



Agriculture and
Agri-Food Canada

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Identifying and managing foliar diseases of potato

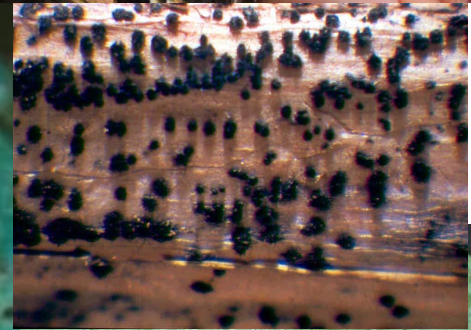
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Canada 

Foliar Disease Problems



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





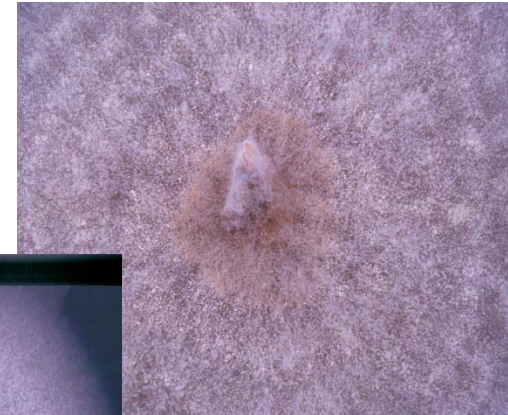
A. Disease Problems at Planting

Fusarium seed decay in a pile of cut seed

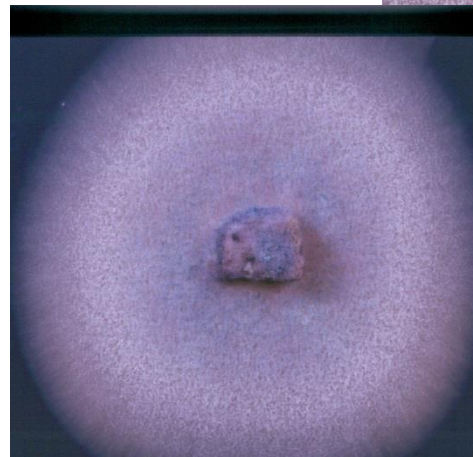


THE BIG THREE

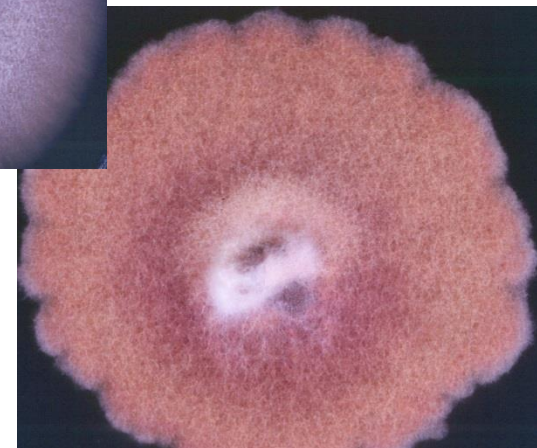
Fusarium sambucinum



Fusarium coeruleum



Fusarium avenaceum



Emergence Issues

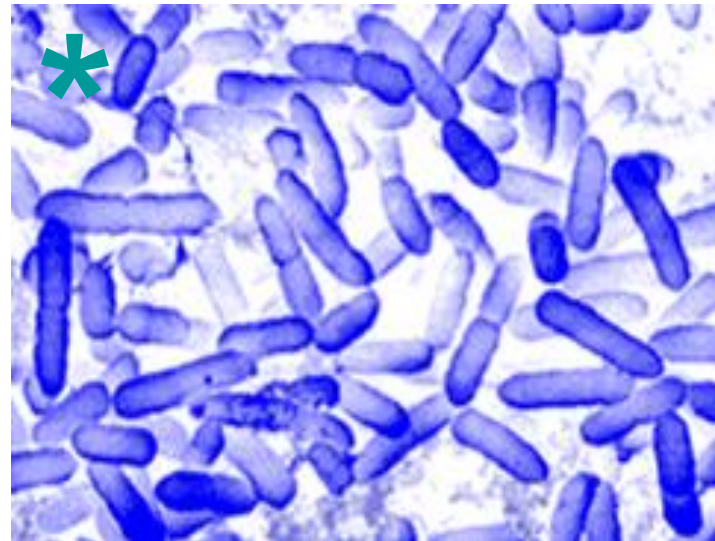


Blackleg/Soft Rot - Symptoms



Blackleg/Soft Rot – Causal Agents

- *Pectobacterium* spp.; *Dickeya* spp.
- Gram-negative rods



Blackleg/Soft Rot – Management

- **clean seed**
- **sanitation of equipment**
- **plant well-suberized seed pieces in well-drained soil**
- **reduce tuber bruising at harvest**
- **do not harvest when soil temperatures are too warm (>25 C)**
- **in storage, wound healing then cooler temperatures and adequate ventilation**

Black Dot - Symptoms

Fig. 1



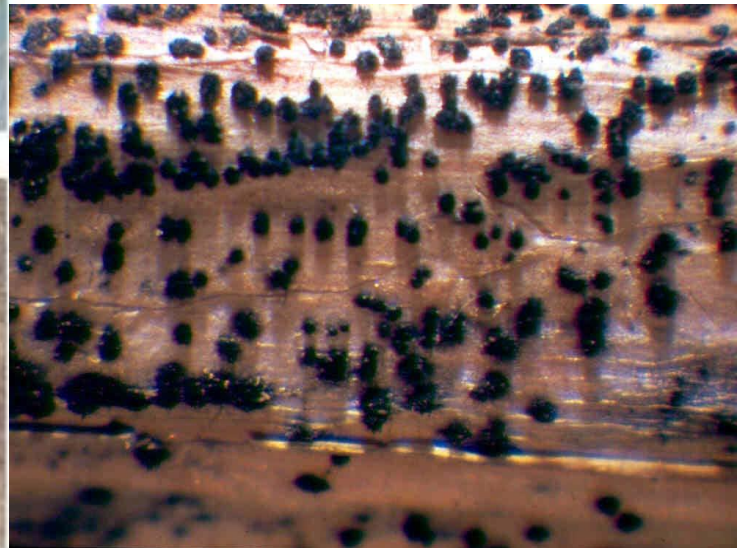
Fig. 2



Fig. 3



Fig. 4



Black Dot – Causal Agent

Colletotrichum coccodes



Fig. 5



Fig. 6

Black Dot – Management

- **use clean seed**
- **crop rotation**
- **adequate moisture and fertility**
- **protective fungicides to reduce foliar infection**
- **grow early cultivars**

Rhizoctonia Stem and Stolon Canker; Black Scurf

Rhizoctonia solani



Rhizoctonia Canker & Black Scurf – Management

REDUCE



SEED-BORNE INOCULUM

SOIL-BORNE INOCULUM

White Mold – Causal Agent

Sclerotinia sclerotiorum







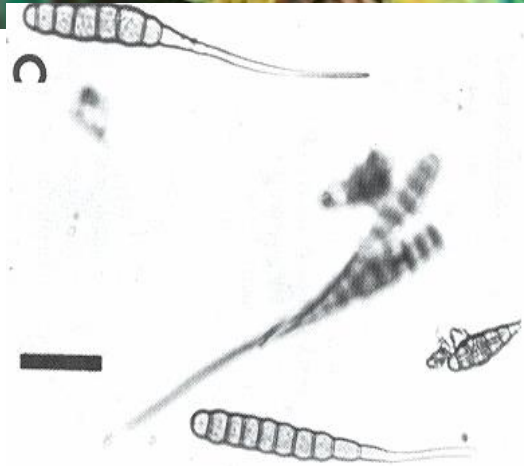




White Mold – Management

- **protectant fungicides applied before infection (number depends on length of time of apothecia production in the area)**
- **manage canopy to reduce conducive microclimates (fertility, irrigation, etc.)**

Early Blight and Leaf Disease Complex



Conidial morphology

A. solani:

- long/slender
- beak present
- solitary



A. alternata:

- short/club-shaped
- no beak
- chains



Early Blight - Symptoms



Brown Spot - Symptoms



'Late' Blight vs 'Early' Blight



- Can appear early in season
- Attacks vigorous, young foliage
- Only overwinters in infected tubers

- Can appear late in season
- Attacks older tissues and/or stressed plants
- Overwinters in debris

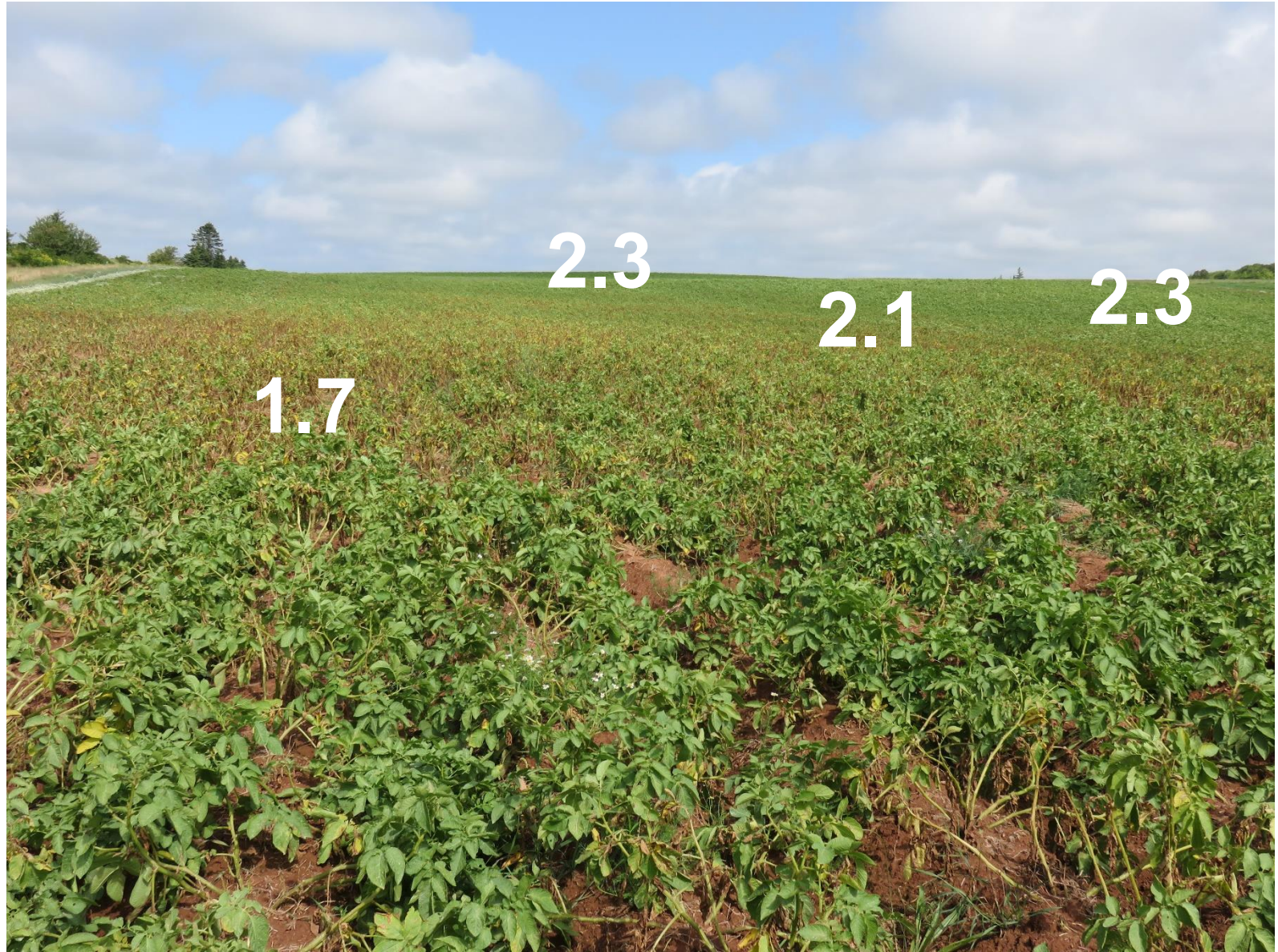
Early Blight/Brown Spot Management – Cultural Practices

- High quality seed
- Disease forecasting tools
- Regular field scouting
- Eliminate sources of primary inoculum
 - Encourage breakdown of crop residues and debris
(crop rotation, tillage)
- Select less susceptible varieties (disease more severe in early-maturing cultivars)
- **Reduce crop stress**
 - **Soil moisture, fertility, other diseases**
- Proper harvest and storage procedures (proper skin set; reduce bruising; allow wound healing)



Early Blight Management – Cultural Practices

Percent Organic Matter



Early Blight/Brown Spot - DISEASE MANAGEMENT

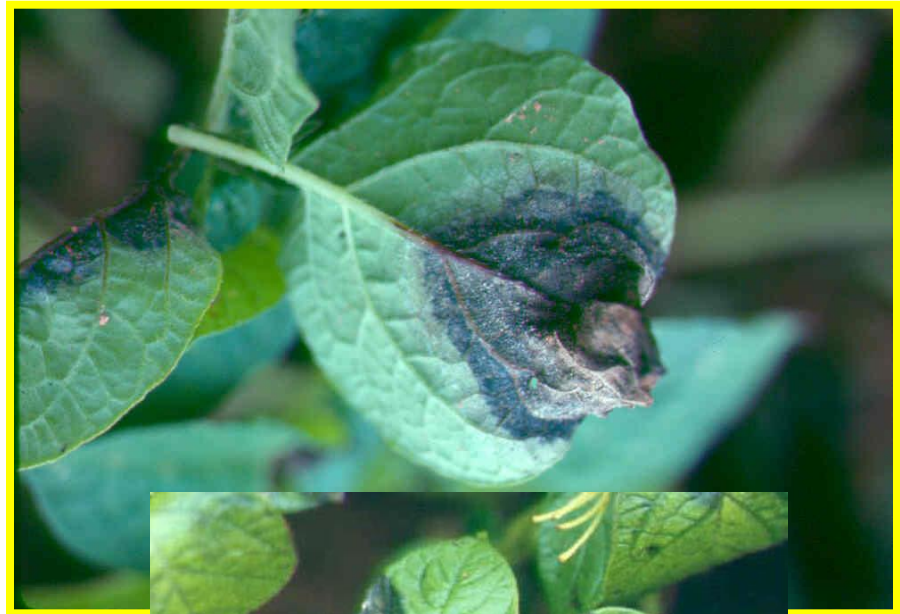
Fungicides

- a preventative program works best
- good coverage is key
- frequent application to protect foliage
- timed applications when weather conditions are conducive to disease and /or disease risk is high



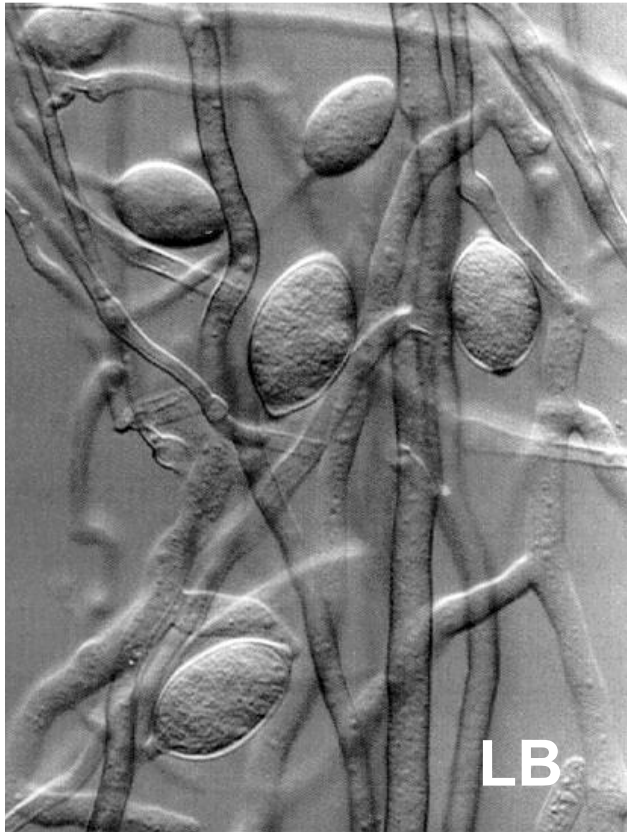
Commercial Name	Active Ingredient	FRAC Group
Aprovia Top	benzovindiflupyr + difenoconazole	7+3
Azoxy	azoxystrobin	11
BAS 700	fluxapyroxad	7
Cabrio Plus	pyraclostrobin + metiram	11+M
Cantus	boscalid	7
Headline	pyraclostrobin	11
Inspire	difenoconazole	3
Luna Privilege Velum Prime (in-furrow)	fluopyram	7
Luna Tranquility	fluopyram + pyrimethanil	7+9
Quadris	azoxystrobin	11
Quadris Top	azoxystrobin + difenoconazole	11+3
Quash	metconazole	3
Reason	fenamidone	11
Scala	pyrimethanil	9
Sercadis	fluxapyroxad	7
Tanos	famoxadone + cymoxanil	11+27
Treoris	penthiopyrad + chlorothalonil	7+M
Vertisan	penthiopyrad	7

Gray Mold - Symptoms



Gray Mold – Causal Agent

Botrytis cinerea



Gray Mold – Management

- do not encourage excessive vine growth
- fungicides (resistance in strains infecting other crops)
- reduce tuber injury at harvest and encourage tuber healing

Late Blight = *Phytophthora infestans*

- oomycete (related to algae)



Symptoms of Late Blight on Tomato



Sources of Pathogen Inoculum

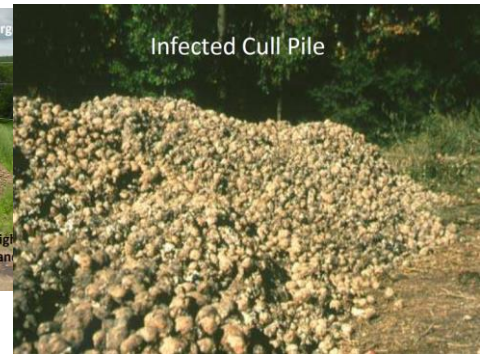
Alternate Hosts



Infected Potato Seed



Cull Piles



Volunteers



Adjacent Fields/Production Areas

The Disease Triangle

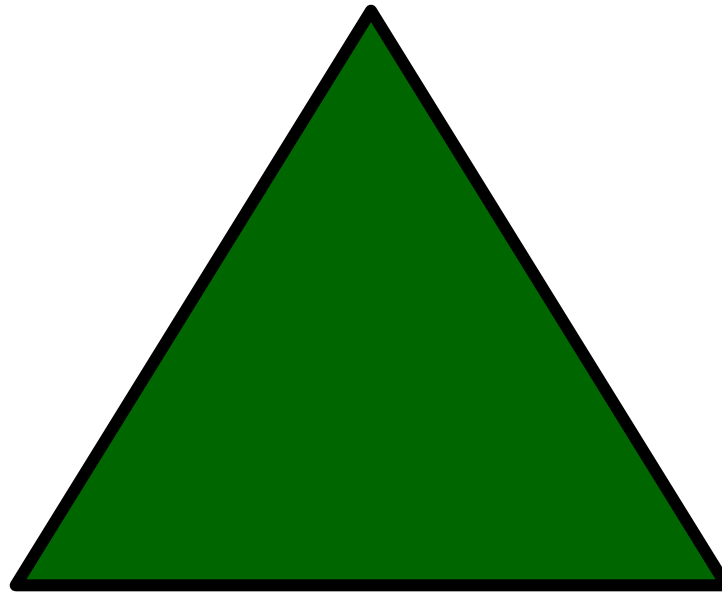


Host



?

Pathogen

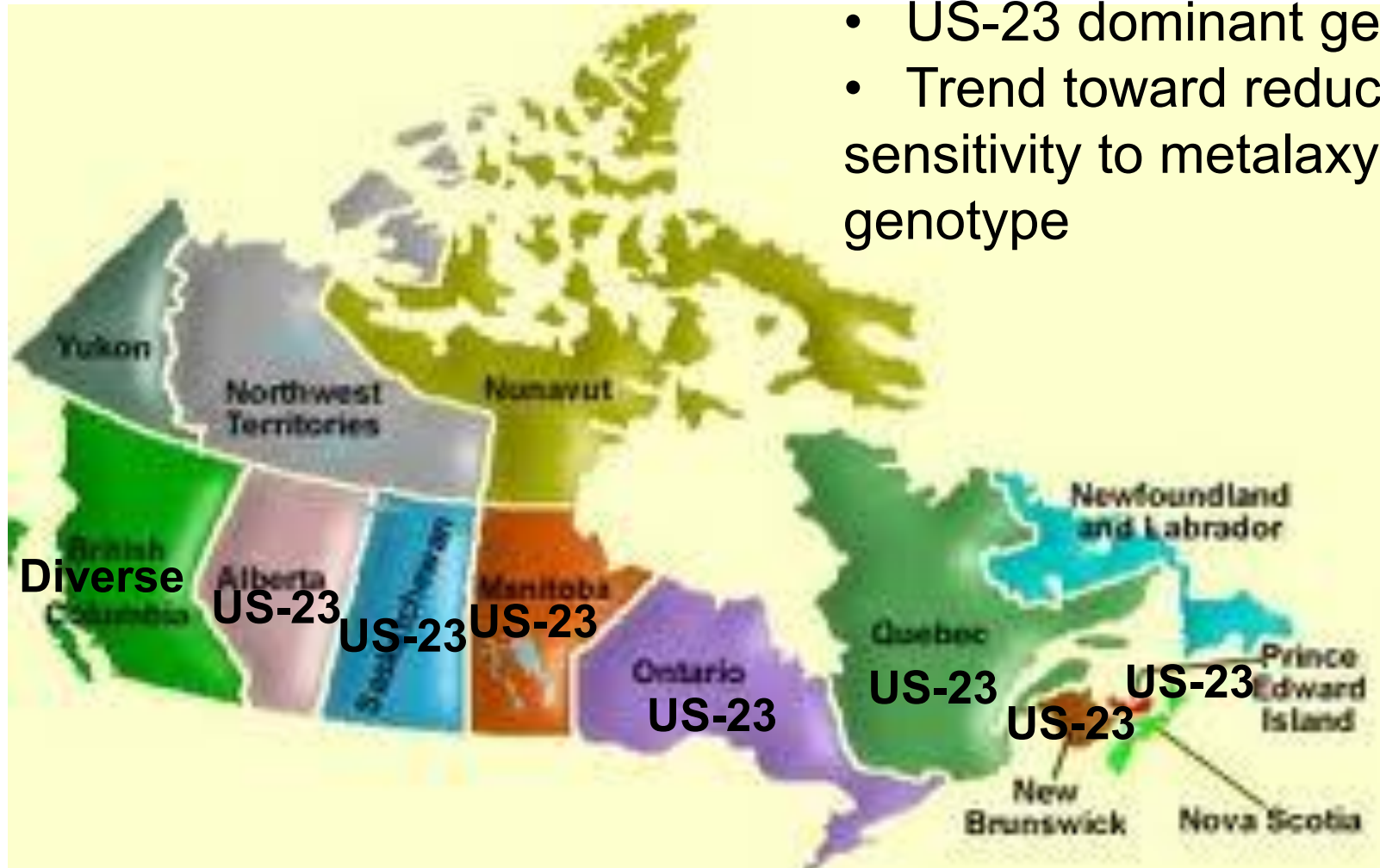


Environment

Late Blight (*Phytophthora infestans*)

Recent Canadian Surveys

- US-23 dominant genotype
- Trend toward reduced sensitivity to metalaxyl-m in the genotype



P. infestans - DISEASE MANAGEMENT

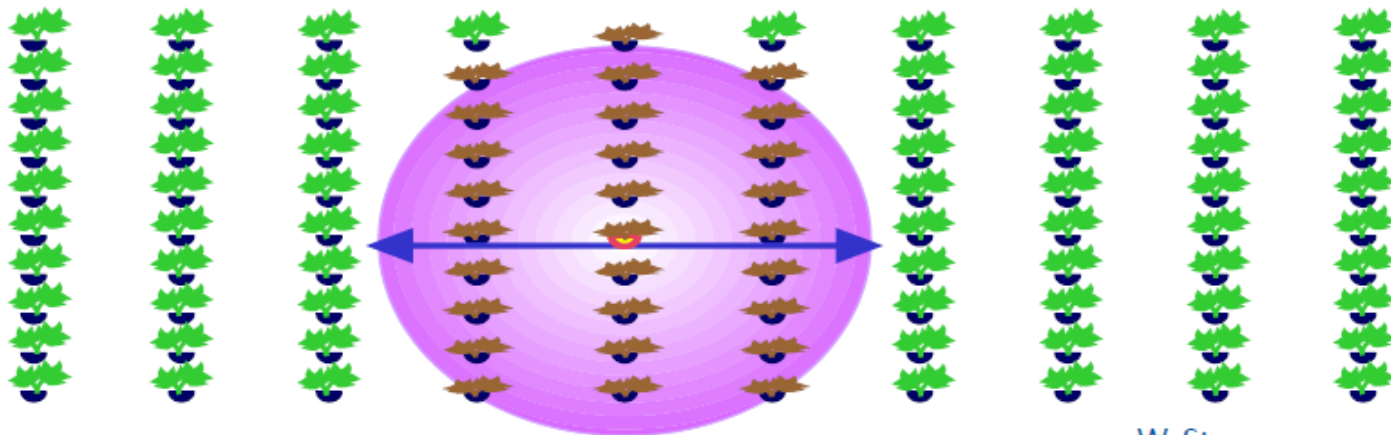
Manage Late Blight in Tomatoes!

- Look for disease in transplants (industry and home-owner awareness)
- Manage the disease in tomatoes grown in home gardens
 - destroy and bag diseased plants
 - grow resistant varieties!
 - awareness of issue in general public



When Late Blight is Present

- Immediately destroy infected plants and surrounding area (twice the size of the infected area - **either side**).



W. Stevenson

- Late in the season it is advisable to avoid excessive irrigation as tubers become infected with late blight when spores wash down through the soil from infected leaves.

P. infestans - DISEASE MANAGEMENT

Late Blight Fungicides

- a preventative program that starts early in the season is critical
- good coverage is key
- frequent application to protect new foliage
- specialty products when weather conditions are conducive to disease and /or disease risk is high



Early Dying Complex

Verticillium spp., nematodes, *Colletotrichum*, etc.

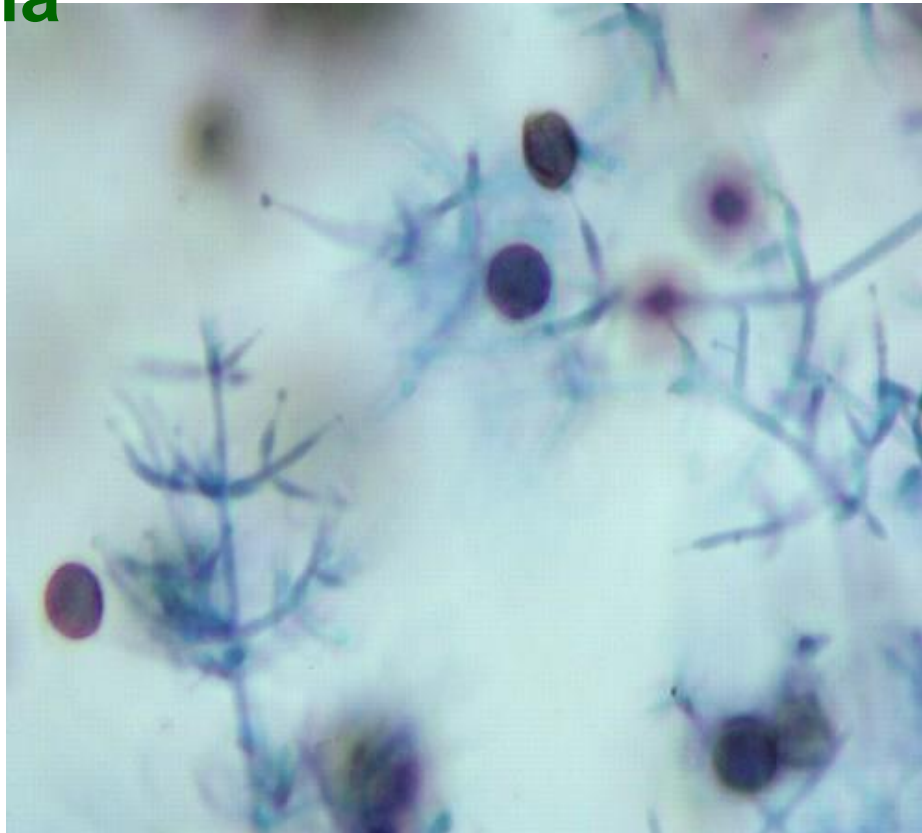


Verticillium Wilt – Causal Agent

Verticillium dahliae – microsclerotia

Verticillium albo-atrum – septate, resting,
dark mycelia

verticillate
whorls



Verticillium Wilt – Management

- **resistant and tolerant cultivars (ie. Butte)**
- **adequate fertility reduces disease severity**
- **avoid water stress**
- **crop rotation**
- **green manure crops (biocontrol)**

Potato Field Guides

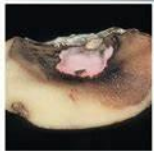
Pests and Diseases of Potatoes

A Colour Handbook

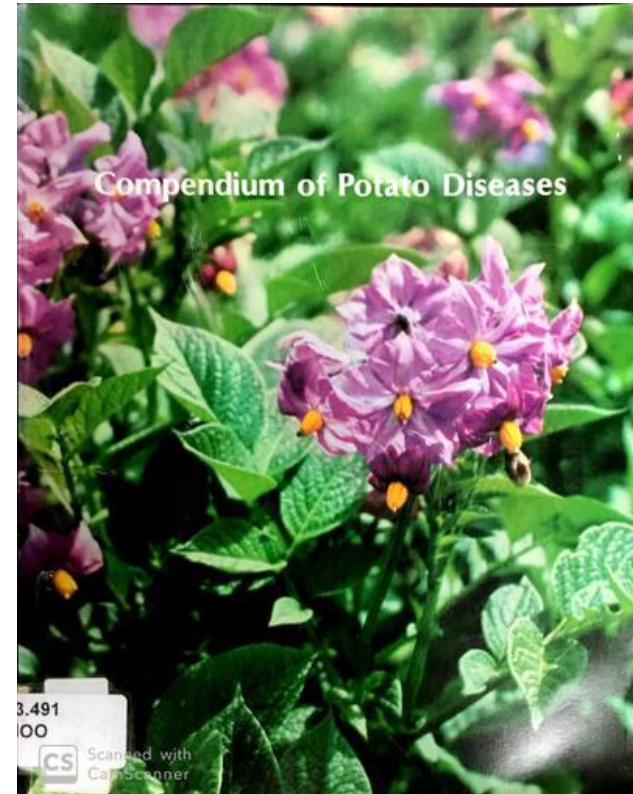
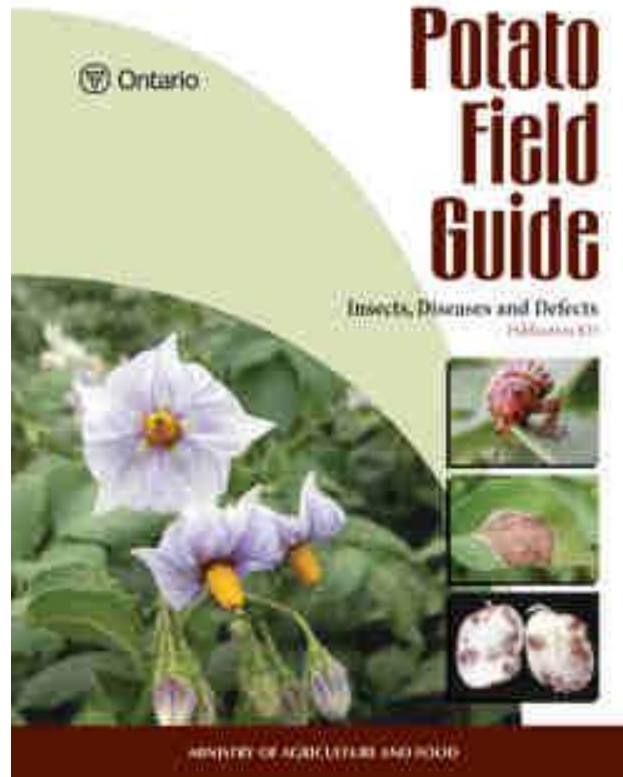
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MANSON
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Thank you !

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