

INDUSTRIAL HEMP PROJECT
BC Peace River Region

1999 Report

To

BC Agriculture Investment Foundation
Peace River Agriculture Development Fund
BC Peace River Grain Industry Development Council
And
Health Canada

Hemp Committee
BC Grain Producers Assoc.
Jack Dobb, PAg. Consultant
and Licencee.
March 31, 2000

Industrial Hemp Report – 1999

BC Peace River Region

John Dobb PAg. Licence No: 99-D0004-R-01 & 02

For the Hemp Committee of the BC Grain Producers Association

Summary

Introduction: In spite of a delay in obtaining licences, seed of some varieties (new to the 1999 trials) and a dry cold spring, some useful data was obtained. In 1999, one variety trial was located at Ft. St. John to broaden the information obtained and reduce the weather risk. 1999 was another very unusual year with below average temperatures and precipitation. June precipitation was near normal at Ft. St. John which helped the crop get a better start at that location although frost only allowed the earliest variety to fully mature.

Objectives: Good data was obtained which contributed to meeting the objectives for this project in spite of the adverse conditions. Results also indicated that seed vigor was a potential problem with hemp seed even though germination test results were high. Some guidelines for agronomic practice under dry cool conditions were also obtained. Additional trials are required to determine varietal and agronomic response under more typical weather conditions. A report on trial results was included in the publication "New Crops and Agronomic Trials – BC Peace River Region 1992-1999". This publication has been placed at seed cleaning plants and grain elevators and have been quickly picked up by farmers. Five hundred copies were produced and more will be printed to meet the demand. A new short early maturing grain variety was the highest seed yielder.

New Industry Developments: A new company has been established in Saskatchewan to process seed and fibre. This off-sets to some extent the collapse of Consolidated in Manitoba. The Alberta Research Council has demonstrated that a combination of some existing and available equipment can be used to process hemp stalks to separate the bast fibre and hurds. This includes a heavy duty forage harvester and an oscillating wood chip screen. A grower in the Alberta Peace near Beaverlodge has established a company and plans in putting this combination together in a mobile unit which can be moved from farm to farm. There appears to be a market for hurds as an absorbent in the oil and gas industry in the Peace with a price of \$150/tonne. The re-baled bast fibre is more marketable than unprocessed hemp straw, with a value of \$200/tonne and can be transported longer distances. Early indications are the Saskatchewan company would be interested. A trial in the Alberta Peace in 1999 indicates hemp has good potential as a silage crop.

Acknowledgements: Financial support by the Peace River Agricultural Development Fund, BC Peace River Grain Industry Development Council and BC Agriculture Investment Foundation is greatly appreciated. PFRA provided the UTM coordinates of the test sites.

Industrial Hemp

The Hemp Committee and the Research Committee of the BC Grain Producers Association have conducted trials with industrial hemp in 1998 and 1999. The purpose of the trials was to provide some varietal and agronomic information on such topics as seeding rates, fertility and seeding dates (1999) so that there would be some guidelines under Peace River conditions, for growers trying this crop. This is a preliminary summary, a final report will be available at a later date.

Trials in 1998

This was the first year for legal commercial production, with Health Canada issuing licences for each phase of activity. Seed distribution and field activity had a late start. The trials were seeded on June 3, and the hemp emerged quickly and grew well even though growing conditions were very dry, combined with above average evaporation. Unfortunately, the hemp trials were destroyed by a severe hailstorm on August 3. The hemp made some recovery with limited new growth, but frost ended this development so no harvest was possible. Other than drought, there was a problem with a lygus bug infestation that required control by spraying. Nearby infested canola fields were the likely source.

Trials in 1999

In 1999, dry weather and a cold spring affected the emergence of some varieties and dry conditions again affected growth and seed yield. Yields were 25 to 35% at Dawson Creek and 50% at Ft. St. John of what could be expected in a good year in other regions of western Canada where hemp has been tried. Even under 1999 conditions some varieties reached a height of 5 feet. Each trial with a summary of the data is presented. Besides the trials conducted at Dawson Creek, the variety trial was also seeded at Ft. St. John.

Variety Trial:

Nine varieties were tested, six of which were in the 1998 trial. The germination rate ranged from a low of 80% up to 95%. There was a problem with seed vigor in some of the varieties. The dry cold soil conditions in spring resulted in poor emergence and stands with all the Zolo. and USO varieties and Fasamo, even though Zolo. 13 had a germination rate of 95%. The French varieties and Fin 314 produced satisfactory stands. It appears from the results of this trial and the Dates of Seeding trial that having a Seed Laboratory conduct a cold temperature germination test might be useful to indicate the presence of poor seed vigor. The poor emergence is indicated in the plant stand numbers and in subsequent yield. All the varieties tested are combination seed/fibre varieties except Fin 314, which is a short-stawed, early maturing high yielding seed variety.

variety	Days to Maturity	Consistency at Maturity 1-5(varied)	Height cm	Plants per sq.meter	Seeded: May 18, 1999 (day 138) Harvested: Oct.14, 1999 (day 287)				
					1000k grams	Test Weight kg/hi	Yield kg/ha	Yield as % of FIN 314	THC *
FIN 314	111	2	58 to 85	53	8.7	45.5	450	100%	0.20
FEDORA 19	120	3	113 to 148	81	7.8	35.6	426	95%	0.10
FERIMON	120	3	114 to 143	53	7.5	37.2	372	83%	< 0.05
FELINA 34	120	5	113 to 149	26	7.4	31.6	299	67%	0.10
USO-31	114	2	110 to 151	13	9.8	42.1	265	59%	< 0.05
USO-14	113	2	110 to 135	17	10.0	43.8	263	59%	< 0.05
ZOLO.-11	114	4	115 to 151	27	8.5	39.4	232	52%	< 0.05
ZOLO.-13	117	3	116 to 155	22	8.8	38.1	219	49%	< 0.05
FASAMO	116	1	105 to 133	12	6.9	39.0	214	47%	< 0.05
FIN 314 (Fort St.John)							797		0.11
Coefficient of Variation = 17.90%					* Acceptable plant tissue THC limit is below 0.3%				

It was not possible to seed the Ft. St. John trial until June 5. Plant stands were somewhat better at this location, due in part to the warmer soil with the later seeding along with a bit more precipitation in June that boosted plant development. As in Dawson Creek, plant stands were poor with USO varieties and Fasamo. Frost terminated seed development on all varieties except Fin 314 which and gave the highest yield of all the hemp plots.

All varieties tested in 1999 are on the 2000 Health Canada approved list except the Zolo.13 variety. Next to Fin 314, Fasamo is the earliest available variety tested. A summary of the variety trial data is presented in Table 1. Fatty acid profile, oil and protein levels are presented in Table 2.

TABLE 2: Hemp Seed Fatty Acids (% of total oil), Total Oil, Protein and THC

Variety	Palmitic	Stearic	Oleic	Linoleic Omega 6	Linolenic Omega 3	Gamma Linolenic	Other	Total Oil	Protein %
FASAMO	6.4	2.7	11.6	55.4	18.8	3.6	1.5	29.3	34.2
FEDORA 19	6.4	2.5	12.3	56.0	18.3	2.0	2.5	28.0	34.2
FELINA 34	5.9	2.7	12.1	56.3	18.0	2.1	2.9	28.6	34.3
FERIMON	5.7	2.7	12.1	55.6	18.1	3.2	2.6	29.0	34.3
FIN 314 - DC	5.8	2.8	12.1	54.6	18.1	3.9	2.7	28.6	34.3
FIN 314 - FSJ	6.1	2.8	12.5	54.0	17.9	4.0	2.7	28.1	35.2
USO-14	6.0	2.7	12.3	54.9	18.2	3.3	2.6	29.3	33.8
USO-31	6.1	2.6	11.9	55.0	18.4	3.2	2.8	29.1	33.5
ZOLO.- 11	6.0	2.7	12.2	56.2	18.2	2.1	2.6	28.9	34.2
ZOLO.- 13	6.0	2.7	12.0	56.3	18.5	1.9	2.6	28.8	33.9

*THC - non detectable in all seed samples

Rates of Seeding:

Three seeding rates were tested 10, 20 and 30 kg/ha. Under the drought conditions experienced in 1999, the 20 kg/ha rate produced the highest yield. Table 3:

**TABLE 3: Dawson Creek 1999
Seeding Rate Trial**

Seeded: May 18, 1999 (138)
Harvested: Oct.20, 1999 (293)

Treatment	Height Low	Height High	Plants per sq.meter	1000k grams	Test Weight kg/ha	Yield kg/ha	L.S.D. Test	Yield as % of 20 kg/ha
20 kg/ha	104	144	53	5.6	29.3	324	A	100%
30 kg/ha	98	138	81	6.1	28.2	299	AB	92%
10 kg/ha	113	156	26	7.0	29.8	282	B	87%

Coefficient of Variation = 6.60%

Fertilizer Trial:

Soil tests at the site of these trials indicated a low level of available nutrients. The drought of 1999 limited the response to fertilizer particularly nitrogen, so that there was no response to increasing nitrogen from 60 to 120 kg/ha. Increasing phosphorus from 30 to 60 kg/ha only increased yield when combined with 50 kg/ha of potash. Potash increased yield when levels of both nitrogen and phosphorus were equal. As a general guideline, a fertility program similar to what one would use on canola would be appropriate in the Peace until more specific information is obtained. The results of this trial appear in Table 4.

**TABLE 4: Hemp Fertilizer Rate Trial
Dawson Creek 1999**Seeded: May 18, 1999 (138)
Harvested: Oct. 19, 1999 (292)

Treatment	Height Low	Height High	Plants per sq. meter	Yield kg/ha	L.S.D. Test	Yield as % of 0-0-0
60-60-50	108	154	52	527	A	168%
120-60-50	110	149	49	450	AB	144%
60-60-0	106	143	53	426	B	136%
120-60-0	110	145	42	409	BC	131%
60-30-50	106	149	42	394	BC	126%
120-30-0	108	145	41	391	BC	125%
60-30-0	110	154	44	376	BCD	120%
120-30-50	103	144	46	358	CD	114%
0-0-0	99	134	47	313	D	100%

Coefficient of Variation = 15.73%

Dates of Seeding Trial:

The unavailability of some seed varieties and some licensing delays resulted in the first seeding on May 18. The other two followed on May 29 and June 11. If possible it would have been of interest to have an earlier date (first week in May) in the trial, but under the cold dry conditions that existed in 1999 an earlier seeding would have been of little use. Work elsewhere suggests hemp should not be seeded until the soil is above 6°C. It is important to see how seeding date influences plant height and yield in the Peace River Region north of the 55th parallel. In southern Manitoba, later seeding reduced plant height but did not significantly reduce yield. The expected response might be different with the long days in the Peace.

**TABLE 5: Hemp Seeding Date Trial
Dawson Creek 1999**

Harvested: Oct. 20, 1999 (293)

Seeding Date	Variety	Days to Maturity	Height Low	Height High	Average Plant Count	Yield kg/ha	Yield as % of May 18	L.S.D. Test	Coefficient of Variation
May 18	USO-31	115	113	149	3	206	100%	B	14.55%
May 18	FASAMO	115	98	140	5	240	100%	B	
May 18	FEDORA 19	121	106	146	17	408	100%	A	
May 18	FIN 314	111	69	88	19	397	100%	A	
May 29	USO-31	111	99	129	12	322	156%	B	7.62%
May 29	FASAMO	110	93	119	11	330	137%	B	
May 29	FEDORA 19	118	99	130	28	280	69%	B	
May 29	FIN 314	107	59	79	33	448	113%	A	
June 11	USO-31		84	119	8	224	109%	B	21.63%
June 11	FASAMO		69	98	11	200	83%	B	
June 11	FEDORA 19		85	110	26	216	53%	B	
June 11	FIN 314		40	59	31	375	94%	A	

Four varieties with a range of genetic makeup were used in the trial. The results indicate that under 1999 conditions, May 29 was the best seeding date. It will also be noted in Table 4 that plant height did decline with later seeding. The plant counts indicate the two varieties USO 31 and Fasamo which had poor seed vigor and emergence performed better after the soil temperature warmed up as indicated in the May 29 and June 11 seeding. However, seed vigor and emergence still did not equal that of Fedora 19 and Fin 314. Even these two varieties which had good seed vigor had improved emergence with May

29 seeding compared to May 18. However, Fedora 19 declined in yield with delayed seeding date due to its longer maturity requirement which resulted in frost damage with the seeding dates after May 18. The results are presented in Table 5.

Organic Trial:

A small organic trial was added since there was a qualifying plot area adjacent to the other trials and the market for organic hemp seed is strong. Yields were very low due to the drought and the low fertility of the plot area. No additional organic amendments to improve fertility were added. The results are presented in Table 6.

Variety	Height Low	Height High	Average Plant Count	Plot Yield grams	Yield kg/ha	L.S.D. Test
FIN 314	33	63	28	128	214	A
FEDORA 19	64	114	24	115	192	B
FASAMO	56	99	7	51	86	C
USO-31	69	118	3	36	61	D

Coefficient of Variation = 11.15%

Other Considerations:

- Growers considering hemp should select a field following a cereal rather than canola. Hemp is susceptible to sclerotinia.
- Select an early or med-early approved variety and plant into well-drained soil in May after soil temperatures are above 6°C.
- While conventional seed prices have been around 60 cents/lb. and organic \$1.00/lb., future prices could be abit lower as production increases in Canada.
- Some developments are being initiated in Alberta, which could provide a market for the hurds and bast fibre including equipment to separate the two.
- **Application forms to obtain a licence to grow hemp are available from:**

Niels Hansen-Trip, Manager
Industrial Hemp Regulation Program
Office of Controlled Substances
Therapeutic Products Programme, Health Canada
A.L.: 3618B
Ottawa, Ontario, K1A 1B9
TEL: (613) 954-6524 FAX: (613) 941-5360

- For further information contact one of the following:

Brent Washington, Chair Hemp subcommittee of BCGPA.
TEL: (250) 843-7618

Raymond Verboven, Managing Technician, Research Committee BCGPA
TEL: (250) 784-2234 FAX: (250) 784-2299

Jack Dobb, Consultant, and Licence holder.
TEL: (250) 384-7044 FAX: (250) 384-7022

HEMP PROJECT -- Financial Statement -- 1999 (Estimated to 03/31/00 -- not final)

Source	Budget	Actual
Income:		
BC Peace River Grain Industry Development Council	\$ 4,136.00	\$ 3,722.40 ¹
Peace River Agriculture Development Fund	\$12,408.00	\$11,167.00 ¹
BC Agriculture Investment Foundation	<u>\$ 4,136.00</u>	<u>\$ 2,068.00²</u>
TOTAL	\$20,680.00	\$16,957.00
Expenses:		
Seed	\$ 600.00	NIL ³
Plot Maintenance & Data (Research. Comm. of BC Grain Producers Assoc.)	\$ 5,000.00	\$ 4,600.00
Analyses (THC, oil, fatty acids & protein)	\$ 5,000.00	\$ 4,945.00
Consultant (fees & expenses)	\$ 6,000.00	\$ 6,000.00
Symposium (Vancouver)	\$ 2,000.00	NIL ⁴
Misc. (courier, freight etc.)	\$ 200.00	\$ 89.26
Project Management	<u>\$ 1,880.00</u>	<u>\$ 1,880.00</u>
TOTAL	\$20,680.00	\$17,514.26
Notes:		
1. Ten percent held back until project complete and 1999 report submitted.		
2. Balance of 50% still to come from BC Agriculture Investment Foundation upon submission of final report.		
3. Some seed was on hand and the new varieties added in 1999 were obtained at no charge.		
4. The symposium scheduled for Vancouver was cancelled. It was not possible to attend the main western conference which was held in Winnipeg in October.		

**BC GRAIN PRODUCERS ASSOCIATION
INDUSTRIAL HEMP PROJECT
INCOME & EXPENSE STATEMENTS
APRIL 01, 1999 TO MARCH 31, 2000**

Income

BC Grain Industry Development Council	4,136.00
Investments Agriculture	4,136.00
Peace River Agriculture Development Fund	<u>12,408.00</u>

Total Income 20,680.00

Expenses

Consultant Costs	6,000.00
Freight & Misc.	52.26
Lab Analysis	4,945.00
Plot Maintenance	4,600.00
Project Management	<u>1,880.00</u>

Total Expenses 17,477.26

Excess of Income over Expenditures 3,202.74

Accounts Receivable

BC Grain Industry Development Council (HB-10%)	413.60
Peace River Agriculture Development Council (HB-10%)	1,241.00
Investments Agriculture	<u>1,034.00</u>

Total 2,688.60