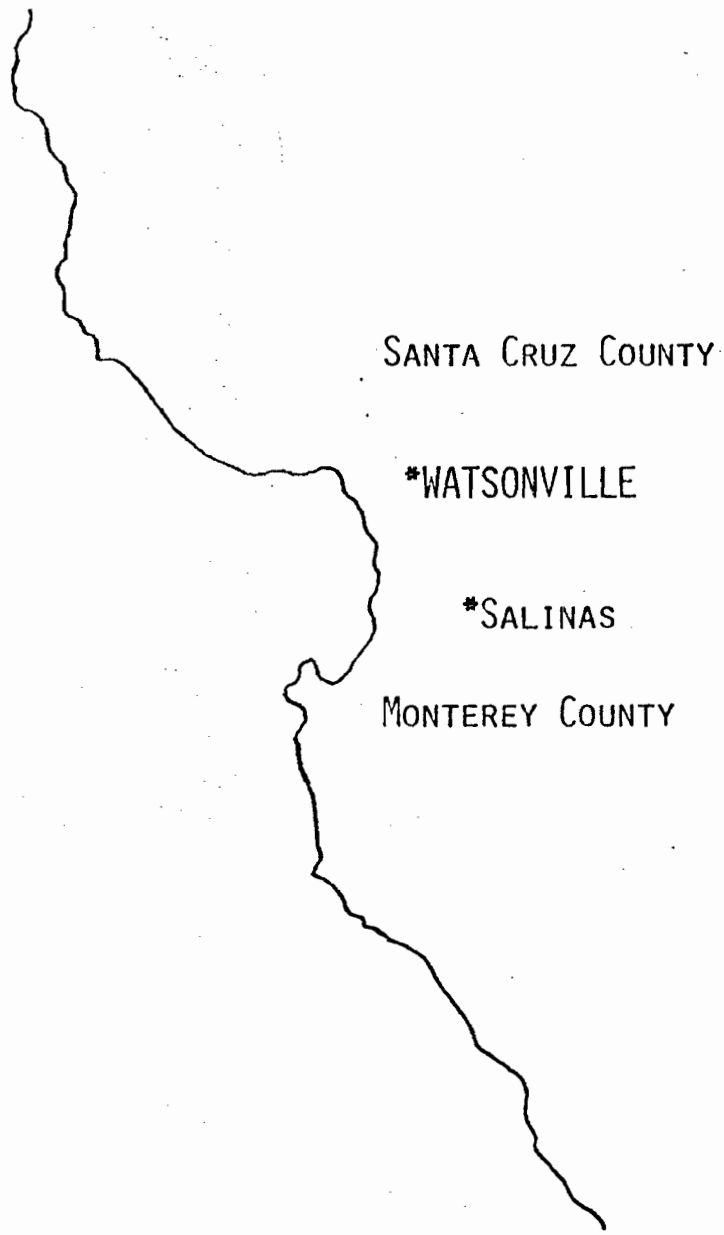


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STRAWBERRY PRODUCTION  
IN  
CENTRAL COAST OF CALIFORNIA



AGRICULTURAL EXTENSION  
UNIVERSITY OF CALIFORNIA  
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## STRAWBERRY PRODUCTION IN CENTRAL COAST OF CALIFORNIA

Total strawberry acreage in the Central Coast area has varied from 2,800 to over 3,000 acres in recent years. Favored by cool summers, per acre yield of strawberries in this area are the highest in the world. This is because low temperatures during summer help promote flower buds even under long day conditions. Successful plant breeding programs have helped develop high quality varieties for this area.

**SOIL:** Strawberries prefer a sandy loam soil. With good drainage and management high yields of berries can be obtained on loam soil. Strawberry roots are very sensitive to salt. Soils with high water table cause root rot and plant die out. Soil pH 6 to 7.3 favors best production. Soils located in low-frost pocket areas should be avoided because of late spring frost in our area.

**LAND LEVELING:** The land should be leveled to zero grade in direction of furrows to insure proper irrigation. Irrigation runs should not exceed 150 feet for efficient water use and for picking.

**SOIL FUMIGATION:** Soil fumigation is a routine practice by all strawberry growers. Higher berry yields result when the soil is treated with a mixture of methyl bromide and chloropicrin. For maximum results soils to be fumigated should be moist (not wet), in excellent tilth, free of clods, and above 50°F. Continuous plastic tarps help hold in fumigant and should not be removed for at least 48 hours. Fifteen days or longer, depending upon soil type, moisture and temperature, should elapse before transplanting to insure that no phytotoxic residues remain in the soil.

**BED PREPARATION:** Beds are listed up on 42 to 52 inch centers depending upon plant spacing. Beds 8 inches or higher are desirable as this helps drainage and keeps fruit out of the water. Both furrows and beds should be level.

**LANTING:** Beds are premoistened by sprinkling. Deep narrow grooves are then opened in the beds by using a specially constructed disk. Plants are hand planted into the grooves so the crown is at the soil surface. Planting plants too high or low results in poor vigor or die out. Grooves are closed by using press wheels.

**SPACING:** Various spacings are used by growers. Most common is a single row on a 40 inch bed with plants planted 6 to 8 inches apart. Two rows, 12 inches apart with plants 10 to 12 inches apart on 42 inch bed is used in some fields.

**PLANTING DATES:** Summer planting using properly stored plants are: Tioga - July 25 to August 15; Tufts - August 5 to August 20. Winter planting with mature, recently dug plants: Tioga or Tufts - October 15 to November 5.

**VARIETIES:** Tioga is grown on more than 60% of the strawberry acreage in California. This variety produces large yields of high quality fruit. Tufts, a recent University of California release, is becoming a popular winter planting variety for the Central Coast. Other varieties planted on limited acreage are Fresno, Cruz, Torrey and Aiko. Day length and chilling control production cycle for each variety. For this reason, they should be planted only on the recommended dates to obtain maximum production.

**IRRIGATION:** Immediately following transplanting, the fields should be sprinkled to settle dirt around plants. Summer planted fields will benefit from sprinkle irrigation for the next 6 to 8 weeks. Strawberries for top production require frequent light applications of water low in salts (below 600 ppm). During harvest season irrigate after each picking. For each acre of strawberries you will need a minimum of 12 gallons of water per minute.

**FERTILIZATION:** Summer planted fields should not be fertilized until plants are growing actively. Nitrogen needs will vary from 120 to 180 pounds per acre depending upon past crop history. Nitrogen should be applied in small amounts less than 40 pounds per acre at any one time. In winter planted fields, nitrogen should be placed in the groove below

strawberry roots and covered with 1/2-inch soil to prevent root burn. Seldom should more than 60 pounds nitrogen per acre be used at planting time. Most fields before leveling are broadcasted with 400 to 800 pounds of 0-20-20 and 1-1/2 to 2 tons of lime per acre, then disked or plowed. Nitrogen fertilizer or manure should not be applied within 3 to 6 months before planting field to summer planted strawberries because of harmful salts.

PLANT MAINTENANCE: Plants transplanted in the summer will produce runners that will need to be cut off to help promote large multiple crown growth. High moisture levels in soil will be needed during early stage of growth and hot weather.

PLASTIC MULCH: In summer planted fields plastic mulch should be laid down in mid January and February. Only dead or dying leaves need to be removed. Some larger outer leaves are removed to help reduce labor cost when applying plastic. Winter planted fields should have the plastic mulch applied as soon as the plants become established to stimulate early growth for development of flower buds in the crowns under short day length conditions. Plastic sheets should cover top and shoulder of beds. This cover will need to be anchored every 8 to 10 feet with a shovel full of dirt or the use of wire or plastic holders.

HARVEST: Strawberry harvest begins in late April and continues through most of the summer. Picking carts holding a crate with 12 baskets are pushed through the field by pickers. A crate will hold approximately 11 to 12 pounds of berries. Maturity of berries picked, will depend upon how far they are to be shipped. Processed berries are picked fully ripe with calyx and stem removed.

DISEASE: Strawberries are attacked by a variety of leaf, fruit, crown and root diseases. For control of diseases contract your local Farm Advisor for latest recommendations.

INSECTS: Mites (2 spotted and cyclamen) various worms, aphids, lygus, root weevil and snails can be serious pests of strawberries. For latest chemical control, contact your local Farm Advisor.

#### MANAGING SECOND PRODUCTION YEAR

Strawberry plants are usually kept for two full harvest seasons.

CULTIVATION: Strawberry furrows are usually cultivated in early spring to control weeds and to break up surface compacted layer. Only a very minimum amount of cultivation is needed in established plantings.

FERTILIZATION: Fertilizer placement after plastic has been applied is limited to bottom of furrows or in the irrigation water. Nitrogen so applied follows water movement and is mostly leached below root zone. Apply nitrogen before cold fall weather or in spring as plants begin to grow. Use same amounts and timing as discussed under first year plantings. Avoid nitrogen application during heavy fruiting periods.

PRUNING: Most fields are oiled in late January. This helps kill certain overwintering insects and aids leaf removal by killing most of the green leaves. In early February the plants are pruned usually by mechanical rotobeaeter or by hand. All but the very small center leaves should be removed. All leaves should be removed from the field and destroyed as a sanitary measure.

IRRIGATION: Salts may build up in some soils. These fields will need to be sprinkler irrigated in years of low rainfall as this will help reduce soil salt content. Irrigation is the same as first year berries.

PEST CONTROL: Disease and insect build up more in second year berries. This is true of mites, root weevil and slugs. Care should be taken to start the year with very low population of these pests.

PLASTIC REMOVAL: At completion of the harvest season remove plastic mulch. This material breaks down slowly in soil and causes numerous problems in preparing and managing soils.

STRAWBERRY SAMPLE COST - ESTABLISHMENT

AUGUST - DECEMBER

1976

	Hours Per Acre				Cost Per Acre
	Man Labor	60 h.p. Tractor	Truck 1-1/2 Ton	40 h.p. Tractor	
Plow, disk, subsoil and float	8	8			\$ 79.04
Survey for leveling: 5 hrs. @ \$8.00	5				40.00
Leveling & grading - contract - 6 hrs. @ \$25.00					150.00
Chisel 2 x	3	3			29.64
List beds	2	2			19.76
Sprinkle irrigate preplant - 2 x (3" water)	2.5			3	15.55
Shape beds & open plant furrows	3			3	20.40
Transplanting & close plant furrows	35			2	133.70
Furrow leveling	5			5	34.00
Apply pesticide 3 x - contract - \$6.00					18.00
Irrigate - sprinkle	19			18	108.10
Cut runners and weed 3 x	52			2	196.60
Fertilizer 3 x - contract - \$6.00/A					18.00
Replant (8% stand)	7		1		28.40
<b>Total Cultural Labor &amp; Field Power</b>	<b>141.5</b>	<b>13</b>	<b>1</b>	<b>33</b>	<b>\$ 891.19</b>
Water 17 x (21")					51.80
Fumigate - contract					610.00
Plants: 24,000 @ \$22.50/1,000					540.00
Insecticide & fumigation materials - 3 x @ \$19.00					57.00
<b>Total Material Cost</b>					<b>\$1,258.80</b>
<b>Total Labor, Field Power &amp; Materials</b>					<b>\$2,149.99</b>
General expenses: office, truck, phone etc., estimate 7% of above					150.49
County taxes					9.80
Repairs					6.10
Rent					275.00
<b>Total Cash Overhead</b>					<b>\$ 441.39</b>
<b>Total Cash Cost</b>					<b>\$2,591.38</b>
<b>Overhead Building and Equipment</b>					
<u>Investment</u>	<u>Per Acre</u>	<u>Depreciation</u>	<u>Interest 8% on 1/2 Cost</u>		
Building	100	5.00	4.00		
Sprinkler system (3 moves)	360	36.00	14.40		
Equipment, includes power	710	71.00	28.40		
Reservoir	62	6.20	2.48		
<b>Total Investment &amp; Interest</b>		<b>118.20</b>	<b>49.28</b>		<b>\$ 167.48</b>
<b>TOTAL COST TO ESTABLISH STAND</b>					<b>\$2,758.86</b>

Labor costs, including fringe benefits and bookkeeping are figured at the following hourly rates: tractor driver, \$4.70; other labor, \$3.70. Cash costs of fuel, oil, repairs for 50 h.p. diesel crawler \$5.18 per hour, 40 h.p. wheel tractor \$2.10 and 1-1/2 ton truck \$2.50.

SAMPLE COST - 1 YEAR FRUIT HARVEST

JANUARY - DECEMBER

Based on Yield 3,400 - 12 pound crates	Hours Per Acre			Cost Per Acre
	Man Labor	40 h. p. Tractor	1-1/2 Ton Truck	
Prune	50			\$ 185.00
Plastic mulch	30	3	2	125.30
Pull plants thru plastic 2nd time & weed	25			92.50
Fertilize 4 x	8	1		32.70
Irrigate 40 x	35			129.50
Weeding 3 x & runner cut 3 x	50			185.00
Pest control 7 x - contract - \$6.00				42.00
Miscellaneous work	10	2	2	48.20
<b>Total Cultural Labor &amp; Field Power</b>	<b>208</b>	<b>6</b>	<b>4</b>	<b>\$ 840.20</b>
Plastic mulch 230 lbs. @ 63¢/lb.				144.90
Fertilizer				180.00
Pest control (plictran, diazinon, benlate, thlodan, etc.)				195.00
Water 6-1/2 Ac. ft. @ \$7.38 Ac. ft.				47.97
<b>Total Material Cost To Harvest</b>				<b>\$ 567.87</b>
<b>Total Labor, Field Power &amp; Materials</b>				<b>\$1,408.07</b>
General Expense: office, truck, phone etc., estimate 7% of above				98.56
County taxes				7.10
Repairs				11.00
Rent				275.00
<b>Total Cash Overhead Costs</b>				<b>\$ 391.66</b>
<b>Total Cash Costs</b>				<b>\$1,799.79</b>
<b>Investment</b>	<b>Per Acre</b>	<b>Depreciation</b>	<b>Int. 8%</b>	
Stand Estab. 60% 1st yr. - 40% 2nd production year	2,758.76	\$1,655.25	\$110.35	
Reservoir	62.00	6.20	2.48	
Pipe - gated & main line	373.00	37.30	14.92	
tractor & truck		71.00	28.40	
<b>Total Depreciation &amp; Interest</b>		<b>1,769.75</b>	<b>156.15</b>	<b>\$1,925.90</b>
<b>Total Cultural Cost</b>				<b>\$3,725.69</b>
Harvest - pick 3,400 crates - approximate cost \$1.20/crate				4,080.00
Supervision - 54 hours				199.80
Crates, baskets & wire @ 56¢				1,904.00
<b>Total Harvest Cost</b>				<b>\$6,183.80</b>
<b>TOTAL COST (\$2.91 per crate)</b>				<b>\$9,909.49</b>

Labor costs, including fringe benefits and bookkeeping are figured at the following hourly rates: tractor driver, \$4.70; other labor, \$3.70. Cash costs of fuel, oil, repairs for 40 h. p. wheel tractor \$2.10 and 1-1/2 ton truck \$2.50.

Total Cost Per Crate At Various Yields

<u>Crates/Acre</u>	<u>Cost/Crate</u>
3,400	\$2.91
4,000	\$2.75
4,500	\$2.64
5,000	\$2.55

SAMPLE COST - 2 YEAR FRUIT HARVEST

	Hours Per Acre			Cost Per Acre
	Man Labor	40 h.p. Tractor	1-1/2 Ton Truck	
Oil - contract - airplane				\$ 7.00
Prune	5	5		34.00
Remove leaves, repair roads and furrows	18	2	2	77.80
Fertilize 2 x	3		1	13.60
Weed & runner cut 2 x	30			111.00
Irrigate 35 x	33	2		128.30
Pest control 7 x - contract - \$6.00				42.00
Remove old plastic	12		4	54.40
Disk 2 x	2	2		13.60
<b>Total Cultural Labor &amp; Field Power</b>	<b>103</b>	<b>11</b>	<b>7</b>	<b>\$ 481.70</b>
Oil				15.65
later 6-1/2 Ac. ft. @ \$7.38 Ac. ft.				48.00
Fertilizer				138.00
Pest control (plictran, diazinon, benlate, thiodan, etc.)				195.00
<b>Total Material Cost To Harvest</b>				<b>\$ 396.65</b>
<b>Total Labor, Field Power &amp; Materials</b>				<b>878.35</b>
General expense: office, truck, phone etc., estimate 7% of above				61.48
County taxes				7.10
Repairs				11.06
Rent				275.00
<b>Total Cash Overhead Costs</b>				<b>\$ 354.64</b>
<b>Total Cash Costs</b>				<b>\$1,232.99</b>
<b>Investment</b>	<b>Per Acre</b>	<b>Depreciation</b>	<b>Int. 8%</b>	
Stand Estab. 40% 2nd year	\$2,758.76	\$1,103.51	\$110.35	
Reservoir	62.00	6.20	2.48	
Pipe - gated & main line	373.00	37.30	14.92	
Tractor & truck	710.00	71.00	28.40	
<b>Total Depreciation &amp; Interest</b>		<b>\$1,218.01</b>	<b>\$156.15</b>	<b>\$1,374.16</b>
<b>Total Cultural Cost (Second Harvest Year)</b>				<b>\$2,607.15</b>
Harvest - pick 3,400 crates - approximate cost \$1.28/crate				4,352.00
Supervision - 54 hours				199.80
Crates, baskets & wire @ 56¢				1,904.00
<b>Total Harvest Cost</b>				<b>\$6,455.80</b>
<b>TOTAL COST (\$2.66 per crate)</b>				<b>\$9,062.95</b>

Labor costs, including fringe benefits and bookkeeping are figured at the following hourly rates: tractor driver \$4.70; other labor, \$3.70. Cash costs of fuel, oil, repairs for 40 h.p. wheel tractor \$2.10 and 1-1/2 ton truck \$2.50.

Total Cost Per Crate At Various Yields

<u>Crates/Acre</u>	-	<u>Cost/Crate</u>
3,400	-	\$2.66
4,000	-	\$2.55
4,500	-	\$2.47
5,000	-	\$2.41