Common Pests of Potato - Diseases

Jeff Miller

Miller Research

- Established in 1977
- Located in Minidoka and Acequia, ID
- Contract and original research
- Mission: Provide sound, scientific information for agriculture.
  - Efficacy
  - GLP (residue, EPA registration)
Additional Sources on Information

Facebook: Miller Research LLC
Twitter: @millerresearch
LinkedIn: Miller Research
Google Groups (Email): Idaho Potato Pest Resource

www.MillerResearch.com

The Disease Triangle

Host Potato
Pathogen *V. dahliae*
Environment
Potato Diseases

- Bacteria – 5
- Fungi – 30
- Plant-Parasitic Nematodes – 6
- Phytoplasmas – 3*
- Viruses and Viroids – 12
- Insect Toxin – 1
- Physiological Disorders and Injuries – 26

*Compendium lists two, but a third has been identified since its publication.

Seed Certification
Zero Tolerance:
1. Bacterial ring rot
2. Root-knot nematode
3. Corky Ring Spot
Seed Certification

Other Diseases:
1. Blackleg
2. Late Blight
3. Mosaic Viruses (PVY, PVA, PVX)
4. Potato Leaf Roll Virus (PLRV)

Quarantine

- Pale cyst nematode (Globodera pallida)
  - Newfoundland
  - Idaho (a few fields in a small area in eastern ID, 2006)
- Golden nematode (Globodera rostochiensis)
  - Newfoundland, Vancouver Island, Quebec, Alberta (2007)
  - New York (9 counties since 1941)
Eradication

• Destruction of diseased material.
• Elimination of weeds/volunteers.
  • Late blight, viruses, insects
• Sanitation of equipment.
• Fumigation

Sanitation

• Storage facilities
• Truck beds
• Seed cutters
• Potato handling equipment

• U of I, CIS 1180
The Role of Proper Fertility and Irrigation

- Low fertility
  - Verticillium wilt
  - Early blight, brown spot
- Over-irrigation
  - Pink rot
  - Pythium leak
  - Aerial stem rot, bacterial soft rot
  - White mold

Seed-Borne Pathogens/Diseases

- Viruses (PVY, PMTV)
- Fusarium dry rot (*Fusarium sambucinum*, others)
- Rhizoctonia canker and black scurf (*Rhizoctonia solani*)
- Silver scurf (*Helminthosporium solani*)
- Late blight (*Phytophthora infestans*)
- Powdery scab (*Spongospora subterranea*)
Fusarium Dry Rot/Seed Piece Decay Disease Cycle

Seed tubers with *Fusarium coeruleum*  
Spores from infected seed infest daughter tubers and get released in the soil.  
Tubers become infected when wounded.

Dry rot develops quickly when tubers are stored at 60-70 F

So what do I do to prevent seed piece decay and dry rot in storage?

1. Purchase seed with as little dry rot as possible.
2. Sterilize seed cutting equipment.
3. Sharpen seed cutting knives.
4. Avoid pre-cutting, if possible
5. Treat with an effective seed treatment.
6. Minimize wounding at harvest.
7. Post-harvest treatment with Stadium (?)
Effect of Seed Treatments on Fusarium Seed Piece Decay

UTC
Alder Bark
Maxim MZ (0.5)

Bark alone is not effective.

Effect of Seed Treatments on Fusarium Seed Piece Decay

UTC
Maxim MZ (0.5)
Moncoat MZ (0.75)
Maxim 4 FS (0.04)
Maxim 4 FS (0.08)
Quadris IF (8.7)

In-furrow applications are not effective.
Seed Treatments Summary – Fusarium Dry Rot

1. In general, seed treatment products combined with mancozeb protect best against Fusarium seed decay.

2. Bark only seed treatments are not effective.

3. In-furrow fungicide applications are not effective.

   – Liquid seed treatments have been effective
   – Liquid MZ treatments?

Rhizoctonia Canker and Black Scurf
Effective Rhizoctonia Fungicides

Seed Treatments
- Fludioxonil
  - Maxim MZ, Maxim 4 FS
  - Spirato
  - CruiserMaxx Potato
  - STartUP FLUDI
- Fludioxonil + Difenoconazole
  - CruiserMaxx Potato Extreme
- Fludioxonil + Difenoconazole + Sedaxane
  - CruiserMaxx Vibrance Potato
- Flutalonil
  - Moncoat MZ
- Penflufen + Prothioconazole
  - Emesto Silver

In-Furrow Fungicides
- Elatus (Benzovindiflupyr + Azoxystrobin)
- Evito (Fluxastrobin)
- Moncut (Flutalonil)
- Priaxor (Fluxopyroxad + Pyraclostrobin)
- Quadris (Azoxystrobin)
- Vertisan (Penthiopyrad)
Foliar Diseases/Pathogens

- Late blight (*Phytophthora infestans*)
- Early blight (*Alternaria solani*)
- Brown spot (*Alternaria alternata*)
- White mold (*Sclerotinia sclerotiorum*)
- Gray mold (*Botrytis cinerea*)
- Black dot (*Colletotrichum coccodes*)
- Aerial stem rot (*Pectobacterium* sp.)
September 3 – 15 days later
Late Blight Management

1. Destroy cull piles and volunteers (tomatoes?)
2. Know your seed – treat with an effective fungicide
3. Scout fields and watch the weather (disease forecasting)
4. Maintain an effective fungicide program until harvest
5. Ensure vines are dead prior to harvest
6. Apply an effective fungicide as a soil barrier
7. Apply a post-harvest phosphite-based fungicide

Fungicides Effective against Foliar Late Blight

**Moderate activity**
- Chlorothalonil
- Headline
- Mancozeb/metiram
- Quadris
- Reason

**High activity**
- Curzate/Tanos
- Forum
- **Gavel/Zing!**
- Omega
- **Orondis**
- Previcur
- Ranman
- Revus Top (Revus)
- **Ridomil (Bravo, MZ, Cu)**
- Super Tin
- Zampro

Use the rate labeled for late blight.
Fungicides NOT Recommended for Foliar Late Blight

**Weaker activity**
- Copper-based sprays
- Phosphorous acid
  - (Foliar phase)

**No activity**
- Luna Tranquility
- Endura
- (Miravis Prime)
- (Provysol)

- Biological-based fungicides?

Copper does have activity, but it is weaker than the above listed fungicides.
Timing is important!

Late July, after the rainstorm
Late July, before the rainstorm

How did the new programs compare for early blight?

<table>
<thead>
<tr>
<th>8&quot; plants</th>
<th>UTC</th>
<th>LunaTran(11)+Bravo(1)</th>
<th>MiravisPrime(11.4)</th>
<th>MiravisPrime(11.4)+RG</th>
<th>Endura(5.5)+Provysol(3)</th>
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</thead>
<tbody>
<tr>
<td>Row closure</td>
<td>--</td>
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<tr>
<td>Early July</td>
<td>LunaTran(11)+Bravo(1)</td>
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<td>Endura(5.5)+Provysol(3)</td>
<td></td>
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<tr>
<td>Late July</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
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<tr>
<td>Early August</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
<td>Bravo (1.5)</td>
<td></td>
</tr>
</tbody>
</table>

% EB Severity

UTC: 21.2 a
LunaTran(11)+Bravo(1): 3.7 b
MiravisPrime(11.4): 3.4 b
MiravisPrime(11.4)+RG: 4.2 b
Endura(5.5)+Provysol(3): 3.7 b
How did the new programs compare for white mold?

![Bar chart showing comparisons for white mold]

How did the new programs compare for black dot?

![Bar chart showing comparisons for black dot]
How did the new programs compare for total yield?

Soil-Borne In-Season Diseases

- Verticillium wilt (*Verticillium dahliae*)
- Pink rot (*Phytophthora erythroseptica*)
- Powdery scab (*Spongostora subterranea*)
- Common scab (*Streptomyces scabies*)
Pythium Leak vs. Pink Rot

Pythium Leak

Pink Rot

Pythium Leak vs. Pink Rot

Pythium Leak

Pink Rot
Pink Rot Management

1. Field selection/crop rotation
2. Adjust soil pH by lime application in low pH soils
3. Plant less susceptible varieties
4. Proper irrigation management
   - Ensure 12 hours between phosphite application and irrigation
5. Use appropriate fungicides
   - Can start phosphite program at row closure
6. Avoid “disease-favorable” conditions at harvest
7. Apply post-harvest fungicides
8. Grade out infected tubers going into storage
9. Reduce tuber pulp temperatures to 55°F or lower

Managing Pythium Leak

- Use mefenoxam-based fungicide
  - Resistance?
  - Phosphorous acid fungicides are not effective
- Ensure skin set prior to harvest
- Minimize wounding
- Do not harvest when pulp temps are > 65°F
Effect of Wounding/Temperature on Pythium Leak

![Bar chart showing percentage of tubers infected with different temperatures and wounding conditions.]

Questions/Comments