Spring Wheat Variety Selection: 2014 Spring Variety Trial Results & New Varieties on the Horizon

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Even The Irish Aren’t This Lucky

- Despite slowest planting progress in recent memory, the state’s average yield came in at 56 bu/A.
- This is equal to 2004 and 2010 and 3rd highest yield ever recorded.
- Yld = -2062+1.05 x Yr ($r^2 = 0.9$)
- 2.3% gain/year

Wheat Breeding Priorities

Agronomic Characteristics
1. Yield  
2. Lodging resistance  
3. Test Weight  
4. Shattering  
5. Kernel color  
6. Pre-harvest sprouting resistance

Diseases
1. Fusarium head blight (scab)  
2. Leaf rust  
3. Bacterial leaf streak  
4. Stripe rust  
5. Leaf Spotting (Tan Spot, Septoria’s)  
6. Barley yellow dwarf virus  
7. Stem rust

Bread-Making Quality Characteristics
1. % protein  
2. Mixing Properties  
3. Loaf Volume  
4. Flour Water Absorption  
5. Kernel Hardness  
6. Flour color  
7. Milling Yield  
8. Percent Flour Ash

Variety Survey

- Faller and Prosper continue to dominate
- WB-Mayville, mostly in northern half of state, largely escaped damage due to FHB
New Varieties in 2014

<table>
<thead>
<tr>
<th>Variety</th>
<th>Pluses</th>
<th>Minuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRS 3361 (Croplan)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRS 3378 (Croplan)</td>
<td></td>
<td>BLS, yield</td>
</tr>
<tr>
<td>HRS 3419 (Croplan)</td>
<td>Yield, straw strength</td>
<td>Protein, BLS</td>
</tr>
<tr>
<td>Prevail (SDSU)</td>
<td>BLS, Leaf rust</td>
<td></td>
</tr>
<tr>
<td>SY-Ingmar</td>
<td>Yield (South), BLS</td>
<td></td>
</tr>
<tr>
<td>WB 9507</td>
<td>Yield</td>
<td>BLS</td>
</tr>
</tbody>
</table>

Fusarium head blight (scab)

- In moderate to severe epidemics ~70% inoculum from outside field boundaries (Bergstrom et al.).
- Substantial damage this year in winter wheat and early spring wheat.

Bacterial Leaf Streak (BLS)

- No control options, but there are differences among variety responses (select <5)
- Not much disease in 2012 or 2013 but lots in 2014 (LeCenter, Morris, Crookston).

Leaf Rust

- Overall pressure very light and prevalence of races with virulence to Lr21 remained same
- Faller and Prosper especially susceptible to these races
- Rating < 4 no problems expected
- Rating > 4 requires active scouting

Note: Newer varieties (2013 & 2014 releases) are highlighted in grey in tables.
Tan Spot and Septoria

- Substantial yield losses in 2014 based on differences in yield between conventional and intensively managed trials (northern locations)
  - Average yield advantage 15 bu/A with a range from 10 to 22 bu/A
  - Correlation between disease rating and yield losses = 0.22

-> Confounded by BLS?
-> Early season disease control paid off

Grain Yield
(8 northern locs., as % of mean = 84 bu/A)

- Data is sorted on 2014, best in green, worst in red
- Relatively better performers in 2014:
  - Faller, Prosper, Forefront, Prevail
- Relatively poorer performers in 2014:
  - Jenna, LCS Powerplay, Samson
- Little to no stripe and leaf rust, lots of tan spot.

Straw Strength

- Interpretation:
  - 2-3: Very good
  - 4-5: Classical HRSW and adequate in most circumstances
  - 6-7: Weaker HRSW and lodging problems a real possibility

-> High(er) seeding rates increase potential for lodging

Protein

- Negative correlation between yield and protein
- N recommendations to achieve optimal yield are same for all varieties
- Achieve 14% Prot. By:
  - Variety selection (sacrifice yield potential)
  - Adequate N (spring is better than fall applied)
  - Post anthesis N if yields higher than fertilized yield goal

Economic Returns – Northern MN 2014

Data is sorted by frequency of economic return in top 20% of all varieties. Higher values are in green, lower in red.

Prices ranged from $3.65/bu to $9.00/bu (95% probability range)

Discount/premiums ranged from $0.00/fifth to $0.28/fifth (95% probability range)

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Economic Returns – Northern MN ‘12-’14

Data is sorted by frequency of economic return in top 20% of all varieties. Higher values are in green, lower in red.

Prices ranged from $3.65/bu to $9.00/bu (95% probability range)

Discount/premiums ranged from $0.00/fifth to $0.28/fifth (95% probability range)
### Future Variety Candidates

- **2015:** BOLLES (MN08165-8) = MN02268-1/MN01333-A-1
  - Very high protein (>Vantage), better yield than other high protein varieties, Excellent baking quality
- **2016:**
  - MN11325-7 (Faller/J00H04*J3/MN03130)
    - Yields equal to LCS Albany; protein similar to Faller/Prosper; better straw strength
  - MN10261-1 (Glenn/Sabin)
    - Nice combination of yield and protein, good scab resistance; wide adaptation

### Yield/TWT/Prot. of New Lines

<table>
<thead>
<tr>
<th>Entry</th>
<th>Yield (% of mean)</th>
<th>TWT 2014</th>
<th>Protein (%) 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN11325-7*</td>
<td>106 112</td>
<td>60.0</td>
<td>13.7 13.7</td>
</tr>
<tr>
<td>LCS Albany</td>
<td>111 112 114</td>
<td>60.4 60.5</td>
<td>13.0 12.9</td>
</tr>
<tr>
<td>Prosper</td>
<td>110 110 109</td>
<td>60.4 60.3</td>
<td>13.4 13.5</td>
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<tr>
<td>Faller</td>
<td>110 109 107</td>
<td>60.2 60.3</td>
<td>13.3 13.4</td>
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<tr>
<td>MN10261-1</td>
<td>105 103</td>
<td>61.8 61.5</td>
<td>14.5 14.4</td>
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<tr>
<td>Forefront</td>
<td>104 102 103</td>
<td>60.9 60.9</td>
<td>14.6 14.5</td>
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<tr>
<td>BOLLES</td>
<td>100 99 101</td>
<td>60.0 60.3</td>
<td>15.7 15.5</td>
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<tr>
<td>Samson</td>
<td>97 99 102</td>
<td>58.0 58.8</td>
<td>14.2 14.1</td>
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<tr>
<td>SY Soren</td>
<td>101 99 101</td>
<td>60.6 60.6</td>
<td>14.4 14.5</td>
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<tr>
<td>RB07</td>
<td>98 98 98</td>
<td>60.2 60.3</td>
<td>14.2 14.3</td>
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<tr>
<td>Norden</td>
<td>98 98 98</td>
<td>61.4 61.7</td>
<td>13.9 13.9</td>
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<tr>
<td>Vantage</td>
<td>95 96 96</td>
<td>61.9 61.7</td>
<td>15.2 15.1</td>
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<tr>
<td>WB-Mayville</td>
<td>94 95 98</td>
<td>58.9 59.4</td>
<td>14.7 14.7</td>
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<tr>
<td>Linkert</td>
<td>95 95 96</td>
<td>60.3 60.4</td>
<td>14.9 15.0</td>
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<td>Rollag</td>
<td>96 95 96</td>
<td>61.1 61.1</td>
<td>14.8 14.9</td>
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</table>

No. Env. 15 28 41

* 2013 extrapolated from adjacent trials

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### Varieties

<table>
<thead>
<tr>
<th>Variety</th>
<th>Pluses</th>
<th>Minuses</th>
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<tbody>
<tr>
<td>Faller/Prosper</td>
<td>Yield, FHB=4/5, Leaf rust=5, Lodging=5/6</td>
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<tr>
<td>Forefront</td>
<td>Yield (south), Lodging, FHB=3</td>
<td>Lodging=5</td>
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<td>Linkert</td>
<td>Prot., Lodging</td>
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<tr>
<td>Prevail</td>
<td>Yield (south), BLS=2</td>
<td>PHS=5</td>
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<tr>
<td>Rollag</td>
<td>Lodging, FHB, Prot.</td>
<td>Early seeding needed</td>
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<tr>
<td>SY-Soren</td>
<td>Balanced, FHB=4, Leaf rust=3</td>
<td>A bit more variable</td>
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### Honorable Mention

<table>
<thead>
<tr>
<th>Variety</th>
<th>Pluses</th>
<th>Minuses</th>
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<tbody>
<tr>
<td>LCS Albany</td>
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<td>SY-Rowyn</td>
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<td>WB9507</td>
<td>Yield</td>
<td>Prot.</td>
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Characteristics of New Lines

<table>
<thead>
<tr>
<th>Entry</th>
<th>Straw Strength</th>
<th>Baking Quality</th>
<th>PHS</th>
<th>Leaf Rust</th>
<th>Bacterial Leaf Streak</th>
<th>Scab</th>
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<tbody>
<tr>
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<td>WB-Mayville</td>
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</table>

Yield vs. Protein (2014)

Funding

- Federal
  - U.S. Wheat & Barley Scab Initiative
  - USDA-NIFA T-CAP (Leaf and stem rust)

- University of Minnesota
  - Minnesota Agricultural Experiment Station
  - MN Small Grains Initiative
  - Variety Development Fund

- NGOs
  - Minnesota Wheat Research & Promotion Council
  - Gates Foundation (Durable rust resistance)

ROCs/Sites:
- Crookston
- Jochum Wiersma
- Madeleine Smith
- Matt Green
- Galen Thompson
- Robert Bovette
- James Cameron
- Mark Hanson
- Morris
- George Nelson
- Roseau
- Donn Velekson
- Dave Graefstrom
- Lamberton
- Steve Quiring
- Waseca
- Matt Bickell

Wheat Breeding Research Team

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