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

2023

**SAMPLE COSTS TO PRODUCE AND HARVEST
BROCCOLI – BUNCHEd 14s**



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

Laura Tourte UC Cooperative Extension Farm Advisor Emeritus, Santa Cruz, Monterey, and San Benito Counties
Richard Smith UC Cooperative Extension Farm Advisor Emeritus, Monterey, Santa Cruz, and San Benito Counties
Jeremy Murdock Staff Research Associate, UC Davis Agricultural and Resource Economics
Brittney Goodrich UC Cooperative Extension Specialist, UC Davis Agricultural and Resource Economics

With Contributions From

Michael Cahn UC Cooperative Extension Farm Advisor, Monterey, Santa Cruz, and San Benito Counties
Kirsten Pearsons UC Cooperative Extension Area IPM Advisor, Monterey, Santa Cruz, and San Benito Counties
Yu-Chen Wang UC Cooperative Extension Farm Advisor, Santa Cruz, Monterey, and San Benito Counties

Funding Source: This material is based on work supported by the U.S. Department of Agriculture under Cooperative Agreement Number NR223A750001C010. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect those of the U.S. Department of Agriculture.

University of California Agriculture and Natural Resources
UC Cooperative Extension
UC Davis Department of Agricultural and Resource Economics
SAMPLE COSTS TO PRODUCE AND HARVEST BROCCOLI – BUNCHED 14s - 2023
 Central Coast - Monterey, Santa Cruz, and San Benito Counties

CONTENTS

INTRODUCTION.....	2
ASSUMPTIONS.....	3
Production Cultural Practices and Material Inputs.....	3
Growing Costs.....	5
Labor, Interest, and Equipment.....	5
Cash Overhead.....	7
Non-Cash Overhead.....	8
REFERENCES.....	10
Table 1. Costs per Acre to Produce and Harvest Broccoli – Bunched 14s.....	11
Table 2. Material and Input Costs per Acre to Produce and Harvest Broccoli – Bunched 14s.....	13
Table 3. Monthly Cash Costs per Acre to Produce and Harvest Broccoli – Bunched 14s.....	14
Table 4. Ranging Analysis for Broccoli – Bunched 14s	15
Table 5. Whole Farm Annual Equipment, Investment, and Business Overhead Costs.....	16
Table 6. Hourly Equipment Costs for Broccoli – Bunched 14s.....	17

Acknowledgements. Appreciation is expressed to the Central Coast growers, shippers, input suppliers, custom service operators, and other industry representatives who provided information, assistance, and expertise for this study.

INTRODUCTION

The sample costs to produce and harvest broccoli 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 Jeremy Murdock, Department of Agricultural and Resource Economics, University of California, Davis, (530) 752-4651 or your local UC Cooperative Extension office, <https://ucanr.edu/About/Locations/>.

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.

The University of California is an affirmative action/equal opportunity employer.

ASSUMPTIONS

The following assumptions refer to Tables 1 through 6 and pertain to sample costs to produce and harvest broccoli (bunched 14s) for the Central Coast Region – Monterey, Santa Cruz, and San Benito Counties. **Broccoli may not be a profitable crop in all market conditions but is an essential rotational crop in coastal vegetable production because it helps reduce key soilborne diseases for subsequent crop production.** 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 practices vs custom services, production location and weather conditions, land rent and taxes, soil type, water costs, pest pressures, material inputs, energy costs, and labor costs and availability.** For example, broccoli 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. Uncertainty about climate change and the regulatory environment may also impact the costs and returns studied here.

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 broccoli production information for California is available online from the University of California Division of Agriculture and Natural Resources at: <https://anrcatalog.ucanr.edu/Details.aspx?itemNo=7211>. **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. Fresh market broccoli (packed as bunched 14s) is planted on 500 acres and rotated with other cool season vegetable crops to assist with pest management and soil fertility. Cover crops, which can assist with soil fertility and water quality and nutrient management regulatory programs, are included in crop rotations when calendars of operations and the economics of coastal vegetable production allow. Costs for a cover crop are not included in this study. Broccoli is planted year-round along the Central Coast. 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 \$500 to a high of \$4,000 per acre per year in the area. For this study, an annual rental rate of \$3,200 per acre per year is assumed, with \$1,600 allocated to the broccoli crop.

Production Cultural Practices and Material Inputs

Land Preparation. Prior to land preparation and to help determine fertilization practices, a total of 25 soil samples per 500 acres are taken for analysis. For this study, land preparation begins in May and includes discing (four times), subsoiling (twice), land and laser leveling (once each for every 2 crops). The acreage is then chiseled (a total of four times), disced (twice), and the beds are listed. In June, the beds are cultivated (twice) with a rolling cultivator (Lilliston), and then shaped with a power mulcher. Though not included in this study, some growers amend soils with compost during land preparation. If compost is used, an estimated cost of \$170 per acre should be added to the total operating costs shown on Tables 1, 2 and 3, which reflects a custom application rate of two tons per acre per crop each year. This application rate is indicative of a soil maintenance rather than the beginning of a soil building program; in the case of a beginning soil building program compost application rates and costs would likely be considerably higher.

Plant/Stand Establishment. Broccoli is direct-seeded using an 80-inch 4-row 3-bed precision air-planter. This study assumes that broccoli is planted to stand in June at the rate of 69,700 plants per acre using a 4.5-inch in-row spacing. A portion of the total acreage planted to broccoli along the Central Coast is transplanted rather than direct-seeded. If transplants are used, estimated costs will increase by \$1,000 to \$1,200 per acre over those shown in this study.

Fertilizers. 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. The liquid fertilizer AN 20 is sidedressed twice during the growing season: 30 days after planting at 30 gallons per acre and again 40 to 50 days after planting at 35 gallons per acre. These applications total 70 gallons of AN 20, which supplies 148 pounds of N to the crop. Total N use during the growing season is 170 pounds per acre. Fertilization practices and materials will vary from grower to grower and location to location.

Irrigation. For this study, the estimated cost of pumped water is \$282 per acre-foot or \$23.50 per acre-inch. Water costs vary considerably in the area depending upon the water district or agency, delivery, associated fees and taxes, and pumping variables and for 2023 were as high as \$435 per acre-foot in the area. Broccoli is sprinkler irrigated using 3.5 acre-inches of water per acre to establish the crop. An additional 15 acre-inches is applied through the sprinkler irrigation system for the remainder of the growing season (July, August, and September) for a seasonal total of 18.5 acre-inches per acre. Labor costs include time to set up and monitor the sprinkler system 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. Some growers may use drip irrigation as an alternative to sprinkler irrigation during the growing season. Others may use “dead row” irrigation methods in which sprinkler pipe is set up on unplanted crop rows for the entire growing season. While this technique reduces the labor needed to move sprinkler pipe for each irrigation, it also takes land out of production and therefore impacts potential returns to growers.

CropManage. Growers may now take advantage of real-time recommendations for efficient water use and nitrogen fertilizer applications by using UC ANR’s CropManage: <https://cropmanage.ucanr.edu/>. CropManage, which is currently available at no cost to growers, may be especially helpful in decision-making, accurate documentation of material inputs, sustainable practices, and compliance with both state and regional regulatory programs (see Fertilizer and Irrigation Regulatory Programs section below). Commercially available software programs may also be used.

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 Cole Crops*. For more information on pest identification, monitoring, and pest management materials, visit the UC IPM website at: <https://ipm.ucanr.edu/agriculture/cole-crops/>. 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 \$39 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. Broccoli is mechanically cultivated three times: once 45 days after planting, with two additional cultivations spaced 10 days apart. Fields are hand weeded once after the last cultivation at an estimated cost

of \$211 per acre. Although not included in this study, many growers now include automated technologies in their weed management programs. An estimated cost of \$200 per acre (as a custom service) should be added to the operating costs shown on Tables 1, 2 and 3 if an automated weeding operation is used; the hand weeding costs shown here may then be lower. Costs for automated technologies will vary depending upon weed populations, the number of passes needed per acre, and custom services vs in-house operations.

Insects/Diseases. Fields are monitored for a variety of insect pests including aphids, caterpillars (diamondback moth, cabbage looper, imported cabbageworm, and armyworm), cabbage maggots, and various sporadic pests. Three to four pest management applications are typically used during the growing season. Disease problems are minimal in broccoli; growers do not typically apply fungicides because of this. If disease issues do arise growers may use one or two fungicide applications to manage pests. 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. Broccoli is hand harvested and field packed at crop maturity as bunches. It may also be harvested as crowns, florets or for slaw. The same field may be harvested multiple times for a mix of different packed products and markets. The exact timing depends on the variety and time of year planted. Cool season plantings may require up to 120 days to mature, but as the season warms, time to maturity decreases. For this study, a harvest and field packing cost of \$8.00 per 21-pound carton (bunched 14s) is assumed. Transportation costs vary depending on the distance to market and are included in the above costs. Cooling and palletizing costs an additional \$1.70 per carton, which brings the total harvest cost to \$9.70 per carton. In addition, a sales and marketing cost of \$1.35 per carton is included in this study; this cost may vary from grower to grower.

Yield. Yield is estimated to range from 550 to 850 cartons per acre, with 700 21-pound cartons (bunched 14s) the representative yield used in this study. The pack is only one of several different types that may be used for broccoli. Actual yield per acre depends upon many variables, including production location, season produced, field conditions, and pack type and weight.

Returns. Price for broccoli is estimated to range from \$9.00 to over \$21.00 per carton (21-pound bunched 14s pack) with a representative price of \$15.00 per carton used in this study. This range reflects the Salinas-Watsonville 2020 to 2022 3-year weekly shipping point averages of the USDA Agricultural Marketing Service. Table 4 provides more information on yield and price ranges, including sample net returns above indicated costs. **It is important to note that broccoli prices are influenced by market conditions and that broccoli is also sold on contract, which may impact the prices and net returns that are studied here in complex ways.**

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 in this region vary considerably and depend on grower specific production practices, water and other input costs, and land rent and taxes.**

Labor, Interest, and Equipment

Labor. The labor rates used in this study \$29.60 per hour for machine operators, \$25.00 for irrigators and \$23.68 for general labor, which includes overhead of 48 percent. The basic hourly wages are \$20.00 for machine operators, \$16.90 for irrigators and \$16.00 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, 2023. Labor for operations involving machinery is 20 percent higher than the operation time given in Table 1 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

California Minimum Wage and Overtime Rules. In 2016 new minimum wage and overtime laws were passed in California and were gradually phased in over time. For 2023 minimum wage increased to \$15.50 per hour, a 3.3 percent increase over the 2022 minimum wage. Many growers may already pay wages that are higher than the state's legal requirement, as is shown in this study. In 2022 the new overtime law completed its multi-year phase in period for farming operations that employ 26 or more employees. Overtime wages are now required for work over 8 hours per day or 40 hours per week.

Federal H-2A Program. Growers may 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, and 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 7.0 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 2023.

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 \$5.40 (excludes excise taxes) and \$4.50 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 the cost for use of a pickup truck for business purposes.

Risk. The risks associated with producing and marketing a broccoli 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. The market for fresh vegetables is volatile for both price and quantity. A market channel should be determined before any broccoli 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 0.710 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 per 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 broccoli 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 \$500 to \$4,000 per acre per year. In this study land rent is assumed to be \$3,200 per acre per year, with \$1,600 allocated to the broccoli 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 quality and nutrient management, growers often have in-house departments and/or staff specially dedicated to supervision and management of these programs. **Associated costs will vary depending upon the farm size and complexity of operations.**

Food Safety. An estimated cost of \$112 per acre per year or \$56 per acre per crop is included in this study. It includes participation in a third party (independent) audit of food safety practices.

Fertilizer and Irrigation Regulatory Programs. This study includes a cost of \$150 per acre per year or \$75 per acre per crop for compliance and fees associated with current water quality and nutrient management regulatory programs: the State's Sustainable Groundwater Management Act (SGMA) and the Central Coast's Irrigated Lands Regulatory Program (ILRP). The estimated costs are for two full time employees: a field technician to assist with sampling, data collection and on-farm problem-solving and an in-house supervisory program manager/analyst to assist with recordkeeping, data analysis, decision-making, reporting, and administration. Fees associated with both SGMA's local Groundwater Sustainability Agency (GSA) and participation in a third-party entity to comply with ILRP's Central Coast (Region 3) Agricultural Order (Ag Order 4.0) are also estimated and included in the cost.

Management Salaries. Wages for other 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 at a cost of \$15 per acre. 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.

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 8.50 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 2023.

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 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 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 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.

REFERENCES

- Agricultural Commissioner. *Monterey County Crop Reports*. 2020-22. Salinas, CA. <https://www.co.monterey.ca.us/government/departments-a-h/agricultural-commissioner/forms-publications/crop-reports-economic-contributions>.
- American Society of Agricultural and Biological Engineers. (ASABE). July, 2015. American Society of Agricultural Engineers Standards Yearbook. Russell H. Hahn and Evelyn E. Rosentreter (ed.). St. Joseph, MO. 41st edition, ANSI/ASAE S279_17.PDF. hq@asabe.org.
- Boehlje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, New York.
- California Chapter of the American Society of Farm Managers and Rural Appraisers. *2023 Trends in Agricultural Land & Lease Values*. American Society of Farm Managers and Rural Appraisers, Woodbridge, CA. www.calasfmra.com.
- California Department of Insurance. 2023. *California Workers' Compensation Rating Data for Selected Agricultural Classifications as of January 2023*. California Department of Insurance, Rate Regulation Branch.
- California Department of Tax Fee Administration. Sales Tax for Fuels. <https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm#motor>.
- California Water Boards / State Water Resources Control Board. The Sustainable Groundwater Management Act (SGMA). https://www.waterboards.ca.gov/water_issues/programs/gmp/index.html. The Irrigated Lands Regulatory Program. https://www.waterboards.ca.gov/water_issues/programs/agriculture/.
- U.S. Energy Information Administration. Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_w.htm.
- Tourte, Laura, Richard F. Smith, Jeremy Murdock and Daniel A. Sumner. 2017. *Sample Costs to Produce Broccoli - Central Coast Region*. University of California Agriculture and Natural Resources, UC Cooperative Extension and UC Davis Department of Agricultural and Resource Economics. <https://coststudies.ucdavis.edu>.
- University of California Statewide Integrated Pest Management Program. *UC IPM Pest Management Guidelines: Cole Crops*. University of California Agriculture and Natural Resources (ANR) Publication 3442. <https://ipm.ucanr.edu/agriculture/cole-crops/>.
- United States Department of Agriculture. Agricultural Market Service Market News. <https://www.ams.usda.gov/market-news/custom-reports>.
- United States Department of Labor. Occupational Outlook Handbook. <https://www.bls.gov/ooh/management/farmers-ranchers-and-other-agricultural-managers.htm>. <https://www.bls.gov/ooh/life-physical-and-social-science/agricultural-and-food-science-technicians.htm>

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 1. COSTS PER ACRE TO PRODUCE AND HARVEST BROCCOLI – BUNCHED 14s

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 (25 per 500 Acres)	0.00	0	0	0	0	17	17	
Disc & Roll 6X	1.73	61	122	65	0	0	249	
Sub-Soil 2X	1.02	36	72	37	0	0	145	
Land Plane (1X per 2 Crops)	0.18	7	13	6	0	0	25	
Laser Level (1X per 2 Crops)	0.00	0	0	0	0	93	93	
Chisel 4X	1.42	50	100	52	0	0	203	
List Beds 3-Row	0.00	0	0	0	0	26	26	
Cultivate-Lilliston 2X	0.40	14	17	8	0	0	39	
Power Mulch/Shape Beds	0.48	17	25	8	0	0	50	
Plant/Fertilize (7-7-0-7)	0.57	25	30	22	594	0	671	
Herbicide Application	0.00	0	0	0	80	30	110	
Sprinkler Setup/Irrigate - Establish	3.75	94	0	0	82	0	176	
Disease/Insect Management	0.00	0	0	0	424	120	544	
Fertilize-Sidedress 2X	0.57	20	29	9	232	0	291	
Cultivate-Break Bottoms	0.95	34	39	16	0	0	89	
Sprinkler Irrigate - Season	6.00	150	0	0	353	0	503	
Hand Weed	8.90	211	0	0	0	0	211	
Vertebrate Pest Management	0.85	20	0	0	0	0	20	
Pickup Truck Use	1.00	36	9	6	0	0	50	
PCA/CCA Fee	0.00	0	0	0	0	39	39	
TOTAL CULTURAL COSTS	27.83	775	456	229	1,765	325	3,550	
Harvest:								
Harvest/Field Pack	0.00	0	0	0	0	5,600	5,600	
Cool/Palletize	0.00	0	0	0	0	1,190	1,190	
Market/Sales Fee	0.00	0	0	0	0	945	945	
TOTAL HARVEST COSTS	0.00	0	0	0	0	7,735	7,735	
Interest on Operating Capital at 7.00%							136	
TOTAL OPERATING COSTS/ACRE	28	775	456	229	1,765	8,060	11,421	

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 1. CONTINUED

Operation	Operation		Cash and Labor Costs per Acre				Total Cost	Your Cost
	Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/Rent		
CASH OVERHEAD:								
Field Sanitation							15	
Land Rent							1,600	
Liability Insurance							2	
Office Expense							375	
Food Safety Program							56	
Water/Nutrient Management Programs							75	
Property Taxes							11	
Property Insurance							1	
Investment Repairs							22	
TOTAL CASH OVERHEAD COSTS/ACRE							2,157	
TOTAL CASH COSTS/ACRE							13,577	
NON-CASH OVERHEAD:								
		Per Producing Acre		Annual Cost				
				Capital Recovery				
Fuel Tanks Overhead		7		1			1	
Building 2400sqft		64		7			7	
Shop Tools		13		1			1	
Sprinkler System		247		24			24	
Sprinkler Pipe		759		68			68	
Equipment		1,273		243			243	
TOTAL NON-CASH OVERHEAD COSTS							343	
TOTAL COSTS/ACRE							13,920	

Total Costs per Acre – Harvest Costs per Acre = Growing Costs per Acre*

$$\$13,920 - \$7,735 = \$6,185$$

*Growing costs can vary considerably in this region and depend on grower specific production practices, water and other input costs, and land rent and taxes.

Example: Potential Additional Growing Costs per Acre**

Compost (Maintenance) Application = \$170

Automated Weed Management (One Pass) = \$200

** These custom services are sometimes used by area growers but are excluded from the costs studied here.

For more detailed information refer to the narrative section.

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 2. COSTS AND RETURNS PER ACRE TO PRODUCE AND HARVEST BROCCOLI – BUNCHED 14s

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Broccoli-Bunched 14s	700	Carton	15.00	10,500	
TOTAL GROSS RETURNS					
	700	Carton		10,500	
OPERATING COSTS					
Fertilizer:					303
7-7-0-7	30.00	Gal	2.36	71	
AN 20	70.00	Gal	3.32	232	
Custom:					8,060
Soil Analysis	0.10	Acre	170.00	17	
Laser Level	0.50	Acre	185.00	93	
List beds 3-Row 80"	1.00	Acre	26.00	26	
Ground Application	5.00	Acre	30.00	150	
Harvest-Field Pack	700.00	Carton	8.00	5,600	
Harvest-Cool/Palletizing	700.00	Carton	1.70	1,190	
Marketing & Sales Fee	700.00	Carton	1.35	945	
PCA/CCA	1.00	Acre	39.00	39	
Seed:					523
Seed-Broccoli	69.70	Thou	7.50	523	
Herbicide:					80
Herbicide Material Cost/Ac*					80
Insecticide:					424
Insecticide Material Cost/Ac*					424
Irrigation:					435
Water-Central Coast	18.50	AcIn	23.50	435	
Labor					775
Equipment Operator Labor	9.99	hrs	29.60	296	
Non-Machine Labor	9.95	hrs	23.68	236	
Irrigation Labor	9.75	hrs	25.00	244	
Machinery					686
Fuel-Gas	2.00	gal	4.50	9	
Fuel-Diesel	82.85	gal	5.40	447	
Lube					68
Machinery Repair					161
Interest on Operating Capital @ 7.00%					136
TOTAL OPERATING COSTS/ACRE				11,421	
TOTAL OPERATING COSTS/CARTON					16

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

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE AND HARVEST BROCCOLI – BUNCHED 14s

	MAY 23	JUN 23	JUL 23	AUG 23	SEP 23	OCT 23	Total
Cultural:							
Soil Samples (25 per 500 Acres)	17						17
Disc & Roll 6X	249						249
Sub-Soil 2X	145						145
Land Plane (1X per 2 Crops)	25						25
Laser Level (1X per 2 Crops)	93						93
Chisel 4X	203						203
List Beds 3-Row	26						26
Cultivate-Lilliston 2X		39					39
Power Mulch/Shape Beds		50					50
Plant/Fertilize (7-7-0-7)		671					671
Herbicide Application		110					110
Sprinkler Setup/Irrigate - Establish		176					176
Disease/Insect Management		136	136	136	136		544
Fertilize-Sidedress 2X			145	145			291
Cultivate-Break Bottoms			30	60			89
Sprinkler Irrigate - Season			168	168	168		503
Hand Weed				211			211
Vertebrate Pest Management				20			20
Pickup Truck Use	8	8	8	8	8	8	50
PCA/CCA Fee	7	7	7	7	7	7	39
TOTAL CULTURAL COSTS	772	1,196	494	754	318	15	3,550
Harvest:							
Harvest/Field Pack						5,600	5,600
Cool/Palletize						1,190	1,190
Market/Sales Fee						945	945
TOTAL HARVEST COSTS	0	0	0	0	0	7,735	7,735
Interest on Operating Capital @ 7.00%	5	11	14	19	21	66	136
TOTAL OPERATING COSTS/ACRE	777	1,208	508	773	339	7,816	11,421
CASH OVERHEAD							
Field Sanitation	3	3	3	3	3	3	15
Land Rent				1,600			1,600
Liability Insurance				2			2
Office Expense	63	63	63	63	63	63	375
Food Safety Program				56			56
Water/Nutrient Management Programs				75			75
Property Taxes			5				11
Property Insurance			0				1
Investment Repairs	4	4	4	4	4	4	22
TOTAL CASH OVERHEAD COSTS	69	69	74	1,802	69	69	2,157
TOTAL CASH COSTS/ACRE	846	1,277	582	2,575	408	7,884	13,577

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 4. RANGING ANALYSIS

COSTS PER ACRE AND PER CARTON AT VARYING YIELDS TO PRODUCE AND HARVEST BROCCOLI – BUNCHED 14s

	YIELD(CARTON)						
	550	600	650	700	750	800	850
OPERATING COSTS/ACRE:							
Cultural	3,550	3,550	3,550	3,550	3,550	3,550	3,550
Harvest	6,078	6,630	7,183	7,735	8,288	8,840	9,393
Interest on Operating Capital @ 7.00%	126	129	132	136	139	142	145
TOTAL OPERATING COSTS/ACRE	9,754	10,309	10,865	11,421	11,976	12,532	13,088
TOTAL OPERATING COSTS/CARTON	17.73	17.18	16.72	16.32	15.97	15.67	15.40
CASH OVERHEAD COSTS/ACRE	2,157	2,157	2,157	2,157	2,157	2,157	2,157
TOTAL CASH COSTS/ACRE	11,911	12,466	13,022	13,578	14,133	14,689	15,245
TOTAL CASH COSTS/CARTON	21.66	20.78	20.03	19.40	18.84	18.36	17.94
NON-CASH OVERHEAD COSTS/ACRE	343	343	343	343	343	343	343
TOTAL COSTS/ACRE	12,254	12,809	13,365	13,921	14,476	15,032	15,588
TOTAL COSTS/CARTON	22.00	21.00	21.00	20.00	19.00	19.00	18.00

Net Return Per Acre Above Operating Costs For Broccoli

PRICE (\$/carton)	YIELD (carton/acre)						
	550	600	650	700	750	800	850
Broccoli-Bunched 14S							
9.00	-4,804	-4,909	-5,015	-5,121	-5,226	-5,332	-5,438
11.00	-3,704	-3,709	-3,715	-3,721	-3,726	-3,732	-3,738
13.00	-2,604	-2,509	-2,415	-2,321	-2,226	-2,132	-2,038
15.00	-1,504	-1,309	-1,115	-921	-726	-532	-338
17.00	-404	-109	185	479	774	1,068	1,362
19.00	696	1,091	1,485	1,879	2,274	2,668	3,062
21.00	1,796	2,291	2,785	3,279	3,774	4,268	4,762

Net Return Per Acre Above Cash Costs For Broccoli

PRICE (\$/carton)	YIELD (carton/acre)						
	550	600	650	700	750	800	850
Broccoli-Bunched 14S							
9.00	-6,966	-7,072	-7,178	-7,283	-7,389	-7,495	-7,601
11.00	-5,866	-5,872	-5,878	-5,883	-5,889	-5,895	-5,901
13.00	-4,766	-4,672	-4,578	-4,483	-4,389	-4,295	-4,201
15.00	-3,666	-3,472	-3,278	-3,083	-2,889	-2,695	-2,501
17.00	-2,566	-2,272	-1,978	-1,683	-1,389	-1,095	-801
19.00	-1,466	-1,072	-678	-283	111	505	899
21.00	-366	128	622	1,117	1,611	2,105	2,599

Net Return Per Acre Above Total Costs For Broccoli

PRICE (\$/carton)	YIELD (carton/acre)						
	550	600	650	700	750	800	850
Broccoli-Bunched 14S							
9.00	-7,309	-7,415	-7,520	-7,626	-7,732	-7,838	-7,943
11.00	-6,209	-6,215	-6,220	-6,226	-6,232	-6,238	-6,243
13.00	-5,109	-5,015	-4,920	-4,826	-4,732	-4,638	-4,543
15.00	-4,009	-3,815	-3,620	-3,426	-3,232	-3,038	-2,843
17.00	-2,909	-2,615	-2,320	-2,026	-1,732	-1,438	-1,143
19.00	-1,809	-1,415	-1,020	-626	-232	162	557
21.00	-709	-215	280	774	1,268	1,762	2,257

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD FOR BROCCOLI – BUNCHED 14s

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	Cash Overhead		Total
						Insur- ance	Taxes	
23	205HP Crawler	350,000	6	144,313	57,437	175	2,472	60,084
23	Triplane - 16'	45,600	10	8,064	6,406	19	268	6,694
23	150HP4WD Tractor	225,000	8	78,522	32,649	108	1,518	34,275
23	Bed Shaper 3-Row	53,290	10	10,052	7,444	22	317	7,783
23	Row crop planter	65,860	5	21,453	13,092	31	437	13,560
23	#1 Saddle Tanks 300gal	1,990	3	828	525	1	14	541
23	Fertilizer Bar 20'	15,670	8	3,774	2,430	7	97	2,534
23	#1 Spray Boom 20'	3,480	5	1,134	692	2	23	717
23	Pickup 3/4 Ton	50,000	4	24,357	9,899	26	372	10,297
23	Disc - Offset 25'	58,520	3	24,338	15,452	29	414	15,896
23	Ring-roller 25'	34,800	3	14,473	9,189	17	246	9,453
23	Subsoiler - 16'	50,900	3	21,169	13,440	26	360	13,826
23	Chisel - Heavy 26'	61,460	3	28,882	20,849	32	452	21,333
23	Disc - Finish 25'	69,600	5	22,671	13,836	33	461	14,330
23	120HP2WD Tractor	144,000	8	50,254	20,896	69	971	21,936
23	Lilliston-Rolling 3-Row	21,600	8	4,877	3,380	9	132	3,522
23	Cultivator 3-Row	11,400	4	4,196	2,556	6	78	2,639
23	#2 Saddle Tanks 300gal	1,990	3	828	525	1	14	541
TOTAL		1,265,160	-	464,185	230,699	614	8,647	239,960
70% of New Cost*		885,612	-	324,930	161,489	430	6,053	167,972

*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								
Fuel Tanks Overhead	10,975	20	0	1,160	4	55	220	1,439
Building 2400sqft	96,000	20	0	10,144	34	480	1,920	12,578
Shop Tools	20,000	20	2,000	2,072	8	110	400	2,590
Sprinkler System	370,495	20	185,247	35,321	197	2,779	7,410	45,707
Sprinkler Pipe	1,139,000	30	569,500	101,400	607	8,543	22,780	133,329
TOTAL INVESTMENT	1,636,470	-	756,747	150,097	850	11,966	32,730	195,643

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/ Farm	Unit	Price/ Unit	Total Cost
Field Sanitation	500.00	Acre	15	7,500
Land Rent	500.00	Acre	1600	800,000
Liability Insurance	500.00	Acre	2	1,000
Office Expense	500.00	Acre	375	187,500
Food Safety Program	500.00	Acre	56	28,000
Water/Nutrient Management Programs	500.00	Acre	75	37,500

UC COOPERATIVE EXTENSION – UC DAVIS AGRICULTURAL AND RESOURCE ECONOMICS

TABLE 6. HOURLY EQUIPMENT COSTS FOR BROCCOLI – BUNCHED 14s

Yr	Description	Broccoli	Total	Cash Overhead			Operating		Total Oper.	Total Costs/Hr.
		Hours Used	Hours Used	Capital Recovery	Insur- ance	Taxes	Lube& Repairs	Fuel		
23	205HP Crawler	2394	2650	15.17	0.05	0.65	20.40	64.25	84.65	100.52
23	Triplane - 16'	92	300	14.95	0.04	0.63	7.98	0.00	7.98	23.60
23	150HP4WD Tractor	893	2000	11.43	0.04	0.53	13.81	47.01	60.82	72.81
23	Bed Shaper 3-Row	242	600	8.68	0.03	0.37	1.42	0.00	1.42	10.50
23	Row crop planter	288	300	30.55	0.07	1.02	21.45	0.00	21.45	53.09
23	#1 Saddle Tanks 300gal	288	500	0.74	0.00	0.02	0.64	0.00	0.64	1.39
23	Fertilizer Bar 20'	570	750	2.27	0.01	0.09	0.43	0.00	0.43	2.79
23	#1 Spray Boom 20'	288	300	1.61	0.00	0.05	1.10	0.00	1.10	2.77
23	Pickup 3/4 Ton	500	500	13.86	0.04	0.52	5.67	9.00	14.67	29.09
23	Disc - Offset 25'	577	650	16.64	0.03	0.45	11.44	0.00	11.44	28.56
23	Ring-roller 25'	577	650	9.90	0.02	0.27	4.70	0.00	4.70	14.88
23	Subsoiler - 16'	510	650	14.47	0.03	0.39	13.71	0.00	13.71	28.60
23	Chisel - Heavy 26'	710	800	18.24	0.03	0.40	14.39	0.00	14.39	33.06
23	Disc - Finish 25'	288	400	24.21	0.06	0.81	13.52	0.00	13.52	38.60
23	120HP2WD Tractor	742	1500	9.75	0.03	0.45	13.21	37.61	50.82	61.05
23	Lilliston-Rolling 3-Row	200	250	9.46	0.03	0.37	5.10	0.00	5.10	14.96
23	Cultivator 3-Row	475	500	3.58	0.01	0.11	2.77	0.00	2.77	6.47
23	#2 Saddle Tanks 300gal	283	500	0.74	0.00	0.02	0.64	0.00	0.64	1.39