

Hemp Seeding Date Demonstration for Grain Production



Principal Investigators:

Morgan Cote¹, Gursahib Singh², Garry Hnatowich², Chris Holzapfel³, Kayla Slind⁴, Jessica Enns⁴ and
Brienne McInnes⁵

¹Saskatchewan Ministry of Agriculture

²Irrigation Crop Diversification Centre, Outlook, SK

³Indian Head Agricultural Research Foundation, Indian Head, SK

⁴Western Applied Research Corporation, Scott, SK

⁵Northeast Agriculture Research Foundation, Melfort, SK

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2. Name of Principal Investigator and contact information: Morgan Cote

3. Name of the collaborators and contact information

Chris Holzapfel, Research Manager, Indian Head Agricultural Research Foundation, 306-695-7761

Kayla Slind, Research Associate, Western Applied Research Corporation, 306-247-2001

Brianne McInnes, Field Research Director, Northeast Agriculture Research Foundation, 306-920-9393

Gursahib Singh and Garry Hnatowich, Co-Research Directors, Irrigation Crop Diversification Corporation, 306-867-5405

4. Abstract

The main objective of this project is to determine the ideal seeding time for conventional hemp over multiple locations in Saskatchewan. Three Hemp seed varieties, X59, Katani & Picola, were selected for grain production. They were then seeded on three different seeding dates, late May, mid-June and early July.

All sites got the plots seeded on schedule; however, one site had issues with the late seeding date plots, which will be discussed in the results.

5. Introduction

The project demonstrates different seeding dates of 3 varieties of conventional hemp to show producers the ideal time for seeding in various Saskatchewan locations.

Hemp is a newer crop in Saskatchewan and is a high value crop (worth around \$0.75-\$0.90/lb) and has good potential yields in Saskatchewan (average 660-1070 lbs/acre). Discovering optimum seeding dates for this higher value crop will encourage local growth in the conventional hemp industry and help ensure new growers access information that will contribute to their success. Having regional seeding date and variety recommendations would increase acres of this crop in Saskatchewan, potentially providing value added opportunities and a higher gross return per acre.

Having different crops in your rotation is important for managing disease and pest problems and can also provide economic benefits to producers. With increased pathogens associated with major crops currently grown (fusarium in wheat and clubroot in canola), increasing the diversity of crops in rotations are becoming more important. Demonstrating the high potential return of this crop and how the currently registered varieties perform will help producers decide if they want to include this crop into their rotation. Demonstrating the wide effective seeding date window of this crop will also show producers how growing hemp can help with time management in spring.

6. Objectives and the progress towards meeting each objective

Objective	Progress
Seeding date 1; Yield, Height & Maturity	Completed as scheduled
Seeding date 2; Yield, Height & Maturity	Completed as scheduled
Seeding date 3; Yield, Height & Maturity	Completed as scheduled

7. Methodology

The project was seeded in a randomized complete block design with four replications. The treatments were arranged in a split-plot with seeding date as the main plots and three different hemp varieties as the sub-plots. The three seed dates used were late May, mid-June, and early July, and the three varieties used were Katani, Picolo, and X59. The three varieties selected were high yielding dwarf varieties that are suitable for Saskatchewan conditions. Four locations were used for the demonstration based on varying soil and climatic conditions. The locations were Outlook, Melfort, Scott, and Indian Head. Outlook was the only irrigated site; whereas Melfort, Scott and Indian Head were non-irrigated. Plot dimensions and row spacing varied by site, and seeding rates targeted plant populations of 100 – 125 plants/m². Fertilizer was applied in a sideband to reduce the risk of seed injury, and rates were dependent on soil test results. Plant vigour was visually assessed for each treatment 2-3 weeks after planting. Plant heights were measured prior to harvest and days to maturity were assessed for each variety and seeding date. Plots were direct combined depending upon the maturity of each variety and seeding dates. Yields were determined from cleaned harvested grain samples and corrected to the required moisture content.

8. Results and Discussion

The growing conditions of 2021 were extremely hot and dry which ultimately affected the plant height, vigor and establishment at all sites. In particular, the early July seeding date plots did not establish at one site due to dry conditions leading up to and after seeding. At Outlook, even with season long irrigation, height varied with plots due to the extreme heat.

Data Collected for year-one of the trials consisted of yield, height and maturity (Tables 1 to 4). Seeding dates had a significant effect on yield at 3 of the 4 sites with mid June having the highest yield (Table 1 and Table 2). Outlook had the highest yield among the four sites, but the seeding date effect was not significant, followed by Indian head. Due to poor growing conditions and lack of moisture, the lowest yields were recorded at Melfort.

Varieties had a significant effect on yield at Melfort, Indian Head and Scott. Yield slightly varied among varieties, with Picola < Katani < X59 increasing in yield. The interaction between different seeding dates and varieties was only significant at Scott and Indian Head with all the three varieties yielding better under mid-June seeding date (Table 2).

Table 1: Analysis of variance (P-values) for seeding dates and varieties effect on yield at four sites in Saskatchewan in 2021,

	<i>Melfort</i>	<i>Outlook</i>	<i>Scott</i>	<i>Indian Head</i>
<i>Date</i>	0.0378	NS	0.0025	0.0001
<i>Variety</i>	<0.0001	NS	0.0001	0.0003
<i>Date*Variety</i>	NS	NS	0.0028	0.0001
<i>Grand Mean</i>	221.66	1234.9	582.11	1084.4

CV	18.94	22.3	7.6	5.19
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NS = Not Significant

Table 2: Seeding dates and varieties effect on mean yield (Kg/ha) measured at four sites

<i>Seeding dates</i>				
	<i>Melfort</i>	<i>Outlook</i>	<i>Scott</i>	<i>Indian Head</i>
Late (early-July)	242.15	1111.1	525.4	1113.7
Mid (Mid-June)	201.17	1446.2	731	1221.4
Early (Late-May)	-	1147.4	489.9	918
<i>Varieties</i>				
Katani	163.22	1178.6	554.8	1046.6
Picola	160.01	1139.1	541.4	1053.7
X59	341.74	1387	650.1	1152.8
<i>Seeding dates* Varieties</i>				
Mid*X59	-	-	851.2	1302.3
Mid*Picolo	-	-	674.7	1194
Mid*Katani	-	-	667	1168
Late*Picolo	-	-	574	1153.8
Late*Katani	-	-	534.7	1151.3
Early*X59	-	-	525	1120.3
Late*X59	-	-	516.5	1036
Early*Katani	-	-	462.7	820.5
Early*Picolo	-	-	433	813.2

Height was not recorded at Outlook due to large variation within plots but was measured at the other three locations (Table 3). Seeding date affected height at two of the three sites, whereas varieties across all sites had no effect on height except at Scott. The possible explanation for the height difference may be due to the extended growing season for the early seeding dates [higher days to maturity (DTM)], allowing more time for vegetative growth.

The measuring of DTM turned out to be more difficult than expected. The research available stated to use the tailgate test, where one gets a plant and smacks it on a truck tailgate and counts the number of seeds that fall out; the other method is to check the lower 2/3's of the plant for seed ripening. These methods were not consistent so in the next year of this project, we plan to gather more information, and develop a consistent method with the assistance of Blue Sky Hemp Ventures, a hemp processing company based in Rosetown and Saskatoon. With the data we did collect both seeding dates and varieties were the most significant cause for variance in maturity (Table 4)

Table 3: Analysis of variance (P-values) for seeding dates and varieties effect on plant height at four sites in Saskatchewan in 2021

	<i>Melfort</i>	<i>Outlook</i>	<i>Scott</i>	<i>Indian Head</i>
<i>Date</i>	0.0005	NC	NS	0.0116
<i>Variety</i>	NS	NC	0.0112	NS
<i>Date*Variety</i>	NS	NC	NS	NS
<i>Grand Mean</i>	80.347	-	65.678	106.42
<i>CV</i>	16.58	-	8.79	4.93

NS = Not Significant

NC = Observation Not Captured

Table 4: Analysis of variance (P-values) for seeding dates and varieties effect on days to maturity (DAT) at four sites in Saskatchewan in 2021

	<i>Melfort</i>	<i>Outlook</i>	<i>Scott</i>	<i>Indian Head</i>
<i>Date</i>	<0.0001	NS	<0.0001	NC
<i>Variety</i>	<0.0001	NS	<0.0001	NC
<i>Date*Variety</i>	<0.0001	NS	<0.0001	NC
<i>Grand Mean</i>	112.8	105	96.7	NC
<i>CV</i>	13.8	27.03	7.33	

NS = Not Significant

NC = Observation Not Captured

9. Interim conclusion

In year-one, we have found that the seeding date significantly affects yield and height. The maturity was more affected by varieties. With the extreme heat and lack of moisture in 2021 growing season these values may not represent the actual characteristics of hemp and the effect of seeding dates, so, weather permitting, years two and three will help focus on the values.

10. List Technology Transfer activities

In 2021 a video was created to generate awareness of the project which can be viewed on the ICDC Irrigation Saskatchewan YouTube site at <https://www.youtube.com/watch?v=Z4g5g1jvkH4>. The plots were shown and the project was discussed by Chris Holzappel during the Indian Head Crop Management Field Day, hosted on July 20 and attended by approximately 75, excluding staff and directors.

11. Identify any changes expected to industry contributions

Blue Sky Hemp Ventures would like to assist with knowledge sharing and support where possible. They have been in touch with both the Ministry and ICDC in Outlook.

12. Appendices

Figure 1: Plots showing poor germination/ crop stand and height variation due to lack of moisture at Melfort, SK. The early July seed date is located on the left as compared to the mid-June seed date on the right.

