
**University of California Cooperative Extension
Agriculture and Natural Resources – Agricultural Issues Center**

2015

**SAMPLE COSTS TO PRODUCE AND HARVEST
ROMAINE HEARTS**



CENTRAL COAST REGION

Monterey, Santa Cruz, and San Benito Counties

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURE AND NATURAL RESOURCES – AGRICULTURAL ISSUES CENTER

SAMPLE COSTS TO PRODUCE AND HARVEST ROMAINE HEARTS - 2015

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 <http://coststudies.ucdavis.edu>. Archived studies are also available on the website.

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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 \$350 to a high of \$3,000 per acre per year in the area. For this study, an annual rental rate of \$2,400 per acre per year is assumed, with \$1,200 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. This study assumes that lettuce is planted in January at the rate of 189,000 seeds per acre using a 2.5-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 \$216 per acre-foot or \$18 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 2015 were as high as \$435 per acre-foot in the area. In 2016, costs may be even higher because of drought conditions and water availability. 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 during the remainder of the growing season (February, March, and April) for a seasonal total of 14 acre-inches 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 \$30 per acre.

Weeds. Prefar herbicide is banded (applied to 37.5 percent of the area) immediately after planting. The crop is cultivated (once) at the time of thinning. A second cultivation occurs roughly two weeks after thinning. The beds are hand weeded and doubles are removed approximately three weeks after thinning.

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 three 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 \$6.00 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 \$1.00 per carton, which brings the total harvest cost to \$7.00 per carton. In addition, a sales and marketing cost of \$0.75 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 \$8.60 to \$21.60 per carton (12 3-count bags). This range reflects the Salinas-Watsonville 2012 to 2015 4-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 \$21.70 per hour for machine operators and \$16.10 for general labor, which includes overhead of 40 percent. The basic hourly wages are \$15.50 for machine operators and \$11.50 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, 2015. 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.

Because of labor constraints and on-farm operational needs, some growers may employ workers using the H-2A visa program or use contract labor for some operations. When using either one of these two approaches, base rates, overhead, and compliance with housing, meals, transportation, and other requirements will vary, and may result in labor costs that are higher than those used in this study.

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 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 2015.

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 Engineers (ASAE). 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 \$2.70 (excludes excise taxes) and \$3.25 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 0.843 percent of the average value of the assets over their useful life. Liability insurance covers accidents and other potential farm related liabilities and costs \$20 per acre for each crop.

Office Expense. Annual office and business expenses are estimated at \$700 per acre. Because two crops are produced per acre each year, half of that cost, or \$350 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 \$350 to \$3,000 per acre per year. In this study land rent is assumed to be \$2,400 per acre per year or \$1,200 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 \$80 per acre per year or \$40 per acre per crop in this study. In addition, a cost of \$80 per acre per year or \$40 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: $((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate})$.

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 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 4.75 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 2015.

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-2015

Operation	Operation		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
Cultural:								
Soil Samples (12 per 250 Ac)	0.00	0	0	0	0	8	8	
Disc & Roll 6X	1.73	45	61	53	0	0	159	
Subsoil 2X	1.02	27	36	32	0	0	95	
Land Plane (1X per 2 Crops)	0.18	5	6	4	0	0	16	
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	37	50	43	0	0	130	
List Beds 3-Row	0.00	0	0	0	0	23	23	
Cultivate-Lilliston 2X	0.40	10	8	7	0	0	26	
Power Mulch & Shape Beds	0.48	13	12	6	0	0	31	
Fertilizer (Potassium Sulfate)	0.00	0	0	0	129	15	144	
Plant/Fertilize (7-7-0-7)	0.57	15	15	18	325	0	373	
Herbicide Application	0.00	0	0	0	43	0	43	
Sprinkler Setup/Irrigate 4X	0.00	81	0	0	72	0	153	
Cultivate-Sled	0.32	8	7	5	0	0	20	
Thin Stand-Automated/Fertilize	0.00	0	0	0	25	210	235	
Disease/Insect Management	0.00	0	0	0	492	80	572	
Cultivate/Break Bottoms	0.22	6	4	4	0	0	14	
Hand Weed/Remove Doubles 1X	0.00	153	0	0	0	0	153	
Drip Setup/Irrigate	1.32	163	34	22	180	0	399	
Fertigate (20-0-0-5) 2X	0.00	0	0	0	62	0	62	
PCA/CCA Fee	0.00	0	0	0	0	30	30	
Pickup-3/4 Ton Farm Use	1.00	26	7	5	0	0	38	
TOTAL CULTURAL COSTS	8.66	588	241	200	1,439	406	2,874	
Harvest:								
Harvest/Field Pack	0.00	0	0	0	0	4,500	4,500	
Cool/Palletize	0.00	0	0	0	0	750	750	
Market/Sales Fee	0.00	0	0	0	0	563	563	
TOTAL HARVEST COSTS	0.00	0	0	0	0	5,813	5,813	
Interest on Operating Capital at 5.75%							78	
TOTAL OPERATING COSTS/ACRE	9.00	588	241	200	1,439	6,218	8,764	

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 1. CONTINUED
 Central Coast-2015

Operation	Cash and Labor Costs per Acre							Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost		
CASH OVERHEAD:									
Land Rent								1,200	
Liability Insurance								20	
Food Safety Program								40	
Regulatory Program								40	
Office Expense								350	
Field Sanitation								12	
Property Taxes								11	
Property Insurance								1	
Investment Repairs								20	
TOTAL CASH OVERHEAD COSTS/ACRE								1,693	
TOTAL CASH COSTS/ACRE								10,458	
NON-CASH OVERHEAD:									
		Per Producing Acre		Annual Cost Capital Recovery					
Building 2400sqft		63		5				5	
Fuel Tanks Overhead		7		1				1	
Shop Tools		13		1				1	
Drip System		226		29				29	
Sprinkler System		245		15				15	
Sprinkler Pipe		753		36				36	
Equipment		1,890		237				237	
TOTAL NON-CASH OVERHEAD COSTS		3,198		324				324	
TOTAL COSTS/ACRE								10,781	

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

\$10,781 – 5,813 = \$4,968

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 2. MATERIAL AND INPUT COSTS PER ACRE TO PRODUCE AND HARVEST ROMAINE HEARTS
 Central Coast-2015

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Romaine Hearts	750	Carton	12.50	9,375	
TOTAL GROSS RETURNS	750	Carton		9,375	
OPERATING COSTS					
Fertilizer:				387	
Compost	2.00	ton	55.00	110	
Potassium Sulfate	150.00	lb	0.86	129	
7-7-0-7	30.00	gal	2.03	61	
14-0-0-5	20.00	gal	1.27	25	
20-0-0-5	50.00	gal	1.23	62	
Custom:				6,218	
Soil Sample	1.00	acre	8.00	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	1.00	acre	15.00	15	
Automated Thinning	1.00	acre	210.00	210	
Air Application	4.00	acre	20.00	80	
Harvest-Field Pack	750.00	carton	6.00	4,500	
Cool/Palletize	750.00	carton	1.00	750	
Market/Sales Fee	750.00	carton	0.75	563	
PCA/CCA	1.00	acre	30.00	30	
Seed:				265	
Romaine Hearts	189.00	thou	1.40	265	
*Herbicide:				43	
Material Costs/Ac				43	
*Insecticide:				272	
Material Costs/Ac				272	
*Fungicide:				220	
Material Costs/Ac				220	
Irrigation:				252	
Water-Pumped	14.00	acin	18.00	252	
Labor:				588	
Equipment Operator Labor	10.40	hrs	21.70	226	
Non-Machine Labor	22.52	hrs	16.10	363	
Machinery:				441	
Fuel-Gas	2.00	gal	3.25	7	
Fuel-Diesel	86.89	gal	2.70	230	
Lube				36	
Machinery Repair				164	
Interest on Operating Capital @ 5.75%				78	
TOTAL MATERIAL AND INPUT COSTS/ACRE				8,764	

*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-2015

	OCT 14	NOV 14	DEC 14	JAN 15	FEB 15	MAR 15	APR 15	Total
Cultural:								
Soil Samples (12 per 250 Ac)	8							8
Disc & Roll 6X	105	53						157
Subsoil 2X	95							95
Land Plane (1X per 2 Crops)	16							16
Laser Level (1X per 2 Crops)	20							20
Compost+Spread (1X per 2 Crops)		130						130
Chisel 4X		130						130
List Beds 3-Row		23						23
Cultivate-Lilliston 2X				26				26
Power Mulch & Shape Beds				31				31
Fertilizer (Potassium Sulfate)				144				144
Plant/Fertilize (7-7-0-7)				373				373
Herbicide Application				43				43
Sprinkler Setup/Irrigate 4X				102	50			153
Cultivate-Sled					20			20
Thin Stand-Automated/Fertilize					235			235
Disease/Insect Management					232	237	103	572
Cultivate/Break Bottoms					14			14
Hand Weed/Remove Doubles 1X					153			153
Drip Setup/Irrigate					119	120	160	399
Fertigate (20-0-0-5) 2X					31	31		62
PCA/CCA Fee	4	4	4	4	4	4	4	30
Pickup-3/4 Ton Farm Use	5	5	5	5	5	5	5	38
TOTAL CULTURAL COSTS	252	346	10	730	864	397	273	2,874
Harvest:								
Harvest/Field Pack							4,500	4,500
Cool/Palletize							750	750
Market/Sales Fee							563	563
TOTAL HARVEST COSTS	0	0	0	0	0	0	5,813	5,813
Interest on Operating Capital @ 5.75%	1	3	3	6	11	12	42	78
TOTAL OPERATING COSTS/ACRE	255	349	13	736	875	410	6,127	8,764
CASH OVERHEAD								
Land Rent							1,200	1,200
Liability Insurance							20	20
Food Safety Program							40	40
Regulatory Program							40	40
Office Expense	50	50	50	50	50	50	50	350
Field Sanitation	2	2	2	2	2	2	2	12
Property Taxes				6				11
Property Insurance				0				1
Investment Repairs	3	3	3	3	3	3	3	19
TOTAL CASH OVERHEAD COSTS	54	54	54	60	54	54	1,354	1,693
TOTAL CASH COSTS/ACRE	310	403	67	797	929	464	7,481	10,458

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 4. RANGING ANALYSIS - ROMAINE HEARTS
 Central Coast-2015

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

	YIELD (Cartons/Acre)						
	600	650	700	750	800	850	900
OPERATING COSTS/ACRE:							
Cultural	2,874	2,874	2,874	2,874	2,874	2,874	2,874
Harvest	4,650	5,038	5,425	5,813	6,200	6,588	6,975
Interest on Operating Capital @ 5.75%	73	74	76	78	80	82	84
TOTAL OPERATING COSTS/ACRE	7,596	7,986	8,375	8,764	9,154	9,543	9,932
TOTAL OPERATING COSTS/CARTON	12.66	12.29	11.96	11.69	11.44	11.23	11.04
CASH OVERHEAD COSTS/ACRE							
	1,693	1,693	1,693	1,693	1,693	1,693	1,693
TOTAL CASH COSTS/ACRE	9,290	9,679	10,068	10,458	10,847	11,236	11,626
TOTAL CASH COSTS/CARTON	15.48	14.89	14.38	13.94	13.56	13.22	12.92
NON-CASH OVERHEAD COSTS/ACRE							
	324	324	324	324	324	324	324
TOTAL COSTS/ACRE	9,613	10,003	10,392	10,781	11,171	11,560	11,950
TOTAL COSTS/CARTON	16.04	15.41	14.86	14.39	13.98	13.61	13.29

Net Return per Acre above Operating Costs for Romaine Hearts

PRICE (\$/carton)	YIELD (Cartons/acre)						
	600	650	700	750	800	850	900
Romaine Hearts							
8.00	-2,796	-2,786	-2,775	-2,764	-2,754	-2,743	-2,732
9.50	-1,896	-1,811	-1,725	-1,639	-1,554	-1,468	-1,382
11.00	-996	-836	-675	-514	-354	-193	-32
12.50	-96	139	375	611	846	1,082	1,318
14.00	804	1,114	1,425	1,736	2,046	2,357	2,668
15.50	1,704	2,089	2,475	2,861	3,246	3,632	4,018
17.00	2,604	3,064	3,525	3,986	4,446	4,907	5,368

Net Return per Acre above Cash Costs for Romaine Hearts

PRICE (\$/carton)	YIELD (Cartons/acre)						
	600	650	700	750	800	850	900
Romaine Hearts							
8.00	-4,490	-4,479	-4,468	-4,458	-4,447	-4,436	-4,426
9.50	-3,590	-3,504	-3,418	-3,333	-3,247	-3,161	-3,076
11.00	-2,690	-2,529	-2,368	-2,208	-2,047	-1,886	-1,726
12.50	-1,790	-1,554	-1,318	-1,083	-847	-611	-376
14.00	-890	-579	-268	42	353	664	974
15.50	10	396	782	1,167	1,553	1,939	2,324
17.00	910	1,371	1,832	2,292	2,753	3,214	3,674

Net Return per Acre above Total Costs for Romaine Hearts

PRICE (\$/carton)	YIELD (Cartons/acre)						
	600	650	700	750	800	850	900
Romaine Hearts							
8.00	-4,813	-4,803	-4,792	-4,781	-4,771	-4,760	-4,750
9.50	-3,913	-3,828	-3,742	-3,656	-3,571	-3,485	-3,400
11.00	-3,013	-2,853	-2,692	-2,531	-2,371	-2,210	-2,050
12.50	-2,113	-1,878	-1,642	-1,406	-1,171	-935	-700
14.00	-1,213	-903	-592	-281	29	340	650
15.50	-313	72	458	844	1,229	1,615	2,000
17.00	587	1,047	1,508	1,969	2,429	2,890	3,350

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS FOR ROMAINE HEARTS
 Central Coast-2015

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
15	Bed Shaper 3-Row	44,412	15	4,548	3,992	21	245	4,257
15	Fertilizer Bar 20"	13,000	15	1,331	1,169	6	72	1,246
15	205HP Crawler	350,000	10	103,384	36,462	191	2,267	38,920
15	150HP4WD Tractor	225,000	10	66,461	23,440	123	1,457	25,020
15	120HP2WD Tractor	136,967	10	40,458	14,269	75	887	15,231
15	Row crop planter	54,887	10	9,706	6,241	27	323	6,592
15	Triplane - 16'	38,000	10	6,720	4,321	19	224	4,564
15	Lilliston-Rolling 3-Row	18,000	10	3,183	2,047	9	106	2,162
15	Drip Tape Laying Machine 3-Row	16,117	10	2,850	1,833	8	95	1,936
15	Cultivator 3-Row	9,500	10	1,680	1,080	5	56	1,141
15	#1 Spray Boom 20'	2,900	6	836	443	2	19	463
15	#1 Saddle Tanks 300gal	1,660	6	479	254	1	11	265
15	Chisel - Heavy 26'	51,218	5	16,684	8,714	29	340	9,082
15	Pickup 3/4 Ton	50,000	5	22,409	7,393	31	362	7,786
15	Subsoiler - 16'	42,454	5	13,829	7,223	24	281	7,528
15	Drip Tape Extraction Sled	30,000	5	9,772	5,104	17	199	5,320
15	Disc - Offset 25'	48,769	4	17,950	9,493	28	334	9,855
15	Ring-roller 25'	29,000	4	10,674	5,645	17	198	5,860
15	Ring Roller-Heavy 18"	15,552	4	5,724	3,027	9	106	3,143
TOTAL		1,177,436	-	338,679	142,151	639	7,581	150,370
70% of New Cost*		824,205	-	237,075	99,505	447	5,306	105,259

*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									
Building 2400 sq ft	96,000	20	0	7,541	40	480	1,920	9,981	
Fuel Tanks Overhead	10,975	20	0	862	5	55	220	1,142	
Shop Tools	20,000	20	2,000	1,509	9	110	400	2,028	
Drip System	341,884	10	0	43,740	144	1,709	17,094	62,687	
Sprinkler System	370,495	20	185,247	23,351	234	2,779	7,410	33,774	
Sprinkler Pipe	1,139,000	2030	569,500	54,103	720	8,543	2,278	65,643	
TOTAL INVESTMENT		1,978,354	-	756,747	131,105	1,153	13,676	29,322	175,255

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Land Rent	250	acre	1,200	300,000
Liability Insurance	250	acre	20	5,000
Food Safety Program	250	acre	40	10,000
Regulatory Program	250	acre	40	10,000
Office Expense	250	acre	350	87,500
Field Sanitation	250	acre	12	3,000

UC COOPERATIVE EXTENSION-AGRICULTURAL ISSUES CENTER
TABLE 6. HOURLY EQUIPMENT COSTS FOR ROMAINE HEARTS
 Central Coast-2015

Yr	Description	Romaine Hearts	Total	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insurance	Taxes	Lube& Repairs	Fuel		
15	205HP Crawler	1198	1600	15.95	0.08	0.99	15.68	32.12	47.80	64.83
15	Disc - Offset 25'	431	500	13.29	0.04	0.47	9.76	0.00	9.76	23.56
15	Subsoiler - 16'	256	400	12.64	0.04	0.49	11.55	0.00	11.55	24.72
15	Triplane - 16'	46	300	10.08	0.04	0.52	6.81	0.00	6.81	17.46
15	Chisel - Heavy 26'	355	400	15.25	0.05	0.59	13.00	0.00	13.00	28.90
15	Ring Roller-Heavy 18"	256	500	4.24	0.01	0.15	2.12	0.00	2.12	6.52
15	Lilliston-Rolling 3-Row	100	200	7.16	0.03	0.37	4.32	0.00	4.32	11.88
15	Bed Shaper 3-Row	121	400	6.99	0.04	0.43	1.20	0.00	1.20	8.65
15	150HP4WD Tractor	653	1600	10.25	0.05	0.64	10.51	23.50	34.01	44.96
15	Row crop planter	144	150	29.13	0.13	1.51	17.65	0.00	17.65	48.41
15	Cultivator 3-Row	133	200	3.78	0.02	0.20	2.28	0.00	2.28	6.27
15	Fertilizer Bar 20"	144	400	2.04	0.01	0.13	0.35	0.00	0.35	2.53
15	Drip Tape Laying Machine 3-Row	188	200	6.41	0.03	0.33	3.86	0.00	3.86	10.64
15	Pickup 3/4 Ton	250	400	12.94	0.05	0.63	5.33	6.50	11.83	25.45
15	#1 Saddle Tanks 300gal	144	250	0.71	0.00	0.03	0.53	0.00	0.53	1.27
15	#1 Spray Boom 20'	144	250	1.24	0.00	0.05	0.92	0.00	0.92	2.22
15	Ring-roller 25'	431	500	7.90	0.02	0.28	3.95	0.00	3.95	12.16
15	Drip Tape Extraction Sled	142	400	8.93	0.03	0.35	7.34	0.00	7.34	16.65
15	120HP2WD Tractor	257	1600	6.24	0.03	0.39	12.74	18.80	31.54	38.21