

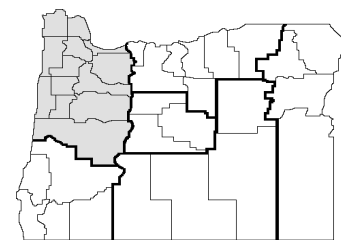
Enterprise Budget

Hemp, CBD Oil, Mechanical Harvest, Willamette Valley

Clark Seavert¹ and Jacob Crabtree²,

¹Agricultural Economist, Department of Applied Economics,

Oregon State University, and ²CEO of Columbia Hemp Trading Company.



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This enterprise budget estimates the typical economic costs and returns to produce hemp for CBD oil in the 2020 crop year. It should be used as a guide to estimate actual costs and returns and is not representative of any particular farm. The assumptions used in constructing this budget are discussed below. Assistance provided by area hemp producers and other agribusinesses is much appreciated.

This study's results are based on our current understanding of hemp production, market, and yields. As research advances, we expect these assumptions to change.

Cropping Pattern

This budget is based on a farm with 1,200 acres in continuous production of grass seeds or related, similar crops such as small grains, oil and forage seeds, with an additional 300 acres of alfalfa hay production, totaling 1,500 tillable acres. All crops are grown using an impact sprinkler irrigation system. Typical hemp dry matter yield in this budget is 3,000 pounds per acre.

Labor

Tractor driver labor cost is \$22 per hour and all other labor \$16 per hour, both rates include social security, workers' compensation, unemployment insurance, and other labor overhead expenses. For this study, owner labor is valued at the same rate as tractor driver rates, and all labor is assumed to be a cash cost. Tractor labor hours are calculated based on machinery hours, plus ten percent.

Capital

Interest on operating capital for production inputs, machinery labor, repairs and maintenance (six percent) are treated as a cash expense, borrowed for six-months. An opportunity cost for machinery and land ownership is six and three percent, respectively. The market value for land is \$15,000 per acre.

Machinery and Equipment

The machinery and equipment used in this budget are sufficient for a 1,500-acre farm with the crops described above. The machinery and equipment hours reflect producing grass seeds, small grains, oil and forage seeds, and alfalfa hay. A detailed breakdown of machinery values is shown in Table 2. Estimated labor, variable, and fixed costs for machinery are shown in Table 3, based on an hourly and per acre basis. The machinery costs are calculated based on the total farm use of the machinery. Off-road diesel is \$2.70 per gallon.

Operations

Table 1 shows the machine operations for hemp production. A 350-hp tractor is used to pull the heavy disk, field cultivator, grain cart, and assist during planting. A 200-hp tractor is used to pull the transplanter and boom sprayer. A charge for miscellaneous and other expenses is five percent of production costs, including additional labor, repairs and maintenance, supplies and materials, tax preparation, memberships in professional organizations, and educational workshops not included in field operations.

Results

Hemp price has been based on a percentage point of CBD per pound of dry biomass in the past. However, based on current markets, a price of \$1 per pound of dry matter, assuming an 8% CBD content, is used. The total gross income in this budget is \$3,000 per acre. At harvest, hemp flowers are custom hauled to a processor for \$2 per mile, 25 miles round-trip, and six loads per year. Drying costs are \$0.50 per dry pound. Variable cash costs are \$4,428 per acre, giving a net return above variable costs of -\$1,428 per acre. Total costs are \$5,169 per acre when all costs are considered, resulting in a -\$2,169. A break-even price of \$1.48 per pound is needed to pay all variable costs and \$1.72 for total costs. A break-even yield of 4,428 pounds of dry matter is required to pay variable costs and 5,169 pounds for total costs. Tables 4 and 5 show the returns per acre for variable cash and total costs at various yields and prices.

Note: Not included in this study are a return to management, family living withdrawals for unpaid labor, depreciation and opportunity costs for vehicles, buildings and improvements, an accounting for all regulatory costs, and local, state, and federal income taxes paid by the owner.

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Table 1. Economic Costs and Returns of Producing Hemp for CBD Oil, \$/acre.

Returns		Unit	\$/Unit	Quantity	Total		
Hemp for CBD Oil, dry matter		pound	\$1.00	3,000.00	\$3,000.00		
Total Returns					\$3,000.00		
Variable Cash Costs	Price	Quantity	Unit	Labor	Machinery	Materials	Total
Land Preparation and Maintenance							
Offset disk		1.00	acre	\$2.77	\$4.47	\$0.00	\$7.24
Field cultivator		1.00	acre	2.35	3.57	0.00	5.92
Crop Production							
Transplanter		1.00	acre	553.59	96.38	1,066.80	1,716.77
- Plugs	\$0.30	3,556.00	plants				
- Planting labor (2-people)	\$16.00	32.00	hour				
Boom sprayer		2.00	acre	4.10	4.07	275.00	283.17
- Pest Control	\$250.00	1.00	acre				
- Fungicide, mold control	\$25.00	1.00	acre				
Irrigation				32.00	3.00	150.00	185.00
- Sprinkler system, repairs & maint.	\$3.00	1.00	acre				
- Power	\$150.00	1.00	acre				
- Labor	\$16.00	2.00	hour				
Harvest							
CBD testing	\$50.00	1.00	acre	0.00	0.00	50.00	50.00
Combine		1.00	acre	7.83	17.82	0.00	25.65
Grain cart		1.00	acre	7.83	12.75	0.00	20.58
Transportation to processor, custom	\$2.00	150.00	mile	0.00	0.00	300.00	300.00
Drying, custom	\$0.50	3,000.00	pound	0.00	0.00	1,500.00	1,500.00
Other Charges							
Other expenses		5.00%		0.00	0.00	204.72	204.72
Interest on operating capital		6.00%		0.00	0.00	128.97	128.97
Total Variable Cash Costs				\$610.47	\$142.06	\$3,675.49	\$4,428.02
Total Returns minus Total Variable Cash Costs							-\$1,428.02
Fixed Cash Costs			Unit	\$/Unit	Value		
Property insurance			acre	\$30.00	\$30.00		
Property taxes			acre	25.00	25.00		
Total Fixed Cash Costs					\$55.00		
Fixed Non-Cash Costs			Unit	\$/Unit	Value		
Power units, machinery & equipment, depreciation & interest			acre	\$235.58	\$235.58		
Annual return on investment in land			acre	450.00	450.00		
Total Fixed Non-Cash Costs					\$685.58		
Total Annual Costs					\$5,168.60		
Returns minus Total Annual Costs					-\$2,168.60		
<i>Break-even Price to Cover Variable Costs</i>					<i>\$1.48</i>		
<i>Break-even Price to Cover Total Costs</i>					<i>\$1.72</i>		
<i>Break-even Yield, pounds of dry matter, to Cover Variable Costs</i>					<i>4,428</i>		
<i>Break-even Yield, pounds of dry matter, to Cover Total Costs</i>					<i>5,169</i>		

Table 2. Machinery Cost Assumptions

Machine	Width (feet)	Market Value	Annual Use	of Expected Life (Years)
350 HP Tractor	N/A	\$250,000	974	12
200 HP Tractor	N/A	200,000	968	12
Offset disk	18.0	30,000	52	15
Field cultivator	20.0	22,000	58	15
Transplanter	6.0	10,000	26	15
Boom sprayer	30.0	9,500	122	15
Combine	15.0	200,000	388	7
Grain cart	N/A	18,000	388	15

Table 3. Machinery Cost Calculations, on a per hour and per acre basis.

Machine	-- Variable Costs --			Fixed Cost	Total Cost
	Fuel & Lube & Maint.	Repairs & Interest			
----- Costs Per Hour -----					
350 HP Tractor	\$24.84	\$8.76	\$30.69		\$64.30
200 HP Tractor	12.42	6.97	24.73		44.11
Offset disk	0.00	5.40	65.07		70.47
Field cultivator	0.00	20.30	37.57		57.87
Transplanter	0.00	3.08	44.10		47.18
Boom sprayer	0.00	4.67	8.86		13.53
Combine	31.05	24.03	80.72		135.80
Grain cart	0.00	5.80	5.44		11.24
----- Costs Per Acre -----					
Field Operation	Acres/ Hour	Operator Labor	Variable Costs	Fixed Costs	Total Costs
350 HP Tractor & Offset Disk	8.73	\$2.77	\$4.47	\$10.97	\$18.22
350 HP Tractor & Field Cultivator	10.30	3.84	5.23	6.63	15.70
Transplanter	0.58	41.59	5.30	75.79	122.68
200 HP Tractor & Boom Sprayer	11.82	2.05	2.04	2.84	6.93
Combine	3.09	7.83	17.82	26.12	51.76
350 HP Tractor & Grain Cart	3.09	7.83	12.75	11.69	32.27

Table 4. Estimated Per Acre Returns Over Variable Cash Costs at Varying Yields and Prices.

Price/Pound	Pounds of Dry Matter per Acre						
	2,800	3,000	3,200	3,400	3,600	3,800	4,000
\$0.90	(1,908)	(1,728)	(1,548)	(1,368)	(1,188)	(1,008)	(828)
\$1.00	(1,628)	(1,428)	(1,228)	(1,028)	(828)	(628)	(428)
\$1.10	(1,348)	(1,128)	(908)	(688)	(468)	(248)	(28)
\$1.20	(1,068)	(828)	(588)	(348)	(108)	132	372
\$1.30	(788)	(528)	(268)	(8)	252	512	772
\$1.40	(508)	(228)	52	332	612	892	1,172
\$1.50	(228)	72	372	672	972	1,272	1,572

Table 5. Estimated Per Acre Returns Over Total Costs at Varying Yields and Prices.

Price/Pound	Pounds of Dry Matter per Acre						
	2,800	3,000	3,200	3,400	3,600	3,800	4,000
\$0.90	(2,649)	(2,469)	(2,289)	(2,109)	(1,929)	(1,749)	(1,569)
\$1.00	(2,369)	(2,169)	(1,969)	(1,769)	(1,569)	(1,369)	(1,169)
\$1.10	(2,089)	(1,869)	(1,649)	(1,429)	(1,209)	(989)	(769)
\$1.20	(1,809)	(1,569)	(1,329)	(1,089)	(849)	(609)	(369)
\$1.30	(1,529)	(1,269)	(1,009)	(749)	(489)	(229)	31
\$1.40	(1,249)	(969)	(689)	(409)	(129)	151	431
\$1.50	(969)	(669)	(369)	(69)	231	531	831