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Seed-borne potato diseases: management considerations

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#### Seed-Borne Potato Disease Problems



#### Seed disease management considerations

- Use clean, high quality seed
- Plant whole seed tubers if possible. Suberize cut seed before planting. Allow to suberize for at least two days prior to planting; two weeks would be preferable.
- Remove obviously diseased tubers before cutting
- Clean and disinfect tools and equipment used for cutting and planting seed. This should be done between seed lots; preferably more frequently.
- Avoid poor seed storage conditions that may lead to condensation build-up on tubers. Seed should be stored in a manner that it can be ventilated and its temperature controlled.
- Plant seed tubers during conditions that favor fast emergence. Plant seed into well- drained soil with warming temperatures.
- Avoid wounding during seed cutting, planting and harvest.
- If using a fungicide seed treatment to control fungal diseases, take care not to add too much water!

# **Post-harvest spray application volumes**



#### **Bacterial Seed Decay Pathogens**

Tuber soft rot (*Pectobacterium carotovorum* subsp. *carotovorum*) Blackleg (*Pectobacterium atrosepticum*) Dickeya Rot (*Dickeya dianthicola*)



## Pink Rot – Phytophthora erythroseptica

all underground tissues may be affected (roots, basal stems, stolons, tubers)
tubers most commonly infected via stolons (tuber infection via eyes or lenticels in very wet autumns)



# **Pink Rot Surveys** Resistance of *Phytophthora erythroseptica* to Ridomil (metalaxyl-m)

Prov.	#	#	%	%	%	%
	samples	isolates	samples MS	samples MR	isolates MS	isolates MR
PE	11	67	55	45	49	51
NB	2	11	50	50	73	27
MB	1	1	100	0	100	0
AB	5	20	80	20	90	10
Total	19	99	<mark>63</mark>	37	61	39



Pink Rot Management

Phytophthora erythroseptica isolate and fungicidal treatment

# Late Blight = *Phytophthora infestans* Infected seed



# P. infestans - DISEASE MANAGEMENT

#### Sources of Inoculum – Infected Seed

- certified seed from a reliable source
- sporulation from seed pieces (spread to healthy during cutting)
  - grade out diseased seed (do not plant!)
  - disease is not spread by tomato seed (but transplants are a serious problem!)
  - seed treatments can be helpful





#### Silver Scurf (*Helminthosporium solani*) Black Dot (*Colletotrichum coccodes*)



#### Silver scurf = *Helminthosporium* solani



#### **Black dot = Colletotrichum coccodes**





Fig. 5

Fig. 6

Courtesy of Cornell University

#### Silver Scurf/Black Dot - DISEASE MANAGEMENT

# **AT PLANTING**

- 1. Plant clean seed
- 2. Use a registered fungicide seed treatment, but utilize resistance management strategies
- Resistance to thiophanate-methyl (Senator) and fludioxonil (Maxim)
- new liquid products with difenoconazole (Cruiser Maxx Potato Extreme) and prothioconazole (Emesto Silver) are effective
- 3. Applications of azoxystrobin (Quadris) may suppress soil inoculum



Courtesy of PEI Dept. of Agriculture and Forestry

Courtesy of R. Loria, Cornell University

# Influence of Supplemental Irrigation



# Summary Comments

**Supplemental Irrigation** 

- 13 fields assessed over the 4 years of study
- In 8 fields (62%), some form of supplemental irrigation reduced the incidence of common scab
- In only 1 field (8%) were no treatment effects noted
- In 4 fields (31%), supplemental irrigation impacted common scab in variable ways
  - influence of timing of water application and natural rainfall (tuber initiation is key!)
  - influence of variety
  - influence of soil chemical, physical and biological properties
  - influence of pathogen species and strains

#### Influence of Tillage Regimen







#### Summary Comments Tillage

- 10 fields assessed over the 3 years of study
- In 6 fields (60%), tillage did not affect the incidence and severity of common scab
- In 1 field (10%), common scab increased under the moldboard plow regimen
- In 3 fields (30%), common scab increased under the residue tillage regimen
  - influence of prior crop and type of residue is important (disease suppressive crops can be beneficial; cereal residues can enhance disease in some cases)
  - influence of supplemental irrigation
  - influence of potato variety
  - influence of soil chemical, physical and biological properties
  - influence of pathogen species and strains

# **Common Scab Management**

- use clean seed
- variety resistance
- maintain adequate soil moisture beginning at tuber initiation
- avoid soil amendments that increase soil pH
- cereal residues may acerbate disease

#### **Powdery Scab - Symptoms**





Courtesy of PEI Dept. of Agriculture and Forestry

Courtesy of Dept. of Agriculture, Western Australia

#### **Powdery Scab – Causal Agent**

#### Spongospora subterranea f.sp. subterranea

cystosori= spore balls



#### Fusarium Dry Rot and Seed Piece Decay – Fusarium spp.

- external symptoms shrinking and shriveling of lesions
- internal symptoms light to dark brown dry rot with mycelium-filled cavities







#### Emergence Issues



## **THE BIG THREE**

#### Fusarium sambucinum

#### Fusarium coeruleum

#### Fusarium avenaceum



#### Seed Treatment Trial Seed inoculated, treated and placed in storage ACIDF Fusarium Project

#### **Russet Burbank**



# Fusarium - DISEASE MANAGEMENT

# **AT PLANTING**

1. Use clean seed; store in a disinfected facility

2. Warm seed tubers prior to cutting to promote rapid healing

3. Remove diseased tubers prior to cutting

4. Disinfect seed cutting and handling equipment often and ensure that cutters are sharp to make a clean cut that heals quickly

5. Don't store cut seed for too long

(no longer than 10 days)

6. Use a registered fungicide seed treatment, but follow a resistance management strategy

- resistance to thiophanate-methyl (Senator) and fludioxonil (Maxim)

- new liquid products with difenoconazole (Cruiser Maxx Potato Extreme) and prothioconazole (Emesto Silver) are effective

7. Plant when soil and temperature conditions promote rapid sprout growth and emergence

#### **Rhizoctonia Stem and Stolon Canker; Black Scurf**

#### Rhizoctonia solani



#### **Disease Factors**

seed-borne and soil-borne inoculum

 cool weather in spring can delay emergence and increase disease incidence

 if tubers remain in the soil too long, black scurf severity can increase

#### **Rhizoctonia Canker & Black Scurf – Management**



# Rhizoctonia - DISEASE MANAGEMENT

 reduce time between planting and emergence reduce time that tubers are left in soil before harvest reduce seed-borne inoculum **b- clean seed** - seed treatments reduce soil-borne inoculum - crop rotation - minimum tillage - soil treatments - soil amendments

#### Summary of common seed management considerations









- Seed source and quality
- clean seed; remove obvious disease
- Cut vs whole seed
- less wounding better to reduce disease
- Seed treatments
- useful in some cases (fungi);
   not in others (bacteria or viruses)
- fungicide resistance issues
- Cut and store vs cut and plant
- various considerations
- Disinfection and cleanliness
- Moisture added
- by treatments; by environments
- Conditions at planting
   -cold and wet; or conducive to rapid emergence











# Thank you !

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For more information:

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