

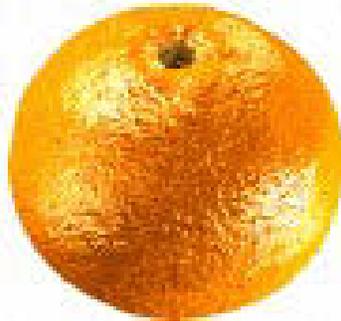
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UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES  
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UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

**2021**  
**SAMPLE COSTS TO ESTABLISH AN ORCHARD AND  
PRODUCE**

**ORANGES**

Navels



**SAN JOAQUIN VALLEY - South**

Low Volume Irrigation

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**San Joaquin Valley South-2021**

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**INTRODUCTION**

Sample costs to establish and produce oranges are presented in this study. It is intended as a guide only and can be used to make production decisions, estimate potential revenue, prepare budgets and evaluate production loans. Practices described are based on production practices considered typical for the crop and area, but these same practices will not apply to every farming operation. The sample costs for labor, materials, equipment and custom services are based on January 2021 figures. A blank column titled “Your Cost”, is provided in Tables 1 thru 4 for your convenience.

For an explanation of calculations used, refer to the section titled Assumptions. For more information contact Donald Stewart, Department of Agricultural and Resource Economics, at (530) 752-4651 or [destewart@ucdavis.edu](mailto:destewart@ucdavis.edu) or Karen Jetter at (530) 792-8255 or [jetter@ucanr.edu](mailto:jetter@ucanr.edu). To discuss this study with a local county extension farm advisor, contact your county cooperative extension office. [ucanr.edu/County\\_Offices/](http://ucanr.edu/County_Offices/).

**Costs and Returns Study Program/Acknowledgements.** Costs and returns studies are a compilation of specific crop data collected from meetings with professionals working in production agriculture within the region. The authors thank farmer cooperators, UC Cooperative Extension 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.*

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## ASSUMPTIONS

This study explains the annual costs associated with an ongoing navel orange operation in the southern San Joaquin Valley under the assumptions that the farm was operated on this basis in prior years and will continue in subsequent years. The cultural practices shown represent operations and materials considered typical of a well-managed farm in the region. The costs, materials and practices shown will not be applicable to all situations. Establishment and cultural practices vary and the differences can be significant.

**Farm.** The hypothetical farm consists of 65 contiguous acres. Establishment and production costs are based on ten acres being planted to oranges. Mature orange trees are grown on 50 acres and the remaining five acres are roads, equipment, shop area and homestead. The grower owns and farms the orchards.

### Establishment Cultural Practices and Material Inputs

**Land.** The orchard is established on ground previously planted to another tree crop. Land preparation begins by removing the old orchard. Orchard removal costs include pushing, stacking and burning or shredding the trees, and a hand cleanup of the area. After removal, deep ripping of the soil profile, 4 to 6 feet deep, is done to break up stratified layers that affect root and water penetration. The ground is disced two times to break up large clods and then leveled. Rows are marked and herbicides are strip sprayed for the tree rows. All land preparation operations are contracted and done in the year prior to planting. Contracted or custom operation costs will vary depending upon acreage size. Small acres (10 in this case) may have a minimum fee or additional equipment delivery charges.

**Trees.** The two major orange varieties grown in the San Joaquin Valley are Navels and Valencias. Navels are grouped into three types by harvest timing – early, mid and late season. Cara Cara is the variety of navel oranges currently most commonly planted. Tree costs are for the Cara Cara varieties. A royalty fee is added to the cost of patented varieties. Due to current planting practices, only navels are included in this budget. Local farm advisors should be consulted for changes in the cultivation of Valencia varieties.

**Planting.** A custom operator starts planting the orchard by marking tree sites (layout orchard). Holes are dug and the trees are planted in March. The trees are planted double density, 10 x 20-foot spacing, at 218 trees per acre. The trunks are wrapped with a foam wrap to shield them from sunburn and to reduce sucker development. Two percent of the trees, 4 trees per acre, are assumed to be replaced in the second year. Tree spacing and densities in orchards vary. At this density, it is possible to start harvesting in year 3 or 4.

**Pruning.** Suckering is done during the first through the third year. Light pruning is done from the fourth year until mature. See Table A for estimated pruning/suckering times for the establishment years. At year 8 or 9 full maturity is achieved and growers begin pruning back every other tree. This allows the grower to maintain yields (though there may be slightly lower yields in the short run as branches are trimmed) while at the same time converting the field to 20 x 20 spacing – yield maximizing for a fully mature orchard. At year 15 the pruned tree is removed.

Orange trees have a long production life if they are well maintained. The life of the orchard is assumed to be 40 years.

**Irrigation.** District water is delivered via canal to the farm at a cost of \$264 per acre-foot or \$22 per acre-inch. Water costs are highly variable among districts and in drought years water costs may increase. Irrigation costs include the water and labor for system operation and monitoring. No assumption is made about effective rainfall, runoff and evaporation. Water applied by tree age is approximated and shown in Table B. Values are based on a micro-sprinkler irrigation system delivering water with a distribution uniformity of 85 percent.

**Frost Protection.** Weed, cover crop management and 2.2 acre-inches of water are used for frost protection during the first three years. Frost protection is in effect from November to February. Wind machines are installed in the fourth year and are operated from the fourth year on. Water use remains constant for frost protection in all years. Table C. illustrates frost protection methods.

Table A. Sucker/Prune Operation Time Per Acre			Table B. Applied Water		Table C. Frost Protection Procedures				
Year	Operation	Hours	Year	Acre-Inches	Year	Water	AcIn	Floor Management	Wind Machine
1	Sucker	2.71	1	2.0	1*	Yes	1.46	Discing & contact herbicide	No
2	Sucker	4.29	2	4.5	2	Yes	2.20	Residual & contact herbicide	No
3	Sucker	5.00	3	7.0	3	Yes	2.20	Residual & contact herbicide	No
4	Prune	3.14	4	10.5	4	Yes	2.20	Residual & contact herbicide	100 Hours
5	Prune	6.00	5	14.0	5+	Yes	2.20	Residual & contact herbicide	100 Hours
			6+	30.0					

Year 1\*: Frost protection is for November & December.

In this region, three methods are used to protect fruit and trees from frost or freeze during late winter and early spring. (1) Orchard floors are kept free of vegetation (or if a cover crop is used, it is maintained as low as possible during freezing weather by planting late in the fall). The low vegetation allows the soil to act as a reservoir for heat from solar radiation during the day. This heat is released at night which raises the air temperature (vegetation tends to reflect solar radiation during the day and consequently less heat is stored in the soil to be released at night). (2) Water is applied to the orchard floor. Water stores heat that is released to the trees as the air temperature falls. (3) Wind machines are used to pull the warm air above the trees into the orchard and mix it with colder resident air resulting in a temperature increase. Wind machine installation is often delayed until significant fruit is produced, sometimes as late as the seventh or eighth establishment year. A single machine will cover about 10 acres.

Protection from yield losses due to freeze damage will help maintain an orchard's economic viability. Several protection strategies have been outlined above, but other options are available (e.g. crop insurance). Methods for determining the best frost protection strategy for individual orchards are discussed in the publication, *Reducing Citrus Revenue Losses for Frost Damage: Wind Machines and Crop Insurance*.

[lpg-apps.org/uploads/Modules/Library/951-citrus.pdf](http://lpg-apps.org/uploads/Modules/Library/951-citrus.pdf)

**Fertilization.** Nitrogen (N) is the major nutrient required for proper tree growth and optimum yields. Beginning in the first year, UAN32 is injected through the drip line and low biuret urea plus micronutrients - zinc sulfate and manganese (Tecmangam) - are applied in March as a foliage spray.

Beginning in the fourth year, the micronutrients are applied as a foliar fertilizer. Additional urea is also applied with the May katydid/thrips spray. Nitrogen fertilizer rates from orchard establishment through maturity are shown below in Table E. If groundwater is used for irrigation, water should be tested for nitrogen and the content taken into consideration in the fertilization program.

**Leaf/Tissue Sampling.** Leaf samples are taken by the PCA from August through October for nutrition analysis. For this study, one sample per 10 acres is taken.

**Soil Amendments.** Beginning in the fifth year, soluble gypsum is applied through the drip lines during each irrigation. A total of one-ton per acre is applied each season. Gypsum, calcium, or lime is applied for improving water infiltration and soil pH and use should be based on soil and water tests. Although not included in the costs, compost may be added to enhance soil organic matter.

**Pest Management.** The pesticides and rates mentioned in this cost study as well as other materials available are listed in *UC Integrated Pest Management Guidelines, Citrus*. Pesticides mentioned are commonly used, but are not presented as a recommendation. [www2.ipm.ucanr.edu/agriculture/citrus/](http://www2.ipm.ucanr.edu/agriculture/citrus/)

**Weeds.** Chemical weed control begins the first year with three spot sprays (April, June, August) in the tree row during the spring and summer using a glufosinate herbicide. In the first year a custom operator discs the floor middles three times (April, May, June). From the second year on residual/pre-emergent herbicides, Alion and Diuron, are applied to the orchard floor in the fall (October) and in the spring (March) using half of the maximum rate for each application. These materials are regulated under the Groundwater Protection Regulations and some conditions may require a pesticide permit from the agricultural commissioner's office.

**Insects.** Insects treated are citrus leafminer (*Phyllocnistis citrella*), Southern fire ants (*Solenopsis xyloni*), earwigs, citrus thrips (*Scirtothrips citri*), and katydids (*Scudderia furcata*) (Table D). Growers are no longer regularly managing orangeworms as groves are being treated with more selective insecticides and natural predators can keep orangeworm populations below economically damaging levels in most situations. Citrus leafminer can retard the growth of trees less than 4 years old and are most abundant when trees are flushing. Because young trees flush continuously as the trees grow, regular treatments are needed to keep populations below economically damaging levels. Control for citrus leafminer occurs during years 1-3. A systemic insecticide, Platinum, is applied in March and will provide continuous care for 2-3 months. An additional 3 foliar treatments are typically completed, with different modes of action to discourage pest resistance. For this study Minecto-pro is applied in June, Assail in July and Micromite in August. Southern fire ant and earwig control is completed in the first year. Brigade controls both ants and earwigs. It is applied in late spring to early summer (June) with the grower-owned UTV and a 55-gallon pull-type sprayer with an engine and pump. Treatments may need to continue through the third year, especially if nests are still present. After careful monitoring, spot treatments may be needed in years 4 and 5, but are not included.

Both citrus thrips and katydids feed on young fruit. Control for citrus thrips and katydids begins in the fourth year. Pesticides for citrus thrips and katydids are applied at a lower volume per acre in the early years to account for the small tree size. In the fourth year, 50 percent and in the fifth, 75 percent of the recommended spray volume is applied. Katydids are treated with Micromite toward the end of April at petal fall. Thrips and katydids are treated with Delegate insecticide plus oil in May. Although a common industry practice is to apply multiple sprays on non-bearing trees for thrips, protection begins in the fourth year for fruit protection rather than foliage protection. California red scale (*Aonidiella aurantii*) is not treated on young trees as it is only an economic problem when found on the fruit. A second treatment for thrips with Minecto Pro occurs in June.

Table D. Insecticide Treatments – Establishment Years.

Year	Month					
	March	April	May	June	July	August
1	Citrus leaf miner with Platinum			Citrus leaf miner with Minecto Pro plus 415. oil, Southern fire ants and earwigs with Brigade	Citrus leaf miner with Assail	Citrus leaf miner with Micromite 80 plus 415 oil.
2	Citrus leaf miner with Platinum			Citrus leaf miner with Minecto Pro plus 415. oil, Southern fire ants and earwigs with Brigade	Citrus leaf miner with Assail	Citrus leaf miner with Micromite 80 plus 415 oil.
3	Citrus leaf miner with Platinum			Citrus leaf miner with Minecto Pro plus 415. oil, Southern fire ants and earwigs with Brigade	Citrus leaf miner with Assail	Citrus leaf miner with Micromite 80 plus 415 oil.
4		Katydid with Micromite 80WGS (50%)	Katydid and Thrips with Delegate (50%) plus 415 oil.	Thrips with Minecto Pro (50%) plus 415 oil.		
5		Katydid with Micromite 80WGS (75%)	Katydid and Thrips with Delegate (75%) plus 415 oil.	Thrips with Minecto Pro (75%) plus 415 oil.		

**Diseases.** Beginning in October of the third year, brown rot (*Phytophthora spp.*) and septoria spot (*Septoria spp.*) are managed with a Kocide (copper) and hydrated lime application. A custom applicator applies the insect and disease materials by ground with an air blast sprayer. Various export markets require additional copper spray applications, but this study does not include these applications.

**Nematodes and Phytophthora.** Nematodes (*Tylenchulus semipenetrans*), phytophthora root rot (*Phytophthora citrophthora* and *P. parasitica*) and phytophthora gummosis (*Phytophthora ssp*) can be severe problems. If the field was previously planted to citrus, phytophthora and nematode samples should be taken to detect the presence and population levels of the organisms prior to planting. Management strategies include resistant rootstocks, irrigation management and chemical applications. All pest management strategies need to be tailored to meet specific orchard requirements and should be discussed with a certified pest control adviser or local farm adviser.

**Harvest.** Commercial yields normally begin in the third or fourth establishment year. New plantings with close spacing may have commercial yields in the second or third year. A custom operator harvests the field. Packed cartons represent 80 percent of the fruit picked. The remaining 20 percent may go to juice, or a small percentage may be culled. Annual yields starting in year 4 are shown further down in Table G.

## Production Cultural Practices and Material Inputs

**Pruning.** Pruning methods and frequencies vary widely on mature trees. Pruning includes topping, hedging, hand pruning and shredding. Pruning operations are done on a four-year cycle: (1) hedge alternate rows – each tree is hedged one side only, (2) top all trees, (3) hedge alternate rows - those not hedged previously, (4) hand prune. In this study, one-fourth of the costs are allocated to the orchard each year. Topping maintains tree height to augment adequate spray coverage and facilitate harvest operations. Hedging tree rows reduces fruit damage from orchard traffic and minimizes disruption of sprays applied to the orchard. Hand pruning of dead wood and suckering enhances spray deposition, which is particularly important in the case of red scale. Hand pruning can also increase the amount of fruit inside the tree.

Pruning for Navels is normally done in the spring. In this study, pruning is done in April. The prunings generally require shredding. The prunings from topping are stacked in alternate row middles by the custom shredder prior to shredding; the hand prunings are stacked by the pruners in alternate row middles and shredded by a custom shredder. The prunings from hedging fall in a manner that does not require hand stacking. Although, the custom operator shreds alternate rows, the charge is based on total acres.

**Fertilization.** Nitrogen (N) as UAN-32 is applied through the irrigation system in several applications during February, March and late April, see Table E. Foliar applications of N as low biuret urea plus minor nutrients, zinc sulfate and manganese (Tecmangam), are mixed and applied in March. A second low biuret urea application is made with the May thrips and katydid spray. The nutritional program should be based on leaf analysis.

Table E. Applied Nitrogen (Lbs. of N)

Year	Per Tree	Per Acre	Dripline	Foliar
1	0.10	9.65	8.50	1.15
2	0.20	21.80	19.50	2.30
3	0.30	33.95	30.50	3.45
4	0.40	44.00	29.00	15.00
5	0.50	55.00	32.50	22.50
6	0.60	66.00	36.00	30.00
7+	0.80	110.00	80.00	30.00

*Leaf/Tissue Sampling.* Samples are taken in the fall from spring flush, non-fruiting, leaves that are five to seven months old. One sample is taken per 10 acres (0.10 samples per acre) by the PCA, from August through October. The cost shown is for lab analysis.

**Soil Amendments.** Each year from April through October, gypsum is injected through the irrigation system with each irrigation; this results in a total application of one-ton per acre for the season. The cost includes the gypsum and the labor to operate and fill the gypsum machine. The machine is listed in Tables 7 & 8 equipment.

**Irrigation.** Water is applied from April through October. Thirty acre-inches of district water, delivered via canal, is applied to the orchard at a cost of \$264 per acre-foot or \$22 per acre-inch. Water costs are highly variable among districts. The irrigation application rates and costs are not based on any specific assumptions about effective rainfall, runoff, evaporation, winter water requirements or rainfall stored in the soil profile, tree size or tree health. The irrigation operation costs include the water and labor for irrigating, operating and monitoring the system.

**Frost Protection.** Protection is required from late winter to early spring (November through February) and is shown for November, December and January. Chemical vegetation control on the orchard floor and 2.2 acre-inches of water are used for frost protection during the season. Also, wind machines are operated on nights with threatening minimum temperatures (see Table C). Each wind machine protects approximately 10 acres and uses 15 gallons of propane per hour. The frost protection cost includes the fuel use and labor to operate the machines and to apply the water.

**Pest Management.** The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Citrus Pest Management Guidelines*. [www2.ipm.ucanr.edu/agriculture/citrus/](http://www2.ipm.ucanr.edu/agriculture/citrus/)

For more information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at [ipm.ucanr.edu/](http://ipm.ucanr.edu/). For information and pesticide use permits, contact the local county agricultural commissioner's office. **Growers with fruit destined for the export market must use registered products that meet maximum residue limits (MRL) for the expected destination.** Check the MRLs at [calcitrusquality.org](http://calcitrusquality.org)

*Pest Control Adviser/Certified Crop Advisor, (PCA/CCA).* Written recommendations are required for many pesticides and are made by licensed PCAs. In addition, the PCA can monitor the field for agronomic problems including pests and nutrition. Growers may hire private PCA's or receive the service as part of a service agreement with an agricultural chemical and fertilizer company.

*Weeds.* Pre-emergent herbicides (Alion, Diuron 4L) are applied to the orchard floor (tree row and middles) in split applications; one in the fall (October) and one in the spring (March), using one-half the maximum rate per application. Surviving weeds are controlled with three spot sprays – April, June, August – with Glufosinate. Alion and Diuron 4L are regulated under the Groundwater Protection Regulations. Check with your farm advisor or PCA prior to applying.

*Insects.* Mites, katydids, citrus thrips, California red scale (CRS) and citricola scale are all pests of economic importance to oranges grown in the Southern San Joaquin Valley (Table F). Insect control can vary widely from year to year; however, the two-year pest cycle treatment in this budget is representative of common practices. Mites are treated in year 1 in March using acequinocyl (Kanemite 15SC). California red scale is controlled throughout its season from March through October with pheromone disruption using CRS plus. Canisters are placed in dispensers at a rate of one per acre. Citricola scale is treated from July through August using Actara. For this study, Actara is applied in July. Scales are treated every year. Katydid treatments are completed in May with beta-cyfluthrin (Baythroid XL). Thrips are treated twice, typically from April through June. For this study one application of acetamiprid (Assail) is made in May and one application of cyantraniliprole (Minecto Pro) in June. Urea and micronutrients are mixed with the mite spray and urea with the katydid spray.

Table F. Insecticide Treatments - Production Years.

Year	March	April	Month May	June	July
1	Mites with Kanemite  CRS with pheromone confusion (CRS plus)	Katydids with Micromite	Katydids with Baythroid XL and Thrips with Assail plus 415 oil.	Thrips with Minecto Pro plus 415 oil.	
2		Mites, Thrips, CRS with Movento plus 415 oil.  Katydids with Micromite	Katydids and thrips with Delegate plus 415 oil.  CRS with pheromone confusion (CRS plus)		Citricola scale with Actara

No pest treatments are applied in March of year 2. Instead, mites, thrips, and CRS are treated in April with an application of spirotetramat (Movento) plus oil. Katydid treatments are also completed in April with difubenzuron (Micromite).

Both katydids and thrips are treated with spinetoram (Delegate), plus oil, in May. Pheromone confusion with CRS Plus is also used to treat CRS in May. In July citricola scale is treated with a foliar application of thiamethoxam (Actara).

### **Exotic Pests of Economic Concern to Citrus Growers.**

Fuller rose beetle (FRB) is an exotic pest of economic concern due to trade restrictions on fruit exported from California to countries such as South Korea (see [www2.ipm.ucanr.edu/agriculture/citrus/Fuller-Rose-Beetle/](http://www2.ipm.ucanr.edu/agriculture/citrus/Fuller-Rose-Beetle/) for more information). To meet quarantine regulations, skirt pruning must be maintained year-round. An initial pruning is completed in the spring, with touch-ups in the summer and fall. In addition, two treatments a year must be completed using bifenthrin, thiamethoxam, or cryolite. Typically, bifenthrin (Brigade) is applied in June for control of larvae on the ground. A second FRB treatment is completed in October using thiamethoxam (Actara).

Two additional pests of economic importance in citrus include the glassy-winged sharpshooter (GWSS) and the Asian citrus psyllid. The GWSS vectors Pierce's disease, a plant disease that causes vine death in grapes. GWSS host in and feed on grapevines after the vines leaf out in the spring. Once grapevines lose their leaves in the fall, GWSS migrate to and overwinter in citrus. Effective areawide management of GWSS then consists of treating GWSS in citrus while grapevines are dormant. For growers participating in the areawide program, their control costs are reimbursed.

The Asian citrus psyllid is a significant pest of citrus because it vectors the disease Huanglongbing (HLB). There are currently no treatments for HLB and HLB causes tree death as the disease moves from feeding sites on new tree flush to the tree's roots. Both ACP and HLB are established in Southern California and along the southern California Coast. To date, local outbreaks of ACP have been eradicated in the Central Valley and HLB has not yet been identified. Should ACP become established growers would incur additional costs to treat the pest to prevent the spread of HLB.

*Disease.* Brown rot is the primary pre-harvest disease of fruit that occurs and is controlled by spraying a Kocide (copper) and hydrated lime mixture during October or November. The same fungicide mixture also controls Septoria spot. Brown rot develops in the fall initially on fruit that is close to the ground. The pathogen is normally found in the soil and is splashed onto the low-hanging fruit by rain. Symptoms usually appear during cool, wet periods on mature or nearly mature fruit.

*Snails.* Brown garden snails (*Helix aspera*) cause fruit damage. Control options for brown garden snails include predaceous snails, skirt pruning, trunk banding and chemical baits. However, in this study snails are assumed not to be a problem.

*Insect and Disease Management Options.* There are two fundamental approaches to using synthetic pesticides in citrus production. (1) Several applications of broad-spectrum pesticides are made to prevent pest damage. While these pesticides control a wide range of insect and mite pests and persist to provide control for long periods of time, these attributes can also create additional pest problems. Long-term use has increased pest resistance to many of these pesticides, resulting in increased pesticide applications. Since broad-spectrum pesticides affect many species of insects and mites, those sprays decrease the levels of beneficial populations that can assist in controlling many pests. Pest resurgence and secondary outbreaks can be the result of parasite and predator suppression by these pesticide applications. For example, treatment for citrus thrips can cause an increase of citrus red mite. (2) Use of selective pesticides and natural enemies (beneficial predators) as control measures. Selective pesticides are toxic to a narrow range of pests and are usually less harmful to the natural enemies. Their use requires careful monitoring of pests and more precise timing and application to be effective. Many selective pesticides do not persist for long-term control. Preserving beneficial predatory and parasitic populations can reduce the potential resurgence and secondary outbreaks of pests. However, some minor pests such as citricola scale may become economic pests once

broad-spectrum pesticides are not used. Pest management practices used in this study follow the first strategy described (currently this is the more typical pest management program used in this region).

**Growth Regulators.** Growth regulators are applied to mature Navel orange trees only. Gibberellic acid (GibGro) and 2, 4-D (Citrus Fix) treatments are made on mid-to-late harvested Navels. Gibberellic acid maintains a juvenile rind and 2,4-D applied in October/November minimizes pre-harvest fruit drop. In this study, gibberellic acid is sprayed in October and 2,4-D in November. Growth regulators are applied to 70 percent of the orchard because 30 percent of the orchard was picked beforehand.

### Harvest, Yields and Revenue

**Harvest.** Orange trees typically reach full production by the 10th or 11th year. The crop is hand-picked and hauled by a contracted harvesting company.

Typically, one-third of the orchard is picked in each of three harvests over the growing season. Navels are normally harvested from November to June. Oranges are hand-picked and put into field bins that hold 900 pounds (24 carton equivalent) of fruit. The oranges are hauled from the field to a packinghouse where they are washed, graded, sized and packed. Picking, hauling, packing and marketing costs from the field to the packinghouse are paid by the grower. Current rates for these services vary; picking and hauling costs are \$1.35 per carton and the packinghouse cost is \$4.85 per carton. Delivering outside the local area will increase hauling costs. The packing house cost includes costs for the carton, packing, marketing and miscellaneous fees charged by the packer. The costs are based on typical costs as received from packinghouses and growers in the region.

Table G. Annual Orange Yields Per Acre

Year	Field Bins (900 lbs.)	Field Boxes (55 lbs.)	Total Ctns/bin (37.5 lbs.)	Packed Cartons (37.5 lbs.)
4	1.4	23	34	28
5	11.1	182	266	213
6	18.9	309	454	363
7	24.0	393	576	460
8	26.4	432	634	508
9	27.7	453	665	532
10+	28.6	468	686	550

*Yields.* Typical annual yields for the Navel varieties are measured in 900-pound field bins per acre but are typically sold by packed cartons weighing 37.5 pounds, although the industry often refers to them as 40-pound cartons (Table G). A 900-pound bin is calculated as either 23 or 24 cartons. Packed cartons represent 80 percent of the fruit picked. The remaining 20 percent may go to juice or a small percentage may be culled.

*Revenue.* An estimated price based on past returns of \$17.60 per carton, FOB packinghouse, is used for this analysis. There is basically no income for juice products in Navels. Returns over a range of yields are shown further down in Table 6.

**Assessments.** Commercial orange producers pay three assessments.

*Citrus Pest and Disease Prevention Program (CPDPP).* The CPDPP was created to advise the Agricultural Secretary of California and the agricultural industry about efforts to combat serious pests and diseases that threaten California’s citrus crop. Growers must pay a mandatory fee of \$0.08 per 40-pound carton, to support the disease prevention program. [californiacitrusthreat.org/](http://californiacitrusthreat.org/)

*State Marketing Order.* Under a state marketing order, mandatory assessment fees are collected and administered by the grower-directed Citrus Research Board. This assessment, currently \$0.03 per 40 lb. carton, is used to fund industry research programs. [citrusresearch.org/](http://citrusresearch.org/)

*Central California Tristeza Eradication Agency.* Tristeza disease can result in damage ranging from lower fruit quality to the death of the tree. The Central California Tristeza Eradication Agency (CCTEA) manages an eradication program to keep the Central Valley tristeza-free. The assessment varies by pest control district and not all districts participate. Although not all growers participate in this program and pay assessments, an average of \$10.56 per acre is charged. The charges are paid in the property assessment bill, but are shown as an assessment line item cost in this study. [cctea.org/](http://cctea.org/)

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

**Equipment Operating Costs.** Repair costs are based on the purchase price, annual hours of use, total hours of life and repair coefficients formulated by the American Society of Agricultural and Biological Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum Power Take Off (PTO) horsepower and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are \$2.80 (excludes excise tax) and \$3.90 per gallon, respectively. Fuel costs are derived from the Energy Information Administration, June, 2021 fuel prices. The cost includes a 13% local sales tax on diesel fuel and a 2.25% sales tax on gasoline. Gasoline also includes federal and state excise tax, which are refundable for on-farm use when filing your income taxes.

*Lube and Repairs.* The fuel, lube and repair cost per acre for each operation in Tables 2 and 4 is determined by multiplying the total hourly operating cost in Table 8 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 downtime.

**Pickup/UTV-4WD.** The grower uses a pickup for business and personal use. It is assumed that 5,000 miles are for business use. A utility vehicle (UTV) is used for checking and monitoring the field, irrigating and checking the irrigation system. The cost is estimated and not based on any specific data. The grower also uses the UTV for weed control and the operation cost is included in those costs.

**Gypsum Machine.** The machine is used to inject the soluble gypsum into the irrigation system. The machine costs are allocated to the 60-acres of producing oranges.

**Labor.** Labor rates of \$26.70 per hour for machine operators and \$20.77 for general labor includes payroll overhead of 48.33%. The basic hourly wages are \$18.00 for machine operators and \$14.00 for non-machine, irrigation and pruning labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for orchard/fruit crops (code 0016) and a percentage for other possible benefits. Workers' compensation costs will vary among growers. Labor hours and costs for operations involving machinery is 20 percent higher than the operation time to account for the extra labor involved in equipment set up, moving, maintenance, work breaks and field repair.

*California Minimum Wage and Overtime Rules.* In 2016, The California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for companies with more than 25 employees will rise each year by \$1.00 per hour until it reaches \$15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes. The minimum wage rate increases \$1.00 per hour each year to \$15.00 per hour in 2023.

Recent California regulations also decrease the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. The regulations decrease the overtime threshold

for agricultural workers from 60 hours per week and 10 hours per day by 5.0 hours per week and 0.5 hours per day each year until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. January 1st, 2019 (2022 for employers with 25 or fewer employees) employees will also be entitled to overtime for 8 hours on the seventh consecutive day of work. These regulations may cause an increased cost of labor used on farms, whether as direct hires, as farm labor contractor employees or as a component of custom services.

**Management/Supervisor Salaries.** Wages for management are not included as a cash cost. Any return above total costs is considered a return to management and risk. However, growers wanting to account for management may wish to add a fee. The manager makes all production decisions including cultural practices, action to be taken on pest management recommendations and labor.

**Interest On Operating Capital.** Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 4.0 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 interest rate will vary depending upon various factors. The rate in this study is considered a typical lending rate by a farm lending agency as of June, 2021.

**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. **It is important to realize that actual results may differ from the revenue contained in this study.** Any revenue above total costs is considered returns on risk and investment to management (or owners).

## 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 can include property taxes, interest on operating capital, 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 the property including equipment, buildings and improvements. For this study, property taxes are calculated as 1 percent of the average value of the property and are not influenced by the Williamson Act or additional county taxes. Average value equals new cost, plus salvage value divided by 2 on a per-acre basis.

*The Williamson Act.* California Land Conservation Act has helped preserve agricultural and open space lands since 1965. Local governments and landowners enter into voluntary contracts to restrict enrolled lands to agricultural and open space uses in exchange for property tax reductions. The impact of the Williamson Act on property taxes will vary from year to year and property to property. This is due to how it is annually calculated and then compared to its Proposition 13 (factored base year value). The lower of the two is used for their annual assessment. [boe.ca.gov/proptaxes/pdf/lta19029.pdf](http://boe.ca.gov/proptaxes/pdf/lta19029.pdf)  
[boe.ca.gov/proptaxes/faqs/changeinownership.htm](http://boe.ca.gov/proptaxes/faqs/changeinownership.htm)

**Insurance.** Insurance for farms varies depending on the assets included and the amount of coverage.

*Property Insurance.* Coverage for property loss is charged at 0.886 percent of the average value of the assets over their useful life.

*Liability Insurance.* Policies cover the expenses for damages and bodily injury claims on their property and

damages to another person's property done by the insured. The charges are \$621 for the entire farm or \$9.55 per acre for the paperwork to process a basic policy for a farm of this size. Increased levels of coverage will incur greater costs.

**Crop Insurance.** This type of insurance is available to citrus 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, crop insurance is not included in this study. For policy and information, visit the USDA Risk Management Agency, 2020 Crop Insurance Policies link: [rma.usda.gov/policies/](http://rma.usda.gov/policies/).

**Office Expense.** Office and business expenses are estimated at \$100 per acre. These expenses include office supplies, telephone/internet, bookkeeping, accounting, office utilities and miscellaneous administrative charges.

**Compliance Costs.** Compliance costs are estimated from studies completed by Babcock (2018) and McCullum et al. (2017). This study estimates total compliance costs at \$100/acre, which includes education and training, air quality compliance, water quality compliance, pesticide regulation, labor regulation and capital expenditures.

**Investment Repairs.** Annual maintenance is calculated as 2 percent of the purchase price, except orchard establishment is calculated at 0.50 percent to account for tree replacement and orchard repairs.

### Non-Cash Overhead

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments.

**Capital Recovery Costs.** Capital recovery cost is the annual depreciation and interest costs for capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is;  $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$ .

**Salvage Value.** Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural and 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.

**Capital Recovery Factor (CRF).** The CRF can be interpreted as the amount of equal (or uniform) payments to be received for (n) years such that the total present value of all these equal payments is equivalent to a payment of 1 dollar at present, if the interest rate is (i) (Boehlje and Eidman).

CRF is the amortization factor for an asset and is calculated as;  $[i * (1 + i)^n] / [(1 + i)^n - 1]$  where  $i$  is the interest rate and (n) the number of years the asset is held.

**Interest Rate.** An interest rate of 4.75 percent is used to calculate capital recovery. The rate will vary depending upon the loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of June, 2021.

**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 oranges are harvested minus any revenue from production. The “Total Accumulated Net Cash Cost” in Table 1, in the third year represents the establishment cost. The cost is \$10,407 per acre or \$104,070 for the 10-acre orchard. The establishment cost is spread over the remaining 37 years of the 40 years the orchard is in production. Establishment costs are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations and other factors. For example, development on marginal soils will require additional land preparation and soil amendments. Management/Development companies will have additional labor costs.

**Irrigation System/Emitter Lines.** Water is delivered under pressure to the orchard through a low-volume irrigation system. Low-volume emitters discharge 10 gallons per hour and are spaced at one per tree. The cost for the low-volume irrigation system includes the cost of a pump, filtration system, hoses, emitters and installation. The life of the irrigation system is estimated at 40 years. The above-ground portion of the irrigation system will probably have to be replaced once per ten years, but is not separated out in this study.

**Land.** Land values for bare or row crop land in Kern and Tulare Counties range between \$8,000 to \$18,000 per acre (*Trends*), depending on available water. Land with citrus orchards ranges from \$14,000 to \$25,500 per acre. The land on which the orchard is planted in this study is valued at \$20,000 per acre.

**Building.** The shop building is a 1,800 square foot metal building on a cement slab.

**Tools.** This includes shop tools, hand tools and miscellaneous field tools such as pruning tools. The value is estimated and not taken from any specific data.

**Fuel Storage.** A 500-gallon fuel tank using gravity feed, is on a metal stand. The tank is setup in a cement containment pad that meets federal, state and county regulations.

**Wind Machines.** Each machine will cover approximately 10-acres. The cost includes six machines on the farm with one new machine costs shown for the new planting. The other five machines are on the remaining producing 50-acres. Cost includes installation of the propane-powered machines.

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

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

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UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**Table 1. COSTS PER ACRE TO ESTABLISH AN ORANGE ORCHARD**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operations	Packout Yield (37.5 lbs. Cartons/Acre):	Costs per Acre				
		YEAR: 1st	2nd	3rd	4th	5th
Pre-Plant: (Custom)				25	125	244
Remove Trees		468				
Sub-soil/Rip 4' - 6'		300				
Disc 2x		100				
Level/Float 2x		350				
Weeds: Strip Spray		23				
Layout Irrigation System		83				
<b>TOTAL PRE-PLANT COSTS</b>		<b>1,325</b>				
Planting: (Contracted)						
Layout, Plant, Stake & Wrap Trees (includes labor costs)		4,197	81			
<b>TOTAL PLANTING COSTS</b>		<b>4,197</b>	<b>81</b>			
Cultural:						
Insects/Fertilizer (Yrs. 4 & 5-2x)		63	64	65	156	210
Fertilize: UAN32		5	11	17	17	18
Soil Amendment: Soluble Gypsum						242
Irrigate: (Water & labor)		127	182	237	345	422
Prune And Sucker 2x		56	89	104	65	125
Weeds: Strip Spray 2x			95	95	95	95
Weeds: Spot Spray 3x		42	42	42	42	42
Weeds: Disc Middles 3x (Custom)		150				
Insects: Thrips					73	107
Insects: Ants (Clinch)		7				
Insects: Fire Ants/Earwigs		39	39	39		
Insects: Citrus Leaf Miner 3x		299	299	299		
Leaf Analysis					7	7
Disease: Brown Rot				87	111	135
Frost Protection (Water & Wind-4 <sup>th</sup> Year+)		53	80	80	376	388
Pickup Truck Use		76	76	76	76	76
UTV Use		49	49	49	49	49
PCA/Consultant Services		36	36	36	36	36
<b>TOTAL CULTURAL COSTS</b>		<b>1,000</b>	<b>1,060</b>	<b>1,224</b>	<b>1,445</b>	<b>1,951</b>
Harvesting Costs:						
Pick and Haul				41	205	400
Pack				121	606	1,183
Assessments				13	24	37
<b>TOTAL HARVEST COSTS</b>		<b>0</b>	<b>0</b>	<b>175</b>	<b>836</b>	<b>1,620</b>
Interest on operating capital @ 4.0%		223	26	27	22	33
<b>TOTAL OPERATING COSTS PER ACRE</b>		<b>6,744</b>	<b>1,167</b>	<b>1,426</b>	<b>2,304</b>	<b>3,604</b>
Cash Overhead Costs:						
Liability Insurance		10	10	10	10	10
Office Expenses		100	100	100	100	100
Compliance Cost		100	100	100	100	100
Property Taxes		215	215	215	282	282
Property Insurance		19	19	19	25	25
Investment Repairs		60	60	60	168	168
<b>TOTAL CASH OVERHEAD COSTS</b>		<b>504</b>	<b>504</b>	<b>504</b>	<b>685</b>	<b>685</b>
<b>TOTAL CASH COSTS</b>		<b>7,249</b>	<b>1,672</b>	<b>1,931</b>	<b>2,989</b>	<b>4,290</b>
<b>INCOME FROM PRODUCTION</b>		<b>0</b>	<b>0</b>	<b>445</b>	<b>2,225</b>	<b>4,343</b>
<b>NET CASH COSTS FOR THE YEAR</b>		<b>7,249</b>	<b>1,672</b>	<b>1,486</b>	<b>764</b>	
<b>PROFIT ABOVE CASH COSTS</b>						<b>53</b>
<b>TOTAL ACCUMULATED NET CASH COSTS</b>		<b>7,249</b>	<b>8,921</b>	<b>10,407</b>	<b>11,171</b>	<b>11,118</b>

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**Table 1. CONTINUED**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation	YEAR:	Costs per Acre				
		1st	2nd	3rd	4th	5th
Non-Cash Overhead Costs:						
Building: 1,800 SqFt		61	61	61	61	61
Irrigation System: Pumps/Filters		68	68	68	68	68
Drip Lines (Emitters)		27	27	27	27	27
Fuel Storage		17	17	17	17	17
Wind Machine					174	174
Shop Tools		25	25	25	25	25
Land SJV		950	950	950	950	950
Establishment Costs					603	603
Equipment		22	23	23	22	24
<b>TOTAL NON-CASH OVERHEAD COSTS</b>		<b>1,171</b>	<b>1,171</b>	<b>1,171</b>	<b>1,947</b>	<b>1,949</b>
<b>TOTAL COST FOR THE YEAR</b>		<b>8,419</b>	<b>2,843</b>	<b>3,102</b>	<b>4,936</b>	<b>6,238</b>
<b>INCOME FROM PRODUCTION</b>				<b>445</b>	<b>2,225</b>	<b>4,343</b>
<b>NET TOTAL COST FOR THE YEAR</b>		<b>8,419</b>	<b>2,843</b>	<b>2,657</b>	<b>2,711</b>	<b>1,895</b>
<b>NET PROFIT FOR THE YEAR</b>						
<b>ACCUMULATED NET TOTAL COST</b>		<b>8,419</b>	<b>11,262</b>	<b>13,919</b>	<b>16,630</b>	<b>18,525</b>

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**Table 2. MATERIALS AND CUSTOM WORK COSTS PER ACRE - ESTABLISHMENT YEARS**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation:	Unit	\$/Unit	Year 1		Year 2		Year 3		Year 4		Year 5	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
<b>Custom/Contract:</b>												
Orchard Removal & Chip	Acre	375.00	1.0	375.0								
Ripping	Acre	300.00	1.0	300.0								
Disc	Acre	50.00	5.0	250.0								
Level - Triplane	Acre	175.00	2.0	350.0								
Layout, Plant, Wrap	Tree	1.50	218.0	327.0	4.0	10.0						
Airblast Application	Acre	40.00	4.0	160.0	4.0	160.0	5.0	200.0	3.0	120.0	3.5	140.0
Harvest: Pick & Haul	Crtn	1.35					30.0	41.0	152.0	205.0	296.0	400.0
Harvest: Pack	Crtn	4.85					25.0	121.0	125.0	606.0	244.0	1183.0
Leaf Analysis (nutrients)	Each	68.00							0.1	7.0	0.1	7.0
PCA	Acre	36.00	1.0	36.0	1.0	36.0	1.0	36.0	1.0	36.0	1.0	36.0
<b>Assessments:</b>												
CA Citrus Pest & Disease	Crtn	0.08					25.0	2.0	125.0	10.0	244.0	20.0
Citrus Research (55 lb. box)	Box	0.03					25.0	1.0	125.0	4.0	244.0	7.0
Tristeza Eradication	Acre	10.56					1.0	11.0	1.0	11.0	1.0	11.0
<b>Tree/Tree Aids:</b>												
Orange Tree	Tree	17.00	218.0	3,706.0	4.0	68.0						
Tree Wraps (foam type)	Each	0.75	218.0	164.0	4.0	3.0						
<b>Irrigation/Frost Protection:</b>												
Water Frost Protection	AcIn	22.00	1.5	32.0	2.2	48.0	2.2	48.0	2.2	48.0	2.2	48.0
Water (growing season)	AcIn	22.00	2.0	44.0	4.5	99.0	7.0	154.0	10.5	231.0	14.0	308.0
Wind Machine Operation	Hour	3.15							100.0	315.0	100.0	315.0
<b>Fertilizer:</b>												
UAN32 (32-0-0)	Lb. N	0.56	8.5	5.0	19.5	11.0	30.5	17.0	29.0	16.0	32.5	18.0
Urea Low Biuret (46-0-0)	Lb. N	0.74	1.2	0.9	2.3	1.7	3.5	3.0	15.0	11.0	22.5	17.0
Zinc Sulfate 36%	Lbs.	0.96	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Tecmangam (31% Mn)	Lbs.	0.73	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4
Soluble Gypsum	Ton	220.00									1.0	220.0

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**Table 2. CONTINUED**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation:	Unit	\$/Unit	<u>Year 1</u>		<u>Year 2</u>		<u>Year 3</u>		<u>Year 4</u>		<u>Year 5</u>	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
			<u>Total Per Acre</u>									
<b>Herbicide:</b>												
Glufosinate	Pint	4.60	6.00	28.0	3.00	14.0	3.00	14.0	3.00	14.0	3.00	14.0
Alion	FLOz	12.00			5.00	60.0	5.00	60.0	5.00	60.0	5.00	60.0
Diuron 4L	Qt.	4.91			3.20	16.0	3.20	16.0	3.20	16.0	3.20	16.0
<b>Insecticide/Miticide:</b>												
Clinch Ant Bait	Lbs.		0.33	4.0								
Platinum 75SG	FLOz	7.05	3.00	21.0	3.00	21.0	3.00	21.0				
Delegate	Oz	10.55							3.00	32.0	4.50	47.0
Brigade	Oz	0.83	40.00	33.0	40.00	33.0	40.00	33.0				
Minecto Pro	FLOz	8.00	8.00	64.0	8.00	64.0	8.00	64.0	6.00	48.0	9.00	72.0
Micromite	Lbs.	15.12	6.25	95.0	6.25	95.0	6.25	95.0	3.12	47.0	4.70	71.0
Spray Oil 415	Gal	10.00	1.00	10.0	1.00	10.0	1.00	10.0	1.00	10.0	0.90	9.0
Assail	Oz	4.00	2.50	10.0	2.50	10.0	2.50	10.0				
<b>Fungicide:</b>												
Hydrated Lime	Lbs.	0.56					5.00	3.0	7.50	4.0	10.00	6.0
Kocide 20/20	Lbs.	8.90					5.00	45.0	7.50	67.0	10.00	89.0
<b>Labor:</b>												
Labor (machine)	Hrs.	26.70	5.21	139.0	5.42	145.0	5.30	141.0	5.23	140.0	6.63	177.0
Labor (irrigation)	Hrs.	20.77	9.00	187.0	5.50	114.0	5.50	114.0	6.07	126.0	5.47	114.0
Labor (non-machine)	Hrs.	20.77	4.50	93.0							2.25	47.0
Labor (pruning)	Hrs.	20.77	2.71	56.0	4.29	89.0	5.00	104.0	3.14	65.0	6.00	125.0
<b>Machinery:</b>												
Fuel - Gas	Gal	3.90	5.15	20.0	5.30	21.0	6.52	25.0	5.17	20.0	5.17	20.0
Fuel - Diesel	Gal	2.80										
Lube				3.0		3.0		4.0		3.0		3.0
Machinery repair				7.0		9.0		7.0		9.0		10.0
Operating Interest @ 4.0%				223		26		28		22		33
<b>Total Operating Costs/Acre</b>				<b>6744</b>		<b>1167</b>		<b>1468</b>		<b>2304</b>		<b>3604</b>

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 3. COSTS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation	Equipment		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs./Ac)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Cultural:								
Frost Protection 3x	0.00	45	0	0	363	0	409	
Fertilize: UAN32 3x	0.00	0	0	0	45	0	45	
Weeds: Strip Spray 2x	0.50	16	2	1	76	0	95	
Insects/Fertilizer 2x	0.00	0	0	0	116	80	196	
CRS Pheromone Confusion/CheckMate	0.00	0	0	0	0	0	0	
Insects: Katydid (Micromite)	0.00	0	0	0	95	40	135	
Prune: Top Trees/Stack/Shred 1x/4yr	0.00	0	0	0	0	33	33	
Hedge: Alt Rows/Shred 2x/4Yr	0.00	0	0	0	0	20	20	
Prune: Hand 1/4Yr/Stack/Shred	0.00	0	0	0	0	93	93	
Irrigate: (Water & Labor)	0.00	115	0	0	660	0	775	
Soil Amendment: Soluble Gypsum	0.00	182	0	0	220	0	402	
Weeds: Spot Spray 3x	0.75	24	3	1	14	0	42	
Insects: Thrips (Minecto Pro)	0.00	0	0	0	69	40	109	
Insects: Scale (Actara)	0.00	0	0	0	20	40	60	
Leaf Analysis	0.00	0	0	0	0	7	7	
Disease: Brown Rot (Lime Kocide)	0.00	0	0	0	95	40	135	
Growth Regulator: (GibGro)	0.00	0	0	0	27	28	55	
Growth Regulator: (Citrus Fix)	0.00	0	0	0	1	28	29	
Pickup Truck Use ½ Ton	1.77	57	11	8	0	0	76	
UTV Use	1.33	43	4	2	0	0	49	
PCA/Consultant Services	0.00	0	0	0	0	36	36	
<b>TOTAL CULTURAL COSTS</b>	<b>4.36</b>	<b>482</b>	<b>20</b>	<b>12</b>	<b>1,800</b>	<b>485</b>	<b>2,800</b>	
Harvest:								
Pick & Haul Fruit	0.00	0	0	0	0	923	923	
Pack	0.00	0	0	0	0	2,735	2,735	
Assessments	0.00	0	0	0	73	0	73	
<b>TOTAL HARVEST COSTS</b>	<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>73</b>	<b>3,659</b>	<b>3,731</b>	
Interest on Operating Capital at 4.0%							128	
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>4.36</b>	<b>482</b>	<b>20</b>	<b>12</b>	<b>1,873</b>	<b>4,144</b>	<b>6,659</b>	

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 3. CONTINUED**  
 SAN JOAQUIN VALLEY – SOUTH 2021

CASH OVERHEAD:			
Liability Insurance			10
Office Expenses			100
Compliance Cost			100
Property Taxes			282
Property Insurance			25
Investment Repairs			168
TOTAL CASH OVERHEAD COSTS/ACRE			685
TOTAL CASH COSTS/ACRE			7,345
NON-CASH OVERHEAD:			
	Per Producing Acre	Annual Cost Capital Recovery	
Building: 1,800 SqFt	969	61	61
Irrigation System: Pumps/Filters	1,200	68	68
Drip Lines (Emitters)	350	27	27
Fuel Storage	223	17	17
Wind Machine (1)	2,800	174	174
Shop Tools	277	25	25
Land SJV	20,000	950	950
Establishment Cost	10,407	603	603
Equipment	181	23	23
TOTAL NON-CASH OVERHEAD COSTS			1,948
TOTAL COSTS/ACRE			9,293

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 4. COSTS AND RETURNS PER ACRE TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY – SOUTH 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>GROSS REVENUE</b>					
Oranges	564	Carton	17.80	10,039	
<b>TOTAL GROSS REVENUE</b>				10,039	
<b>OPERATING COSTS</b>					
<b>Herbicide:</b>					<b>90</b>
Alion	5.00	FLOz	12.00	60	
Diuron 4L	3.20	Qt	4.91	16	
Glufosinate	3.00	Pint	4.60	14	
<b>Insecticides:</b>					<b>109</b>
CheckMate (Dispensers)	0.00	Acre	35.00	0	
Spray Oil 415	1.00	Gal	10.00	10	
Baythroid XL	6.00	FLOz	1.10	7	
Assail	2.00	Oz	4.00	8	
Minecto Pro	8.00	FLOz	8.00	64	
Actara	5.00	Oz	4.00	20	
<b>Miticides:</b>					<b>166</b>
Kanemite 15SC	21.00	FLOz	3.39	71	
Micromite	6.25	Lb.	15.12	95	
<b>Fungicide:</b>					<b>95</b>
Hydrated Lime	10.00	Lb.	0.56	6	
Kocide 20/20	10.00	Lb.	8.90	89	
<b>Growth Regulator:</b>					<b>28</b>
GibGro	56.00	Gram	0.48	27	
Alco Citrus Fix	1.25	FLOz	1.00	1	
<b>Fertilizer:</b>					<b>70</b>
UAN32	80.00	Lb. N	0.56	45	
Urea Low Biuret	30.00	Lb. N	0.74	22	
Zinc Sulfate-36%	2.00	Lb.	0.96	2	
Tecmangam-31% Mn	2.00	Lb.	0.73	1	
<b>Soil Amendments:</b>					<b>220</b>
Soluble Gypsum	1.00	Ton	220.00	220	
<b>Custom:</b>					<b>449</b>
Spray Airblast	7.40	Acre	40.00	296	
Prune, Stack, Shred (top)	0.25	Acre	132.00	33	
Prune & Shred (hedge)	0.25	Acre	80.00	20	
Prune (hand) 1x/4Yr	0.25	Acre	320.00	80	
Stack & Shred (hand)	0.25	Acre	53.00	13	
Leaf Analysis	0.10	Each	68.00	7	
<b>Contract:</b>					<b>3,695</b>
Harvest: Pick & Haul	684.00	Crtn	1.35	923	
Harvest: Sort & Pack	564.00	Crtn	4.85	2,735	
Pheromone Confusion-PCA	0.00	Acre	0.00	0	
PCA Fees	1.00	Acre	36.00	36	
<b>Irrigation:</b>					<b>660</b>
Water	30.00	AcIn	22.00	660	
<b>Frost Protection:</b>					<b>48</b>
Water	2.20	AcIn	22.00	48	
<b>Assessment:</b>					<b>73</b>
Citrus Research	564.00	Carton	0.03	17	
Tristeza Eradication	1.00	Acre	10.56	11	
CCPDPC	564.00	Carton	0.08	45	
<b>Frost Protection:</b>					<b>315</b>
Wind Machine Operation	100.00	Hour	3.15	315	
<b>Labor:</b>					<b>482</b>
Equipment Operator Labor	5.23	Hrs.	26.70	140	
Irrigation Labor	5.55	Hrs.	20.77	115	
Non-Machine Labor	10.94	Hrs.	20.77	227	
<b>Machinery:</b>					<b>32</b>
Fuel-Gas	5.17	Gal	3.90	20	
Fuel-Diesel	0.00	Gal	2.80	0	
Lube				3	
Machinery Repair				9	
Interest on Operating Capital @ 4.0%					128
<b>TOTAL OPERATING COSTS/ACRE</b>				6,659	
<b>TOTAL OPERATING COSTS/CARTON</b>				12	
<b>NET RETURNS ABOVE OPERATING COSTS</b>				3,377	

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 4. CONTINUED**  
 SAN JOAQUIN VALLEY – SOUTH 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
<b>CASH OVERHEAD COSTS</b>					
Liability Insurance				10	
Office Expenses				100	
Compliance Cost				100	
Property Taxes				282	
Property Insurance				25	
Investment Repairs				168	
<b>TOTAL CASH OVERHEAD COSTS/ACRE</b>				<b>685</b>	
<b>TOTAL CASH OVERHEAD COSTS/CARTON</b>				<b>2</b>	
<b>TOTAL CASH COSTS/ACRE</b>				<b>7,348</b>	
<b>TOTAL CASH COSTS/CARTON</b>				<b>13</b>	
<b>NET RETURNS ABOVE CASH COSTS</b>				<b>2.692</b>	
<b>NON-CASH OVERHEAD COSTS (Capital Recovery)</b>					
Building: 1,800 SqFt				61	
Irrigation System: Pumps/Filters				68	
Drip Lines: Emitters				27	
Fuel Storage				17	
Wind Machine (1)				174	
Shop Tools				25	
Land SJV				950	
Establishment Cost				603	
Equipment				23	
<b>TOTAL NON-CASH OVERHEAD COSTS/ACRE</b>				<b>1,948</b>	
<b>TOTAL NON-CASH OVERHEAD COSTS/CARTON</b>				<b>3</b>	
<b>TOTAL COST/ACRE</b>				<b>9,295</b>	
<b>TOTAL COST/CARTON</b>				<b>16</b>	
<b>NET RETURNS ABOVE TOTAL COST</b>				<b>744</b>	

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 5. MONTHLY PER ACRE CASH COSTS TO PRODUCE ORANGES**  
 SAN JOAQUIN VALLEY – SOUTH 2021

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
<b>Cultural:</b>													
Frost Protection 3x	135										138	135	409
Fertilize: UAN32 3x		15	15	15									45
Weeds: Strip Spray 2x			47							47			95
Insects/Fertilizer 2x			126		71								196
CRS Pheromone Confusion/CheckMate													0
Insects: Katydid (Micromite)				135									135
Prune: Top Trees/Stack/Shred 1x/4yr				33									33
Hedge: Alt Rows/Shred 2x/4Yr				20									20
Prune: Hand-Stack/Shred 1/4Yr				93									93
Irrigate (Water & Labor)				87	105	131	166	131	105	51			775
Soil Amendment: Soluble Gypsum				50	57	63	72	63	57	39			402
Weeds: Spot Spray 3x				14		14		14					42
Insects: Thrips (Minecto Pro)						109							109
Insects: Scale (Actara)							60						60
Leaf Analysis									7				7
Disease: Brown Rot (Lime Kocide)										135			135
Growth Regulator: (GibGro)										55			55
Growth Regulator: (Citrus Fix)											29		29
Pickup Truck Use	6	6	6	6	6	6	6	6	6	6	6	6	76
UTV Use	4	4	4	4	4	4	4	4	4	4	4	4	49
PCA/Consultant Services	3	3	3	3	3	3	3	3	3	3	3	3	36
<b>TOTAL CULTURAL COSTS</b>	<b>149</b>	<b>28</b>	<b>201</b>	<b>461</b>	<b>245</b>	<b>330</b>	<b>311</b>	<b>221</b>	<b>182</b>	<b>341</b>	<b>181</b>	<b>149</b>	<b>2,800</b>
<b>Harvest:</b>													
Pick & Haul Fruit		308		308							308		923
Pack		912		912							912		2,735
Assessments		24		24							24		73
<b>TOTAL HARVEST COSTS</b>	<b>0</b>	<b>1,244</b>	<b>0</b>	<b>1,244</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,244</b>	<b>0</b>	<b>3,731</b>
Interest on Operating Capital @ 4.0%	0.50	4.74	5.41	11.09	11.91	13.01	14.05	14.78	15.39	16.52	21.27	0.0	128
<b>TOTAL OPERATING COSTS/ACRE</b>	<b>149</b>	<b>1,277</b>	<b>207</b>	<b>1,715</b>	<b>257</b>	<b>343</b>	<b>325</b>	<b>236</b>	<b>197</b>	<b>357</b>	<b>1,446</b>	<b>148</b>	<b>6,659</b>
<b>CASH OVERHEAD</b>													
Liability Insurance	1	1	1	1	1	1	1	1	1	1	1	1	10
Office Expenses	8	8	8	8	8	8	8	8	8	8	8	8	100
Compliance Cost										100			100
Property Taxes				141								141	282
Property Insurance	13						13						25
Investment Repairs	14	14	14	14	14	14	14	14	14	14	14	14	168
<b>TOTAL CASH OVERHEAD COSTS</b>	<b>36</b>	<b>23</b>	<b>23</b>	<b>164</b>	<b>23</b>	<b>23</b>	<b>36</b>	<b>23</b>	<b>23</b>	<b>123</b>	<b>23</b>	<b>164</b>	<b>685</b>
<b>TOTAL CASH COSTS/ACRE</b>	<b>185</b>	<b>1,300</b>	<b>230</b>	<b>1,880</b>	<b>281</b>	<b>367</b>	<b>361</b>	<b>259</b>	<b>220</b>	<b>481</b>	<b>1,469</b>	<b>313</b>	<b>7,345</b>

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 6. RANGING ANALYSIS**  
 SAN JOAQUIN VALLEY – SOUTH 2021

COSTS PER ACRE AND PER CARTON AT VARYING YIELDS TO PRODUCE ORANGES

	YIELD (CARTONS/ACRE)						
	489.00	514.00	539.00	564.00	589.00	614.00	639.00
OPERATING COSTS/ACRE:							
Cultural	2,800	2,800	2,800	2,800	2,800	2,800	2,800
Harvest	3,235	3,401	3,566	3,731	3,897	4,062	4,228
Interest on Operating Capital @ 4.0%	117.68	121.17	124.67	128.16	131.65	135.14	138.63
TOTAL OPERATING COSTS/ACRE	6,153	6,321	6,490	6,659	6,828	6,997	7,166
TOTAL OPERATING COSTS/CARTON	12.58	12.30	12.04	11.81	11.59	11.40	11.21
CASH OVERHEAD COSTS/ACRE	685	685	685	685	685	685	685
TOTAL CASH COSTS/ACRE	6,838	7,007	7,176	7,345	7,513	7,683	7,851
TOTAL CASH COSTS/CARTON	13.98	13.63	13.31	13.02	12.76	12.51	12.29
NON-CASH OVERHEAD COSTS/ACRE	1,948	1,948	1,948	1,948	1,948	1,948	1,948
TOTAL COSTS/ACRE	8,786	8,955	9,124	9,293	9,461	9,630	9,799
TOTAL COSTS/CARTON	17.97	17.42	16.93	16.48	16.06	15.68	15.34
Net Return per Acre Above Operating Costs for Oranges-Production							
PRICE (\$/carton)							
	YIELD (cartons/acre)						
Oranges	489.00	514.00	539.00	564.00	589.00	614.00	639.00
14.80	1,085	1,286	1,487	1,688	1,889	2,090	2,292
15.80	1,574	1,800	2,026	2,252	2,478	2,704	2,931
16.80	2,063	2,314	2,565	2,816	3,067	3,318	3,570
17.80	2,552	2,828	3,104	3,380	3,656	3,932	4,209
18.80	3,041	3,342	3,643	3,944	4,245	4,546	4,848
19.80	3,530	3,856	4,182	4,508	4,834	5,160	5,487
20.80	4,019	4,370	4,721	5,072	5,423	5,774	6,126
Net Return per Acre Above Cash Costs for Oranges-Production							
PRICE (\$/carton)							
	YIELD (cartons/acre)						
Oranges	489.00	514.00	539.00	564.00	589.00	614.00	639.00
14.80	399	600	801	1,003	1,204	1,405	1,606
15.80	888	1,114	1,340	1,567	1,793	2,019	2,245
16.80	1,377	1,628	1,879	2,131	2,382	2,633	2,884
17.80	1,866	2,142	2,418	2,695	2,971	3,247	3,523
18.80	2,355	2,656	2,957	3,259	3,560	3,861	4,162
19.80	2,844	3,170	3,496	3,823	4,149	4,475	4,801
20.80	3,333	3,684	4,035	4,387	4,738	5,089	5,440
Net Return per Acre Above Total Costs for Oranges-Production							
PRICE (\$/carton)							
	YIELD (cartons/acre)						
Oranges	489.00	514.00	539.00	564.00	589.00	614.00	639.00
14.80	-1,549	-1,347	-1,147	-945	-744	-543	-342
15.80	-1,060	-833	-608	-381	-155	71	297
16.80	-571	-319	-69	183	434	685	936
17.80	-82	195	470	747	1,023	1,299	1,575
18.80	407	709	1,009	1,311	1,612	1,913	2,214
19.80	896	1,223	1,548	1,875	2,201	2,527	2,853
20.80	1,385	1,737	2,087	2,439	2,790	3,141	3,492

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 7. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT and BUSINESS OVERHEAD COSTS**  
 SAN JOAQUIN VALLEY – SOUTH 2021

ANNUAL EQUIPMENT COSTS

Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
					Insurance	Taxes	
Pickup Truck 1/2 Ton	34,000	7	12,897	4,227	21	234	4,482
UTV-4WD	8,700	6	3,587	1,170	5	61	1,237
Gypsum Applicator	8,500	12	1,177	870	4	48	923
UTV Weed Sprayer 100-Gallon	3,460	10	612	393	2	20	416
UTV Spot Sprayer 20-Gallon	850	10	150	97	0	5	102
<b>TOTAL</b>	<b>55,510</b>	<b>-</b>	<b>18,424</b>	<b>6,757</b>	<b>33</b>	<b>370</b>	<b>7,159</b>
60% of New Cost*	33,306	-	11,054	4,054	20	222	4,296

\*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
<b>INVESTMENT</b>								
Building: 1,800 SqFt	63,000	30	0	3,982	28	315	1,260	5,585
Irrigation System: Pumps/Filters	12,000	40	0	676	5	60	240	981
Drip Lines: Emitters	3,500	20	0	275	2	18	70	364
Fuel Storage	14,500	20	1,015	1,107	7	78	290	1,482
Wind Machine (1)	28,000	30	1,960	1,739	13	150	560	2,462
Shop Tools	18,000	15	1,260	1,645	9	96	360	2,110
Land:	200,000	40	200,000	9,500	177	2,000	0	11,677
Establishment Cost	104,070	37	0	6,025	46	520	520	7,112
<b>TOTAL INVESTMENT</b>	<b>443,070</b>	<b>-</b>	<b>204,235</b>	<b>24,950</b>	<b>287</b>	<b>3,237</b>	<b>3,300</b>	<b>31,774</b>

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Liability Insurance	65	acre	9.55	621
Office Expenses	65	acre	100.00	6,500
Compliance Cost	60	acre	100.00	6,000

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 8. HOURLY EQUIPMENT COSTS**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Description	Oranges Hours Used	Capital Recovery	Cash Overhead		Operating		Total Oper.	Total Costs/Hr.
			Insurance	Taxes	Lube & Repairs	Fuel		
UTV-4WD	26	2.11	0.01	0.11	1.36	3.34	4.70	6.93
UTV Weed Sprayer 100-Gallon	5	1.57	0.01	0.08	0.93	0.00	0.93	2.59
UTV Spot Sprayer 20-Gallon	8	0.39	0.00	0.02	0.23	0.00	0.23	0.64
Pickup Truck 1/2 Ton	18	8.90	0.04	0.49	4.30	6.50	10.80	20.24
Gypsum Applicator	1	5.22	0.03	0.29	3.27	0.00	3.27	8.81

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 9. OPERATIONS WITH EQUIPMENT & MATERIALS**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation	Operation Month	Implement	Labor Type/ Material	Rate/ acre	Unit	
Frost Protection 3x	Jan		Irrigation Labor	0.73	Hour	
			Water-SJV Frost	0.73	AcIn	
			Wind Machine Operation	33.00	Hour	
	Nov		Irrigation Labor	0.73	Hour	
			Water-SJV Frost	0.73	AcIn	
			Wind Machine Operation	34.00	Hour	
	Dec		Irrigation Labor	0.73	Hour	
			Water-SJV Frost	0.74	AcIn	
			Wind Machine Operation	33.00	Hour	
Fertilize: UAN32 3x	Feb		UAN32	26.60	Lb. N	
	Mar		UAN32	26.70	Lb. N	
	Apr		UAN32	26.70	Lb. N	
Weeds: Strip Spray 2x	Mar	UTV-4WD	Equipment Operator Labor	0.30	Hour	
			Alion	2.50	FIOz	
			UTV Weed Sprayer 100 Gal	Diuron 4L	1.60	Qt
	Oct		UTV-4WD	Equipment Operator Labor	0.30	Hour
			Alion	2.50	FIOz	
			UTV Weed Sprayer 100 Gal	Diuron 4L	1.60	Qt
Insects/Fertilizer 2x	Mar		Urea Low Biuret	15.00	Lb. N	
			Zinc Sulfate 36%	2.00	Lb.	
			Tecmangam (31%Mn)	2.00	Lb.	
			Spray Airblast	1.00	Acre	
			Kanemite 15SC	21.00	FIOz	
			Urea Low Biuret	15.00	Lb. N	
	May		Spray Oil 415	0.50	Gal	
			Baythroid XL	6.00	FIOz	
			Assail	2.00	Oz	
			Spray Airblast	1.00	Acre	
			Pheromone Confusion-PCA	-	-	
			CheckMate (Dispensers)	-	-	
Insects: Katydid	Apr		Micromite	6.25	Lb.	
			Spray Airblast	1.00	Acre	
Top Trees/Stack/Shred	Apr		Prune, Stack, Shred (top)	0.25	Acre	
Hedge: Alt Rows/Shed	Apr		Prune & Shred (hedge)	0.25	Acre	
Prune: Hand 1/4Yr/Stack	Apr		Prune (hand) 1X/4Yr	0.25	Acre	
			Stack & Shred (hand)	0.25	Acre	
Irrigate	Apr		Irrigation Labor	0.50	Hour	
			Water-SJV	3.50	AcIn	
			Water-SJV	4.00	AcIn	
	May		Irrigation Labor	0.80	Hour	
			Water-SJV	4.00	AcIn	
			Water-SJV	5.00	AcIn	
	June		Irrigation Labor	1.00	Hour	
			Water-SJV	6.50	AcIn	
	July		Irrigation Labor	1.10	Hours	
			Water-SJV	6.50	AcIn	
	Aug		Irrigation Labor	1.00	Hour	
			Water-SJV	5.00	AcIn	
	Sept		Irrigation Labor	0.80	Hour	
			Water-SJV	4.00	AcIn	
	Oct		Irrigation Labor	0.35	Hour	
Water-SJV		2.00	AcIn			
Soil Amendment	Apr		Non-Machine Labor	1.25	Hours	
			Gypsum Machine	Soluble Gypsum	0.11	Ton
			Non-Machine Labor	1.25	Hours	
	May		Gypsum Machine	Soluble Gypsum	0.14	Ton
			Non-Machine Labor	1.25	Hours	
	June		Gypsum Machine	Soluble Gypsum	0.17	Ton
			Non-Machine Labor	1.25	Hours	
	July		Gypsum Machine	Soluble Gypsum	0.21	Ton
			Non-Machine Labor	1.25	Hours	
	Aug		Gypsum Machine	Soluble Gypsum	0.17	Ton
			Non-Machine Labor	1.25	Hours	
	Sept		Gypsum Machine	Soluble Gypsum	0.14	Ton
			Non-Machine Labor	1.25	Hours	
	Oct		Gypsum Machine	Soluble Gypsum	0.14	Ton
			Non-Machine Labor	1.25	Hours	

UC COOPERATIVE EXTENSION  
 AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS  
**TABLE 9. CONTINUED**  
 SAN JOAQUIN VALLEY – SOUTH 2021

Operation	Operation Month	Implement	Labor Type/ Material	Rate/Acre	Unit
Weeds: Spot Spray 3x	Apr	UTV-4WD	Equipment Operator Labor	0.30	Hour
		UTV Spot Sprayer 20 Gal	Glufosinate	1.00	Pint
	June	UTV-4WD	Equipment Operator Labor	0.30	Hour
		UTV Spot Sprayer 20 Gal	Glufosinate	1.00	Pint
	Aug	UTV-4WD	Equipment Operator Labor	0.30	Hour
Insects: Thrips	June	UTV Spot Sprayer 20 Gal	Glufosinate	1.00	Pint
			Spray Oil 415	0.50	Gal
			Minecto Pro	8.00	FLOz
Insects: Scale	July		Spray Airblast	1.00	Acre
			Actara	5.00	Oz
			Spray Airblast	1.00	Acre
Leaf Analysis	Sept		Leaf Analysis	0.10	Each
Disease: Brown Rot	Oct		Hydrated Lime	10.00	Lb.
			Kocide 20/20	10.00	Lb.
			Spray Airblast	1.00	Acre
Growth Regulators	Oct		GibGro	56.00	Grams
			Spray Airblast	0.70	Acre
	Nov		Alco Citrus Fix	1.25	FLOz
			Spray Airblast	0.70	Acre
Pickup Truck Use	Nov	Pickup Truck 1/2 Ton	Equipment Operator Labor	2.12	Hours
UTV Use	Nov	UTV-4WD	Equipment Operator Labor	1.61	Hours
PCA/Consultant	Nov		PCA Fees SJV	1.00	Acre
Pick & Haul Fruit	Feb		Harvest Pick/Haul	228.00	Crtn
	Apr		Harvest Pick/Haul	228.00	Crtn
	Nov		Harvest Pick/Haul	228.00	Crtn
Pack	Feb		Harvest: Sort/Pack	188.00	Crtn
	Apr		Harvest: Sort/Pack	188.00	Crtn
	Nov		Harvest: Sort/Pack	188.00	Crtn