WARC
Western Applied Research Corporation

Tristan Coelho – Research Assistant
Anne Kirk – Research Manager
The Western Applied Research Corporation was incorporated in 2003 and is comprised of 7 board members

WARC’s Mandate

- Identify and evaluate research and technology for Saskatchewan producers
- Transfer technology from research to Saskatchewan producers
WARC’s Recent Activities

- **Scott Field Day** – August 1st, 2012
  - Research and demonstration projects including saline tolerant forages, herbicide resistance in wild oat and canola seeding seeds trial
- **Crop Production Show** – January 7-10, 2013
  - Coordinate with the 7 other Agri-ARM sites
- **Crop Production Week** – January 11th, 2013
  - Agri-ARM Research Update
- **Crop Opportunity and Scott Research Update** – March 7th, 2013
2012 Research Activities

**ADOPT**
- Managing herbicide resistance in wild oat
- Managing herbicide resistance in kochia
- Fall 2,4-D preceding canola, lentil and pea
- Canola seeding speeds demo
- Proper preharvest glyphosate in wheat
- Rates of ESN and Agrotain treated urea for wheat
- Response to cereal fungicide applications in spring wheat
- Foliar fungicides on wheat and barley
- Fertilizer seed dressing effects on spring wheat
- Nitrogen fertilizer management options for winter wheat
- Inoculant product ad formulation effect on field pea
- Reclamation of saline soil using perennial forages
- N rates on canaryseed
- Chloride fertilizer on canaryseed
- Improving phosphorus efficiency
- Intercropping

**Industry or other**
- Toadflax timing
- Canola low plant populations
- Canola variety shatter tolerance
- Winter wheat production practices
- Pulse desiccant trial
- Corn grazing study
- Mustard demonstration

**Contracted from AAFC**
- Evaluating varieties for straight cutting
- Nitrogen management in canola and malt barley
- Predicting Nitrogen dynamics in Canadian cropping systems
## 2012 Weather at Scott

<table>
<thead>
<tr>
<th></th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Season Avg./Total</th>
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<tbody>
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<td><strong>Air Temperature</strong></td>
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<td>18.7</td>
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<td>0.9</td>
<td>11.1</td>
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<td>3.2</td>
<td>10.2</td>
<td>14.5</td>
<td>17.3</td>
<td>16.2</td>
<td>10.5</td>
<td>3.8</td>
<td>10.8</td>
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<td><strong>Growing Degree Days</strong></td>
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<tr>
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<td>349</td>
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<td>1485</td>
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<td>346</td>
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<td><strong>Precipitation</strong></td>
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<td></td>
<td></td>
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<td></td>
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<td>185</td>
<td>56</td>
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<td>24</td>
<td>12</td>
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<td>37</td>
<td>62</td>
<td>62</td>
<td>45</td>
<td>31</td>
<td>16</td>
<td>276</td>
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Evaluate 3 corn varieties and on barley for quality and yield

- Monsanto – DKC26-25
- Pioneer P7443R
- Hyland 2D093
- Ranger Barley

Corn was seeded on 30” rows, May 18th
- 30,000 seeds per acre

Barley was seeded on 10” rows, June 15th
- 2 bushels per acre
Silage Yield Estimate

Tonnage per Acre

<table>
<thead>
<tr>
<th>Variety</th>
<th>Wet Tonnage</th>
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<tr>
<td>CHU</td>
<td>2125</td>
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<tr>
<td>DK26-25</td>
<td>19</td>
</tr>
<tr>
<td>P7443R</td>
<td>21</td>
</tr>
<tr>
<td>2D093</td>
<td>24</td>
</tr>
<tr>
<td>Ranger</td>
<td>22</td>
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</table>

Variety
Pea Input Study

- The effects on yield when many agronomic factors are combined in relatively unknown
- 22 treatments starting with an empty and a full package, removing or adding specific agronomic inputs
- **Empty Package** – low seeding rate, no seed treatment, liquid inoculant, no starter fertilizer, no fungicide
- **Full Package** - high seeding rate, seed treatment, granular inoculant, starter fertilizer, two fungicide applications
- Conducted at four locations:
  - Scott, Indian Head, Melfort and Swift Current
Seeding Rate - optimum seeding rate for maximum yield in SK was 108 plants/m², economic seeding rate in weed-free conditions (50-75 seeds/m²).

Inoculants – granular inoculant has shown to increase biomass, yield and protein concentration over a liquid inoculant.

Starter Fertilizer - greater benefit to starter N when spring soil test N was less than 18 lb/ac (average yield increase of 11%).

Foliar Fungicide – recommended when conditions favour disease development.
Empty vs Full
Yield – Indian Head

Foliar fungicide
Comparing Individual Inputs

<table>
<thead>
<tr>
<th></th>
<th>Scott</th>
<th>Indian Head</th>
<th>Melfort</th>
<th>Swift Current</th>
<th>All Sites</th>
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<tr>
<td>Seed treatment</td>
<td>(-34)</td>
<td>(-92)</td>
<td>68</td>
<td>(-117)</td>
<td>42</td>
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<tr>
<td>Seeding rate</td>
<td>1268</td>
<td>4</td>
<td>598</td>
<td>506</td>
<td>604</td>
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<tr>
<td>Granular inoculant</td>
<td>902</td>
<td>73</td>
<td>357</td>
<td>33</td>
<td>364</td>
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<td>Starter fertilizer</td>
<td>573</td>
<td>52</td>
<td>191</td>
<td>-70</td>
<td>195</td>
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<tr>
<td>Fungicide</td>
<td>392</td>
<td>845</td>
<td>1134</td>
<td>-8</td>
<td>1004</td>
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</table>
Evaluating the Response of Hybrid Canola to Low Plant Populations

Three year study completed in 2012 at: Scott, Swift Current, Indian Head, Melfort and Saskatoon

Objectives:
- Determine the minimum plant density where hybrid canola yields 90% of the maximum
- Evaluate the effects of plant population on maturity, seed size and green seed
- Determine the minimum plant density at which reseeding would be recommended

Two varieties – 5440LL and 5770LL

Seeding Rates – 5, 10, 20, 40, 80, 150 and 300 seeds/m²
- Typical seeding rate of 5lbs/ac, using seed with a TKW of 5 grams, estimating 60% survival would give us an actual seeding rate of 70 plants/m²
20 seeds/m²

40 seeds/m²
80 seeds/m²

150 seeds/m²
Actual Plant Densities – increased podding and branching delayed harvest

1 plant/m²

52 plants/m²
Yield Response to Plant Density in 2011

Scott (7 pl/m²)

Melfort (26 pl/m²)

Swift Current (19 pl/m²)

Saskatoon (47 pl/m²)
Objective – provide information on the yield benefits associated with increasing seeding rate in spring wheat

Unity VB - was seeded at rates ranging from 60 to 480 seeds square meter

Plant Density – the trial averaged 57% emergence and this decreased slightly with higher seeding rates

Weed biomass with herbicides - ranged from 20% at the lowest seeding rate to 6% at the highest seeding rate

Weed biomass without herbicides - ranged from 188% at the lowest seeding rate to 23% at the highest seeding rate
Objective - demonstrate the effects of commercially available seed-applied micronutrient fertilizer products and granular Zinc on spring wheat emergence, early development and yield

Table 2. Description of treatments in seed applied fertilizer demonstration.

<table>
<thead>
<tr>
<th>Trt</th>
<th>Trade Name</th>
<th>Description / Rate / Nutrient Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Untreated check</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>EZ20 Essential Zn®</td>
<td>ZnSO₄ (2-0-0-14 + 20% Zn) applied in-furrow at 12 kg/ha</td>
</tr>
<tr>
<td>3</td>
<td>Awaken ST®</td>
<td>Seed-applied at 325 mL 100 kg seed⁻¹; 6-0-1-0 + 5% Zn + 0.8% B, Cu, Fe, Mn &amp; Mo</td>
</tr>
<tr>
<td>4</td>
<td>Alpine Seed Nutrition®</td>
<td>Seed applied at 510 ml 100 kg seed⁻¹; 6-22-2-0 + Zn</td>
</tr>
<tr>
<td>5</td>
<td>Protinus®</td>
<td>Seed applied at 323 g 100 kg seed⁻¹; 40% Zn, 10% Mn + Fe</td>
</tr>
<tr>
<td>6</td>
<td>Undisclosed - ZnX</td>
<td>Seed-applied; commercial Zn-based product</td>
</tr>
<tr>
<td>7</td>
<td>Undisclosed - Cu</td>
<td>Seed-applied; commercial Cu-based product</td>
</tr>
</tbody>
</table>
Data Collection

Emergence counts – plant counts at 5 dates
   Subtle treatment effects on emergence were observed at Melfort

Biomass sampling - 3 weeks after first emergence

Vigor rating - 1-10 scale of plant vigor

Growth stage – Haun scale

Yield and Quality – test weight, seed size and protein
   Slight yield increase at Indian Head with the application of granular ZnSO₄ fertilizer
Reclamation of Saline Soil with Perennial Forages

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Salinity Gradient</th>
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<tbody>
<tr>
<td></td>
<td>Non-Saline</td>
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<tr>
<td>Alfalfa - rambler</td>
<td>100</td>
</tr>
<tr>
<td>Alfalfa - halo</td>
<td>100</td>
</tr>
<tr>
<td>Alfalfa - rugged</td>
<td>100</td>
</tr>
<tr>
<td>Tall fescue - kokanee</td>
<td>100</td>
</tr>
<tr>
<td>Tall wheatgrass</td>
<td>100</td>
</tr>
<tr>
<td>Creeping foxtail</td>
<td>100</td>
</tr>
<tr>
<td>Saline Master</td>
<td>100</td>
</tr>
<tr>
<td>Green wheatgrass – AC</td>
<td>100</td>
</tr>
<tr>
<td>Saltlander</td>
<td>100</td>
</tr>
<tr>
<td>NewHy</td>
<td>100</td>
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</tbody>
</table>
High Salinity

Forage production in moderately saline soil
1 NewHy
2 Smooth Brome
3 Tall Wheatgrass
4 Creeping Foxtail
5 Tall Fescue
6 Tall Wheatgrass
7 AC Saltlander Green Wheatgrass
8 Halo Alfalfa
9 Tall Wheatgrass
Pre-Harvest Glyphosate

- Conducted at Scott, Swift Current and Prince Albert in 2012
- Unity spring wheat - midge tolerant varietal blend

**Objectives of this project:**

- Demonstrate to producers the proper pre-harvest glyphosate timing in wheat
- Illustrate methods of avoiding issues of improper applications
  - High glyphosate residue levels
  - Reduction of grain yield and quality
Proper Glyphosate Timing

Apply at 30% grain moisture or less
Cereal grain reaches physiological maturity at the hard dough stage
Maximizes yield and quality potential
Pre-harvest glyphosate can also reduce the risk of frost damage and post-harvest sprouting
Hard Dough Stage
# Glyphosate Treatments

## Treatment List and Application Dates

<table>
<thead>
<tr>
<th>Trt</th>
<th>Timing</th>
<th>Scott</th>
<th>Swift Current</th>
<th>Prince Albert</th>
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<td>1</td>
<td>Check (no glyphosate)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>Early milk</td>
<td>Aug 7</td>
<td>Aug 1</td>
<td>Aug 7</td>
</tr>
<tr>
<td>3</td>
<td>Early milk + 5 days</td>
<td>Aug 12</td>
<td>Aug 7</td>
<td>Aug 12</td>
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<tr>
<td>4</td>
<td>Early milk + 10 days</td>
<td>Aug 17</td>
<td>Aug 10</td>
<td>Aug 17</td>
</tr>
<tr>
<td>5</td>
<td>Early milk + 15 days</td>
<td>Aug 23</td>
<td>Aug 14</td>
<td>Aug 22</td>
</tr>
<tr>
<td>6</td>
<td>Early milk + 20 days</td>
<td>Aug 27</td>
<td>N/A</td>
<td>Aug 27</td>
</tr>
<tr>
<td>7</td>
<td>Early milk + 25 days</td>
<td>Sep 1</td>
<td>N/A</td>
<td>Sep 3</td>
</tr>
<tr>
<td>8</td>
<td>Early milk + 30 days</td>
<td>Sep 6</td>
<td>N/A</td>
<td>Sep 8</td>
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</table>
## Scott Results

**Table 2:** Treatment effects on wheat yield, test weight (TW), thousand kernel weight (TKW) and protein

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (kg/ha)</th>
<th>Test Weight (g)</th>
<th>Thousand Kernel Weight (g)</th>
<th>Protein %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No glyphosate</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Early milk</td>
<td>1331c\textsuperscript{y}</td>
<td>61.9c</td>
<td>16.13c</td>
<td>14.7a</td>
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<tr>
<td>Early milk + 5 days</td>
<td>2542b</td>
<td>70.5b</td>
<td>18.94b</td>
<td>13.9b</td>
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<td>3530a</td>
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<td>21.83a</td>
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<tr>
<td>CV</td>
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<td>1.65</td>
<td>4.62</td>
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<td>LSD</td>
<td>620.81</td>
<td>1.99</td>
<td>1.52</td>
<td>0.37</td>
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</table>
Prince Albert and Swift Current Results

[Bar chart showing results for Prince Albert and Swift Current with different treatments and their respective glyphosate levels.]
Conclusions

- Pre-harvest glyphosate on wheat gives an additional time to control **perennial weeds**
- Assists in **plant dry-down** to facilitate an earlier harvest
- May be difficult to justify as a harvest aid in a weed-free crop

**Increasing Seeding Rates** - this is an alternative method that will allow you to reduce weed pressure and reduce secondary growth which together both contribute to easier and earlier harvest
New for 2013

- Effect of seeding rate and seed size on lentil
- Demonstrating the effect of fungicide application and seeding rate on disease levels in field peas and lentils
- Fall 2,4-D preceding canola, lentil and pea
- Optimum timing of weed control in field pea and lentil
- Straight combining canola small plot demonstration
- Nitrogen fertilizer management options for winter wheat
- Short season corn and soybean demonstration
Acknowledgements

For more information visit: www.warc.ca

- ADOPT (Agricultural Demonstration of Practices and Technologies) program