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

2019

SAMPLE COSTS TO PRODUCE AND HARVEST
ROMAINE HEARTS

CENTRAL COAST REGION
Monterey, Santa Cruz, and San Benito Counties

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Central Coast - Monterey, Santa Cruz, and San Benito Counties

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INTRODUCTION

The sample costs to produce and harvest romaine hearts in the Central Coast Region – Monterey, Santa Cruz, and San Benito 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, but will not apply to every situation. Sample costs for labor, materials, equipment, and custom services are based on current figures. A blank column titled "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 used in the study, call the Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-4651, Laura Tourte, UC Cooperative Extension Santa Cruz County (831) 763-8005, Richard Smith, UC Cooperative Extension Monterey County (831) 759-7357, or the local UC Cooperative Extension office.

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

ASSUMPTIONS

The following assumptions refer to Tables 1 through 6 and pertain to sample costs to produce and harvest romaine hearts for the Central Coast Region – Monterey, Santa Cruz, and San Benito Counties. Sample costs are given for tractor, fuel, repairs, labor, materials, and custom services and are based on current figures. *Costs per acre can vary considerably depending upon many variables including individual grower, production location and weather conditions, land rent and taxes, soil type, water costs, pest pressures, material inputs, and energy costs.* For example, lettuce produced in areas with heavy clay soils may have higher land preparation costs per acre than areas with sandy soils. Areas with sandy soils, in turn, will likely have higher water use and irrigation costs per acre than areas with heavy clay soils.

The practices and costs used in this study may not be applicable to all situations or used in each production year. Individual growers may use this study as a template and modify it to more accurately reflect their own situations. Additional leaf lettuce production information for California is available online from the University of California Division of Agriculture and Natural Resources at: http://anrcatalog.ucdavis.edu/pdf/7216.pdf. **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 of 1,500 non-contiguous acres of rented land. Roads and buffer zones comprise roughly six percent of the acreage. Romaine lettuce for the hearts market is planted on 250 acres and rotated with other lettuce and cool season vegetable crops to assist with pest management and soil fertility. Lettuce is planted continuously from late December to mid-August along the Central Coast. Monterey County has a host-free period (December 7 through 21) for management of lettuce mosaic virus (LMV), during which time lettuce may not be planted. Typically, a farm can produce up to two vegetable crops per year on each field. Costs that affect both crops are allocated accordingly. Land rents for row crops range from a low of $850 to a high of $3,800 per acre per year in the area. For this study, an annual rental rate of $2,900 per acre per year is assumed, with $1,450 allocated to the lettuce crop.

Production Cultural Practices and Material Inputs

Land Preparation. Prior to land preparation, and to help determine fertilization practices, a total of 12 soil samples per 250 acres are taken for analysis. In this study, land preparation is assumed to begin in October and November of the year preceding planting and includes discing (four times), subsoiling (twice), land and laser leveling (once each for every 2 crops). Compost is then custom applied at the rate of four tons per acre (or two tons for each lettuce crop), the acreage chiseled (a total of four times), disced (twice), and beds listed. In January, the beds are cultivated (twice) with a rolling cultivator (Lilliston), and then shaped with a power mulcher.

Plant/Stand Establishment. Romaine lettuce is direct-seeded using an 80-inch 6-row 3-bed precision air-planter. Bed preparation and precision planting is especially important when using automated technologies. This study assumes that lettuce is planted in January at the rate of 189,000 seeds per acre using a 3.0-inch in-row spacing and then thinned to a 9-inch in-row spacing approximately 14 to 21 days after planting using an automated thinner; some growers use contract or field labor to perform this operation. The use of an

automated thinner does not reduce the cost of this practice at present but instead allows growers to perform the operation in a timely manner given labor constraints.

Fertilizer/Soil Amendments. In addition to the compost applied during the tillage operations noted above, potassium sulfate is custom applied prior to planting at the rate of 150 pounds per acre. At planting, an anti-crustant (7-7-0-7) is custom applied at the rate of 30 gallons per acre, which supplies 22 pounds of nitrogen (N) to the crop. During the automated thinning process a fertilizer (14-0-0-5) is applied at the rate of 20 gallons or 30 pounds N per acre. A liquid fertilizer (20-0-0-5) is injected into the drip irrigation system once in late February and once in March for a total of 50 gallons per acre or 105 pounds N per acre. A total of 157 pounds of N per acre is applied during the season. Fertilization practices will vary from grower to grower and location to location.

Irrigation. For this study, the estimated cost of pumped water is $228 per acre-foot or $19 per acre-inch. Water costs vary considerably in the area depending upon the water district or agency, delivery, associated fees, and pumping variables and for 2019 were as high as $435 per acre-foot in the area. Approximately 4 acre-inches of water are applied through sprinklers three times during stand establishment: 3 acre-inches during the first 6 to 10 days after planting and another 1 acre-inch during the week prior to thinning. An additional 10 acre-inches are applied through the drip system using single use drip tape during the remainder of the growing season (February, March, and April) for a seasonal total of 14 acre-inches per acre. The cost for single use drip tape is estimated at $300 per acre. Labor costs include time to set up and monitor the sprinkler and drip irrigation systems for proper function. Total water use will vary depending upon factors such as irrigation method, soil type, weather, and the time of the year the crop is planted.

Pest Management. Information for specific pest management materials and the associated application rates can be found in the *UC Integrated Pest Management (IPM) Guidelines for Lettuce*. For more information on pest identification, monitoring, and pest management materials, visit the UC IPM website at: http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html. Written recommendations are required for many commercially applied pesticides and are made by licensed pest control advisers. For information and pesticide use permits, contact your local county Agricultural Commissioner's office.

Pest Control Adviser/Certified Crop Adviser (PCA/CCA). A PCA/CCA monitors the field for insects, diseases, irrigation, nutrition, and other production needs to determine the necessary management practices. The cost for a PCA in this study is $35 per acre.

Weeds. Weeds are managed using one banded (applied to 37.5 percent of the area) herbicide application immediately after planting. Material type will depend on the specific weed populations and time of year planted. The crop is cultivated (once) at the time of thinning, which is performing using an automated thinner. A second cultivation occurs roughly two weeks after thinning. The beds are hand weeded and doubles are removed approximately three weeks after thinning and then weeded again prior to harvest when necessary. Costs for two hand weeding operations are included here.

Insects/Diseases. Fields are monitored for a variety of insect pests including aphids, leaf miners, and lepidopterous pests. Three to four pest management applications are typically used during the growing season. Diseases such as downy mildew (pathogen: *Bremia lactucae*) and lettuce drop (pathogen: *Sclerotinia minor*) can cause substantial damage and crop loss in romaine lettuce production. If disease control is

necessary, two to five fungicide applications are used during the season. Because of the variation in insect and disease pressures from year to year and location to location, costs for a generic pest management program are included in this study.

Harvest. Romaine hearts are hand harvested and field packed at crop maturity. The exact timing depends on the variety and time of year planted. Cool season plantings may require 100 days to mature, but as the season warms, time to maturity decreases. For this study, a harvest and field packing cost of $7.20 per carton is assumed. A carton contains 12 3-count bags (3 hearts per bag) weighing 22 pounds. Transportation costs vary depending on the distance to market and are included in the above costs. Cooling and palletizing costs an additional $1.50 per carton, which brings the total harvest cost to $9.00 per carton. In addition, a sales and marketing cost of $1.20 per carton is included in this study; this cost may vary from grower to grower.

Yield. Yield is estimated to range from 600 to 900 cartons per acre, with 750 cartons the representative yield used in this study. The 12 3-count bag (per carton) pack, weighing 22 pounds, is only one of many packs that may be used for romaine lettuce. Actual yield per acre depends upon many variables, including production location, conditions, and pack type and weight.

Returns. Price for romaine hearts is estimated to range from $9 to $21 per carton (12 3-count bags). This range reflects the Salinas-Watsonville 2016 to 2018 3-year shipping point weekly averages of the USDA Agricultural Marketing Service. Table 4 provides more information on yield and price ranges, including sample net returns above indicated costs.

Growing Costs. Some growers along the Central Coast of California prefer to focus on growing costs and therefore separate total harvest costs from total cash costs, and 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, Interest, and Equipment

Labor. The labor rates used in this study are $24.70 per hour for machine operators, $20.80 for irrigators and $18.70 for general labor, which includes overhead of 41 percent. The basic hourly wages are $17.50 for machine operators, $14.75 for irrigators and $13.25 for general labor. The overhead includes the employers' share of federal and California state payroll taxes, workers' compensation insurance for truck crops (code 0172), 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 rate as of January 1, 2019. Labor for operations involving machinery are 20% 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.

California Minimum Wage and Overtime Rules. In 2016, the California State Government passed new legislation concerning overtime and minimum wage rates that may affect farm labor costs. The California minimum wage rate for 2019 is $12.00 per hour for companies with more than 25 employees and will rise each year by $1.00 per hour until it reaches $15.00 per hour in 2022. Businesses with 25 or fewer employees are given an additional year to comply with the changes; minimum wage rate is $11.00 per hour for 2019 and increases by $1.00 per hour each year until it reaches $15.00 per hour in 2023.

Recent California regulations also decrease the overtime threshold—the number of hours required to be worked before overtime benefits are received—for agricultural workers. Beginning January 2019, for businesses with more than 25 employees, the regulations decreased the overtime threshold for agricultural workers from 60 hours per week and 10 hours per day to 55 hours per week and 9.5 hours per day. In each year following the overtime threshold for agricultural workers decreases by 5.0 hours per week and 0.5 hours per day until it reaches 40 hours per week and 8.0 hours per day in 2022. Businesses with 25 or fewer employees are given an additional three years to comply with the regulation's changes. In January 1, 2019 (2022 for employers with 25 or fewer employees) employees will also be entitled to overtime for 8 hours on the seventh consecutive day of work.

These regulations may result in increased costs for on-farm labor, whether as direct hires, as farm labor contractor employees, or as a component of custom services. For more information and to view the California minimum wage and overtime phase-in schedules visit http://aic.ucdavis.edu/.

Federal H-2A Program. Growers may also choose to use H-2A guestworker visa program to employ workers. Rates of pay are determined by the highest applicable wage rates that are in effect at the time work is performed: the adverse effect wage rate (AEWR), the applicable prevailing wage, the agreed-upon collective bargaining rate, or the Federal or State statutory minimum wage (US Department of Labor). Growers also need to comply with other requirements associated with the H-2A program, including those for housing, meals, transportation. Use of this program 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 6.25 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 in this study is considered a typical lending rate by a farm lending agency as of January 2019 .

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 ASAE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of red dye diesel and gasoline are $3.73 (excludes excise taxes) and $3.46 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 excise 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.

Pickup Truck. This study includes a cost for use of a pickup truck for business purposes.

Risk. The risks associated with producing and marketing a romaine leaf lettuce crop are considered high. While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent the production, financial, market, legal, and human resource risks that ultimately affect the profitability and economic viability of fresh market vegetable production. Crop insurance is one

tool that growers may use to protect against loss. The market for fresh vegetables is volatile for both price and quantity. A market channel should be determined before any lettuce production begins.

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. In most cases costs are apportioned based on the number of crops produced per acre per year.

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 and other potential farm related liabilities and costs $2 per acre for each crop.

Office Expense. Annual office and business expenses are estimated at $750 per acre. Because two crops are produced per acre each year, half of that cost, or $375 is assumed for the lettuce crop studied here. Costs include, but are not limited to, a variety of administration and office expenses, a ranch supervisor, telephones, supplies, utilities, bookkeeping, and accounting. Some growers have one or more additional sub-foremen for various aspects of their operations. Costs for additional foremen are not included here.

Land Rent. Land rents in Monterey, Santa Cruz, and San Benito Counties range from $850 to $3,800 per acre per year. In this study land rent is assumed to be $2,900 per acre per year or $1,450 for the lettuce crop. However, rents vary substantially in the area. Land rent includes developed wells and irrigation system. In general, growers in the region 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.

Food Safety and Regulatory Programs. To ensure the safety of fresh products, accommodate buyer requests, and comply with regulatory programs such as those for water and air quality, growers now have in-house departments and/or staff specially dedicated to supervision and management of these programs. Part of a food safety program is participation in third party (independent) audits. Costs associated with food safety programs vary depending upon the farm and inspection circumstances and are estimated at $100 per acre per year or $50 per acre per crop in this study. In addition, a cost of $120 per acre per year or $60 per acre per crop is included for management and compliance with regulatory programs.

Management Salaries. Wages for managers are not included as a cash cost. Any returns above total costs are considered a return to management.

Field Sanitation. Sanitation services for the farm provide portable toilets and washbasins to the farm. The cost includes two double toilets with washbasins, delivery and pickup, and 12 months of weekly servicing.

Costs also include soap or other suitable cleansing agent, and single-use towels. Separate potable water and single-use drinking cups are also supplied. Growers using contract labor may not have a separate sanitation cost.

Investment Repair. Repair costs are the annual maintenance costs for investments in non-cash overhead. For this study, annual repairs are calculated as 2 percent of the new cost, with the exception of drip system repairs, which are 5 percent of the total cost and include materials & labor.

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 calculation for the annual capital recovery costs is: ((Purchase Price – Salvage Value) X Capital Recovery Factor) + (Salvage Value X Interest Rate).

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements), the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural 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 equal to the purchase price 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. An interest rate of 6.75 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions, but is the basic suggested rate by a farm lending agency as of January 2019.

Building. The metal building or buildings are on a cement slab and comprise 2,400 square feet.

Tools. This includes shop and field tools used on the farm. The value is estimated and does not represent any specific inventory.

Fuel Tanks. Two 1,000-gallon fuel tanks, one for diesel and one for gasoline, are on metal stands. The tanks are set up in a cement containment pad that meets federal, state, and county regulations.

Irrigation System/Trailers. The irrigation system is maintained by the landowner and assumed to be included in the land rental cost. The grower invests in and owns sprinkler pipe and drip system materials sufficient for irrigation needs. The grower also owns trailers and 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 fields 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 120 feet in a 500-foot well and the grower pays the pumping cost.

Equipment. Farm equipment is purchased when it is both new and used. This study shows the current purchase price for new equipment, which is then adjusted to 70 percent to reflect a mix of new and used equipment. Seventy percent indicates a relatively high percentage of new equipment because of machinery upgrades that are currently necessary to meet air quality requirements. 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 ISSUES CENTER

TABLE 1. COSTS PER ACRE TO PRODUCE AND HARVEST ROMAINE HEARTS

Central Coast-2019

Operation	Equipment 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 (12 per 250 Ac)	0.00	0	0	0	0	8	8	
Disc & Roll 6X	1.73	51	84	56	0	0	191	
Sub-Soil 2X	1.02	30	50	33	0	0	114	
Land Plane (1X per 2 Crops)	0.18	5	9	5	0	0	19	
Laser Level (1X per 2 crops)	0.00	0	0	0	0	20	20	
Compost-Spread (1X per 2 Crops)	0.00	0	0	0	110	20	130	
Chisel 4X	1.42	42	69	45	0	0	157	
List Beds 3-Row	0.00	0	0	0	0	23	23	
Cultivate-Lilliston 2X	0.40	12	11	8	0	0	31	
Power Mulch/Shape Beds	0.48	14	17	7	0	0	38	
Fertilizer (Potassium Sulfate)	0.00	0	0	0	137	20	157	
Plant/Fertilize (7-0-0-7)	0.57	17	21	18	426	0	482	
Herbicide Application	0.00	0	0	0	80	20	100	
Sprinkler Setup/Irrigate 4X	0.00	104	0	0	76	0	180	
Cultivate-Sled	0.32	9	9	5	0	0	24	
Thin Stand-Automated/Fertilize	0.00	0	0	0	50	150	200	
Disease/Insect Management	0.00	0	0	0	759	120	879	
Cultivate/Break Bottoms	0.22	6	6	4	0	0	16	
Hand Weed (2X)/Remove Doubles 1X	16.0	299	0	0	0	0	299	
Drip Setup/Irrigate	1.32	205	47	24	490	0	766	
Fertigate (20-0-0-5) 2X	0.00	0	0	0	87	0	87	
PCA/CCA Fee	0.00	0	0	0	0	35	35	
Pickup-3/4 Ton Farm Use	1.00	30	7	5	0	0	42	
TOTAL CULTURAL COSTS	24.7	826	331	210	2,214	415	3,997	
Harvest:								
Harvest/Field Pack	0.00	0	0	0	0	5,400	5,400	
Cool/Palletize	0.00	0	0	0	0	1,125	1,125	
Market/Sales Fee	0.00	0	0	0	0	900	900	
TOTAL HARVEST COSTS	0.00	0	0	0	0	7,425	7,425	
Interest on Operating Capital at 6.25%							112	
TOTAL OPERATING COSTS/ACRE	24.7	826	331	210	2,214	7,840	11,534	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. CONTINUED
Central Coast-2019

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:								
Land Rent							1,450	
Liability Insurance							2	
Food Safety Program							50	
Regulatory Program							60	
Office Expense							375	
Field Sanitation							12	
Property Taxes							10	
Property Insurance							1	
Investment Repairs							22	
TOTAL CASH OVERHEAD COSTS/ACRE							1,981	
TOTAL CASH COSTS/ACRE							13,515	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Building 2400sqft		64		6			6	
Fuel Tanks Overhead		7		1			1	
Shop Tools		13		1			1	
Sprinkler System		247		20			20	
Sprinkler Pipe		759		55			55	
Equipment		1,890		265			265	
TOTAL NON-CASH OVERHEAD COSTS		2,981		348			348	
TOTAL COSTS/ACRE							13,864	

TOTAL COSTS PER ACRE – HARVEST COSTS PER ACRE = GROWING COSTS PER ACRE

$13,864 – 7,425 = $6,239

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 2. MATERIAL AND INPUT COSTS PER ACRE TO PRODUCE AND HARVEST ROMAINE HEARTS

Central Coast-2019

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Romaine Hearts	750	Carton	15.00	11,250	
TOTAL GROSS RETURNS	750	Carton		11,250	
OPERATING COSTS					
Fertilizer:				**450**	
Compost	2.00	Ton	55.00	110	
Potasium Sulfate	150.00	Lb	0.91	137	
7-7-0-7	30.00	Gal	2.24	67	
Auto-Thin Mix	1.00	Acre	50.00	50	
20-0-0-5	50.00	Gal	1.73	87	
Custom:				**7,840**	
Soil Analysis	0.05	Acre	150.00	8	
Laser Level	0.12	Acre	165.00	20	
Haul/Spread Compost	1.00	Acre	20.00	20	
List beds 3-Row 80"	1.00	Acre	23.00	23	
Ground Application	3.00	Acre	20.00	60	
Plant Thinning-Automated	1.00	Acre	150.00	150	
Air Application 20 gal/Ac	4.00	Acre	25.00	100	
Harvest-Field Pack	750.00	Carton	7.20	5,400	
Harvest-Cool/Palletizing	750.00	Carton	1.50	1,125	
Marketing & Sales Fee	750.00	Carton	1.20	900	
PCA/CCA	1.00	Acre	35.00	35	
Seed:				**359**	
Seed-Romaine Hearts	189.00	Thou	1.90	359	
Herbicide:				**80**	
Herbicide Material Cost/Ac*				80	
Insecticide:				**374**	
Insecticide Material Cost/Ac*				374	
Fungicide:				**385**	
Fungicide Material Cost/Ac*				385	
Irrigation:				**566**	
Water-Pumped	14.00	AcIn	19.00	266	
Single Use Drip Tape	1.00	Acre	300.00	300	
Labor				**826**	
Equipment Operator Labor	10.40	hrs	24.70	257	
Irrigation Labor	13.00	hrs	20.80	270	
Non-Machine Labor	16.00	hrs	18.70	299	
Machinery				**541**	
Fuel-Gas	2.00	gal	3.46	7	
Fuel-Diesel	86.89	gal	3.73	324	
Lube				50	
Machinery Repair				160	
Interest on Operating Capital @ 6.25%				112	
TOTAL OPERATING COSTS/ACRE				11,534	
TOTAL OPERATING COSTS/CARTON				15	
NET RETURNS ABOVE OPERATING COSTS				-284	

*Pest management programs vary depending on annual production conditions and pest pressure.

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 3. MONTHLY CASH COSTS PER ACRE TO PRODUCE AND HARVEST ROMAINE HEARTS

Central Coast-2019

	OCT 18	NOV 18	DEC 18	JAN 19	FEB 19	MAR 19	APR 19	Total
Cultural:								
Soil Samples (12 per 250 Ac)	8							8
Disc & Roll 6X	128	64						191
Sub-Soil 2X	114							114
Land Plane (1X per 2 Crops)	19							19
Laser Level (1X per 2 crops)	20							20
Compost-Spread (1X per 2 Crops)		130						130
Chisel 4X		157						157
List Beds 3-Row		23						23
Cultivate-Lilliston 2X				31				31
Power Mulch/Shape Beds				38				38
Fertilizer (Potassium Sulfate)				157				157
Plant/Fertilize (7-0-0-7)				482				482
Herbicide Application				100				100
Sprinkler Setup/Irrigate 4X				119	61			180
Cultivate-Sled					24			24
Thin Stand-Automated/Fertilize					200			200
Disease/Insect Management					450	215	215	879
Cultivate/Break Bottoms					16			16
Hand Weed (2X)/Remove Doubles (1X)					178		122	299
Drip Setup/Irrigate					441	138	187	766
Fertigate (20-0-0-5) 2X					43	43		87
PCA/CCA Fee	5	5	5	5	5	5	5	35
Pickup-3/4 Ton Farm Use	6	6	6	6	6	6	6	42
TOTAL CULTURAL COSTS	299	384	11	938	1,423	407	534	3,997
Harvest:								
Harvest/Field Pack							5,400	5,400
Cool/Palletize							1,125	1,125
Market/Sales Fee							900	900
TOTAL HARVEST COSTS	0	0	0	0	0	0	7,425	7,425
Interest on Operating Capital @ 6.25%	2	4	4	9	17	19	59	112
TOTAL OPERATING COSTS/ACRE	300	388	15	947	1,439	426	8,019	11,534
CASH OVERHEAD								
Land Rent							1,450	1,450
Liability Insurance							2	2
Food Safety Program							50	50
Regulatory Program							60	60
Office Expense	54	54	54	54	54	54	54	375
Field Sanitation	2	2	2	2	2	2	2	12
Property Taxes					5			10
Property Insurance					0			1
Investment Repairs	3	3	3	3	3	3	3	22
TOTAL CASH OVERHEAD COSTS	58	58	58	58	64	58	1,620	1,981
TOTAL CASH COSTS/ACRE	359	446	73	1,005	1,503	484	9,639	13,515

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 4. RANGING ANALYSIS - ROMAINE HEARTS

Central Coast-2019

COSTS PER ACRE AND PER CARTON AT VARYING YIELDS TO PRODUCE AND HARVEST ROMAINE HEARTS

	YIELD (CARTON)						
	600.00	650.00	700.00	750.00	800.00	850.00	900.00
OPERATING COSTS/ACRE:							
Cultural	3,997	3,997	3,997	3,997	3,997	3,997	3,997
Harvest	5,940	6,435	6,930	7,425	7,920	8,415	8,910
Interest on Operating Capital @ 6.25%	104	107	109	112	115	117	120
TOTAL OPERATING COSTS/ACRE	10,041	10,539	11,036	11,534	12,031	12,529	13,027
TOTAL OPERATING COSTS/CARTON	16.74	16.21	15.77	15.38	15.04	14.74	14.47
CASH OVERHEAD COSTS/ACRE	1,981	1,981	1,981	1,981	1,981	1,981	1,981
TOTAL CASH COSTS/ACRE	12,023	12,520	13,018	13,515	14,013	14,511	15,008
TOTAL CASH COSTS/CARTON	20.04	19.26	18.60	18.02	17.52	17.07	16.68
NON-CASH OVERHEAD COSTS/ACRE	348	348	348	348	348	348	348
TOTAL COSTS/ACRE	12,371	12,869	13,366	13,864	14,361	14,859	15,357
TOTAL COSTS/CARTON	21.00	20.00	19.00	18.00	18.00	17.00	17.00

Net Return per Acre above Operating Costs for Romaine Hearts

PRICE ($/carton)	YIELD (Carton/acre)						
Romaine Hearts	600.00	650.00	700.00	750.00	800.00	850.00	900.00
9.00	-4,641	-4,689	-4,736	-4,784	-4,831	-4,879	-4,927
11.00	-3,441	-3,389	-3,336	-3,284	-3,231	-3,179	-3,127
13.00	-2,241	-2,089	-1,936	-1,784	-1,631	-1,479	-1,327
15.00	-1,041	-789	-536	-284	-31	221	473
17.00	159	511	864	1,216	1,569	1,921	2,273
19.00	1,359	1,811	2,264	2,716	3,169	3,621	4,073
21.00	2,559	3,111	3,664	4,216	4,769	5,321	5,873

Net Return per Acre above Cash Costs for Romaine Hearts

PRICE ($/carton)	YIELD (Carton/acre)						
Romaine Hearts	600.00	650.00	700.00	750.00	800.00	850.00	900.00
9.00	-6,623	-6,670	-6,718	-6,765	-6,813	-6,861	-6,908
11.00	-5,423	-5,370	-5,318	-5,265	-5,213	-5,161	-5,108
13.00	-4,223	-4,070	-3,918	-3,765	-3,613	-3,461	-3,308
15.00	-3,023	-2,770	-2,518	-2,265	-2,013	-1,761	-1,508
17.00	-1,823	-1,470	-1,118	-765	-413	-61	292
19.00	-623	-170	282	735	1,187	1,639	2,092
21.00	577	1,130	1,682	2,235	2,787	3,339	3,892

Net Return per Acre above Total Costs for Romaine Hearts

PRICE ($/carton)	YIELD (Carton/acre)						
Romaine Hearts	600.00	650.00	700.00	750.00	800.00	850.00	900.00
9.00	-6,971	-7,019	-7,066	-7,114	-7,161	-7,209	-7,257
11.00	-5,771	-5,719	-5,666	-5,614	-5,561	-5,509	-5,457
13.00	-4,571	-4,419	-4,266	-4,114	-3,961	-3,809	-3,657
15.00	-3,371	-3,119	-2,866	-2,614	-2,361	-2,109	-1,857
17.00	-2,171	-1,819	-1,466	-1,114	-761	-409	-57
19.00	-971	-519	-66	386	839	1,291	1,743
21.00	229	781	1,334	1,886	2,439	2,991	3,543

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ROMAINE HEARTS

Central Coast-2019

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Total
19	205HP Crawler	350,000	10	103,384	41,686	201	2,267	44,154
19	Disc - Offset 25'	48,769	4	17,950	10,259	30	334	10,622
19	Subsoiler - 16'	42,454	5	13,829	7,868	25	281	8,175
19	Triplane - 16'	38,000	10	6,720	4,856	20	224	5,099
19	Chisel - Heavy 26'	51,218	5	16,684	9,492	30	340	9,862
19	Ring Roller-Heavy 18"	15,552	4	5,724	3,271	9	106	3,387
19	Lilliston-Rolling 3-Row	18,000	10	3,183	2,300	9	106	2,415
19	Bed Shaper 3-Row	44,412	15	4,548	4,615	22	245	4,881
19	150HP4WD Tractor	225,000	10	66,461	26,798	129	1,457	28,385
19	Row crop planter	54,887	10	9,706	7,014	29	323	7,365
19	Cultivator 3-Row	9,500	10	1,680	1,214	5	56	1,275
19	Fertilizer Bar 20"	13,000	15	1,331	1,351	6	72	1,429
19	Drip Tape Laying Machine 3-Row	16,117	10	2,850	2,060	8	95	2,163
19	Pickup 3/4 Ton	50,000	5	22,409	8,197	32	362	8,591
19	#1 Saddle Tanks 300gal	1,660	6	479	278	1	11	290
19	#1 Spray Boom 20'	2,900	6	836	486	2	19	506
19	Ring-roller 25'	29,000	4	10,674	6,100	18	198	6,316
19	Drip Tape Extraction Sled	30,000	5	9,772	5,560	18	199	5,777
19	120HP2WD Tractor	136,967	10	40,458	16,313	79	887	17,279
	TOTAL	1,177,436	-	338,679	159,720	672	7,581	167,972
	70% of New Cost*	824,205	-	237,075	111,804	470	5,306	117,580

*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								
Building 2400sqft	96,000	20	0	8,886	43	480	1,920	11,329
Fuel Tanks Overhead	10,975	20	0	1,016	5	55	220	1,296
Shop Tools	20,000	20	2,000	1,801	10	110	400	2,321
Sprinkler System	370,495	20	185,247	29,652	246	2,779	7,410	40,087
Sprinkler Pipe	1,139,000	30	569,500	83,188	757	8,543	22,780	115,267
TOTAL INVESTMENT	1,636,470	-	756,747	124,544	1,060	11,966	32,730	170,300

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent	250	Acre	1,200	362,500
Liability Insurance	250	Acre	1.75	438
Food Safety Program	250	Acre	50.00	12,500
Regulatory Program	250	Acre	60.00	15,000
Office Expense	250	Acre	375.00	93,750
Field Sanitation	250	Acre	12.00	3,000

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER

TABLE 6. HOURLY EQUIPMENT COSTS FOR ROMAINE HEARTS

Central Coast-2019

Yr.	Description	Romaine Hearts Hours Used	Total Hours Used	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Operating Lube& Repairs	Operating Fuel	Operating Total Oper.	Total Costs/Hr.
19	205HP Crawler	1198	1600	18.24	0.09	0.99	17.16	44.38	61.54	80.85
19	Disc - Offset 25'	431	500	14.36	0.04	0.47	9.67	0.00	9.67	24.54
19	Subsoiler - 16'	256	400	13.77	0.04	0.49	11.46	0.00	11.46	25.76
19	Triplane - 16'	46	300	11.33	0.05	0.52	6.73	0.00	6.73	18.63
19	Chisel - Heavy 26'	355	400	16.61	0.05	0.59	12.90	0.00	12.90	30.16
19	Ring Roller-Heavy 18"	256	500	4.58	0.01	0.15	2.11	0.00	2.11	6.85
19	Lilliston-Rolling 3-Row	100	200	8.05	0.03	0.37	4.24	0.00	4.24	12.70
19	Bed Shaper 3-Row	121	400	8.08	0.04	0.43	1.17	0.00	1.17	9.71
19	150HP4WD Tractor	653	1600	11.72	0.06	0.64	11.62	32.47	44.09	56.51
19	Row crop planter	144	150	32.73	0.13	1.51	17.02	0.00	17.02	51.39
19	Cultivator 3-Row	133	200	4.25	0.02	0.20	2.24	0.00	2.24	6.70
19	Fertilizer Bar 20"	144	400	2.36	0.01	0.13	0.34	0.00	0.34	2.84
19	Drip Tape Laying Machine 3-Row	188	200	7.21	0.03	0.33	3.80	0.00	3.80	11.37
19	Pickup 3/4 Ton	250	400	14.34	0.06	0.63	5.36	6.92	12.28	27.31
19	#1 Saddle Tanks 300gal	144	250	0.78	0.00	0.03	0.52	0.00	0.52	1.34
19	#1 Spray Boom 20'	144	250	1.36	0.00	0.05	0.92	0.00	0.92	2.33
19	Ring-roller 25'	431	500	8.54	0.02	0.28	3.94	0.00	3.94	12.78
19	Drip Tape Extraction Sled	142	400	9.73	0.03	0.35	7.29	0.00	7.29	17.40
19	120HP2WD Tractor	257	1600	7.14	0.03	0.39	13.49	25.98	39.46	47.02