2013 PCDF ANNUAL REPORT

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Cereals

Advanced Two-Row Hulless Barley for Food Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Ana Badea[2]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Ana Badea- Barley Breeder, AAFC Brandon
Rudy Von Hertzberg- Research Technician, AAFC Brandon

Background

Two-row hulless food barley: This effort, led by Dr. Therrien, has produced the first Canadian milling barley, Millhouse which was officially released in the spring of 2006. Millhouse can be combined with wheat flour to produce noodles and breadstuffs without altering the flavour and texture of the finished product, while enhancing healthful ingredients including dietary fibre and anti-oxidants. The current effort seeks to improve on Millhouse's agronomic performance while maintaining quality. A new food quality evaluation lab has been developed to support this effort. (Therrien n.d.) So far this effort has contributed to the development of a new milling barley cultivar, Roseland. Roseland was registered in 2011 with the intent to replace Millhouse.

Hulless barley has many positive characteristics for feed, food and malt uses. Yet according to the Canadian Wheat Board's 2011-12 Variety Survey, hulless barley is estimated to account for less than one percent of the barley grown in Western Canada. Nevertheless breeders, food scientists, industry development specialists and others continue to work on many fronts to help realize hulless barley's full potential.

Hulless barley is not truly hulless, but the hull is much more loosely held onto the seed than in hulled barley, and the hulls are removed during combining. The absence of hulls means the grain has more nutrients and higher energy per unit weight than hulled barley and it requires less space to store and transport. The absence of hulls also means the seed is more easily damaged during handling; yields may sometimes be lower because the hulls are left in the field and in some cases food and beverage processing is different than for hulled.

The efforts of some small food companies on the Prairies could help spark greater interest in hulless barley. Nyachiro says, "There are some things happening in the niche markets, with companies embracing the use of hulless barley. Right off the top of my head are: Hamilton's Barley Flour, which has done a great job of making barley flour available to grocery stores and Progressive Foods Inc., which has made great progress in inventing quick-cooking barley and promoting the use of barley as a healthy food." (King 2012)

[1] PCDF, Roblin
[2] AAFC, Brandon

Objective

To test two-row hulless barley varieties for human consumption.

Design, Materials & Operation

Treatments:	12 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 4
Product handling:	Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. At the 2-4 leaf stage, the trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 1 kilogram composite sample was then sent to AAFC-Brandon for further quality analysis.

Table 1. 2013 Advanced Two-Row Hulless Barley for Food Trial Varieties at Roblin, MB*

Roseland	H273-38
CDC McGwire	H275-26
CDC Rattan	H277-7
H272-28	H280-10
H273-14	H280-26
H273-36	H280-35

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

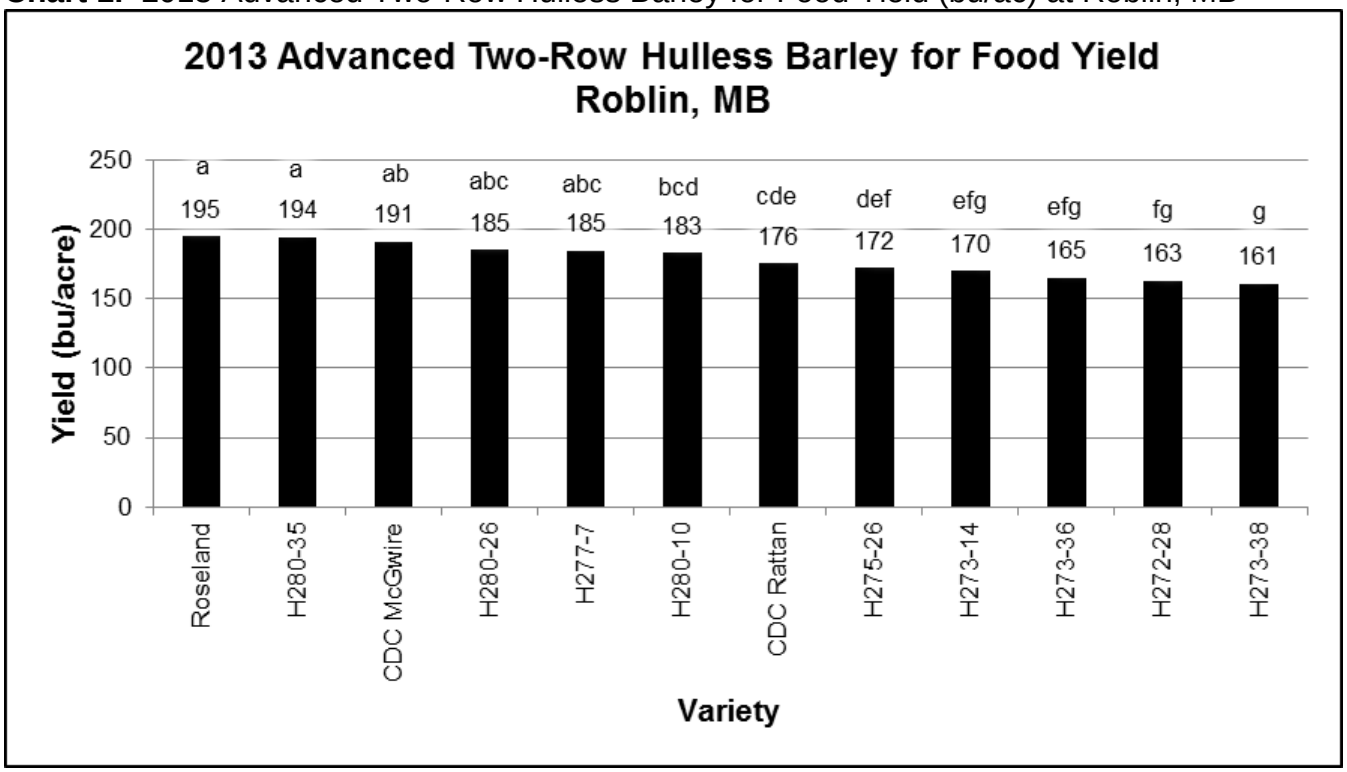
Results

Table 3. 2013 Advanced Two-Row Hulless Barley for Food Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Plants per m²*	Days to Heading	Days to Maturity	Height (cm)	Disease (1-9)*	Lodging (1-9)*
Roseland	10,486	273	59	100	110	5	5
H280-35	10,477	303	56	97	108	5	2
CDC McGwire	10,307	313	58	100	111	5	8
H280-26	9988	267	60	100	118	5	6
H277-7	9952	343	57	96	109	6	5
H280-10	9854	277	56	98	118	7	6
CDC Rattan	9461	300	59	98	105	6	4
H275-26	9287	317	59	98	112	7	6
H273-14	9148	310	58	99	113	7	7
H273-36	8908	303	59	99	116	7	7
H272-28	8776	290	61	100	116	7	8
H273-38	8670	330	59	100	114	7	7
Grand Mean	9610	302	58	99	113	6	6
CV%	3.6	17.3	1.0	0.9	3.5	8.4	19.8
LSD	577.7	88.7	1.0	1.5	6.7	0.9	2.0
Sign Diff	Yes	No	Yes	Yes	Yes	Yes	Yes

* Plants per m^2 = Plants per Meter Squared
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat

Chart 1. 2013 Advanced Two-Row Hulless Barley for Food Yield (bu/ac) at Roblin, MB



In regards to the data, the line H280-35 has the best all round agronomic package. It is similar in yield to Roseland and CDC McGwire and significantly higher yielding than CDC Rattan. H280-35 has excellent standability, shorter in height and significantly earlier than Roseland and CDC McGwire.

Important Considerations and Recommendations

In February 2009, Health Canada's Food Directorate received a submission requesting approval for the use of a therapeutic claim linking barley beta-glucan to blood cholesterol lowering. Studies were done to measure the total cholesterol and low-density lipoprotein cholesterol (LDL-cholesterol). Data collected showed that consuming at least 3 grams of beta-glucan per day helps reduce cholesterol. Beta-glucan is a type of soluble fibre found in barley. (Health Canada 2012)

Some barley products include dehulled or hulless barley, pasta, tortilla chips, bran, pearl barley, even pizza dough. Barley is packed with vitamins and minerals; it is also a source of antioxidants which are important for maintaining good health. (Dummer 2012)

Researchers hope that with the approval from Health Canada, farmers will have the incentive to grow more food-grade barley and will expand marketing options to sell their crop. Presently about three percent of Canadian-grown barley is consumed as food, with the majority going to the feed and malt sectors. (Stevenson 2012)

Conclusions

The two-row hulless barley production destined for the food market is a very specialized and niche market. Production and demand in this market is still in the infancy stage. Strides are being made in terms of breeding high performing varieties and acceptance in the food industry with Health Canada's approval for the health claims associated with the consumption of barley. More effort and time is required in educating producers about the new food market, transitioning of barley into the ingredient list of large food company's products and expanding the consumer demand. PCDF's role will continue in supporting Dr. Ana Badea with varietal development and educating producers.

References

Dummer, Jane. "Barley for Health." *Agri-Food for Healthy Living.* November 7, 2012. http://aha.the-ria.ca/pdf/HPD2012-PDFs/HPD2012%20-%20Jane%20Dummer.pdf (accessed November 26, 2013).

Health Canada. "Summary of Health Canada's Assessment of a Health Claim about Barley Products and Blood Cholesterol Lowering." *Health Canada.* July 2012. http://www.hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/barley-orge-eng.php (accessed November 21, 2013).

King, Carolyn. "Hulless barley: challenges and prospects." *Top Crop Manager*, February 2012.

Stevenson, Lorraine. "Health Canada gives barley permission to boast about its health benefits." *Manitoba Co-Operator.* August 10, 2012. http://www.manitobacooperator.ca/2012/08/10/health-canada-gives-barley-permission-to-boast-about-its-health-benefits%E2%80%A9/ (accessed November 26, 2013).

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Advanced Six-Row Malt Barley Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Ana Badea[2]

Site Information

Location:	Roblin, Manitoba
Cooperator:	Dr. Ana Badea- Barley Breeder, AAFC Brandon
	Rudy Von Hertzberg- Research Technician, AAFC Brandon

Background

This trial is designed to identify new six-row malting barley varieties.

The barley breeding effort at AAFC Brandon is aiming to develop new varieties of six-row malting barley well-suited to western Canada with improved disease resistance and agronomic performance combined with enhanced quality traits to expand market opportunities at home and abroad.

Three registered varieties, Tradition, CDC Mayfair and Celebration were grown at Roblin this year, as well as 6 numbered breeding lines under evaluation for possible registration.

Objective

To test malt barley varieties from the barley breeding program at AAFC Brandon.

Design, Materials & Operation

Treatments:	9 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S
	15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 4
Product handling:	Each individual plot harvest with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. At the 2-4 leaf stage, the trial was sprayed with Axial and Barricade to control

[1] PCDF, Roblin
[2] AAFC, Brandon

broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 1 kilogram composite sample was then sent to AAFC-Brandon for further quality analysis.

Table 1. 2013 Advanced Six-Row Malt Barley Trial Varieties at Roblin, MB*

Celebration	A498-7	A502-8
CDC Mayfair	A500-11	A503-4
Tradition	A500-36	A503-10

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

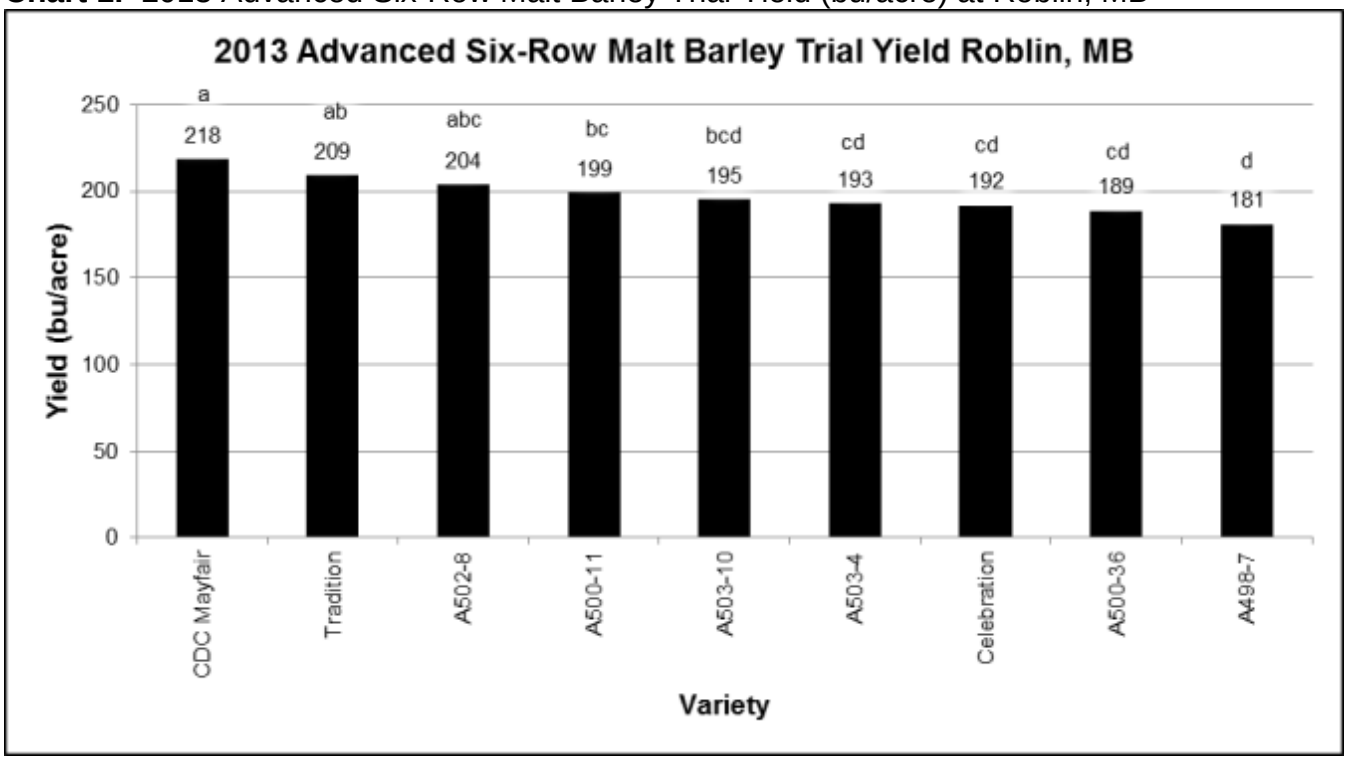
Results

Table 3. 2013 Advanced Six-Row Malt Barley Trial Results at Roblin, MB

Variety	**Yield (kg/ha)**	**Plants per Meter^2**	**DTH***	**DTM***	**Height (cm)**	**Disease (1-9)***	**Lodging (1-9)***
CDC Mayfair	11,775	300	53	96	111	6	7
Tradition	11,275	350	53	95	112	5	4
A502-8	10,973	343	51	97	109	6	6
A500-11	10,735	337	53	94	113	6	1
A503-10	10,528	303	53	95	106	6	8
A503-4	10,401	353	53	98	107	6	6
Celebration	10,338	370	54	94	107	5	7
A500-36	10,168	390	54	95	111	5	5
A498-7	9755	340	52	97	105	6	5
Grand Mean	10,661	343	53	96	109	6	6
CV%	4.81	15.25	1.95	1.54	3.21	15.97	14.53
LSD	892.93	90.51	1.79	2.55	6.07	1.57	1.38
Sign Diff	Yes	No	Yes	Yes	Yes	No	Yes

* DTH = Days to Heading
* DTM = Days to Maturity
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat

Chart 1. 2013 Advanced Six-Row Malt Barley Trial Yield (bu/acre) at Roblin, MB



One of the entries, A502-8, had similar grain yield to two of the checks, Tradition and CDC Mayfair, and higher than Celebration. This line looks to be the most promising based on yield, but malting quality is unknown at the moment.

Important Considerations and Recommendations

Malt is the main ingredient for brewing beer. Various specialty malts with particular color or flavor intensities can be produced by selecting specific barley types and altering the processing conditions. Manitoba has one major maltster, Dominion Malting Ltd., and the malt is either used by provincial breweries or exported. The majority of Manitoba's exported malting barley is in an unprocessed form. Only a small amount of barley malt and malt extract are exported. About three-quarters of the malting barley destined for alcohol is brewed in Canada. The other quarter is exported to international brewers in China, United States, South Africa, Colombia, Japan and Mexico.

Manitoba has a long history of producing beer in the province. A book was released this summer called "300 Years of Beer: An Illustrated History of Brewing in Manitoba", authors Bill Wright and Dave Craig. The popularity in brewing continues in the province with micro-breweries such as Half Pints Brewery and Farmery Estate Brewery establishing in Winnipeg. Fort Garry Brewery (Winnipeg) has history dating back to the 1930s. (Lunney 2013)

Canada's international and domestic malting barley markets are dominated by two-row varieties because of their good characteristics for malting and brewing. However, some companies prefer the six-row types for their brewing methods. The six-row markets are

predominantly in the United States and European Union. Cost is a factor when determining which type of barley to use and six-row generally cost less. Manitoba is well positioned for exporting six-row malting varieties to the United States because it is centrally located with the least freight costs. Anheuser-Busch for Budweiser is one of the big players and it has malt plants in North Dakota and Wisconsin. (King 2010)

The challenges for Manitoba barley producers are most of them grow two-row varieties and the infestation of the disease fusarium head blight deteriorating quality of the grain. The new six-row varieties may be improvements for western Manitoba growers and provide them with a consistent market for the malt barley. (King 2010)

Recently the federal government negotiated the final terms of the free trade agreement with the EU. Currently there are EU tariffs of up to $120 per tonne of barley. With the free trade agreement and the end of the CWB monopoly, the potential for Canadian malt barley growers is huge. This will open the door for processed malt barley products. Manitoba producers will benefit due to their geographic location to the eastern seaboard. (Western Producer 2013)

Conclusions

The Manitoba Parkland has the potential to successfully produce commercial six-row malting barley. Development of six-row malting barley varieties with enhanced quality traits will contribute to the expansion of market opportunities at home and abroad, increasing profitability of farmers and malting and brewing sectors. The EU free trade agreement will expand market access and producer profitability. PCDF will continue to play an important role with the varietal evaluation for Dr. Ana Badea's breeding lines.

References

King, Carolyn. "Growing a market thirst for new Canadian six-row malting barleys." *Top Crop Manager*, October 2010.

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Western Producer. *Western Producer*, November 20, 2013.

Advanced Forage Barley Grain Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Ana Badea[2]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Ana Badea- Barley Breeder, AAFC Brandon
Rudy Von Hertzberg- Research Technician, AAFC Brandon

Background

One of the most cost-effective ways for cattle producers to feed their livestock is to include forage barley in their feeding regimes. Forage barley is a low-cost, easy to grow, high yielding crop that is well-adapted to all barley growing areas of the world. Forage barley is especially well-adapted to the Parkland region and is versatile, where it can be field-grazed before it heads, swath-grazed in the late summer and early fall, or put up as greenfeed, chopped or ensiled for over-winter use. Feed conversion of the newest forage barley varieties is often high enough to be considered as a mainstay in dairy rations.

New forage barley varieties are being developed that demonstrate a very high yield potential with moderate inputs while maintaining a Relative Feed Value in excess of 100. This is a more effective source of cattle feed than other sources of grain or silage corn. Other grains and silage corn are more expensive to grow and they are higher risk in the short seasoned Parkland region.

AC Ranger, Vivar (two registered varieties) and FB015 (control for waxy type) were grown at Roblin this year, as well as 11 numbered breeding lines under evaluation for possible registration.

Objective

To test the top barley forage varieties from the barley breeding program at AAFC Brandon.

[1] PCDF, Roblin
[2] AAFC, Brandon

Design, Materials & Operation

Treatments:	14 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 4
Product handling:	Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. At the 2-4 leaf stage, the trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 1 kilogram composite sample was then sent to AAFC-Brandon for further quality analysis.

Table 1. 2013 Advanced Forage Barley Grain Trial Varieties at Roblin, MB*

AC Ranger	EX819-4
EX812-26	EX819-10
EX814-2	EX819-33
EX814-3	EX820-8
EX814-5	EX820-19
EX818-3	FB015
EX818-6	Vivar

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

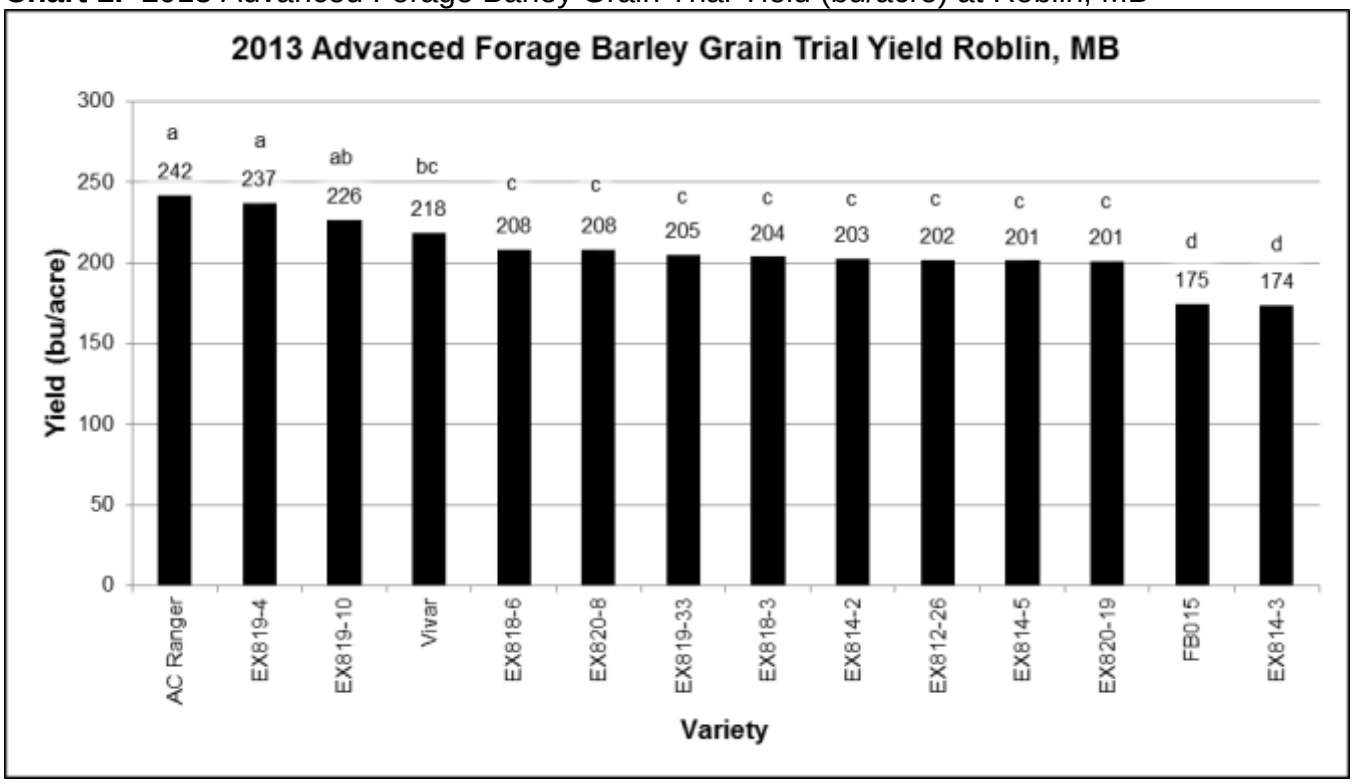
Results

Table 3. 2013 Advanced Forage Barley Grain Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Pl/m^2*	DTH*	DTM*	Lodging (1-9)*	Disease (1-9)*	Height (cm)
AC Ranger	13,023	280	55	99	7	3	107
EX819-4	12,728	283	56	100	8	5	113
EX819-10	12,170	327	56	99	8	3	108
Vivar	11,749	337	55	99	7	3	104
EX818-6	11,192	300	56	97	5	5	116
EX820-8	11,179	367	56	99	7	4	113
EX819-33	11,021	340	53	99	8	5	109
EX818-3	10,954	330	57	100	7	4	119
EX814-2	10,891	310	57	97	7	4	117
EX812-26	10,852	327	57	100	7	5	122
EX814-5	10,827	307	56	97	6	4	121
EX820-19	10,812	313	56	99	7	5	111
FB015	9395	373	53	98	8	6	109
EX814-3	9344	340	56	97	8	5	120
Grand Mean	11,153	324	56	99	7	4	113
CV%	5.10	12.30	1.52	1.64	13.73	16.64	4.42
LSD	954.35	66.87	1.42	2.70	1.65	1.22	8.41
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Pl/m^2 = Plants per Meter Squared
* DTH = Days to Heading
* DTM = Days to Maturity
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat
* Disease (1-9) = 1- No Disease, 9- Dead Preferred

Chart 1. 2013 Advanced Forage Barley Grain Trial Yield (bu/acre) at Roblin, MB



In regards to grain yield, six of the feed/forage breeding lines tested had lower values than both checks AC Ranger and Vivar.

Of particular interest are two feed/forage breeding lines EX819-4 and EX819-10, which had higher grain yield than Vivar.

The three waxy breeding lines tested were EX812-26, EX-818-6 and EX820-19. Two of them, EX812-26 and EX-818-6, showed significant higher grain yield than the waxy check line FB015. However, the grain yield was still lower than the other two checks AC Ranger and Vivar.

Important Considerations and Recommendations

The test in 2013 was comprised of eight feed/forage breeding lines and three waxy breeding lines targeted for early swath-grazing along with the suitable checks AC Ranger, Vivar and FB105. The FB105 waxy line was previously developed by Dr. Mario Therrien at Brandon Research Center (BRC). This line showed promising characteristics for early season swath-grazing due to its heavy cuticular wax layer; however it was not put forward for registration due to inferior grain yield.

Canada is known for its high quality barley due to the strict standards of the Canadian Grain Commission's grain quality control program. This includes varietal control, licensing of elevators, product inspection and weighing, sanitation and quality monitoring programs.

In Japan, roughly 80% of the barley is consumed as feed in the cattle sector. Barley plays an important role in feeding cattle because it produces high quality beef with the white marbling that Japanese consumers favor. Japanese yearly consumption is estimated around 1.6 million tonnes, but demand is expected to decline with the potential reduction in the country's cattle population. (Manitoba Government n.d.)

Recently the federal government negotiated the final terms of the free trade agreement with the EU. Currently there are EU tariffs of up to $120 per tonne of barley. With the free trade agreement and the end of the CWB monopoly the potential for Canadian feed barley growers is huge. The agreement will open the door for raw feed barley products internationally. The significant benefit though will be from increased domestic feed sales. Canadian hog and cattle producers will gain greater access for meat exports. Manitoba producers will benefit due to their geographic location to the eastern seaboard. (Western Producer 2013)

Conclusions

The importance of feed barley should rise once the EU free trade agreement is finalized. Barley has a multitude of applications and offers many options to producers. Breeding efforts are being conducted to improve varieties and it is important that PCDF continues its evaluation process to identify varieties that would be best adapted to this region.

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Western Producer. *Western Producer*, November 13, 2013.

Western Cooperative Six-Row Barley Registration Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Ana Badea[2]

Site Information

Location:	Roblin, Manitoba
Cooperator:	Dr. Ana Badea- Barley Breeder, AAFC Brandon
	Rudy Von Hertzberg- Research Technician, AAFC Brandon

Background

The Western Cooperative Six-Row Barley Registration Test (WCOOP) is a registration trial grown across the Northern Great Plains, which is officially recognized by the Variety Registration Office (VRO) of the Canadian Food Inspection Agency (CFIA). This test provides most of the data required to determine merit in consideration of registration of new six-row malt and feed barley varieties.

Each year the test consists of between 16 to 20 entries, including checks, replicated three times and grown at 20 locations. The Prairie Registration Recommending Committee for Oats and Barley (PRCOB) is a VRO-recognized recommending body of over 80 experts on barley research, development, production and marketing. PRCOB was determined that the eastern Parkland region of Western Canada was under-represented and sought an additional location.

PCDF is in its sixth year of this very important test being grown at Roblin. The 2013 WCOOP trial consists of 4 checks (AC Ranger, Vivar, CDC Mayfair and Celebration) and 12 new entries for a total of 16 entries.

Objective

To evaluate six-row malt barley lines for further registration.

Design, Materials & Operation

Treatments:	16 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S
	15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 4

[1] PCDF, Roblin
[2] AAFC, Brandon

Product handling: Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. At the 2-4 leaf stage, the trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 1 kilogram composite sample was then sent to AAFC-Brandon for further quality analysis.

Table 1. 2013 Western Cooperative Six-Row Barley Registration Trial Varieties at Roblin, MB*

BT596	SR451
BT597	SR452
BT598	SR457
BT599	SR458
BT980	SR459
EX467	SR460
SD516	SR461
SR412	SR462

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

Results

The Prairie Grain Development Committee (PGDC), which oversees the testing and registration recommendations for potential new western Canada crop varieties, does not permit the publication of results from registration trials, in order to protect any proprietary information, as well as prevent any conflicting information prior to officially publishing the outcome of PGDC deliberations on new cultivars.

The official site at Roblin provides crucial data for a large area of the Parkland regions that would otherwise be unavailable. Past tests have shown that six-row malting barley is very well-suited to this region.

Important Considerations and Recommendations

With the recent improvements in six-row malting barley varieties and the EU free trade agreement, Canada is positioning itself to potentially increase its share of the global malting market. In order for this to happen, potential buyers will require a detailed description of the varieties to ensure they have the attributes to meet their malting and brewing requirements.

The Canadian Malting Barley Technical Centre (CMBTC) has a project in place to meet this requirement. It is a three-year project that ends at the closure of 2013. The project will test newly registered six-row malting barley varieties during a multi-year period and prepare a complete data package encompassing malting and brewing characteristics. The data will be used along with data from two-row malting varieties in promotional seminars and training sessions that Canada will be holding around the world.

Malting barley opportunities are expanding globally. China is becoming a big player as its middle class grows and beer consumption becomes popular. The estimated Chinese demand for malting barley is 4.5 million tonnes annually. Vietnam is a new market with significant growth potential. Canada is striving to increase market share in Central and South America. They generally use two-row malt barley but they are interested in conducting brewing trials to see if six-row varieties have applications.

The hope is the project will generate more buyers for Canadian six-row malt barley varieties. This will be beneficial for existing and new producers because malt barley has a market premium over feed barley. Also, the higher yield of the new varieties would give good value for feed production when the production does not meet malt status.

Conclusions

The Western Canada Six-Row Barley trial is important for evaluating and providing data for the registration of new varieties. The new and improved varieties will provide Canada with new marketing opportunities in the malting industry and provide producers with a dual purpose crop that provides value in both malt and feed sectors.

Western Canada Forage Barley Coop Grain Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Pat Juskiw[2]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Patricia Juskiw- Barley Breeder, Lacombe Field Crop Development Center
Susan Lajeunesse- Research Technician, Lacombe Field Crop Development Center

Background

The Western Canada Forage Barley Coop Forage Trial is run under the auspices of the Prairie Recommending Committee for Oat and Barley (PRCOB). More information on PRCOB can be found at http://www.pgdc.ca/committees_ob.html. The purpose of PRCOB is to generate data for oat and barley lines for the purpose of evaluation and recommendation of lines for registration by the Varieties Office of the Canadian Food Inspection Agency (CFIA).

Dr. Pat Juskiw and Susan Lajeunesse of the Field Crop Development Centre (FCDC), Lacombe, AB act as the coordinators for the Forage Barley Coop. In that capacity Pat and Susan coordinate the supply of seed to each of the cooperators. The cooperators run the trials. There were seven forage and six grain sites in 2013.

There were nine entries plus four check varieties: AC Ranger, a six-row, hulled variety from AAFC-Brandon, Vivar, a six-row, hulled, semi-dwarf variety from FCDC, CDC Austenson, a two-row, hulled variety from Crop Development Centre, Saskatoon and Gadsby, a two-row, hulled variety from FCDC. AC Ranger was released by Dr. Therrien from AAFC-Brandon due to its high biomass yields, good standability and forage quality that surpassed that of Virden. Vivar has exceptionally good straw strength and for a semi-dwarf also has high grain and biomass yields. It also has better forage quality than Virden. In 2013, 2 two-row checks were also added to the Forage Coop. They were Gadsby for its scald resistance and good forage digestibility and CDC Austenson for its lodging resistance. Both Gadsby and CDC Austenson have good grain yields. These four varieties are used for comparison purposes as candidate lines must meet or exceed them for yield and quality.

Objective

To evaluate different barley lines for grain analysis.

[1] PCDF, Roblin
[2] FCDC, Lacombe

Design, Materials & Operation

Treatments:	13 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 4
Product handling:	Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. At the 2-4 leaf stage, the trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 600 gram composite sample was then sent to the Field Crop Development Center in Lacombe, Alberta for further quality analysis.

Table 1. 2013 Western Canada Forage Barley Coop Grain Trial Varieties at Roblin, MB*

AC Ranger	FB446
CDC Austenson	FB447
FB018	FB449
FB206	FB450
FB439	Gadsby
FB442	Vivar
FB445	

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

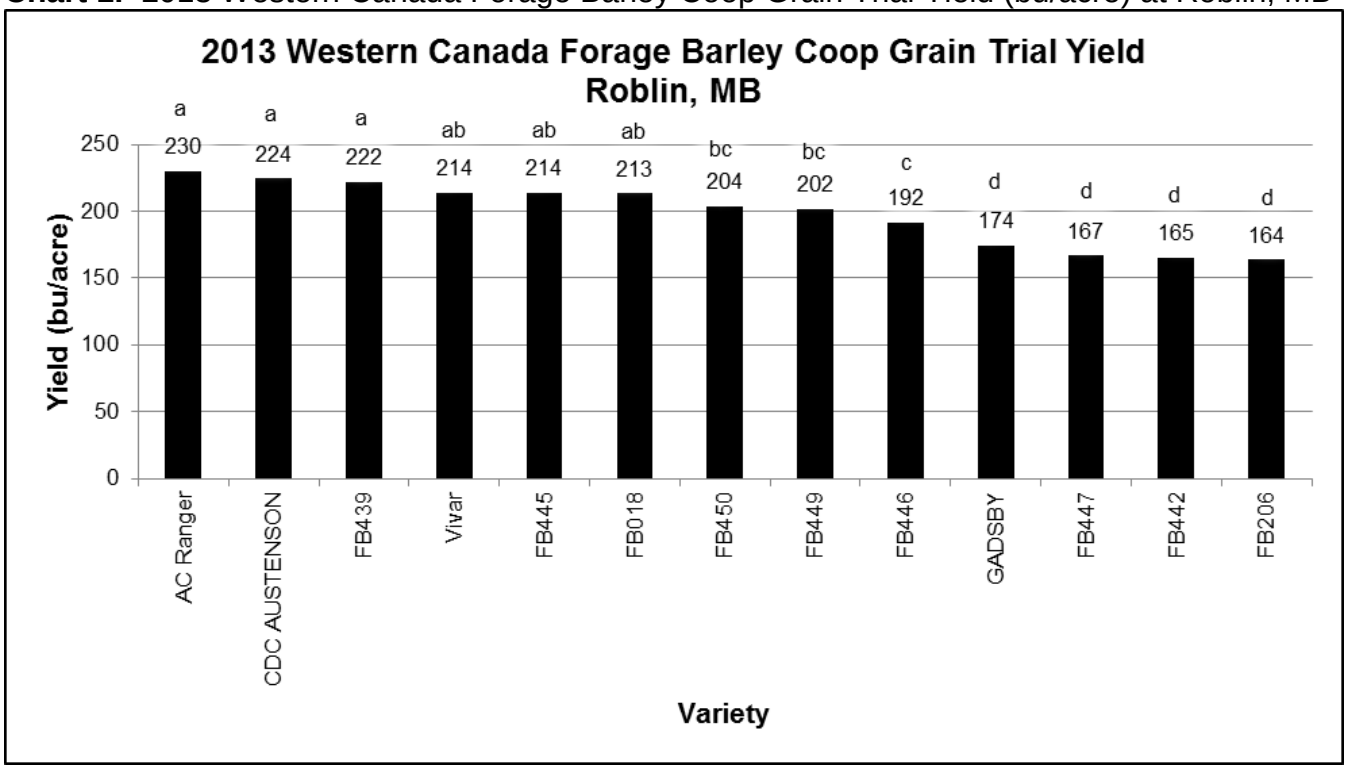
Results

Table 3. 2013 Western Canada Forage Barley Coop Grain Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Pl/m^2*	DTH*	DTM*	Height (cm)	Disease (1-9)*	Lodging (1-9)*	Visual (1-9)*
AC Ranger	12,382	227	53	98	110	4	4	4
CDC AUSTENSON	12,067	183	56	96	112	4	4	3
FB439	11,957	223	52	99	109	5	6	3
Vivar	11,512	260	54	94	104	5	3	4
FB445	11,504	203	53	97	113	5	4	4
FB018	11,469	230	53	99	116	5	6	2
FB450	10,947	233	58	98	107	3	5	3
FB449	10,860	257	57	95	103	3	4	3
FB446	10,324	243	56	98	115	4	7	2
GADSBY	9368	213	57	95	113	5	8	4
FB447	8970	233	52	93	109	6	3	3
FB442	8896	187	54	94	116	4	3	4
FB206	8813	227	58	98	127	4	7	2
Grand Mean	10,698	225	55	97	112	4	5	3
CV%	5.29	20.64	1.37	1.11	2.84	23.90	38.87	36.76
LSD	955.64	78.13	1.27	1.81	5.35	1.81	3.19	1.87
Sign Diff	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

* Pl/m^2 = Plants per Meter Squared
* DTH = Days to Heading
* DTM = Days to Maturity
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat
* Visual (1-9) = 1- Very Poor, 9- Excellent

Chart 1. 2013 Western Canada Forage Barley Coop Grain Trial Yield (bu/acre) at Roblin, MB



This trial had an excellent %CV (coefficient of variation) of 5.29. FB439 was the only experimental line that was significantly higher yielding than all the other experimental lines and the check variety GADSBY. FB439 was similar in yield to the check varieties AC Ranger, CDC AUSTENSON and Vivar. FB439 is one of the later maturing lines, with similar height and lodging resistance to the checks.

Important Considerations and Recommendations

The feed barley sector consists of six-row and two-row barley varieties. Barley that does not meet human consumption quality standards is used domestically or exported for animal feed. In Manitoba the primary user of feed barley is the hog industry which comprises 30% of the national hog production. (Manitoba Agriculture, Food and Rural Initiatives n.d.)

To improve digestibility, barley grain is cracked or rolled for cattle feed and ground for the hog and chicken market.

Breeding efforts are targeting specialty markets such as hulless barley cultivars for the poultry and hog industries. Other breeding efforts are developing barley varieties that are more resistant to fusarium head blight. Hogs are the most sensitive to mycotoxins in feed and the highest acceptable level in the feedstock is 1 ppm.

Contracts and options for feed barley can be traded on the Winnipeg Commodity Exchange. Until August 2012, the Canadian Wheat Board (CWB) represented western Canadian

producers as the sole exporter of barley. Today the CWB is one of many options for producers to use for marketing their feed barley. (Manitoba Government n.d.)

Feed barley has fierce competition in the feed grain market. There are many other options for livestock feed and price is the major driver for livestock producers in selecting their sources. The malt barley industry also competes for barley production and the malt industry offers a premium over feed prices. Also the by-products from the barley food industry have opportunities to be used in pelletized feed and other complex feed grain products.

The world feed barley trade has declined over the last 10 years. This has resulted from changes in customer requirements, price sensitiveness and a trend towards least cost formulation feed mixes. Ongoing research on yield is expected to direct more attention on nutritional aspects within the grain mix of feed barley, while the high metabolic energy varieties focus on quality. (Manitoba Government n.d.) Also the recent EU free trade agreement will have positive results for the feed barley domestic and export markets. It is predicted that domestic consumption will expand with the European market opening up for Canadian hog and beef products. The removal of tariffs on feed barley exports has potential for increasing demand for raw feed barley.

Conclusions

Research plays an important role in keeping an industry competitive in meeting customer needs. This is apparent in the feed barley industry with plant breeders continuing to incorporate new genetics. The EU free trade agreement plus better disease resistance, higher yield and improved quality attributes ensures barley continues to be a viable feed grain option for livestock producers.

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Organic Oat Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Jennifer Mitchell Fetch- Oat Breeder, AAFC-CRC Winnipeg

Background

Manitoba is considered one of the most productive areas in the world for oats. The long warm days combined with adequate moisture levels generates an ideal climate for growing oats. Manitoba is also centrally located to North American oat processors and it has excellent transport services via air, road and rail. (Government of Manitoba n.d.) It only makes sense that the only organic oat breeding program be located at Agriculture Canada's Research Centre (CRC) in Winnipeg, MB.

Dr. Jennifer Mitchell Fetch began the breeding experiments in 2003 and she has successfully received support to register her first organic oat variety this past February, OT8003. Dr. Mitchell Fetch made the initial cross in 2005 and then used a process called bulk breeding for generations two to five. During the bulk breeding process the most plump and well-filled seeds were used to develop the next generation. (Prairie Oat Growers Association 2013)

Another component to the selection process is to grow the cultivars under an organic production system. This supports the concept of breeding genetic adaptability for the environment you intend to grow the crop in. An organic environment could potentially have higher competition from weeds, disease and pests. Organic cultivars also require optimal utilization of slow-release nitrogen from legumes versus the applied fertilizers of conventional varieties. (Stevenson 2011) The cultivars selected from an organic breeding program would therefore be more adapted to organic production practices. These varieties would also be applicable for farmers interested in low-input farming. In addition, there is the thought that these varieties would perform well in conventional farming practices. In general, all farmers could potentially benefit from the organic oat breeding program.

There is an increased interest from farmers to have organic cultivars bred under organic conditions. The reasons listed above support that thought. Another concern is that organic farmers are losing access to organic and conventional seed stock varieties due to seed companies consolidating and pursuing biotechnology as a breeding tool.

Objective

To test lines of organic oats grown under organic management conditions for the organic oat breeding program at AAFC Winnipeg.

[1] PCDF, Roblin

Design, Materials & Operation

Treatments: 25 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 29
Fertilizer applied: None
Pesticide applied: None
Harvest date: September 16
Product handling: Each individual plot harvested with weight and moisture recorded

The trial was seeded into tilled corn stubble that was not organically certified. The plots did not receive any chemical or fertilizer applications. Weed intensity was monitored throughout the growing season and data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged with weight and moisture recorded. A 750 gram composite sample was then sent to AAFC-CRC Winnipeg for further quality analysis.

Table 1. 2013 Organic Oat Trial Varieties at Roblin, MB*

AC Morgan	04G48-OA08	07P02-OCA	07P12-OAZ	07P12-OCN
CDC Dancer	04G48-OA13	07P08-OBV	07P12-OBD	07P12-OCQ
Jordan	05P14-OA01	07P09-OAA	07P12-OBE	07P12-OCU
Leggett	05P15-OA06	07P09-OCH	07P12-OBF	07P13-OAF
04G45-OA43	05P15-OA23	07P09-ODN	07P12-OCC	09QBulk1-OCM

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24” Depth at the Roblin, MB Site **

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	52 lbs/acre (low)	0
P*	12 ppm (med)	0
K*	198 ppm (high)	0
S*	102 lbs/acre (high)	0

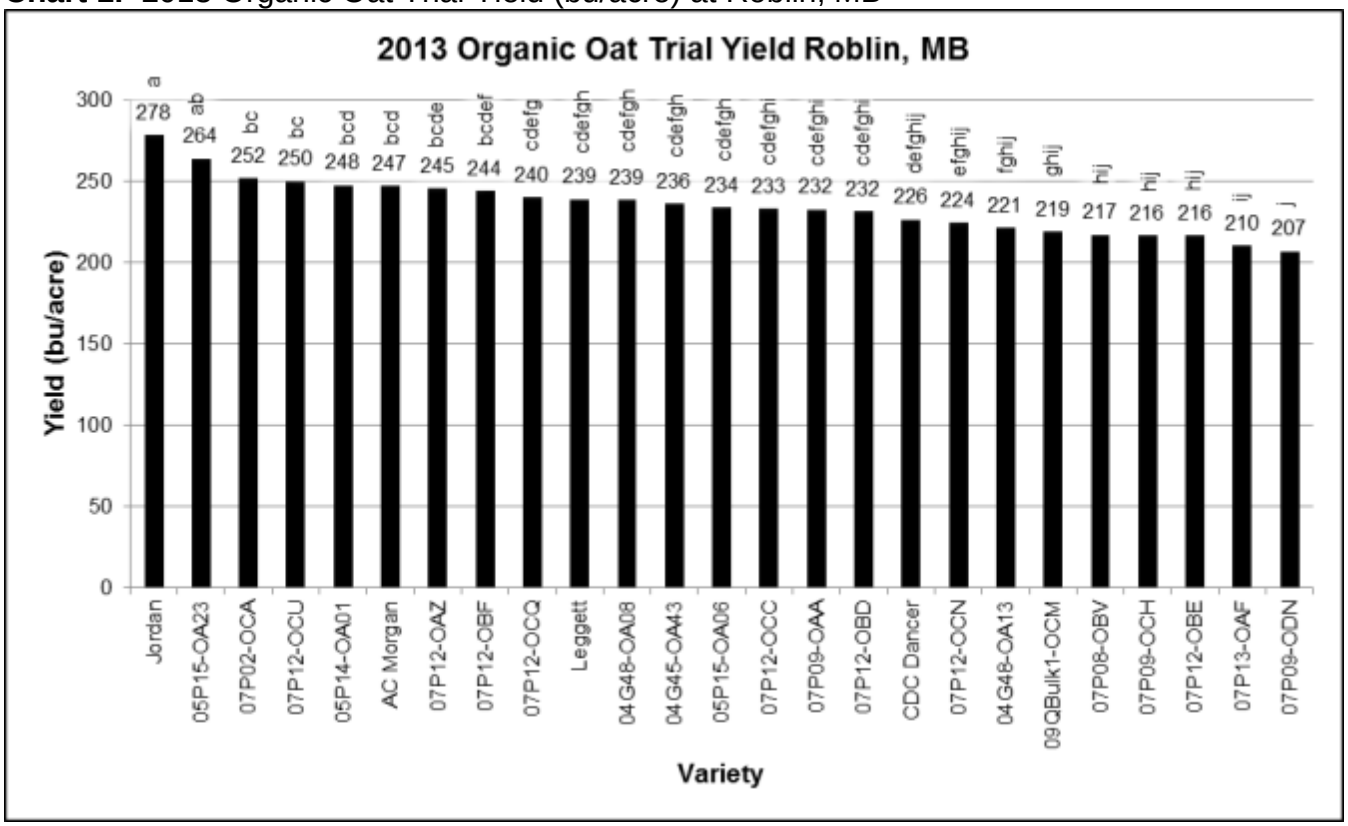
* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate
** Analysis by Agvise Laboratories

Results

Table 3. 2013 Organic Oat Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Plants/Meter^2	Days to Heading	Days to Maturity	Height (cm)
Jordan	9998	270	62	104	115
05P15-OA23	9478	313	55	98	121
07P02-OCA	9049	387	52	89	124
07P12-OCU	8972	307	56	95	106
05P14-OA01	8893	317	58	99	123
AC Morgan	8882	323	57	96	119
07P12-OAZ	8820	327	53	94	118
07P12-OBF	8766	320	54	96	116
07P12-OCQ	8627	330	53	94	115
Leggett	8582	363	55	95	111
04G48-OA08	8573	323	57	95	128
04G45-OA43	8486	307	52	91	126
05P15-OA06	8397	323	54	94	128
07P12-OCC	8363	347	55	96	107
07P09-OAA	8352	310	57	95	131
07P12-OBD	8320	327	55	96	111
CDC Dancer	8126	310	56	93	123
07P12-OCN	8055	280	54	96	108
04G48-OA13	7957	330	56	94	120
09QBulk1-OCM	7870	277	55	90	125
07P08-OBV	7799	317	54	92	135
07P09-OCH	7777	357	56	94	138
07P12-OBE	7772	313	54	94	114
07P13-OAF	7559	353	56	91	130
07P09-ODN	7431	380	57	95	141
Grand Mean	8436	324	55	95	121
CV%	5.95	17.30	1.85	1.15	4.34
LSD	825.08	92.12	1.68	1.79	8.65
Sign Diff	Yes	Yes	Yes	Yes	Yes

Chart 1. 2013 Organic Oat Trial Yield (bu/acre) at Roblin, MB



The trial consists of four checks, Jordan, AC Morgan, Leggett and CDC Dancer. Jordan was the highest yielding entry in the test and it was significantly higher yielding than all the other entries except for 05P15-OA23. 05P15-OA23 was comparable in yield to AC Morgan and significantly higher yielding than Leggett and CDC Dancer. 05P15-OA23 is significantly earlier than Jordan and significantly later than AC Morgan, Leggett and CDC Dancer. 05P15-OA23 is similar in height to Jordan, AC Morgan and CDC Dancer, and significantly shorter than Leggett.

The remaining entries are comparable to a check in the test and there were no entries that were significantly lower yielding than all the checks. Please see Chart 1 for a more thorough evaluation of each entry for yield and Table 3 for maturity and height.

Important Considerations and Recommendations

Manitoba is centrally located to oat processing plants. General Mills, one of the world's largest food companies, is a nearby neighbour at Minneapolis, MN, USA. Today, General Mills provides 60 million servings of ready to eat cereal and 14 million Nature Valley Bars. Oat is one of the largest grain crops purchased by General Mills and Canada is a significant source for their products.

General Mills has taken a holistic approach to sustainable agriculture including reducing environmental impacts and improving the overall value chain. They are developing

relationships with producers, suppliers, industry associations and other partners to ensure they are sourcing sustainable raw materials for their products. Integrated Pest Management (IPM) is one component of their focus on sustainable agriculture. General Mill's IPM program looks at minimizing the use of pesticides on the crops and the ingredients that they source. Organic production would meet that requirement. In Canada, General Mills is participating in the launch of the Western Canada Sustainability Pilot in Manitoba and Saskatchewan. They began their recruitment of growers this past season. Partnerships have been developed with organizations such as Prairie Oat Growers Association, Crop Life and Ducks Unlimited. (General Mills 2013)

Canada has a number of suppliers and manufacturers for the oat industry as well. Richardson International headquartered in Winnipeg, MB, has grown its oat business with the acquisition of Viterra's oat and specialty business. Richardson Milling has the most extensive oat supply chain in North America and offers a full range of oat ingredients including oat groats, flakes, flour and bran. Their portfolio expands even further into value-added ingredients such as coated whole grains and granola clusters. (Germination 2013)

Oats also have applications in the cosmeceutical, nutraceutical and therapeutical industries. Oats have been used since Roman times for soothing the skin. In 2003, the U.S. Food and Drug Administration formally recognized colloidal oatmeal as a skin protectant and for the relief of minor skin irritations and itching. An Edmonton company, Ceapro, has developed a list of new oat products specifically targeted for these industries. The opportunities are huge and there is optimism that there will be value added benefits to the farmer. (Prairie Oat Growers Association 2013)

Since Manitoba is the most productive area in the world for oats, it is important that PCDF supports the breeding efforts of Dr. Jennifer Mitchell Fetch. The last two years of organic oat trials have indicated organic oat breeding and production is worth a consideration. The two year average yield for 2012 and 2013 for the organically grown oat trials versus the conventionally grown oat trials was 199 bu/acre and 214 bu/acre, respectively. The slight reduction in yield is insignificant when overall revenue per acre is computed from the differences in input costs and market price for the two production systems. Also, general observations for seed quality were positive for the organic oats. The seeds appeared larger with no discoloration on the seed coat. Weed competition was good and minimal weeds were observed within the plots.

Conclusions

Continued support with the testing of the organic oat cultivars would be beneficial for all producers in the Parkland area. The organic oat breeding program is definitely generating cultivars that are high yielding, provide excellent weed competition and with larger seed size. These attributes are appealing to all producers, organic or conventional. Natural selection and regional adaptation to the Parkland region is achieved by having PCDF as one of the testing locations.

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Canadian International Grains Institute Canada Western Red Spring Wheat Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Roblin, Manitoba
Cooperator: Canadian International Grains Institute, Winnipeg MB
Elaine Sopiwnyk- Analytical Services, Canadian International Grains Institute, Winnipeg, MB
Dale Alderson- Independent Seed Consultant, East St. Paul, MB

Background

The Canadian International Grains Institute (Cigi) is an independent market development institute established in 1972, based out of Winnipeg, Manitoba. They provide technical expertise, support, applied research and customized agricultural training to the field crop industry including farmers, researchers, marketers, processors and end-product manufacturers. Throughout the past 40 years, Cigi has delivered 1,430 programs and has continued to expand its expertise in processing and testing capabilities for wheat, durum, pulses, barley, oilseeds and special crops.

Cigi's work in specific markets has given them an in-depth understanding of customer and consumer preferences with respect to specific end-product applications. For example, the different textural and color requirements for Asian noodles in Japan, China, Indonesia, Thailand and Taiwan; how pasta processing requirements and products differ in markets like Italy and Venezuela and the significant range of processing conditions and formulations that exist in bakeries producing bread and other products in the United Kingdom, Peru and Colombia. (Canadian International Grains Institute 2013)

China's state-owned company, COFCO has raised concerns about the poor baking quality of Canadian wheat. COFCO is concerned about weak gluten strength in some of the Canadian wheat. Gluten protein is important for keeping the shape of baking goods through the baking process. Part of the issue could be related to the many different varieties of wheat grown by Canadian farmers. Cigi is conducting field research in hopes to address the issue and produce wheat with proper gluten levels for the Asian markets. (Nickel 2013)

This year at PCDF, Cigi conducted a trial to study the impact of fungicide and variety on gluten strength for the Asian market for producing pasta, noodles and other baking products.

Objective

To study the impact of fungicide application and wheat variety on gluten strength.

[1] PCDF, Roblin

Design, Materials & Operation

Treatments:	18: 6 varieties, 3 fungicide treatments (Table 1)
Replication:	2
Plot size:	4m x 19m
Test design:	Split Plot Design: Main Plot- Fungicide, Split Plot- Variety
Seeding date:	May 21
Fertilizer applied:	Broadcast 100 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 20 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade June 28- Buctril M and Twinline July 15- Folicur
Harvest date:	September 16
Product handling:	Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 20 lbs. actual P applied with the seed. Axial and Barricade were used to control broadleaf and grassy weeds. Fungicide applications were applied accordingly; a no fungicide application (control), a group 3 fungicide at flowering and a group 3 and 11 combination where a group 11 fungicide was applied at flag leaf and group 3 fungicide at flowering.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight and moisture were recorded. A 25 kilogram sample from each plot was then sent to Cigi in Winnipeg for further quality analysis.

Table 1. 2013 Cigi Canada Western Red Spring Wheat Trial Treatments at Roblin, MB

Fungicide Treatment	Seed Variety	Fungicide Treatment	Seed Variety	Fungicide Treatment	Seed Variety
None	AC Barrie	Group 3 @ Flower	AC Barrie	Group 11 @ Flag, Group 3 @ Flower	AC Barrie
	Carberry		Carberry		Carberry
	Harvest		Harvest		Harvest
	Kane		Kane		Kane
	Lillian		Lillian		Lillian
	Unity VB		Unity VB		Unity VB

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	100
P*	12 ppm (med)	60
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

Results

Table 3. 2013 Cigi Canada Western Red Spring Wheat Trial Yield (kg/ha and bu/ac) at Roblin, MB

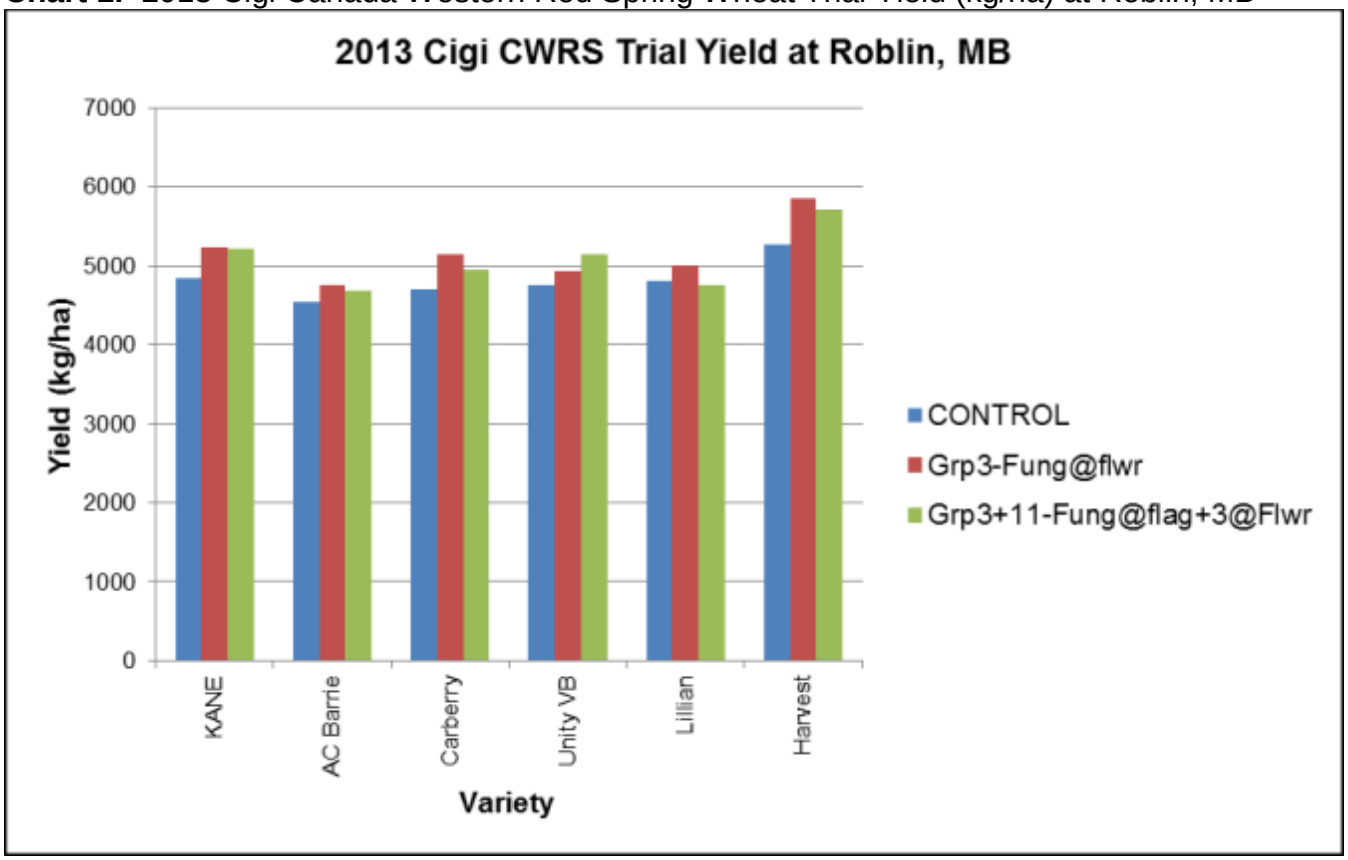
HRSW Variety	Fungicide Treatment	Yield (kg/ha)	Yield (bu/ac)	Significant Difference
Harvest	Grp3 Fung @ Flwr	5852	87	a
Harvest	Grp3@Flwr+11@Flag	5715	85	a
Harvest	Control	5271	78	b
KANE	Grp3 Fung @ Flwr	5228	78	b
KANE	Grp3@Flwr+11@Flag	5214	78	b
KANE	Control	4852	72	defg
Carberry	Grp3 Fung @ Flwr	5150	77	bc
Carberry	Grp3@Flwr+11@Flag	4959	74	cde
Carberry	Control	4699	70	fgh
Unity VB	Grp3@Flwr+11@Flag	5146	77	bc
Unity VB	Grp3 Fung @ Flwr	4925	73	cdef
Unity VB	Control	4757	71	efgh
Lillian	Grp3 Fung @ Flwr	5001	74	cd
Lillian	Control	4811	72	defg
Lillian	Grp3@Flwr+11@Flag	4765	71	efgh
AC Barrie	Grp3 Fung @ Flwr	4765	71	efgh
AC Barrie	Grp3@Flwr+11@Flag	4678	70	gh
AC Barrie	Control	4546	68	h
Grand Mean (kg/ha): 5019				
CV%: 2.2				
LSD: 230.3 kg				
Significant Difference: Yes				

This trial allows us to extract some agronomic data regarding the cost/benefit to fungicide applications and yield boost. Firstly, is there a significant benefit to fungicide applications versus no fungicide application? Secondly, is there any significant benefit between applying fungicides at flowering and flag leaf or a single application at the flag leaf stage? Thirdly, are there varietal differences? Table 3 outlines the significant differences between the wheat varieties and their respective fungicide applications. The varieties Harvest, KANE and Carberry illustrate a significant increase in yield by applying the two fungicide treatments versus no fungicide at all. Unity had a significant increase in yield only when the plot received the split application of Grp-3 @ flowering and Grp-11 at flag leaf stage. There was no significant increase in yield for Barrie and Lillian when either fungicide application was conducted. There was no significant difference in yield between the two fungicide applications for all the varieties except for Lillian. In regards to Lillian, the yield was significantly higher for the fungicide application at flowering versus the split application at flowering and flag leaf.

An important consideration when reviewing the data is varietal differences in disease resistance and if this has a bearing on fungicide response. All the varieties except Harvest

have resistance to prevalent races of leaf and steam rust. Harvest has moderate resistance. Barrie, Unity, Carberry and KANE have resistance to common bunt, whereas Lillian has intermediate resistance. Harvest has fair resistance to common bunt. Barrie is the only variety that has resistance to loose smut. All the rest have intermediate resistance. Harvest is the only variety with the least optimum disease resistance package. The positive yield response to fungicide applications is therefore expected for Harvest. The positive yield response for KANE, Carberry and Unity are not expected and there is no clear explanation. (Canadian Journal of Plant Science 2013)

Chart 1. 2013 Cigi Canada Western Red Spring Wheat Trial Yield (kg/ha) at Roblin, MB



Important Considerations and Recommendations

PCDF conducted a fungicide trial in 2009. The trial entailed the CWRS variety Harvest and the fungicide Tilt. The results for that trial indicated there was no significant yield increase when the fungicide was applied at the flag leaf stage. This is contradictory to the trial results for 2013. This emphasizes that the benefit to fungicide applications on wheat is inconsistent and a general recommendation for fungicide use requires more research.

Factors that could contribute to this inconsistency are growing conditions for the season, disease pressure at the time of and after the fungicide application and were the proper crop stages achieved at the time of application.

Conclusions

In regards to the agronomic portion of this trial, more research is required to determine the cost/benefit to producers with the application of fungicides in wheat. Results from 2009 and 2013 are inconsistent for the variety Harvest. Producers need to review the growing conditions each year to determine if disease pressure will be severe enough to justify the cost of a fungicide application.

In regards to conducting the research for Cigi's mandate, PCDF will continue to participate in this trial as agreed upon at the onset of the trial.

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Canada Western Red Spring Wheat Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Russell, Manitoba
Cooperators: Denise Schmidt- Regional Business Manager, FP Genetics
Keating Seed Farms, Russell, Manitoba

Background

The CWRS trial was conducted in collaboration with FP Genetics and Mark Keating of Keating Seed Farms. FP Genetics was founded in 2008 with the goal of providing a reputable seed production, distribution and sales force for producers in Western Canada. The company is owned by a shareholder network that spans from the Red River Valley in Manitoba to the Peace River district of Alberta. FP Genetics offers over 60 varieties of crop types including wheat.

Wheat is one of Manitoba's most important crops and occupies the largest area of crop by area. Canada Western Red Spring (CWRS) is the largest class of wheat grown in Western Canada. The diverse market potential for CWRS has allowed it to be exported to over 70 countries. Canada has consistently been a major producer of high quality wheat on the world stage. CWRS offers superior gluten strength and can be blended with lower protein wheat to improve the quality of flours. (Government of Manitoba n.d.)

This class of wheat is superior for its milling and baking quality and has various guaranteed protein levels. Varietal differences and growing conditions can impact the protein content and quality. Millers and bakers require certain levels of protein to ensure consistency in their end use products. The main end uses for CWRS are high volume pan bread, hearth bread, steamed bread, noodles, flat bread and common wheat pasta. (Canadian Grain Commission 2008)

There are a number of factors that can affect the quality of the seed. Diseases such as fusarium head blight and ergot, as well as insect damage from midge can result in significant

[1] PCDF, Roblin

losses to the producer by downgrading the sample. See Table 1 for a breakdown of the CWRS classifications and the tolerated thresholds for each grade.

Table 1. Canada Western Red Spring Grade Determinant Table

Grade Name	Minimum % Protein	% Fusarium Damage	% Midge	% Ergot
No. 1 CWRS	10	0.25	2	0.01
No. 2 CWRS	No minimum	0.8	5	0.02
No. 3 CWRS	No minimum	1.5	10	0.04
No. 4 CWRS	No minimum	1.5	10	0.04
CW Feed	No minimum	4	No limit	0.10
Grade, if specs for CW Feed not met	-	%FD > 10%, Commercial Salvage	-	Sample

(Government of Saskatchewan 2008)

Objective

To evaluate different varieties of Canada Western Red Spring Wheat in terms of yield and quality in the Parkland region of Manitoba.

Design, Materials & Operation

Treatments: 7 (Table 2)
Replication: 4
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 24
Fertilizer applied: 25 lbs. actual P applied with seed
Pesticide applied: June 17- Axial and Curtail M
Harvest date: September 9
Product handling: Each individual plot harvested with weight and moisture recorded

The trial was seeded into tilled canola stubble with 25 lbs. actual P applied with the seed. Axial and Curtail M were used to control broadleaf and grassy weeds. Various data parameters were collected throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight was recorded. A 750 gram composite sample was then sent to Intertek Laboratory in Winnipeg for further quality analysis.

Table 2. 2013 Canada Western Red Spring Wheat Trial Varieties at Russell, MB

Carberry	Pasteur
Cardale	Utmost
Harvest	Vesper
Muchmore	

Results

Table 3. 2013 Canada Western Red Spring Wheat Trial Report of Analysis**

Variety	Grade	Reason for Grade	Dockage %	Protein %	MST* %	TWT* (kg/hl)	Ergot %	Fus Dmg* %	Midge %
Carberry	TF Wheat, 3 CWRS*	0.028% Ergot, 2.8% Grass Green	Nil	12.7	16.2	80.7	0.028	Nil	0.3
Cardale	3 CWRS*	0.04% Ergot	Nil	12.5	14.2	81.0	0.040	Nil	0.4
CDC Utmost	2 CWRS*	1.2% Grass Green	Nil	12.6	14.5	80.5	Nil	Nil	0.2
Harvest	Wheat Sample Account Ergot	0.12% Ergot	Nil	12.2	14.3	82.2	0.120	0.05	0.2
Muchmore	TF Wheat, 3 CWRS*	0.03% Ergot, 2.8% Grass Green	Nil	12.4	15.5	81.2	0.030	0.05	0.5
Pasteur	TF Wheat, 2 CWRS*	1.0% Grass Green	Nil	10.5	17.0	79.7	Nil	Nil	0.2
Vesper	TF Wheat, 2 CWRS*	1.2% Grass Green	Nil	11.9	15.0	82.2	0.006	Nil	0.2

* MST = Moisture
* TWT (kg/hl) = Test Weight in Kilograms per Hectolitre
* Fus Dmg = Fusarium Damage
* CWRS = Canadian Western Red Spring
** Analysis by Intertek, Winnipeg

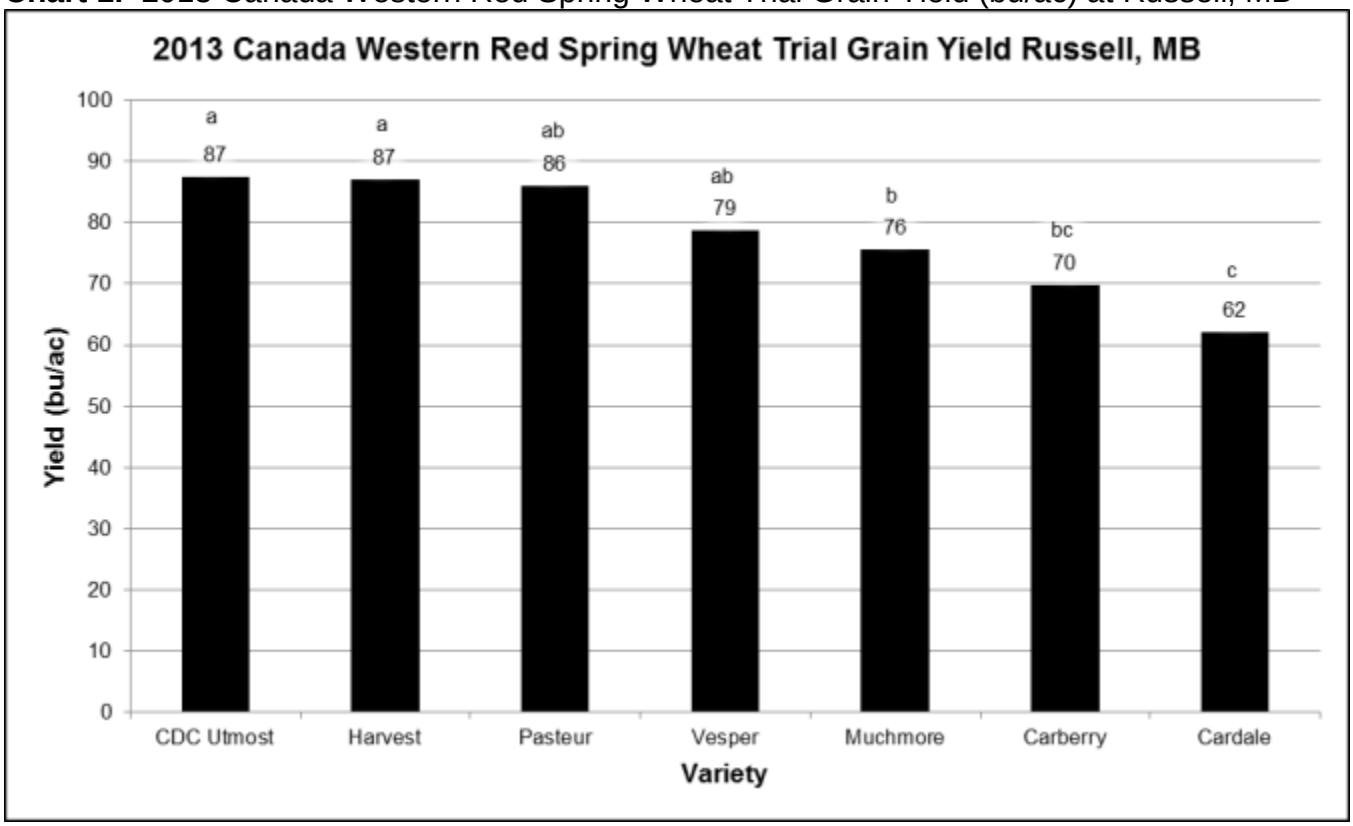
Table 4. 2013 Canada Western Red Spring Wheat Trial Results at Russell, MB

Variety	Yield (kg/ha)	Pl/m^2*	Height (cm)	DTM*	Disease (1-9)*
CDC Utmost	5890	323	95	92	5
Harvest	5862	305	96	92	5
Pasteur	5792	318	90	102	2
Vesper	5296	298	102	92	4
Muchmore	5090	265	86	95	3
Carberry	4701	228	90	96	3
Cardale	4180	288	90	91	5

Grand Mean	5259	289	93	94	4
CV %	10	22	3.5	1.1	15.1
LSD	783	94.5	4.9	1.5	0.8
Sign Diff	Yes	Yes	Yes	Yes	Yes

* Pl/m^2 = Plants per Meter Squared
* DTM = Days to Maturity
* Disease (1-9) = Disease Rating 1- No Disease, 9- Severe Disease

Chart 1. 2013 Canada Western Red Spring Wheat Trial Grain Yield (bu/ac) at Russell, MB



For the 2013 yield data, CDC Utmost and Harvest were similar in yield to Pasteur and Vesper and significantly higher yielding than Muchmore, Carberry and Cardale. All the varieties except Carberry were significantly higher yielding than Cardale.

Maturity ranged from 91 to 102 days. Pasteur was significantly later maturing than all the other varieties. Cardale, CDC Utmost, Harvest and Vesper were significantly earlier than the other varieties.

In respect to protein content, all the varieties met the minimum grading standard for protein content. Protein levels for the majority of the varieties ranged from 12.2 to 12.7%. Pasteur and Vesper were lower at 10.5% and 11.9% respectively.

The levels for fusarium head blight were minimal to non-existent. There was no impact to down grading the samples. Harvest and Muchmore were the only varieties that had minimal levels of fusarium infestation in their samples. Ergot levels were significant and varietal

differences were observed. CDC Utmost, Pasteur and Vesper met the minimum standard for No. 1 CWRS. Carberry, Cardale, Muchmore and Harvest were graded as No. 2, No. 3, No. 3 and CW feed respectively.

The % midge damage to the sample was minor and all the varieties met the minimum requirement for No. 1 CWRS.

Table 5. Three Year Summary (2011, 2012 & 2013) for Canada Western Red Spring Wheat Trial at Russell, MB

Variety	Yield (kg/ha)	Protein %	Midge %
Pasteur	4753	Only 1 year	Only 1 year
CDC Utmost	4714	16.0	1.46
AC Barrie	4322	16.0	1.48
CDC Go	4289	15.7	1.96
Vesper	4210	Only 1 year	Only 1 year
Muchmore	4207	15.0	3.37
Harvest	4064	16.0	1.09
Carberry	3977	15.5	2.82
Goodeve	3903	16.5	1.31
Alvena	3894	17.0	2.52
KANE	3818	15.3	2.05
Cardale	3174	Only 1 year	Only 1 year
Std Error	583.1	0.1	0.74
Significance %	10	5	No Significance

Important Considerations and Recommendations

Each year brings challenges to wheat producers in crop insurance risk areas 7 and 9. 2013 was no exception with growing conditions being ideal for high yields and the development of ergot in the wheat samples.

Grading tolerances for ergot are set based on the results of scientific research conducted by the Canadian Grain Commission (CGC) and recommendations made to the CGC by the Western and Eastern Standards Commissions. Both committees are comprised of members from all parts of the industry, including grain producers. The committee conducts a bi-yearly assessment of the grading standards to ensure they are relevant.

Tolerances for ergot are tight for safety and quality reasons. Ergot is toxic to both humans and animals and at alarming small amounts. This toxicity cannot be reduced through processing. Any flour or feed made from ergot-infected wheat will still be toxic. The toxic component is called alkaloids. The alkaloids found in ergot are also similar to the components found in the drug LSD.

Human symptoms of ergot poisoning include impaired blood circulation, causing alternating burning and freezing sensations, followed by gangrene of extremities. This symptom is referred to as St. Anthony's Fire. Nervous convulsions can also occur and lead to eventual

death. Animal symptoms to ergot poisoning may include lameness, loss of body parts from gangrene, abortions in pregnant animals, seizures and eventually death. Consumption of contaminated feeds with sub-lethal doses may still lead to problems of poor growth and performance, loss of milk production in lactating animals and animals going "off feed." (Government of Saskatchewan 2008)

Ergot is difficult to clean from wheat because most cleaning systems clean on the basis of size and shape. Ergot is very similar to wheat in both respects. Many seed cleaning companies and some licensed primary elevators have the capacity to remove ergot by using specialized equipment. The most common means for removing ergot is through the use of a gravity table and implementing differences in density to remove the ergot bodies. A colour sorter is a new technology and it is very effective in cleaning out the ergot bodies. (Canadian Grain Commission 2012)

Conclusions

There are some significant differences in yield and quality for CWRS varieties that are being grown in risk areas 7 and 9. Protein levels met the minimum requirement for No.1 grade for all the varieties. Midge and fusarium head blight were non-events in 2013 with no to minimal impact to the sample quality. Ergot was a prominent disease this year and grading differences were observed between the varieties.

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Parkland Cooperative Wheat Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Gavin Humphreys- Wheat Breeder, AAFC Winnipeg
Alanna Olson- Research Technician, AAFC Beaverlodge

Background

For wheat breeders like Gavin Humphreys, Canada's registration system can be, in his own words, a hard hill to climb. But it's worth it.

Gavin Humphreys, with Agriculture and Agri-Food Canada in Winnipeg, works with hard red and hard white wheat lines, and says the registration system is key to Canada's reputation for consistently high quality CWRS wheat.

Gavin says as a breeder, once a line has been tested and has potential, there are six location years of data needed to support the line. He can choose from the Parkland, Western and Central Bread Wheat Trials. These so-called co-op trials are conducted on eight to thirteen sites across the specified region and contain replicated plots.

The purpose of this trial is to evaluate high yielding, new hard red spring wheat lines for the Parkland Region. New wheat lines go through three years of co-op trials and are evaluated for agronomy (maturity, standability, yield and so on), disease and milling/baking quality. Grade checks are done at every location. All the grain is collected from all the sites within a region and sent to the Grain Research Centre's lab in Winnipeg to be evaluated. The samples are then tested for protein content, milling performance, dough mixing quality and baking performance. All the results are summarized.

In February, the Prairie Recommending Committee for Wheat, Rye and Triticale (PRCWRT) meets to review all the data on new lines proposed for registration and pronounce their suitability.

For many international buyers, Canada's registration system is an assurance of quality and trust is not misplaced. "I can't think of a CWRS variety with desirable end-use quality in the co-op trials that was released commercially and then did not deliver similar quality in the field and market," says Humphreys. (Farm Forum 2009)

This is the third year that the Parkland Cooperative Trial was located at the PCDF site.

[1] PCDF, Roblin

Objective

The objectives of the Parkland "C" Wheat Cooperative Trial include:

1. To evaluate CWRS breeding lines for their adaptation to the Parkland and Peace River cultivation regions of western Canada through field trials at selected locations. Agronomic data including grain yield, days to maturity, plant height and lodging is collected by site collaborators at each site.
2. To evaluate CWRS breeding lines for their resistance to Leaf Rust, Stem Rust, Common Bunt and Fusarium Head Blight pathogens. Disease evaluation is done by scientists from AAFC in Winnipeg or Lethbridge (Common Bunt).
3. To test and evaluate the end use quality of CWRS breeding lines, through testing of composite grain samples generated from the Parkland Cooperative tests. Scientists at the Grain Research Laboratory of the Canadian Grain Commission conduct the testing.
4. To provide the data to wheat breeders that can be used to request support for registration of CWRS breeding lines that demonstrate improved adaptation to the Parkland and Peace River cultivation regions.

Design, Materials & Operation

Treatments:	30 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Lattice
Seeding date:	May 16
Fertilizer applied:	Broadcast 100 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 20 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	September 12
Product handling:	Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 20 lbs. actual P applied with the seed. The trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight and moisture were recorded. A 1.5 kilogram composite sample was then sent to AAFC-CRC Beaverlodge for further quality analysis.

Table 1. 2013 Parkland Cooperative Wheat Trial Varieties at Roblin, MB*

AC Splendor	PT 472	PT 638
CDC Osler	PT 474	PT 642
CDC Teal	PT 476	PT 643
Katepwa	PT 477	PT 644
PT 245	PT 478	PT 769
PT 246	PT 588	PT 772
PT 248	PT 592	PT 773
PT 249	PT 593	PT 774
PT 250	PT 594	PT 776
PT 468	PT 637	PT 777

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	100
P*	12 ppm (med)	60
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

Results

Table 3. 2013 Parkland Cooperative Wheat Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Pl/m^2*	DTF*	DTM*	Height (cm)	Disease (1-9)*	Lodging (1-9)*	Sign. Diff. Yield*
PT 588	9603	360	57	108	102	3	3	a
PT 245	9315	383	58	106	100	3	3	a
PT 769	8863	430	58	104	107	5	6	b
PT 474	8744	323	58	108	104	5	7	bc
CDC Osler	8649	400	58	106	104	4	8	bc
PT 638	8629	400	56	108	108	5	4	bcd
PT 472	8581	367	54	106	101	4	7	bcde
PT 776	8393	400	59	108	115	2	7	cdef
PT 772	8359	400	55	106	102	6	5	cdef
PT 642	8248	393	56	108	103	4	3	defg
PT 777	8202	367	59	106	105	4	8	efgh
AC Splendor	8201	397	56	103	107	4	8	efgh
PT 250	8177	370	58	109	100	5	7	fgh
PT 592	8169	440	58	106	102	4	7	fghi
PT 468	8126	367	58	105	103	5	7	fghi
PT 249	8054	363	57	104	106	5	6	fghij

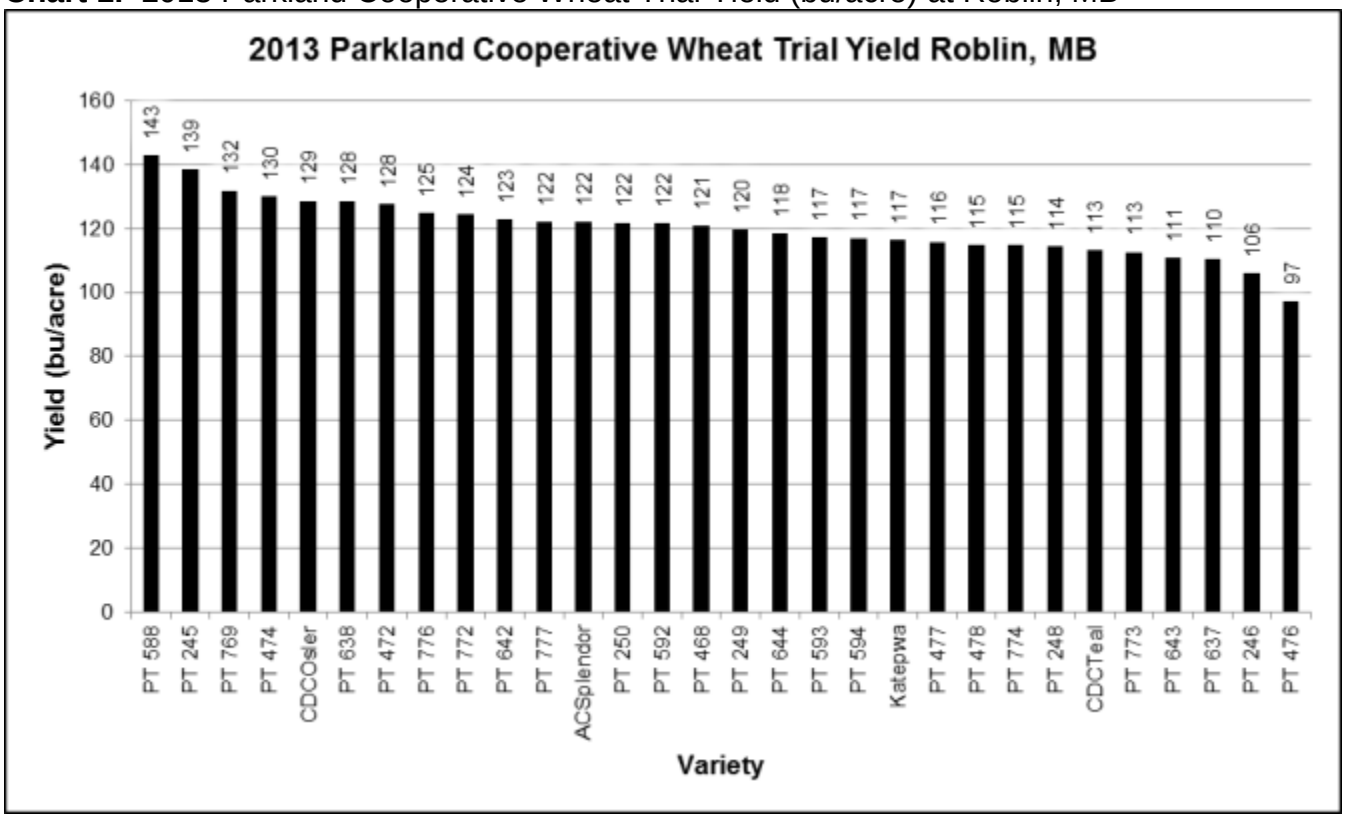
PT 644	7957	353	56	105	114	7	7	ghijk
PT 593	7882	400	58	108	96	3	6	ghijk
PT 594	7867	370	59	107	101	4	6	ghijk
Katepwa	7833	410	57	106	107	5	8	hijkl
PT 477	7788	407	55	109	105	4	7	ijklm
PT 478	7727	460	57	105	99	3	5	jklm
PT 774	7724	380	58	106	113	4	5	jklm
PT 248	7695	447	59	108	93	4	8	jklm
CDC Teal	7602	360	59	108	104	4	7	klm
PT 773	7569	407	59	108	103	5	5	klm
PT 643	7446	423	56	108	106	3	7	lmn
PT 637	7418	380	59	110	111	5	6	mn
PT 246	7119	430	58	107	109	3	7	n
PT 476	6543	370	54	103	104	4	9	o
Grand Mean	8083	392	57	107	104	4	6	--
CV%	2.93	13.96	1.04	1.20	1.39	20.04	8.84	--
LSD	387.63	89.62	0.98	2.10	2.98	1.38	0.90	--
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	--

* Pl/m^2 = Plants per Meter Squared
* DTF = Days to Flower
* DTM = Days to Maturity
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat
* Sign. Diff. Yield = Significant Difference According to Yield

The check varieties for this test are Katepwa, AC Splendor, CDC Teal and CDC Osler. From the data in Table 3, there are two cultivars that are significantly higher yielding than all the checks. They are PT588 and PT245. The maturity for PT588 and PT245 is similar to CDC Osler, Katepwa and CDC Teal and significantly later than AC Splendor. They have significant improvements in standability and good disease resistance. They are slightly shorter than the checks for height.

This is the first year of testing for PT588 and the second year for PT245 at the Roblin location. The 2012 data package for PT245 can be seen at:
http://www.gov.mb.ca/agriculture/diversification/pcdf/reports.html

Chart 1. 2013 Parkland Cooperative Wheat Trial Yield (bu/acre) at Roblin, MB



Important Considerations and Recommendations

Wheat is one of Manitoba's more important cereal crops. In the 2011 census, wheat represented 14 to 17% of Canada's total wheat production. Wheat is an important part of the crop rotation for most farmers and it breaks disease cycles that may plague oilseeds and pulses. Based on the 2011 census, acreage had been declining do to the reduced economic returns from wheat. (Manitoba Government n.d.)

The Canadian Wheat Board monopoly on wheat marketing ended August 1, 2012. Since that pivotal time, producers have access to more marketing options than ever before. Pricing options are more competitive and producers have the ability to maximize economic returns for a relatively easy crop to grow.

Conclusions

The Parkland Cooperative Wheat trial is tailored for developing varieties that are best adapted to the Parkland region of production. It is important that PCDF continues its collaboration with this project to ensure local producers have awareness and access to new CWRS varieties.

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Feed Grains

Pioneer Grain Corn Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Roblin, Manitoba
Cooperator: Arron Nerbas- Sales Consultant, Pioneer Seeds
Jeremy Andres- Sales Consultant, Pioneer Seeds

Background

Field corn in Manitoba is grown for human and livestock consumption. The three main climatic variables that affect adaptation in Manitoba are day length, temperature and rainfall. Day length and temperature affect development (flowering and maturity) and temperature and rainfall affect growth (yield). In Manitoba, cumulative temperatures such as Corn Heat Units (CHU) are closely related to development. CHU are better than calendar days for measuring time between stages because in warmer regions, more CHU are accumulated per day, so corn develops faster per day than in cooler regions. Local factors such as soil type, slope of land, elevation and shelter will modify the growing conditions. Corn hybrids in Manitoba are given a CHU rating, providing a base for selecting hybrids for a particular location.

When calculating the CHU each day for corn, there are several considerations:

- Day and night temperatures are treated separately
- No growth is assumed to occur with night temperatures below 4.4°C or day temperatures below 10°C
- Maximum growth occurs at 30°C and decreases with higher temperatures

(Manitoba Agriculture, Food and Rural Initiatives n.d.)

Corn generally performs best on well-drained, sandy or sandy loam soils. Warm spring soil is important for rapid early season growth. In order to select the best hybrid, the CHU rating of the farm, the CHU of the hybrid and whether the hybrid will be grown for grain or silage must be known. (Manitoba Agriculture and Food 2001)

The average corn heat units for the Roblin/Russell region are 2100-2300 CHU. Some of the varieties grown in the PCDF 2013 trial were in that range and some were just under at 2000 CHU and 2050 CHU.

Developing new varieties of corn with proper heat units that suit the region gives producers an advantage in crop rotations, along with potential economic benefits. Seed companies see the advantage by expanding corn acres in areas that do not traditionally grow this heat loving crop.

[1] PCDF, Roblin

Objective

To evaluate different varieties of grain corn as a possible cropping option for Parkland area producers.

Design, Materials & Operation

Treatments:	4 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 17
Fertilizer applied:	Broadcast 200 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 15 lbs. actual P applied with seed
Pesticide applied:	June 11- Roundup June 25- Roundup July 2- Roundup
Harvest date:	October 18
Product handling:	All cobs from each plot were picked by hand and then ran through the combine. The grain was collected then dried. Weight and moisture were recorded once samples were dry.

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into wheat stubble with 15 lbs. actual P applied with the seed. Throughout the growing season, the trial was sprayed three times with Roundup to control broadleaf and grassy weeds. Plant counts and heights were recorded.

All the cobs from each plot were picked by hand and then they were put through the combine. The grain was collected and then dried. Once the samples were dry, weight and moisture were recorded.

Table 1. 2013 Pioneer Grain Corn Trial Varieties at Roblin, MB

39F44 (2000 CHU)	P7443 (2100 CHU)
P7213R (2050 CHU)	39M26 (2100 CHU)

Table 2. 2013 Spring Soil Nutrient Analysis from 0-24” Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	40 lbs/acre (high)	200
P*	5 ppm (low)	55
K*	174 ppm (high)	10
S*	14 lbs/acre (low)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

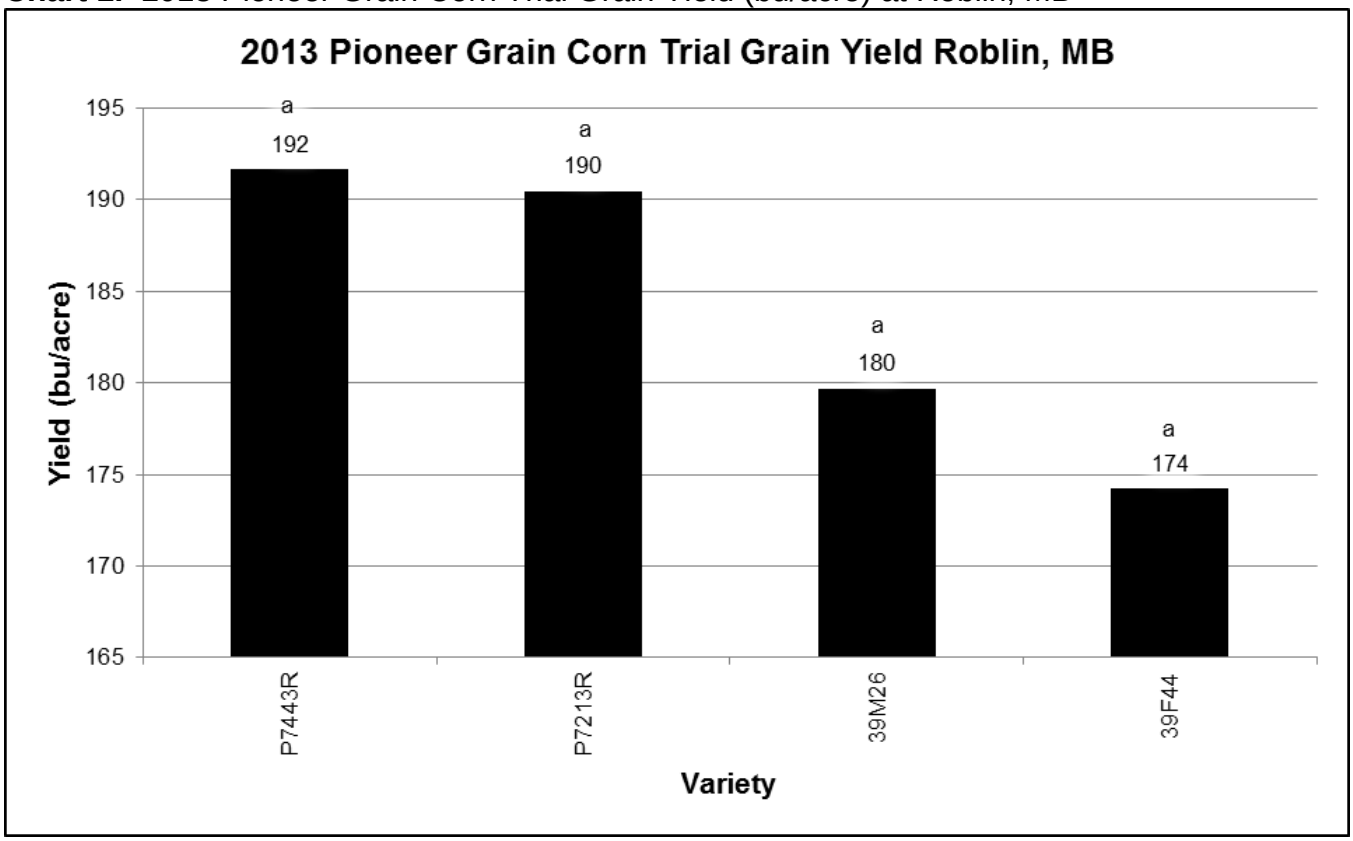
** Analysis by Agvise Laboratories

Results

Table 3. 2013 Pioneer Grain Corn Trial Yield (bu/acre) at Roblin, MB

Variety	Yield (bu/acre)
P7443R	192
P7213R	191
39M26	180
39F44	174
Grand Mean: 184	
CV %: 6.6	
LSD: 24.2	
Sign Diff: No	

Chart 1. 2013 Pioneer Grain Corn Trial Grain Yield (bu/acre) at Roblin, MB



Yield was the only data parameter collected for this trial. There were no significant differences in yield between the varieties. This is as expected since the CHU requirement for these varieties is 2000 to 2100. The calculated CHU for the Roblin area in 2013 was 2501 to 2600. (Manitoba Corn Committee 2013)

Important Considerations and Recommendations

Seed corn is extending its presence into new production zones in the province. Producers are always researching new cropping options to make their business more profitable and sustainable. Seed companies have recognized producers' need for diversification. Companies are committing resources into their corn breeding programs to develop earlier maturing varieties that require lower CHUs and are more adapted to shorter and cooler growing conditions.

Seed companies such as DuPont Pioneer and Monsanto have built and/or expanded existing facilities to accommodate this mandate. Monsanto established a corn breeding facility in Carman, MB as their first big step to a $100 million effort. A second facility will be built in Saskatchewan and Alberta or portions in both provinces. Monsanto is conservatively estimating 8 to 10 million acres of corn in Western Canada by 2025. (Pratt 2013) DuPont Pioneer has built a canola and corn research facility in Ardrossan, AB (near Edmonton). They have completed a facility expansion at their multi-crop research centre in Carman, MB. Their goal is to develop corn varieties by 2018 that require as low as 1850 CHUs. (Western Producer 2013)

Manitoba Agricultural Services Corporation's (MASC) crop insurance program also recognizes that corn is being grown outside of its normal production zones. In 2013, the crop insurance program announced that there would be a "Grain Corn Insurance Test" area added to its insurance areas. The test area encompasses risk areas 6, 7, 8 and 16. The coverage for this new area will be 80 per cent of the lowest probable yield in any of the current insured areas. Producers can select coverage of 50, 70 or 80 per cent of that level. The premium will be the same cost despite the lower coverage. (Dawson 2013) (Manitoba Agricultural Services Corporation 2013)

Manitoba producers increased their grain corn acreage from 273,000 in 2012 to 334,620 in 2013. (Manitoba Corn Committee 2013) The expectation is that corn will displace other cereal acreage and the main end use will be for livestock feed. Corn has higher yield potential than other cereals so there is an opportunity to produce more feed per acre on the same land. (Western Producer 2013)

Science has broken many barriers in corn genetics and its applications in production. Corn hybrids can manufacture their own built-in pesticides to combat pests. Drought tolerance to expand production areas and stabilize production swings. Another interesting twist to corn production is the research being done by a U.K.-based company called Azotic Technologies. They are poised to introduce a biological seed treatment that will enable corn plants to fix their own nitrogen in a similar manner as soybeans and other legumes. (Country Guide 2013)

Conclusions

The four varieties performed similar in yield. This is as expected since all four varieties had a pre-determined CHU of 2000 to 2100 and this is within the calculated CHU for this area. A number of seed companies are investing significant resources into developing corn varieties

with lower CHU requirements and expanding corn acres into shorter and cooler production zones. It is important that PCDF continues to evaluate potential corn varieties for this area.

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Western Feed Grains Development Cooperative Variety Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1] and Amy Stewart[1]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Dana Maxwell- Plant Breeder, Ag-Quest Inc.
Dr. Matthew Yau- Plant Breeder, Ag-Quest Inc.

Background

For over forty years, there have been unsuccessful attempts by both public and private groups to develop and license a feed wheat variety. For this reason, the formation of the Western Feed Grains Development Cooperative (WFGDC) was initiated. These failed attempts were largely due to the traditional approach taken by breeders that has stringent Kernel Visual Distinguishability (KVD) requirements for variety licensing. Some of the cultivars developed by the WFGD Cooperative will be exempt from licensing and KVD requirements because the seed will be supplied to members only. Grain will be sold only to members and will be used exclusively for livestock feed or ethanol production within a closed loop system. Other cultivars developed by the WFGDC have been submitted for registration under the new Canada Western General Purpose wheat class.

Wheat is usually available for feeding cattle when it cannot meet “human grade”. (Manitoba Agriculture Food and Rural Initiatives 2005) Poor weather conditions and disease determine the availability of supply. By developing these feed wheat varieties, it gives the farmers a continuous supply of grain for livestock without compromising the better quality grain for feed. New high yielding cultivars with low FHB and lower protein will increase feed value (i.e., higher energy value) and farm gate revenues, lower feed costs and reduce the reliance on imported feed grains, both provincially and internationally.

The WFGD is currently offering memberships to both grain producers and end users of the grain. Membership fees collected will finance the research necessary for such development. Feed wheat cultivar releases are anticipated in approximately five to seven years from the time the first crosses are made and some cultivars developed by the WFGD Cooperative are very close to public release at this time.

Since some of the feed wheat varieties will not be registered, it is imperative that all members enter contracts which state clearly that any grain produced will not enter the export market, they will only sell to recognized members of the WFGD Cooperative and the grain will only be used for livestock feed and ethanol purposes.

[1] PCDF, Roblin

Feed grain development is not limited to only wheat, as many feed grain varieties could be developed in the future through this cooperative. (Western Feed Grain Development Co-op Ltd. n.d.)

Objective

To test different varieties of feed wheat on behalf of the WFGDC.

Design, Materials & Operation

Treatments: 36 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Lattice
Seeding date: May 16
Fertilizer applied: Broadcast 100 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S
20 lbs. actual P applied with seed
Pesticide applied: June 11- Axial and Barricade
Harvest date: September 16
Product handling: Each individual plot harvested with weight and moisture recorded

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 20 lbs. actual P applied with the seed. The trial was sprayed once throughout the growing season to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, maturity date and lodging was recorded throughout the growing season.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight and moisture were recorded. All seed samples were transported to Ag-Quest in Minto, Manitoba for further quality analysis.

Table 1. 2013 Western Feed Grains Development Cooperative Variety Trial Varieties at Roblin, MB*

AC Andrew	WFT 824	Y08-04-L3 (10.1) H15
KAZCIM11-26	WFT 839	Y08-05-L6 (32.4) H5
Pasteur	Y07-11 (22SH)(29.4)H5	Y09-04 (6SH)(29.4) H9
Sadash	Y07-11 (22SH)(29.4)H7	Y09-04 (6SH)(29.4) H32
WFT 409	Y07-11 (22SH)(29.4)H8	Y09-06-Macyk
WFT 411	Y07-11 (22SH)(29.4)H11	20SAWYT-342
WFT 603	Y07-11 (22SH)(29.4)H14	20SAWYT-345
WFT 717	Y07-11 (22SH)(29.4)H24	20SAWYT-365
WFT 721	Y08-01 L16-S1 (37.2) H4	20SAWYT-388
WFT 736	Y08-04-L3 (10.1) H11	29SAWSN-3058
WFT 805	Y08-04-L3 (10.1) H13	44IBWSN-1136
WFT 813	Y08-04-L3 (10.1) H14	5702 PR

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	100
P*	12 ppm (med)	60
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate
** Analysis by Agvise Laboratories

Results

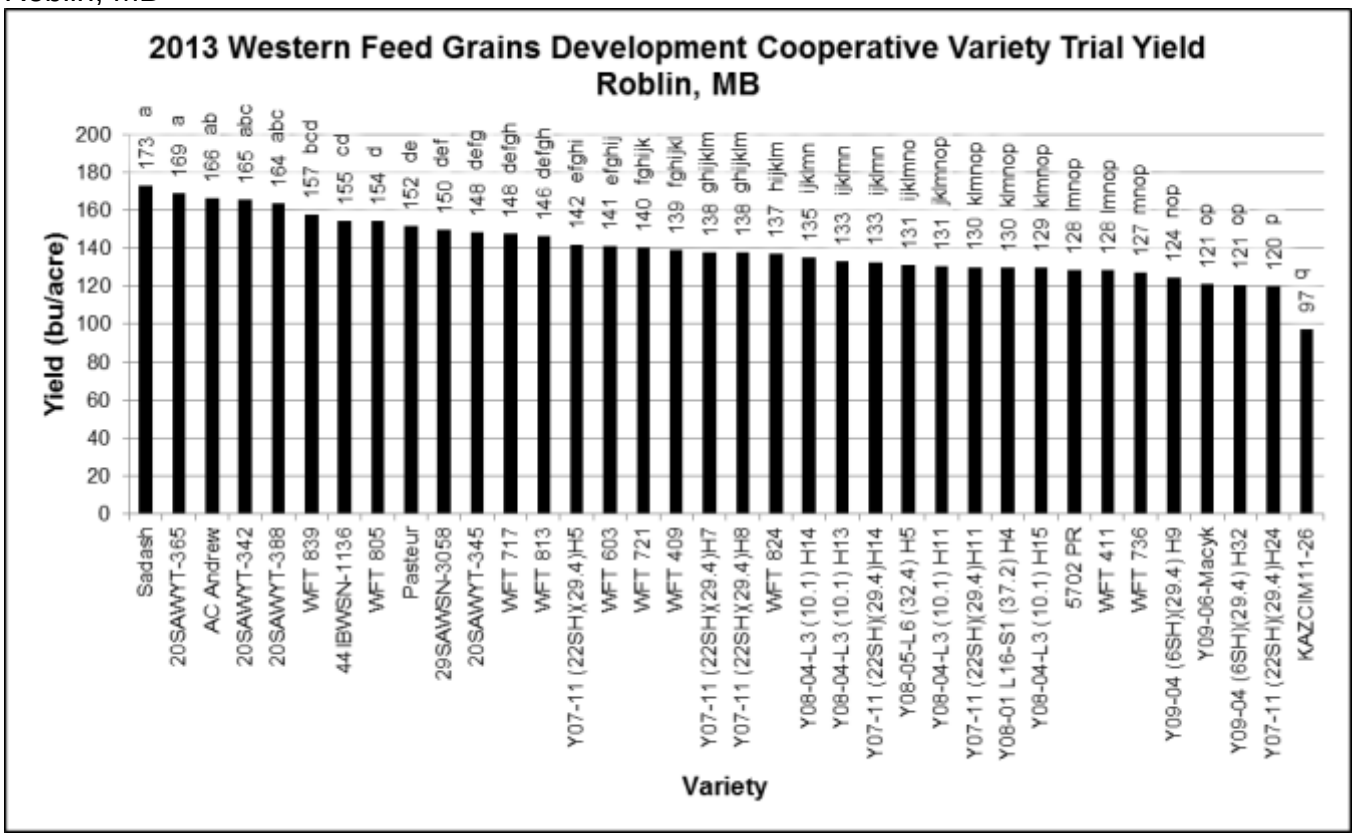
Table 3. 2013 Western Feed Grains Development Cooperative Variety Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Pl/m^2*	DTH*	DTF*	Score @ Anth. (1-5)*	DTM*	Height (cm)	Disease (1-9)*	Lodging (1-9)*
Sadash	11,635	323	57	63	4	116	107	4	8
20SAWYT-365	11,369	387	58	62	2	111	108	3	4
AC Andrew	11,169	420	58	64	3	110	105	2	3
20SAWYT-342	11,112	333	56	60	2	110	98	2	5
20SAWYT-388	10,992	407	57	61	2	111	106	3	2
WFT 839	10,576	323	62	66	2	112	107	2	4
44IBWSN-1136	10,388	377	54	58	2	114	91	4	6
WFT 805	10,382	337	60	66	3	108	106	3	7
Pasteur	10,197	393	58	64	3	114	96	2	4
29SAWSN-3058	10,073	417	56	59	2	111	105	3	5
20SAWYT-345	9960	333	60	65	3	108	110	3	4
WFT 717	9947	323	54	58	2	107	114	5	6
WFT 813	9828	280	59	63	2	111	97	3	5
Y07-11 (22SH) (29.4) H5	9538	470	57	61	3	109	114	4	5
WFT 603	9502	350	55	62	4	114	112	3	5
WFT 721	9436	357	58	62	2	112	121	4	8
WFT 409	9333	410	55	60	3	107	94	3	5
Y07-11 (22SH) (29.4) H7	9272	447	56	60	2	110	114	5	5
Y07-11 (22SH) (29.4) H8	9251	357	55	60	2	110	113	3	6
WFT 824	9206	340	59	63	2	108	119	6	7

Y08-04-L3 (10.1) H14	9070	400	54	59	3	110	114	5	5
Y08-04-L3 (10.1) H13	8931	340	56	61	3	111	119	3	5
Y07-11 (22SH) (29.4) H14	8924	470	56	61	3	110	116	4	6
Y08-05-L6 (32.4) H5	8810	390	59	63	2	113	121	4	5
Y08-04-L3 (10.1) H11	8773	457	56	62	3	110	119	3	6
Y07-11 (22SH) (29.4) H11	8746	410	57	63	4	114	114	5	8
Y08-01 L16-S1 (37.2) H4	8745	373	57	61	2	113	114	7	8
Y08-04-L3 (10.1) H15	8703	437	56	61	3	111	119	3	4
5702 PR	8638	410	55	59	3	110	98	5	4
WFT 411	8624	393	50	56	3	110	100	6	3
WFT 736	8565	395	53	57	2	110	100	5	6
Y09-04 (6SH)(29.4) H9	8359	437	56	61	3	108	117	6	5
Y09-06-Macyk	8134	370	51	55	3	108	104	6	7
Y09-04 (6SH)(29.4) H32	8114	410	48	56	4	108	107	5	7
Y07-11 (22SH) (29.4) H24	8049	427	64	71	4	115	108	4	8
KAZCIM11-26	6545	380	61	64	2	109	114	3	8
Grand Mean	9414	386	57	61	3	111	109	4	6
CV%	4.92	15.09	1.49	1.65	24.16	3.16	2.73	14.15	38.45
LSD	753.58	94.73	1.38	1.65	1.07	5.70	4.83	0.90	3.52
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Pl/m^2 = Plants per Meter Squared
* DTH = Days to Heading
* DTF = Days to Flowering
* Score @ Anth. (1-5) = Score at Time of Flower: 1- very early, 5- very late
* DTM = Days to Maturity
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Completely Flat

Chart 1. 2013 Western Feed Grains Development Cooperative Variety Trial Yield (bu/acre) at Roblin, MB



The checks for this test are Sadash, AC Andrew, Pasteur and 5702 PR. The entries 20SAWYT-365, 20SAWYT-342 and 20SAWYT-388 are similar in yield to Sadash and AC Andrew and significantly higher yielding than Pasteur and 5702PR. 20SAWYT-365, 20SAWYT-342 and 20SAWYT-388 are similar in maturity to all the checks. In regards to lodging, they are similar to all the checks except for Sadash where they are significantly better for standability.

Important Considerations and Recommendations

Kernel Visual Distinguishability (KVD) has been eliminated and a General Purpose class has been established. This will allow the registration of wheat varieties that do not meet the requirements of the other classes. Varieties registered in the General Purpose class will be suitable for feed, ethanol use and possibly some wheat millers. Strong disease resistance and high yield potential will be some of the agronomic attributes affiliated with these wheat varieties.

The WFGD Co-op wheat breeding program started with a few initial crosses and the focus has increased to a total of 190 crosses made to date. The breeding program is tailored for the General Purpose class and targeted for the end users mentioned above.

The WFGD Co-op has been successful in registering their first General Purpose Wheat variety, WFT 603, in February 2013. WFT 603 is an awned variety with excellent yield potential, average maturity and a good disease resistance package. PCDF played an integral part in providing data to support the WFGD Co-op in their registration process. (Western Feed Grain Development Co-op Ltd. n.d.)

Conclusions

The General Purpose Wheat class will provide other opportunities for producers in marketing their grain. WFGD Co-op will provide additional value for local producers by conducting their breeding and selection process in western Manitoba. PCDF will continue to play a role in the evaluation and adaptability of the germplasm in the Parkland region.

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—. "Welcome." *Western Feed Grain Development Co-op Ltd.* n.d. http://www.wfgd.ca/welcome.htm (accessed December 13, 2013).

Forage Crops

Advanced Forage Barley Forage Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Ana Badea[2]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Ana Badea- Barley Breeder, AAFC Brandon
Rudy Von Hertzberg- Research Technician, AAFC Brandon

Background

One of the most cost-effective ways for cattle producers to feed their livestock is to include forage barley in their feeding regimes. Forage barley is a low-cost, easy to grow, high yielding crop that is well-adapted to all barley growing areas of the world. Forage barley is especially well-adapted to the Parkland region and is versatile, where it can be field-grazed before it heads, swath-grazed in the late summer and early fall, or put up as greenfeed, chopped or ensiled for over-winter use. Feed conversion of the newest forage barley varieties is often high enough to be considered as a mainstay in dairy rations.

New forage barley varieties are being developed that demonstrate a very high yield potential with moderate inputs while maintaining a Relative Feed Value in excess of 100. This is a more effective source of cattle feed than other sources of grain or silage corn. Other grains and silage corn are more expensive to grow and they are higher risk in the short seasoned Parkland region.

AC Ranger, Vivar (two registered varieties) and FB015 (control for waxy type) were grown at Roblin this year, as well as 11 numbered breeding lines under evaluation for possible registration.

Objective

To test the top forage barley varieties from the barley breeding program at AAFC Brandon.

Design, Materials & Operation

Treatments: 14 (Table 1)
Replication: 4
Plot size: 1m x 5m
Test design: Randomized Complete Block Design

[1] PCDF, Roblin
[2] AAFC, Brandon

Seeding date: May 17
Fertilizer applied: Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S
15 lbs. actual P applied with seed
Pesticide applied: June 11- Axial and Barricade
Harvest date: August 7
Product handling: Total plot weighed with subsample taken to determine dry matter

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. The trial was sprayed once throughout the growing season to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, disease and lodging was recorded throughout the growing season.

Each individual plot was harvested with a Mitsubishi rice harvester. Each treatment was then weighed and a subsample was taken to be dried down and weighed to determine dry matter yield. The samples were then sent to AAFC-Brandon for further quality analysis.

Table 1. 2013 Advanced Forage Barley Forage Trial Varieties at Roblin, MB*

AC Ranger	EX819-4
EX812-26	EX819-10
EX814-2	EX819-33
EX814-3	EX820-8
EX814-5	EX820-19
EX818-3	FB015
EX818-6	Vivar

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate
** Analysis by Agvise Laboratories

Results

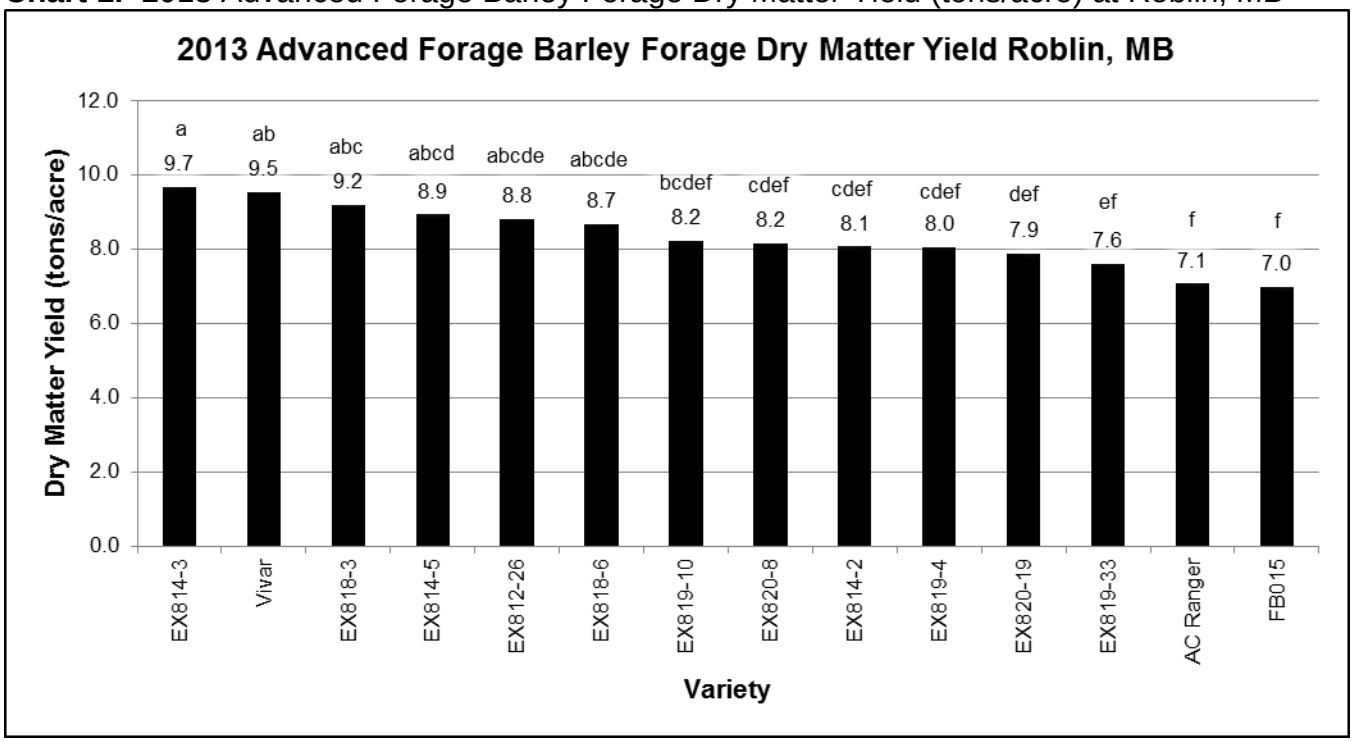
Table 3. 2013 Advanced Forage Barley Forage Trial Results at Roblin, MB

Variety	DMY (kg/ha)*	Plants per Meter^2	Days to Heading	Disease (1-9)*	Lodging (1-9)*	Height (cm)
EX814-3	21,657	263	57	3	4	114
Vivar	21,385	273	55	3	2	102
EX818-3	20,619	270	56	4	4	114
EX814-5	20,021	280	55	3	3	108
EX812-26	19,740	233	56	3	3	113

EX818-6	19,444	223	54	4	2	105
EX819-10	18,428	280	55	2	1	103
EX820-8	18,282	240	55	3	4	105
EX814-2	18,083	313	55	3	3	106
EX819-4	18,036	283	53	3	4	103
EX820-19	17,635	263	57	3	2	104
EX819-33	17,035	285	52	2	4	101
AC Ranger	15,847	218	55	2	2	99
FB015	15,624	255	53	4	6	112
Grand Mean	18,073	263	55	3	3	107
CV%	11.12	15.80	2.01	31.00	64.48	4.45
LSD	2976.30	59.30	1.57	1.31	2.67	6.75
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes

* DMY (kg/ha) = Dry Matter Yield in Kilograms per Hectare
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat

Chart 1. 2013 Advanced Forage Barley Forage Dry Matter Yield (tons/acre) at Roblin, MB



Almost all the feed/forage breeding lines evaluated have shown higher dry matter yield than AC Ranger but lower than the other check, Vivar. The exception is the line EX818-3 which has significantly higher dry matter yield than AC Ranger and also similar dry matter yield to Vivar.

Of particular interest are the following two feed/forage breeding lines EX819-4 and EX819-10 which have shown higher dry matter yield than AC Ranger (Table 3 and Chart 1 above) and higher grain yield than Vivar (see Advanced Forage Barley Grain Trial- Table 3 and Chart 1) .

The three waxy breeding lines tested were EX812-26, EX-818-6 and EX820-19. Two of them, EX812-26 and EX-818-6, have higher dry matter yield than the waxy check line FB015.

Important Considerations and Recommendations

The test in 2013 was comprised of eight feed/forage breeding lines and three waxy breeding lines targeted for early swath-grazing along with the suitable checks: AC Ranger, Vivar and FB105. The FB105 waxy line was previously developed by Dr. Mario Therrien at Brandon Research Center (BRC). This line showed promising characteristics for early season swath-grazing due to its heavy cuticular wax layer however it was not put forward for registration due to inferior grain yield.

Conclusions

Forage barley has an excellent fit as an annual source of forage for livestock, especially in the Parkland and northern areas of Manitoba. Moreover, the development of new forage barley with a coat of heavy cuticular wax could circumvent the loss in forage quality and quantity in the interval between swathing and grazing and offer livestock producers with more options and flexibility which can translate into significant economic returns and environmental advantages.

Western Canada Forage Barley Coop Forage Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Pat Juskiw[2]

Site Information

Location: Roblin, Manitoba
Cooperator: Dr. Patricia Juskiw- Barley Breeder, Lacombe Field Crop Development Center
Susan Lajeunesse- Research Technician, Lacombe Field Crop Development Center

Background

The Western Canada Forage Barley Coop Forage Trial is run under the auspices of the Prairie Recommending Committee for Oat and Barley (PRCOB). More information on PRCOB can be found at http://www.pgdc.ca/committees_ob.html. The purpose of PRCOB is to generate data for oat and barley lines for the purpose of evaluation and recommendation of lines for registration by the Varieties Office of the Canadian Food Inspection Agency (CFIA).

Dr. Pat Juskiw and Susan Lajeunesse of the Field Crop Development Centre (FCDC), Lacombe, AB act as the coordinators for the Forage Barley Coop. In that capacity Pat and Susan coordinate the supply of seed to each of the cooperators. The cooperators run the trials. There were seven forage and six grain sites in 2013.

There were nine entries plus four check varieties in the 2013 trial: AC Ranger, a six-row, hulled variety from AAFC-Brandon, Vivar, a six-row, hulled, semi-dwarf variety from FCDC, CDC Austenson, a two-row, hulled variety from Crop Development Centre, Saskatoon and Gadsby, a two-row, hulled variety from FCDC. AC Ranger was released by Dr. Therrien from AAFC-Brandon due to its high biomass yields, good standability and forage quality that surpassed that of Virden. Vivar has exceptionally good straw strength and for a semi-dwarf also has high grain and biomass yields. It also has better forage quality than Virden. In 2013, 2 two-row checks were also added to the Forage Coop. They were Gadsby for its scald resistance and good forage digestibility and CDC Austenson for its lodging resistance. Both Gadsby and CDC Austenson have good grain yields. These four varieties are used for comparison purposes as candidate lines must meet or exceed them for yield and quality.

Objective

To evaluate different lines of barley for forage analysis.

[1] PCDF, Roblin
[2] FCDC, Lacombe

Design, Materials & Operation

Treatments:	13 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 50 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S 15 lbs. actual P applied with seed
Pesticide applied:	June 11- Axial and Barricade
Harvest date:	August 6
Product handling:	Total plot weighed with subsample taken to determine dry matter

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The trial was seeded into tilled corn stubble with 15 lbs. actual P applied with the seed. The trial was sprayed once throughout the growing season to control broadleaf and grassy weeds. Data such as plant counts, heading date, height, disease and lodging was recorded throughout the growing season.

Each individual plot was harvested with a Mitsubishi rice harvester. Each treatment was then weighed and a subsample was taken to be dried down then weighed to determine dry matter yield. The samples were then sent to the Lacombe Field Crop Development Center for further quality analysis.

Table 1. 2013 Western Canada Forage Barley Coop Forage Trial Varieties at Roblin, MB *

AC Ranger	FB446
CDC Austenson	FB447
FB018	FB449
FB206	FB450
FB439	Gasby
FB442	Vivar
FB445	

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24” Depth at the Roblin, MB Site **

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	52 lbs/acre (low)	50
P*	12 ppm (med)	55
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate

** Analysis by Agvise Laboratories

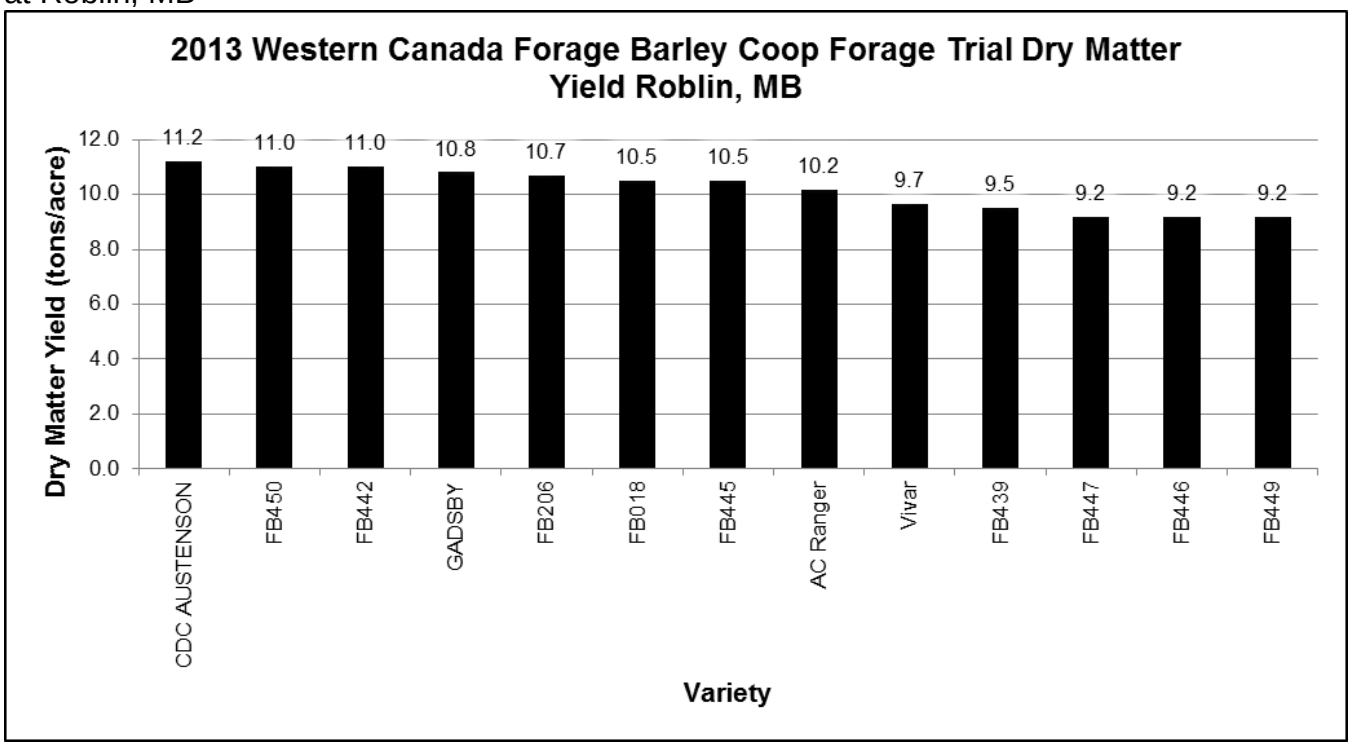
Results

Table 3. 2013 Western Canada Forage Barley Coop Forage Trial Results at Roblin, MB

Variety	DMY (kg/ha)*	Pl/m^2*	Height (cm)	DTH*	Disease (1-9)*	Lodging (1-9)*	Visual (1-9)*
CDC AUSTENSON	25,110	227	107	57	4	5	5
FB450	24,713	260	111	58	4	7	6
FB442	24,702	227	116	56	3	5	6
GADSBY	24,227	243	115	58	3	8	4
FB206	23,926	237	123	60	3	6	7
FB018	23,578	263	111	54	3	5	4
FB445	23,546	243	107	54	3	3	5
AC Ranger	22,782	213	108	53	2	4	5
Vivar	21,668	233	104	55	4	5	3
FB439	21,341	243	102	53	2	7	4
FB447	20,606	213	105	53	5	3	3
FB446	20,567	213	115	57	3	8	3
FB449	20,541	247	105	57	5	6	4
Grand Mean	22,870	236	110	56	3.36	6	5
CV%	12.14	22.93	2.29	1.29	23.92	36.27	17.56
LSD	4679.24	91.04	4.24	1.21	1.35	3.40	1.36
Sign Diff	No	No	Yes	Yes	Yes	Yes	Yes

* DMY (kg/ha) = Dry Matter Yield in Kilograms per Hectare
* Pl/m^2 = Plants per Meter Squared
* DTH = Days to Heading
* Disease (1-9) = 1- No Disease, 9- Dead Preferred
* Lodging (1-9) = 1- Fully Erect, 9- Fully Flat
* Visual (1-9) = 1- Very Poor, 9- Excellent

Chart 1. 2013 Western Canada Forage Barley Coop Forage Trial Dry Matter Yield (tons/acre) at Roblin, MB

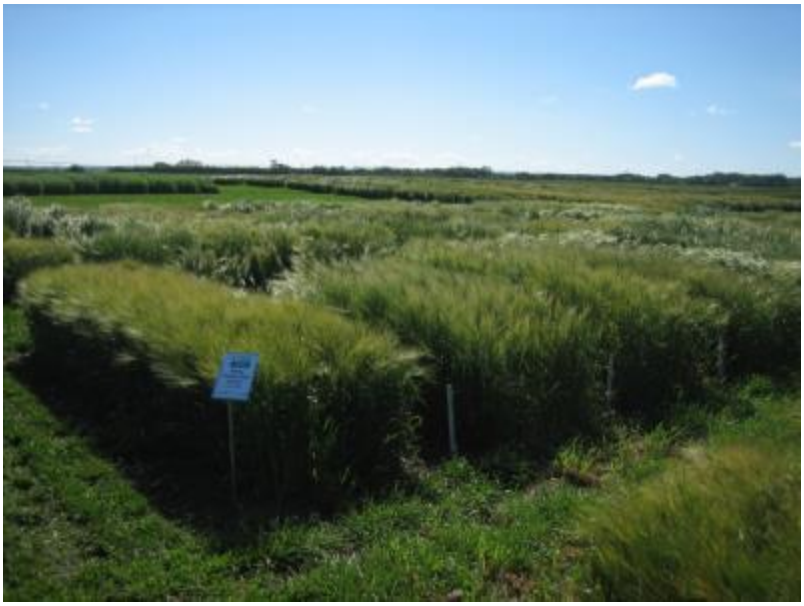


There were no significant differences in forage yield between the experimental lines and the checks.

Important Considerations and Recommendations

Other uses for feed barley are forage and in the forms of green feed or silage. Green feed is cutting and baling the crop when the crop has reached the early to soft dough stage. To make silage, the entire plant is cut down, piled, compacted and then allowed to ferment. The early to soft dough stage is the best crop stage for silage as well. Cereal crops are the most versatile of the annual crops for forage. Crop rotation is as important in forage production as it is in grain production for reducing disease incidence and maintaining yield targets. Barley fits into the rotational schedule across the prairies. (Alberta Agriculture and Rural Development 2004)

Barley is suited for forage production because it can be seeded early, matures earlier, better drought tolerance and is yield responsive to improved management practices. It also provides an opportunity to spread out the harvest workload. (Saskatchewan Ministry of Agriculture n.d.) The rule of thumb for varietal selection is a high yielding variety for grain will be high yielding for green feed or silage. Smooth awned varieties are more suited for forage production than rough awned varieties. Rough awned varieties can cause mouth infections and lumps on the jaw. (Foragebeef.ca 2013) Semi-dwarf varieties have better lodging resistance which makes them more suited for using higher fertility to increase yield and growing it under high moisture conditions. The standard varieties may produce a higher percentage of stem in the silage ratio than a semi-dwarf type.



When dealing with forage quality, consideration is needed for digestible energy content, crude protein and potential dry matter intake. Feed testing tells a lot about the quality of the feed and how to use it in a least cost manner. Some nutritional things to keep in mind are that cereal forages tend to be low in magnesium and calcium, and possibly higher levels of potassium which will impair magnesium absorption, causing tetany. A supplemental mineral package is required when feeding annual cereals during the winter months. (Foragebeef.ca 2013)

Both quantity and quality of forage is important, with the quality being of more importance to the dairy and backgrounding industries. For an overwinter beef cow, it is most important to have enough feed to support her maintenance requirements. While quality is not as important to the beef cow as the dairy cow, improvements in quality can be made to benefit this sector.

Conclusions

Barley is diverse in its applications in Canadian agriculture. Good quality forage production is important to livestock producers and barley is considered the best cereal option for this. Varietal selection and evaluation is important to ensure excellent varieties are registered for forage applications.

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Forage Establishment Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1], Elizabeth Nernberg[2] and Pam Iwanchysko[3]

Site Information

Location: Roblin, Manitoba
Cooperator: Forage Team- Manitoba Agriculture, Food and Rural Development

Background

Due to excess moisture over the last several years, many forage fields have reverted to Kentucky Bluegrass and more invasive species. Many of the more productive tame species have depleted in forage fields across Manitoba. Re-establishment of dense, vigorous stands of alfalfa/legumes is essential for long-term profitability, but establishment can be challenging because seedling alfalfa is vulnerable to competition from weeds, wind and water erosion. Weed contamination can also reduce the quality of alfalfa hay. Establishment strategies have been designed to reduce the risk of establishment. One of the most widely used strategies is using companion (cover) crops like oats or barley. Companion crops reduce stand loss from wind and water erosion and may suppress the growth of some weeds. For spring seeding, companion crops also provide greater assurance of economic return in the seeding year. However, even with reductions in seeding rates and removal before maturity, small grain companion crops can provide competition with new alfalfa seedlings and reduce alfalfa yield potential. This trial was undertaken to show the respective differences between forage establishment with and without a companion/nurse crop.

Objective

To demonstrate forage seeding recommendations including companion crop seeding rate.

Design, Materials & Operation

Treatments: 7 main treatments with 3 sub treatments (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Split Plot Design
Seeding date: June 5, 2012
Fertilizer applied: Broadcast 55 lbs. actual P, 20 lbs. actual S
Pesticide applied: None
Harvest dates: First Cut- July 3, 2013
Second Cut- August 20, 2013

[1] PCDF, Roblin
[2] MAFRD, Roblin
[3] MAFRD, Dauphin

Product handling: A 60cm x 100 cm cut was taken from the middle of each treatment. Wet weight was recorded and a 500 gram subsample was taken and dried down to determine dry matter.

In the spring, phosphorus and sulfur were broadcast by hand according to soil test results. Heights were recorded before each harvest. Harvest took place when the alfalfa was between first flower and 10% bloom. This year there were two harvests. One thing to note for 2013 is that the second cut regrowth was at the bud stage prior to freeze-up; therefore, a third cut could have been possible for this year.

A 60 cm x 100 cm area was taken from the middle of each treatment using a Swift Mower. Each treatment was weighed to record wet weight and then a 500 gram subsample was taken, dried down and weighed to determine dry matter yield.

Table 1. 2013 Forage Establishment Trial Treatments at Roblin, MB

High Concentration of Barley (2.5 bu/ac)	Low Concentration of Barley (0.5 bu/ac)	No Barley
Alfalfa Tap	Alfalfa Tap	Alfalfa Tap
Alfalfa Creeping	Alfalfa Creeping	Alfalfa Creeping
KY Blue Grass	KY Blue Grass	KY Blue Grass
Alfalfa Grass Mix	Alfalfa Grass Mix	Alfalfa Grass Mix
Saline Mixture	Saline Mixture	Saline Mixture
Pasture	Pasture	Pasture
Native Mix	Native Mix	Native Mix

Table 2. 2013 Spring Soil Nutrient Analysis from 0-24" Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	40 lbs/acre (high)	0
P*	5 ppm (low)	55
K*	174 ppm (high)	0
S*	14 lbs/acre (low)	20

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate
** Analysis by Agvise Laboratories

Results

Table 3. 2013 Forage Establishment Trial Yield (kg/ha) Results at Roblin, MB

Forage Mixture	Barley Rate*	First Cut Yield (kg/ha)	Second Cut Yield (kg/ha)	Total Yield (kg/ha)	Total Yield Sign. Diff.
Saline Mix	None	8488	6935	15,423	a
Saline Mix	Low	7111	6791	13,902	bc
Saline Mix	High	5109	6013	11,122	e
Alfalfa Grass Mix	None	6270	8062	14,332	ab
Alfalfa Grass Mix	Low	7468	6969	14,437	ab

Alfalfa Grass Mix	High	5960	5655	11,615	de
Alfalfa Creeping	None	5938	6982	12,920	cd
Alfalfa Creeping	Low	5493	7483	12,976	c
Alfalfa Creeping	High	5603	7333	12,936	c
Alfalfa Tap	None	5695	7266	12,961	c
Alfalfa Tap	Low	5577	5708	11,285	e
Alfalfa Tap	High	5575	5474	11,049	e
Pasture	None	7021	4171	11,192	e
Pasture	Low	5462	4856	10,318	e
Pasture	High	3822	3457	7278	f
Native Forages	None	4289	3470	7759	f
Native Forages	Low	3283	2090	5373	g
Native Forages	High	1767	1723	3490	h
Kentucky Bluegrass	None	2897	2496	5393	g
Kentucky Bluegrass	Low	2753	1925	4678	gh
Kentucky Bluegrass	High	1378	2182	3560	h
Grand Mean		5093	5097	10,191	
CV%		20.51	20.58	13.40	
LSD		999	1003	1306	
Sign Diff		Yes	Yes	Yes	

* Barley Rate = None- No barley, Low- 0.75 bu/acre, High- 1.75 bu/acre

Chart 1. 2013 Forage Establishment Total Production Yield (lbs/acre) at Roblin, MB

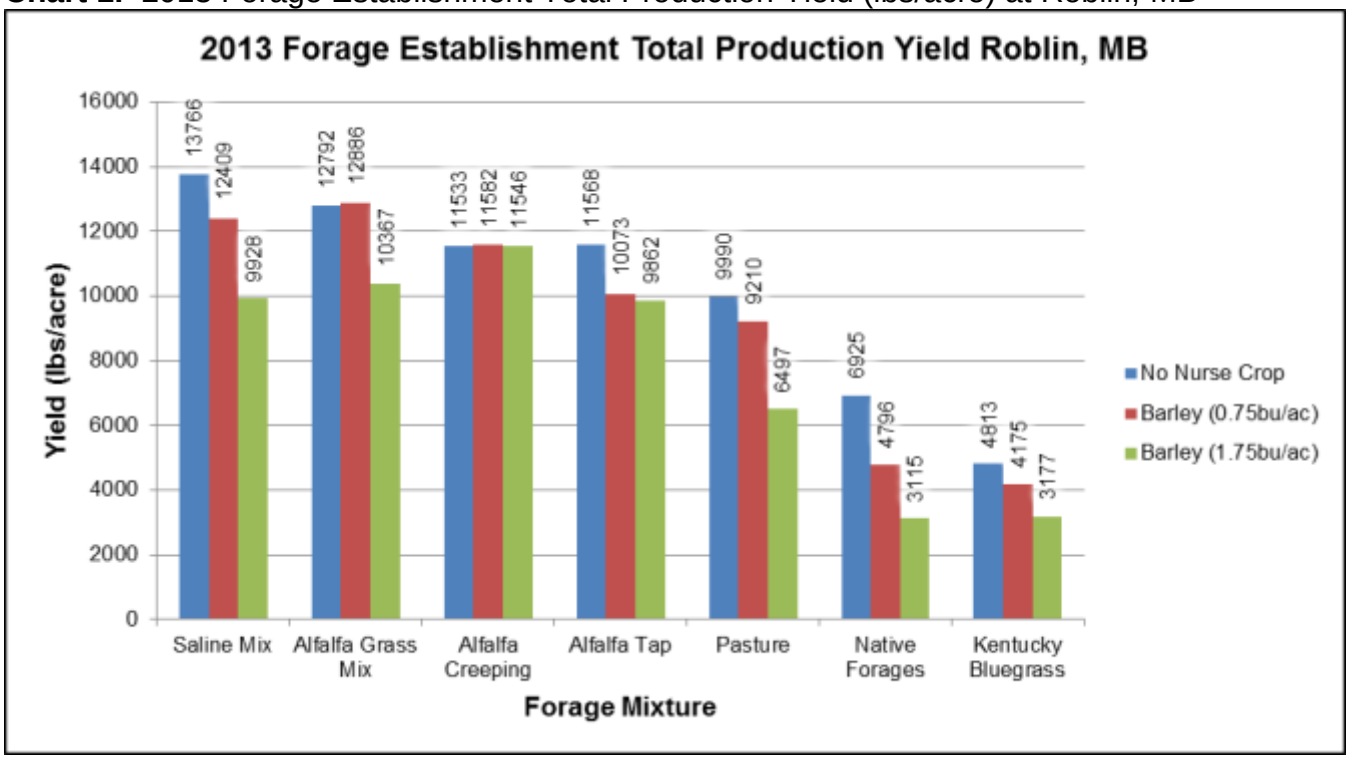

Table 3 and Chart 1 illustrate the impact on production a companion crop may have on establishing the different forage mixtures. The degree of impact varies depending on the forage mixture type and the density of the companion crop. Factors contributing to this are the interaction of the competitive natures of the companion crop and the forage mixture type and the length of time a forage mixture may require to be fully established.

In general, this trial illustrates that a high density of barley as a cover crop reduces production the most when compared to no companion crop or a low density of barley for the majority of the forage mixtures. The forage mixtures Saline Mix, Alfalfa Tap and Native Forages had significantly higher production when there was no companion crop. Alfalfa Grass Mix, Pasture and Kentucky Bluegrass had significantly higher production with no companion crop or a low density of barley when compared to the higher density of barley. Alfalfa creeping yielded similar under all three companion crop options. The highest production overall was harvested from the Saline Mix with no companion crop. This combination was significantly higher yielding than all the other combinations except for the Alfalfa Grass Mix grown with no companion crop or a low density of barley.

Important Considerations and Recommendations

The use of a companion crop is one of the factors affecting forage establishment. Although companion crops provide additional income in the year of forage establishment, protect seedlings from wind and soil erosion and help suppress weeds, they also compete with forages for moisture, light and fertility. (Saskatchewan Forage Council 2007) Thus the use of a

companion crop may be more successful when adequate growing season precipitation is received.

In selecting a companion crop, choose one that is the least competitive. The following crops are listed in order of least to most competitive: flax, millet, oats, canola, wheat and barley. (Manitoba Agriculture, Food and Rural Development n.d.)

When using a companion crop, other management strategies can ensure a more successful forage establishment. For example, reduce the seeding rate of it by 30 to 50 percent of recommended rates. Seeding the forage at right angles to the companion crop will also reduce the amount of competition, although it may not be the most practical. In addition, harvesting the cereal crops early as a greenfeed or silage will reduce the competition, with silage being the best option. (Manitoba Agriculture, Food and Rural Development n.d.) Additionally do not harvest the cover crop when it is very hot as forage seedlings are susceptible to high temperatures.

Besides the use of companion crops, there are many other factors affecting forage establishment. They include field preparation, forage selection, seeding, fertility and inoculants outlined below.

Planning to establish forages should take place a year prior in order for the field to be properly prepared. Consideration must be taken to be sure the soil is free of herbicide residues such as chloropyid (Lontrel, Curtail M) and in some cases 2,4-D. Reducing the weed population in the field prior to establishing the forages is recommended, as options in crop herbicides for forages are limited. Seedbed preparation is also part of preparing the field particularly because forage seeds are so small. A smooth, firm, moist and relatively weed-free seedbed is desired. (Manitoba Agriculture, Food and Rural Development n.d.)

Selecting the right forage based on its intended use and site conditions will also improve forage establishment. Certain species are better suited for hay production like timothy, while others are more suited to grazing, like meadow bromegrass. There are also species differences in water use efficiency with some doing better on dry soils like alfalfa and crested wheat grass and some preferring wetter soils like red clover and reed canary grass. (Manitoba Agriculture, Food and Rural Development n.d.)

Seeding timing, method and rate affect forage establishment as well. The best time to seed forages is when spring conditions are cool and moist. With the numerous methods of seeding, be sure to choose the method that allows for seeding shallow into a firm, moist seed bed. Seeding too deep reduces emergence of most forage species, so aim for a depth of ½ to ¾ inch. Seeding rates can be calculated by using seed weight and target plant populations. (Manitoba Agriculture, Food and Rural Development n.d.)

Fertility also plays an important role with forage establishment. Fields should be soil tested and fertilized based on the corresponding recommendations. With phosphorus improving root development and potassium improving winter survivability, these nutrients are particularly

important for forage establishment. (Saskatchewan Forage Council 2007) (Manitoba Agriculture, Food and Rural Development n.d.)

Using inoculants for legumes is necessary for their establishment. By inoculating immediately prior to planting, early and increased development on the nodules is encouraged resulting in more vigorous seedlings as they utilize the soil nitrogen quicker. Since inoculants are host specific, make sure the right inoculant is used with the right forage species. (Manitoba Agriculture, Food and Rural Development n.d.)

Conclusions

Although this trial showed using a companion crop for establishment had a negative effect on the forage yield the year after establishment, more site years of data are required. Initial indications show that if a companion crop must be used for reasons described above, cutting the seeding rate to half of the recommended rate has less of an impact on forage establishment.

References

Manitoba Agriculture, Food and Rural Development. *Tips for Improving Forage Establishment Success.* n.d. http://www.gov.mb.ca/cgi-bin/print_hit_bold.pl/agriculture/////crops/forages/bjb05s07.html?print (accessed January 15, 2014).

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Pea Silage and Grain Trial

Jeff Kostuik[1], Susan M[c]Eachern[1], Angel Melnychenko[1], Amy Stewart[1] and Tom Warkentin[2]

Site Information

Location:	Roblin, Manitoba
Cooperator:	Dr. Tom Warkentin- Pulse Breeder, CDC Saskatoon
	Jaret Horner- Research Technician, CDC Saskatoon

Background

This trial was established for the eleventh consecutive year in 2013 to evaluate pea varieties for silage potential.

Peas are recommended for silage production in the Grey and Black soil zones. Peas are efficient users of water. However, they are not heat tolerant during flowering. Peas are best adapted to loam, clay loam and sandy loam soils. (Saskatchewan Ministry of Agriculture n.d.)

Some other options for silage peas are to intercrop with a cereal to produce silage. The primary benefit of mixing peas with a cereal crop is to improve quality and potentially boost yield. When peas make up at least 50% of the seeded mixture (by weight), producers can expect crude protein in the harvested forage to be 2 to 4 percentage points higher than with cereals alone. Pea silage can be 13-18% protein, while cereal silage is about 10%. Therefore the combination of the two will be significantly higher in protein. Pea/cereal mixtures can produce better quality silage than cereals alone but the success of these under seeded crops is mostly dependent on the seeding rates and ensuring there are enough peas in the mixture to influence feed quality. (Megan Oleksyn 2010)

Objective

To evaluate the adaptation and performance of field peas as a silage, grain and feed crop alternative.

Design, Materials & Operation

Treatments:	18 (Table 1)
Replication:	4
Plot size:	1m x 5m
Test design:	Lattice Design
Seeding date:	May 16
Fertilizer applied:	Broadcast 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S
Pesticide applied:	June 12- Odyssey and Poast Ultra

[1] PCDF, Roblin
[2] CDC, Saskatoon

Harvest date: Silage: August 15
Grain: September 4

Product handling: Silage: 1m² from each plot was harvested then weighed. A 500 gram subsample was then taken to be dried down and weighed to determine moisture content.
Grain: The remaining 4m² from each plot was individually harvested with weight and moisture recorded.

Prior to seeding, the fertilizer blend was broadcast with a Valmar applicator and incorporated with a heavy harrow. The peas were inoculated with the proper Rhizobia prior to seeding and then seeded into tilled corn stubble. Following seeding, but prior to emergence, the trial was rolled with a land roller to push stones in and assist with an easier harvest. The plot was sprayed once during the growing season to control broadleaf and grassy weeds. Throughout the growing season, plant counts, heights, pod assessment and lodging were recorded.

1m² from each plot was harvested using a Gravely mower for the silage portion of the trial. The total wet weight of the 1m² samples was recorded, then a 500 gram subsample was taken and dried down to determine dry matter yield.

Reglone was applied prior to grain harvest to speed up the drying process. The remaining 4m² of each plot was harvested with a small plot combine and the weight and moisture from each individual plot was recorded.

Table 1. 2013 Pea Silage and Grain Trial Varieties at Roblin, MB*

CDC Horizon	3329-9	3834-4
CDC Leroy	3525-11	3855-6
CDC Sonata	3548-2	3873-14
CDC Tucker	3795-3	3912-6
2815-6	3795-4	40-10
3012-3	3821-3	4045-5

* Numbered Varieties are advanced lines that are under evaluation for possible registration

Table 2. 2012 Fall Soil Nutrient Analysis from 0-24” Depth at the Roblin, MB Site **

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	52 lbs/acre (low)	0
P*	12 ppm (med)	40
K*	198 ppm (high)	10
S*	102 lbs/acre (high)	10

* N- Nitrate * P- Phosphorus (Olsen) * K- Potassium *S- Sulphate
** Analysis by Agvise Laboratories

Results

A summary of the results and data from the 2012 Pea Silage Elite Trial have been provided in the 2013 PCDF Annual Report because the 2013 data from the three cooperating locations

was not available at the time of publication. The data from the 2013 trial will be published in the 2014 report. The analysis from the three sites has been compiled by Dr. Tom Warkentin.

Report on the 2012 Pea Silage Elite Trial
Prepared by Dr. Tom Warkentin, January 2013

All varieties had acceptable plant stands at all locations. Mean days to flower ranged from 56-61. Mean vine length of the pea varieties ranged from 71-119 cm. Mean lodging score ranged from 2.7-7.2. The varieties with normal leaf type and long vines (checks 40-10 and Trapper) had the highest lodging scores, while the semi-leafless varieties had low to moderate lodging scores. Mean maturity rating ranged from 1.0-3.0.

Pea varieties were all harvested for biomass on the same date at a given location. The target date was when CDC Sonata had thick pods at the lower two reproductive nodes. On that date, one m^2 of biomass was cut from each plot. Eight varieties exceeded check variety 40-10 in mean fresh weight of biomass in 2012. Check variety 40-10 was intermediate among the entries in percent dry matter. Mean dry matter yield of check variety 40-10 was 746 g/m^2, i.e., 7.46 tonnes/ha. Mean dry matter yield ranged from 78-114% of 40-10 among the entries in the trial.

Mean crude protein of the harvested biomass of the pea varieties ranged from 16.2-19.1. Mean acid detergent fibre of the harvested biomass ranged from 28.5-36.2. Mean neutral detergent fibre of the harvested biomass ranged from 39.9-50.4. Mean relative feed value of the harvested biomass ranged from 110-158.

Mean grain yield of 40-10 was 2.1 tonnes/ha, with varieties in the test ranging from 72-153% of 40-10. Mean seed weight of the pea varieties ranged from 111-211 g/1000 seeds.

Table 3. 2012 Pea Silage and Grain Trial Quality Summary at Saskatoon, SK, Sutherland, SK and Roblin, MB**

# of Locations Data was Recorded	2	2	3	3	1	3	3	3	2	2	2
Variety	**GR YD***	**DTF***	**HT***	**LDG***	**MAT***	**DM***	**CP***	**ADF***	**NDF***	**RFV***	**KWT***
Trapper	83	58	117	7.2	3.0	78	17.9	35.2	49.0	116	111
40-10	100	61	119	7.2	3.0	100	17.9	36.2	50.4	110	124
CDC Sonata	72	60	101	6.8	3.0	82	18.9	35.2	47.5	121	176
CDC Minuet	130	60	75	3.5	1.5	84	18.3	31.0	42.3	143	165
CDC Tucker	121	60	87	3.6	3.0	114	18.8	31.5	43.7	139	140
CDC Leroy	114	57	79	4.6	2.0	86	19.1	31.2	42.6	143	132
CDC Horizon	121	59	92	2.9	2.8	90	18.3	31.8	44.5	134	141
2815-6	136	59	79	3.0	1.5	98	16.4	28.5	39.9	158	191
2949-14	137	60	86	2.6	1.8	89	17.2	31.1	43.5	139	191
3012-3	145	58	89	3.1	3.0	101	18.5	32.1	43.7	138	161
3012-6	137	58	92	3.5	2.8	89	17.8	33.3	46.7	126	188
3528-1	132	60	84	2.7	1.8	97	17.7	30.8	41.1	150	166
3528-2	139	58	86	3.1	1.3	94	16.6	32.9	42.3	144	167
3525-11	139	58	90	2.8	2.3	108	16.6	35.3	49.8	113	197
3548-2	116	57	96	3.4	2.8	97	18.2	34.3	48.3	117	172
3873-14	139	57	82	3.4	1.5	103	17.0	34.3	46.7	122	191
3758-11	151	58	90	3.3	1.3	95	17.0	29.3	42.5	145	167
3329-9	144	59	77	3.4	1.8	98	16.9	28.6	41.3	149	167
3539-1	142	57	85	2.6	1.5	99	16.2	31.8	43.6	137	211
3760-28	137	56	85	2.8	1.5	103	17.1	31.3	44.3	134	206
3526-2	153	58	74	3.3	1.8	98	18.2	28.6	40.5	151	171
3404-5	144	56	83	3.0	2.0	95	18.1	29.6	40.1	155	177
P06070-2	113	57	71	3.6	1.0	83	17.0	30.5	41.2	148	123
CDC Meadow	134	57	77	3.7	1.5	100	16.2	32.1	44.7	132	176

* GR YD = Grain Yield in Kilograms per Hectare as a % of 40-10
* DTF = Days to Flower
* HT = Plant Height (cm)
* LDG = Lodging Score- 1=no lodging, 9=severe lodging
* MAT = Maturity Rating- 1=early, 3=late
* DM = Dry Matter (g/m^2) of Biomass as a % of 40-10
* CP = Percent Crude Protein of Biomass on a Dry Matter Basis
* ADF = Percent Acid Detergent Fibre of Biomass on a Dry Matter Basis
* NDF = Percent Neutral Detergent Fibre of Biomass on a Dry Matter Basis

* RFV= Relative Feed Value
* KWT = Seed Weight in Grams per 1000 Seeds
** Prepared by Dr. Tom Warkentin, January 2013

Due to excess moisture conditions in the Pea Silage Trial at the Roblin location in 2013, it was decided not to publish the results.

Important Considerations and Recommendations

The following traits are desirable in silage pea varieties:

- High dry matter biomass yield
- High crude protein %, low NDF %, low ADF %, high RFV to enhance feed value
- Small seed size to reduce planting costs
- High grain yield to improve efficiency of seed production
- Low lodging score to improve the efficiency of grain and forage harvest
- Favorable ensiling qualities

Entries 3012-3, 3525-11, 3873-14, 3760-28 and cultivars CDC Tucker and CDC Meadow had equal or greater biomass dry matter yield than check variety 40-10 in 2012, with greater grain yield and a much better lodging score than 40-10. All had somewhat greater seed weight than 40-10. Based on these criteria, several of the pea varieties in this trial have good potential to replace 40-10 as forage/silage pea varieties in western Canada.

New Forage Pea Varieties

Based on data arising from the Pea Silage Elite Trials, the variety CDC Tucker was released in 2006, CDC Leroy in 2008 and CDC Horizon in 2010. Breeder seed of all three was released to select seed growers in Saskatchewan and Alberta through the Saskatchewan Pulse Growers Variety Release Program.

Conclusions

This trial was conducted again in 2013 using the 2004-2012 protocol. New promising entries were added to the trial, while less promising varieties were dropped. A need exists in the agricultural community for data on the performance of promising forage/silage pea varieties grown in mixture with forage barley, as this is the typical use of forage peas in dairy and beef feed lot applications. Thus far, funding has not been obtained for this research.

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