



Photo: UI Canola Photo Gallery, <http://agweb.ag.uidaho.edu/brassica/photos.htm>

Economics of Spring Canola Production in Dryland Eastern Washington

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Demand for oilseed crops for biodiesel production promises to be strong due to recent legislative and commercial developments. This study calculates break-even crop prices for a range of oilseed production levels across a wide region of dryland crop production in eastern Washington. Appendix tables provide detailed costs of production for each crop and rainfall zone. These tables include both variable and fixed machinery costs as well as land rent expenses using a traditional cost-share arrangement. These appendix tables are available as spreadsheets in electronic format, available from <http://cff.wsu.edu/publications> (type canola in the search bar). Growers can alter the input prices, yields, and other information to tailor the costs to their operation. February 2006 prices in Table 1 were used to conduct this analysis.

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We wish to thank Curtis Henning for his careful review and valuable suggestions for canola productions. However, the authors assume responsibility for any omissions or errors. We welcome your comments and suggestions on this draft.

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Table 1. Input Price Changes for Fertilizer and Fuel, 2003-2005

<u>Input</u>	<u>Sept. 2003</u>	<u>Sept. 2004</u>	<u>Sept. 2005</u>	<u>Feb. 2006</u>
Aqua-Nitrogen	35¢/lb.	40¢/lb.	49¢/lb.	37¢/lb.
Aqua-Sulfur	35¢/lb.	35¢/lb.	38¢/lb.	22¢/lb.
Dry-Nitrogen	34.5¢/lb.	34¢/lb.	50¢/lb.	44¢/lb.
Dry-Phosphorous	29¢/lb.	32¢/lb.	35¢/lb.	32¢/lb.
Dry-Sulfur	26¢/lb.	29¢/lb.	32¢/lb.	17¢/lb.
Off-Road Diesel	\$1.19/gal.	\$1.50/gal.	\$2.50/gal.	\$2.23/gal.

BACKGROUND

Alternative crops can provide some benefits for dryland grain growers in the Pacific Northwest. Oilseed crops, such as rapeseed, canola, and mustard, have been used in rotation with wheat and barley in the region since the late 1970s. Including oilseeds in a cereal grain rotation provides a greater choice of herbicide use in the battle against unwanted grasses, thus providing for better weed control. The addition of an oilseed crop also helps loosen hardpan within the soil and may break up disease cycles. Although these alternative crops potentially improve yields of the subsequent wheat or barley crop, the market price for these oilseed crops during the past several years has caused some producers to produce these crops at a loss.

The objective of this project is to help growers learn about canola production and provide a basis for determining the prices and/or yields they must receive to produce canola at a profit. The scope of the project includes various rainfall zones in eastern Washington. Canola budgets were developed for areas with less than 15 inches of annual precipitation, 15 to 20 inches of annual precipitation, and over 20 inches of annual precipitation. Returns over variable and total production costs at various canola price levels are presented in Tables 2, 3, and 4. Expected yields were considered reasonable given variety trials conducted across the region for the past five years.

Table 2: Returns over Variable and Total Production Costs for Spring Canola Production by Precipitation Zone (assuming canola price = \$0.12)

<u>Precipitation Zone/ Yield (lb/acre)</u>	<u>Returns over Variable Production Costs (\$/ac)</u>	<u>Returns over Total Production Costs (\$/ac)</u>
Less than 15" annual precipitation (1200 lb)	40	-15
15" to 20" annual precipitation (1500 lb)	54	-3
Over 20" annual precipitation (1800 lb)	87	20

Table 3: Returns over Variable and Total Production Costs for Spring Canola Production by Precipitation Zone (assuming canola price = \$0.11)

Precipitation Zone/ Yield (lb/acre)	Returns over Variable Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Less than 15" annual precipitation (1200 lb)	28	-27
15" to 20" annual precipitation (1500 lb)	39	-13
Over 20" annual precipitation (1800 lb)	69	8

Table 4: Returns over Variable and Total Production Costs for Spring Canola Production by Precipitation Zone (assuming canola price = \$0.10)

Precipitation Zone/ Yield (lb/acre)	Returns over Variable Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Less than 15" annual precipitation (1200 lb)	16	-39
15" to 20" annual precipitation (1500 lb)	24	-23
Over 20" annual precipitation (1800 lb)	51	-4

Table 5 presents break-even prices for a range of canola yields over the three rainfall zones. The current bid price for canola is around \$9.60 per cwt in North Dakota. This price is similar to delivery bid prices for Canadian processors. See http://www.northerncanola.com/daily_cash/index.asp for updates. Assuming the average price of \$0.12 per lb received for canola over the past few years and the expected yields for each rainfall zone, only growers in the middle and highest rainfall zones would cover their costs of total production. If current prices are trending downward, as suggested by these bid prices, then production will not cover costs of production for any of the rainfall zones in this study, given the production assumptions used in this study.

Average yields for the Pacific Northwest Canola Variety Trials, conducted by university and industry sponsors at a number of sites in the Inland Northwest, reveal considerable yearly fluctuation across the dozens of varieties tested. (See <http://agweb/ag.uidaho.edu/brassica> for detailed trial results.) The overall mean for 27 trial cultivars and five control cultivars at nine locations was 1633 lb. per acre in 2005. Most cultivars produced acceptable yields with 75 percent of the lines producing more than 1500 lb per acre when averaged across nine locations. In 2004, the overall average was 1675 lb. per acre. The overall mean in 2003 was 1279 lb per acre, due to lower than average rainfall across the region.

Table 5: Estimated Break-Even Prices Covering Total Production Costs for Canola Seed By Rainfall Zone

Less than 15" Rainfall Zone		15" to 20" Rainfall Zone		Greater than 20" Rainfall Zone	
Production Level	2006 B-E Price	Production Level	2006 B-E Price	Production Level	2006 B-E Price
(lbs.)	(¢/lb.)	(lbs.)	(¢/lb.)	(lbs.)	(¢/lb.)
1000	15.9	1000	16.3	1000	16.4
1100	14.5	1200	14.3	1200	14.4
1200	13.3	1400	12.8	1400	12.9
1300	12.3	1600	11.7	1600	11.8
1400	11.4	1800	10.8	1800	10.9
1500	10.6	2000	10.2	2000	10.2

CULTURAL CONSIDERATIONS²

Extensive agronomic data is available from the Canadian Canola Council's excellent website, <http://www.canola-council.org/growing.html>. You'll find data on pests, IPM, stress factors, and disease as well as marketing, grading, and storing information.

Damage from Herbicide Residual

Some herbicide residues can damage oilseed crops. Canola is very sensitive to imidazolinone and the sulfurea-type herbicides such as Glean, Finesse, Ally, Maverick, and Pursuit. If these chemicals have been used, growers are advised to wait at least 40 months before planting brassicas and yellow mustard. There are varieties resistant to Pursuit; check with seed sources for further information. A report on field trials with Pursuit-resistant cultivars can be found at <http://agweb.ag.uidaho.edu/brassica/Variety-trial-info/Pursuit.PDF>.

Seed Treatments

The budgets in this publication use treated seed. Prices for treated seed vary by cultivar and treatment. Gaucho is a 45-day systemic insecticide seed treatment for aphid and flea beetle control. Benlate is used to prevent black leg, a seedborne fungal disease that is common in Canada. Treated seed costs considerably more than untreated seed, but studies have shown that the treatments are cost-effective. A report on the effectiveness of various seed treatments based on field trials can be found at <http://agweb.ag.uidaho.edu/brassica/Variety-trial-info/CRP-Seedtr04.PDF>. Varieties that are resistant to glyphosphate as well as some other herbicides are available, but growers need to be aware that European markets are closed to GMO products. Japanese markets, however, accept GMO products at the time of this publication.

² See EB1919 GROWER EXPERIENCES WITH MUSTARD AND CANOLA IN EASTERN WASHINGTON, 1997–2000, by Norm Herdrich, for more information. Available online at <http://cru.cahe.wsu.edu/CEPublications/eb1919/eb1919.pdf>

Seeding Rate

When seedbed conditions are optimal, a seeding rate of 4 to 6 lb per acre is recommended for canola. Seed needs to be in firm contact with the soil at a uniform depth of ½ to 1 inch deep. In less than ideal planting conditions, a seeding rate of 6 to 8 lb is recommended. Seed should be placed from ¾ to one inch deep, in rows no wider than 12 inches. An ideal row spacing is from 6 to 7 inches apart.

Fertility for Canola and Mustard Seed Production

Canola requires about 6.5 lb of nitrogen for each 100 lb of seed yield. A 6:1 ratio of nitrogen to sulfur is recommended. More detail on optimum nitrogen use by soil moisture and expected yield can be found on the Canadian Canola Council's excellent website, <http://www.canola-council.org/nitrogenintro.aspx>. Canola is sensitive to burning from nitrogen placed in the seed row. An effective management strategy is to deep-band fertilizer in the fall, particularly for dry soils. This increases the availability of the nutrients in the root zone, rather than trapping them in the upper layer of dry soil. Again, more detailed information is available at <http://www.canola-council.org/nitromgmt.aspx>.

Recommendations for phosphorus will depend on field history. There should be about 10 lb available phosphate per acre, and at least 10 lb of available sulfur. Soil testing of the entire soil profile is recommended. The Canadian Canola Council has excellent information on nutrient needs at <http://www.canola-council.org/soilfertandnut.aspx>.

Swathing Versus Direct Harvesting

In the budgets for this publication, we assume that all of the oilseeds are directly harvested with a combine. However, some producers swathe canola before combining. Swathing is expensive and time-consuming, but can prevent excessive shattering with canola. Polymer sprays are also available to counteract shatter problems. The cost of the spray is typically about \$10 to \$11 per acre plus the cost of aerial application (usually \$5 per acre).

The Yield Shield, a new product from Canada, is promoted as a better alternative to swathing. As shown below in Figure 1, it is basically a curved blade similar to a snowplow that is used to bend the canola stalks while green, allowing the crop to dry without danger of blowing away. Further information can be found on the company's website, <http://www.agshield.com/yield.html>.

Winter Canola

Winter canola is planted in the fall, either on summer fallow or recropped ground. Planting following summer fallow produces higher yields than recropping, but recropped winter canola generally outyields spring canola. However, winter kill and establishment problems when soil moisture is inadequate can be problematic with winter canola. Plant breeder Jack Brown at the University of Idaho is developing varieties suited to our region. Average yields in field trials have ranged from a low of 2608 lb in 2004 to a high of 3292 lb in 2003. Extensive trial data for winter canola trials extending from northern Idaho to central Washington and northeastern Oregon can be viewed at <http://agweb/ag.uidaho.edu/brassica>.



Figure 1. The Yield Shield from AgShield of Canada is used to bend canola stalks while green, which the company claims encourages a more uniform ripening of seed without cutting the plant. Note: The steering mechanism on the tractor swivels, so it is actually driving backwards!

DISCUSSION OF BUDGET INFORMATION

Enterprise costs and returns vary from one location to the next and over time for any particular farming operation. Variability stems from differences in the following:

- Capital, labor and natural resources
- Type and size of machinery complement
- Cultural practices
- Size of farm enterprise
- Crop yields
- Input prices
- Commodity prices
- Management skill

Costs can also be calculated differently depending on the intended use of the cost estimate. To avoid drawing unwarranted conclusions for any particular farm, the reader must closely examine the assumptions used. If they are not appropriate, adjustments in the costs and/or returns should be made.

Machinery Costs

The same machinery complement was used for all producers to eliminate the effect of different values and sizes of machinery among producers upon the total cost comparisons. The machinery complement used for this study was derived from interviews with 15 canola producers across the study area. A detailed list of machinery and data for each machine in the complement are presented in Tables D1 and D2.

Machinery fixed costs include depreciation, interest on the investment, property taxes, insurance, and housing. For the overall farm operation, these costs do not vary by crop, given the ownership of a specific machinery complement, and are incurred whether or not crops are grown. Machinery fixed costs for a specific field operation are determined by multiplying the machine hours per acre times per hour fixed cost (Table D2). Per hour fixed costs are determined by dividing the total fixed cost by the annual hours of machinery use for the representative firm.

Machinery interest costs are calculated on the average annual investment in the machine. The formula used to calculate the average machine investment is:

$$(\text{Purchase Cost} + \text{Salvage Value})/2$$

The 8.5% interest charge made against this average investment represents an opportunity cost (returns forgone by investing in a given machine implement rather than in an alternative investment) or interest paid on money borrowed to finance machine purchases, or both. Machinery interest cost for one acre of the crop enterprise being analyzed is determined by multiplying the respective machine hours per acre times the per hour interest costs shown in Table D2.

Land Costs

Costs of production among producers tend to be somewhat similar for any particular production system, regardless of production level, when land costs are not taken into consideration. Since the net land rental value is based on production level, land cost varies directly with production level, which in turn directly affects total cost. Land costs, included either as real or as opportunity costs, are based on the share rental arrangement typical in the area. In our study, net land rental cost was calculated as:

$$1/3 \text{ Crop Value} - (1/3 \text{ Fertilizer Cost} + 1/3 \text{ Chemical Cost} + 1/3 \text{ Crop Insurance} + \text{Land Taxes})$$

Land fixed costs include taxes and net rent, which are based on rental agreements typical for the area minus expenditures typically covered by the landlord. The typical lease agreement in the areas surveyed is a one-third land owner and two-third tenant crop share, with the land owner paying land taxes, one-third of the fertilizer cost, one-third of the chemical cost, and one-third of the crop insurance. The tenant covers all other production expenses.

While the owner-operator will not actually experience a land rental cost, this cost represents the minimum return owner-operators must realize to justify growing the crop themselves. This net rent return represents the income the owner-operator forgoes by producing the crop rather than renting to a tenant who produces the crop. As a result of owning land, the farmer receives both current returns from the farming operation and any long-term appreciation in land value. However, the farmer would continue to realize land value appreciation even if the land is rented out. Consequently, the appropriate land charge for growing the crop is only the forgone net rent. As used in this publication, for land that is owned and not rented, land cost is termed an opportunity cost to indicate that it is not an out-of-pocket expense, but rather a return that is forgone as a result of choosing to use the land to grow this crop. To determine the profitability of crop production relative to other activities, the owner-operator may want to consider these forgone returns, or opportunity costs, along with the usual production expenses.

Detailed Results

Spreadsheets with itemized production costs for each crop and rainfall zone are presented in the appendices. These spreadsheets are also available in an electronic format so that producers can adjust inputs and production levels, then determine break-even prices for their individual situations. Please contact the author (kpainter@wsu.edu) for an electronic copy of the spreadsheets.

A budget for the driest region, with less than 15" annual precipitation, is presented in Table A1. A brief description of field operations and inputs used is presented in Table A2. A budget for the 15" to 20" annual precipitation region can be found in Table B1, and the description of field operations and inputs used in Table B2. Table C1 presents the budget for the greater than 20" rainfall area and Table C2 describes field operations and inputs used. Tables D1 and D2 contain information about the machinery complement used in this study.

In the itemized budgets, costs of production are divided into variable and fixed costs. Variable costs vary directly with the crop grown and the number of acres produced. These costs include fuel, oil, repairs, fertilizer, chemicals, custom work, overhead, and interest on operating capital. Labor, including that provided by the owner-operator, is also included as a variable cost. Fixed costs occur whether or not a crop is grown, such as land and machinery taxes, machinery depreciation and interest, and land rent.

The itemized budgets can be tailored to individual producers' situations to some degree without changing the underlying cost assumptions. Increasing or decreasing input usage such as fertilizer levels and seed price or quantity will not change machinery usage costs or the fixed costs of production, such as machinery depreciation. Adjusting variable costs impacts the interest on operating costs and overhead costs, as these are calculated as a percentage of variable costs, but these adjustments are fairly minor.

Rotational Considerations

When looking at the economics of oilseed production, one cannot look at oilseeds as stand-alone crops. The economics of an oilseed rotation need to be compared with the economics of the rotation(s) it is replacing. The inclusion of oilseeds in a rotation may have a positive, neutral, or negative effect on the production of other crops in the rotation. Positive effects include the potential to help with control of disease and grassy weeds. Large taproots and considerable plant residue can also be beneficial. Oilseed crops are more difficult to establish and may require more moisture than most other rotational crops. In the less than 15" rainfall area, producers sometimes have difficulty establishing a stand due to drought and/or frost conditions in the area.

Summary and Conclusions

The objective of this project is to help growers evaluate the potential of growing canola as a rotational crop in the dryland eastern Washington grain region. The term "profit" as used in this publication is defined as making a return over all costs, including the opportunity cost of operator labor and capital invested. Assumptions made regarding the machinery complement determine the fixed costs of production. Each grower has a unique machinery complement, so these per-acre costs will vary. Land costs will also vary depending on whether land is owned or rented, and the type of crop-share or rental arrangement on leased land. Growers may find comparisons of variable costs and returns more useful than total production costs, given the nature of fixed costs.

In order for canola to be economically viable in the eastern Washington production area, prices received by producers will need to increase over current market levels of approximately \$10.30 per cwt. Since over half of all farmland is rented, landlords will also play an important role in the adoption of new rotational crops. Policymakers may need to create positive incentives for widespread adoption of oilseed crops in the dryland region of eastern Washington.

FURTHER READING:

Effect of Varying Soil Residues of Pursuit® (Imazethapyr) Herbicide on the Performance of Clearwater Spring Canola and Gem Spring Rapeseed. 2005. Jack Brown and Jim B. Davis. University of Idaho. <http://www.ag.uidaho.edu/brassica/>.

EB1919 Grower Experiences with Mustard and Canola in Eastern Washington, 1997–2000. 2001. Norm Herdrich. Washington State University and Western Region SARE Program #USU 99-057. Available online at <http://cru.cahe.wsu.edu/CEPublications/eb1919/eb1919.pdf>

Effects of Swathing on Yield and Quality of Spring Canola in Northern Idaho. Jack Brown, Jim B. Davis, Donna Erickson, and Angela P. Brown. *Journal of Production Agriculture*, v.12, no. 1:33-37.

APPENDIX:
ITEMIZED COSTS OF PRODUCTION FOR
CANOLA PRODUCTION
BY ANNUAL PRECIPITATION ZONE



NOTE: Symbols represent locations of the 15 canola growers who participated in the 2002 survey of oilseed growers. Information provided by these growers was critical to determining typical machinery complements and cultural practices. We would like to thank them once again for their cooperation. Original project sponsored by the Whitman Conservation District and funded by Whitman County and the Washington Oilseed Commission.

Table A1. Itemized Cost Per Acre for Canola in the Under 15" Rainfall Zone,
Eastern Washington State (February 2006 prices)

			Yield:	1,200	lbs. per acre	
	Unit	Cost/Unit	Quantity	Total Cost	Your Farm	
Variable Costs		\$		\$		
Glyphosphate	Qt.	4.50	0.50	2.25	_____	
Ammonia Sulfate	Oz.	0.015	50.00	0.75	_____	
M-90	Oz.	0.01	1.50	0.02	_____	
Glyphosphate	Qt.	4.50	0.50	2.25	_____	
Ammonia Sulfate	Oz.	0.015	50.00	0.75	_____	
M-90	Oz.	0.01	1.50	0.02	_____	
Canola Seed	Lb.	4.00	6.00	24.00	_____	
Liquid Nitrogen	Lb.	0.37	60.00	22.20	_____	
Liquid Sulfur	Lb.	0.32	10.00	3.20	_____	
Liquid Phosphorous	Lb.	0.35	-	-	_____	
Custom Aerial	Acre	5.00	1.00	5.00	_____	
Capture	Acre	10.17	1.00	10.17	_____	
Crop Insurance	Acre	2.50	1.00	2.50	_____	
Hauling Cost	Cwt.	0.15	12.00	1.80	_____	
Machinery Repairs	Acre	5.59	1.00	5.59	_____	
Machinery Fuel	Gal.	2.23	1.55	3.46	_____	
Machinery Lube	Acre	0.52	1.00	0.52	_____	
Labor	Hour	14.00	0.82	11.48	_____	
Interest on Op. Capital	Acre	3.36	1.00	3.36	_____	
Overhead	Acre	4.97	1.00	4.97	_____	

Total Variable Costs				104.27	_____	
Fixed Costs						
Machine Depreciation	Acre	9.89	1.00	9.89	_____	
Machine Interest	Acre	5.89	1.00	5.89	_____	
Machine Insurance	Acre	0.47	1.00	0.47	_____	
Machine Taxes	Acre	1.41	1.00	1.41	_____	
Machine Housing	Acre	0.79	1.00	0.79	_____	
Land Taxes	Acre	3.50	1.00	3.50	_____	
Land Rent*	Acre	29.14	1.00	29.14	_____	

				51.09	_____	
Total Cost	Acre			159.25	_____	
Average Yield						
			1,200.00			
Average Price/Lb.						
		0.120				
Average cost per pound						
		0.133	Profit/Lb.	(0.013)		
			Profit/Cwt.	(1.27)		

* Land Rent = 1/3 (Yield x Price) - 1/3 Fertilizer Cost - 1/3 Chemical Cost - 1/3 Crop Insurance Cost - Land Taxes

Table A2. Schedule of Operations for Canola Using No-Till/Direct Seeding Practices
in the under 15" Rainfall Zone

Month	Operation	Machinery Used
October	Fertilize/chisel [1]	250HP-WT with 30' chisel
October	Haul water	2-ton truck with slip tank
October	Spray weeds if needed [2]	250HP-WT with 80' sprayer
March	Haul water	2-ton truck with slip tank
March	Spray weeds if needed [3]	250HP-WT with 80' sprayer
April	Haul seed	3/4 Ton Pickup
April	Haul fertilizer	Tandem axle truck
April	Plant canola [4]	250HP-WT with 35' GP box drill
May	Haul water	2-ton truck with slip tank
May	Spray insects if needed [5]	Custom aerial @ \$5/ac
August	Harvest	25' combine
August	Haul canola	Hauling cost calculated on a per cwt basis (\$0.15/cwt)

[1] 60 lb N, 10 lb S (liquid fertilizer applied with chisel)

[2] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[3] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[4] 6 lb treated seed

[5] Capture @ \$10.17 per acre

Table B1. Itemized Cost Per Acre for Canola in the 15" to 20" Rainfall Zone
Eastern Washington State (February 2006 prices)

				Yield: 1,500lbs. per acre	
	Unit	Cost/Unit	Quantity	Total Cost	Your Farm
Variable Costs		\$		\$	
Glyphosphate	Qt.	4.50	0.50	2.25	_____
Ammonia Sulfate	Oz.	0.015	50.00	0.75	_____
M-90	Oz.	0.01	1.50	0.02	_____
Glyphosphate	Qt.	4.50	0.50	2.25	_____
Ammonia Sulfate	Oz.	0.015	50.00	0.75	_____
M-90	Oz.	0.01	1.50	0.02	_____
Canola Seed	Lb.	4.00	6.00	24.00	_____
Liquid Nitrogen	Lb.	0.37	90.00	33.30	_____
Liquid Sulfur	Lb.	0.32	20.00	6.40	_____
Liquid Phosphorous	Lb.	0.35	15.00	5.25	_____
Assure II	Oz.	1.20	-	-	_____
Custom Aerial	Acre	5.00	1.00	5.00	_____
Capture	Acre	10.17	1.00	10.17	_____
Crop Insurance	Acre	2.50	1.00	2.50	_____
Hauling Cost	Cwt.	0.15	15.00	2.25	_____
Machinery Repairs	Acre	5.73	1.00	5.73	_____
Machinery Fuel	Gal.	2.23	1.77	3.95	_____
Machinery Lube	Acre	0.59	1.00	0.59	_____
Labor	Hour	14.00	0.85	11.90	_____
Interest on Op. Capital	Acre	5.85	1.00	5.85	_____
Overhead	Acre	6.15	1.00	6.15	_____
Total Variable Costs				126.07	_____
Fixed Costs					
Machine Depreciation	Acre	9.89	1.00	9.89	_____
Machine Interest	Acre	5.89	1.00	5.89	_____
Machine Insurance	Acre	0.47	1.00	0.47	_____
Machine Taxes	Acre	1.41	1.00	1.41	_____
Machine Housing	Acre	0.79	1.00	0.79	_____
Land Taxes	Acre	4.50	1.00	4.50	_____
Land Rent*	Acre	34.28	1.00	34.28	_____
				57.23	_____
Total Cost	Acre			183.30	_____
Average Yield	1,500.00				
Average Price/Lb.	0.12				
Average cost per pound	0.122	Profit/Lb.	(0.002)		
		Profit/Cwt.	(0.22)		

* Land Rent = 1/3 (Yield x Price) - 1/3 Fertilizer Cost - 1/3 Chemical Cost- 1/3 Crop Insurance Cost - Land Taxes

Table B2. Schedule of Operations for Canola Using No-Till/Direct Seeding Practices
in the 15" to 20" Rainfall Zone

Month	Operation	Machinery Used
October	Harrow	250HP-WT with 60' flex harrow
March	Haul water	2-ton truck with slip tank
March	Spray weeds if needed [1]	250HP-WT with 60' sprayer (rented @ \$1.50/ac)
April	Haul seed	3/4 ton pickup
April	Haul fertilizer	Tandem axle truck
April	Seed/fertilize [2]	250HP-WT with 35' GP box drill
May	Haul water	2-ton truck with slip tank
May	Spray weeds [3]	250HP-WT with 60' sprayer (rented @ \$1.50/ac)
May	Spray insects if needed [4]	Custom aerial @ \$5/ac
August	Harvest	25' combine
August	Haul canola	Hauling cost calculated on a per lb basis (\$0.15/cwt)

[1] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[2] 6 lb treated seed, 60 lb N, 10 lb S

[3] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[4] Capture @ \$10.27 per acre

Table C1. Itemized Cost Per Acre for Canola in the Greater than 20" Rainfall Zone
Eastern Washington State (February 2006 prices)

			Yield: 1,800lbs. per acre		
	Unit	Cost/Unit	Quantity	Total Cost	Your Farm
Variable Costs		\$		\$	
Roundup	Qt.	4.50	1.00	4.50	_____
Ammonia Sulfate	Oz.	0.015	100.00	1.50	_____
M-90	Oz.	0.01	1.50	0.02	_____
Canola Seed	Lb.	4.00	6.00	24.00	_____
Liquid Nitrogen	Lb.	0.37	100.00	37.00	_____
Liquid Sulfur	Lb.	0.32	15.00	4.80	_____
Liquid Phosphorous	Lb.	0.35	15.00	5.25	_____
Custom Aerial	Acre	5.00	1.00	5.00	_____
Capture	Acre	10.17	1.00	10.17	_____
Crop Insurance	Acre	2.50	1.00	2.50	_____
Hauling Cost	Cwt.	0.15	18.00	2.70	_____
Machinery Repairs	Acre	5.73	1.00	5.73	_____
Machinery Fuel	Gal.	2.23	1.51	3.37	_____
Machinery Lube	Acre	0.59	1.00	0.59	_____
Labor	Hour	14.00	0.85	11.95	_____
Interest on Op. Capital	Acre	4.17	1.00	4.17	_____
Overhead	Acre	6.16	1.00	6.16	_____
Total Variable Costs				129.40	_____
Fixed Costs					
Machine Depreciation	Acre	9.89	1.00	9.89	_____
Machine Interest	Acre	5.89	1.00	5.89	_____
Machine Insurance	Acre	0.47	1.00	0.47	_____
Machine Taxes	Acre	1.41	1.00	1.41	_____
Machine Housing	Acre	0.79	1.00	0.79	_____
Land Taxes	Acre	5.50	1.00	5.50	_____
Land Rent*	Acre	42.92	1.00	42.92	_____
				66.87	_____
Total Cost				196.27	_____
Average Yield	1,800.00				
Average Price/Lb.	0.120				
Average cost per pound	0.109	Profit/Lb.	0.011		
		Profit/Cwt.	1.10		

* Land Rent = 1/3 (Yield x Price) - 1/3 Fertilizer Cost - 1/3 Chemical Cost
- 1/3 Crop Insurance Cost - Land Taxes

Table C2. Schedule of Operations for Canola Using No-Till/Direct Seeding Practices in the over 20" Rainfall Zone

Month	Operation	Machinery Used
October	Harrow [1]	250HP-WT with 40' heavy harrow
October	Haul water	2-ton truck with slip tank
October	Spray weeds [2]	250HP-WT with 60' sprayer (rented @ \$1.50/ac)
March	Haul water	2-ton truck with slip tank
March	Spray weeds [3]	250HP-WT with 60' sprayer (rented @ \$1.50/ac)
April	Haul seed	3/4 ton pickup
April	Haul fertilizer	Tandem axle truck
April	Seed/fertilize [4]	250HP-WT with 35' GP box drill
May	Haul water	2-ton truck with slip tank
May	Spray insects [5]	Custom aerial @ \$5/ac
August	Harvest	25' combine
August	Haul canola	Hauling cost calculated on a per lb basis (\$0.15/cwt)

[1] 50% of producers do not fall harrow. 25% of producers harrow in the spring.

[2] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[3] 6 lb treated seed, 100 lb N, 15 lb P, 15 lb S

[4] 1 pt. Roundup, 50 oz ammonium sulfate, 1.5 oz M-90

[5] Capture @ \$10.17 per acre

Table D1. Machinery Compliment for EB1960, Cost of Producing Canola and Mustard Oilseeds in Eastern Washington and North Central Idaho, 2003

Type of Machine	Replacement Value \$	Years of Life	Annual Hours of Use	Salvage Value \$	Annual Repairs (Materials & Labor) \$	Comments
2-Ton Truck	20,000	15	200	3,000	1,000	
Tandem Axle Truck	35,000	15	200	4,500	2,000	
3/4 Ton Pickup	22,000	10	400	7,500	1,500	
4WD-ATV	5,000	10	150	1,500	75	
50HP-WT w/Bucket	15,000	20	150	3,500	150	
300HP-WT	60,000	10	500	15,000	2,500	
250HP-WT	50,000	10	500	10,000	2,500	
24' Chisel	17,500	15	125	2,000	700	
25' Tandem Disk	9,000	8	100	2,000	700	
60' Harrow	5,000	5	60	1,500	500	
40' Heavy Harrow	18,000	15	100	2,000	550	
Fertilizer Backpack	5,000	10	100	500	350	
Slip Tank (2000 gal)	1,500	15	50	0	25	
35' GP Box Drill	65,000	12	250	15,000	1,000	
36' DBL Disk Drill	20,000	10	100	8,500	600	
25' JD Combine	70,000	10	200	15,000	3,500	

TABLE D2. HOURLY MACHINERY COSTS FOR EB1960, COST OF PRODUCING CANOLA AND MUSTARD OILSEEDS IN EASTERN WASHINGTON AND NORTH CENTRAL IDAHO, 2003

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC- IATION	INTER- EST	INSUR- ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$								COST PER HOUR				
300HP-WT[1]	60,000.00	10	500	9.00	6.38	.45	1.35	.75	17.93	5.00	6.90	11.90	29.83
300HP-WT[2]	60,000.00	10	500	9.00	6.38	.45	1.35	.75	17.93	5.00	13.80	18.80	36.73
250HP-WT[3]	50,000.00	10	500	8.00	5.10	.36	1.08	.60	15.14	5.00	6.90	11.90	27.04
250HP-WT[4]	50,000.00	10	500	8.00	5.10	.36	1.08	.60	15.14	5.00	15.53	20.53	35.67
2-TON TRUCK	20,000.00	15	200	5.67	4.89	.35	1.04	.58	12.51	5.00	4.31	9.31	21.82
TANDEM AXL TRUCK	35,000.00	15	200	10.17	8.39	.59	1.78	.99	21.92	10.00	4.31	14.31	36.23
3/4 PICKUP	22,000.00	10	400	3.62	3.13	.22	.66	.37	8.01	3.75	3.68	7.43	15.44
4WD-ATV	5,000.00	10	150	2.33	1.84	.13	.39	.22	4.91	.50	.92	1.42	6.33
ATV SPRAYER	600.00	10	50	1.20	.51	.04	.11	.06	1.91	.40	.00	.40	2.31
50HP-WT W/BUCKET	15,000.00	20	150	3.83	5.24	.37	1.11	.62	11.17	1.00	3.45	4.45	15.62
30' CHISEL	17,500.00	15	125	8.27	6.63	.47	1.40	.78	17.55	5.60	.00	5.60	23.15
40' HEAVY HARROW	18,000.00	15	100	10.67	8.50	.60	1.80	1.00	22.57	5.50	.00	5.50	28.07
25' TANDEM DISK	9,000.00	8	100	8.75	4.68	.33	.99	.55	15.30	7.00	.00	7.00	22.30
FERT BACKPACK	5,000.00	10	100	4.50	2.34	.17	.50	.28	7.77	3.50	.00	3.50	11.27
2000 GAL SLIP TK	1,500.00	15	50	2.00	1.28	.09	.27	.15	3.79	.50	.00	.50	4.29
30' JD COMBINE	130,000.00	10	250	32.00	30.60	2.16	6.48	3.60	74.84	16.00	13.80	29.80	104.64
40' RODWEEDER	15,400.00	12	200	5.12	3.93	.28	.83	.46	10.63	6.00	.00	6.00	16.63
35' GP BOX DRILL	65,000.00	12	250	16.67	13.60	.96	2.88	1.60	35.71	4.00	.00	4.00	39.71
36' HOE DRILL	20,000.00	10	100	11.50	12.11	.86	2.57	1.43	28.46	6.00	.00	6.00	34.46
25' COMBINE	70,000.00	8	250	27.50	14.45	1.02	3.06	1.70	47.73	16.00	.00	16.00	63.73
750GAL FERT CART	2,500.00	10	100	2.00	1.28	.09	.27	.15	3.79	2.50	.00	2.50	6.29
30' 3-PT SPRAYER	1,000.00	10	100	1.00	.43	.03	.09	.05	1.60	1.50	.00	1.50	3.10
60' FLEX HARROW	5,000.00	5	60	11.67	4.60	.33	.98	.54	18.11	8.33	.00	8.33	26.45
36' DBL DISK DRIL	20,000.00	10	100	11.50	12.11	.86	2.57	1.43	28.46	6.00	.00	6.00	34.46

- [1]FUEL CONSUMPTION 4 GALLONS PER HOUR.
- [2]FUEL CONSUMPTION 8 GALLONS PER HOUR.
- [3]FUEL CONSUMPTION 4 GALLONS PER HOUR.
- [4]FUEL CONSUMPTION 9 GALLONS PER HOUR.