“Durum Agronomy for Improved Quality and Yield”
Presentation Outline

• Wheatland Conservation Area / Agri-ARM background
• Project introduction
• - Seeding Rate, Fungicide, Seed Treatment Trials
  - Durum Fertility
  - Durum Varieties
• Wrap up and acknowledgements
Wheatland Brief History

- Non-profit / producer run since 1982.
- We operate under the Agri-ARM umbrella of Applied Research sites (7 sites)
- Trials from the Dry Brown Soil Zone of Southwest Saskatchewan
  - presenting results from Swift Current and Gull Lake areas from 2015-16
2016 Accumulative Precipitation

Accumulative Weekly Precipitation for Years 2010-2016

as of October 31st, 2016 577.6 mm
Using Good Agronomic Practices to Managing Fusarium Head Blight in Durum Wheat When Using Bin Run Seed

With limited options for resistant varieties, producers are sourcing seed from bin run seed harvested in 2014, a year with high disease pressure. Even with limited options for resistant varieties, producers can take advantage of best agronomic practices to combat or manage disease.

The three agronomic practices studied in this trial were:

Seeding rates, Seed treatments, and Foliar fungicides.
Bin run seed harvested in 2014 was submitted for seed analysis at Seed Solutions Seed Lab showing relatively low levels of disease:

- Common Root Rot – 3.50%
- Fusarium graminearum 1.50 %
- Seedling Blight/Root Rot – Fusarium spp. - 9.00 %.

This seed was seeded in four reps with a combination of 3 different seeding rates (200, 300, 400 seeds/m2), 2 seed treatment variables (with Raxil Pro and without a seed treatment) and 2 fungicide treatments (with Caramba and without a registered fungicide for FHB suppression).
Using a registered seed treatment is an effective way to help insure establishment when planting seed with relatively low levels of diseases.

Using higher seeding rates in cereal crops is known to result in fewer tillers and therefore earlier and less variable maturity, resulting in a shorter window of infection for FHB. Simultaneously making it easier to time fungicide applications to target the disease at the optimum stage due to lower variability in crop development.

Higher seeding rates can result in a denser crop canopy that can retain humidity or potentially lodge, which could increase potential for FHB to develop and thus the potential benefit from a foliar fungicide applications.
Plant Establishment and Tillering

Increased seeding rates significantly increased plants per meter row.

Increased seeding rates did not significantly increase the number of heads per meter row.

Less tillering as seeding rate increases and less variability in crop stage and maturity.
Generally, in 2015 disease levels were relatively low with graminearum < 2%. Highest overall disease levels occurred at the low seeding rates with more tillering. Lowest overall disease levels at higher seeding rates.
Seed treatments had little effect on disease in 2015 due to the dry spring conditions and the relatively low levels of disease in the seed source. (Fusarium Graminearum 1.5%, Fusarium spp. (seedling blight) 9.0%, and Cochliobolus Sativus 3.5%)
Results (Foliar Fungicide on Disease Levels 2015)

Even though overall disease levels were relatively low in 2015, we did notice a slight benefit from foliar fungicides.
Higher seeding rates result in fewer late developing tillers and therefore earlier and less variable maturity. This creates a very narrow window of infection to harmful pathogens. Increased seeding rates reduced the levels of Fusarium Graminearum and Fusarium spp. (seedling blight) in the 2015 harvest sample and had no effect on Cochliobolus Sativus (common root rot).
Results (Seed Treatments, Foliar Fungicide, and Seed Rate on Yield 2015)

Even though there was low disease pressure in these trials we still observed the best yields coming from the plots with the higher seeding rates with a seed treatment applied, and lowest yield from the low seeding rates with no seed treatment applied.
In 2015 we saw a small, but significant yield increase when using a seed treatment, even though there was low disease pressure in these trials. It is recommended that seed sources with higher levels of disease (2 to 5% fusarium graminearum) should be treated with a registered seed treatment for FHB and seed sources with >5% fusarium graminearum should not be used.
Increasing seeding rates from 200 seeds/m² up to 300 seeds/m² was beneficial in 2015 and even though there was a slight increase in yield at the 400 seeds/m² the increase was not significant.
Even though there was no significant increase in yield from a foliar fungicide application in 2015, there was a quality benefit when it came to disease levels in the harvest sample.
Conclusions

• This data would suggest that there are benefits to increasing seeding rates and using seed treatments on bin run seed that is shown to have relatively low levels of disease.
• It is recommended that seed sources with higher levels of disease (2 to 5 % fusarium graminearum) should be treated with a registered seed treatment for FHB.
• Seed sources with >5% fusarium graminearum should not be used.
Effects of Nitrogen Form, Rate, and Placement on Durum at Gull Lake, Sk.

- This is one of eight small trials we ran for SWT in Gull Lake, Sask. in 2016, looking at nitrogen form, rate, and placement on Durum.
- We used soil test recommendations to determine standard fertility levels (70-25-0-6).
- From this we varied the N formulation (Urea, ESN, and UAN) and N placement (sideband, broadcast, and topdress) while keeping a base level of P, K, and S (non-limiting).
- Additional treatments included a 100 lb N per acre sideband treatment and a 50 lb N per acre sideband treatment, both with the base rate of P, K, and S.
- Data collected includes yield and protein.
Effects of Nitrogen Form, Rate, and Placement on Durum Treatment List.

- 70 lbs N (as urea sidebanded).
- 70 lbs N (as urea broadcast).
- 70 lbs N (as ESN sidebanded).
- 70 lbs N (as UAN topdressed).
- 70 lbs N (50 lbs urea sideband and 20 lbs UAN topdressed).
- 100 lbs N (as urea sidebanded).
- 50 lbs N (as urea sidebanded).

- All 7 treatments received 25 lbs P and 6 lbs S (sidebanded) so as not to limit yield.
2016 – A good year for a Nitrogen response

Accumulative Weekly Precipitation for Years 2010-2016

Shortly after seeding in early May it started to rain

as of October 31st, 2016  577.6 mm

Shortly after seeding in early May it started to rain
Effects of Nitrogen Form, Rate, and Placement on Durum

With abundant precipitation in 2016 we saw an excellent yield and protein responses to increased nitrogen levels with 100 lbs N delivering the best yield and protein.

There was no significant difference between the 70 lb sidebanded urea and the 70 lb sidebanded ESN, possibly due to rapid break down of the ESN protective coating.
Durum Varieties

<table>
<thead>
<tr>
<th>Variety</th>
<th>Protein</th>
<th>FHB resistance</th>
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<tbody>
<tr>
<td>CDC Fortitude</td>
<td>14.4</td>
<td>MS</td>
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<tr>
<td>Strongfield</td>
<td>-0.3</td>
<td>S</td>
</tr>
<tr>
<td>Transcend</td>
<td>-0.3</td>
<td>MS</td>
</tr>
<tr>
<td>AAC Marchwell</td>
<td>-0.1</td>
<td>MS</td>
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<td>AAC Raymore</td>
<td>+0.2</td>
<td>S</td>
</tr>
<tr>
<td>CDC Desire</td>
<td>-0.2</td>
<td>S</td>
</tr>
</tbody>
</table>

Yield (bus/ac) for 2015 and 2016 across years 2015 and 2016.

Protein values and FHB resistance levels for each variety are shown in the diagram.
Effects of Fungicide

Sprayed at fungicide time for FHB (early flower).

Even though durum wheat lags behind other wheat classes regarding FHB resistance, there are some varieties that are slightly more resistant to the disease than others.
Who is seeding durum next year?

• It’s still a little fuzzy!!!
Thank-you!

2017 Cropopportunities Conference, March 14
2017 Wheatland Annual Tour July 20, 2017
www.wheatlandconservation.ca