Intercropping Chickpea and Flax
Agri-Arm Research Update
Jan 15, 2015
ADOPT Project
Reasons to Consider Intercrops

- Agronomic Obstacles
  - Weeds, Disease pressure, Maturity
- Possibility of Over-Yielding
- Biodiversity
- Desire to complicate your life??
Obstacles to Intercropping

- Both must be compatible with herbicide
- Complicates seeding and harvest
- Over-yielding is elusive and inconsistent
- Practical separation of harvested product
Chickpea-Flax Combination

Why this combo?

• High value chickpeas, large agronomic problems
• Flax as ‘nurse crop’ for chickpea; flax yield is a bonus
• Herbicide: Authority pre-seed registered on both
• Low levels of shattering prior to harvest for both
• Low cost of flax seed

Potential Benefits:

• Late competition affects chickpea maturity ??
• Lower chickpea disease pressure ?? (Aschochyta blight)
• Both are Arbuscular Mycorrhiza Fungi (AMF) associated
  ◦ Sharing fixed N through fungus ??
Objectives of studies:

- Investigate the possibility that area of adaptation can be increased
- Investigate the effect on yield and disease incidence
The yield was 1500 lb/ac of harvested chickpea.
INTERCROPPING
CHICKPEA FLAX TRIAL –
2013, 2014 REDVERS

3 rates of Kabuli Chickpea
3 rates of Desi Chickpea

Compared with

Monocropped Flax (high N)
Monocropped Flax (low N)
Monocropped Kabuli
Monocropped Desi

Locations in 2014:
Redvers, Indian Head, Scott, Outlook,
Swift Current
MATERIALS AND METHODS – REDVERS 2014

- CDC Alma Kabuli Chickpea
- CDC Cory Desi Chickpea
- Three target seeding rates for intercrops
  - 30 pl/m2
  - 40 pl/m2
  - 50 pl/m2
- Monocrop seeding rates were 40 pl/m2 chickpea
- Flax
  - 40 lb/ac intercrop
  - 56 lb/ac monocrop
CHICKPEA – FLAX TRIALS

- Lessons from 2014
  - Don’t put trial on canola stubble (Scott location lost)
  - Chickpeas do poorly with 500 mm of rainfall.
MONOCROPPED FLAX (LOW N)

- Poor competition with weeds
- Low yield
Monocropped Flax – 50 lb/ac N
DESI CHICKPEA (40 PL/M2) AND FLAX

• Faster row closure
• Weed competition
• Canopy structure is altered
REDVERS 2014 – TRIAL YIELDS

Yield (kg/ha)

- Flax with N
- Flax no N
- DI 3
- DI 2
- DI 1
- KI 3
- KI 2
- KI 1
- D Monocrop
- K Monocrop

Chickpeas
Flax

Dimethyl formamide (DMF) provides a yield advantage for KI 3, KI 2, and KI 1.
ADDITIONAL REDVERS 2014 RESULTS

- Plant Count – variable (p= <0.1)
- Disease Incidence on Aug 30 (% severity) significant (p=<0.01)
- TKW – not significant
- Mature Pods on Sept 24 (%) – not significant
Disease incidence was reduced in intercrop plots

Chickpea Aschocyta
Incidence on Aug 30 (% severity):

51% for monocrop plots
17% for intercrop plots
- Significant difference
Horizontal leaf structures seal in humidity

Lodging was 2.5 in monocrops and averaged 1.5 in intercrop
Highest yields were in the highest elevation plots low disease incidence.

- Moisture
- Soil fertility

- 1460 kg/ha desis
- 300 kg/ha flax
<table>
<thead>
<tr>
<th>Chickpea</th>
<th>Desi Intercrop</th>
<th>Desi Monocrop</th>
<th>Kabuli Intercrop</th>
<th>Kabuli Monocrop</th>
<th>Flax (black soil zone)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yield</strong></td>
<td>1200 lb/ac 12 bu flax</td>
<td>1100 lb/ac 12 bu/ac flax</td>
<td>1400 lb/ac 12 bu/ac flax</td>
<td>1300 lb/ac</td>
<td>24 bu/ac</td>
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<tr>
<td><strong>Revenue</strong></td>
<td>$315 + 150 = $465/ac</td>
<td>$297</td>
<td>$490 + 150 = $640/ac</td>
<td>$455</td>
<td>$300</td>
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<tr>
<td><strong>Seed costs</strong></td>
<td>36 + 11</td>
<td>36</td>
<td>69 + 11</td>
<td>69</td>
<td>11</td>
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<tr>
<td><strong>Fertilizer</strong></td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>49</td>
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<td><strong>Herbicide/Fungicide</strong></td>
<td>36</td>
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<td>36</td>
<td>53</td>
<td>14</td>
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<tr>
<td><strong>Inoculant</strong></td>
<td>11</td>
<td>11</td>
<td>25</td>
<td>25</td>
<td>11</td>
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<tr>
<td><strong>Total Input Cost</strong></td>
<td>107</td>
<td>96</td>
<td>143</td>
<td>160</td>
<td>74</td>
</tr>
<tr>
<td><strong>Return over inputs</strong></td>
<td>350</td>
<td>200</td>
<td>500</td>
<td>300</td>
<td>230</td>
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</tbody>
</table>
ONGOING GOALS

Identify combinations of production practices that work best for desi and kabuli intercrops with flax.
NITROGEN DYNAMICS ARE UNKNOWN

Moderate rate of Rhizobium inoculant used in trial.

Left – Intercropped Flax - Low N

Right – Monocropped Flax – Low N

SPG is funding an N15 study led by Dr. Fran Walley
  • Apply N15 and sample biomass from Chickpea intercropping trials
Colin Rosengren – production field, Midale area
BEST ADVICE SO FAR

- Use Authority herbicide unless organic producer
- Cereal stubble good – canola stubble bad
- Seed chickpeas deeper than flax and at same time
- Consider using N fertilizer instead of inoculant to assist with terminal stress
SERF – NEVER A DULL MOMENT
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