
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURE AND NATURAL RESOURCES
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
2023

SAMPLE COSTS TO PRODUCE

POTATOES



Fresh Market

KLAMATH BASIN in the INTERMOUNTAIN REGION

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURE AND NATURAL RESOURCES
Sample Costs to Produce Fresh Market Potatoes
In the Tulelake-Klamath Basin of the Intermountain Region-2023

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INTRODUCTION

The sample costs to produce potatoes for fresh market in the Klamath Basin of the Intermountain Region are presented in this study. The study is intended as a guide only, and can be used in making production decisions, determining potential returns, preparing budgets and evaluating 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 “*Your Cost*” column in Tables 1 and 2 is provided for you to enter your costs.

For an explanation of calculations used in the study refer to the section titled Assumptions. For more information contact Paul Long, Department of Agricultural and Resource Economics, University of California, Davis at 530-752-4651 or pmlong@ucdavis.edu You may also contact Rob Wilson at your local extension office at 530-667-5117 or rgwilson@ucanr.edu, http://ucanr.edu/sites/Intermountain_REC/.

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.

Costs and Returns Study Program/Acknowledgements. A cost and return study is a compilation of specific agricultural crop data collected from the region where the study is based. The authors thank the farmer cooperators and the industry representatives who provided information, assistance, and expert advice. The University of California, Division of Agriculture and Natural Resources (UCANR) is an equal opportunity provider.

ASSUMPTIONS

The following assumptions pertain to sample costs to produce potatoes for fresh market in the Klamath Basin of the Intermountain Region. Practices described should not be considered recommendations by the University of California, but represent production procedures considered typical for this crop and area. Some of the costs and practices may not be applicable to your situation or used during every production year. Other practices not indicated may be needed. Cultural practices and costs to produce potatoes will vary by grower and region, and differences can be significant. The practices and inputs used in this cost study serve as a sample or guide, only. The costs are presented on an annual, per acre basis. **The use of trade names 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.**

Farm. This report is based on a hypothetical 1,500-acre farm. Potatoes are grown on 200 acres of which the grower rents. The 1,500-acre farm has 50 acres consisting of roads, irrigation systems, farmstead, and unused or unusable land. Typically, a grower with this amount of potato acreage will have several non-adjacent fields and the cultural practices usually vary among fields. Extra costs may be involved for moving equipment between fields, but are not included in this study. Other crops that might be grown in rotation with the potatoes include onions, small grains, alfalfa, peppermint, and horseradish. In this report, practices completed on less than 100% of the potato acreage are denoted as a percentage of the total potato crop acreage. This report for fresh market potatoes and the chippers for processing potatoes report are based on the same hypothetical farm. Most of the time fresh market potatoes are grown in higher quality areas. Table 5 lists some of the business overhead costs at 500 acres due to this assumption.

CULTURAL PRACTICES AND MATERIAL INPUTS

Land Preparation. It is assumed that the ground planted to the potato crop is coming out of rotation of another crop. It is also assumed that 80% of the acreage will need the preceding crop residue chopped to start ground preparations in the fall before planting the next spring. A heavy stubble disc and ring roller are used to incorporate the residue into the soil. Half of the acreage is deep ripped.

Fumigation. This study assumes 25% of the acreage will be fumigated in the fall and 25% of the acreage is fumigated in the spring. Fall-fumigated fields are irrigated with 2 acre-inches of water using wheel line sprinklers after fall tillage to bring soil moisture to the optimal level for fumigation. Fields are then rotospiked and soil fumigates (Vapam HL) are incorporated into the soil. Beginning in April the potato ground is opened with a chisel and ring roller. Fields are then rotospiked and soil fumigants are incorporated into the soil with rotospiking or shank-injection 5 weeks before planting. Rows are pulled shortly before planting and one cultivation/hilling operation is included to control small weeds and reduce tuber exposure to sunlight, which lessens tuber greening. Herbicides are incorporated on 25% of the acreage during this operation.

Fertilization. A mixed pre-plant fertilizer of nitrogen, phosphorus and potassium are custom applied prior to planting in May at a cost of 13.75 an acre. During the growing season UAN 32 is applied through the sprinklers in June, July and August. Total nitrogen and potassium for the season is at 200 pounds each per acre.

Planting. Potato seeds are cut, treated with a fungicide, and hauled to the grower by custom service. An additional fungicide, such as Quadris, is often applied in the furrow at planting. Vydate or another nemacide is applied in the furrow at planting to suppress nematodes. Potatoes are planted in 36-inch beds at a rate of 22 cwt per acre by the grower.

Irrigation. Potatoes are irrigated a total of 20 acre-inches which is applied with the sprinklers from June through August, during the growing season. Water costs are \$75 per acre-foot which equals \$6.25 per acre inch. A cost of \$12 per acre-inch is used for this study which includes booster pumping costs and Oregon Energy Management. (OEM) fees. Growers often apply either fertilizers or pesticides with water through the irrigation system, a process known as chemigation. Prior to harvest, all of the pipes are removed from the fields. Irrigation labor for the entire growing season is included with installation/removal costs for the irrigation pipe.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines*. For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at www.ipm.ucdavis.edu. For information and pesticide use permits, contact the local county agricultural commissioner's office. **Pesticides mentioned in this study are used to calculate rates and costs. Although the pesticides mentioned are commonly used by growers, many other pesticides are available. Check with your PCA, field crops farm advisor, and/or the UC IPM website for current recommendations.** Pesticide costs may vary by location, brand, and grower volume.

Pesticide and fertilizer applications are made by either chemigation (pesticides and/or fertilizers applied through the irrigation water), by tractor-mounted ground sprayer, or foliar-broadcasting by airplane. Insecticides and fungicides can be tank-mixed and applied to the crop in the same operation. Check individual pesticide labels for compatibility, mixing and usage. Some pesticides are applied to a portion of the acreage. Pesticides with different modes of action and different active ingredients should be rotated to avoid resistance development by the targeted pests. See Tables 2 and 7 for a list of chemicals used for the applications. Adjuvants are recommended for many pesticides for effective control and are an added cost. Adjuvants are not included as a cost in this study.

Pest Control Adviser/Certified Crop Advisor (PCA/CCA). Written recommendations are required for many pesticides and are available from licensed pest control or certified crop advisers. In addition, the PCA/CCA or an independent consultant will monitor the field for agronomic problems including irrigation and nutrition. They can also take weekly petiole samples during the growing season for fertilizer recommendations. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company.

Weeds. Pre-emergence herbicides (Prowl, Sencor, Matrix.) are applied prior to planting with a tractor and incorporated into the soil with a bed shaper on 25% of the acreage. Pre-emergence herbicides are broadcast applied and incorporated with irrigation after planting but before potato emergence on the remaining 75% of acres. Post-emergence herbicides such as desiccant application are applied to 100% of the acreage when potatoes are 3 to 5 inches tall.

Insects and Nematodes. Treatment for insects and nematodes begins with soil fumigation. An insecticide/nemacide (Vydate, Movento.) is applied to the soil to suppress nematodes at planting. Insecticide treatment for worm and aphid control is applied broadcast-foliar applied with an airplane.

Monitoring of pest populations during the growing season will determine how often control is needed.

Diseases. The most problematic pests of potatoes are diseases. Control begins with soil fumigation in the fall or spring. A fungicide (Quadris, Ridomil, Luna, Tanos) is applied to the potato seeds and soil at planting. In June and July, a fungicide is often applied through the irrigation system to control foliar diseases. In August another disease application is made by aircraft for control of foliar diseases.

Endangered Species. It is important to know if your farm is located in an area where endangered or threatened species reside. PRESCRIBE is an online database application to allow pesticide applicators to learn if endangered species are in the vicinity of an application site, and the use limitations applicable to the pesticide product(s) they intend to use. The database is implemented by the California Department of Pesticide Regulation. <https://www.cdpr.ca.gov/docs/endspec/prescint.htm>

Growth Regulator and Desiccant. A growth regulator, Royal MH-30, is used to prevent sprouting in storage and is applied in August by aircraft over 50% of the acreage. Later in September a desiccant is used to dry out the remaining plant tops. Much of the above-ground vegetative matter dries out with crop maturity or killing fall frosts, but Reglone is applied by aircraft on 100% of the acreage to aid in harvesting by drying out remaining growth.

Harvest. After sprinkler pipe removal, the beds and vines are flattened by a roller and vines are cut. The potatoes are dug, harvested, and field cleaned in one pass with a tractor pulling a PTO driven four-row digger, and deposited directly into a 15–22-ton bottom-conveyor belt truck for transport to storage. The truck follows alongside the harvester in the field.

Growers may choose to own harvesting equipment, purchased either new or used, or hire a custom harvester. Many factors are important in deciding which harvesting option a grower uses.

Transportation and Storage. Once the trucks are loaded in the field, they are driven to the storage shed. Hauling potatoes from the field to the storage sheds is assumed to be a 10-mile roundtrip.

Once at the sheds trucks are unloaded by the conveyer belt, which runs the length of the truck bed and discharges potatoes into a large holding tub. These special tubs allow for faster unloading of the trucks and movement into the storage shed. In this study, it is assumed that the grower hauls his potatoes to a custom storage facility. Most potatoes are stored in the sheds for six months. During storage, 50% of the potatoes are treated to prevent sprouting.

Yields. This study assumes a yield of 490 cwt per acre for fresh market potatoes, which is the 2023 average yield for Modoc and Siskiyou counties. Yields from 410 to 560 cwt per acre are used to calculate grower returns, the yields have varied over the years in the Tulelake Basin of the Intermountain Region.

Returns. For this study, \$12.00 per cwt is paid to the grower. A unit price range of \$9.50 to \$15.00 per cwt is used to calculate grower returns. This price reflects the actual price paid to the grower by the packing shed after storage and run costs are subtracted, not the wholesale or retail price of the potatoes. This price information is taken from Modoc and Siskiyou counties crop reports and from grower consensus. See Table 4, for the range of prices over yields.

Assessments. Under a state marketing order a mandatory assessment fee is collected and administered by

the California Potato Research Advisory Board (CPRAB). This assessment of \$0.02 per cwt pays for potato research in California.

LABOR, EQUIPMENT AND INTEREST

Labor. Labor rates of \$28.66 per hour for machine operators and \$25.72 for general labor includes payroll overhead of 47%. The basic hourly wages are \$19.50 for machine operators and \$17.50 for general labor. The overhead includes the employer's share of federal and California state payroll taxes, workers' compensation insurance for field crops and a percentage for other possible benefits. Workers' compensation insurance costs will vary among growers. The cost is based on the average industry rate as of May 2023. Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the American Society of Agricultural 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 diesel and gasoline are \$4.10 and \$3.70 per gallon, respectively. The costs are based on June 2023 prices from the Energy Information Administration, Department of Energy (DOE) weekly data.

Fuel Lube & Repair. The fuel, lube, and repair costs per acre for each operation in Table 1 are determined by multiplying the total hourly operating cost in Table 5 and 6 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10% higher than implement time for a given operation to account for setup, travel and down time.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 8.50% per year. It is assumed that all cash operations are financed. A nominal interest rate is the typical market cost of borrowed funds. Any post-harvest costs of operations are discounted back to the 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 May 2023.

Risk. Risks associated with potato production are not assigned a production cost. While this study makes every effort to model a production system based on typical, real-world practices, it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability of fresh market potato production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner and in various combinations for a sustainable operation. Any returns above total costs are considered returns on risk and investment to management, (or owners).

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. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, rents, and investment repairs. Cash overhead costs are included in Tables 1, 2, 3 and 4.

Property Taxes. Counties charge a base property tax at the rate of 1% on the assessed value of the property including land, equipment, buildings, and improvements. In some counties special assessment districts exist and charge additional taxes on property. For this study, county taxes are calculated as 1% of the average value of the property.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. Property insurance provides coverage for property loss and is charged at 0.843% of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, injury or damage to another's property. In this study, liability insurance costs \$1,545 for the entire farm.

Crop Insurance. This is available to growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50%-85% of the approved average yield as established by verifiable production records. Actual insurance coverage is by unit, not by acre. Due to variability in coverages no level is specified in this study.

Field Sanitation. Sanitation services includes double portable bathrooms and hand wash area. A shaded lunching table is also provided. This service is contracted annually.

Irrigation System. The irrigation delivery system from the district to the field is already in place. The two-wheel lines and two booster pumps are owned by the grower. This includes lay flat main lines, valves and connectors.

Supervisor Salary. One supervisor salary is charged at 50% time, or \$55 per acre for this study.

Office Expense. Office and business expenses are estimated at \$75.00 per acre. These expenses include office supplies, telephones, bookkeeping, accounting and legal fees, road maintenance, and miscellaneous business expenses.

Regulatory Compliance. A set rate of 55.00 per acre is set for all regulatory costs, and fees assessed to the grower by compliance agencies.

Land Rent. In this region land rent ranges from \$450 to \$700 per acre are with surface water attached to the land, but the water is not paid for by the landowner. The cost of the water is paid by the grower renting the land. Cash rent at \$550 per acre is used for this study. The grower in this study rents 205 acres of which 200 are producing or planted acres and the grower pays \$550 per rented producing acre to the landlord. The non-producing acres consist of roads, irrigation system, and equipment yard.

GPS Auto-Trac. An annual activation fee is charged for Auto-trac service that controls the GPS systems mounted in tractors.

Investment Repairs. Annual cash maintenance or repair costs are associated with investments under non-cash overhead. Repairs to the fuel tanks and pumps, shop building, shop tools, irrigations system and tool carrier are calculated at 2% of the new purchase price distributed over the life of the investment.

NON-CASH OVERHEAD

Non-cash overhead is calculated as the capital recovery cost for equipment and other farm investments. Annual ownership costs for equipment and investments are shown in Tables 1, 2, 5, and 6 as the capital recovery cost on an annual per acre basis.

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). Put another way, 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 as follows:
$$((\text{Purchase Price} - \text{Salvage Value}) \times \text{Capital Recovery Factor}) + (\text{Salvage Value} \times \text{Interest Rate}).$$

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 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 certain equipment and investments are shown in Table 5.

Interest Rate. The interest rate of 7.00% used to calculate capital recovery cost is the effective long term interest rate as of May 2023. The interest rate is provided by a local farm lending agency and will vary according to risk and amount of loan.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60% to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Tables 6 and 7. 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 AND RESOURCE ECONOMICS, UC DAVIS
TABLE 1. COSTS PER ACRE TO PRODUCE POTATOES-FRESH MARKET
Klamath Basin-Tulelake-2023

Operation	Time (Hrs/Ac)	Cash and Labor Costs per Acre					Total Cost	Your Cost
		Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent		
Pre-plant:								
Chop Residue 80% Ac	0.17	5.25	5.00	2.04	0.00	0.00	12.29	
Stubble Disc & Roll	0.30	4.64	7.94	3.36	0.00	0.00	15.93	
Sub-Soil 50% Ac	0.67	10.43	17.86	8.23	0.00	0.00	36.53	
Pre-Irrigation/Sprinklers	0.00	0.00	0.00	0.00	6.00	0.00	6.00	
Roto-Spike/Fall-Fumigate	0.11	3.44	4.58	1.99	53.13	0.00	63.13	
Gypsum 25% Ac	0.00	0.00	0.00	0.00	0.00	22.50	22.50	
Chisel & Roll	0.11	1.72	2.94	1.08	0.00	0.00	5.74	
Roto-spike/Spring-Fumigate	0.15	4.81	6.41	2.78	138.13	0.00	152.13	
Fertilize-Pre-Plant	0.00	0.00	0.00	0.00	254.20	13.75	267.95	
Pull Beds	0.22	6.76	9.00	2.69	15.21	0.00	33.65	
TOTAL PRE-PLANT COSTS	1.72	37.05	53.73	22.16	466.66	36.25	615.86	
Cultural:								
Plant Potatoes	0.27	8.31	14.24	7.09	550.00	0.00	579.65	
At Planting-Fungicide	0.00	0.00	0.00	0.00	45.34	0.00	45.34	
Irrigation Labor	0.00	257.20	0.00	0.00	0.00	0.00	257.20	
Irrigate/Sprinklers	0.00	0.00	0.00	0.00	240.00	0.00	240.00	
Chemigation-Fertilize	0.00	0.00	0.00	0.00	58.00	0.00	58.00	
Cultivate/Hilling	0.17	5.25	7.00	2.10	41.50	0.00	55.86	
Chemigation-Disease	0.00	0.00	0.00	0.00	66.38	0.00	66.38	
Herbicide post emergence	0.19	5.85	7.79	2.13	47.66	0.00	63.42	
Chemigation-Insects	0.00	0.00	0.00	0.00	13.76	0.00	13.76	
Insects-Broadcast	0.00	0.00	0.00	0.00	13.76	30.00	43.76	
Disease-Broadcast	0.00	0.00	0.00	0.00	19.30	30.00	49.30	
Growth Regulator	0.00	0.00	0.00	0.00	3.75	15.00	18.75	
Petiole Samples	0.00	0.00	0.00	0.00	0.00	10.00	10.00	
1/2 Ton Pickup Truck	0.22	6.88	1.53	0.68	0.00	0.00	9.09	
3/4 Ton Pickup Truck	0.22	6.88	1.93	0.81	0.00	0.00	9.62	
ATV4WD	0.22	6.88	0.81	0.15	0.00	0.00	7.84	
Service Truck	0.19	5.85	2.88	2.56	0.00	0.00	11.28	
Desiccant Application	0.00	0.00	0.00	0.00	17.73	15.00	32.73	
TOTAL CULTURAL COSTS	1.47	303.10	36.17	15.53	1117.18	100.00	1571.98	
Harvest:								
Cut Vines/Roll Beds	0.17	5.25	5.00	1.52	0.00	0.00	11.77	
Dig/Harvest Potatoes	0.84	26.27	44.99	29.94	0.00	0.00	101.20	
Bulk Potatoes	0.00	51.44	0.00	0.00	0.00	0.00	51.44	
Haul Potatoes	2.20	68.78	33.83	9.38	0.00	0.00	111.99	
Assessments/Fees	0.00	0.00	0.00	0.00	10.70	0.00	10.70	
TOTAL HARVEST COSTS	3.21	151.75	83.81	40.84	10.70	0.00	287.10	
Post-Harvest:								
Elevate/Holding Tub	1.10	34.39	32.72	15.63	0.00	0.00	82.74	
Shed-Store Potatoes	1.10	0.00	0.00	9.76	0.00	356.85	366.61	
Treat For Sprouts	0.00	0.00	0.00	0.00	19.20	0.00	19.20	
TOTAL POST-HARVEST COSTS	2.20	34.39	32.72	25.39	19.20	356.85	468.54	
Interest on Operating Capital at 8.5%							73.35	
TOTAL OPERATING COSTS/ACRE	8.60	526.29	206.43	103.92	1613.74	493.10	3016.83	

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TABLE 2. COSTS AND RETURNS PER ACRE TO PRODUCE POTATOES-FRESH MARKET
 Klamath Basin-Tulelake-2023

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Potatoes Fresh Mkt	490	Cwt	12	5880	
TOTAL GROSS RETURNS				5880	
OPERATING COSTS					
Herbicide				104.37	
Eptam 7E	1.75	Pint	8.69	15.21	
Prowl H2O	2	Pint	8.01	16.02	
Sencor 4	4	Oz	6.37	25.48	
Matrix SG	2	Oz	23.83	47.66	
Fungicide				125.78	
Quadris	10	FLOz	2.09	20.90	
Ridomil Gold Bravo	2	Lb	18.39	36.78	
Luna Tranquility	10	FLOz	2.96	29.60	
Tanos	10	Oz	1.93	19.30	
StorOx	4	Pint	4.8	19.20	
Insecticide				51.96	
Vydate L	2	Pint	12.22	24.44	
Movento	4	FLOz	6.88	27.52	
Fumigant				191.25	
Vapam HL	22.5	Gal	8.5	191.25	
Custom				493.10	
Gypsum Hauled-Spread	0.25	Ton	90	22.50	
Apply Fertilizer Ground Rig	1	Acre	13.75	13.75	
Application Air 20G	3	Acre	30	90.00	
Petiole Samples	1	Acre	10	10.00	
Store Potatoes-Processing	535	Cwt	0.667	356.85	
Fertilizer				312.20	
16-20-0-24% S	100	Lb	1.65	165.00	
10-34-0	20	Gal	2.23	44.60	
Potash	200	Lb	0.223	44.60	
UN-32	100	Lb	0.58	58.00	
Seed				550.00	
Seed Potatoes-Treated/Cut/F	22	Cwt	25	550.00	
Assessment				10.70	
CPRAB	535	Cwt	0.02	10.70	
Growth Regulator				3.75	
Royal MH-30	1	Gal	3.75	3.75	
Desiccant				17.73	
Reglone Desiccant	1	Pint	17.73	17.73	
Irrigation				246.00	
Water-Pumped	20.5	AcIn	12	246.00	
Labor				526.29	
Equipment Operator	7.59	Hr	28.66	217.65	
Irrigation	10	Hr	25.72	257.20	
Non-Machine	2	Hr	25.72	51.44	
Machinery				310.36	
Fuel-Diesel	49.78	Gal	4.1	204.09	
Fuel-Gas	0.63	Gal	3.7	2.34	
Lube				30.96	
Machinery Repair				72.96	
Interest on Operating Capital 8.50%				73.35	
TOTAL OPERATING COSTS/ACRE				3016.83	
TOTAL OPERATING COSTS/CWT				6.16	
NET RETURNS ABOVE OPERATING COSTS				2863.17	

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 2. CONTINUED COSTS AND RETURNS PER ACRE TO PRODUCE POTATOES-FRESH
MARKET
Klamath Basin-Tulelake-2023

Cash Overhead Costs	
Land Rent-Potatoes	550.00
Field Sanitation	2.00
Field Supervisor Salary	55.00
GPS Auto-TracActivation	2.33
Liability Insurance	1.03
Regulatory Compliance	55.00
Office Expense	75.00
Investment Repairs	4.46
Property Insurance	0.76
TOTAL CASH OVERHEAD COSTS/ACRE	745.58
TOTAL CASH OVERHEAD COSTS/CWT	1.52
TOTAL CASH COSTS/ACRE	3762.41
TOTAL CASH COSTS/CWT	7.68
NET RETURNS ABOVE CASH COSTS	2117.59
Non-Cash Overhead Costs (Capital Recovery)	
Building 2400 sq ft	1.43
Fuel Tanks 2-500, 1000 gal	1.35
Pipe Trailer (10)	3.15
125 Hp Booster Pumps(2)	3.59
Semi-Truck & Lowbed	6.86
Implement Carrier	1.18
GPS Guidance System	0.77
Shop Tools	1.23
Solid Set	4.44
Equipment	108.12
TOTAL NON-CASH OVERHEAD COSTS/ACRE	132.11
TOTAL NON-CASH OVERHEAD COSTS/CWT	0.270
TOTAL COSTS/ACRE	3894.51
TOTAL NON-CASH COSTS/CWT	7.948
NET RETURNS ABOVE TOTAL COSTS	1985.49

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. MONTHLY COSTS PER ACRE TO PRODUCE POTATOES-FRESH MARKET
Klamath Basin-Tulelake-2023

Operation	Nov	Dec	Jan	Feb	Mar	April	May	June	Jul	Aug	Sept	Oct	Total
Pre-plant:													
Chop Residue 80% Ac	12												12.29
Stubble Disc & Roll	16												15.93
Sub-Soil 50% Ac	37												36.53
Pre-Irrigation/Sprinklers	6												6.00
Roto-Spike/Fall-Fumigate	63												63.13
Gypsum 25% Ac	23												22.50
Chisel & Roll						6							5.74
Roto-spike/Spring-Fumigate						152							152.13
Fertilize-Pre-Plant							268						267.95
Pull Beds							34						33.65
TOTAL PRE-PLANT COSTS	156					158	302						615.86
Plant Potatoes							580						579.65
At Planting-Fungicide							45						45.34
Irrigation Labor							257						257.20
Irrigate/Sprinklers							42	48	72	54	24		240.00
Chemigation-Fertilize							58						58.00
Cultivate/Hilling							56						55.86
Chemigation-Disease								37	30				66.38
Herbicide post emergence								63					63.42
Chemigation-Insects									14				13.76
Insects-Broadcast										44			43.76
Disease-Broadcast										49			49.30
Growth Regulator										19			18.75
Petiole Samples											10		10.00
1/2 Ton Pickup Truck											9		9.09
3/4 Ton Pickup Truck											10		9.62
ATV4WD											8		7.84
Service Truck											11		11.28
Desiccant Application											33		32.73
TOTAL CULTURAL COSTS							1,038	148	115	166	105		1,571.98
Cut Vines/Roll Beds											12		11.77
Dig/Harvest Potatoes												101	101.20
Bulk Potatoes												51	51.44
Haul Potatoes												112	111.99
Assessments/Fees												11	10.70
TOTAL HARVEST COSTS											12	275	287.10
Elevate/Holding Tub												83	82.74
Shed-Store Potatoes												367	366.61
Treat For Sprouts												19	19.20
TOTAL POST-HARVEST COSTS												469	468.54
Interest on Operating Capital 8.5%	1	1	1	1	1	2	11	12	13	14	15	-	73.35
TOTAL OPERATING COSTS/ACRE	157	1	1	1	1	160	1,351	160	128	180	131	744	3,016.83

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 3. CONTINUED MONTHLY COSTS PER ACRE TO PRODUCE POTATOES-FRESH MARKET
Klamath Basin-Tulelake-2023

Operation	Nov	Dec	Jan	Feb	Mar	April	May	June	Jul	Aug	Sept	Oct	Total
CASH OVERHEAD													
Land Rent-Potatoes												550.00	550.00
Field Sanitation				2.00									2.00
Field Supervisor Salary	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	55.00
GPS Auto-TracActivation												2.33	2.33
Liability Insurance												1.03	1.03
Regulatory Compliance	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	55.00
Office Expense	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	75.00
Investment Repairs	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	4.46
Property Insurance				0.38						0.38			0.76
TOTAL CASH OVERHEAD COSTS/ACRE	15.79	15.79	15.79	18.17	15.79	15.79	15.79	15.79	15.79	16.17	15.79	569.15	745.58
TOTAL CASH COSTS/ACRE	173.24	16.86	16.86	19.23	16.86	175.81	1,366.71	176.28	144.23	196.19	147.13	1,313.02	3,762.41

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 4. RANGING ANALYSIS - POTATOES-FRESH MARKET
 Klamath Basin-Tulelake-2023

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE POTATOES FRESH MKT							
	YIELD (Cwt/Acre)						
	484.00	486.00	488.00	490.00	492.00	494.00	496.00
OPERATING COSTS/ACRE:							
Pre-Plant	616	616	616	616	616	616	616
Cultural	1,572	1,572	1,572	1,572	1,572	1,572	1,572
Harvest	284	285	286	287	288	289	291
Post-Harvest	469	469	469	469	469	469	469
Interest on operating capital@ 8.50%	73	73	73	73	73	73	73
TOTAL OPERATING COSTS/ACRE	3,013	3,014	3,016	3,017	3,018	3,019	3,020
TOTAL OPERATING COSTS/CWT	6.23	6.20	6.18	6.16	6.13	6.11	6.09
CASH OVERHEAD COSTS/ACRE	746	746	746	746	746	746	746
TOTAL CASH COSTS/ACRE	3,759	3,760	3,761	3,762	3,764	3,765	3,766
TOTAL CASH COSTS/CWT	7.77	7.74	7.71	7.68	7.65	7.62	7.59
NON-CASH OVERHEAD COSTS/ACRE	132	132	132	132	132	132	132
TOTAL COSTS/ACRE	3,891	3,892	3,893	3,895	3,896	3,897	3,898
TOTAL COSTS/CWT	8.04	8.01	7.98	7.95	7.92	7.89	7.86

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR POTATOES FRESH MKT

PRICE	YIELD (Cwt/Acre)						
\$/Cwt	484.00	486.00	488.00	490.00	492.00	494.00	496.00
4.50	-835	-827	-820	-812	-804	-796	-788
7.00	375	388	400	413	426	439	452
9.50	1,585	1,603	1,620	1,638	1,656	1,674	1,692
12.00	2,795	2,818	2,840	2,863	2,886	2,909	2,932
14.50	4,005	4,033	4,060	4,088	4,116	4,144	4,172
17.00	5,215	5,248	5,280	5,313	5,346	5,379	5,412
19.50	6,425	6,463	6,500	6,538	6,576	6,614	6,652

NET RETURNS PER ACRE ABOVE CASH COSTS FOR POTATOES FRESH MKT

PRICE	YIELD (Cwt/Acre)						
\$/Cwt	484.00	486.00	488.00	490.00	492.00	494.00	496.00
4.50	-1,581	-1,573	-1,565	-1,557	-1,550	-1,542	-1,534
7.00	-371	-358	-345	-332	-320	-307	-294
9.50	839	857	875	893	910	928	946
12.00	2,049	2,072	2,095	2,118	2,140	2,163	2,186
14.50	3,259	3,287	3,315	3,343	3,370	3,398	3,426
17.00	4,469	4,502	4,535	4,568	4,600	4,633	4,666
19.50	5,679	5,717	5,755	5,793	5,830	5,868	5,906

NET RETURNS PER ACRE ABOVE TOTAL COST POTATOES FRESH MKT

PRICE	YIELD (Cwt/Acre)						
\$/Cwt	484.00	486.00	488.00	490.00	492.00	494.00	496.00
4.50	-1,713	-1,705	-1,697	-1,690	-1,682	-1,674	-1,666
7.00	-503	-490	-477	-465	-452	-439	-426
9.50	707	725	743	760	778	796	814
12.00	1,917	1,940	1,963	1,985	2,008	2,031	2,054
14.50	3,127	3,155	3,183	3,210	3,238	3,266	3,294
17.00	4,337	4,370	4,403	4,435	4,468	4,501	4,534
19.50	5,547	5,585	5,623	5,660	5,698	5,736	5,774

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 5. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
 Klamath Basin-Tulelake 2023

ANNUAL EQUIPMENT COSTS							
	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead		Total
					Insurance	Taxes	
225 HP 4WD Tractor	245,388	15	166,864	20,299	174	2,061	22,534
175 HP 4WD Tractor	175,833	15	119,566	14,545	125	1,477	16,147
125 HP 4WD Tractor	115,412	15	78,480	9,547	82	969	10,598
Subsoiler 16' 9 Shank	42,400	5	25,440	5,917	29	339	6,285
Stubble Disc 16'	45,000	5	27,000	6,280	30	360	6,670
Rotospike - 15"	29,000	10	17,400	2,870	20	232	3,121
Chisel - 21'	20,000	10	12,000	1,979	13	160	2,153
Ring Roller 16'	18,000	10	10,800	1,781	12	144	1,937
Flail Mower 15'	13,203	10	7,922	1,306	9	106	1,421
Bed Shaper - 15' 5 Row	10,500	10	6,300	1,039	7	84	1,130
Potato Digger-Harvest	120,000	12	72,000	11,083	81	960	12,124
Planter 5 Row 15'	53,000	10	9,373	6,868	26	312	7,206
Cultivator-Sled Close	11,000	10	6,600	1,088	7	88	1,184
Cultivator Sled 5 Row	9,500	8	5,700	1,035	6	76	1,118
Potato Truck 15 Ton #	20,000	5	13,600	2,513	14	168	2,695
Potato Truck 15 Ton #	20,000	5	13,600	2,513	14	168	2,695
Potato Truck 15 Ton #	20,000	5	13,600	2,513	14	168	2,695
Potato Truck 15 Ton #	20,000	5	13,600	2,513	14	168	2,695
Elevator	55,000	5	33,000	7,676	37	440	8,153
Holding Tub	70,000	5	42,000	9,769	47	560	10,376
Pickup 3/4 Ton #1	32,000	5	21,760	4,021	23	269	4,312
Pickup 1/2 Ton #1	28,000	5	19,040	3,518	20	235	3,773
#1 ATV	8,500	5	5,780	1,068	6	71	1,145
Service Truck #2	120,000	10	81,600	11,179	85	1,008	12,272
Spray Boom - 25'	3,630	5	2,178	507	2	29	538
Total	1,305,366		825,203	133,427	898	10,653	144,978
60% of New Cost*	783,220		495,122	80,056	539	6,392	86,987

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
**TABLE 5. CONTINUED WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS
OVERHEAD COSTS**

Klamath Basin-Tulelake 2023

ANNUAL INVESTMENT COSTS

Investment	Price	Years Life	Salvage Value	Capital Recovery	Cash Overhead			Total
					Insurance	Taxes	Repairs	
Building 2400 sq ft	25,000	25	-	2,145	11	125	500	2,781
Fuel Tanks 2-500, 1000 gal	21,950	20	2,195	2,018	10	121	439	2,588
Pipe Trailer (10)	35,000	10	3,500	4,730	16	193	700	5,639
125 Hp Booster Pumps(2)	39,838	10	3,984	5,384	18	219	797	6,418
Semi-Truck & Lowbed	95,000	15	3,617	10,287	42	493	1,900	12,721
Implement Carrier	16,700	15	1,670	1,767	8	92	334	2,201
GPS Guidance System	8,500	10	850	1,149	4	47	170	1,369
Shop Tools	20,000	20	2,000	1,839	9	110	400	2,358
Solid Set	72,404	20	7,240	6,658	34	398	1,448	8,538
Total Investment	334,392		25,056	35,976	152	1,797	6,688	44,613

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/Farm	Units	Price/Unit	Total
Land Rent-Potatoes	200	Acre	550	110,000
Field Sanitation	1,500	Acre	2	3,000
Field Supervisor Salary	1,500	Acre	55	82,500
GPS Auto-TracActivation	1,500	Acre	2	3,500
Liability Insurance	1,500	Acre	1	1,545
Regulatory Compliance	1,500	Acre	55	82,500
Office Expense	1,500	Acre	75	112,500

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 6. HOURLY EQUIPMENT COSTS

Klamath Basin-Tulelake 2023

Description	HOURLY EQUIPMENT COSTS								
	Total Hours Used	Potatoes Hours Used	Capital Recovery	Cash Overhead		Operating			Total Costs/Hr
				Insurance	Taxes	Lube and Repairs	Fuel	Total Operating	
225 HP 4WD Tractor	1066	329	11.43	0.10	1.16	13.92	53.54	67.46	80.14
175 HP 4WD Tractor	1066	167	8.19	0.07	0.83	10.47	41.64	52.11	61.20
125 HP 4WD Tractor	1066	287	5.37	0.05	0.55	7.23	29.74	36.98	42.94
Subsoiler 16' 9 Shank	400	61	8.88	0.04	0.51	9.80	-	9.80	19.23
Stubble Disc 16'	400	27	9.42	0.05	0.54	7.56	-	7.56	17.57
Rotospike - 15"	150	48	11.48	0.08	0.93	8.36	-	8.36	20.84
Chisel - 21'	200	10	5.94	0.04	0.48	4.18	-	4.18	10.64
Ring Roller 16'	200	98	5.34	0.04	0.43	2.03	-	2.03	7.85
Flail Mower 15'	200	31	3.92	0.03	0.32	5.41	-	5.41	9.67
Bed Shaper - 15' 5 Row	200	39	3.12	0.02	0.25	2.16	-	2.16	5.55
Potato Digger-Harvester 4 Row	400	153	16.62	0.12	1.44	23.88	-	23.88	42.07
Planter 5 Row 15'	150	48	27.47	0.11	1.25	14.03	-	14.03	42.85
Cultivator-Sled Close 5 Row	150	31	3.27	0.02	0.26	2.26	-	2.26	5.81
Cultivator Sled 5 Row	150	31	2.48	0.02	0.18	2.01	-	2.01	4.69
Potato Truck 15 Ton #1	400	110	3.77	0.02	0.25	4.26	15.38	19.64	23.68
Potato Truck 15 Ton #2	400	110	3.77	0.02	0.25	4.26	15.38	19.64	23.68
Potato Truck 15 Ton #3	400	110	3.77	0.02	0.25	4.26	15.38	19.64	23.68
Potato Truck 15 Ton #4	400	110	3.77	0.02	0.25	4.26	15.38	19.64	23.68
Elevator	400	200	11.51	0.06	0.66	7.67	-	7.67	19.90
Holding Tub	400	200	14.65	0.07	0.84	9.76	-	9.76	25.33
Pickup 3/4 Ton #1	400	44	6.03	0.03	0.40	3.68	8.79	12.47	18.94
Pickup 1/2 Ton #1	400	44	5.28	0.03	0.35	3.11	6.94	10.05	15.71
#1 ATV	400	44	1.60	0.01	0.11	0.69	3.70	4.39	6.10
Service Truck#2	200	37	33.54	0.25	3.02	13.69	15.38	29.07	65.88
Spray Boom - 25'	300	34	1.01	0.00	0.06	0.99	-	0.99	2.06

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS
TABLE 7. OPERATIONS WITH EQUIPMENT & MATERIALS
Klamath Basin-Tulelake 2023

Operation	Operation	Tractor	Implement	Labor	Labor	Material/Custom	Rate/Acre	Unit
Chop Residue 80% Ac	Oct	125 HP 4WD	Flail Mower 15'	Machine	0.18		0.15	
Stubble Disc & Roll	Oct	225 HP 4WD	Stubble Disc 16'	Machine	0.16		0.16	
Stubble Disc & Roll	Oct		Ring Roller 16'	Machine				
Sub-Soil 50% Ac	Oct	225 HP 4WD	Subsoiler 16' 9	Machine	0.36		0.18	
Sub-Soil 50% Ac	Oct		Ring Roller 16'	Machine				
Pre-	Oct					Water-Pumped	0.5	AcIn
Roto-Spike/Fall-	Oct	175 HP 4WD	Rotospike - 15"	Machine	0.12	Vapam HL	6.25	Gal
Gypsum 25% Ac	Oct					Gypsum Hauled-	0.25	Ton
Chisel & Roll	April	225 HP 4WD	Chisel - 21'	Machine	0.06			
Chisel & Roll	April		Ring Roller 16'					
Roto-spike/Spring-	April	175 HP 4WD	Rotospike - 15"	Machine	0.17			
Roto-spike/Spring-	April					Vapam HL	16.25	Gal
Fertilize-Pre-Plant	May					16-20-0-24% S	100	Lb
Fertilize-Pre-Plant	May					10-34-0	20	Gal
Fertilize-Pre-Plant	May					Potash	200	Lb
Pull Beds	May	175 HP 4WD	Bed Shaper - 15' 5	Machine	0.24			
Pull Beds	May					Eptam 7E	1.75	Pint
Plant Potatoes	May	225 HP 4WD	Planter 5 Row 15'	Machine	0.29	Seed Potatoes-	22	Cwt
At Planting-Fungicide	May					Quadris	10	FLOz
At Planting-Fungicide	May					Vydate L	2	Pint
Irrigation Labor	May						10	
Irrigate/Sprinklers	May			Irrigation	10.00	Water-Pumped	3.5	AcIn
Irrigate/Sprinklers	June			Irrigation		Water-Pumped	4	AcIn
Irrigate/Sprinklers	July			Irrigation		Water-Pumped	6	AcIn
Irrigate/Sprinklers	Aug			Irrigation		Water-Pumped	4.5	AcIn
Irrigate/Sprinklers	Sept			Irrigation		Water-Pumped	2	AcIn
Cultivate/Hilling	May					Prowl H2O	2	Pint
Cultivate/Hilling	May					Sencor 4	4	Oz
Chemigation-Disease	June					Ridomil Gold Bravo	2	Lb
Chemigation-Disease	July					Luna Tranquility	10	FLOz
Herbicide post	June	175 HP 4WD	Spray Boom - 25'	Machine	0.20	Matrix SG	2	Oz
Chemigation-Insects	July					Movento	2	FLOz
Insects-Broadcast	Aug					Application Air 20G	1	Acre
Insects-Broadcast	Aug					Movento	2	FLOz
Disease-Broadcast	Aug					Application Air 20G	1	Acre
Disease-Broadcast	Aug					Tanos	10	Cwt
Growth Regulator	Aug					Application Air 20G	0.5	Acre
Growth Regulator	Aug					Royal MH-30	1	Gal
Petiole Samples	Sept					Petiole Samples	1	Acre
1/2 Ton Pickup Truck	Sept	Pickup 1/2 Ton		Machine	0.24			
3/4 Ton Pickup Truck	Sept	Pickup 3/4 Ton		Machine	0.24			
ATV4WD	Sept	#1 ATV		Machine	0.24			
Service Truck	Sept	Service Truck#2		Machine	0.20			
Desiccant Application	Sept					Application Air 20G	0.5	Acre
Desiccant	Sept					Reglone Desiccant	1	Pint
Cut Vines/Roll Beds	Sept	125 HP 4WD	Cultivator Sled 5	Machine	0.18			
Dig/Harvest Potatoes	Oct	225 HP 4WD	Potato Digger-	Machine	0.92	Harvest		Ton
Bulk Potatoes	Oct			Non-	2.00			
Haul Potatoes	Oct	Potato Truck 15		Machine	0.60	Haul (ton)		Ton
Haul Potatoes	Oct	Potato Truck 15			0.60	Haul (ton)		Ton
Haul Potatoes	Oct	Potato Truck 15			0.60	Haul (ton)		Ton
Haul Potatoes	Oct	Potato Truck 15			0.60	Haul (ton)		Ton
Assessments/Fees	Oct					CPRAB	535	Cwt
Elevate/Holding Tub	Oct	125 HP 4WD	Elevator	Machine	2.20			
Shed-Store Potatoes	Oct		Holding Tub			Store Potatoes-	535	Cwt
Treat For Sprouts	Oct					StorOx	4	Pint