Parkland College

East Central Research Foundation

2014

Annual Report

Michael Hall

Research Manager

306 621 6032

www.ecrf.ca

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Introduction

The East Central Research Foundation (ECRF) is a non-profit, producer directed research organization which works closely with various levels of government, commodity groups, private industry and producers. Founded in 1996, the mission of ECRF is to promote profitable and sustainable agricultural practices through applied research and technology transfer to the agricultural industry.

In 2013, ECRF signed a memorandum of understanding with Parkland College that will allow the partners to jointly conduct applied field crop research in the Yorkton area. The City of Yorkton has provided the college with a 5 year lease of land (108 acres) located just a half mile south of town on York lake road and another 60 acre parcel located just west of town.

Michael Cameron (left), Director of Training & Business Development at Parkland College, signs the MOU with Glenn Blakley from the East Central Research Foundation.

Parkland College is now the first regional college in Saskatchewan to undertake an applied research program. Parkland College is thrilled to be involved in applied research because it fits with one of their mandates to "serve regional economic development". The Partnership also provides the college with a location and equipment to use for training students. Both partners benefit from each other's expertise and connections. ECRF and Parkland College also have access to different funding sources which is another strength of the partnership.

ECRF Board of Directors

ECRF is led by a 6 member Board of Directors consisting of producers and industry stakeholders who volunteer their time and provide guidance to the organization. Residing all across East-Central Saskatchewan, ECRF Directors are dedicated to the betterment of the agricultural community as a whole. The 2014 ECRF Directors are:

- Glenn Blakely (Chairperson) – Tantallon, SK

- Fred Phillips (Vice Chairperson) – Yorkton, SK
- Blair Cherneski - Goodeve, SK
- Dale Peterson - Norquay, SK
- Wayne Barsby - Sturgis, SK
- Ken Waldherr - Churchbridge, SK

Ex-Officio

- Gwen Machnee - Co-ordinator for University and Applied Research-Parkland College
- Charlotte Ward – Regional Forage Specialist- Saskatchewan Agriculture
- Lyndon Hicks – Regional Crops Specialist – Saskatchewan Agriculture

Staff

- Mike Hall – Research Manager
- Kurtis Peterson – Administrator*
- Clark Anderson – Seasonal Equipment Technician
- Ashley Zelinski – Summer Student

*Corinn Lutz has now retired from the Administrator role and has moved to British Columbia. Corinn served with ECRF for numerous years. Corinn and her husband Tim Lutz have been great friends to ECRF over the last couple years. We wish you well in your new life in British Columbia.

Agri-Arm

The Saskatchewan Agri-ARM (Agriculture Applied Research Management) program connects eight regional, applied research and demonstration sites into a province-wide network. Each site is organized as a non-profit organization, and is led by volunteer Boards of Directors, generally comprised of producers in their respective areas.

Each site receives base-funding from the Saskatchewan Ministry of Agriculture to assist with operating and infrastructure costs, with project-based funding sought after through various government funding programs, producer / commodity groups and industry stakeholders. Agri-ARM provides a forum where government, producers, researchers and industry can partner on provincial and regional projects.

The eight Agri-ARM sites found throughout Saskatchewan include:

- Conservation Learning Centre (**CLC**), Prince Albert
- East Central Research Foundation (**ECRF**), Yorkton
- Indian Head Agricultural Research Foundation (**IHARF**), Indian Head
- Irrigation Crop Diversification Corporation (**ICDC**), Outlook

- Northeast Agriculture Research Foundation (**NARF**), Melfort
- South East Research Farm (**SERF**), Redvers
- Western Applied Research Corporation (**WARC**), Scott
- Wheatland Conservation Area (**WCA**), Swift Current

Farm sites

ECRF and Parkland College currently have two farm site locations. The south farm site is located a half mile south of Yorkton down York Lake Road. (SW 26 25 4 w2). The soil at this site is described in the table below:

Soil description for SW 26 25 4 w2 (South Farm site)

Factor	Comments
Drainage	Well drained
Soil Characteristics	Clay-loam; pH 7.6; Non-saline
Nutrient levels 2014	0-12 inch soil test levels (lbs/ac); N-NO3 12 (Deficient); P 27 (Marginal); K 693 (Sufficient); S-SO4 30 (Marginal)

The west farm site is located just west of Yorkton NW 3 26 4 w 2. This is not great land and is used for forage experimentation. The soil is described in the table below:

Factor	Comments
Drainage	Moderately well drained
Soil Characteristics	Clay-loam; pH 7.9; Non-saline; Rocky
Nutrient levels 2014	0-12 inch soil test levels (lbs/ac); N-NO3 8 (Deficient); P 4 (Deficient); K 496 (Sufficient); S-SO4 6 (deficient)

Research and Statistical analysis

Unless stated otherwise all trials are small plot research. Plot size is typically either 12 or 22 feet wide and 30 feet long. The trials are seeded with a 10 foot wide Seedhawk drill and the middle 5 rows of plots are harvested using a small plot Wintersteiger combine. In the case for forage trials, the middle 5 rows of each plot are harvested with a small plot forage harvester.

Treatments are replicated and randomized throughout the field so that data may be analyzed. If a treatment is seeded in multiple plots throughout the field, experience tells us we are unlikely to obtain the same yield for each of these plots. This is the result of experimental variation or variation within the trial location. This variation must be taken into consideration before the difference between two treatment means can be considered "significantly" different. This is accomplished through proper trial design and statistical analysis

Trials are typically set up as Randomized complete blocks, Factorial or split plot designs and replicated 4 times. This allows for an analysis of variance. If the analysis of variance finds treatments to differ statistically then means are separated by calculating the least squares difference (Lsd). For example, if the lsd for a particular treatment comparison is 5 bu/ac then treatment means must differ more than 5 bu/ac from each other to be considered significantly (statically) different. In this example, treatment means that do not differ more than 5 bu/ac are not considered to be significantly different. All data in our trials must meet or exceed the 5% level of significance in order to be considered significantly different. In other words, the chance of concluding there is a significant difference between treatments when in reality there is not, must be less than 1 out of 20.

Environmental Data

Data for Yorkton was obtained from Environment Canada from the following internet site: [http://www.climate.weatheroffice.gc.ca/climateData/canada_e.html]. Crop heat units were calculated using the formula available from Omafra website: [http://www.omafra.gov.on.ca/english/crops/pub811/10using.htm]

2014 was a decent year at the research farm and yields were average to above average depending on the trial. Crop maturity was not an issue for any of the crops grown with the exception of soybeans. Soybean growth was considerably slower in 2014 than it had been in 2013. Though the accumulated crop heat units between the years was quite similar (Figure 1.), the early fall of 2014 was much cooler compared to 2013 which slowed soybean ripening.

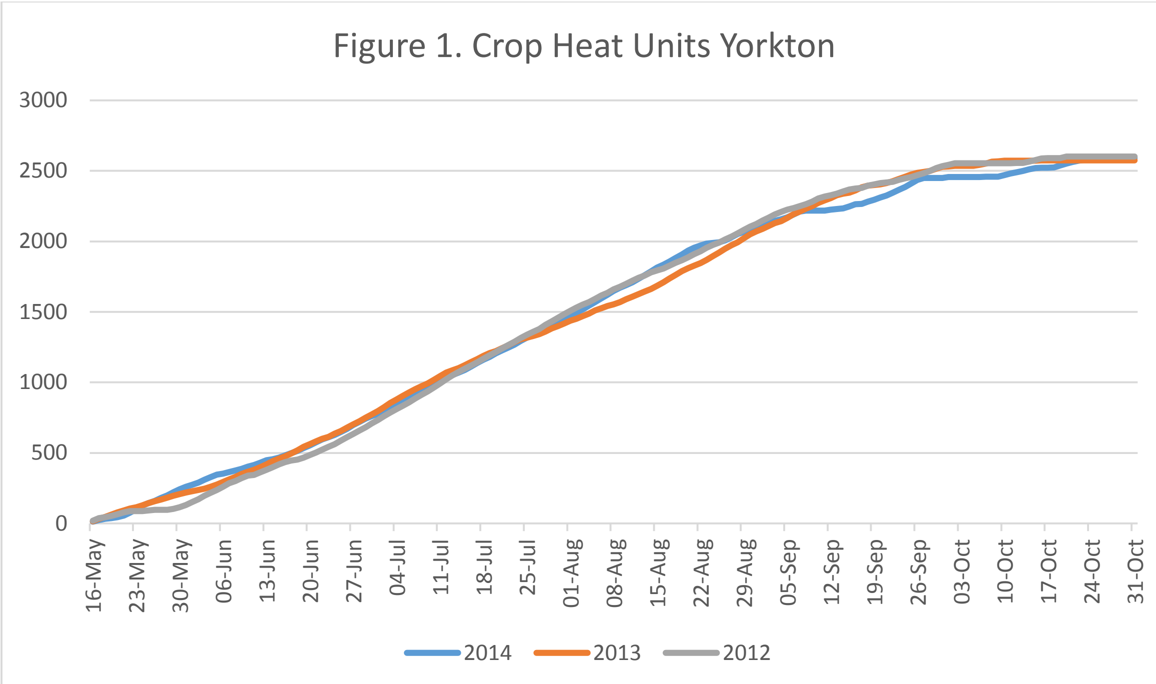
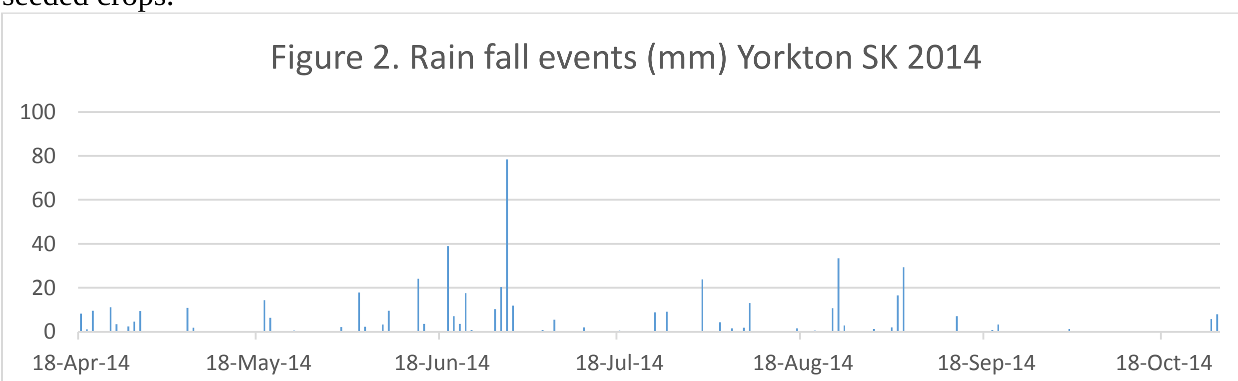
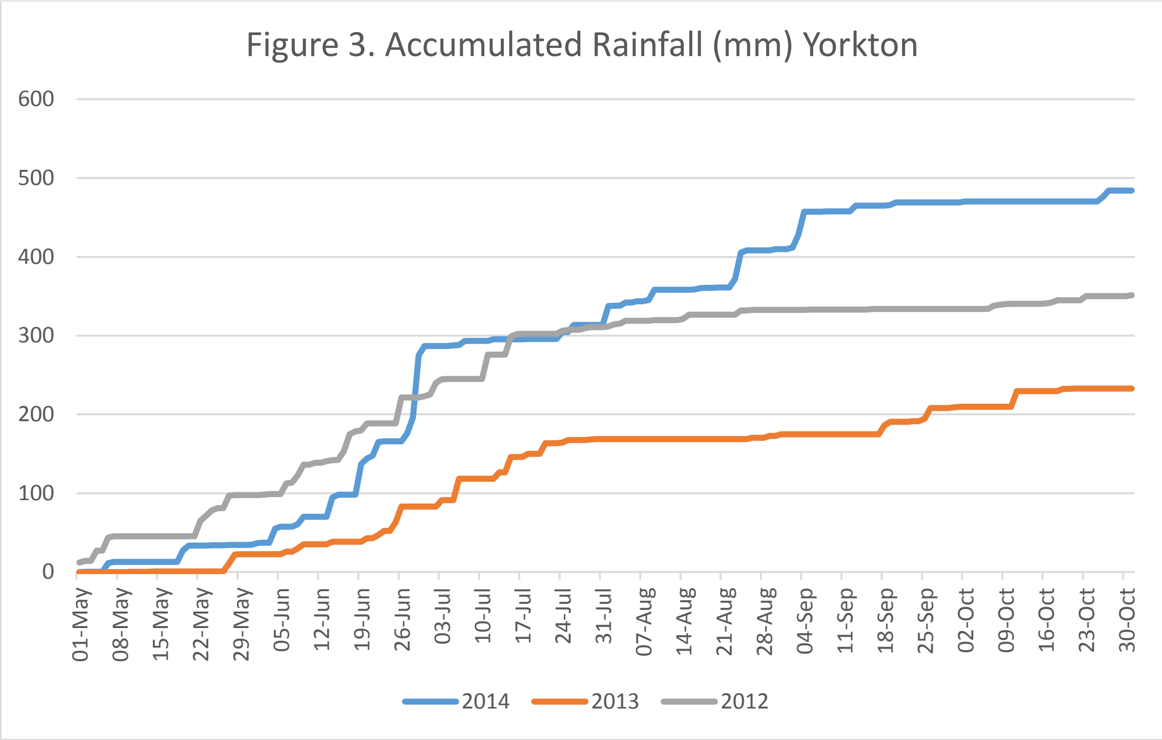


Figure 2 shows the date of rainfall events and the amount that fell. Fortunately, rainfall was neither excessive in spring nor fall and did not hinder seeding or harvest operations. However, rains were frequent and heavy in June which affected crop development, particularly of late seeded crops.



Overall, rainfall was excessive in 2014 unlike the ideal pattern of 2013 (Figure 3). Again, you can see June was a heavy rainfall period.



Weather data for Melfort has also been included since Melfort (Narf) results are included in the cereal forage report. In Melfort rainfall for the May-August period was about average. Like Yorkton, rainfall in June was above average (Table 1).

Table 1. Rainfall for Melfort

	2011		2012		2013		2014		Normal	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
January	7.3	0.29	8.2	0.32	14.9	0.59	11.7	0.46	**15.1**	**0.59**
February	6	0.24	0.9	0.04	11.7	0.46	4.0	0.16	**11.2**	**0.44**
March	4.8	0.19	11.6	0.46	3.3	0.13	5.7	0.22	**17.9**	**0.70**
April	8.1	0.32	24.7	0.97	3.0	0.12	50.1	1.97	**24.5**	**0.96**
May	10.5	0.41	72.7	2.86	22.7	0.89	24.3	0.96	**45.6**	**1.80**
June	103.5	4.07	112.3	4.42	96.9	3.81	167.0	6.57	**65.8**	**2.59**
July	73.3	2.89	97.8	3.85	103.2	4.06	51.0	2.01	**75.7**	**2.98**
August	10.7	0.42	68.1	2.68	10.6	0.42	57.9	2.28	**56.8**	**2.24**
September	1.1	0.04	12.6	0.50	17.0	0.67	9.4	0.37	**39.9**	**1.57**
October	25.5	1.00	29.2	1.15	4.3	0.17	34.0	1.34	**24.7**	**0.97**
November	11.4	0.45	13.9	0.55	26.2	1.03	19.4	0.76	**16.4**	**0.65**
December	4.0	0.16	9.6	0.38	10.4	0.41	6.3	0.25	**19.2**	**0.76**
May-Aug	**198.0**	**7.8**	**350.9**	**13.8**	**233.4**	**9.2**	**300.2**	**11.8**	**243.9**	**9.60**

2014 was a touch cooler than the long term average. It was certainly cooler than 2013 (Table 2).

Table 2. Grow Degree Days for Melfort.

	2011	2012	2013	2014	Normal
April	14	30	1	7	43
May	167	146	229	176	195
June	311	304	312	268	319
July	389	430	352	387	384
August	374	375	392	390	353
September	264	220	279	209	173
October	57	20	27	67	49
May-Aug	**1241**	**1255**	**1285**	**1221**	**1251**
May-Sep	**1505**	**1475**	**1564**	**1430**	**1424**

Impact of ESN on the Nitrogen Use Efficiency for Canola and Wheat

M. Hall[1]

[1]East Central Research Foundation/Parkland College, Yorkton, SK

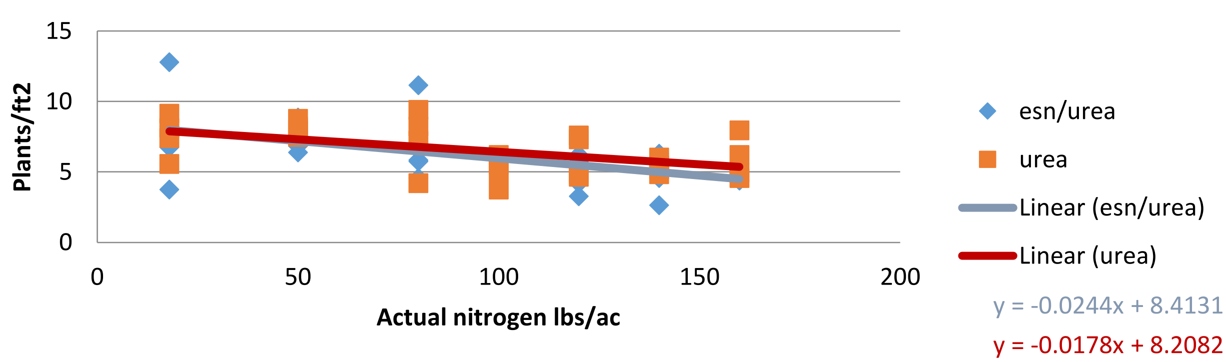
Description

Environmentally smart nitrogen (ESN) is a polymer coated urea which is designed to release dissolved urea more slowly compared to unprotected urea. ESN has the potential to increase nitrogen use efficiency by releasing some of the nitrogen latter in the season thereby protecting it from early season losses to leaching and denitrification. The objective of this study was to determine if side banded ESN in a blend with urea could increase the yield of canola and either increase the yield or protein of wheat. An ESN blend (25% ESN:75% Urea) was compared to straight urea at rates from approximately 20 to 160 lbs/ac of actual nitrogen. The trial was setup as a 2 order factorial. Factor A contrasted the ESN blend versus straight urea. Factor B contrasted 7 rates of nitrogen up to 160 lbs/ac of actual.

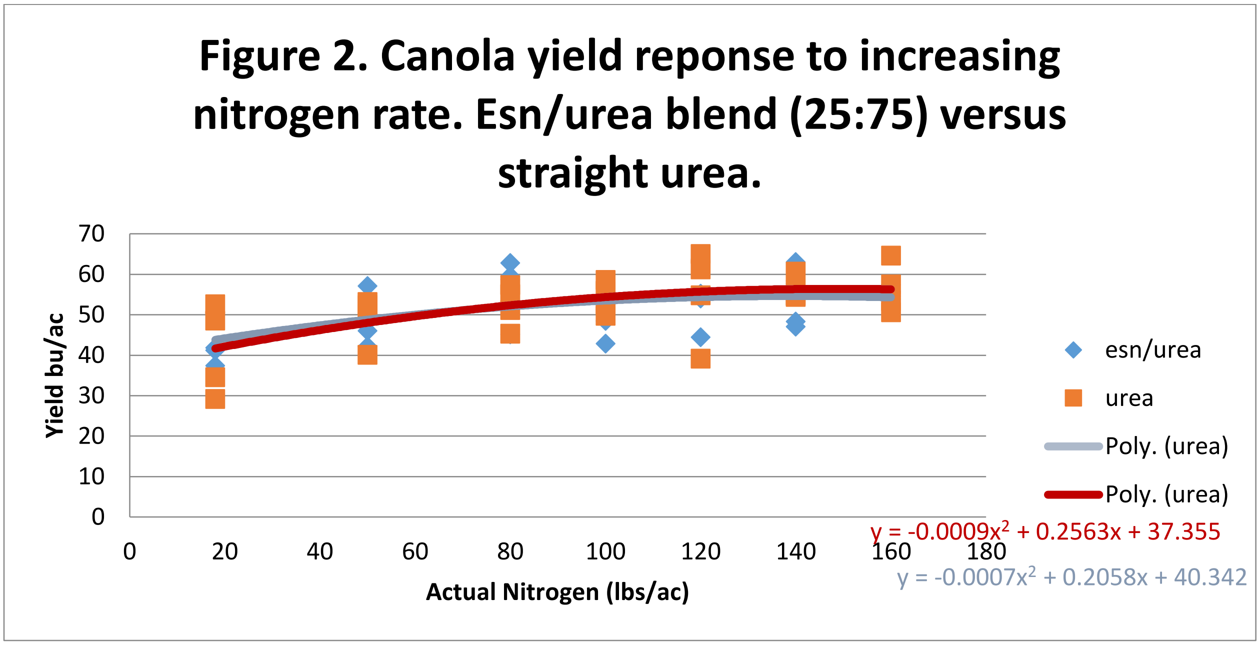
Results for Canola ESN Trial

Increasing side banded rates of actual nitrogen rates up to 160 lb/ac significantly reduced the emergence of canola in a linear fashion from 8 to 5 plants/ft^2 (Figure 1). However, the rate of decline did not significantly differ between straight urea and the blend (25% ESN to 75% urea). In other words, the blend with Esn did not provide any added protection for emerging canola.

Figure 1. Canola emergence response to increasing nitrogen. Esn/urea blend (25:75) vs straight urea

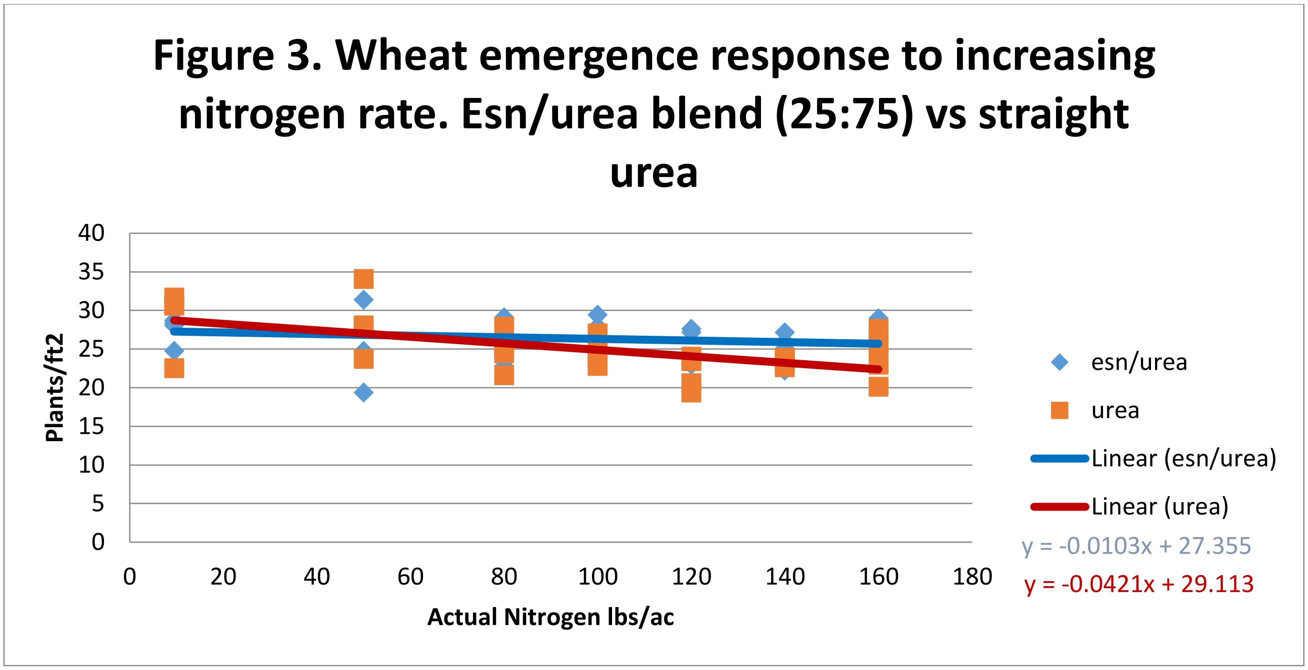


Canola yield significantly increased from about 42 to 56 bushels/ac in response to increasing rates of side banded nitrogen (Figure 2). However, the rate of response did not differ significantly between straight urea and ESN/urea blend. There is no evidence to suggest a yield gain from using the ESN/urea blend.



<u>Results for Wheat ESN Trial</u>

As with the canola, wheat emergence was also significantly reduced by increasing rates of side banded nitrogen (Figure 3). Emergence was reduced from around 28 to 23 plants/ft^2 when nitrogen rates where increased up to 160 lbs/ac of actual N. The rate of decline is more modest compared to that observed for canola as canola is more sensitive to the toxic effects of urea. The rate of decline in wheat emergence was not statistically different between the ESN blend and straight urea.



Wheat yield significantly increased with increasing nitrogen rates up to about 100 lbs/ac of actual N, after which yields declined (Figure 4). After 100 lbs/ac of actual N, lodging became a significant factor and is likely the cause of the yield decline (Figure 5). In contrast, grain protein continued to significantly increase all the way to 160 lbs/ac of actual N (Figure 6).

Figure 4. Wheat yield response to Nitrogen rate. Esn/urea blend (25:75) vs strainght urea

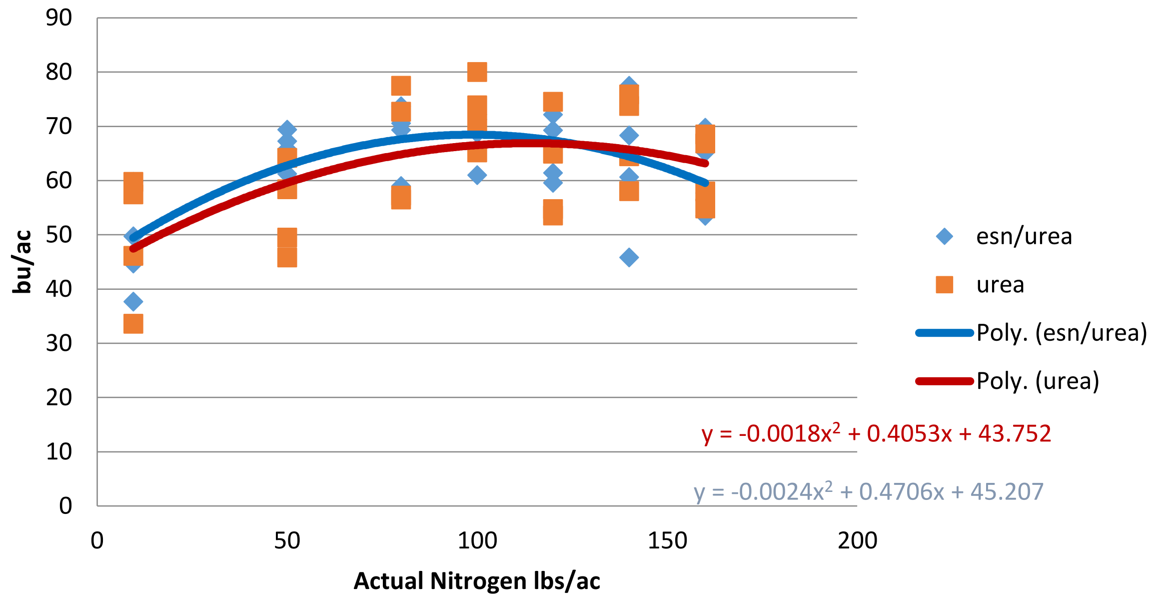
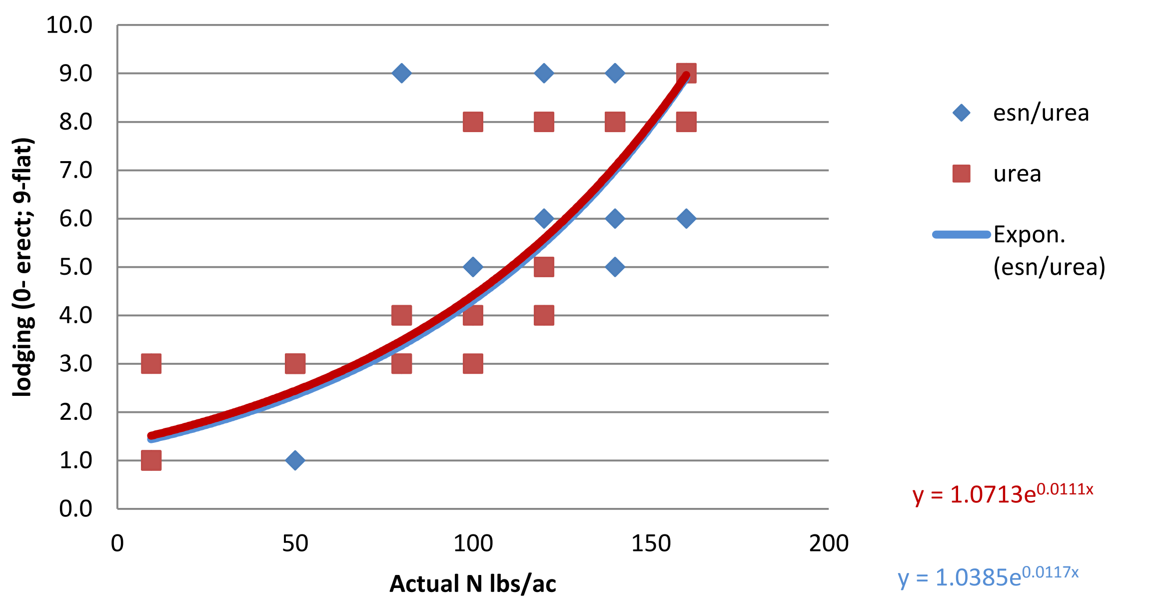
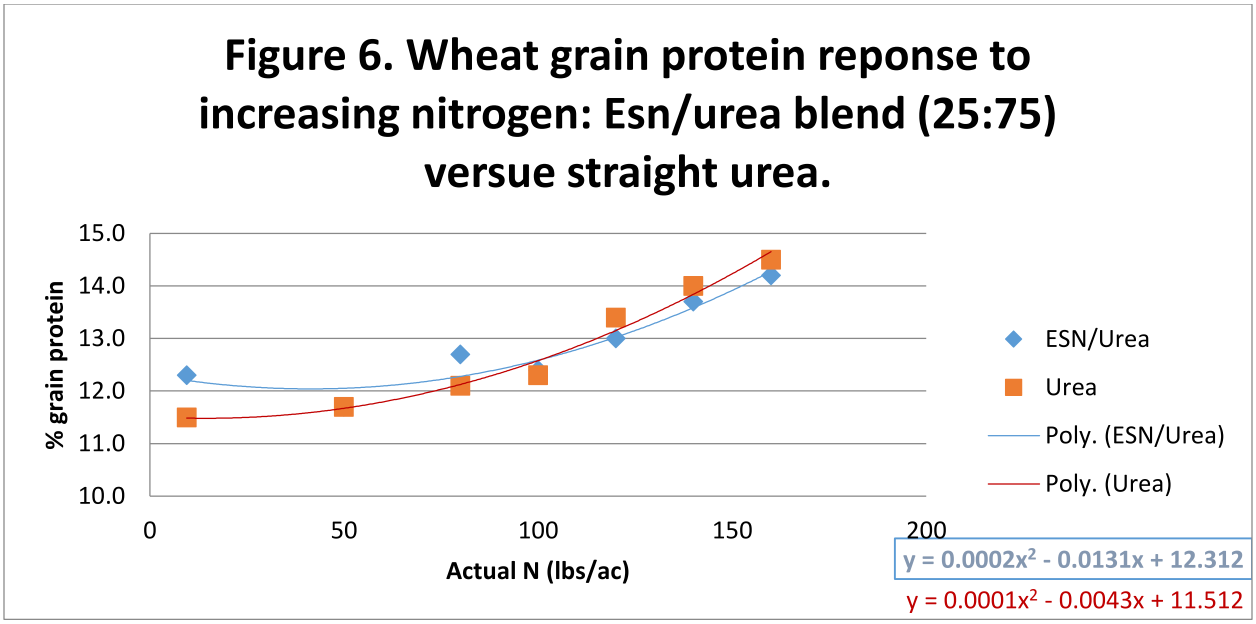


Figure 5. Wheat lodging response to increasing nitrogen rate. Esn/urea blend (25:75) vs straight urea.





Visually there appears to be a slight benefit in terms of yield (Figure 4) and protein (Figure 6) from using the ESN blend at low levels of nitrogen. However, these differences were not statistically significant. The use of the ESN blend made no difference in lodging either (Figure 5).

<u>Conclusions</u>

No statistically significant benefits were observed from using a blend of ESN (25% ESN:75% urea) in either canola or wheat. Increasing rates of side banded nitrogen did significantly decrease the emergence of canola and wheat. However, the use of the ESN blend did not statistically provide any protection. This is quite surprising as numerous studies have demonstrated added seed safety from using ESN. Canola and wheat yields increased significantly to increasing nitrogen but no differences between using the ESN blend or straight urea could be detected. Increasing nitrogen rates increased grain protein and lodging however, differences could not be detected between using the ESN blend or straight urea.

The results are somewhat surprising as there was considerable rain fall in June and one would have expected nitrogen losses from leaching or denitrification to be possible. However, perhaps these losses were not significant. The trial sites were on a well drained a clay-loam soil and losses may have been minimal. One might criticize that ESN did not make up a large enough portion of the blend. The blend in this study was 25% ESN whereas many studies have looked at blends containing 75% ESN. However, even at this level of ESN there are a number of studies which could not detect a significant benefit from using ESN. Len Kryzanowski with Alberta Agriculture summarized studies from Alberta which were using blends of 75% ESN to 25%

urea. He found the blend provided an economic benefit only 39.8%, 46.3% and 35.2% of the time in experiments conducted on barley, canola and wheat, respectively.

Using ESN blends to improve nitrogen use efficiency does not consistently provide economic benefits. No benefits were detected in this experiment.

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement. ESN treated urea was donated by Crop Production Services in Yorkton. Protein testing of grain was done by Richardson Pioneer in Yorkton.

Effect of Fungicide Timing on Wheat Yield and Quality

M. Hall[1]

[1]East Central Research Foundation/Parkland College, Yorkton, SK

Description

Numerous fungicide timing trials have been done over the years. The reason for this is the variability in results obtained. New fungicides are developed, disease continues to evolve and weather patterns change. The results of the past may no longer be applicable. Historically in the Yorkton area, wheat was mostly sprayed at the flag leaf stage as that was considered ideal for leaf disease control. Spraying for FHB typically was not practiced. However, FHB has become more of an issue as infected kernels are a significant cause of yield and grade reductions. Many producers are now opting to spray at early flowering for control of FHB and leaf spot diseases.

The objectives of this project were:

- to demonstrate the effects of fungicide timing on leaf spot diseases and Fusarium head blight on spring wheat in the Yorkton area.
- to demonstrate the benefits of planting cultivars with improved disease resistance to Fusarium head blight.

The trial was setup as 2 order factorial with 4 replicates. The first factor contrasted the variety Goodeve (Very poor resistance to FHB) versus Unity (Fair resistance to FHB). The second factor compared the following 4 fungicide timings:

1. No Fungicide
2. T1 – Twinline at flag

3. T2- Prosaro at early heading
4. T1 + T2

<u>Results</u>

The application of fungicide significantly reduced the incidence of leaf disease on the flag leaf (Figures 1 and 2). While the level of disease on the flag was reduced by the dual application (T1 + T2) over Twinline alone at flag (T1) it was not statistically significant.

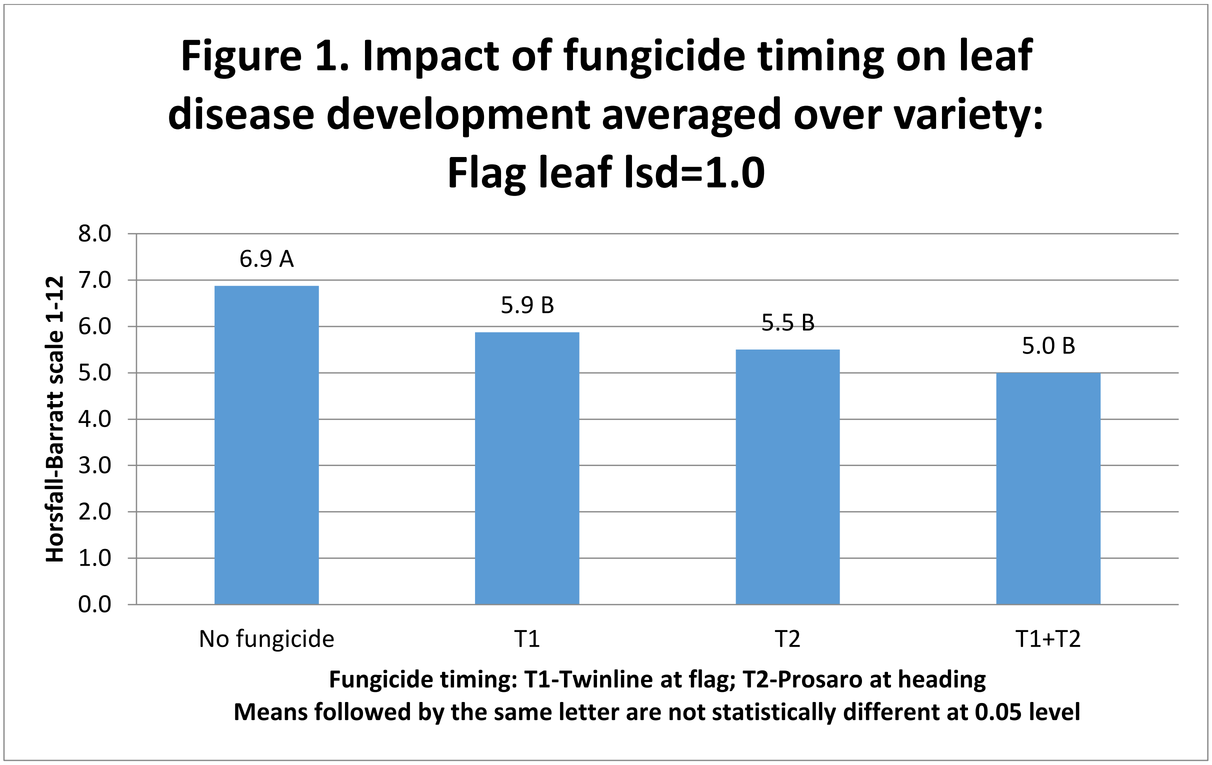
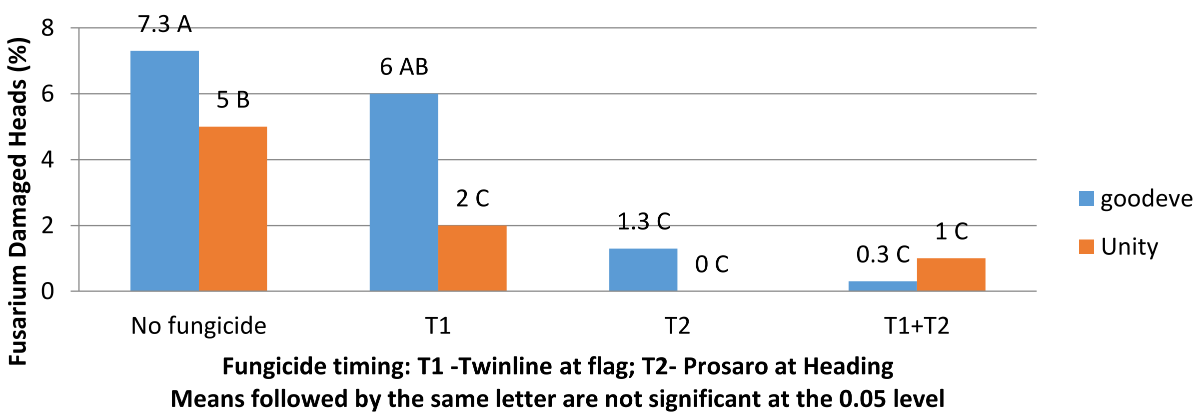


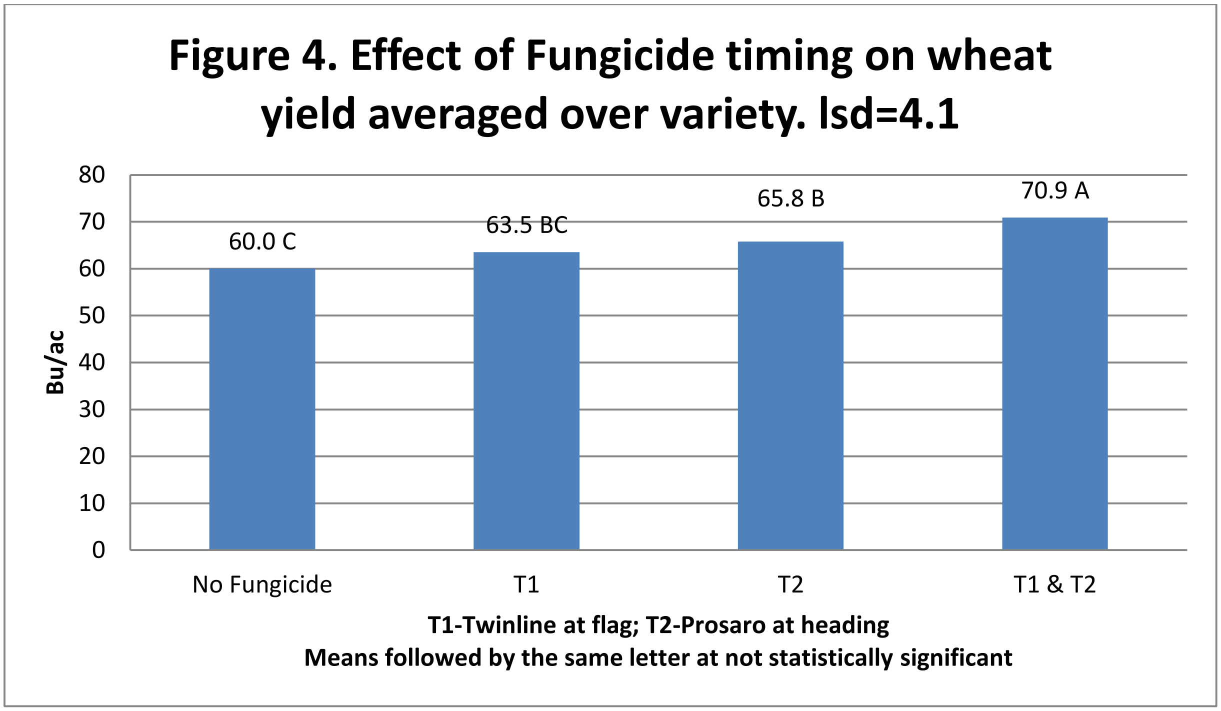
Figure 2. Goodeve: no fungicide versus the dual application of Twinline at flag and Prosaro at early heading.

Visual ratings of Fusarium damaged heads observed significant differences between varieties and fungicide timings (Figure 3). The level of Fusarium damaged heads was significantly lower for the variety Unity in the absence of fungicide or when Twinline at flag was applied alone. This makes sense as Unity is rated to be more resistant to FHB and Twinline at flag is not expected to provide any suppression of FHB. Having said that, it is unexpected that Twinline at flag significantly reduced Fusarium damaged heads in Unity. Perhaps the Twinline improved plant health enabling more resistance to FHB. This is only speculation. As expected, Prosaro at early heading provided the best suppression of Fusarium damaged heads.

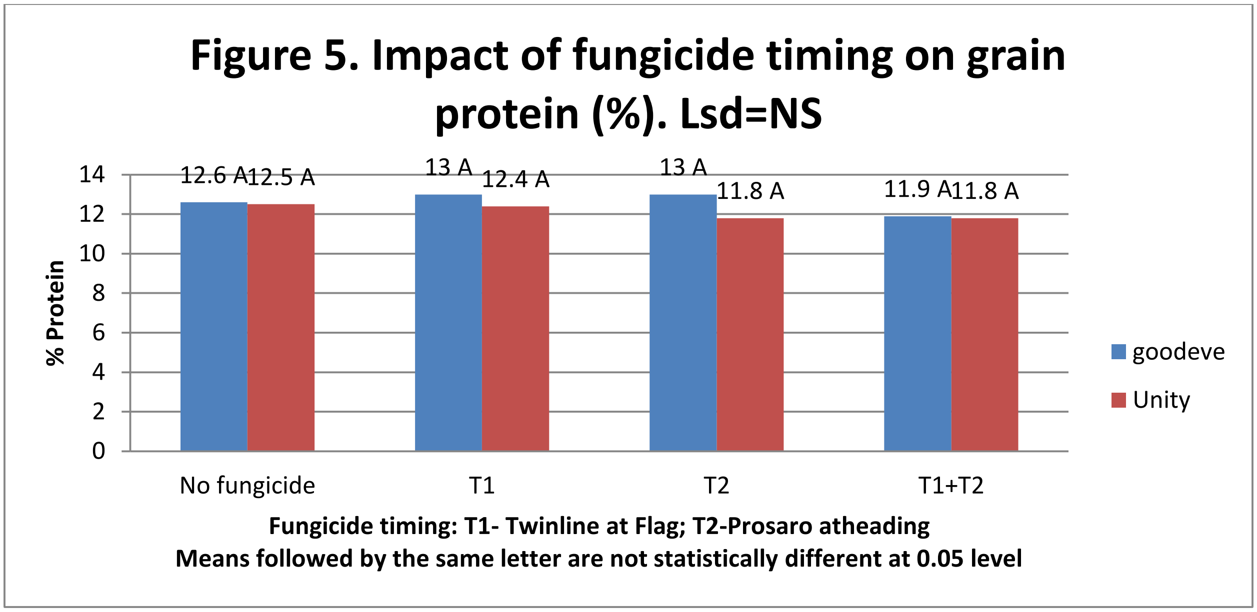
Figure 3. Impact of fungicide timing on the level of Fusarium damaged heads. Lsd= 2.1



The yield response of wheat to fungicide did not significantly differ between varieties. Thus, data has been averaged over variety (Figure 4). The application of Twinline at flag resulted in a 3.5 bushel/ac increase which was not quite statistically significant. The application of Prosaro at early heading provided a 5.8 bushel/ac increase which was statistically significant. The combination of Twinline at flag and Prosaro at early heading resulted in 10.9 bushel gain over the no fungicide check and was a significant yield gain over Prosaro alone.



There were no statistically significant differences in grain protein between varieties or fungicide treatments (Figure 5). However, there seems to be less protein associated with the dual application. This would not be unexpected as the yield from the dual application was significantly increased which should dilute protein levels.



All the grain samples essentially graded #2 (Table 1). Fungicide timings containing Prosaro reduced levels of Fusarium damaged kernels. However, levels were not quite reduced enough for a #1 grade.

Table 1. Impact of Variety and Fungicide timing on wheat Grade

Variety	Fungicide timing	Grade	Protein	Fusarium %	Ergot %
Goodeve	No fungicide	#2 CWRS	12.8	0.8	0.017
Goodeve	T1	#3 CWRS	13.4	1.3	0.004
Goodeve	T2	#2 CWRS	13.3	0.58	0.006
Goodeve	T1 + T2	#2 CWRS	11.9	0.3	0.016
Unity	No fungicide	#2 CWRS	12.4	0.4	0.013
Unity	T1	#2 CWRS	12.3	0.42	0.008
Unity	T2	#2 CWRS	11.8	0.2	0.02
Unity	T1 + T2	#2 CWRS	11.7	0.3	0.009

Conclusions

The application of Twinline at flag or Prosaro at early heading significantly reduced the development of leaf spot diseases. The dual application reduced levels a little more.

Levels of Fusarium were higher in Goodeve relative to Unity without the application of fungicide. Prosaro at early heading significantly reduced the number of Fusarium damaged wheat heads and reduced the number of Fusarium damaged kernels in the harvested grain to similar levels for both varieties. However, the reduction was not quite good enough to improve the grade from #3 to #2.

Twinline applied at flag resulted in a 3.5 bushel/ac increase in yield. Prosaro at early heading resulted in a 5.8 bushel/ac yield increase. Using Twinline at flag in combination with Prosaro at early heading provided the greatest yield increase of 10.9 bushels/ac.

This is not what farmers want to hear. No one wants to spray fungicide at flag and then turn around and spray it again at early heading. Fortunately, this result is not common. Based on 21 site years of Agri-arm data the dual application was only superior at 3 site years; ours is one of them. Based on 24 site year comparisons fungicide at heading usually produced greater yields than fungicide at flag and was never worse. Fungicide at heading will likely give you the biggest bang for your buck.

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement. Protein testing of grain was done by Richardson Pioneer in Yorkton.

Yield Response and Test Weight Stability of Oat to increasing Nitrogen

W. May[1] , M. Hall[2], S. Brandt[3]

[1]Agriculture & Agri-Food Canada, Indian Head, SK
[2]East Central Research Foundation/Parkland College, Yorkton, SK
[3]Northeast Agriculture Research Foundation, Melfort, SK

Description

Oat growers are looking for ways to increase their yield and maintain the quality of the oats they grow. Many are using high N rates with varying degrees of success. Research indicates that some cultivars have a more stable test weight than other cultivars as the nitrogen fertilizer rate is increased. In addition, new cultivars are available that growers have not had a chance to see evaluated in their own area. This demonstration will help producers choose the appropriate nitrogen rate and cultivar when growing oats.

Objectives:

1) to validate under local conditions, recent research results showing that oat requires moderate amounts of N and that test weight declines as N rate is increased.

2) to expose growers to new oat cultivars that may be better than cultivars currently grown in the area of the trial.

3) to determine if the test weight of current oat cultivars vary in the stability of their test weight as the nitrogen rate is increased.

The trials were established as a 2 order factorial. First factor was Oat cultivar. Cultivars varied between locations. Cultivars picked for each location were based on two popular and two new cultivars with potential. Each oat cultivar was then evaluated at the following nitrogen rates (kg N ha-1):

- 40
- 60
- 80
- 120

Results

The experiment was successfully carried out at three locations: Indian Head, Yorkton and Melfort. At Redvers, seeding could not be completed due to excessive soil moisture and rain. At all three locations, there was no interaction among the cultivars for their response to nitrogen fertilizer; which means that cultivars all responded in a similar manner to the application of nitrogen fertilizer. Lodging increased as the rate of applied N increased, especially at Indian Head (Tables 1- 3). At Yorkton and Melfort, the lodging increased when the N rate increased from 80 to 120; however, at Indian Head there was an increase in lodging each time the N rate increased. At Yorkton the cultivars Summit and Triactor had lower lodging than both Strider and CDC dancer (Table 1). At Melfort and Indian Head the cultivars did not differ in lodging. At all three locations, grain yield increased as the N rate increased. The yield potential at Yorkton and Melfort was greater than at Indian Head. At Yorkton, grain yield increased as the N rate increased from 40 to 60 kg N/ha and 80 to 120 kg N/ha (Table 1). At Melfort, grain yield increased every time the N rate was increased (Table 2). At Indian Head, grain yield increased when the N rate increased from 40 to 60 kg N/ha (Table 3). At Indian Head, the cultivars did not differ in their grain yield. At Yorkton, Triactor had the highest grain yield, followed by CDC Dancer with Summit and Strider having the lowest yield (Table 1). At Melfort, AC Morgan had the highest yield (196 bu/acre) of all the cultivars (Table 2).

Test weight declined as the N rate increased at Indian Head and Yorkton but not at Melfort (Tables 1-3). At Yorkton the decrease in test weight was small from 259 to 253 g/0.5L as the N rate increased from 40 to 120 kg N/ha. At Indian Head, there was a larger decrease in test weight, from 264 to 246 g/0.5L as the N rate was increased from 40 to 120 kg N/ha. Even the lowest test weight was high enough to meet milling quality standards.

Table 1: Effect of Cultivar and Nitrogen Rate on Oat Yield and Development at Yorkton in 2014

	Plant Density	Lodging	Yield	Test weight	Thin Seed	Groat Yield
	Plants/m^2	1-10	Kg/ha	g/0.5L	%	%
Cultivar						
Stride	272.7 a	4.2 b	5960.9 c	266.0 a	0.5 b	72.9 c
CDC Dancer	271.4 a	5.6 a	6512.6 b	257.0 c	0.7 b	75.6 a
Summit	269.0 a	2.6 c	6194.8 c	260.8 b	0.6 b	74.5 b
Triactor	253.8 a	2.9 c	7049.3 a	242.4 d	1.3 a	72.4 c
Nitrogen Rate (kg/ha)						
40	268.5 a	3.5 b	5741.6 c	259.2 a	0.6 a	73.9 a
60	268.2 a	3.4 b	6309.8 b	257.6 ab	0.8 a	73.9 a
80	268.8 a	3.7 b	6642.0 b	256.6 b	0.8 a	73.9 a
120	261.3 a	4.8 a	7024.2 a	252.8 c	0.9 a	73.8 a

Table 2. Yield response and test weight stability of oat to fertilizer N at Melfort in 2014

	Plant Density /m2		Lodge Belgian 0-5		Grain yield kg/ha		Grain yield bu/ac		Test Wt g/0.5 L		Plump %		Thin %		TKW g/1000 k	
Cultivar																
Stride	284.8	b	0.2	a	6714.3	b	175.8	b	282.89	a	88.216	a	2.288	a	32.7	d
CDC Minstrel	328.3	a	0	a	6874.6	b	180	b	276.31	ab	90.388	a	2.368	a	36.11	c
AC Morgan	295.6	b	0	a	7496.6	a	196.3	a	273.86	b	90.244	a	1.203	b	37.36	b
CDC Seabiscuit	277.8	b	0.3	a	6819.1	b	178.6	b	264.92	c	90.475	a	1.611	b	39.48	a
Nitrogen Rate																
40 kg/ha	294.7	a	0.05	b	6575.5	d	172.2	d	276.29	a	90.716	a	1.834	a	36.83	a
60 kg/ha	293.4	a	0.05	b	6850.6	c	179.4	c	275.44	a	90.635	a	1.936	a	36.93	a
80 kg/ha	305.3	a	0.05	b	7103.9	b	186	b	272.04	a	89.113	b	1.866	a	36	b
120 kg/ha	292.9	a	0.35	a	7374.6	a	193.1	a	274.2	a	88.859	b	1.833	a	35.9	b

Table 3. Yield response and test weight stability of oat to fertilizer N at Indian Head

Description	Plant Density	Lodge	Lodge	Grain yield	Test Wt	Wild Oat
Rating Unit	/m2	1-10	1-10	kg/ha	g/0.5 L	g/50g
Cultivar						
Stride	241.24 a	4.6 a	6.8 a	3726.8 a	261.9 a	0.252 a
Pinnacle	221.87 a	5.1 a	6.6 a	4028.7 a	248.29 c	0.264 a
CDC Orrin	228.74 a	4.1 a	6.6 a	4125.3 a	256.08 b	0.25 a
CDC Big Brown	228.94 a	4.2 a	5.8 a	4038.7 a	260.52 ab	0.216 a
Nitrogen Rate (kg/ha)						
40 kg/ha	228.53 a	2.4 c	3.8 d	3426.4 b	264.31 a	0.26 a
60 kg/ha	230.89 a	3.7 bc	5.8 c	4144.7 a	261.07 a	0.191 a
80 kg/ha	233.96 a	4.9 b	7.4 b	4051.8 a	255.62 b	0.313 a
120 kg/ha	227.4 a	6.9 a	8.8 a	4296.6 a	245.79 c	0.219 a

Conclusion

It appears that in the current wetter than normal environmental conditions oat is more responsive to N and test weight is less sensitive to high N rates than found in past research. More testing is required to differentiate the response of cultivars to increasing N rates.

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement, and the Prairie Oat Growers Association.

Effect of Seeding Date on Cereal Forage.

M. Hall[1], S. Brandt[2], A. Foster[3], C. Ward[4]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Northeast Agricultural Research Foundation, Melfort, SK
[3]Saskatchewan Agriculture and Food, Tisdale, SK
[4]Saskatchewan Agriculture and Food, Yorkton, Sk

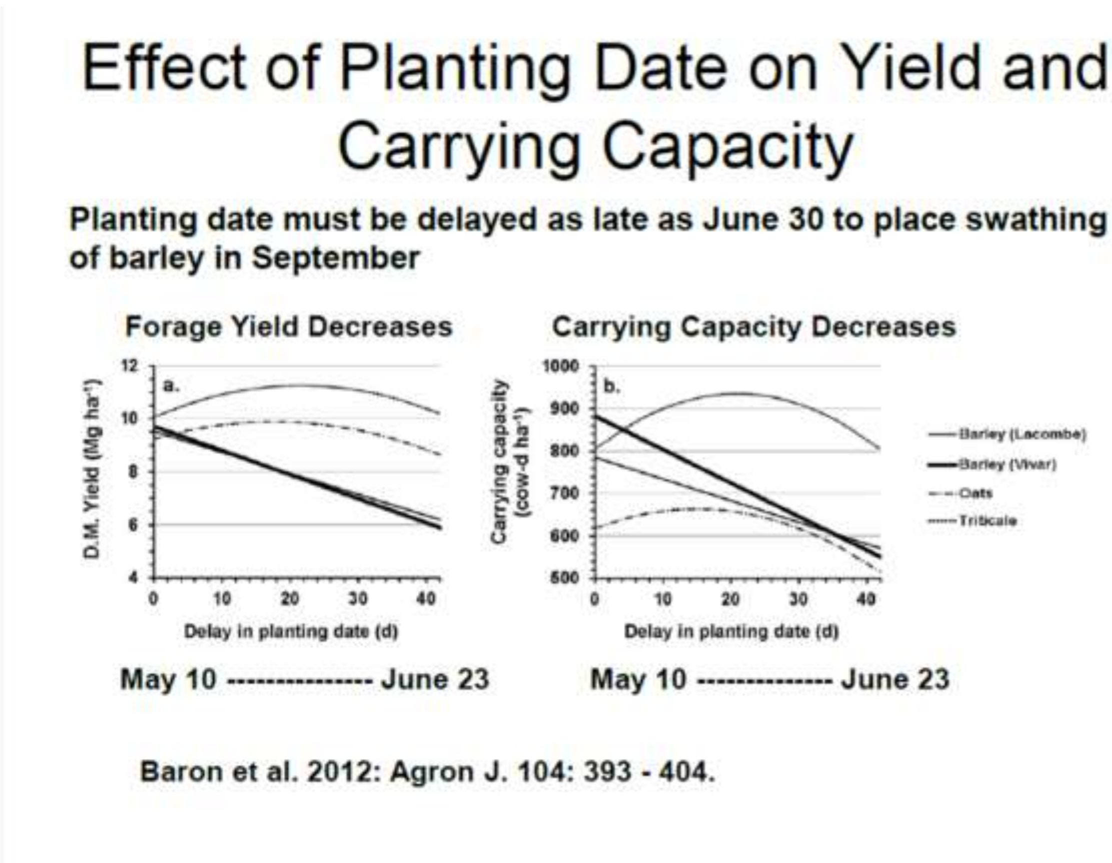
Cereal Forage Trial Yorkton (July 24, 2014)

Description

Cereals can be grown for greenfeed or seeded later for swath grazing. Oats and barley are the most commonly grown cereals for forages across the province. Barley is considered to provide the best quality feed but oats can be higher yielding. Triticale is another cereal worth considering again. The newer varieties with reduced awnlettes are more attractive to cattle than the older varieties. Under a swath grazing situation, Vern Baaron (AAFC lacombe) found the carrying capacity of land could be doubled by growing triticale instead of barley. This seems counter intuitive based on the Saskatchewan experience. Work initiated by Lorne Klein (Forage specialist Sask Ag) and carried out by various agriarm sites compared the dry matter yields of commonly grown cereal forages when seeded around June 1. Based on ten site years of data, Tyndal triticale yielded significantly more than Cowboy barley in 4/10 site years, was the same in 4/10 site years and yielded significantly less in 2/10 site years. When averaged across the 10 site years Tyndall triticale out yielded Cowboy barley by only 4.6 percent. This is a far cry from doubling the carrying capacity of the land. The reason for this discrepancy was explained nicely in a short article written by Linda Hunt a Sask ag. Forage specialist in June 2013.

She explains that the difference in relative yield potential between barley and triticale in the Lacombe study mostly comes down to seeding date. Lacombe research has observed very different forage yield responses to delaying seeding date between barley versus triticale and oats (Figure 1).

Figure 1.



Yields of barley, triticale and oats were comparable at the May 10 seeding date. As seeding date is delayed the yield potential of barley declined linearly whereas the yield potential of triticale and oats increased and did not start to decline until early June. In Lacombe's swath grazing situation, the barley was seeded later than the longer maturing triticale to ensure both crops were at the same stage for cutting in the fall. The barley was seeded late to minimize weathering losses in the swath prior to fall grazing. However, late seeding barley shortens its vegetative period due to its photosensitivity. This in turn may also reduce its yield potential. In contrast, triticale is not photosensitive and is more likely to produce similar yields if seeded late. Since triticale is a longer maturing crop it can be seeded a couple weeks earlier than barley and better utilize available resources. The combination of seeding triticale earlier than barley and barley's photosensitivity to late seeding likely accounts for the greater carrying capacity of triticale in the Lacombe swath grazing study.

Purposefully seeding barley in late June for swath grazing may not be the best practise, particularly if barley does not substantially lose quality when seeded in early June. However, seeding forage in late June is not uncommon as farmers face time constraints and weather issues.

Within the past two years, new varieties of both oats (CDC Haymaker) and barley (CDC Maverick) have been released by the new Crop Development Centre in Saskatoon. Maverick was bred from Cowboy and has many of its attributes such as high forage yields and feed quality under low inputs. However, unlike Cowboy it has smooth awns to reduce the occurrence of mouth sores in cattle. This is more of a problem in a swath grazing scenario when cattle are using snow as a water source. Snow does not wash the awns out of the mouth as well as water. Haymaker oats is expected to replace Baler as it is reported to have better forage quality and yield. There is a lower lignin level in the hulls which improves digestibility.

Recent research and demonstrations have also resulted in renewed interest in new triticale varieties for swath grazing and greenfeed. Tyndall and Bunker are awnletted (reduced awns) varieties which are more exceptable to cattle.

Another swath grazing crop to consider is Golden German Millet (Figure 2.). It is an alternative forage crop with good feed quality and worth consideration. As a warm season crop, it produces most of its biomass after July, during the hottest months of the summer. This crop is drought tolerant but will not produce well in cool wet years. However, as a swath grazed crop it has many beneficial qualities such as late maturity and a waxy coating on the leaves and stems, which allows the crop to retain its quality while in the swath. There are also potential disadvantages to growing Golden German Millet. Because this is a warm season crop it establishes very slowly and can be uncompetitive with weeds. It is not suitable for grazing as it is shallow rooted and easily pulled out of the ground. Golden German millet does not dry down quickly in the swath and therefore, can be difficult to bale for greenfeed.

Figure 2.Golden German Millet

The objective of this study was to compare the forage quality and yield between different crop species when seeding early and late. The trial at Yorkton (ECRF) was setup as a split plot with four replications. The main plot factor was seeding date which contrasted an early date (May 22 atYorkton) for greenfeed with a late seeding date (June 25) for swath grazing. The sub-plot factor was the following crop species:

1. CDC Cowboy barley
2. CDC Maverick barley
3. CDC Baler oats
4. CDC Haymaker oats
5. Bunker triticale
6. Tyndall triticale
7. Golden German Millet

The dates of operations for early and late seeded treatments are in Tables 1 and 2., respectively.

Table 1. Dates of Operations for Early seeded treatments at Yorkton (ECRF)

Operation	Date
Preseed burnoff (Cleanstart + 0.33l/ac Roundup transorb)	May 15, 2014
Seeded Cereals (39 lbs/ac of ammonium Phosphate and 109 lbs/ac of urea side banded). Conditions excellent. Soil test results (lbs/ac) 0 to 12 inches: NO_3-N = 12, P = 27, K = 693, SO_4-S = 30	May 22, 2014
Crop Emergence plant counts at 2 leaf stage	June 10, 2014
In-crop herbicide (Prestige 27 acre rate per case)	June 12, 2014
Harvest barley	August 5, 2014
Harvested Oats	August 11, 2014
German millet starting to head	August 11, 2014
Harvested triticale (harvested early at milk because leaves dying off)	August 19, 2014
Harvested German millet	Sept 2, 2014

Table 2. Dates of Operations for Late seeded treatments at Yorkton (ECRF)

Operation	Date
Preseed burnoff (Cleanstart + 0.33l/ac Roundup transorb)	May 27, 2014
Seeded Cereals (39 lbs/ac of ammonium Phosphate and 109 lbs/ac of urea side banded). Heavy rains followed seeding. Soil test results (lbs/ac) 0 to 12 inches: NO_3-N = 12, P = 27, K = 693, SO_4-S = 30	June 25, 2014
Crop Emergence plant counts	July 8, 2014
In-crop herbicide (Prestige 27 acre rate per case)	July 8, 2014
Harvest barley	Sept 2, 2014
German millet starting to head	Sept 2, 2014
Harvested Oats	Sept 15, 2014
Harvested triticale (harvested early at milk because leaves dying off) and German millet	Sept 26, 2014

The Northeast agricultural research foundation (Narf) in Melfort conducted a sister site. They established two separate trials setup as randomized complete block designs. The first trial looked at the cereal forages seeded early (June 6) and the second trial looked at the cereal forages seeded late (July 3). Tables 3 and 4 list the dates of operations.

Table 3. Dates of Operations for Early seeded treatments at Melfort (Narf)

<table>
<tr><th>Operation</th><th>Date</th></tr>
<tr><td>Preseed burnoff Roundup</td><td></td></tr>
<tr><td>Seeded Cereals (no fertilizer applied seeded on summer fallow). Conditions excellent. Soil test results (lbs/ac):
<table>
<tr><td>Depth (inches)</td><td>NO₃-N</td><td>P</td><td>K</td><td>SO₄-S</td></tr>
<tr><td>0-6</td><td>71</td><td>58</td><td>598</td><td>15</td></tr>
<tr><td>6-12</td><td>23</td><td></td><td></td><td>10</td></tr>
<tr><td>12-24</td><td>43</td><td></td><td></td><td>21</td></tr>
</table></td><td>June 6, 2014</td></tr>
<tr><td>Harvest barley</td><td>August 21, 2004</td></tr>
<tr><td>Harvested Oats</td><td>August 27, 2004</td></tr>
<tr><td>Harvested triticale</td><td>August 27, 2004</td></tr>
<tr><td>Harvested German millet</td><td>Sept 9, 2004</td></tr>
</table>

Table 4. Dates of Operations for Late seeded treatments at Melfort (NARF)

<table>
<tr><th>Operation</th><th>Date</th></tr>
<tr><td>Preseed burnoff Roundup</td><td></td></tr>
<tr><td>Seeded Cereals (no fertilizer applied seeded on summer fallow). Conditions excellent. Soil test results (lbs/ac):
<table>
<tr><td>Depth (inches)</td><td>NO₃-N</td><td>P</td><td>K</td><td>SO₄-S</td></tr>
<tr><td>0-6</td><td>71</td><td>58</td><td>598</td><td>15</td></tr>
<tr><td>6-12</td><td>23</td><td></td><td></td><td>10</td></tr>
<tr><td>12-24</td><td>43</td><td></td><td></td><td>21</td></tr>
</table></td><td>July 3, 2014</td></tr>
<tr><td>Harvest barley</td><td>Sept 12, 2014</td></tr>
<tr><td>Harvested Oats</td><td>Sept 26, 2014</td></tr>
<tr><td>Harvested triticale and German millet</td><td>Sept 26, 2014</td></tr>
</table>

<u>Results</u>

At Yorkton, yields of barley, oats and triticale were significantly lower with seeding late on June 25 (figure 3), largely due to heavy rainfall which significantly reduced crop emergence (figure 4). A total of 120 mm of rain fell from June 27 to 30 shortly after seeding. Yields of late seeded barley were particularly reduced.

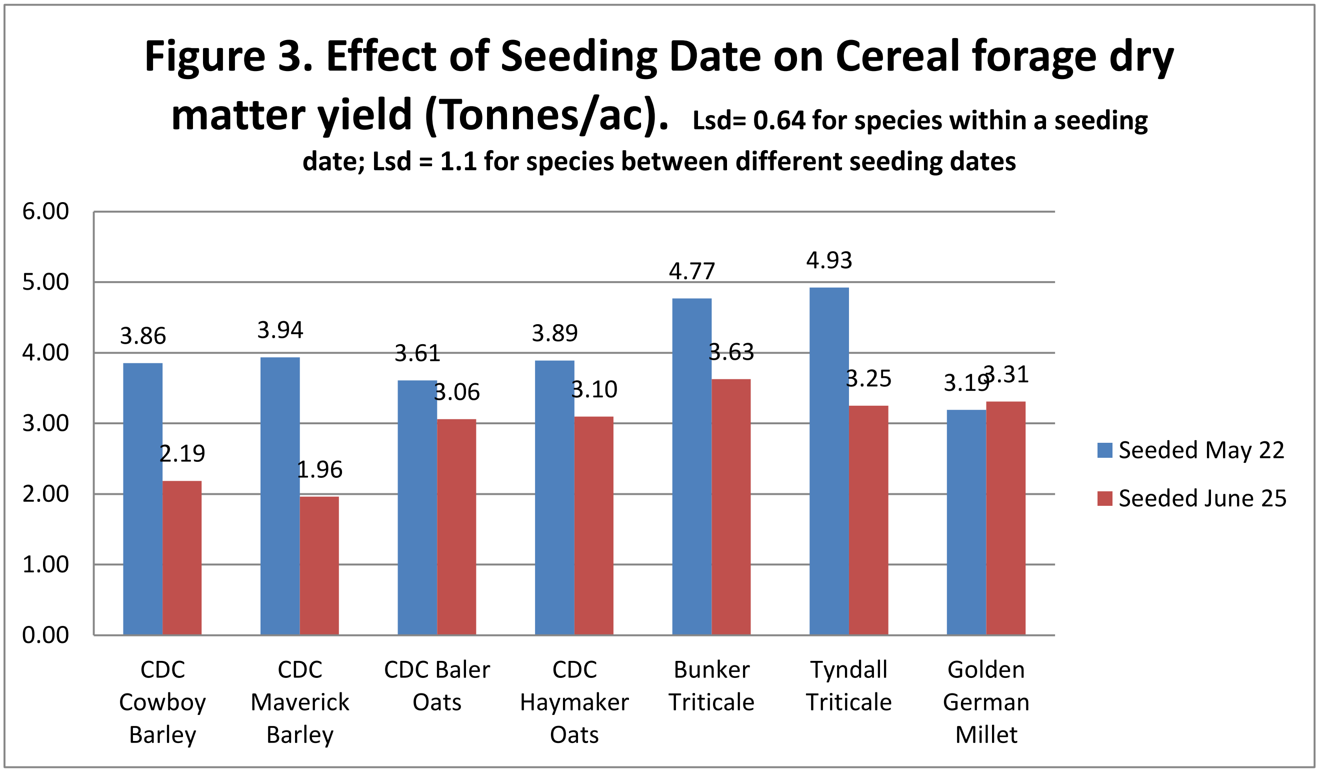


Figure 3. Effect of Seeding Date on Cereal forage dry matter yield (Tonnes/ac). Lsd= 0.64 for species within a seeding date; Lsd = 1.1 for species between different seeding dates
6.00
5.00
4.00
3.00
2.00
1.00
0.00
3.86
2.19
3.94
1.96
3.61
3.06
3.89
3.10
4.77
3.63
4.93
3.25
3.19
3.31
CDC Cowboy Barley
CDC Maverick Barley
CDC Baler Oats
CDC Haymaker Oats
Bunker Triticale
Tyndall Triticale
Golden German Millet
Seeded May 22
Seeded June 25

.

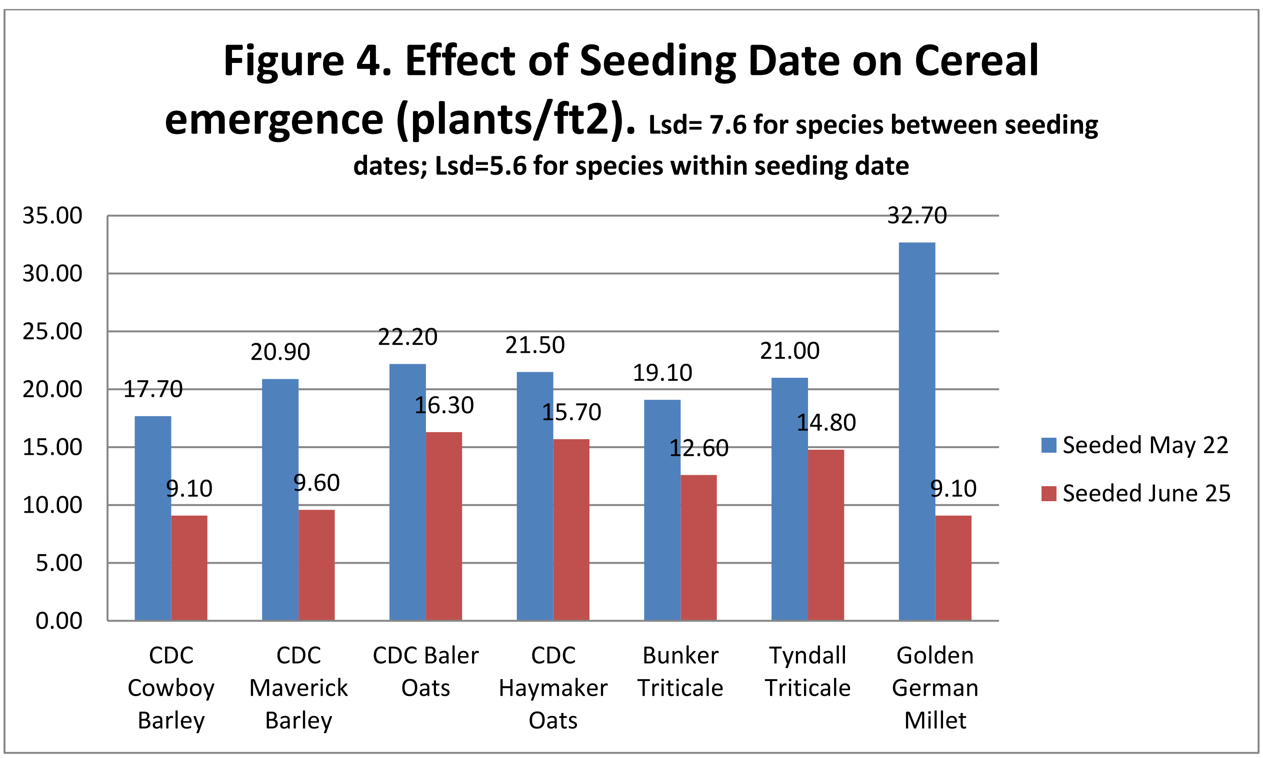
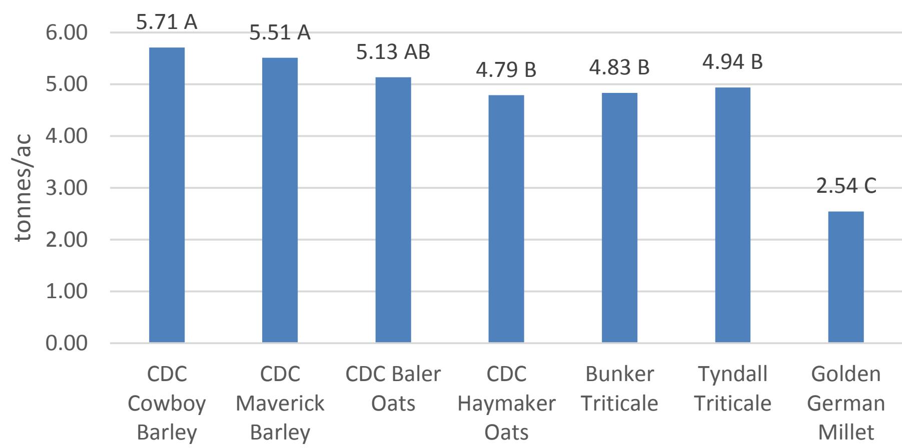


Figure 4. Effect of Seeding Date on Cereal emergence (plants/ft2). Lsd= 7.6 for species between seeding dates; Lsd=5.6 for species within seeding date
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
17.70
9.10
20.90
9.60
22.20
16.30
21.50
15.70
19.10
12.60
21.00
14.80
32.70
9.10
CDC Cowboy Barley
CDC Maverick Barley
CDC Baler Oats
CDC Haymaker Oats
Bunker Triticale
Tyndall Triticale
Golden German Millet
Seeded May 22
Seeded June 25

At Melfort, the difference between early and late seeding cannot be compared statistically as they were separate experiments. However, the yields of oat, barley and triticale yields were more comparable between early and late seedings than that experienced at Yorkton. At Melfort, barley varieties produced significantly higher yields than triticale varieties when seeded early (Figures 5). When seeded late, barley yields reduced and no significant differences could be detected between any varieties of barley oats or triticale (Figure 6). Although barley varieties did perform relatively poorer on the second seeding the difference was very modest. Barley's poorer performance when seeded late may have been due in part to its photosensitivity, which shortened its vegetative period by about 5 days at both Yorkton and Melfort (Table 5). In contrast, the vegetative period of Triticale was extended a few days when seeded late (Table 5). However, Barley's poorer performance with late seeding at Yorkton was more likely the product of poorer emergence and vigor due to excessively wet conditions after seeding.

Figure 5. Cereal Forage yields (Tonnes/ac) seeded early June 6 (NARF) Lsd=0.49



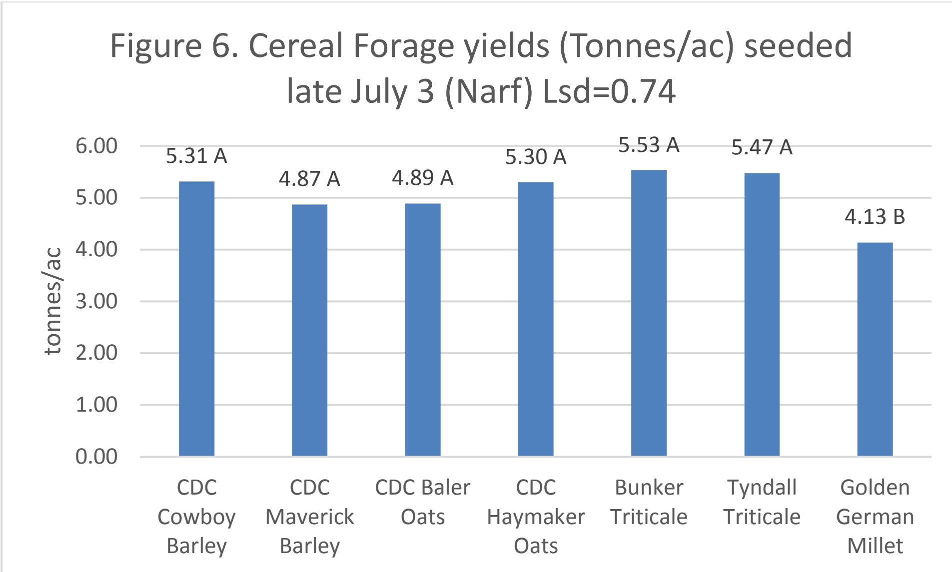


Table 5. Days from seeding to soft dough stage

Seeding time	Barley	Triticale
Early (Melfort)[1]	76	82
Late (Melfort)[2]	71	85
Early (Yorkton)[1]	75	89
Late (Yorkton)[2]	69	93

[1] Early Seeding dates for Melfort and Yorkton were May 22 and June 6, respectively.
[2] Late Seeding dates for Melfort and Yorkton were July 3 and June 25, respectively.

At Melfort, Golden German millet yielded substantially more when seeded late (figures 5 and 6). For Yorkton, the Golden German Millet yielded about the same for each seeding date (Figure 2) which was surprising considering how much the emergence was reduced at the late seeding date by wet conditions. Either the crop tillered well to compensate or more plants emerged after counts were done. The greater performance of Golden German Millet when seeded late may be related to it being a warm season crop and better weed control at the latter seeding date at the Melfort site. When seeded in the cool spring it is slow to develop (Figure 7). At Yorkton, Golden German Millet took 81 days to head when seeded early (May 22) under cool conditions and only 69 days to head when seeded late (June 25) under warmer conditions. This slow rate of development particularly under cool conditions makes it uncompetitive with weeds. Weeds were not an issue at Yorkton where they were controlled with an in-crop herbicide and preseed burnoffs. However, weeds were not controlled in crop with herbicide at the Melfort site and competition with volunteer canola significantly reduced the yield of Golden German Millet when seeded early. Golden German Millet is likely better suited to a swath grazing scenario. It grows better when seeded into warm conditions and its slow rate of dry down in the swath makes it a riskier choice for green feed.

Figure 7. Slow growth of Golden German Millet Compared to Triticale on the left at Yorkton site[1].

[1]Both Crops seeded May 22 and picture taken on July 8.

At both sites, substantial differences in feed quality were not observed between varietal comparisons for barley, triticale or oats (figures 8, 9, 10 and 11). However, between barley varieties Maverick may still be preferable for swath grazing because of its smooth awns.

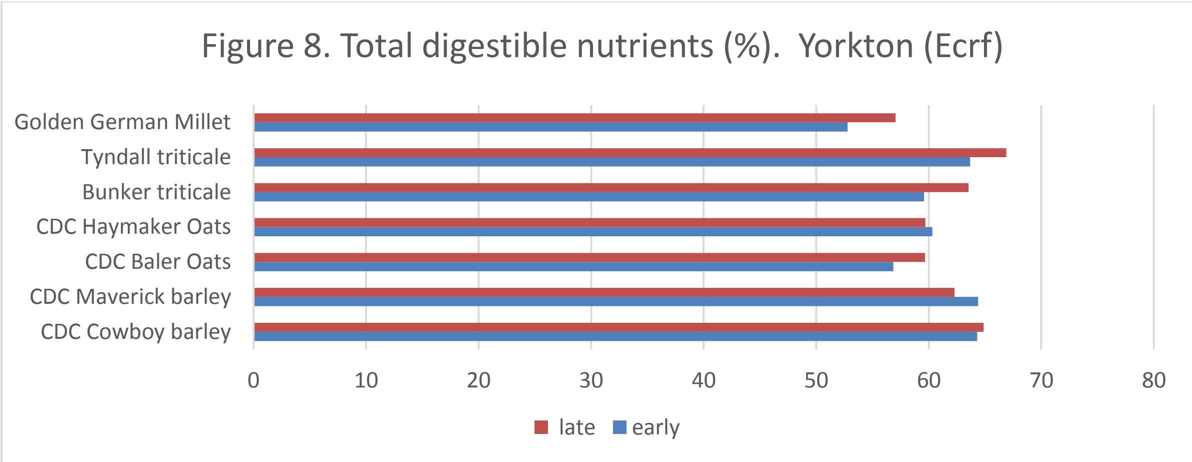


Figure 8. Total digestible nutrients (%). Yorkton (Ecrf)
Golden German Millet
Tyndall triticale
Bunker triticale
CDC Haymaker Oats
CDC Baler Oats
CDC Maverick barley
CDC Cowboy barley
0
10
20
30
40
50
60
70
80
late
early

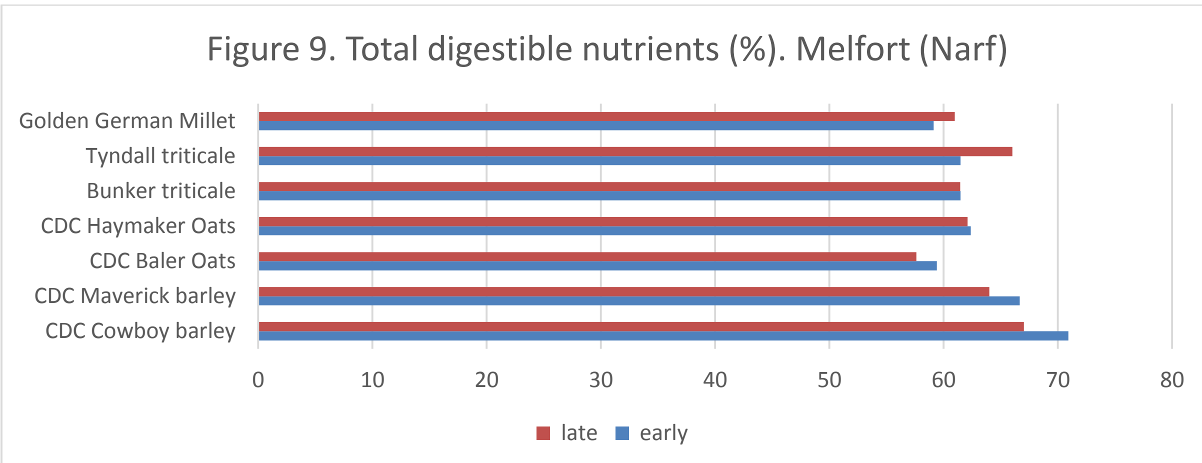


Figure 9. Total digestible nutrients (%). Melfort (Narf)
Golden German Millet
Tyndall triticale
Bunker triticale
CDC Haymaker Oats
CDC Baler Oats
CDC Maverick barley
CDC Cowboy barley
0
10
20
30
40
50
60
70
80
late
early

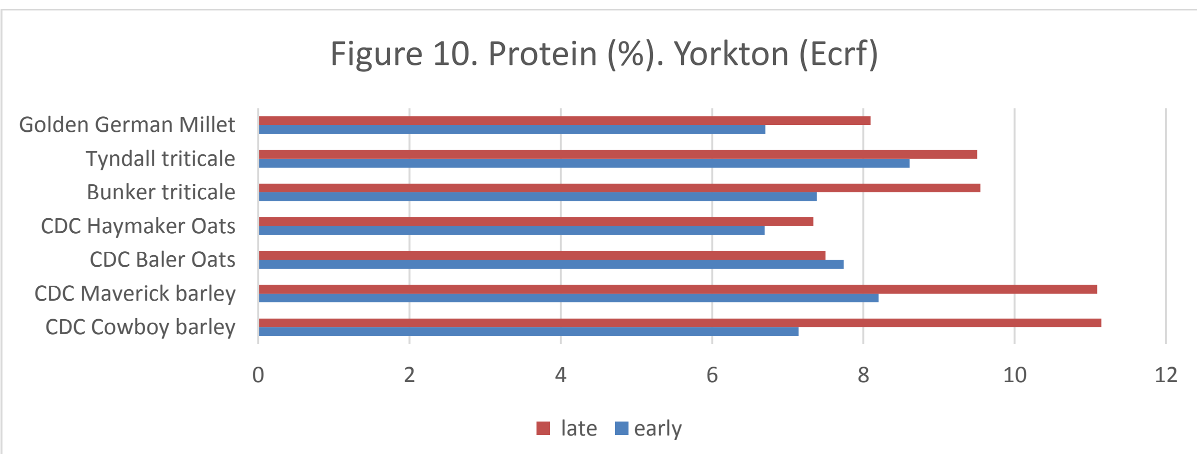
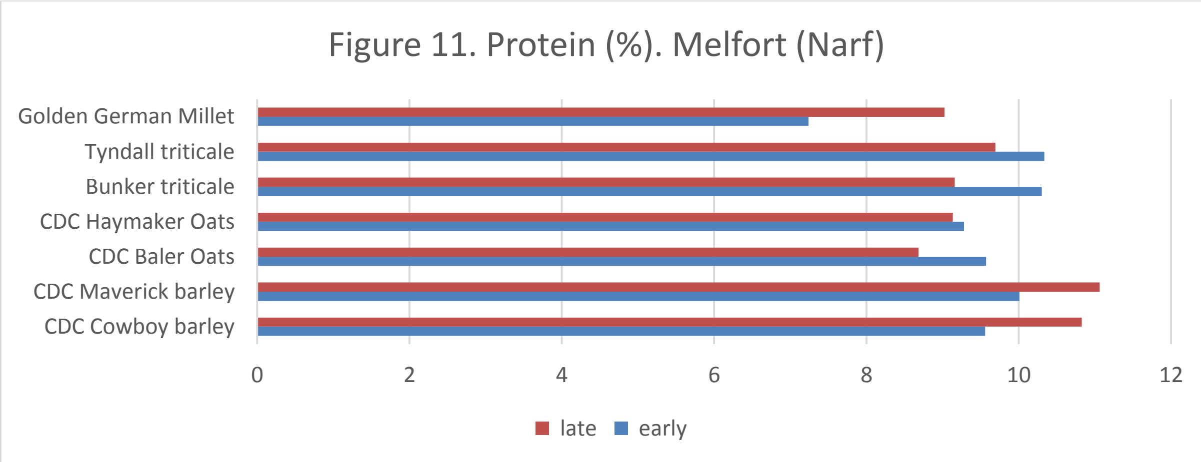


Figure 10. Protein (%). Yorkton (Ecrf)
Golden German Millet
Tyndall triticale
Bunker triticale
CDC Haymaker Oats
CDC Baler Oats
CDC Maverick barley
CDC Cowboy barley
0
2
4
6
8
10
12
late
early



At both sites feed quality of all crops was adequate for mid-pregnancy cows. The average cow requires 55 per cent TDN during mid-pregnancy, 60 per cent during late pregnancy and 65 per cent after calving.

All crude protein (CP) levels were adequate at both locations for a cow in mid-pregnancy requiring about seven per cent (Figures 10 and 11). However, supplemental feed would be required for cows in late pregnancy requiring nine per cent CP and particularly after calving when requirements are 11 per cent CP. Stands were not fertilized heavily with N so CP levels were not expected to be high. However, there was a substantial jump in CP with barley and to a lesser extent with triticale when seeded late in Yorkton (Figure 10). This likely resulted because yields of these crops were considerably reduced when seeded late at Yorkton (Figure 3). A similar but less pronounced pattern was observed at Melfort with the barley (Figure 11). In total, protein levels at Melfort were higher, likely the result of higher soil fertility from summer fallow.

<u>Conclusions</u>

When seeded early Golden German Millet did not yield well compared to the other cereal forages. It was very slow to develop and competition with volunteer canola at the Melfort site became an issue. When seeded late Golden German Millet developed more quickly and performed comparatively better.

With the exception of Golden German Millet, yields of cereal forages were significantly reduced with the late seeding at Yorkton. This was mostly the result of poorer emergence due to excessively wet conditions after seeding. Barley emergence and yield was particularly reduced as it is sensitive to excessive moisture. Barley yield loss at the late seeding may have also been in part due to it photosensitivity which reduced its vegetative period. The vegetative period was reduced by 5 days at both the Yorkton and Melfort locations by seeding late. The vegetative period of Triticale and Oats lengthen by a few days by seeding late. The comparative yield of barley also decreased at the Melfort site with late seeding but it was not substantial or significantly different.

More work is required to compare the relative performance of cereal forages when seeded in early versus late June in order to verify results that were observed in Lacombe. Comparisons between different barley varieties are needed to see if differences in photosensitivity exist.

All these forages could provide good feed by themselves for mid-pregnancy cows. There were no detectable differences between varietal comparisons of oats, barley and triticale in terms of feed quality. At Yorkton, seeding late caused a spike in barley protein but this is likely the result of the substantially reduced barley yield.

Acknowledgements

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Effect of Macro and Micro Nutrients on Canaryseed Development and Yield

W. May[1] , M. Hall[2], S. Brandt[3], L. Grenkow[4], B. Nybo[5], L. Shaw[6]

[1]Agriculture & Agri-Food Canada, Indian Head, SK
[2]East Central Research Foundation/Parkland College, Yorkton, SK
[3]Northeast Agriculture Research Foundation, Melfort, SK
[4]Western Applied Research Corporation, Scott, SK

[5]Wheatland Conservation Association, Swift Current, SK

[6]South East Research Farm, Redvers, SK

Description

Canaryseed producers are becoming aware that chloride is an import nutrient to apply and that large amounts of nitrogen are not required for canaryseed production. This project will help to demonstrate to canaryseed growers the importance of a complete nutrient management package in canaryseed.

The objective of the study was to demonstrate the effect of macro and micro nutrients on canaryseed and provide professionals with up to date information on the benefits of macro and micro nutrients for canaryseed.

Trials were setup as single replicate RCBD with four replicates. Table 1 below lists the treatments:

Table 1 Nutrients applied in each treatment

Treatment	N	P_2O_5	K_2O	Cl	S	Copper	Zinc	Combination of Micro's
---------------------------------- kg/ha -----------------------------------								
1	0							
2	15		20	18.1				
3	30		20	18.1				
4	30	30	20	18.1				
5	30	30	20	18.1	15			
6	60	30	20	18.1	15			
7	60	30			15			
8	60	30	20	18.1	15	3		
9	60	30	20	18.1	15		3	
10	60	30	20	18.1	15			Yes
11	90	30	20	18.1	15			Yes

Results

The nutrients applied in each treatment are laid out in Table 1. At Indian Head the differences in grain yield from the treatments could not be separated statistically (Fig1). After examining the data it became apparent that the Cl response varied depending on the elevation. When the low elevation was separated from the high elevation there appears to be a chloride response at the higher elevation but not the lower elevations. This makes sense since chloride is mobile and will flow with the water. In the spring the elevation of each plot will be used to improve the statistical analysis of the site.

At Swift Current, the application of 15 kg N ha^{-1} combined with 18 kg Cl ha^{-1} increased the grain yield and removing Cl, treatment 7, reduced grain yield below the unfertilized check, treatment 1 (Figure 2).

At Melfort the addition of N fertilizer up to 30 kg ha^{-1} increased yield and N levels above 30 kg ha^{-1} did not increase yield and may have actually been slightly negative (Figure 3).

At Scott there was a strong yield response to N up to the highest rate of 90 kg ha^{-1} (Figure 4). In addition there appears to be a grain yield response to Zinc at Scott in 2014.

At Yorkton, the addition of 15 kg N ha^{-1} combined with 18 kg Cl ha^{-1} increased the grain yield and removing Cl, treatment 7, reduced grain yield back to the level of the unfertilized check (Figure 5). The application of N above 15 kg N ha^{-1}had little effect on grain yield.

Figure 1. The grain yield response of canaryseed at Indian Head in 2014.

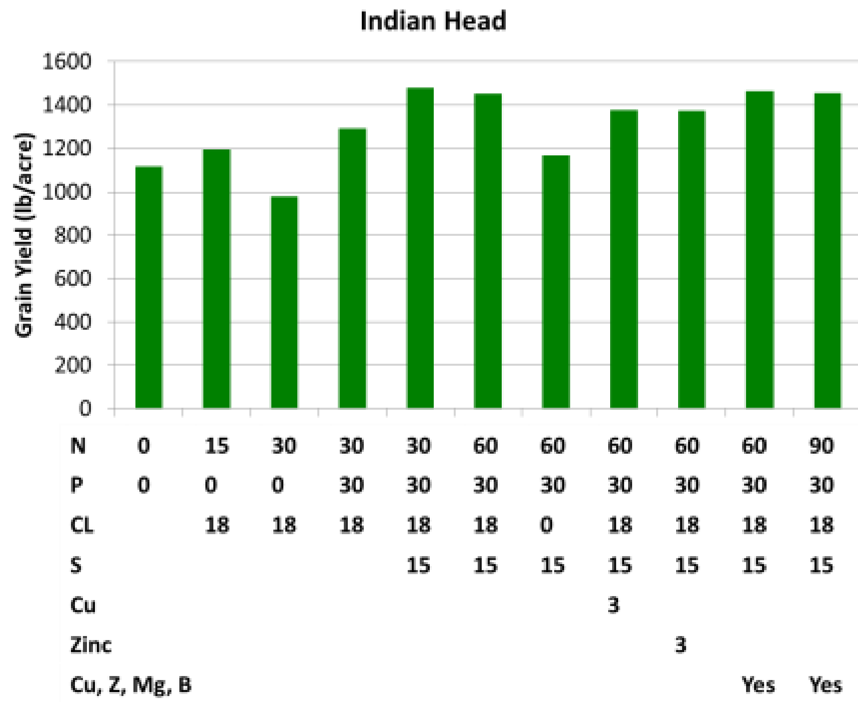


Figure 2. The grain yield response at Swift Current in 2014.

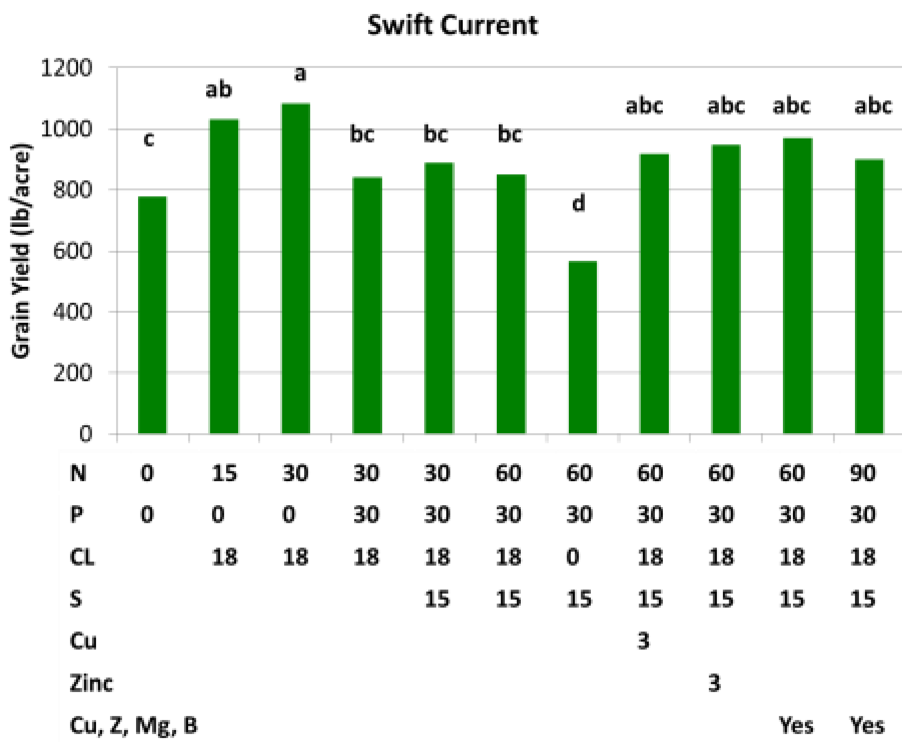
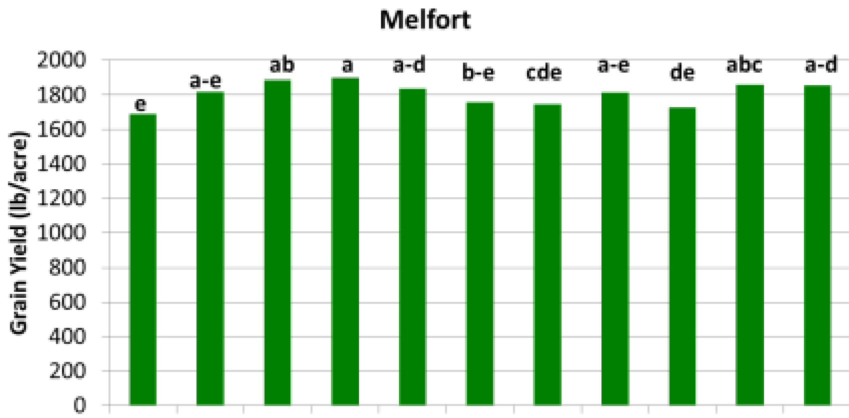
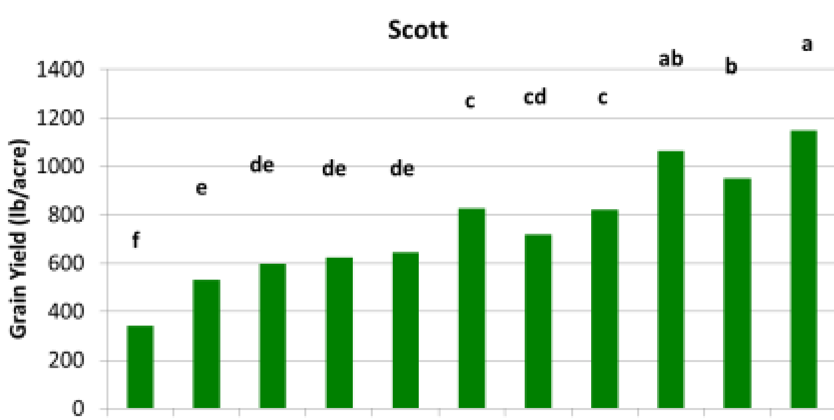


Figure 3. The grain yield response at Melfort in 2014



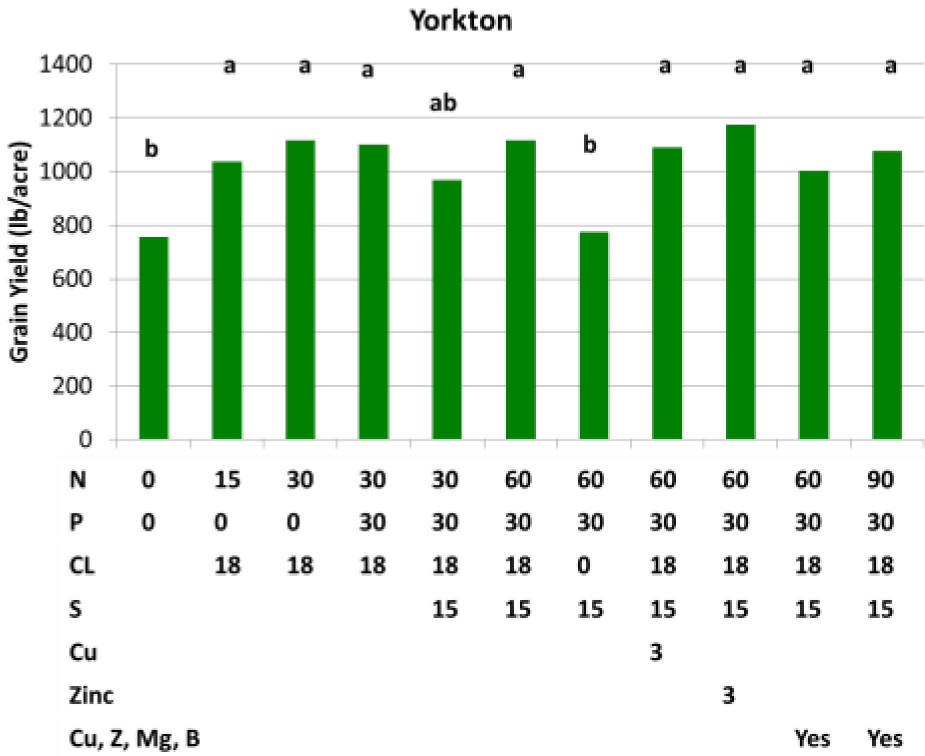
N	0	15	30	30	30	60	60	60	60	60	90
P	0	0	0	30	30	30	30	30	30	30	30
CL		18	18	18	18	18	0	18	18	18	18
S					15	15	15	15	15	15	15
Cu								3			
Zinc									3		
Cu, Z, Mg, B										Yes	Yes

Figure 4. The grain yield response at Scott in 2014



N	0	15	30	30	30	60	60	60	60	60	90
P	0	0	0	30	30	30	30	30	30	30	30
CL		18	18	18	18	18	0	18	18	18	18
S					15	15	15	15	15	15	15
Cu								3			
Zinc									3		
Cu, Z, Mg, B										Yes	Yes

Figure 5. The grain yield response at Yorkton in 2014



Conclusion

- N Fertilizer: response at all 6 locations
  - Optimum amount ranged from 15 to 90 kg/ha
- Chloride: response at 3 of 6 locations
- Test weight appears to be affected by a lack of Chloride
- Zinc: response at 1 out of 6 locations
- Still need to incorporate soil test results

Acknowledgements

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Soybean seeding date by variety: The influence of soil temperature at seeding on varietal performance

M. Hall[1], C. Durand[2]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Northstar Genetics, Carman, MB

Description

There is a phenomenon where soybeans varieties appear to differ in their sensitivity to cool conditions. Varieties with similar maturities in southern Manitoba may differ greatly in maturity when grown in more northerly climes even when sensitivity to photoperiod is not a factor. The exact nature of the sensitivity to cool conditions is unknown. Is it the result of sensitivity to cool soils at seeding or cool conditions experienced at other times of the year? Green house studies were conducted by Agriculture Canada over the winter of 2014-2015 to try and address this question. Unfortunately, the results of those investigations were inconclusive.

The original objective of this study was to investigate the impact of seeding into 5^{o} versus 10^{o}C soil temperatures on the relative maturity and yield of varieties listed in Table 1.

Table 1. Soybean varieties and their distributing Company

Variety	Company
NSC Moosomin RR2Y	Northstar Genetics
TH33003	Thunder Seeds
NSC Tilston RR2Y	Northstar Genetics
NSC Vito	Northstar Genetics
Pekko	Brett-Young
NSC Reston RR2Y	Northstar Genetics
DK 23-10	Dekalb
NSC Anola	Northstar Genetics
P001T34R	Pioneer Hi-bred

Unfortunately, due to field conditions it was not possible to get into the field early enough to meet our soil temperature objectives. The trial was seeded on May 22nd into 9^{o}C soil and then again on June 3rd into 14^{o}C soil. It should also be noted that it had been cool prior to seeding but it was 27 ^{o}C on the day of seeding (May 22) and the next couple of days after were quite warm reaching highs into the 30's. While we did not meet targeted soil temperatures the results are of interest nonetheless. Strong differences in the relative performance between varieties were observed between seeding dates.

The trial was setup as a two factor split plot. The main plot factor was seeding date and the subplot factor was variety.

<u>Results</u>

Crop emergence was good for all varieties seeded early and late and did not significantly differ between seeding dates. Emergence (averaged over seeding date) varied from 3.5 to 4 plants/ft^2 for all varieties excepting Anola (5 plants/ft^2) and P001T34R (4.5 plants/ft^2). The target population for all varieties was 3.67 plants/ft^2.
All varieties were nipped by frost on September 12th. A heavy killing frost was received on October 4th. Most of the varieties reached physiological maturity before the frost when seeded early however, most did not when seeded late. The exception was P001T34R which was very early maturing Table 2.

Table 2. Date of reaching 95% brown pod

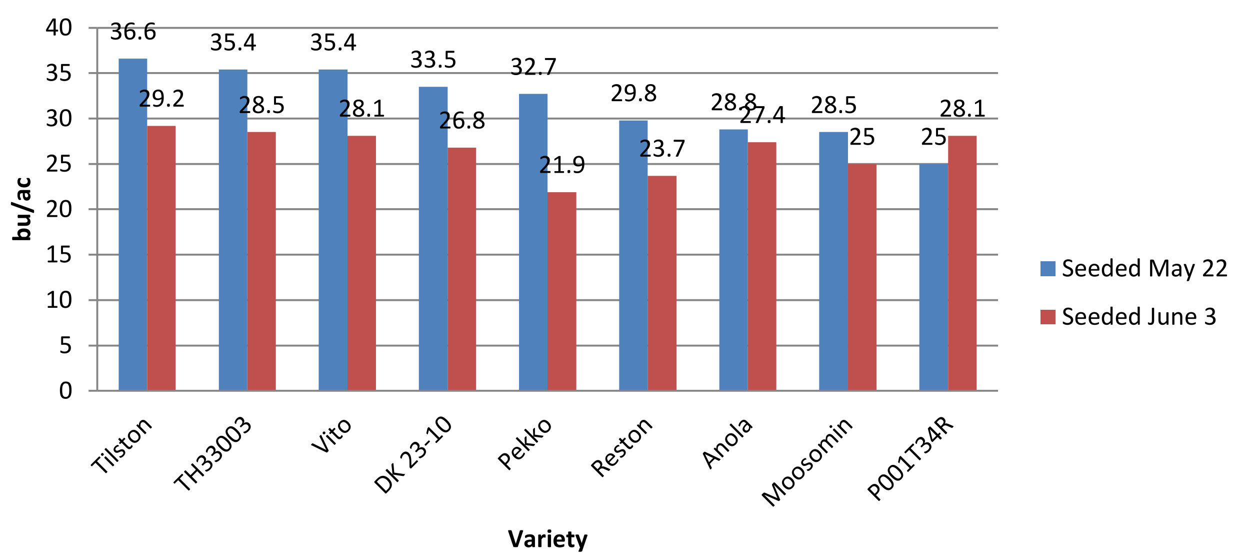
Variety	Seeded early (May 22)	Seeded late (June 3)
NSC Moosomin RR2Y	Sept 26	Killed by frost
TH33003	Sept 30	Killed by frost
NSC Tilston RR2Y	Sept 26	Killed by frost
NSC Vito	Oct 6	Killed by frost
Pekko	Sept 30	Killed by frost
NSC Reston RR2Y	Oct 6	Killed by frost
DK 23-10	Sept 26	Killed by frost
NSC Anola	Oct 6	Killed by frost
P001T34R	Sept 23	Sept 30

Most varieties would not have made the grade when seeded late in 2014. Three varieties representing early, mid and late maturities where sent away for grading. All 3 varieties graded #2 when seeded early (May 22), which is the top grade for GMO soybeans. However, only the early maturing variety P001T34R managed to grade #2 when seeded late (June 3). The mid-season variety NSC Tilston and the late season variety NSC Anola graded #3 due to green seed, but only just. The elevator manager stated that these two seed lots would probably have been accepted as #2 if there was lots of #2 soybeans available for blending. Green seed in Soybeans is not as big an issue as it is for canola. Figure 1 gives you an indication of the outward appearance of the soybeans. Even when seeded early, the later varieties (NSC Tilston and NSC Anola) appeared greener than the early maturing variety P001T34R but they were not green enough to be downgraded.

Figure 1. Seed samples from early (P001T34R), mid (NSC Tilston) and late (NSC Anola) season varieties seeded early (May 22) and late (June 3)

The yields of most varieties were significantly and often substantially reduced when seeded late (June 3) versus early (May 22) (Figure 2). A large part of the yield loss can be attributed to not reaching physiological maturity before the killing frost Oct 4. At harvest many of the top pods were flat with undeveloped seed and just passed through the combine. The exception to this was P001T34R which was the earliest maturing variety and actually managed to produce higher yields with the later seeding date. At the late seeding date, yields between varieties did not differ substantially but a few significant differences between varieties could be detected. At the earlier seeding date there were a greater number of significant differences between varieties. Tilston, TH33003 and Vito were among the top of the pack. This is the second year in a row that Tilston has come in top position at our location. It should be noted that while Moosomin and P001T34R are the shortest season varieties they are also short statured varieties and in our trial produced the lowest yields when seeded early.

Figure 2. Influence of seeding date on soybean yield. Lsd=4.16 (within a seeding date) Lsd= 4.77 between seeding dates)



Conclusions

There is still risk to seeding soybeans in our area. The optimum time to seed soybeans is likely narrower that it is for other crops. Soybeans should not be seeded early into 5 degree soil, but waiting until early June may also increase the risk of frost damage in fall. Assessing the impact of seeding into 5°C soil on varietal development was not achieved in this study. However, it was quite clear that seeding early (May 22) versus late (June 3) was highly advantageous in 2014. With the exception of the very early maturing variety P001T34R, seeding early provided the greatest yield and grade. At the early seeding date NSC Tilston, TH33003 and NSC Vito were at the top of the pack. NSC Tilston and TH33003 are also attractive because they are relatively short seasoned. Moosomin and P001t34R are even shorter seasoned and least likely to be damaged by fall frost however, they also have a short stature and are low yielding making them less desirable.

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement and Northstar Genetics.

Forage Rejuvenation trial

M. Hall[1], C. Ward[2]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Saskatchewan Agriculture and Food, Yorkton, Sk

Description

As forage stands age they become less productive and the legume component of the mixed stand decreases. Terminating and reestablishing a forage stand can be time consuming, expensive and may require a year of missed production. A strategy to rejuvenate depends on the condition of the stand. If the population of desirable species is high enough, the stand may only require added fertilizer to become more productive. In some cases the producer may only wish to re-establish the legume component of the stand. Alfalfa cannot be reseeded into a stand with even a relatively low presence of mature alfalfa due to autotoxicity. However, Cicer Milk Vetch can be established because it is not affected by any allelopathy from alfalfa. Cicer Milk Vetch is a non-bloating legume which means the forage stand could also be used for pasture if desired. Cicer Milk Vetch may take longer to establish than other non-bloat legumes such as birdsfoot trefoil or Sainfoin but it is more persistent.

The general recommendation is to suppress the existing vegetation before trying to re-establish a new forage species. The challenge occurs when there is still a large proportion of desirable species present, such as smooth bromegrass that needs to be maintained.

The objective of this project is to demonstrate different stategies to rejuvenate an old alfalfa brome stand. These strategies include rejuvenation with fertilizer and different methods of introducing cicer milkvetch to the stand.

The trial was setup as an RCBD with 4 replicates on an alfalfa/brome stand. The treatment list was as follows:

1) Check
2) Sod-seed cicer milk-vetch early spring, no suppression
3) sod-seed cicer milk-vetch early spring, sod-suppression with glyphosate
4) sod-seed cicer milk-vetch in mid summer after first cut of forage crop
5) fertilize existing stand with 50 lbs/ac N
6) fertilize existing stand with 50-15-10-10 lbs/ac of NPKS

Dates of Operations are found in table 1.

Table 1. Dates of Operations

Operation	Date
Fertilizer applied to treatments 5 and 6	May 16, 2014
Roundup transorb (165 ml/ac) on trt 3	May 17, 2014
Seeded Cicer Milk Vetch into trt 2 and 3. Packing not ideal but moisture good	May 21, 2014
Roundup transorb (495 ml/ac) on trt 3 (Respray because no impact from 1st spray)	May 27, 2014
Harvested alfalfa brome from trial. Cicer Milk Vetch too small to be in harvest material	July 9, 2014
Seeded Cicer Milk Vetch into treatment 4	July 9, 2014
Cicer Milk Vetch emergence counts	August 12, 2014

<u>Results</u>

On May 21, Cicer Milk Vetch was seeded directly into sod (trt 2) and into sod which was suppressed by 165 ml/ac of Roundup transorb (trt 3) (Figure 1). The seeding was done with a seed hawk drill which was not ideal. The packing wheels were too broad to properly pack the narrow opening within sod. However, the Cicer Milk Vetch still emerged quite well as the soil moisture was excellent.

Figure 1. Treatment 3 on the day of seeding (May 21)

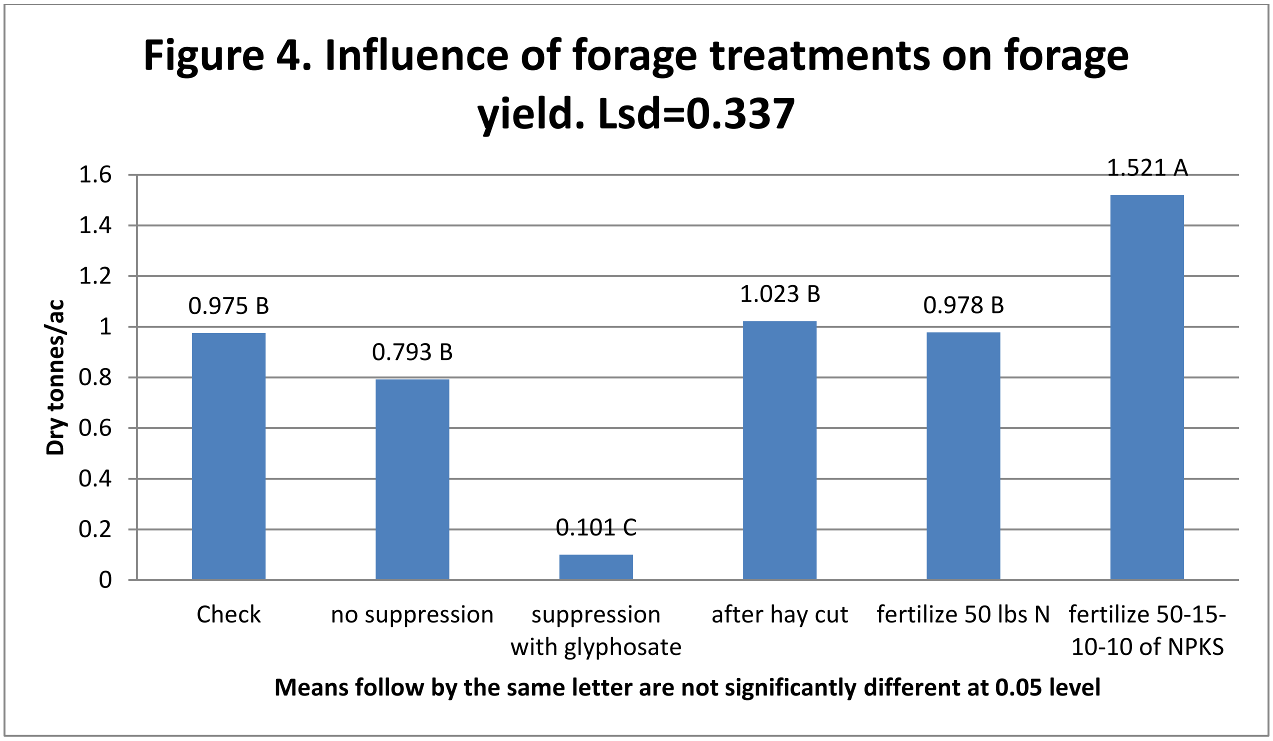
The application of 165 ml/ac of Roundup transorb on May 17 did not provide any suppression of the bromegrass. So on May 27, Roundup transorb was reapplied to plots at 495 ml/ac before the emergence of the Cicer Milk Vetch. This time the Roundup transorb greatly suppressed the bromegrass (Figure 2).

Figure 2. Treatments 2 and 3 June 9 (19 days after seeding)

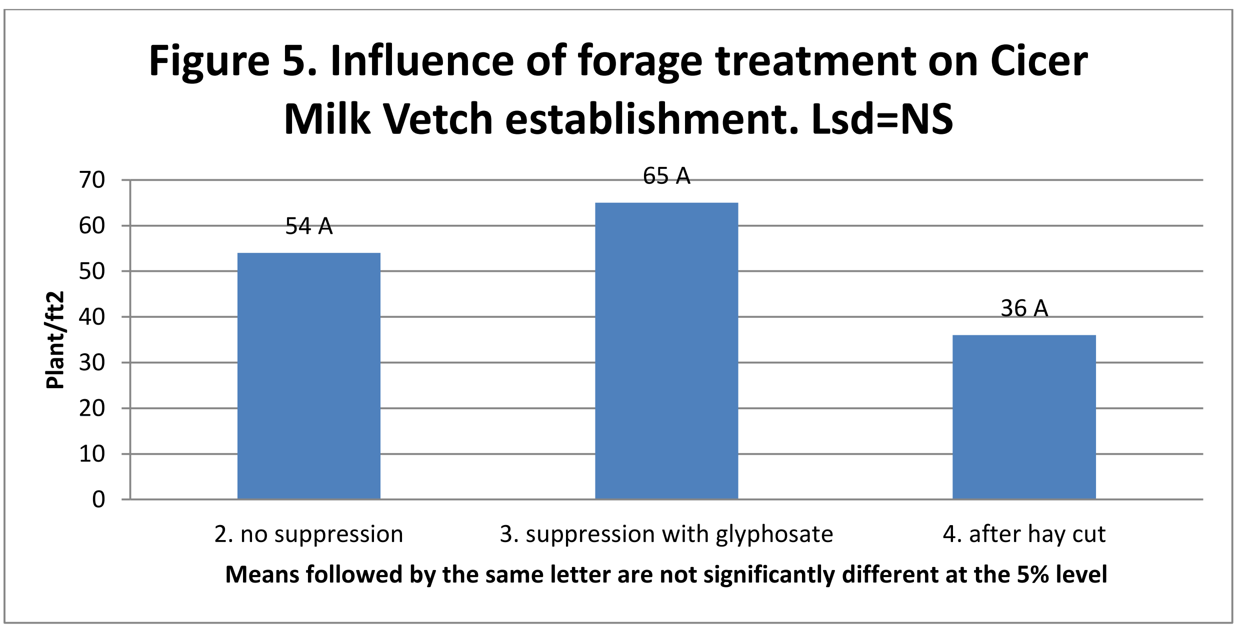
On July 9, forage was harvested off the plots (Figure 3.). None of the Cicer Milk Vetch was affected by this harvest as seedlings were well below the cutting height.

Figure 3. Forage treatment just prior to cutting for hay on July 9, 2014

Forage yields were greatly suppressed by the application of glyphosate (Figure 3 and 4). The application of glyphosate suppressed forage yield more than what was intended. Essentially a year of forage harvest was lost. The application of NPKS significantly increased forage yields by about 50% (Figure 4). This would be expected as soil test levels of nitrogen (N), Phosphorous (P) and Sulphur (S) were very low. However, forage yields were not increased by the application of Nitrogen alone despite very low levels in the soil. This demonstrates the need for a balanced approach to fertility. After the hay cut, Cicer Milk Vetch was seeded into treatment 4.



The establishment of Cicer Milk Vetch was assessed on Sept 23, 2014. Plant counts were good for all treatments but somewhat variable. Thus no significant differences were observed between treatments despite some large numerical differences (Figure 5).



The size of the Cicer Milk Vetch plants differed hugely between treatments. Plants were large and well developed in treatment 3 where the forage was suppressed by glyphosate (Figure 6).

Not surprising as the suppression of the forage stand was quite substantial. Plants which were directly seeded into the stand without suppression (trt 2) were quite small even though they were also seeded at the same time as trt 3 in early spring. Plants established after the hay cut were also small.

Figure 6. Establishment of Cicer Milk Vetch by Sept 23, 2014

<u>Conclusions</u>

This is the first year of a two year project so final conclusions on the establishment of Cicer Milk Vetch are not yet available. However, the following conclusions can be made presently:

- Application of NPKS increased forage yields by 50%
- Application of nitrogen alone did not increase forage yields despite low soil test N. This demonstrates the importance of a balanced approach to fertility.
- Application of glyphosate greatly reduced the forage stand and resulted in the greatest establishment of Cicer Milk Vetch.
- The application of glyphosate essentially eliminated a year of forage production. Getting the exact level of suppression is a combination of glyphosate rate and timing. Getting the desired level of forage suppression is very difficult.

Acknowledgements

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Evaluating Different Methods of Forage Termination

M. Hall[1], C. Ward[2]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Saskatchewan Agriculture and Food, Yorkton, Sk

Description

Producers often miss the opportunity to terminate a forage stand more effectively by applying glyphosate either preharvest to the forage crop or in the fall. Forages taken out in spring are often done with varying degrees of success. Whether to seed canola or wheat into the spring terminated stand is debated. RR canola has the advantage over wheat because forage grass volunteers can be controlled in crop with glyphosate. There are no effective in crop herbicides to control forage grasses in wheat. However, wheat may still be seeded because it is better able to emerge than canola under poor seed bed conditions. This study will compare the ease of establishing wheat and canola crops into an alfalfa/brome stand which is terminated in the spring versus the year prior using glyphosate. The need for working the soil in spring will also be assessed. A seed hawk drill will be used for this trial which represents equipment farmers have available for seeding.

To achieve these objectives two trials were setup as RCBDs with 4 replications. Plot size is 45 by 50 ft. In the spring of 2015, one trial will be established to wheat and the other to rr canola. The following treatments will be applied to terminate an alfalfa/brome stand prior to seeding either crop:

1. Preharvest Glyphosate (1 L/ac old formulation equivalent) a week before haying (2014); Direct seed crop early spring 2015
2. Spring (2015) glyphosate application at 2L/ac rate +2,4-D* on 8 inches forage regrowth; Direct seed Crop
3. Spring (2015) glyphosate application at 1L/ac rate +2,4-D* on 8 inches forage regrowth; work the soil ; Seed Crop#
4. Spring (2015) glyphosate application at 2L/ac rate +2,4-D* on 8 inches forage regrowth; work the soil ; Seed Crop

*2,4-D will not be sprayed in the spring prior to seeding canola

[#] The treatment has been changed from the original intent. The intended treatment was a fall application of glyphosate + 2,4-D on regrowth. However, this was not practical as the farmer was unable to harvest the forage until Sept 14. Regrowth was inadequate to spray.

Results

This is a two year project so results will not be available until next year. The preharvest treatment (trt 1) was applied and stand appeared quite dead in the year of application (Figure 1). The intent was to harvest the forage a week after application but the farmer was not able to harvest the field for over month after application.

Figure 1. Preharvest glyphosate (0.67 l/ac Roundup transorb) applied August 8. Photo taken on August 19.

Conclusions

Conclusions cannot be made until next year.

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement.

Perennial Forage Species and Varieties Demonstration

M. Hall[1], P. Jefferson[2]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Western Beef Development Center, Humboldt, SK

<u>Description</u>

This forage demonstration was setup in conjunction with the Crops of the Parkland demonstration located beside the tourism building in Yorkton (Figure 1.). Its objective was to show currently available perennial forage species to beef producers to help inform their decisions about species and variety selection for seeding new pastures and hay stands. It was a place where producers could physically see the different species available. This was not a research project and no data was taken. A complete list of species seeded can be found in table 1.

Figure 1. Various forage legume and grass species.

Table 1. Forage legume and grass species seeded.

Grasses	variety	Legumes:		variety
Creeping Foxtail	Garrison	Alfalfa		AC Dalton
Meadow Foxtail	Common #1	Alfalfa		Stealth
Reed Canarygrass	Venture	Alfalfa		Equinox
Hybrid brome	AC Success	Alfalfa		AC Yellowhead
Hybrid brome	AC Knowles	Alfalfa		HB2410
Hybrid brome	Bigfoot	Alfalfa		Spredor 4
Smooth brome	Carlton	Alfalfa		Halo
Smooth brome	AC Rocket	Alfalfa		Multifoliate
Meadow Brome	MBA	Alfalfa		Rugged
Orchardgrass	AC Kootenay	Alfalfa		4010 BR
Orchardgrass	AC Killarney	Red Clover	DC	Wildcat
Crested Wheatgrass	Kirk	Red Clover	DC	Belle
Crested Wheatgrass	AC Goliath	Red Clover	SC	AltaSwede
Crested Wheatgrass	Fairway	White Dutch Clover		Common #1
Green Needlegrass	Common #1	Alsike		Common #1
Slender Wheatgrass	Common #1	Cicer Milkvetch		AC Veldt
Intermediate Wheatgrass	Chief	Cicer Milkvetch		Oxley II
Pubescent Wheatgrass	GreenLeaf	Birdsfoot Trefoil		Leo
Western Wheatgrass	Common #1	Sainfoin		Common #1
Northern Wheatgrass	Common #1			
Sheep Fescue	Common #1			
Tall Fescue	Courtenay			
Russian wildrye	Swift			
Dahurian wildrye	Common #1			
Altai wildrye	Common #1			
Timothy	AC Pratt			

Acknowledgements

This project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward bi-lateral agreement

Crops of the Parkland

M. Hall[1], G. Machnee[2]

[1]East Central Research Foundation/Parkland College, Yorkton, SK
[2]Parkland College, Yorkton, SK

<u>Description</u>

Multiple small plots were seeded on a small parcel of land located beside the Yorkton tourism building. These plots were available for tourists and local people with an interest in agriculture. The site was also used for training agricultural students with Parkland College and industry people. The main objectives of the demonstration were:

- To demonstrate various agronomic practices a producer must employ to successfully raise canola and wheat crops.
- To showcase the variety of different crops grown in the Parkland and their importance to the local economy.

Every plot was signed and detailed information was available. The demonstration was targeted to the general population so concepts demonstrated where not highly technical. The importance of weed control (Figure 1), seeding depth (Figure 2) and fertilizer placement (Figure 3) were among the numerous concepts demonstrated.

Figure 1. Impact of weed control on crop development.

Figure 2. Impact of seeding depth on canola emergence. 0.5 inches deep (left); 3 inches deep (right)

Figure 3. Impact of fertilizer placement on seed safety. Eighty lbs/ac of Actual N placed with the seed (right) versus banded (left).

Numerous crops grown in Saskatchewan were also available for display (Figure 4.)

Figure 4. Examples of crop species on display.