year and specific conditions, but those are not included here.

Vertebrate Pests. Treatments will vary depending upon rodent populations and orchard location. Gophers are managed with poison bait applied in the spring and fall using a hand bait applicator. Trapping is used to control squirrels at a cost of $8.50/trap, which is included in shop tools under investments. Squirrel traps are set from March through October. It is assumed 2.5 traps/acre are used. See the following websites for additional information. ucanr.org/sites/Ground_Squirrel_BMP/
ipm.ucdavis.edu/PMG/menu.vertebrate.html.

Endangered Species. It is important to know if your farm is located in an area where endangered or threatened species reside. PRESCRIBE is an online database application to allow pesticide applicators to learn if endangered species are in the vicinity of an application site, and the use limitations applicable to the pesticide product(s) they intend to use. The database is implemented by the California Department of Pesticide Regulation. https://www.cdpr.ca.gov/docs/endspec/prescint.htm

Harvest. Beginning in the third year, the almonds are mechanically harvested; great care is taken when shaking the trees in the first harvest year as to not damage the trunk and/or the root system. It is assumed the orchard is harvested by a custom harvesting operation. Almond harvest starts in August and goes through October. A shaker head attaches to the tree trunk to shake the nuts from the tree. The nuts fall to the ground, are allowed to dry and in a separate operation are blown from around the tree and mechanically swept into windrows. A pickup machine gathers the nuts from the windrow and loads them into a cart or bank-out wagon. The nuts are elevated into bottom dump trailers (set of doubles) and transported to the hulling operation.

Production Cultural Practices and Material Inputs

Prune. Hand pruning is done in alternate years which can begin after harvest and continue through the winter months to remove dead or diseased wood, facilitate orchard management and provide equipment access. One-half of the cost is charged each year to the orchard operation. Prunings are placed into the row middles and pushed out of the orchard by a tractor with a brush rake and burned. Some growers elect to shred prunings in the rows.

Fertilizer. Nitrogen fertilization is based on estimated yield, while leaf samples are used to monitor long-term trends and potential change post-harvest N decisions. UAN-32 is applied through the irrigation system at 220 pounds of N per acre and is split into separate applications in April (33% of annual budget), May (33% annual

budget), June (33% annual budget). Zinc sulfate is applied as a foliar spray in October or November. Boron is assumed to be included with the fall zinc spray. Outside of the Cache Creek watershed (Yolo County), many Sacramento Valley orchards may require inputs to maintain sufficient boron, which growers can best assess by reviewing their hull analysis report. Potassium sulfate (K2SO4) at 440 pounds per acre is fertigated through the drip line along the tree row in late November, depending on tree nutrient status.

Samples: Leaf samples are collected by the PCA in July to analyze tree nutrient status. Hull samples are collected from the windrow by the PCA at harvest. The charges shown are for the lab analysis.

Irrigation. The water is pumped from a well and passes through a filtration system into the micro-sprinkler system. Thirty-eight acre-inches of water are applied to the orchard from April to October averaging two irrigation per week over the 25-week period. Irrigations early and late in the season may be less than twice per week or of shorter durations. Pumping costs are assumed to be $16.66 per acre-inch, ($200 per acre-foot). Rates will vary depending upon pump and well specifications and rate program selected. Irrigation labor costs are included.

Frost Protection. Frost protection may not be required every year and the amount of protection needed will vary. No frost protection costs are included in this study.

Pollination. In mature orchards, two hives (8 frames of bees per hive) per acre are rented for pollination during February through mid-March.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines for Almonds.* For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at ipm.ucanr.edu.

Vegetation Management. Weeds in mature orchards are controlled in the tree row (strip spray) in the winter (January) using Alion, Matrix and Roundup. In addition, one spot spray with Roundup and Rely 280 is made during May. Row middles are mowed five times to control vegetation. To prepare the orchard floor for harvest, an herbicide application of Rely 280 and Roundup is made in late July. A UTV and pull sprayer is used for spraying the herbicides.

Insects and Mites. Several insect and mite pests are controlled each year using integrated pest management. It is assumed that biological insecticides such as B.t. (for example, Dipel, which is considered bee safe) applied at bloom and post bloom will control peach twig borer (PTB); therefore, dormant sprays are not needed (but annual dormant spur monitoring is done to confirm this). The materials are applied with the disease sprays in early to late March.

Naval orangeworm is also monitored with pheromone traps with lures as well as egg traps (and female traps in many orchards). 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. Insecticide applications of Altacor and Intrepid for NOW (with Zeal-once, for mites) is applied twice, (two varieties) in separate applications at hull-split in July. These applications may not be done every year, other insecticides and timings may be utilized depending upon insect and pressure. This study includes $120 per acre for NOW mating disruption, application, and monitoring.

Winter Sanitation. Winter sanitation, November through January, destroys overwintering sites and spring food sources for NOW. The trees containing mummy nuts are mechanically shaken and poled by hand to drop the mummies to the orchard floor where they are swept into the middles and shredded with a flail mower. The shaking and sweeping operations are custom hired and the grower does the shredding. 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. Fungicide applications are made to control brown rot, shot hole, scab, Alternaria and anthracnose. Applications for brown rot control are made with Vanguard during bloom in February. Bravo is applied at late petal fall for shot hole in March and Ziram for scab and anthracnose later in March. Additional fungicide sprays may be applied in April or later for scab, rust, alternaria and anthracnose. A fungicide (Merivon, Luna Sensation, Ph-D, Quash, etc.) may be applied with the first hull split spray for hull rot. Alternate fungicides with different modes of action should be used to protect against chemical resistance. See Efficacy and Timing of Fungicides, Bactericides, and Biologicals for Deciduous Tree Fruit, Nut Crops, and Grapevines at ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf

Vertebrate Pests. Gophers are managed with poison bait applied in the spring and late summer using a hand bait applicator. Trapping is used to control squirrels at a cost of $8.50/trap, which is included in shop tools under investments. Squirrel traps are set from March through October. The grower uses an ATV to check bait stations and set 2.5 traps/acres. Vertebrate control costs will vary considerably between orchards.

Harvest, Yields and Revenue

Harvest. The almonds are mechanically shaken, mechanically blown and swept to the row middles, into windrows. The nuts are mechanically picked up and hauled to the roadside truck or huller. The harvest is performed by a custom operator, with the grower providing the labor for hand raking missed nuts and gathering the nuts which stick in the crotches of the trees, into the windrows. Almond harvest starts in August and goes through October depending on the varieties planted.

This orchard is assumed to 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/varieties. Some varieties can be harvested together. Added costs for a second harvest are not shown since harvest costs are 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. For this study, it is assumed the orchard will average 2,200 pounds per acre for the life of the orchard.

Revenue. The almond meats are sold for $1.60 per pound based on reported current returns.

Ranging Analysis. Table 5 shows a range of yields, 1,800 – 3,000 kernel pounds per acre over a range of prices, $1.00 - $3.00 per pound.

Almond Hulls and By-Products. The almond hulls are high in fiber and are 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 could be another source of income from the orchard. No revenues from any of these potential sources of income are shown.

Assessment. The Almond Board of California (ABC) 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

Labor, Equipment and Operating Interest

Labor. Hourly wages for workers are $22.00 for machine operators and $20.00 per hour non-machine labor. Adding 43.00 percent for the employer's share of federal and state payroll taxes, workers' compensation insurance, for nut crops (Code 0045) and other possible benefits gives the labor rates shown of $31.46 and $28.60 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers. The costs are based upon the average industry final rate as of January 2024. 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.

Management Salary. Wages for management are not included as a cash cost. Any return above total costs is considered a return to management.

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 & Biological 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 $4.80 and $4.40 per gallon, respectively. The costs are based on January 2024, Energy Information Administration (EIA), monthly data. The cost includes a 13.0 percent sales tax on diesel fuel and 2.25 percent sales tax on gasoline. Included in the cost per gallon is federal and state excise tax, $0.36 on diesel fuel and $0.42 on gasoline, 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/Utility Vehicle, (ATV). The study assumes the pickup is used to move equipment, supplies and tools. The ATV is used for baiting ants, gophers and squirrels. The ATV is also used to check the orchard for pest problems and irrigation monitoring.

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 9.00 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, the rate is considered a typical lending rate by a farm lending agency as of January 2024.

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, and equipment repairs.

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 .710 percent per $1,000 of the average value of the assets over their useful life.

Liability Insurance. A baseline 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. For this analysis, $833 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. A significant number of growers purchase crop insurance in this region. In this study crop insurance at 70% coverage is purchased. The USDA Risk Management Agency, Crop Insurance Policies link: rma.usda.gov/policies/.

Office Expenses. Office and business expenses are estimated at $100 per acre. These expenses include office supplies, communications, bookkeeping, accounting.

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 $40.00 per acre is included.

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 provide one portable toilet and cost the farm $1050 annually. 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.

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 (Purchase Price – Salvage Value) x Capital Recovery Factor) + (Salvage Value x 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 & Biological 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 7.

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. An interest rate of 8.25 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions but is the basic suggested rate by a farm- lending agency as of January 2024.

Land. Irrigated cropland values range from $15,000 to $25,000 in the Sacramento Valley. The orchard site is valued at $20,000 per acre or $2,100,000 for the 105 acres and ($21,000 per producing acre). Established almond orchards in this region range in value from $25,000 - $42,000 per acre (*2023 TRENDS*).

Establishment Cost. Costs to establish the orchard are used to determine the non-cash overhead expenses, capital recovery, and interest on investment for the production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing almond trees through the third year less returns from production. The Accumulated Net Cash Cost in the third year shown in Table 1 represents the establishment cost per acre. The cost is $14,894 per acre or $1,489,400 for the 100-acre orchard. Establishment costs are amortized beginning in the fourth year and are continuous for the remaining 22 years of production. The establishment costs added to the bare land value is consistent with the value of an established mature orchard, ($20,000 + $14,894 = $34,894). 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 pump and well cost are based on one 175 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 re-casing 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 75 HP booster pump, is used to pump the water through the filtration station out into the sprinkler system.

The life of the irrigation system is estimated to be 50 years. An annual pump test is performed in March to monitor pumping level and efficiency (gallons/minute) at a cost of $750 for each pump. 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 6.

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 alarm is also included in this cost.

Fuel Tanks. Two 1,000-gallon fuel tanks, one for diesel and one for gasoline, are placed on stands in a cement containment meeting federal, state, and local regulations.

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

REFERENCES

American Society of Agricultural and Biological Engineers. (ASABE). July 2023. *"American Society of Agricultural Engineers Standards Yearbook"*. Russell H. Hahn and Evelyn E. Rosentreter (ed.). St. Joseph, MO. 41st edition, ANSI/ASAE S279_17.PDF. hq@asabe.org

Boehlje, Michael D., and Vernon R. Eidman. 1984. "*Farm Management"*. John Wiley and Sons. New York, New York.

California Chapter of the American Society of Farm Managers and Rural Appraisers. 2023 "*Trends in Agricultural Land & Lease Values"*. American Society of Farm Managers and Rural Appraisers, Woodbridge, CA. calasfmra.com

California State Board of Equalization. *Fuel Tax Division Tax Rates*. boe.ca.gov/sptaxprog/spftdrates.htm

California Department of Insurance. 2023 *California Workers' Compensation Rating Data for Selected Agricultural Classifications as of January 2023.* California Department of Insurance, Rate Regulation Branch. insurance.ca.gov/0500-about-us/

Duncan, Roger A., P.E. Gordon, B.A. Holtz, D. Stewart. D.A. Sumner, *"Sample Cost to Establish an Almond Orchard and Produce Almonds, Northern San Joaquin Valley, 2019"*. University of California Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA. coststudies.ucdavis.edu/en/current/

Energy Information Administration. *Weekly Retail on Highway Diesel Prices.* eia.gov/petroleum/gasdiesel/

Haviland, David, R., M. Yaghmour, E. J. Fichtner B. L. Sanden, M. Culumber, M. Viveros, D. Stewart, D. A. Sumner. *"Sample Costs to Establish an Almond Orchard and Produce Almonds in The San Joaquin Valley, South-2019"*. University of California Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA. coststudies.ucdavis.edu/en/current/.

Jarvis-Shean, Katherine, A. Fulton, D. Doll, B. Lampinen, B. Hanson, R. Baldwin, D. Lightle and B. Vinsonhaler. *"Young Orchard Handbook-2018"*. University of California, Agriculture and Natural Resources. UCCE Capitol Corridor, Sacramento, Solano and Yolo Counties.

Micke, Warren C. *Almond Production Manual*. *3364*, Oakland, Calif: University of California, Division of Agriculture and Natural Resources, 1996. anrcatalog.ucanr.edu/Details.aspx?itemNo=3364

Buchner, R., Niederholzer, F., Jarvis-Shean, K.S., Lightle, D., Symmes, E.J., Milliron, L., Stewart, D. and D. A. Sumner. "*Sample Costs to Establish an Orchard and Produce Almonds, Sacramento Valley, 2019*". University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA. coststudies.ucdavis.edu/en/current/.

University of California Statewide Integrated Pest Management Program. *UC Pest Management Guidelines, Almonds*. 2019. University of California, Davis, CA. ipm.ucanr.edu/.

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

Table 1. COSTS PER ACRE TO ESTABLISH AN ALMOND ORCHARD

Sacramento Valley - 2024

		Cost Per Acre						Your
	Year:	1st	2nd	3rd	4th	5th	6th	Costs
Operations:	Meat Pounds Per Acre @ $1.60/lbs.			400	800	1,400	2,000	
Pre-Plant:								
Tree Removal/Chip		1,600						
Spread Compost		300						
Rip 6' Depth/Root Removal (2X)		800						
Disc & Roll 2x		150						
Survey Mark Site		40						
Make Berms/Rows		40						
Micro-Sprinkler Irrigation System Installation & Materials		3,500						
Smooth/Float Row Middles		40						
Strip Spray: Berms		46						
TOTAL PRE-PLANT COSTS		6,516						
Plant:								
Treat Roots/Plant/Top (130 trees/acre)		1,671						
Stake/Whitewash/Cartons/Irrigate-Hand		385						
Replant 1% of Trees			51	51	51	51		
TOTAL PLANTING COSTS		2,056	51	51	51	51		
Cultural:								
Irrigate: Pump Test		8	8	8	8	8	8	
Irrigate: Water Analysis		1	1	1	1	1	1	
Irrigation: Move Sprinklers			114					
Irrigate		300	300	433	533	633	633	
Irrigation Labor		41	41	57	78	92	92	
Irrigation: System Flush		17	17	17	17	17	17	
Pollination: Hive Rental				105	210	420	420	
Fertigate: (15-15-15) 3x		62						
Fertigate: (UAN-32) 3x			21	41	83	110	152	
Fertilize (Foliar): Zinc Sulfate & Yr. 3 + Solubor			49	53	53	53	53	
Fertigate: K_2SO_4			20	39	78	101	196	
Fertilize: Leaf Sample				1	1	1	1	
Fertilize: Hull Sample				2	2	2	2	
Vertebrate Pests: Gophers – Bait 2x		50	50	50	50	50	50	
Vertebrate Pests: Squirrels – Traps 6x		43	86	86	86	86	86	
Weeds: Strip/Spot Spray		41	77	32	32	32	32	
Weeds: Pre-Harvest Spray				45	45	45	45	
Weeds: Mow Middles (3X Year 1 & 2, 5X Year 3+)		43	43	67	67	67	67	
Weeds: Dormant Strip Spray			39	82	82	82	82	
Insects: NOW Disruptor				120	120	120	120	
Insects:(Yr.1 Hand, Yr.2 50% of ac., Yr.3+ NOW/Mites)		17	61	238	238	238	238	
Disease: (Yr. 3, + Insects Yr. 4 & 5 2x, Yr. 6 + 3x)				140	161	161	216	
PCA/CCA Fee		35	35	35	35	35	35	
Prune: Summer Suckering		37						
Prune: Dormant – Hand Crew			57	72	72	72	72	
Prune: Push Prunings			13	14	14	16	22	
Insects: NOW-Winter Sanitation				164	164	164	164	
Pickup Truck Use		90	90	90	90	90	90	
ATV Use		57	65	65	65	65	65	
TOTAL CULTURAL COSTS		841	1,186	2,058	2,385	2,761	2,956	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
Table 1. CONTINUED
Sacramento Valley - 2024

	Cost per Acre						
Year:	1st	2nd	3rd	4th	5th	6th	Your
Operation: Meat Pounds Per Acre @ $1.60/lbs.			400	800	1,400	2,000	Costs
Harvest:							
Shake/Pickup/Haul Nuts			465	465	465	465	
Hull/Shell Nuts			40	80	140	200	
TOTAL HARVEST COSTS			505	545	605	665	
Interest on Operating Capital @ 9.00%	778	63	39	49	61	62	
TOTAL OPERATING COSTS/ACRE	10,191	1,300	2,654	3,031	3,478	3,683	
Cash Overhead							
Liability Insurance	8	8	8	8	8	8	
Office Expense	100	100	100	100	100	100	
Sanitation Fees	9	9	11	11	11	11	
Environmental/Regulatory Fees	40	40	40	40	40	40	
Miscellaneous Costs	20	20	20	20	20	20	
Property Taxes	215	215	216	290	290	290	
Property Insurance	15	15	15	21	21	21	
Investment Repairs	55	55	55	130	130	130	
TOTAL CASH OVERHEAD COSTS	463	463	465	620	620	620	
TOTAL CASH COSTS/ACRE	10,653	1,763	3,118	3,650	4,097	4,303	
REVENUE/ACRE FROM PRODUCTION			**640**	**1,280**	**2,240**	**3,200**	
NET CASH COSTS/ACRE FOR THE YEAR	10,653	1,763	2,478	2,370	1,857	1,103	
PROFIT/ACRE ABOVE CASH COSTS							
ACCUMULATED NET CASH COSTS/ACRE	10,653	12,416	**14,894**	17,264	19,121	20,224	
NON-CASH OVERHEAD:							
Fuel Tanks 2-1,000 Gallon	12	12	12	12	12	12	
Well/Pump/Filters	209	209	209	209	209	209	
Shop/Field Tools	14	14	14	14	14	14	
Land: Sacramento Valley	1,650	1,650	1,650	1,650	1,650	1,650	
Establishment Costs				1,489	1,489	1,489	
Equipment	27	32	37	37	37	37	
TOTAL NON-CASH OVERHEAD COST/ACRE	1,912	1,917	1,922	3,412	3,412	3,412	
TOTAL COST/ACRE FOR THE YEAR	12,566	3,680	5,041	7,062	7,509	7,715	
REVENUE/ACRE FROM PRODUCTION			**640**	**1,280**	**2,240**	**3,200**	
TOTAL NET COST/ACRE FOR THE YEAR	12,566	3,680	4,401	5,782	5,269	4,515	
NET PROFIT/ACRE ABOVE TOTAL COSTS							
TOTAL ACCUMULATED NET COST/ACRE	12,566	16,246	20,647	26,429	31,698	36,213	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

Table 2. COSTS PER ACRE TO PRODUCE ALMONDS

Sacramento Valley - 2024

Operation	Equipment Time (Hrs/A)	Labor Cost	Cash and Labor Costs per Acre: Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Weeds: Dormant Strip Spray	0.16	6	1	0	75	0	82	
Mow Middles 5x	1.30	49	29	15	0	0	93	
Pollination (2 hives /acre)	0.00	0	0	0	0	420	420	
Pump Test	0.00	0	0	0	0	8	8	
Water Analysis	0.00	0	0	0	0	1	1	
Disease/Insects 3x	0.00	0	0	0	99	120	219	
Squirrels 6x	0.00	86	0	0	0	0	86	
Gophers 2x	0.00	29	0	0	21	0	50	
NOW Mating Disruption	0.00	0	0	0	120	0	120	
Fertigate: UAN32 3x	0.00	0	0	0	152	0	152	
Irrigate	0.00	87	0	0	633	0	720	
Weeds: Spot Spray	0.25	9	2	1	23	0	35	
Leaf Samples	0.00	0	0	0	0	1	1	
Insects: NOW/Mites 2x	0.00	0	0	0	158	40	198	
Weeds: Pre-Harvest Spray	0.16	6	1	0	37	0	45	
Hull Sample	0.00	0	0	0	0	2	2	
Irrigation: System Flush	0.00	7	0	0	10	0	17	
Fertigate: K2SO4	0.00	0	0	0	216	0	216	
Fertilizer (Foliar): Zinc Sulfate & Solubor	0.25	9	6	3	36	0	53	
Winter Sanitation	0.33	13	7	4	0	150	174	
Prune: Dormant	0.00	72	0	0	0	0	72	
Prune: Push Prunings	0.30	11	7	2	0	0	20	
PCA/CCA Fees	0.00	0	0	0	0	35	35	
Pickup Truck Use	1.67	63	20	7	0	0	90	
ATV Use	1.42	53	9	2	0	0	65	
TOTAL CULTURAL COSTS	5.85	501	81	34	1,580	777	2,972	
Harvest:								
Harvest: Shake/Pickup/Haul	0.00	0	0	0	0	465	465	
Harvest: Hull/Shell Nuts	0.00	0	0	0	0	220	220	
TOTAL HARVEST COSTS	0.00	0	0	0	0	685	685	
Interest on Operating Capital at 9.00%							63	
TOTAL OPERATING COSTS/ACRE	6	501	81	34	1,580	1,462	3,720	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

Table2. CONTINUED

Sacramento Valley - 2024

Operation	Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
	Operation		Cash and Labor Costs per Acre					
CASH OVERHEAD:								
Office Expense							100	
Liability Insurance							8	
Environmental/Regulatory Fees							40	
Sanitation Fees							11	
Miscellaneous Costs							20	
Crop Insurance (70% Coverage)							42	
Property Taxes							290	
Property Insurance							21	
Investment Repairs							130	
TOTAL CASH OVERHEAD COSTS/ACRE							662	
TOTAL CASH COSTS/ACRE							4,382	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Fuel Tanks (2) - 1,000 Gal		125		12			12	
Well/Pump/Filters		2,488		209			209	
Shop/Field Tools		150		14			14	
Land SV		20,000		1,650			1,650	
Establishment Costs-SV		14,894		1,489			1,489	
Equipment		310		44			44	
TOTAL NON-CASH OVERHEAD COSTS		37,966		3,418			3,418	
TOTAL COSTS/ACRE							7,800	

UC COOPERATIVE EXTENSION -AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS

Sacramento Valley – 2024

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Almonds Prod	2,200	Lb	1.60	3,520	
TOTAL GROSS RETURNS	2,200	Lb		3,520	
OPERATING COSTS					
Herbicide:				**135**	
Roundup PowerMax	2.75	Pint	6.00	17	
Matrix SG	2.00	Oz	8.99	18	
Alion	3.50	FlOz	14.50	51	
Rely 280	4.00	Pint	12.45	50	
Fungicide:				**77**	
Vanguard WG	6.00	Oz	3.38	20	
Bravo-Weatherstik	32.00	FlOz	0.45	14	
Ziram WDG76	8.00	Lb	5.25	42	
Insecticide:				**301**	
Dipel Pro DF	1.40	Lb	16.00	22	
NOW Mating Disruption	1.00	Acre	120.00	120	
Altacor	3.00	FlOz	8.45	25	
Zeal	3.00	FlOz	22.08	66	
Intrepid 2F	24.00	FlOz	2.78	67	
Rodenticide:				**21**	
Vertebrate Pest Bait	5.00	Lb	4.25	21	
Custom:				**1,462**	
Pollination Fee	2.00	Hive	210.00	420	
Irrigation Pump Test	0.01	Each	750.00	8	
Irrigation Water Analysis	0.02	Each	50.00	1	
Pesticide Spray Application	4.00	Acre	40.00	160	
Leaf Analysis	1.00	Acre	1.00	1	
Harvest-Shake/Pickup/Haul	1.00	Acre	465.00	465	
Hull/Shell Nuts	2200.00	Lb	0.10	220	
Hull Analysis	1.00	Acre	2.25	2	
Shake/Sweep Nuts- NOW	1.00	Acre	150.00	150	
PCA/CCA Fee	1.00	Acre	35.00	35	
Irrigation:				**643**	
Water-Pumped	38.25	AcIn	16.66	637	
N-Phuric Acid	0.12	Gal	47.54	6	
Fertilizer:				**403**	
UAN32 (32-0-0)	220.00	Lb N	0.69	152	
Potassium Sulfate-K2SO4 50%	440.00	Lb	0.49	216	
Zinc Sulfate 36%	20.00	Lb	1.59	32	
Solubor (20,5%)	1.95	Lb	2.03	4	
Labor				**501**	
Equipment Operator Labor	7.02	hrs	31.46	221	
Non-Machine Labor	4.00	hrs	28.60	114	
Irrigation Labor	3.29	hrs	28.60	94	
Pruning Labor	2.50	hrs	28.60	72	
Machinery				**115**	
Fuel-Gas	2.99	gal	4.40	13	
Fuel-Diesel	14.19	gal	4.80	68	
Lube				12	
Machinery Repair				21	
Interest on Operating Capital @ 9.00%				63	
TOTAL OPERATING COSTS/ACRE				3,720	
TOTAL OPERATING COSTS/LB				2	
NET RETURNS ABOVE OPERATING COSTS				-200	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 3. CONTINUED

Sacramento Valley - 2024

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Office Expense				100	
Liability Insurance				8	
Environmental/Regulatory Fees				40	
Sanitation Fees				11	
Miscellaneous Costs				20	
Crop Insurance (70% Coverage)				42	
Property Taxes				290	
Property Insurance				21	
Investment Repairs				130	
TOTAL CASH OVERHEAD COSTS/ACRE				662	
TOTAL CASH OVERHEAD COSTS/LB				0	
TOTAL CASH COSTS/ACRE				4,382	
TOTAL CASH COSTS/LB				2	
NET RETURNS ABOVE CASH COSTS				-862	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Fuel Tanks (2) - 1,000 Gal				12	
Well/Pump/Filters				209	
Shop/Field Tools				14	
Land SV				1,650	
Establishment Costs-SV				1,489	
Equipment				44	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				3,418	
TOTAL NON-CASH OVERHEAD COSTS/LB				2	
TOTAL COST/ACRE				7,800	
TOTAL COST/LB				4	
NET RETURNS ABOVE TOTAL COST				-4,280	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE ALMONDS

Sacramento Valley - 2024

	JAN 24	FEB 24	MAR 24	APR 24	MAY 24	JUN 24	JUL 24	AUG 24	SEP 24	OCT 24	NOV 24	DEC 24	Total
Cultural:													
Weeds: Dormant Strip Spray	82												82
Mow Middles 5x		21		18	18	18		18					93
Pollination (2 hives /acre)		420											420
Pump Test			8										8
Water Analysis			1										1
Disease/Insects 3x		70	149										219
Squirrels 6x			14	14	14	14			14	14			86
Gophers 2x			25					25					50
NOW Mating Disruption				120									120
Fertigate: UAN32 3x				51	51	51							152
Irrigate				76	95	133	152	114	95	57			720
Weeds: Spot Spray					35								35
Leaf Samples							1						1
Insects: NOW/Mites 2x							198						198
Weeds: Pre-Harvest Spray							45						45
Hull Sample								2					2
Irrigation: System Flush										17			17
Fertigate: K2SO4											216		216
Fertilizer: Zinc Sulfate/Solubor											53		53
Winter Sanitation											174		174
Prune: Dormant												72	72
Prune: Push Prunings												20	20
PCA/CCA Fees	3	3	3	3	3	3	3	3	3	3	3	3	35
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	8	90
ATV Use	5	5	5	5	5	5	5	5	5	5	5	5	65
TOTAL CULTURAL COSTS	98	527	213	294	228	231	412	175	125	104	459	107	2,972
Harvest:													
Harvest: Shake/Pickup/Haul								465					465
Harvest: Hull/Shell Nuts								220					220
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	685	0	0	0	0	685
Interest on Operating Capital @9.00%	1	5	6	8	10	12	15	22	-6	-5	-4	-1	63
TOTAL OPERATING COSTS/ACRE	99	532	219	303	238	243	427	881	119	99	454	106	3,720
CASH OVERHEAD													
Office Expense	8	8	8	8	8	8	8	8	8	8	8	8	100
Liability Insurance	1	1	1	1	1	1	1	1	1	1	1	1	8
Environmental/Regulatory Fees									40				40
Sanitation Fees SacVal									11				11
Miscellaneous Costs									20				20
Crop Insurance (70% Coverage)			42										42
Property Taxes		145							145				290
Property Insurance		10							10				21
Investment Repairs	11	11	11	11	11	11	11	11	11	11	11	11	130
TOTAL CASH OVERHEAD COSTS	20	176	62	20	20	20	20	20	246	20	20	20	662
TOTAL CASH COSTS/ACRE	119	707	281	323	258	263	446	901	365	119	474	126	4,382

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 5. RANGING ANALYSIS

Sacramento Valley – 2024

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALMONDS

	YIELD (LBS.)						
	1,800.00	2,000.00	2,100.00	2,200.00	2,400.00	2,700.00	3,000.00
OPERATING COSTS/ACRE:							
Cultural	2,972	2,972	2,972	2,972	2,972	2,972	2,972
Harvest	561	623	652	685	747	842	932
Interest on Operating Capital @ 9.00%	62	62	63	63	63	64	65
TOTAL OPERATING COSTS/ACRE	3,595	3,658	3,686	3,720	3,782	3,878	3,969
TOTAL OPERATING COSTS/LB	2.00	1.83	1.76	1.69	1.58	1.44	1.32
CASH OVERHEAD COSTS/ACRE	662	662	662	662	662	662	662
TOTAL CASH COSTS/ACRE	4,257	4,320	4,348	4,382	4,444	4,540	4,631
TOTAL CASH COSTS/LB	2.37	2.16	2.07	1.99	1.85	1.68	1.54
NON-CASH OVERHEAD COSTS/ACRE	3,418	3,418	3,418	3,418	3,418	3,418	3,418
TOTAL COSTS/ACRE	7,675	7,738	7,766	7,800	7,862	7,958	8,049
TOTAL COSTS/LB	4.00	4.00	4.00	4.00	3.00	3.00	3.00

Net Return per Acre above Operating Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1800.00	2000.00	2100.00	2200.00	2400.00	2700.00	3000.00
1.00	-1,795	-1,658	-1,586	-1,520	-1,382	-1,178	-969
1.20	-1,435	-1,258	-1,166	-1,080	-902	-638	-369
1.40	-1,075	-858	-746	-640	-422	-98	231
1.60	-715	-458	-326	-200	58	442	831
2.00	5	342	514	680	1,018	1,522	2,031
2.50	905	1,342	1,564	1,780	2,218	2,872	3,531
3.00	1,805	2,342	2,614	2,880	3,418	4,222	5,031

Net Return per Acre above Total Cash Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1800.00	2000.00	2100.00	2200.00	2400.00	2700.00	3000.00
1.00	-2,457	-2,320	-2,248	-2,182	-2,044	-1,840	-1,631
1.20	-2,097	-1,920	-1,828	-1,742	-1,564	-1,300	-1,031
1.40	-1,737	-1,520	-1,408	-1,302	-1,084	-760	-431
1.60	-1,377	-1,120	-988	-862	-604	-220	169
2.00	-657	-320	-148	18	356	860	1,369
2.50	243	680	902	1,118	1,556	2,210	2,869
3.00	1,143	1,680	1,952	2,218	2,756	3,560	4,369

Net Return per Acre above Total Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1800.00	2000.00	2100.00	2200.00	2400.00	2700.00	3000.00
1.00	-5,875	-5,738	-5,666	-5,600	-5,462	-5,258	-5,049
1.20	-5,515	-5,338	-5,246	-5,160	-4,982	-4,718	-4,449
1.40	-5,155	-4,938	-4,826	-4,720	-4,502	-4,178	-3,849
1.60	-4,795	-4,538	-4,406	-4,280	-4,022	-3,638	-3,249
2.00	-4,075	-3,738	-3,566	-3,400	-3,062	-2,558	-2,049
2.50	-3,175	-2,738	-2,516	-2,300	-1,862	-1,208	-549
3.00	-2,275	-1,738	-1,466	-1,200	-662	142	951

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

Sacramento Valley - 2024

ANNUAL EQUIPMENT COSTS

						Cash Overhead		
Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Total
24	ATV-4WD	9,350	8	3,263	1,338	4	63	1,406
24	ATV Sprayer System 100 Gal	3,850	10	681	534	2	23	558
24	85HP4WD Low-Profile Tractor	79,000	15	15,380	8,815	34	472	9,321
24	Flail Mower 11'	13,600	10	2,405	1,886	6	80	1,971
24	Air-Blast PTO 500Gal	31,000	8	6,999	4,794	13	190	4,997
24	Brush Rake 10'	2,400	15	230	276	1	13	290
24	Pickup Truck 1/2 Ton	35,000	5	15,686	6,163	18	253	6,435
	TOTAL	174,200	-	44,645	23,807	78	1,094	24,979
	60% of New Cost*	104,520	-	26,787	14,284	47	657	14,987

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

					Cash Overhead			
Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Insurance	Taxes	Repairs	Total
INVESTMENT								
Fuel Tanks (2) - 1,000 Gal	12,500	25	875	1,059	5	67	250	1,380
Well/Pump/Filters	248,775	50	0	18,026	88	1,244	4,976	24,334
Shop/Field Tools	15,000	25	1,500	1,263	6	83	300	1,652
Land	2,100,000	30	2,100,000	147,000	1,491	21,000	0	169,491
Establishment Costs-SV	1,489,400	22	0	148,907	529	7,447	7,477	164,360
TOTAL INVESTMENT	3,865,675	-	2,102,375	345,679	2,119	29,840	13,003	390,640

ANNUAL BUSINESS OVERHEAD COSTS

Description	Farm	Units/ Unit	Price/ Unit	Total Cost
Office Expense	100	Acre	100.00	10,000
Liability Insurance	105	Acre	8.33	875
Environmental/Regulatory Fees	100	Acre	40.00	4,000
Sanitation Fees	100	Acre	10.50	1,050
Miscellaneous Costs	100	Acre	20.00	2,000
Crop Insurance (70% Coverage)	100	Acre	42.33	4,233

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 7. HOURLY EQUIPMENT COSTS

Sacramento Valley - 2024

		Almonds			Cash Overhead		Operating			
Yr.	Description	Hours Used	Hours Used	Capital Recovery	Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	Total Costs/Hr.
24	ATV-4WD	200	625	1.28	0.00	0.06	1.19	6.60	7.79	9.14
24	ATV Sprayer System 100 Gal	58	150	2.14	0.01	0.09	1.01	0.00	1.01	3.25
24	85HP4WD Low-Profile Tractor	240	1066	4.96	0.02	0.27	4.84	20.04	24.88	30.12
24	Flail Mower 11'	163	200	5.66	0.02	0.24	6.25	0.00	6.25	12.17
24	Air-Blast PTO 500Gal	25	250	11.50	0.03	0.46	5.23	0.00	5.23	17.22
24	Brush Rake 10'	30	130	1.28	0.00	0.06	0.43	0.00	0.43	1.77
24	Pickup Truck 1/2 Ton	167	400	9.25	0.03	0.38	4.38	12.00	16.38	26.03

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 8. OPERATIONS WITH EQUIPMENT & MATERIALS

Sacramento Valley - 2024

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Weeds: Dormant Strip	Jan		ATV-4WD	Equipment Operator Labor	0.20	hour
				Roundup PowerMax	1.00	Pint
			ATV Sprayer System 100 Gal	Matrix SG	2.00	Oz
				Alion	3.50	FlOz
Mow Middles 5x	Feb	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.36	hour
	Apr	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.30	hour
	May	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.30	hour
	June	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.30	hour
	Aug	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.30	hour
Pollination (2 hives)	Feb			Pollination Fee	2.00	Hive
Pump test	Mar			Irrigation Pump Test	0.01	Each
Water Analysis	Mar			Irrigation Water Analysis	0.02	Each
Disease/Insects 3x	Feb			Dipel Pro DF	0.60	Lb
				Vanguard WG	6.00	Oz
				Pesticide Spray Application	1.00	Acre
	Mar			Bravo-Weatherstik	32.00	FlOz
				Pesticide Spray Application	1.00	Acre
	Mar			Ziram WDG76	8.00	Lb
				Dipel Pro DF	0.80	Lb
				Pesticide Spray Application	1.00	Acre
Squirrels 6x	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
Gophers 2x	Mar			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	2.50	Lb
	Aug			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	2.50	Lb
NOW Disruption	Apr			NOW Disruptor/Trap Monitoring	1.00	Acre
UAN32 3x	Apr			UAN32 (32-0-0)	73.34	Lb N
	May			UAN32 (32-0-0)	73.33	Lb N
	June			UAN32 (32-0-0)	73.33	Lb N
Irrigate	Apr			Irrigation Labor	0.32	hour
				Water-Pumped	4.00	AcIn
	May			Irrigation Labor	0.40	hour
				Water-Pumped	5.00	AcIn
	June			Irrigation Labor	0.56	hour
				Water-Pumped	7.00	AcIn
	July			Irrigation Labor	0.64	hour
				Water-Pumped	8.00	AcIn
	Aug			Irrigation Labor	0.48	hour
				Water-Pumped	6.00	AcIn
	Sept			Irrigation Labor	0.40	hour
				Water-Pumped	5.00	AcIn
	Oct			Irrigation Labor	0.24	hour
				Water-Pumped	3.00	AcIn
Weeds: Spot Spray	May		ATV-4WD	Equipment Operator Labor	0.30	hour
				Roundup PowerMax	0.75	Pint
			ATV Sprayer System 100 Gal	Rely 280	1.50	Pint
Leaf Samples	July			Leaf Analysis	1.00	Acre
Insects: NOW/Mites 2X	July			Altacor	3.00	FlOz
				Zeal	3.00	FlOz
				Pesticide Spray Application	1.00	Acre
	July			Intrepid 2F	24.00	FlOz
Weeds: Pre-Harvest Spray	July		ATV-4WD	Equipment Operator Labor	0.20	hour
				Roundup PowerMax	1.00	Pint
			ATV Sprayer System 100 Gal	Rely 280	2.50	Pint
Hull Sample	Aug			Hull Analysis	1.00	Acre
Irrigation: System Flush	Oct			Irrigation Labor	0.25	hour
				Water-Pumped	0.25	AcIn
				N-Phuric Acid	0.12	Gal
Fertilizer: K2SO4	Nov			Potassium Sulfate-K2SO4 50%	440.00	Lb.
Fertilizer: Zinc Sulfur	Nov	85HP4WD Low-Profile	Air Blast PTO 500Gal	Equipment Operator Labor	0.30	hour
				Zinc Sulfate 36%	20.00	Lb
				Solubor (20,5%)	1.95	Lb

TABLE 8. CONTINUED

Sacramento Valley – 2024

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Winter Sanitation	Nov	85HP4WD Low-Profile	Flail Mower 11'	Equipment Operator Labor	0.40	hour
				Shake/Sweep Nuts- NOW	1.00	Acre
Prune: Dormant	Dec			Pruning Labor	2.50	hours
Prune: Push Prunings	Dec	85HP4WD Low-Profile	Brush Rake 10'	Equipment Operator Labor	0.36	hour
PCA/CCA Fees	Dec			PCA/CCA Fee	1.00	Acre
Pickup Truck Use	Dec		Pickup Truck 1/2 Ton	Equipment Operator Labor	2.00	hours
ATV Use	Dec		ATV-4WD	Equipment Operator Labor	1.70	hours
Harvest: Shake/Pickup	Aug			Harvest-Shake/Pickup/Haul	1.00	Acre
Harvest: Hull/Shell	Aug			Hull/Shell Nuts	2,200.00	Lb