Small Grain Variety Trial Results & Inoculant Research

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2017 District 4 Recommended Varieties

WINTER WHEAT VARIETIES
Performance Evaluation and Recommendations

Recommendations are made for the districts shown on the map below by the Montana State University Agricultural Experiment Station.

The information in this publication can also be found at a link on:
http://plantsciences.montana.edu/crops/

Another variety selection tool is available at:
http://www.sarc.montana.edu/php/varieties.html

Winter Wheat

<table>
<thead>
<tr>
<th>District</th>
<th>Recommended Varieties</th>
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<tbody>
<tr>
<td>4</td>
<td>Bearpaw</td>
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<tr>
<td></td>
<td>Coulter</td>
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<td></td>
<td>Decade</td>
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<td>Judee</td>
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<td>Keldin</td>
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<td>Loma</td>
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<td>SY Wolf</td>
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<td>Warhorse</td>
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<td>WB-Quake</td>
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<td>Yellowstone</td>
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</tbody>
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Spring Wheat

| Choteau  | SY Soren               |
| Corbin   | SY Tyra                |
| Duclair  | Westbred 926          |
| Hank     | Vida                  |
| Jedd     | WB Gunnison            |
| Kelby    | QB9879CLP              |
| McNeal   | *SY Ingmar             |
| O’Neal   | *LCS Pro               |
|          | SY Soren               |
|          | SY Tyra                |
|          | Westbred 926          |
|          | WB Gunnison            |
|          | QB9879CLP              |
|          | *SY Ingmar             |
|          | *LCS Pro               |

http://plantsciences.montana.edu/crops/
Cereal VT Overview, Moccasin, MT

**Yield**
- Winter Wheat: 60 bu/acre
- Spring Wheat: 30 bu/acre
- Barley: 30 bu/acre

**Test Weight**
- Winter Wheat: 60 lbs/bu
- Spring Wheat: 50 lbs/bu
- Barley: 40 lbs/bu

**Protein**
- Winter Wheat: 16%
- Spring Wheat: 18%
- Barley: 14%

**Gross Return**
- Winter Wheat: $250.00/acre
- Spring Wheat: $350.00/acre
- Barley: $100.00/acre
Moccasin Winter Wheat Results

Moccasin average yield past 5 years

Yield (bu/acre): 60, 55, 58, 42, 61
Moccasin Winter Wheat Results

![Bar graph showing yield (bu/acre) for different varieties of wheat. The graph includes a red dotted line at 60.3, indicating the yield of the Moccasin variety. Each bar represents a variety, and the error bars indicate the variability in yield. The varieties include Bearpaw, Brawl CLP, CDC Falcon, Decade, Judee, Keldin, Loma, Northern, SY Clearstone 2CL, SY Monument, SY Wolf, Warhorse, WB-Quake, and Yellowstone.](image-url)
Moccasin Winter Wheat Results

The graph shows the protein content (%) of various varieties of winter wheat. The protein content is primarily around 13.9%, with some varieties exceeding this value. Varieties marked with an asterisk (*) indicate a statistically significant difference from the control value. The graph indicates that SY Clearstone 2CL and Northern have the highest protein content, while SY Wolf has the lowest.
Denton Winter Wheat Results

![Graph showing yield comparison of various wheat varieties. The graph displays yield data for each variety with error bars, indicating variability. The highest yield is indicated by the red dotted line at 39.2 bushels per acre. Varieties include Bearpaw, Braw CLP, CDC Falcon, Decade, Judee, Keldin, Loma, Northern, SY Clearstone 2CL, SY Monument, SY Wolf, Warhorse, WB-Quake, and Yellowstone.](image)
Denton Winter Wheat Results

![Graph showing protein percentages for various wheat varieties. The average protein content is 13.5%.

Key:
- Bearpaw
- Brawl CLP
- CDC Falcon
- Decade
- Judge
- Keldin
- Loma
- Northern
- SY Clearstone 2CL
- SY Monument
- SY Wolf
- Warhorse
- WB-Quake
- Yellowstone

Significance:
* indicates a significant difference from the average protein content.
Geraldine Winter Wheat Results

![Graph showing yield comparison for various varieties of winter wheat. The graph includes bars for Bearpaw, Braw CLP, CDC Falcon, Decade, Judee, Keldin, Loma, Northern, SY Clearstone 2CL, SY Monument, SY Wolf, Warhorse, WB-Quake, and Yellowstone. The highest yield is 82.1 bu/acre for SY Wolf.](image-url)
Geraldine Winter Wheat Results

![Bar graph showing protein content of various wheat varieties.]

- Bearpaw
- Brawl CLP
- CDC Falcon
- Decade
- Judee
- Keldin
- Loma
- Northern
- SY Clearstone 2CL
- SY Monument
- SY Wolf
- Warhorse
- WB Quake
- Yellowstone

Protein (%)

Variety
Highwood Winter Wheat Results

The bar chart shows the yield (bu/acre) for various wheat varieties. The highest yield is indicated by the red line at 57.2 bu/acre. Varieties such as 'Decade', 'Northern', and 'SY Clearstone 2CL' have yields close to this level, marked with an asterisk (*) for significance. Other varieties like 'Brawl CLP' and 'WB Quake' have lower yields, indicated with error bars.
Belt Winter Wheat Results

Yield (bu/acre)

Variety

Bearpaw
Brawl CLP
CDC Falcon
Decade
Judee
Keldin
Loma
Northern
SY Clearstone 2CL
SY Monument
SY Wolf
Warhorse
WB-Quake
Yellowstone
Belt Winter Wheat Results

![Graph showing protein content of different varieties of Belt Winter Wheat. The red line represents the average protein content of 8.9%. Varieties like Bearpaw, Braw CLP, CDC Falcon, Decade, Judee, Keldin, Loma, Northern, SY Clearstone 2CL, SY Monument, SY Wolf, Warhorse, WB-Quake, and Yellowstone are plotted along the x-axis. The asterisks indicate significant differences from the average.](image-url)
Moccasin Spring Wheat Results

Moccasin average yield past 5 years

Yield (bu/acre)
Moccasin Spring Wheat Results

![Graph showing wheat yield results for various varieties. The graph displays the yield (bu/acre) for each variety with error bars indicating variability. The x-axis represents different varieties such as Alum, Brennan, Chateau, Corbin, Duclar, Egan, Fortuna, Lanning, NS Presser CL+, Oneal, Reeder, Sy Ingmar, Sy Soren, Vida, WB Gunnison, Camaro, and Cheville. The y-axis shows the yield ranging from 0 to 32.5 bu/acre. The dotted line at 32.5 bu/acre is used as a reference.]
Moccasin Spring Wheat Results

![Graph showing protein content for various varieties of wheat. The graph indicates that Moccasin has a protein content of 17.1% with an asterisk indicating a significant result.](image-url)
Denton Spring Wheat Results

![Bar chart showing yield (bu/acre) for various wheat varieties.](chart.png)
Denton Spring Wheat Results

![Graph showing protein content for various wheat varieties. The graph indicates that all varieties have a protein content close to 17.2%.]

Varieties include: Alum, Brennan, Chateau, Corbin, Ducclair, Egan, Fortuna, Lanning, LCS Pro, NS Presser CL+, Oneal, Reeder, Sy Ingrain, Sy Soren, Vida, WB Gunnison, Camaro, Cheville.

All varieties show similar protein content, with a significance level (*) indicating a possible statistical significance in some varieties.
Highwood Spring Wheat Results

Yield (bu/acre)

Variety

Alum, Brennan, Choteau, Corbin, Ducclair, Egan, Fortuna, Lanning, LCS Pro, NS Presser CL+, Omeal, Reeder, Sy Ingmar, Sy Soren, Vida, WB Gummison, Camaro, Cheville.

32.5
Highwood Spring Wheat Results

![Bar chart showing protein content for various wheat varieties. The chart includes bars for Alum, Brennan, Cheville, Corbin, Duclair, Egan, Fortuna, Lanning, LCS Pro, NS Presser CL+, Oreal, Reeder, Sy Ingmar, Sy Soren, Vida, WB Gunnison, Camaro, and Cheville. The protein content is indicated by the height of the bars, with the majority of varieties having protein content around 15.6%. There is a red dotted line at 15.6% indicating the benchmark value. The variety with the highest protein content is marked with an asterisk (*).]
Moccasin Barley Results

Moccasin average yield past 5 years
Moccasin Barley Results

![Barley Yield Bar Chart](image_url)

- **Yield (bu/acre)**
  - Varieties: Balsler, Bill Coors 100, Champion, Claymore, Conrad, Copeland, Eslick, Genie, Growler, Hayby, Haybet, Hays, Hockett, Lavina, Merit 57, Metcalfe, Moravian 165, Odyssey, Oreana, Synergy
  - Average Yield: 34.3 bu/acre
Moccasin Barley Results

![Barley Protein Results Graph](image-url)
Off Station Barley Results

Yield
• Denton: 27.8 bu/ac
• Highwood: 28.4 bu/ac

Protein
• Denton: 18.4%
• Highwood: 16.7%
Inoculant Viability

Factors contributing to inoculant failure

• Storage conditions
  • Heat
  • Moisture
Inoculant Viability

Factors contributing to inoculant failure

• Storage conditions
  • Heat
  • Moisture

• Field conditions
  • Low temperatures
  • Excess moisture (anaerobic conditions)

Low Temps

Saturated soils – low/no oxygen
Inoculant Viability

- Viable cell count assay
- Ambient temperature and humidity
- 2, 5, and 24 hours following inoculation
Inoculant viability

Conditions

• Control (sealed bag, room temp storage)
• Treatments (all at 100°F)
  • Sealed – sealed container
  • Dry – open container
  • 50% - sealed container at 50% moisture
  • 75% - sealed container at 75% moisture
• 24 hr incubation

Samples with the same letter are not significant at p <0.001
Future Direction

• Identify other factors contributing to inoculant failure
• Field kit for rapid determination of inoculant viability
• Isolate new rhizobia strains for Central Montana
Isolation of novel strains

Highwood acidic soil isolates

- Rhizobia isolation medium
- Low (<4.5) pH tolerant
- 40+ isolates to date

Future work

- Identify isolates
- Characterize potential N-fixing and other beneficial microorganisms
Acknowledgements

• CARC Faculty and Staff
• Phil Bruckner – winter wheat breeder
• Luther Talbert – spring wheat breeder
• Jamie Sherman – barley breeder

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• Ron and Andy Long
• Charles Bumgarner
Questions?