Blackleg and Bacterial Soft Rot

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Ron Howard, RJH Ag Research Solutions Ltd., Brooks, AB
Mike Harding, Alberta Agriculture and Forestry, Brooks, AB

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Outline

- Causal Agent
- Symptoms
- Disease Cycle
- Factors Affecting Disease Development
- Scouting Tips
- Disease Management Strategies
- Dickeya Blackleg and Soft Rot: A New Disease of Potatoes in North America

Blackleg and Bacterial Soft Rot

- Blackleg is caused by the bacterium Pectobacterium atrosepticum (Erwinia)
- Soft rot is caused by Pectobacterium carotovorum and other bacterial species
- These diseases often occur together
- Blackleg is restricted to potato, while soft rot can affect many plant species
- Both diseases can cause seed-piece decay and tuber rot in the field and storage and may occasionally kill stems and/or plants in the field

Pectobacterium Blackleg Symptoms

- Slow, uneven emergence
- Missing plants (5-10% up to 40-50%)
- Ragged stands
- Wilting, discolored and/or dying plants
- Seed piece decay or rotten tubers

Field Symptoms of Blackleg

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**Pectobacterium Soft Rot**

**Exterior Symptoms**

**Interior Symptoms**

**Disease Cycle**

- *Pectobacterium* bacteria can be tuber or soil-borne
- They can be spread during seed cutting, planting and handling operations
- They can also be spread in irrigation water, wash water and by insects
- Wounds are ideal infection sites
- Infection of seed pieces and tubers is favored by wet soil conditions and warm temperatures
- Tubers can become contaminated with *Pectobacterium* at harvest and in storage

**Factors Affecting Disease Development**

- Crops are predisposed to blackleg by:
  - Seed-borne infection
  - Spread of infection during seed cutting
  - Wounding of tubers
  - Saturated soil conditions
  - Contaminated irrigation water
  - Insect feeding

**Blackleg Disease Cycle**

**Factors Affecting Disease Development**

- Tubers are predisposed to soft rot by:
  - Wounds and enlarged natural openings
  - Large amounts of decaying organic matter
  - Wet soil conditions
  - Freezing injury
  - Low oxygen levels
  - Free moisture or surface mud on tubers
  - Inadequate drying of tubers in storage
  - Poor ventilation in storage or during shipping
  - Other diseases, e.g., blackleg, pink rot, FDR
Scouting for Blackleg and Soft Rot
- Examine seed tubers for symptoms of external and internal decay
- Examine crops during and after emergence for seed piece decay and lower stem symptoms
- Look for stunted plants with cupped leaves and stem lesions early in the growing season
- Later in the season, watch for aerial stem rot
- Look for symptoms of tuber decay in the field, at harvest and in storage

Managing Blackleg and Soft Rot
- Use disease-free certified seed
- Plant into warm soil (>10°C)
- Rogue infected plants if practical to do so
- Sanitize seeding and harvesting equipment
- Avoid injuring tubers during harvesting
- Grade out decaying tubers prior to storage
- Promote wound healing in storage
- Increase air circulation to dry wet tubers
- Store tubers at low temperatures
- Senator PSPT is registered for blackleg control

Dickeya Blackleg and Soft Rot
- A new infectious disease of potatoes caused by the bacterium Dickeya dianthicola and related species in North America
- Causes blackleg, wilt and tuber rot
- Closely related to Pectobacterium, which causes common blackleg and soft rot
  - P. atrosepticum – Common blackleg and wilt
  - P. carotovorum – Soft rot and stem rot
- Other Dickeya and Pectobacterium species are damaging on potatoes in Europe

Dickeya Blackleg and Soft Rot
- Dickeya dianthicola has been infecting potatoes in Europe since the 1970s
  - Yield losses of 20-25% have been common
- Outbreaks in the eastern USA in 2015
- Detections in ON (2015) and NB (2016)
- Dickeya solani was detected in Finland in 2004 and in Poland and Belgium in 2005
- Infected seed potato imports from the Netherlands were implicated in spreading this pathogen

Field Symptoms of Dickeya Blackleg

Field Symptoms of Dickeya Blackleg
**Dickeya dianthicola vs. Pectobacterium**

- Prefers warmer conditions (24-25°C)
- Spreads readily with wind-blown rain, contaminated equipment and water
- Can infect potatoes at any time during the growing season
- Some specific concerns:
  - Requires fewer cells to cause wilt
  - More aggressive than common blackleg
  - Can have a latent phase
  - Abundant extracellular slime (biofilm)
  - Potent cell-wall degrading enzymes

**Managing Dickeya Blackleg**

- Use recommendations for *Pectobacterium*
- Use locally grown certified seed
- Consider planting whole (uncut) seed
- Senator PSPT (thiophanate-methyl) seed piece treatment is registered for the control of blackleg (*Pectobacterium*) and may also help to control *Dickeya*
- Thoroughly sanitize equipment between each seed lot at planting and harvest

**Contact Information**

Ron Howard, Ph.D., P.Ag.
Plant Pathologist
RJH Ag Research Solutions Ltd.
Box 1456
Brooks, Alberta T1R 1C3
Email: agresearch@eidnet.org