Crown Rust in Oats
Will Foliar Fungicides Increase the Quality and Yield of Oats?

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Agriculture and Agri-food Canada
Indian Head, Saskatchewan, Canada
Crown Rust in Oats

Why look at it?

1. Antidotal evidence of response in Red River Valley

2. Single site experiments that have shown a response to fungicides even when crown rust is present

3. Growing belief than fungicides will provide a benefit even if crown rust is not present

4. Image of oats
Crown Rust in Oats

Objectives

To determine if a fungicide application can improving yield or quality in the absence of crown rust, across western Canada.

To determine the level of crown rust infection that would make the application of a fungicide a prudent decision. Does this level change as you move across western Canada?
Crown Rust in Oats

Seeding Date
I) May 15
II) June 5

Fungicide
I) No Fungicide
II) Fungicide (Headline)

Cultivars
Four cultivars with a range of resistance to Crown rust
Crown Rust in Oats

Cultivars
I) very Susceptible to crown rust (AC Morgan)  
II) Susceptible to crown rust (CDC Orrin)  
II) Partially resistant to crown rust (CDC Boyer)  
III) Cultivar with best possible resistance at time of trial (Leggettt)
Crown Rust in Oats

Locations
– Indian Head
– Canora
– Melfort (Rust Free)
– Saskatoon (inoculated)
– Brandon
– Portage la Prairie
Crown Rust in Oats
Financial Support

– Saskatchewan Oat Development Commission
– Cargill Ltd
– Can-Oat Milling
– Grain Millers
– Saskatchewan Ministry of Agriculture (ADF)
Seeding Date

Grain Yield (bu/acre)

- Mid May: 117 bu/acre
- Early June: 105 bu/acre
Cultivar

Grain Yield (bu/acre)

- AC Morgan: 116
- CDC Boyer: 106
- CDC Orrin: 113
- Legget: 110
Fungicide

Grain Yield (bu/acre)

No Fungicide: 108
Fungicide: 115
Cultivar

Grain Yield (bu/acre)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>No Fungicide</th>
<th>Fungicide</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Morgan</td>
<td>109</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>CDC Boyer</td>
<td>102</td>
<td>110</td>
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</tr>
<tr>
<td>CDC Orrin</td>
<td>110</td>
<td>116</td>
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</tr>
<tr>
<td>Leggett</td>
<td>108</td>
<td>111</td>
<td></td>
</tr>
</tbody>
</table>
Sites with Low Crown Rust

Grain Yield (bu/acre)

<table>
<thead>
<tr>
<th></th>
<th>No Fungicide</th>
<th>Fungicide</th>
<th>Sig</th>
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</thead>
<tbody>
<tr>
<td>AC Morgan</td>
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<tr>
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<td>120</td>
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<td>CDC Orrin</td>
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<td>138</td>
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<tr>
<td>Leggett</td>
<td>125</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>
Sites with High Crown Rust

Grain Yield (bu/acre)

- AC Morgan: 86 (No Fungicide), 104 (Fungicide)
- CDC Boyer: 82 (No Fungicide), 90 (Fungicide)
- CDC Orrin: 92 (No Fungicide), 96 (Fungicide)
- Leggett: 93 (No Fungicide), 94 (Fungicide)
Seeding Date

Test Weight (g/0.5L)

- Mid May: 248
- Early June: 232

- Test wt
- Sig
Cultivar

Test Weight (g/0.5L)

AC Morgan: 236
CDC Boyer: 235
CDC Orrin: 243
Leggett: 248
Fungicide

Test Weight (g/0.5L)

- No Fungicide: 238
- Fungicide: 244
Cultivar

Test Weight (g/0.5L)

- AC Morgan
  - No Fungicide: 230
  - Fungicide: 242

- CDC Boyer
  - No Fungicide: 232
  - Fungicide: 238

- CDC Orrin
  - No Fungicide: 240
  - Fungicide: 246

- Leggett
  - No Fungicide: 248
  - Fungicide: 248

Legend:
- No Fungicide
- Fungicide
- Sig
Sites with Low Crown Rust

![Bar chart showing test weights (g/0.5L) for AC Morgan, CDC Boyer, CDC Orrin, and Leggett with and without fungicide.](image-url)
Sites with High Crown Rust

Test Weight (g/0.5L)

AC Morgan
216
CDC Boyer
229
CDC Orrin
234
Leggett
248

No Fungicide
Fungicide
Sig

- No Fungicide
- Fungicide
- Sig
Preliminary Conclusions

**Seeding Date**
- Large effect on yield and test weight

-12 bu/acre
- 15 g/0.5L
Preliminary Conclusions

Cultivars x Fungicide

Largest benefit from fungicide occurred in cultivars most susceptible to crown rust under high levels of crown rust

AC Morgan – 18 bu/acre

Leggett – no effect
Preliminary Conclusions

Cultivars x Fungicide
Under low levels of crown rust only CDC Boyer had a significant response

CDC Boyer – 11 bu/acre
other three cultivars – no statistical effect

Under all conditions the yield of Leggett was not affected by fungicides
Preliminary Conclusions

Cultivars x Fungicide

A fungicide improved test weight only in rust susceptible cultivars at high levels of crown rust

A fungicide application did not lower test weight

Under all conditions the test weight of Leggett was not affected by fungicides
Nitrogen Rates

• 54 lbs/acre of Nitrogen Fertilizer
  – 13 lbs/acre at 3 sites
  – 27 to 54 lbs/acre at 10 sites
  – 107 lbs/acre at 1 site
• Increasing Nitrogen decreased test weight
  – 13 out of 17 site years
• High rates of Nitrogen Fertilizer reduced the profitability of Oats.
<table>
<thead>
<tr>
<th>Nitrogen Rate (lbs/acre)</th>
<th>Canora</th>
<th>Melfort</th>
<th>Brandon</th>
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<tr>
<td>13</td>
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<td>121.6c</td>
<td>58.5d</td>
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<td>63.4d</td>
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<td>126.9a</td>
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<td>73.0c</td>
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<td>80</td>
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<td>135.8a</td>
<td>84.5b</td>
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<td>107</td>
<td>123.3a</td>
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<td>CV</td>
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<td>7.4</td>
<td>15</td>
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<tr>
<td>Nitrogen Rate (lbs/acre)</td>
<td>Weyburn</td>
<td>Ituna</td>
<td>Indian Head</td>
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<td>13</td>
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<tr>
<td>Nitrogen Rate</td>
<td>Indian Head</td>
<td>Melfort</td>
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<td>107</td>
<td>117a</td>
<td>167a</td>
<td>155a</td>
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</tbody>
</table>
Herbicide and Fungicide Experiment

• Treatments consisted of herbicides applied alone and in tank-mixtures with Tilt at 3 crop growth stages (2-3, 5-6, Flag (split or only at flag leaf stage))

• Lead by Dr. Turkington at Lacomb, AB – 403-782-8138
Percentage leaf area diseased
Lacombe 2010

Herbicide/Fungicide Treatment

- H2-3
- H5-6
- H2-3 + HRF
- H2-3/FRF-Flg
- H5-6 + HRF
- H5-6 + HRF/FRF-Flg
- H2-3 + HRF/HRF-Flg

B B B B
A A A A A A A
Percentage leaf area diseased, Melfort 2010

Herbicide/Fungicide Treatment

- H2-3
- H5-6
- H5-6 + HRF
- H2-3/FRF-Flg
- H5-6/FRF-Flg
- H2-3 + HRF
- H5-6 + HRF/FRF-Flg
- H2-3 + HRF/FRF-Flg
Percentage leaf area
Scott 2010
Grain yield (bu/ac)
Lacombe 2010

Herbicide/Fungicide Treatment

No fungicide at flag leaf stage
Fungicide at flag leaf stage

A A A A

B B B B

H2-3 H2-3/FRF-Flg H2-3 + HRF H2-3 + HRF/FRF-Flg
H5-6 H5-6/FRF-Flg H5-6 + HRF H5-6 + HRF/FRF-Flg
H2-3 + HRF H2-3 + HRF/FRF-Flg

A A A A
# Grain yield (bu/ac)  
**Melfort 2010**

<table>
<thead>
<tr>
<th>Herbicide/Fungicide Treatment</th>
<th>H2-3</th>
<th>H2-3/FRF-Flg</th>
<th>H2-3 + HRF</th>
<th>H2-3 + HRF/FRF-Flg</th>
<th>H5-6</th>
<th>H5-6/FRF-Flg</th>
<th>H5-6 + HRF</th>
<th>H5-6 + HRF/FRF-Flg</th>
<th>H2-3 + HRF/HRF-Flg</th>
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<tbody>
<tr>
<td><strong>No fungicide at flag leaf stage</strong></td>
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</table>

**Note:** Bars with different letters (A, B, AB, CD, D) indicate significant differences in grain yield at the 5% probability level.
Grain yield (bu/ac)
Scott 2010

No fungicide at flag leaf stage
Fungicide at flag leaf stage

Herbicide/Fungicide Treatment

CD
D
C
AB
B
AB
Grain yield (bu/ac)
Indian Head 2011

Herbicide/Fungicide Treatment

- H2-3
- H2-3/FRF
- H2-3 + HRF/HRF
- H5-6
- H5-6/FRF
- H5-6 + HRF/FRF
- H2-3 + HRF
- H2-3 + HRF/HRF
- H5-6 + HRF/FRF
- H5-6 + HRF

Fungicide at flag leaf stage

No fungicide at flag leaf stage

Herbicide/Fungicide Treatment
The People Who Do The Work

- Orla Willoughby
- Randy Shiplack
- Kevin Willoughby
- Kim Reiter
- Sam Tillotson
Thank you!