Western Applied Research Corporation

2012 Annual Report
Summary of Research Results and Events

Compiled by:

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TABLE OF CONTENTS

Table of Contents 1
Western Applied Research Corporation 3
Scott Research Farm 4
Statistics 5
Weather Report for Scott, Saskatchewan 2012 8
Extension Activities 9
Adopt Projects 10
Canola Seeding Speeds Demonstration 11
Maximizing Benefits From Foliar Fungicides on Wheat and Barley 12
Intercropping for Better Profit 13
Managing Herbicide Resistance in Wild Oat 13
Optimal Seeding Rate for Spring Wheat 14
Yield Busters - Seed Applied Nutrient Effects on Spring Wheat 15
Yield Busters - Canola Response to Foliar Fungicide 16
Proper Pre-Harvest Glyphosate Application in Wheat 17
Seed placed ESN and Agrotain Treated Urea for Wheat 18
Reclamation of Saline Soil using Perennial Forages 18
Inoculant Product and Formulation Effect on Field Pea 20
Weed Management for Controlling Herbicide Resistant Broadleaf Weeds in Lentil 21
Nitrogen Fertilizer Management Options for Winter Wheat 22
Demonstrating Winter Wheat Production Practices 23
Control of Leafy Spurge (Euphorbia esula L.) with Aminocyclopyachlor in Grassland. 24
Fall 2,4-D Preceeding Canola, Lentil and Pea 25
Response of Canola to Low Plant Populations and Reseeding.. 25
Precision Inter-row Seeding 28
Camelina Fall Seeding 29
Participatory Plant Breeding 30
Mustard Species of the World 31

Improving Phosphorus Efficiency 31
Seeding Rates for Precision Seeded Canola 32
Response of Canola to Phosphourus and Penicillium Bilaii (Jumpstart) 33
Field Pea Input Study... 34
Lentil Desiccant Trial 35
Corn Grazing Study 35
Nitrogen Rates and Fungicide Effects in Canary Seed... 36
Regional Canola Variety Trials 37
2012 Funding Support and Collaborations 223

WESTERN APPLIED RESEARCH CORPORATION

The Western Applied Research Corporation (WARC) was incorporated in 2003 and is directed by a seven member Board of Directors. The seven directors are local producers that represent both livestock and grain producers from each of the seven Agriculture Development and Diversification (ADD) districts in Northwest Saskatchewan.

WARC is a producer based organization that facilitates practical field research and demonstration. It also ensures the transfer of technology from research to farm level for the benefit of producers in Northwest Saskatchewan and the province. In addition to the field trial analysis the economic implication for the technology is evaluated.

WARC is affiliated with Agriculture and Agri-Food Canada (AAFC) at Scott. The Scott Research Farm acts as the main site for research and demonstration as well as coordination of the projects. Another location accessible to WARC through AAFC at Scott is Glaslyn. In addition to Glaslyn, there are seven other sites that are accessible through the AgriARM program: Indian Head, Redvers, Canora, Rosthern, Swift Current, Prince Albert, and Melfort.

Board of Directors

Don Karstens	Wilkie, SK
Laura Reiter	Radisson, SK
Rob Florence	Battleford, SK
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Ian Sonntag	Goodsoil, SK
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Lorne Nielsen	Technician, AAFC Scott
Cindy Gampe	Technician, AAFC Scott

SCOTT RESEARCH FARM

The Scott Research Farm was established in 1910 by the Federal Department of Agriculture's Experimental Farm Service. In the 1970's organizational restructuring within Agriculture and Agri-Food Canada Research Branch resulted in Scott Research Farm becoming a sub-station of Saskatoon Research Centre.

The farm consists of approximately 340 hectares (840 acres) of dark brown loam soil (pH ranging from 5.0-6.5). In addition to this land base there were two Project Farms operated on leased land in North Western Saskatchewan. One located near Lashburn (Black climatic zone) and the other near Loon Lake (Grey climatic zone). These project farms were closed at the end of 2006. In 2007, a new Project Farm near Glaslyn (Grey climatic zone) was started.

In the early years, there were research programs in livestock, horticulture and field crop production. Along with specialization in the agriculture industry, Research Centres also specialized. As a result, the livestock and horticulture programs have been transferred to other AAFC Research Centres. Scott Research Farm now specializes in crop production systems**.**

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STATISTICS

Statistics are very important for agricultural research. They allow a person to understand how different treatments relate to one another. Statistical analysis is a mathematical way to determine if the differences between treatments are a real effect or a random effect. For agricultural research a significance level of α=0.05 is generally used. This means that if there is a significant difference, the difference is expected to occur 95 percent of the time. The following are some common statistical terms and their corresponding definition.

Mean - average of the sample being measured.

Median - the exact middle when comparing a range of numbers.

Standard error - a measure of the statistical accuracy of an estimate (often mean). The smaller the standard error the more accurate the estimate.

Experimental design - is the way a researcher designs an experiment to reduce the amount of error in a project. There are many different types with randomized complete block and split plot being the most common in WARC research.

Replication - the amount of times that an experiment is repeated at each site (also called blocks). Four is a common number of replication.

Location - where the experiment takes place, as the number of locations increase the number of different environments increase allowing for better results because the treatments were exposed to more environments (also called sites).

Experimental unit - the smallest unit that is measured in an experiment

Treatment - what is being applied to the experimental unit. The treatments are being tested in an experiment (also called entry).

Plot - in WARC related research it is the same as experimental unit

Trial - another term for experiment. It encompasses all of the plots, or treatments and blocks in a test.

For example if the yield of variety A is larger and statistically different from variety B, variety A is higher yielding 95% of the time under the environmental conditions of the experiment. Least significant difference (LSD) will be used in the WARC annual report to show differences among treatments like varieties and herbicides. To compare treatment averages you subtract one treatment average from another. If the difference is greater than the LSD the treatments are statistically different. Table 1 shows an example of three different treatments.

Table 1 A statistical example of using LSD to determine significant differences between treatments.

Treatment	Average
A	10
B	8
C	5
LSD(0.05)	2.5

treatment A (10) – treatment B (8) = difference (2)
2 is less than LSD of 2.5 so treatment A is not statistically different than treatment B

treatment A (10) – treatment C (5) = difference (5)
5 is greater than LSD of 2.5 so treatment A is statistically higher than treatment C

treatment B (8) – treatment C (5) = difference (3)
3 is greater than LSD of 2.5 so treatment B is statistically higher than treatment C

Statistical differences can also be presented by letters next to the average. Treatment averages with the same letter are not different but treatment averages with different letters are significantly different (Table 2). Treatments A and B are not significantly different but they are both significantly different from treatment C.

Table 2 A statistical example using letters on treatment averages to denote significant differences.

Treatment	Average
A	10^a
B	8^a
C	5^b
LSD(0.05)	2.5

Statistical significance is usually shown as error bars on graphs. If the error bar reaches as high as another average the treatments are not statistically different. If the error bar does not reach as high as another average they are significantly different. Treatment A and B are not significantly different but both are different from treatment C.

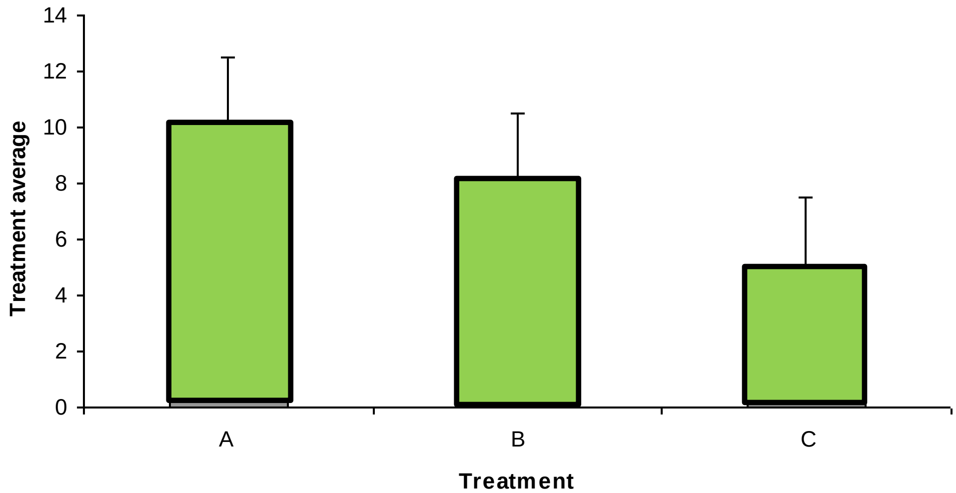

Figure 1 A statistical example using error bars on treatment averages to denote significant differences.

If treatment averages are not significantly different under the conditions of the experiment it is assumed that the environment of the experiment explains more of the treatment differences than do the treatments themselves. When there is no significant difference it is difficult to predict which treatment will perform better. The environment is the years and locations that the experiment takes place.

Two important factors that influence how precise an experiment is are the number of locations used and the number of years the experiment occurred in. The more site years (multiply number of sites by the number of years) an experiment occurs in the more precise the results. Experiments with few sites and few years do not have many different environments to compare. More conclusive results are obtained by experiments with more site years of data.

WEATHER REPORT FOR SCOTT, SASKATCHEWAN 2012

Soil Information:
Dark Brown Chernozemic (Typic Boroll)
Association: Scott
Texture: Loam
sand: 31%
silt: 42%
clay: 27%
Organic Matter: 4%
Soil pH: 6.0

Table 1. Air temperature, growing degree days and precipitation at Scott in 2012.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Season Avg./Total
Air Temperature (°C)								
2012 mean	3.7	9.8	15.2	18.7	17.1	12.4	0.9	11.1
100 year mean	3.2	10.2	14.5	17.3	16.2	10.5	3.8	10.8
Growing Degree Days								
2012 mean	47	187	307	377	349	169	49	1485
100 year mean	42	169	285	381	346	174	48	1445
Precipitation (mm)								
2012 mean	37	53	185	56	51	24	12	418
100 year mean	23	37	62	62	45	31	16	276

Last spring frost: May 27 (-0.2°C)

First fall frost: September 17 (-0.8°C)

Rainfall event greater than 10 mm (April-October):
April 27 (15.8mm)
May 6 (10.6mm)
May 22 (14.2mm)
June 9 (34.0mm)
June 15 (60.8mm)
June 17 (13.2mm)
June 25 (16.4mm)
July 10 (12.6mm)
July 28 (10.0mm)
Aug. 14 (11.4mm)
Aug. 24 (11.4mm)
Sept. 10 (23.1mm)

EXTENSION ACTIVITIES

Field days:

- *Scott Field Day, August 1, 2012, approximately 150 people in attendance*
- *Delisle Ag Ventures Field Day, August 8, 2012, approximately 35 people in attendance who viewed the response to cereal fungicide application in spring wheat demonstrations in the Delisle area*

Extension Events:

- *Crop Opportunity and Scott Research Update – March 7, 2013*
  - *Approximately 200 people in attendance*
  - *Research updates on AgriARM, ADOPT and AAFC projects*
- *Agritopics – radio spot on two radio stations (CJNB North Battleford and CJWW in Saskatoon). To date four radio spots have been done by the research manager based on results of 2012 ADOPT projects, and one radio spot was done on how to conduct on-farm research.*
- *Agri-ARM Research Update at 2013 Crop Production Week – January 11, 2013*
  - *Approximately 90 people in attendance*
  - *Research manager presented results of inoculant product and formulation effect on field pea demonstration*
- *Crop Production Show - January 7-10, 2013*
  - *Coordinated an Agri-ARM booth for the crop production show.*
  - *This booth provided a venue for participating sites to connect with farmers and let them know about the research we are conducting*
- *WARC website*
  - *research results and reports are published on www.warc.ca*

ADOPT Projects

Agricultural Demonstration of Practices and Technologies (ADOPT) is a program funded by the Saskatchewan Ministry of Agriculture. The goal of the program is to demonstrate new research findings around the province and to show the effectiveness of the new research findings. WARC has funding for several of these projects.

CANOLA SEEDING SPEEDS DEMONSTRATION

Sherrilyn Phelps[1], Alicia Olsen[1], Stu Brandt[2], Tristan Coelho[3]

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The purpose was to demonstrate the effect of increasing seeding speed on canola emergence over a range of equipment and field conditions. The speeds that were targeted ranged from three to 8.5 mph depending on the equipment. The majority of sites were seeded at 1 mph increments from 3 to 7 mph. Across Northern Saskatchewan in 2011 and 2012 there were 26 field scale demonstrations and one small plot demonstration. Plant counts at 21 days after seeding were taken from 20 square metres per seeding speed at each of the field scale locations. Linear regression was performed on the data to determine the response in plant population to increasing seeding speed. Out of the 26 field scale demonstrations in Northern Saskatchewan in 2011 and 2012 there were six fields that had a response to seeding speed. Four fields showed decreases in plant populations as seeding speeds were increased and two sites showed increases in plant populations as seeding speeds were increased. In other words, 15% (4/26) of the sites showed a negative response in plant populations to increased seeding speeds. The response to increased seeding speed ranged from a loss of 1.2 to 5.7 plants per metre square with each 1 mph increase in speed. The average loss over the four negatively responsive sites was 3.2 plants per metre square loss for each 1 mph increase in speed.

Plant populations are influenced by seeding rates. In 2012 the thousand kernel weights (TKW) of the seed planted were obtained and the emergence rates calculated. Emergence ranged from 23% to 68% with an average of 47%, which is close to the average suggested by Canola Council of Canada (50%). Canola target plant populations are 80 to 100 plants per square metre but only one site out of 26 field scale trials had populations in the target zone. With the small plot trial at Scott, seeding depth had a negative impact on emergence. 36% emergence was observed seeding at two inches compared to 47% and 56% for the ½ and ¼ inch depths, respectively. Seeding speed did not have a significant effect on plant emergence in the small plot demonstration.

In summary, an increase in seeding speed by 1 mph under ideal environmental conditions does not pose a significant risk of reducing plant stands. However, there is no evidence that growers should routinely increase seeding speeds above the traditional speed of 4 to 5 mph unless compelled to do so by time limitations. Growers should bear in mind that these demonstrations were conducted in normal to wet conditions. Seeding depth did have more impact than seeding speed in small plots. As a result, minor changes in seed depth associated with seeding speed could have a more dramatic impact on emergence under dry conditions. Effects of seeding depth should be validated with large field scale equipment and is a potential project for future years.

Acknowledgements

This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

MAXIMIZING THE BENEFITS FROM FOLIAR FUNGICIDES ON WHEAT AND BARLEY

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Agronomists, industry and producers; including members of the WARC board have been considering routine practice of foliar fungicides in cereal production in Saskatchewan. The economic benefit of fungicide use on cereals is variable depending upon variety, environmental conditions and yield potential of the location. The objective of this project was to demonstrate the effects of different fungicides on varieties with varying levels of disease resistance to leaf spotting diseases. This project consisted of two components; a small plot demonstration at the AAFC Scott Research Farm and a field scale demonstration located on the farm of a collaborating producer. The small plot demonstration entailed an untreated check and applications of Tilt and Headline to three wheat varieties; AC Barrie, Infinity and 5603 HR. As well as an untreated check and applications of Tilt and Proline to three barley varieties; Harrington, AC Metcalfe and Newdale. Stubble from known disease infected fields was spread in the plot area and all fungicides were applied at the flag leaf stage. Barley treated with Tilt and Proline fungicides yielded significantly higher than the untreated barley. Wheat and more so Barley varieties rated as having better levels of resistance to leaf spotting diseases exhibited lower levels of disease at the soft dough stage regardless of fungicide application. Infinity and 5603 HR wheat varieties are both identified as resistant to leaf spotting diseases, however, the 5603 HR yielded 23% higher than Infinity without a fungicide and 16% higher with fungicide application. An economic analysis was performed to compare fungicide products, Tilt and Proline did not result in significantly different barley yields, tilt is less expensive, therefore producing a greater net gain. \

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

INTERCROPPING FOR BETTER BENEFIT

Anne Kirk[1]

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Increasing input costs have led to renewed interest in intercropping. Growing two or more crops simultaneously on the same field will increase crop diversity and may lead to reduced fertilizer and pesticide requirements. The objective of this project is to demonstrate a pea and barley intercrop as well as a pea and canola intercrop. The intercrops will be grown alongside barley, canola and pea crops for comparison purposes. Pea, barley and canola crops were seeded at their recommended seeding rate. In the intercropped plots the two crops were seeded at 75% of their recommended seeding rate. Plant density was measured two weeks after seeding. Barley establishment was increased when planted with pea compared to when planted alone. Density of the pea and canola intercrop was as expected, approximately 75% of the combined sole crops. Due to hail shortly before crop maturity the trial was unable to be harvested. Although yield data was not collected from this trial, results from other research organizations and producers have found intercrops to out yield the two crops when grown separately due to synergisms between the intercrops. Prior to growing an intercrop it is important to choose crop varieties with similar maturity dates.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

MANAGING HERBICIDE RESISTANCE IN WILD OAT

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Wild Oat (*Avena fatua*) is a common weed in Saskatchewan with cultivars resistant to groups 1, 2, 8 and 25 herbicides. Wild oat resistance to group I herbicides occurs most frequently, followed by resistance to both group I and II. The purpose of the field portion was to demonstrate an integrated weed management strategy to control wild oat in spring wheat that allows for herbicide group rotations. Variables in this study included wheat variety, seeding rate and herbicide treatment. Three wheat varieties were seeded at 1, 2 and 3 bushels per acre and eight post-emerge herbicides were applied to all. A reduction in the wild oat biomass collected in the taller wheat varieties in this demonstration further confirmed previous research that taller varieties are more weed competitive. Also, increased wheat seeding rates increased the wild oat control. Highest levels of weed suppression was achieved by group I herbicides (>95%), followed by group 2 (>85%), and group 8 ranging from 45-80% weed suppression. A greenhouse demonstration was conducted to show the complexity of herbicide resistance. One susceptible and seven herbicide resistant biotypes were grown and treated with a number of group I and II herbicides. Overall, clethodim attained the highest wild oat control but growers should not expect that clethodim will control all biotypes with multiple group I and II resistance.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture

OPTIMAL SEEDING RATE FOR SPRING WHEAT

Anne Kirk[1], Curtis Braaten[2], Chris Holzapfel[3] and Bryan Nybo[4]

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Increasing the seeding rate of spring wheat may help to optimize yield when seeding newer varieties with higher yield potential. Research has shown that wheat yields can be increased by increasing seeding rates, but there is a point when the benefits of an increased plant population do not outweigh the costs of additional seed. The objective of this project is to demonstrate the potential yield benefits that can be achieved by increasing plant populations. Field trials were located at Scott, Prince Albert, Indian Head and Swift Current, Saskatchewan. Wheat was seeded at rates of 60, 120, 180, 240, 420 and 480 seeds m^{-2}. Plant density increased as seeding rate increased. Maximum yield occurred at seeding rates of 180, 480 and 360 seeds m^{-2} at Indian Head, Swift Current and Prince Albert, respectively. At the Swift Current site seeding rates of 120-480 seeds m^{-2} resulted in statistically similar yields. The Prince Albert site was not replicated and therefore could not be statistically analysed. At Swift Current and Indian Head seed weight was not affected by seeding rate. The Scott site could not be harvested, but biomass collection demonstrated that increasing seeding rate can be an effective tool to aid in weed control. This trial will be repeated in 2013, giving greater insight into optimal seeding rates for spring wheat.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

YIELD BUSTERS- SEED APPLIED NUTRIENT EFFECTS ON SPRING WHEAT

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No-till seeding spring wheat in the prairies often occurs into cold and wet environments, leaving seedlings susceptible to disease and vigour losses. Seed applied nutrients are purported to assist seedlings through these environmental stressors via quicker crop establishment. The objective of this project was to demonstrate the effects of commercially available seed-applied micronutrient fertilizer products and granular $ZnS0_4$ application on emergence, development, growth and grain yield. Field trials were conducted at four locations in Saskatchewan with contrasting soil types; Indian Head, Melfort, Scott and Swift Current. Treatments included: EZ20 Essential Zn, Awaken ST, Apline Seed Nutrition, Protinus, as well as one Zn and one Cu product, names undisclosed. Midge tolerant hard red spring wheat cultivar Unity VB was seeded early seeking potentially cool and wet conditions. Two sets of comprehensive soil samples were collected, one of a traditional method and the other utilizing plant root simulator probes to estimate nutrient availability. The study included six different micronutrient products and an untreated check for comparison. Early season growth encompassed emergence counts at five dates and collection of the biomass in the area the emergence counts were completed within. While a marginally significant treatment effect was observed three days after emergence, plant populations for the untreated check did not significantly differ from those observed for any other individual treatments. The average number of days from planting to maturity ranged from 90 at Swift Current to 101 at Indian Head as a result of diverse environments and crop management, and within individual sites, days to maturity was not affected by treatment. Also, grain yields were not affected by treatment at any sites. Nonetheless, many different products are available, formulations change and the eight sites where this study was conducted cannot be representative of every potential field or situation; thus, it is possible that benefits could exist under the right circumstances.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

YIELD BUSTERS – CANOLA RESPONSE TO FOLIAR FUNGICIDE

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Elevated grain prices continue to increase the economic benefits of canola production in the prairies, but the annual application of a fungicide to control sclerotinia stem rot is still questionable. The objective of this demonstration was to exhibit the effects of various fungicides on canola disease levels and seed yield. Treatments included five fungicides at 20-50% bloom, Headline at herbicide timing and an untreated check. The untreated check and treatment where Headline was applied at herbicide timing (4-6 leaf) had similar levels of sclerotinia incidence.

Table 1 Description of fungicide treatments

Trt.	Trade Name[Z]	Description / Application Rate / Application Timing
1	Untreated check	N/A
2	Headline EC	250 g L^{-1} pyraclostrobin / 0.16 L ac^{-1} / 4-6 leaf stage
3	Lance WDG	70% boscalid / 142 g ac^{-1} / 20-50% bloom stage
4	Lance WDG + Headline EC	142 g ac^{-1} and 0.12 L ac^{-1} / 20-50% bloom stage
5	Proline 480 SC	480 g L^{-1} prothioconazole / 0.15 L ac^{-1} / 20-50% bloom stage
6	Astound	37.5% cyprodinil and 25% fludioxonil / 395 g ac^{-1} / 20-50% bloom stage
7	Vertisan	200 g L^{-1} penthiopyrad / 0.50 L ac^{-1} / 20-50% bloom stage

[Z]Disclosure of trade names does not imply any endorsement or disapproval of any specific products and is only intended to differentiate treatments and allow producers to identify the specific technologies being demonstrated in the marketplace

RESULTS

The results from this demonstration confirm that applying fungicides at the recommended times is an effective method of minimizing the impact of sclerotinia stem rot on canola yield. Disease ratings showed that the incidence of sclerotinia was affected by site, treatment, and a site by treatment interaction was also noted. This indicates that fungicide effects on sclerotinia incidence varied from one site to the next. Indian Head was the sole site with high disease pressure in 2012; fungicide application resulted in an average yield increase of nearly 20%. Economic benefits of a fungicide are seen when disease levels are high enough to cause significant seed yield, but the costs of not using a foliar fungicide when disease booms can be drastic. Strategic field scouting is required to identify if sclerotinia disease pressure is high enough to justify a fungicide application. This project will be continued in 2013.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

PROPER PRE- HARVEST GLYPHOSATE TIMING IN SPRING WHEAT

Anne Kirk1, Tristan Coelho[1], Bryan Nybo[2] and Curtis Braaten[3]

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Early applications of a pre-harvest glyphosate can lead to reduced grain yield and quality as well as potential load rejection due to grain glyphosate levels above the maximum residue limit (MRL) of 5ppm. The purpose of this project was to demonstrate ideal pre-harvest glyphosate application timing in wheat to producers. Unity spring wheat was seeded at the recommended rate and fertilizers were applied at rates reflecting soil test results. The initial glyphosate application was 1L/ac and occurred at the early milk stage. Up to six additional treatments were applied depending on the environmental conditions at the site, each application being 5 days apart. At Swift Current, test weight (TW), thousand kernel weight (TKW) and yield was significantly lower when glyphosate was applied at the early milk stage. Yield and test weight did not differ between the no glyphosate treatment and all treatments applied after the early milk stage, potentially a result of rapid crop maturity from hot and dry conditions. At Prince Albert, yield, protein and TKW were highest when pre-harvest glyphosate was applied 20 days after the early milk stage, quality did not significantly differ for applications after this date. Scott also experienced lowest yields and quality when glyphosate was applied at the early milk stage. Results show that applying a pre-harvest glyphosate at the hard dough stage will assist in crop dry-down and weed control without negatively affecting grain quality. A pre-harvest glyphosate may not be required when hot and dry conditions persist unless the main objective is perennial weed control.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

RATES OF SEED PLACED ESN AND AGROTAIN TREATED UREA FOR WHEAT

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Seed placed urea fertilizer causes damage to seeds and seedlings through ammonia toxicity. There are circumstances where producers may want to apply higher rates of N fertilizer than the guidelines for safe application allow. Treated urea products such as ESN and Agrotain are of interest to producers because they are said to increase the amount of N that can be safely placed with the seed. The objective of this project is to demonstrate the increased safety of ESN and Agrotain treated urea over untreated urea fertilizer when placed with seed. This project took place over a two year period at Scott, Melfort and Swift Current. Untreated urea, ESN treated urea and Agrotain treated urea were placed with the seed at 20 (the maximum recommended safe rate for the equipment used), 40, 80 and 160 lb/ac. Urea was pre-banded on all treatments to bring the combined total N to 160 lb/ac. Increasing the rate of seed-placed N decreased plant density and wheat yield when data from all site years was combined. Increasing rates of seed applied N caused little damage to the wheat seedlings when significant amounts of rain were received shortly after seeding. ESN treated urea increased seed safety over both untreated urea and Agrotain treated urea. It is recommended that producers follow the guidelines for maximum safe rate of seed applied N.

Acknowledgements

Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

RECLAMATION OF SALINE SOIL USING PERENNIAL FORAGES

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Saline areas are a concern for producers since they contain salts in the soil at concentrations that affect the growth and production of agricultural crops. A management option for saline areas is to seed perennial forages into the affected area. The establishment of perennial forages in a saline area allows an unproductive saline area to become a productive area of the field. This demonstration was conducted to show producers with saline areas how to map salinity and to demonstrate the effectiveness of perennial forages with increased saline tolerance at colonizing a saline site. Soil salinity mapping occurred in 2011 during the Scott Field Day. In the fall of 2011 treatments were seeded into the trial area.

Forages:

1) NewHy
2) Smooth Brome Carlton
3) Tall Wheatgrass
4) Creeping Foxtail
5) Tall Fescue Kokanee
6) AC Saltlander Green Wheatgrass
7) Saline Master
8) Halo Alfalfa
9) Rugged Alfalfa
10) Rambler Alfalfa

In 2012 biomass samples were taken from the non-saline, slightly saline and moderately saline areas of each plot to assess colonization. Ability to colonize the saline areas varied; both wheatgrasses, creeping foxtail, NewHy and Saline Master were the top yielding forages and produced similar yields in a moderately saline environment compared to a none-saline environment, table 1. All three alfalfa varieties used in this study were poor colonizers and failed to compete with the other forages even in the slightly saline areas.

Table 1 Biomass yields of forages across a salinity gradient (Yield as a % of non-saline soil).

Treatment	Non – Saline	Slightly Saline	Moderately Saline
Alfalfa – Rambler	100	39	15
Alfalfa – Halo	100	55	4
Alfalfa – Rugged	100	77	13
Tall Fescue – Kokanee	100	78	32
Tall Wheat Grass	100	101	101
Smooth Brome	100	65	45
Creeping Foxtail	100	95	106
Saline Master	100	102	76
AC Saltlander – Green Wheatgrass	100	95	106
NewHY	100	109	70

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

INOCULENT PRODUCT AND FORMULATION EFFECT ON FIELD PEA

Anne Kirk[1], Stewart Brandt[2] and Bryan Nybo[3]

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Inoculation of pulse crops is important for optimising plant nutrition and enhancing yield. In order to enhance nitrogen fixation field peas require inoculation with rhizobium leguminosarum, especially when grown for the first time in rotation. Commercial inoculants are formulated as granular, peat-based and liquid. There are also a variety of inoculant products available to Saskatchewan producers. Inoculant products and formulations can vary in cost per acre and in the effectiveness of their Rhizobium/legume associations. The objective of this project is to demonstrate the efficacy of different inoculant products and formulations on field pea. Field peas were seeded at three locations in Saskatchewan. Treatments included eleven different inoculant products and formulations, an uninoculated check and an uninoculated check with 60 lb ac^{-1} N side banded at the time of seeding. Data collection included nodulation, field pea biomass and grain yield. At the Swift Current site nodulation differed between treatments with inoculated treatments having more effective nodulation than uninoculated treatments. Treatment differences were not seen at the other sites. When all sites years were analysed together there were no significant differences between treatments for nodulation, biomass or yield.

Acknowledgements
Funding provided through the ADOPT program from the Saskatchewan Ministry of Agriculture.

CULTURAL, CHEMICAL AND MECHANICAL WEED MANAGEMENT FOR CONTROLLING HERBICIDE RESISTANT BROADLEAF WEEDS IN LENTIL

Steven Shirtliffe[1], Eric Johnson[2], Anne Kirk[3], and Tristan Coelho[3]

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Group II herbicide resistance in wild mustard and kochia is rapidly spreading in the prairies, mandating the revision of present control techniques. A primary objective of this project was to determine optimum management of herbicide resistant broadleaf weeds in lentils through a combination of physical, chemical and cultural methods. Secondly, to develop an integrated weed management system that will reduce herbicide selection pressure in lentil.

Experiment 1

CDC Impala lentils were seeded at 1, 2 and 4 times the recommended rates and Xceed mustard was broadcast at 100 seeds m^{-2}. An integrated system that combined high seeding rates, Heat, ½ rate of Sencor and rotary hoeing resulted in lentil yield equivalent to full rate of Sencor. Instead of relying solely on a single application of Sencor, an example of an integrated approach would be applying the ½ rate of Sencor at the mid seeding rate and being prepared to rotary hoe should mustard densities warrant.

Experiment 2

The experiment investigates the use of Edge (fall surface applied), fall and/or spring rotary hoeing, and a combination of Edge and rotary hoeing.

The treatments are:

1) Untreated check
2) Edge fall surface applied, no incorporation
3) Fall rotary hoeing
4) Spring rotary hoeing
5) Fall and spring rotary hoeing
6) Edge and fall rotary hoeing
7) Edge and spring rotary hoeing
8) Edge, fall and spring rotary hoeing

The treatment effects on kochia density are illustrated in Figure 1. Edge surface applied worked better than expected in this experiment, typically one can expect 70% control; however kochia density was reduced by 95% in this study. Spring rotary hoeing provided similar per cent control. Although not statistically different from the Edge and the rotary hoe treatments, the combination of Edge and rotary hoeing reduced kochia density to less than 3 per m^2, and the combination of Edge, fall and spring rotary hoeing essentially eliminated all kochia. There was no post-emergence herbicide applied in this trial. The trial will be repeated in 2 locations in 2013.

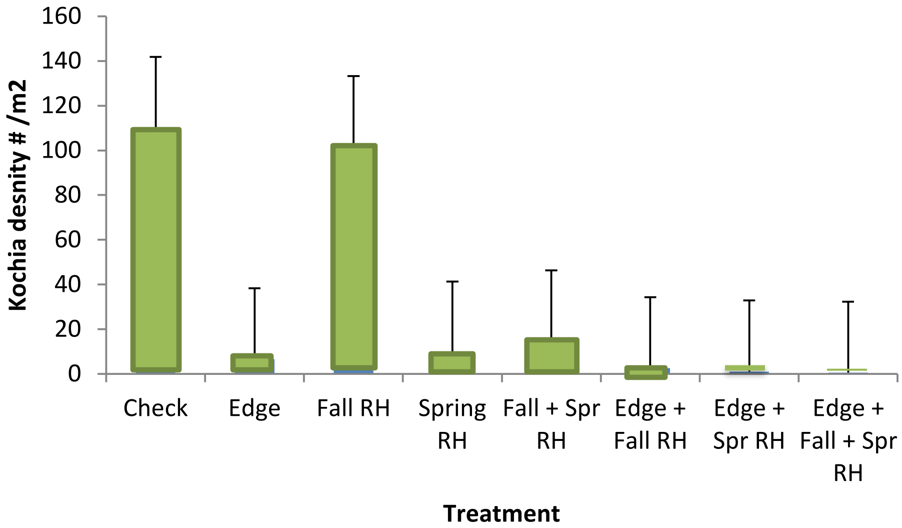

Figure 1: Effect of Edge herbicide, fall and spring rotary hoeing, and a combination of Edge and rotary hoeing on kochia density in lentil. Scott 2012.

Acknowledgements

This project is jointly funded by the Saskatchewan Agriculture Development Fund and the Saskatchewan Pulse Growers.

NITROGEN FERTILIZER MANAGEMENT OPTIONS FOR WINTER WHEAT

Tristan Coelho[1]

[1]Western Applied Research Corporation, Scott, SK

Nitrogen is generally the most limiting crop nutrient in cereal production in the prairies and must be managed to maximize economic returns and to help maintain environmental quality. In addition to contributing to yield, nitrogen management can assist a producer in targeting a specific protein level for a wheat crop. The primary objective in this demonstration is to identify the effects of various nitrogen application options available in the prairies on winter wheat yield and quality. Buteo wheat was seeded at 300 seeds m^{-2} on September 14th. Nitrogen fertilizer types compared include: Urea, ESN, Super Urea, UAN and Ammonium Nitrate. A diverse number of application techniques are utilized; side-banded at seeding, fall dribble banded, spring broadcast, and split applications of side-banded and spring broadcast. Split nitrogen applications consist of 40% of total N rate being side-banded Urea at seeding and the remainder of the nitrogen applied in early spring. All treatment variations are replicated at total N rates of 75 and 115 Kg N/ha, except for the split applications which all have a total N requirement of 115 Kg

N/ha. Data collection consists of spring plant counts as well as yield and quality characteristics: thousand kernel weight, test weight and grain protein.

Acknowledgements
This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

DEMONSTRATING WINTER WHEAT PRODUCTION PRACTICES

Tristan Coelho[1]

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Production of winter wheat in the prairies is limited; however there are several economic and environmental advantages associated with this practice. Benefits of winter wheat over a spring seeded crop may consist of: more efficient water utilization, increased waterfowl habitat, a reduction in pesticide use and earlier maturity. An objective of this project is to evaluate winter wheat production with different agronomic practices including: herbicides, nitrogen fertilizers, seeding dates and fungicides. Buteo wheat was seeded at 450 seeds m^{-2} on September 14th for the early seeding date and September 24th for the late seeding date. Additional variations in seeding practices included deeper seeding and tillage prior to seeding. Four different nitrogen fertilizer types are involved: Urea, Agrotain, Super Urea and ESN. Pesticide inputs vary across treatments; with and without fall weed control, and with and without fungicide. Data collection consists of spring plant counts as well as yield and quality characteristics: thousand kernel weight, test weight and grain protein.

Acknowledgements
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CONTROL OF LEAFY SPURGE (EUPHORBIA ESULA L.) WITH AMINOCYCLOPHYACHLOR IN GRASSLAND

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Leafy spurge (Euphorbia esula L.) is an invasive noxious weed that is problematic in forages and rangeland in the Northern Great Plains. Livestock generally selectively overgraze leafy spurge since it is not palatable, which leads to dominance of the weed in an ecosystem. Aminocyclopyrachlor, a new pryimidine carboxylic acid herbicide under development by E.I. DuPont Canada Company, has exhibited activity on a wide range of non- cropland broadleaf weed species. Its attributes include low use rates, low animal toxicity, and low environmental impact.

The objective of this project is to evaluate the efficacy of two aminocyclopyrachlor formulations, DuPont™ Rejuvra XL™ and DuPont™ Truvist™, on controlling leafy spurge and injury to grass in comparison to industry standards (Grazon and Tordon). Field studies were conducted near Battleford, Saskatchewan in 2009 and 2010. Treatments were applied when leafy spurge plants were 30-60 cm tall with approximately 80 % flowering.

Treatments included:

1) Untreated check
2) Rejuvra XL™ at 45 g ai ha-1
3) Rejuvra XL™ at 90 g ai ha-1
4) Truvist™ at 100 g ai ha-1
5) Grazon™ at 2135 g ai ha-1
6) Tordon™ at 2160 g ai ha

Visual control ratings were done at 2, 4 and 6 weeks after application (WAA). Long-term control was assessed at 53 WAA.

RESULTS

Two weeks after application (WAA) Tordon™ and Grazon™ achieved significantly better leafy spurge control than the RejuvraXL™ and Truvist™ treatments, while at 4 WAA control achieved with Tordon™ was comparable to the full rate (90 g ai ha-1) of RejuvraXL™. Six WAA the full rate of RejuvraXL™ and Truvist™ were comparable to Grazon™ and Tordon™. The Truvist™ formulation achieved statistically similar leafy spurge control to both Grazon™ and Tordon™, while the full rate of RejuvraXL™ achieved control similar to Tordon™. Control of leafy spurge with Grazon™ was reduced one year after application and was similar to control achieved with the half rate of RejuvraXL™. One year after application the greatest leafy spurge control was achieved with Tordon™, although there was no significant difference between Tordon™ and the full rates of RejuvraXL™ and Truvist™. Application of Grazon™ and Tordon™ resulted in severe injury to the mixed grass at 2, 4 and 6 WAA. In the Grazon™ treatments the mixed grass recovered by the next growing season, while severe injury was still evident in the Tordon™ treatments.

Acknowledgements
This project is being funded by DuPont Canada.

FALL 2,4-D PRECEEDING CANOLA, LENTIL AND PEA

Tristan Coelho[1]

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As integrated crop management systems evolve to improve the economic and environmental aspects of western agriculture, maximizing options and minimizing risks of crop damage from previous pesticides applied is important. The main objective of this project is to document the effects of a fall application of 2,4-D on spring planted canola, lentil and pea crops. Amine formulation of 2,4-D was applied to plots at rates of: 0, 85, 170, 341 and 682 ml of active ingredient per acre on October 12th, 2012. Fertilizers, herbicide and fungicides will be utilized as required to reach full yield potential of the site. Data collection will begin with spring plant densities with five half meter counts per plot, ten and twenty-one days after plant rows are visible. In addition to early crop injury, crop maturities and grain yields will also be examined.

Acknowledgements
This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

RESPONSE OF CANOLA TO LOW PLANT POPULATION AND RESEEDING

Blaine Davey[1], Anne Kirk[1], Sherrilyn Phelps[2], Eric Johnson[3], Steve Shirtliffe[4], Cecil Vera[5], Chris Holzapfel[6] and Bryan Nybo[7].

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INTRODUCTION

Hybrid canolas are widely grown by producers, information on minimum plant stands required for establishment is important for producers when it comes to reseeding decisions. Previous research suggests 45 plants per meter square as a minimum plant population to achieve 90% of maximum yields. Saskatchewan Crop Insurance uses 20 plants per square meter as a minimum plant stand under which crops are no longer covered for yield loss, but limited research is available to support this number. When it comes to reseeding low plant stands of canola, little research has been done to evaluate the options. Recent research suggests using the earliest maturing varieties when reseeding canola, but research on whether or not to use hybrid canola when reseeding a poor canola stand is also limited.

OBJECTIVES

1) Determine the plant population at which canola hybrid yields at 90% of the maximum yield

2) Determine the effect of plant populations on maturity, seed size and green seed count

3) Determine minimum plant density at which reseeding would be recommended for hybrid canola

4) Determine what the risks are with each reseeding option in terms of maturity, yield and quality

MATERIALS AND METHODS

This experiment was held in Scott, Swift Current, Indian Head, Melfort and Saskatoon from 2010-2012. The experimental design is a randomized complete block design with four replicates. The project was conducted as two separate experiments, the first to investigate the response of hybrid canola to low plant populations and the second to look at reseeding options.

Experiment 1: Plant density response

Hybrid canolas (*Brassica napus*) were seeded at rates of 5, 10, 20, 40, 80, 150, and 300 seeds per m^2. An elemental sulfur bulking agent was used to ensure even seed spread. The variety 5440 LL was used at all sites with 5770 LL also included at Scott and Melfort. Data collected throughout the growing season includes; plant density, days from planting to start and end of flowering, lodging, days to 60% seed colour change, grain yield, percent green seed and thousand kernel weight. Seeds per pod and pods per plant were collected at Scott and Saskatoon.

Experiment 2: Reseeding options

Three seeding dates were used at each site. The first seeding date was early May where one treatment was seeded to 5440 LL canola at 150 seeds m^2, while all of the other treatments were seeded at 20 seeds m^2 to duplicate poor stand establishment. All but one of the treatments planted at 20 seeds m^2 were later killed with glyphosate prior to reseeding. After glyphosate application, canola was planted into the plot to mimic a reseeding situation in the field where a poor plant stand is terminated and canola is reseeded. Two hybrid canola varieties; 5440 LL and 9350 RR, and a Polish canola variety were planted at the two reseeding dates. The reseeding dates were early and mid-June. For a complete treatment list see Table 1.

Table 1 Seeding date, cultivar and seeding rate for each of the 8 treatments used in the canola reseeding study.

Treatment	Seeding Date	Cultivar	Seeding Rate (seeds m_{-2})
1	Early May	5440 LL	150
2	Early May	5440 LL	20
3	Early June	5440 LL	150
4	Early June	9350 RR	150
5	Early June	Polish	150
6	Mid-June	5440 LL	150
7	Mid-June	9350 RR	150
8	Mid-June	Polish	150

RESULTS

Experiment 1: Plant density response

Wet conditions in 2010 and 2012 produced higher canola emergence at most sites, especially at the lower plant populations. The high emergence levels were attributed to large numbers of volunteer canola plants emerging from the seed bank. In 2010, canola emergence averaged 70 percent for the highest seeding rate of 300 seeds m^2. Volunteer canola was less of a problem in 2011; although, emergence rates were still very high for the lowest seeding rate of 5 plants m^2 (Table 2). Emergence ranged prominently in 2012 at the 80 seeds per m^2 seeding rate, from 18% to 130% emergence.

Table 2 Percent emergence from 2010-2012, averaged across all sites.

Seeding Rate (seeds m^2)	Emergence (%)		
--------------	**2010**	**2011**	**2012**
5	145	100	240
10	111	68	120
20	83	45	85
40	98	38	73
80	94	36	64
150	88	34	71
300	70	34	64

Yield was affected by plant population in all years. On average, across all site years, maximum yield was achieved 95% of the time at a plant density of 45 plants per m^2. The broken line regression model was used to fit the 2010 and 2011 yield data, and worked well when all sites for each year were combined. The R2 was 0.97 for both 2010 and 2011 (Figure 1 and 2). In 2010 the join point where increased plant densities did not result in increased yield was 24 plants m^2 (Figure 1). In 2011 this point was 20 plants m^2 (Figure 2). When examining each site year the join points ranged from 12 to 32 plants m^2 and 7 to 47 plants m^2 for 2010 and 2011, respectively. No seeding rate included was high enough to cause yield decreases due to plant overcrowding.

Acknowledgements
This project is being funded SaskCanola.

PRECISION INTER – ROW SEEDING

Inter-row seeding and RTK-guided technology is gaining in popularity as more producers are interested in the potential benefits of precision farming. Precision inter-row seeding may enhance crop establishment and provide even germination by placing seed at a more consistent depth. Seeding into the soil between stubble rows should give better seed placement and allow for better packing, which is especially important for small seeded crops such as canola. The objective of this project is to demonstrate the effects of precision seeding between the rows of last year's stubble compared to seeding with no consideration of stubble row on crop establishment and yield. The effect of seeding direction and stubble height will also be studied. Plots for the 2012 growing season were set up in the spring of 2011. The eight treatments were randomized and wheat was seeded into four replicate blocks of 10 x 10 m plots at the AAFC Scott Research Farm. Treatments included different combinations of three factors: seeding direction, stubble height and precise or random seeding. Plots were seeded either north-south or east-west. At physiological maturity the wheat was harvested with the stubble cut tall or short. Canola was to be seeded either between the rows or randomly in the spring of 2012. Due to a variety of unforeseen circumstances, canola was unable to be seeded into this trial in 2012 and will proceed to complete the trial in 2013.

Acknowledgements
This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

CAMELINA FALL SEEDING DEMONSTRATION

Camelina is a new crop to Saskatchewan and more research is needed to determine the best agronomic practices for this crop. Seeding date is one of the agronomic factors that effects crop establishment and yield potential of camelina. It is important to produce a competitive crop early in the season since there are few herbicide options and camelina has poor weed competition early in its lifecycle. Camelina seeding date trials have taken place at Indian Head, Swift Current and Scott for the past few years. These trials have compared camelina emergence and grain yield across eight different seeding dates. Greater overwintering success has occurred at Indian Head compared to Scott. These trials have typically involved October and November seeding dates. This project looked at earlier seeding dates for camelina to see if greater overwintering success could be achieved with earlier planting of camelina. This objective of this project is to demonstrate the most suitable fall seeding dates for camelina.

This demonstration started in the fall of 2011 and was completed in the fall of 2012. Camelina was planted at four fall seeding dates, August 25, September 15, October 5 and October 26. Emergence date and fall plant counts were done for the treatments that emerged in the fall. In the spring of 2012 spring plant counts were done to assess the overwintering success of the various seeding dates. Plots were harvested August 20, 2012 and were cleaned and weighed to evaluate yield.

The camelina seeded from late August to early October emerged in the fall while the late October seeded camelina emerged in the spring. In the spring of 2012 the earliest seeded camelina had a plant density of just 16 plants m^{-2} indicating that most of the fall emerged plants did not over winter. The mid-September and early October seeded camelina had spring plant densities of about 100 plants m^{-2}, while the dormant seeded camelina had a spring plant density of 233 plants m^{-2}. As would be expected, based on the low spring plant populations, the late August seeded camelina had the lowest yield, 70 kg ha^{-1}. The mid-September seeded camelina yielded 258 kg ha^{-1} and the October 5 and October 26 seeding dates resulted in yields of 384 and 376 kg ha^{-1}, respectively. Although there was some winterkill in the mid-September and early October seeded plots, which resulted in lower spring plant densities than the dormant seeded camelina, the early October seeding date was able to compensate and had the greatest yield.

This demonstration confirmed what previous research on fall seeding camelina has found. In general, greater camelina yields are achieved when camelina is seeded later in the fall.

Acknowledgements
This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

PARTICIPATORY PLANT BREEDING

Participatory plant breeding (PPB) is collaboration between breeding institutions, farmers and other stakeholders. The aim of PPB is to ensure that the breeding efforts being undertaken by institutions are relevant to the farmer's needs and to create more relevant technology and equitable access to technology. PPB methods are designed to incorporate the perspective of farmers by inviting them to participate in varietal evaluation or by teaching them formal selection techniques. Farmer involvement in the breeding program can include defining breeding goals and priorities, hosting of trials, selection of parental lines, evaluation of results, and many other activities. The objective of PPB is to create new varieties, build farmer's technical experience, and to develop new products for niche markets. In a PPB program, selection and testing are conducted in the target environments with the participation of the users.

The University of Manitoba and Stephen Fox's breeding program at the AAFC Cereal Research Centre have had a collaboration to breed wheat specifically for organic production systems since about 2002. Material from this breeding program was used to start a participatory plant breeding program. In 2010, four populations of third generation wheat lines were planted at five locations across Manitoba and Saskatchewan. In 2011 this program grew to include more farmers and research centres. WARC participated in this program in 2011, planting four populations of F3 wheat lines at the Scott Research Farm. The bulk populations of wheat grown in 2011 were comprised of lines selected the previous year in the F2 nursery. The F3 generation was chosen to be planted in the PPB program because these populations have a lot of diversity and will respond to the selection pressure of their environment.

The material planted in 2011 was harvested as a bulk population and was cleaned thoroughly to remove small kernels. The three populations that performed the best in 2011 were chosen to be planted at the Scott Research Farm in 2012. The F4 bulk populations were seeded into 2 x 5 m plots on tilled fallow on May 29. Fertilizer was not applied at the time of seeding and herbicides were not applied during the growing season. The registered wheat variety 5603 HR was planted in an adjacent plot so that the performance of the bulk populations could be compared to the registered variety. Prior to the wheat maturing a hail storm damaged the plots and seed was not collected.

Acknowledgements
This project is funded by the ADOPT program from the Saskatchewan Ministry of Agriculture.

MUSTARD SPECIES OF THE WORLD

Demonstrations showcasing new and novel crops have proved to be popular stops on field days and tours. This demonstration provides an opportunity to see which novel edible mustard varieties may be adapted to Northwest Saskatchewan and to explore new crop opportunities. This demonstration was used as an extension tool for the 2012 Scott Field Day.

This demonstration included 20 novel mustard varieties. The mustard varieties were seeded in non-replicated plots at the Scott Research Farm. The mustard varieties demonstration included varieties that are grown throughout the world, with many of the varieties being popular in Taiwan, China and Japan.

This demonstration was seeded in late May so that the mustard plants would be at an appropriate size for viewing for the field day. Due to heavy rainfall events throughout June the Scott Field Day was moved from mid-July to August 1. The mustard species were shown at the Scott Field Day, but were not at the ideal size for viewing and tasting. This demonstration will be repeated for the 2013 field day.

IMPROVING PHOSPHOROUS EFFICIENCY

A non-replicated field demonstration was initiated in 2012 with a cooperating producer near Waseca Saskatchewan. The objectives of this project are to show the benefits, if any, associated with liquid orthophosphates compared to liquid polyphosphates phosphorus fertilizer, and to demonstrate the effect of reduced rates of liquid orthophosphate fertilizer compared to soil test recommendations. The five treatments applied at the time of seeding canola in 2012 were: a no phosphorus check, Alpine 6-22-4 at 12L/ac, Alpine 6-22-4 at 20L/ac, P_2O_5 10-34-0 at 15lb/ac and Alpine 6-22-4 at 20L/ac + P_2O_5 10-34-0 at 15lb/ac. Data collection for 2012 was comprised of spring soil samples to establish P concentration before applications and fall soil samples to determine the addition or removal of P from the environments in 2012. Two additional treatments will be added to the study in 2013; P soil test recommendations rates of Alpine 6-22-4 and P soil test recommendations of P_2O_5 10-34-0. 2013 data collection will include; wheat tissue samples to detect for ranges in P concentrations in the plants and fall soil samples.

SEEDING RATES FOR PRECISION SEEDED CANOLA

Anne Kirk[1], Stewart Brandt[2], Chris Holzapfel[3] and Lana Shaw[4]

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The establishment of an adequate and even canola stand is essential to yield. Poor seed bed conditions and poor seed placement can result in a weak establishment and uneven plant stands. Non-uniform seed distribution within the row can result in greater plant to plant competition. SeedMaster's UltraPro canola meter is said to seed canola more evenly which will allow producers to reduce seeding rates while achieving maximum yields (SeedMaster 2010). The objectives of this project are to determine if the UltraPro canola roller produces more uniform canola seed placement and if more uniform seed placement has the potential for allowing lower canola seeding rates.

MATERIALS AND METHODS

In 2012, field trials were located near Scott, Melfort, Redvers and Indian Head, Saskatchewan. The twelve treatments consisted of six seeding rates and two metering roller types Table 1).

Treatment	Roller	Seeding Rate (seeds m^{-2})
1	Valmar	10
2	Valmar	20
3	Valmar	40
4	Valmar	80
5	Valmar	160
6	Valmar	320
7	UltraPro	10
8	UltraPro	20
9	UltraPro	40
10	UltraPro	80
11	UltraPro	160
12	UltraPro	320

Data collection included spring and fall seedling uniformity, plant densities, maturities and seed yield.

RESULTS

As the seeding rate was increased, plant density increased and the percent emerged decreased. Emergence rates varied depending on location, Indian Head (111%), Scott (100%), Melfort (70%) and Redvers (53%). Volunteer canola plants contributed to the very high emergence rates at Indian Head and Scott. Emergence at Redvers and Melfort was more typical. No differences were seen in plant density between the two rollers at lowest three seeding rates. Plant establishment was greater with the Valmar roller at seeding rates of 80 plants m^{-2} at Indian Head, 160 plants m^{-2} at Mefort and at 320 plants m^{-2} at Indian Head and Redvers. At Melfort the UltraPro roller resulted in higher establishment at 320 plants m^{-2}. When all locations were combined greater plant establishment was achieved with the Valmar roller at a seeding rate of 160 seeds m^{-2}, but there were no significant differences between rollers at the other seeding rates. Days to maturity was affected by plant density, but not by roller type. As seeding rate increased, days to plant maturity decreased. Increasing the seeding rate from 40 to 160 plants m^{-2} decreased days to maturity by 2 to 5 days at Indian Head and Melfort, respectively. There was no significant difference in canola yield between the rollers at any location. In conclusion, the UltraPro roller was not found to produce more uniform seed placement or higher yields than the traditional Valmar roller.

Acknowledgements
This project is funded by the Saskatchewan Canola Development Commission (SaskCanola).

RESPONSE OF CANOLA TO P AND PENICILLIUM BILAII (JUMPSTART)

The objective of this project was to determine the effect of the commercially available phosphate solubilizing inoculant *Penicillium bilaii* (JumpStart®), on the growth, phosphorus uptake, yield and quality of canola under field conditions in Manitoba and Saskatchewan.
JumpStart was applied to half of the treatments and different rates of P_2O_5 were applied; 10, 20, 30 and 40 kg/ha, either banded with the seed or side-banded. Locations with low to medium soil test phosphorus were selected.
At Scott, no visual indicators of phosphorus stress were found. Yield data showed no significant differences between phosphorus fertilizer rates or fertilizer placement. Treatments with JumpStart applied to the seed did not differ in yield from treatments without Jumpstart. Good environmental conditions and low levels of disease and weed pressure lead to an average yield of 61 bushels per acre at Scott in 2012.

FIELD PEA INPUT STUDY

Anne Kirk[1], Eric Johnson[2], Stewart Brandt[3], Blain Davey[1], Sherrilyn Phelps[4], Chris Holzapfel[5] and Bryan Nybo[6]

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This project was designed to incorporate knowledge of previous research in field pea agronomy to provide insight into the factors that are currently limiting the yield potential of field pea. The objectives of this project are to determine which agronomic practices and combinations of practices contribute most to field pea seed yield and provide the best economic return for producers. Field peas were seeded at four locations in Saskatchewan. The variables investigated included seeding rate, seed treatment, inoculant type, starter fertilizer and foliar fungicide. The base treatments were an empty input package with low seeding rate and liquid inoculant and a full input package with high seeding rate, fungicide seed treatment, granular inoculant, starter fertilizer and two applications of fungicide. The remaining twenty treatments start with the empty input package and add a component or multiple components of the full input package into the empty input package. The individual inputs that contributed most to yield were granular inoculant, foliar fungicide and increased seeding rate. The full input package without starter fertilizer had the greatest overall yield and economic return. Input interactions will be investigated further when more site years are available for analysis. This study will continue through 2013 and 2014.

Acknowledgements
This project is funded by the Saskatchewan Pulse Growers.

LENTIL DESSICANT TRIAL

Eric Johnson[1], Cindy Gampe[1], Chris Willenborg[2], and Ti Zhang[2].

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A number of different herbicides were applied to lentil to assess rate and efficacy of crop dry down. The experiment was conducted on a farmer's field near Scott, SK. Treatments include the following herbicides: glyphosate, Edict (pyraflufen), Liberty, Chateau (flumioxazin), Heat, Reglone and tank-mixes of glyphosate and Edict, glyphosate and Liberty, glyphosate and Chateau, glyphosate and Heat, and glyphosate and Reglone. Edict and Chateau are not registered in Western Canada as crop desiccants. Generally, Reglone and Reglone / glyphosate tank-mixes provided the fastest visual crop dry down followed by Liberty and Liberty / glyphosate tank-mixes. Tank-mixes of glyphosate and Heat, Edict and Chateau were intermediate in terms of rate of dry-down while glyphosate was the slowest. The experiment will be repeated in 2013. Additional experiments will include effect of these treatments on weed dry down and the impact of desiccant timing on lentil dry-down and seed yield.

Acknowledgements
This project is being funded by Pulse Canada.

CORN AND BARLEY GRAZING STUDY

The Western Applied Research Corporation in conducting a three year study for the Western Beef Development Centre, which compares corn to barley for forage production. The objective of this project is to evaluate three different corn varieties and one forage barley for quality and yield in Western Canada. Corn was seeded May 18th on 30" rows and barley was seeded June 22nd on 10" rows. Data collection included cob counts on the corn and silage biomass on the corn and barley. Silage harvest was dried to calculate the dry matter yield of each corn cultivar and the barley. Corn varieties did not differ significantly in yield and the overall average was 6 dry tonnes per hectare. The Ranger barley averaged 7 dry tonnes per hectare. This study will be continued in 2013 and 2014 to provide more site years of data.

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NITROGEN RATES AND FUNGICIDE EFFECTS IN CANARY SEED

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Septoria leaf mottle has caused significant economic losses in Canaryseed production in Saskatchewan, primarily in eastern regions and in wetter than normal growing seasons. Septoria leaf mottle has not found to be an issue in other crops and survives in Canaryseed residue. Disease does not normally impact yield when incorporating a three year rotation and disease-free seed is used. This project has two main objectives and Scott has adopted the project to provide more site year data to the trial conducted at Indian Head, Swift Current and Melfort. The first objective is to demonstrate the week response of Canaryseed to nitrogen fertilizer and the second it to demonstrate the strong response of Canaryseed to a fungicide application to control leaf mottle. Trial set up was comprised of six nitrogen rates; 10, 20, 30, 50, 70, and 90kg/ha, all rates duplicated with and without fungicide (Stratego). Fungicide application at Scott caused a reduction of visual disease occurrence, unfortunately severe hail damage prevented harvest. The application of a fungicide increased grain yield at Indian Head and Melfort. In 2012, there was no clear interaction between the fungicide and nitrogen fertilizer. Therefore, it does not appear that the application of a fungicide will promote the use of higher nitrogen rates. The Canaryseed Development Commission has obtained funding from the Saskatchewan Ministry of Agriculture to conduct this demonstration again in 2013.

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REGIONAL TESTING OF CEREAL, OILSEED AND PULSE CULTIVARS 2012

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Cultivars are tested regionally to determine their adaptation to the wide range of soil and climatic conditions in Saskatchewan. These tests are conducted at approximately 12 locations each year including two by Scott Research Farm staff (Scott and Glaslyn) and one at the Melfort Research Farm. Results form the basis of cultivar recommendations – yield data can help producers assess the performance of varieties in their area. However, data from a single location can be limited, particularly for new varieties. More comprehensive information is contained in the Saskatchewan Ministry of Agriculture publication, *Varieties of Grain Crops 2013*. Seed quantities for new varieties listed herein may be limited for 2013.

Table 1 Average yield of crop species on fallow expressed as a % of hard red spring wheat (AC Barrie) at Scott, Glaslyn and Melfort. Data is based upon yield averages over the past 15-20 years, except for Glaslyn, of which yields are based on 5 year averages.

Crop	Cultivar	Scott		Glaslyn		Melfort	
Bread Wheat	AC Barrie	100	(3480)	100	(4132)	**100**	**(3978)**
Utility Wheat	AC Andrew	136	(4742)	128	(5391)	133	**(6282)**
Extra Strong Wheat	Burnside	121	(4225)	106	(4978)	102	**(5038)**
Durum Wheat	Strongfield	117	(4081)	---		101	**(4644)**
Triticale	AC Certa	125	(4350)	---		131	**(4781)**
Barley	AC Metcalfe	133	(4626)	136	(5268)	121	**(4682)**
Oat	CDC Dancer	154	(5363)	130	(5545)	130	**(4929)**
Canola	46A65	*88	(3058)	*58	(2407)	88	**(3446)**
Flax	CDC Bethune	*55	(1914)	*53	(2141)	53	**(1937)**
Mustard (Juncea)	Cutlass	*79	(2742)	---		----	
Mustard (Alba)	AC Pennant	*53	(1848)	---		---	
Field Pea	Cutlass	68	(2362)	101	(3970)	100	**(4364)**
Lentil	CDC Milestone	56	(1938)	---		51	**(1885)**

* Less than 4 years of data

Table 2 Yield of Flax Cultivars at Scott, Glaslyn and Melfort 2012

Cultivar	2010 Yield (kg/ha)			Long Term Average Yield (% of CDC Bethune)					
	Scott	Glaslyn	Melfort	Scott		Glaslyn		Melfort	
	hailed out								
CDC Bethune		1659	1425	100		100		100	
AC Bravo		1691	1675		*	77	*	118	*
CDC Glas		2067	1813		*	95	*	127	*
CDC Sanctuary		2131	1329	82	*	116	*	87	
Prairie Sapphire		2195	1795		*	101	*	110	*

***** Less than 3 years of data

Table 3 Yield of Spring Wheat Cultivars at Scott, Glaslyn and Melfort 2012

Cultivar	2012 Yield (kg/ha)			Long Term Average Yield (% of AC Barrie)					
	Scott	Glaslyn	Melfort	Scott		Glaslyn		Melfort	
Bread Wheat	hailed out								
AC Barrie		4192	4305	100		100		100	
AC Bailey		3948	3665	93	*	101	*	96	*
AC Redwater		4024	3777		*	94	*	88	*
Carberry		4372	4034	113		108		93	
Cardale		4248	4345		*	99	*	97	*
CDC Kernen		4346	4072	102	*	102	*	103	*
CDC Plentiful		4500	4472		*	105	*	106	*
CDC Stanley		4994	4016	110	*	93	*	101	
CDC Thrive		4134	4226	107	*	96	*	102	
CDC Utmost VB		4370	4310	103	*	97	*	104	
CDC VR Morris		4418	4301	105	*	110	*	109	*
Glenn		4478	4044	109		111		99	
Muchmore		4374	3639	108		107		90	
Shaw VB		4358	4099	113		110		110	
Stettler		4310	4397	111		110		105	
Unity VB		4358	-	114		112		117	
Vesper VB		4388	4797	99	*	106	*	115	
Whitehawk		2946	2999	84	*	80	*	81	*

Utility Wheat					
Burnside	5300	3165	121	112	97
CDN Bison	6170	3509	121	122	111
CDN NRG003	6132	4281	116 *	130 *	109 *
Conquer VB	5736	4727	120 *	136 *	129
Enchant	5612	3701	*	124 *	102 *
Minnedosa	5440	4371	121	115	106
Pasteur	6204	4074	138 *	139 *	117 *
Sadash	5534	3885	150	133	117

* Less than 3 years of data

Table 4 Yield of Durum Cultivars at Scott and Melfort 2012

	2012 Yield (kg/ha)		**Long Term Average Yield (% of Strongfield)**	
Cultivar	**Scott**	**Melfort**	**Scott**	**Melfort**
Strongfield	Hailed out	3298	100	100
Brigade		3520	95	106
CDC Verona		3750	98	102
CDC Vivid		3626	*	110 *
Enterprise		3394	93	98
Eurostar		3475	96	101
Transcend		3459	88 *	100

* Less than 3 years of data

Table 5 Yield of Oat Cultivars at Scott, Glaslyn and Melfort 2012

	2012 Yield (kg/ha)			**Long Term Average Yield (% of CDC Dancer)**		
Cultivar	**Scott**	**Glaslyn**	**Melfort**	**Scott**	**Glaslyn**	**Melfort**
CDC Dancer	4439	5397	2166	100	100	100
Bradley	4729	5251	2844	108	95	113
CDC Big Brown	4853	5805	2598	101 *	106 *	110
CDC Nasser	4367	5609	2848	104 *	103 *	115
CDC Seabiscuit	4347	5536	2856	111	107	114
Souris	4698	5285	3750	109	100	129
Stride	4892	5857	2824	110 *	105 *	119 *

* Less than 3 years of data

Table 6 Yield of Barley Cultivars at Scott, Glaslyn and Melfort 2012

	2012 Yield (kg/ha)			Long Term Average Yield (% of AC Metcalfe)					
Cultivar	**Scott**	**Glaslyn**	**Melfort**	**Scott**		**Glaslyn**		**Melfort**	
TWO ROW									
AC Metcalfe	4121	4552	3996	100		100		100	
AC Synergy	4587	5345	4148	96	*	97	*	101	*
Bentley	4305	4439	3553	119		111		107	
CDC Austenson	5051	5871	5143	127		127		123	
CDC Carter	3682	4095	3584	101		97		103	
CDC Clear	3405	4343	3761	91	*	95	*	104	*
CDC ExPlus	3027	3344	2715	89		74		101	
CDC Kindersley	3905	5107	4060	102		93		107	*
CDC Landis	4340	4846	4197	112		110		114	
CDC Maverick	3793	4610	3668	79	*	84	*	89	*
CDC Meredith	4671	5247	4425	120		116		109	
CDC PolarStar	4117	4451	3735	102	*	97	*	100	*
Gadsby	4875	5275	4575	113		107		113	
Major	4463	5185	4762	122		111		120	
Merit 57	4341	5348	4311	116		115		108	
SIX ROW									
Breton	4062	5393	4694					117	*
CDC Anderson	4270	4772	4504	101		106		115	
CDC Mayfair	3786	4974	4457	107		124		110	
Celebration	3813	4491	4533	108		107		106	
Chigwell	2982	4278	3988	109		129		112	
Innovation	3694	4686	4275	77	*	98	*	110	*
Muskwa	3211	5026	4599	67	*	105	*	115	*
Stellar ND	3768	4829	4246	100		107		118	

* Less than 3 years of data

Table 7 Yield of Lentil Cultivars at Scott and Melfort 2012

Cultivar	2012 Yield (kg/ha)		Long Term Average Yield (% of CDC Maxim CL)	
	Scott	Melfort	Scott	Melfort
Maxim CL				100
Small Green	Hailed out			
CDC Imvincible		1537	132	84
CDC Viceroy		2063		128 *
Medium Green				
CDC Imigreen CL		950	84	58
CDC Impress CL		1386	96	74
Large Green				
CDC Greenland		1134	87	71
CDC Greenstar		1185	86	80 *
CDC Impower CL		898	86	50
CDC Improve CL		1136	83	67
CDC Plato		1234	95	68
Extra Small Green				
CDC Asterix		1609	57	93 *
French Green				
CDC Emerald		1947		116 *
CDC Peridot		1188	104	65
Extra Small Red				
CDC Impala CL		1451	116	83
CDC Imperial CL		1028	97	64
CDC Redbow		1886	121	99
CDC Robin		1209	97	71
CDC Rosebud		2151	119	106
CDC Rosetown		1781	119	98
CDC Rosie		1468	67	96 *
CDC Ruby		2102	102	90
Small Red				
CDC Dazil		1881	93	101 *
CDC Imax CL		1125	103	56
CDC Maxim CL		1617	123	100
CDC Redberry		1700	111	93
CDC Redcliff		1849	116	110
CDC Redcoat		1172	118	69
CDC Scarlet		2458	58	128 *

* Less than 3 years of data

Table 8 Yield of Pea Cultivars at Scott, Glaslyn and Melfort 2012

	2012 Yield (kg/ha)			Long Term Average Yield (% of Cutlass)		
Cultivar	**Scott**	**Glaslyn**	**Melfort**	**Scott**	**Glaslyn**	**Melfort**
Yellow						
Cutlass	749	1641	5803	100	100	100
Agassiz	1989	3188	6496	142	130	110
Argus	1144	2047	6326	117	92	111
CDC Amarillo	1891	3057	8170	115 *	98 *	130 *
CDC Golden	1379	2339	5891	122	100	104
CDC Hornet	1739	2143	5167	111	95	103
CDC Meadow	1471	2059	5953	116	108	114
CDC Prosper	1153	1673	5214	104	97	100
CDC Saffron	1407	2171	6576	119	94	111 *
CDC Treasure	1365	2449	5210	123	113	106
Hugo	843	1817	6569	121	95	114
Sorento	1164	2578	5951	105	105	98
Green						
CDC Limerick	1458	2363	5935	87 *	77 *	106 *
CDC Patrick	1377	2921	5152	125	114	97
CDC Pluto	1593	2413	5872	112	109	101
CDC Raezer	1756	2067	5007	90 *	59 *	100
CDC Striker	2406	2449	5927	134	101	93
CDC Tetris	1780	2291	6282	126	114	110
Cooper	1375	2157	4702	119	108	99
Mendel	778	1350	4394	89 *	49 *	74 *
Dun						
CDC Dakota	2634	2784	6796	134 *	99 *	117 *
Forage						
CDC Horizon	1283	2083	5009	57 *	53 *	95 *
Stella	759	1117	4849	87	62	90
Maple						
CDC Mosaic	1155	2172	5229	50 *	60 *	90 *

* Less than 3 years of data

For the full version of the Crop Variety Highlights and Insect Pest Updates visit:
http://www.warc.ca/reports/2012CropVarietyHighlights_100.pdf

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