Chloride and Canary Seed

William May
AAFC
Indian Head
<table>
<thead>
<tr>
<th>Soil test nutrient levels and physical characteristics</th>
<th>Indian Head</th>
<th>Melfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride (kg ha(^{-1}))</td>
<td>2015 2016 2017 2018</td>
<td>2015 2017</td>
</tr>
<tr>
<td>0-15 cm</td>
<td>2.04 7.95 7.34 11.21</td>
<td>4.95</td>
</tr>
<tr>
<td>0-60 cm</td>
<td>. 25.04 26.4 20.4</td>
<td>16.43</td>
</tr>
<tr>
<td>Chloride in Leaves at Anthesis(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No fertilizer</td>
<td>0.37a 0.34a 0.29a 0.33a</td>
<td>0.03b</td>
</tr>
<tr>
<td>Cl, N, P, K and S</td>
<td>0.30a 0.26a 0.37a 0.26a</td>
<td>0.22a</td>
</tr>
<tr>
<td>Chloride in Whole Plant at Anthesis(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No fertilizer</td>
<td>0.55b 0.38b 0.75a 0.09b</td>
<td>0.03b</td>
</tr>
<tr>
<td>Cl, N, P, K and S</td>
<td>0.93a 0.62a 0.89a 0.27a</td>
<td>0.44a</td>
</tr>
<tr>
<td>Chloride in Leaves During Seed Filling (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No fertilizer</td>
<td>0.20a 0.35a 0.23a 0.44a</td>
<td>0.04b 0.02a</td>
</tr>
<tr>
<td>Cl, N, P, K and S</td>
<td>0.23a 0.26b 0.12b 0.20b</td>
<td>0.15a 0.04a</td>
</tr>
<tr>
<td>Chloride in Whole Plant at Seed Filling (%)</td>
<td></td>
<td></td>
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<tr>
<td>No fertilizer</td>
<td>0.25 0.45</td>
<td>0.03b</td>
</tr>
<tr>
<td>Cl, N, P, K and S</td>
<td>0.30 0.55</td>
<td>0.15a</td>
</tr>
</tbody>
</table>
Grain Yield (lb/acre)

<table>
<thead>
<tr>
<th></th>
<th>Lower Slope</th>
<th>Upper Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>P</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>CL</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
Chloride Concentration in the Leaves of Canaryseed Grown on a Slope from Bottom to Top
Chloride Concentration in the Leaves of Canaryseed Grown on a Slope from Bottom to Top

Anthesis

- No Chloride
- Chloride

Seed Filling

- No Chloride
- Chloride

Bottom, Lower, Middle, Upper, Top

Chloride (%)
Chloride Concentration in the Heads of Canaryseed Grown on a Slope from Bottom to Top

Anthesis

<table>
<thead>
<tr>
<th></th>
<th>BOTTOM</th>
<th>LOWER</th>
<th>MIDDLE</th>
<th>UPPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Chloride</td>
<td>0.20</td>
<td>0.15</td>
<td>0.12</td>
<td>0.10</td>
</tr>
<tr>
<td>Chloride</td>
<td>0.28</td>
<td>0.25</td>
<td>0.18</td>
<td>0.13</td>
</tr>
</tbody>
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Seed Filling

<table>
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<tr>
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<th>UPPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Chloride</td>
<td>0.15</td>
<td>0.12</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>Chloride</td>
<td>0.22</td>
<td>0.19</td>
<td>0.15</td>
<td>0.12</td>
</tr>
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</table>
Chloride Concentration in Mature Seed of Canaryseed Grown on a Slope from Bottom to Top
### Soil test nutrient levels and physical characteristics

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Conclusion

• The slope is having an impact on Chloride concentration in canaryseed

• The addition of Cl fertilizer increased Cl levels in the leaves and heads.
Question

• What is the concentration of Chloride in canaryseed is required?
• When is it required?
• Would providing more Chloride in the upper slope position make a difference in yield?
• Was this due to the 2.5 inches of rain received in August?
• Does it make sense to apply chloride as a variable rate across the field?
INTERCROPPING

William May and Michelle Hubbard

AAFC

Indian Head and Swift Current

Co-authors: L. SHAW

Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Intercropping

• Intercropping can be defined as growing two or more crop species together
Intercropping Chickpea and Flax

Objectives

• To develop an agronomic system for intercropping chickpea with flax. Why? (William May)

• To determine if intercropping can be used to reduced disease pressure in chickpeas. Why? (Michelle Hubbard)

• To determine if the area of adaptation for chickpeas can be expanded

• To increase the production of flax in western Canada
Intercropping Chickpea and Flax

1) **Crop Placement** (special arrangement)
   - Intermixed (both crops in same row)
   - Single alternate rows

2) **Flax seed density**
   (seeds m\(^{-2}\))

| a. 0   | 0    |
| b. 75  | 5 (2018) |
| c. 150 | 10   |
| d. 300 | 19   |
| e. 600 | 38   |

3) **Nitrogen Rate** (kg ha\(^{-1}\))

| 0   | 0  |
| 60  | 60 |

4) **Flax Mono Crop** (2018)
Locations

- Indian Head
- Redvers
- Swift Current
- Saskatoon
- Melfort
Funding

ADOPT
Saskatchewan Pulse Growers
Adopt a plot

Current funding
ADF
WGRF
Saskatchewan Flax Development Commission
A, 0 flax, 0 N
A, 0 flax, 60 N
1, 75 flax, 0 N
I, 75 flax, 60 N
A, 75 flax, 60 N
A, 300 flax, 60 N
A, 600 flax, 60 N
Chickpea Plant Density

Flax Seeding Rate

IH 2019
Red 2019
IH 2018
Red 2018
IH 2017
Red 2017
Flax Plant Density

Flax Seeding Rate

Plants/m²

IH 2019
Red 2019
IH 2018
Red 2018
IH 2017
Red 2017
Optimal
Grain Yield Indian Head 2017

Grain Yield Kg/ha

Flax Seeding Rate

Chickpea Yield
flax yield
Grain Yield Indian Head 2018

Grain Yield Kg/ha

Flax Seeding Rate

C Mixed - C Alt Rows - Flax Alt row - Flax mix - Mono Flax
Grain Yield Redvers 2018

Grain Yield Kg/ha

Flax Seeding Rate

Mono Flax
Chickpea Yield
flax yield
Grain Yield Indian Head 2019

Flax Seeding Rate

- C Mixed
- C Alt Rows
- Flax Alt row
- Flax mix
- Mono Flax

Grain Yield Kg/ha
Grain Yield Swift Current 2019

- Mono Flax
- Chickpea Yield
- F Alt Row
- F mix

Grain Yield Kg/ha vs. Flax Seeding Rate

- 0 Kg/ha
- 75 Kg/ha
- 150 Kg/ha
- 300 Kg/ha
- 600 Kg/ha
- 625 Kg/ha
Conclusions - Bill

• Just getting started
• Focus
  – Chickpea Yield, Maturity, Green Seed
  – Flax Yield
• Flax Seeding Rate is the Driver
Conclusions

- Intercropping with flax has potential as a tool to manage Ascochyta blight in chickpeas
- Specifically
  - ↓ incidence, even when disease pressure is low
  - ↓ severity under moderate disease
Conclusions and Questions

• Other factors (row placement and N fert.) do not impact disease
  – At low to moderate pressure
  – May have impact at high disease pressure
  – Impact some aspects of plant growth and agronomy
    • Branching, LER
  – But branching etc. may or may not be important in disease
  – If not these traits, what is?
  – **How** might intercropping help manage Ascochyta?
Acknowledgments

Swift Current:
Technicians: Lee Poppy
General labor: Eric Walker
Students: Ben Kellough, Alex Menun

Redvers:
Technician: Elijah Leatherdale
Other staff: Gordon Leatherdale, Pat Leatherdale
Intern: Louis Gegu

Indian Head:
Technicians: Rebecca Davies, Orla Willoughby, Randy Shiplack
Other staff: Kevin Willoughby, Kathy Ringdal, Joanne MacKay