CANOLA: ARE SAFE RATES OF P CHANGING?

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WARC
Scott, SK
CURRENT RECOMMENDATIONS

Safe Rates of $P_2O_5$

- 17 to 22 kg $P_2O_5$ / ha
- 28 kg $P_2O_5$ / ha under good moisture

Removal Rates

- 1-1.2 kg $P_2O_5$ / bu > Safe Rate

Safe rates of $SO_4^-$ $S$

- 11 kg $S$ / ha

Typical Recommendation

- 15- 30 kg $S$ / ha
OBJECTIVES

- Are current P fertilizer recommendations adequate for high yielding cultivars?

- Does all fertilizer P need to be seed placed or is side banding equally effective?

- Are current recommendations regarding safe rates of P and S suitable for typical knife or hoe openers in use today?
EXPERIMENTAL DESIGN

- 3 Sites: Scott, Indian Head, & Melfort
- Trial Period: 2016, 2017, 2018
- RCBD 4 Replicates
- 2-Way Factorial
  - Rate: 0, 20, 40, 60, 80 kg/ha P$_2$O$_5$ & 15 S
  - Placement: Sideband (SB) & Seed-Placed (SP)
- Data Collection
  - Plant Density: 2,4,6 WAP
  - Biomass: 6 WAP
  - Days to Maturity: 60% SCC
  - Yield
  - Green Seed
  - TKW
## TREATMENT APPLICATION

<table>
<thead>
<tr>
<th>Treatment #</th>
<th>kg/ha P₂O₅</th>
<th>Placement</th>
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<tbody>
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<td>12</td>
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<td>15</td>
<td>80 &amp; 15S</td>
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</table>
Scott

- SBU 10%
- Loam

Indian Head

- SBU 6%
- Clay Loam

Melfort

- SBU 8%
- Clay Loam
## Preliminary Results: Scott

<table>
<thead>
<tr>
<th>Fertilizer Rate (Rt)</th>
<th>Plant Density (plants/m²)</th>
<th>Dry Weight (kg/ha)</th>
<th>P Concentration (%)</th>
<th>DTM -</th>
<th>Yield (kg/ha)</th>
<th>Green Seed (%)</th>
<th>TKW (g/1000s)</th>
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<tbody>
<tr>
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<td>&lt;0.0001</td>
<td>0.0238</td>
<td>&lt;0.0001</td>
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<tr>
<th>Placement (Pc)</th>
<th>Plant Density (plants/m²)</th>
<th>Dry Weight (kg/ha)</th>
<th>P Concentration (%)</th>
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<th>Green Seed (%)</th>
<th>TKW (g/1000s)</th>
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<tbody>
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<td>0.6762</td>
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<td>0.7943</td>
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<td>0.9483</td>
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<tr>
<th>Rt * Pc</th>
<th>Plant Density (plants/m²)</th>
<th>Dry Weight (kg/ha)</th>
<th>P Concentration (%)</th>
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<th>Green Seed (%)</th>
<th>TKW (g/1000s)</th>
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<td>0.004</td>
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PLANT DENSITY

$R^2 = 0.8834$

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<tbody>
<tr>
<td>kg/ha P$_2$O$_5$</td>
<td>12%</td>
<td>18%</td>
<td>21%</td>
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<td>26%</td>
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<td>Plant Density (plants per sq. m)</td>
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<td>Dry Weight (kg per ha)</td>
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**DRY WEIGHT**

<25%

<37%
DAYS TO MATURITY

± 3 days

Days to Maturity

Fertilizer Rate (kg P₂O₅ per ha)
SEED YIELD & GREEN SEED

Yield (bu per acre) vs. Green Seed (%)

5 bu/ ac

1 bu/ ac

kg/ ha P₂O₅ Placement

r = -0.80
# Preliminary Results: Indian Head

<table>
<thead>
<tr>
<th>Fertilizer Rate (Rt)</th>
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<th>P Concentration (%)</th>
<th>DTM -</th>
<th>Yield (kg/ha)</th>
<th>Green Seed* (%)</th>
<th>TKW* (g/1000s)</th>
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</thead>
<tbody>
<tr>
<td>0.0026</td>
<td>0.1937</td>
<td>0.0019</td>
<td>0.1189</td>
<td>0.4788</td>
<td>0.331</td>
<td>0.202</td>
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</table>

| Placement (Pc) | 0.7697 | 0.8954 | 0.9237 | 0.6638 | 0.9084 | 0.392 | 0.310 |

| Rt * Pc         | 0.3572 | 0.3092 | 0.8072 | 0.3661 | 0.7712 | 0.310 | 0.838 |

* 2016 data only
PLANT DENSITY

Fertilizer Rate (kg P$_2$O$_5$ per ha)

Plant Density (plants per sq. m)

R$^2 = 0.5583$

2 WAE  4 WAE  6 WAE  Post Harvest

15%  8%  25%
**DRY WEIGHT**

- **Dry Weight (kg per ha)**
  - 0
  - 20
  - 40
  - 60
  - 80
  - 0 & 15S
  - 20 & 15S
  - 40 & 15S
  - 60 & 15S
  - 80 & 15S

- **P Concentration (%)**
  - 0
  - 0.1
  - 0.2
  - 0.3
  - 0.4
  - 0.5
  - 0.6
  - 0.7

24% highlighted at 60 kg per ha.
PRELIMINARY RESULTS: MELFORT
PLANT DENSITY

Plant Density (plants per sq. m)

Fertilizer Rate (kg P₂O₅ per ha)
**Dry Weight & P Concentration**

![Graph showing dry weight and P concentration across different conditions. The graph indicates that at 0 and 15s, the dry weight is around 2000 kg/ha, with a P concentration of 41%. At 20 and 15S, the dry weight is around 2500 kg/ha, with a P concentration of 38%. The graph also shows a trend where dry weight increases with an increase in P concentration.](image-url)
SEED YIELD & GREEN SEED

Yield (bu per acre) vs Fertilizer Rate (kg P2O5 per ha)

- Yield levels increase with fertilizer application.
- Highest yield observed at 80 kg P2O5 per ha.
- Green seed percentage remains relatively constant across fertilizer rates, with slight variations.

Fertilizer Rate (kg P2O5 per ha):
- 0
- 20
- 40
- 60
- 80
- 0 & 15S
- 20 & 15S
- 40 & 15S
- 60 & 15S
- 80 & 15S
Effects of P & S were Site Dependent

- **Scott:**
  - Placement & Rate Interaction
    - Side-banding higher rates effective
    - >40 kg/ha
    - S above recommended rate negative effects

- **Indian Head**
  - Rate Effect
    - Early season effect
    - Yield & GS unaffected: 4 bu/ac difference

- **Melfort**
  - Rate Effect
    - > 40 $P_2O_5$ greatest yield
    - S applications < $P_2O_5$ alone
FUTURE RESEARCH

- Are current P fertilizer recommendations adequate for high yielding cultivars?
  - >40 kg/ha $P_2O_5$

- Does all fertilizer P need to be seed placed or is side banding equally effective?
  - Location dependent? Scott > Melfort > Indian Head

Factors to Consider:  
SOIL TEXTURE  
SOIL MOISTURE

- Are current recommendations regarding safe rates of P and S suitable for typical knife or hoe openers in use today?
  - 17 to 22 kg $P_2O_5$ / ha VS. >40 kg $P_2O_5$ / ha
ACKNOWLEDGEMENTS

SaskCanola

AgriARM

IHARF

Government of Saskatchewan

Ministry of Agriculture

Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada

WARC