Division of Marketing
Agricultural Development and Diversification (ADD) Program

1993 Grant Final Report

Grant Number 08010

Grant Title Response of Spring Canola to Planting Date and Seeding Rate in Wisconsin (Phase 2)

Amount Awarded $2,275.00

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Final Report

of study

Response of Spring Canola to Planting Date and Seeding Rate in Wisconsin

funded by

The Wisconsin Department of Agriculture, Trade, and Consumer Protection

Study conducted by Earl T. Gritton and Patrick J. Flannery of the Department of Agronomy,
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Duration of Project: Two years
Beginning: July 1, 1992
Ending: June 30, 1994

SUMMARY

During the period 1991-1993, a canola date of planting and seeding rate study was conducted at Arlington and Sturgeon Bay, Wisconsin. Three dates of planting were used, starting with the earliest date feasible to plant the canola, with subsequent plantings at approximately 2-week intervals. At each date of planting, three seeding rates were included. These were 3.0 lbs/acre, 7.5 lbs/acre, and 12.0 lbs/acre.

Grain yields ranged from a low of 149 lbs/acre during a drought at Arlington in 1991 to a high of 3038 lbs/acre at Arlington in 1992. Averaged over the 5 trials, the earliest date of planting produced the highest yield. Grain yields decreased an average of 160 lbs/acre for each week planting was delayed past the first date it could be planted.

Seeding rates ranging from 3.0 to 12.0 lbs/acre had little effect on grain yield. The canola plant has a remarkable ability to compensate for differences in population. While the 3.0 lb/acre seeding rate was usually sufficient in this study, growers may feel a little more comfortable with a slightly higher rate in case of poor germination or stand establishment.

It is possible to obtain good yields of canola in Wisconsin. One of the main constraints to growing of the crop here is the lack of a nearby crushing facility.

Need for this Research

Spring canola has been suggested as a new crop for Wisconsin, and small acreages have been planted by farmers to test its potential.

Canola is grown primarily for its edible oil, which contains the lowest level of saturated fat of any cooking oil on the market today. Because of this fact, canola oil consumption has increased dramatically, creating a large demand for production. The meal left after oil extraction is a valuable protein supplement for livestock.

Currently, almost all spring canola used in the U.S. is imported from Canada. To meet the constantly expanding market demand, there exists a need for production within the U.S. Due to our climate, which is similar to production areas in Canada and Europe, Wisconsin is a possible area for spring canola production.

While spring canola can be an option for producers in the southern part of the state, the area with the greatest potential is northern Wisconsin. In the south, producers are able to produce such cash crops as corn, soybeans, and wheat. In the north, however, those cash crops that grow well in the south are not as productive, leaving those producers fewer options. Canola may provide a cash crop for the north, and give added income to northern producers.

Canola variety trials have been carried out by our research program since 1985. Originally these trials included both spring-seeded and fall-seeded trials. However, winter killing of fall-seeded canola was always severe and some years was complete. It is concluded that fall cultivars now available are not suitable for growing in Wisconsin. Spring-seeded cultivars and experimental lines have performed relatively well over a geographic range in Wisconsin. Spring canola appears to hold promise. Because it is a new crop, we know little of the agronomic practices needed for production in Wisconsin. The variety trials provide data on choice of cultivars, but we are lacking other information. This project was designed to look at the response to date of seeding, and to seeding rate. These are important variables in the production of spring-seeded canola in Wisconsin.

Materials and Methods

A preliminary study was conducted during the field season of 1991, before this project funded by the Wisconsin Department of Agriculture, Trade, and Consumer Protection was initiated. The research was conducted at the Arlington, Wisconsin Agricultural Research Station. Three dates of planting were selected, with planting occurring at two-week intervals using a single commercial cultivar. Dates of seeding were: April 20, May 3, and May 16. At each planting date, three seeding rates were used. These were: 3.0, 7.5, and 12.0 pounds of seed per acre. The experimental design was a split plot arrangement of a randomized complete block with four replications. Plot size was 16 rows, 25 feet in length, planted 7 inches apart. A 20 foot section of the center seven rows were harvested with a plot-style Hege combine at grain maturity, with 2 1/2 feet removed at each end to eliminate border effect.

The 1992 and 1993 studies were conducted on the Arlington and Sturgeon Bay Agricultural Research Stations. Planting dates in 1992 were April 30, May 14, and May 28 at Arlington; and May 6, May 20, and June 6 at Sturgeon Bay. The 1993 planting dates were April 30, May 13, and May 17 at Arlington, and May 7, May 20, and June 3 at Sturgeon Bay. Seeding rates were 3.0, 7.5, and 12.0 lbs/acre. Plot sizes and harvest procedures were the same as in 1991.

Results and Discussion

The 1991 data are presented in Table 1. While planting dates were separated by 13-day intervals, the warmer temperatures at flowering resulted in only 8-9 day differences due to planting date. Plant height increased with delayed planting. Lodging tended to decrease with delay in planting, though the differences were not statistically significant. Seed yield decreased dramatically as planting was delayed. While the earliest planting averaged 1376 lbs/acre, the latest planting produced only 149 lbs/acre. Delayed planting resulted in increased seed size, probably because fewer seed were formed.

Seeding rate caused little or no change in bloom date in 1991. Increasing the seeding rate, which resulted in higher plant populations, resulted in decreasing plant height. Lodging was not significantly affected by seeding rate. The highest yield was obtained from the lowest seeding rate, with yields decreasing as seeding rate increased.

In 1992 at Arlington (Table 2), two weeks' delay in planting resulted in 11-14 days' delay in blooming, a longer time interval than was observed in 1991. As in 1991, plant height increased with later planting. The lodging value for the earliest planting was considerably lower than for the two later dates, but because of much variability, the difference was not significant. The second date of planting, May 14, produced higher yield than either of the other dates. The earliest planting produced the lowest yield. Weight per seed was not affected by planting date.

Seeding rate at Arlington in 1992 did not affect bloom date, lodging, or seed size. Plant height tended to decrease with increased seeding rate, but the effect was not significant. The highest grain yield was obtained from the intermediate seeding rate of 7.5 lbs/acre, while the low rate of 3 lbs/acre produced the lowest grain yield.

Plant height at Sturgeon Bay in 1992 (Table 3) increased with delayed planting. Lodging was not affected. The first date of planting yielded much better than either of the later dates, which had similar yields. Seed size was inconsistent in response.

Seeding rate in 1992 at Sturgeon Bay did not affect bloom date, yield, or seed size. Plant height and lodging decreased with delayed planting.

At Arlington in 1993, the earliest date of planting resulted in the tallest plants (Table 4), while those from the second and third dates were similar in height. There was less lodging of the first planting. Grain yields from the first two dates were similar, but declined with the latest date of planting. Weight per seed did not exhibit a consistent trend. Percent protein of the grain declined slightly with delayed planting. Oil content was not consistent.

Plants from the 3 and 7.5 lbs/acre seeding rate averaged slightly taller than from the 12 lb rate. Lodging increased with heavier seeding rates. Grain yield was not affected by the seeding rate. Percent protein was less for the higher seeding rate but percent oil was not consistent in response.

At Sturgeon Bay in 1993 (Table 5), plant height decreased with delayed seeding rate, while lodging increased. Yields declined as planting was delayed. Seed size tended to decrease with later plantings. Percent protein increased and percent oil decreased with successive plantings.

Plants were somewhat shorter with increasing seeding rates and lodged the most at the highest seeding rate. There was a slight increase in grain yield corresponding to heavier seeding. One thousand seed weight, percent protein, and percent oil were little affected by rate of seeding.

In addition to the range of values observed in individuals years and locations, it is informative to look at the data when combined over locations and years (Table 6). The latest date of seeding tended to result in plants that were slightly taller than from the first two dates, which did not differ. Lodging, however, was least from the earliest planted material. Highest grain yields were obtained from the earliest planted canola, with the difference between the earliest and latest date averaging 630 lbs/acre.

Increased seeding rates caused plants to be shorter, but even so they tended to show more lodging. Grain yields were little affected by seeding rate, indicating that even 3 lbs per acre can be sufficient for maximum yields.

We can conclude that it is advantageous to plant canola as early in the spring as it is feasible to do so. This will result in the shortest plants, the least lodging, and the highest grain yields. Yields declined an average of 160 lbs/acre for each week planting was delayed.

Even the lowest seeding rate of 3 lbs/acre produced enough plants for maximum grain yields. A producer might be more comfortable seeding at 7.5 lbs/acre, to compensate for possible poor germination and emergence. If percent emergence is high, however, there is likely to be very little, if any, benefit from the higher seeding rate. It certainly does not appear desirable to seed at 12 lbs/acre. Our research results show that it is possible to produce yields of canola in Wisconsin that are competitive with large producing areas such as Canada, North Dakota and South Dakota. With the ability to competitively produce the crop with major production regions, Wisconsin producers will be able to increase diversification of their operations by expanding cropping options. The main impediment to greater acceptance of the crop is the lack of a nearby crushing facility. Presently, all canola grain from Wisconsin must be trucked to Ontario, Canada.

Outreach

Progress reports have been filed periodically with the Wisconsin Department of Agriculture, Trade, and Consumer Protection, and annual reports have summarized results for the year. This information was, thus, made available to all WDATCP personnel.

The research plots have been included on field days and presentations made to those in attendance. This has included both Arlington and Sturgeon Bay, Wisconsin.

Several farm newspaper and magazine articles have reported on the presentations made at field days, and have reached a wide audience.

Results of this study have been supplied, along with data from our other canola studies, to Dr. Ed Oplinger, Agronomy Extension Crops specialist. He has, thus, had actual research data from several Wisconsin trials to discuss with growers and potential growers.

It should also be pointed out that Wisconsin is part of a new regional study on canola that is funded by a USDA grant. Our past efforts, which include this data of planting and seeding rate study, give evidence that canola research is taking place in Wisconsin, and we are able to contribute to this joint effort which includes researchers in Minnesota, North Dakota, and South Dakota.

Table 1. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates at Arlington, Wisconsin in 1991.

Factor	Plants Per Acre	Bloom Date	Harvest Date	Height	Lodging	Yield		1000 Seed Weight
Date				in	1-5	lbs/a	bu/a	gm
20-April	932930	13-JUN	25-Jul	34.2	1.8	1376	27.5	2.60
03-May	911275	21-JUN	12-Aug	35.8	1.5	815	16.3	2.81
16-May	936664	30-JUN	20-Aug	36.9	1.2	149	3.0	3.34
LSD (.10)	ns	1		2.0	ns	133	2.7	0.19
LSD (.05)	ns	2		2.5	ns	168	3.4	0.24
LSD (.01)	ns	3		ns	ns	254	5.1	0.36
Seeding Rate								
3 lbs/a	384323	22-JUN		38.1	1.4	946	18.9	2.97
7.5 lbs/a	1011089	21-JUN		35.0	1.6	773	15.5	2.89
12 lbs/a	1385456	21-JUN		33.7	1.6	620	12.4	2.88
MEAN	926956	21-JUN		35.6	1.5	780	15.6	2.91
LSD (.10)	187700	1		1.4	ns	109	2.2	ns
LSD (.05)	227400	1		1.7	ns	132	2.6	ns
LSD (.01)	311600	1		2.3	ns	180	3.6	ns
CV%	14	3		5.6	29.7	20	19.6	9.75

Table 2. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates at Arlington, Wisconsin in 1992.

Factor	Plants Per Acre	Bloom Date	Harvest Date	Height	Lodging	Yield		1000 Seed Weight
Date				in	1-5	lbs/a	bu/a	gm
30-April	544345	07-JUN	14-Aug	37.8	1.3	2390	47.8	4.06
14-May	474358	18-JUN	04-Sep	38.9	3.5	3038	60.8	4.41
28-May	496754	02-JUL	21-Sep	42.2	3.1	2681	53.6	4.42
LSD (.10)	ns	1		3.2	ns	273	5.4	0.18
LSD (.05)	ns	1		4.1	ns	344	6.9	0.22
LSD (.01)	ns	2		ns	ns	521	10.4	0.34
Seeding Rate								
3 lbs/a	216805	19-JUN		40.6	1.6	2590	51.8	4.32
7.5 lbs/a	519149	19-JUN		39.3	3.6	2801	56.1	4.30
12 lbs/a	779502	19-JUN		39.0	2.8	2718	54.4	4.27
MEAN	505152	19-JUN		39.6	2.6	2703	54.1	4.30
LSD (.10)	111600	ns		ns	ns	134	2.7	ns
LSD (.05)	135200	ns		ns	ns	163	3.2	ns
LSD (.01)	185200	ns		ns	ns	ns	3.6	ns
CV%	18	3		3.8	115.8	4	19.6	2.75

Table 3. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates at Sturgeon Bay, Wisconsin in 1992.

Factor	Plants Per Acre	Bloom Date	Harvest Date	Height	Lodging	Yield		1000 Seed Weight
Date				in	1-5	lbs/a	bu/a	gm
06-May	343715	15-JUN	26-Aug	35.6	1.5	2352	47.1	4.18
20-May	313232	28-JUN	22-Sep	39.9	1.6	1375	27.5	3.39
06-Jun	300478	17-JUL	22-Sep	44.3	1.2	1359	27.2	4.02
LSD (.10)	ns	ns		2.2	ns	205	4.1	0.46
LSD (.05)	ns	ns		2.8	ns	258	5.2	0.58
LSD (.01)	ns	ns		4.2	ns	390	7.8	ns
Seeding Rate								
3 lbs/a	171391	30-JUN		42.3	1.6	1696	33.9	3.68
7.5 lbs/a	316342	30-JUN		41.0	1.4	1767	35.3	3.81
12 lbs/a	469692	30-JUN		36.4	1.2	1622	32.4	4.09
MEAN	319142	30-JUN		39.9	1.4	1695	33.9	3.86
LSD (.10)	75060	ns		5.1	0.3	ns	ns	ns
LSD (.05)	90940	ns		ns	0.4	ns	ns	ns
LSD (.01)	124600	ns		ns	ns	ns	ns	ns
CV%	19	--		10.4	16.6	15	19.6	9.55

Table 4. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates at Arlington, Wisconsin in 1993.

Factor	Plants Per Acre	Bloom Date	Harvest Date	Height	Lodging	Yield		1000 Seed Weight	Protein	Oil
Date				in	1-5	lb/a	bu/a	gm	%	%
30-April	341386	11-JUN	16-Aug	44	2.1	1981	39.6	3.68	23.2	39.7
13-May	366028	22-JUN	25-Aug	38	3.2	2029	40.6	3.83	23.0	40.0
27-May	282268	29-JUN	31-Aug	38	3.2	1604	32.1	3.30	22.8	38.9
Seeding Rate										
3 lbs/a	138023	22-JUN		41	2.4	1887	37.7	3.61	23.3	39.2
7.5 lbs/a	311516	21-JUN		40	2.9	1874	37.5	3.56	23.0	39.6
12 lbs/a	540143	21-JUN		39	3.2	1851	37.0	3.64	22.6	39.8
MEAN	329894	21-JUN		40	2.8	1871	37.4	3.60	23.0	39.5
CV%	10			7	13.5	6	5.9	4.93	5.4	2.1

Table 5. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates at Sturgeon Bay, Wisconsin in 1993.

Factor	Plants Per Acre	Bloom Date	Harvest Date	Height	Lodging	Yield		1000 Seed Weight	Protein	Oil
Date				in	1-5	lb/a	bu/a	gm	%	%
07-May	215559	25-JUN	01-Sep	50	1.6	2469	49.4	4.09	22.8	39.6
20-May	285130	04-JUL	01-Sep	49	1.9	2317	46.3	4.02	23.7	38.3
03-Jun	267458	09-JUL	16-Sep	46	2.1	1623	32.5	3.36	24.5	37.8
Seeding Rate										
3 lbs/a	109771	03-JUL		49	1.6	2019	40.4	3.80	23.6	38.3
7.5 lbs/a	256256	03-JUL		49	1.6	2188	43.8	3.80	23.4	38.8
12 lbs/a	402120	03-JUL		48	2.4	2203	44.1	3.90	24.0	38.5
MEAN	256049	03-JUL		48	1.9	2331	46.6	3.82	23.7	38.5
CV%	14			6	12.4	11	11.8	4.95	2.9	1.2

Table 6. Agronomic performance of spring canola planted at 3 dates and 3 seeding rates per year. Data combined over Arlington in 1991 and Arlington and Sturgeon Bay, Wisconsin in 1992 and 1993.

Factor	Height	Lodging	Yield	
Date	in	1-5	lb/a	bu/a
1st	40.3	1.7	2113	42.3
2nd	40.3	2.4	1915	38.3
3rd	41.6	2.2	1483	29.7
LSD (.10)	0.6	0.5	70	1.4
LSD (.05)	0.8	0.6	84	1.7
LSD (.01)	1.0	0.7	114	2.3
Seeding Rate				
3 lbs/acre	42.2	1.7	1828	36.6
7.5 lbs/acre	40.9	2.2	1881	37.6
12 lbs/acre	39.1	2.2	1803	36.1
MEAN	40.7	2.1	1868	37.4
LSD (.10)	0.8	0.4	56	1.1
LSD (.05)	1.0	0.5	67	1.3
LSD (.01)	1.3	0.7	89	1.8
CV%	6.8	67.9	10.1	10.1

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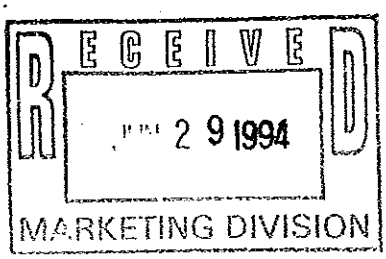

June 27, 1994

Ms. Stacy Chrislaw
Marketing Division
Wisconsin Department of Agriculture,
Trade, and Consumer Protection
801 W Badger Road
PO Box 8911
Madison WI 53708-8911

Dear Stacy:

Enclosed is a final report summarizing three year's of research on the effect of planting date and seeding rate on canola. The 1992 and 1993 years of the study were funded with a WDATCP grant "Response of Spring Canola to Planting Date and Seeding Rate in Wisconsin."

We have tried to keep you informed of the field days and publication of this research during the period of time we have been conducting the study. We feel it has received quite a bit of publicity, which has brought attention to the study and made known the availability of research results. We also appreciate your field visit to view the research.

This study also helped secure federal funds for further research on canola and its production practices in Wisconsin, Minnesota, South Dakota, and North Dakota.

Our research results provide information to potential growers on some of the best management techniques and give them an idea of the yields they might expect. Expansion of canola acreage in Wisconsin is presently limited more by the lack of a suitable market, since the nearest crushing facility is located at Windsor, Ontario, Canada, than it is by any production problems of this crop.

Sincerely,

Earl Gritton

Earl Gritton
Professor

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