

Economics of Canola Production in the Pacific Northwest

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Abstract

Interviews with canola producers across the major production regions of Washington and Oregon provide the basis for the economic analysis of canola production for this region. Enterprise budgets were created for producing spring canola in western Washington and three precipitation zones in dryland eastern Washington, and for winter canola production under irrigation as well as following summer fallow in dryland regions. Record high prices for wheat have reduced the relative profitability of canola production in this region, but spring canola is promising as a rotational crop for wheat, replacing dry peas in the annual cropping region of eastern Washington and northern Idaho. Winter canola can improve the productivity of winter wheat in the higher rainfall dryland wheat/fallow regions of the PNW, as it reduces grassy weeds, improves soil tilth and enhances the moisture holding capacity of the soil. A four-year wheat/fallow/canola/fallow system rotated throughout the farm enhances overall profitability by 50% for a long-time dryland canola producer in an 11” precipitation zone.

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Canola production is a logical choice for biofuels in the Pacific Northwest for several reasons. It grows well in most agricultural areas of the region and serves as a good rotational crop for the predominant cash crops of wheat, potatoes, and corn. Canola has high oil content, approximately 40%, compared to about 30% for yellow mustard and 20% for soybeans, a crop which is not well suited for production in most of the state. Canola and rapeseed, particularly the winter varieties, produce a high yield of high quality oil suitable for biofuel production. While mustard may be better suited to the dry conditions and hot summer temperatures common east of the Cascades, mustard has a lower average yield and, at this point in time, a low-value meal byproduct relative to canola. (Research is currently underway on a biopesticide product made from mustard meal, which should increase the value of the meal significantly.)

Canola is a minor crop in the U.S., averaging just over a million acres planted per year over the past decade, with 84% of the production located in the state of North Dakota (USDA-NASS data, 1997-2006). Average yields over the past decade were 1372 lb per acre while average market price was \$0.0975 per lb, resulting in an average gross revenue of \$134 per acre. In 2007, prices increased dramatically, averaging \$0.12 per lb in early 2007 and \$0.15 per lb by August 2007. Bid prices for the remainder of 2007 range from \$0.16 per lb for October/November 2007 deliveries to \$0.17 per lb for June/July 2008 deliveries (FOB Velva, ND; see http://www.northerncanola.com/daily_cash/index.asp).

Spring Canola Production

In the Pacific Northwest, initial trials have shown that the cool maritime climate west of the Cascades has excellent potential for production of spring canola and mustard. University researchers, private industry, and county government officials worked together to plant over 50 acres of spring canola and mustard in Snohomish County, Washington, in 2006 (Snohomish County Public Works, 2007). Despite various problems with the project, satisfactory yields were obtained, with average canola yields of 3000 lb/acre for Pioneer 45H72 and 2626 lb/acre for Hyola 420. Mustard yields averaged 3848 lb/acre for IdaGold and 1878 lb/acre for Pacific Gold. While mustard yields were satisfactory, oil content is lower for mustard (approximately 30% oil for yellow mustard) and, unlike canola meal, little if any market exists for mustard meal at this time. Canola meal is in high demand for use as an animal feed in this region, which imports the majority of its protein requirements for animal feed.

An economic analysis of the Snohomish County canola trials based on recommended or typical practices for this area showed that this crop has potential as a rotational crop. The trials were far from ideal, as the crop was planted three weeks late due to seed quarantine issues, then delays at harvest due to machinery procurement and weather problems resulted in shatter and seed loss at harvest. Lack of drying equipment caused excessive moisture and sprouting in the stored seed, rendering it worthless. Yields listed in Table 1 below were based on hand-harvested samples conducted by Washington State University personnel. Variable production costs (costs incurred from are relatively high in western Washington, due to higher custom rates and intensive tillage practices used on the heavy, high organic matter soils (see Snohomish County Public Works, 2007,

for detailed cost of production information). Returns over total production costs, which include fixed costs such as land rent and machinery depreciation, were \$23 per acre (Table 1). While there may be higher value uses for these rich, rainfed soils, canola may have a place as a good rotational crop for corn production, for example. Continued trials should result in yield improvements. In particular, winter canola may be very well suited to this area, as similar climates in Germany, Belgium, and France achieve average yields of 3 tons per acre.

Table 1: Returns over Variable and Total Production Costs for Spring Canola in Western Washington and Dryland Eastern Washington (over 20" Rainfall Zone).

	Price	Yield	Total Cash Receipts	Variable Production Costs	Returns over Variable Production Costs	Total Production Costs	Returns over Total Production Costs
	(\$/cwt)	(cwt/ac)	(\$/ac)	(\$/ac)	(\$/ac)	(\$/ac)	(\$/ac)
Western WA:							
40" rainfall	15.00	28	\$420	\$280	\$140	\$397	\$23
Eastern WA:							
>20" rainfall	15.00	16	\$240	\$138	\$102	\$188	\$52
15"-20" rainfall	15.00	13	\$195	\$137	\$58	\$179	\$16
12"-15" rainfall	15.00	10	\$150	\$117	\$33	\$153	-\$3

Spring canola has been grown for several decades in eastern Washington and northern Idaho, particularly in the cooler, higher rainfall regions. Yield data in our study were based on producer estimates and variety trials. 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.) In 2006, the overall mean for 37 cultivars at 10 sites was 1948 lb per acre. The overall mean for 27 trial cultivars and five control cultivars at nine locations was 1633 lb per acre in 2005. In 2004, the overall average was 1675 lb per acre but it fell to 1279 lb per acre in 2003, due to lower than average rainfall across the region. Most locations were in the higher rainfall zones of eastern Washington and northern Idaho.

Costs of production estimates for spring canola production were developed based on interviews with canola producers conducted in early 2006 (Painter et al., 2006). Only producers in the higher rainfall zones of eastern Washington have positive returns to risk and management, i.e., they are covering all economic costs of production, including their machinery investment and land costs. As is typical in this region, a cost-share land rental arrangement was assumed.

Canola was introduced as a potential rotational crop for wheat, the dominant cash crop in dryland production regions east of the Cascades. Average returns to risk and management for winter wheat production in the 20" and higher rainfall zone, given August 2007 market prices, are \$200 per acre, including a cost-share land payment of \$128 per acre (Table 2). Both the operator and landlord will want to maximize the production of this crop, particularly in the current market situation of record high prices for wheat. Wheat producers typically use a two- or three-year crop rotation consisting of one to two years of grains followed by a pulse crop such as peas, lentils, or garbanzos. In the lower rainfall regions, producers will leave fields fallow one in every two or three years in order to store moisture for the following crop. The largest areas of wheat

production are dry, relatively low productivity winter wheat rotated with summer fallow in a two-year cycle.

Table 2: Comparison of Net Returns for Major Grain Crops and Common Rotational Crops Relative to Spring Canola in Eastern Washington under Dryland Production.

Major Grain Crops and Common Rotational Crops (shaded)	Yield (unit/ac)	Revenue (\$/ac)	Returns			
			Variable Production Costs (\$/ac)	Variable Production Costs (\$/ac)	Total Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Winter Wheat	82	\$533	\$167	\$366	\$333	\$200
Spring Wheat	65	\$423	\$202	\$221	\$320	\$103
Spring Barley	2	\$376	\$149	\$227	\$277	\$99
Dry Peas	2000	\$220	\$141	\$79	\$227	-\$7
Lentils	1200	\$216	\$107	\$109	\$192	\$24
Garbanzos	1200	\$336	\$167	\$169	\$289	\$47
Spring Canola	1700	\$255	\$184	\$71	\$263	-\$8

Price assumptions:

winter and spring wheat: \$6.50/bu
barley: \$188/ton
dry peas: \$0.11 per lb
lentils: \$0.18 per lb
garbanzos: \$0.28 per lb
spring canola: \$0.15 per lb

NOTE: Costs of production based on 2007 revision of EB1970E, Painter et al., forthcoming.

Rotational crops play a much bigger role in the high productivity, high rainfall annual cropping regions. Based on the results of this analysis, spring canola production is feasible in higher rainfall zones but would be unprofitable in the lowest rainfall zone. As

a rotational crop for wheat, spring canola would need to be competitive with peas, lentils, or garbanzos. Based on August 2007 prices of \$0.15 per lb, net returns per acre are \$47 per acre for garbanzos, \$24 per acre for lentils, -\$7 per acre for peas, and -\$8 per acre for spring canola (Table 2). Despite their low profitability, peas are a popular alternative crop for wheat production as growers frequently see a significant yield boost following peas. Canola growers also report a yield advantage in the following wheat crop (Painter et al., 2006).

Winter canola

Winter canola can be grown under irrigated production in Columbia Basin or following summer fallow in dryland areas east of the Cascades, preferably with 11" or more annual rainfall. Costs of production estimates are based on interviews with canola producers in various production regions of Washington and Oregon in 2006. Given the low market price for canola at that time (\$0.09 per lb), few producers were raising canola. Dryland producers were located in the following production areas: 11" rainfall in Adams County; 14" rainfall in Whitman County; 14" rainfall in Lincoln County, and 14" rainfall near Pendleton, OR. Irrigated producers were located in Lincoln County near Odessa, in Yakima County near Sunnyside, and near Hermiston, OR, just south of the Tri-Cities in Washington.

Winter wheat is the predominant crop in dryland cropping systems of the inland Northwest, and a typical rotational crop in irrigated systems. Production costs for winter canola are similar to those for winter wheat, but canola yields are more variable and the crop is more difficult to establish and less winter hardy. With August 2007 market prices,

net returns over total production costs for winter canola averaged \$99 per acre for dryland production and \$141 for irrigated production. Net returns for winter wheat production are

Table 3: Returns over Variable and Total Production Costs for Winter Canola and Winter Wheat for Dryland and Irrigated Production (canola price = \$0.15/lb, wheat price = \$6.50/bu)

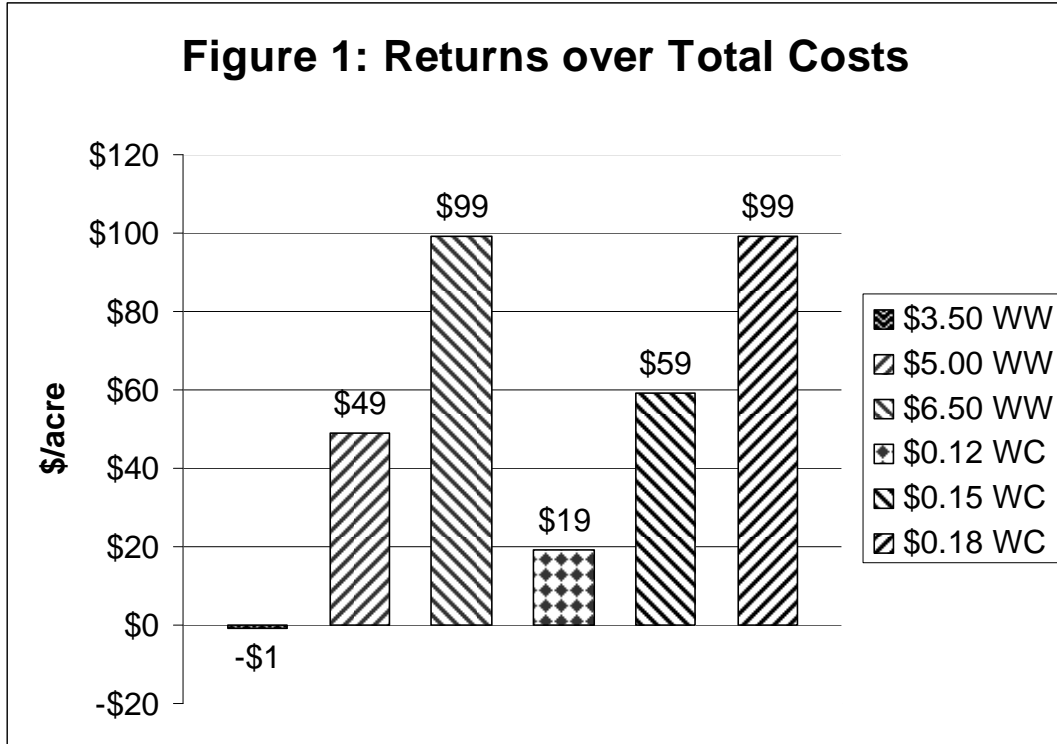
	Yield (unit/ac)	Revenue (\$/ac)	Variable Production Costs (\$/ac)	Returns over Variable Production Costs (\$/ac)	Total Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Dryland Winter Canola ¹	20	\$300	\$116	\$184	\$201	\$99
Dryland Winter Wheat ²	50	\$325	\$83	\$242	\$180	\$145
Irrigated Winter Canola	36	\$540	\$289	\$251	\$399	\$141
Irrigated Winter Wheat	130	\$845	\$282	\$563	\$440	\$405

considerably higher, given current record high prices for wheat, at \$145 per acre for dryland production and \$405 per acre for irrigated production.

Currently, wheat prices are at record highs, approximately double the price over August 2006. Canola looks less profitable than usual relative to wheat, given this situation. Figure 1 shows the relative profitability of these two crops for the dryland producer under various prices for wheat and canola. Producers earn equivalent returns over total costs when the price for wheat is \$6.50 per bu and the price for canola is \$0.18 per lb. The current price scenario (\$6.50 per bu for wheat and \$0.15 per lb for canola) gives wheat a relative advantage of \$50 per acre; in August 2006, wheat prices were \$3.50 per bu and canola was \$0.12 per lb, which gave canola a \$20 per acre advantage.

¹ These costs and returns represent a two-year period, as a fallow year precedes the crop year.

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While winter canola production is not currently a profitable alternative to wheat production, reductions in herbicide needs (grassy weeds are controlled during canola production while broadleaf weeds are controlled during the wheat year) and yield gains in winter wheat production following winter canola can make a significant difference in the overall economics of the farm. Table 4 shows average returns per crop year for a four-year rotation of fallow, winter canola, fallow, and winter wheat based on a grower's system in Adams County in a 11" annual rainfall zone (Henning, personal communication, 2006). The typical grower in this large, low rainfall region in Central Washington grows winter wheat followed by summer fallow. Table 5

Table 4: Returns over Variable and Total Production Costs for Winter Canola/Fallow/Winter Wheat/Fallow Rotation for 10"-11" Rainfall Zone.

	Price (\$/cwt)	Yield (cwt/ac)	Total Cash Receipts (\$/ac)	Variable Production Costs (\$/ac)	Returns over Variable Production Costs (\$/ac)	Total Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Summer Fallow + Winter Canola	\$15.00	20	\$300	\$116	\$184	\$201	\$99
Summer Fallow + Winter Wheat	\$6.50	55	\$358	\$83	\$275	\$180	\$178

presents average returns for this system, assuming the county average winter wheat yield of 45 bu per acre. Based on the winter canola grower's records over more than twenty years, winter wheat in the four-year rotation has a 22% yield advantage of 55 bu per acre. The four-year system is grown on approximately 25% of his acreage each year. If a conservative canola crop failure rate of 20% is assumed, average returns to risk and management per year are \$77 per acre per year. In the typical wheat/fallow two-year rotation, economic returns to risk and management are \$101, or \$50 per are per year.

The transition to this four-year system would require eliminating herbicides with carryover effects on canola. Canola is very sensitive to imidazolinone and the sulfyurea-type herbicides such as Glean (chlorsulfuron), Finesse (chlorsulfuron & metsulfuron), Ally (metsulfuron), Maverick (sulfosulfuron), Pursuit (imazethapyr), Pursuit Plus (pendimethalin & imazethapyr) and others. If chemicals like these have been used, growers are advised to wait for a minimum of 10 months to a maximum of 40 months

Table 5: Returns over Variable and Total Production Costs for Winter Wheat/Fallow Rotation for 10"-11" Rainfall Zone

	Price (\$/cwt)	Yield (cwt/ac)	Total Cash Receipts (\$/ac)	Variable Production Costs (\$/ac)	Returns over Variable Production Costs (\$/ac)	Total Production Costs (\$/ac)	Returns over Total Production Costs (\$/ac)
Summer Fallow +							
Winter Wheat	6.50	45	\$292	\$102	\$190	\$191	\$101

before planting brassicas and yellow mustard. However, new varieties resistant to some of these chemicals are becoming available.

As crop breeding research and variety trials continue, growers can expect varieties that are better suited to areas of the Pacific Northwest. Yield improvements and/or market price increases are needed to make this crop economically competitive with winter wheat in the wheat production areas of eastern Washington and Oregon. With current record high wheat prices, the relative profitability of canola production in this region has deteriorated. However, the crop may still be attractive to producers due to rotational considerations such as yield benefits to wheat production, improved soil tilth, and fewer weed problems, particularly in areas with few cropping alternatives.

References:

Kathleen M. Painter, Dennis Roe, and Herbert Hinman. "Economics of Spring Canola Production in Dryland Eastern Washington." EB2009E Washington State University Extension, April, 2006.

Kathleen M. Painter, Herbert Hinman, and Dennis Roe. "2007 Enterprise Budgets for Winter Wheat, Spring Wheat, Spring Barley, Peas, Lentils, Garbanzos, and Canola in the 18- to 22-Inch Rainfall Area, Whitman County, Washington" EB1970E Washington State University Extension, forthcoming.

Snohomish County Public Works. 2007. Biodiesel Seed Crop Report, Phase 1.