2014 PCDF ANNUAL REPORT

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Cereals

Advanced Two-Row Hulless Barley Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Ana Badea[2]

Site Information

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

Objective

To evaluate advanced two-row hulless barley lines for human consumption.

Procedure and Project Activities

Treatments:	10 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 22
Fertilizer applied:	Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. The samples from each plot were packaged and taken to AAFC Brandon for further quality analysis.

Table 1. 2014 Advanced Two-Row Hulless Barley Trial Varieties at Roblin, MB*

CDC McGwire	H286-19

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

CDC Rattan	H286-38
Roseland	H287-3
H286-4	H287-32
H286-15	H243-5S

* Numbered entries are advanced lines with potential advancement to the cooperative testing system.

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

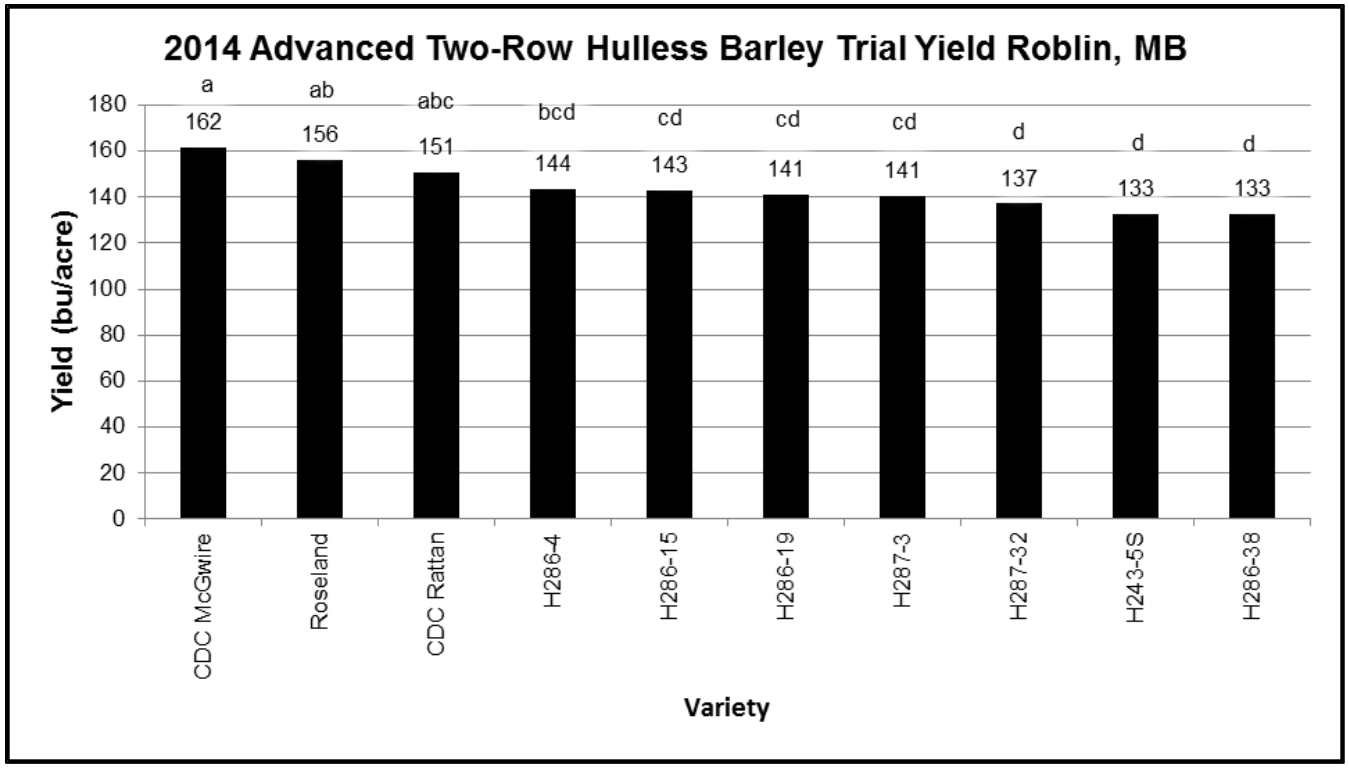
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Advanced Two-Row Hulless Barley Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Days to Maturity
CDC McGwire	8702	94
Roseland	8385	96
CDC Rattan	8118	89
H286-4	7731	91
H286-15	7679	91
H286-19	7601	90
H287-3	7567	92
H287-32	7376	92
H243-5S	7136	88
H286-38	7129	97
Grand Mean	7742	92
CV%	4.99	1.47
LSD 5%	663.3	2.3
Significant Difference	Yes	Yes

Chart 1. 2014 Advanced Two-Row Hulless Barley Trial Yield (bu/acre) at Roblin, MB



All of the lines included in the test were milling lines and thus should be compared to Roseland. Unfortunately, none of them showed yield increase over any of the checks in the growing conditions at Roblin.

Conclusions

The flour of barley cultivars such as Millhouse and Roseland developed at BRC can be used as an adjunct to wheat flour without compromising the dough formation and baking or cooking properties of wheat flour. Inclusion of barley flour will enhance the dietary fibre and antioxidant content of a wheat flour blend. The goods made out of this flour blend will constitute a healthier food choice for consumers.

Note: In addition to the health claim, now the Canadian Grain Commission's Official Grain Grading Guide added a new food barley class. This should assist companies in achieving the quality they require for their processing needs.

Acknowledgements

This research was supported in part by funding from the Western Grains Research Foundation.

For technical assistance, we gratefully thank R. Von Hertzberg and B. Graham from Brandon Research Centre, MB, Canada and PCDF for continued support with growing and caring for the field trials.

References

[1] Ames, P. N., and Rhymer, C.R. (2008) J. Nutr. 138: 1237S-1243S.
[2] Beta, T., Kwaing, S., Nam, S., Mpofu, A., and Therrien, M. (2007) In Shahidi, F. and Ho, C.T. (eds): Antioxidant Measurements and Applications, 956: 242-254.
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[5] Summary of Health Canada's Assessment of a Health Claim about Barley Products and Blood Cholesterol Lowering **-** http://www.hc-sc.gc.ca/fn-an/alt_formats/pdf/label-etiquet/claims-reclam/assess-evalu/barley-orge-eng.pdf.
[6] Therrien M.C., and Ames, P. N. (2006) Crop Sci. 46: 2715-2716.

Schedule

PCDF will continue to work with Dr. Ana Badea to test hulless barley varieties at Roblin, MB.

Advanced Six-Row Malt Barley Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Ana Badea[2]

Site Information

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

Objective

To evaluate different lines of barley from the barley breeding program at AAFC Brandon for malting qualities.

Procedure and Project Activities

Treatments:	8 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 23
Fertilizer applied:	Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. The samples from each plot were packaged and taken to AAFC Brandon for further quality analysis.

Table 1. 2014 Advanced Six-Row Malt Barley Trial Varieties at Roblin, MB*

CDC Mayfair	A508-28
Celebration	A509-22

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

Tradition	A510-2
A508-5	A510-29

* Numbered entries are advanced lines with potential advancement to the cooperative testing system.

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

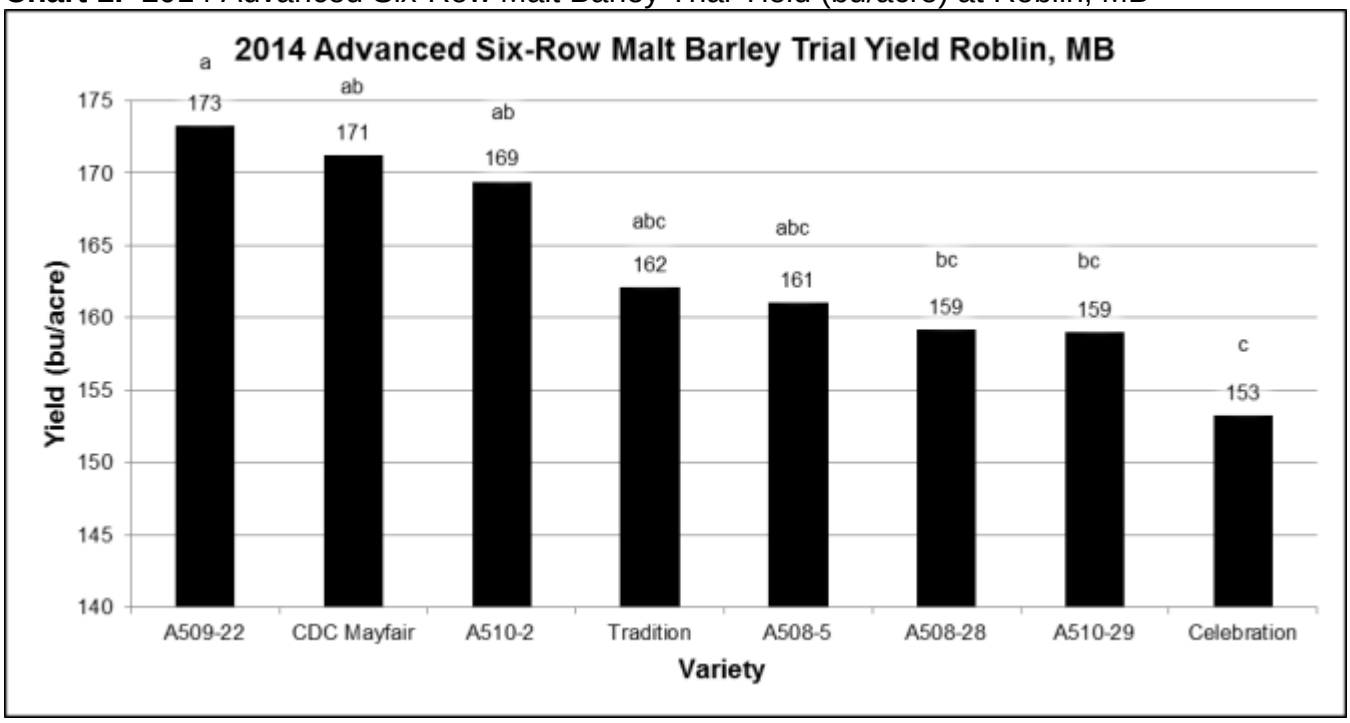
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Advanced Six-Row Malt Barley Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Days to Maturity
A509-22	9319	83
CDC Mayfair	9209	82
A510-2	9111	85
Tradition	8718	81
A508-5	8662	82
A508-28	8562	81
A510-29	8551	80
Celebration	8243	80
Grand Mean	8797	82
CV%	4.8	1.2
LSD 5%	745.8	1.7
Significant Difference	Yes	Yes

Chart 1. 2014 Advanced Six-Row Malt Barley Trial Yield (bu/acre) at Roblin, MB



In the testing conditions at the Roblin site in 2014, all 5 barley lines had higher yields than the check cultivar Celebration. Two of the lines, A510-2 and A509-22, had also higher yield than the check cultivar Tradition with the latter slightly surpassing the check cultivar CDC Mayfair. These two lines, A510-29 and A509-22, look to be promising based on yield. If they will show consistency at the other testing locations with respect to yield and good malting quality, which at the moment are unknown, then they will be entered for extensive evaluation in the 2015 Western Cooperative Six-Row Barley Registration Test.

Conclusions

PCDF will continue to play an important role with the varietal evaluation for Dr. Ana Badea's breeding lines.

Advanced Forage Barley Grain Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Ana Badea[2]

Site Information

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

Objective

To test the top barley forage lines from the barley breeding program at AAFC Brandon for grain qualities.

Procedure and Project Activities

Treatments: 9 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 23
Fertilizer applied: Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
25 lbs. actual P_2O_5 applied with seed
Pesticide applied: June 16 - Axial and Barricade
Harvest date: September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. The samples from each plot were packaged and taken to AAFC Brandon for further quality analysis.

Table 1. 2014 Advanced Forage Barley Grain Trial Varieties at Roblin, MB*

AC Ranger	EX821-5	EX825-19

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

Vivar	EX821-15	EX820-23W
FB015	EX824-9	EX821-15W

* Numbered entries are advanced lines with potential advancement to the cooperative testing system.

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

* N - Nitrate * P - Phosphorus * K - Potassium *S - Sulphate

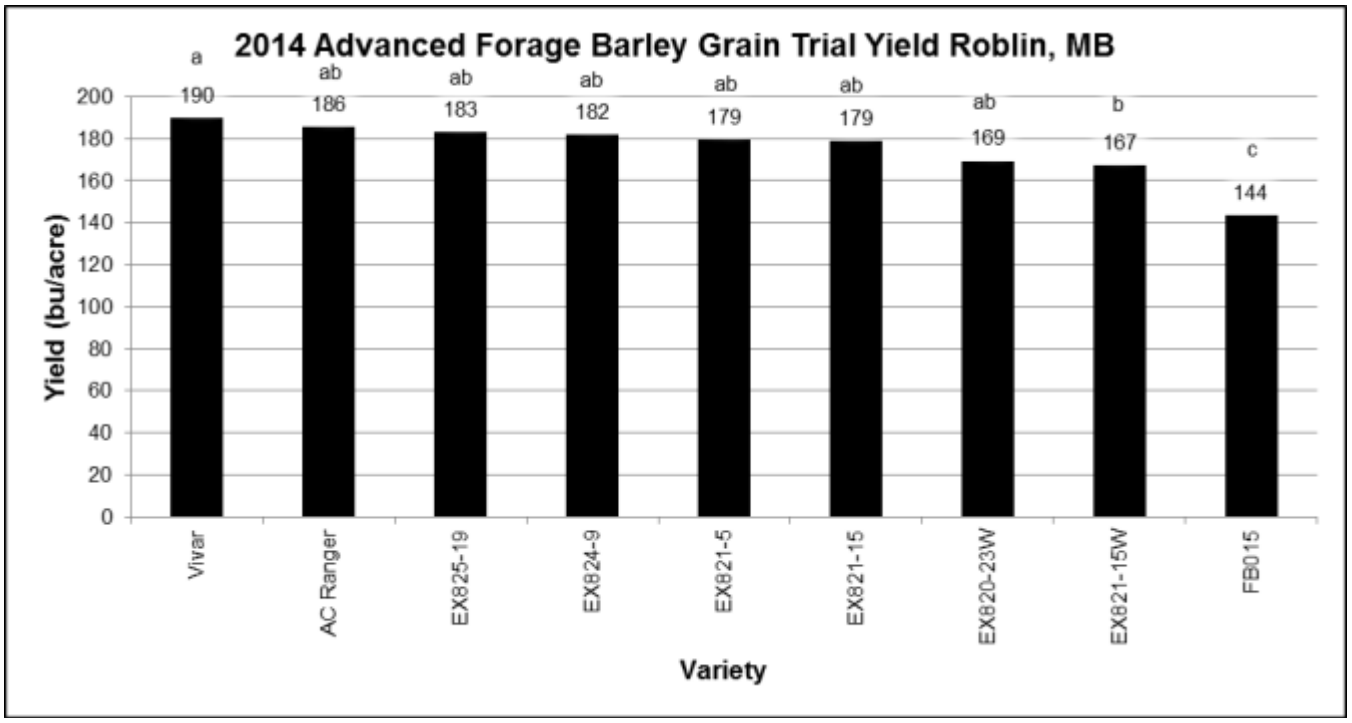
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Advanced Forage Barley Grain Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Days to Maturity
Vivar	10,206	87
AC Ranger	9982	88
EX825-19	9837	89
EX824-9	9792	86
EX821-5	9643	87
EX821-15	9624	87
EX820-23W	9110	84
EX821-15W	8983	88
FB015	7730	83
Grand Mean	9434	87
CV%	7.3	1.9
LSD 5%	1198.1	2.8
Significant Difference	Yes	Yes

Chart 1. 2014 Advanced Forage Barley Grain Trial Yield (bu/acre) at Roblin, MB



The trial had a good CV% (coefficient of variation) of 7.3. All the non-waxy forage breeding lines tested had lower values than both checks AC Ranger and Vivar.

The two waxy forage breeding lines, EX820-23W and EX921-15W, 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.

Conclusions

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.

Acknowledgements

This research was supported in part by funding from the Western Grains Research Foundation. PCDF would also like to acknowledge the funding contribution made by Growing Forward 2. Thank you to Dr. Badea for cooperating in this trial. For technical assistance we gratefully thank R. Von Hertzberg and B. Graham from Brandon Research Centre and PCDF for continued support in growing and caring for the trials. Thank you to Bradley Cranwell for the use of the land.

Saskatchewan Variety Performance Group Two-Row Barley Variety Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location:	Roblin, Manitoba
Cooperators:	Saskatchewan Variety Performance Group (SVPG) Manitoba Crop Variety Evaluation Team (MCVET) Bradley Cranwell - Roblin, Manitoba

Background

Objective

To evaluate two-row barley varieties for the Saskatchewan Variety Performance Group.

Procedure and Project Activities

Treatments:	16 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 22
Fertilizer applied:	Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded.

Table 1. 2014 Saskatchewan Variety Performance Group Two-Row Barley Variety Trial Varieties at Roblin, MB

AAC Synergy	Gadsby

[1] PCDF, Roblin

ABI Voyager	HB623
AC Metcalfe	Taylor
Canmore	TR07921
CDC Clear	TR10214
CDC Kindersley	TR11127
CDC Maverick	TR12733
CDC PolarStar	TR12735

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

Results and Discussion

Table 3. 2014 Saskatchewan Variety Performance Group Two-Row Barley Variety Trial Yield Results (kg/ha) at Roblin, MB

Variety	Yield (kg/ha)
TR12733	10,628
AAC Synergy	10,548
Canmore	10,544
TR10214	9814
CDC Clear	9768
TR11127	9061
TR12735	8909
Gadsby	8900
CDC Maverick	8815
CDC Kindersley	8790
ABI Voyager	8635
HB623	8433
TR07921	8338
CDC PolarStar	8140
Taylor	7985
AC Metcalfe	7757
Grand Mean	9060
CV%	8.0
LSD 5%	1205.9
Significant Difference	Yes

Chart 1. 2014 Saskatchewan Variety Performance Group Two-Row Barley Variety Trial Yield (bu/acre) at Roblin, MB

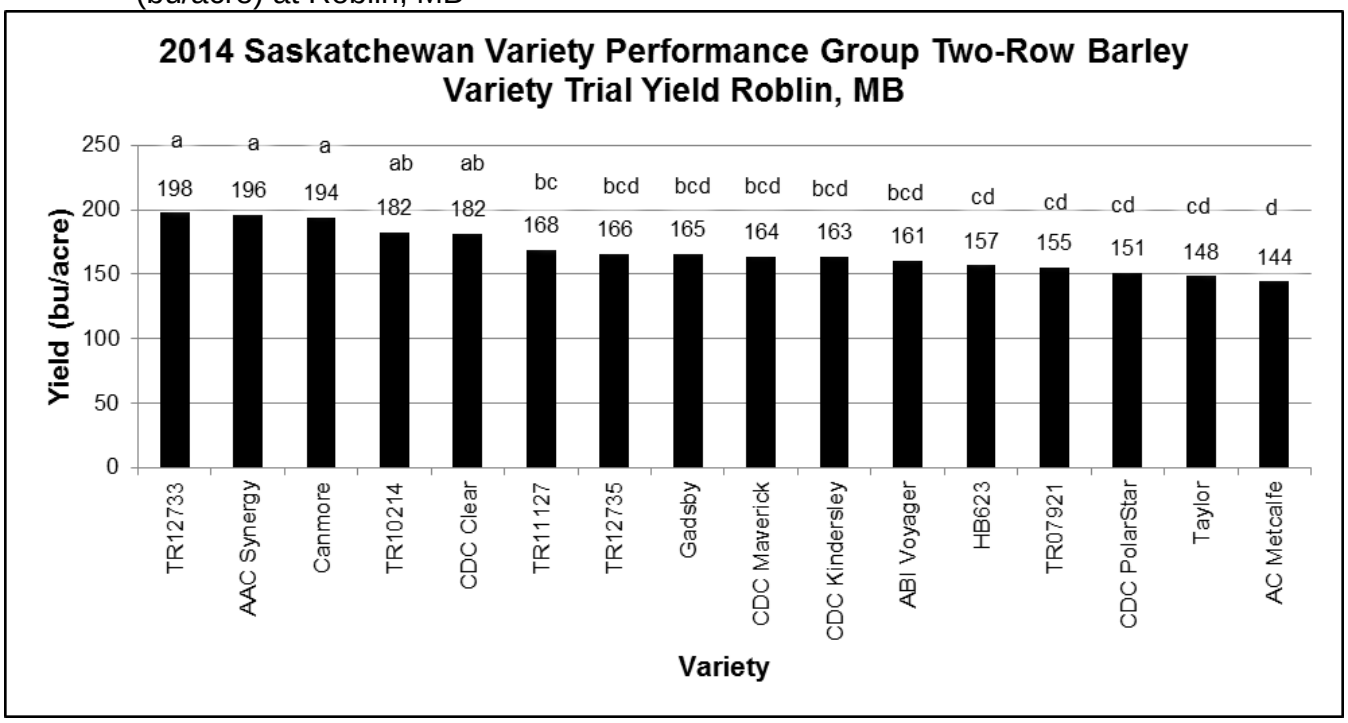


Table 3 and Chart 1 illustrate the yield data for the SVPG two-row barley trial. The entries TR12733, TR10214, TR11127, TR12735, HB623 and TR07921 are varieties supported for registration in 2014. TR12733, AAC Synergy and Canmore are significantly higher yielding than all the other entries except for TR10214 and CDC Clear. The yields were impressive, ranging from 144 to 198 bu/acre. This is well above the provincial average and for risk area 9 in 2013 (Manitoba Agricultural Services Corporation 2014).

Conclusions

Having Roblin's PCDF as a location for SVPG gives the producers in the area a firsthand look at newly registered varieties that normally would not be researched in the region. The Roblin site also generates another location data package to include in the analysis and determine the performance of the varieties. Approximately 55% of the barley acreage in risk crop area 9 is two-row barley.

Yields in the SVPG trial were exceptional, ranging from 144 to 198 bu/acre. The top performers included new and existing varieties.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you SVPG and MCVET for their cooperation in this trial and to Bradley Cranwell for the use of the land.

References

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Saskatchewan Variety Performance Group Six-Row Barley Variety Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Roblin, Manitoba
Cooperators: Saskatchewan Variety Performance Group (SVPG)
Manitoba Crop Variety Evaluation Team (MCVET)
Bradley Cranwell - Roblin, Manitoba

Objective

To evaluate six-row barley varieties for the Saskatchewan Variety Performance Group.

Procedure and Project Activities

Treatments: 7 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 23
Fertilizer applied: Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
25 lbs. actual P_2O_5 applied with seed
Pesticide applied: June 16 - Axial and Barricade
Harvest date: September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded.

Table 1. 2014 Saskatchewan Variety Performance Group Six-Row Barley Variety Trial Varieties at Roblin, MB

AC Metcalfe	CDC Anderson
Amisk	Celebration
Breton	Muskwa
BT596	

[1] PCDF, Roblin

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

Results and Discussion

Table 3. 2014 Saskatchewan Variety Performance Group Six-Row Barley Variety Trial Yield Results (kg/ha) at Roblin, MB

Variety	Yield (kg/ha)
Amisk	9883
BT596	9836
Breton	9588
CDC Anderson	9365
Muskwa	9239
Celebration	8499
AC Metcalfe	8095
Grand Mean	9215
CV%	3.5
LSD 5%	578.3
Significant Difference	Yes

Chart 1. 2014 Saskatchewan Variety Performance Group Six-Row Barley Variety Trial Yield (bu/acre) at Roblin, MB

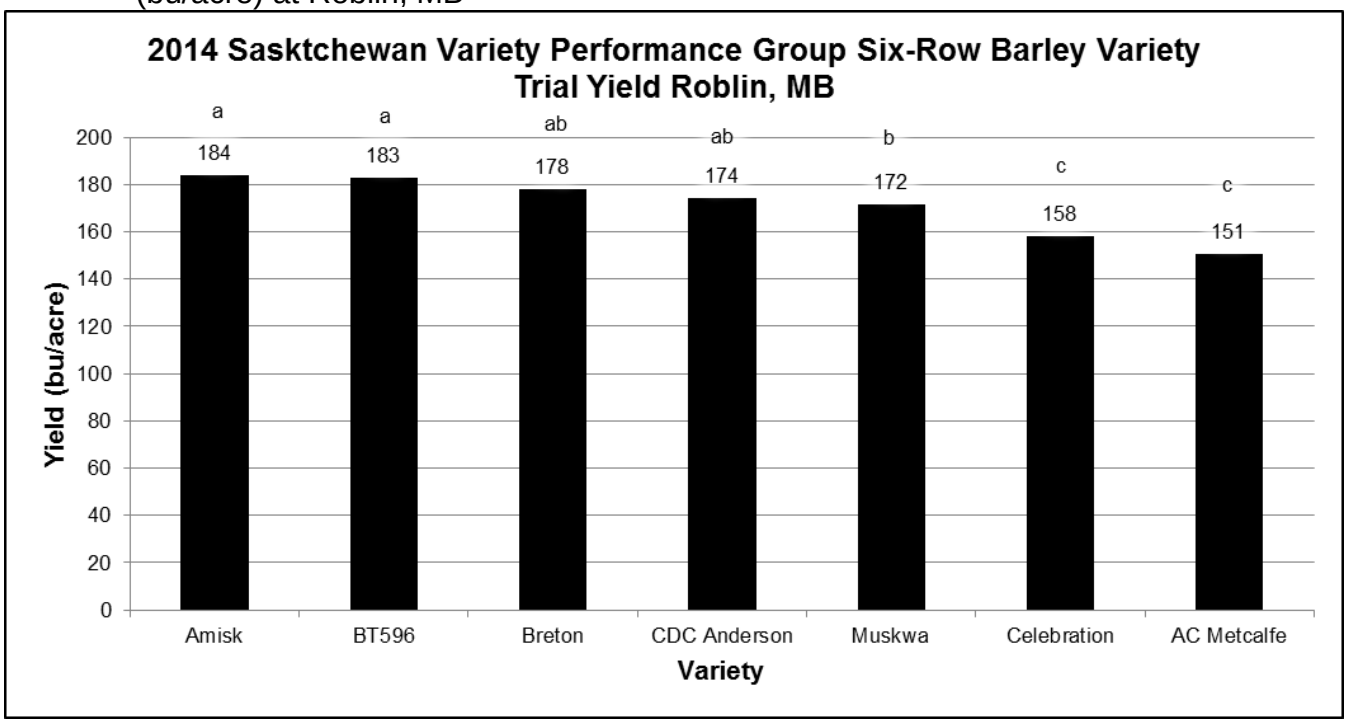


Table 3 and Chart 1 summarize the yield data for the SVPG six-row barley variety trial. Yields were impressive and they ranged from 151 to 184 bu/acre. BT596 was supported for registration in 2014. Amisk and BT596 were significantly higher yielding than all the other varieties except for Breton and CDC Anderson. Celebration and AC Metcalfe were significantly lower yielding than all the other varieties.

Conclusions

The SVPG Six-Row Barley Variety Trial at Roblin provides an opportunity for producers to see how the varieties perform in the Parkland region. 2014 saw a major reduction in barley acreage across western Canada. Manitoba saw approximately a 100,000 acre reduction alone (Manitoba Agricultural Services Corporation 2013) (Manitoba Agricultural Services Corporation 2014). There is a certain degree of risk in growing barley because quality dictates the market. A promising looking malt or food targeted barley crop can soon become feed quality if harvest conditions are not good or weather patterns during the growing season are not optimal. The yields for the SVPG Six-Row Barley Variety Trial were excellent and well above the provincial average.

Western Cooperative Six-Row Barley Registration Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Ana Badea[2]

Site Information

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

Objective

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

Procedure and Project Activities

Treatments: 21 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 22
Fertilizer applied: Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
25 lbs. actual P_2O_5 applied with seed
Pesticide applied: June 16 - Axial and Barricade
Harvest date: September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. The samples from each plot were packaged and taken to AAFC Brandon for further quality analysis.

Table 1. 2014 Western Cooperative Six-Row Barley Registration Trial Varieties at Roblin, MB*

AC Ranger (EX467)	SR14317	SR14468
Vivar (SD516)	SR14318	SR14500
CDC Mayfair (SR412)	SR14463	SR14501

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

Celebration (BT980)	SR14464	SR14502
BT598	SR14465	SR14503
BT599	SR14466	SR458
SR14316	SR14467	SR460

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

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

** Analysis by Agvise Laboratories

Results and Discussion

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. This provides protection to any proprietary information as well as prevents 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 region that would otherwise be unavailable. Past tests have shown that six-row malting barley is very well-suited to this region.

Conclusions

The Western Cooperative Six-Row Barley Registration Test is important for evaluating and providing data for the registration of new varieties.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dr. Ana Badea and Rudy Von Hertzberg of AAFC's Brandon Research Centre for their cooperation in this trial and to Bradley Cranwell for the use of the land.

Western Canada Forage Barley Coop Grain Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Pat Juskiw[2]

Site Information

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

Objective

To evaluate different forage barley lines for grain analysis.

Procedure and Project Activities

Treatments: 17 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 22
Fertilizer applied: Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
25 lbs. actual P_2O_5 applied with seed
Pesticide applied: June 16 - Axial and Barricade
Harvest date: September 11
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. A 600 gram composite sample was sent to the Field Crop Development Center in Lacombe, Alberta for further quality analysis.

Table 1. 2014 Western Canada Forage Barley Coop Grain Trial Varieties at Roblin, MB*

AC Ranger	FB446	FB454
CDC AUSTENSON	FB447	FB455

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

Gadsby	FB450	FB456
Vivar	FB451	FB457
FB019	FB452	FB458
FB445	FB453	

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

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

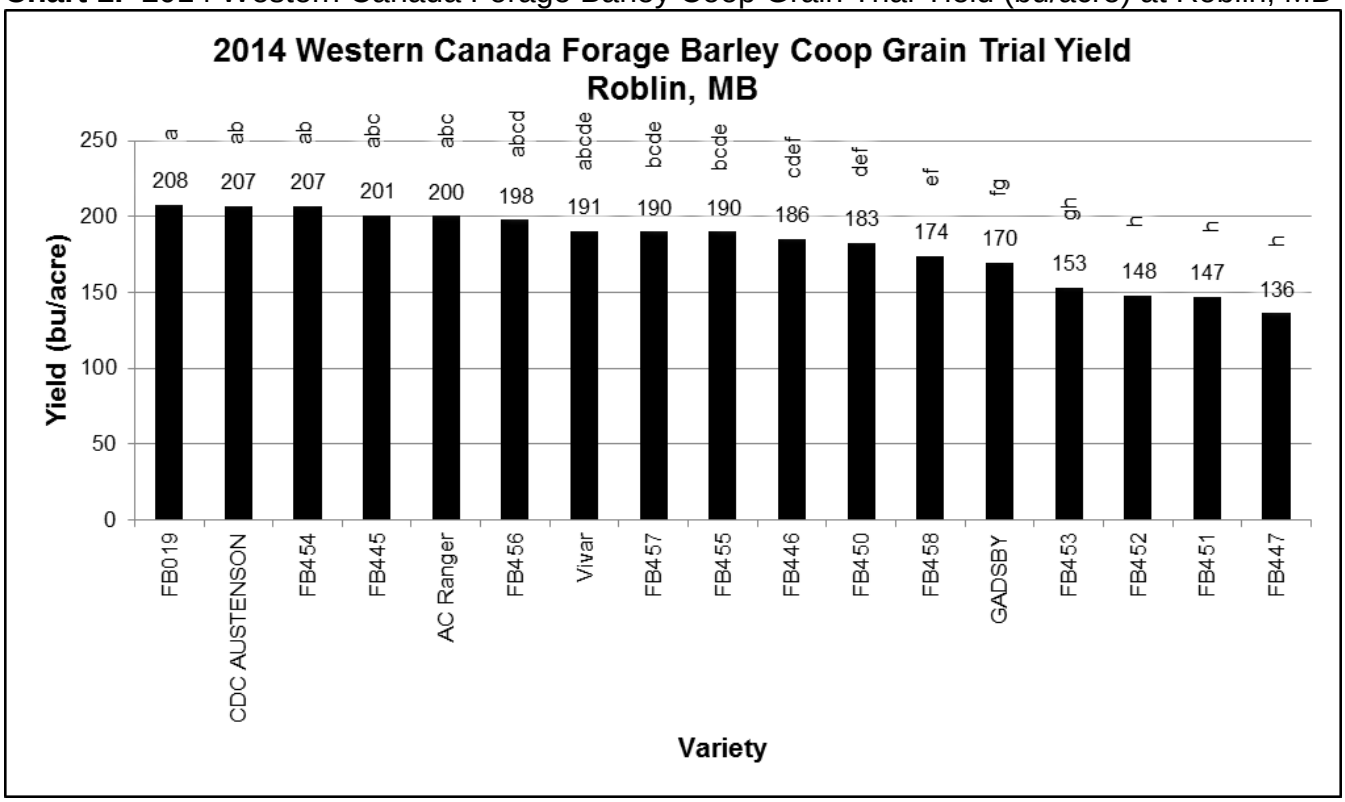
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Western Canada Forage Barley Coop Grain Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Days to Maturity
FB019	11,174	89
CDC AUSTENSON	11,143	90
FB454	11,127	89
FB445	10,796	89
AC Ranger	10,772	91
FB456	10,636	89
Vivar	10,245	89
FB457	10,226	88
FB455	10,221	87
FB446	9976	94
FB450	9820	92
FB458	9354	90
GADSBY	9129	89
FB453	8235	89
FB452	7949	90
FB451	7917	85
FB447	7322	83
Grand Mean	9767	89
CV%	5.8	2.6
LSD 5%	939.1	3.8
Significant Difference	Yes	Yes

Chart 1. 2014 Western Canada Forage Barley Coop Grain Trial Yield (bu/acre) at Roblin, MB



Similar to the forage biomass yields, the grain yields of the lines fell between those of the checks; however, for grain, CDC AUSTENSON, AC Ranger and Vivar had significantly higher yields than Gadsby. The highest yielding entry was FB019, a six-rowed hulled line from AAFC-Brandon. The FCDC entries, FB445, FB454, FB455, FB456 and FB457, had similar yields to the highest yielding check. FB445 is a six-rowed hulled line in its second year of testing and may be put forward for support for registration at the PRCOB meeting in 2015. FB454, FB455 and FB456 are six-rowed, hulled lines in their first year of testing. FB457 is a two-row, hulled line in first year testing. The lowest yielding lines, FB447, FB451, FB452 and FB453 were all hulless lines.

Generally, the forage barley project's main goal is to look at the forage aspect of production. Grain yield is also included in the event a producer decides to take his production to grain harvest and market his crop through other avenues.

Conclusions

The highest yielding lines for grain did not always have the highest biomass yields. There was a much higher range in grain yields than biomass yields. The lowest yielding lines were hulless and since 15% of the yield of hulled lines can be in the hull, these lower yields are not unexpected. Quality data was not available when this report was prepared but will be included in the Forage Coop Report presented to the PRCOB in February, 2015.

FP Genetics Oat Variety Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Russell, Manitoba
Cooperators: Denise Schmidt - Senior Territory Manager, FP Genetics
Mark Keating - Keating Seed Farms, Russell, Manitoba

Objective

To evaluate different varieties of oats for FP Genetics.

Procedure and Project Activities

Treatments: 4 (Table 1)
Replication: 4
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 23
Fertilizer applied: 75 lbs. N, 40 lbs. P_2O_5
Pesticide applied: June 23 - Refine SG
Harvest date: September 22
Product handling: Each individual plot harvested with weight and moisture recorded

A spring application of nitrogen and phosphorus was applied. The trial was seeded into canola stubble. Refine SG was sprayed 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.

Table 1. FP Genetics Oat Variety Trial Varieties at Roblin, MB

AAC Justice	CDC Minstrel
AC® Summit	CDC Ruffian

Results and Discussion

Table 2. 2014 FP Genetics Oat Variety Trial Results at Russell, MB

Variety	Yield	Pl/m²*	Height	Disease*	DTH*	DTM*	Lodge*

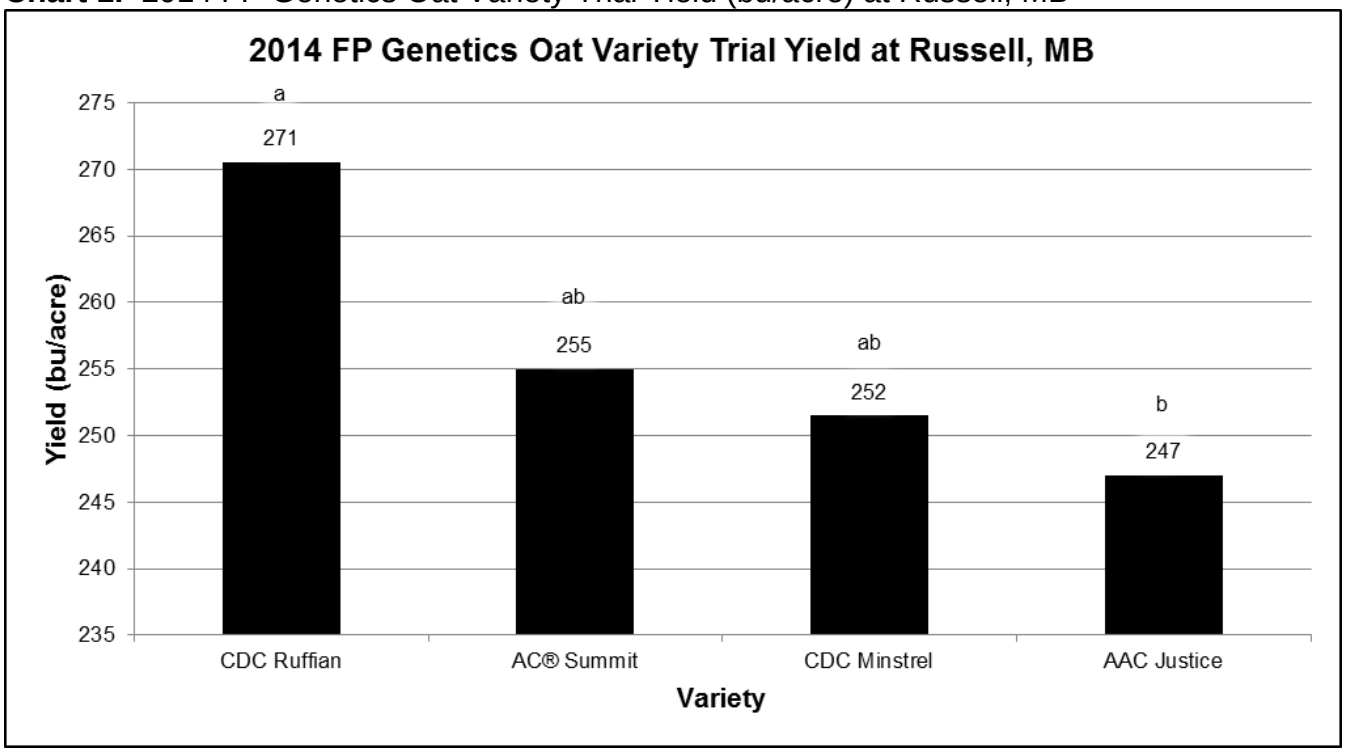
[1] PCDF, Roblin

	(kg/ha)		(cm)				
CDC Ruffian	9699	295	104	3	61	97	3
AC® Summit	9142	280	97	6	58	98	2
CDC Minstrel	9018	278	109	4	58	98	2
AAC Justice	8856	270	112	4	62	100	3
Grand Mean	9179	281	105	4	60	98	2
CV%	4.69	12.38	3.38	13.93	1.13	0.64	30.77
LSD 5%	688.33	55.56	5.7	0.9	1.07	1.01	1.2
Sign. Diff.	Yes	No	Yes	Yes	Yes	Yes	Yes

Pl/m²* = Plants per Meter Squared
Disease* = Disease Rating 1-9: 1 - No Disease, 9 - Severe Disease
DTH* = Days to Heading
DTM* = Days to Maturity
Lodge* = Lodging Rating 1-9: 1 - Straight, 9 - Completely Flat

Table 2 summarizes a number of data parameters that were collected throughout the season and Chart 1 illustrates the yield data and level of significant difference between the varieties tested. CDC Ruffian was the highest yielding variety and only significantly higher yielding than AAC Justice. CDC Ruffian was also significantly earlier maturing and significantly shorter than AAC Justice. There was minimal lodging at the site and disease resistance was similar in all the varieties except for AC® Summit who expressed a significantly higher rate of infection. Records were not taken on the type of disease present, but this is an important consideration for future data collection.

Chart 1. 2014 FP Genetics Oat Variety Trial Yield (bu/acre) at Russell, MB



Conclusions

Developing oat varieties that are sought after by millers and end users is very important for the oat industry as a whole. FP Genetics offers growers a suite of oat varieties that meet these criteria. The relationship between FP Genetics and Grain Millers establishes vertical integration that gives producers an opportunity to do production contracts with pricing markets established prior to seeding. As long as quality parameters are met, the grain produced should give producers a cash flow option with timely deliveries and payment.

Organic Oat Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Roblin, Manitoba
Cooperators: Dr. Jennifer Mitchell Fetch - Oat Breeder, AAFC Brandon
Karl Kreutner - Organic Producer, Roblin, Manitoba

Objective

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

Procedure and Project Activities

Treatments: 25 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 30
Fertilizer applied: None
Pesticide applied: None
Harvest date: September 24
Product handling: Each individual plot harvested with weight and moisture recorded

The trial was seeded into organically certified, tilled alfalfa ground. 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 500 gram composite sample was sent to AAFC Brandon for further quality analysis.

Table 1. 2014 Organic Oat Trial Varieties at Roblin, MB*

AC Morgan	05P15-OA23	08P09A-OA08	08P11-OA25	08P15A-OA03
CDC Dancer	07P12-OAZ	08P09A-OA15	08P11-OA38	08P15B-OA25
Jordan	07P12-OBE	08P09B-OA16	08P14A-OA22	08P17A-OA17
Leggett	07P12-OCQ	08P10A-OA38	08P14A-OA23	08P17A-OA44

[1] PCDF, Roblin

05P14-OA01	07P12-OCU	08P10B-OA08	08P14A-OA26	08P17B-OA09

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

Results and Discussion

Table 2. 2014 Organic Oat Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Significant Difference Yield	Days to Maturity
AC Morgan	6050	a	91
05P15-OA23	5832	ab	104
07P12-OCU	5443	bc	90
08P14A-OA23	5371	bcd	96
07P12-OAZ	5305	cde	88
Leggett	5294	cde	89
08P14A-OA22	5262	cde	92
CDC Dancer	5220	cdef	90
08P15A-OA03	5211	cdef	94
08P11-OA25	5111	cdefg	91
08P15B-OA25	5027	cdefg	99
05P14-OA01	5003	cdefg	96
08P10B-OA08	4980	cdefg	93
08P09A-OA15	4969	cdefg	96
Jordan	4928	defg	103
08P17A-OA17	4917	defg	92
08P14A-OA26	4896	defg	92
08P10A-OA38	4871	defg	90
07P12-OBE	4817	efgh	90
07P12-OCQ	4736	fghi	93
08P17B-OA09	4676	ghi	96
08P11-OA38	4668	ghi	92
08P09A-OA08	4360	hi	93
08P09B-OA16	4311	i	91
08P17A-OA44	4261	i	94
Grand Mean	5021	--	93.4
CV%	6.1	--	2.6
LSD 5%	502.1	--	3.9
Sign. Diff.	Yes	--	Yes

Chart 1. 2014 Organic Oat Trial Yield (bu/acre) at Roblin, MB

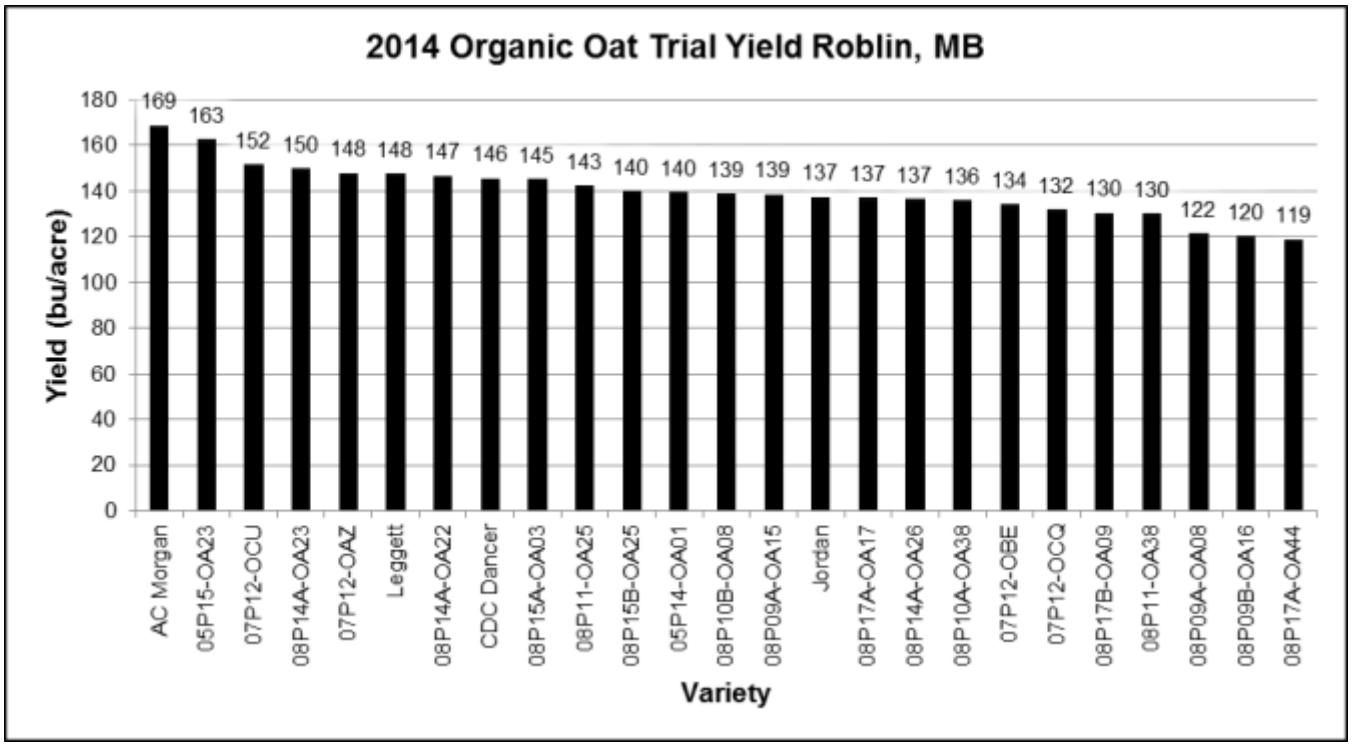


Table 2 summarizes the yield and maturity data for the organic oat trial and Chart 1 illustrates the yield ability of the entries in comparison to the conventional oat checks AC Morgan, Leggett, CDC Dancer and Jordan. The %CV was very good for this trial considering there was a fair amount of volunteer alfalfa plants and wild oats growing in the trial. This was a good test for competiveness and yield ability.

The yield range for the entries in this trial was 119 to 169 bu/acre. This is lower than what our oat trials yielded on conventional land management. One must be mindful that the two projects were not in close proximity to each other so environmental conditions such as weather and soil type would have been different. AC Morgan was significantly higher yielding than all the other entries except for 05P15-OA23. All the other entries were comparable to the other check varieties except for 08P09A-OA08, 08P09B-OA16 and 08P17A-OA44 which were significantly lower yielding than all the checks. 05P15-OA23 has a similar maturity to Jordan which is on the later side of the maturity scale.

Conclusions

Organic production is increasing in western Canada. Consumer awareness and demand and the attractive commodity prices are driving the industry ahead. Price advantage over conventional grain prices varies according to crop type. The organic advantage can vary from double to almost quadruple the price of conventional prices. The economic advantages are calculated on the basis of gross returns, variable costs and net returns for similar rotation on the same soil type and zone (The Organic Advantage n.d.). The process to become organic certified is a lengthy one with a number of guidelines to follow. It involves a long term commitment, so growers considering the transition must do a full evaluation to ensure this is

the right management system for their farming operation. The Canadian Government and the organic industry are committing money to ensure the industry continues to grow through plant breeding efforts to develop varieties that are more competitive in an organic setting and produce the quality attributes that millers are seeking for in organic marketing.

Saskatchewan Variety Performance Group Oat Variety Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Roblin, Manitoba
Cooperators: Saskatchewan Variety Performance Group (SVPG)
Manitoba Crop Variety Evaluation Team (MCVET)
Bradley Cranwell - Roblin, Manitoba

Objective

To evaluate oat varieties for the Saskatchewan Variety Performance Group.

Procedure and Project Activities

Treatments: 13 (Table 1)
Replication: 3
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 23
Fertilizer applied: Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
25 lbs. actual P_2O_5 applied with seed
Pesticide applied: June 16 - Refine SG
Harvest date: September 18
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 4 leaf stage, the trial was sprayed with Refine SG 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.

Table 1. 2014 Saskatchewan Variety Performance Group Oat Variety Trial Varieties at Roblin, MB

AAC Justice	Leggett
Bia	Nice
CDC Big Brown	OT3066*
CDC Dancer	CS Camden (OT4001)

[1] PCDF, Roblin

CDC Haymaker	Souris
CDC Nasser	Stride
CDC Ruffian	

* OT3066 was supported for registration in 2014.

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

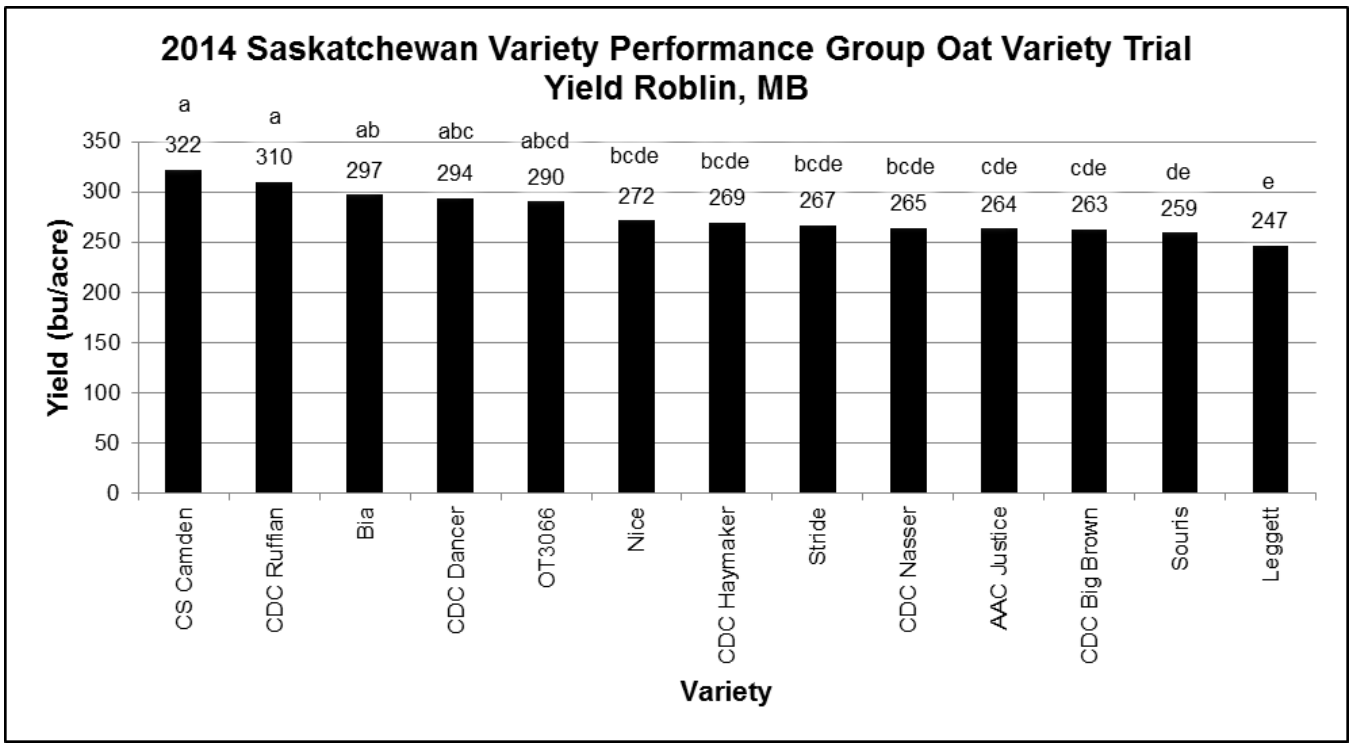
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Saskatchewan Variety Performance Group Oat Variety Trial Yield (kg/ha) at Roblin, MB

Variety	Yield (kg/ha)
CS Camden (OT4001)	11,540
CDC Ruffian	11,129
Bia	10,651
CDC Dancer	10,549
OT3066	10,415
Nice	9746
CDC Haymaker	9660
Stride	9562
CDC Nasser	9485
AAC Justice	9452
CDC Big Brown	9416
Souris	9300
Leggett	8847
Grand Mean	9981
CV%	6.9
LSD 5%	1169.4
Significant Difference	Yes

Chart 1. 2014 Saskatchewan Variety Performance Group Oat Variety Trial Yield (bu/acre) at Roblin, MB



Oat varieties continue to perform extremely well at the PCDF Roblin site. Yields ranged from 247 to 322 bu/acre (Chart 1). CS Camden and CDC Ruffian were the highest yielding oat varieties and they were significantly higher yielding than all the other varieties except for Bia, CDC Dancer and OT3066.

CS Camden was developed by Canterra Seeds. It is a white oat and was launched in the fall of 2014. CDC Ruffian is a white oat as well and it is available through FP Genetics. Anticipated seed availability for CDC Ruffian is expected in 2017. Information regarding the other varieties in the test and the other data parameters can be found in Seed Manitoba 2015 or at www.seedmb.ca . (Seed Manitoba 2014)

Conclusions

Oats continue to perform exceptionally well in the Parkland region. Yields continue to exceed expectations each year at the PCDF site. Developing varieties that are earlier maturing with good lodging and disease resistance to support yield ability and seed quality are important for growers in the area. Pair this with attractive prices and market accessibility and the crop could have a promising role in cropping options for producers.

Canadian International Grains Institute Canadian Western Red Spring Wheat Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Roblin, Manitoba
Cooperators: Canadian International Grains Institute (Cigi), Winnipeg, Manitoba
Dale Alderson - Independent Seed Consultant, East St. Paul, Manitoba
Bradley Cranwell - Roblin, Manitoba

Background

When China's state-owned agricultural trading company (COFCO) complained about the inconsistency and baking properties of Canadian wheat in the spring of 2013, the nation's grain industry responded. Huge progress has been made and the reaction from customers has been fantastic. Extensive research involving many sectors of Canada's wheat industry has gained better insight into the issue. (Arnason 2014)

Interaction between wheat variety and weather has been discovered as a factor of interest. Research conducted by the Canadian International Grains Institute (Cigi) has found that there are certain varieties of wheat that are resilient. Over a long range of environmental conditions they produce high gluten strength. Other varieties are more sensitive. Scientists are also studying the influence of herbicides and fungicides on wheat properties. Studies in 2013 showed that a pre-harvest glyphosate application caused some increase in gluten strength. The impact of fungicide is uncertain as it doesn't seem to cause a lot of weakness. These conclusions are preliminary because they are based on one year of data. (Arnason 2014) Replicated research was conducted in 2013 and 2014 with PCDF's Roblin site included in the test.

The Federal Government announced $5 million from the Agriinnovation Program (AIP) on June 6, 2014 to expand research at Cigi over the next five years. The funding allows efforts to put a specific focus on the functional properties of various wheat varieties to ensure customers are receiving the wheat gluten strength they require, gain better understanding of the regional differences of varieties and classes of wheat and to work with barley and pulse crops to develop other innovative products such as pulse flours. In depth, one of the activities Cigi will study is agronomic practices that may impact CWRS quality including gluten strength and other quality characteristics will be identified to understand effect on customers' food applications. This will be studied through the use of test plots, factors such as fungicide use, variety and growing location. (Candian International Grains Institute 2014) (Arnason 2014).

[1] PCDF, Roblin

Cigi is an independent market development institute created in 1972. Cigi's mission is to create a global advantage for Canadian field crops through the delivery of technical expertise, support and customized training to the domestic industry and customers around the world. Cigi is funded by farmers, the Government of Canada (AAFC) and industry partners. (Candian International Grains Institute 2014)

Objective

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

Procedure and Project Activities

Treatments:	18: 6 varieties, 3 fungicide treatments (Table 1)
Replication:	2
Plot size:	1m x 5m
Test design:	Split Plot Design: Main Plot - Fungicide, Sub Plot - Variety
Seeding date:	May 22
Fertilizer applied:	Broadcast 110 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade July 8 - Twinline July 21 - Folicur 250 EW
Harvest date:	September 18
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 4 leaf stage, the trial was sprayed with Axial and Barricade to control broadleaf and grassy weeds. Fungicide applications were applied as follows: 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 at flowering.

All plots were harvested with a small plot combine. Each treatment was individually bagged and weight and moisture were recorded. A 2 kilogram composite sample from each treatment was delivered to Cigi in Winnipeg for further quality analysis.

Table 1. 2014 Cigi Canadian 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
	Glenn		Glenn		Glenn
	Harvest		Harvest		Harvest
	Lillian		Lillian		Lillian
	Unity VB		Unity VB		Unity VB

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	110
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

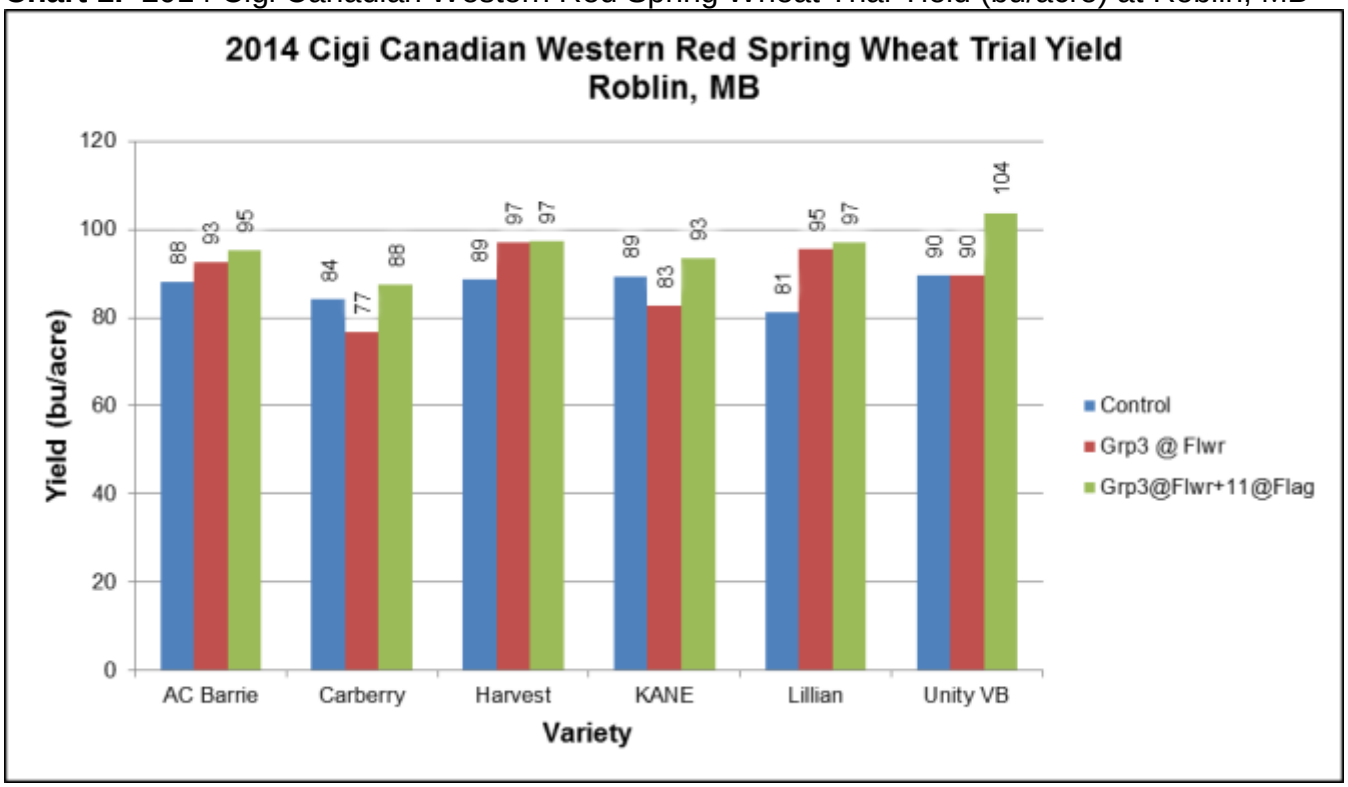
* N - Nitrate * P - Phosphorus (Olsen) * K - Potassium *S - Sulphate
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Cigi Canadian Western Red Spring Wheat Trial Yield (kg/ha and bu/acre) at Roblin, MB

HRSW Variety	Fungicide Treatment	Yield (kg/ha)	Yield (bu/acre)	Significant Difference Yield (kg/ha)
Unity VB	Grp3@Flwr+11@Flag	6971	104	a
Harvest	Grp3@Flwr+11@Flag	6543	97	ab
Lillian	Grp3@Flwr+11@Flag	6531	97	ab
Harvest	Grp3 @Flwr	6526	97	ab
Lillian	Grp3 @Flwr	6414	95	ab
AC Barrie	Grp3@Flwr+11@Flag	6401	95	ab
KANE	Grp3@Flwr+11@Flag	6283	93	ab
AC Barrie	Grp3 @Flwr	6219	93	ab
Unity VB	Control	6020	90	ab
Unity VB	Grp3 @Flwr	6020	90	ab
KANE	Control	6011	89	ab
Harvest	Control	5957	89	ab
AC Barrie	Control	5925	88	ab
Carberry	Grp3@Flwr+11@Flag	5889	88	ab
Carberry	Control	5653	84	ab
KANE	Grp3 @Flwr	5554	83	ab
Lillian	Control	5455	81	ab
Carberry	Grp3 @Flwr	5161	77	b
Grand Mean (kg/ha): 6085				
CV%: 9.3				
LSD 5%: 1545.8				
Significant Difference: Yes				

Chart 1. 2014 Cigi Canadian Western Red Spring Wheat Trial Yield (bu/acre) at Roblin, MB



PCDF does not have access to the gluten strength data for this test so no results can be published in that regard at this time.

One area of discussion is the agronomic benefit with the use of fungicides. Chart 1 summarizes the yield data for all the varieties and the various fungicide treatments compared to the untreated check for each variety. In 2014, there was no significant yield increase with the use of fungicides, even for the variety Harvest who has the least disease resistance of all the varieties.

The results in 2014 do not mimic the results from 2013 and 2009 (Parkland Crop Diversification Foundation 2010) (Parkland Crop Diversification Foundation 2014). This illustrates that the interaction between CWRS wheat varieties, fungicide application and number of fungicide applications is very complex and requires many years of research to be confident in the data. There are a number of factors that can impact the results of the test. Factors include growing conditions, disease pressure and conditions and crop stage at time of fungicide application.

Conclusions

The Canadian International Grains Institute (Cigi) plays an important role in identifying international and domestic customer concerns regarding Canadian grain production. Their role

is instrumental in ensuring Canadian exports continue and the Canadian farmer has access to viable marketing options. Conducting research plots to address customer concerns is one part of the mandate in finding solutions and solidifying customer preference for Canadian grains. The CWRS wheat variety, fungicide and gluten strength interaction trial is an example of the work that Cigi coordinates in this regard.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dale Alderson for his cooperation in the trial and to Bradley Cranwell for the use of the land.

References

Arnason, Robert. "Customers praise CIGI on wheat gluten research." *The Western Producer*, June 12, 2014: 8.

Candian International Grains Institute. "Cigi welcomes $5M in federal government funding for research and innovation." *Canadian International Grains Institute.* June 6, 2014. http://cigi.ca/cigi-welcomes-5m-in-federal-government-funding-for-research-and-innovation/ (accessed January 20, 2015).

Parkland Crop Diversification Foundation. "2009 Annual Report." Annual, 2010.

Parkland Crop Diversification Foundation. "2013 Annual Report." Annual, 2014.

Schedule

PCDF will continue their involvement in this project if Cigi requires more years of data.

Canadian Western Red Spring Wheat Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

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

Background

This is the fourth year that PCDF has collaborated with Keating Seed Farms (Mark Keating) and FP Genetics (Denise Schmidt) in regards to conducting a CWRS trial in the Russell area. The collaboration provides growers with a research site that generates agronomic data for selecting CWRS varieties that are more adapted to their Risk Areas (7 & 9) in the Parkland region. CDC Utmost VB, Harvest, Muchmore and Carberry have been the main varieties included in the trial each year. In 2013, their acreage representation for Risk Area 7 and Risk Area 9 was 53% and 36%, respectively, and their yield ability was average to above average (Manitoba Agricultural Services Corporation 2013). CDC Utmost VB is a midge resistant variety. Each year a few new varieties are included to go "head to head" with the existing four and give producers a firsthand look at their performance.

Another important component to the trial is the evaluation of seed quality attributes such as percent protein and percent midge damage to the seed. Higher protein content is required for good bread making properties. There are a number of factors that impact protein content. Genetics, fertility, growing conditions and crop rotations are the primary ones. Breeding programs and variety registration standards for CWRS have ensured that desirable protein levels are attainable through genetics. Nitrogen is an essential component of grain protein so fertility management during the production cycle is very important. Environmental conditions that affect seed protein are timing and amount of precipitation during the growing season, reserve moisture, growing degree days and soil nitrogen reserve levels (mineralization of organic N). Crop rotations can affect protein levels through an effect of phase of the rotation and an effect of crop sequence. Wheat grown in a well-fertilized rotation with non-cereal crops tends to have higher protein than a wheat crop grown on a well-fertilized rotation of continuous wheat. The thought is the different rooting patterns of non-cereal crops allows the wheat to extract N from the different soil depths. The type of non-cereal crop has an impact as well. Pulses with high N fixation capabilities will have a greater positive impact on wheat protein levels than non-pulse crops.

Wheat midge has been in Manitoba since the early 1900's. It became a pest in the 1950's and the first major outbreak occurred in northeast Saskatchewan in 1983. Producers in that area suffered over $30 million in yield loss. Today, management tools are available for producers to combat wheat midge and keep CWRS as a profitable cropping option in their farming

[1] PCDF, Roblin

business. The management tools include midge tolerant variety development, introduction of parasitoids such as the *Macroglenes penetrans (*chalcidoid wasp), availability of after harvest soil surveys that generate risk maps for the upcoming year, access to a website that gives daily updates of degree-day accumulation above 5°C and estimates of percent adult emergence, bug traps for monitoring in-field pressures, proper rotations with non-wheat crop types and insecticidal application as required.

Objective

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

Procedure and Project Activities

Treatments:	9 (Table 1)
Replication:	4
Plot size:	1m x 5m
Test design:	Lattice
Seeding date:	May 23
Fertilizer applied:	75 lbs. N, 40 lbs. P_2O_5
Pesticide applied:	June 23 - Axial and Refine SG
Harvest date:	September 22
Product handling:	Each individual plot harvested with weight and moisture recorded

A spring application of nitrogen and phosphorus was applied. The trial was seeded into canola stubble. Axial and Refine SG were sprayed 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 750 gram composite sample was sent to Intertek Laboratory in Winnipeg for further quality analysis.

Table 1. 2014 Canadian Western Red Spring Wheat Trial Varieties at Russell, MB

Brandon	CDC Plentiful	Glenn
Carberry	CDC Utmost	Harvest
Cardale	Faller	Muchmore

Results and Discussion

Table 2. 2014 Canadian Western Red Spring Wheat Trial Report of Analysis**

Variety	Grade	Reason for Grade	DKG* %	Protein %	MST* %	TWT* (kg/hl)	Ergot %	Fus Dmg* %	Midge %
Brandon	1 CWRS*		0.1	13.6	13.9	82.2	0.007	0.08	1.20
Carberry	2 CWRS*	2.3% Midge	0.1	14.1	13.2	81.6	0.008	0.27	2.30
Cardale	2 CWRS*	FRHTS*	0.1	13.8	13.6	80.7	0.004	0.02	0.60
CDC Plentiful	2 CWRS*	0.6% Fus Dmg	0.1	14.3	13.5	81.0	0.017	0.6	1.60
CDC Utmost	2 CWRS*	0.8% Fus Dmg	0.1	13.4	13.7	80.3	0.000	0.8	1.00
Faller	CW Feed*	Unapp. Variety*	0.1	12.6	14.0	81.8	0.000	0.28	0.36
Glenn	1 CWRS*		0.1	13.7	14.5	84.4	0.008	0.16	0.68
Harvest	2 CWRS*	0.7% Fus Dmg	0.1	14.0	13.8	81.6	0.006	0.7	1.00
Muchmore	2 CWRS*	0.8% Fus Dmg	0.1	13.2	14.1	80.7	0.003	0.8	1.30

DKG* = % Dockage
MST* = % Moisture
TWT* = Test Weight in Kilograms per Hectolitre
Fus Dmg* = Fusarium Damage
CWRS* = Canadian Western Red Spring Wheat
CW Feed* = Canadian Western Feed Wheat
FRHTS* = Frost/ Heat Stress
Unapp. Variety* = Unapproved Variety
** Analysis by Intertek, Winnipeg, MB

Table 3. 2014 Canadian Western Red Spring Wheat Trial Results at Russell, MB

Variety	Yield (kg/ha)	Pl/m²*	DTH*	DTF*	Height (cm)	Disease (1-9)*	DTM*	Lodge (1-9)*
Faller	5557	273	58	62	91	6	99	2
CDC Utmost	5505	258	56	62	102	5	96	4
Brandon	4911	263	56	62	87	6	100	2
Harvest	4878	240	55	60	100	7	95	3
Carberry	4819	245	55	60	89	7	100	3
CDC Plentiful	4754	263	57	62	100	6	98	3
Muchmore	4690	255	55	61	88	7	98	3
Glenn	4674	253	54	60	100	6	98	2
Cardale	4393	303	55	60	95	6	98	3
Grand Mean	4909	261	56	61	95	6	98	3
CV%	7.7	11.8	0.9	1.0	1.9	11.1	1.3	17.9
LSD 5%	555.5	45	0.7	0.9	2.6	1.0	1.8	0.7
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Pl/m² * = Plants per Meter Squared
DTH* = Days to Heading
DTF* = Days to Flowering
Disease (1-9)* = 1 - No Disease, 9 - Severe Disease
DTM* = Days to Maturity
Lodge (1-9)* = 1 - Straight, 9 - Completely Flat

Chart 1. 2014 Canadian Western Red Spring Wheat Trial Grain Yield (bu/ac) at Russell, MB

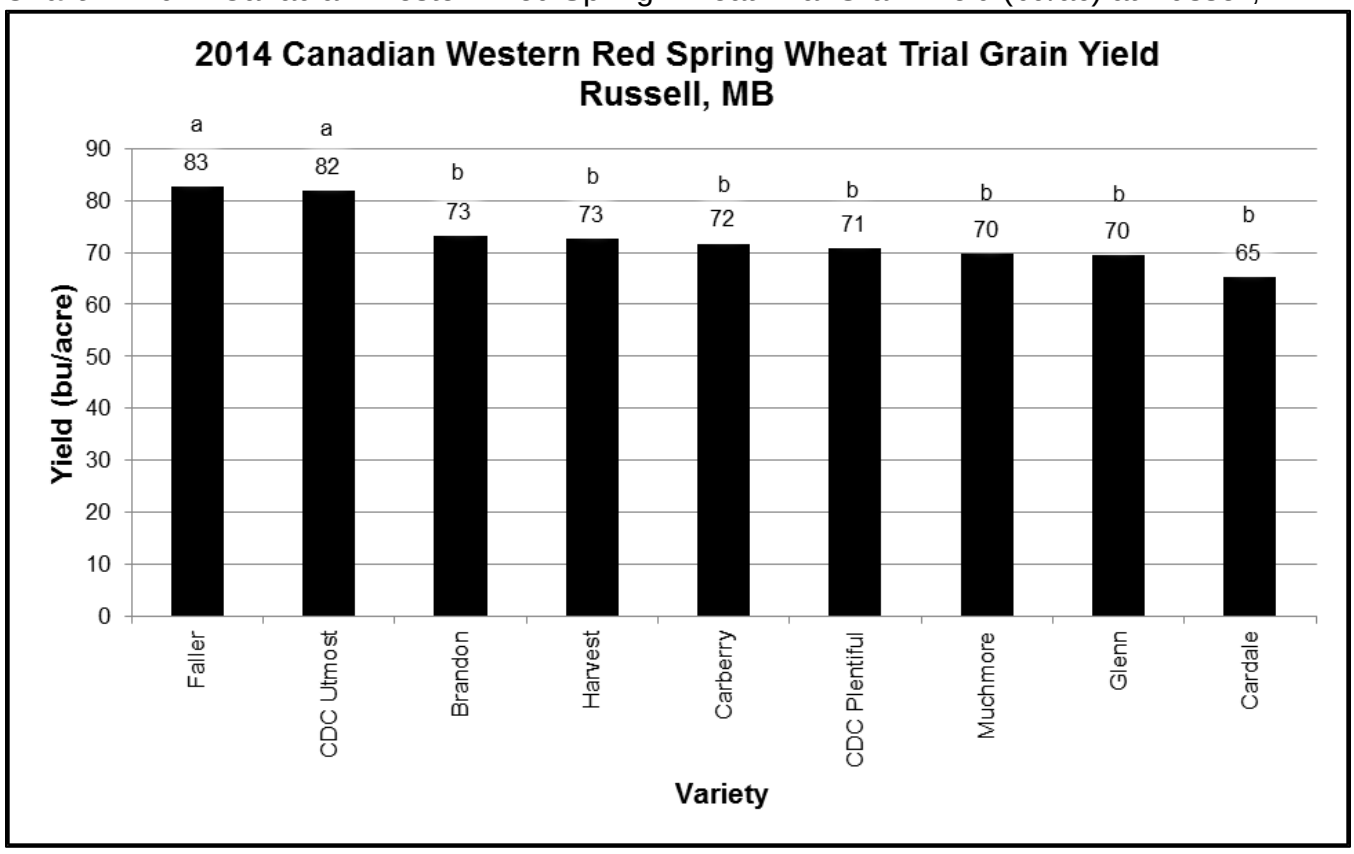


Table 4. 2014 Four Year Summary (2011, 2012, 2013 and 2014) for Canadian Western Red Spring Wheat Trial at Russell, MB

Variety	Yield (kg/ha)	Protein %	Midge %
CDC Utmost	4923	14.47	1.025
Muchmore	4358	14.00	2.150
Harvest	4318	14.38	0.825
Carberry	4087	14.50	2.075
Standard Error	246.1	0.2366	0.6016
Significance %	5	No Significance	No Significance
LSD 5%	552.4	-	-

Faller, Glenn, Brandon and CDC Plentiful are new varieties in the test this year. Cardale was tested in 2013 and 2014. Faller and Glenn are North Dakota varieties. Faller is currently not registered in Canada and must be grown under an IP contract for commercial production. Faller and CDC Plentiful are distributed by FP Genetics. Brandon is available through Secan, Seed Depot is distributing Cardale and Glenn is from Canterra Seeds.

Table 2 is a summary of the seed quality attributes tested at Intertek Laboratories. No statistical analysis is available since the testing is done on a composite sample from all reps for each variety. Differences can be noted for some of the seed quality attributes and we can do some comparisons to the 2013 data for possible trends (Parkland Crop Diversification

Foundation 2014). In 2014, the % seed protein ranges from 12.6% (Faller) to 14.3% (CDC Plentiful). When compared to 2013, protein levels are lower in 2014 than in 2013. The incidence of midge damage is variable from year to year and it is partially due to the success of overwintering and emergence of adults. There was more midge pressure and damage to the seed in 2014 when compared to 2013. There are varietal differences in midge damage and the range is from 0.36 % (Faller) to 2.3% (Carberry). CDC Utmost was below the test average for % midge damage in both years. The percentage of ergot found in the samples was less evident in 2014 when compared to 2013. One thing to note is that CDC Utmost consistently had the least amount of ergot in the seed sample for both years. Fusarium damage in 2014 ranged from 0.02% (Cardale) to 0.8% (CDC Utmost and Muchmore). The incidence of fusarium is higher in 2014 then 2013. CDC Utmost was consistently on the high side for both years.

Table 3 outlines the agronomic data that was collected in 2014. Faller and CDC Utmost were comparable in yield and they were significantly higher yielding than the other varieties in the test. Faller is shorter, three days later maturing and has better lodging resistance when compared to CDC Utmost. The statistics were significant for all three data parameters.

Table 4 represents a four year summary for the four varieties that have been grown since the trial's inception. CDC Utmost is significantly higher yielding than the other three varieties. In regards to % protein and % midge damage, there is no significant difference between the varieties.

Conclusions

The CWRS trial, in collaboration with Keating Farms and FP Genetics, is an opportunity for PCDF to offer producers an agronomic evaluation of new varieties coming down the commercial pipeline. The project gives good representation of the CWRS acreage with the four main varieties (CDC Utmost VB, Harvest, Muchmore and Carberry) encompassing 36-53% of the Parkland acreage in 2013. In comparison with the 2013 overall Manitoba CWRS acreage, the four varieties represent 49.9% of the acreage (Manitoba Agricultural Services Corporation 2013). Overall this project gives good representation for the provincial CWRS acreage as well. Seed quality analysis also gives a good regional snapshot of how the varieties perform with regards to protein content, midge tolerance and fusarium and ergot resistance.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Mark Keating for providing the land for this trial and to Denise Schmidt for coordinating the trial.

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Schedule

PCDF will continue with this project as long as the other collaborative partners want to continue. The project has many positive applications to the Parkland region.

Parkland Cooperative Wheat Trial

Jeff Kostuik[1], Susan McEachern[1] and Angel Melnychenko[1]

Site Information

Location: Roblin, Manitoba
Cooperators: Dr. Dean Spaner - Coordinator, University of Alberta Research Station
Klaus Strenzke - Research Technician, University of Alberta Research Station
Bradley Cranwell - Roblin, Manitoba

Background

Change is occurring in all aspects of the wheat industry. The closing of the Cereal Research Centre in Winnipeg resulted in staff being relocated to other locations. A new investment in eastern wheat research had sparked an interest in Dr. Gavin Humphreys to move back to Ontario and join AAFC's Eastern Cereal and Oilseed Research Centre in Ottawa. With no breeder to lead the team, AAFC has transferred the CWRS germplasm for the northern Parkland region to Dr. Dean Spaner at the University of Alberta. This will allow varietal development to continue in a zone that gives good representation of the area the varieties will be grown in. Dr. Dean Spaner brings many years of experience in wheat breeding and variety development (ASTech Foundation 2013).

Cereals have traditionally been one of Canada's agricultural cornerstones, but unfortunately their presence in the Prairies has been declining in the last 20 years. Competition for acres from other more lucrative crops has diminished the appeal for cereals even though wheat yields have rose by 45 per cent. The Canadian cereal sector recognizes that it's time for a change and more investment and innovation is required for cereals to stay competitive with other crops. (Germination 2014)

Agriculture and Agri-Food Canada has played a major role in wheat breeding, variety development and registration and pedigreed seed production of their varieties. AAFC has decided to funnel their resources to germplasm development and leave the variety finishing and registration to other parties. This has prompted the industry to review the previous structure and see what role organizations, other government agencies and private companies can play to ensure the cereal industry is successful going forward.

A cereal consortium was created to increase investment and innovation in wheat and barley varietal development. The consortium was organized by the Alberta Seed Growers' Association and it encompasses 13 organizations. The organizations include the Alberta Barley and Wheat Commissions, Grain Growers of Canada, Keystone Agricultural Producers, Manitoba and Saskatchewan Seed Growers Associations, Western Barley Growers Association, Western Canadian Wheat Growers and the Western Grains Research

[1] PCDF, Roblin

Foundation. The consortium is looking at various models as to how to move the cereal industry forward. The Western Grains Research Foundation recently announced they will be contributing 9.6 million dollars to programming delivered through the five-year, $25 million wheat cluster (Cross 2014).

Wheat breeding and developing a variety with desirable traits is a complex process and requires screening millions of cultivars. Bread wheat has more than 21 chromosomes. There are 17 billion nucleotide base pairs in wheat. That is five times more base pairs than what is in the human genome (Germination 2014). An international team of private and public institutions have joined forces to unravel the wheat genome. In July, the Canadian division of the international team published the first chromosome-based draft sequence for the wheat genome. This release of gene sequencing will accelerate gene discovery in wheat and pave the way for development of tools to improve breeding of complex traits such as yield, insect and disease resistance and end-use quality. AAFC is also collaborating on this front and using molecular genetics to adapt new wheat varieties for complex market demands and environmental risks such as the orange wheat blossom midge. Continued investment by both the private and public sectors is required to ensure wheat yields are increased 60% by 2050. The World Bank estimates production will have to increase significantly by this timeline in order to meet the demand of the projected world population of 9.6 billion people. Wheat breeding/genetic development and regional crop adaptation are important factors for production to keep pace with consumption. (Telford n.d.)

Objective

The objectives of the Parkland Cooperative Wheat 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.
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.
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.

Procedure and Project Activities

Treatments:	25 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Lattice
Seeding date:	May 22
Fertilizer applied:	Broadcast 110 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	September 25
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded. A 2.5 kilogram composite sample of each entry was sent to the University of Alberta for further quality analysis.

Table 1. 2014 Parkland Cooperative Wheat Trial Varieties at Roblin, MB*

AC Splendor	PT 250	PT 481	PT 642	PT 772
CDC Osler	PT 472	PT 482	PT 643	PT 778
CDC Teal	PT 474	PT 588	PT 645	PT 779
Katepwa	PT 479	PT 594	PT 646	PT 780
PT 245	PT 480	PT 595	PT 647	PT 781

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

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

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	16 lbs/acre (very low)	110
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

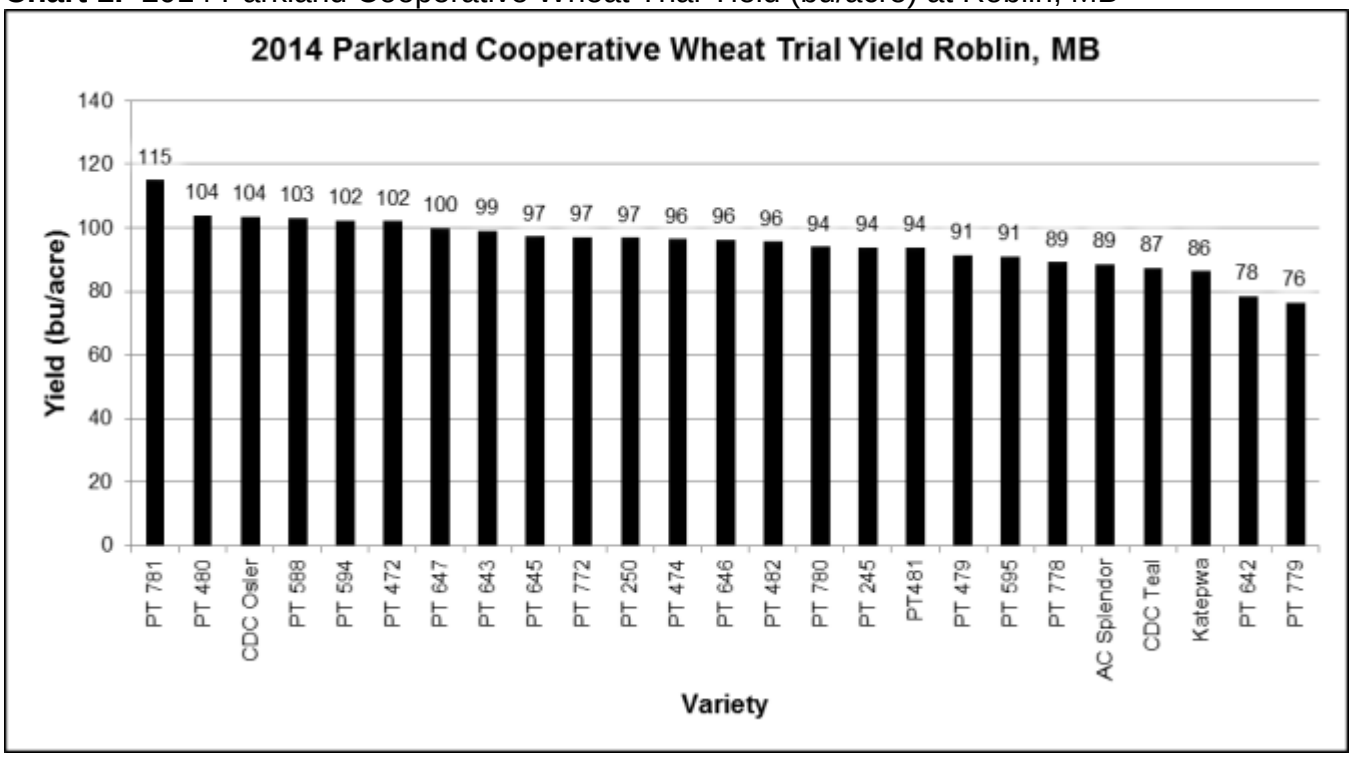
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Parkland Cooperative Wheat Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Significant Difference Yield	Days to Maturity
PT 781	7728	a	104
PT 480	6984	b	104
CDC Osler	6961	bc	104
PT 588	6937	bcd	106
PT 594	6882	bcde	101
PT 472	6863	bcde	102
PT 647	6709	bcdef	103
PT 643	6653	bcdef	104
PT 645	6538	cdefg	105
PT 772	6522	defgh	99
PT 250	6512	defgh	101
PT 474	6481	efgh	102
PT 646	6477	efgh	98
PT 482	6434	fgh	105
PT 780	6326	fghi	97
PT 245	6312	fghi	100
PT 481	6303	fghij	99
PT 479	6139	ghijk	106
PT 595	6110	hijk	101
PT 778	5999	ijk	102
AC Splendor	5950	ijk	100
CDC Teal	5879	jk	105
Katepwa	5805	k	104
PT 642	5273	l	100
PT 779	5137	l	100
Grand Mean	6397	-	102
CV%	4.06	-	2.16
LSD 5%	426.9	-	3.6
Significant Difference	Yes	-	Yes

Chart 1. 2014 Parkland Cooperative Wheat Trial Yield (bu/acre) at Roblin, MB



The check varieties for this test are AC Splendor, CDC Osler, CDC Teal and Katepwa. PT 245 has been in the test for 4 years. PT 472, PT 474, PT 588, PT 642 and PT 772 have been in the testing system since 2012. PT 250, PT 594 and PT 643 are in their second year of testing. The remaining entries are new for 2014.

PT 781 was significantly higher yielding than all the other entries and its maturity was later than the average for the test. CDC Osler was the highest yielding check. CDC Osler is equal to PT 480, PT 588, PT 594, PT 472, PT 647 and PT 643 and significantly higher yielding than the other checks and PT #'s not mentioned above. AC Splendor, CDC Teal and Katepwa performed at the lower end of the yield ability chart and they were significantly higher yielding to only PT 642 and PT 779.

Maturity ranged from 97 to 106 days for the test. PT 780 was the earliest maturing entry and it was significantly earlier than all the other entries except for AC Splendor, PT 772, PT 646, PT 245, PT 481, PT 642 and PT 779. In regards to yield, PT 780 was below the test average. This is one of the challenges in breeding for early maturity for all crop types, yield is generally compromised.

Conclusions

Many changes are occurring in the wheat industry including breeding programs, production and marketing. The world population is growing and this has prompted demand for wheat products to expand as well. In order to keep up with this growing demand, production increases are required. Germplasm adaptation to shorter growing regions and increased yield ability is important in meeting the World Bank estimates for feeding the world in the future.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dr. Dean Spaner and Klauz Strenzke at the University of Alberta for their cooperation on this trial, as well as to Bradley Cranwell for the use of the land.

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Schedule

PCDF will continue to be a testing site for the Parkland C Wheat trial. The Roblin location is situated in the heart of the Parkland region and provides excellent agronomic data for selecting varieties adapted to this zone.

Western Feed Grains Development Cooperative Variety Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Matthew Yau[2]

Site Information

Location: Roblin, Manitoba
Cooperators: Dr. Dana Maxwell - President, Ag Quest Inc.
Dr. Matthew Yau - Plant Breeder, WFGD Co-op
Bradley Cranwell - Roblin, Manitoba

Background

The Western Feed Grain Development (WFGD) Co-operative is a farmer directed breeding program established in December 2005; created by farmers, for farmers, to benefit farms, livestock production operations, ethanol facilities and local communities across western Canada. Since its initiation, the WFGD Co-op has continued to operate the farmer directed spring wheat breeding program to meet the changing needs of western Canadian grain producers, the livestock industry as well as the ethanol industry. This small, dedicated organization was formed by three founding directors with a dream to develop "feed wheat" varieties that they could use on their own farms for livestock feed instead of relying on "feed wheat" by default due to negative impacts of disease and weather.

WFGD Co-op is a unique concept in that farmers can invest and participate in the development of varieties that they can use on their own farm. Grain produced from WFGD seed can be utilized to feed livestock on farm or market to a variety of different markets. The Co-op has focused on developing general purpose class wheat that can be utilized in many markets, providing many marketing options for farmers. In February 2013, WFT 603, the first cultivar developed by the WFGD Cooperative was publicly approved for release.

The Co-op is incorporated in Manitoba and is also registered in Saskatchewan and Alberta. The Co-op is governed by a Board of Directors consisting of six grain and livestock producers representing Manitoba, Saskatchewan and Alberta.

The Co-op 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.

Objective

To test newly developed cultivars of feed wheat on behalf of the WFGD Co-op.

[1] PCDF, Roblin
[2] Ag Quest, Minto

Procedure and Project Activities

Treatments:	30 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Lattice
Seeding date:	May 22
Fertilizer applied:	Broadcast 110 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	September 25
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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 and moisture were recorded.

Table 1. 2014 Western Feed Grains Development Cooperative Variety Trial Varieties at Roblin, MB*

AC Andrew	PYT13-41	PYT13-86
Pasteur	PYT13-42	PYT13-88
Sadash	PYT13-44	PYT13-96
Unity	PYT13-50	PYT13-97
5702PR	PYT13-51	PYT13-103
PYT13-4	PYT13-56	WFT 409
PYT13-5	PYT13-58	WFT 603
PYT13-6	PYT13-65	WFT 805
PYT13-8	PYT13-75	WFT 914
PYT13-20	PYT13-85	WFT 921

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

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs/acre (very low)	110
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Western Feed Grains Development Cooperative Variety Trial Results at Roblin, MB

Variety	Yield (kg/ha)	Pl/m²*	DTH*	DTF*	Score @ Anth.*	DTM*	Height (cm)	Disease (1-9)*	Lodging (1-9)*
PYT13-42	9051	307	60	65	4	107	104	5	3
PYT13-50	8973	310	56	62	1	101	92	5	2
PY13-88	8856	297	62	66	3	109	97	5	4
PYT13-44	8732	293	59	64	3	109	101	5	5
PYT13-20	8665	300	60	66	4	107	100	5	3
WFT 921	8577	290	60	65	3	106	100	5	3
AC Andrew	8426	267	61	68	4	106	102	5	3
WFT 805	8406	300	60	66	4	107	100	5	5
PYT13-65	8401	317	57	63	3	104	94	5	3
PYT13-56	8392	287	58	63	3	102	96	5	2
PYT13-8	8331	330	60	67	4	108	97	5	3
WFT 914	8299	290	60	65	4	110	104	5	3
PYT13-58	8275	273	58	64	4	105	99	4	5
PYT13-85	8217	263	62	67	4	110	107	5	4
Pasteur	8171	280	59	65	4	113	94	5	3
Sadash	8016	250	59	64	3	106	102	7	4
Unity	8014	320	56	63	2	102	105	5	4
PYT13-5	8006	283	60	66	3	108	99	5	4
PYT13-6	7950	260	61	65	3	108	99	5	3
PYT13-103	7925	250	58	63	2	106	96	4	4
PYT13-96	7871	283	59	65	4	103	97	5	3
PYT13-4	7867	220	60	65	2	108	100	5	3
5702PR	7851	310	59	65	4	106	100	6	3
PYT13-97	7782	287	60	65	4	107	97	5	3
WFT 603	7780	307	56	62	3	118	114	5	7
PYT13-75	7726	287	60	67	4	108	95	5	4
PYT13-51	7644	290	58	63	2	108	94	4	2
PYT13-86	7639	307	59	63	2	104	102	4	3
PYT13-41	7396	260	57	62	3	102	96	6	3
WFT 409	7326	310	58	64	4	105	93	5	4
Grand Mean	8152	288	59	65	3.2	107	99	5	4
CV%	4.8	14.9	2.9	3.6	46.2	3.9	7.4	15.1	45.9
LSD 5%	640.43	70.08	2.77	3.8	2.43	6.73	11.93	1.23	2.63
Sign Diff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Pl/m²* = Number of Plants per Meter Squared

DTH* = Days to Heading
DTF* = Days to Flowering
Score @ Anth.* = Score at Time of Flowering (1-5): 1 - very early, 5 - very late
DTM* = Days to Maturity
Disease (1-9)* = 1 - No Disease, 9 - Dead Preferred
Lodging (1-9)* = 1 - Straight, 9 - Completely Flat

Chart 1. 2014 Western Feed Grains Development Cooperative Variety Trial Yield (bu/acre) at Roblin, MB

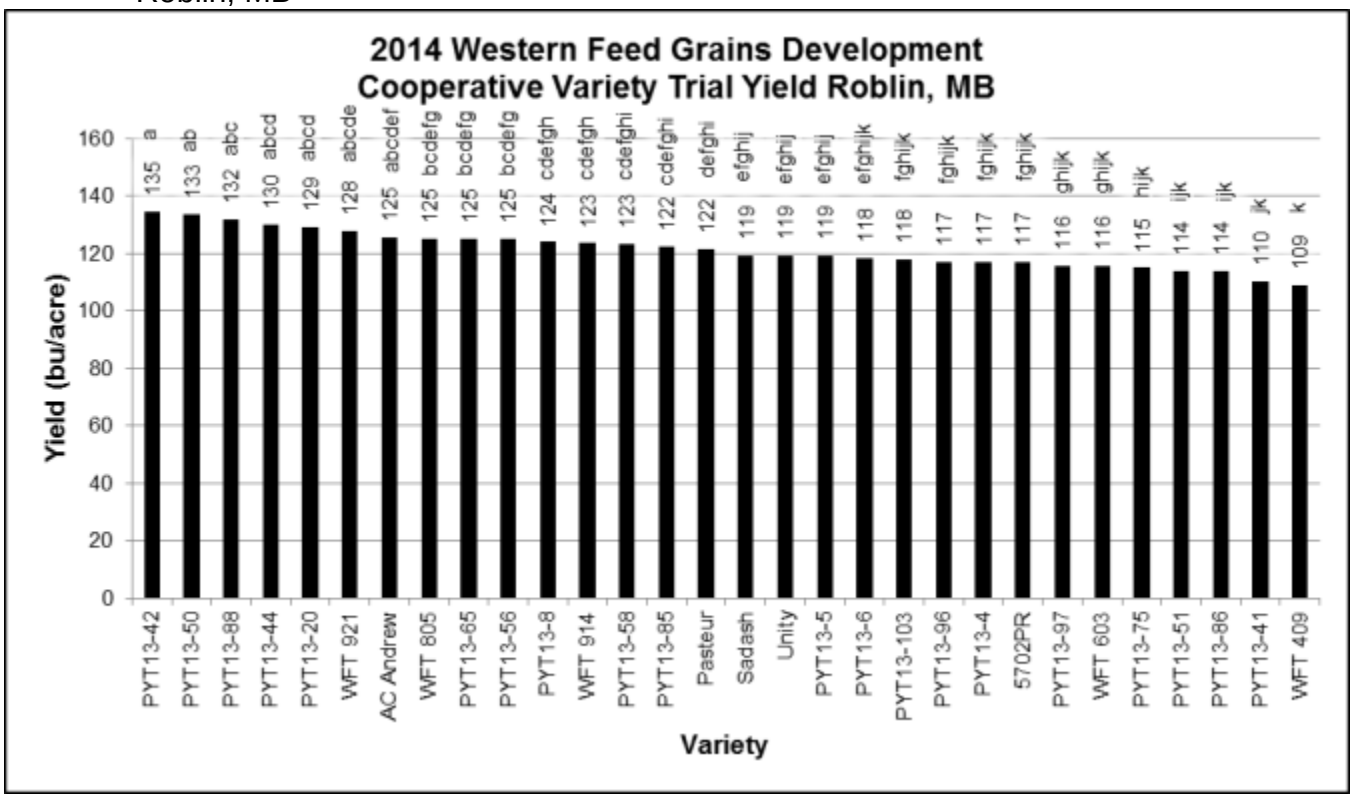


Table 3 summarizes a number of data parameters that were collected from this trial. Chart 1 summarizes the yield data and outlines the level of significant differences that occurred in the trial. In regards to yield, AC Andrew was the highest yielding check and there were no new cultivars that were significantly higher yielding than it. PYT13-42, PYT13-50, PYT13-88, PYT13-44, PYT13-20 and WFT 921 were the highest yielding entries in the test. All of them were significantly higher yielding than the check 5702PR and the significance ranged from 7% to 15%.

Maturities ranged from 101 to 118 days for the entries. The entry PYT13-50, second highest yielding entry, had the earliest maturity of 101 days. This is 1 day earlier than the earliest check Unity. PYT13-50 is also a short variety with good lodging resistance.

Conclusions

The General Purpose Wheat class provides new opportunities for producers in marketing their grain and the WFGD Co-op has demonstrated that it can contribute benefits to local producers in western Canada.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dr. Matthew Yau, Dr. Dana Maxwell and the WFGD Co-op for their cooperation in this trial. Also thank you to Bradley Cranwell for the use of the land.

Schedule

PCDF will continue to play a role in the evaluation of yield and adaptability of new lines of feed wheat in the Parkland region.

Forage Crops

Advanced Forage Barley Forage Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Ana Badea[2]

Site Information

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

Background

Barley is a very competitive plant that matures quickly and can be harvested for forage in approximately 58 to 65 days. Barley green feed, silage or swath grazing/bale feeding systems can deliver a large proportion of the dietary energy and protein needs of beef cattle.

The barley breeding effort at AAFC Brandon is aiming to develop new varieties of six-row forage/feed barley well-suited to western Canada, with improved disease resistance and agronomic performance combined with enhanced quality to meet producers' needs and to contribute to their economic benefit.

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.

AC Ranger, Vivar (two registered cultivars) and FB015 (control for waxy type) were grown at Roblin this year, as well as 6 numbered breeding lines (Table 1) and 4 non-waxy and 2 waxy type varieties.

Objective

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

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

Procedure and Project Activities

Treatments:	9 (Table 1)
Replication:	4
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 23
Fertilizer applied:	Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5 applied with seed
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	August 5
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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, 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, dried down and then weighed to determine dry matter yield. The samples were then sent to AAFC-Brandon for further quality analysis.

Table 1. 2014 Advanced Forage Barley Forage Trial Varieties at Roblin, MB*

AC Ranger	EX821-5	EX824-9
Vivar	EX821-15	EX825-19
EX820-23W	EX821-15W	FB015

* Numbered entries are advanced lines with potential advancement to the cooperative testing system.

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

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	16 lbs/acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

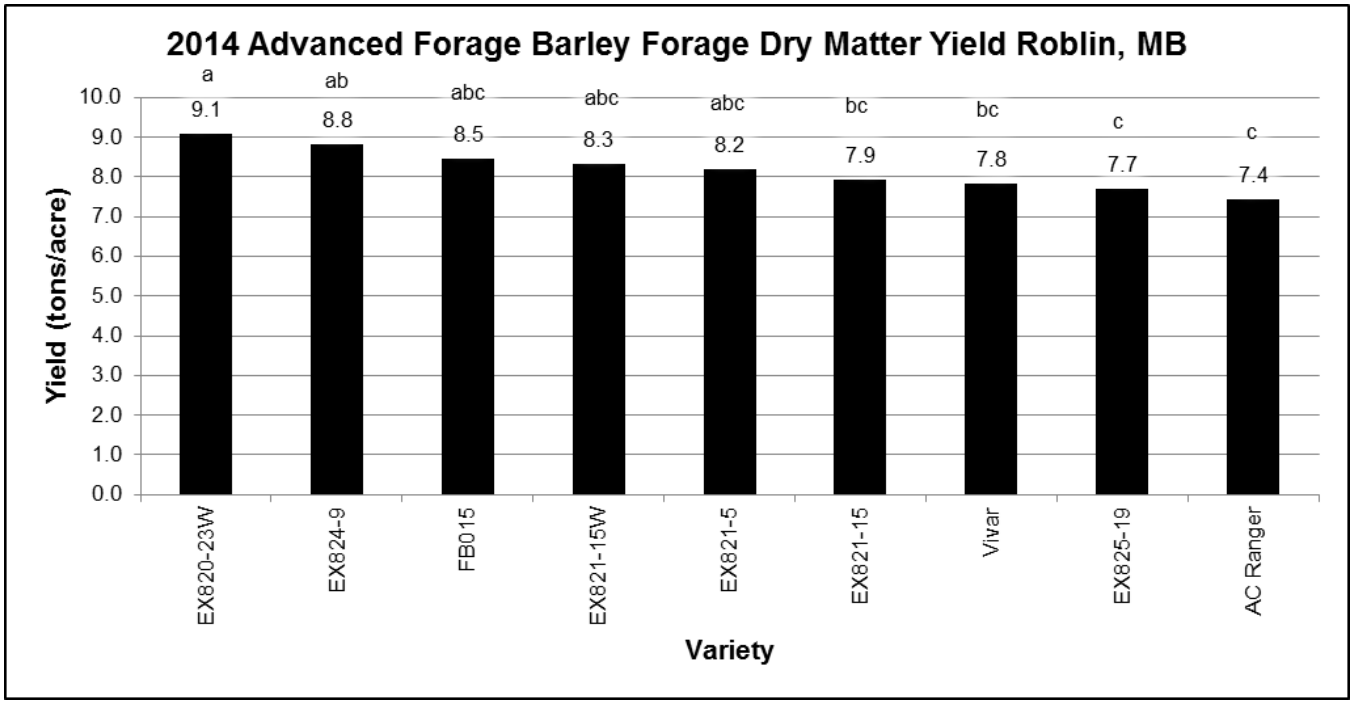
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Advanced Forage Barley Forage Trial Dry Matter Yield (kg/ha) at Roblin, MB

Variety	Dry Matter Yield (kg/ha)
EX820-23W	20,349
EX824-9	19,811
FB015	18,994
EX821-15W	18,640
EX821-5	18,366
EX821-15	17,773
Vivar	17,543
EX825-19	17,234
AC Ranger	16,689
Grand Mean	18,378
CV%	9.3
LSD 5%	2494.9
Significant Difference	Yes

Chart 1. 2014 Advanced Forage Barley Forage Trial Dry Matter Yield (tons/acre) at Roblin, MB



Almost all the non-waxy forage/feed breeding lines evaluated have shown higher dry matter yield than both checks, cultivars AC Ranger and Vivar with EX824-9 having the highest dry matter yield (19,811 kg/ha) (Table 3).

In regards to the two waxy breeding lines tested, EX820-23W had higher dry matter yield (20,349 kg/ha) than the control FB015 (18,994 kg/ha), while EX821-15W was almost equal

(18,640 kg/ha) to the control. Moreover, EX820-23W was the highest yielding line in the test surpassing all the other lines and checks (Table 3 and Chart 1).

Conclusions

Forage barley has an excellent fit as an annual source of forage for livestock, especially in the Parkland and northern areas of Manitoba.

Acknowledgments

This research was supported in part by funding from the Western Grains Research Foundation. PCDF would also like to acknowledge the funding contribution made by Growing Forward 2. Thank you to Dr. Badea for cooperating in this trial. For technical assistance we gratefully thank R. Von Hertzberg and B. Graham from Brandon Research Centre and PCDF for continued support in growing and caring for the trials. Thank you to Bradley Cranwell for the use of the land.

Schedule

PCDF will continue to work with Dr. Badea to test barley forage varieties for forage qualities in the Parkland region.

Western Canada Forage Barley Coop Forage Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Pat Juskiw[2]

Site Information

Location: Roblin, Manitoba

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

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 the PRCOB can be found at http://www.pgdc.ca/committees_ob.html . The purpose of the 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) at 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 2014. The Brandon site was lost due to flooding.

There were thirteen 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 the late 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. Gadsby has excellent scald resistance and good forage digestibility and CDC AUSTENSON has excellent 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

Procedure and Project Activities

Treatments:	17 (Table 1)
Replication:	3
Plot size:	1m x 5m
Test design:	Randomized Complete Block Design
Seeding date:	May 22
Fertilizer applied:	Broadcast 55 lbs. N, 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4 25 lbs. actual P_2O_5
Pesticide applied:	June 16 - Axial and Barricade
Harvest date:	August 6, 2014
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 direct seeded into canola stubble with 25 lbs. actual P_2O_5 applied with the seed. At the 2 to 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, 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, dried down and then weighed to determine dry matter yield. The samples were then sent to the Field Crop Development Center in Lacombe, AB for further quality analysis.

Table 1. 2014 Western Canada Forage Barley Coop Forage Trial Varieties at Roblin, MB*

AC Ranger	FB446	FB454
CDC AUSTENSON	FB447	FB455
Gadsby	FB450	FB456
Vivar	FB451	FB457
FB019	FB452	FB458
FB445	FB453	

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

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

	Estimated Available Nutrients	Fertilizer Applied (actual lbs)
N*	16 lbs./acre (very low)	55
P*	13 ppm (med)	65
K*	182 ppm (high)	10
S*	48 lbs/acre (high)	10

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

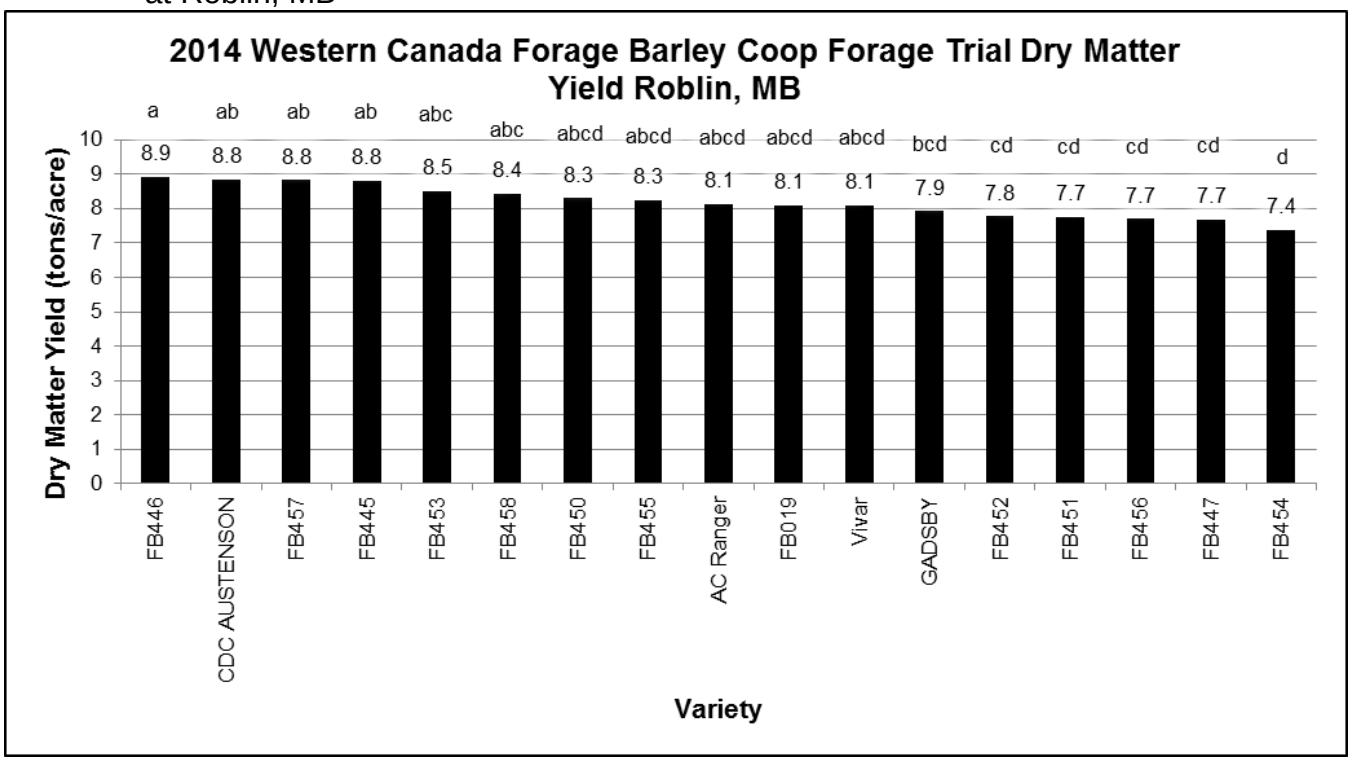
** Analysis by Agvise Laboratories

Results and Discussion

Table 3. 2014 Western Canada Forage Barley Coop Forage Trial Results at Roblin, MB

Variety	Dry Matter Yield (kg/ha)	Plants per Meter Squared	Height (cm)
FB446	19,979	263	121
CDC AUSTENSON	19,816	287	101
FB457	19,796	260	96
FB445	19,747	230	109
FB453	19,082	213	101
FB458	18,873	260	107
FB450	18,602	297	109
FB455	18,489	287	118
AC Ranger	18,213	240	108
FB019	18,133	230	113
Vivar	18,113	247	99
GADSBY	17,762	237	109
FB452	17,434	237	105
FB451	17,354	207	103
FB456	17,242	247	112
FB447	17,203	250	105
FB454	16,523	230	119
Grand Mean	18,374	248	108
CV%	6.8	13.2	3.7
LSD 5%	2090.1	54.5	6.7
Sign. Diff.	Yes	Yes	Yes

Chart 1. 2014 Western Canada Forage Barley Coop Forage Trial Dry Matter Yield (tons/acre) at Roblin, MB



At Roblin in 2014, yield of most of the lines fell between those of the check cultivars and did not differ significantly from one another with CDC AUSTENSON having the highest forage yield and Gadsby the lowest. The highest yields were from the FCDC forage line FB446. FB446 is a six-rowed, hulled line in its second year of testing and may be put forward for registration. While several lines were lower yielding than CDC AUSTENSON, their yields were not significantly lower than the other three checks. The FCDC two-row hulled entries FB450, FB457 and FB458, had yields between the check cultivars. The yield of FB019 from AAFC-Brandon was similar to that of AC Ranger.

Conclusions

Based on yields at one site, we can see that there is a wide range within the lines. While biomass yields are very important, quality must also be considered especially for those operations such as dairy and finishing where conversion is important. The quality data was not available when this report was prepared, but will be presented at the PRCOB meeting in February 2014.

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dr. Patricia Juskiw and Susan Lajeunesse of the Field Crop Development Center for their cooperation in this trial and to Bradley Cranwell for the use of the land.

Schedule

PCDF will continue to work with Dr. Patricia Juskiw and Susan Lajeunesse of the Field Crop Development Center to study different lines of forage barley for grain and forage analysis.

Evaluating Forages Suitable for Extended Grazing of Beef Cows

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Emma McGeough[2]

Site Information

Locations:	Arborg, Manitoba Carman, Manitoba Roblin, Manitoba Lanigan, Saskatchewan Saskatoon, Saskatchewan
Cooperators:	Emma McGeough - Assistant Professor, Department of Animal Science, University of Manitoba Prairies East Sustainable Agriculture Initiative (PESAI), Arborg, MB Ian Morrison Research Farm, Carman, MB Parkland Crop Diversification Foundation, Roblin, MB Bruce Coulman - University of Saskatchewan, Saskatoon, SK Paul Jefferson - Western Beef Development Centre, Lanigan, SK
Funding Agency:	Beef Cattle Research Council (BCRC)

Background

Across the Prairie Provinces, producers are seeking to extend the grazing season as it is well established that strategies for maintaining animals on pasture offer the potential for lower cost and labor requirements during overwintering. A national survey of cattle producers in 2012 showed that a significant number of cattle producers have adopted extended grazing strategies (Sheppard et al. 2015).

Although there is increased interest in stockpiled grazing, there are knowledge gaps including persistence of quality/nutrient profile, physical capacity to remain upright under snow conditions and spring regrowth potential, particularly with new or novel forages or new applications of existing forages. As the objective is low-cost, pasture-based feeding during fall and early winter, tame forage species that can maintain nutritive value in this period are desirable. Furthermore, it is important to assess animal nutrient status and subsequent impacts on performance including animal gain and reproductive capacity when using these forages.

This study, funded by the Beef Cattle Research Council is a joint Manitoba – Saskatchewan initiative collaborating with Dr. Paul Jefferson at the Western Beef Development Centre and Dr. Bruce Coulman at the University of Saskatchewan, as well as Manitoba Agriculture, Food and Rural Development.

[1] PCDF, Roblin
[2] University of Manitoba, Winnipeg

Objective

Identify superior forage varieties for use in extended grazing systems for beef cows.

Procedure and Project Activities

In 2014, small plots were established at three sites in Manitoba (PDCF, Roblin, PESAI, Arborg and the Ian Morrison Research Farm at Carman) and also at the University of Saskatchewan in Saskatoon and Western Beef Development Centre at Lanigan, Saskatchewan, representing a range of soil types and eco-regions. Forage species were selected based on consultation with members of the forage seed industry and beef producers. Forage species included both annual (Table 1) and perennial forages (Table 2; alone or in combination), under two management strategies, early or late stockpiling following haying. Examples of parameters measured at each site included plant counts, stage of maturity, standing height, leaf to stem ratio, forage yield and chemical nutritive value at monthly intervals. Analysis of these measurements is currently ongoing.

Based on industry consultation and biomass yield, chemical and physical quality data generated from the small plot assessment, the two most promising species for fall/winter grazing will be selected for inclusion in grazing trial with dry beef cows. Assessment of animal status and performance will be conducted and compared with a standard forage treatment reflecting current grazing practices.

Subsequently, economic analysis will be conducted by Dr. Derek Brewin, University of Manitoba and Dr. Kathy Larson, Western Beef Development Centre, to include estimations of the net return on investment and variation in these returns for each of the overwintering system.

Table 1. 2014 Beef Cattle Research Council Forage Trial Annual Forages

Maverick (Barley)	Haymaker (Oats)
Fusion (Corn)	Mammoth (Soybean)
Hazlet (Fall Rye)	Aubade (Westerwold)
Golden German (Foxtail Millet)	

Table 2. 2014 Beef Cattle Research Council Forage Trial Perennial Forages

Algonquin (Alfalfa)	Courtenay (Tall fescue)
Yellowhead (Alfalfa)	Success (Hybrid bromegrass)
Oxley II (Cicer Milkvetch)	Fleet (Meadow bromegrass)
Killarney (Orchard grass)	Armada (Meadow bromegrass)

Results and Discussion

2014 was the establishment year for this trial so there are no results to discuss.

Conclusions

Efforts are under way to determine forage varieties that can offer a low-cost and effective way to support beef cattle in extended grazing systems. 2014 was an establishment year for this trial, so few results were obtained. This study will be continued in future years at different locations in Manitoba and Saskatchewan.

Acknowledgments

This project is funded by the Beef Cattle Research Council. PCDF would like to thank Emma McGeough and her students for their cooperation in this trial.

References

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Schedule

PCDF will continue to work with Emma McGeough and the Beef Cattle Research Council to study forage varieties with an application in extending grazing systems.

Pea Silage and Grain Trial

Jeff Kostuik[1], Susan McEachern[1], Angel Melnychenko[1] and Tom Warkentin[2]

Site Information

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

Background

In response to industry demand, this trial was established for the twelfth consecutive year in 2014 to evaluate pea varieties for silage potential. Sites were grown on a voluntary basis by co-operators. Fees for quality assessments were paid by Saskatchewan Pulse Growers.

Peas are best adapted to loam, clay loam and sandy loam soils. Soils with poor internal drainage or cold soils (e.g., organic soils) are not well suited to pea production since seedling and root diseases are more prevalent under these conditions. Peas have low tolerance to soil salinity. Peas are most suitable following cereals in crop rotations. They should be seeded as early as possible with proper rhizobium inoculant. In terms of silage production, normal-leafed, long-vined pea varieties are recommended over semi-leafless because they produce significantly more biomass (Saskatchewan Ministry of Agriculture n.d.).

Usually, peas will yield less total dry matter and digestible energy than cereals alone. Mixing cereals and field peas for silage will improve feed quality and provide a possibility to increase yield. If cereals are sown in mixture with field peas, at least 50% (by weight) of the mixture should be peas (Ontario Ministry of Agriculture, Food and Rural Affairs 2013).

Objective

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

Procedure and Project Activities

Treatments: 12 (Table 1)
Replication: 4
Plot size: 1m x 5m
Test design: Randomized Complete Block Design
Seeding date: May 16
Fertilizer applied: Broadcast 40 lbs. P_2O_5, 10 lbs. K_2O, 10 lbs. S_2O_4
Pesticide applied: May 16 - Authority

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

June 16 - Viper

Harvest date: Silage - August 11
Grain - September 9

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

Prior to seeding, the plot area was heavy harrowed to break down previous barley stubble. The fertilizer blend was then broadcast with a Valmar applicator and incorporated with a heavy harrow. The peas were inoculated with the proper Rhizobia and then seeded into worked silage barley 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. A pre-emergence herbicide application of Authority was applied, as well as an in-crop application of Viper. Data such as plant counts, heights, pod assessment and lodging was recorded throughout the growing season.

One meter squared from each plot was harvested using a Gravely mower for the silage portion of the trial. The total wet weight from the harvested area was recorded, then a 500 gram subsample was dried down to determine dry matter yield.

Reglone was applied prior to grain harvest to aid in the drying process. The remaining 4 m² of each plot was harvested with a small plot combine and weight and moisture were recorded.

Table 1. 2014 Pea Silage and Grain Trial Varieties at Roblin, MB*

CDC Horizon	40-10	3834-4
CDC Leroy	3548-2	4397-3
CDC Sonata	3795-3	4400-4
CDC Tucker	3795-4	4516-2

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

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

	Estimated Available Nutrients	**Fertilizer Applied (actual lbs)**
N*	82 lbs/acre (med)	0
P*	22 ppm (high)	40
K*	231 ppm (high)	10
S*	52 lbs/acre (high)	10

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

Results and Discussion

A summary of the results and data from the 2013 Pea Silage Elite Trial have been provided in the 2014 PCDF Annual Report because the 2014 data from the three cooperating locations was not available at the time of publication. The data from the 2014 trial will be published in the 2015 report. The analysis from the three sites has been compiled by Dr. Tom Warkentin.

Report on the 2013 Pea Silage Elite Trial
Prepared by Dr. Tom Warkentin, January 2014

Materials and Methods for 2013 Trial
A protocol was developed in consultation with interested co-operators in western Canada. The protocol involved growing field pea plots in pure stands, in plots of 3-6 rows, with row length of 4-5 m, using typical agronomic practices for field pea yield trials in the area. When the lower pods on the stems of the cultivar CDC Sonata had thickened, a 1 m^2 sample was cut at the soil level from the front of each plot for biomass assessments. The remainder of the plot was harvested for grain yield. Crude protein (CP), neutral detergent fibre (NDF), acid detergent fibre (ADF) and relative feed value (RFV) of biomass was assessed by Central Testing Lab of Winnipeg.

Results
The Roblin site was lost due to early season flooding and late season damage by Canada geese. All varieties had acceptable plant stands at the two Saskatoon area locations. Mean days to flower ranged from 55-59. Mean vine length of the pea varieties ranged from 91-143 cm. Mean lodging score ranged from 3.6-8.3. Check variety 40-10 has normal leaf type and long vines and had the highest lodging score. CDC Sonata has normal leaf type and medium-long vines and had the second worst lodging score. In comparison, the semi-leafless varieties had low to moderate lodging scores. Mean maturity rating ranged from 1.6-3.0.

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, 1 m^2 of biomass was cut from each plot. Four varieties exceeded check variety 40-10 in mean dry weight of biomass in 2013. Check variety 40-10 was intermediate among the entries in percent dry matter (data not shown). Mean dry matter yield of check variety 40-10 was 1297 g/m^2, i.e., 12.97 tonnes/ha. Mean dry matter yield ranged from 86-115% of 40-10 among the entries in the trial. **Thus, forage pea is capable of very high biomass yield, similar to that of forage barley and other annual cereals.**

Mean crude protein of the harvested biomass of the pea varieties ranged from 12.3-18.1. Mean acid detergent fibre of the harvested biomass ranged from 24-34. Mean neutral detergent fibre of the harvested biomass ranged from 33-47. Mean relative feed value of the harvested biomass ranged from 103-172.

Mean grain yield of 40-10 was 2.4 tonnes/ha, with varieties in the test ranging from 105-170% of 40-10. Mean seed weight of the pea varieties ranged from 133-243 g/1000 seeds.

Table 3. Performance of the Entries in 2013 Pea Silage Forage Trial

# of Locations Data was Recorded	2	2	2	2	2	2	2	2	2	2	2
Variety	**GRYD***	**DTF***	**HT***	**MAT***	**LOD***	**SDWT***	**DM%***	**ADF***	**NDF***	**CP***	**RFV***
40-10	100	59	143	3.0	8.3	133	100	33	45	15.2	135
CDC Sonata	114	56	128	2.9	6.6	203	93	29	42	16.9	149
CDC Tucker	146	57	100	2.5	4.3	178	90	29	42	17.6	149
CDC Leroy	105	57	91	2.1	6.0	142	97	26	38	16.7	168
CDC Horizon	118	55	102	2.4	4.5	153	96	30	43	15.5	145
2815-6	136	57	94	2.1	4.6	198	86	31	44	15.0	137
3012-3	170	56	108	3.0	5.4	175	115	24	33	12.3	103
3525-11	140	56	101	2.5	3.6	234	99	28	41	15.5	155
3548-2	137	55	104	2.6	4.1	191	100	34	47	16.4	126
3873-14	135	55	98	1.9	4.8	210	94	32	45	16.3	131
3329-9	134	57	93	1.9	4.5	191	94	29	41	15.5	153
3795-3	147	57	101	2.3	4.9	193	105	26	37	17.6	172
3795-4	169	57	101	2.5	5.0	181	101	29	41	18.0	158
4045-5	123	56	95	2.1	4.5	191	90	32	45	18.1	134
3834-4	140	55	95	2.4	4.9	184	104	28	40	17.0	161
3855-6	112	57	95	1.8	4.4	236	88	32	45	14.9	134
3912-6	140	55	94	1.6	4.5	243	92	27	39	16.4	161
3821-3	131	58	102	3.0	4.3	153	95	33	46	15.8	130

GRYD* = Grain Yield as % of Cultivar 40-10
DTF* = Days to Flower
HT* = Plant Height (cm)
MAT* = Relative Maturity Where 1=Early, 3=Late
LOD* = Lodging Score Where 1=Upright, 9=Completely Flat
SDWT* = Seed Weight in Grams per 1000 Seeds
DM%* = Biomass Dry Matter as % of Cultivar 40-10
ADF* = Acid Detergent Fiber of Biomass (%)
NDF* = Neutral Detergent Fiber of Biomass (%)
CP* = Crude Protein of Biomass (%)
RFV* = Relative Feed Value

(Warkentin 2014)

Conclusions

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, 3795-4, 3834-4 and 3795-3 had greater biomass dry matter yield than check variety 40-10 in 2013 with greater grain yield and much better lodging score than 40-10. Three of these (except the maple type 3012-3) also had earlier maturity, less ADF, less NDF, more protein and greater RFV than 40-10. All four 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.

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.

(Warkentin 2014)

Acknowledgments

PCDF would like to acknowledge the funding contribution made by Growing Forward 2 to make this research project possible. Thank you to Dr. Tom Warkentin and Jaret Horner of CDC for their cooperation in this trial.

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Schedule

This is a long-term project that will most likely be continued in 2015. Results from the 2014 trial will be published in the PCDF 2015 Annual Report.