Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Update on pea root rot in 2016

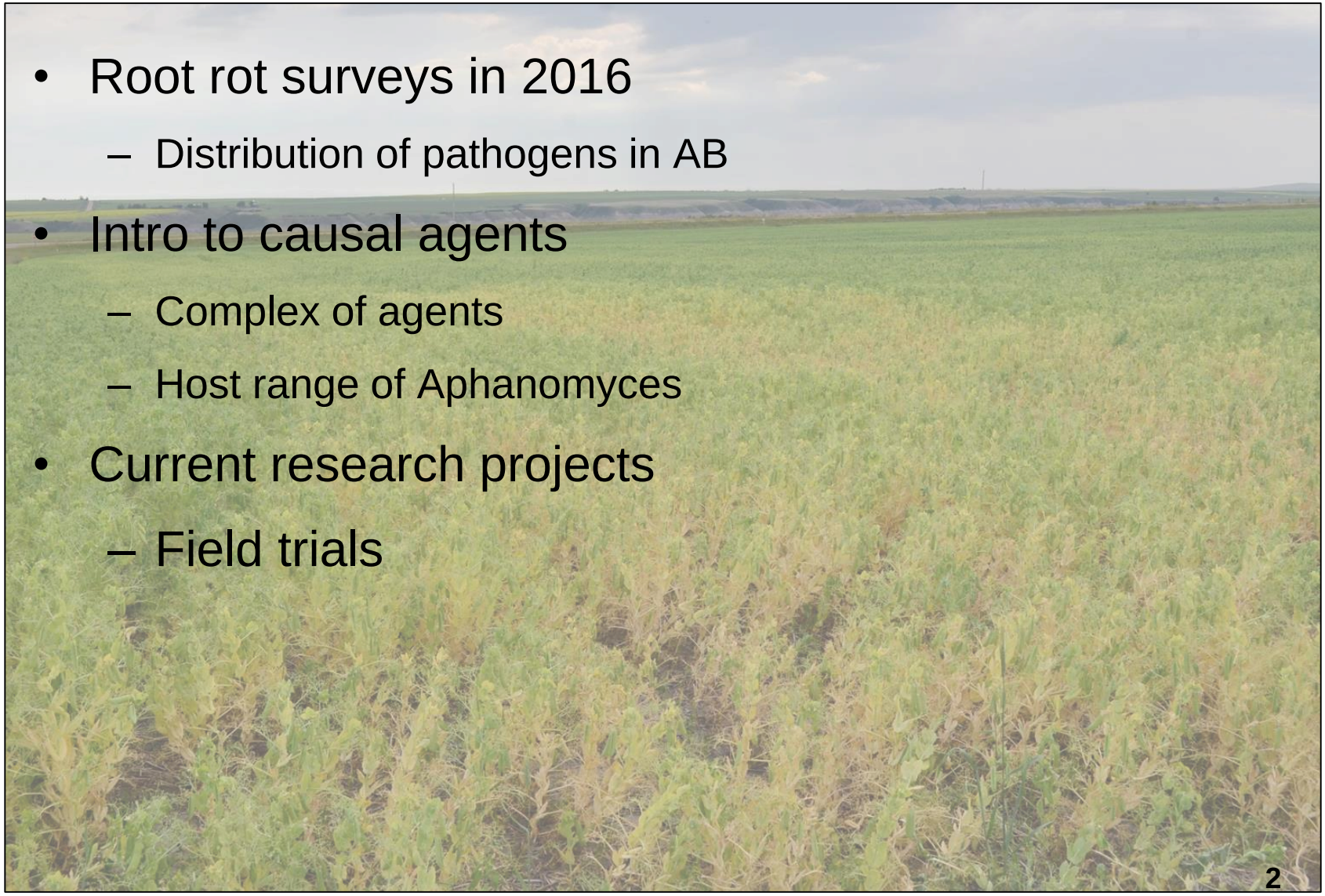
Syama Chatterton, Lethbridge Research Centre

Agronomy Update

January 17-18, 2017, Lethbridge, AB

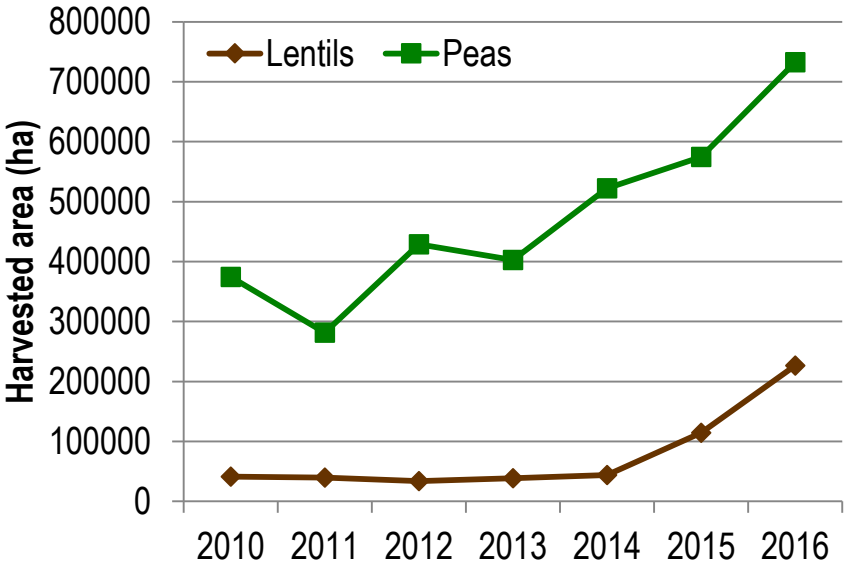
Canada

Overview



- Root rot surveys in 2016
  - Distribution of pathogens in AB
- Intro to causal agents
  - Complex of agents
  - Host range of Aphanomyces
- Current research projects
  - Field trials

2016 was a great year for pulses!



High prices help lentils take top spot in exports

Posted Feb. 25th, 2016 *by* Sean Pratt

> Lentils beat canola in seed sales, but canola still reigns if the value of oil and canola meal are taken into account

The mighty lentil dethroned Cinderella to become Saskatchewan's top crop last year.

The province's lentil exports were valued at $2.5 billion last year compared to $2.4 billion worth of canola seed sales and $2.3 billion of wheat shipments.

"Quite honestly, I was a little bit surprised to see it exceed canola because canola is such a large acreage and large production crop in Saskatchewan," said Carl Potts, executive director of Saskatchewan Pulse Growers.

THE WESTERN PRODUCER

SUBSCRIBE & SAVE

Classifieds

All articles | News | Crops | Livestock | Markets | Weather | Farm Living | Opinion & Blogs | Video

Home / Markets / Pulse crops expected to steal acres from cereals...

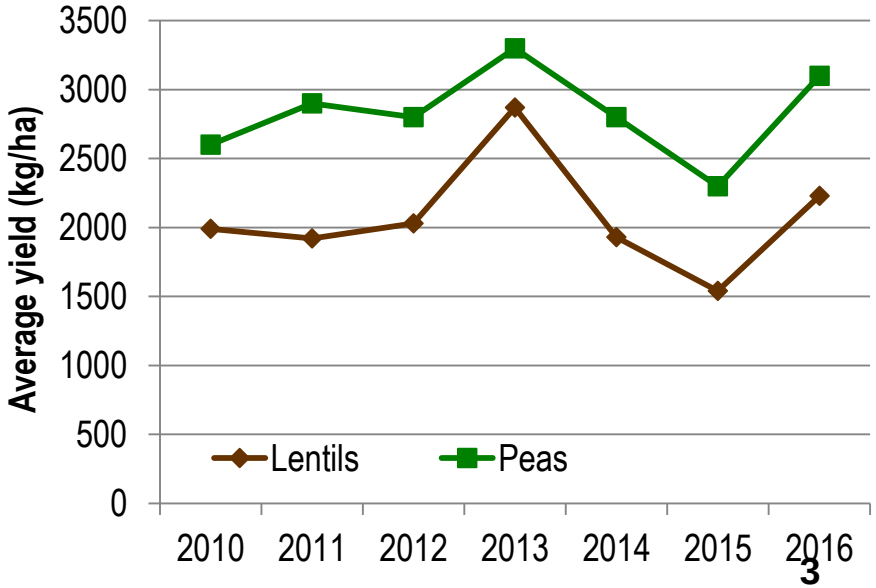
Pulse crops expected to steal acres from cereals in 2016

Posted Dec. 22nd, 2015 *by* Commodity News Service Canada

WINNIPEG — Canadian farmers are expected to seed more pulse crops at the expense of cereals in 2016, according to early projections from industry experts looking at current market trends.

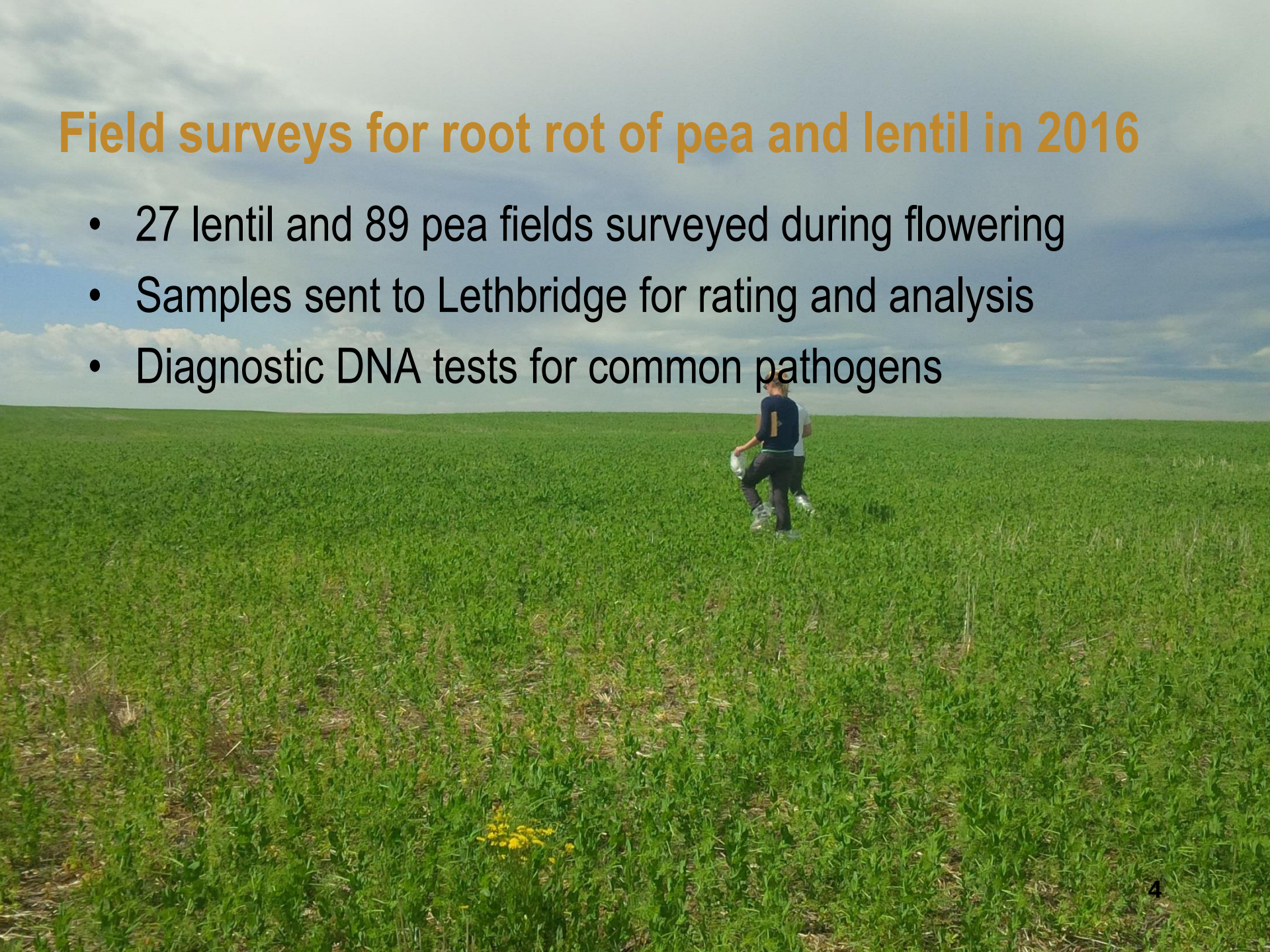
PULSES

"Definitely, we'll see an increase in pulse crop acreage," said Bruce Burnett, weather and crop specialist at G3 Canada Limited



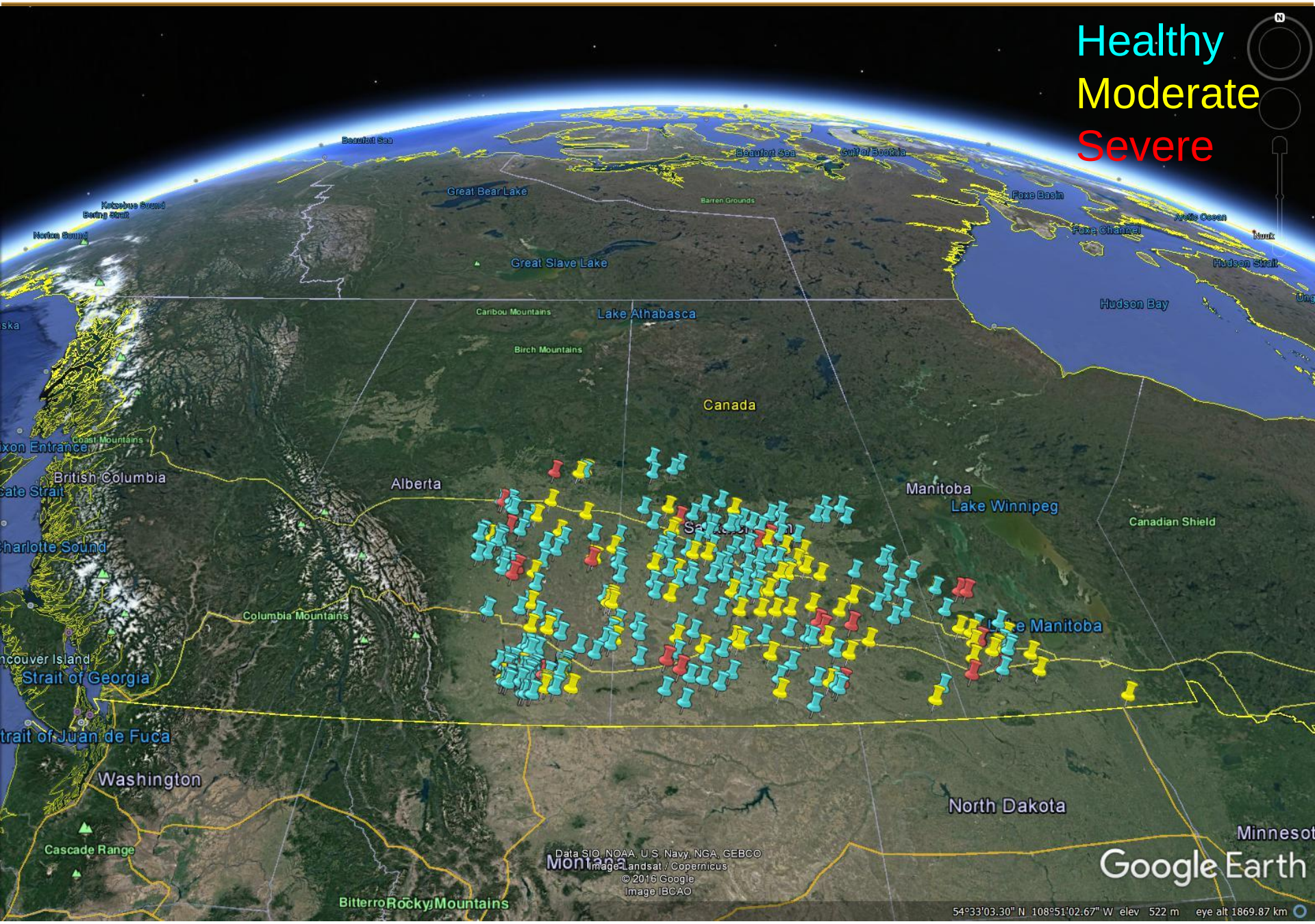
Field surveys for root rot of pea and lentil in 2016

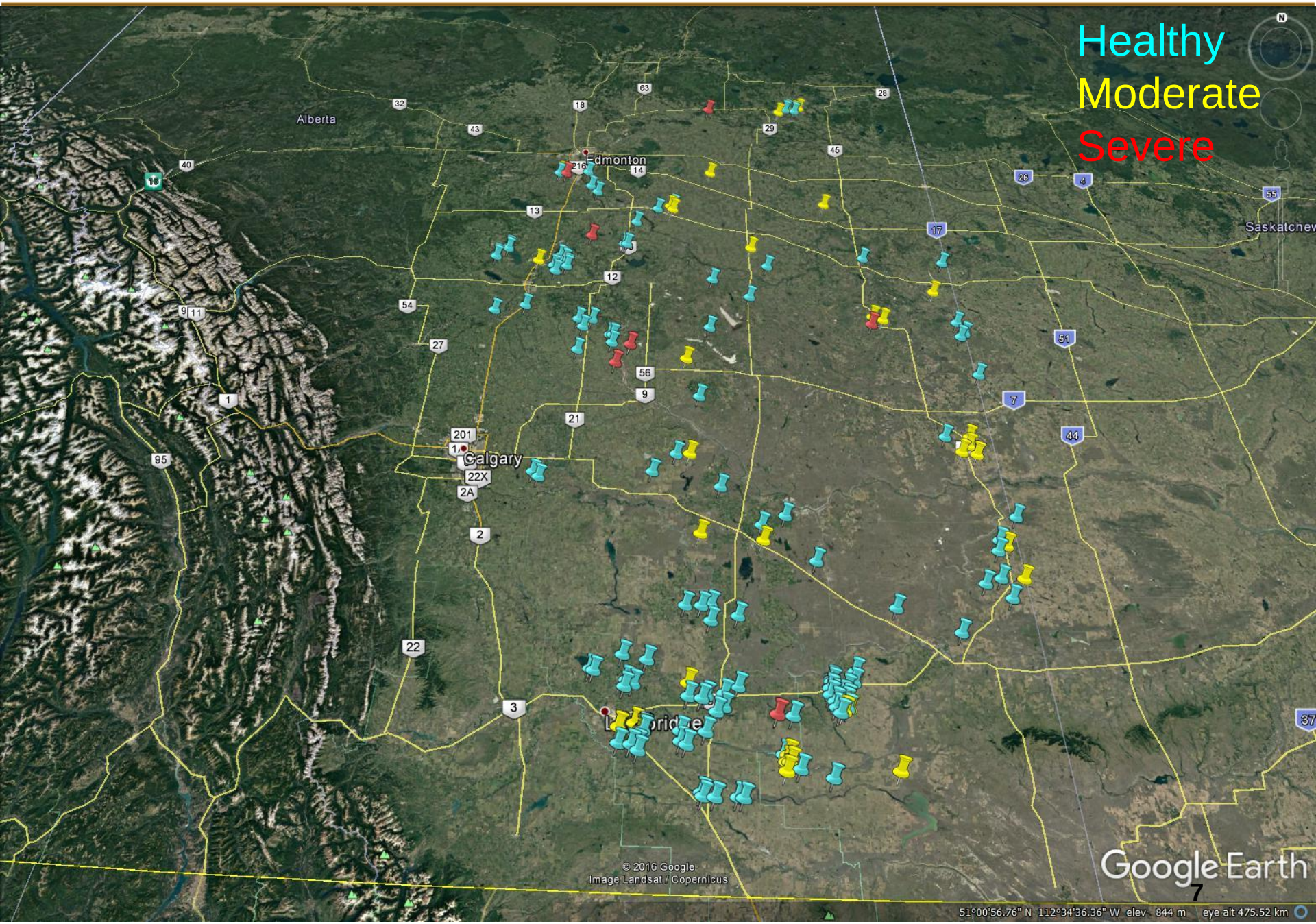
- 27 lentil and 89 pea fields surveyed during flowering
- Samples sent to Lethbridge for rating and analysis
- Diagnostic DNA tests for common pathogens

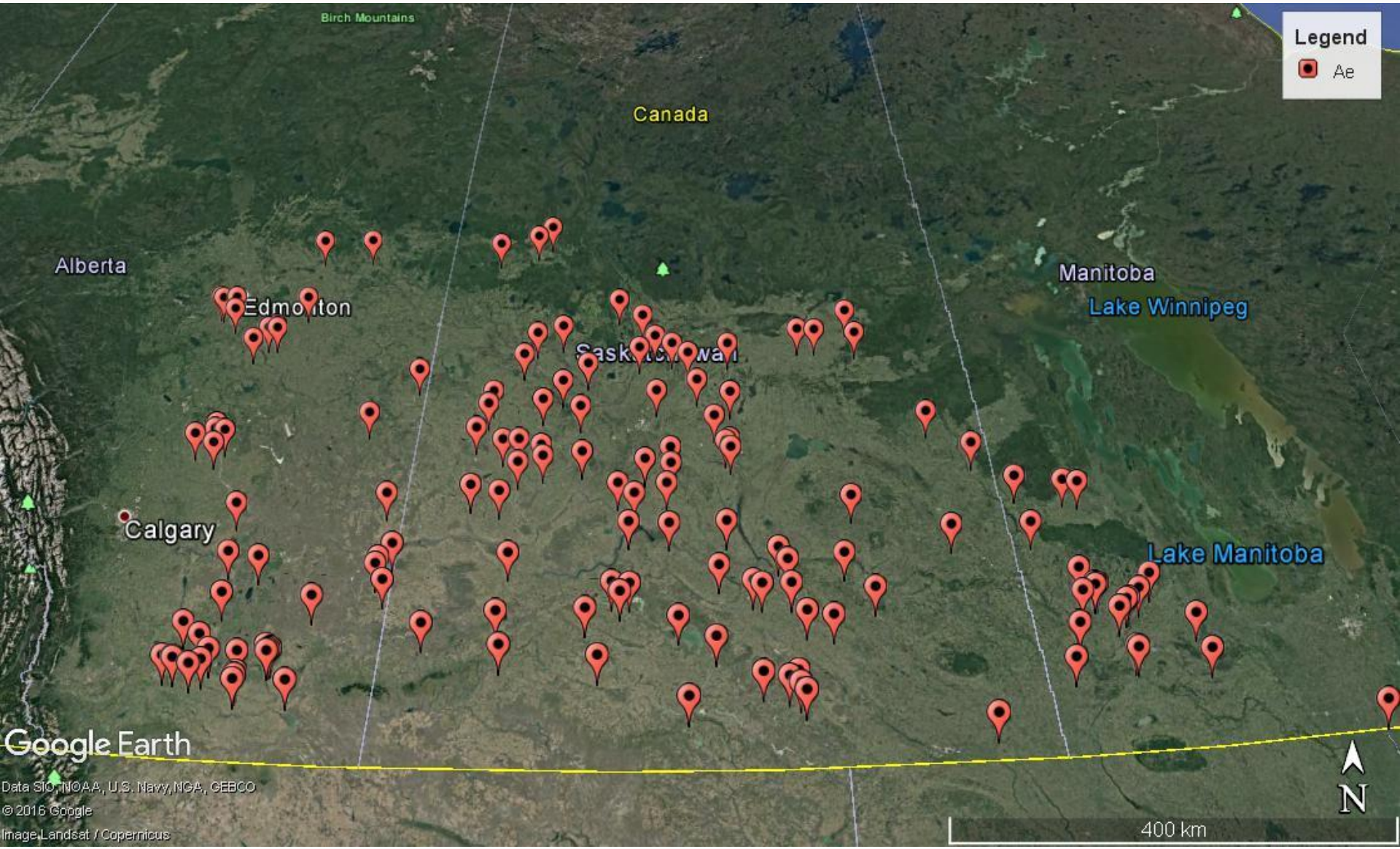


Disease severity rating scale

Healthy | Moderate | Severe


Healthy
Moderate
Severe
Great Bear Lake
Great Slave Lake
Lake Athabasca
Caribou Mountains
Birch Mountains
Hudson Bay
Canada
British Columbia
Alberta
Manitoba
Lake Winnipeg
Canadian Shield
Columbia Mountains
Strait of Georgia
Washington
North Dakota
Cascade Range
Rocky Mountains
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
© 2016 Google
Image IBCAO
Google Earth
54°33'03.30" N 108°51'02.67" W elev 522 m eye alt 1869.87 km


Healthy
Moderate
Severe
Alberta
Edmonton
Calgary
Saskatchev
© 2016 Google
Image Landsat / Copernicus
Google Earth
51°00'56.76" N 112°34'36.36" W elev 844 m eye alt 475.52 km

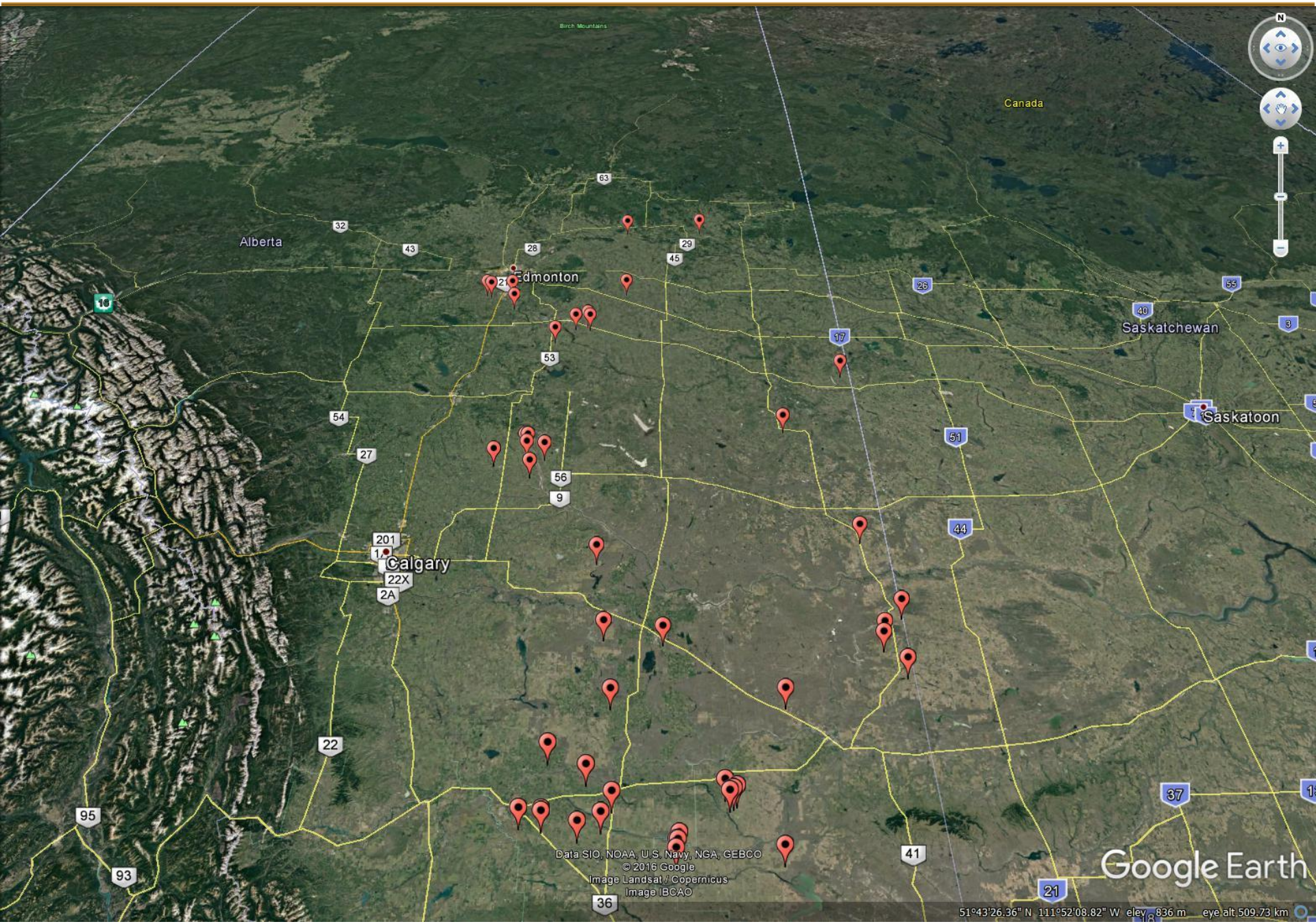

Legend
Ae
Birch Mountains
Canada
Alberta
Edmonton
Manitoba
Lake Winnipeg
Calgary
Lake Manitoba
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2016 Google
Image Landsat / Copernicus
N
400 km

Pea root rot by soil zones in 2016

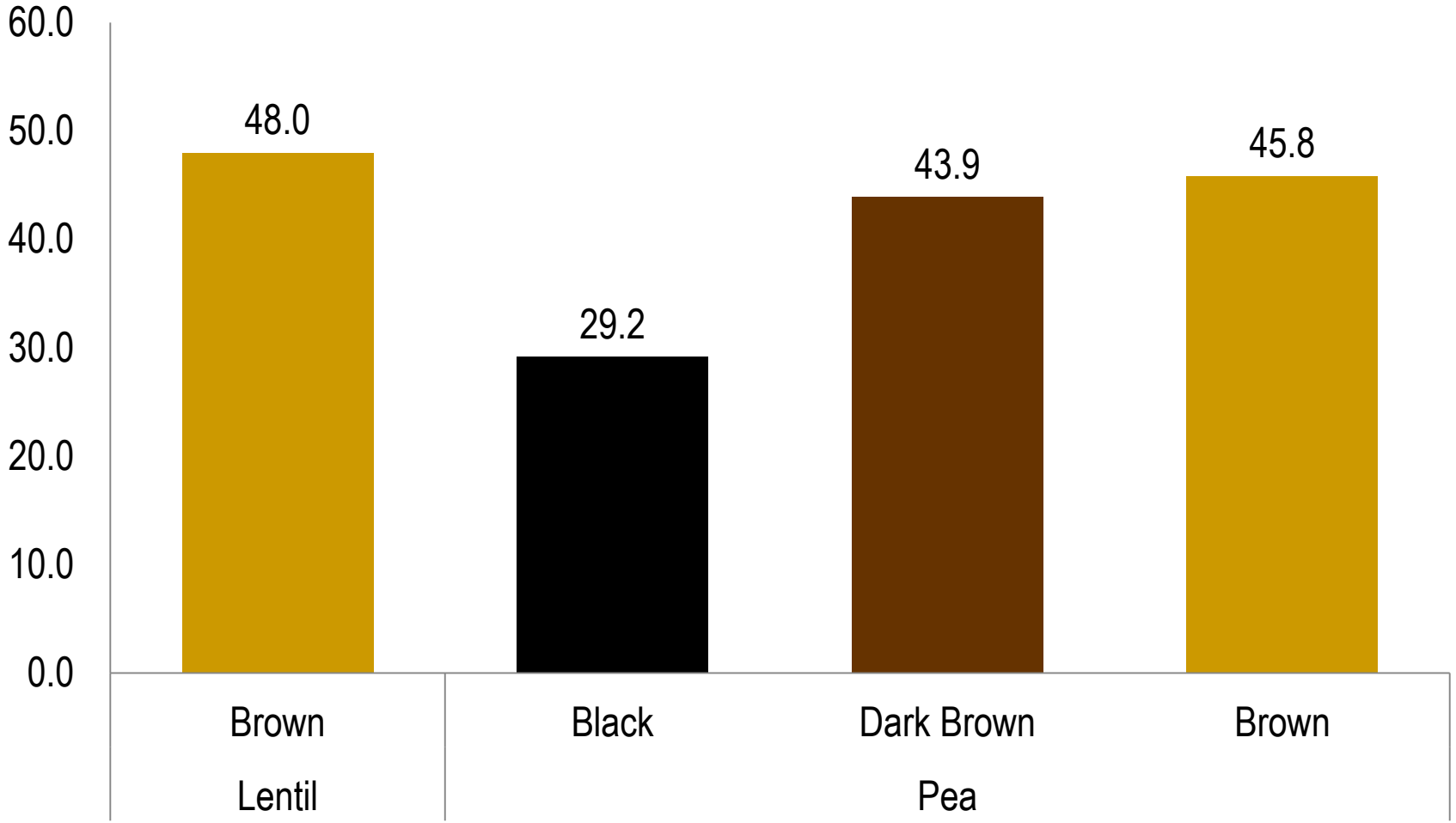
	Incidence DS > 1 (healthy – severe)	Incidence DS > 3 (moderate + severe)	Mean DS
Black	60	18	2.4
Dark Brown	60	30	2.6
Brown	74	27	2.8

Lentil root rot in 2016

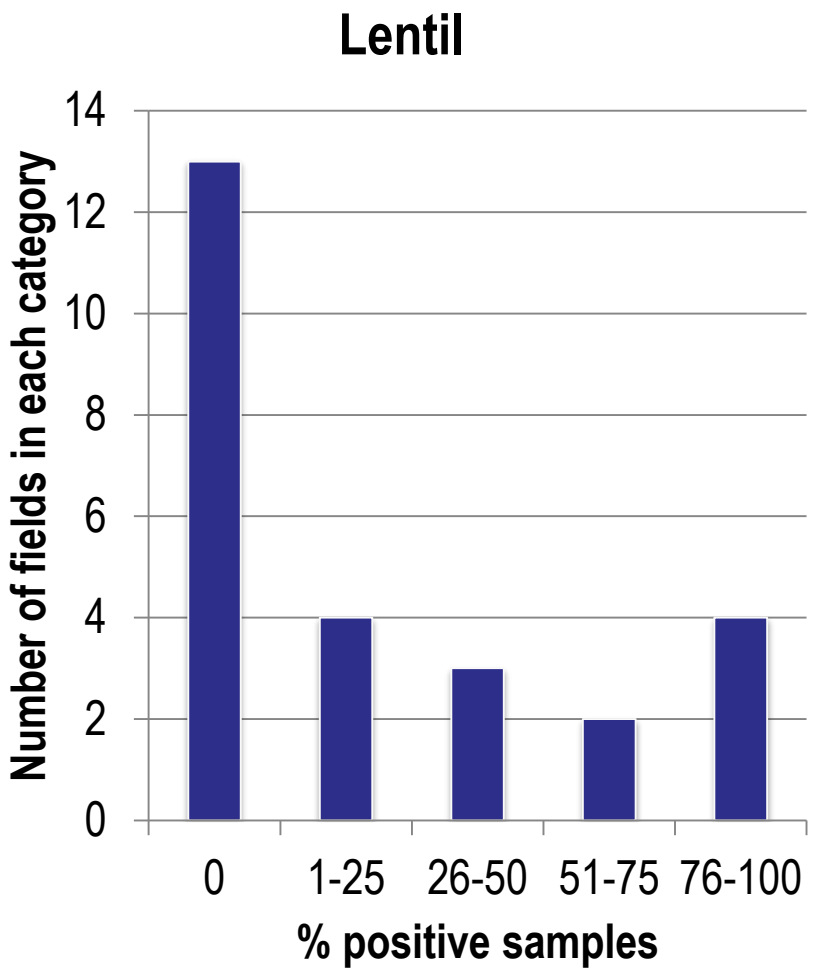
Incidence DS > 1	78
Incidence DS > 3	33
Mean DS	2.4

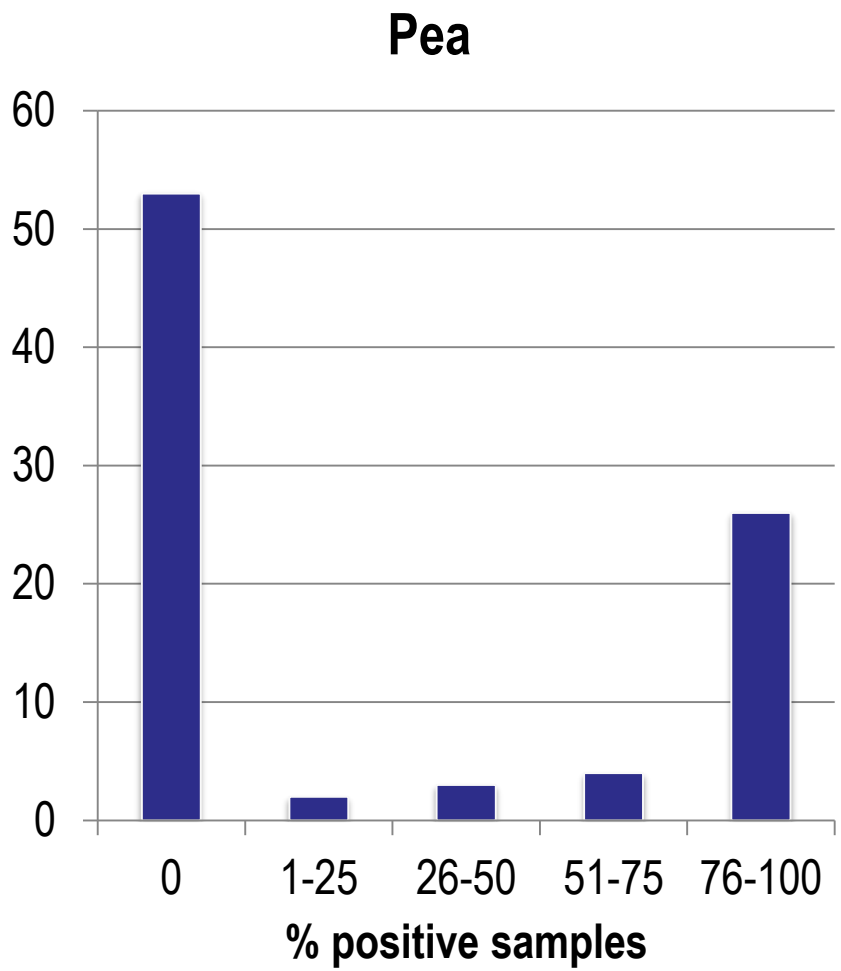

Birch Mountains
Canada
Alberta
Edmonton
Saskatchewan
Saskatoon
Calgary
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2016 Google
Image Landsat / Copernicus
Image IBCAO
Google Earth
51°43'26.36" N 111°52'08.82" W elev 836 m eye alt 509.73 km

Percent fields positive for *Aphanomyces euteiches*

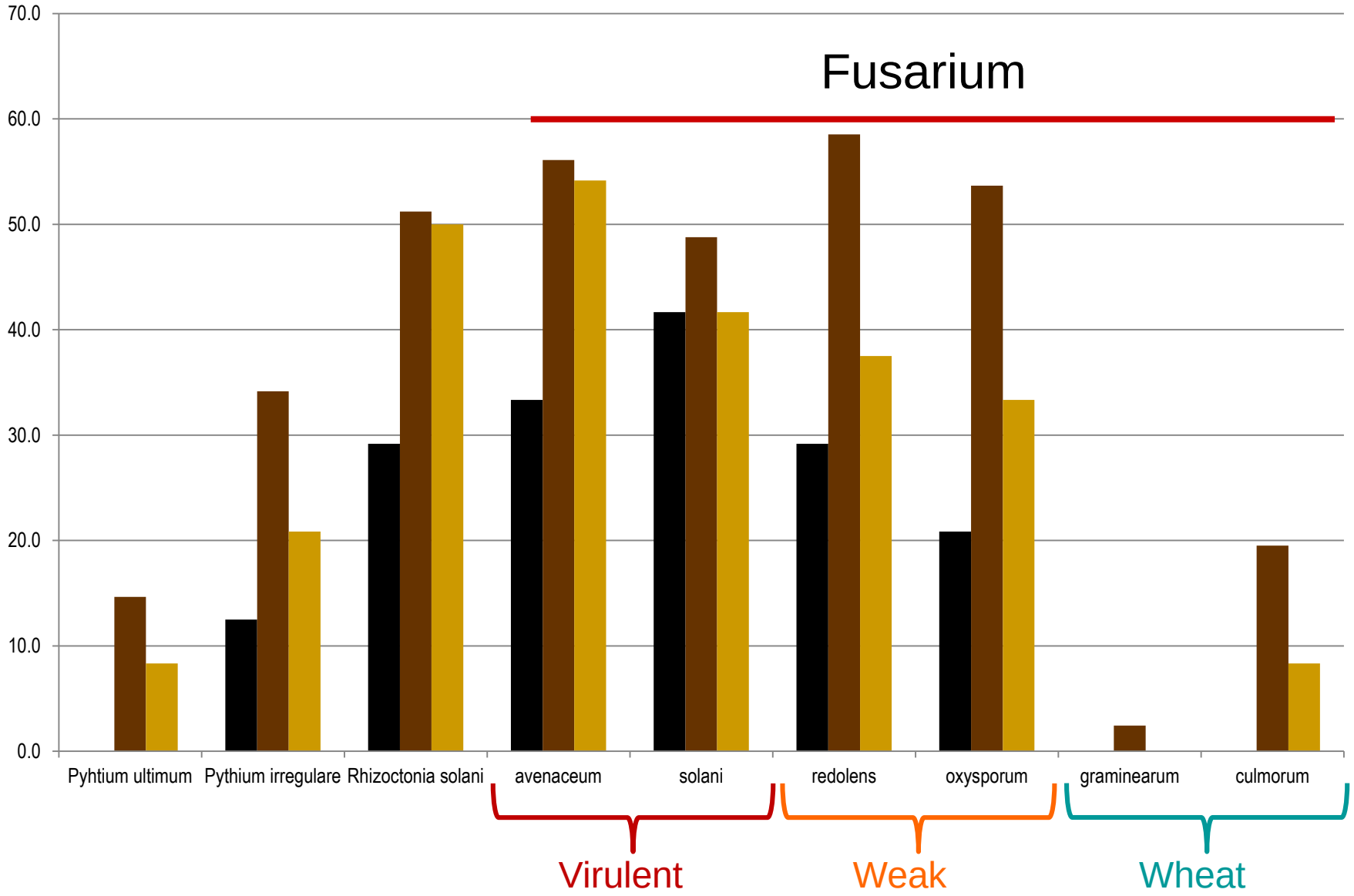


Distribution of Ae samples within fields





Other soilborne fungi….



Root rots are caused by a complex of organisms

- Two main pathogen groups of focus
  - *Aphanomyces euteiches* – highly aggressive on pea and lentil, long-lived resting spore
  - *Fusarium* spp. - distributed widely
    - *F. avenaceum and F. solani* most virulent species

Symptom expression is not clear-cut

Most often roots are infected with a pathogen complex

Control options – what can you do right now?

- If you have had a history of root rots – get soil tested to confirm presence of Aphanomyces
- Avoid planting peas and lentils in Aphanomyces-infested fields
- Prolonged rotations of susceptible hosts (**peas and lentils**) in infested fields (6 – 8 years)
- Consider using a seed treatment that targets the root rot complex
- An in-crop fungicide application **will not** have any effect

Host range testing of Aphanomyces

Crop	Disease reaction	Oospores
Peas	Susceptible	Yes
Lentils	Susceptible	Yes
Cicer milkvetch	Susceptible	Yes
Dry bean	Variable	Few
Alfalfa	Variable	Yes
Chickpeas	Resistant	Few
Sainfoin	Resistant	Few
Faba bean	Resistant	No
Soybean	Non-host	No
Fenugreek	Non-host	No

Root rot in other legume crops

	Incidence DS > 1	Incidence DS > 3	Mean DS	Ae positive
Alfalfa	7.5	0.92	1.1	2*/13
Dry Bean	60	1.7	1.8	4*/15
Faba bean	13	0.7	1.2	0/14

*being confirmed with soil baiting assays, incidence is very low

Research projects on the go

1. Survey and map root rot incidence and severity in Alberta and Saskatchewan
2. Evaluate field-based solutions to reducing root rot impact – seed treatments, cultivar effects, soil amendments
3. Develop inoculum quantification tools for predicting root rot risk in Canadian prairie soils
4. Determine spatial distribution of *A. euteiches* in vertical and horizontal soil profiles, and in different soil zones
5. Identify interactions between species that affect root rot development

Field-based solutions

- Most are in the research phase…
- Ethaboxam (Intego Solo)
  - Registered for early suppression of Aphanomyces root rot
  - Must be used in combination with other seed treatments with actives against Fusarium and other damping-off pathogens
- Phostrol (phosphite salts)
  - Not registered on pulse crops
  - Good efficacy in trials in the U.S. on processing pea when applied at seeding or emergence
  - More widespread trials taking place in 2016

➢ Won't provide full-season protection

Results

A. euteiches + ethaboxam in the greenhouse

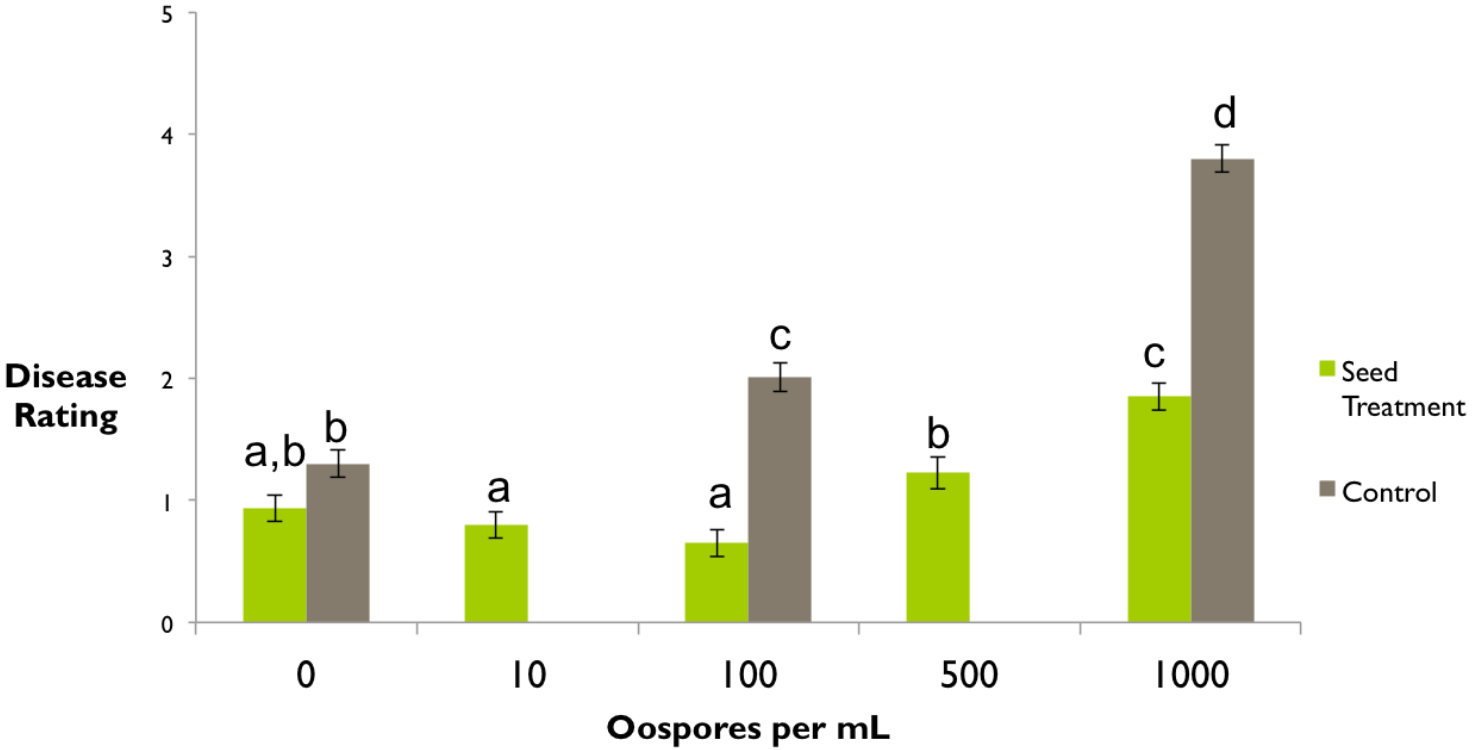


Figure 4. Disease rating of seedlings grown from seed treated with ethaboxam vs. untreated seed planted in soil inoculated with *A. euteiches* at concentrations ranging from 0 to 1000 oospores per mL.

Results - Field Trials

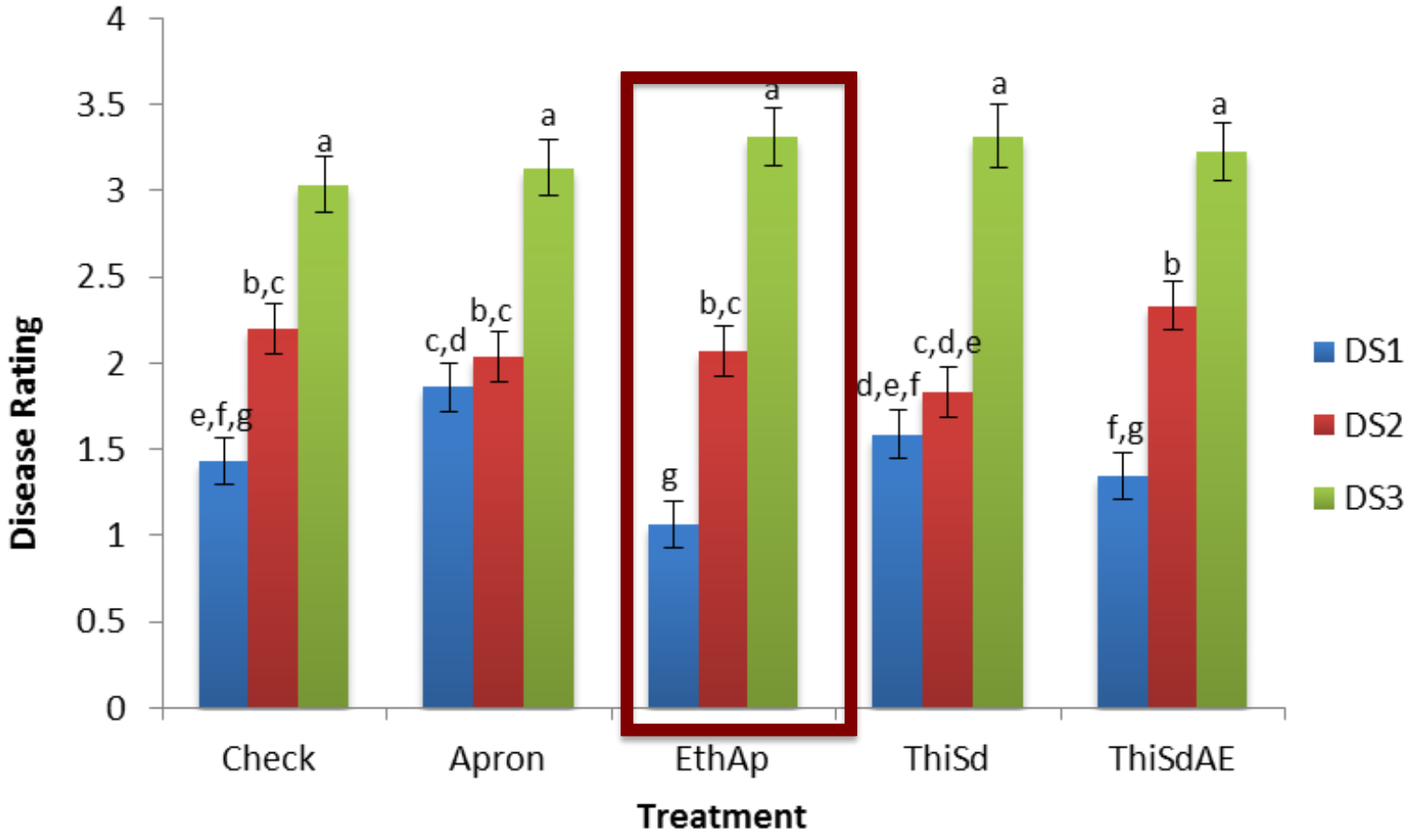


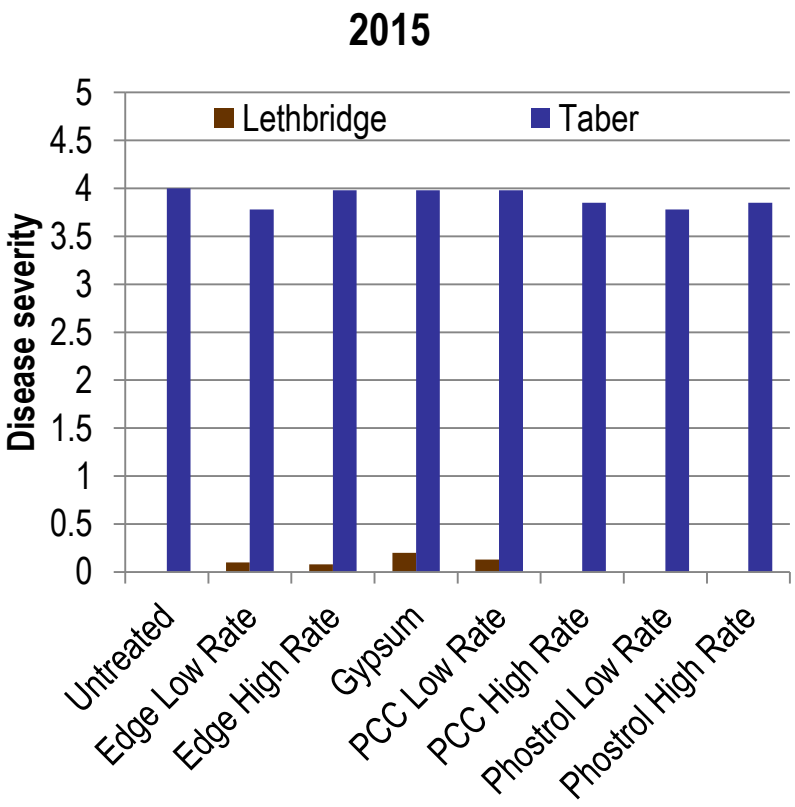
Figure 3. Severity of root rot disease in pea measured over 3 sampling periods

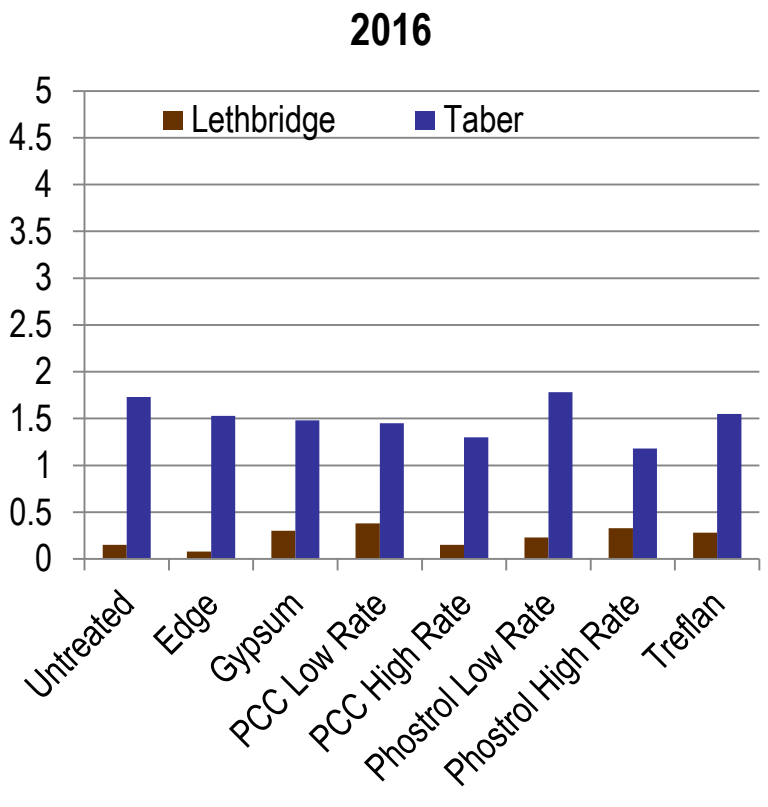
Control options

- Liming or Ca^{+} amendments
  - Calcium prevents zoospores from germinating
  - Feasibility of applying and incorporating calcium?
- Brassica cover crops
  - Green manure break-down products “biofumigate” soil and suppress oospores
  - Feasibility in no-till systems if green manure needs to be incorporated?
  - Increased disease risk to canola?

➢ Long-term effects as amending inoculum levels in soil

Field trial results – soil amendments





Minimal reductions in disease severity in some treatments, but doesn't translate to changes in yield

Conclusions

- Root rots are widespread – impact in 2016 was variable and depended on soil moisture levels
- Aphanomyces and Fusarium root rots occur as a complex, are difficult to distinguish and act synergistically
- Long rotations between susceptible pulse crop only control option
- Faba beans, soybean and chickpeas best pulse crop option in infested fields

Collaborators

- Mike Harding and Robyne Bowness, Alberta Agriculture
- Sabine Banniza, U of S
- Sherillyn Phelps and Brian Olson, SPG
- Bruce Gossen, AAFC

Technical Assistance

- Christine Vucurevich
- Carol Mueller, Scott Erickson
- Trina Dubitz
- Dustin Burke, Carol Pugh
- Cheryl Cho
- Telsa Willsey (MSc student)
- A lot of coop students