Management of Field Pea Diseases

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Lacombe, AB

Agronomy Update
January 18th, 2012
Field Pea

- Field Pea
  - Pulse crop produced for food, ingredients, and feed
  - Valuable in crop rotation (N$_2$ fixation, soil benefits)
  - Important economic crop
  - Canadian prairies are the world’s largest producer and exporter
    - Demand is increasing every year
    - Market relies on healthy production and high quality

- In 2011
  - Over 725,000 acres of peas harvested in Alberta
  - An average yield of 38.8 bu/ac (13% higher than 10 yr avg)

Source: Statistics Canada
Pea Diseases

• Ascochyta Blight
  ▫ Common disease
  ▫ Made up of complex of three pathogens
    • *Mycosphaerella pinodes*
    • *Ascochyta pisi*
    • *Phoma pinodella*

• Fusarium root rot
  ▫ Common disease
  ▫ Part of a complex of 4-5 pathogens
    • “Root Rot complex”
Pea Diseases

- Caused by fungal pathogens
- Can attack the crop at various growth stages
- Prefer wet conditions
- Problematic in Alberta during summers of 2010 and 2011
Ascochyta Blight

- Most serious foliar disease of field pea in Western Canada
- Found in all commercial pea fields
- Interferes with photosynthesis
- Crop lodges
- Reduces seed weight, size, number and quality
- Yield losses are common from 20-50%
  - In wet years even higher
Ascochyta Blight - Pea

• Symptoms
  ▫ Appear within 2-4 days of infection
  ▫ Small purple to brown lesions on leaves, stems and pods
  ▫ Small pinpoint lesions on the flowers
  ▫ Crop lodges due to breakdown of stem strength (lignin)
    • increases the humidity in the canopy
    • problems for harvest
  ▫ Seeds - shrunken with dark brown discoloration
Ascochyta Blight - Pea

• Survives in seed, in the soil and on plant debris

• Two types of spores - spread by wind or rain splash

• Infections occur repeatedly throughout the season

• Most critical factor is leaf wetness
Ascochyta Blight - Management

- Strategies include
  - Crop rotation
  - Disease free seed
  - Seed treatment
  - Cultural practices

- No cultivars resistant to this pathogen

- Most effective strategy is repeated application of fungicides

- Fungicide options include:
  - Bravo 500
  - Headline EC
  - Lance
  - Quadris
Ascochyta - Fungicide Timing

• Timing is critical

• Considerations
  ▫ Protectants – won’t kill the disease
  ▫ Level disease
  ▫ Canopy type
  ▫ Before canopy closes
  ▫ Wet vs dry weather
  ▫ Yield increase is expected

• Is yield loss higher than cost of application?
Ascochyta - Prediction system

• Crop Canopy
  ▫ Thin, moderate, or thick

• Leaf wetness (at noon)
  ▫ None, low, moderate, or high

• Percent of plants showing symptoms
  ▫ None, low (<20%), moderate (20-50%) or high (50-100%)

• 5 day weather forecast
  ▫ Dry, unsettled, showers, wet

Source: Lopetinsky and Hoy, 2008
### Ascochyta - Prediction system

<table>
<thead>
<tr>
<th>Estimation Risk Scale</th>
<th>Score</th>
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<tr>
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<td>Thin</td>
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<td>Moderate</td>
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<td>Mod/ Thick</td>
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<td><strong>Leaf wetness / humidity</strong></td>
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<td><strong>5 day weather forecast</strong></td>
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<td><strong>Total</strong></td>
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Source: Lopetinsky and Hoy, 2008
Ascochyta - Prediction system

- Field inspections done bi-weekly

- Add up score for each factor
  - $1 + 2 + 3 + 4 = ?$

Source: Lopetinsky and Hoy, 2008
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Source: Lopetinsky and Hoy, 2008
Ascochyta - Prediction system

- Field inspections done bi-weekly
- Add up score for each factor
  - $1+2+3+4 = ?$
- Magic number is 65
  - Score above 65 points..
    - Fungicide application is recommended
  - Score below 65 points..
    - Fungicide applications not necessary at this time
    - Field inspections should continue

Source: Lopetinsky and Hoy, 2008
Considerations

• Prediction system is a tool

• May help make the decision as to whether to spray or not easier

• Increased value of easier harvest
  ▫ Crop is not lodged as much

• Increased value for lower levels of *Ascochyta* in the seed

• Increased value for higher grade of the harvested product
Considerations

- More than 2 applications in a season is not recommended
- Must be starting with a healthy crop
- No disease.....don’t spray!
- Is the cost of spraying less than the cost of not spraying?
Fusarium Root Rot

- Important widespread disease of field pea in Western Canada
- Found in all commercial pea fields
- Interferes with nodulation, nitrogen fixation
- Deteriorates the roots
- Reduces plant biomass
- Yield losses are common
  - harder to measure

Photo courtesy of Dr. Kan-Fa Chang
Fusarium Root Rot

• Soil-borne disease

• Affects plants from seeding to flowering

• Soils are wet and warm

• Part of a complex that includes:
  ▫ Seed rot, Seeding blight, Root rots, Wilt

• Combination of three pathogens:
  ▫ *Fusarium sp.*, *Rhizoctonia solani*, *Pythium sp.*
Fusarium species

- Three species:
  - *Fusarium oxysporum*
    - Fusarium Wilt – distinct
    - Not found in the root rot complex
  - *Fusarium solani f. sp pisi*
  - and
  - *Fusarium avenaceum*
    - Found in root rot complex
    - Identical symptoms

*F. avenaceum* dominant species in Alberta
Fusarium avenaceum

• Huge variation within isolates:
  ▫ aggressiveness or pathogenicity
  ▫ some cause very little damage to roots
  ▫ some cause complete root disintegration

• Variation not due to:
  ▫ geographical areas
  ▫ dryland vs irrigated areas

Photo courtesy of Dr. Kan-Fa Chang
Fusarium Root Rot

- **Symptoms**

  - Early in season
    - No emergence
    - Seedlings collapse
    - Stunted growth

    - Rotting seeds
    - Primary and secondary roots are brown/reddish
    - Vascular discoloration
      - Reddish / brownish/ pinkish

Source: www.info-biovision.org
Fusarium Root Rot

• Symptoms

Late in season
  ▫ Stunted growth
  ▫ Stand collapse after flowering
  ▫ Yellowing in patches
  ▫ Weak, non-existent root system
  ▫ Roots are brown
  ▫ Vascular discoloration
    • Reddish / brownish/ pinkish

Source: www.info-biovision.org

Photo courtesy of Dr. Kan-Fa Chang
Fusarium Root Rot

- Survives in the soil as a resting spore

- Spores can survive for a very long time
  - up to 10 years

- Infections can occur throughout the season

- Most critical factor soil conditions, stress and aggressiveness of the pathogen
Fusarium Root Rot - Management

- Strategies include
  - Crop rotation
  - Seed treatments
  - Cultural practices
  - Good tillage practices (reduce compaction)
  - High quality seed

- There are no cultivars resistant to this pathogen

- Most effective strategies are:
  - crop rotation and seed treatments
Considerations

- Tough...really nothing you can do in season.
- Depends on pathogen aggressiveness
- Water logged soils - warm
- Could be other pathogens involved
  - later in the season
- Rotate your crops
- Treat your seed
Summary - Disease Management

• Crop Rotation

• Seed treatments

• Land / weed management

• Cultural practices

• Disease-free, high quality seed

• Fungicide applications
  ▫ proper timing
  ▫ cost effective
Thanks! Questions?