
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2013

**SAMPLE COSTS TO ESTABLISH AND PRODUCE
FRESH MARKET
BLACKBERRIES**



Central Coast Region

Santa Cruz and Monterey Counties

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INTRODUCTION

Sample costs to produce blackberries in 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 may 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 2 through 6.

The hypothetical farm operation, production practices, overhead, and calculations are described under assumptions. For additional information or explanation of calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-3589, UC Cooperative Extension Santa Cruz County: Mark Bolda (831) 763-8025 and Laura Tourte (831) 763-8005, or the UC Cooperative Extension office in your county.

Current and archived "Sample Cost of Production" studies for many commodities can be downloaded at <http://coststudies.ucdavis.edu>, requested through the Department of Agricultural and Resource Economics, UC Davis, (530) 752-6887, or obtained from selected county UC Cooperative Extension offices.

ASSUMPTIONS

The following assumptions refer to calculations in Tables 1 to 11 beginning on page 12 and pertain to sample costs to establish and produce blackberries in the Central Coast Region - Santa Cruz and Monterey Counties. Practices described represent methods considered typical for conventional blackberry production in the region. The costs, practices, and materials will not be applicable to all situations every production year. Cultural practices, materials, and blackberry production costs vary by grower and region, and differences can be significant. The practices and inputs used in the cost study serve 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.**

Blackberries are also produced using organic methods along the Central Coast; statistics indicate that roughly 20 percent of the crop is produced and marketed as organic. Many of the same practices that are used in conventional blackberry production are also used in organic production. Differences between the two production systems are primarily, though not exclusively, found in approaches to crop fertilization and pest management.

Farm. The farm consists of 30 contiguous acres of rented land. Blackberries are planted on 15 acres. Other berries are planted on 12 acres; roads, the irrigation system and farmstead account for three acres. In this area, a few operations will rotate berry crops with vegetables and other row crops. The grower rents the land, which includes a small shop, for \$2,200 per acre per year, and owns the equipment and machinery.

Establishment Cultural Practices and Material Inputs

Tables 1, 2 and 3

Crop Cycle. Blackberries are a perennial crop that, when well-managed, can produce for up to 20 years in some locations. For this study and location, we consider costs and returns associated with the establishment of a florican bearing blackberry crop, along with five production and harvest cycles. This planting and production cycle is intended to ensure high productivity and fruit quality. On farming operations where plants remain healthy and productivity high, some growers may choose to extend the production and harvest cycle by one or more years beyond the five cycles described here.

Land Preparation. Blackberries are best produced on soil that has been well worked and is friable, with good tilth. Two soil samples per 15 acres are taken for soil analysis in the fall prior to beginning land preparation to help determine fertilization practices. For this study, land is prepared for planting by first disking three times, chiseling (ripping) 3-feet deep four times and disking three times. Six tons of well composted greenwaste (manure) is applied and incorporated into the soil at the same time as the disking operations. The field is also chiseled 1.5 feet deep one day prior to soil fumigation for good fumigant penetration. The fumigation is a combination of Telone and chloropicrin for pest management purposes. Cost for a solid, tarped fumigation is estimated at \$3,000 per acre. After fumigation, the field is disked again and rototilled, if necessary, to break up cloddy soils. Beds are then listed and shaped.

Plant Stock. Several blackberry varieties are planted in the region; no specific variety is assumed in this study. Most varieties are florican bearing, which produce over a six to eight week period; therefore, several varieties are usually planted to extend the harvest season to a four to five month period (June to October). The price of stock depends on the variety selected, a possible storage charge, and shipping costs; for this study the cost for tissue cultured plants is \$1.15 each.

Planting. Blackberries are planted by hand in December and January (they can be planted as late as May) on 8-foot rows spaced 24-inches apart, for a total plant density of 2,722 plants per acre. Labor is estimated at 24 hours per acre to plant.

Trellis. Each acre of the blackberry production operation will have 25 rows per acre based on 8-foot rows (square acre basis is 200 ft x 218 ft). A trellis system is installed in the establishment year; the total cost (materials plus labor) is estimated at \$3,000 per acre. Installation labor is estimated at 41 hours per acre. Material costs include end posts, stakes, and wire system. Because trellis materials can be used for other plantings, the material cost (estimated at roughly \$2,500) is included in the non-cash or investment overhead, and amortized appropriately.

Tunnels. In this area, a portion of the blackberry crop is produced using tunnels, which are also called hoop houses. If used, tunnels are constructed over the planted blackberries, generally covering three rows. The structures consist of a line of anchor posts, bridged by a metal frame, and covered with 6 mil thick semi-clear plastic, which is tied down with a rope. Struts on each side of the tunnel maintain tension down the length of the tunnel. Plastic is taken down and secured, and unfurled and put over the structures, as needed to ensure optimal growing conditions each year. The structures are removed with completion of the cropping cycle. For a complete discussion of tunnel systems, including cost, please refer to the 2012 “Sample Costs to Produce Fresh Market Raspberries – Primocane Bearing – Central Coast Region”. Costs associated with tunnels in blackberry production are not included in this study.

Train/Prune. Plants are trained and pruned on a limited basis during the establishment year. Training and pruning (labor) costs, including bunching and wrapping canes onto wires are estimated to be \$1,750 per acre for an approximate total of 141 hours per acre.

Fertilize. In addition to the soil samples and composted greenwaste (manure) discussed above, an 18-13-16 fertilizer is applied at 400 pounds per acre and incorporated into the beds when shaped prior to planting. In March, 17-0-0 is injected through the irrigation system four times at the rate of 20 pounds per acre per irrigation. From April 1 to July 30, a 3-18-18 fertilizer at 24 pounds per application is injected twice monthly. Labor hours for injecting the liquid fertilizer are assumed to be included in the irrigation labor.

Irrigate. A drip irrigation system is installed during the establishment year, with drip lines tied to the lower wire of the trellis system and emitters placed every 6-inches. During the winter, crop growth is generally dependent on seasonal rains; total irrigations vary depending on seasonal conditions. In this study, drip irrigations are assumed to be twice per week, which usually begins in March and ends in late September – during the establishment year and are from April to October during Production Years 1 to 5. A total of 12 acre-inches is applied during the establishment year; 24 acre-inches are applied in all subsequent years. Cost of pumped water is estimated at \$22.50 per acre-inch, for a total of \$270 per acre-foot.

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, Caneberries*. Pesticides discussed in the study are commonly used, but are not recommendations.

Weeds. Beginning in the establishment year, the cane rows are hand weeded monthly from May through October, for a total cost of \$450 per acre. Some growers report higher hand weeding costs depending on weed pressure, particularly in anchor rows and around anchor posts. Though not calculated for this study, weed mats are sometimes used to control weeds around anchor posts; if used, investment costs are initially higher but over time annual operating costs are reduced. Row middles are disked in June and August.

Diseases. Several diseases including downy mildew and powdery mildew are found in blackberries. In the Establishment Year, lime sulfur is applied once in November at the rate of 10 gallons per acre to assist with disease management.

Insects/Arthropods. No insect/arthropod management materials are applied to blackberries during the Establishment Year.

Production Cultural Practices and Material Inputs

Tables 1 and 4-10

Fertilize. In each of the five production years two soil samples for each 15 acres are analyzed to assist with fertilizer decisions. Fertilizers are either injected through the drip system and/or applied mechanically. Leaf samples for nutrient analysis are collected mid-season (May) to determine the nutritional needs of the plants. Ammonium sulfate (21-0-0) is band applied at 150 pounds per acre twice in February in equal amounts (75 lbs each application). Incorporation is expected with winter rains. In March, 17-0-0 is injected through the irrigation system four times at the rate of 20 pounds per acre per application. From April 1 to July 30, 3-18-18 at 24 pounds per acre is applied twice monthly. Labor for liquid fertilizer practices is included with labor hours for irrigation.

Irrigate. Depending on effective rainfall and available soil moisture, plants are irrigated from April through October, twice per week. Total irrigation water during the season is approximately two acre-feet. The cost of water includes pumping costs and is estimated at \$270 per acre-foot or \$22.50 per acre-inch. In this study, the lines are flushed and repaired in March prior to the first irrigation. Irrigation time (labor) is estimated at 0.05 hours per acre per irrigation which includes checking the lines at each irrigation during the season. The total amount and cost of water may differ substantially from farm to farm depending on factors such as climatic conditions, soil type, well depth, and irrigation district cost.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Caneberries*. You may also find additional information in the *UC Fresh Market Caneberry Production Manual*. For additional 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. Information and pesticide use permits are available through the local county agricultural commissioner's office. Pesticides mentioned in this study are used to calculate rates and costs. Although growers commonly use the pesticides mentioned, other pesticides may be available. Spray adjuvants are recommended for use with many pesticides, but are not accounted for in this study. Pesticide costs vary by location, brand, and volume purchased. Pesticide costs in this study are from a single dealer and shown as full retail.

Pest Control Adviser (PCA). A PCA monitors the field for crop growth and health and identifies problems associated with pests, diseases, and nutritional status. Growers may hire private consultants on a per acre basis or as part of an agreement with an agricultural chemical and fertilizer company. Costs of \$100 per acre per year for a private PCA are included in this study.

Weeds. For this study, weeds in cane rows are managed by hand weeding monthly from May through October for a total cost per acre of \$450. Some growers report higher hand weeding costs depending on weed pressure, particularly in anchor rows and around anchor posts. Though not calculated for this study, weed mats are sometimes used to control weeds around anchor posts; if used, investment costs are initially higher but over time annual operating costs are reduced. Row middles are disked in June and August.

Diseases. Several diseases are found in blackberries, including downy and powdery mildew. In Production Years 1 to 5, Aliette is applied each February or March for downy mildew control and Rally in May for powdery mildew control. Lime sulfur is applied once in November to assist with disease management. All applications are made by the grower using an air-blast sprayer. Production conditions may differ; therefore, plants should be monitored for potential diseases during the growing season.

Insects/Arthropods. In each of Production Years 1 to 5, blackberries are treated with horticultural oil (Golden Spray Oil) four times for redberry mite. Applications are made once in April, twice in May and once in June at the rate of 1.2 gallons per acre per application or 4.8 gallons total during the growing season. For control of lepidopterous pests such as leafrollers, two applications of Success are made in April. Spotted Wing Drosophila (SWD) is managed by one application of Malathion at 2 pints per acre during the first week in July, followed by one application of Mustang Max in August at 4 ounces per acre. The number of pest management applications and materials will vary depending on pest and infestation levels each year.

Pollination. Bee pollination is critical to ensure quality fruit and yield. Two hives per acre are placed in the field by a custom beekeeper in May of each production year and removed at the end of July or early August. The cost is \$30 per hive or \$60 per acre.

Harvest. Harvest season begins in the second year (Production Year 1), with yield approximated at 60% of the average mature yield received in years two through five. Harvest begins in mid-June and extends through mid-September. Blackberries are harvested by hand every few days (twice per week) at an average seasonal piece rate cost of \$4.25 per tray. Early and late in the season, when yields are lower, the piece rate cost is usually higher. Crew size and number of crews may vary through the season depending upon the volume of fruit (yield) for harvest. Harvest rate per picker ranges from one to three trays per hour, with the lower rate occurring early and late in the season. For this study, it assumed that an average picking rate for the season is 2.5 trays per hour. The fruit is picked using one-half gallon buckets; then field sorted and packed into a tray containing 12 6-oz plastic clam shells. It is common for growers to have each full tray contain 5.0 pounds of fruit to ensure market weight and acceptability. A packing and sorting wagon/trailer with a stainless steel table top and a shade structure is pulled by a small tractor to the picking area. Generally, harvest consists of one crew of 25 that hand picks the berries, a crew supervisor and a checker-loader who records the trays picked by each crewmember and who also loads the trays on the pallets on the truck. The truck holds up to two pallets with 144 trays and takes one hour round trip to deliver the fruit to the cooler. To prevent the fruit from heating up, the truck should make deliveries to the cooler with less than full loads. The grower pays \$0.85 per tray for cooling services.

Yields and Returns. This study assumes an average marketable yield of 3,500 trays per acre, which is equivalent to approximately 8.75 tons per acre. In this area, yields range from 2,000 to 5,000 five-pound trays per acre. For this study, the unit price to growers is \$16 per tray. This price falls within the range of the Watsonville-Salinas 2013 shipping point averages of the USDA's Agricultural Marketing Service reports per tray.

Post-Harvest/Pruning/Training. After harvest in each of Production Years 1 to 5, canes that produced fruit (old canes) are removed leaving new canes to produce fruit in the subsequent year. The fruited or old canes are cut by hand in October, shredded and disked into the soil. Postharvest pruning also includes any repairs that are necessary for the trellis system. At the same time as the pruning or soon thereafter, the new canes (the next year's crop) are tied, wrapped or propped up on the trellis system. These operations are estimated to cost roughly \$3,000 per acre, or 248 labor hours per acre. At the end of the sixth year, blackberry plants/canes are removed from the field, as are the trellis and drip systems; additional operations to prepare the field for the next

new crop also take place. Labor for these operations is estimated at 143 hours per acre for a total of \$1,725; a portion of this cost is shown for production years 2-5 on Table 5 under postharvest.

Cover Crop. In November of Production Years 1-5, Merced Rye is planted as a cover crop in 4-foot swaths in crop row middles for assistance with weed management and erosion control. Cover crop growth is dependent on fall and winter rains. The cover crop is mowed in March of each production year to reduce the above ground biomass.

Labor, Equipment, and Interest Costs

Pickup/ATV. It is assumed that the pickup is used for business and personal use. The grower uses the ATV for collecting the soil samples and is included in that cost. The ATV is also used to check the field, monitor the irrigation, and other miscellaneous use. The time and mileage use for the pickup and ATV operations are estimated and not taken from any specific data.

Labor. The basic hourly wage for equipment operators is \$14.25 per hour and for general labor is \$9.25 per hour. At harvest, the pickers receive piece rate pay of \$4.25 per tray. This is an average seasonal piece rate cost. At the beginning of the season due to lower yields, the piece rate is higher (\$4.50 to \$5.00) than during the peak season. Adding payroll overhead of 34% to the hourly wage gives labor rates of \$19.10 for equipment operators and \$12.39 per hour for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for berry crops (code 0179), and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers, but for this study the cost is based upon the average industry final rate as of January 1, 2012 (California Department of Insurance, March 2012, unreferenced). Labor for operations involving machinery are 20% higher than the operation time given in Tables 2, 4 and 5 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

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 \$3.84 (excludes excise taxes) and \$4.07 per gallon, respectively. The cost includes a 2% local sales tax on diesel fuel, but does not include excise taxes. Gasoline costs include a 7.5% sales tax plus federal and state excise tax. Some federal and excise tax can be refunded for on-farm use when filing your income tax. The fuel costs are based on 2012 Department of Energy (DOE) monthly data. The fuel, lube, and repair cost per acre for each operation in Table 4 and 5 is determined by multiplying the total hourly operating cost in Table 10 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 5.75% 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 is the basic rate provided by a farm lending agency as of January 2013.

Risk. The risks associated with producing and marketing blackberries are considered high. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent all risk associated with agriculture, including financial, production, market, legal, and human resource risks that ultimately affect the profitability and economic viability of blackberries. 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.

Office Expense. Office and business expenses are estimated at \$400 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, utilities, and miscellaneous expenses.

Sanitation Services. Sanitation services provide a double portable toilet and single toilet with washing equipment and cost the farm \$5,976 annually for 8 months service.

Land Rent. The grower pays \$2,200 per acre per year for the 30-acres. The land includes a small shop and storage area.

Food Safety Program. Many growers of fresh market commodities such as blackberries now incorporate and participate in food safety programs for their operations. Part of a food safety program is participation in third party (independent) audits that are done to ensure the safety of fresh products, accommodate buyer requests, and to enhance marketability of the crop. Costs will vary depending upon farm or inspection circumstances. For this study, costs for the farm are estimated at approximately \$800 per year.

Regulatory Programs. Costs for compliance with regulatory programs such as water and air quality are estimated to be \$50 per acre or \$1,350 per year. Costs for regulatory programs will vary depending on the size of the farming operation and the direction and implementation requirements of regulatory agencies.

Property Taxes. Counties charge a base property tax rate of 1% 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% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis.

Insurance. Insurance for farm investments vary depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.817% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$618 for the entire farm.

Investment Repairs. Annual repairs on investments (see Non-Cash Overhead) are calculated as 2% of new costs.

Non-Cash Overhead

Non-cash overhead, shown on an annual per acre basis, is calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase 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. The purchase price and salvage value for equipment and investments are shown in Table 9.

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 2013. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Picking/Harvest Tools. Includes approximately 160 one-half gallon picking buckets, plus miscellaneous picking equipment and supplies. Cost is estimated and not taken from specific data.

Trellis. The trellis is installed in the establishment year soon after planting. The trellis system has a long life and most materials are reusable. The trellis is removed at the end of the growing season and used on other plantings. The cost includes the materials only, whereas the labor is charged to the establishment costs.

Shade Structures (& Buildings). The shade structure is set up in first year or by early spring of the second year to provide shade for the labor and for a sorting and packing area at harvest. The cost includes the setup labor and materials. A packing and sorting wagon/trailer with a stainless steel table top and a shade structure is pulled by a small tractor to the picking area. The shade structure may also be used for future crops. A small shop and storage area is on the rented land for use by the grower and included in the land rent cost.

Shop/Hand Tools. Shop, hand, and various small field tools are included in these costs. Tools vary considerably from farm to farm and the cost does not represent any specific inventory.

Irrigation System. The irrigation system includes the filtration system and laterals that connect to the drip line. Water is pumped through the filtration station into the main lines. Reusable telescoping lateral lines are buried at the edge of the blackberry field and are connected to the main and drip lines. The cost also includes the laterals for the other berries on the farm. The drip lines are included in these costs, and will be replaced at the end of the six year period when the berry canes are removed.

Irrigation Pump & Well. This study assumes that the grower refurbished the 40 HP electric pump and well that services the farm. In general, growers in the region are responsible for the portion above the ground such as the pump, and the landowner is responsible for what is below ground such as the well running dry.

Establishment Cost. Costs to establish the blackberries 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, trellis system labor, drip tape, planting, plants, cash overhead and expenses for establishing the canes through the first production year. The Total Accumulated Net Cash Cost on Table 1 represents the establishment cost. Establishment costs are \$7,753 per acre or \$116,295 for the 15 acres. Establishment costs are amortized over the remaining four years the blackberries are assumed to be in production.

Equipment Costs. 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% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are in the Whole Farm Equipment, Investment and Business Overhead Tables. 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
Table 1. COSTS PER ACRE TO ESTABLISH & PRODUCE BLACKBERRIES: SUMMARY
 CENTRAL COAST - Santa Cruz and Monterey Counties 2013

	Year:	*Cost Per Acre		
		Establish	1st	2nd
	5- Pound Trays Per Acre:		2,100	3,500
Planting Costs:				
Land Preparation/Planting Costs		7,806		
TOTAL PLANTING COSTS		7,806		
Cultural Costs:				
Cultural Costs		2,873	2,186	2,197
TOTAL CULTURAL COSTS		2,873	2,186	2,197
Harvest Costs:				
Harvest/Pack/Haul			18,454	30,757
TOTAL HARVEST COSTS			18,454	30,757
Post Harvest:				
Post Harvest Operations			3,262	3,699
TOTAL POSTHARVEST COSTS			3,262	3,699
Interest On Operating Capital @ 5.75%		493	219	382
TOTAL OPERATING COSTS/ACRE		11,172	24,122	37,036
Cash Overhead Costs:				
Rent, Insurance, Taxes, etc.		3,004	3,055	3,129
TOTAL CASH OVERHEAD COSTS		3,004	3,055	3,129
TOTAL CASH COSTS/ACRE		14,176	27,177	40,165
INCOME/ACRE FROM PRODUCTION			33,600	56,000
NET CASH COSTS/ACRE FOR THE YEAR		14,176		
PROFIT/ACRE ABOVE CASH COSTS			6,423	15,906
ACCUMULATED NET CASH COSTS/ACRE		14,176	7,753	
Non-Cash Overhead (Capital Recovery Cost):				
Equipment/Investments		787	998	3,241
TOTAL NON-CASH OVERHEAD COST/ACRE		787	998	3,241
TOTAL COST/ACRE FOR THE YEAR		14,964	28,175	43,406
INCOME/ACRE FROM PRODUCTION			33,600	56,000
TOTAL NET COST/ACRE FOR THE YEAR		14,964		
NET PROFIT/ACRE ABOVE TOTAL COST			5,425	12,594
TOTAL ACCUMULATED NET/ACRE		14,964	-9,539	3,055

* Production Year 1 represents first harvest year; yield is 60% of a mature crop.

Production Year 2 represents the second through fifth harvest years; yield is for a mature crop.

UC COOPERATIVE EXTENSION
CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 2013
Table 2. COSTS PER ACRE TO ESTABLISH BLACKBERRIES

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Plant:								
Soil Samples 2/15 acres	0.07	2	0	0	0	10	12	
Disc 6X	1.03	24	12	5	0	0	40	
Chisel 4X (Rip) 3'deep	0.52	12	6	3	0	0	21	
Chisel 1X 1.5'deep	0.13	3	1	1	0	0	5	
Fumigate (Telone, Chloropicrin)	0.00	0	0	0	0	3,000	3,000	
Fertilize: Greenwaste (Manure)	0.34	8	4	2	246	0	260	
Disc 1X	0.17	4	2	1	0	0	7	
Layout Field (2 men)	1.00	12	0	0	0	0	12	
List & Shape Beds	0.46	11	5	1	0	0	17	
Fertilize:(18-13-16)	0.34	8	4	2	220	0	234	
Plant: (Blackberries)	24.00	297	0	0	3,130	0	3,428	
Trellis: Install (Labor Only)	41.00	508	0	0	0	0	508	
Drip System (Tape & Labor)	3.50	43	0	0	220	0	263	
TOTAL PLANT COSTS	72.56	931	34	15	3,816	3,010	7,806	
Cultural:								
Prune/Train	141.00	1,747	0	0	0	0	1,747	
Irrigate	2.90	36	0	0	270	0	306	
Fertilize: Inject (17-0-0) 4X	0.00	0	0	0	17	0	17	
Fertilize: Inject (3-18-18) 8X	0.00	0	0	0	156	0	156	
Weed: Hoe Vine Rows	36.00	446	0	0	0	0	446	
Weed: Disk middles 2X	0.43	10	5	1	0	0	16	
ATV	0.38	9	1	0	0	0	10	
Pickup	2.33	53	19	8	0	0	80	
Disease: Mildew (LimeSulfur)	0.57	13	7	2	74	0	96	
TOTAL CULTURAL COSTS	183.61	2,314	31	11	516	0	2,873	
Interest on Operating Capital @ 5.75%							493	
TOTAL OPERATING COSTS/ACRE	256.16	3,245	66	27	4,332	3,010	11,172	
CASH OVERHEAD:								
Land Rent							2,200	
Office Expense							400	
Liability Insurance							23	
Regulatory Programs							50	
Sanitation Fee							221	
Property Taxes							31	
Property Insurance							25	
Investment Repairs							54	
TOTAL CASH OVERHEAD							3,004	
TOTAL CASH COSTS/ACRE							14,176	
NON-CASH OVERHEAD:								
		Per producing Acre		Annual Cost				
				Capital Recovery				
Irrigation Sys		1,200		83			83	
Pump and Well		1,481		103			103	
Shop/Hand Tools		467		42			42	
Trellis		2,586		505			505	
Equipment		600		54			54	
TOTAL NON-CASH OVERHEAD		6,334		787			787	
TOTAL COSTS/ACRE							14,964	

UC COOPERATIVE EXTENSION
 CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 2013
Table 3. MATERIAL COSTS PER ACRE TO ESTABLISH BLACKBERRIES

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Costs
OPERATING COSTS					
Fungicide:					74
Lime Sulfur	10.00	gal	7.38	74	
Fertilizer:					638
Greenwaste (Manure)	6.00	ton	41.00	246	
18-13-16	400.00	lb	0.55	220	
17-0-0 (CAN 17)	80.00	lb	0.21	17	
3-18-18	192.00	lb	0.81	156	
Water:					490
Drip Tape	5,500.00	foot	0.04	220	
Water-Pumped	12.00	acin	22.50	270	
Custom:					3,010
Soil Analysis	0.13	each	75.00	10	
Fumigate/Telone, Chloropicrin	1.00	acre	3,000.00	3,000	
Plant:					3,130
Blackberry Plants	2,722.00	each	1.15	3,130	
Labor:					3,245
Equipment Operator Labor	8.11	hrs	19.10	155	
Non-Machine Labor	249.40	hrs	12.39	3,090	
Machinery:					92
Fuel-Gas	4.96	gal	4.07	20	
Fuel-Diesel	11.83	gal	3.84	45	
Lube				10	
Machinery Repair				17	
Interest on Operating Capital (5.75%)				493	
TOTAL OPERATING COSTS/ACRE					11,172

UC COOPERATIVE EXTENSION
CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 2013
Table 4. COSTS PER ACRE TO PRODUCE BLACKBERRIES: PRODUCTION YEAR 1

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
Cultural:								
Fertilize; Soil sample 2/15ac (PCA)	0.00	0	0	0	0	10	10	
Fertilize:(21-0-0) banded 2X	0.67	15	8	5	32	0	60	
Disease:Downy Mildew (Aliette)	0.57	13	7	2	95	0	116	
Irrigate:Flush/Repair Drip Line	0.04	1	0	0	13	0	14	
Fertilize inject:(17-0-0)	0.00	0	0	0	17	0	17	
Irrigate	2.72	34	0	0	463	0	497	
Fertilize Inject (3-18-18)	0.00	0	0	0	156	0	156	
Insects: Worms (Success)	1.14	26	13	4	79	0	122	
Insect: Mites (Oil)	2.29	52	26	8	181	0	268	
Pollinate: 2 Hives (3 months)	0.00	0	0	0	0	60	60	
Weed: Hand	36.00	446	0	0	0	0	446	
Disease: Powdery Mildew (Rally)	0.57	13	7	2	8	0	30	
Fertilize: Leaf Analysis (PCA)	0.00	0	0	0	0	10	10	
Weed: Disk Middles	0.69	16	8	2	0	0	26	
Insect: SWD (Malathion)	0.57	13	7	2	12	0	33	
Insect: SWD (Mustang)	0.57	13	7	2	10	0	32	
PCA	0.00	0	0	0	0	100	100	
ATV	0.75	17	2	1	0	0	20	
Pickup	5.00	115	41	16	0	0	172	
TOTAL CULTURAL COSTS	51.58	774	123	45	1,064	180	2,186	
Harvest:								
Harvest (+foreman&checker)	67.20	833	0	0	3,633	8,925	13,391	
Haul	14.58	334	178	79	0	0	591	
Cooling	0.00	0	0	0	1,785	0	1,785	
Sell @ 8%	0.00	0	0	0	2,688	0	2,688	
TOTAL HARVEST COSTS	81.78	1,167	178	79	8,106	8,925	18,454	
Postharvest:								
Prune: Cut Old Canes	95.00	1,177	0	0	0	0	1,177	
Prune: Shred Prunings	0.26	6	3	2	0	0	11	
Prune: Disk Shredded Prunings	0.34	8	4	1	0	0	13	
Irrigate	0.40	5	0	0	77	0	82	
Train: Train new growth	150.00	1,859	0	0	0	0	1,859	
Disease: Mildew (Lime Sulfur)	0.57	13	7	2	74	0	96	
Cover Crop; Plant	0.21	5	2	2	17	0	25	
TOTAL POSTHARVEST COSTS	246.64	3,072	16	7	167	0	3,262	
Interest on Operating Capital @ 5.75%							219	
TOTAL OPERATING COSTS/ACRE	380.00	5,013	317	130	9,338	9,105	24,122	
CASH OVERHEAD:								
Food Safety Audit							30	
Regulatory Programs							50	
Land Rent							2,200	
Liability Insurance							23	
Office Expense							400	
Sanitation Fee							221	
Property Taxes							37	
Property Insurance							31	
Investment Repairs							63	
TOTAL CASH OVERHEAD							3,055	
TOTAL CASH COSTS/ACRE							27,177	

*Growing Costs= Total Cash Costs – Harvest Costs (\$27,177 - \$18,454 = \$8,723)

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Table 4. (continued) COSTS PER ACRE TO PRODUCE BLACKBERRIES: PRODUCTION YEAR 1

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
NON-CASH OVERHEAD:	Per producing Acre			Annual Cost				
IrrigationSys		1,200		83			83	
Picking Equipment		53		12			12	
Pump and Well 27Ac		1,481		103			103	
Shop/Hand Tools		467		42			42	
Trellis		2,586		505			505	
Sorting/Packing Trailer Equipment		370		47			47	
		1,947		206			206	
TOTAL NON-CASH OVERHEAD		8,105		998			998	
TOTAL COSTS/ACRE							28,175	

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Table 7. (continued) MONTHLY CASH COSTS PER ACRE TO PRODUCE BLACKBERRIES: PRODUCTION YEARS 2-5

Beginning 01-13	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Ending 11-13	13	13	13	13	13	13	13	13	13	13	13	13	
CASH OVERHEAD													
Food Safety Audit	30												30
Regulatory Programs			50										50
Land Rent			2,200										2,200
Liability Insurance			23										23
Office Expense	33	33	33	33	33	33	33	33	33	33	33	33	400
Sanitation Fee												221	221
Property Taxes				39							39		78
Property Insurance	64												64
Investment Repairs	5	5	5	5	5	5	5	5	5	5	5	5	63
TOTAL CASH OVERHEAD COSTS	132	39	2,311	78	39	39	39	39	39	39	78	260	3,129
TOTAL CASH COSTS/ACRE	167	124	2,522	393	458	5,596	10,567	10,570	5,583	1,402	2,508	274	40,164

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Table 8. RANGING ANALYSIS: PRODUCTION YEARS 2-5

COST PER ACRE AT VARYING YIELDS TO PRODUCE BLACKBERRIES

	YIELD (tray/acre)						
	2,000	2,500	3,000	3,500	4,000	4,500	5,000
OPERATING COSTS:							
Cultural	2,197	2,197	2,197	2,197	2,197	2,197	2,197
Harvest	19,917	23,531	27,144	30,757	34,370	37,984	41,597
Post	3,699	3,699	3,699	3,699	3,699	3,699	3,699
Interest on operating capital @ 5.75%	252	296	339	382	426	469	512
TOTAL OPERATING COSTS/ACRE	26,066	29,723	33,379	37,036	40,692	44,349	48,005
Total Operating Costs/each	13.03	11.89	11.13	10.58	10.17	9.86	9.60
CASH OVERHEAD COSTS/ACRE	3,129	3,129	3,129	3,129	3,129	3,129	3,129
TOTAL CASH COSTS/ACRE	29,195	32,852	36,508	40,165	43,821	47,478	51,135
Total Cash Costs/each	14.60	13.14	12.17	11.48	10.96	10.55	10.23
NON-CASH OVERHEAD COSTS/ACRE	3,241	3,241	3,241	3,241	3,241	3,241	3,241
TOTAL COSTS/ACRE	32,436	36,093	39,749	43,406	47,062	50,719	54,375
Total Costs/each	16.22	14.44	13.25	12.40	11.77	11.27	10.88

NET RETURNS PER ACRE ABOVE OPERATING COSTS

PRICE(\$/tray) Production	YIELD(tray/acre)						
	2,000	2,500	3,000	3,500	4,000	4,500	5,000
13	-66	2,777	5,621	8,464	11,308	14,151	16,995
14	1,934	5,277	8,621	11,964	15,308	18,651	21,995
15	3,934	7,777	11,621	15,464	19,308	23,151	26,995
16	5,934	10,277	14,621	18,964	23,308	27,651	31,995
17	7,934	12,777	17,621	22,464	27,308	32,151	36,995
18	9,934	15,277	20,621	25,964	31,308	36,651	41,995
19	11,934	17,777	23,621	29,464	35,308	41,151	46,995

NET RETURNS PER ACRE ABOVE CASH COSTS

PRICE(\$/tray) Production	YIELD(tray/acre)						
	2,000	2,500	3,000	3,500	4,000	4,500	5,000
13	-3,195	-352	2,492	5,335	8,179	11,022	13,865
14	-1,195	2,148	5,492	8,835	12,179	15,522	18,865
15	805	4,648	8,492	12,335	16,179	20,022	23,865
16	2,805	7,148	11,492	15,835	20,179	24,522	28,865
17	4,805	9,648	14,492	19,335	24,179	29,022	33,865
18	6,805	12,148	17,492	22,835	28,179	33,522	38,865
19	8,805	14,648	20,492	26,335	32,179	38,022	43,865

NET RETURNS PER ACRE ABOVE TOTAL COSTS

PRICE(\$/tray) Production	YIELD(tray/acre)						
	2,000	2,500	3,000	3,500	4,000	4,500	5,000
13	-6,436	-3,593	-749	2,094	4,938	7,781	10,625
14	-4,436	-1,093	2,251	5,594	8,938	12,281	15,625
15	-2,436	1,407	5,251	9,094	12,938	16,781	20,625
16	-436	3,907	8,251	12,594	16,938	21,281	25,625
17	1,564	6,407	11,251	16,094	20,938	25,781	30,625
18	3,564	8,907	14,251	19,594	24,938	30,281	35,625
19	5,564	11,407	17,251	23,094	28,938	34,781	40,625

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Table 9. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
13	55HP 2WD Tractor	32,269	15	6,282	2,760	157	193	3,110
13	ATV 4WD	7,430	20	953	554	34	42	630
13	Disc-Harrow 5'	3,500	20	182	269	15	18	303
13	Mower-Flail 7'	9,600	20	500	739	41	51	830
13	Pickup 1/2 Ton	28,000	10	8,271	2,917	148	181	3,246
13	Spreader-Fertilize	12,000	15	1,152	1,082	54	66	1,202
13	Truck 1 Ton	36,000	5	20,000	4,620	229	280	5,129
13	Vine Sprayer 3PT 100g	6,000	20	313	462	26	32	519
TOTAL		134,799		37,654	13,403	704	862	14,969
60% of new cost*		80,879		22,592	8,042	423	517	8,982

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
Irrigation Sys	18,000	25	0	1,245	74	90	300	1,709
Picking Equipment	800	5	0	184	3	4	16	207
Pump and Well 27Ac	40,000	25	0	2,767	163	200	598	3,729
Shop/Hand Tools	12,600	15	1,260	1,134	57	69	252	1,512
Trellis	38,788	6	0	7,581	158	194	44	7,977
Sorting/Packing Trailer	10,000	10	0	1,279	41	50	200	1,570
Establishment Blackberries	116,295	4	0	32,606	457	581	0	33,663
TOTAL INVESTMENT	120,188		1,260	46,796	971	1,189	1,410	50,367

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Food Safety Audit	27	acre	29.63	800
Land Rent	30	acre	2,200.00	66,000
Liability Insurance	27	acre	22.89	618
Office Expense	27	acre	400.00	10,800
Sanitation Fee	27	acre	221.33	5,976
Regulatory Programs	27	acre	50.00	1,350

UC COOPERATIVE EXTENSION
CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 2013
Table 10. HOURLY EQUIPMENT COSTS

COSTS PER HOUR

Yr	Description	Blackberry Hours Used	Total Hours Used	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
				Capital Recovery	Insur- ance	Taxes	Lube & Repairs	Fuel		
13	55HP 2WD Tractor	142	500	3.31	0.19	0.23	2.46	10.37	12.83	16.56
13	ATV 4WD	11	100	3.32	0.21	0.25	0.93	2.71	3.64	7.42
13	Disc-Harrow 5'	21	100	1.62	0.09	0.11	0.54	0.00	0.54	2.36
13	Mower-Flail 7'	4	100	4.43	0.25	0.30	4.30	0.00	4.30	9.28
13	Pickup 1/2 Ton	75	200	8.75	0.44	0.54	3.27	8.14	11.41	21.15
13	Spreader-Fertilize	15	80	8.12	0.40	0.49	4.57	0.00	4.57	13.59
13	Truck 1 Ton	364	400	6.93	0.34	0.42	5.38	12.21	17.59	25.29
13	Vine Sprayer 3PT 100g	94	100	2.77	0.15	0.19	0.97	0.00	0.97	4.09

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CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 22013
Table 11. OPERATIONS WITH EQUIPMENT & MATERIALS: PRODUCTION YEARS 2-5

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Fertilize; Soil sample 2/15acre	Jan			Soil Analysis	0.13	each
Fertilize: (21-0-0) banded	Feb	55HP 2WD	Spreader-Fertilize	Equipment Operator Labor	0.40	hour
				21-0-0 bagged	75.00	lb
	Feb	55HP 2WD	Spreader-Fertilize	Equipment Operator Labor	0.40	hour
				21-0-0 bagged	75.00	lb
Disease: Downy Mildew (Aliette)	Mar	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour
				Aliette	5.00	lb
Irrigate: Flush/Repair Drip Line	Mar			Non-Machine Labor	0.04	hour
				Water-Flush Lines	0.25	acin
				Drip Repair Material	1.00	acre
Cover Crop: (Rye) Mow	Mar	55HP 2WD	Mower-Flail 7'	Equipment Operator Labor	0.31	hour
Irrigate	Mar			Non-Machine Labor	0.32	hour
				Water-Pumped	1.00	acin
	Apr			Non-Machine Labor	0.40	hour
				Water-Pumped	2.42	acin
	May			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	June			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	July			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	Aug			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	Sept			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	Oct			Non-Machine Labor	0.40	hour
				Water-Post Harvest	3.43	acin
Fertilize Inject: 17-0-0	Mar			17-0-0 CAN17	80.00	lb
Fertilize Inject 3-18-18	Apr			Non-Machine Labor	24.00	lb
	Apr			3/18/18	24.00	lb
	Apr			Non-Machine Labor	24.00	lb
	Apr			3/18/18	24.00	lb
	May			3/18/18	24.00	lb
	May			3/18/18	24.00	lb
	June			Non-Machine Labor	24.00	lb
	June			3/18/18	24.00	lb
	June			Non-Machine Labor	24.00	lb
	June			3/18/18	24.00	lb
	July			3/18/18	24.00	lb
	July			3/18/18	24.00	lb
	July			3/18/18	24.00	lb
Insects: Worms (Success)	Apr	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour
				Success	5.00	floz
	Apr	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour
				Success	5.00	floz

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Table 11. (continued) OPERATIONS WITH EQUIPMENT & MATERIALS: PRODUCTION YEARS 2-5

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit	
Insect: Mites (Oil)	Apr	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				GoldenPestSprayOil	1.20	gal	
	May	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				GoldenPestSprayOil	1.20	gal	
	May	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
			GoldenPestSprayOil	1.20	gal		
Pollinate: 2 Hives (3 months)	June	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				GoldenPestSprayOil	1.20	gal	
	May			Bee Hives	0.67	each	
	June			Bee Hives	0.67	each	
Weed: Hand	July			Bee Hives	0.66	each	
	May			Non-Machine Labor	6.00	hours	
	June			Non-Machine Labor	6.00	hours	
	July			Non-Machine Labor	6.00	hours	
	Aug			Non-Machine Labor	6.00	hours	
	Sept			Non-Machine Labor	6.00	hours	
	Oct			Non-Machine Labor	6.00	hours	
Disease: Powdery Mildew (Rally)	May	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				Rally 40WSP	1.50	oz	
Fertilize: Leaf Analysis	May			Leaf Analysis	0.13	each	
Weed: Disk Middles	June	55HP 2WD	Disc-Harrow 5'	Equipment Operator Labor	0.41	hour	
	Aug	55HP 2WD	Disc-Harrow 5'	Equipment Operator Labor	0.41	hour	
Insect: SWD (Malathion)	July	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				Malathion 5EC	2.00	pint	
Insect: SWD (Mustang)	Aug	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour	
				Mustang Max	4.00	floz	
PCA	Aug			PCA	1.00	acre	
ATV	Aug		ATV 4WD	Equipment Operator Labor	0.90	hour	
Pickup	Aug		Pickup 1/2 Ton	Equipment Operator Labor	6.00	hours	
Harvest (+foreman & checker)	June			Non-Machine Labor	19.04	hours	
				Piece Rate	595.00	each	
				Clamshell, 12 Unit	595.00	each	
	July				Non-Machine Labor	36.96	hours
					Clamshell, 12 Unit	1,155.00	each
					Piece Rate	1,155.00	each
	Aug				Non-Machine Labor	36.96	hours
					Piece Rate	1,155.00	each
					Clamshell, 12 Unit	1,155.00	each
	Sept				Non-Machine Labor	19.04	hours
					Piece Rate	595.00	each
					Clamshell, 12 Unit	595.00	each

UC COOPERATIVE EXTENSION
 CENTRAL COAST – SANTA CRUZ & MONTEREY COUNTIES 2013
Table 11. (continued) OPERATIONS WITH EQUIPMENT & MATERIALS: PRODUCTION YEARS 2-5

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Haul	June		Truck 1 Ton	Equipment Operator Labor	4.96	hours
	July		Truck 1 Ton	Equipment Operator Labor	9.62	hours
	Aug		Truck 1 Ton	Non-Machine Labor		
	Sept		Truck 1 Ton	Equipment Operator Labor	4.96	hours
Cooling	June			Cooling	584.00	each
	July			Cooling	1,166.00	each
	Aug			Cooling	1,166.00	each
	Sept			Cooling	584.00	each
	Sell	June			Sales 8% gross	584.00
	July			Sales 8% gross	1,166.00	each
	Aug			Sales 8% gross	1,166.00	each
	Sept			Sales 8% gross	584.00	each
Prune: Cut Old Canes	Oct			Non-Machine Labor	95.00	hours
Prune: Shred Prunings	Oct	55HP 2WD	Mower-Flail 7'	Equipment Operator Labor	0.31	hour
Prune: Disk Shredded Prunings	Oct	55HP 2WD	Disc-Harrow 5'	Equipment Operator Labor	0.41	hour
Irrigate	Mar			Non-Machine Labor	0.32	hour
				Water-Pumped	1.00	acin
	Apr			Non-Machine Labor	0.40	hour
				Water-Pumped	2.42	acin
	May			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	June			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
	July			Non-Machine Labor	0.40	hour
				Water-Pumped	3.43	acin
Aug			Non-Machine Labor	0.40	hour	
			Water-Pumped	3.43	acin	
Sept			Non-Machine Labor	0.40	hour	
			Water-Pumped	3.43	acin	
Oct			Non-Machine Labor	0.40	hour	
			Water-Post Harvest	3.43	acin	
Train: Train new growth	Nov			Non-Machine Labor	150.00	hours
Post: Field Cleanup 1X/4Yr	Nov			Non-Machine Labor	35.80	hours
Disease: Mildew (LimeSulfur)	Nov	55HP 2WD	VineSprayer3PT100g	Equipment Operator Labor	0.69	hour
				Lime Sulfur	10.00	gal
Cover Crop 4X/5 Yr	Nov	55HP 2WD	Spreader-Fertilize	Equipment Operator Labor	0.19	hour
			Disc-Harrow 5'	Merced Rye	22.50	lb