A “Big Picture” Look at Pulse Production in Alberta

Agronomy Update
Lethbridge, Alberta
January 18th, 2017

Mark Olson, Unit Head
Alberta Agriculture and Forestry
Crops Research and Extension Branch
Food and Bio-Industrial Crop Section

Outline

1. Definition of pulse
2. Overview the industry
3. The Alberta potential
4. Market trends
5. Research priorities of the industry
6. New crop opportunities

Pulses

- the word pulse is derived from Latin “puls”, “pultis”, a thick soup.
- are the dried edible seeds of legumes which include field pea, lentil, dry bean, faba bean, chickpea, lupin and mung bean.
- legumes are crop plants that do not need manufactured nitrogen fertilizer due to a symbiotic relationship with certain bacteria known as rhizobia found on root nodules.
  - bacteria pulls nitrogen from the air we breath (78.1% nitrogen)
  - lowers carbon footprint in the entire crop rotation
- pulses are an important source of protein and fiber, low in fat which have numerous positive health implications for diabetes, obesity, heart disease, high blood pressure, celiac disease (“gluten free”) and mortality

Seeded Pulse Acres 2016 for Prairie Provinces and Western Canada

	MB	SK	AB	AB % of crop kind in W.Can	W Canada
Dry bean	116,800 (1,695 lbs/acre)	10,000[8] (1,800 lbs/acre)	44,973 46,882[1] 55,000[2] (2,587 lbs/acre)	**30%**	165,854 - 181,800
Chickpea	-	159,877[8] (1,597 lbs/acre)	- 11,728[3]	**7%**	159,877 - 171,605
Faba bean	-	47,300 (55/bushels)	49,915 55,255[4] (56 bu/acre)	**55%**	97, 215 – 102,555
Lentil	-	5,274,958 (1,614 lbs/acre)	564,882 417,749[5] (1,704 lbs/acre)	**10%**	5,839,841
Field pea	164,819 (50 bu/acre)	2,199,979 (47 bu/acre)	1,859,962 1,960,660[6] (45 bu/acre)	**44%**	4,224,761
Soybean	1,624,964 (45 bu/acre)	234,997 (35 bu/acre)	10,000[7] (-)	-	1,859,962
Total	1,906,583		**2,384,477**		12,317,278

Source: Field Crop Reporting Series, Statistics Canada – Cansim Table 001-0010. November 29, 2016. [1] **Assume 100% dry bean acres insured.** [3,4,5,6] **Insured acres extrapolated assuming 75% acres are insured (Source: AFSC). No Statistics Canada reporting on faba bean until 2014.** [2,] **Personal Communication – Viterra.**[7] **Personal communication Fabian Seed Farms,** [8] **Saskatchewan Crop** Insurance Corporation (SCIC)

2016 Alberta Pulse Acres

Total 2.4 million or 13% of Alberta's annual cropped acres

Alberta

Alberta Pulse Crop Seeded Area

Crop	2010	2011	2012	2013	2014	2015	2016	Seeded Acreage % change 2016 vs 2015
Dry pea	935,000	706,726	1,075,000	1,000,000	1,200,000	1,445,000 1,451,160[1]	1,860,000 1,960,660[1]	↑ 30-35%
Lentil	105,000	97,775	85,000	95,000	110,000	220,000 203,000[2]	565,000 417,749[2]	↑ 105-150%
Faba bean	5,709	5,733	8,212	20,669	75,000 79,521	100,000 96,709[3]	50,000 55,255[3]	↓ 50-57%
Dry bean	45,000	45,273	45,000	40,000	55,000	45,000 47,498[4] 55,000[5]	45,000 46,882[4] 55,000[5]	-
Chickpea	n/a	12, 538	20,000 15,846	n/a 11,469	n/a 10,183	n/a 3,861[6]	n/a 11,728[6]	↑ 200%
Soybean	n/a	n/a	n/a	n/a	10,000	n/a	10,000	-
Total	**1,090,709**	**868, 045**	**1,233,212**	**1,167,138**	**1,464,704**	**1,830,027**	**2,384,477**	**↑ 30%**

Source: Field Crop Reporting Series, Statistics Canada – Catalogue no. 22-002-X. June 29, 2016. [1,2,3] Insured acres extrapolated assuming 75% acres are insured (Source: AFSC). No Statistics Canada reporting on faba bean until 2014. [4, 6] 100% acres insured. [5] Personal Communication – Viterra.

Dollar Value of the Alberta Pulse Industry(year ending July 31/16)

PULSE Market Classes	2013/2014	% of industry	2015/2016	% of industry
FABABEAN	$ 3,800,731.00	0.96%	$ 10,165,015.00	1.8%
DRY BEAN	$ 59,344,207.00	15.0%	$ 45,066,987.00	7.8%
CHICKPEA	$ 3,521,177.00	0.9%	$ 5,369,199.00	0.9%
LENTIL	$ 23,457,979.00	6.0%	$ 109,255,738.00	19.0%
FIELD PEA (EDIBLE)	$ 300,129,115.00	76.0%	$ 402,051,897.00	69.8%
FIELD PEA (NON EDIBLE)	$ 5,618,769.00	1.4%	$ 3,118,944.00	0.5%
SOYBEAN	$ 875,634.00	0.2%	$ 919,606.00	0.2%
TOTAL	$ 396,747,612.00		$ 575,947,376.00	

Source: APGC 2016, based on 1% check off of sales

What is the pulse potential (acres) in Alberta?

- approximately 25 million acres of cropland in Alberta (including tame hay acres)
- 1 in 4 rotation with a pulse crop = 6,250,000 acres
- ½ is not suitable for pulse production because of soil pH, rocks, hills, salinity

= 3,125,000 acres

Where were we at we at 2016?

- 2,384,477 of 75% of the way there

Faba bean crop near Wetaskiwin

Pulses
“The Perfect Storm”

-International Year of Pulses – huge awareness
-increasing demand from Asia
-North America trend to a more healthy and increased plant protein diet

International Year of Pulses

GLOBAL CELEBRATION

Growing Global Demand for Protein

- **global population grows to 9 billion by 2050, the demand for protein will double**

- **developing countries become wealthier, the demand for quantity and quality of food is not linear with population growth: higher wealth results in rapid increases in caloric intake and consumption of animal protein that eventually plateaus at 3000 calories per day and 50 grams of animal protein per day, respectively**

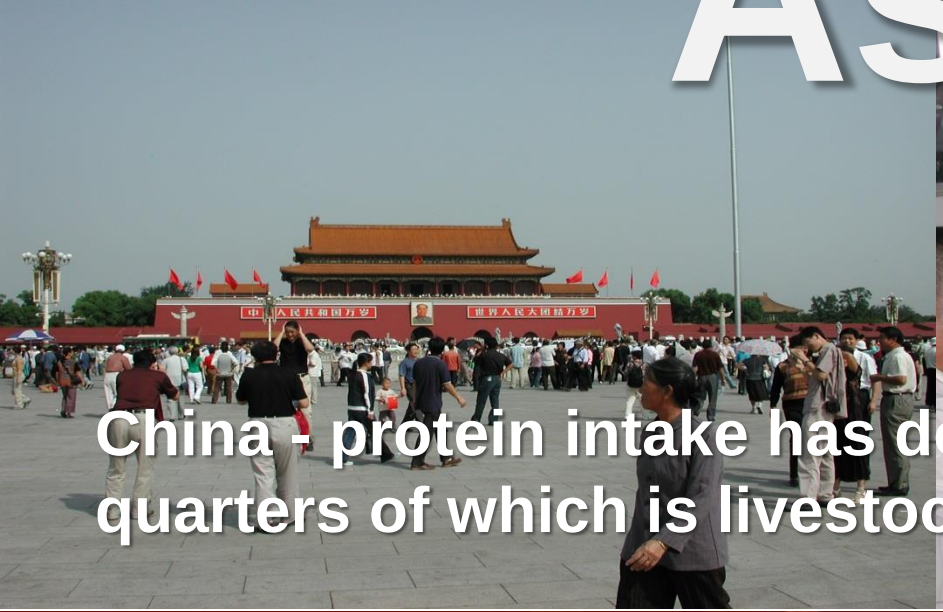
- **India – huge consumer of plant protein currently. Animal protein consumption is lower in India than China, due to high vegetarian rates (25 to 30%) among Hindus.**

- **China - protein intake has doubled since 1978; three-quarters of which is livestock-based.**

Source: Gauthier and Sernyk 2016."The Protein Highway - Creating a Regional Approach to Enable Innovative Agricultural Technology Solutions from Plant Proteins"

India - expectation that Agri-Food Industry to grow to $310 billion by 2020. . Canada had Agri- Food exports of $1.53 B in 2015.

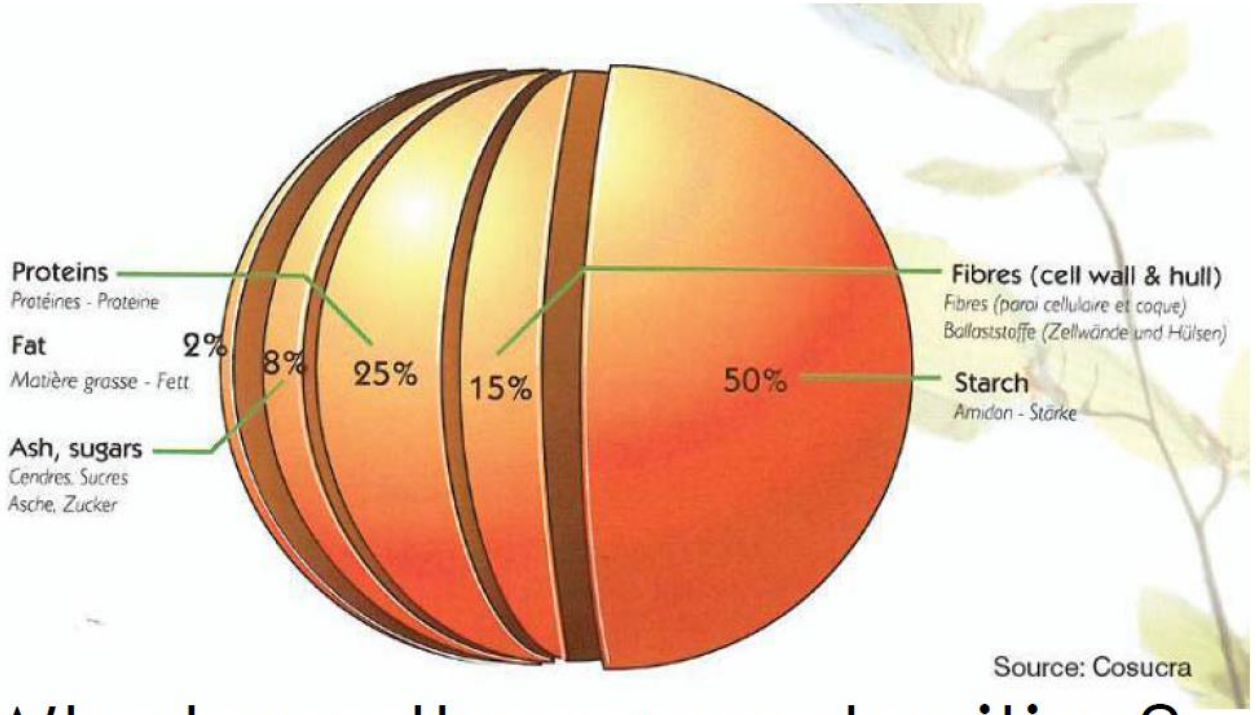
Asia



China - protein intake has doubled since 1978; three-quarters of which is livestock-based

Alberta

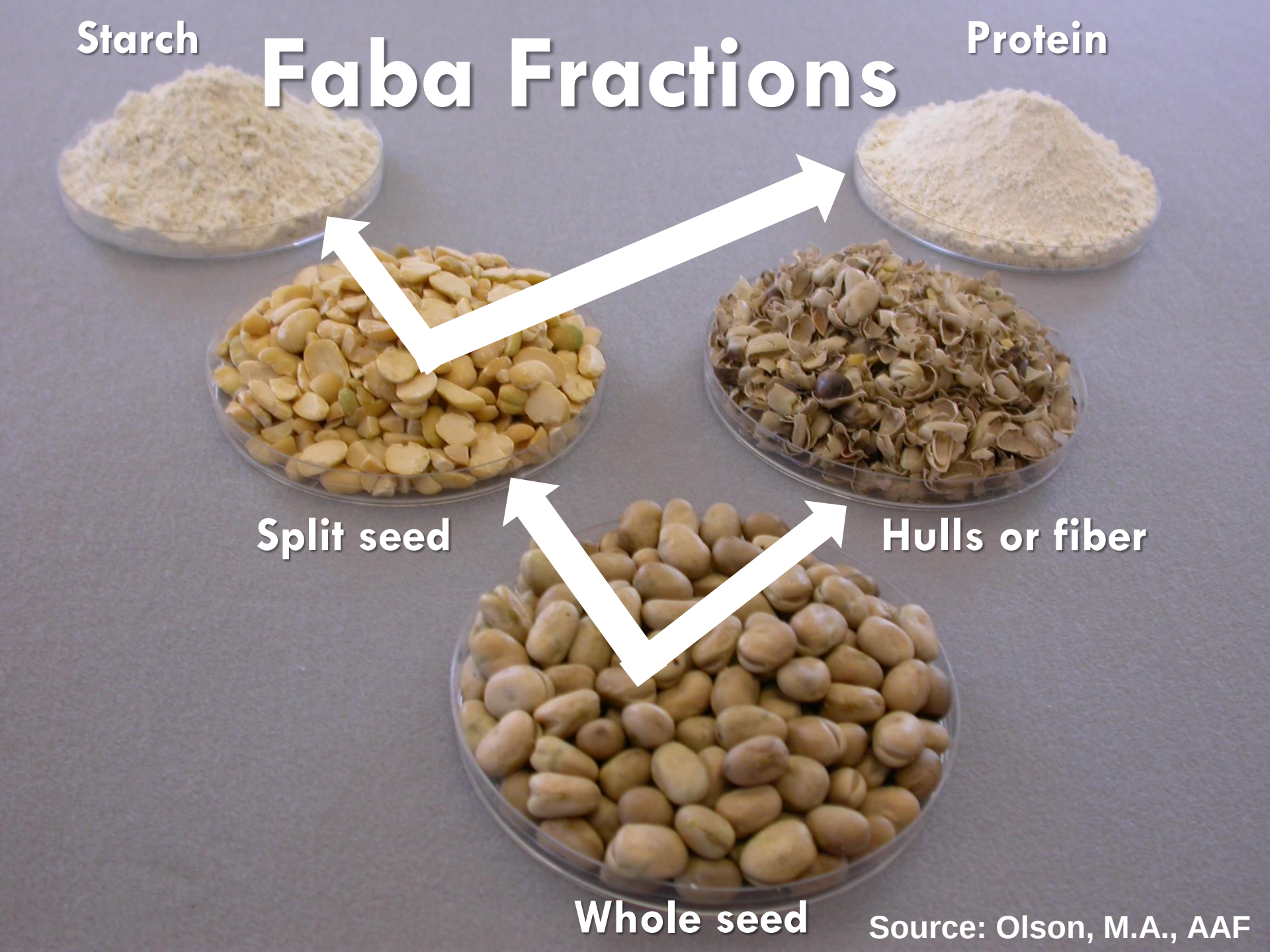
NUTRITIONAL COMPOSITION OF PULSES



What are the opportunities?

Pulse Canada

Courtesy Dr. Julianne Curran, Pulse Canada


Starch
Faba Fractions
Protein
Split seed
Hulls or fiber
Whole seed
Source: Olson, M.A., AAF

Increase the protein content of your products to meet consumer demand for healthier foods

Alberta

Source: Ingredion
http://m.ingredion.com/Ingredion-Pulse

Use pulse flours in your products to meet consumer demand for foods that address dietary and health needs

Alberta

Source: Ingredion
http://m.ingredion.com/Ingredion-Pulse

Advantages of pulses for processors

- adding plant protein and fiber to their food and fibre products
- plant-based, label friendly (clean label), sustainable(lowering carbon foot print), non-genetically modified and non- allergen?
- replacing wheat flour with novel proteins as well as “gluten free”
- 3,956 product launches with pulse ingredients in North America (2015)

Source: Food Processing. 2014 .on line (http://www.foodprocessing.com/articles/2014/label-it-clean/).

“Impossible Burger” plant-based delivers bioavailable protein and iron comparable to conventional beef. It has no cholesterol, hormones or antibiotics, but has added “heme.” Heme contributes to the characteristic color and taste of meat, and it catalyzes all the othe flavors when meat is cooked.

Alberta

Source: https://www.**impossible**foods.com

National and provincial scientific research priorities

- **Increase pulse yields by 20% by 2027, concomitant with low cost of production and improved nutritional quality**

- **Increase utilization of pulses**

  -whole food by 10% by 2023

  -ingredients in product categories such as analogues and extruded products by 5-10% by 2023

- **As ingredients in new markets such as pet food (20%), aquafeed (10%), and other industrial uses (10%) by 2023**

- **To have a pulse crop option for every arable acre in Canada by 2027.**

New crop opportunities

- **Mung bean** (Manjula Bandara)
  - **bean sprouts**
  - **vermicelli noodles**
- **Super size kabuli chickpea** (Manjula Bandara)
- **Lupin** (Robyne Bowness,Christy Hoy and Mark Olson)
- **Winter field pea and lentil** (Mark Olson, Robyne Bowness and Christy Hoy)

Mung bean

Super-large chickpea (Jumbo type)

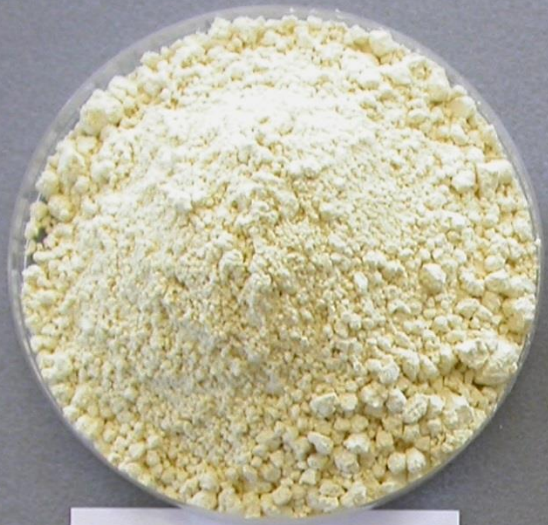
70% larger seed

CDC Orion
(497 g/ TSW)

Line 8394
(857 g/TSW)

Courtesy of Dr. Manjula Bandara.
CDCS Brooks, Alberta

Lupin - lupinus angustifolius)



Lupin Protein/
Starch

Lupin Hulls

Arabella Lupin

Lupin
Dehulled


Winter pulses
The Feasibility and Constituent Analysis of Winter Pulses Grown in Alberta Agro-Ecological Environments (2008-2012)

Contact Information

Mark Olson

Alberta Agriculture and Forestry
Crops Research and Extension Branch
Food and Bio-Industrial Crop Section

106 Provincial Building
4709 – 44 Avenue
Stony Plain, Alberta
T7Z 1N4

mark.olson@gov.ab.ca

Phone 780-968-3556, cell 780-246-5363

Alberta Agriculture and Forestry's Pulse Research Team

- **Director- Darcy Driedger**
- **Administrators - Tabitha Mackinnon, Elsie Gross**
- **Unit Head - Mark Olson**
- **Researchers, agrologists and technologists**
- **CDCS (Brooks) - *Manjula Bandara,* Art Kruger, Kathie Davidson, Don Elmer**
- **AF (Lacombe) - *Robyne Bowness*, Trina Dubitz**
- **CDCN (Edmonton) - *Christy Hoy*, Boris Henriquez, Alex Fedko, Jackie Tieulie**

- collaborative research with *Doon Pauly*, Allan Middleton, Pat Pffifner in (Lethbridge) and *Sheri Strydhorst*, Susan Jess, Chelsea Jaeger (Barrhead)

Pulse Research projects

Research on lentil, soybean and chickpea

- **“Evaluation of the affect of nitrogen rates, seeding rates, and herbicide applications on production of Clearfield red lentil in Alberta”(Bowness)**
- **Developing Red Lentil Cultivar for Alberta and Analyzing the Newest Red Lentil Cultivars for the Starch Profile to Attract New Lentil Markets”(Bandara)**
- **“Identifying promising genotypes, and optimizing seeding density, nitrogen fixation and irrigation for cost-effective soybean production in Alberta”(Bandara)**
- **“Optimizing the frequency and sequence of annual pulses in cropping systems and their impacts on crop performance, biotic and abiotic stresses, and soil quality attributes- Phase II (Bandara)**

Pulse Research projects

Research on field pea and faba bean

- "Evaluation of faba bean and field pea germplasm for Alberta growers" (Bowness/Olson/Hoy)
- "Enhancing pulse crop productivity and resilience through germplasm screening"(Hoy/Olson/Henriquez - proposed)
- "Investigating agronomic practices to overcome barriers to faba bean production in Alberta" (Bowness/Olson)
- "Prevalence, pathogenicity and risk assessment of Fusarium species causing root rot of field peas"(Bowness)
- "Pulse RVTs" (Fedko)

New project

New project