Ergot; A Perennial Issue?

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Claviceps purpurea (Fr.) Tul.

Often associated with the Middle Ages.

– “St. Anthony’s Fire”
-- “Sacer Ignis”

Sporadic but not causing major issues during late 20th century

Ergot Incidence
Hexaploid wheat

Data provided by the Canadian Grain Commission from their Harvest Survey Program.
www.grainscanada.gc.ca
Ergot Incidence
Durum wheat

Data provided by the Canadian Grain Commission from their Harvest Survey Program.
www.grainscanada.gc.ca
Effects of Ergot

- **Yield**
  - Replaces the Kernel, resulting in a reduction in yield

- **Presence of Ergot Bodies**
  - Toxic Alkaloids
  - Grade Loss or rejection at the elevator

- **Human food and animal feed issue**


G.L. Schumann, 2005, APSnet
Ergot – Disease Cycle

Conidia produced in honeydew on infected florets are spread to healthy flowers by insects and rain.

- Infection by ascospores during flowering
- Carried by wind to flowers of grains and grasses
- Ascospores
- Sclerotia germinate during spring or early summer
- Sclerotia overwinter in soil or in seed bin
- Sclerotia (ergot bodies) in mature head

Bailey et al. 2003. Mike Shillinglaw
Ergot Disease Cycle

Bailey et al. 2003
Infected Host and Infested Grain
Management strategies: Overwintering phase of ergot

- **Sclerotia**
  - Survive for one year

- **Seed with no or low levels of ergot**
  - Certified Seed.

- **Reduce sclerotia**
  - Rotation
    - Avoid wheat after rye (or rye after wheat)
    - No wheat beside fall rye
    - Use of Proper Rotations (3 to 4 years)
Management strategies: Overwintering phase of ergot

- **Sclerotia**
  - Deep ploughing??
    - Bury to 5 cm depth
  - Fire??

  - Mowing or spraying of grasses in headlands or ditches.
Management strategies: Limit host infection

- **Grain floret infection**
  - Limit factors related to pollen sterility
    - Related to flower opening
    - Maintain balanced fertility (e.g. copper, boron)
    - Avoid late herbicide apps.
  - **Uniform stand**
    - Increase seeding rate and limit tiller development
Management Strategies; Limit Host Infection

• **Crop Choice**
  – Winter vs. spring
  – Class of wheat?
Ergot reaction and wheat class

Average # of sclerotia per wheat head

- CWRS
- CPS
- CWAD

Menzies 2004
Management Strategies; Limit Host Infection

• Crop Choice
  – Winter vs. spring
  – Class of wheat?
  – Cultivar?
Ergot Distribution – 2011
Courtesy, Mike Grenier, Former CWB

2011 CWB Harvest Survey – Ergot
Physiological Resistance to *Claviceps purpurea*; Does it Exist?

**Easy Answer? Yes!**

**Rye**
- Sosulski and Bernier 1975

**Barley**

**Wheat**

- Differences are not always great, but resistance is not a rare trait.
- Most lines with identified resistance are not commercially acceptable lines.
Management strategies: Limit infection

• Foliar fungicide application
  – Limit infection of cereal ovary tissues
  – European and US research
    • Recent UK studies suggest none of the fungicides used gave commercially acceptable levels of control in the field
      – Attributed to poor protection of cereal ovary tissue
        » Limited uptake and movement of fungicides to ovary tissues

• Research is ongoing
  – Water volumes, etc.

Anther (x3)
Stigma
Ovule (ovary)
Management strategies: Reducing ergot content of grain

- Delay swathing/harvest
  - Wind will blow off ergot bodies

- Selective harvesting
  - Headlands can be more affected
  - Harvest headlands separately

- Grain cleaning
  - Gravity table?
  - Colour sorters?
Acknowledgements

• Soils and Crops 2015
• Canadian Seed Growers’ Association
• AAFC (GF2 – EmTox)
• Zlatko Popovic, Cheri Saramaga, Rebecca Dueck, Janet Gruenke, host of summer students.
Thank you - Merci