WHEAT DISEASE UPDATE, CROP PROTECTION ACTIVE INGREDIENTS AND TIMING OF APPLICATION
REDUCING RISK – BMP’S

Variety selection(s)
Seed treatments
Seeding rates

Foliar fungicides
FHB fungicides
SEED TREATMENTS PROTECT THE GENETIC POTENTIAL OF THE SEED

- Rarely Increase Yield
- Risk Reduction
- Stand and Yield Protection
- Enhance Root Development
INCREASING RISK

No-till or reduced tillage
Short crop rotation
Field history
Volunteer
Early planting
SEED TREATMENT COSTS / CWT

Costs vary according to product required

Fungicides – general fungicides or metalxyl

Insecticides – what’s the field history?
BEST SEEDING PRACTICES – MAKING EVERY SEED COUNT
WINTER WHEAT SEEDING RATE

Winter Yield Data

![Bar chart showing yield data for different seed rates and cultivars.]

- Brundage (SWW)
- SY Ovation (SWW)
- WB 1529 (SWW)
- WB 456 (SWW)
- Norwest 553 (HRW)
- Keldin (HRW)
- Whetstone (HRW)
- Yellowstone (HRW)

Seeds/ Acre:
- 1 Million
- 1.25 Million
- 1.5 Million
- 1.75 Million
- 2 Million

Bushels/ Acre:
- 80.0
- 90.0
- 100.0
- 110.0
- 120.0

Linear (SY Ovation (SWW))
SPRING WHEAT SEEDING RATE

Spring Yield Data

Bushels/Acre

1 Million | 1.25 Million | 1.5 Million | 1.75 Million | 2 Million

Bullseye (HRS) | Cabernet (HRS) | WB 936 (HRS) | Alturas (SWS) | BZ 608125 (SWS) | UI Pettit (SWS) | Klasic (HWS) | Paloma (HWS) | Snowcrest (HWS) | Linear (UI Pettit (SWS))
FOLIAR FUNGICIDES – TO PROTECT AGAINST THE UNEXPECTED

Need the cost of fungicides when there is no disease? (Plant Health Usage)

Cost of fungicide application – one to three times (Brundage?)

Method of application (and expense) depends on each field (irrigation type, trees for plane interference, etc)
STRIPE RUST

Controls: resistant varieties, fungicide application on susceptible varieties, green bridge control
<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield (bu/A)</th>
<th>Test Wt (lb/bu)</th>
<th>Spring Stand %</th>
<th>Heading Date</th>
<th>Height (in)</th>
<th>Lodging (%)</th>
<th>Protein (%)</th>
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<tbody>
<tr>
<td>LCS Drive</td>
<td>143</td>
<td>57.8</td>
<td>99</td>
<td>5/19</td>
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<td>98</td>
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<td>40</td>
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<td>60.7</td>
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<td>37</td>
<td>19</td>
<td>9.7</td>
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<tr>
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<td>59.2</td>
<td>99</td>
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<td>38</td>
<td>18</td>
<td>9.4</td>
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<tr>
<td>Jasper</td>
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<td>58.3</td>
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<td>40</td>
<td>15</td>
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<td>99</td>
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<td>99</td>
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<td>12</td>
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<td>98</td>
<td>5/20</td>
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<tr>
<td>Norwest Duet</td>
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<td>59.4</td>
<td>98</td>
<td>5/27</td>
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<tr>
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<td>97</td>
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<td>24</td>
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<td>97</td>
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<td>38</td>
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<td>10.5</td>
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<tr>
<td>UI Magic</td>
<td>112</td>
<td>59.4</td>
<td>97</td>
<td>5/22</td>
<td>37</td>
<td>14</td>
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<td>97</td>
<td>5/20</td>
<td>39</td>
<td>6</td>
<td>10.1</td>
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<tr>
<td>Average</td>
<td>123.1</td>
<td>58.2</td>
<td>98</td>
<td>5/23</td>
<td>38</td>
<td>18</td>
<td>9.8</td>
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<tr>
<td>LSD (α = .05)</td>
<td>10.2</td>
<td>0.8</td>
<td>1.6</td>
<td>1.1</td>
<td>1.8</td>
<td>10.1</td>
<td>0.9</td>
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</table>
2013 FUNGICIDE STUDY - YIELD

Herbicide timing  50% flowering

<table>
<thead>
<tr>
<th></th>
<th>Untreated Check</th>
<th>Stratego</th>
<th>Prosaro 421 SC</th>
<th>Stratego + Prosaro</th>
<th>Twinline</th>
<th>Caramba</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicide timing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Yield (bu/A)</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
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Note: Different letters indicate significant difference.
2013 FUNGICIDE STUDY – TEST WT

Herbicide timing  50% flowering

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Test weight (lbs/bu)</th>
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<tbody>
<tr>
<td>Untreated Check</td>
<td>56.5</td>
</tr>
<tr>
<td>Stratego</td>
<td>57.0</td>
</tr>
<tr>
<td>Prosaro 421 SC</td>
<td>57.5</td>
</tr>
<tr>
<td>Stratego + Prosaro</td>
<td>58.0</td>
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<tr>
<td>Twinline</td>
<td>58.5</td>
</tr>
<tr>
<td>Caramba</td>
<td>59.0</td>
</tr>
</tbody>
</table>

Herbicide timing:
- Untreated Check: b
- Stratego: b
- Prosaro 421 SC: a
- Stratego + Prosaro: a
- Twinline: a
- Caramba: a

Herbicide timing corresponds to 50% flowering.
REDUCING STRIPE RUST

• Control green bridge
• Plant winter wheat later (to extend break in green bridge)
• Plant resistant varieties
• Scout fields in fall (especially susceptible varieties) and recheck the same area in the spring to determine overwintering
• Spray fungicides of very susceptible varieties at herbicide application
• When stripe rust is developing in the area, spray with fungicides, but if established in our field at 5% infection, include triazoles for slightly curative activity
• Read and FOLLOW label directions
CCN in Wheat and Barley
Stunt, Patchy, Unthrifty

Field symptoms
2015
St. Anthony
Barley
Bushy, Knotted, Shallow
Plant symptoms
St. Anthony, Daw Farm
Jun 20 2011 CCN on Alpowa without or with Temik
Alpowa spring wheat in a CCN-infested dryland field near St. Anthony, ID 2011

Control

Temik

+32% grain yield
Management strategies for cereal cyst nematodes

Chemical and biological controls:

• effective nematicides are not registered for use on cereals
• seed treatments registered for other crops were not effective on wheat
• foliar application of Movento (insecticide) was as good as a crop rotation, but is not registered for use on wheat in the USA
• naturally occurring fungi can reduce the viability of *H. avenae* eggs but don’t provide reliable or adequate protection
Management strategies for cereal cyst nematodes

Sanitation:
• don’t introduce infested soil into a clean field -- via equipment, vehicles, blowing dust, animals, plant products, irrigation ‘tail’ water, or boots

• don’t allow volunteer cereals to mature in rotation crops -- kill the volunteers before nematodes produce viable eggs during the spring
Management strategies for cereal cyst nematodes

Crop Rotation:
• use a 2 or 3 year rotation (a single year of a small grain and 1 or 2 years of a broadleaf crop or a volunteer-free fallow)

Host resistance and tolerance:
• varieties with resistance are being identified & developed
• select the most tolerant variety available
• a variety that is both resistant and tolerant was recently identified
FHB IN WHEAT AND BARLEY
FHB IN WHEAT
FHB IN WHEAT

2014 – sample of hard white spring wheat (at soft dough) Pristea from Sugar City, ID
CROP ROTATION = PATHOGEN
# 2016 Cooperative Uniform Fungicide Trial

## Fungicide Application

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Rate</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Prosaro</td>
<td>6.5 fl. oz/A</td>
<td>Anthesis</td>
</tr>
<tr>
<td>Prosaro</td>
<td>6.5 fl. oz/A</td>
<td>Anthesis</td>
</tr>
<tr>
<td>Caramba</td>
<td>14 fl. oz/A</td>
<td>A+4</td>
</tr>
<tr>
<td>Caramba</td>
<td>14 fl. oz/A</td>
<td>Anthesis</td>
</tr>
<tr>
<td>Folicur</td>
<td>4 fl. Oz/A</td>
<td>A+4</td>
</tr>
<tr>
<td>Proline</td>
<td>5.7 fl. oz/A</td>
<td>Anthesis</td>
</tr>
<tr>
<td>Folicur</td>
<td>4 fl. oz/A</td>
<td>A+4</td>
</tr>
</tbody>
</table>
Trial Assessment

**SEV**
- Severity (%) = Percent blighted spikelets per scored head

**INC**
- Incidence (%) = \( \frac{\text{# of blighted heads}}{\text{total # of scored heads}} \)

**IND**
- FHB Index (%) = \( \frac{\text{Severity} \times \text{Incidence}}{100} \)

**YLD**
- Yield in bushels per acre (bu/A)

**TW**
- Test weight (lbs/bu)

**FDK**
- Fusarium damaged kernels (%)

**DON**
- DON (ppm) – courtesy of Dr. Yanhong Dong (UMN)
2016 Cooperative Uniform Fungicide Trial

Varieties: Diva  IDO1202S  IDO851  Klasic

<table>
<thead>
<tr>
<th>Variety</th>
<th>Class</th>
<th>FHB Index (%)</th>
<th>Yield (bu/A)</th>
<th>Test weight (lbs/bu)</th>
<th>FDK (%)</th>
<th>DON (ppm)</th>
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</thead>
<tbody>
<tr>
<td>Diva</td>
<td>Soft white</td>
<td>Moderately susceptible</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>IDO1202S</td>
<td>Hard white</td>
<td>Moderately susceptible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDO851</td>
<td>Soft white</td>
<td>Resistant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klasic</td>
<td>Hard white</td>
<td>Susceptible</td>
<td></td>
<td></td>
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</table>

P=0.05
## 2016 Cooperative Uniform Fungicide Trial

**Varieties:**
- Diva
- IDO1202S
- IDO851
- Klasic

### Varietal Effect

<table>
<thead>
<tr>
<th>Variety</th>
<th>Class</th>
<th>FHB Index (%)</th>
<th>Yield (bu/A)</th>
<th>Test weight (lbs/bu)</th>
<th>FDK (%)</th>
<th>DON (ppm)</th>
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<tbody>
<tr>
<td>Diva</td>
<td>Soft white</td>
<td>6.1 a</td>
<td>133.3 ab</td>
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<td>1.1 ab</td>
<td>1.7 b</td>
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<td>IDO1202S</td>
<td>Hard white</td>
<td>4.8 a</td>
<td>131.5 b</td>
<td>61.3 a</td>
<td>1.0 b</td>
<td>1.6 b</td>
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<td>Soft white</td>
<td>0.3 b</td>
<td>144.4 a</td>
<td>59.7 b</td>
<td>0.4 c</td>
<td>0.4 b</td>
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<td>Klasic</td>
<td>Hard white</td>
<td>0.9 b</td>
<td>103.2 c</td>
<td>58.5 c</td>
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<td>$P=0.05$</td>
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<td>Treatment Anthesis / A+4</td>
<td>FHB Index (%)</td>
<td>Yield (bu/A)</td>
<td>Test weight (lbs/bu)</td>
<td>FDK (%)</td>
<td>DON (ppm)</td>
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<td>Prosaro (P) / none</td>
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<td>0.45 c</td>
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<td>60.4 a</td>
<td>0.58 c</td>
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<td>60.3 a</td>
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<td>3.2 a</td>
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<td>Untreated non-inoculated check (UN)</td>
<td>6.7 a</td>
<td>121.8 b</td>
<td>59.2 b</td>
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Figure 1. F x V interaction on FHB Index (%)
Figure 2. F x V interaction on yield (bu/A)
Figure 3. F X V interaction on test weight (lbs/bu)
STUDY SUMMARY

VARIETAL EFFECT

- Significant differences in FHB assessments were found.
- IDO851 had the lowest FHB and DON and the highest yield.
- Klasic had low FHB index but had the highest FDK and DON.
- Klasic reached anthesis one week earlier than other varieties which resulted in earlier and possibly lower FHB ratings.
FUNGICIDE EFFECT

- Fungicide applications significantly reduced FHB and DON while reducing losses in yield and test weight.

- UI check had significantly lower test weight than UN check.

- Treatments that included Caramba had the lowest FDK and DON.

- A+4 treatments had slightly reduced FDK and DON than anthesis only.
FUNGICIDE X VARIETY INTERACTION

- FHB index and DON ranged from 0.1 to 14.2% and 0.2 to 4.9 ppm, respectively.

- FHB index was significantly reduced on moderately susceptible varieties (Diva and IDO1202S) with fungicide application (Fig. 1).

- Yields of fungicide-treated Diva did not differ from the checks. However, yields of treated IDO1202S were statistically higher than UI and test weights were significantly higher compared to both checks (Fig. 2 and 3).
FUNGICIDE X VARIETY INTERACTION

- Visual symptoms on Klasic were low, but DON was significantly reduced with fungicide use. Fungicides significantly improved yield (UI only) and test weight (UI and UN).

- DON was significantly reduced on susceptible and moderately susceptible varieties when treated with fungicides (Fig. 4).

- For moderately resistant IDO851, FHB index and DON were not reduced with fungicides. Only Prosaro (P) had significantly higher yield and test weight compared to both checks.
FHB CONTROL – BMP

- Avoid minimum tillage where scab has been a problem in the past – infected debris is an excellent source of inoculum
- Control volunteer and weedy grasses
- Reduce lodging
- Plow down corn residue
- After harvest, destroy residue of affected crops
- Can we modify irrigation practices?
- Variety selection