Biodiesel Seed Crop Report
Phase I

Sno / Sky Agricultural Alliance

March 2007

Biodiesel

Snohomish County

Farm-grown fuel project

Project Team

A multi-disciplinary team including members from the public and private sector worked together.

Team members are:

Washington State University

- Dr. Tim Miller
- Dr. Kate Painter

Sno/Sky Agricultural Alliance

- Dale Reiner
- Dan Bartelheimer
- Peter Alden
- Dave Remlinger
- Steve Davison

Wolfkill Feed & Fertilizer

- Merritt Wolfkill
- Terry Svoboda

Private Consultant

- Diane Kamionka

Snohomish County

- Steve Thomsen
- Sam Chandler
- Allen Mitchell
- Steve Pottle
- John Roney
- Lorena Mracheck
- Deanna Carveth

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Dale Reiner *Executive Reardon*

Special Acknowledgment

The Project Team extends special thanks to Snohomish County Executive Aaron Reardon for both his clear economic foresight and his strong commitment to local agriculture. Under his direction, the County's diesel-powered fleet is converting to biodiesel fuels, the County's Solid Waste Transfer and Recycling Stations have provided temporary distribution facilities for biofuel producers, and his Agriculture Action Plan continues to support agricultural entrepreneurship and exploration of new crops and markets for Snohomish County growers.

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Introduction

In 2006, the Sno/Sky Agricultural Alliance and Snohomish County undertook the first phase of a jointly sponsored project to investigate whether canola and mustard seed crops could provide the basis for an economically viable biodiesel industry in the county.

The first phase focused on two primary research objectives:

1. To determine whether locally grown canola and mustard crops could yield sufficient product to satisfy the Snohomish County diesel fleet's demand for 120,000 gallons of fuel per year.
2. To identify which oilseed crop would provide the greatest financial return to Snohomish County growers.

Although the research produced invaluable new knowledge, results were not conclusive that canola and mustard seed crops can successfully meet the above objectives. More studies are needed to accurately gauge the economic viability of these particular seed crops, and to further progress toward establishing a viable biodiesel industry in the county.

So far, findings indicate that Hyola 420 Canola offers the strongest potential for oilseed production because of its ability to grow well in a variety of soil types and because of an existing secondary market for canola seed mash as cattle feed. We ranged between 2,600 to 3,100 #/acre in good soil which would generate about 144 gallons of fuel per acre. The net return to the farmer is about $320/acre.

From an economic standpoint, phase one results show promise for local biodiesel production from canola seed. At this time, however, the combination of yield, cost and price make oilseed production a breakeven business proposition for local growers. Yet, with further fertilizer testing to increase yields, availability of local processing facilities to keep transport costs down, and reasonable price support from the marketplace, there is clearly an opportunity for a commercially viable biodiesel industry to develop in Snohomish County.

The following pages describe in detail the results and recommendations of the Phase I Biodiesel Seed Crop Project.

Production and details by farm

Farm	Soil Type	Seed Crop	Fertilizer (per Acre)	Pesticides	water	acreage
Diamond M Dave Remlinger	Heavy peat	Hyola 420C Pioneer47A76C Ida Gold Pacific Gold	150#46-0-0 100# 21-0-0 1# Boron	2pt Triflorilan	No	8.2 3.5 1.5 1.0
Lord Hill Dave Remlinger	Clay Loam	Hyola 420C Pioneer47A76C Ida Gold Pacific Gold	150#46-0-0 100# 21-0-0 1# Boron	2pt Triflorilan	No	2.1 2.6 1.1 1.3
Custer's Last Stand – Dan Bartelheimer	Sandy Clay Loam	Hyola 420C Pioneer 47A76C Ida Gold Pacific Gold	150#46-0-0 100# 21-0-0 1# Boron	2pt Triflorilan	no	10.4 3.5 1.5 1.4
Race Trac – Steve Davison	Sandy	Hyola 420C Pioneer47A76C Ida Gold Pacific Gold	150#46-0-0 100# 21-0-0 1# Boron	2pt Triflorilan	No	1.2 1.5 1.0 2.3
Marsh Road – Peter Alden	Light Peat	Hyola 420C Pioneer47A76C Ida Gold Pacific Gold	None	None	No	3.4 3.0 1.1 1.0
Total Acres						52.6

Objective Number 1: Determine whether locally grown canola and mustard seed crops can provide the basis for a viable biodiesel industry in Snohomish County.

Sno/Sky procured the seeds from Wolfkill Feed and Fertilizer with input from Washington State University Extension's Tim Miller. Sno/Sky, in compliance with Washington State quarantine laws, tested the seed for black leg and black rot. The quarantine testing took three weeks, delaying the planting to late April and early May. However, the crop germinated quickly and grew to 4 feet in three weeks. 8.5 acres of the crop were organic and the remaining 44.1 acres were grown conventionally.

Yield Numbers

Four different crops were tested in five different soil types: Hyola canola, Pioneer canola, Ida Gold mustard, and Pacific Gold mustard.

Farm	Soil Type	Seed Crop	Pounds (per Acre)	% Oil	acreage
Diamond M Dave Remlinger	Heavy Peat	Hyola 420C	3615	38	8.2
		Pioneer47A76C	4128	33	3.5
		Ida Gold	4684	26	1.5
		Pacific Gold	1318	33	1.0
Lord Hill Dave Remlinger	Clay Loam	Hyola 420C	2614	43	2.1
		Pioneer47A76C	1824	37	2.6
		Ida Gold	3157	29	1.1
		Pacific Gold	1785	37	1.3
Custer's Last Stand – Dan Bartelheimer	Sandy Clay Loam	Hyola 420C	2706	38	10.4
		Pioneer 47A76C	3346	37	3.5
		Ida Gold	5146	29	1.5
		Pacific Gold	1948	37	1.4
Race Trac – Steve Davison	Sandy	Hyola 420C	2252	40	1.2
		Pioneer47A76C	3313	40	1.5
		Ida Gold	2215	29	1.0
		Pacific Gold	2730	40	2.3
Marsh Road – Peter Alden *organic	Light Peat	Hyola 420C	1945	40	3.4
		Pioneer47A76C	2390	31	3.0
		Ida Gold	4040	28	1.1
		Pacific Gold	1607	31	1.0

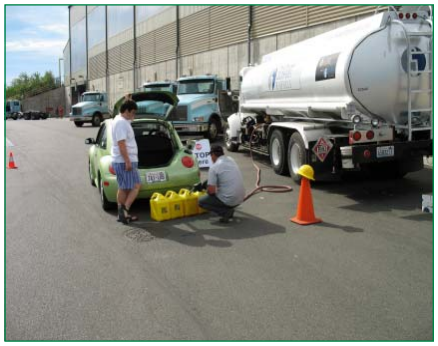
Lessons Learned

Due to late planting, the harvest was also late and finished two days before the rainy season set in. In a normal weather year, the timing would have placed this harvest well into the wet season, but the dry September allowed a successful, later harvest. Some of the challenges learned include:

- Late planting start due to seed testing – ideally, the fields should be planted by April 1, with quarantine beginning in February;
- The crops matured late;
- Swathing is not necessary for this crop, it's hard to time it correctly and it shattered the crop into the field resulting in less seed harvested;

- Direct harvest and drying appears to be the best method;
- Lack of harvesting machines slowed the harvest down;
- There was competition for the machines contracted to other crops;
- Sno/Sky Agricultural Alliance bought a combine for $3,000 from Skagit County but it is not large enough on which to base an entire industry;
- September fog made for short harvest days and before harvesting, crop moisture must be dried off; and
- Snohomish County needs a local dryer for the seed crop.
- Would a fall planting produce a higher yield?

Hyola 420 Canola is the preferred crop due to the mature market for the mash as cattle feed. The yield target is 4,000-4,500 pounds per acre with a 40% oil content in the seed based on similar climates each year.. These numbers would generate 240 gallons of fuel per acre of canola planted (assuming 40% oil content and 90% recovery of that oil from the crusher). Since the goal of the Public Works Division is 120,000 gallons of fuel per year, 420 acres are needed in production. At this time, averaging of 2,600-3,100 pounds per acre and an average of 37.7% oil, there is potential to produce 148 gallons of fuel per acre.



The mustard crop was a heavy seed producer on average, but the oil content is lower. While livestock can eat canola mash, mustard mash is not suitable for that purpose. There is some research into using mustard mash as a soil bio-fumigant, but this is still in the preliminary stages. Full analysis is attached in attachment A in a report by Dr. Tim Miller, WSU.

Economic Viability Results

The project, through its affiliation with Washington State University (WSU), had access to Dr. Kate Painter, an analyst with the Center for Sustaining Agriculture and Natural Resources at WSU. Dr. Painter was completing a study with similar objectives for the eastern half of the state and was pleased to add Snohomish County as a west side data point. Her results are attached to this report in attachment C. The spreadsheets outline cost variables for organic and conventional growing methods as well as various equipment types on other sheets. The listed costs are largely industry standard costs such as insurance, taxes, etc. Each individual farm needs to use their own numbers to obtain a projected cost and profit.

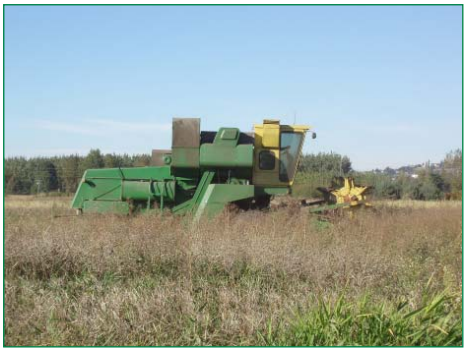
The County's Economic Development Office is involved in this project via its Sustainable Energy Resources project. The team has been meeting with Economic Development to determine suitable next steps for this project depending on various levels of funding.

Objective Number 2: Identify which oilseed crop would provide the greatest financial return to Snohomish County growers.

Ida Gold mustard is a great seed producer. There is no market for the mash at this time. Canola has a meal and oil market. The Pioneer variety of canola produced the greatest number of seeds but Hyola canola has a higher percentage of oil per pound of seed.

Current thought is to use this crop in rotation, which would subsequently increase the value to the farmer. Each farm could make about $6,000 on a 40 acre plot. In five to six years the demand for this product will increase which makes it more profitable than the current $0.12 per pound.

The canola industry needs its own driers and to perfect the fertilizer mix on the plant to increase the number of seeds per plant. Potash and nitrogen will increase the yield, so test plots are needed to determine the best mix.



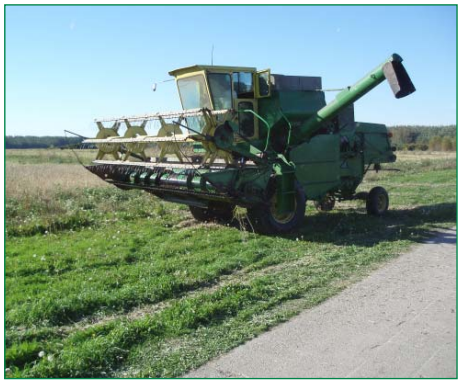
2007 Timelines (from Dr. Painter's Report)

Schedule of Operations for Producing Conventional Spring Canola, Snohomish County, Washington

Month	Operation	Machinery	Materials	Speed
March	Finish disc (3 times)	CASE 9270 tractor, 32' finish disc		5-6 mph
March	Chisel plow	CASE 9270 tractor, 28' chisel plow		5 mph
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Plow	CASE 9270 tractor, 13.5' plow		
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Apply fertilizer	Custom application @ $7.95/acre	150# 46-0-0 @ $0.28/lb ($42) 100# 21-0-0 @ $0.15/lb ($15) 1# Boron @ $3/lb ($3)	

Month	Operation	Machinery	Materials	Speed
April	Cultivate	CASE 9270 tractor, 36' field cultivator		
April	Apply herbicide	Custom application @ $10.95/acre	Trifluralin, 2 pt/ acre, $4/pt	
April	Cultimulcher	CASE 9270 tractor, 24' cultimulcher		8 mph
April	Plant canola	CASE 9270 tractor, Brillion seeder	5 lb canola seed @ $4 per lb	5 mph
May	Spray weeds	Custom application $10.95/acre	Stinger 3EC, 0.33 - 0.5 pt/acre*	
June	Spray insects	Custom application @ $10.95/acre	Capture 2E, 0.04 lb ai/acre**	
August	Swath	JD 970 swather		4.5 mph
August	Combine	JD 7720 combine		3.5 mph
August	Haul	Custom hauling	$0.15 per cwt	

***Capture 2E 2.58 oz @ $3.55 per oz = $9.16 per acre. Treats aphids and cabbage flea beetles. Treat if pest pressure warrants.*



Next Steps to Commercial Production

- For consideration: a fall planting with the Athena and Rapier varieties
- More testing on spring varieties
- More testing on nutrient timing and amounts
- More testing on seeding density (too dense means more lodging means less seed available for harvest)
- Side by side testing on large plots (50+ acres) for varying nutrient packages on the same seed variant
- Experiment with various growth regulators and stem strengtheners to keep the crop vertical, prevent lodging (plant lay down), and improve harvest-ability
- Locate and install a dryer at the Cathcart Landfill using the methane already present and currently being flared to the atmosphere
- Locate storage facility at Cathcart or close by
- Continue looking for grants and funding and the possibility of a cooperative of canola grower

Attachment A – Canola Seed Trials

Potential for canola and mustard production in Western Washington

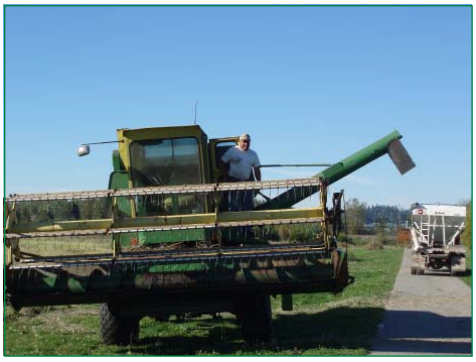
Final Project Report

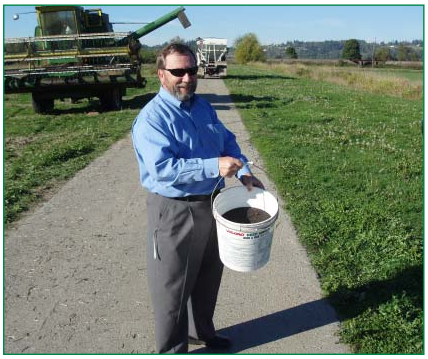
Date: December 12, 2006

Contact Person:
Tim Miller, Extension Weed Scientist
WSU Mount Vernon Northwestern Washington Research and Extension Center
16650 State Route 536
Mount Vernon, WA 98273
(360) 848-6138; FAX (360) 848-6159; twmiller@wsu.edu

Other Personnel Involved:
Snohomish County
Mike Hackett, WSU Snohomish County Extension
Dale Reiner, SnoSky Alliance
Merritt Wolfkill and Terry Svoboda, Wolfkill Fertilizer, Monroe

Grays Harbor County
Don Tapio, WSU Grays Harbor County Extension





Objective

Evaluate several canola and mustard crops for their production potential in western Washington.

Findings

Materials and Methods:

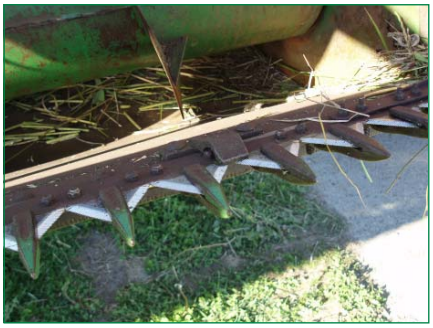
Snohomish County:

Two canola lines (Pioneer 45H72 CL [Clearfield® canola, imidazolinone tolerant] and conventional canola Hyola 420 (Interstate Seed); both Brassica napus) and two mustard species ('IdaGold' white mustard (Sinapis alba) and 'Pacific Gold' oriental mustard (Brassica juncea)) were seeded into five fields in Snohomish County. Cooperators were Dave Remlinger (Diamond M and Lord Hill sites), Dan Bartelheimer (Marsh Road site), Steve Davison (Race Track site), and Peter Alden (organic site on Marsh Road). Peter Bartelheimer did the seeding with a target seeding rate of five to eight pounds of seed per acre. Acreage totals by site, canola/mustard line, and seeding date are listed in Table 1.

Four samples from each canola/mustard type were collected at each site August 28 and 30 when most of the plants were mature enough to be swathed. Quadrats used to obtain seed samples measured 12 inches by 20 inches in size and were randomly placed at four sites approximately 12 inches toward the center of each plot as measured from the edge of each plot. To insure that yields were representative, samples were taken only if there was no evidence of shattered seedpods on the plants within each quadrat; if some seedpods were shattered, the quadrat was moved to a new location for sampling. The number of canola/mustard plants within each 1.67 ft2 quadrat was counted, and those plants were then clipped at the soil surface. Excess stem material was trimmed off each plant, and remaining upper stems and racemes were placed into paper grocery bags and then stored in a screen house at WSU Mount Vernon NWREC for slow drying and seed ripening to occur (maximum daytime temperatures probably did not exceed 85 F during the drying process). After approximately three weeks of drying, the seed was threshed by hand, passed over screens to remove large chaff, and freed of fine chaff and dust using a blower-style seed cleaner. Seed weight for each sample was then recorded. Samples were pooled by canola/mustard type and site and a single 20 g sample was collected and delivered to the University of Idaho Brassica breeding program for oil analysis. Weather data from the WSU Mount Vernon NWREC (about 60 miles north of the field sites) are provided in Table 2 to give general regional climatic conditions over the duration of the experiment.

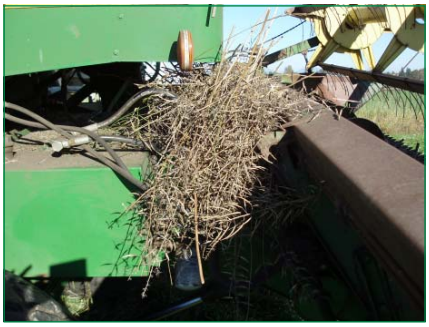
Yield data were analyzed using a general linear models procedure and means were separated using Fisher's Protected LSD at the P = 0.05 level. Oil data were from pooled samples so no statistical analyses were performed on those data. Yield and oil means are presented in Tables 3 and 4.

Grays Harbor County:
Three canola lines (HyLite 292 CL [Clearfield® canola, imidazolinone tolerant], and conventional canola Hyola 401 and Hyola 420; all three Brassica napus from Interstate Seed) were seeded June 12 into a small experimental block near Montesano (Larry Willis, cooperator). Samples were collected on September 26 in the same manner as in the larger Snohomish county trial. These samples were air dried, and seed weight and oil content determined as described before. Statistical design and approach were as in the Snohomish county trial. Yield and oil means are presented in Tables 3 and 4.



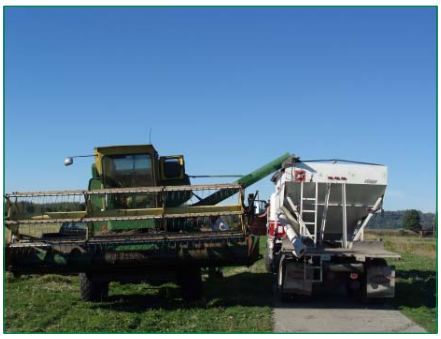
Results

Snohomish County:
The Pioneer 45H72 canola typically produced more seed than did Hyola 420, with mean yields over the five sites of 3000 and 2626 lbs/acre, respectively, for the two lines (Table 3). Only at Lord Hill did Hyola 420 out-yield Pioneer 45H72. This test was not designed to determine the best variety for Snohomish county conditions, but rather whether canola could be successfully grown in western Washington. Based on these yield data, canola can be productive under western Washington conditions. However, the wide range in yields (Pioneer 45H72 ranged from 1824 to 4128 lbs/acre and Hyola 420 ranged from 1945 to 3615 lbs/acre, for a difference between high and low yields of 2304 and 1670 lbs/acre, respectively) indicates that individual sites may vary tremendously in their suitability for canola production. If the canola seed was sold at 12 cents per lb (assumption of average market price), total income from Hyola 420 would have been $315, compared to $360 for Pioneer 45H72.



Ida Gold white mustard was the highest yielder of all canola/mustard types grown in this trial (Table 3). Mean yield from the five sites was 3848 lbs/acre, ranging from 2215 to 5156 lbs/acre. Pacific Gold oriental mustard was the poorest yielder in this test, producing 1878 lbs/acre (range from 1318 to 2730 lbs/acre) (Table 3). This may have been reflective of higher injury to Pacific Gold seedlings from apparently preferential adult flea beetle feeding early in this test. The only site where oriental mustard out-yielded white mustard was at Race Track. These results indicate that while both mustards might be able to be produced in western Washington, white mustard might

be better suited to western Washington growing conditions. Oil content of harvested canola and mustard seed in this trial was good (Table 4). Mean Hyola 420 oil percentage over the five sites was 39.7% while Pioneer 45H72 averaged 40.7%. Coupled with mean yield for these canola lines, oil percentages would have resulted in 1043 lbs of oil/acre for Hyola 420 and 1221 lbs/acre for Pioneer 45H72, leaving 1580 and 1779 lbs meal/acre for Hyola 420 and Pioneer 45H72, respectively. At 7.6 lbs/gal for canola oil, this oil production would be equivalent to 137 gal/acre for Hyola 420 and 161 gal/acre for Pioneer 45H72. Canola meal (seed solids remaining after oil extraction) may be fed to livestock, which could potentially offer growers additional value for this crop if seed is crushed on site for biodiesel production.



Mean oil content for Ida Gold and Pacific Gold mustard in this test were 28.3 and 35.8% (Table 4). When combined with mean mustard seed yield over these five sites, Ida Gold produced 1089 lbs oil/acre (leaving 2759 lbs meal/acre) compared to 672 lbs oil/acre (leaving 1206 lbs meal/acre) for Pacific Gold. The equivalent oil yield in gallons would be 143 gal/acre for Ida Gold and 89 gal/acre for Pacific Gold. While de-fatted mustard seed meal is not currently recommended for animal feed, it does display great promise as a biofumigating soil amendment, and at some point in the future may be sold for nematode, soil disease, or weed suppression.

Oil quality by canola/mustard type did not differ substantially by site, although there were slight differences in oil profiles in types grown in western Washington compared to the standards used by the University of Idaho (Table 4). Fatty acid content in this table is abbreviated with the number of carbon atoms (attached in a straight chain) written to the right of the colon and the number of double bonds occurring in that chain of carbons to the left of the colon (e.g., an 18:2 fatty acid is a chain of 18 carbon atoms containing two double bonds, commonly known as linoleic acid). Both Hyola 420 and Pioneer 45H72 were generally higher in their percentage of 18:3 fatty acids, and lower in 16:0, 18:0, and 18:2 fatty acids than the standard (Sunrise canola). Pioneer 45H72 was also lower in 18:1 fatty acids than the standard. Pacific Gold and IdaGold grown in this trial produced higher percentages of 18:3 and 22:1 fatty acids and lower percentages of 18:1 fatty acids than did the University of Idaho standard Pacific Gold and IdaGold. Further, IdaGold was also generally lower in 16:0, 18:0, 18:2, and 20:1 fatty acids than was the standard IdaGold. The reason for these slight changes, and their impact on biodiesel production, is not clear.

Grays Harbor County:
Yield for Hyola 401 was excellent (4456 lbs/acre), nearly a ton more seed per acre than either Hyola 420 or HyLite 292 (2688 and 2392 lbs/acre, respectively) (Table 3). Yield for Hyola 420 in Grays Harbor County was similar to the five-site average yield in Snohomish County, perhaps allowing us to draw certain conclusions of how the other canola/mustard lines would have performed at other sites in western Washington. If the canola seed was sold at 12 cents per lb (assumption of average market price), total income from Hyola 401 would have been $534, compared to $323 for Hyola 420 and $287 for HyLite 292.

Oil content of the three tested lines were typical for canola, although not outstanding, averaging 37.7% (ranging from 35.7 to 40.3%) (Table 4). Oil percentage of Hyola 420 at this site was 37.2%, lower than the five-site Snohomish County mean of 39.7%. Coupled with mean yield for these canola lines, oil percentages would have resulted in 1796 lbs of oil/acre for Hyola 401, 1000 lbs/acre for Hyola 420, and 854 lbs/acre for HyLite 292, leaving 2660, 1688, and 1538 lbs meal/acre, respectively. Resultant canola oil production in gallons would have been 236 gal/acre for Hyola 401, 132 gal/acre for Hyola 401, and 112 gal/acre for HyLite 292.

Oil quality analysis indicated that all three canolas were higher in the percentage of 18:3 fatty acids and lower in the percentages of 16:0, 20:1, and 22:1 fatty acids than the Sunrise canola standard used in the University of Idaho test (Table 4). The reason for these slight changes, and their impact on biodiesel production, is not clear.

Table 1. Snohomish County acreage of canola and mustard lines

Site	Seeding date	Hyola 420	Pioneer 45H72	IdaGold	Pacific Gold	Total
		acres	acres	acres	acres	acres
Diamond M	May 17-18	8.2	3.5	1.5	1.0	14.2
Lord Hill	May 17	2.1	2.6	1.1	1.3	7.1
Marsh Road	May 13	10.4	3.5	1.5	1.4	16.8
Organic	May 18-19	3.4	3.0	1.1	1.1	8.6
Race Track	May 18-19	1.2	1.5	1.0	2.3	6.0
Total acres	---	25.3	14.1	6.2	7.1	52.7

Table 2. Temperature and precipitation data during the 2006 western Washington canola and mustard production trials1

Month	Temperature lows	Temperature highs	Precipitation
	°F	°F	inches
May	35 to 53	51 to 75	1.5
June	43 to 59	55 to 80	1.1
July	44 to 58	61 to 87	0.8
August	42 to 54	62 to 79	0.2
Sept	40 to 55	53 to 82	1.8

[1]Data from WSU Mount Vernon Northwestern Washington Research and Extension Center for regional weather comparisons.

Table 3. Yield of canola and mustard lines in Snohomish and Grays Harbor counties

	Pioneer 45H72	HyLite 292	Hyola 401	Hyola 420	IdaGold	Pacific Gold
	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a
Snohomish County						
Diamond M	4128	---	---	3615	4684	1318
Lord Hill	1824	---	---	2614	3157	1785
Marsh Road	3346	---	---	2706	5146	1948
Organic	2390	---	---	1945	4040	1607
Race Track	3313	---	---	2252	2215	2730
Means	3000	---	---	2626	3848	1878
Grays Harbor County						
Willis	---	2392	4456	2688	---	---

Table 4. Oil content and composition

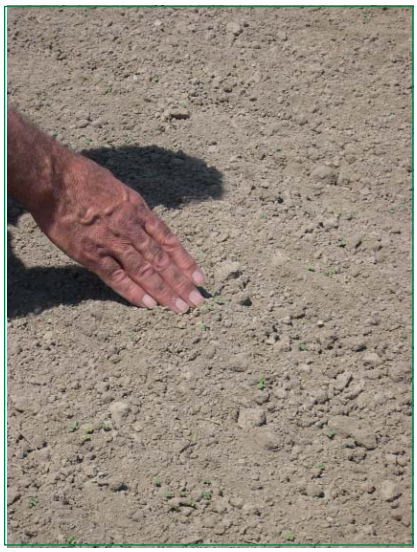
Sample[1]	% oil	16:0	18:0	18:1	18:2	18:3	20:1	22:1
Snohomish county								
DPM	33.3	2.7	1.2	19.0	16.2	13.4	12.5	29.8
LPM	37.2	2.8	1.4	17.6	19.9	13.0	12.9	26.1
MPM	37.4	2.7	1.4	17.7	19.7	12.5	12.9	26.7
OPM	31.4	3.0	1.3	13.4	22.1	14.0	11.1	27.6
RPM	39.5	2.6	1.6	19.8	19.0	11.9	13.4	25.9
Means	35.8	2.8	1.4	17.5	19.4	13.0	12.6	27.2
DIM	25.6	2.6	1.0	25.1	9.2	11.3	10.2	35.6
LIM	29.2	2.7	1.0	24.6	8.6	10.1	10.4	37.6
MIM	29.3	2.4	0.9	22.7	8.2	10.8	9.6	40.0
OIM	28.2	2.7	1.0	24.1	9.6	10.3	9.8	37.7
RIM	29.0	2.7	1.1	25.1	9.2	10.1	10.5	36.5
Means	28.3	2.6	1.0	24.3	9.0	10.5	10.1	37.5
DHC	38.0	3.5	1.9	65.9	16.6	8.9	1.3	0.0
LHC	42.5	3.5	1.8	60.9	16.6	9.7	2.8	3.0
MHC	38.1	3.8	1.9	62.4	17.9	9.8	1.5	0.9
OHC	39.6	3.9	1.9	64.3	17.4	9.5	1.2	0.2
RHC	40.4	3.7	2.0	66.3	16.4	8.7	1.1	0.1
Means	39.7	3.7	1.9	64.0	17.0	9.3	1.6	0.8
DPC	39.6	3.6	1.8	64.9	16.7	9.1	1.3	0.2
LPC	42.9	3.7	1.7	63.5	17.4	9.8	1.4	0.5
MPC	40.7	3.6	1.7	63.8	17.5	9.7	1.2	0.1
OPC	38.6	3.6	1.7	63.0	17.7	10.2	1.3	0.1
RPC	41.8	3.6	1.8	64.8	17.2	9.1	1.2	0.1
Means	40.7	3.6	1.7	64.0	17.3	9.6	1.3	0.2
Grays Harbor County								
292	35.7	3.7	2.0	65.6	15.9	10.6	1.5	0
401	40.3	3.9	1.5	58.8	21.9	11.1	1.4	0
420	37.2	3.6	2.2	65.7	16.5	9.9	1.3	0
Means	37.7	3.7	1.9	63.4	18.1	10.5	1.4	0
Standards								
Bridger rapeseed	---	2.8	0.9	12.3	10.1	6.1	6.1	54.7
Sunrise canola	43.0	4.2	2.1	65.0	18.4	6.7	1.2	0.2
IdaGold	---	3.3	1.2	28.4	9.8	8.7	11.2	32.3
Pacific Gold	---	2.9	1.6	20.5	20.8	10.9	12.9	24.4

[1]For Snohomish County entries, the first letter is the site: "D" = Diamond M, "L" = Lord Hill, "M" = Marsh Road, "O" = Organic, and "R" = Race Track, while the second and third letters are the type of canola/mustard grown: "PM" = Pacific Gold mustard, "IM" = IdaGold mustard, "HC" = Hyola 420 canola, and "PC" = Pioneer 45H72 canola. For Grays Harbor County entries, "292" is HyLite 292, "401" is Hyola 401, and "420" is Hyola 420.

Attachment B

Biodiesel Seed Crop Report
Sno/Sky Agricultural Alliance
December 2006

Contact Information:
Dale Reiner, President
Sno/Sky Agricultural Alliance,
17503 State Route 203,
Monroe, Washington 98272
Phone number: (425) 344-2940
E-mail: dalereiner@hotmail.com



The Sno/Sky Agricultural Alliance is a non-profit group of local farmers involved in a biogas project in south Snohomish County. The Alliance approached the County in 2006 on behalf of several area farms with a request to work with them on a pilot project to determine the economic viability of a locally grown oil seed crop for the biodiesel industry in Snohomish County. Canola and mustard seed have the possibility of becoming an alternative cash crop for farms in Snohomish County. The goal of this pilot project was to discover which crop provides the largest economic return to Snohomish County farmers. Additionally, results of this pilot project would help inform the industry participants as to the steps required to increase the viability of a biodiesel industry in Snohomish County.

Sno/Sky procured the seeds for this project from Wolfkill Feed and Fertilizer, a local distributor. With input from Dr. Tim Miller, an agronomist with Washington State University, Sno/Sky, in compliance with state law quarantine tested the seed for black leg and black rot. The quarantine testing took three weeks which delayed the planting into early May.

52.7 acres were planted spread over five area farms. 8.6 of these acres were grown organically. The remaining 44.1 were grown using conventional methods. The same two varieties of Canola and two varieties of mustard were planted at all locations. Plot sizes varied per farm.

The crops were planted approximately three weeks late due to the wait for results of the quarantine testing. We started harvesting on September 12 – ten days after an attempt had been made to swath the crop. The attempt at swathing was not successful because the crop was too dry and too light weight causing a "feeding" problem with the swathing equipment and a "shattering" problem with the crop seed pods.

The contractor hired to do the swathing thought that it could have been done as much as ten days earlier. Locating harvesting equipment for this project in our area was extremely difficult as all existing equipment was committed to other seed crops and "contaminating" the local equipment with Canola seed which has a potential for cross pollination with some seed crops, for this small amount of acreage did not make economic sense. (Note: previously promised contractor equipment could not make our schedule due to overrun times with their regular customers.)

A combine was located and we began harvesting on September 12, as no drying equipment was available seed was placed directly in transport trailers for shipment to Pendleton, Oregon to be crushed and processed. We had only four hours of harvesting on September 12 before rain set in on September 13 stopping all field work.

The harvested seed sat in a tarp covered trailer at the field site in the rain for 12 days before the crop was dry enough to continue harvesting. On September 25 we went back to combining using a direct cut system as the swathed crop was lying too close to the ground and was still quite wet. Foggy late September mornings allowed no work before noon so it took from September 25 to the 29 (along with all the moving of equipment site to site) to complete the harvest.

The seed was shipped to Pendleton Grain Growers in Pendleton, Oregon but upon arrival was determined to be too wet for them to crush. By this time a small portion of the crop had been in a trailer for 18 days with most of the crop in a trailer from 2 to 6 days without having been dried. Pendleton Grain Growers sent the trucks on to Madison Farms in Herminston, Oregon where Kent Madison attempted to crush the crop but was unsuccessful. Kent said it appeared that some of the seeds had begun to germinate.

At first glance it may appear that our pilot project was unsuccessful. This is not the case. We learned that we can grow Canola here in western Washington and at much higher yields per acre than we had anticipated. (Note: Testing for yield per acre and quality of oil content had been done by Washington State University personnel prior to harvesting and was not subject to weather and equipment delays experienced during harvesting.) We learned what it takes and how to put together a transportation system to get a crop to market. We learned that a dryer and storage system at or near the farm is a requirement but that swathing may not be. Basically we learned that we have much more to learn but that an oil seed crop such as Canola appears to be a viable cash crop for Snohomish County Farmers once the necessary infrastructure of equipment, seed and fertilizer procurement and informed knowledgeable personnel are in place.

The pilot project was successful enough to convince me to plant 10 acres of fall Canola which is now in the ground and I plan to plant 40 to 60 acres of spring crop for 2007.

Dale Reiner
President
Sno-Sky Agricultural Alliance

Attachment C – Economic Results

Contact:
Kate Painter, Analyst
Center for Sustaining Agriculture and Natural Resources
WSU Extension
kpainter@wsu.edu

Instructions and Assumptions

Since farming is inherently variable and constantly changing, we hope that this spreadsheet format will be helpful in adjusting these budgets to reflect your particular operation. 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

Please examine closely the assumptions we have used and make adjustments to reflect your particular operation. Adjustments in the variable costs can easily be made without affecting the overall accuracy of the budget information, with the exception of interest on operating capital and overhead, which are based on percentages. Fixed costs in these budgets are based on a budget generator program that incorporates detailed information on the machinery complement and performs complex calculations based on machinery width, tractor horsepower, type of operation, etc. In the variable costs section, fuel and machinery repair costs will be affected by changes in machinery usage. The fixed costs section of the budget presents costs that are incurred regardless of crop production practices. These costs will change if your machinery complement differs from those in the worksheet.

Machinery Costs:

The machinery complement used in these calculations is presented in the last worksheet in this series. It is based on interviews with canola producers in the study area. 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. 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:

(Purchase Cost + Salvage Value)/2

The 10% 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 the machinery complement worksheet.

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 cash rental rates typical in the area.

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 landlord would typically pay flood control taxes as well as property taxes.
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.

Inputs Prices:

In this enterprise budget example, we have used actual production costs from the 2006 canola and mustard trials conducted in Snohomish County. Input prices can be changed in the spreadsheets to reflect current prices of inputs such as diesel and fertilizer that are subject to fluctation.

Acknowledgments:

We wish to acknowledge the generous assistance of Robert Smathers at the University of Idaho. With his permission, we have used the UI spreadsheet format to present our budget information. Crop enterprise budgets for all of the major crops in each production region for the state of Idaho can be found on their website, http://www.ag.uidaho.edu/aers/r_crops.htm

Production Costs for Conventional Spring Canola, Snohomish County, WA

Item	Quantity Per Acre	Unit	Price or Cost	Value or Cost/Acre	
Gross Returns					
Canola seed	30	cwt	$12.00		$360.00
Operating Inputs					
Seed:				$30.00	
Canola seed	6	lb	$5.00		$30.00
Fertilizer:				$60.00	
Urea	150	lb	$0.28		$42.00
Ammonium sulfate	100	lb	$0.15		$15.00
Boron	1	lb	$3.00		$3.00
Pesticides:				$29.57	
Trifluralin	2	pt	$4.00		$8.00
Stinger 3EC	0.33	pt	$37.60		$12.41
Capture 2E	2.58	oz	$3.55		$9.16
Warrior					
Custom & Consultants:				$45.30	
Custom fertilizer application	1	acre	$7.95		$7.95
Custom herbicide application	1	acre	$10.95		$10.95
Custom herbicide application	1	acre	$10.95		$10.95
Custom insecticide application	1	acre	$10.95		$10.95
Custom hauling	30	cwt	$0.15		$4.50
Other:				$15.83	
Crop insurance	1	acre	$2.50		$2.50
Overhead	1	acre	$13.33		$13.33
Fuel, diesel	17.44	gal	$2.80		$48.83
Lubricants	1	acre	$8.62		$8.62
Machinery Repairs					$13.33
Storage Facility & Equip. Repairs					
Machinery Labor	1.46	hour	$14.50		$21.24
Other Labor					
Operating Interest					$7.21

Total Operating Costs	$279.93
Operating Costs per Unit	$9.33
Net Returns Above Operating Expenses	$80.07

Ownership Costs:	
Machinery depreciation	$15.54
Machinery interest	$12.66
Machinery insurance	$0.76
Machinery housing	$1.27
Machinery taxes	$2.28
Cash rent	$75.00
Land taxes	$10.00
Total Ownership Costs	$117.51
Ownership Costs per Unit	$3.92
Total Costs per Acre	$397.44
Total Cost per Unit	$13.25
Returns to Risk	-$37.44

Breakeven Analysis:	- 10%	Base	+ 10%
		Yield	
Price	27	30	33
Operating Cost Breakeven	$10.37	$9.33	$8.48
Ownership Cost Breakeven	$4.35	$3.92	$3.56
Total Cost Breakeven	$14.72	$13.25	$12.04
		Price	
Yield	$10.80	$12.00	$13.20
Operating Cost Breakeven	25.9	23.3	21.2
Ownership Cost Breakeven	10.9	9.8	8.9
Total Cost Breakeven	36.8	33.1	30.1

Schedule of Operations for Producing **Conventional** Spring Canola, Snohomish County, Washington

Month	Operation	Machinery	Materials	Speed
March	Finish disc (3x)	CASE 9270 tractor, 32' finish disc		5-6 mph
March	Chisel plow	CASE 9270 tractor, 28' chisel plow		5 mph
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Plow	CASE 9270 tractor, 13.5' plow		
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Apply fertilizer	Custom application @ $7.95/acre	150# 46-0-0 @ $0.28/lb ($42) 100# 21-0-0 @ $0.15/lb ($15) 1# Boron @ $3/lb ($3)	
April	Cultivate	CASE 9270 tractor, 36' field cultivator		
April	Apply herbicide	Custom application @ $10.95/acre	Trifluralin, 2 pt/acre, $4/pt	
April	Cultimulcher	CASE 9270 tractor, 24' cultimulcher		8 mph
April	Plant canola	CASE 9270 tractor, Brillion seeder	5 lb canola seed @ $4 per lb	5 mph
May	Spray weeds	Custom application $10.95/acre	Stinger 3EC, 0.33 - 0.5 pt/acre*	
June	Spray insects	Custom application @ $10.95/acre	Capture 2E, 0.04 lb ai/acre**	
August	Swath	JD 970 swather		4.5 mph
August	Combine	JD 7720 combine		3.5 mph
August	Haul	Custom hauling	$0.15 per cwt	

*Stinger 3EC, recommended rate 0.33 to 0.5 pt/acre, apply in the 2- to 6-leaf stage in 10-20 gal of water. $2.35/oz X 0.33 pt (5.33 oz) = $12.53/acre

**Capture 2E 2.58 oz @ $3.55 per oz = $9.16 per acre. Treats aphids and cabbage flea beetles. Treat if pest pressure warrants.

Cabbage seedpod weevil will require Warrior (0.015 to 0.03 lb ai/a).
Consult your local pesticide dealer or county Extension agent for assistance.

Production Costs for Organic Spring Canola, Snohomish County, WA

Item	Quantity Per Acre	Unit	Price or Cost		Value or Cost/Acre
Gross Returns					
Canola seed	21	cwt	$12.00		$252.00
Operating Inputs					
Seed:				$20.00	
Canola seed	5	lb	$4.00		$20.00
Fertilizer:					
Pesticides:					
Custom & Consultants:				$3.15	
Custom fertilizer application		acre	$7.95		
Custom herbicide application		acre	$10.95		
Custom hauling	21	cwt	$0.15		$3.15
Other:				$9.18	
Crop insurance	1	acre	$2.50		$2.50
Overhead	1	acre	$6.68		$6.68
Fuel, diesel	17.44	gal	$2.80		$48.83
Lubricants	1	acre	$8.62		$8.62
Machinery Repairs					$13.33
Storage Facility & Equip. Repairs					
Machinery Labor	1.46	hour	$14.50		$21.24
Other Labor					
Operating Interest					$4.48
Total Operating Costs					$128.83
Operating Costs per Unit					$6.13
Net Returns Above Operating Expenses					$123.17

Ownership Costs:		
Machinery depreciation		$15.54
Machinery interest		$12.66
Machinery insurance		$0.76
Machinery housing		$1.27
Machinery taxes	$2.28	
Cash rent	$75.00	
Land taxes	$10.00	
Total Ownership Costs		$117.51
Ownership Costs per Unit		$5.60
Total Costs per Acre		$246.34
Total Cost per Unit		$11.73
Returns to Risk	$5.66	

Breakeven Analysis	-	Base	+
	10%		10%
Yield			
Price	18.9	21	23.1
Operating Cost Breakeven	$6.82	$6.13	$5.58
Ownership Cost Breakeven	$6.22	$5.60	$5.09
Total Cost Breakeven	$13.03	$11.73	$10.66
		Price	
Yield	$10.80	$12.00	$13.20
Operating Cost Breakeven	11.9	10.7	9.8
Ownership Cost Breakeven	10.9	9.8	8.9
Total Cost Breakeven	22.8	20.5	18.7

Schedule of Operations for Producing Organic Spring Canola, Snohomish County, Washington

Month	Operation	Machinery	Materials	Speed
March	Finish disc (3 tx)	CASE 9270 tractor, 32' finish disc		5-6 mph
March	Chisel plow	CASE 9270 tractor, 28' chisel plow		5 mph
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Plow	CASE 9270 tractor, 13.5' plow		
April	Finish disc	CASE 9270 tractor, 32' finish disc		3 mph
April	Apply fertilizer	**Organic amendments would typically need to be applied, based on soil testing.**		
April	Cultivate	CASE 9270 tractor, 36' field cultivator		
April	Apply herbicide	Custom application @ $10.95/acre		
April	Cultimulcher	CASE 9270 tractor, 24' cultimulcher		8 mph
April	Plant canola	CASE 9270 tractor, Brillion seeder	5 lb canola seed @ $4 per lb	5 mph
August	Swath	JD 970 swather		4.5 mph
August	Combine J	D 7720 combine		3.5 mph
August	Haul	Custom hauling	$0.15 per cwt	

Note: Beneficial insects or other organic methods may be needed to control typical pests in canola such as aphids and cabbage seedpod weevil.

Fuel Use and Cost Per Acre By Operation for Spring Canola Production

MACHINE	FUEL TYPE	FUEL UNIT	FUEL/ HOUR (gal/hr)	COST/ HOUR ($/hr)	FUEL/ ACRE ($/ac)	COST/ ACRE $
CASE9270 TRACTOR	DIESEL	GALLON	13	36.4	?	?
PLOW, 13.5'	DIESEL	GALLON	6	16.8	1.048	2.93
CHISEL PLOW 28'	DIESEL	GALLON	4	11.2	0.337	0.94
SWATHER, JD970	DIESEL	GALLON	3.5	9.8	1.719	4.81
JD 7720 COMBINE	DIESEL	GALLON	10	28	2.946	8.25
4-WHEEL ATV	GASOLINE	GALLON	0.5	1.5	?	?
PICKUP	GASOLINE	GALLON	3	9	?	?

Fuel Use and Cost Per Acre By Operation for Spring Canola Production

OPERATION	DESCRIPTION	FUEL TYPE	FUEL UNIT	TRACTOR FUEL (gal/ac)	TRACTOR COST ($/ac)	MACHINE FUEL (gal/ac)	MACHINE COST ($/ac)
FINISH DISC (3X)	CASE 9270, 32' FINISH DISC	DIESEL	GALLON	2.68	7.51	0	0
CHISEL PLOW	CASE 9270, 28' CHISEL PLOW	DIESEL	GALLON	1.2	3.36	0	0
FINISH DISC	CASE 9270, 32' FINISH DISC	DIESEL	GALLON	0.89	2.5	0	0
PLOW	CASE 9270, 13.5' PLOW	DIESEL	GALLON	2.47	6.93	0	0
FIELD CULTIVATOR	CASE 9270, 36' CULTIVATOR	DIESEL	GALLON	0.77	2.16	0	0
CULTIMULCHER	CASE 9270, 24' CULTIMULCHER	DIESEL	GALLON	1.17	3.28	0	0
FINISH DISC	CASE 9270	DIESEL	GALLON	0.89	2.5	0	0
PLANT CANOLA	CASE 9270, 8' BRILLION SEEDER	DIESEL	GALLON	4.09	11.44	0	0
HARVEST	JD 7720 COMBINE	DIESEL	GALLON	0	0	1.7	4.76
SWATH CANOLA	15' JD970 SWATHER	DIESEL	GALLON	0	0	0.6	1.67

Schedule and Costs by Operation for Spring Canola Production

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST $	VARIABLE COSTS FUEL, LUBE, & REPAIRS $	VARIABLE COSTS MACH LABOR $	SERVICE $	MATER. $	INTER. $	TOTAL VARIABLE COST $	TOTAL COST $
FINISH DISC	CASE 9270, 32' FINISH DISC 3X	Mar-06	0.19	0.21	$5.50	$10.75	$2.99	$0.00	$0.00	$0.46	$14.20	$19.70
CHISEL PLOW	CASE 9270, 28' CHISEL PLOW	Mar-06	0.08	0.09	$2.47	$5.90	$1.34	$0.00	$0.00	$0.24	$7.48	$9.95
FINISH DISC	CASE 9270, 32' FINISH DISC	Mar-06	0.06	0.07	$1.83	$3.58	$1.00	$0.00	$0.00	$0.15	$4.73	$6.57
PLOW	CASE 9270, 13.5' PLOW	Mar-06	0.17	0.19	$6.62	$13.55	$2.75	$0.00	$0.00	$0.54	$16.85	$23.47
FINISH DISC	CASE 9270, 32' FINISH DISC	Apr-06	0.06	0.07	$1.83	$3.58	$1.00	$0.00	$0.00	$0.11	$4.70	$6.53
FERTILIZE	CUSTOM FERTILIZE	Apr-06	0.00	0.00	$0.00	$0.00	$0.00	$7.95	$60.00	$1.70	$69.65	$69.65
FIELD CULTIVATOR	CASE 9270, 36' CULTIVATOR	Apr-06	0.05	0.06	$2.07	$3.22	$0.87	$0.00	$0.00	$0.10	$4.19	$6.26
APPLY HERBICIDE	CUSTOM SPRAYER	Apr-06	0.00	0.00	$0.00	$0.00	$0.00	$10.95	$8.00	$0.47	$19.42	$19.42
CULTIMULCHER	CASE 9270, 24' CULTIMULCHER	Apr-06	0.08	0.09	$2.41	$4.73	$1.31	$0.00	$0.00	$0.15	$6.18	$8.59
SPRAY WEEDS	CUSTOM SPRAYER (STINGER 3EC)	May-06	0.00	0.00	$0.00	$0.00	$0.00	$10.95	$12.41	$0.39	$23.75	$23.75
PLANT CANOLA	CASE 9270, 8' BRILLION SEEDER	May-06	0.29	0.31	$6.36	$16.38	$4.56	$0.00	$30.00	$0.85	$51.79	$58.15
SPRAY INSECTS	CUSTOM SPRAYER (CAPTURE 2E)	Jun-06	0.00	0.00	$0.00	$0.00	$0.00	$10.95	$9.16	$0.17	$20.28	$20.28
HARVEST	JD 7720 COMBINE	Aug-06	0.17	0.19	$3.03	$6.61	$2.71	$0.00	$0.00	$0.85	$10.17	$13.20
SWATH CANOLA	15' JD970 SWATHER	Aug-06	0.17	0.19	$0.38	$2.48	$2.71	$0.00	$0.00	$0.48	$5.67	$6.05
LAND TAXES	LAND TAXES	ANN 2006	0.00	0.00	$10.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.00
OVERHEAD	OVERHEAD (ACCTING, LEGAL, ETC)	ANN 2006	0.00	0.00	$0.00	$0.00	$0.00	$13.08	$0.00	$0.00	$13.08	$13.08
CROP INSURANCE	HAIL AND FIRE INSURANCE	ANN 2006	0.00	0.00	$0.00	$0.00	$0.00	$2.50	$0.00	$0.13	$2.63	$2.63
LAND COST	CASH RENT	ANN 2006	0.00	0.00	$75.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$75.00
	TOTAL PER ACRE		1.33	1.46	$117.51	$70.79	$21.24	$56.38	$119.57	$6.80	$274.77	$392.28

Machinery Costs for Spring Canola Production, Snohomish County, WA

MACHINERY	PURCHASE PRICE (NEW/USED) $	YEARS TO TRADE	ANNUAL HOURS	DEPREC-IATION $/hr	INTER-EST $/hr	INSUR-ANCE $/hr	TAXES $/hr	HOUSING $/hr	TOTAL FIXED COST $/hr$/hr	REPAIRS LUBE $/hr	FUEL AND COST $/hr	TOTAL VARIABLE $/hr	TOTAL COST
CASE9270 TRACTOR	50,000.00	12.00	400.00	9.38	6.88	0.41	1.24	0.69	18.59	8.75	41.86	50.61	69.20
PLOW, 13.5'	10,000.00	15.00	150.00	4.00	3.67	0.22	0.66	0.37	8.91	1.33	19.32	20.65	29.57
CHISEL PLOW 28'	10,000.00	15.00	150.00	4.00	3.67	0.22	0.66	0.37	8.91	1.67	12.88	14.55	23.46
CULTIVATOR, 36'	10,000.00	15.00	150.00	4.00	3.67	0.22	0.66	0.37	8.91	2.00	0.00	2.00	10.91
CULTIMULCHER 36'	10,000.00	15.00	150.00	4.00	3.67	0.22	0.66	0.37	8.91	2.00	0.00	2.00	10.91
FINISH DISC, 32'	10,000.00	15.00	150.00	4.00	3.67	0.22	0.66	0.37	8.91	1.67	0.00	1.67	10.58
BRILLION SEEDER	1,500.00	10.00	120.00	0.42	1.04	0.06	0.19	0.10	1.81	1.67	0.00	1.67	3.48
SWATHER, JD970	2,500.00	15.00	150.00	0.67	1.17	0.07	0.21	0.12	2.23	3.33	11.27	14.60	16.83
JD 7720 COMBINE	20,000.00	15.00	150.00	8.00	7.33	0.44	1.32	0.73	17.83	6.67	32.20	38.87	56.69
4-WHEEL ATV	6,000.00	15.00	250.00	1.20	1.50	0.09	0.27	0.15	3.21	0.60	1.73	2.33	5.54
PICKUP	25,000.00	10.00	400.00	4.38	4.06	0.24	0.73	0.41	9.82	1.25	10.35	11.60	21.42
FARM BUILDINGS	80,000.00	30.00	1,500.00	1.69	2.80	0.17	0.50	0.28	5.44	0.67	0.00	0.67	6.11
SHOP TOOLS	30,000.00	20.00	1,500.00	0.90	1.10	0.07	0.20	0.11	2.37	1.00	0.00	1.00	3.37