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# Fusarium root rot of peas: update and future research opportunities

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# Dry field peas

- Increased production of field peas
- 3.2 million acres harvested in 2012, increase of 35%
- Yield decreased 16% to 32.1 bushels per acre in 2012
- Alberta – 960,000 acres planted, 935,000 acres harvested
- Average yield = 40.7 bushels/acre, decrease of 4.5%



<http://www.aitc.sk.ca/photogallery>

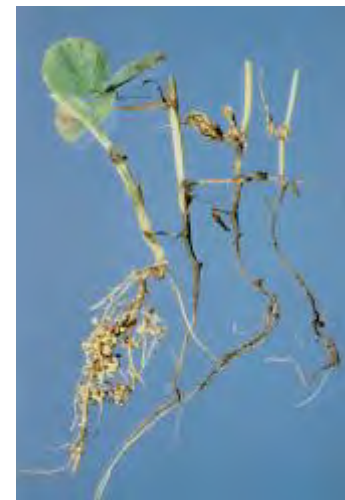
# Pea root rot complex

- Important widespread diseases of field pea
- Can attack the crop at various growth stages, symptoms in seedlings to mature plants
- Problematic in Alberta during summers of 2010 and 2011 (above average moisture)
- Still a problem in 2012, despite hot, dry summer
  - Cool, wet weather during seedling and hot, dry weather after seedling stage



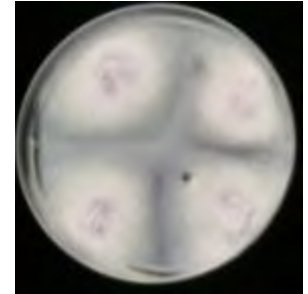
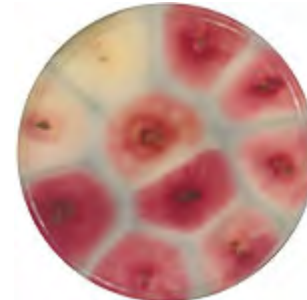
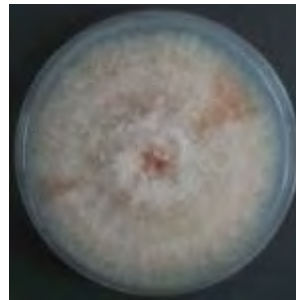
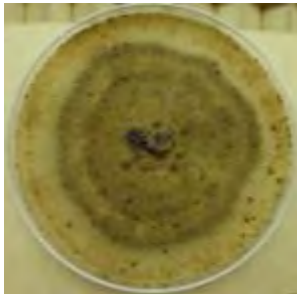
# Root rots - Current disease situation

- In Central Alberta surveys consistently find very high incidence of root rot
- Increasing reports from producers about root rots in fields
- In Manitoba – 100% of field peas surveyed had root rot
  - Variety of *Fusarium* spp.
- In Saskatchewan in 2012 – first reported incidence of the root rot pathogen, *Aphanomyces euteiches*



# Pea root rots

- Complex of different soilborne pathogens
  - *Rhizoctonia solani*, *Fusarium* spp. > *F. solani* f. sp. *lisi*



***F. avenaceum***, *F. oxysporum*, *F. redolens*, *F. graminearum*



# Root rot symptoms



[http://mtvernon.wsu.edu/path\\_team/](http://mtvernon.wsu.edu/path_team/)



Photo courtesy of R. Bowness

Brown, spreading lesions on taproots, root decay, and reddening of vascular tissue

# Root rot field symptoms - early



Photos courtesy of Kan-Fa Chang

Early season symptoms:

- Poor emergence, seedling collapse, stunted growth



# Root rot field symptoms - late



Photos courtesy of Kan-Fa Chang

Late season symptoms:

- Stunted growth, yellow patches, stand collapse



# Root rot impact on field pea

- Interferes with nodulation, nitrogen fixation
- Deteriorates the roots causing weak root system
- Reduces plant biomass
- Stunted growth, stand collapse after flowering, yellowing patches
- Yield losses are common
  - Hard to measure
  - Relate to disease severity



Photo courtesy of R. Bowness

# Fusarium root rot pathogens

- Produce long-lived resting spores within soil
- Patchy distribution within a field
- Variation in aggressiveness of isolates
- Infections can occur throughout the growing season – roots grow through soil profile to meet resting spores
- Usually require plant stress for infection



<http://www.mycology.adelaide.edu.au>



Photo courtesy of R. Bowness

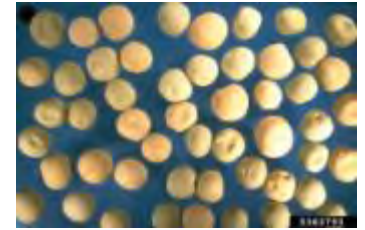
# Fusarium root rot management

- Limited options within a season
- There are no cultivars resistant to root rot pathogens
- Manage disease before seeding
  - High quality seed
  - Cultural practices
  - Reduce soil compaction and increase residue decomposition
- Ø Seed treatments
- Ø Crop rotation



# Fusarium root rot management

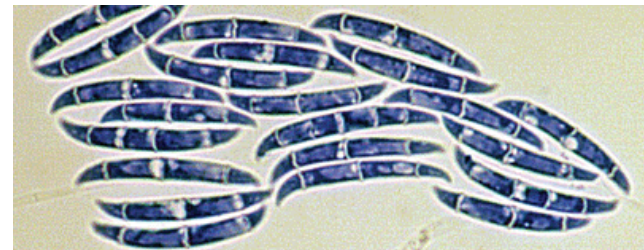
- Seed treatment
  - Ensures crop gets off to a good start
  - Prevents early infection
  - Mixed results on effect of late symptoms
  - Ø Planting into sites with a history of root rots or poor stand establishment
- Crop rotation
  - Reduce resting-spore inoculum in soil
  - 4-year break between pulse crops
  - Problem with *F. avenaceum*?





# Future research goals

- Why is root rot increasing and what can we do about it?
- Comprehensive field surveys of Alberta pea fields – root and soil samples to see what's present
- Relationship between inoculum levels in soil and risk of developing disease and yield loss
  - Risk assessment based on soil tests



# Future research goals

- Seed treatments to reduce early infections, prevent late symptom development
- Resistance screening of field cultivars
- Host range and survival of *Fusarium spp.*
- Soil conditions and soil management practices that will reduce survival of long-lived resting spores

# Thanks! Questions?



<http://www.ndsu.edu/pubweb/pulse-info/fieldtext.html>