FABA BEAN AGRONOMY

Sherrilyn Phelps, MSc., P.Ag., CCA

Feb 17, 2017
TOPICS TO COVER

• Interest and acres
• Agronomy
• Experience

Source: S. Phelps, SPG 2015
### INTEREST IN FABA BEANS

Acreage in Western Canada
- based on Crop Insurance Acreage

<table>
<thead>
<tr>
<th>Year</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>80,000</td>
<td>20,000</td>
<td></td>
<td>100,000</td>
</tr>
<tr>
<td>2015</td>
<td>110,000</td>
<td>61,792</td>
<td>9,040</td>
<td>&gt;180,000</td>
</tr>
<tr>
<td>2016</td>
<td>55,000</td>
<td>50,000</td>
<td>9,500</td>
<td>114,500</td>
</tr>
</tbody>
</table>
ACREAGE OF FABA BEAN W. CAN. (2012-2016)

Seeded Acres of Faba Beans

- AB
- SK
- MB
• Like moisture
• Tolerate flooding better than other pulses
• Prefer medium textured soils
• Black and Northern parts of dark brown soil zones
For full yield potential need lots of moisture!!

- 8-10 inches suggested
- Spring soil moisture + rainfall or **irrigation**

44.5 bu/acre

300 mm moisture (12”)

Alberta Agriculture
(1974-77, Vauxhall and Brooks)
Faba beans varieties have more tolerance than pea / lentil but similar to chickpea.
## ALTERNATIVE PULSE OPTIONS

### Resistance to Aphanomyces

<table>
<thead>
<tr>
<th>Crop</th>
<th>Disease reaction</th>
<th>Oospores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pea</td>
<td>Susceptible</td>
<td>Yes</td>
</tr>
<tr>
<td>Lentil</td>
<td>Susceptible</td>
<td>Yes</td>
</tr>
<tr>
<td>Cicer milkvetch</td>
<td>Susceptible</td>
<td>Yes</td>
</tr>
<tr>
<td>Dry bean</td>
<td>Variable</td>
<td>Few</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>Variable</td>
<td>Yes</td>
</tr>
<tr>
<td>Chickpea</td>
<td>Resistant</td>
<td>Few</td>
</tr>
<tr>
<td>Sainfoin</td>
<td>Resistant</td>
<td>Few</td>
</tr>
<tr>
<td><strong>Faba bean</strong></td>
<td><strong>Resistant</strong></td>
<td><strong>No</strong></td>
</tr>
<tr>
<td>Soybean</td>
<td>Non-host</td>
<td>No</td>
</tr>
<tr>
<td>Fenugreek</td>
<td>Non-host</td>
<td>No</td>
</tr>
</tbody>
</table>

*Source: Dr. Banniza & Dr. Chatterton*
STANDABILITY IS GOOD

Faba beans

Peas

Photo: S. Phelps, SPG from Medstead, September 2015
Faba bean are the highest N-fixing legume grain crop
### N fixed in Western Canada (dryland)

<table>
<thead>
<tr>
<th>Crop</th>
<th>lbs N / acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>100 - 250</td>
</tr>
<tr>
<td>Pea</td>
<td>50 - 150</td>
</tr>
<tr>
<td>Lentil</td>
<td>30 - 120</td>
</tr>
<tr>
<td>Chickpea</td>
<td>20 - 100</td>
</tr>
<tr>
<td>Dry Bean</td>
<td>5 - 70</td>
</tr>
<tr>
<td><strong>Faba Bean</strong></td>
<td><strong>80 - 160</strong></td>
</tr>
</tbody>
</table>

*Source: Dr. J. Schoenau, U of Saskatchewan*

Actual amount depends on inoculation/nodulation, environmental conditions, soil available N and other nutrients like P.
AGRÓNOMY OF FABA BEAN

Source: S. Phelps, SPG 2015
# CROP MATURITY

<table>
<thead>
<tr>
<th>Crop</th>
<th>Maturity (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola</td>
<td>88-100</td>
</tr>
<tr>
<td>SWS wheat</td>
<td>105</td>
</tr>
<tr>
<td>CPS wheat</td>
<td>101-103</td>
</tr>
<tr>
<td>HRS wheat</td>
<td>98-103</td>
</tr>
<tr>
<td>Barley</td>
<td>91</td>
</tr>
<tr>
<td>Oat</td>
<td>96</td>
</tr>
<tr>
<td>Peas</td>
<td>86-94</td>
</tr>
<tr>
<td>Flax</td>
<td>101</td>
</tr>
<tr>
<td>Canary Seed</td>
<td>104 – 106</td>
</tr>
<tr>
<td>Mustard</td>
<td>92-98</td>
</tr>
</tbody>
</table>

### Fababean

<table>
<thead>
<tr>
<th>Crop</th>
<th>Maturity (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fababean</td>
<td><strong>105-109</strong></td>
</tr>
<tr>
<td>Hemp</td>
<td>80-120</td>
</tr>
<tr>
<td>Corn</td>
<td>120</td>
</tr>
<tr>
<td>Soybean</td>
<td>119-124</td>
</tr>
<tr>
<td>Sunflower</td>
<td>108-119</td>
</tr>
<tr>
<td>Quinoa</td>
<td>90?–125</td>
</tr>
<tr>
<td>Camelina</td>
<td>90</td>
</tr>
</tbody>
</table>

**Note:** Colorado variety of Quinoa.
TYPES

Tannin (8-9%)
(brown seed coat & black dot)

Low Tannin (Zero) (1%)
(white flower & cream seed coat)
<table>
<thead>
<tr>
<th>Variety</th>
<th>Type*</th>
<th>Breeding Program/Distributors</th>
<th>Seed size</th>
<th>DTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowdrop</td>
<td>Low Tannin</td>
<td>University of Saskatchewan / SPG</td>
<td>335</td>
<td>104</td>
</tr>
</tbody>
</table>
| Snowbird     | Low Tannin | Limagrain Nederland  
Bob Park – Lacombe, AB                                            | 495       | 104 |
| Imposa       | Low Tannin | Limagrain Nederland  
Cyre Seed Farms                                                  | 695       | 107 |
| Tabasco      | Low Tannin | NPZ Lemke / DL seeds                                           | 530       | 106 |
| Taboar       | Tannin   | Globe Seeds - Netherland Terrramax                            | 480       | 107 |
| CDC Fatima   | Tannin   | University of Saskatchewan  
Legumex Walker                                                   | 520       | 105 |
| Malik (FB 9-4) | Tannin | University of Saskatchewan  
Saskcan Pulse Trading/AGT                                       | 680       | 104 |
| CDC SSNS-1   | Tannin   | University of Saskatchewan  
Meier Brothers                                                    | 335-350   | 105 |
<p>| Florent      | Tannin   | NPZ Lemke / DL Seeds                                           | 660       | 107 |
| Fabelle (low vicine) | Tannin | DL Seeds/ Stamp Seeds                                          | 533       | 105 |
| Vertigo      | Tannin   | DL Seeds                                                        | 571       | 106 |</p>
<table>
<thead>
<tr>
<th>Market Class</th>
<th>Variety Name</th>
<th>% of total acres</th>
<th>% Tannin class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low/Zero Tannin</strong></td>
<td>Snowbird</td>
<td>26%</td>
<td>59%</td>
</tr>
<tr>
<td></td>
<td>CDC Snowdrop</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tabasco</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td><strong>Tannin</strong></td>
<td>FB9-4</td>
<td>25%</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td>Taboar</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Florent</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>
CHALLENGE: SEEDING

- Target 45 plants/m² (4-5/ft²)
- Seed size varies = by variety and seed lot
- Challenge is getting enough seed without plugging
- 2.6 to 6.3 bushels per acre!!! (156 lbs to 378 lbs/acre)

<table>
<thead>
<tr>
<th>Variety</th>
<th>TKW (g)</th>
<th>kg/ha</th>
<th>bu/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malik (FB9-4)</td>
<td>680</td>
<td>360</td>
<td><strong>5.3</strong> (6.3)</td>
</tr>
<tr>
<td>Snowbird</td>
<td>495</td>
<td>262</td>
<td>3.9</td>
</tr>
<tr>
<td>Snowdrop</td>
<td>335</td>
<td>177</td>
<td>2.6</td>
</tr>
</tbody>
</table>
1. Plugging at opener

2. Plugging at secondary manifold

Distributor heads
Seeds can be damaged as they hit the distributor head.
Blockages occur at outlet holes.

Tubes
Hoses block on bends.

Seeding boot
Blockages occur, especially if boot narrows or changes in shape from circular to oval.

Seed box
Check for bridging, especially following transport.

Metering device
Check roller type for seed clearance and possible seed damage.
Check device can meter correct seeding rate.

3. Metering limitations & seed flow issues
1. PLUGGING AT OPENERS

- Narrow exit
- Collapsed hose
1. OPENER SOLUTIONS

- Use largest diameter for seed
- Use opener with straight delivery system
- Redesign hose clamp method or replace
- Watch turns

Morris

Bourgault
2. PLUGGING AT SECONDARY MANIFOLD

- Tower style suggested to have less issues compared to flat fan (anecdotal)
2. PLUGGING AT SECONDARY MANIFOLD

- Obstructions
- Blockage sensors
- Changes in direction
- Hose sagging
3. METERING SYSTEMS

• Use coarse/extra coarse rollers
• Good clearance is important
• Meter out of 2 tanks
• Increase air speed
• Decrease ground speed
4. OTHER SUGGESTIONS

- Decrease ground speed….*Takes extra time!*
- Seed in two passes….*Takes extra time!*
- Screen out largest seeds and seed only smaller ones
- *Slow down and take your time!*
Go slow!!! Check often!!!

Source: S. Phelps, SPG
FABA BEAN: SEED EARLY

32% yield advantage with early seeding

Germinate at soil temperatures of 3 degrees Celsius

Mark Olson, AARD
SEEDING

- **2-3 inches deep**
- **Cross pollinate** - Keep types/varieties separate by at least 100m (Dr. Vandenberg suggests 500m) or will have a lot of outcrossing
- **Seed treatments** – low tannin varieties higher risk (Apron products/ Stress Shield)
POTENTIAL FOR HUGE BIOMASS

Source: Olson, M.A.
2014

July 5, 2013

July 20, 2013
FERTILITY

Nutrient Removal Rates (lbs/bu)

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potassium</th>
<th>Sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pea</td>
<td>2.3</td>
<td>0.7</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Lentil</td>
<td>2.0</td>
<td>0.6</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Faba bean</td>
<td>3.0</td>
<td>1.2</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Canola</td>
<td>1.6</td>
<td>0.8</td>
<td>0.4</td>
<td>0.25</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.5</td>
<td>0.57</td>
<td>0.33</td>
<td>0.1</td>
</tr>
</tbody>
</table>

- 1.2 lbs P removed for every bushel of grain (50 bu crop = 60 lbs P)
- Max. safe rate seed placed P is 40 lb/acre actual (P+K)
- Use faba bean inoculant or pea/lentil for N(*Rhizobium leguminosarum*)
P Pulses do not respond well to addition of P fertilizer but are good scavengers and like “aged” fertility
  • acidify root zone and solubilize calcium phosphates that are common in our soils

consider P fertilizer as replacement strategy as we need to replace what is removed

faba beans remove 1.1 to 1.3 lbs of P2O5 for every bushel produced!
  • 50 bushel crop = 60 lbs removed
INOCULANT PRODUCTS

Rhizobium leguminosarum:
pea, lentil, faba, chickling vetch

Faba bean specific products:
BASF (formerly BeckerUnderwood) - Nodulator® peat
Monsanto Bio-AG (formerly Novozymes) - Tag Team granular
NO INOCULANT VS SEED APPLIED

Faba bean inoculant trial – G. Hnatowich, ICDC
Indian Head site July 21 2015
Inoculated vs No inoculant

Faba bean inoculant trial – G. Hnatowich, ICDC
Indian Head site July 21 2015

Source: S. Phelps, SPG 2015
RESIDUAL HERBICIDES

Year (or season) after application that faba beans can be grown

5 + years - Tordon 22K, Grazon (Spot treatments or broken pasture)

4 + years - Ally Toss-N-Go (cropland), Escort (broken pasture)
(persistence is extended when soil pH is 7.5 or greater)

2\textsuperscript{nd} season after application (ie. 18 months recropping)
Muster (Toss-N-Go / Gold II), Assert, Everest, Triton C
Clopyralid (<123 gai/ac)
(Lontrel, Curtail M, Prestige XC, Eclipse III, Flaxmax, Spectrum*)
Banvel II/Oracle (high rates >0.5L/ac)

PrePass (fall application)
2,4-D (high rates applied in fall)

Best Guess as little work on recropping to faba beans!!
## WEED CONTROL (REGISTERED PRODUCTS)

<table>
<thead>
<tr>
<th>Pre-Seed / Pre-Emergent</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim® / CleanStart® (carfentrazone)</td>
<td>14</td>
</tr>
<tr>
<td>Authority® (sulfentrazone)</td>
<td>14</td>
</tr>
<tr>
<td>Express® (tribenuron) + glyphosate</td>
<td>2, 9</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>9</td>
</tr>
<tr>
<td>Trifluralin</td>
<td>3</td>
</tr>
<tr>
<td>Trifluralin + Sencor® (metribuzin)</td>
<td>3, 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In-Crop</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basagran/Basagran Forte® (bentazon)</td>
<td>6</td>
</tr>
<tr>
<td>Odyssey® (imazamox + imazathapyr)</td>
<td>2</td>
</tr>
<tr>
<td>Poast Ultra® (sethoxydim)</td>
<td>1</td>
</tr>
<tr>
<td>Assure II (quizalofop)</td>
<td></td>
</tr>
</tbody>
</table>
WEEDS
PEST MANAGEMENT

Grow it…they will come……

Source: Olson, M.A.
2014
LYGUS

Most prevalent species in 2016 survey was *Lygus lineolaris* (tarnished plant bug)

**Grading**

1% No. 1 Canada

3% No. 2 or No. 3 Canada
OTHER INSECTS

Blister Beetles
Pea Leaf Weevil
Grasshoppers
Leafhoppers (AY)
Aphids

Source: S. Phelps, SPG
DISEASE

Chocolate Spot – botrytis
Ascochyta
Alternaria
Sclerotinia

NOT Disease = herbicide burn

Source: S. Phelps, SPG
LEAF BURNING = NOT CHOC SPOT

Source: S. Phelps, SPG 2015
DISEASE SURVEY - 2016

18 fields surveyed

- 2 fields had trace amounts in lower canopy
- 5 fields had low disease severity in middle
- 11 fields more severe disease in upper canopy
- Only 4 fields had severity ratings greater than 3 (22%) (RM 427/340)
- Botrytis found in 16/18 samples (5 to 100% incidence)
- Stemphylium found in 12/18 samples (5 to 60% incidence)
- Continuing survey for 2017 and evaluating for ascochyta and alternaria as well

Thanks to Dr. Banniza Lab for analysis, SCIC for samples
FUNGICIDES

Photos: K. Stonehouse, SMA (North of Tisdale)
EFFECT OF FUNGICIDE TIMING ON YIELD OF FABA BEAN (SCOTT AND OUTLOOK /2 OF 10 SITES YEARS; CDC SNOWDROP)

Source: J. Pratchler, MSc, U of S
FABA BEAN GROWTH STAGES
Seeding depth – 1.5 to 2”

Source: S. Phelps, SPG 2015
FROST & CUTWORMS
- REGROWTH FROM SEED

Source: S. Phelps, SPG 2015
4 TRUE LEAF

1 node/week

Source: S. Phelps, SPG 2015
FLOWERING

Start flowering 8-10 node stage = 12” high
Flowers located approx. 8”

**BBCH Staging guide suggests:**

**Start of flowering** – 1 flower open on 1 raceme per plant

**Full flower** - flowers open at 5 racemes/plant

**End of flower** - first pods visible
FLOWERING STAGES:
START  FULL  END
ONLY ABOUT ¼ OF FLOWERS PRODUCE PODS!

Flowers/pods abort:
- >27 degrees C
- Hot & dry during podding
- Lack of pollinators (bees)

Source: S. Phelps, SPG 2015
3-4 SEEDS PER POD AVERAGE

Source: S. Phelps, SPG 2015
HARVEST

- harvest aids when bottom pods are tan or black
- straight cut 6-8” off ground
  shorter straw = easier seeding into next spring
- 16% moisture is dry
- combine at 18-20% and aerate
- don’t use lifters (pop pods)

“Amazing to combine….quiet….just hear the grain coming in the tank”

Harvest Aid Products

| Glyphosate   |
| Reglone®    |
| Aim® / Cleanstart® |
EXPERIENCE – DRY SPRING (2015)

Source: S. Phelps, SPG 2015
Saskatoon (U of S)

Source: S. Phelps, SPG 2015

END OF JULY

Melfort (Randy Cay) – 50 bu/acre
FIELD VARIABILITY

Medstead (Terrel Hill)
35 to 65 bu/acre (58 pea)

Source: S. Phelps, SPG 2015
UNDER DRY CONDITIONS

20 bu/acre

Source: S. Phelps, SPG 2015
UNDER GOOD MOISTURE

Gary Hnatowich – Outlook Variety Trials

100 bu/acre

Source: S. Phelps, SPG 2015
WET + DRY CYCLES = POD SPLITTING

Source: S. Phelps, SPG 2015
SPRING FROST = LOW PODDING
- consider rolling ???

Source: S. Phelps, SPG 2015
FALL FROST = DAMAGE TO SEED

Source: S. Phelps, SPG 2015
OTHER ISSUES

• Yellowing with poor pod set (P?)
• Difficulty combining – silage like (Too Wet)
• Roots growing sideways (Compaction)
• Regrowth after desiccation
WE DON’T QUITE HAVE ALL THE ANSWERS YET......

- Fungicide timing and effectiveness
- Disease prediction/risk assessment
- Herbicide residue sensitivity
- Desiccation options
- Seeding rates by variety
- Fertility requirements & Inoculant options
- Impact of pollinators/bees
TIP FOR FABA BEANS

- Wetter or higher moisture capacity fields
- Avoid fields with residual herbicide use
- Seed early – tolerates cooler temperatures
- Know seed size – calculate seeding rates
- **Slow down and check often!**
- Heavy requirement for P (target removal rate of 1.1 to 1.2 lbs/bu)
- Monitor disease pressure / risk
- Desiccate/harvest aids if uneven maturity, lots of weeds present, or getting late in fall

[www.saskpulse.com](http://www.saskpulse.com)

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