

Division of Marketing  
Agricultural Development and Diversification (ADD) Program  
1997 Grant Final Report

Grant Number 12055

**Grant Title** Value-added Oil Seed Industrial Development

**Amount Awarded** \$20,000.00

**Name** Mark Mueller

**Organization** Wisconsin Business Innovation Corporation  
Spooner

**E-Mail**

**WEB**

Department Contact: DATCP - Marketing - ADD Grants  
PO Box 8911 Madison, WI 53708-8911  
Tel: (608)224-5136  
<http://datcp.state.wi.us>

**Final Report**  
**ADD Grant Project**  
**Development of a Value Added Oil Seed Industry for Wisconsin**  
**Project Number 12055**  
**July 1997 - September 1998**

**Wisconsin Business Innovation Corporation**

**Original Purpose of Project**

To identify non food industrial products and markets from canola/rape as well as other vegetable seed plants

To create markets for canola/rape grown and produced in Wisconsin to expand and diversify the agricultural base in Wisconsin

To examine the overall feasibility of producing canola/rape in Wisconsin for industrial lubricant products.

**Work Conducted During the Project**

- Cultivar Trials and Demonstrations

1. Two years of cultivar trials were undertaken by the University of Wisconsin, Agronomy Department. The field trials were conducted at four research field stations in the state, Arlington, Ashland, Hancock and Spooner. The trials evaluated 12 different cultivars for yield in pounds per acre and oil content. See attached report by Thomas Osborn, Professor for details.

2. Three different field demonstrations totalling about 100 acres were planted by two different farmers in northwest Wisconsin in the spring of 1998. The purpose of this effort was to "scale up" the plantings from the small trial plots undertaken by the University. The field demonstrations developed experience with the use of field scale equipment in planting and harvesting, yields, weed control and irrigation. Yields from the irrigated field were better than from the non irrigated fields and were nearly 2,000 pounds per acre. The field demonstrations identified three areas to address for improving yields:

- **Early Planting** A combination of late planting and unusually warm spring was a major factor in reducing yield. Canola should be planted at first opportunity after winter thaw.
- **Fertilization** European experience with canola demonstrates benefits for periodic (up to four times) fertilization with nitrogen to achieve high yields

- Natural Fungicide Some Canadian research has indicated that canola develops natural soil born fungicides that have carry over effect on next years rotation crop such as potatos. This potential benefit needs to be further researched and documented, as it would potentially help in the economics of the growing canola.
- Other factors to address in future growing are weed control, cultivar selection based on yield and oil content, and harvesting technique to eliminate losses in the field.
- Pilot Crush to Produce Oil and Meal

In September a pilot plant using "cold press" oil extraction equipment was set up and operated to produce canola oil and meal from the seed grown in the field demonstrations. A twin screw press from the German Company IBG Monforts was used. The pilot run was attended by the President of the company, Siegmund Szyplewski and operational engineer, Dirk Skuras. The IBG Monforts equipment was used because it produces a food grade as well as industrial grade of oil. Because it is a cold press, the oil is considered a "virgin" oil containing all the essential natural ingredients of the oil. About two hundred pounds of seed were crushed and produced about 10 gallons of oil.

A small quantity of wild hazelnuts which are rather plentiful in many parts of Wisconsin were also processed into oil and meal. The yield was rather low, however, since the nuts were not preshelled. Consequently, some of the oil was left over in the meal. There is a very strong market for hazelnut oil as it is used as a flavoring agent in confectionary, coffee and even liquor. The US is a major importer of hazelnut oil and wholesale prices are in excess of fortyfive dollars per gallon.

- Market Research, Trials and Testing

Market research was undertaken on vegetable seed oil based industrial lubricants to determine trends and emerging issues. Early on, the objective was to identify rich markets which were not being addressed by major agribusiness firms. For example, food grade cooking oils are dominated by several large firms. More than a dozen proprietary industrial lubricants developed by enetpreneurs and public entities such as Universities and federal labs were identified and investigated. Product applications such as hydraulic fluid oil, transmission oil, concrete release agents, motor oils and bar and chain oils were identified. Several products were investigated in depth based on:

- Availability of technology through licensing
- Capital requirements to process oil
- Size of market

Agro Management Group This small firm has been developing a crankcase motor oil called Bio 25-30 from canola using a cold press process to produce the base oil and fortified with several additives to increase the burn point and modify other characteristics. Extensive work was undertaken to determine methods to begin test marketing of the product including introduction into state and local vehicles and small engines. A University of Wisconsin business marketing class was engaged to undertake market research with golf course managers to determine their receptivity to purchase a biodegradable motor oil.

A preliminary understanding was reached on a licensing agreement. Barriers to market entry were identified, the major barrier being a voiding of warranty by engine manufacturers for use of a motor oil which did not meet American Petroleum Institute Certification. It was determined that the time and cost to address the warranty barrier was beyond the means of the Wisconsin Business Innovation Corporation or any of its potential partners. Consequently, although preliminary understandings had been reached, pursuit of the technology was dropped.

Colorado River Valley Farms (CRVF) and Tessol GmbH This small firm uses cold press technology to produce a large variety of food grade oils are in a special niche - higher priced, higher valued because of the cold press technology which preserves the all the essential ingredients, vitamins and aroma of the natural oil. The large agribusiness producers predominantly use an alcohol solvent process which alters the natural oil. While CRVF had been producing food grade oils, it had developed a preliminary agreement with a German firm Tessol, GmbH, wholly owned subsidiary of a large farm cooperative to access their "additive" packages to produce industrial lubricants. Tessol has been producing and marketing industrial lubricants from canola since 1984 and has more than forty different products. CRVF and Tessol, GmbH expressed strong interest in developing a market in the US for canola oil and expressed willingness to share the technology. In September agreements were reached with Tessol and CRVF to incorporate a Wisconsin company, Badger Oil, LLC to process and market both food grade and non food grade oils.

President and owner of CRVF, E. Peter Matthies, has agreed to join Badger Oil as an investor and as an operational manager. He is contributing his technical expertise including the process for producing a food grade "toasted canola oil". Some of the initial batch of canola oil has been processed into the "toasted canola oil".

The initial industrial lubricant to be commercialized is a bar and chain oil for chain saws. Bar and chain oil is considered a total loss lubricant, meaning as the oil is consumed, it is spilled in the environment. Tessol plans to provide Badger Oil in early 1999 with an additive for a WD-40 type self cleaning lubricant and a two cycle engine oil.

Tessol has introduced the Wisconsin Business Innovation Corporation to the Agriculture Department of the University of Hohenheim at Stuttgart. The University has had a long standing cooperative relationship with Tessol and has been researching a dairy feed ration based on canola meal which results in increased production in milk with a low saturated fat. The University of Hohenheim is interested in cooperating with the WBIC, University of Wisconsin WDATCP for further research and development of the dairy feed ration.

IBG Monforts identified several other vegetable seed oils which have very strong market potential and as well as growing potential for Wisconsin and include rose hips for cosmetic markets, pumpkin seed oil for food and evening primrose for nutraceuticals.

### Badger Oil, LLC Development Plans

Start up plans for Badger Oil, LLC.

### **Public Outreach Efforts**

To date two public outreach efforts have been undertaken and include a demonstration of the pilot plant in operation. This was attended by Country Today and the Spooner Advocate. See attached article. The Spooner Advocate plans another information story when the plant becomes operational. Samples of a food grade toasted canola oil were also provided to the Wis DATCP for inclusion at its booth at the Dunn County fair.

### **Results of the Project**

In summary, the following results can be reported

- Feasibility analysis of
- Formation of a new enterprise, Badger Oil, LLC., start up employment of 1 full time and two part time, initial capitalization of \$150,000.
- Canola Growing Demonstration as a Wisconsin field crop
- Demonstration of Oil and Meal processing from canola seed
- New Product Development
  - Toasted Canola Oil
  - Wild Hazel Nut Oil and Meal
  - Chainsaw Bar and Chain Oil
- New Product Opportunities
  - Rose Hip Oil
  - Pumpkin Seed Oil
  - Evening Primrose Oil

**Without the Wisconsin DATCP ADD grant assistance, the Wisconsin Business Innovation Corporation would not have been able to undertake the project. The project will hopefully launch a new industry of growing and producing plants for oil and meal extraction.**

See attached for additional information on results from the project.

## **PRODUCTION ATTACHMENTS**

- Wisconsin Spring Canola Cultivar Trial– Thomas Osborn
- Estimated Cost of Production – Canola
- Chart on New Food Oil Seeds in European Union

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# University of Wisconsin-Madison

College of Agricultural and Life Sciences  
Department of Agronomy  
1575 Linden Drive  
Madison, Wisconsin 53706-1597  
Phone: 608-262-1390/1391  
FAX: 608-262-5217

*Improving Agriculture Through Crop Biotechnology,  
Genetics and Production Research*

29 January 1998

To: Participants and collaborators in the 1997 Wisconsin Spring Canola Cultivar Trial

From: Thomas C. Osborn, Professor

Re: Trial results

I have enclosed a copy of the results from the 1997 Wisconsin Spring Canola Cultivar Trial. You will see that we also included some High Erucic Acid Rapeseed (HEAR) cultivars at all three locations and grew only these at Hancock. At Arlington, we included two experimental Wisconsin hybrids.

I am planning again to conduct a canola trial this summer. I will send out entry forms next month.

Thank you for participating in this project.

Sincerely,



Thomas C. Osborn  
Professor

TCO/jal

## 1997 WISCONSIN SPRING CANOLA VARIETY TESTS

T.C. Osborn & R.D. Vogelzang  
 Agronomy Department  
 Univ. of Wisconsin - Madison  
 Madison, WI 53706  
 (608) 262-2330

	Locations			
	Arlington	Ashland	Spooner	Hancock
Soil Type:	Silt Loam	Sandy loam	Sandy loam	Sand
Row spacing:	6"	6"	6"	6"
Planting Date(s):	4/26/97	4/29/97	4/29/97	4/29/97
Cooperator:	S. Kraak	M. Mlynarek	R. Rand	J. Breuer

Companies and public institutions providing seeds:

Croplan Genetics  
 P.O. Box 1291  
 Minot, ND 58702

North Dakota State Univ.  
 Langdon Research Center  
 Langdon, ND 58249

Brett-Young Seeds  
 Box 99 St. Norbert P.S.  
 Winnipeg, MB

University of Manitoba  
 Dept. of Plant Science  
 Winnipeg, MB

University of Idaho  
 P.S.E.S., College of Agriculture  
 Moscow, ID

University of Wisconsin  
 Dept. of Agronomy  
 Madison, WI 53706

# Wisconsin Spring Canola Variety Tests, 1997

Dr. T. C. Osborn  
 Department of Agronomy  
 University of Wisconsin-Madison  
 Madison, WI 53706  
 (608) 262-2330

Location: Hancock Agric. Research Station; field G-5  
 Soil Type: Plainfield sand  
 Soil Test: Fall 1996  
 Previous Crop: Soybean  
 Fertilizer: 200#/A 0-0-60 (4/4/97); 100#/A 21-0-0-24S (6/10/97);  
 240#/A 33-0-0 (7/3/97)  
 Herbicide: Treflan (1 pt/acre)  
 Seed Treatment: Benlate  
 Planting Date: 29-Apr-97  
 Seeding Rate: 4 lb/A  
 Plot Size: Fourteen 25 ft rows, 6 in apart; replicated four times  
 Harvest Date: 5-Aug-97  
 Harvest Method: Hand cut 10 rows x 20'/plot; collect into cloth bags;  
 oven dry 2-3 days; machine thresh.

Cooperator: J. Breuer, U. W.-Hancock Ag. Research Station

Companies and public institutions providing seeds:

University of Manitoba	University of Idaho
Dept. of Plant Science	P.S.E.S., College of Agriculture
Winnipeg, MB	Moscow, ID

## Weather Data

Month	Monthly Precip.**		Ave. Temp.	
	Precip.**	Normal	Temp.	Normal
May	1.9	3.1	51.4	55.9
June	3.4	3.9	67.4	64.4
July	5.2	3.7	68.3	69.5
August	4.0	4.2	64.9	66.6

\*\* In addition, irrigation supplied 13.2",  
 with 0.5" applied every 2-5 days  
 between May 22 and Aug 28



# Wisconsin Spring Canola Variety Tests, 1997

Dr. T. C. Osborn  
 Department of Agronomy  
 University of Wisconsin-Madison  
 Madison, WI 53706  
 (608) 262-2330

Location: Ashland Agric. Research Station  
 Soil Type: Superior sandy loam  
 Soil Test: Fall 1993  
 Previous Crop: Oats  
 Fertilizer: 300#/A 0-10-42-5S; 100#N/A (Urea) - (4/29/97)  
 Herbicide: Treflan (1.5 pt/acre) - 4/29/97  
 Seed Treatment: Benlate  
 Planting Date: 29-Apr-97  
 Seeding Rate: 6 lb/A  
 Plot Size: Ten 25 ft rows, 6 in apart; replicated four times  
 Harvest Date: August 8-August 18, 1997  
 Harvest Method: Hand cut 4 rows x 12'/plot; collect into cloth bags;  
 oven dry 2-3 days; machine thresh.

Cooperator: M. Mlynarek, U. W.-Ashland Ag. Research Station

## Companies and public institutions providing seeds:

Croplan Genetics  
 P.O. Box 1291  
 Minot, ND 58702

North Dakota State Univ.  
 Langdon Research Center  
 Langdon, ND 58249

University of Idaho  
 P.S.E.S., College of Agriculture  
 Moscow, ID

Brett-Young Seeds  
 Box 99 St. Norbert P.S.  
 Winnipeg, MB

University of Manitoba  
 Dept. of Plant Science  
 Winnipeg, MB

University of Wisconsin  
 Dept. of Agronomy  
 Madison, WI 53706

## Weather Data

Month	Monthly		Ave. Temp.
	Precip.	Normal	
May	2.0	3.7	47.1
June	3.1	3.6	64.5
July	3.9	4.1	67.0
August	2.7	4.6	63.3

Normal  
 51.2  
 60.9  
 67.3  
 65.5

# Wisconsin Spring Canola Variety Tests, 1997

Dr. T. C. Osborn  
 Department of Agronomy  
 University of Wisconsin-Madison  
 Madison, WI 53706  
 (608) 262-2330

Location: Arlington Agric. Research Station; field #412  
 Soil Type: Plano Silt loam  
 Soil Test: ?

Previous Crop: Soybean  
 Fertilizer: Urea (200 lbs/acre) (4/23/97)  
 Herbicide: Treflan (1 pt/acre)

Seed Treatment: Benlate  
 Planting Date: 26-Apr-97  
 Seeding Rate: 6 lb/A

Plot Size: Seven 25 ft rows, 6 in apart; replicated four times  
 Harvest Date: August 6-August 19, 1997  
 Harvest Method: Hand cut 7 rows x 15'/plot; collect into cloth bags;  
 oven dry 2-3 days; machine thresh.

Cooperator: S. Kraak, U. W. Arlington Ag. Research Station

Companies and public institutions providing seeds:

Croplan Genetics	North Dakota State Univ.	University of Idaho
P.O. Box 1291	Langdon Research Center	P.S.E.S., College of Agriculture
Minot, ND 58702	Langdon, ND 58249	Moscow, ID

Brett-Young Seeds	University of Manitoba	University of Wisconsin
Box 99 St. Norbert P.S.	Dept. of Plant Science	Dept. of Agronomy
Winnipeg, MB	Winnipeg, MB	Madison, WI 53706

**Weather Data**

Month	Monthly		Ave.	
	Precip.	Normal	Temp.	Normal
May	2.0	3.1	51.0	57.9
June	4.9	3.8	68.4	66.8
July	6.0	3.4	69.4	71.3
August	3.2	3.9	64.8	68.9

1997 Canola Variety Trials Plant Data  
T. C. Osborn, Agronomy Dept.  
Univ. of Wisconsin

Variety	Wisconsin location	First Flower (DAP)	End Flower (DAP)	Maturity (DAP)	Plant Height (inches)	Yield (lbs/acre)	Seeds/lb	Oil (%)	Yield (kg/ha)	Seed wt. (g/1000 seeds)
BNS94043	Arlington	57.0	76.3	106.0	56.0	1748	165557	41.43	1986	2.761
GOH18	Arlington	56.8	78.3	112.0	59.5	1891	148870	41.04	2148	3.071
CL2070	Arlington	58.0	78.5	112.5	51.7	2009	164292	39.10	2283	2.783
Crusher	Arlington	59.3	79.0	110.0	58.6	1844	140985	41.44	2095	3.243
Cyclone	Arlington	56.8	75.3	107.5	52.9	1821	154076	39.83	2069	2.967
Hudson	Arlington	54.3	71.3	104.0	45.8	1476	198047	39.68	1677	2.308
Hyola401	Arlington	52.5	68.3	104.0	47.6	1808	138308	40.63	2054	3.305
Sterling	Arlington	55.0	72.5	104.0	48.1	1309	174699	39.10	1488	2.617
Garnett	Arlington	55.0	73.0	104.0	46.8	1551	164100	40.61	1762	2.786
Reston	Arlington	58.3	79.5	106.0	55.1	1017	192117	39.44	1156	2.380
RV128p1	Arlington	61.0	82.0	115.8	66.4	2685	160204	40.93	3051	2.854
RV128p7	Arlington	61.0	81.5	117.0	63.0	2606	156556	40.52	2961	2.920
Mean		57.1	76.3	108.6	54.3	1814	163151	40.31	2061	2.833
LSD(.05)		0.5	1.4	4.7	7.1	490	17335	n.a.	557	0.316
CV (%)		0.7	1.3	3.0	9.1	18.8	7.4	n.a.	18.8	7.7
BNS94043	Ashland	67.0	87.5	113.8	47.5	1652	181803	45.66	1878	2.515
GOH18	Ashland	67.3	88.5	116.3	48.5	1565	163924	44.75	1778	2.789
CL2070	Ashland	67.3	87.5	115.5	46.0	1980	164263	44.46	2250	2.783
Crusher	Ashland	67.8	88.0	113.0	45.5	2156	167959	47.65	2450	2.722
Cyclone	Ashland	67.5	89.0	113.3	46.0	1424	158167	43.70	1618	2.890
Hudson	Ashland	66.5	90.8	114.3	41.0	1275	201185	42.58	1449	2.272
Hyola401	Ashland	62.0	80.8	109.8	39.5	1748	140649	43.83	1986	3.250
Sterling	Ashland	65.5	86.8	113.3	40.5	1497	167207	45.04	1701	2.734
Garnett	Ashland	66.0	86.0	110.5	45.5	1577	179342	46.82	1792	2.549
Reston	Ashland	67.5	88.3	116.0	48.0	1251	187738	44.83	1421	2.435
Mean		66.4	87.3	113.6	44.8	1612	171224	44.93	1832	2.694
LSD(.05)		1.0	1.7	2.3	4.9	635	12577	n.a.	721	0.200
CV (%)		1.0	1.4	1.4	7.6	27.3	5.1	n.a.	27.3	5.0
BNS94043	Spooner	52.8	73.8	--	41.3	1302	178589	42.04	1480	2.560
GOH18	Spooner	53.3	73.0	--	47.5	1257	147608	43.37	1429	3.097
CL2070	Spooner	54.3	78.0	--	42.5	1592	156797	40.51	1809	2.916
Crusher	Spooner	53.3	71.8	--	35.3	1051	179395	41.15	1194	2.548
Cyclone	Spooner	53.0	68.3	--	40.8	1057	148291	41.41	1201	3.083
Hudson	Spooner	54.0	74.8	--	35.5	1058	180742	42.39	1203	2.529
Hyola401	Spooner	52.0	67.8	--	45.8	956	136054	40.05	1087	3.360
Sterling	Spooner	53.3	64.0	--	40.0	905	163222	40.53	1028	2.801
Garnett	Spooner	55.5	78.0	--	40.5	1206	160485	41.00	1370	2.849
Reston	Spooner	58.0	76.5	--	44.0	1012	166143	43.41	1150	2.752
Mean		53.9	72.6	--	41.3	1140	161733	41.59	1295	2.849
LSD(.05)		1.8	4.1	--	7.2	303	21883	n.a.	345	0.381
CV (%)		2.3	4.0	--	12.1	18.4	9.4	n.a.	18.4	9.3
Sterling	Hancock	--	81.5	98.0	28.7	1568	170211	39.85	1782	2.686
Garnett	Hancock	--	78.0	98.0	28.5	1316	178746	40.73	1495	2.558
Reston	Hancock	--	82.3	98.0	30.5	1339	185887	40.64	1522	2.459
Mean		--	80.6	98.0	29.3	1408	178281	40.41	1600	2.568
LSD(.05)		--	4.4	0.0	4.6	362	26901	n.a.	411	0.380
CV (%)		--	3.4	0.0	9.9	16.1	9.4	n.a.	16.1	9.3

1997 Canola Variety Trials Field Information  
 T. C. Osborn, Agronomy Dept.  
 Univ. of Wisconsin

Location	<u>Arlington</u>	<u>Ashland</u>	<u>Hancock</u>	<u>Spooner</u>
Planting date	4/26/97	4/29/97	4/29/97	4/29/97
Row spacing	6 inches	6 inches	6 inches	6 inches
Seeding rate	6 lb/A	6 lb/A	4 lb/A	6 lb/A
Previous crop	Soybeans	Oats	Soybeans	Soybeans
Seed treatment	Benlate	Benlate	Benlate	Benlate
Herbicide	Treflan, 1pt/A, PPI	Treflan, 1pt/A, PPI	Treflan, 1pt/A, PPI	Treflan, 1pt/A, PPI
Soil type	Plano silt loam	Superior	Plainfield sand	Cress sandy loam
Soil test	?	69 ppm P 120 ppm K pH 6.2	98 ppm P 64 ppm K pH 6.8	125 ppm P 135 ppm K pH 6.5
Fertilizer applied	on 4/24/97: 200#/A urea	on 5/5/97: 300#/A (0-10-42, +5S) 100#/N/A (urea)	on 4/4/97: 200#/A (0-0-60) on 6/10/97: 100#/A (21-0-0-24S) on 7/3/97: 240#/A (33-0-0)	on 5/5/97: 250#/A (21-0-0-24S)

**Estimated Cost of Production / Canola  
4-23-1998**

		Irrigated		Dryland
<b>Land Rent</b>		\$110.00		\$40.00
<b>Seed</b>		N/A		N/A
<b>Soil Preparation</b>				
	Field Cultivate	\$5.50		\$5.50
	Plow	\$13.00		\$13.00
	Soil Finish	\$8.00		\$8.00
	Plant	\$8.00		\$8.00
<b>Herbicide</b>				
	Treflan 1.25 pt. Application	\$4.06 \$5.00		\$4.06 \$5.00
<b>Fertilizer</b>		<b>Irrigated Amt.</b>	<b>Dry Amt.</b>	
	Ammonium Sulfate	150 #	100#	\$7.75
	Urea	125#	125#	\$10.31
	DAP	100#	100#	\$11.80
	Potassium Mag. Sul.	100#	100#	\$8.50
	Potassium Chloride	100#	100#	\$6.75
	28% Spreading	3 gal.		\$1.73 \$1.50
<b>Electric</b>		\$9.00		
<b>Harvest</b>		\$26.00		\$26.00
<b>Miscellaneous Expense</b>	(mgt., support, insurance)	\$15.00		\$5.00
<b>Total Cost of Production Per Acre</b>		<b>\$255.77</b>		<b>\$161.17</b>

# Cultivation of Nonfood Oilseeds in the EU (1993 - 1997)

