Cereal Disease Management

T.K. Turkington and M.W. Harding
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Outline

- Seed, seedling and root rot diseases
- Stripe rust
- Fungal Leaf Spot (FLS) complex
- Physiological Leaf Spot (PLS)
- Fusarium Head Blight
- Fungicide timing for control of FLS
Seed rot, seedling blight, root rot
Stripe rust on wheat and barley

- Can be very severe
  - Rust spores blown in from US
    - Pacific Northwest
  - Overwintering
  - Some adaptation to resistant varieties
    - Now appear to be susceptible

John Burns, Extension Agronomist, WSU
Stripe rust resistance: key strategy

Resistant

Susceptible
Regular scouting is critical!

- **Key when growing variety with VP to F reaction**
  - Are symptoms present in winter wheat the previous fall
  - Monitor winter wheat in spring
  - Keep an eye on fields
    - On a regular basis

- **Follow updates**

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John Burns, Extension Agronomist, WSU
Stripe rust of wheat

• Foliar fungicide application
  – Flag leaf protection
    • Protect leaves that are key to grain filling
  – Earlier applications may be needed
    • Where symptoms are widespread in a field
    • A flag leaf/head emergence stage application may still be needed
Typical Symptoms of Fungal Leaf Spot Diseases

Healthy
Net-form net blotch
Scald early
Scald late
Spot-form net Blotch/spot blotch
Septoria/tan spot
Tan spot
Septoria

Note the development of chlorosis (yellowing) around well developed symptoms.
Barley Scald

Net Blotch

Tan spot

Septoria

Glume Blotch

J. Gilbert, AAFC Winnipeg
Tan Spot

Red smudge
Leaf Yelllowing Due to Abiotic Issues or Viral Diseases (two far right leaves)

Healthy

Total/partial leaf yelloing due to N deficiency, etc.

Total/partial leaf yelloing due to N deficiency, etc. Brown spotting not the reason for total/partial leaf yelloing

Leaf margin yelloing due to fertility, physiological factors, or other abiotic issues

PLS

Barley yellow dwarf virus

Wheat streak mosaic virus
Physiological leaf spotting

Wu and Tiedemann (2002)

Burrows et al. 2009, MSU
Physiological Leaf Spotting

Light-induced PLS on leaves from winter barley cv. Anoa from shaded (left) and unshaded (right) field plots (GS 65).

http://wwwuser.gwdg.de/~instphyt/app/research/pls.html

Wu and Tiedemann (2002)
CDC Kestrel winter wheat

Courtesy of C.A. Grant et al.

CDC Falcon also prone to PLS
Fusarium Head Blight

- Continues to cause downgrading issues for many fields in S. Alberta
- Becoming more established in areas further north?
- Difficult to manage
  - Stubble-borne and seed-borne disease
  - Spores travel large distances
  - Corn and durum wheat are excellent hosts
  - Narrow window for fungicide application
  - No strong resistance
Worst Case Scenario For Creating an FHB Problem

- No idea regarding seed infection
- No seed treatment done
- Grow highly susceptible variety
- Grow same cereal crop type for grain production several years in a row
- Farm located in moister regions of Alberta or where irrigation occurs
- Include corn in rotation with cereals
Using Fungicides to Manage Cereal Diseases

• Integrate all available knowledge into pest management
  – crop biology and growth stage
  – pathogen biology and disease cycle
  – weather conditions and forecast
  – field history, yield potential and yield target
  – economic thresholds
  – fungicide characteristics

• If you can’t or don’t have long, diverse crop rotations, you will need to lean more on other management tools like fungicides
Impact of Rotation
Disease Severity For CDC Earl Grown on Different Cereal Stubble, 1999

Residue type

AC Lac.  CDC Earl  Harr.  Kas.  Wapiti
Barley  Triticale

% Leaf Area Diseased

Scald  Net

Impact of Rotation
Grain Yield of CDC Earl Grown on Different Cereal Stubble, 1999

Grain Yield (bu/ac)

Residue type

AC Lac.   CDC Earl   Harr.   Kas.   Wapiti
Barley    Triticale

Kasota – after one year

Kasota – after three years in a row

Contribution to yield from upper leaves of the cereal canopy

Cereal growth stages and their importance to fungicide application, 2003, Colin Hacking and Nick Poole, Hi-Grain Update

i) Winter Wheat
Diagram 3. Approximate contribution of top 3 leaves in winter wheat

- Leaf 2: 23%
- Leaf 3: 7%
- Leaf 4: 3%
- Ear: 22%
- Flag: 43%

ii) Winter barley
Diagram 4. Approximate contribution of top 3 leaves in winter barley

- Leaf 2: 20%
- Leaf sheath: 25%
- Leaf 3: 10%
- Ear: 13%
- Flag: 9%
Effect of fungicide timing

Figure 1.7-2. Growth stages of cereals.
Grain yield (bu/ac) and herbicide/fungicide treatment, Lacombe 2010

Herbicide/Fungicide Treatment

- H2-3
- H5-6
- H2-3/FRF
- H5-6/FRF
- H2-3 + HRF
- H5-6 + HRF
- H5-6 + HRF/FRF
- H2-3 + HRF/FRF

Fungicide at flag leaf stage

- No fungicide at flag leaf stage

Herbicide/Fungicide Treatment

- A
- B

A
A
A
A

A
A
A
Grain yield (bu/ac) and herbicide/fungicide treatment, Melfort 2010

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**Fungicide at flag leaf stage**

- No fungicide at flag leaf stage
- Fungicide at flag leaf stage

Herbicide/Fungicide Treatment
Grain yield (bu/ac) and herbicide/fungicide treatment, Scott 2010

Herbicide/Fungicide Treatment

- H2-3
- H5-6
- H2-3 + HRF
- H5-6 + HRF
- H2-3/FRF
- H5-6/FRF
- H2-3 + HRF/FRF
- H5-6 + HRF/FRF

Fungicide at flag leaf stage

No fungicide at flag leaf stage

Herbicide/Fungicide Treatment

- CD
- AB
- B
- D
- C
- A

Levels of significance:

- CD
- AB
- C
- B
- D
Net blotch symptoms on Harrington barley at the 3 leaf stage (June 18th) at Melfort, 2004
Conclusions

• Know what you are dealing with
  – Scouting, diagnosis/testing, record keeping

• Obtain and Integrate as much knowledge, and as many tools, as possible to optimize crop health and make decisions

• When using fungicides, spray decision and timing are most important
  – protect the part(s) of the crop that contribute to yield