Soils and Crops
2019

Phosphorus and Seed Rate Trial in Canola
Introduction

Two issues
- Producers want to increase phosphorus application rates
- Producers want to decrease canola seed rates to decrease costs

$70-80/acre

<table>
<thead>
<tr>
<th>Crop</th>
<th>Actual P$_2$O$_5$ (lb/ac.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>50</td>
</tr>
<tr>
<td>Canola</td>
<td>25</td>
</tr>
<tr>
<td>Canaryseed, Pinto bean</td>
<td>30</td>
</tr>
<tr>
<td>Flax, pea, forages (alfalfa, bromegrass)</td>
<td>15</td>
</tr>
<tr>
<td>Faba bean</td>
<td>40</td>
</tr>
<tr>
<td>Lentil, mustard, chickpea</td>
<td>20</td>
</tr>
</tbody>
</table>
Trial Design – Land

- 500’ x 25’
- Randomized Complete Block – 3 replications
Trial Design – Land
Trial Design – Land

Soil Type
- Waitville-Whitewood
- Dark Gray wooded soil formed on loamy glacial till; loam surface texture
- Nearly level topography but contains moderate amount of stones

Nutrient levels (tested spring 2018)

- N 27 lbs (0-24”)
- P$_2$O$_5$ 16 lbs (0-6”)
- K 160 lbs
- S 10 lbs (0-24”)
- O.M. 3.0%
- pH 6.9
Trial Design – Equipment
Trial Design – Equipment

**Harvest**
- Use of modern equipment
- Every trial weighed and sampled
- Yields equalized to 10% moisture and 0% dockage

**Plant Count**
- Independent consultant
- 6 locations/trial averaged
2018 Precipitation
Location: St. Brieux

Total Rain: 213mm

- May: 40mm
- June: 40mm
- July: 60mm
- August: 30mm
- September: 45mm
- October: 5mm

Average: Melfort (1981-2010)
# Trial Design – Treatments

## Total Fertility
130-50-0-25

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Seed Rate</th>
<th>Drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>25P SR; 25P Band;</td>
<td>5lb seed</td>
<td>3320; DK</td>
</tr>
<tr>
<td>50P SR;</td>
<td>5lb seed</td>
<td>3320; DK</td>
</tr>
<tr>
<td>25P SR; 25P Band;</td>
<td>2.5lb seed</td>
<td>3320; DK</td>
</tr>
<tr>
<td>50P SR;</td>
<td>2.5lb seed</td>
<td>3320; DK</td>
</tr>
</tbody>
</table>
2018 - Canola - P/Seeding Rate - Yield

Confidence 90%
Yield LSD 2.6
Plants LSD 0.9

Adj. Yield - 3320
Adj. Yield - DK
Avg. Plant/ft² - 3320
Avg. Plant/ft² - DK

BU/ACRE

25P SR; 25P MRB; 5lb seed
50P SR; 5lb seed

P: lbs P₂O₅
2018 - Canola - P/Seeding Rate - Yield

Confidence: 90%
Yield LSD: 2.6
Plants LSD: 0.9

Graph showing the relationship between P application rates and canola yield and plant density. The graph includes bars and lines indicating yield and plant density for different P application rates and seeding rates. The data points are labeled as follows:

- **25P SR; 25P MRB; 2.5lb seed**
  - Adj. Yield: 54.6 BU/acre, Plants/ft²: 3.0

- **50P SR; 2.5lb seed**
  - Adj. Yield: 55.6 BU/acre, Plants/ft²: 2.5

Legend:
- **Red** - Adj. Yield - 3320
- **Blue** - Adj. Yield - DK
- **Pink** - Avg. Plant/ft² - 3320
- **Light Blue** - Avg. Plant/ft² - DK

**P**: lbs P₂O₅
2018 - Canola - P/Seeding Rate - Yield

Confidence: 90%
Yield LSD: 2.6
Plants LSD: 0.9

Adj. Yield - 3320
Adj. Yield - DK
Avg. Plant/ft2 - 3320
Avg. Plant/ft2 - DK

BU/acre

25P SR; 25P MRB;
5lb seed

25P SR; 25P MRB;
2.5lb seed

P: lbs P₂O₅
Confidence 90%
Yield LSD 2.6
Plants LSD 0.9

2018 - Canola - P/Seeding Rate - Yield

Adj. Yield - 3320
Adj. Yield - DK
Avg. Plant/ft^2 - 3320
Avg. Plant/ft^2 - DK

55.0 53.4
50P SR; 5lb seed

55.6 54.8
50P SR; 2.5lb seed

P: lbs P_2O_5
Supporting Research

Western Applied Research Corporation (WARC) - 2015

• Applied 0, 18, 35, and 70lbs P$_2$O$_5$/acre

• Placed in the seed row
### Plant Count

<table>
<thead>
<tr>
<th>Phosphorus Rate (PR)</th>
<th>&lt;.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 kg P₂O₅</td>
<td>58ᴬ</td>
</tr>
<tr>
<td>20 kg P₂O₅</td>
<td>53ᴬ</td>
</tr>
<tr>
<td>40 kg P₂O₅</td>
<td>45ᴮ</td>
</tr>
<tr>
<td>80 kg P₂O₅</td>
<td>37ᶜ</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>SR* PR</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0986</td>
</tr>
</tbody>
</table>
Figure 3. The effect of P rate (kg/ha) on canola yield and thousand kernel weight at Scott SK, 2015.
Independent Research

Indian Head Agriculture Research Foundation (IHARF) - 2015

- Applied 18, 35, 53, 70, and 88 lbs P_2O_5/acre
- Placed in the seed row or in the side-band
Yield

- P Rate vs Side-Band
- P Rate vs Seed-Placed

Seed Yield (kg/ha)

Phosphorus Rate (kg P₂O₅ ha⁻¹)

Equations:
- $y = 2801 + 7.645x - 0.0463x^2$ ($R^2 = 0.710$)
- $y = 2800 + 7.701x - 0.0427x^2$ ($R^2 = 0.813$)
Conclusion

- Did not find a correlation of plant stand to yield
- Decreasing seed rate influenced plant stand the most
- Increasing seed placed phosphorus also decreased plant count, but not as much as seeding rate
- The combination of low seeding rate and high seed placed phosphorus decreased plant stand the greatest
- Row spacing and proximity of nitrogen to the seed row reduced plant stand, but can not determine between the two
Recommendations

- If a producer is looking to decrease seeding rate, they must take into consideration other controllable factors at the time of seeding including:
  - seed placed phosphorus
  - row spacing
  - nitrogen placement

- Lower plant counts lead to longer maturity which increases end of season frost risk
2018 - Canola - Demonstration

ADJ Yield - 3320

Plant/ft² - 3320

BU/acre

Plants/ft²

SR: 15P  
100P SR  
150P SR  
200P SR  
1.5lb seed; 15P SR; 35P MRB  
15P SR; 0 N

P: lbs P₂O₅   SR: Seed Row   MRB: Mid-Row Bander
Thank you!

References