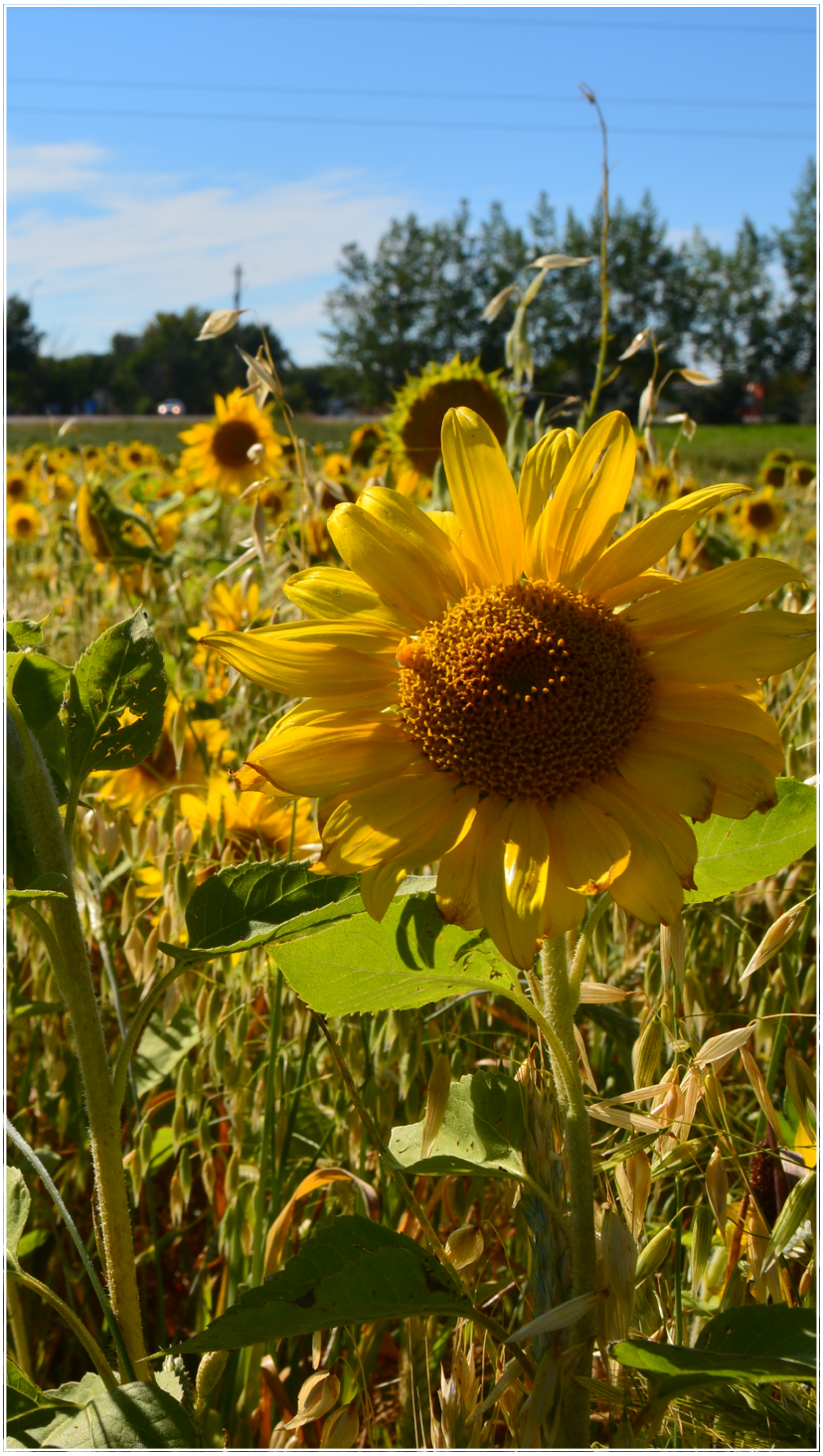
CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

2016 Annual Report

Member of ARECA



Chinook Applied Research Association

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The Chinook Applied Research Association is driven by farmers and ranchers in east central Alberta to bring innovative and profitable practices to the local agricultural industry. Our program of applied research, demonstration and extension projects provides a link in the transfer of technology between research and the producer. Producers, industry, government and others can access reliable data on crop, livestock and soils that is relevant to the area and its soil and climatic conditions.

We are pleased to make available the 37th edition of our Projects Report. It contains a description and summary of results of projects carried out or monitored by CARA in 2016.

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President's Message

Being Agricultural Producers, we have come to learn to accept challenges and opportunism that comes our way. 2016 was no exception to the rule. Spring came early followed by unpredictable weather patterns, fluctuations in livestock markets and a very wet fall with grain dryers working overtime.

Adapting to the changes, we keep finding new ways to meet those challenges. One of the challenges in east central Alberta is soil health. Years ago it was a rarity if the term even came up in a conversation and now it is an everyday topic. Whether it be newspapers, television or flyers in the mail, the headlines are about soil health. CARA has taken this resource to the next level and will develop a lab to evaluate soil health characteristics. Agricultural producers will be able to have this soil testing done right here in Oyen, Alberta. The opening date is scheduled for September 01, 2017. We, the Board, are very excited to give farmers and ranchers one more tool for their tool box.

As CARA is a non-profit association, monetary donation towards the soil lab is being accepted. In return, we will issue tax deductible receipts.

We give thanks to all our sponsors and donors for their support. Without you, CARA could not do our projects and provide a leading edge into new research. Good research leads the way to Successful Farming.

Gloria Nelson, Chairperson

Manager's Message

2016 proved to be another memorable year for the agricultural community here in Alberta, from both positive and negative perspectives. Most areas received a high level of precipitation resulting in lots of forage and crop growth. Perennial and annual crops were difficult to harvest, however, as the rain continued well into the fall. Mechanical problems magnified the challenges for CARA's harvest, but all crops were finally in by the end of October thanks to a combine borrowed from HyTech.

A huge thank you was earned by my staff members as they worked with many obstacles in getting our program completed. We are very fortunate to have such a dedicated team of full-time and seasonal staff. Appreciation also goes to our Board of Directors for guiding the organization through another year of challenges but many accomplishments as well. Although the process has been very slow, we are excited about the development of our Soil Health Lab. The project partnership and donation of equipment from RA West International has been an enormous boost towards the biological analyses that our lab will be offering. Support from our local municipalities and industry has also been very important.

CARA's project partnerships expanded in other areas as well. A long awaited Perennial Forage Evaluation project began in the spring with the seeding of grasses and legumes at 8 locations in the province. CARA also participated in other provincial initiatives, including a Higher Legume Pasture Project, Raising the Regional Variety Testing Bar, the Alberta Beef, Forage and Grazing Center as well as expansion of crop disease and pest monitoring programs. We were pleased to host other applied research and forage association staff at the CARA Center in August for some soil training and a look at a few of our projects. We have a wealth of knowledge and experience within the producer groups in the province – I learn something new whenever we get together and I'm proud to be part of the group. I look forward to more project collaboration as we move into another growing season.

With regards,

Dianne Westerlund, CARA Manager

2016 Board Members

Gloria Nelson, Veteran (President)

James Madge, Hanna (Vice President)

David Eaton, Sibbald (Past President)

Marvin Molzan, Sibbald (Financial Supervisor)

Ann Rafa, Acadia Valley (ARECA Rep.)

Richard Bailey,Veteran
Kyle Christianson, Sedalia
Darryl Conners, Hanna
George Doupe, Oyen
Matthew Gould, Consort
Danny Grudecki, Acadia Valley
John Kimber, Youngstown
Kirby Laughlin, Youngstown
Kevin Letniak, Consort
Charles Schmidt, Chinook
Walter Suntjens, Hanna
Stacy Scheuerman, Acadia Valley

2016 CARA Staff

Manager & Forage Agronomist: *Dianne Westerlund*

Crop & Soil Nutrient Management Specialist: *Dr. Yamily Zavala*

Conservation & Extension Coordinator: *Olivia Sederberg*

Conservation Agronomist & Animal Nutritionist: *Lacey Gould (Part time)*

Office Manager: *Shelley Norris*

Field Technicians: *Jerry Pratt*

Karen Raynard

Summer Technicians: *Danny Rude, Kale Scarff, Megan Snell & Irene Timm*

2016 Acknowledgements

Completion of CARA's 2016 program was again testament to the tremendous support and partnerships we have with a number of organizations and individuals. There is no doubt that the scope of projects CARA is able to carry out would not happen without our local municipalities behind us. There are many benefits to the relationships which have developed with ARECA member groups on projects and extension activities. Contributions from Alberta Agriculture & Forestry and Agriculture Canada specialists have enhanced our work and the information we are able to pass on to our producers.

A number of Agricultural Societies, agri-businesses, producer and community groups support our trials, demonstrations and events in various ways. Finally, we work with a great group of farmers and ranchers in all aspects of the program and are very proud to be part of the agricultural industry in our community.

Many thanks to the following who have contributed to CARA's program by providing funding, donations, inputs, partnering or extension or otherwise have lent a helping hand. *Our sincere apologies for anyone we have missed.*

20/20 Seed Labs

Canadian Humalite International

A & L Laboratory Group

Agricultural Research and Extension Council of Alberta & Member Groups

Agricultural Service Boards of Special Area 2, 3, 4 & M.D. of Acadia

Agriculture & Agri-Food Canada (AAFC)

Alberta Agriculture and Forestry (AAFD) & Specialists

Alberta Barley Commission

Alberta Beef Producers

Alberta Canola Producers Commission

Alberta Financial Services Corporation - (AFSC)

Alberta Pulse Growers

Alberta Wheat Commission

Berry Creek Agricultural Society

Big Country Adult Learning Centre

Big Country Agricultural Society

Exova Testing Group

Brett Young Seeds

Buffalo & District Agricultural Society

Canterra Seeds

Crop Production Services

Canola Council of Canada

Cornell University

Down to Earth Labs

Farm Credit Corporation

Foothills Forage & Grazing Association

Hannas Seeds

Lethbridge Agricultural Research Station

Mark Strutt

Miller Seeds

Municipal District of Acadia

Murray Beaumont Mechanical

Neutral Hills Ag Society

Northstar Seeds

Oyen South Country Coop

Oyen Vet Services

Pickseed

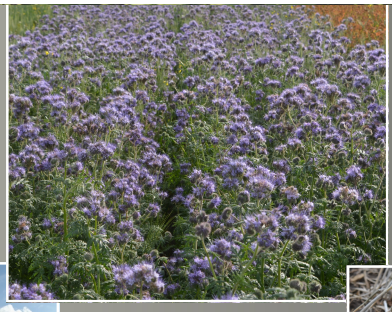
Proven Seeds

R.A. West International
Ratepayers of Special Areas and M.D. of Acadia
Red Deer River Watershed Alliance
Richardson Pioneer Grain, Oyen
Rocky Mountain Equipment, Oyen
Rob Shields
Saskatchewan Agriculture and Food
SeCan Association
Semi-Arid Prairie Agricultural Research Center (SPARC)
Sounding Creek Seeds
Special Areas Board and Advisory Council
Spondin Agricultural Society
Starland County
Steadfast Veterinary Services
The Late Donna Scory, Oyen
United Farmers of Alberta
University of Alberta
University of Saskatchewan

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Crop Trials & Demonstrations



Variety Trials

The following project description applies to all the variety trials. Site differences are noted in the individual reports. Long term data from past years and sites will not be included in this report but is available in the 2015 edition. We recommend to use caution when interpreting cumulative data if it represents yield from only a few years.

Purpose: To provide information on the performance of new and established crop varieties when grown under dryland conditions in east-central Alberta.

Project Description:

Fallow or stubble fields selected for the project sites are soil tested to determine soil fertility prior to seeding. Pre-seeding tillage, if needed, is usually done by the cooperator. In the case of stubble seeding, the plots are seeded directly into standing stubble following a pre-seed burn-off with glyphosate. The plots are seeded with CARA's Henderson 500 drill, with Morris contour openers, through a single belt cone with spinner/splitter in 5 paired rows (separated by 4 inches) on 11 inch spacing. Fertilizer is delivered through a chute between the paired rows. Plots are 1.4 m x 5.0 m laid out in a randomized complete block design with 3 or 4 replications.

CARA uses seeding rates that are based on recommendations for this area: the targeted plant population for cereals is 18 - 24 plants per sq. ft. and for pulses is 4 -12 plants/square foot. The amount of seed required for each plot is calculated using the thousand kernel weight of that particular seed lot, percent germination and estimated seed mortality.

Weed control is obtained by the appropriate use of herbicides. In the case volunteer crops or herbicide resistant weeds appear, they are removed by hand. Performance of the varieties is evaluated periodically throughout the season. At maturity, height measurements are taken and the plots are straight cut with a plot combine. The samples are air dried, cleaned and weighed for yield determination. Bushel weight is then determined. Thanks to the Richardson Pioneer Grain staff in Oyen for grade and protein determination.

A statistical analysis has been carried out on the yields harvested in 2015. Reference to Least Significant Difference (LSD) in the tables indicates the lb/A difference between yields that is significant at a 95% level of confidence. This also means that if two or more varieties have yields that fall within the LSD range, they are not significantly different from each other at 95% confidence level. The 95% confidence level means that we are 95% certain that the result is not a chance occurrence. A Coefficient of Variance (C.V.) of less than 20 means the data is reliable.

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Forestry website at

www.agric.gov.ab.ca. Data from these trials contributes to the crop recommendation guides. Feel free to call the CARA office with your questions.

Site Precipitation Summary (May – September) in Inches

	Oyen	Consort	Hanna	Acadia Valley
1990	3.3	N/A	N/A	N/A
1991	9.1	9.7	9.3	N/A
1992	5.4	6.5	7.5	N/A
1993	6.2	8.6	5.8	13.1
1994	8.2	6.9	11.7	5.7
1995	8.7	5.7	N/A	9.4
1996	6.9	6.5	9.5	3.0
1997	5.2	9.3	4.9	4.9
1998	5.3	3.9	5.8	5.1
1999	12.2	14.5	19.3	12.2
2000	3.6	N/A	6.5	6.8
2001	2.8	N/A	4.0	3.0
2002	N/A	N/A	N/A	N/A
2003	N/A	10.0	6.0	N/A
2004	N/A	15.1	10.9	N/A
2005	N/A	N/A	11.8	N/A
2006	N/A	N/A	6.6	N/A
2007	9.3	N/A	13.1	N/A
2008	10.6	7.95	10.25	N/A
2009	7.8	N/A	N/A	N/A
2010	12.4	N/A	14.0	12.4
2011	8.0	8.0	8.4	8.7
2012	7.6	13.0	9.9	7.0
2013	7.5	9.0	9.7	7.8
2014	7.5	10.0	9.5	8.7
2015	8.6	9.0	11.6	8.7
2016	13.1	13.8	15.5	14.6

Wheat and Durum Variety Trial

Summary

Wheat variety trials were conducted in 2016 to evaluate the performance of several varieties in east-central Alberta. Varieties of durum, winter wheat, Canada Prairie Spring Red (CPSR), Canada Western Red Spring (CWRS), Canadian Prairie Spring (CPS), Canadian Western General Purpose (CWGP) & Canada Western Soft White Spring (CWSWS) wheat were tested at Oyen, Hanna or Acadia Valley in 2016. The variety trial at Hanna was lost due to hail damage. Durum and triticale variety trials at Oyen were mowed because of competition with repeated flushes of volunteer millet and herbicide resistant kochia weeds. The variety trials are part of Alberta's Regional Variety Testing Program.

The long term averages for all sites are not included in this report. More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Forestry website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Cooperators:	Pat Kuhn, Oyen	SW 11-28-04-W4
	Blake Robinson, Hanna	SE 17-31-15-W4
	Vince Grudecki, Acadia Valley	NE 28-24-2-W4

Project Description and Precipitation Summary from previous years – see "Variety Trials" report, pages 1 and 2.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		**Hanna**	**Acadia Valley**	**Oyen**
Nitrogen*	(0-24")	85 lb/A (M)	42 lb/A (D)	39 lb/A (D)
Phosphorus*	(0-6")	67 lb/A (O)	12 lb/A (D)	26 lb/A (D)
Potassium*	(0-6")	1093 lb/A (O)	1200 lb/A (E)	639 lb/A (O)
Sulfate*	(0-24")	160 lb/A (O)	169 lb/A (O)	103 lb/A (O)
Soil Salinity*	(E.C.)	0.20 (G)	1.2 (G)	0.34 (G)
pH		6.0 (acidic)	8.3 (alkaline)	7.7 (alkaline)
OM	(%)	4.7 (normal)	3.8 (normal)	2.8 (normal)
Soil Texture**		Clay (21% S, 29% Si, 50% C)	Clay (13% S, 29% Si, 58% C)	Clay (13% S, 29% Si, 58% C)

* D = Deficient, M = Marginal, O = Optimum, E = Excess,
** S = Sand, Si = Silt, C = Clay

Table 2 **Precipitation 2016**

Month	Acadia Valley	Hanna	Oyen
May	2.7	3.3	2.8
June	2.9	2.3	2.2
July	6.1	6.1	3.6
Aug	2.7	3.0	3.7
Total (inches)	14.4	15.5	12.3

Table 3 **Agronomic Information**

	Hanna	Acadia Valley	Oyen
Previous Crop	Chem Fallow	Peas	Chem Fallow
Seeding Date	May 10	May 11	Sept 21
Seeding Depth	1.5-2 inches	1.5-2 inches	1.5-2 inches
Seedbed Condition	Good moisture condition at all sites		
Seeding Rate	18 plants per square foot		
Fertilizer* (26-18-5-3)	130 lb/A	200 lb/A	150 lb/A
Seeder**	Henderson 500 drill		
Seedbed Preparation	Pre-seed glyphosate		
Herbicide	Buctril M + Achieve Liquid Gold+Turbocharge		
Fungicide	None applied		
Harvest Dates:			
Durum	Terminated	Sept 19	
All wheat	Terminated	Sept 19 & 26	August 30

*placed between paired rows ** 5 paired rows on 11” spacing.
***Winter wheat was seeded at the Oyen site

Results:

Table 4 **Winter Wheat - Oyen 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Elevate	3659	61	11	72	63	35
AAC Gateway	3666	61	12	76	61	36
AAC Icebreaker	3767	63	11	75	62	35
AAC Wildfire	4183	70	11	74	64	36
AC Emerson	3274	55	13	73	61	38
AC Flourish	2712	45	12	69	63	33
AC Radiant	4073	68	11	78	62	39
CDC Buteo	3137	52	12	66	64	38
Chase	2882	48	12	72	63	33
Moats	3967	66	12	73	63	34
Pintail	3390	56	10	65	63	38
Sunrise	3843	64	10	78	61	37
Swainson	3385	56	10	77	62	37
W520	3515	59	10	73	63	35
Mean	3532	59	11			
LSD (.05)	NS					
C.V. %						

Comments: The winter wheat varieties at the Oyen averaged 59 bu/A in 2016, which is 14 bu/A higher yield than the previous year. The protein average was 11%, 3% lower than previous years. There was no significant difference in yield (lb/A) between varieties. Bushel weights were all slightly below the industry standard 60 lb/bu.

Table 5 **Durum – Acadia Valley 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Cabri	3770	63	99	65.7	45.0
AAC Congress	3897	65	97	64.8	42.0
AAC Spitfire	3435	57	91	64.1	45.0
CDC Alloy	3662	61	100	65.7	44.0
CDC Carbide	3803	63	97	65.1	46.0
CDC Dynamic	4323	72	97	65.1	44.0
CDC Precision	3948	66	97	65.1	45.0
DT862	3804	63	89	64.5	44.0
Strongfield	3373	56	98	64.0	45.0
Mean	3780	63			
LSD (0.05)	864	14			
C.V. %	13				

Comments: Yield of the durum varieties at Acadia Valley site for 2016 were significantly different with yields ranging from 56 to 72 bu/A and averaging 63 bu/A. Bushel weight average was 3 lb above the industry standard (60 lb/bu).

Table 6. **Canadian Prairie Red Spring (CPRS) Wheat – Acadia Valley 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Crossfield	4305	72	12	91	59.9	40
AAC Crusader	3986	66	11	88	59.3	40
AAC Tenacious	3539	59	11	111	62.7	44
AC Barrie	3449	57	12	106	62.3	37
Carberry	3713	62	13	86	62.9	37
Elgin ND	4326	72	12	99	61.3	37
HY2013	4027	67	11	83	61.9	36
HY537	4116	69	11	97	61.0	43
Mean	3933	66	11			
LSD (0.05)	396	7				
C.V. %	9.4					

Comments: Yields for the CPRS wheat ranged between 57 to 72 bu/A with an average of 66 bu/A. There was significant difference in yield between varieties. AAC Crossfield and Elgin ND had the higher yield, although the difference is not statistically significant. The protein average was very poor at 11%. Bushel weights were all 6 bu/A above the industry standard 60 lb/bu.

Table 7. **Canada Western General Purpose (CWGP) & Canada Western Soft White Spring (CWSWS) Wheat – Acadia Valley 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Indus SW	5166	86	9.2	97	65	35
AAC Innova SW	4796	80	8.8	91	64	39
AC Andrew	3856	64	8.9	85	64	41
AC Barrie	2642	44	11.8	107	66	37
Belvoir	3878	65	8.5	80	59	38
Carberry	3918	65	12.5	85	58	40
GP151	5024	84	9.5	94	62	37
KWS Alderon UK	4192	70	9.2	75	62	37
KWS Charing	4820	80	9.5	83	63	39
KWS Sparrow	4544	76	9.4	84	66	38
Mean	4284	71	9.7			
LSD (.05)	1130	19				
C.V. %	22					

Comments: The CWGP & CWSWS wheat varieties at Acadia Valley site averaged 71 bu/A in 2016, ranging from 44 to 86 bu/A. AAC Indus had the highest yield while AAC Barrie had the lowest. Average yields with a minimal difference of 19 bu/A among varieties were significant different. The protein average was 9.7 and bushel weight average was 10 lb. above the industry standard 60 lb/bu. Some of the varieties performed better this year compared with previous years, for example AAC Indus and AAC Innova yielded 20 lb/A higher than last year near Hanna. AC Andrew and AC Barrie performed similar to last year. The increase in yield when compared with previous years may have been influenced by better moisture condition throughout the growing season.

Table 8. **Canada Western Red Spring (CWRS) & Canada Western Hard White Spring (CWHWS) Wheat – Acadia Valley 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Cameron VB	3433	57	12	107	63	43
AAC Concord (Solid Stem)	3605	60	11	98	61	42
AAC Conner HRS	1965	33	12	87	62	40
AAC Prevail VB	2768	46	12	115	61	38
AAC Redberry HRS (Semi Dwarf)	3099	52	12	90	65	37
AAC Viewfield	3166	53	12	77	64	37
AC Barrie HRS	3071	51	12	104	64	37
BW1011	2724	45	12	95	63	40
BW488	3017	50	12	88	62	35
BW496	3538	59	12	95	63	39
BW968	3554	59	12	87	63	40
BW971 VB	3306	55	12	90	64	40
Carberry HRS	3150	53	13	82	63	38
CDC Bradwell HRS	2935	49	12	97	63	36
GO Early HRS	3161	53	12	105	61	39
PT250	3081	51	12	93	63	38
PT588	3494	58	12	94	64	43
SY479 VB	3150	53	12	101	63	37
SY637	2997	50	12	105	64	38
Mean	3117	52				
LSD (0.05)	355	8				
C.V. %	13					

Comments: The CWRS & CWHRS wheat varieties at Acadia Valley averaged 52 bu/A, ranging from 33 to 60 bu/A. Yields were up to 10 bu/A higher than last year for similar varieties tested in this site, due at least in part to high precipitation levels. Protein levels averaged 12%.

For the summaries data collected over past several years from various wheat variety trial tested in Central Eastern Alberta, please refer to last year CARA's Annual Report.

Triticale Variety Trial

Summary

Triticale variety trials were conducted in 2016 to evaluate the performance of these varieties in east-central Alberta (Acadia Valley). Only two triticale varieties were tested this year. They average 82 bu/A, more than double the average of last year, and 20 bu/A greater than the long term average of 67 bu/A. This increase in yield could be attributed to the good moisture conditions during the growing season.

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Cooperator: Vince and Dan Grudecki, Acadia Valley NE 28-24-2-W4

Project Description: Please see “Variety Trials”, page 1.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Acadia Valley
Nitrogen*	(0-24”)	42 lb/A (Deficient)
Phosphorus*	(0-6”)	12 lb/A (Deficient)
Potassium*	(0-6”)	1200 lb/A (Excess)
Sulfate*	(0-24”)	169 lb/A (Optimum)
Soil Salinity*	(E.C.)	1.2 (Good)
pH		8.3 (Alkaline)
OM	(%)	3.8 (Normal)
Soil Texture**		Clay (13% S, 29% Si, 58% C)

** S = Sand, Si = Silt, C = Clay

Table 2 **Precipitation 2016**

Month	Acadia Valley
May	2.7
June	2.9
July	6.1
Aug	2.7
Total (inches)	14.4

Table 3 **Agronomic Information**

	Acadia Valley
Previous Crop	Field Peas
Seeding Date	May 11
Seeding Depth	1.5 – 2.0 inches
Seedbed Condition	Adequate moisture conditions for germination
Seeding Rate	18 plants per square foot
Fertilizer	200 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M, Achieve, Turbocharge
Fungicide	None
Harvest Date	September 19

Results:

Table 4 **Triticale – Acadia Valley 2016**

Variety	**Yield (lb/A)**	**Yield (bu/A at 52 lb/bu)**	**Height (cm)**	**Bushel Weight (lb/bu)**	**TKW (grams)**
AAC Delight	5018	86	104	61	50
Brevis	4764	102	95	63	47
Mean	4891	86			
LSD (0.05)	NS				
C.V. %					

Comments: There were no significant differences among the variety yields in the 2016 triticale variety trial at Acadia valley. Mean average for the trial was 86 bu/A. Triticale yield for this year was double of last year and it could be attributed to more moisture during the growing season. The average yields of these two triticale varieties were 26 bu/A higher that the Pronghorn long term (7 years) average yield. Brevis variety average yield was similar to the 2015 test.

Fall Rye Variety Trial

Summary

Six varieties of Fall Rye were seeded in 2015 Fall for the 2016 cropping season to evaluate their performance in east-central Alberta. The six varieties averaged 27 bu/A above the reported average yield (40 bu/A) in Alberta. That increase in yield might be attributed to a better moisture condition during the 2016 growing season compared with previous years. Fall rye has been used as a green cover crop for weed control in organic farming production. In the US it has been used to improve soil health for its soil-holding rooting system, reduction of nitrate leaching, for controlling wind erosion as well as for breaking disease cycles in rotation. With all of these qualities fall rye can play an important role in the cropping system management in the area.

Cooperator: Pat Kuhn, Oyen SW 11-28-04-W4

Project Description: Please see “Variety Trials”, page 1.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Oyen
Nitrogen*	(0-24”)	39 lb/A (Deficient)
Phosphorus*	(0-6”)	26 lb/A (Deficient)
Potassium*	(0-6”)	639 lb/A (Optimum)
Sulfate*	(0-24”)	103 lb/A (Optimum)
Soil Salinity*	(E.C.)	0.34 (Good)
pH		7.7 (Alkaline)
OM	(%)	2.8 (Normal)
Soil Texture**		Clay (13% S, 29% Si, 58% C)

** S = Sand, Si = Silt, C = Clay

Table 2 **Precipitation 2016**

Month	Oyen
May	2.8
June	2.2
July	3.6
Aug	3.7
Total inches	12.3

Table 3 **Agronomic Information**

	Oyen
Previous Crop	Canola
Seeding Date	September 21, 2015
Seeding Depth	1.5 – 2.0 inches
Seedbed Condition	Excellent moisture conditions
Seeding Rate	18 plants per square foot
Fertilizer	150 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M, Achieve, Turbocharge
Fungicide	None
Harvest Date	August 30

Results:

Table 4 **Fall Rye – Oyen 2016**

Variety	**Yield (lb/A)**	**Yield (bu/A at 56 lb/bu)**	**Height (cm)**	**Bushel Weight (lb/bu)**	**TKW (grams)**
Bono	4556	81	97	56.0	40.0
Brassetto	4798	86	109	58.6	41.0
Danko	3980	71	94	57.9	47.0
Guttino	4125	74	100	56.9	44.0
Hazlet	3261	58	90	57.2	39.0
Prima	3385	60	97	57.1	48.0
Mean	4018	72			
LSD (0.05)	NS				
C.V. %					

Comments: There were no significant differences between the variety yields in the 2016 rye variety trial at Oyen. Mean average for the trial was 72 bu/A which is almost 3 times higher than previous years, most likely due to the moisture conditions during 2016.

Barley Variety Trial

Summary:
Barley variety trials were conducted in 2016 to evaluate the performance of several varieties and their potential in the brown soil zone as part of the Alberta and Saskatchewan Regional Variety Testing Program. Both trials performed very similar in Acadia Valley with an average of 69 bu/A. Moisture conditions were excellent during 2016.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Acadia Valley
Nitrogen	(0-24")	42 lb/A (Deficient)
Phosphorus	(0-6")	12 lb/A (Deficient)
Potassium	(0-6")	1200 lb/A (Excess)
Sulfate	(0-24")	169 lb/A (Optimum)
Soil Salinity	(E.C.)	1.2 (Good)
pH		8.3 (Alkaline)
OM	(%)	3.8 (Normal)
Soil Texture**		Clay (13% S, 29% Si, 58% C)

** S = Sand, Si = Silt, C = Clay

Table 2 **Agronomic Information**

	Acadia Valley
Previous Crop	Field Peas
Seeding Date	May 11
Seeding Depth	1.5 – 2.0 inches
Seedbed Condition	Adequate moisture conditions for germination
Seeding Rate	18 plants per square foot
Fertilizer	200 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M, Achieve, Turbocharge
Fungicide	None
Harvest Date	September 19

Table 3. **Precipitation 2016**

Month	Acadia Valley
May	2.7
June	2.9
July	6.1
Aug	2.7
Total (inches)	14.4

Results:

Table 7 **Two Row Barley – Acadia Valley 2016 (Alberta)**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AC Metcalfe	4232	71	74	66	44
CDC Bow	3807	63	74	63	47
CDC Platinum Star	4229	70	83	65	45
Champion	4268	71	71	67	52
Claymore	4643	77	76	66	45
HB13324	3405	57	77	79	50
Oreana	4780	80	57	65	49
TR12135	4150	69	75	62	47
TR12225	4160	69	73	63	47
TR13606	4073	68	73	62	44
TR13609	4534	76	84	63	46
TR13740	3803	63	71	66	49
TR14928	4255	71	58	62	46
Mean	4165	69			
LSD (0.05)	730	12			
C.V. %	12				

Comments: The two row barley Alberta variety trial at Acadia Valley averaged 69 bu/A, ranging from 57 to 80 bu/A. These varieties showed to have average yield that were significant different with a difference of 12 bu/A. See previous long term yield averages for these varieties in the 2015 CARA Annual Report

Table 7. **Two Row Barley – Acadia Valley 2016 (Saskatchewan)**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Synergy	4057	68	78	63	45
AC Metcalfe	3777	63	76	66	43
Amisk	4629	77	75	61	41
Canmore	3470	58	82	66	43
CDC Bow	4278	71	77	63	45
CDC Platinum Star	3476	58	88	65	44
Cerveza	4656	78	73	80	43
HB13324	3603	60	81	63	41
Muska	4020	67	76	62	39
TR10214	4442	74	82	65	45
TR12135	4136	69	75	62	46
TR12733	4378	73	79	65	43
TR12735	3428	57	59	65	48
TR13606	4451	74	77	63	43
TR13609	4277	71	87	64	44
TR13740	4696	78	77	66	46
TR14928	4731	79	60	63	44
Mean	4147	69			
LSD (0.05)	NS				
C.V. %					

Comments: The two row barley variety trial for the Saskatchewan set behaved similar to the Alberta variety set. Average yield was 69 bu/A, ranging from 57 to 78 bu/A. They were not significant different mainly because of the high variability that the varieties presented among the replications.

Oat Variety Trial

Summary:
Oat varieties were planted near Oyen to evaluate their potential in the brown soil zone, as part of the Alberta Regional Variety Testing Program. Unfortunately, yield was significantly affected by bird damage so the data reported here is not considered to be a good indication of the actual yield. It is reported to give reference on relative yield potential between varieties. More information on varieties is available in the variety guide in the seed.ab.ca seed guide or website or on the Alberta Agriculture and Forestry website at www.agric.gov.ab.ca.

Cooperator: The late Donna Scory, Oyen E 35-27-4-W4

Project Description: Please see "Variety Trials", page 1.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Oyen
Nitrogen*	(0-24")	23 lb/A (Deficient)
Phosphorus*	(0-6")	52 lb/A (Marginal)
Potassium*	(0-6")	678 lb/A (Optimum)
Sulfate*	(0-24")	11 lb/A (Marginal)
Soil Salinity*	(E.C.)	0.16 (Good)
pH		6.4 (Neutral)
OM	(%)	1.8 (Normal)
Soil Texture**		N/A

Table 2 **Precipitation 2016**

Month	Oyen
May	2.8
June	2.2
July	3.6
Aug	3.7
Total (inches)	12.3

Table 3 **Agronomic Information**

	Oyen
Previous Crop	Camelina
Seeding Date	May 19
Seeding Depth	1.5 – 2.0 inches
Seedbed Condition	Excellent moisture conditions
Seeding Rate	18 plants per square foot
Fertilizer	250 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M, Achieve, Turbocharge
Fungicide	None
Harvest Date	October 3

Results:

Table 7 **Oats – Oyen 2016**

Variety	Yield (lb/A)	Yield (bu/A at 52 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Justice	4738	91	102	54.2	54.0
Akina	4184	80	94	48.3	54.0
CDC Dancer	3066	59	104	46.0	48.0
CDC Haymaker	3666	71	112	47.2	52.0
CDC Morrison	4253	82	94	51.9	50.0
CDC Norseman	3573	69	101	46.2	53.0
CDC Ruffian	4601	88	94	50.3	47.0
CFA1207	4894	94	94	51.9	58.0
CFA1220	3656	70	100	52.3	46.0
CS Camden	4283	82	96	49.7	54.0
Kara	5047	97	89	50.7	66.0
OT6008	4060	78	95	50.5	49.0
OT6009	4559	88	95	49.7	48.0
OT6011	4176	80	97	49.7	43.0
Summit	4959	95	92	52.3	47.0
Mean	4248				
LSD (0.05)	NA				
C.V. %					

Comments: The oats grew well during 2016 at Oyen, but much of the yield was lost by bird damage.

Field Pea Variety Trial

Summary:
Six yellow and four green field pea varieties were grown at Consort and Oyen to determine their performance in the brown soil zone, as part of the Alberta Regional Variety Testing Program. The sites were planted in early May and harvested in late August (Oyen) and late September (Consort). Varieties at the Oyen site showed to be a lower standability when compared with the Consort site. No statistical analysis was performed for the Consort trial because the harvest was delayed due to high moisture conditions at harvest and some varieties started to shatter. **The data reported for Consort should be used with caution.**

Long term yield for previous field pea variety trials are not included in this report (for long term reference of this varieties please refer to last year CARA's report). More information on varieties is available in the variety guide in the seed.ab.ca seed guide or website or on the Alberta Agriculture and Forestry website at www.agric.gov.ab.ca.

Cooperator: Barry Redel, Consort NE 11-35-7-W4
Dwayne Smigelski, Oyen SE 4-28-3-W4

Project Description: Please see "Variety Trials", page 1.

Table 1 **Soil Analysis**

Soil Analysis		Consort	Oyen
Nitrogen*	(0-24")	59 lb/A (D)	39 lb/A (D)
Phosphorus*	(0-6")	50 lb/A (M)	26 lb/A (D)
Potassium*	(0-6")	1023 lb/A (O)	639 lb/A (O)
Sulfate*	(0-24")	> 1000 lb/A (E)	103 lb/A (O)
Soil Salinity*	(E.C.)	0.73 (G)	0.34 (G)
pH		6.6 (neutral)	7.7 (neutral)
OM	(%)	4.7 (normal)	2.8 (normal)
Soil Texture**		N/A	Sandy Loam (49% S, 23% Si, 28% C)*

* D = Deficient, M = Marginal, O = Optimum, E = Excess,
** S = Sand, Si = Silt, C = Clay

Table 2 **Precipitation 2016**

Month	Consort	Oyen
May	3.0	2.8
June	3.4	2.2
July	3.8	3.6
Aug	2.7	3.7
Total (inches)	12.9	12.3

Table 3 **Agronomic Information**

	Consort	Oyen
Previous Crop	Wheat	Wheat
Seeding Date	May 5	May 5
Seeding Depth	1.5 inches	
Seedbed Condition	Excellent moisture conditions	
Seeding Rate	6 plants per square foot	
Fertilizer (11-52-0)	80 lb/A placed between the paired seed rows	
Seeder	Henderson 500 drill*	
Seedbed Preparation	Pre-seed glyphosate	
Herbicide	Odyssey	
Fungicide	None applied	
Harvest Dates:		
Green Peas	September 22	August 31
Yellow Peas	September 22	August 31

* 5 paired rows on 11" spacing,

Results:

Table 4. **Green Peas – Consort 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Radius	3129	52	94	63	202	9
AAC Royce	4066	68	92	65	195	8
CDC Greenwater	2563	43	90	62	204	9
CDC Limerick	2469	41	84	65	203	9
Mean	3057	51				
LSD (0.05)	NA					
C.V. %						

*1 = erect 9 = flat

Comments: Harvested yields of the green peas ranged from 41 to 68 bu/A, with an average yield of 51 bu/A. Yield during 2016 was almost triple the average yield for 2015. Green peas performed well during 2016, but because of the moisture at the end of the growing season, the harvest had to be delayed. Pods were shattering and plants were laying on the ground. For this reason statistical analysis was not performed for the Consort site.

Table 5. **Yellow Peas – Consort 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Barrhead	2301	38	88	64	206	8
AAC Carver	3990	66	89	63	211	9
CDC Amarillo	3258	54	96	65	194	7
CDC Inca	3880	65	96	64	190	6
CDC Meadow	2546	42	94	64	212	8
LN4228	2165	36	89	63	243	6
Mean	3023	50				
LSD (0.05)	NA					
C.V. %						

* 1 = erect 9 = flat

Comments: Yellow pea average yields at consort ranged from 36 to 66 bu/A, with an average yield of 50 bu/A. The average yield a Consort for 2016 yielded double when compared with 2015.

Table 6. **Green Peas – Oyen 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Radius	3497	58	83	65	203	3
AAC Royce	4263	71	75	64	222	3
CDC Greenwater	4167	69	85	65	216	2
CDC Limerick	3911	65	82	66	189	3
Mean	3960	66				
LSD (0.05)	246	13				
C.V. %	15					

*1 = erect 9 = flat

Comments: Average yield of the green peas ranged from 58 to 71 bu/A, with an average yield of 66 bu/A. Any difference of 13 bushels was significant, meaning the AAC Royce was significantly higher yielding than the AAC Radius. All varieties presented poor standability but still performed almost three times better than last year.

Table 7. **Yellow Peas – Oyen 2016**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Barrhead	3957	66	89	65	213	4
AAC Carver	3173	53	89	65	215	5
CDC Amarillo	4369	73	96	65	214	2
CDC Inca	3638	61	82	65	206	5
CDC Meadow	3726	62	84	65	193	4
LN4228	5135	86	81	64	196	1
Mean	4000	67				
LSD (0.05)	1112	19				
C.V. %	22					

*1 = erect 9 = flat

Comments: Yellow pea yields ranged from 53 to 86 bu/A, led by LN4228. Mean yield of the trial was 67 bu/A. Regardless of the variability found in yield within the varieties (as reflected by the high CV), they demonstrated their ability to respond when moisture conditions are good. The minimum significant difference between variety was 19 bu/A. All varieties performed well when compared with the long term CDC Meadow yield (49 bu/A).

Peas at Oyen site early August

Flax Variety Trial

Summary:
Fifteen flax varieties were grown at Oyen to determine their performance in the brown soil zone, as part of the Alberta and Saskatchewan Regional Variety Testing Programs. The sites were planted in early May and harvested in early September. The flax varieties performed well in comparison with last year's trial at Oyen. Yield average was 46 bu/A, four times higher than the 2015 average yield. Moisture conditions for 2016 were more favorable for growth, but also complicated harvest as precipitation continued into September. Because of too much moisture at harvest time, each plot was cut with the combine and then carefully packed to let them dry inside the CARA's shop. The entire sample was threshed a second time through the combine. Then each variety was cleaned well before weight measurements were taken.

More information on varieties is available in the variety guide in the seed.ab.ca seed guide or website or on the Alberta Agriculture and Forestry website at www.agric.gov.ab.ca.

Cooperator: The late Donna Scory, Oyen E 35-27-4-W4

Project Description: Please see "Variety Trials", page 1.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Oyen
Nitrogen*	(0-24")	23 lb/A (Deficient)
Phosphorus*	(0-6")	52 lb/A (Marginal)
Potassium*	(0-6")	678 lb/A (Optimum)
Sulfate*	(0-24")	11 lb/A (Marginal)
Soil Salinity*	(E.C.)	0.16 (Good)
pH		6.4 (Neutral)
OM	(%)	1.8 (Normal)
Soil Texture**		N/A

** S = Sand, Si = Silt, C = Clay

Table 2 **Precipitation 2016**

Month	Oyen
May	2.8
June	2.2
July	3.6
Aug	3.7
Total (inches)	12.3

Table 3 **Agronomic Information**

	Oyen
Previous Crop	Wheat
Seeding Date	May 26
Seeding Depth	0.5 - 1 inch
Seedbed Condition	Excellent moisture conditions
Seeding Rate	35 plants per square foot
Fertilizer	200 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	None
Fungicide	None
Harvest Date	October 27

Results:

Table 7. **Flax – Oyen 2016**

Variety	**Yield (lb/A)**	**Yield (bu/A at 56 lb/bu)**	**Height (cm)**
AAC Bravo	2641	47	73
CDC Bethune	2693	48	77
CDC Glas	2728	49	74
CDC Neela	2464	44	74
CDC Plava	2755	49	70
FP2316	2456	44	79
FP2388	2528	45	62
FP2454	2480	44	68
FP2457	2553	46	77
Nulin50	2253	40	68
Prairie Grande	2522	45	64
Prairie Sapphire	2506	45	73
Prairie Sunshine	2568	46	76
Westlin 71	2496	45	70
Westlin 72	2701	48	72
Mean	2556	46	
LSD (0.05)	95	5	
C.V. %	9		

Comments: Mean average for the trial was 46 bu/A, ranging from 40 to 49 bu/A. Yield differences greater than 5 bu/A were significantly different. Several varieties yielded greater than the site mean, including CDC Glas, CDC Plava, CDC Bethune, Westlin 72 and AAC Bravo. This year average was four times higher than last years and which might be attributed to the excellent moisture condition during 2016.

The Effect of Nitrogen Placement on Yield and Protein Quality in Hard Red Spring Wheat.

Yamily Zavala, Ph.D

Note – this project is funded by the Alberta Wheat Commission

Summary

A research activity was conducted during 2016 to evaluate the effect of rate, timing and source of nitrogen (N) on hard red spring wheat grain yield and protein content on a clay soil in east central Alberta.

Average wheat yields were statistically different between some of the treatments. An increase in yield was observed as the level of N increased for both liquid and broadcasted N regardless the time of application. The highest yield (65 bu/A) with the highest level of protein (15%) was reached when additional N was applied at flag leaf. This is almost 30 bu/A more than the control treatment (0 lb N/A). The lower average yield (27 lb/A) was obtained when only the recommended N rate was applied as liquid N at the flowering stage. A similar trend was observed at the 2015 Oyen study.

Cooperator: Vince Grudecki, Acadia Valley NE 28-24-2-W4

Site Information:

Table 1 **Soil Analysis and Precipitation 2016**

Soil Analysis		Acadia Valley
Nitrogen*	(0-24")	42 lb/A (Deficient)
Phosphorus*	(0-6")	12 lb/A (Deficient)
Potassium*	(0-6")	1200 lb/A (Excess)
Sulfate*	(0-24")	169 lb/A (Optimal)
Soil Salinity*	(E.C.)	1.2 (Good)
pH		8.3 (alkaline)
OM	(%)	3.8 (normal)
Soil Texture**		Clay (13% S, 29% Si, 58% C)

** S = Sand, Si = Silt, C = Clay

Month	Precipitation
May	2.7 inches
June	2.9
July	6.1
August	2.7
Total	**14.4 inches**

Project Description:

Wheat was seeded into pea stubble using CARA's Henderson 500 small plot drill. The experiment was laid out in a randomized complete block design with 4 replications (plots area of 1.4 m by 5 m) and 19 treatments. Treatments of N included three base levels (0, 28, 56 lb N/A as urea) at sowing and topdressing N (28 lb N/A) at flag-leaf and anthesis (flowering) with urea (broadcast) and UAN-dribble banded, respectively (Table 3). The recommended rate of N rate (56 lb/A) was selected to target 35-40 bu/A. Soil moisture conditions were good when the N was applied.

Table 1 shows soil analysis and precipitation (inch) for this site. All plots were harvested with an Almaco plot combine. A sub-sample of each plot was analyzed for protein quality. Yield and protein data were analyzed for statistical significance by using one-way ANOVA and LSD of the mean by Minitab 17.

A partial economic analysis (fertilizer and application costs vs returns/A) was calculated to assess economic implications of the fertility treatments.

Table 2 **Fertilizer Treatments**

Treatment	Description
Control P-K	0 N
Half N Rec	28 lb/A
Half N Rec + 28 lb/A liquid at flag leaf	28 lb/A N at seeding + 28 lb/A liquid N (UAN) at flag leaf
Half N Rec + 28 lb/A liquid at post flowering	28 lb/A N at seeding + 28 lb/A liquid N (UAN) post flowering
Half N Rec + 28 lb/A broadcast at flag leaf	28 lb/A N at seeding + 28 lb/A N (urea) at flag leaf
Half N Rec + 28 lb/A broadcast at post flowering	28 lb/A N at seeding + 28 lb/A N (urea) post flowering
Half N Rec liquid at flag leaf	28 lb/A liquid N (UAN) at flag leaf
Half N Rec liquid at post flowering	28 lb/A liquid N (UAN) at flowering
Half N Rec broadcast at flag leaf	28 lb/A N (urea) broadcast at flag leaf
Half N Rec broadcast at post flowering	28 lb/A N (urea) broadcast post flowering
Rec N Rate	**56 lb/A N**
N Rec Rate liquid at flag leaf	56 lb/A liquid N (UAN) at flag leaf
N Rec Rate liquid at post flowering	56 lb/A liquid N (UAN) post flowering
Rec N broadcast at flag leaf	56 lb/A N (urea) broadcast at flag leaf
Rec N broadcast at post flowering	56 lb/A N (urea) broadcast post flowering
Rec N + 28 lb/A liquid at flag leaf	56 lb/A N + 28 lb/A liquid N (UAN) at flag leaf
Rec N + 28 lb/A liquid at post flowering	56 lb/A N + 28 lb/A liquid N (UAN) post flowering
Rec N + 28 lb/A broadcast at flag leaf	56 lb/A N + 28 lb/A N (urea) at flag leaf
Rec N + 28 lb/A broadcast at post Flowering	56 lb/A N + 28 lb/A N (urea) post flowering

Pictures 1 & 2. Top-dressing N applications: dribble UAN and broadcast urea at flag stage.

Results and Discussion:

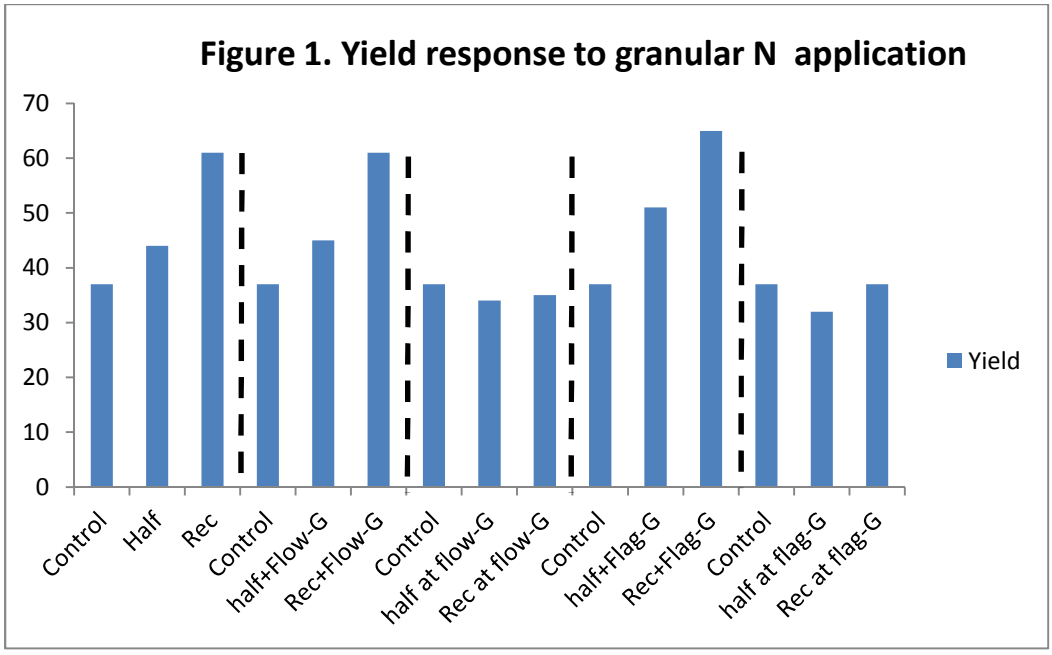
Table 3 shows the 2016 mean average grain yields and protein. It was observed as the level of nitrogen increases during seeding an increase on yield was observed. This increase on yield was also observed for both forms of N applications when half of the recommended N rate was applied at both flag and flowering stage. There was no increase on yield when N was applied at late stage of the growing season. This was an indication that N was needed at the early stage of the growing season (Figure 1 and 2).

The highest percentage of protein (15%) was observed on the recommended rate of N at seeding as well as most of the broadcast N applications.

Table 3 **Mean Average Yield and Protein Response to N Placements on Stettler Hard Red Spring Wheat**

Treatment	Protein (%)		Yield (bu/A)	
Control P-K	13	fgh	37	f
Half N Rec	13	gh	44	e
Half N Rec + 28 lb/A liquid at flag leaf	14	efgh	47	de
Half N Rec + 28 lb/A liquid at post flowering	14	defg	47	de
Half N Rec + 28 lb/A broadcast at flag leaf	15	a	51	cd
Half N Rec + 28 lb/A broadcast at post flowering	14	cdef	46	de
Half N Rec liquid at flag leaf	14	bcdef	34	f
Half N Rec liquid at post flowering	14	efg	27	g
Half N Rec broadcast at flag leaf	14	abcde	32	fg
Half N Rec broadcast at post flowering	14	bcde	34	f
Rec N Rate	**15**	**ab**	**61**	**ab**
Rec N liquid at flag leaf	13	h	33	fg
Rec N liquid at post flowering	14	efgh	32	fg
Rec N broadcast at flag leaf	15	ab	37	f
Rec N broadcast at post flowering	15	abc	35	f
Rec N + 28 lb/A liquid at flag leaf	14	efgh	56	bc
Rec N + 28 lb/A liquid at post flowering	12	i	56	bc
Rec N + 28 lb/A broadcast at flag leaf	**15**	**abc**	**65**	**a**
Rec N + 28 lb/A broadcast at post flowering	**15**	**ab**	**61**	**ab**

*Grain Yield and Protein with different letters are significantly different statistically



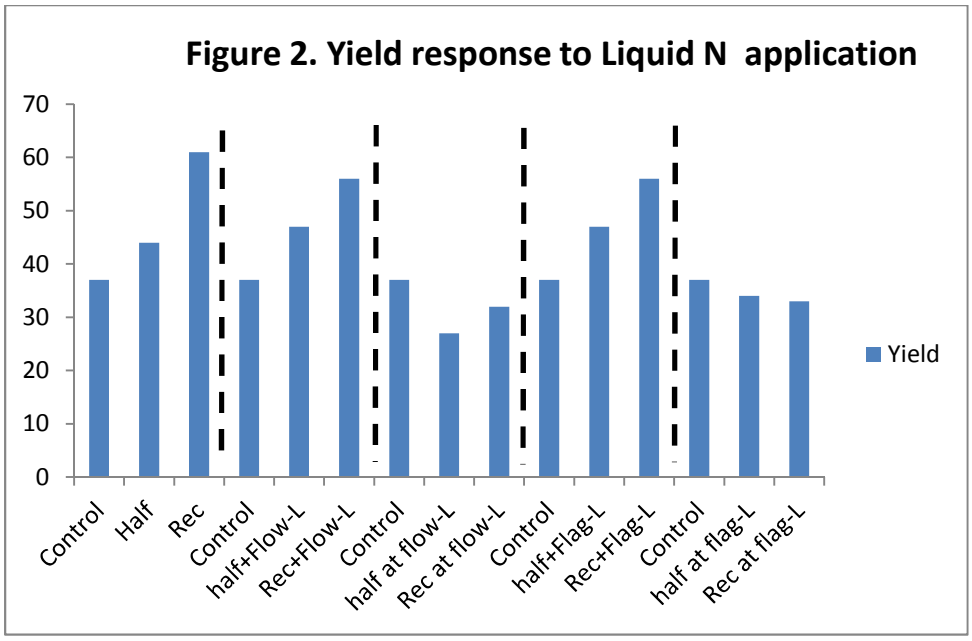


Table 4 **Partial Economic Analysis of Gross Returns and Fertilizer Costs**

	Protein	Yield	Wheat Value*		N Fertilizer*	Net Return
Treatment	**(%)**	**(bu/A)**	**$/bu**	**$/A**	**Cost/A**	**$/A**
Control P-K	13	37	$6.20	$229.40	$0.00	$229.40
Half N Rec	13	44	6.20	272.80	12.48	260.32
Half N Rec + 28 lb/A liquid at flag leaf	14	47	6.45	303.15	33.48	269.67
Half N Rec + 28 lb/A liquid at post flowering	14	47	6.45	303.15	33.48	269.67
Half N Rec + 28 lb/A broadcast at flag leaf	15	51	6.60	336.60	31.96	304.64
Half N Rec + 28 lb/A broadcast at post flowering	14	46	6.45	296.70	31.96	264.74
Half N Rec liquid at flag leaf	14	34	6.45	219.30	21.00	198.30
Half N Rec liquid at post flowering	14	27	6.45	174.15	21.00	153.15
Half N Rec broadcast at flag leaf	14	32	6.45	206.40	19.48	186.92
Half N Rec broadcast at post flowering	14	34	6.45	219.30	19.48	198.82
Rec N Rate (56 lb/A)	**15**	**61**	**6.60**	**402.60**	**24.95**	**377.65**
Rec N liquid at flag leaf	13	33	6.20	204.60	35.00	169.60
Rec N liquid at post flowering	14	32	6.45	206.40	35.00	171.40
Rec N broadcast at flag leaf	15	37	6.60	244.20	31.95	212.25
Rec N broadcast at post flowering	15	35	6.60	231.00	31.95	199.05
Rec N + 28 lb/A liquid at flag leaf	14	56	6.45	361.20	45.95	315.25
Rec N + 28 lb/A liquid at post flowering	12	56	6.00	336.00	45.95	290.05
Rec N + 28 lb/A broadcast at flag leaf	**15**	**65**	**6.60**	**429.00**	**44.43**	**384.57**
Rec N + 28 lb/A broadcast at post flowering	**15**	**61**	**6.60**	**402.60**	**44.43**	**358.17**

*Percent Protein:	12% @ $6.00/bu	13.5% @ $6.30/bu
	12.5% @ $6.10/bu	14% @ $6.45/bu
	13% @ $6.20/bu	14.5% @ $6.55/bu

46-0-0 fertilizer @ $450/tonne; 29% UAN liquid N @ $300/tonne
In-crop application @ $7/A

Conclusions:

Data collected during the first year of this study at Acadia Valley gave response which aligns with a similar study done in Oyen in 2015. There was an increase in yield and protein content for the Stettler wheat variety when additional N was top-dressed at the flag and/or flowering stage. When the increased price for higher protein and the cost of applying additional nitrogen are considered (Table 4), broadcasting 29 lb/A N at the flag leaf stage provided the highest return per acre. These responses may have been influenced by favorable soil moisture conditions throughout the summer, including the time of applications. More research needs to be done to corroborate these findings.

Canola Fertilizer Challenge

Thanks to the Canola Council of Canada for supporting this project.

Summary
This project studied the impact of various levels of nitrogen fertilizer on canola yield using field scale equipment. Precipitation levels at the site in 2016 were above average. Yield from all treatments averaged 48.4 bushels/A.

Objectives
Evaluate canola yield response to nitrogen fertilizer using field scale equipment.

Cooperator: Barry Redel, Consort NE 11-35-7-W4

Site Information:

Table 1 **Soil Analysis and Precipitation**

Nutrient	Spring 2016
Nitrogen (0-24)	59 lb/A (Deficient)
Phosphorus (0-6)	50 lb/A (Marginal)
Potassium (0-6)	1023 lb/A (Optimum)
Sulfate (0-24)	6303 lb/A (Excess)
Soil Salinity (E.C.)	0.73 (Good)
pH	6.6 (Neutral)

Month	Inches
May	3.0
June	3.4
July	3.8
August	2.7
Total	10.0

Project Description:
Canola Variety: Canterra 1990 Round-up Ready
Previous Crop: Wheat
Seedbed Preparation: Glyphosate was applied prior to seeding
Seeding Depth: 1 - 1 ½ inches
Seeding Date: May 13
Plot Size: 40 feet by 300 feet long
Fertilizer: See treatments below
Harvest: September 27
Combine: JD 9770 RTS

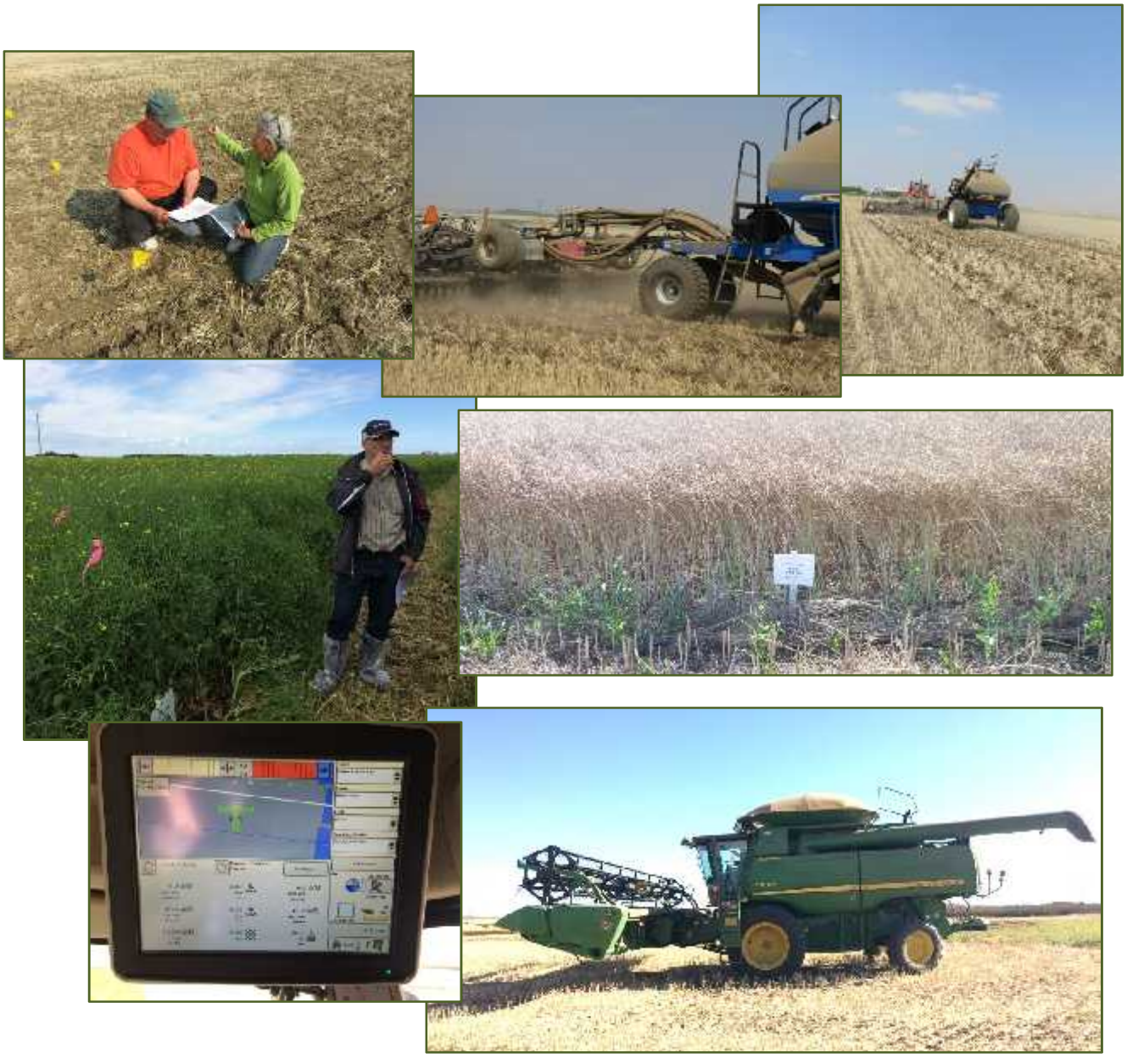
A base rate of ammonium sulphate fertilizer (100 lb/A of 20-0-0-24) was applied in the fall of 2015. Additional nitrogen treatments were applied at time of seeding in 2016, including 20 lb/A additional nitrogen, 40 lb/A nitrogen delivered in a 36-8-5 blend and 60 lb/A nitrogen (110 lb/A blend plus 44 lb/A of 46-0-0). A 40 foot wide JD seeder used was to apply the fertilizer and the seed in 300 foot long strips replicated four times. All strips were managed the same for weed control. The site received ample rainfall right into September, resulting in delayed harvest. Yield was measured by straight cutting each treatment strip with a 35 foot JD combine. A built in monitoring system was used to measure yield and moisture. See results in table below.

Table 1 **Canola Yield Response to Nitrogen**

Treatment	Delivery	Yield (bu/A)	Moisture (%)	Cost/Benefit*
20 lb/A N	Fall Base (Fall applied 20-0-0-24 @ 100 lb/A)	48.1	7.3	$5 / $0
40 lb/A N	Fall Base + 44 lb/A 46-0-0 at seeding	47.4	7.3	$10 / -$7
60 lb/A N	Fall Base + 110 lb/A 36-8-5 at seeding	48.6	7.2	$30 / $5
80 lb/A N	Fall Base + 110 lb/A 36-8-5 + 44 lb/A 46-0-0 at seeding	49.5	7.2	$40 / $14
	Mean	48.4	7.3	

*Cost of N / value of increased yield over the Fall Base yield
N valued at $.25/lb
Canola valued at $10/bushel

The 60 and 80 lb/A N treatments resulting in a slight increase (.5 bu/A and 1.4 bu/A respectively) over that achieved by the fall base fertilizer treatment of 20 lb/A. With canola valued at $10/bu, the small increase in yield did not cover the cost of fertilizer.



Other Crop Activities

Several trials and demonstrations were seeded adjacent to the CARA Center at Oyen in 2016.

- Flax, oat and durum varieties which were part of the Alberta and Saskatchewan Regional Variety Testing Programs (reports appear earlier in this document).
- Strip demos of chickpeas, coriander, black beans, fenugreek, soybeans and popcorn.
- Research activities to evaluate the effect of different soil minerals on seeding emergence of canola and wheat for a private company.
- Various amendments were applied for improving productivity of the areas affected by salinity.
- The AC Saltlander Green Wheat Grass seeded in the fall of 2015 did not perform as well as expected, partially due to a huge seed supply of foxtail barley weed.
- Less white salinity patches were observed where the granular humalite was applied at the rate of 1000 kg/A
- Figure 1 shows the Plot Plan for the Oyen site with the crops tested during 2016.

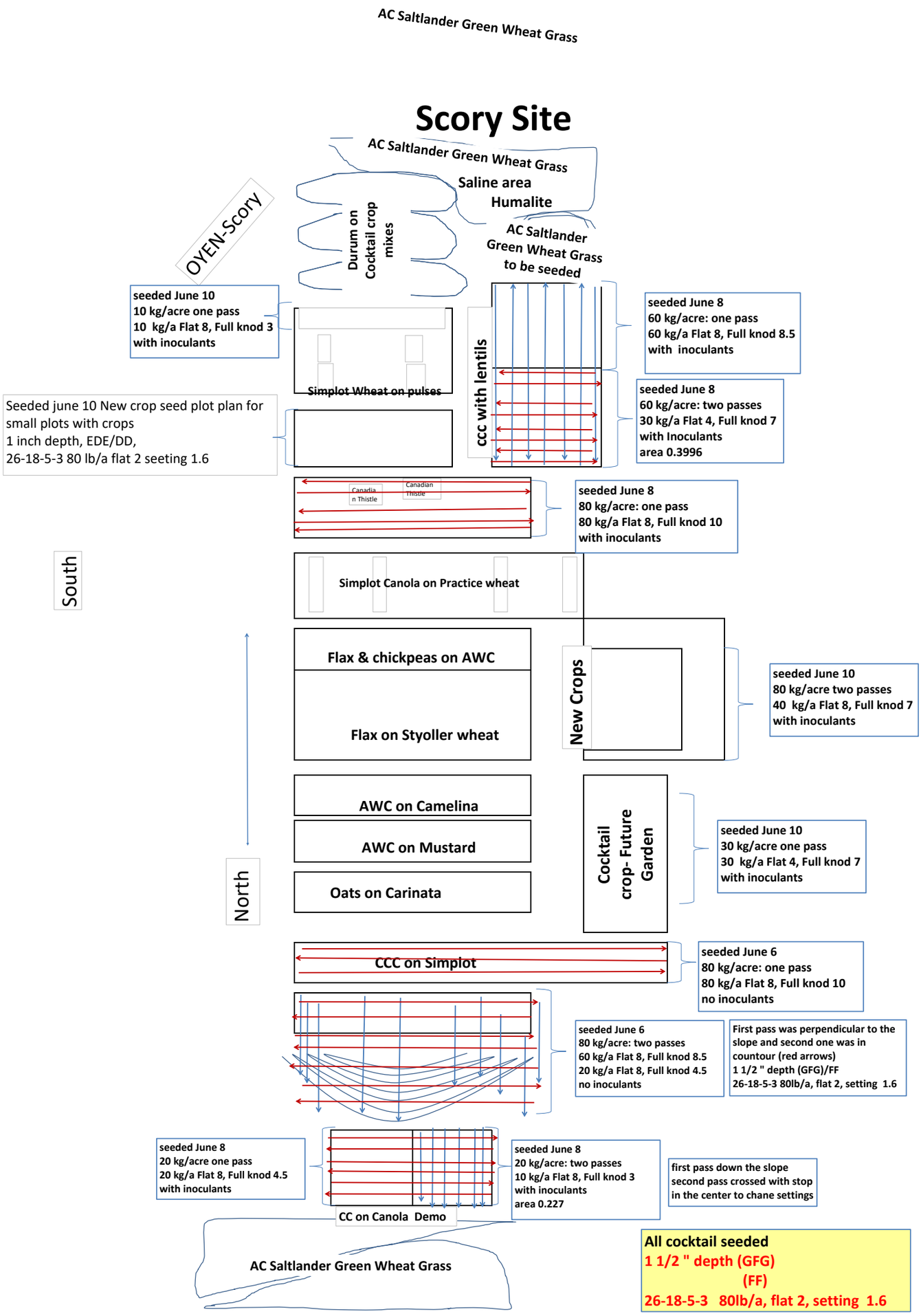


Figure 1. Scory Plot Plan 2016 for RVT, New Crops, Research Activities and Cover Crop Cocktails

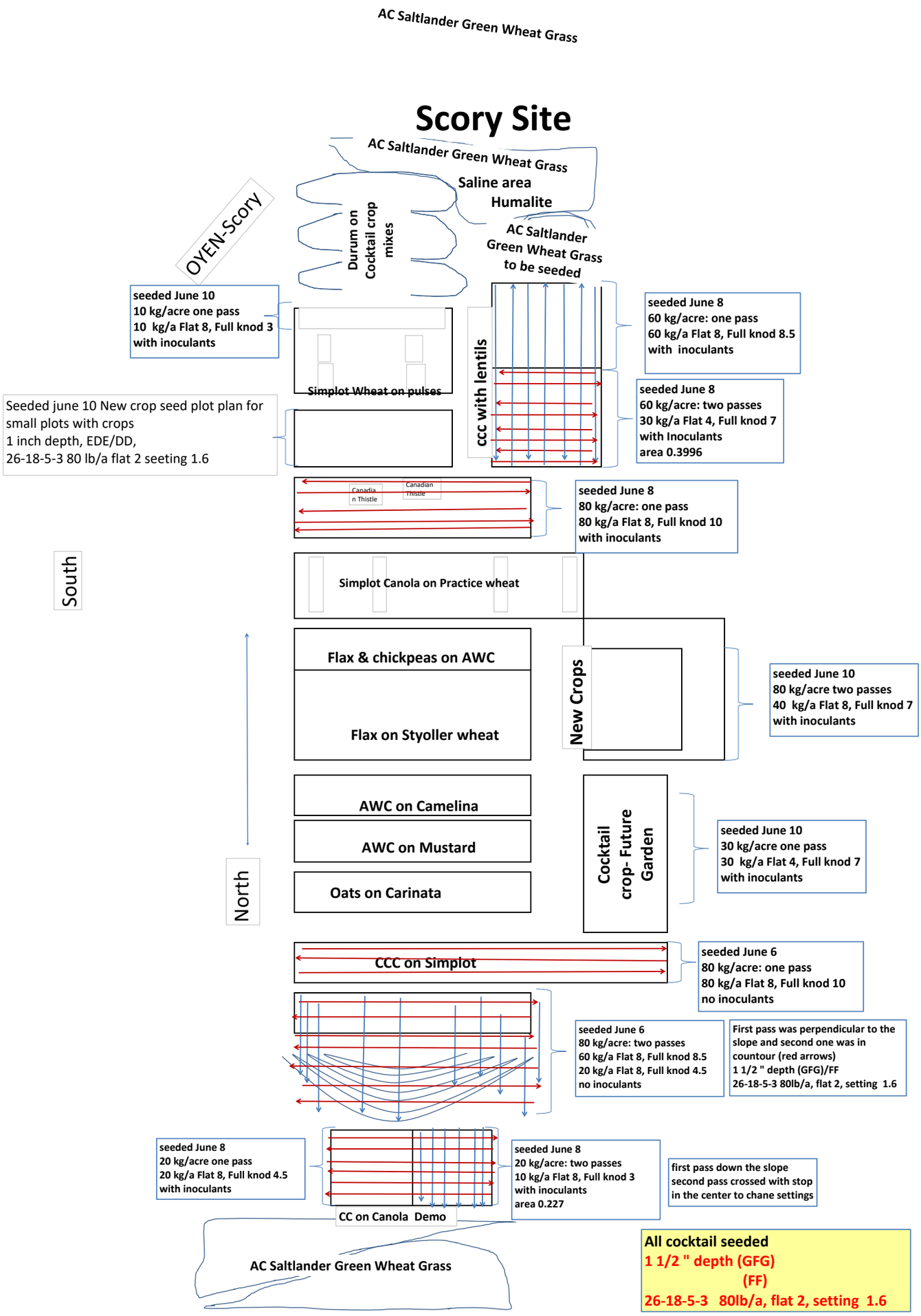
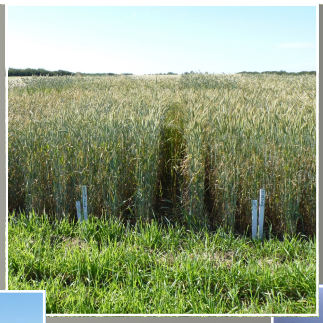


Figure 1. Scory Plot Plan 2016 for RVT, New Crops, Research Activities and Cover Crop Cocktails

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Forage Trials & Demonstrations



Annual Forage Dry Matter Trial

Background:
This project is part of a provincial initiative developed to evaluate the yield and quality potential of a number of annual crops grown for forage use. 2016 is the eighth year of this project which includes sites at 10 locations in the province. CARA's site in the Special Areas represents the brown soil zone. Data from the project sites in Alberta is summarized and included in the Alberta Seed Guide (Seed.ab.ca). The Summary tables as they appear in this guide are attached to this report. Many thanks to Alexader Fedko, AAF for distributing seed, summarizing data and preparing the tables.

Objective:
To evaluate the forage potential of various annual crops when grown under dryland conditions.

Cooperators: James Madge, Stanmore NE 20-30-11-W4 (Special Area 2) (2010-2016)
Barry Redel, Consort NW 12-37-07-W4 (Special Area 4) (2010-2011)

Project Description:
Seeder: Henderson 500 plot drill with Morris contour openers
Seeding Rate: 18 plants per square foot for cereals
8 plants per square foot for peas
Previous Crop: Fallow
Seedbed Preparation: Glyphosate was applied prior to seeding
Seeding Depth: 2 - 2 ½ inches
Seeding Date: May 17
Plot Size: 1.4 m by 5 m, replicated 4 times in randomized block design
Fertilizer: None applied
Herbicides: MCPA Sodium
Harvest: The target harvest stage for all crops was soft dough.
Barley – August 18; Oats & Triticale – August 22

Site Information:

Table 1 **Soil Analysis**

Nutrient	Madge Site Spring 2016
Nitrogen (0-24)	99 lb/A (marginal)
Phosphorus (0-6)	84 lb/A (optimum)
Potassium (0-6)	886 lb/A (optimum)
Sulfate (0-24)	1738 lb/A (excess)
Soil Salinity (E.C.)	0.39 (good)
pH	7.8 (slightly alkaline)

Table 2 **Precipitation**

Month	Inches
May	2.7
June	2.6
July	3.0
August	2.5
Total	10.8

Results:

Table 3 **Summary of Dry Matter Forage Yield**

	Stanmore				Consort (2010-2011)
	2016 Yield (lb/A)	2016 Yield as % Check	Average Yield①	Average Yield as % Check	Average Yield as % Murphy②
Oats (CDC Baler Check)					
Murphy	17647[a]	105	8869	100 (6)	100
AC Morgan	17380[a]	103	8595	95 (6)	104
CDC Baler	16797[a]	100	8894	100 (6)	102
Derby	16787[a]	100	8848	83 (3)	101
Waldern	16785[a]	100	7896	77 (5)	104
AC Juniper	16233[ab]	97	9444	101 (4)	104
CDC Haymaker	16433[ab]	98	9551	108 (4)	
AC Mustang	15802[ab]	94	8613	98 (6)	98
CDC Seabiscuit	15330[ab]	91	10059	91 (2)	
CDC S0-1	13928[b]	83	7769	87 (4)	95
Everleaf			6492	76 (2)	99
Foothill			6453	89 (5)	112
Jordan			7461	97 (4)	103
Mean	16312				
LSD (.05)	2663				
CV (%)	11.25				

① 2010 - 2016 data combined ② 2010 & 2011 data combined

CDC Baler oats, August 17

Murphy oats, August 17

Table 3 con't **Summary of Dry Matter Forage Yield**

	Stanmore			Consort (2010-2011)
	2016 Yield (lb/A)	2016 Yield as % Check	Average Yield as % Check①	Average Yield as % Check②
Barley (CDC Austenson Check)				**% Vivar**
Claymore	17156[a]	105	105 (1)	-
CDC Cowboy	17065[a]	104	101 (4)	106
Sundre	16736[ab]	102	90 (4)	96
Amisk	16667[ab]	102	106 (2)	-
CDC Meredith	16439[ab]	102	115 (2)	-
CDC Austenson	16377[ab]	100	100 (5)	97
CDC Maverick	16477[ab]	101	100 (3)	-
Canmore	16426[ab]	100	108 (2)	-
TR13740	16053[ab]	98	98 (1)	-
Gadsby	15888[ab]	97	95 (3)	-
Conlon	15798[ab]	96	89 (2)	-
Champion	15224[b]	93	101 (2)	
CDC Coalition	13265[b]	81	93 (3)	-
Chigwell			90 (3)	104
Busby			107 (3)	109
Ponoka			105 (3)	98
Seebe			97 (3)	98
Trochu			94 (3)	96
AC Lacombe			86 (1)	94
AC Ranger			122 (2)	97
Xena			98 (3)	92
Vivar			89 (3)	100
Muskwa			106 (1)	
Mean	16121			
LSD (.05)	1892			
CV (%)	8.19			
Triticale & Wheat (Taza Check)				**% Pronghorn**
Bunker	19750[a]	112	101 (6)	108
Sunray	19056[ab]	108	99 (3)	
Tyndal	18297[bc]	104	128 (7)	94
94L043057	18268[bc]	104	104 (1)	
Taza	17650[c]	100	100 (7)	87
AC Ultima			182 (3)	94
Companion			175 (3)	90
Pronghorn			145 (3)	100
AAC Chiffon			124 (1)	
AAC Innova			121 (1)	
AAC Ryley			109 (1)	
AC Sadash			111 (1)	-
Mean	18604			
LSD (.05)	1099			
CV (%)	3.84			

① 2010 - 2016 data combined ② 2010 & 2011 data combined

Table 4 **Feed Quality Analysis 2016 – Stanmore SIte**

	Feed Quality (as % of Check*)						
	Crude Protein	**ADF**	**TDN**	**Ca**	**P**	**K**	**Mg**
Oats							
Murphy	91	113	94	83	102	96	87
AC Morgan	102	111	95	95	110	107	100
Derby	90	115	93	80	94	104	87
Waldern	86	121	91	95	90	99	87
AC Juniper	102	113	94	78	104	96	87
CDC Haymaker	87	110	96	85	94	96	87
AC Mustang	90	112	95	90	88	104	78
CDC Seabiscuit	79	110	95	83	100	91	87
CDC S0-1	102	113	95	78	100	94	96
***CDC Baler**	**6.17**	**34.42**	**62.09**	**0.20**	**0.25**	**2.32**	**0.12**
Barley							
Claymore	72	114	94	147	85	105	87
CDC Cowboy	97	111	96	111	102	113	100
Sundre	108	98	101	105	102	128	91
Amisk	100	107	97	108	91	114	87
CDC Meredith	89	122	92	116	79	127	74
CDC Maverick	94	107	97	111	117	94	104
Canmore	101	104	98	111	98	106	96
TR13740	98	97	101	105	109	107	100
Gadsby	78	118	93	161	89	115	96
Conlon	125	88	105	111	117	107	91
Champion	86	105	98	97	96	108	87
CDC Coalition	112	90	104	89	106	100	96
***CDC Austenson**	**6.98**	**31.88**	**64.07**	**0.19**	**0.24**	**1.28**	**0.12**
Triticale							
Bunker	127	92	103	90	110	81	147
Sunray	117	95	102	103	123	104	147
Tyndal	109	111	95	100	90	101	100
94L043057	130	103	98	100	103	98	113
***Taza**	**6.02**	**35.9**	**60.94**	**0.15**	**0.20**	**1.55**	**0.08**

301: CDC Meredith
302: Claymore

203: Bunker triticale

Discussion:

All crop and varieties responded to the excellent moisture conditions at the Madge site with exceptional production. Mean triticale yield was 18,604 lb/A, oat yield was 16,312 lb/A and mean barley yield was 16,121 lb/A. Lodging was observed in some of the oat varieties and ergot was observed in the triticales as a result of the high moisture. Murphy and AC Morgan oats were the top yielders at 5 and 3% above the check CDC Baler respectively. CDC Haymaker maintains the highest long term average at 8% above the check. First year entry Claymore barley yielded 5% above the check followed by CDC Cowboy at 3%. Bunker and Sunray triticale both yielded higher than the mean, at 12 and 8% respectively above the check Taza.

Although adequate for a cow in mid-pregnancy, crude protein levels would require supplementation for other classes of cattle in all crops included in the trial. The protein levels may have been compromised by the volume of straw generated by the excellent growing conditions in 2016. Ensiling or chopping the biomass might be necessary to ensure complete consumption of these crops and allow for easily adding a protein source. Calcium supplementation may also be required with these cereals.

Note – the following appears in the spring 2017 Alberta Seed Guide

2016 Regional Silage Variety Trials

An important component of the annual feed supply for Alberta's cattle producers comes in the form of silage, green feed and swath grazing of annual cereal crops. It could be argued that there is more grain forage than cereal grain fed to take many market animals from conception to plate. Selection of annual crop varieties which produce the highest forage yield and/or nutritional quality becomes increasingly important.

Trial Information

Applied research and forage associations performed regional silage trials at eight locations throughout the province in 2016. Data from additional sites grown during the past five years has been included in the variety summaries below. The trials are intended to determine yield and nutritional values of various cereal crops and cereal/pea combinations. The tables below show a summary of data from 2012 through 2016 as compared to the control variety (in bold). Yield of the test varieties are expressed as wet tons/acre (ie. 65% moisture, typical of silage production). Data sets which did not meet minimum quality standards and variance levels were excluded.

Varieties of barley, oats, triticale and peas commonly used for silage, green feed and swath grazing were included in the trial. The cereal trials, (barley, oats & triticale), were seeded at recommended seeding density rates with fertility as determined from soil samples. The pulse mixture trial looked at increasing the nutritional value of silage, with a potential side benefit of decreasing future nitrogen costs. The pulse mix plots were seeded with 50 pounds of 11-52-0-0, while the monoculture cereal comparison plots were fertilized with 50 percent of the recommended fertilizer rates. Peas were seeded at 75 percent of their recommended seeding rate and cereals at 50 percent when in mixtures.

Growing conditions at the trial sites ranged from dryer than normal to excessive moisture in 2016.

Maturity, plant height and lodging were not measured in the trials as it is reported in the Cereal RVT program tables.

Test Yield Categories

The defined range for each Test Yield Category is provided in tons per acre. Variety yields are reported as average yields in Low, Medium and High Test Yield Categories. This allows for comparison with the check when growing conditions, management regimes or target yields are anticipated to be of low, medium or high productivity. Varieties that are statistically higher (+) or lower (–) yielding than the standard check are indicated. No symbol after the yield figure indicates that there is no statistical difference. Caution is advised when interpreting the data with respect to new varieties that have not been fully tested.

It should also be noted that the indicated yield levels are those from small plot trials, which can be somewhat higher than yields expected under commercial production. As yield is not the only factor that affects net return, other important agronomic and disease resistance characteristics should be considered. The genetic yield potential of a variety can be influenced by various management and environmental factors.

Nutritional Analysis

Nutrition was assessed using NIRS for macro-nutrient assessments and wet chemistry for the micro-nutrients. Full nutritional analysis was done on each sample, however, only six nutritional categories are reported: crude protein (CP), total digestible nutrients (TDN) which is an estimation of energy, calcium (Ca), phosphorus (P), potassium (K) and magnesium (Mg).

Many thanks to Alex Fedko, AAF for summarizing the data and preparing the crop summary tables.

OATS

			Area					Yield Category			Nutritional Data					
Variety	Overall Yield	Overall Station Years of Testing	2	3	4	5	6	Low < 7.0 (T/A)	Medium 7.1 - 10.0 (T/A)	High > 10.1 (T/A)	CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2016 trials (Yield, significant differences and agronomic data only directly comparable to CDC Baler)																
CDC Baler (T/A)	10.1		12.4	10.7	8.6	10.8	8	5.8	9.1	12.9	9.3	61.7	0.3	0.2	1.8	0.2
CDC Baler	100	33	100	100	100	100	100	100	100	100	100	100	100	100	100	100
AC Juniper	94-	23	91	98	98	87	103	111	84-	93	101	102	92	112	102	106
AC Morgan	100	32	102	100	92-	96	114	108	96-	101	99	101	100	114	99	97
AC Mustang	98	33	99	97	95	100	97	95	97	100	103	99	99	106	102	99
CDC Haymaker	99	28	105	96	100	97	99	105	94	100	97	100	98	100	104	98
CDC Seabiscuit	94	6	91	XX	108	78	96	78	96	99	96	100	89	94	100	100
CDC So-i	94-	33	84	102	88	93-	96	92	94	95-	103	102	96	105	97	104
Derby	96	6	100	XX	106	89	94	89	93	101	89	100	98	99	100	110
Murphy	103	27	106	104	102	103	103	104	104	102	91	95	95	96	102	99
Waldern	104	26	100	104	98	101	115	101	112+	99	93	99	105	106	94	99
Previously tested varieties (Yield, significant differences and agronomic data only directly comparable to CDC Baler)																
Everleaf	94	5	XX	113	106	72	XX	108	76	67	96	98	105	97	110	92
Foothills	99	21	103	95	101	99	103	99	96	102	99	98	103	103	102	100
Jordan	100	20	107	92	88	100	121	102	102	96	97	100	96	105	97	112

BARLEY

Variety	Overall Yield	Overall Station Years of Testing	Area					Yield Category			Nutritional Data					
			2	3	4	5	6	Low < 8.0 (T/A)	Medium 8.1 - 12.0 (T/A)	High > 12.1 (T/A)	CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2016 trials (Yield and agronomic data only directly comparable to CDC Austenson)																
CDC Austenson (T/A)	10.8		11.8	12.1	11	11.5	8	6.7	9.3	12.8	10.1	67.9	0.3	0.2	1.3	0.2
CDC Austenson	100	35	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Amisk	90-	23	102	92-	91	88-	83-	85	93	90-	104	99	132	106	107	109
CDC Coalition	92-	27	92	93	92	86-	102	92	92	92-	102	100	104	107	106	99
CDC Cowboy	102	27	102	103	98	103	100	106	99	100	95	98	117	107	110	115
CDC Maverick	103	29	105	96	96	104	108	111+	102	101	95	98	123	106	96	116
CDC Meredith	102	16	114	106	93	99	103	111	102	100	95	97	97	98	101	91
Canmore	98	16	105	99	93	99	97	101	93	99	100	99	119	103	98	104
Champion	102	16	104	97	100	102	106+	106	101	101	98	99	105	97	104	100
Claymore	100	16	114	102	97	100	94	106	87	103	93	96	122	93	98	100
Conlon	86-	21	82	95	86	79-	92	80-	80-	91-	99	101	128	111	101	104
Gadsby	100	27	103	106	94	100	101	104	101	98	95	99	129	99	100	103
Sundre	92-	27	97	93	87-	88-	96	86-	96	93-	102	99	134	104	114	115
TR13740	100	16	103	92	99	99	107	95	99	101	99	97	105	97	104	92
Previously tested varieties (Yield and agronomic data only directly comparable to CDC Austenson)																
Busby	93-	19	91	98	71	96	88	86-	95	97	105	99	128	100	100	103
Chigwell	90-	19	80	95	87	86-	97	91-	82-	91-	106	99	152	101	105	116
Muskwa	90-	13	101	93	XX	86-	91	86-	91	91-	114	100	167	107	121	127
Ponoka	96	19	90	100	100	96	95	96	94	97	101	99	148	103	104	115
Ranger	95	13	104	99	XX	96	88	85-	97	99	109	98	171	101	128	131
Seebe	96-	19	95	103	92	95-	95	95	96	97	109	96	136	109	113	103
Trochu	88-	18	XX	91	73	91-	85-	82-	89	92-	103	101	139	107	109	119
Vivar	93-	19	95	99	78	92-	93	90-	98	93	108	100	144	99	104	123
Xena	95-	19	87	101	84	92-	101	96	90	95	106	99	111	105	102	106

TRITICALE

			Area					Yield Category			Nutritional Data					
Variety	Overall Yield	Overall Station Years of Testing	2	3	4	5	6	Low < 8.0 (T/A)	Medium 8.1 - 12.0 (T/A)	High > 12.1 (T/Ac)	CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2016 trials (Yield and agronomic data only directly comparable to Taza)																
Taza (T/A)	10.7		12.3	12.3	8.8	10.4	9.5	6.3	10.7	14.5	8.8	62.8	0.2	0.2	1.3	0.1
Taza	100	37	100	100	100	100	100	100	100	100	100	100	100	100	100	100
94l043057	100	7	103	XX	110	93	101	89	103	100	106	102	91	102	90	108
Bunker	99	29	99	93	111+	99	100	106	98	98	103	99	111	96	97	115
Sunray	101	30	97	100	105	100	105	99	102	100	104	104	105	103	103	109
Tyndal	99	36	98	105	109	96-	96	100	98	99	103	101	101	102	97	105
Previously tested varieties (Yield and agronomic data only directly comparable to Taza)																
AAC Chiffon	111	8	124	123	118	92	126	105	113	114	97	101	88	97	106	108
AAC Innova	104	8	121	119	123	83	102	95	107	107	108	100	87	106	109	107
AAC Ryley	97	8	108	104	87	87	110	86	100	101	103	100	95	106	89	117
AC Ultima	103	7	104	98	120	100	XX	109	100	104	110	100	101	93	97	122
Pasteur	94	8	110	96	97	84	103	91	99	91	107	103	96	99	107	117
Pronghorn	102	21	107	103	114	99	101	108+	99	103	103	100	102	99	109	106
Sadash	102	8	111	102	109	91	121	101	108	97	99	99	88	91	110	105

Perennial Forage Variety Evaluation

This project is funded by an Alberta Beef Producers/Alberta Livestock Meat Agency research partnership.

Background:

This project will provide performance information on a number of perennial grass and legume species and varieties. It is part of a provincial initiative with sites in 8 regions of Alberta. Establishment, winter survival and yield will be monitored.

Objective:

To provide unbiased, current and comprehensive regional data regarding the establishment, winter survival, yield and economics of specific species and varieties of perennial forage crops.

To identify perennial crop species/varieties that demonstrate superior establishment, hardiness, forage yield and nutritional quality characteristics in different eco-regions of Alberta.

To assess any benefits from growing mixtures of selected species.

Cooperator: Rude Farms, Sedalia SW 2–31–06–W4

Table 1 **Soil Quality**

Nutrient	Spring 2016
Nitrogen (0-24)	43 lb/A (Deficient)
Phosphorus (0-6)	75 lb/A (Optimum)
Potassium (0-6)	1200 lb/A (Optimum)
Sulfate (0-24)	36 lb/A (Excess)
Soil Salinity (E.C.)	0.39 (Good)
pH	7.8 (Slightly alkaline)

Table 2 **Precipitation**

Month	Inches
May	1.5
June	3.0
July	2.4
August	1.9
September	1.2
Total	10.0

Description:

Seeding Date: June 6
Seeder: Henderson 500 plot drill with Morris contour openers
Seeding Rates: As listed below
Previous Crop: Canola stubble
Seedbed Preparation: Glyphosate was applied prior to seeding
Seeding Depth: ½ - 1inch
Plot Size: 1.4 m by 5 m, replicated 4 times in randomized block design
Fertilizer: 50 lb/A 26-18-05-03
Herbicide: Basagran
Harvest: No harvest in 2016

Observations

Establishment of most trial entries in the project was generally very good. More detail will be provided in subsequent reports. Basagran herbicide was applied and some volunteer canola and broadleaf weeds were hand pulled. The 2016 growth was left standing to enhance snow trap and will be mowed early in 2017.

Yield and feed quality of all the species and mixes will be monitored during the next few years. Data from all sites in the study will be summarized into a provincial guide.

Varieties Seeded and Seeding Rates:

	Species	Variety	Seeding Rate (lb/A)
Grasses	Meadow Brome	AC Armada	14
		Fleet	14
		AC Admiral *(low germ)*	18
	Hybrid Brome	Success	12
		Knowles	12
	Wheatgrasses		
	Pubescent	Greenleaf	10
	Intermediate	Chief	10
	Crested	Kirk	6
	Green Wheatgrass	AC Saltlander	9
	Russian Wildrye	Tom	8
	Fojtan Festulolium		20
	Orchard Grass	Killarney *(low germ)*	10
	Tall Fescue	Courtney	8
	Timothy	Grinstad	4
Legumes	Alfalfa	AC Grazeland	8
		Dalton	8
		20-10	8
		Halo	8
		Rangelander	8
		Rugged	8
		Spreder 4	8
		Spredor 5	8
		Yellowhead	8
		PV Ultima	8
		44-44,	8
	Sainfoin	AC Mountainview	30
		Nova	30
	Cicer Milk Vetch	Veldt	13
		Oxley 2	13
Mixes	Mix 1	Fleet Meadow Brome	7
		Yellowhead Alfalfa	4
	Mix 2	Success Hybrid Brome	7
		Yellowhead Alfalfa	4
	Mix 3	AC Armada Meadow Br	7
		Yellowhead Alfalfa	4
	Mix 4	Fleet Meadow Brome	7
		Spredor 5 Alfalfa	4
	Mix 5	Success Hybrid Brome	7
		Spredor 5 Alfalfa	4
	Mix 6	AC Armada Meadow Brome	7
		Spredor 5 Alfalfa	4
	Mix 7	Fleet Meadow Brome	7
		AC Mountainview Sainfoin	15
	Mix 8	Success Hybrid Brome	7
		AC Mountainview Sainfoin	15
	Mix 9	AC Armada Meadow Brome	8
		AC Mountainview Sainfoin	15

Grass/legume mix block at Rude Farms Perennial Forage Trial site. August 2016

Legume block at Rude Farms Perennial Forage Trial site. August 2016

Grass/legume mix block at Rude Farms Perennial Forage Trial site. August 2016

High Legume Pasture Demonstration Project

This project was funded in part by the Growing Forward 2 program and was administered by ARECA.

Background/Purpose

Incorporating legumes into tame grass pastures has been shown to:

- increase gains in yearling and calves
- extend the productivity of tame grasses further into the summer grazing period
- fix nitrogen which benefits grass quality and quantity
- improve soil moisture utilization and carbon capture depths with their root structure and growth pattern

This project is intended to demonstrate the above characteristics of high legume content in tame pastures. It introduces AAC Mountainview sainfoin in a forage mix with alfalfa, providing productivity benefits along with reduced bloat potential. Field demonstrations were established at 12 sites across Alberta in 2016.

CARA Cooperator: Gould Ranching Ltd, Consort
SW 23-33-06-W4

Site Information:

Seeding Date – June 15
Pre-seed Treatments – Glyphosate (early May and late May)
Entire field was rolled just prior to seeding
Fertilizer – 70 lbs/A 11-52-0 banded 1.5 inches deep just prior to seeding
Soil Conditions – Firm seedbed, no weeds, top dry but moisture one inch below
Seeder – JD Van Brunt double disc
Seed Depth – ½ inch
Target Seeding Rates – 33 lb/A of Ultimate Pasture Mix (70 % Haygrazer alfalfa pelletized plus 30 % ACC Mountainview sainfoin)
4 lb/A AC Knowles Hybrid bromegrass
Target Establishment – 3 to 5 plants/square foot
No companion crop

Table 1 **Precipitation**

Month	Inches
May	3.0
June	3.4
July	3.8
August	2.7
September	0.9
Total	13.8

Plant counts per foot^2 August 26:

Sainfoin	1.5 *(4.1 /1/4 m$^{2)}$*
Alfalfa	1.9 *(5.2 /1/4 m$^{2)}$*
Grass	2.0 *(5.3 /1/4 m$^{2)}$*
Weeds	22.4

Alfalfa was pelletized and combined with the sainfoin

JD Van Brunt seed drill

Calibration achieved targeted seeding rate

A Field Day was held August 18

Hayland Rejuvenation

This project is funded by an Alberta Beef Producers/Alberta Livestock Meat Agency research partnership. It is led by Dr. Akim Omokanyem Research Coordinator with the Peace Country Beef and Forage Association, who manages a duplicate site near Fairview, Alberta.

Background:

Grazing is generally understood to be the lowest cost option to maintaining a beef cow herd. Unfortunately, productivity and carrying capacity of seeded hayfields and pastures may decline because of reduced stand vigor, periods of drought, invasion of undesirable species, over-grazing, compaction and poor soil fertility as the stands age. The purpose of this study is to investigate the effects of different methods of rejuvenating an old forage stand, to test chemical brush control and to demonstrate practical and low cost options. The study is replicated at locations in two different eco-zones.

Objectives:

1. To test a variety of methods to:
    A. rejuvenate the productivity of low producing forage stands and
    B. improve soil conditions under a hay/grazing system.
2. To examine the effect of herbicide application on brush control in pastures and forage stand rejuvenation.
3. To evaluate the economics of various pasture rejuvenation methods.
4. To communicate findings to beef cattle producers and related beef cattle industry members.

Cooperator: Madge Farms, Stanmore
NE 10-31-11-W4

Description:

14 treatments will be applied in a Randomized Complete Block Design (RCBD) with three replications. Each plot size measures 30 by 30 meters (.22 A).
The treatments at each site will be:
1. Check (control) - grazed or hayed only, no other treatments will be imposed
2. Summer rest - one year summer rest, no grazing or haying for one year (2016)
3. Fertility/fertilization - fertilize with dry inorganic fertilizer in spring. Field soil sampling and testing will be done to develop proper fertilizer recommendations
4. Complete renovation (plow under/cultivate) and reseed with a legume-grass mixture in spring
5. Spray Roundup® herbicide in spring or early summer
6. Spray Grazon® herbicide in spring or early summer
7. Spray field with herbicide in fall, cultivate & seed in spring
8. Spray field with herbicide in fall and direct seed in spring
9. Aerate/spike field/paddock in fall
10. Aerate/spike field/paddock in spring
11. Broadcast seed & aerate/spike field/paddock in fall

12. Broadcast seed & aerate/spike field/paddock in spring
13. Subsoil field/paddock in the fall to a depth of 9-12”
14. Subsoil field/paddock in the fall to a depth of 9-12” and direct seed in the spring
Note: Wet weather in the fall prevented treatments 13 & 14.

Where seeding is indicated (treatments 4, 7, 8, 11, 12 & 14), Pickseed’s Cattlemen Pro forage Mix (40% MB-A meadow brome, 15% AC Grazeland alfalfa, 8% Dahurian wildrye, 7% slender wheatgrass, 15% Kirk crested wheatgrass and 15% Duramax tall fescue). No grazing or haying will take place during the seeding year to allow proper establishment. Soil and forage yield and quality will be monitored in 2017 and subsequent years.

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Conservation

CARA Shelterbelt Demonstration

CARA continues to maintain and monitor a Shelterbelt Demonstration site adjacent to the CARA centre in Oyen. It was initially developed in the summers of 2003 and 2004 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. Eight tree species were planted including Colorado Spruce, Green Ash, Mountain Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffaloberry.

Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees. Black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row to cover the drip tape and secured to the ground using an applicator pulled by a small tractor. Two discs, one on each side of the unit, cut a small trench in the soil when the machine moves forward. As the mulch unrolls, discs near the back of the unit throw soil over each edge of the plastic, securing it to the ground. A small hole is then cut where each seedling has been planted and the tree is gently pulled upright. The irrigation system consists of a plastic tape which has outlets at regular intervals that allow a slow trickle of water to be delivered directly to the root systems of the seedlings. At the CARA Centre, the water source includes two 1250 gallon water tanks on either side of the equipment storage shop.

Adequate precipitation during the past few years has limited the need for direct watering or by the drip tape. The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing good growth for our prairie climate. The plastic mulch has become weathered in places, particularly where it was not held firmly to the soil. Deer hooves have broken the plastic in several places. Damage from wildlife has also caused leaks in the drip tape.

Shelterbelt Mulch Demonstration

Applying mulch suppresses weeds, keeps soil warm in the winter and cool in the summer. It also conserves moisture, supports and encourages numerous beneficial organisms, such as earthworms and eliminates stress in shallow-rooted plants. Mulch improves soil structure and drainage and can provide aesthetically pleasing and beneficial effects. Overall, the healthiest plants are those that have access to a consistent supply of water and nutrients and mulch helps with this. Mulches allow for moisture retention, weed reduction as well as increased competitiveness and survival in shelterbelts.

Objectives:

To demonstrate the benefits of various mulches for weed reduction and moisture retention in new shelterbelts.

Treatments:

The following mulch options were established in 2013 soon after planting of hawthorn and dogwood.

Landscape fabric plus large rock
Landscape fabric with large rock plus gravel
Landscape fabric with gravel
Wood chips
Hay
Straw
Grass Clippings

Flax straw was added to the original straw treatment and also to the hay treatment which both had shrunk in volume and were allowing weed growth through them.

Observations:

- Perennial sow thistle has been an issue in the straw, hay and grass mulches. The majority of the mulches had to be pulled back in 2015 to remove the creeping root system of the thistle to try to prevent further weed spread
- The most weed growth has appeared in the rototilled area and the straw mulch
- The landscape fabric and rock had minimal to no weed growth
- Buckwheat weed seeds were inadvertently imported with the wood chips when they were distributed in 2013, demonstrating the importance of knowing where the mulches are coming from and what may come along with it.
- The hay & straw mulches deteriorated, so a portion of the straw mulch was replaced with flax straw in the summer of 2015
- Moisture retention in the mulched strips was better than that of the rototilled area. The trees required watering only once after planting and twice during the summer of 2013.
- The trees in the mulch have appeared to grow much faster and better than those of the rototilled area.

Bio-Control of Canada Thistle With the Stem Mining Weevil

Background

Canada thistle (*Cirsium arvense*) is a competitive noxious weed that is widespread across Alberta and much of North America. This perennial herb can grow up to 4 feet tall, has prickly leaves and urn-shaped purple flowers. It causes intensive crop losses from its extensive, horizontal creeping root system. Canada thistle is attracted to sites that have had disturbance and moisture, either by overgrazing, tillage and/or earthmoving. It is listed under the Alberta Weed Control Act as noxious. Canada thistle has a high tolerance to many different environmental conditions and is highly competitive with other vegetation. It is prevalent in many locations such as riparian areas that do not allow for chemical or mechanical control methods. Biological control agents, such as the weevil are of interest in controlling Canada thistle in sensitive areas.

There are 4 beetles considered as potential biocontrol agents for Canada thistle, including the Stem-mining weevil, scientifically known as *Hadropontus litura* (formerly *Ceutorhynchus litura*). *H.litera* has one generation per year with 3 distinct stages of life: larva, pupa and adult. The adult lifespan is approximately 10 months as they overwinter in the soil and leaf litter, emerging in the spring to feed on rosette leaf foliage and stem tissue. Eggs are laid in May and June in the mid vein of the leaf and hatch 9 days later. The larva tunnel down the stem into the root collar consuming plant tissue and when several larva are present the stem turns black from tunneling and dies several days later. Early summer, once fully fed, the larva will emerge from the thistle shoot. This is the where the main damage happens to the thistle because it opens up holes to where secondary invaders, such as nematodes, parasite and fungi enter and further damage the stems. They then enter the soil, and the papal stage begins, in which they transform into adults. A few weeks later (late June and July) these new adults emerge from the soil and feed on the thistle foliage until heavy frost occurs in fall.

Reported success of the weevils varies according to geographic locations. Research in the Eastern States, California and British Columbia have indicated that *h.litura* provides poor to moderate control when used alone; however, integrating additional tactics may enhance its efficacy. Research carried out in the mid-western states (i.e. Idaho and Montana) and Alberta indicate higher incidences of impact on Canada thistle populations. This could be open to a number of different interpretations but conjecture on the part of some researchers is that stronger winter conditions could be a factor in the geographic locations where Canada thistle are being negatively impacted by the stem mining weevil. Other biological factors, such as rust, might also be more readily apparent in these regions and so add to Canada thistle decline when the stem mining weevil is introduced.

The weevils were initially imported from Montana for this project in dishes of 105 individuals at $125 (US). The weevils do procreate every year and while some documentation indicates that they will migrate, as long as they have a food source they remain rather sedentary and populations expand within a thistle stand. As they reproduce and feed on Canada thistle, an absence of this habitat will eliminate their existence. Adults can fly very well and are active on warm summer days, however they are content to stay among the thistle patch.

Weevils are not '*a be all and end all'* for the eradication of Canada thistle but may have a place in controlling the weed in sensitive areas of the environment. CARA is working with other ARECA member groups to evaluate establishment, survival and impact of the *h.litera* at several locations in Alberta.

Objective:
To evaluate establishment, survival and affect of the Stem mining weevil on Canada thistle.

Project Description:
CARA, along with other ARECA member groups, introduced the Stem-Mining Weevil as a biological control agent to help control Canada thistle populations at various points in Alberta. The purpose of this project is to decrease and control Canada thistle populations in sensitive areas such as riparian zones, organic farms and native pasture. It is hoped the weevil may be a tool to reduce the use of chemicals to control weeds in sensitive areas.

The *h.litera were* imported from Montana and introduced to two sites in September of 2012 and again in September 2012, one in the MD of Acadia and to the second in Special Areas 4. Weather conditions and thistle stand qualities were recorded. The sites were visited in June 2015 to investigate winter survival rate of the weevils. Although no stem mining weevils (*Hadropluntus litura*) were observed at the MD of Acadia site, Damage was found in the plants, so there is optimism that the stem mining weevils are living and reproducing in this stand. Definitive identification of the stem mining weevils were not observed in 2014 either.

We continued to monitor both sites into 2016 and did see a reduction of Canada Thistle population within the site in Special Areas 4, but no evidence of damage was found in the MD of Acadia site. Because of moisture conditions during August and early September in Montana the weevils could not be fully harvested in both 2015 and 2016. We received a small order of weevils in 2016 that were placed at one location in Special Areas 4. The MD of Acadia site did not receive a weevil release in both 2015 and 2016. We will continue to monitor the survival and impact of the weevils and potentially release more weevils in the fall of 2017.

Bio-Control of Western Snowberry With Sheep

Background:
Western snowberry (buckbrush) is a perennial forb that reproduces both by seeds and rhizome. Rhizome is a horizontal creeping root system growing within 2-12 inches of top soil. The rhizomes can access soil moisture from a deeper profile at a much faster rate than fibrous roots of pasture grasses, giving buckbrush the competitive advantage over grass, especially in dry years. Heavy stands can reduce grass production as much as 80%, especially in dry years. Buckbrush plants usually start growing in sparse groups (patches or clusters) and then spread further if not controlled. Buckbrush has no feed value to livestock because of its low palatability. When grazing within a mixed sward, sheep prefer forbs, making them well-suited to landscape management.

Objective:
To demonstrate the biological control of Western snowberry (buckbush) with the use of sheep.

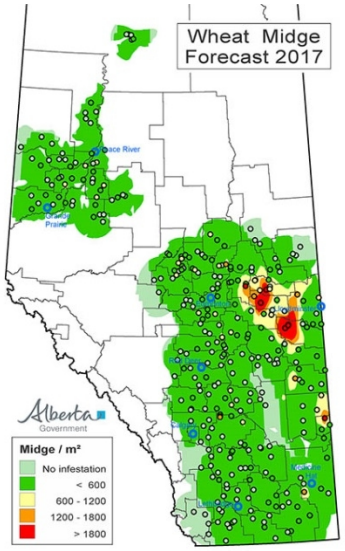
Cooperators: Don Vincent, Hanna and Dylan Biggs, Veteran

Description:
Lacey Gould, Conservation Agronomist & Animal Nutritionist, Olivia Sederberg, Conservation Technician, and Kale Scarf, Summer Field Technician, completed a Rangeland Health Assessment at several points within each of two buckbrush control sites to determine the initial state of the range field. Sheep were introduced to both sites in June to measure how the sheep grazing affects the range health & the potential of depletion of buck brush. They will also be placing grazing cages on the locations in 2017 to determine the growth of the pasture and western snowberry. Range health at the sites will be monitored for 2 years to see if there is any significant depletion of the western snowberry. The sites will be visited multiple times throughout the grazing & post-grazing season. Sheep were provided by Integrity Ranching.

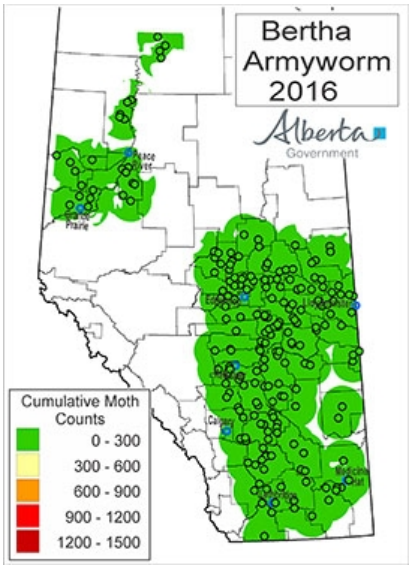
Insect Forecast for 2017

CARA participated in the provincial pest monitoring program by monitoring bertha army worm, cabbage seedpod weevil, wheat midge and wheat stem sawfly populations. To view the insect forecast summaries compiled by Scott Meers, Provincial Entomologist with Alberta Agriculture and Forestry go to the Alberta Insect Pest Monitoring Network Website. (http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/All/prm13779)

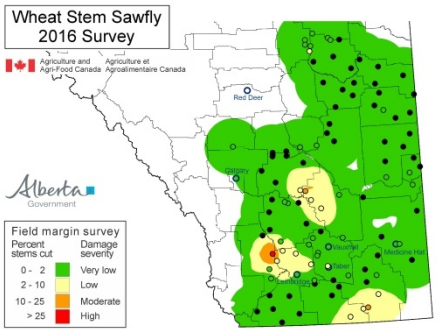
Wheat Midge



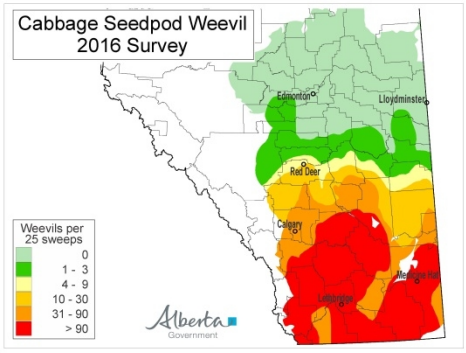
Bertha Armyworm



Wheat Stem Sawfly



Cabbage Seedpod Weevil



Alberta Insect Pest Monitoring Network

New insect species found in canola flowers in Saskatchewan and Alberta.

Researchers at Agriculture and Agri-Food Canada's Saskatoon Research and Development Centre (SRDC), along with colleagues at the University of Guelph, Alberta Agriculture and Forestry, and the Canadian Food Inspection Agency found a new insect damaging canola in northeastern Saskatchewan and east-central Alberta. The new species, a midge, which has yet to be named and scientifically described, belongs to the genus *Contarinia*. It is similar in appearance to the swede midge, *Contarinia nasturtii*, commonly found in Ontario.

Currently, the only confirmed symptom of damage by this insect are "bottle"-shaped galled flowers that form as a result of larval feeding inside flowers. Damaged flowers do not produce pods or seeds.

How the new species was confirmed

For years there have been accounts of differences between swede midge populations in Saskatchewan and Ontario, including adult size, the number of generations per year, and the type and amount of damage reported. These hints, combined with extremely low capture rates of adult swede midge in pheromone-baited traps in Saskatchewan despite apparently high rates of adult swede midge emergence caught the attention of Dr. Boyd Mori, a trained chemical ecologist and new biologist at the SRDC.

Dr. Mori collected adult midges from soil emergence cages and reared larvae found in infested flowers. The resulting adult midges were sent to preeminent North American swede midge researchers at the University of Guelph, Dr. Rebecca Hallett and James Heal who immediately noticed differences between the midge from Saskatchewan and swede midges from Ontario: midges from Saskatchewan were more robust, had hairier wings and had slight differences in the antennae and genitalia compared to the swede midge.

These differences were confirmed by midge expert Dr. Bradley Sinclair with the Canadian Food Inspection Agency in Ottawa who also found several other physical differences. Using morphological differences, and DNA sequencing, the researchers concluded that the Saskatchewan midges were a separate species from the swede midge.

Economic Importance

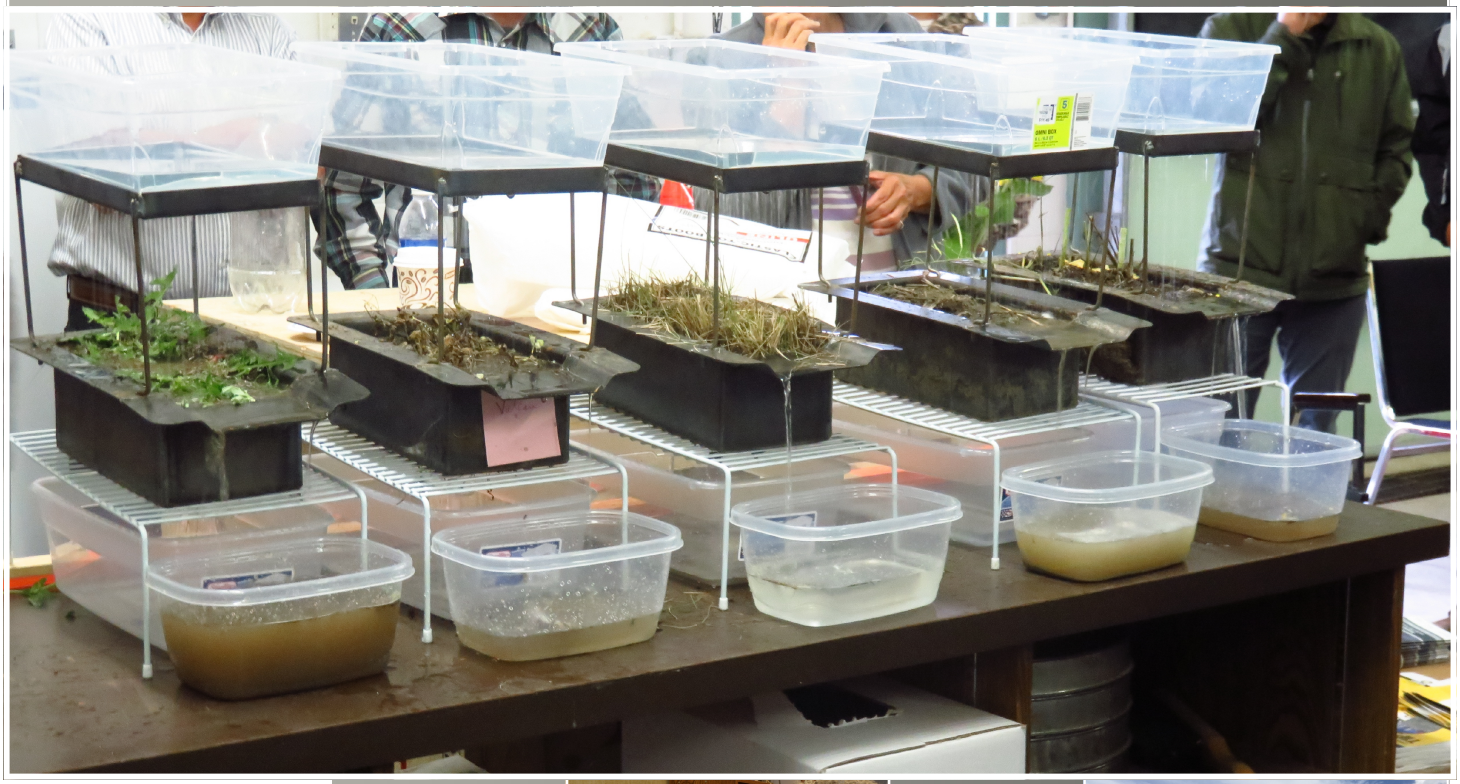
While midge damage observed in Saskatchewan in 2016 appeared to be low in most fields, the economic impact of the new *Contarinia* midge is not known. Understanding pests and pest management is a priority of Agriculture and Agri-Food Canada and work is underway to formally describe and name this new species.

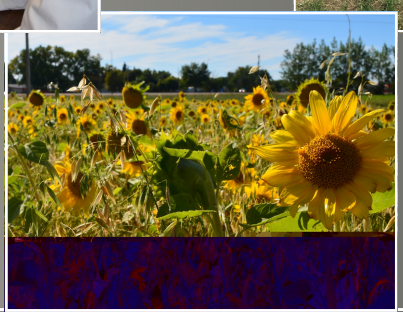
Questions? Contact Dr. Boyd Mori (Boyd.Mori@canada.ca) or Dr. Meghan Vankosky (Meghan.Vankosky@canada.ca)

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Soil Health





Cocktail Cover Crop Demonstrations

Cocktail cover crops (CCC) were planted near the CARA Center at Oyen and the Grudecki crop trial site south of Acadia Valley to evaluate their effect on soil health. Various cocktail combinations, seeding rates and seeding passes were seeded at each location (pictures 1 and 2 (Oyen) and Picture 3 and 4 (Acadia Valley)). Growth was terminated by mowing (picture 5).

Picture 1. Cocktail cover crop (millet, oat, lentil, peas, tillage radish, sunflower) at a seeding rate of 10 kg/A in one pass at Oyen.

Picture 2. Cocktail cover crop (millet, oat, lentil, peas, tillage radish, sunflower) at a seeding rate of 80 kg/A in one pass at Oyen

The cocktail cover crops at Oyen performed well for all the seeding rates (10, 20, 40, 80 kg/A). Biomass was collected in each one of the treatments for future evaluation. Picture1 shows the seeding rate of 10 kg/A, one pass. Observations of the soil surface indicate that the soil seems to be sealed, no sign of biological activity (earthworms) and no signs of soil aggregation formation were observed. On the contrary, at a higher seeding rate (80 kg/A) there was less indication that the soil was sealed and there was evidence of aggregate formation and biological activity (Picture 2)

Observations of Cocktail Cover Crop Acadia Valley

The cocktail cover crop was seeded July 13 and they performed well at all the seeding rates (10, 20, 40, 80 kg/A). Biomass was collected in each one of the treatments for future evaluation. Picture 3 shows a general overview of the area one month after seeding.

Picture 3. Acadia Valley cocktail cover crop (millet, oat, lentil, peas, tillage radish, sunflower)

It was observed that micro aggregates were forming at the surface of the soil around the seeding row with a distinct dark brown coloration along it. This could be an indication of some microbial activity next to the plants. It was also observed that the surface area away from the seeding row was sealed with no sign of micro aggregate formation (Picture 4).

Picture 4. Acadia Valley cocktail cover crop (millet, oat, lentil, peas, tillage radish, sunflower) indication of aggregate.

The cocktail cover crops at both sites were terminated by mowing it with a rotary mower 1 ½ month after seeding at Acadia Valley (right) and 3 ½ months following seeding at Oyen (left). See Picture 5.

Picture 5. Cocktail cover crop termination Oyen (left) and Acadia Valley (right)

Picture 6 shows the infiltration demonstration at the future garden site near the CARA Center. A cocktail cover crop has been seeded in this plot for two consecutive years. An infiltration demo was carried out over a 24 hour period. The infiltration rings were inserted in the soil at 2 ½ inches depth. They were separated by less than a meter. One ring was located at the bare soil and the other was located inside the cocktail crop (Picture 6). 3 inches of water was added at the same time in both rings. After 24 hours, water was still standing in the ring that has no cover crop (Picture 6, left). This is an indication there may have been some microbial activity which might have improved the water infiltration for this soil. This result could suggest that incorporating a cocktail crop into the cropping system may give an opportunity for the soil to infiltrate more water.

Picture 6. Infiltration demonstration at the Oyen site in bare soil (left) and inside cocktail cover crop (right).

Crops for Cover Crop Cocktails

Summary
Interest is growing in using a mixture of crops (cocktail cover crops) as part of as a strategy to improve general soil health and therefore productivity within a cropping system. The cocktails typically include a mix of crop types – eg. legumes, cereals, brassicas and other broad leafs, as well those identified as cool or warm season crops. The benefits from growing these crop cocktails can include improvements in soil fertility, water infiltration and aggregation, and reductions in weed and disease pressures as well as compaction. The mixes can also provide valuable grazing in early-late fall.

Many crops promoted for use in cocktail crops have not traditionally been grown in east central Alberta. This demonstration included 34 crops with potential use as cocktail crops planted in individual stands to evaluate their adaptation to east central Alberta growing conditions. A Field Day was held at the site in mid-September.

Cooperator: Curtis Hoffmann, Loverna
SW 34 31 01 W4

Project Description:
34 individual crops were seeded in strips with CARA's small plot Henderson 500 seed drill into wheat stubble on July 15. Glyphosate had been applied to the site prior to seeding but no in-crop herbicides were applied. Samples of each crop were collected in late August and analyzed for feed quality.

Precipitation: July – 3.15 inches
(including 1.1 inch immediately after seeding)
August – 1.81 inches

Species & Seed Rates

		lb/A Seeding Rate
Brassicas	Radish	8
	Forage Rape	7
	Purple Top Turnip	6
	Forage Brassica	6
	Foage Collards	8
	Appin Turnip	6
	Bayou Rape/Kale	7
Broadleaves	Sunflower	8
	Sugar Beet	7
	Plantain	4
	Chicory	4
	Safflower #23	12
	Buckwheat	30
	Phacelia	12
Cereals	Sesame	3
	CM 440 Corn	24
	Grain Sorghum	25
	Sorghum Sudan 79	25
	Red Proso Millet	15
	Crown Proso Millet	15
	Teff Grass-VNS	8
	Annual Rye	18
	Festilolium	20
	Japanese Millet	15
	Winter Triticale	80
	BMR Corn	24
	Pearil Millet	
Legumes	Mung Beans	20
	Crimson Clover	18
	Persian Clover	6
	Hairy Vetch	20
	Chickling Vetch	50
	Cow Peas	50
	Berseem Clover	10

Legumes

Berseem Clover

- Cool season
- Fix Nitrogen (needs inoculant)
- Shallow taproot
- Sensitive to grazing
- 4 seeds/sq/ft
- Mycorrhizal association

Cowpeas

- Warm season
- Fix Nitrogen (needs inoculant)
- Taproot
- Mycorrhizal association

Crimson Clover

- Cool season
- Fix Nitrogen (needs inoculant)
- Shallow taproot
- Sensitive to grazing
- 4 seeds/sq/ft
- Good shade tolerance
- Mycorrhizal association
- Fair regrowth after grazing or cutting

Hairy Vetch

- Good regrowth after grazing
- Cool season
  - Annual, vine
- Fix Nitrogen (needs inoculant)
- Taproot
- Resistant to Glyphosate (natural)
- 4 seeds/sq/ft
- Mycorrhizal association

Broadleaf

Buckwheat

- Cool/ warm season
- Nutrient scavenger (enhances P)
- Weed suppressor
- Dense fibrous root
- Quick establishment
- Limited regrowth after grazing
- No mycorrhizal association

Chicory

- Warm season
- Nutrient scavenger
- Weed suppressor
- Break compaction
- Fair regrowth after grazing
- No mycorrhizal association

Phacelia

- Cool season
- Bees pollinator
- Weed suppressor
- Soil stabilizer
- Break compaction
- Fair regrowth after grazing
- Mycorrhizal association

Plantain

- Cool season
- Soil Stabilizer
- Weed suppressor
- Break compaction
- Good regrowth after grazing or cutting
- mycorrhizal association

Broadleaf Brassicas

Bayou Rape/Kale

- Cool season
- Nutrient scavenger
- Weed suppressor
- Break compaction
- Fair regrowth after grazing
- No mycorrhizal association

Forage Brassica

- Cool season
- Nutrient scavenger , Break compaction
- Weed suppressor
- Break compaction
- Good regrowth after grazing
- No mycorrhizal association

Forage Collards

- Cool season
- Nutrient scavenger
- Soil conditioner, taproot, breaks compaction
- Fair regrowth after grazing
- No mycorrhizal association

Forage Rape

- Cool season
- Nutrient scavenger
- Soil conditioner, Tap root
- Break compaction
- Fair regrowth after grazing
- No mycorrhizal association

Broadleaf Brassicas con't

Sugar Beet

- Cool season, biennial
- Nutrient scavenger
- Soil conditioner, breaks compaction, Taproot
- Weed suppression
- Fair regrowth after grazing
- No mycorrhizal association

Sunflower

- Warm season
- Nutrient scavenger
- Soil conditioner, break compaction
- No regrowth after grazing
- Mycorrhizal association

Cereals/Grasses

Annual Rye

- Cool season
- Nutrient scavenger
- Fibrous roots
- Weed suppressor
- Break compaction
- Good regrowth after grazing/cutting
- Mycorrhizal association

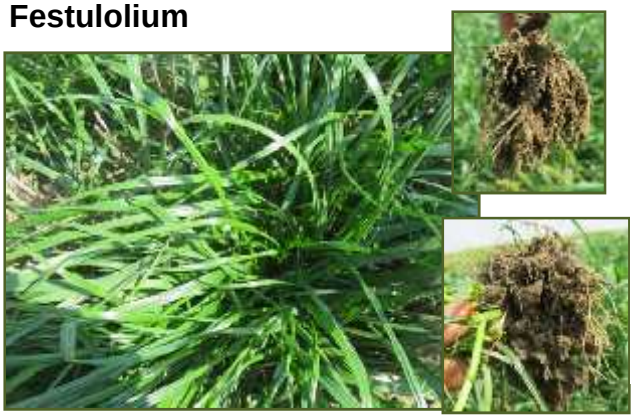
BMR Corn

- Warm season
- Nutrient scavenger, Build OM, Fibrous roots
- No regrowth after grazing/cutting
- Mycorrhizal association

Crown Proso Millet

- Warm season
- Nutrient scavenger, Build OM,
- Fibrous roots
- No regrowth after grazing/cutting
- Mycorrhizal association

Festulolium



- Warm/cool season perennial grass
- Roots Mycorrhizal association
- Good growth in summer
- Well adapted to cool moist conditions but can also tolerate drought
- Large deep root system which form lots of aggregates

Cereals/Grasses

BMR Corn


- Warm season
- Nutrient scavenger, Fibrous roots
- Drought tolerant,
- Weed suppressor
- Good regrowth after grazing/cutting
- Mycorrhizal association

Sorghum Sudan


Grain Sorghum


- Warm season grass & cereal
- Nutrient scavenger, fibrous roots
- OM builder, rapid growth warm conditions
- Drought tolerant, weed suppressor
- Good regrowth after grazing/cutting
- Mycorrhizal association

Teff Grass-VNS


- Warm season grass
- Nutrient scavenger,
- Fibrous roots,
- Drought tolerant, weed suppressor
- Mycorrhizal association

Winter Triticale


- Cool season grass (winter annual)
- Nutrient scavenger, Fibrous roots
- Soil builder, Rapid growth warm conditions
- Good regrowth after grazing/cutting
- Mycorrhizal association

Feed Quality Analysis for selected Crops for Cocktail Cover Crop.

		Crude															
	WSC	Protein	ADF	NDF	TDN	NE	Ca	P	K	Mg	Na	S	Cu	Fe	Zn	Mn	
Legumes	----------%----------					Mcal/Kg	---------- % ----------						---------- ppm --------				RFV
BERSEEM CLOVER	13.16	14.5	30.8	38.0	64.9	3.95	1.7	0.17	2.43	0.3	0.43	0.2	3.8	78	19	39	159
COWS PEAS	7.83	19.1	26.3	33.7	67.3	4.24	2.5	0.39	3.29	0.8	0.02	0.2	7.3	179	22	105	189
CRIMSON CLOVER	9.02	19.2	19.3	25.7	72.6	4.69	1.2	0.22	2.58	0.5	0.87	0.3	7.5	176	20	30	267
HAIRY VETCH	6.09	33.8	22.2	26.8	66.6	4.50	1.1	0.36	2.87	0.5	0.14	0.3	9.7	634	38	153	248
Broadleaf																	
BUCKWHEAT	5.41	20.1	15.6	23.9	62.5	4.93	2.1	0.3	3.22	1.4	0.01	0.2	9.3	172	26	202	299
CHICORY	7.36	25.8	26.6	34.4	68.1	4.22	1.1	0.27	3.73	0.4	2.51	0.8	7.8	416	24	173	184
PHACELIA	6.42	30.4	30.1	49.1	71.2	3.99	3.3	0.41	4.47	1.3	0.23	0.5	7.9	245	29	80	124
PLANTAIN	7.11	34.4	26.7	31.2	65.4	4.21	3	0.36	2.4	0.7	0.82	0.6	8.9	533	32	185	203
Broadleaf Brassicas																	
BAYOU RAPE/KALE	10.09	19.0	31.8	58.7	68.4	3.88	2.2	0.22	3	1.1	0.05	0.3	3.9	130	22	153	102
FORAGE BRASSICA	8.80	21.8	24.2	26.1	75.8	4.36	2.3	0.44	5.23	0.5	0.53	0.7	4.4	165	25	50	249
FORAGE COLLARDS	10.81	24.1	24.5	39.4	71.6	4.36	1.6	0.33	3.78	0.5	0.7	0.8	4.1	114	21	55	165
FORAGE RAPE	16.44	17.1	14.6	18.0	75.5	4.99	1.5	0.34	3.11	0.3	0.22	0.5	4.1	109	20	48	402
SUGAR BEET	5.85	31.4	25.6	50.3	76.8	4.28	1	0.33	2.73	1.3	5.42	0.5	6.8	387	36	354	128
SUNFLOWER	6.18	31.4	24.8	40.6	71.9	4.33	2.2	0.43	3.43	0.8	2.51	1.2	5.3	235	28	106	159
Cereal/Grasses																	
ANNUAL RYE	19.37	14.2	28.7	32.2	69.8	4.08	0.4	0.29	4.35	0.2	0.13	0.2	6.9	100	17	52	193
BMR CORN	15.16	11.4	28.2	54.7	69.0	4.10	0.2	0.25	2.33	0.2	0.02	0.1	4.3	85	20	33	114
CROWN PROSO MILLE	12.69	16.4	28.7	52.7	66.9	4.07	0.3	0.26	3.16	0.4	0.02	0.3	11	88	24	50	117
FESTILOLIUM	11.01	25.3	21.8	20.0	70.4	4.53	0.4	0.29	4.59	0.3	0.06	0.3	9	171	24	63	335
GRAIN SORGHUM	10.44	14.4	16.8	21.6	66.5	4.84	0.4	0.25	2.98	0.3	0.01	0.1	7.4	92	19	40	326
PEARL MILLET	8.01	13.0	28.3	54.9	64.9	4.10	0.6	0.41	5.39	0.4	0.05	0.2	7.8	107	20	52	113
SORGHUM SUDAN 79	5.33	15.9	28.8	54.2	63.0	4.07	0.5	0.31	4.08	0.4	0.01	0.2	9.8	117	33	54	114
TEFF GRASS VNS	9.76	20.9	33.3	58.0	66.9	3.79	0.6	0.27	2.68	0.3	0.03	0.4	10	112	23	133	101
WINTER TRITICALE	10.23	21.9	29.6	54.4	69.6	4.02	0.4	0.41	5.4	0.2	0.03	0.4	9.8	140	34	94	113

For definition of the feed nutrient terms please see appendix pages 74 -75

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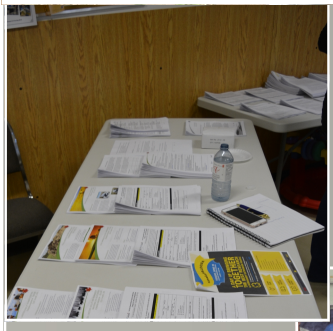
Extension Program



2016 Extension Highlights

Newsletters
Nine editions of CARA's '*Grain, Grass and Growth'* newsletters were mass-mailed to 1700 producers.

Cooperator Appreciation Evening *January 14, Cereal*
CARA hosted projects cooperators, local funders and other supporters to a banquet on January 14 in Cereal to show appreciation for contributors to our program during the past year. Everyone enjoyed a presentation by Tornado Hunter Ricky Forbes.

Garden & Soil Health *January 23, Buffalo*
CARA assisted the Buffalo Ag Society in promoting a seminar featuring horticulture specialist Jim Hole speaking on Garden Myths and CARA's Soil and Crop Management Specialist Dr. Yamily Zavala speaking on Soil Health.

High Quality Forages for Growing & Finishing Cattle with Dr. Anibal Pordomingo *January 28, Brooks*
CARA partnered with the Foothills Forage and Grazing Association and other ARECA groups to bring Dr. Pordomingo, a Senior Researcher with the National Institute of Agriculture Research of Argentina to Alberta. He shared his expertise on forage sequencing for finishing cattle, grazing strategies for optimal gain and beef quality under various grazing systems. 2013 Nuffield Scholar Graduate Clayton Robins from Manitoba reported on his study of feeding energy-dense forages and their place in production systems in Canada.

4-H Calving & Safety Clinic*, *January 30, Sedalia*
CARA partnered with the East Sounding Creek 4-H Beef club to host a clinic on calving and safety tips for local 4-H clubs. Approximately eighty-five 4-Her's listened to presentations by Dr. Cec Ruschkowski of Oyen Vet Services, Dianne Westerlund from CARA and local teacher Haley Powell.

Ladies Calving Clinic* *February 2, Oyen*
Body condition – Colostrum – Toes Down/Toes Up – Intervention – Tube Feeding – Bonding! Just a few examples of terms which were discussed during CARA's Ladies Calving Clinic in Oyen.

Discussions were led by Dr. Cec Ruschkowski and her husband John during late afternoon and evening presentations to 90 ladies in attendance included experienced cattlewomen, those new to the business of calving and every participation level in between. Some travelled as far as 200 km to learn basic calving principles, dealing with problems as well as tips and tricks to keep calves healthy.

Managing Cattle for Today & Tomorrow* *February 9, Pollockville & February 10, Consort*
Jennifer Woods, Alberta Farm Animal Care consultant brought ranchers up to date on euthanasia protocol as promoted by the Beef Code of Practice. Peggy Strankman, Barbwire Consulting, reported on the McDonald's Sustainability pilot project.

**These events received funding support from the Growing Forward 2 Welfare Deliver Agent program.*

CARA's Annual Meeting & Project Review *February 25, Cereal*
CARA staff reviewed the results of CARA's 2015 program and plans for the 2016 year at the February 25th meeting. Don Strankman, Lodestone Investment Corp. led a discussion on succession planning and the options a producer may have when starting a plan.

Ladies Post Calving Clinic *February 29, Hanna*
Dr. Tamara Quaschnik (Steadfast Veterinary Services) shared her expertise and humor as she addressed post calving issues with approximately 90 cattle-women. In addition to lots of information to keep calves and their mothers in good shape, the women also had the opportunity to do a bit of shopping at a small trade fair. Taking care of personal health and managing the stress of a busy calving season was addressed by a short presentation and "stretch break" by Patrick May with Patrick May Exercise Services. The crowd included from new comers to the cattle industry to very experienced cow managers.

Soil Health & Pulses Workshop *March 7, Consort*
CARA's Dr. Yamily Zavala improved workshop participant's understanding of soil health and how they could improve soils in their fields. Crop Specialist Neil Whatley (AAF) led a discussion on pulse production, focusing on growing lentils in east central Alberta.

Crop Strategy Seminar *March 15, Oyen*
CARA's Annual Crop Strategy Seminar included an array of farming related topics such as glyphosate resistant kochia by Kelly Cooly, CoolPro Solutions; crop scouting with drones (Kristina Polzhein Axiom Agronomy Ltd), pest forecasts by Scott Meers, AAF; market outlooks with Neil Blue, AAF; crop rotations & lentil production (Neil Whatley, AAF) to help farmers prepare for the quickly approaching crop year.

Classroom Ag Program *March*

Presentations on CARA's program, pulse crops (recognizing the International Year of Pulses), soil health and the importance of safety in agricultural production were made by CARA staff to elementary students at seven schools within the Special Areas and MD of Acadia.

Farm Safety Camp *April 20, Oyen*

CARA staff joined forces with Alberta Health Services staff to deliver a Progressive Farm Safety Camp April 20th. 225 students grades one through six from Berry Creek, Oyen ARC, Oyen Public, Warren Peers, Youngstown and home schools converged at the Crossroads Center for the seventh version of the event since 2003. The day long camp included presentations on various safety related areas including large equipment, electrical, hearing, first aid, small tools, chemicals, grain, water and large animals. All students took home various reminders of the safety camp, including T-shirts from the Progressive Farm Safety program, bags, magnets, ear safety buds, snacks and water bottles.

EFP and Growing Forward 2 Workshops *June 13, Spondin & June 20, Consort*

Olivia Sederberg and Lacey Gould led two workshops focused on filling out an Environmental Farm Plan and the various Growing Forward Programs available to producers. Several farmers and ranchers were assisted with applications to various Growing Forward programs during the year including Grazing and Winter Feeding Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity.

Rangeland Congress Tour *July 16, Veno & McArthur Ranches, Richdale*

A busload of international range enthusiasts visited the Special Areas as part of a pre-conference tour of the 2016 International Range Congress. Marj Veno and Murray McArthur hosted the group and explained their approach to range and water management. CARA's invasive weed control project was also discussed.

Crop Walk *July 21, Hanna & July 26, Consort*
Farmers had the opportunity for one-on-one consultations with Crop Specialist Neil Whatley (AF) during a visit to CARA's wheat trials at the Robinson site and pulse and canola projects at the Redel site.

Southern Alberta Grazing School for Women *July 27-28, Elkwater*
CARA's Olivia Sederberg helped plan the 2016 Southern Alberta Women's Grazing School which offered a unique opportunity to learn grazing principles, range health, plant ID and stories of other successful women involved in ranching and agriculture.

Soil Health and Crop Field Day *August 3, Oyen*
Rainfall demanded an adjustment from a true field day to a seminar format for CARA's Crop and Soil Health Field Day which took place at the CARA Center on August 3. Lunch was served to 44 participants who spent the day in CARA's shop gathering information from several industry specialists. Technicians waded into some of the nearby trials and demo's to provide a close look at some of the crops discussed during the day. CARA's Dr. Yamily Zavala led discussion on the basics of soil health and demonstrated differences in aggregation and moisture retention from soil samples she has collected from fields across Alberta. Dr. Mandula Bandara, Crop Scientist at Alberta's Crop Development Center in Brooks, shared information on the pulse and special crop research he oversees. Dr. Tom Jensen, with the International Plant Nutrient Institute, discussed nutrient recommendations for various crops. Dr. Christina Eynck, Camelina Breeder with Linnaeus Plant Sciences, introduced the crowd to camelina and her breeding program. Keith Gabert, Canola Council of Canada Agronomist provided some scouting and harvest tips for canola and mustard. Neil Whatley, Alberta Ag and Forestry Crop Specialist, summarized some of the benefits and tips for managing production of lentils and other pulse crops. Use of the Brix Meter for monitoring crop quality was presented by Bob West, RA West International of Taber.

Grazing Options Field Day *August 18, Consort*

Several producers took time off from haying and silaging to visit CARA's High Legume Pasture Demo and Trevor Deagle's corn site on August 18. Andrea Hanson, Beef Extension Specialist with Alberta Agriculture and Forestry, led discussion on the High Legume Pasture project which has been replicated at 13 sites across the province by applied research and forage associations. CARA's site is located south of Consort with Gould Ranching. Craig Ference, Double F Farms, shared some practical management tips for growing corn here in the Special Areas.

Corn and Cover Crop Field Day *September 15, Loverna*

20 producers spent the morning looking at demo strips of 34 crops which may have potential for use in improving soil as part of cover crop cocktails. The Field Day was hosted by Curtis Hoffmann of Sounding Creek Seeds at a site near Loverna. CARA's Dr. Yamily Zavala led discussion on attributes of each crop, complimented by experience from Pat Fabian, Fabian Seeds and other attendees. Alexis Arthur, Thunder Seed Corn Specialist, Thunder Seeds shared management tips and variety information for producing corn for silage, grazing or grain.

Red Deer Watershed Authority Seminar September 19, Oyen

CARA Manager Dianne Westerlund presented '*Surviving and Thriving in Last Year Country*' to members of the Red Deer Watershed Authority at their information seminar September 19.

7th Annual Cattlemen Clinic *November 15, Oyen*

CARA hosted another successful Cattlemen Clinic in Oyen on November 15. 45 producers participated in the day which featured great speakers, relevant topics and lots of audience interaction. Dr. John Campbell, Department Head and Professor of Large Animal Clinical Sciences at the Western College of Veterinary Medicine, addressed Johnes Disease – what it is, identifying if it's in your herd, implications on your cows and how to reduce the spread of it. Dr. Campbell also led a discussion on the Beef Code of Practise, focusing on pain management. The Code was developed with ranchers at the table and is more of a practical guide than a regulatory document. Sean Ewing, Plant Cattle Buyer from JBS Canada in Brooks led the afternoon presentations with information about JBS, some general trends in cattle pricing and fielded lots of questions on carcass quality, direct sales and delivery as well as reducing carcass discounts. Dr. Cec Ruschkowski (Oyen Vet Services), WCABP Boehringer Ingelheim Veterinarian of the Year, discussed the role of vaccinations in managing various diseases and other factors which influence herd health. Her experience with local

livestock issues and her practical view on herd management made for delivery of valuable guidance as she responded to questions from those in attendance. Melissa Downing, first day on the job with the Alberta Verified Beef organization, provided details on the Verified Beef Plus program which is now in place, how it differs from the original and potential benefits to producers to take part. Olivia Sederberg gave a brief update on the Growing Forward 2 programs to complete the informative day.

Cowbytes Workshops

December 2, Spondin, December 6, Consort, December 13, Oyen

18 producers joined CARA & Barry Yaremcio, Beef & Forage Specialist with Alberta Agriculture & Forestry, in one of the hands-on training sessions for using Cowbytes beef ration balancing program. The producers were encouraged to bring their own feed analysis information to do a one-on-one ration formulation based on their herd and their feed.

Green Certificate Testing

CARA hosted testing days for the Green Certificate Program at the CARA Center in March, May and December.

Growing Forward 2

Many producers were assisted with applications to various Growing forward programs during the year, including Grazing & Winter Feeding Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity.

Winter Feeding Videos

The video series covering many aspects of winter grazing were released early in 2016. Calvin Bishell, James Madge and Colt Peterson from the Special Areas were a few of the producers featured in the videos. The series can be accessed through Alberta Agriculture and Forestry's Ropin the Web.

Feed, Seed and Soil Analysis

CARA continued to provide producers with information, use of bale sampling probes and/or facilitation of analysis of feed, seed, plant, soil and water samples in 2015.

Social Media

CARA's website (www.chinookappliedresearch.ca) has received over 127,000 hits during the past three years. Information is also distributed to producers via Facebook, Twitter and email contact lists.

Twitter: @CARAresearch
Visit us on Facebook
Instagram: @CARAresearch
Email: cara-1@telus.net

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CARA

Appendix

Definitions of Common Feed Nutrient Terms

ADF Acid Detergent Fibre - consists of lignin and cellulose and is the least digestible portion of roughage. ADF content of forages is used for determination of digestibility and energies.

ADIN Acid Detergent Insoluble Nitrogen – the portion of total nitrogen bound to the fibre in a feed which may not be available to the animal.

AIP Available Insoluble Protein – the portion of the total available protein which is not soluble in rumen fluid, but is still available to the cow. Available insoluble protein which escapes degradation in the rumen is almost completely digested in the lower digestive tract (rumen un-degraded insoluble protein).

AP Available Protein (AP = CP – ADIP) – the portion of the total protein which is available to the animal if the animal could completely digest the feed (ie. not bound to the fibre in a feed).

BP Bypass Protein – ingested protein that is not degraded in the rumen (also referred to as “undegradable” or “escape” protein).

CP Crude Protein - The total protein contained in feeds as determined by measuring nitrogen content. %CP = %N x 6.25.

DE Digestible Energy – the amount of energy consumed minus the amount of energy lost in the feces. DE is calculated based on ADF analysis.

DM Dry Matter - total weight of feed minus the weight of the water.

DMI Dry Matter Intake - all the nutrients contained in the dry portion of the feed consumed by animals. Can be estimated using NDF values: DMI (as a per cent of body weight) = 120/%NDF.

GE Gross Energy – measure of total caloric energy of a feedstuff.

IP Insoluble Protein – the portion of protein which digestive juices or similar solutions cannot dissolve.

ME Metabolizable Energy – equal to DE minus energy lost in urine, feces and in methane for ruminants.

NDF Neutral Detergent Fibre – commonly called “cell walls”. NDF measures cellulose, hemi-cellulose, lignin, silica, tannin and cutin; used as an indicator of feed intake.

NEF Net Energy for fat production.

NEG Net Energy for Gain – based on the ADF; it is used for balancing rations for ruminants.

NEL Net Energy for Lactation – based on the ADF; it is used for dairy ration balancing.

NEM Net Energy for Maintenance – amount of energy required to maintain an animal with no change in body weight or composition. It is based on the ADF and is used in ruminant ration balancing.

RFV Relative Feed Value – it is an index for assessing quality based on the acid detergent and neutral detergent fibre levels. As the fibre values increase the RFV of forages decreases.
RFV = [(88.9 – (0.78 x %ADF)) x (120/%NDF)]/1.29

SP Soluble Protein – the portion of protein which digestive juices of ruminants (or similar solutions) can dissolve, soluble protein is rapidly attacked by bacteria.

TDN Total Digestible Nutrients – a term which is estimated from the ADF content and is used to describe the digestible value of a feed.

UIP Undegradable Intake Protein (also called undegradable protein – UPD or rumen bypass protein) – the portion of consumed protein that is not degraded in the rumen; i.e., it “by-passes” the rumen and is usually degraded in the small intestine.

Table 1 **Nutrient Requirements for Beef Cattle**

	Daily Gain (lb)	Dry Matter Intake (lb)	Crude Protein		TDN		Ca (%)	P (%)
			lb/day	% of DM	lb/day	% of DM		
600 lb **Calves**	1.5	13.8	1.32	9.5	9.4	68.5	0.32	0.21
950 lb **Bred Heifers**	0.9	19.0	1.5	8.0	10.3	54.1	0.27	0.02
1200 lb **Cows Mid pregnancy**	-	20.8	1.4	6.9	10.1	48.8	0.19	0.19
1200 lb **Cows Late pregnancy**	0.9	22.3	1.7	7.8	11.8	52.9	0.26	0.21
1000 lb **2 yr Heifer With calf**	0.5	20.8	2.1	10.2	12.9	61.9	0.31	0.23
1200 lb **Cow Nursing Calf** (1st 3 - 4 months)	-	23.0	2.1	9.3	12.1	55.5	0.27	0.22
1800 lb **Bull** Regain condition & maintenance	0.5	30.9	2.1	7.0	16.1	52.0	0.20	0.20

Source: NRC.1984. Nutrition Requirements of Beef Cattle (6th Ed.) National Academy Press, Washington, D.C.

Table 2 **Nutrient Requirements for Nursing Cows**

Nutrient	Recommended Range	Required	Maximum
Protein %	10 – 12	-	-
Digestible Energy Mcal/kg	2.5 – 3.3	-	-
Total Digestible Nutrients %	56 – 63	-	-
Calcium (Ca) %	0.16 - 1.53	0.27	2
Phosphorus (P) %	0.17 - 0.59	0.22	1
Sodium (Na) %	0.04 - 0.25	0.08	1.57
Salt %	0.20	0.25	4
Magnesium (Mg) %	0.05 - 0.25	0.10	0.5
Potassium (K) %	0.50 - 0.70	0.65	3
Sulphur (S) %	0.08 - 0.30	0.10	0.4
Iron (Fe) ppm	50 - 100	50	1000
Copper (Cu) ppm	4 - 10	8	100
Cobalt (Co) ppm	0.07 - 0.11	0.10	10
Iodine (I) ppm	0.20 - 2.0	0.5	50
Manganese (Mg) ppm	20 - 50	40	1000
Molybdenum (Mo) ppm	N/A	N/A	5
Zinc (Zn) ppm	20 - 40	30	1000
Selenium (Se) ppm	0.05 - 0.30	0.20	2

Adapted from NRC Nutrient Requirements for Dairy Cattle and Feedstuffs

Table 3 **Nutrient Composition of Typical Feed Sources**

Feedstuff	Percent of Dry Matter Basis								
	DM*	CP*	ADF*	Ca**	P**	K**	TDN*	Mg**	Na**
Alfalfa Hay Early	90	18	35	1.41	0.24	2.40	59	0.33	0.14.
Alfalfa Hay Late	89	16	41	1.30	0.22	1.7	54	0.20	0.05
Alfalfa Silage	40	17	37	1.40	0.29	2.6	55	0.33	0.14
Barley Silage	35	12	37	0.41	0.32	2.3	59	0.13	0.01
Barley Straw	90	3	55	0.33	0.08	2.1	46	0.23	0.14
Barley Grain	89	12	7	0.08	0.41	0.6	83	0.20	0.03
Brome Grass Hay	89	10	41	0.33	0.25	1.9	55	0.09	0.02
Sweet Clover	91	16	38	1.27	0.25	1.8	53	0.49	0.09
Corn Grain	88	9	3	0.02	0.30	0.4	87	0.13	0.02
Grain Screenings	90	14	15	0.25	0.34	0.9	65	0.15	0.05
Grass Hay	91	12	40	0.70	0.25	2.0	58	0.18	0.03
Grass Silage	40	12	39	0.70	0.25	2.1	61	0.18	0.03
Oat Hay	90	10	39	0.38	0.28	1.8	59	0.26	0.18
Oat Silage	35	12	39	0.53	0.31	2.8	60	0.20	0.37
Oat Grain	89	13	16	0.09	0.40	0.5	76	0.14	0.08
Oat Straw	90	4	48	0.25	0.08	2.4	48	0.18	0.42
Peas Grain	89	26	10	1.30	0.47	1.4	83	0.03	0.05
Wheat Hay	90	10	36	0.25	0.23	1.6	57	0.12	0.21
Wheat Silage	35	12	37	0.38	0.28	2.0	60	0.20	0.03
Wheat Straw	91	3	58	0.16	0.05	1.3	44	0.12	0.14
Wheat Grain	89	14	4	0.05	0.42	0.5	88	0.16	0.08

* Refer to Definitions of Common Feed Nutrient Terms
** Refer to Tables 1 & 2
Note: The above figures are averages from a wide range of samples and should be used as a guide only. To best understand if a feed is meeting the nutritional needs of a specific group of cattle, a lab analysis is recommended. Nutrient levels each year are influenced by growing conditions, plant stage, timing and weather conditions at harvest.

Table 4 **Agronomic and Tolerance Information for Perennials**

Grasses	Optimum pH Limits	Acidity Tolerance	Alkalinity Tolerance	Salt Tolerance	Winter Hardiness	Drought Tolerance
Colonial Bentgrass (browntop)		Moderate		Low	Moderate	Low
Creeping Bentgrass		High	Low	Low	Moderate-high	Low-moderate
Velvet Bentgrass	5.5 - 7.5	Moderate		Low	Moderate-high	Low
Kentucky Bluegrass	6.0 - 7.5	Moderate	Moderate	Low	High-very high	Low-moderate
Meadow Bromegrass	6.0 - 7.5	Moderate	Moderate	Low-moderate	Moderate	Moderate-high
Smooth Bromegrass		Moderate	Moderate	Low-moderate	Moderate-high	Moderate-high
Reed Canarygrass		High	Moderate	Moderate-high	Moderate-high	Low-moderate
Chewings Fescue		High	Moderate	Moderate	High-very high	Moderate-high
Creeping Red Fescue		High	Moderate	Moderate-high	High very high	Moderate high
Hard Fescue		Moderate	Low	Low	Very high	Moderate-high
Meadow Fescue				Moderate	Moderate	Low
Sheep Fescue		Moderate	Low	Low	Very high	Moderate-high
Tall Fescue	5.5 - 6.5	High	Moderate	Moderate-high	Moderate	Moderate
Creeping Foxtail		High	Low	Low	High-very high	Low-moderate
Meadow Foxtail		Moderate		Low	High	Low
Orchardgrass	6.0 - 7.5	Moderate	Low	Low-moderate	Moderate	Moderate
Redtop		High		Low	Moderate	
Italian Ryegrass (annual)	5.5 - 7.5	High	Low	Moderate	Low	Low
Perennial Ryegrass	5.5 - 7.5	High	Low	Moderate	Low	Low
Timothy	5.6 - 7.3	Very high	Low	Low	Moderate	Low
Turf Timothy	5.6 - 7.3	Very high	Low	Low	Moderate	Low
Crested Wheatgrass (Fairway)			Moderate	Moderate	Very high	Very high
Crested Wheatgrass (Standard)			Moderate	Moderate	Very high	Very high
Intermediate Wheatgrass		Low	Moderate	Moderate	Moderate	Moderate

Table 4 **Agronomic and Tolerance Information *continued***

Grasses	Optimum pH Limits	Acidity Tolerance	Alkalinity Tolerance	Salt Tolerance	Winter Hardiness	Drought Tolerance
Northern (Thickspike) Wheatgrass		Moderate	High	Moderate	Moderate	Very high
Pubescent Wheatgrass		Low-moderate	Moderate	Moderate	Moderate	Moderate-high
Slender Wheatgrass			High	Moderate-high	High	Moderate
Streambank Wheatgrass		Low	Moderate	Moderate	Moderate-high	High
Tall Wheatgrass			Very high	Very high	Moderate	High
Western Wheatgrass		Moderate	Moderate	Very high	Moderate	Moderate-high
Altai Wildrye				High	High	Very high
Dahurian Wildrye				High	Moderate-high	Moderate-high
Russian Wildrye		Low	Moderate	High	High	Very high
Legumes						
Alfalfa	6.0 - 7.8	Moderate	High	Moderate	Moderate-high	Very high
Cicer Milkvetch		Low	Moderate	Low-moderate	Very high	Moderate-high
Alsike Clover	5.7 - 7.0	Moderate	Moderate	Low	High	Low-moderate
Red Clover	5.5 - 7.5	Low	Moderate	Low	Moderate-high	Low-moderate
White Clover	5.5 - 7.0	Moderate	Low	Low	Moderate-high	Low
Crownvetch	6.0 - 7.0			Moderate	Moderate	High
Sainfain		Low	Low	Low-moderate	Moderate	Moderate
Sweetclover (white)	6.5 - 7.5	Low	High	Moderate	Moderate	Moderate-high
Sweetclover (yellow)	6.5 - 7.5	Low	High	Moderate	Moderate	Moderate-high
Birdsfeet Trefoil	6.2 - 6.5	High	Moderate	High	Low-moderate	Moderate

Ian Murray, Chair

2016 was a good year for ARECA. We worked with our 9 members associations to deliver programs across the province.

RVTs: 5 of our member associations delivered pea, wheat, barley, oats and flax Regional Variety Trials on 22 sites across the province. Yield data is collected and distributed in the Alberta Seed Guide.

Pest Monitoring: As in the past, 6 of our associations worked with AAF to monitor insect infestations across the province. We monitored 8 insect pests in 260 field visits over the summer and submitted the data for inclusion in the Alberta Insect Pest Monitoring Network releases.

We launched a new website in 2016. It is cleaner, leaner, and is full of information about programs delivered by our member associations (www.areca.ab.ca).

Connections Newsletter: We created and distributed 9 newsletters with the intent of increasing the connection between our member association Boards. Each edition featured one member association. The newsletter is distributed internally to all association Board members.

Janette McDonald, Executive Director

Environmental Farm Plan: In 2016, we introduced the Web 3.0 edition of the EFP. As well, ARECA was instrumental in leading a movement to a national EFP. We hope to move this plan further in 2017. Late in 2016, we started preparing the Alberta EFP 5-year Business Plan for 2018-2023.

Sustainable Sourcing: ARECA was awarded Green Intern funding in 2016 and our intern has completed an excellent summary of potential global sustainability requirements and how those requirements will impact Alberta farmers.

Governance: In 2016, the ARECA Board spent time developing sound processes around how projects are approved and managed within ARECA and between ARECA and our members. Our new processes have resulted in successful programs and co-operation between our members.

Sainfoin Pasture: All associations are collaborating with ARECA and Alberta Agriculture and Forestry (AAF) on a province-wide sainfoin pasture project. We established 10 sites and will be measuring plant health and grazing yield in 2017.

Blackleg Surveillance: ARECA and 7 associations co-operated with AAF to collect and submit samples from 171 canola fields across the province. This project is a significant benefit to canola producers and we have the opportunity to expand it in 2017 and beyond.

Project Management Training: All ARECA associations and their staff manage projects. Project Management is a valued skill. Late in 2016, ARECA paid for training of 10 staff from 7 associations. This was an excellent course. If we work at what we learned, our projects will get better and better. Some staff comments:

> "We will be more organized and take less time to complete events or projects....Great course!"
> "Projects will be better understood and support more buy –in."
> "This was one of the best training workshops I have ever been to. "

Strategic Planning Conference: In November, ARECA hosted 35 association Board members at a conference in Lacombe. It was an excellent session and will lead to greater collaboration between our associations, government and industry in 2017.

CARA's program includes projects located within the Special Areas and the MD of Acadia in east-central Alberta. Although results are drawn from this area, we anticipate many of the projects may be applicable to other areas as well.

ARE YOU A CURRENT MEMBER OF CARA? A membership ensures you are on the mailing list to receive all reports, monthly newsletters, and admission discounts at CARA workshops/seminars. To become a member or renew a membership, simply complete the form below and send along with the appropriate fee.

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Enclosed is: ___$20.00 1 year membership (2017)
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