Clubroot Soil Sampling

14 November 2019
Winnipeg, MB
Kim Kenward
R&D Manager

our lab to your field

our lab to your field

Clubroot Pathology

- Clubroot disease caused by *Plasmodiophora brassicae*
  - Infection causes galls on roots
    - Interferes with water and nutrient uptake by the plant→premature aging
  - Yield Loss = ~ half of % of infected plants
    - Eg. A field with 50% infection will result in a 25% yield loss

Clubroot Life Cycle

Long lived resting spores survive up to 20 years in soil

Root galls can release up to 16 billion spores per infected plant

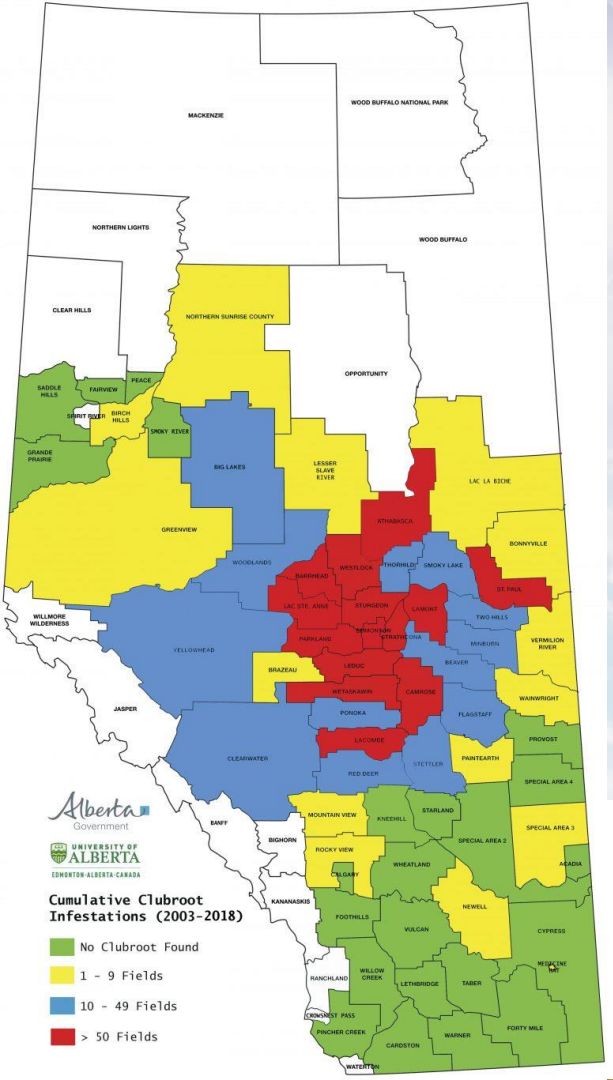
Obligate Parasite: only grows and multiplies within a host

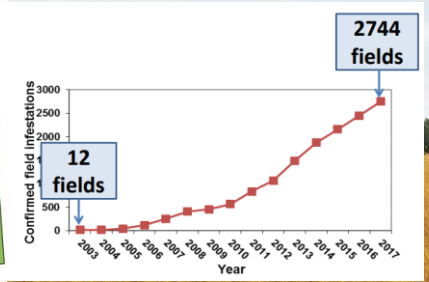
Resting spores germinate in spring and zoospores can swim very short distances in soil water to roots

Source: Ohio State University

Clubroot in Alberta

- Clubroot first reported on broccoli, cabbage and cauliflower in home gardens in the Edmonton area in the mid 1970's.
- First detected in canola in Sturgeon county, NW of Edmonton, in 2003.
- Declared a pest under Alberta's *Agricultural Pests Act* in 2007.
- In 2014 the first case of population shift to overcome varietal resistance was observed.

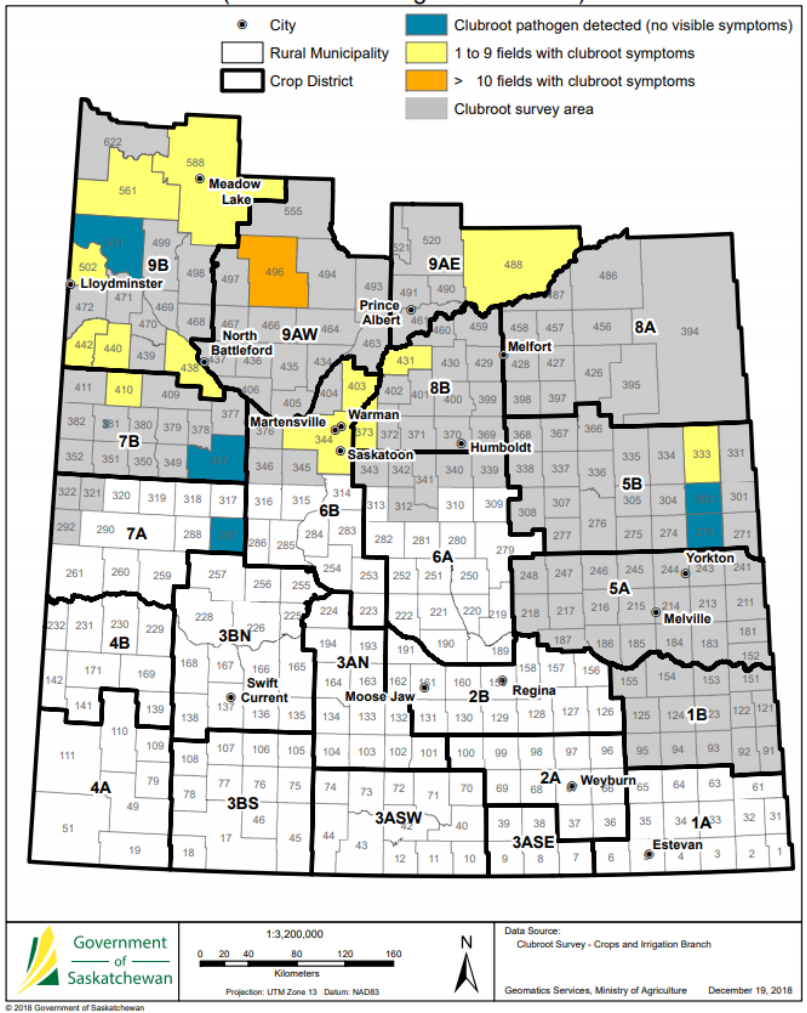


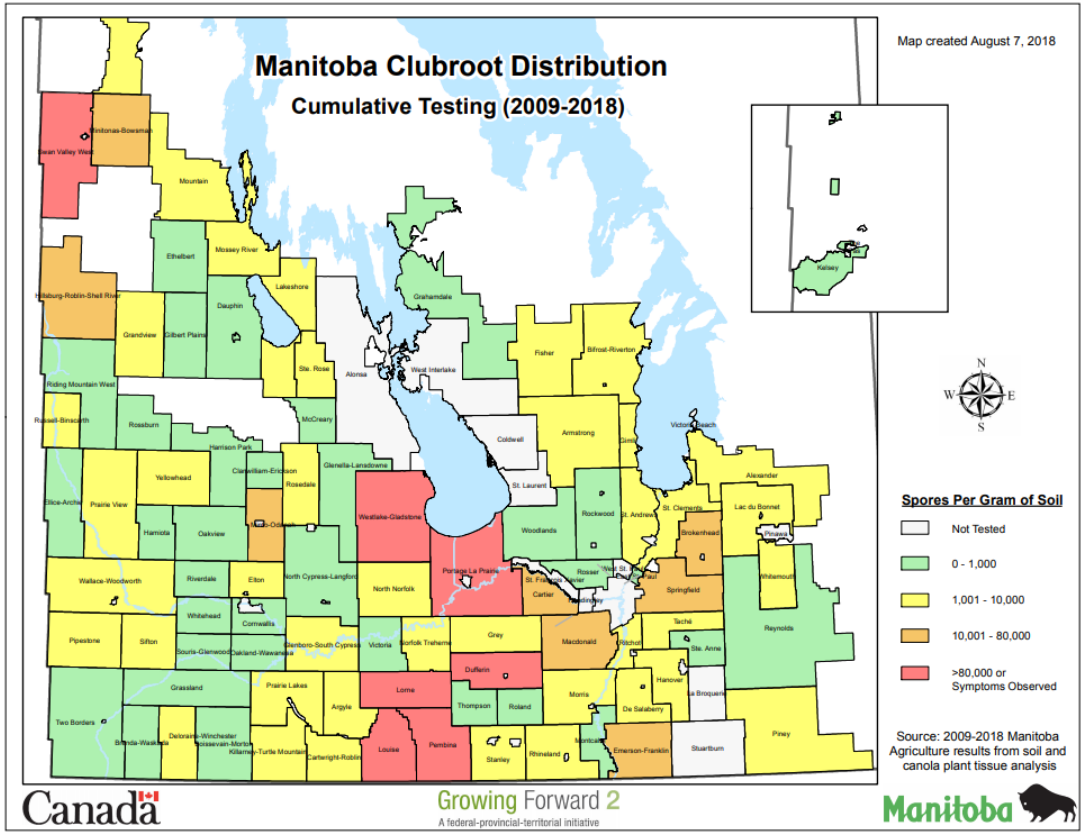


our lab to your field

Clubroot Distribution in Saskatchewan

(cumulative testing 2008 to 2018)





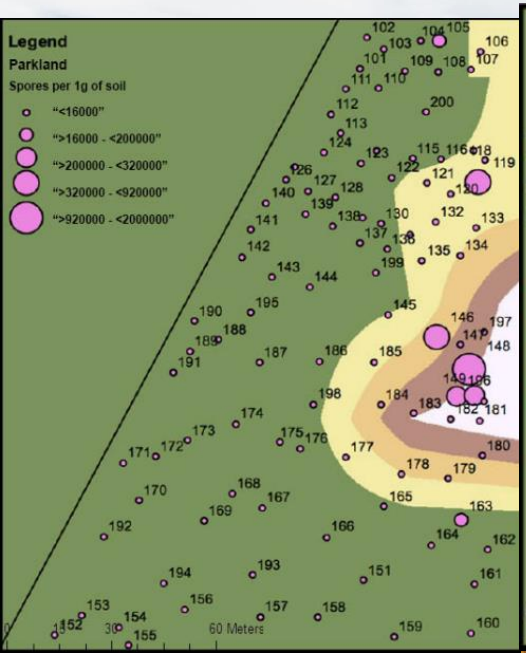
Clubroot Pathology

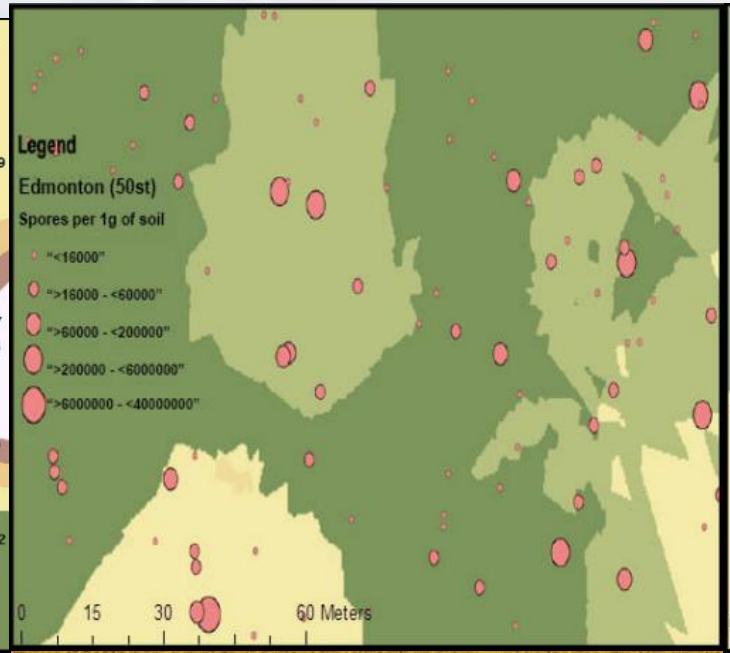
- Spores can be spread by soil movement:
  - Machinery
  - Water
  - Wind
  - Seed (Earth tag)

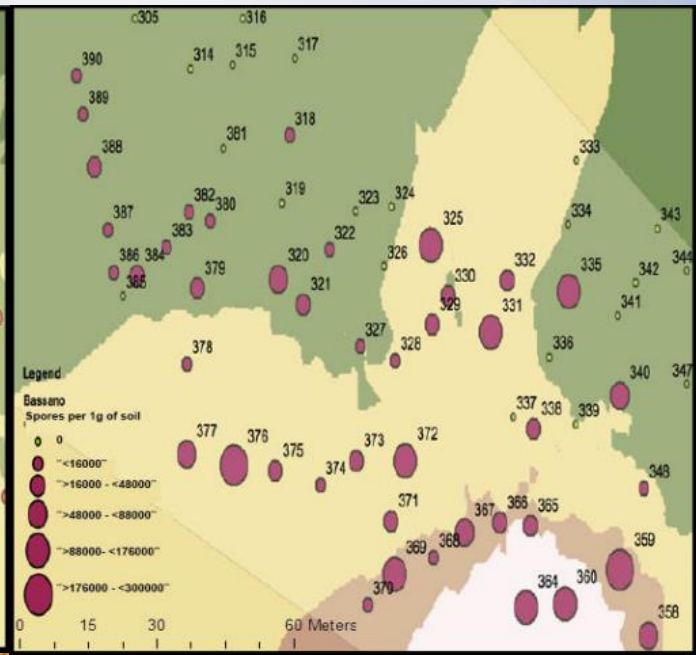
Clubroot field distribution

Not evenly distributed around a field

Mirko Tabori's Master's Thesis (2015), U. Alberta







In-Field Scouting for Symptoms

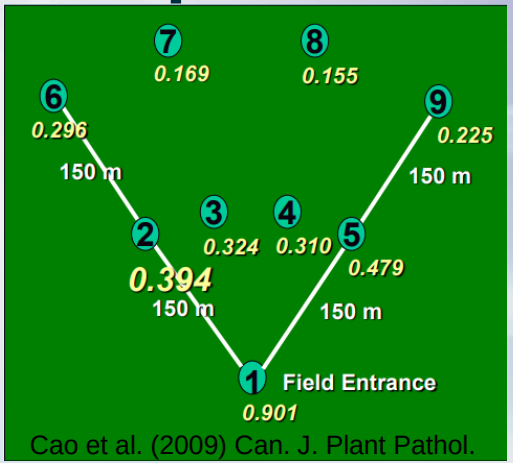
All photos from https://www.alberta.ca/clubroot-disease-of-canola-and-mustard.aspx

Clubroot Sampling

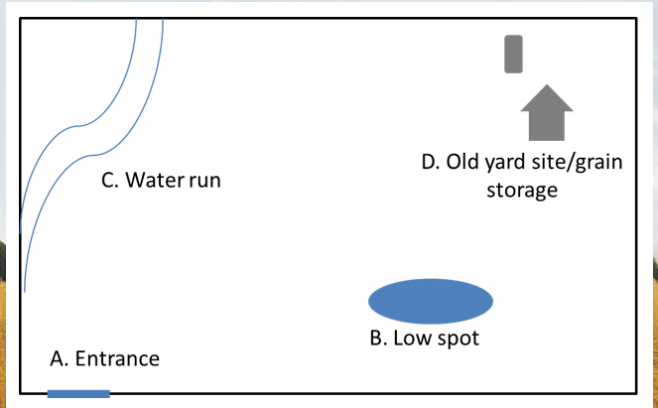
- Plant Specimens
  - Infected plants are concentrated sources of pathogen
  - Testing soil near infected plants has come back negative. Test the plant!
  - Dig up roots to keep galls intact
  - Submit fresh, frozen or dried roots

Where to Sample

- Soil
  - Dilution of a (+) soil sample 1:1 with clean soil 6-8X can result in loss of micro-organism detection
  - Not equally distributed throughout field
  - Highest incidence is found at field entrances
  - Also found at low-lying spots, water runs and garden sites

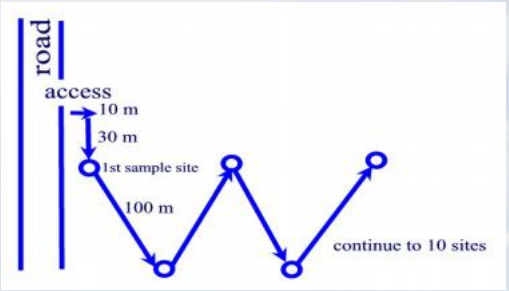


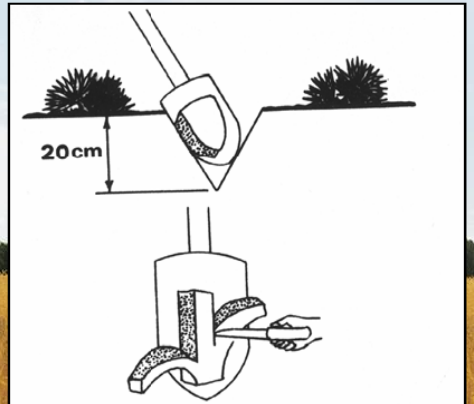
Cao et al. (2009) Can. J. Plant Pathol.



How to Sample

- Clear loose surface organic matter
- Collect top 5 cm of A-horizon, or less as depth allows, without taking any of B-horizon
- Composite sample high incidence area: Collect in a W-shaped pattern at entrances to field and other suspect spots (eg. low-lying areas, homestead gardens, soil clumps at entrances)
- Air-dry sample (room temp)
- Submit 2 C sample

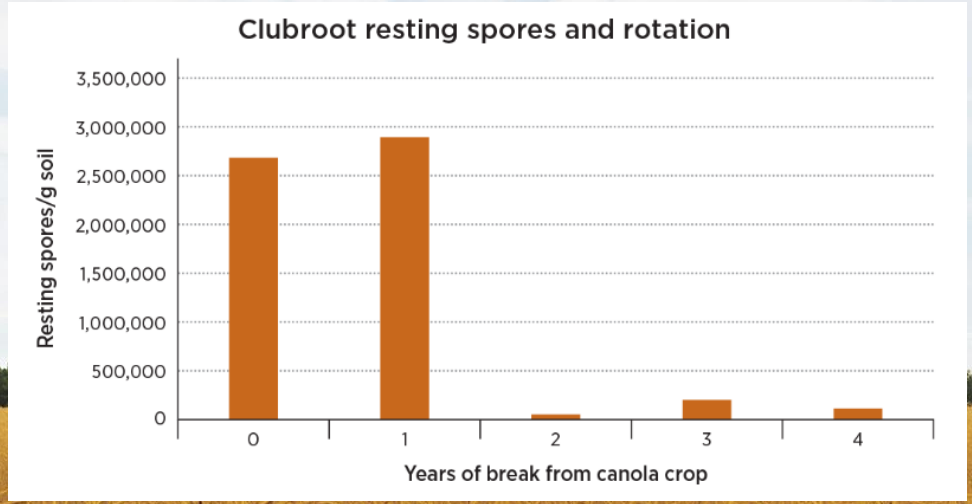


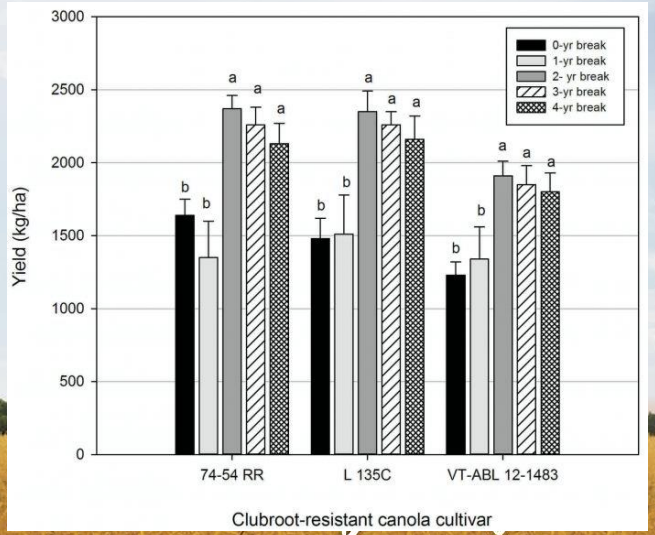


our lab to your field

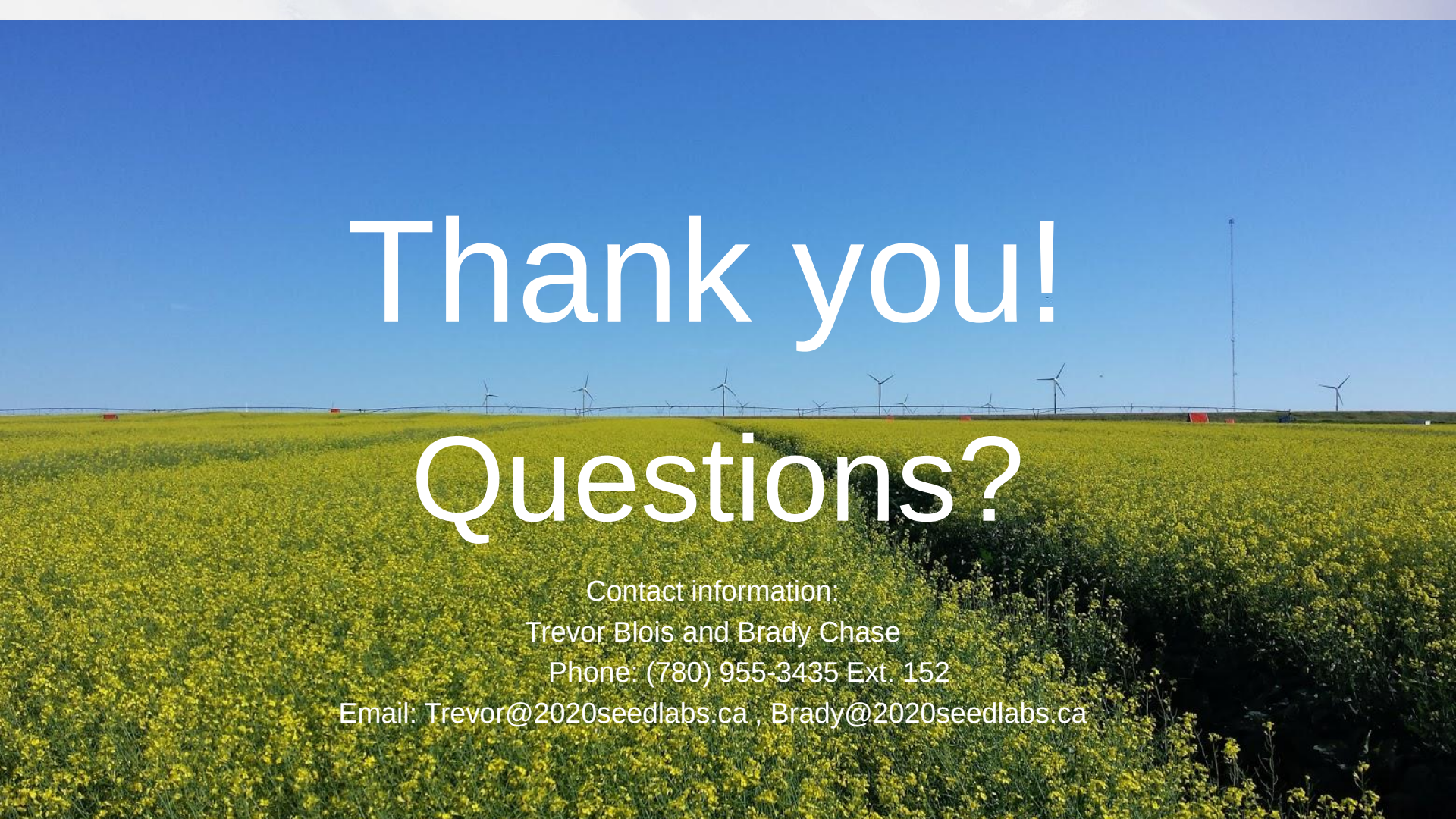
When to Sample

- Canola Roots if intact and available through harvest
- Soil: Wait until any gall material has decayed back into soil
- Be aware spore load changes over time: reduced by ~90% after a 2 year break from canola





Peng et al. 2015. Europ. J. Agron. (70), 78-84.



Thank you!

Questions?

Contact information:
Trevor Blois and Brady Chase
Phone: (780) 955-3435 Ext. 152
Email: Trevor@2020seedlabs.ca , Brady@2020seedlabs.ca