Growing Red Lentil in Alberta

How they are different from pea

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Agronomy Update
January 9th, 2018
Red Lentil

- **Background**
  - Important commodity for nutritional and crop rotational benefits around the world
  - Red lentil represents the majority of global consumption, production and trade
  - Majority (90%) of Canadian lentil production is in Saskatchewan
  - In 2016, Alberta lentil acreage exploded!
Red lentil in Alberta

• Background
  – This increased the number of Alberta pulse producers with questions on how to grow this crop
  – We had just completed a province wide project
    • Testing agronomic practices on Clearfield® red lentil
  – Able to provide basic local agronomic information.
  – Assumption was that they were very similar to field pea
    – There are a lot of similarities
    – There are some differences too
Lentil Acreage…

Acreage has varied across Alberta

<table>
<thead>
<tr>
<th>Year</th>
<th>AFSC Lentil Acres in Alberta</th>
<th>Extrapolated Acres assuming 75% of Acres are Insured</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>33,000 ac</td>
<td>45,000 ac</td>
</tr>
<tr>
<td>2010</td>
<td>105,000 ac</td>
<td>140,000 ac</td>
</tr>
<tr>
<td>2011</td>
<td>98,000 ac</td>
<td>130,000 ac</td>
</tr>
<tr>
<td>2012</td>
<td>85,000 ac</td>
<td>113,000 ac</td>
</tr>
<tr>
<td>2013</td>
<td>95,000 ac</td>
<td>127,000 ac</td>
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<tr>
<td>2014</td>
<td>110,000 ac</td>
<td>147,000 ac</td>
</tr>
<tr>
<td>2015</td>
<td>165,000 ac</td>
<td>220,000 ac</td>
</tr>
<tr>
<td>2016</td>
<td>420,000 ac</td>
<td>565,000 ac</td>
</tr>
<tr>
<td>2017</td>
<td>452,000 ac</td>
<td>485,000 ac</td>
</tr>
</tbody>
</table>
What happened in 2016

• Research had demonstrated success:
  – 5 locations across the province:
    – Falher, St. Albert, Killam, Brooks, Lethbridge

• Had some important agronomic information

• Increased producer confidence

• Price
  – Increased from about $0.18 to $0.40 / lb
  – Average yield of 2000 lbs/ac
What happened in 2016

• Overall success was good
  – Heard some good feedback from some surprising areas
    • Peace region
    • St. Albert

• There was also lentil grown in areas where they should not have
  – Were some wrecks

• Why were there wrecks?
  – Weather
  – Inexperienced growers
  – Differences between lentil and field pea
Growing red lentil successfully

• Field selection
• Seeding rate
• Fertility
• Weed control
• Disease management
• Successful harvest
• Right climatic conditions
Field selection

- Sandy loam / loam
- Well drained
- Will not tolerate wet feet
  - Low lying fields are not a good choice
- Cannot tolerate excess moisture
- Are quite drought tolerant
- Can withstand higher temperatures during the growing season
Field selection

- Will not tolerate salinity
- Free of stones and dirt lumps
- Relatively free of perennial weeds
  - Canada Thistle
  - Sow thistle
  - Dandelion
  - Quackgrass
- Watch the herbicide rotations
  - Cropping restrictions
- Avoid fields with high nitrogen levels
Seeding

- Cool season crop early
  - Can withstand 4°C of frost

- Seed at 2” (5cm) deep
  - into cool moist soils

- Inoculate with rhizobia

- Use caution with air seeders
  - Can damage the seed if airflow too high

- Seeding rate of 11-12 ft²
  - check the TSW
  - Rate can vary from 50-95 lbs or 0.8-1.6 bu per acre
Seeding rate research

• Tested a range of populations from 4 - 20 plants ft\(^{-2}\)
• Plants can and will compensate
• Noticed differences plant structure
  – At the 4 plants ft\(^{-2}\) rate the plants were short, bushy, lots of tillers, and thick stems
  – At the 20 plants ft\(^{-2}\) rate the plants were thin, tall, spindly, with very few lower leaves
• Poor weed competitors
• Optimum seeding rate is 12 plants ft\(^{-2}\)
Land rolling

- Land rolling is highly recommended
  - For ease of harvest
    - manages rocks and lumps
    - increases harvest speed
    - reduces sickle and guard damage

- Use caution under wet conditions
  - Soil compaction
  - Compromise the plant
    - Disease will set in
Land rolling

- Pre-emergence timing is best
- Unless...
  - Extremely wet conditions
    - Sink and leave ruts
  - Extremely dry / sandy conditions
    - Wind erosion
    - Not a great concern with direct seeding
  - Clay soils prone to crusting
- Up to the 6th node is safe
- Leave time between rolling and herbicide application
Fertility

• Phosphorus is the most important
  – Lentil crop requires quite a bit
  – About 0.8 lbs bu⁻¹ P₂O₅
  – Safe rate is 17 lbs ac⁻¹ with the seed
  – Under good moisture conditions
  – Dry conditions increase possible seed damage
  – Side band additional phosphorus requirements
Fertility

- **Additional Potassium is usually not required**
  - Unless there is a known deficiency
  - About 2.6 lbs bu\(^{-1}\) K\(_2\)O

- **Sulphur is required in fairly high amounts**
  - About 0.3 lbs bu\(^{-1}\)
  - Soils usually have enough available
  - Addition of S is not common

- **Micronutrient requirements are of minor concern**
  - Deficiencies are not documented as widespread
  - Some have been suspected
  - More research needs to go into this area
Fertility

• What about Nitrogen?

• Lentil requirement is 3.0 lbs bu\(^{-1}\)

• Pulse crops produce their own N from the air
  – Rhizobial bacterial inoculant

• Anecdotal information suggested that starter N would be beneficial for lentil
  – Different from all other pulses

• Looked at the research

Nitrogen

14.007
Nitrogen and inoculation research

• Is there a benefit to starter nitrogen?
  – How much is enough?
  – How much is too much?

• With additional N present…
  – What is the effect on…
    • nodulation
    • growth
    • yield

• Do we really need to inoculate?
Nitrogen and inoculation research

• Inoculation is important…
  – Better nodulation
  – Higher yields
Nitrogen and inoculation research

- Inoculated treatments had higher yield than non-inoculated treatments
Nitrogen and inoculation research

- Inoculation is important…
  - Can’t replace the natural symbiotic partnership

- Starter N?

- Small amount (15 lbs ac\(^{-1}\)) starter nitrogen is OK
  - Didn’t see positive effect every time – overall we did

- Don’t go above 30 lbs ac\(^{-1}\)
  - Yields are reduced
Nitrogen and inoculation research

As nitrogen rates increased, nodulation decreased…
Weed control

• Lentil are poor competitors

• Clearfield® trait has given us more options
  – Have the “imi” group 2 resistance

• Products available:
  – Grassy weeds:
    • Have a number that work well
  
  – Broadleaf weeds:
    • Sencor*
    • Ares, Odyssey, Solo
Weed control research

• These products can run a bit “hot”:
  – Odyssey (imazamox)
  – Solo (imazamox + imazethapyr + tepraloxydim)
  – Ares (imazamox + imazapyr)

• Do these herbicides…?
  – affect nodulation
  – stunt growth
  – lower yield
Weed control research

• No consistent differences:
  – plant growth
  – days to flower or maturity

• Nodulation and yield were affected sometimes
  – compared to highly managed control plots
  – varied by year and location
  – not consistent

• More important to control the weeds
• All formulations worked
Lentil Diseases

- **Ascochyta**
  - one to watch for
  - good resistance in the germplasm
  - potential to be very destructive

- **Anthracnose**
  - potentially an economic problem
  - very few reports of significant impact in AB

- **Botrytis Grey mold**
  - Widespread in a wet year
  - Usually not of economic importance

- **Fungicide products available for these diseases**
Lentil disease concerns

- *Sclerotinia* white mould
  - Only real foliar disease concern at the moment
  - A huge economic problem in wet years
  - Fungicides work well
    - Quite a few products available
  - Must be applied before canopy closure

- Research that was done
  - Consistently saw white mold in St. Albert trials
    - Black soil zone
    - More moisture
    - Higher organic matter
Root rot diseases

- The root rot complex containing:
  - *Fusarium*
  - *Aphanomyces*

- Two main pathogen groups of focus
  - One very widely distributed and opportunistic
  - One highly aggressive on pea and lentil

- Occur together in fields
- Are very difficult to distinguish
- Act synergistically
Aphanomyces – Why are we so concerned?

• Infection can occur at any time in the growing season
  – Infection is usually early
  – Symptoms compound later in the season (flowering)
• Produces long-living resting spores (8-10 years)
• Once diagnosed in a field there are really no options
• An in-crop fungicide application will have no effect
• No seed treatments registered for control of this disease
Harvest management

- Harvest can be tricky
- Short plants with pods low to the ground
  - Don’t tend to lodge
  - Do “shrink”
  - Lifters will help
  - Flex headers will help
- Harvest at 16-18% moisture
  - Store at 14%
- Don’t “handle” them too much
Harvest management

- Mature earlier (~ 95 days) than you may expect
- Prone to shattering
- Learn when to desiccate
  - When plants still look very green
  - Pods are brown, mature and seeds “rattle”
- Dessiccate them
  - with Reglone (diquot)
  - glyphosate not recommended
  - Heat® (saflufenacil) not registered
  - Glufosinate
- Quality crop in the bin = success
Red Lentil vs Field Pea

• How do they differ?
  • Well drained fields are more important
  • Lighter soils are more important
  • Seeding rate is higher (11-12 plants ft\(^{-2}\))
  • Starter N is beneficial
  • Rolling your fields is necessary
  • Herbicides are more limited
  • Clean fields more important
    • Control perennials in the fall
    • Pre-seed burn down in spring
Red Lentil vs Field Pea

• How do they differ?
  • The foliar diseases vary somewhat
    • *Ascochyta* being the only similar one
    • *Sclerotinia* being more of a concern
  • *Aphanomyces* may/may not be more problematic than in pea
    • Biggest disease concern at the moment
  • Harvest can be trickier
  • Desiccation is more important
  • Lentils are slightly harder to handle
Conclusions

• Have the recipe for the Alberta soil zones
• Have had some success and great crops
• Having some trouble with our peas right now
  • 50% import taxes from India
  • Fumigation requirements
  • Competition with Black Sea area
• So far lentil isn’t facing *all* these barriers
  • 30% tax on lentil
  • Black sea area not focused on lentil… yet
Final Comments…

• Red lentil is a pulse commodity in high demand
• Alberta producers are always looking for alternative rotation crops
• Red lentil is certainly an option that Alberta producers should consider
• Price is decent right now
• Give lentil crop the additional attention it requires
• Can be successful – make money!
Thanks!

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