Nitrogen and Test Weight in Oats

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¹ Agriculture and Agri-food Canada
Indian Head, Saskatchewan, Canada
Nitrogen Rate and Cultivar

Test Weight (g/0.5L)

Nitrogen Rate (kg/ha)

- AC Assinaboia
- CDC Pacer
# Test Weight Stability

## Treatment Factors:

### 1) Cultivars

Four cultivars (cultivars picked for each location based on two popular and two new cultivars with potential)

<table>
<thead>
<tr>
<th>Location</th>
<th>16-621 Indian Head:</th>
<th>16-623 Melfort:</th>
<th>16-628 Redvers:</th>
<th>16-629 Yorkton:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Varieties</strong></td>
<td>Stride CDC Ruffian</td>
<td>Stride CDC Minstrel</td>
<td>Stride Justice Souris</td>
<td>Stride CDC Dancer Summit Triactor</td>
</tr>
<tr>
<td></td>
<td>CS Camden</td>
<td>AC Morgan</td>
<td>Souris</td>
<td>CDC Morrison</td>
</tr>
<tr>
<td></td>
<td>CDC Big Brown</td>
<td>CDC Seabiscuit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2) Nitrogen Rate (kg N ha⁻¹)

<table>
<thead>
<tr>
<th></th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>60</td>
</tr>
<tr>
<td>III</td>
<td>80</td>
</tr>
<tr>
<td>IV</td>
<td>120</td>
</tr>
</tbody>
</table>
Nitrogen x Cultivar at Melfort in 2014

Grain Yield (bu/acre) vs. N Rate (lb N / acre)

- Stride
- AC Morgan
- CDC Minstrel
- CDC Seabiscuit
Nitrogen x Cultivar at Melfort in 2014

Test weight (g/0.5 L)

N Rate (lb N / acre)

Stride
AC Morgan
CDC Minstrel
CDC Seabiscuit
Nitrogen x Cultivar at Melfort in 2015

Graph showing the relationship between grain yield (bu/acre) and nitrogen rate (lb N / acre) for different cultivars:

- **Stride**
- **AC Morgan**
- **CDC Minstrel**
- **CDC Seabiscuit**

The graph indicates an increase in grain yield with increasing nitrogen rate for all cultivars.
Nitrogen x Cultivar at Melfort in 2015

![Graph showing test weight (g/0.5 L) against N Rate (lb N / acre) for different cultivars: Stride, AC Morgan, CDC Minstrel, CDC Seabiscuit. The graph indicates a downward trend in test weight as N Rate increases for all cultivars.]
Nitrogen x Cultivar at Melfort in 2016

![Graph showing grain yield (bu/acre) against N rate (lb N/acre) for different cultivars.]

- Stride
- AC Morgan
- CDC Minstrel
- CDC Seabiscuit
Nitrogen x Cultivar at Melfort in 2016

Test weight (g/0.5 L)

N Rate (lb N / acre)

Stride
AC Morgan
CDC Minstrel
CDC Seabiscuit
Nitrogen x Cultivar at Indian Head in 2014

![Graph showing test weight (g/0.5 L) against N Rate (lb N / acre) for different cultivars: Stride, CDC Big Brown, CDC Orrin, and Pinnacle. The graph indicates a decrease in test weight as N Rate increases.]
Nitrogen x Cultivar at Indian Head in 2015

![Graph showing grain yield vs N rate for different cultivars](image)
Nitrogen x Cultivar at Indian Head in 2016

![Graph showing grain yield (bu/acre) vs. N Rate (lb N / acre) for different cultivars: Stride, CDC Big Brown, CDC Ruffian, and CS Camden. The graph indicates a positive correlation between N rate and grain yield for all cultivars.](image_url)
Nitrogen x Cultivar at Indian Head in 2016

![Diagram showing test weight (g/0.5 L) against N Rate (lb N / acre) for different cultivars. The cultivars include Stride, CDC Big Brown, CDC Ruffian, and CS Camden. The graph indicates that test weight remains relatively stable across different nitrogen rates for each cultivar.](image-url)
Nitrogen x Cultivar at Yorkton in 2014

![Graph showing grain yield (bu/acre) vs. N rate (lb N/acre) for different cultivars: Stride, CDC Dancer, Summit, and Triactor. The graph indicates a positive correlation between N rate and grain yield for all cultivars.]
Nitrogen x Cultivar at Yorkton in 2014

![Graph showing the relationship between nitrogen rate and test weight for different cultivars.]

- Stride
- CDC Dancer
- Summit
- Triactor
Nitrogen x Cultivar at Yorkton in 2015

Grain Yield (bu/acre)

N Rate (lb N / acre)

- Stride
- CDC Dancer
- Summit
- Triactor
Nitrogen x Cultivar at Redvers in 2015

Grain Yield (bu/acre)

N Rate (lb N / acre)

- Stride
- CDC Morrison
- Legget
- Souris
Nitrogen x Cultivar at Redvers in 2016

Grain Yield (bu/acre) vs. N Rate (lb N / acre)

- **Stride**
- **CDC Morrison**
- **Justice**
- **Souris**
Nitrogen x Cultivar at Redvers in 2016

![Graph showing the effect of nitrogen rate on test weight for different cultivars.](image-url)

- **Test weight (g/0.5 L)**
- **N Rate (lb N / acre)**
- **Lines and markers represent different cultivars:**
  - Red: Stride
  - Green: CDC Morrison
  - Blue: Justice
  - Black: Souris
Crop Sequencing of Large acreage crops and special crops
Experimental Design: Strip plot
Replication: 4
Locations: Indian Head, Melfort, Saskatoon, Swift Current
The use of these locations should help us to determine if beneficial crop sequences change as we move from a typical warmer and drier environment to wetter cooler environments.

Year A
All eight crops are seeded in strips resulting in 32 strips (8 x 4reps)

Year B
In year B the same crops are seeded perpendicular to the strips in year A. This results in 256 plots (8 proceeding crops x 8 crops x 4 reps)
### Year A Replicate 1

<table>
<thead>
<tr>
<th>Crop</th>
<th>Wheat</th>
<th>Oat</th>
<th>Canola</th>
<th>Pea</th>
<th>Canaryseed</th>
<th>Hemp</th>
<th>Quinoa</th>
<th>Coriander</th>
</tr>
</thead>
</table>

400 feet

### Year B Replicate 1

<table>
<thead>
<tr>
<th>Crop</th>
<th>Wheat</th>
<th>Oat</th>
<th>Canola</th>
<th>Pea</th>
<th>Canaryseed</th>
<th>Hemp</th>
<th>Quinoa</th>
<th>Coriander</th>
</tr>
</thead>
</table>

400 feet
<table>
<thead>
<tr>
<th></th>
<th>Plant</th>
<th>Value</th>
<th></th>
<th>Plant</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Wheat</td>
<td>23.3769726 bc</td>
<td></td>
<td>3</td>
<td>Wheat</td>
</tr>
<tr>
<td>10</td>
<td>Oat</td>
<td>21.5624852 c</td>
<td></td>
<td>11</td>
<td>Oat</td>
</tr>
<tr>
<td>18</td>
<td>Canola</td>
<td>23.2576146 bc</td>
<td></td>
<td>19</td>
<td>Canola</td>
</tr>
<tr>
<td>26</td>
<td>Pea</td>
<td>23.9962286 ab</td>
<td></td>
<td>27</td>
<td>Pea</td>
</tr>
<tr>
<td>34</td>
<td>Canarysee</td>
<td>24.8400442 ab</td>
<td></td>
<td>35</td>
<td>Canarysee</td>
</tr>
<tr>
<td>42</td>
<td>Hemp</td>
<td>25.5502258 a</td>
<td></td>
<td>43</td>
<td>Hemp</td>
</tr>
<tr>
<td>50</td>
<td>Quinoa</td>
<td>25.188196 ab</td>
<td></td>
<td>51</td>
<td>Quinoa</td>
</tr>
<tr>
<td></td>
<td>Oat</td>
<td></td>
<td></td>
<td></td>
<td>Oat</td>
</tr>
</tbody>
</table>
Main Plot
Rotation (all crops)
Continuous oat
oat-canola-oat-PEA-oat
oat-canola-barely-PEA-oat

Factors:
2) Oat Seeding rate (seeds/m^2) (oat only)
200,
400

Oat Cultivar (oat only)
Summit (semi-dwarf)
CDC Seabiscuit (Tall)

Row Spacing (all crops):
Narrow 25 cm (14 x 35)
Wide 40 cm (11 x 35)
Starting point | Rotations  
|---|---
| **Phase in Rotation** | 1 | 2 | 3 | 4 | 5 | 6 |
| A (pea stubble) | Wheat | Wheat | Wheat | Wheat | Wheat | Wheat |
| B (wheat stubble) | Canola | Pea | Pea | Pea | Lentil | Canola |
| C (Broadleaf stubble) | oat | oat | Canola | Lentil | oat | Pea |
| D (oat, canola, lentil or pea stubble) | Pea | Pea | Pea | Pea | Pea | Canola |

**Justification**

Cereal-oilseed-pulse in a rotation, expected to be the most sustainable rotation system

Intensified pea-based rotation with cereal as a break crop

Intensified broadleaf crop with 1 cereal as a break crop

Intensified pulse-based rotation, 2 species with 1 cereal as a break crop

Intensified pulse-based rotation, 2 species with cereal as a break crop

Intensified canola-based rotation with cereal and pulse between
Seeding Rate of Oats
Seeding Rate and Wild Oats

Grain Yield (bu/acre)

Seeding Rate (Seeds/m²)

- low (10 WO/m²)
- high (27 WO/ m²)
Grain Yield, Seeding Rate and Wild Oats

![Graph showing the relationship between grain yield and wild oat density for different seeding rates.]
Seeding Rate and Wild Oats

Wild Oat Biomass (lb/acre)

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Seeding Rate (Seeds/m²)

- low (10 WO/m²)
- high (27 WO/m²)

Values:

- 150 (14)
- 250 (23)
- 350 (32)
- 450 (42)
Wild Oat Biomass and Tame Oat Seeding Rate

![Graph showing the relationship between Wild Oat Density (plants m\(^{-2}\)) and Wild Oat Biomass (kg ha\(^{-1}\)). The graph includes lines for 150, 250, 350, and 450 seeds m\(^{-2}\).]