University of California Agriculture and Natural Resources
Cooperative Extension
UC Davis Department of Agricultural and Resource Economics

2021

SAMPLE COSTS TO PRODUCE AND HARVEST STRAWBERRIES

CENTRAL COAST REGION

Santa Cruz & Monterey Counties

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Central Coast Region - Santa Cruz & Monterey Counties - 2021

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Acknowledgements. Thank you to the strawberry growers, Pest Control Advisers, supervisors and various suppliers who provided cultural and cost information.

INTRODUCTION

The sample costs to produce and harvest strawberries in the Central Coast Region – Santa Cruz and Monterey counties – are presented in this study. The study is intended as a guide only, and can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. The practices described are based on production procedures considered typical for this crop and area, and will not apply to every farm. Sample costs for labor, materials, equipment and custom services are based on current figures. A blank column, "*Your Cost*", is provided to enter your actual costs on Tables 1 and 2.

The hypothetical farm operation, production practices, overhead, and calculations are described under assumptions. For additional information or explanation of calculations in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-4651, UC Cooperative Extension Santa Cruz County: Mark Bolda (831) 763-8025 or the UC Cooperative Extension office in your county.

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

ASSUMPTIONS

The following assumptions refer to Tables 1 to 6 and pertain to sample costs to produce strawberries in the Central Coast Region - Santa Cruz and Monterey counties. The cultural practices described and materials used are considered typical for a well-managed strawberry operation in the region. The costs, materials and practices will not apply to all situations every production year. Cultural practices and costs for the production of strawberries vary by grower and region, and can be significant. The study is intended as a guide only. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products or cultural practices.**

Farm. This study assumes a farm operation size of 50 contiguous acres of rented land. Strawberries are planted on 45 acres; roads, the irrigation system, and on-farm buildings account for the remaining five acres. The grower rents the land, which is assumed to be fairly flat. Strawberries may also be planted on rolling hills or sloped land in the area. This may necessitate erosion prevention and control measures, as well as practices and equipment that differ from those used in this study; differing practices or equipment are not included here. Stawberries are often grown on land that was planted previously to vegetable crops in a strawberry – vegetable rotation.

Production Cultural Practices and Material Inputs

Land Preparation, Pre-Plant Fertilization, and Pre-Plant Irrigation. Prior to land preparation, and to help determine fertilization practices, two soil samples per the 45 acres are taken for analysis. Strawberry ground is then disced a total of six times, subsoiled twice, chiseled twice and then sprinkler irrigated using 0.5 acre-inches of water to moisten the soil for fumigation (see Fumigation and Alternatives section). After fumigation, the soil is further moistened with an additional 0.5 acre-inches of water, and then beds are listed and shaped. A slow release 18-8-13 fertilizer at 500 pounds per acre or a different complete fertilizer is drilled pre-plant into the beds at the same time as shaping. Drip irrigation tape (two lines per bed) is installed, and beds are covered with a plastic mulch using a mulch laying implement.

Plant Establishment. Prior to planting, a slotting implement is used to open the plastic mulch at appropriate intervals for transplants. Several strawberry varieties such as Monterey, Cabrillo, and a number of proprietary varieties are suitable for production in the region, but no specific variety is assumed in this study. For this study strawberries are planted on 48-inch beds, two rows per bed at 12-inch plant spacing for a total of 21,780 plants per acre. Typically, five percent of the field, or 1,089 plants per acre is replanted in the weeks and months that follow because of poor planting and field conditions; replanting is included in the establishment costs. Planting takes approximately 50 hours per acre. Some growers use different bed widths and plant spacings; management practices may then also differ to accommodate production and harvest needs.

Post-Plant Fertilization. From March to September CN9, CAN 17, KNO3, monopotassium phosphate or 6-30-30 is applied through the drip system. Grower fertilizer programs and timing vary widely, but most will use a complete or NPK fertilizer and nitrogen (N) fertilizers, depending upon seasonal nutrient requirements.

Post-Plant Irrigation. Immediately after planting strawberries are sprinkler irrigated each day for one week, and as needed on alternate days for another week using a total of 2.5 acre-inches of water. From March to September (seven months), strawberries are drip irrigated two to three times per week through the drip lines using a total of 24 acre-inches. A total of 27.5 acre-inches of water are used for the season. Effective rainfall is not taken into account. Water cost is estimated at $360 per acre-foot or $30.00 per acre-inch. The

amount and cost of water can differ substantially from farm to farm in the area depending on climatic conditions, soil type, well depth, and irrigation district.

Pest Management. The pesticides and rates mentioned in this cost study are listed in the *UC IPM Pest Management Guidelines, Strawberries*. For more information on pesticides, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu, or contact your local UCCE farm advisor. Pesticide use permits and regulatory information are available through your local agricultural commissioner's office. Pesticides mentioned in this study are used to calculate rates and costs; applications, timing and materials vary according to pest pressure. Adjuvants are recommended for many pesticides for effective control and are not included here. The pesticide program shown in Table A represents a typical program for the region but can vary considerably; effectiveness of practices depends upon field and environmental conditions.

Pest Control Adviser (PCA). To assist with pest management and decisions, the grower contracts with a PCA at an estimated cost of $125 per acre. Pest control advisers write pest management recommendations and monitor the fields for production, nutrition, and pest problems.

Fumigation and Alternatives. In this study, arthropods, soilborne fungi/diseases, nematodes, and weeds are assumed to be controlled with a pre-plant soil fumigation. A custom operator applies chloropicrin using a flat fumigation. The custom operator provides the chloropicrin, tarp (totally impermeable film – TIF), glue, and workers to complete the practice, which includes one tractor driver. Approximately 1.5 to 2 acres can be fumigated per hour; total cost per acre is estimated at $5,000. The grower incurs an additional cost of $25 per acre to obtain a fumigation permit. Cost includes field measuring, field maps and fumigation layout, obtaining permission from nearby residents, and meeting with representatives from the county agricultural commissioner's office. Some growers use bed-type fumigation practices, which differ in cost from the flat fumigation described here.

Growers areactively researching alternative methods of soil fumigation by either using individual materials such a chloropicrin, or integrating them into a larger system of soil pest managment. Several novel fumigants, for example metam potassium (KPAM) and mustard oil (Dominus) are currently being tested; a number of non-fumigant materials are also being used on small acreage plantings. One example of an alternative management approach is anaerobic soil disinfestation (ASD). ASD begins by adding a carbon source such as rice bran or mustard seed meal to the soil, followed by flooding the soil with water to create an anaerobic environment that is less hospitable to soil pathogens. This approach has been deployed over several hundreds of acres in California; results have been positive with several fields showing good control of the soil pathogen *Verticillium*. However, the lack of weed control and difficulty with *Fusarium* wilt with ASD is an issue. Another method showing great promise in the control of soil pathogens and weeds is the use of steam for soil disinfestation.

Weed and Runner Removal. Fumigation provides some control of weeds in strawberry production. However, additional weed management is required during the season, and, in addition, removal of strawberry plant runners. Hand weeding is estimated at 7.5 hours per acre for 10 months during the production season and runner removal is estimated at 12.5 hours per acre per month for the same 10 months during the production season. Growers with different planting configurations and/or especially weedy fields may require a higher level of management and therefore higher costs.

Diseases. Powdery mildew *(Podosphaera aphanis)*, Botrytis fruit rot (*Botrytis cinerea*), and Anthracnose (*Colletotrichum actatum)* are the diseases treated in this study. Treatments are combined (tank mixed) with the insect control applications. Fungicide treatments are made every 12 to 16 days through March and every 20 to 25 days thereafter ending in early September. Also, some growers may dip transplants in a fungicidal solution prior to planting as a preventative measure for disease.

Table A. Disease and Insect Material Applications-Review

MONTH	DISEASE			INSECTS		
	Botrytis	Mildew	Anthracnose	Mites	Worms	Lygus
March	Captan	Rally	Pristine	Savey		
March				*Persimilis*		
April		Quadris	Quadris		Dipel	
April	Elevate	Rally			Success	
May	Captan	Thiolux		Acramite	Dipel	Rimon
May		Quadris				
June	Elevate	Rally		Acramite		Malathion
June	Captan	Thiolux				
July		Quadris				Beleaf
August		Thiolux		Danitol		Danitol
September		Thiolux				

RATES PER ACRE in study: (Not Recommendations - see label or your PCA)

Captan	4.0 lb	Beleaf	2.8 oz
Elevate	1.5 lb	Dipel	1.0 lb
Rally	5.0 oz	Malathion	2.0 pt
Thiolux	5.0 lb	Savey	6.0 oz
Quadris	12 floz	Success	5.0 floz
Acramite	1.0 lb	*Persimilis*	40,000
Danitol	16.0 oz	Pristine	23.0 oz.

Insects. Two-spotted spider mite (*Tetranychus urticae*), lygus bug (*Lygus hesperus*) and various lepidopterous larvae are the insects controlled in this study. To assist with the control of twospotted spider mite, the predatory mite *Phytoseiulis persimilis* is released four times, once in January, once in February and then twice in March, for a total rate of 80,000 mites per acre per year. Application time is estimated at one hour per acre per release. Lygus bug is considered to be one of the most challenging pests to manage in strawberries. Growers control this pest using material applications, which are combined with the fungicide treatments and shown in Table A. Some growers may also use a bug vacuum twice weekly from April to October to control lygus bug. Costs are estimated at $1,100 per acre, but are not included in this study (please see 2019 Sample Costs to Produce Organic Strawberries for more information about this practice).

Harvest. The crop is harvested from April through early October with peak harvest in June and July. Based on weight, the percent of the crop harvested each month in this study is shown in Table B. The grower hires a crew foreman to supervise one 35-person crew early and late in the season and two 35-person crews during peak production. Each person uses a push cart holding a tray with eight 1-pound clamshell containers to move down furrows and across fields. Strawberries are harvested by hand and packed into containers and trays. Other container types and sizes are used, but are not included in this study. Each worker harvests roughly three trays per hour early and late in the season when fruit load is light; during peak production each worker can harvest five to eight trays per hour. In addition to the harvest crew and foreman, field labor also includes one fruit checker and one card puncher per crew to ensure proper harvest and tray counts for each worker. A truck loader stacks harvested trays on the truck and a truck driver delivers strawberries to the cooler. The grower uses two one and one-half ton flatbed trucks holding two to three pallets at 110 trays per pallet or 330 trays per load for delivery to the cooler. Trays per pallet will vary by container type. The truck driver takes about an hour per load to deliver the filled trays. The grower will have at least one tractor, one trailer, and two toilet in the fields. (Please see Labor section for additional information related to harvest costs).

Table B. Percent Crop Harvested by Month

	April	May	June	July	Aug	Sept	Oct
Fresh %	5	12	25	26	18	12	2

Transportation and Cooling. Cost to transport strawberries from the field to the cooler is shown under harvest costs on Tables 1 and 3. Cooling costs vary by cooler and grower volume and are estimated at $0.50 per tray in this study.

Assessments. Growers and shippers pay the California Strawberry Commission (CSC) an assessment per tray (eight 1-pound containers) for research and marketing activities. The current assessment is $0.045 per tray, which is split equally between grower and shipper. Grower cost is therefore estimated at $0.0225 per tray.

Yields. Strawberry yield is measured in trays per acre. Average yield for fresh market fruit ranges from 7,000 to 12,000 trays per acre. This study assumes a yield of 9,000 trays containing eight 1-pound clamshells per acre. The weight ranges from 9.0 to 9.3 pounds per tray to account for some variance in fruit weight per tray and including the weight of the clamshells and trays.

Returns. Based on recent USDA Watsonville-Salinas Shipping Point returns (FOB), the representative return is $10.00 per tray. Strawberry prices range from $7.00 to $14.00 in the area. Estimated net returns to growers are shown in Table 4. Higher prices are seen early and late in the season when the volume of harvested product is low; lower prices are seen when peak season volumes are high.

Sales/Marketing. Selling costs for fresh market fruit are estimated at eight percent of the selling price or $0.80 per tray ($10.00 x 8%), which is shown on Tables 1 to 3.

Post-Harvest Cleanup. After all harvest operations have been completed, strawberry plants are mowed, the plastic mulch and drip tape are removed and disposed of at a landfill or recycling center. In this study a custom operator performs this service; it may also be handled by growers using their own equipment and labor. Growers may also have a crew walk the field to make sure all mulch has been removed from the field. The field is disked twice in preparation for the next crop. The discing operation is incorporated into the land preparation costs.

Growing Cost. Some growers along the Central Coast of California prefer to focus on growing costs and therefore separate total harvest costs from total cash costs, equipment depreciation and replacement costs. For this study, growing costs are noted at the bottom of Table 1, and are calculated by subtracting total harvest costs from total costs. Growing costs depend upon many variables including location and grower.

Labor, Equipment, and Interest

Labor. Labor rates are estimated at $28.86 per hour for machine operators and $21.46 for field labor, which includes overhead of 48 percent. The basic hourly wages are $19.50 for machine operators and $14.50 for field labor. Harvest crews are often paid a base wage plus piecework rate, or straight piecework depending on the time of harvest. In this study, harvest wages are calculated using the field labor rate. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for strawberry crops (code 0079), and a percentage for other possible benefits. Workers' compensation costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2021. Labor for operations involving machinery are 20 percent higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

In 2016 new minimum wage and overtime laws were passed in California. Currently in 2021, minimum wage is $14.00 per hour, an increase of 7.7% over that of 2020. In 2022, the minimum wage increases to $15.00 per hour which represents an increase of 7.1% over that of 2021. Many growers may already pay wages that are higher than the state's legal requirement.

The new overtime law will gradually decrease the number of hours employees can work on a daily and weekly basis before overtime wages are required. Prior to its passage field workers and equipment operators could work up to 10 hours per day or 60 hours per week without overtime wages; by 2022 the requirement will be lowered to 8 hours per day or 40 hours per week for employers with 26 or more employees. The new overtime law may change wages and scheduling of work in complicated ways as it is phased in.

Growers may also choose to use a farm labor contractor or the H-2A guestworker visa program to employ workers. When using either one of these two approaches, base rates, overhead and compliance with housing, meals, transportation, and other requirements will vary. Use of these services may result in labor costs that are higher than those shown in this study but may be necessary in order to assure a reliable supply of 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 4.00 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, but the rate used in this study is considered a typical lending rate by a farm lending agency as of January 2021.

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 and 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 red dye diesel and gasoline are $4.15 (excludes excise taxes) and $3.90 per gallon, respectively. The cost includes a 2 percent local sales tax on diesel fuel, and 8 percent sales tax on gasoline. Gasoline costs also include federal and state taxes, which are refundable for on-farm use when filing income taxes. The fuel, lube, and repair cost per acre for each operation in Table 1 is determined by multiplying the total hourly operating cost in Table 6 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.

Risk. The risks associated with producing and marketing fresh market strawberries are considered high. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, production, market, legal and human resource risks that ultimately affect the profitability and economic viability of fresh market strawberries. In this area invasive pests pose particular regulatory and management challenges and increase production and marketing risks for growers. In addition, labor availability, scheduling and cost is a noteworthy human resource risk. In recent years labor constraints have meant challenges in securing and retaining a sufficient number of workers to ensure timely and effective farm operations. Some growers report paying higher wages to attract and retain workers; others may pay overtime because of labor constraints. Overall profitability of the crop is negatively impacted in either case.

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. Because overhead costs are farm and ranch specific, costs will vary among growers.

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. Average value equals new cost plus salvage value divided by two on a per

acre basis.

Insurance. Insurance for farm investments varies depending upon the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.886 percent of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and other potential farm related liabilities and costs $1,914.

Office Expenses. Annual office and business expenses are estimated at $750 per acre. Costs include, but are not limited to, a variety of administration and office expenses such as office supplies, telephones, bookkeeping, accounting, road maintenance, utilities, and miscellaneous expenses.

Food Safety and Regulatory Programs. To ensure the safety of fresh products, accommodate buyer requests, and comply with regulatory programs (i.e. for water and air quality), growers incorporate various programs into their operations. Part of a food safety program is participation in third party (independent) audits. Costs associated with a food safety program varies depending upon the farm and inspection circumstances and employee training requirements and is estimated at $100 per acre per year. In addition, a cost of $80 per acre per year is included for management and compliance with regulatory programs.

Land Rent. Land rents in Monterey and Santa Cruz Counties range from $2,500 to $3,000 per acre per year. In this study land rent is assumed to be $2,700 per acre per year or $3,000 per producing acre per year. Land rent includes developed well(s) and irrigation system. In general, growers are responsible for the portion above ground such as the pump, and the landowner is responsible for what is below ground, such as the well running dry (see the Irrigation System section for more information).

Field Sanitation. Sanitation services provide portable toilets with washing stations, delivery and service, and is estimated at $6,340 annually. Separate potable water and single-use drinking cups are also supplied. Sanitation facilities vary depending on the size of the labor force.

Farm Supervisor. The grower hires a farm supervisor to oversee some of the cultural and harvest operations as well as fill in on some of the operations where temporary assistance is needed. The estimated cost for the supervisor is $1,500 per acre. Larger operations may have multiple supervisory levels; associated costs will therefore differ.

Non-Cash Overhead

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase price and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((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 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 and purchase price for land are the same because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 5.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

Interest Rate. The interest rate of 4.75% used to calculate capital recovery cost is the effective long term interest rate effective January 1, 2021. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Building and Tools. Estimated costs for both a metal building and shop and hand tools are included in the study.

Fuel Tanks. Two fuel tanks, one for diesel and one for gasoline, are located on the property. The tanks are set up in a cement containment pad that meets federal, state, and county regulations.

Irrigation System. The irrigation system is maintained by the landowner and assumed to be included in the land rental cost; in some cases the grower may be responsible for maintenance. The grower invests in and owns sprinkler pipe and drip system materials sufficient for irrigation needs. The grower also owns a trailer and other equipment needed for moving pipe and other irrigation supplies to and from the field. Irrigation water is pumped from a well and delivered to the field through an underground pipe system. Main lines above ground are connected to the underground system to deliver water for the sprinkler and drip irrigations. In this study water is pumped from a depth of 150 feet in a 300-foot well and the grower pays the pumping costs.

Equipment. Farm equipment is purchased when it is both new or used. This study shows the current purchase price for new equipment, which is adjusted to 60 percent to reflect a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 5. 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 PRODUCE AND HARVEST STRAWBERRIES
CENTRAL COAST REGION – 2021

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Cultural:								
Soil Samples (2 per 45 acre)	0.00	0	0	0	0	6	6	
Disc 8X	1.03	36	56	22	0	0	114	
Subsoil 2X	1.50	52	81	31	0	0	164	
Chisel 2X	0.60	21	33	12	0	0	65	
Sprinkle Irrigation - Pre-Plant	1.30	73	12	3	30	0	118	
Fumigate - Flat - TIF Tarped	0.00	0	0	0	0	5,000	5,000	
Fumigation Permit	0.00	0	0	0	0	25	25	
Tarp Retrieval/Disposal	0.00	0	0	0	0	100	100	
List/Shape 48" beds	0.25	9	14	5	0	0	27	
Fertilize Pre-Plant	0.29	10	3	1	425	0	439	
Install Drip Tape/System	2.00	112	19	7	1,525	0	1,662	
Open Trench for drip	0.10	14	1	0	0	0	15	
Grade Field Roads 2X	0.58	20	5	1	0	0	27	
Lay Mulch	2.00	241	19	10	452	0	722	
Punch Holes	1.50	52	14	4	0	0	71	
Plant (Includes Replant Labor &	0.00	1,073	0	0	3,430	0	4,503	
Roll Plants to Pack	0.20	7	2	1	0	0	9	
Sprinkle Irrigation - Post-Plant	1.75	104	16	4	75	0	199	
Hand Weed	0.00	1,610	0	0	0	0	1,610	
Runner Removal	0.00	2,683	0	0	0	0	2,683	
Botrytis/Mildew/Mite/Anthracnose	0.58	20	7	3	273	0	303	
Predatory Mites - Persimilis 4X	0.00	86	0	0	520	0	606	
Drip Irrigation - Season	0.00	225	0	0	720	0	945	
Fertigate- CAN 17	0.00	0	0	0	263	0	263	
Botrytis/Mildew/Anthracnose	0.58	20	7	3	149	0	179	
Mildew/Anthracnose/Worms	0.58	20	7	3	48	0	79	
Botrytis/Mildew/Worms	1.17	40	14	6	150	0	211	
Botrytis/Mildew/Mites/Worms/Lygus	1.17	40	14	6	209	0	270	
Botrytis/Mildew/Mite/Lygus	1.17	40	14	6	253	0	313	
Mildew/Lygus	0.58	20	7	3	66	0	96	
Mildew/Mites/Lygus	0.58	20	7	3	35	0	65	
Mildew	0.58	20	7	3	6	0	36	
Year End Cleanup	0.00	0	0	0	0	500	500	
PCA	0.00	0	0	0	0	125	125	
Pickup Truck Use	1.71	109	17	8	0	0	133	
TOTAL CULTURAL COSTS	21.82	6,777	378	145	8,629	5,756	21,685	
Harvest:								
Harvest Strawberries	0.00	34,572	0	0	15,120	3,330	53,022	
Load/Haul	7.71	1,133	138	64	0	0	1,335	
Cool	0.00	0	0	0	0	4,500	4,500	
Market/Sales Fee	0.00	0	0	0	0	7,200	7,200	
Assessments - CSC	0.00	0	0	0	203	0	203	
TOTAL HARVEST COSTS	7.71	35,705	138	64	15,322	15,030	66,259	
Interest on Operating Capital at 4.00%							1,695	
TOTAL OPERATING COSTS/ACRE	30	42,483	516	209	23,951	20,786	89,639	

* A discussion about new labor laws and costs are included on pages 6 and 7 of this study; labor costs may vary substantially from those shown in here.

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 1. CONTINUED
CENTRAL COAST REGION - 2021

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Food Safety							100	
Land Rent							2,700	
Liability Insurance							38	
Office Expense							750	
Ranch Supervisor							1,500	
Field Sanitation							127	
Regulatory Programs							80	
Property Taxes							38	
Property Insurance							3	
Investment Repairs							65	
TOTAL CASH OVERHEAD COSTS/ACRE							5,402	
TOTAL CASH COSTS/ACRE							95,041	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Buildings		983		62			62	
Fuel Tank: 1000 gal.		220		17			17	
Hand Tools		92		8			8	
Harvest Carts 70		23		5			5	
Lateral Lines		222		51			51	
Shop Tools		253		23			23	
Sprinkler Pipe		1,465		92			92	
Equipment		3,199		314			314	
TOTAL NON-CASH OVERHEAD COSTS		6,457		573			573	
TOTAL COSTS/ACRE							95,613	

TOTAL COST PER ACRE – HARVEST COST PER ACRE = GROWING COST PER ACRE

$95,613 - $66,259 = $29,354

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 2. COSTS and RETURNS PER ACRE to PRODUCE AND HARVEST STRAWBERRIES
CENTRAL COAST REGION - 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Strawberry	9,000	tray	10.00	90,000	
TOTAL GROSS RETURNS	9,000	tray		90,000	
OPERATING COSTS					
Insecticide:				**493**	
Savey 50 DF	6.00	oz	20.69	124	
Dipel DF	2.00	lb	15.65	31	
Success	5.00	floz	7.97	40	
Acramite 50WS	2.00	lb	93.14	186	
Rimon 0.83 EC	11.00	floz	3.07	34	
Malathion 8	2.00	pint	7.76	16	
Beleaf 50SG	2.80	oz	11.96	33	
Danitol 2.4 EC	16.00	floz	1.80	29	
Fungicide:				**696**	
Captan 50W	16.00	lb	6.92	111	
Rally 40W	20.00	oz	5.50	110	
Pristine	46.00	oz	4.08	188	
Quadris	36.00	floz	2.72	98	
Elevate 50WDG	3.00	lb	55.31	166	
Thiolux	20.00	lb	1.20	24	
Miticide:				**520**	
Persimilis (Mite)	80.00	thou	6.50	520	
Fertilizer:				**688**	
Scotts 18-8-13	500.00	lb	0.85	425	
CAN 17 17-0-0 (N)	350.00	lb N	0.75	263	
Custom:				**8,961**	
Soil Analysis	0.04	each	150.00	6	
Fumigate - TIF Tarped	1.00	Acre	5000.00	5,000	
Fumigation Permit	1.00	acre	25.00	25	
Mulch Retrieval/Disposal	1.00	acre	100.00	100	
Misc Picking Costs	9000.00	tray	0.37	3,330	
Year End Cleanup	1.00	acre	500.00	500	
Materials:				**17,097**	
T-Tape	21780.00	foot	0.07	1,525	
Mulch Pins	4000.00	each	0.02	60	
Mulch 48" 1.25mil	10890.00	foot	0.04	392	
Trays/Clamshells	9000.00	each	1.68	15,120	
Water:				**825**	
Water- Pumped	27.50	acin	30.00	825	
Plants:				**3,430**	
Strawberry Plants	22869.00	each	0.15	3,430	
Contract:				**11,825**	
Cooler	9000.00	tray	0.50	4,500	
Market/Sales Fee	9000.00	tray	0.80	7,200	
PCA	1.00	acre	125.00	125	
Assessment:				**203**	
Strawberry Commission	9000.00	tray	0.02	203	
Labor				**42,483**	
Equipment Operator Labor	35.44	hrs	28.86	1,023	
Irrigation Labor	11.80	hrs	21.46	253	
Non-Machine Labor	1905.39	hrs	21.46	40,890	
Equipment Operator Labor	10.98	hrs	28.86	317	
Machinery				**725**	
Fuel-Gas	39.61	gal	3.90	154	
Fuel-Diesel	87.15	gal	4.15	362	
Lube				77	
Machinery Repair				131	
Interest on Operating Capital @ 4.00%				1,695	
TOTAL OPERATING COSTS/ACRE				89,639	
TOTAL OPERATING COSTS/TRAY				10	
NET RETURNS ABOVE OPERATING COSTS				361	

TABLE 2. CONTINUED
CENTRAL COAST REGION – 2021

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Food Safety				100	
Land Rent				2,700	
Liability Insurance				38	
Office Expense				750	
Ranch Supervisor				1,500	
Field Sanitation				127	
Regulatory Programs				80	
Property Taxes				38	
Property Insurance				3	
Investment Repairs				65	
TOTAL CASH OVERHEAD COSTS/ACRE				5,402	
TOTAL CASH OVERHEAD COSTS/TRAY				1	
TOTAL CASH COSTS/ACRE				95,041	
TOTAL CASH COSTS/TRAY				11	
NET RETURNS ABOVE CASH COSTS				-5,041	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Buildings				62	
Fuel Tank: 1000 gal.				17	
Hand Tools				8	
Harvest Carts 70				5	
Lateral Lines				51	
Shop Tools				23	
Sprinkler Pipe				92	
Equipment				314	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				573	
TOTAL NON-CASH OVERHEAD COSTS/TRAY				0	
TOTAL COST/ACRE				95,613	
TOTAL COST/TRAY				11	
NET RETURNS ABOVE TOTAL COST				-5,613	

* A discussion about new labor laws and costs are included on pages 6 and 7 of this study; labor costs may vary substantially from those shown in here.

UC COOPERATIVE EXTENSION

AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 3. MONTHLY CASH COSTS PER ACRE to PRODUCE AND HARVEST STRAWBERRIES

CENTRAL COAST REGION – 2021

	AUG 20	SEP 20	OCT 20	NOV 20	DEC 20	JAN 21	FEB 21	MAR 21	APR 21	MAY 21	JUN 21	JUL 21	AUG 21	SEP 21	OCT 21	Total
Cultural:																
Soil Samples (2 per 45 acre)	6															6
Disc 8X	114															114
Subsoil 2X		164														164
Chisel 2X		65														65
Sprinkle Irrigation - Pre-Plant		118														118
Fumigate - Flat - TIF Tarped		5,000														5,000
Fumigation Permit		25														25
Tarp Retrieval/Disposal		100														100
List/Shape 48" beds		27														27
Fertilize Pre-Plant		439														439
Install Drip Tape/System		1,662														1,662
Open Trench for drip		15														15
Grade Field Roads 2X		14						14								27
Lay Mulch		722														722
Punch Holes			71													71
Plant (Includes Replant Labor &			4,503													4,503
Roll Plants to Pack			9													9
Sprinkle Irrigation - Post-Plant			199													199
Hand Weed					161	161	161	161	161	161	161	161	161	161		1,610
Runner Removal					268	268	268	268	268	268	268	268	268	268		2,683
Botrytis/Mildew/Mite/Anthracnose								303								303
Predatory Mites - Persimilis 4X						151	151	303								606
Drip Irrigation - Season								122	137	137	137	137	137	137		945
Fertigate- CAN 17								38	38	38	38	38	38	38		263
Botrytis/Mildew/Anthracnose								179								179
Mildew/Anthracnose/Worms									79							79
Botrytis/Mildew/Worms									211							211
Botrytis/Mildew/Mites/Worms/Lygus										270						270
Botrytis/Mildew/Mite/Lygus											313					313
Mildew/Lygus												96				96
Mildew/Mites/Lygus													65			65
Mildew														36		36
Year End Cleanup															500	500
PCA															125	125
Pickup Truck Use	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	133
TOTAL CULTURAL COSTS	129	8,361	4,792	9	438	590	590	1,397	902	882	926	709	678	649	634	21,685
Harvest:																
Harvest Strawberries									4,335	7,107	11,887	11,428	9,437	7,107	1,721	53,022
Load/Haul									92	168	304	300	233	168	70	1,335
Cool									225	540	1,125	1,170	810	540	90	4,500
Market/Sales Fee									360	864	1,800	1,872	1,296	864	144	7,200
Assessments - CSC															203	203
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	5,011	8,679	15,116	14,770	11,776	8,679	2,228	66,259
Interest on Operating Capital @4.00%	0	28	44	44	46	48	50	54	74	106	159	211	253	284	293	1,695
TOTAL OPERATING COSTS/ACRE	129	8,389	4,836	53	484	637	639	1,451	5,988	9,667	16,202	15,690	12,706	9,612	3,155	89,639

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. CONTINUED
CENTRAL COAST REGION – 2021

	AUG 20	SEP 20	OCT 20	NOV 20	DEC 20	JAN 21	FEB 21	MAR 21	APR 21	MAY 21	JUN 21	JUL 21	AUG 21	SEP 21	OCT 21	Total
CASH OVERHEAD																
Food Safety																100
Land Rent	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	2,700
Liability Insurance													38			38
Office Expense	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	750
Ranch Supervisor	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	1,500
Field Sanitation	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	127
Regulatory Programs													80			80
Property Taxes							19					19				38
Property Insurance							2					2				3
Investment Repairs	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	65
TOTAL CASH OVERHEAD COSTS	380	380	380	380	380	380	401	380	380	380	380	401	499	380	380	5,402
TOTAL CASH COSTS/ACRE	510	8,769	5,216	433	864	1,018	1,040	1,832	6,368	10,048	16,582	16,-091	13,205	9,992	3,535	95,041

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 4. RANGING ANALYSIS - STRAWBERRIES
CENTRAL COAST REGION – 2021

COSTS PER ACRE AND PER TRAY AT VARYING YIELDS TO PRODUCE AND HARVEST STRAWBERRIES

	YIELD (TRAY)						
	6,000.00	7,000.00	8,000.00	9,000.00	10,000.00	11,000.00	12,000.00
OPERATING COSTS/ACRE:							
Cultural	21,685	21,685	21,685	21,685	21,685	21,685	21,685
Harvest	44,329	51,639	58,949	66,259	73,569	80,880	88,189
Interest on Operating Capital @ 4.00%	1,389	1,491	1,593	1,695	1,796	1,898	2,000
TOTAL OPERATING COSTS/ACRE	67,404	74,815	82,227	89,639	97,051	104,463	111,875
TOTAL OPERATING COSTS/TRAY	11.23	10.69	10.28	9.96	9.71	9.50	9.32
CASH OVERHEAD COSTS/ACRE	5,402	5,402	5,402	5,402	5,402	5,402	5,402
TOTAL CASH COSTS/ACRE	72,805	80,217	87,628	95,041	102,453	109,865	117,276
TOTAL CASH COSTS/TRAY	12.13	11.46	10.95	10.56	10.25	9.99	9.77
NON-CASH OVERHEAD COSTS/ACRE	573	573	573	573	573	573	573
TOTAL COSTS/ACRE	73,378	80,789	88,201	95,613	103,025	110,437	117,849
TOTAL COSTS/TRAY	12.00	12.00	11.00	11.00	10.00	10.00	10.00

Net Return per Acre above Operating Costs for Strawberry

PRICE ($/tray)	YIELD (tray/acre)						
Strawberry	6000.00	7000.00	8000.00	9000.00	10000.00	11000.00	12000.00
7.00	-25,404	-25,815	-26,227	-26,639	-27,051	-27,463	-27,875
8.00	-19,404	-18,815	-18,227	-17,639	-17,051	-16,463	-15,875
9.00	-13,404	-11,815	-10,227	-8,639	-7,051	-5,463	-3,875
10.00	-7,404	-4,815	-2,227	361	2,949	5,537	8,125
11.00	-1,404	2,185	5,773	9,361	12,949	16,537	20,125
12.00	4,596	9,185	13,773	18,361	22,949	27,537	32,125
14.00	16,596	23,185	29,773	36,361	42,949	49,537	56,125

Net Return per Acre above Cash Costs for Strawberry

PRICE ($/tray)	YIELD (tray/acre)						
Strawberry	6000.00	7000.00	8000.00	9000.00	10000.00	11000.00	12000.00
7.00	-30,805	-31,217	-31,628	-32,041	-32,453	-32,865	-33,276
8.00	-24,805	-24,217	-23,628	-23,041	-22,453	-21,865	-21,276
9.00	-18,805	-17,217	-15,628	-14,041	-12,453	-10,865	-9,276
10.00	-12,805	-10,217	-7,628	-5,041	-2,453	135	2,724
11.00	-6,805	-3,217	372	3,959	7,547	11,135	14,724
12.00	-805	3,783	8,372	12,959	17,547	22,135	26,724
14.00	11,195	17,783	24,372	30,959	37,547	44,135	50,724

Net Return per Acre above Total Costs for Strawberry

PRICE ($/tray)	YIELD (tray/acre)						
Strawberry	6000.00	7000.00	8000.00	9000.00	10000.00	11000.00	12000.00
7.00	-31,378	-31,789	-32,201	-32,613	-33,025	-33,437	-33,849
8.00	-25,378	-24,789	-24,201	-23,613	-23,025	-22,437	-21,849
9.00	-19,378	-17,789	-16,201	-14,613	-13,025	-11,437	-9,849
10.00	-13,378	-10,789	-8,201	-5,613	-3,025	-437	2,151
11.00	-7,378	-3,789	-201	3,387	6,975	10,563	14,151
12.00	-1,378	3,211	7,799	12,387	16,975	21,563	26,151
14.00	10,622	17,211	23,799	30,387	36,975	43,563	50,151

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

Table 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, and BUSINESS OVERHEAD COSTS FOR STRAWBERRIES

CENTRAL COAST REGION - 2021

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Total
21	205HP Crawler	350,000	15	68,139	29,935	185	2,091	32,211
21	42HP 4WD Tractor	35,400	15	6,892	3,028	19	211	3,258
21	Blade Rear 3 pt 6'	1,012	15	97	91	0	6	97
21	Chisel Spring 14'	9,800	15	941	884	5	54	942
21	Disc Offset 14'	21,800	10	3,855	2,479	11	128	2,619
21	Drip Mchne 1-52"R	3,500	15	336	316	2	19	337
21	FertDril 2-52"R 9'	5,000	10	884	569	3	29	601
21	Fume/Plstc 2-52"R	22,500	15	2,160	2,029	11	123	2,163
21	Lstr/Shpr 2-52"R	5,000	15	480	451	2	27	481
21	Punch Mchn 1-48"	5,000	15	480	451	2	27	481
21	Ripper-5 Shank 14'	10,800	10	1,910	1,228	6	64	1,297
21	Roller 8'	4,500	15	432	406	2	25	433
21	Sprayer 20' boom	3,630	4	1,336	707	2	25	734
21	Trailer-Pipe	2,150	20	120	165	1	11	178
21	55HP 2WD Tractor	44,725	15	8,707	3,825	24	267	4,116
21	Truck 1 & 1/2 Ton Flatbed #1	58,000	10	17,132	6,042	33	376	6,451
21	Truck 1 & 1/2 Ton Flatbed #2	58,000	10	17,132	6,042	33	376	6,451
21	Pickup Truck 1/2 T	42,000	7	15,932	5,221	26	290	5,536
	TOTAL	682,817	-	146,966	63,868	368	4,149	68,385
	60% of New Cost*	409,690	-	88,179	38,321	221	2,489	41,031

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Cash Overhead Repairs	Total
INVESTMENT								
Buildings	49,162	30	0	3,108	22	246	983	4,358
Fuel Tank: 1000 gal.	10,975	20	768	838	5	59	220	1,122
Hand Tools	4,595	15	460	414	2	25	92	533
Harvest Carts 70	1,042	5	0	239	0	5	21	266
Lateral Lines	10,000	5	0	2,294	4	50	200	2,548
Shop Tools	12,637	15	885	1,155	6	68	253	1,482
Sprinkler Pipe	65,934	20	32,967	4,156	44	495	1,319	6,013
TOTAL INVESTMENT	154,345	-	35,080	12,203	84	947	3,088	16,322

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Food Safety	50.00	acre	100.00	5,000
Land Rent	50.00	acre	2700	135,000
Liability Insurance	50.00	acre	38.28	1,914
Office Expense	50.00	acre	750.00	37,500
Ranch Supervisor	50.00	acre	1500.00	75,000
Field Sanitation	50.00	acre	126.80	6,340
Regulatory Programs	50.00	acre	80.00	4,000

UC COOPERATIVE EXTENSION
AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
Table 6. HOURLY EQUIPMENT COSTS FOR STRAWBERRIES
CENTRAL COAST REGION - 2021

Yr	Description	Strawberry Hours Used	Total Hours Used	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr.
					Insurance	Taxes	Lube & Repairs	Fuel	Total Oper.	
21	205HP Crawler	167	1066	16.85	0.10	1.18	16.33	49.37	65.70	83.83
21	42HP 4WD Tractor	482	1066	1.70	0.01	0.12	2.19	8.56	10.75	12.58
21	Blade Rear 3 pt 6'	31	100	0.55	0.00	0.03	0.13	0.00	0.13	0.72
21	Chisel Spring 14'	27	133	3.99	0.02	0.24	2.04	0.00	2.04	6.29
21	Disc Offset 14'	47	200	7.44	0.03	0.38	3.60	0.00	3.60	11.45
21	Drip Mchne 1-52"R	90	100	1.89	0.01	0.12	0.92	0.00	0.92	2.94
21	FertDril 2-52"R 9'	13	150	2.27	0.01	0.12	1.38	0.00	1.38	3.78
21	Fume/Plstc 2-52"R	90	133	9.15	0.05	0.56	2.54	0.00	2.54	12.30
21	Lstr/Shpr 2-52"R	11	133	2.03	0.01	0.12	1.01	0.00	1.01	3.17
21	Punch Mchn 1-48"	68	133	2.03	0.01	0.12	0.56	0.00	0.56	2.73
21	Ripper-5 Shank 14'	68	200	3.68	0.02	0.19	2.47	0.00	2.47	6.36
21	Roller 8'	9	133	1.83	0.01	0.11	0.51	0.00	0.51	2.46
21	Sprayer 20' boom	315	375	1.13	0.00	0.04	1.00	0.00	1.00	2.17
21	Trailer-Pipe	137	200	0.50	0.00	0.03	0.04	0.00	0.04	0.57
21	55HP 2WD Tractor	347	800	2.87	0.02	0.20	3.68	11.21	14.89	17.97
21	Truck 1 & 1/2 Ton Flatbed #1	173	200	18.13	0.10	1.13	8.29	17.88	26.16	45.52
21	Truck 1 & 1/2 Ton Flatbed #2	173	200	18.13	0.10	1.13	8.29	17.88	26.16	45.52
21	Pickup Truck 1/2 T	77	285	10.99	0.05	0.61	4.57	9.75	14.32	25.97