Crop Production

Side by Side Economics of Winter Canola and Winter Wheat

Francis Epplin, Thomas Peeper
Departments of Agricultural Economics and Plant and Soil Sciences, Oklahoma State University

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Research is ongoing to determine if crop rotations that include winter canola and winter wheat are economically viable alternatives to continuous wheat in the traditional wheat regions of Oklahoma and Kansas. A major objective of the research is to determine if inclusion of winter canola in a rotation with winter wheat is an effective strategy for managing fields that have severe weed pressure. A limited number of winter canola varieties have been developed and are available for planting. The purpose of this paper is to present results from research trials and demonstration experiments conducted during the 2006-07 growing season.

Replicated experiments that include both winter wheat and winter canola have been established on experiment station sites at Chickasha, Fort Cobb, and Perkins. Average yields from the 2007 harvest are reported in Figure 1. Average canola yields from an experimental Roundup Ready® (RR) variety ranged from 1,812 lb/ac at Fort Cobb to 2,050 lb/ac at Perkins. The average across the three locations was 1,896 lb/ac. Average wheat yields (Bullet) in adjacent plots ranged from 12 bu/ac at Perkins to 48 bu/ac at Chickasha with an overall average of 30 bu/ac.

Estimated net returns above cash production costs including cost of custom harvest, with a wheat price of $5/bu and Canola price of $0.12/lb are reported in Figure 2. The estimated average net returns were $32/ac for wheat and $60/ac for canola.

Canola demonstration blocks were established on several farm fields. Average yields are available from seven fields. These fields included both conventional and RR varieties. Figure 3 shows the minimum, average, and maximum canola yields obtained across the seven fields. The field canola yields ranged from 1,333 to 2,300 lb/ac with an average across the fields of 1,828 lb/ac. Because of the difficult harvest season wheat yields from adjacent blocks were not available at the time of this writing. However, to enable comparison, wheat yields necessary to produce net returns equal to those produced by canola were computed. At prices of $5/bu for wheat and $0.12/lb for canola a wheat yield of 36 bu/ac would have been required to produce net returns equal to those from canola (Figure 4). Figure 5 includes a chart of Oklahoma state average wheat yield per harvested acre from 2002-2006. In four of the five years state average wheat yields were less than the 36 bu/ac estimated as necessary to breakeven with the average canola yield of 1,828 lb/ac harvested on the seven farm fields in 2007.

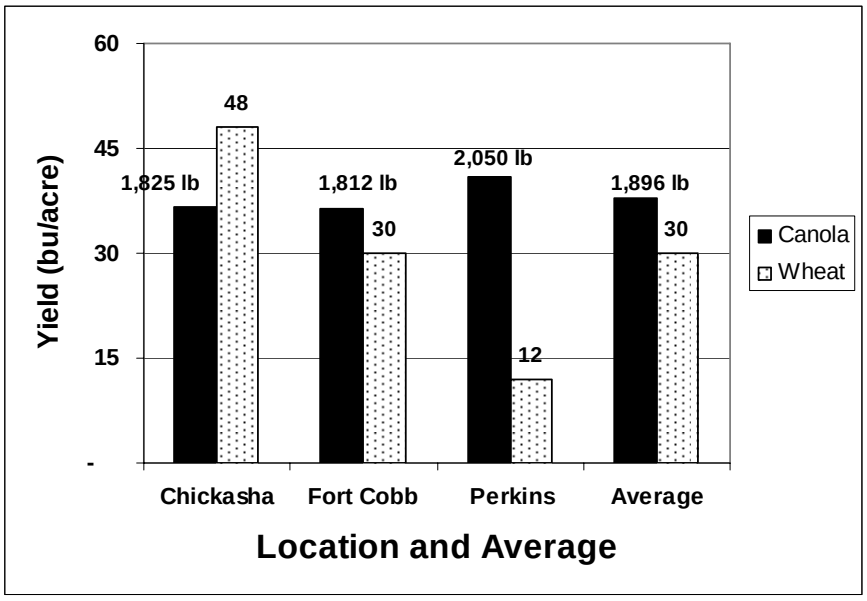

Figure 1. Average winter canola and winter wheat yields from replicated experiments harvested in 2007 at Chickasha, Fort Cobb, and Perkins, Oklahoma.

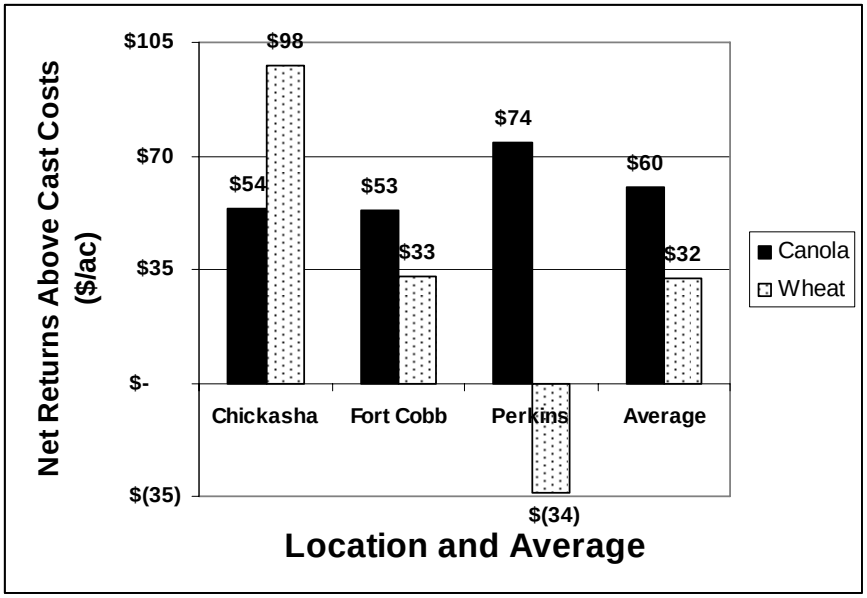

Figure 2. Estimated net returns above cash production costs including cost of custom harvest with a wheat price of $5/bu and canola price of $0.12/lb from replicated experiments harvested in 2007 at Chickasha, Fort Cobb, and Perkins, Oklahoma.

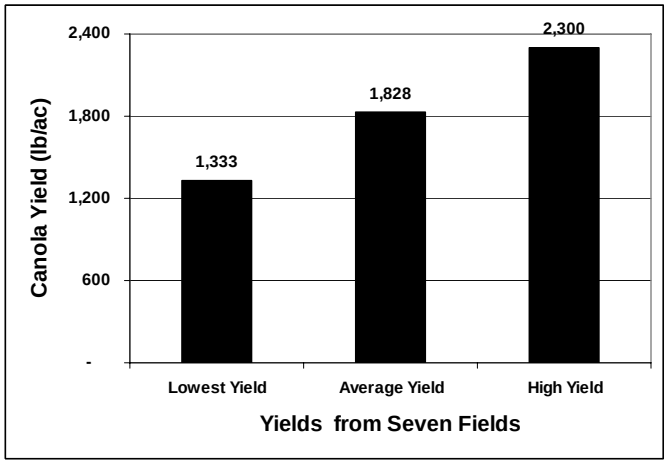

Figure 3. Average canola yields obtained across demonstration blocks on seven Oklahoma farm fields in 2007.

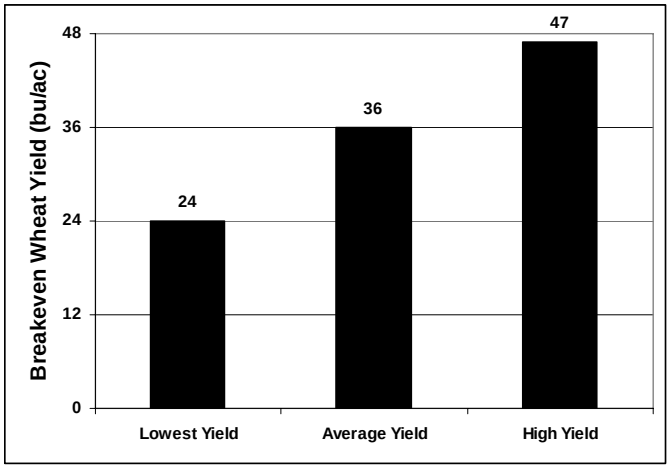

Figure 4. Wheat yields required to produce the same net returns as the canola yields obtained across the demonstration blocks on seven Oklahoma farm fields for a wheat price of $5/bu and a canola price of $0.12. (Actual wheat yields from the farm fields were not available, so breakeven yields were computed.)

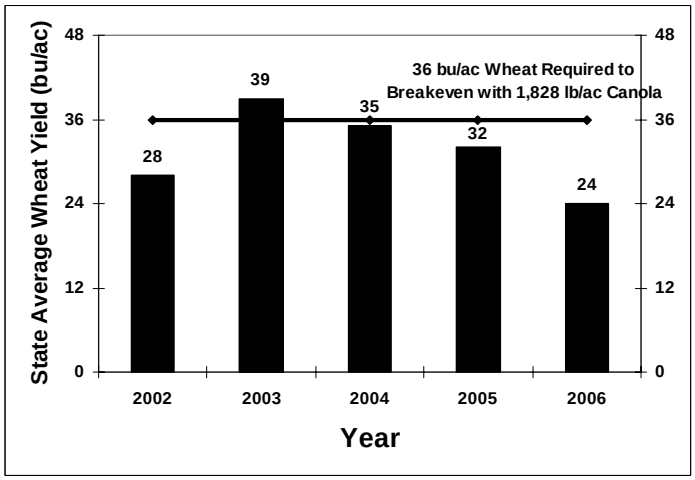

Figure 5. Oklahoma state average wheat yield per harvested acre and wheat yield required to breakeven with average canola yield of 1,828 lb/ac harvested on the seven farm fields.

Methods

Production practices budgeted for wheat, conventional canola, and RR canola are reported in Table 1. Forage production is not considered for any of the three alternatives. Wheat for grain-only and canola for grain-only are compared. Conventional tillage, custom direct cut harvest, and custom application of herbicide, insecticide, and fertilizer is budgeted for all systems.

Herbicide programs described in Table 1 and budgeted in Table 2 are designed for fields that have heavy weed pressure. The budgets shown in Table 3 include one less herbicide application for wheat and RR canola and two less herbicide applications for conventional canola.

Both canola budgets include the cost of an insecticide seed treatment. The cost of a spring aerial application of an insecticide is also included. The wheat budget does not include a seed treatment insecticide but does include a spring aerial insecticide application. A spring aerial

foliar fungicide application is budgeted for wheat for one of three growing seasons. The canola seed treatment also includes a fungicide.

The budgeted fertilizer requirements for wheat includes 50 lb/ac of 18-46-0 banded with the grain drill. The remainder of the nitrogen (N) requirement is met by applying urea preplant in August. The expected N requirement for wheat is based upon expected yield and is computed by multiplying the expected yield (bu/ac) by 2 lb N/bu and subtracting the assumed level of soil N of 15 lb/ac (carryover). For a 38 bu/ac expected yield the required level of N, in addition to the expected carryover and that applied in the diammonium phosphate (18-46-0), is estimated to be 52 lb/ac [(38 bu/ac × 2 lb/bu) – (50 lb/ac × 0.18) – (15 lb/ac carryover)]. This requirement can be met with 113 lb/ac of urea (46-0-0).

The budgeted fertilizer requirements for canola also include 50 lb/ac of 18-46-0 banded with the grain drill. For the soils in the region it is assumed that canola would require an additional 5 lb/ac of sulfur that could be met with an alternate year application of 42 lb/ac of ammonium sulfate (21-0-0-24S). It is budgeted at a rate of 21 lb/ac/year and one half acre application costs per year. The remainder of the N requirement is met by applying urea. For an expected yield of 1,800 lb/ac of canola and an expected requirement of 0.05 lb N/lb of canola yield goal, 50 lb/ac of 18-46-0, 15 lb/ac carryover, and 4 lb/ac N in the ammonium sulfate, 62 lb/ac of actual N would be required [(2000 lb/ac × 0.05 lb/lb) – (50 lb/ac × 0.18) – (21 lb/ac × 0.21) - (15 lb/ac carryover)]. This N requirement could be met with 134 lb/ac of urea. For winter canola, it is recommended that only a third of the N be applied preplant with the remaining two thirds applied as a top-dress in February.

Machinery fixed costs, and costs for labor, land, management, and overhead are not included in the budgets. It is assumed that these excluded costs would be very similar for wheat and canola grown to produce only grain. Prices differ across regions, months, and dealers. In some cases differences in prices reflect differences in services, quality, and timeliness. Most prices are negotiable and many producers negotiate with a good understanding of expected differences in services, quality and timeliness that are not readily apparent in posted prices.

Table 1. Field Operations for Wheat, Conventional Canola, and Roundup Ready® Canola Production Systems for Fields with Heavy Weed Pressure

Operations	Month	Wheat	Canola (conventional)	Canola (Roundup Ready®)
Tillage				
Primary	June	✓	✓	✓
Secondary	August	✓	✓	✓
Secondary	September	✓	✓	✓
Seedbed Preparation	September		✓	✓
Seedbed Preparation	October	✓		
Seeding				
Plant Canola	September		✓	✓
Plant Wheat	October	✓		
Fertilizer				
Nitrogen (e.g. 46-0-0)	August	✓	✓	✓
Sulfur (e.g. 21-0-0-24S)	August		✓	✓
Phosphorus (e.g. 18-46-0)	September		✓	✓
Phosphorus (e.g. 18-46-0)	October	✓		
Nitrogen (e.g. 46-0-0)	February		✓	✓
Herbicide				
Preplant (e.g. Triflurex®) [a]	September		✓	
Tillage to Incorporate Preplant [a]	September		✓	
Apply (broadleaf herbicide)	October	✓		
Apply (e.g. Select® & COC) [a]	October		✓	
Apply (e.g. Roundup® & AMS) [a]	October			✓
Apply (grass herbicide)	March	✓		
Apply (e.g. Assure II® & COC)	March		✓	
Apply (e.g. Roundup® & AMS)	March			✓
Pesticide				
Seed Treatment (Fungicide & Insecticide; e.g. Prosper FX®)	September		✓	✓
Apply Insecticide (e.g. Dimethoate)	April	✓		
Apply Insecticide (e.g. Warrior®)	April		✓	✓
Harvest				
Canola	June		✓	✓
Wheat	June	✓		

[a] Budgets prepared to reflect costs for fields with light to moderate weed pressure do not include the cost of the wheat grass herbicide. They also do not include the conventional canola preplant herbicide and fall herbicide. The RR canola light to moderate weed pressure budget includes only one application of Roundup.

Breakeven Canola Yields

Yields necessary for canola to generate the same net income as wheat were computed for several sets of canola and wheat prices and wheat yields. Table 4 includes a set of estimated canola breakeven yields for wheat yields of 25, 40, and 55 bu/ac for three wheat and three canola prices. For a wheat price of $4.80/bu and a canola price of $0.12/lb, canola yields of 1,287, 1,878, and 2,470 lb/ac would be required to breakeven with wheat yields of 25, 40, and 55 bu/ac, respectively. By this measure, 1,878 lb/ac of canola would be required to breakeven with 40 bu/ac of wheat.

Figure 6 includes a chart of the breakeven wheat and canola yields for a canola price of $0.12/lb and wheat prices of $3.60, $4.80, and $6.00/bu. The breakeven charts may be used to determine the expected breakeven canola yields for a given expected wheat yield.

Given the information currently available, an individual producer may use the breakeven chart to determine the canola yield necessary to breakeven with a specific wheat yield. If it is estimated that the breakeven canola yield can be exceeded on the field in question then canola may be a good option. Decisions are field specific. Canola may not be an option on a specific field depending upon prior herbicide applications to the field and soil pH. However, if a grower has decided to seed a particular field to canola, the next step is to identify the field's historical weed problems. If either herbicide system will control the targeted weeds then select the best variety from among all potential varieties. If glyphosate is required to control the targeted weeds then the next step is to identify the best RR canola variety for the farm from among all available RR varieties.

This economic analysis is based upon currently available information. As more field research is conducted, and more data become available from trials in which wheat, canola, and rotations that include both crops, are compared, more precise economic analysis can be conducted. The consequences of crop rotation in terms of yield, yield variability, grain quality, and herbicide, insecticide, tillage, and fertilizer requirements, can be incorporated into the economic analysis.

Enterprise budget software is available to develop budgets customized for a specific field or farm. Farmers may contact their local county extension office for more information. Oklahoma budgets are also available at www.agecon.okstate.edu/budgets. Budgets for regions in Kansas are also available online at http://www.agmanager.info/crops/budgets/proj_budget.

Oklahoma farmers may obtain a more comprehensive economic analysis for their specific farm by using the services provided by the Intensive Financial Management and Planning Support (IFMAPS) program available through the Oklahoma Cooperative Extension Service. Farmers may contact their local county extension office or call 800-522-3755 for more information.

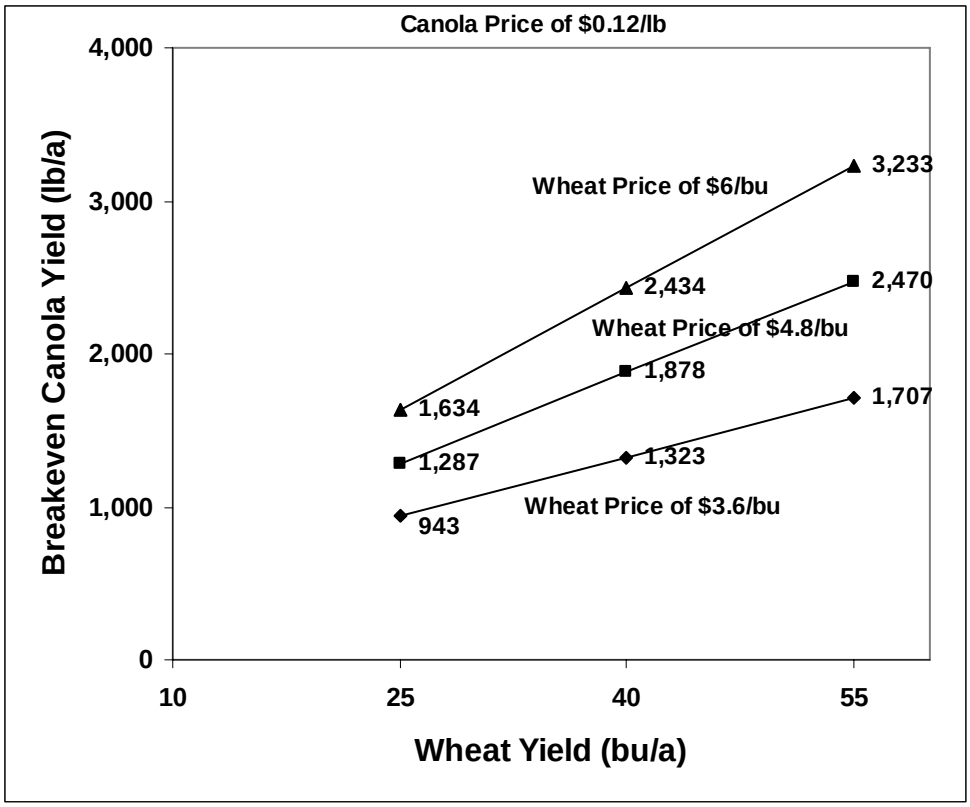

Figure 6. Breakeven Canola and Wheat Yields for Wheat Prices of $3.60, $4.80, and $6.00/bu and a Canola Price of $0.12/lb.

Table 2. Wheat, Conventional Canola, and Roundup Ready Canola Budgets for Fields with Heavy Weed Pressure

			Production System					
			Wheat (grain-only)		Canola (conventional)		Canola (Roundup Ready)	
Item	Unit of Measure	Price per unit	Quantity	Value	Quantity	Value	Quantity	Value
Production								
Wheat	bu	$4.80	38	182.40				
Canola	lbs	$0.120			1800	216.00	1800	216.00
Gross Returns				182.40		216.00		216.00
"Cash" Costs								
Wheat Seed	bu	$10.00	1	10.00				
Canola Seed (conventional)	lb	$1.50			5	7.50		
Canola Seed (Roundup Ready) + Technology Fee	lb	$3.80					5	19.00
Urea (46-0-0)	lb	$0.22	113	24.87	134	29.46	134	29.46
Diammonium Phosphate (18-46-0)	lb	$0.23	50	11.50	50	11.50	50	11.50
Ammonium Sulfate (21-0-0-24S)	lb	$0.14			21	2.94	21	2.94
Fertilizer Application	acre	$4.00	1	4.00	2.5	10.00	2.5	10.00
Herbicide (broadleaf)	acre	$5.00	1	5.00				
Herbicide (grass)	oz	$4.60	3.5	16.10				
Herbicide (e.g.Triflurex® (trifluralin))	pint	$2.75			2	5.50		
Herbicide (e.g. Select®)	oz	$1.30			6	7.80		
Herbicide (e.g. Assure II®)	oz	$1.40			8	11.20		
Herbicide Additive (Crop Oil Concentrate)	ac	$1.00			2	2.00		
Herbicide (e.g. Roundup® (glyphosate))	oz	$0.25					44	11.00
Hebicide Additive (ams)	units	$0.125					2	0.25
Herbicide Application	acre	$4.00	2	8.00	3	12.00	2	8.00
Seed Treatment (e.g. Prosper FX®)	acre	$6.00			1	6.00	1	6.00
Insecticide (e.g. dimethoate)	pint	$4.00	0.75	3.00				
Insecticide (e.g. Warrior®)	oz	$2.50			3	7.50	3	7.50
Foliar Fungicide (1 of 3 years)	acre	$12.50	0.33	4.13				
Aerial Pesticide Application	acre	$5.00	1.33	6.65	1	5.00	1	5.00
Wheat Crop Insurance	acre	$4.00	1	4.00				
Canola Crop Insurance	acre	$8.50			1	8.50	1	8.50
Fuel Lube and Repair	acre			16.50		19.50		16.50
Annual Operating Capital	$	$0.07	57	3.98	73	5.12	68	4.75
Wheat Custom Harvest & Haul								
Base Charge	acre	$20.00	1	20.00				
Excess for > 20 bu/a	bu	$0.20	18	3.60				
Hauling	bu	$0.20	38	7.60				
Canola Custom Harvest & Haul								
Base Charge	acre	$22.00			1	22.00	1	22.00
Excess for > 20 bu/a	bu	$0.22			16.0	3.52	16.0	3.52
Hauling	bu	$0.22			36.0	7.92	36.0	7.92
Total "Cash" Costs	$/acre			$ 149		$ 185		$ 174
Return to Machinery and Equipment Fixed Cost, and Labor, Land, Management, and Overhead	$/acre			$ 33		$ 31		$ 42

Table 3. Wheat, Conventional Canola, and Roundup Ready Canola Budgets for Fields with Light to Moderate Weed Pressure

			Production System					
			Wheat (grain-only)		Canola (conventional)		Canola (Roundup Ready)	
Item	Unit of Measure	Price per unit	Quantity	Value	Quantity	Value	Quantity	Value
Production								
Wheat	bu	$4.80	38	182.40				
Canola	lbs	$0.120			1800	216.00	1800	216.00
Gross Returns				182.40		216.00		216.00
"Cash" Costs								
Wheat Seed	bu	$10.00	1	10.00				
Canola Seed (conventional)	lb	$1.50			5	7.50		
Canola Seed (Roundup Ready) + Technology Fee	lb	$3.80					5	19.00
Urea (46-0-0)	lb	$0.22	113	24.87	134	29.46	134	29.46
Diammonium Phosphate (18-46-0)	lb	$0.23	50	11.50	50	11.50	50	11.50
Ammonium Sulfate (21-0-0-24S)	lb	$0.14			21	2.94	21	2.94
Fertilizer Application	acre	$4.00	1	4.00	2.5	10.00	2.5	10.00
Herbicide (broadleaf)	acre	$5.00	1	5.00				
Herbicide (e.g. Assure II®)	oz	$1.40			10	14.00		
Herbicide Additive (Crop Oil Concentrate)	ac	$1.00			1	1.00		
Herbicide (e.g. Roundup® (glyphosate))	oz	$0.25					22	5.50
Hebicide Additive (ams)	units	$0.125					1	0.13
Herbicide Application	acre	$4.00	1	4.00	1	4.00	1	4.00
Seed Treatment (e.g. Prosper FX®)	acre	$6.00			1	6.00	1	6.00
Insecticide (e.g. dimethoate)	pint	$4.00	0.75	3.00				
Insecticide (e.g. Warrior®)	oz	$2.50			3	7.50	3	7.50
Foliar Fungicide (1 of 3 years)	acre	$12.50	0.33	4.13				
Aerial Pesticide Application	acre	$5.00	1.33	6.65	1	5.00	1	5.00
Wheat Crop Insurance	acre	$4.00	1	4.00				
Canola Crop Insurance	acre	$8.50			1	8.50	1	8.50
Fuel Lube and Repair	acre			16.50		16.50		16.50
Annual Operating Capital	$	$0.07	47	3.28	62	4.34	63	4.41
Wheat Custom Harvest & Haul								
Base Charge	acre	$20.00	1	20.00				
Excess for > 20 bu/a	bu	$0.20	18	3.60				
Hauling	bu	$0.20	38	7.60				
Canola Custom Harvest & Haul								
Base Charge	acre	$22.00			1	22.00	1	22.00
Excess for > 20 bu/a	bu	$0.22			16.0	3.52	16.0	3.52
Hauling	bu	$0.22			36.0	7.92	36.0	7.92
Total "Cash" Costs	$/acre			$ 128		$ 162		$ 164
Return to Machinery and Equipment Fixed Cost, and Labor, Land, Management, and Overhead	$/acre			$ 54		$ 54		$ 52

Table 4. Conventional canola yields that produce net returns equal to expected net returns from wheat for wheat prices of $3.6, $4.8, and $6/bu; canola prices of $0.08, $0.12, and $0.16/lb and wheat yields of 25, 40, and 55 bu/a

	Wheat Price (bu)		
Canola Price (lb)	$ 3.60	$ 4.80	$ 6.00
	Wheat Yield of 25 bu/ac		
$ 0.08	1,749	2,395	3,041
$ 0.12	943	1,287	1,634
$ 0.16	654	884	1,117
	Wheat Yield of 40 bu/ac		
$ 0.08	2,463	3,496	4,529
$ 0.12	1,323	1,878	2,434
$ 0.16	908	1,284	1,664
	Wheat Yield of 55 bu/ac		
$ 0.08	3,176	4,597	6,018
$ 0.12	1,707	2,470	3,233
$ 0.16	1,167	1,689	2,211

Note: If the price of wheat is $4.80/bu and the price of canola is $0.12/lb, a canola yield of 1,878 lb/ac would produce the same net returns as 40 bu/ac wheat. Breakeven yields computed from the light to moderate weed pressure budgets for wheat and conventional canola.

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