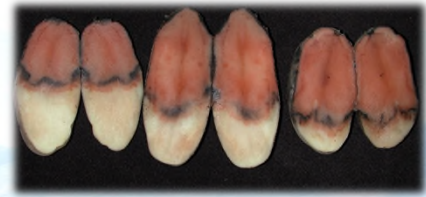


Common Pests of Potato - Diseases

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

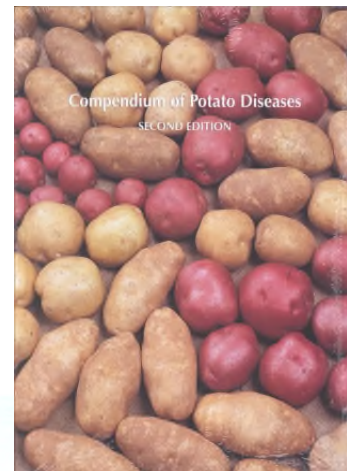


Environment



Potato Diseases

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



APS Press

Taken from Compendium of Potato Diseases, 2nd Edition, 2001.

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

Seed Certification

Zero Tolerance:

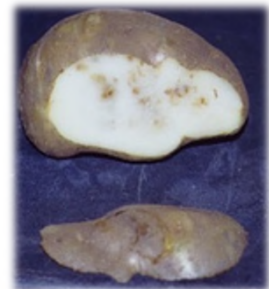
1. Bacterial ring rot
2. Root-knot nematode
3. Corky Ring Spot



Bacterial ring rot



Corky Ring Spot



Root-knot nematode damage

Seed Certification

Other Diseases:

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

Blackleg



PVY



Quarantine

- Pale cy
 - Nev
 - Idah
- Golden
 - Nev
 - (200
 - Nev



Eradication

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



Potato Cull Pile



Volunteers

Sanitation

- Storage facilities
- Truck beds
- Seed cutters
- Potato handling equipment
- U of I, CIS 1180

University of Idaho
Extension

CIS 1180

Cleaning and disinfectant can help prevent spread of the following potato diseases

In fields, spread by contaminated equipment. Most problem pests can be effectively eliminated by removing all soil and debris from field equipment before they leave one field and enter another. Harvesters retain the most soil, followed by plows, and then cultivators.

Pests that can spread include:

- Nematodes
- Weed seeds
- Soil-borne diseases

Seed cutter (machine) is a common source of contamination for:

- Bacterial ring rot—caused by *Clavibacter michiganense*
- Bacterial soft rot—caused by *Pectobacterium* spp.
- Fusarium dry rot—caused by *Fusarium* sp.
- Late blight—caused by *Phytophthora infestans*

Cleaning and Disinfecting Potato Equipment and Storage Facilities

By Nora Olsen and Phil Notte

Potato equipment and storages are exposed to a number of pests including fungi, bacteria, insects, nematodes, and weed seeds. Many of these pests can be spread from tuber to tuber or field to field on equipment or in storage and cause problems in future crops if not eliminated or at least minimized.

Some disease problems, like bacterial ring rot (caused by *Clavibacter michiganense*), can be a very serious problem for seed potato producers, even when the disease occurs at very low levels. Nematodes are easily transferred from one field to another in soil adhering to equipment that is not properly cleaned between fields.

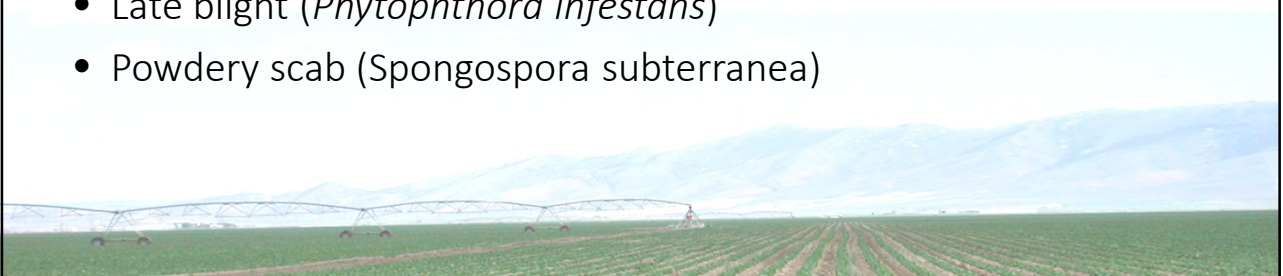
The Role of Proper Fertility and Irrigation

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

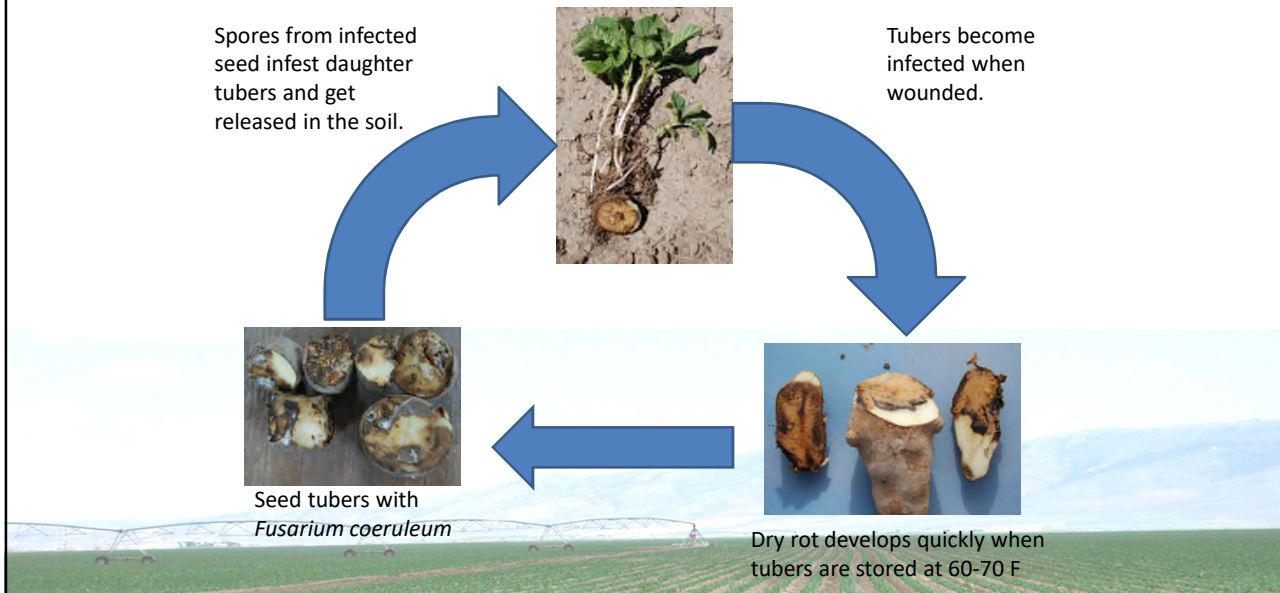


Seed-Borne Pathogens/Diseases

- 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*)



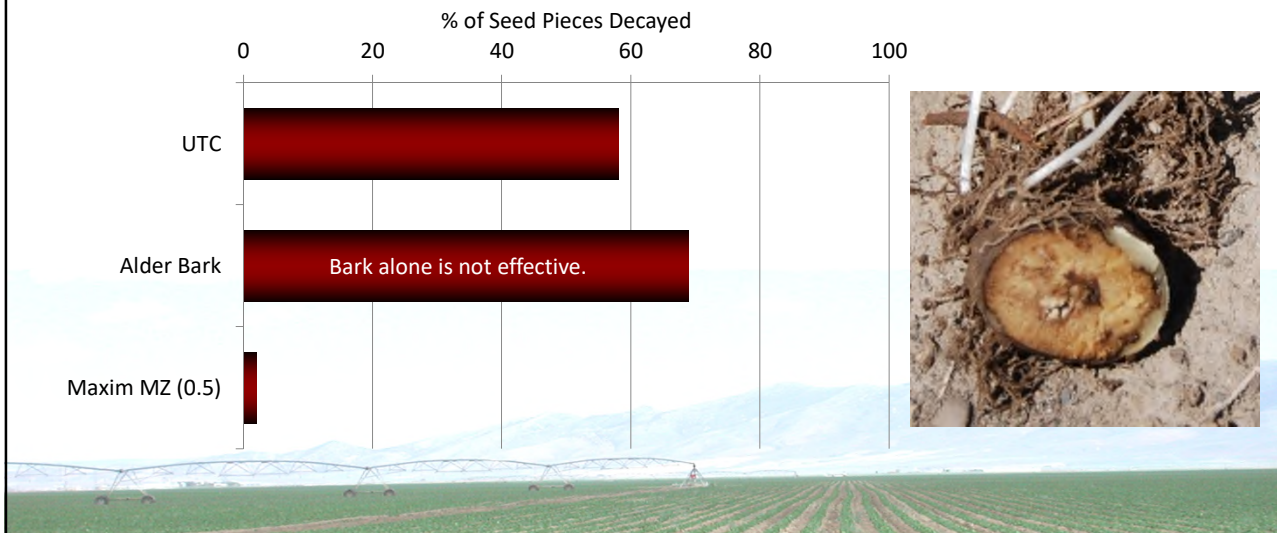
Fusarium Dry Rot/Seed Piece Decay Disease Cycle



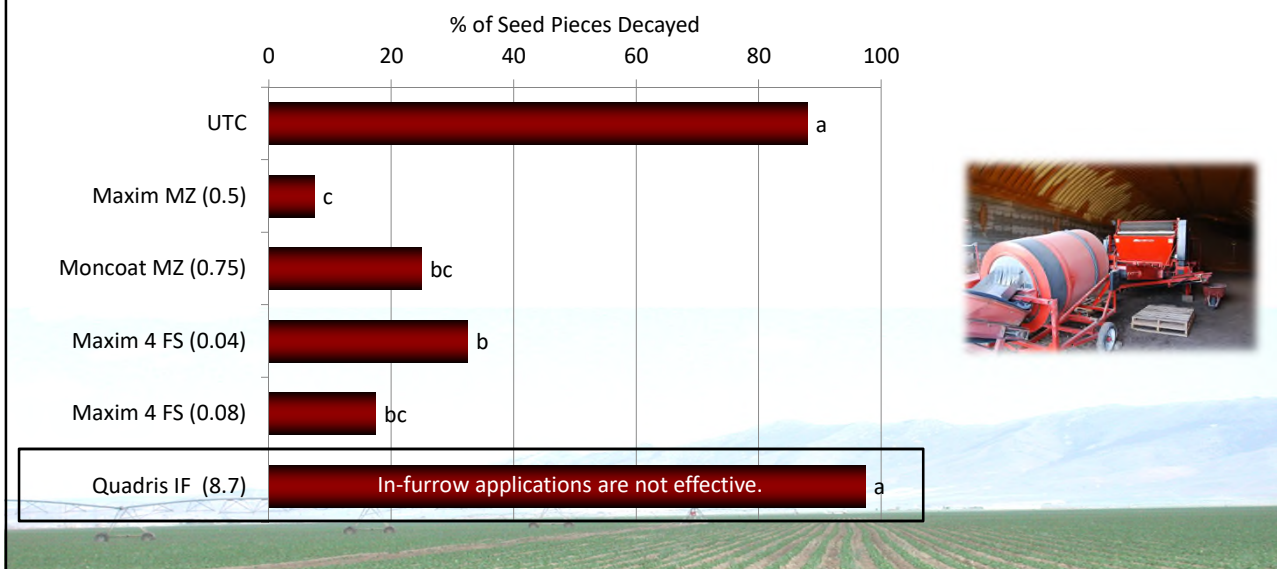
So what do I do to prevent seed piece decay and dry rot in storage?

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



Effect of Seed Treatments on Fusarium Seed Piece Decay



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.
4. Elimination of dust? Worker protection/safety issues.
 - 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
 - Ernesto Silver

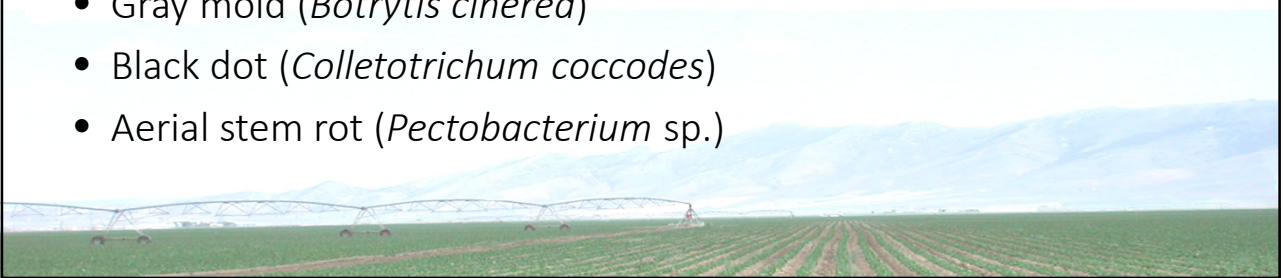
In-Furrow Fungicides

- Elatus (Benzovindiflupyr + Azoxystrobin)
- Evito (Fluoxastrobin)
- 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.)



Monday, August 19





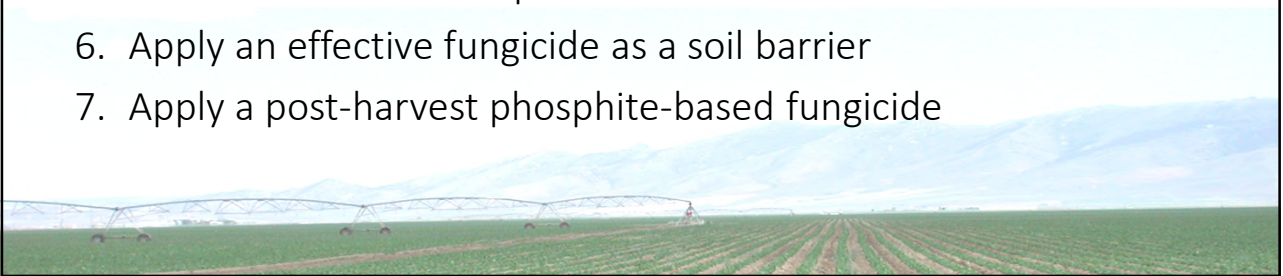


September 3 – 15 days later



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

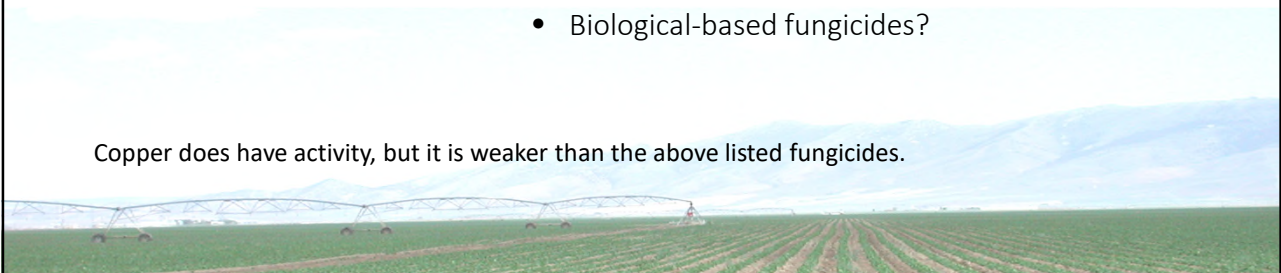
Weaker activity

- 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

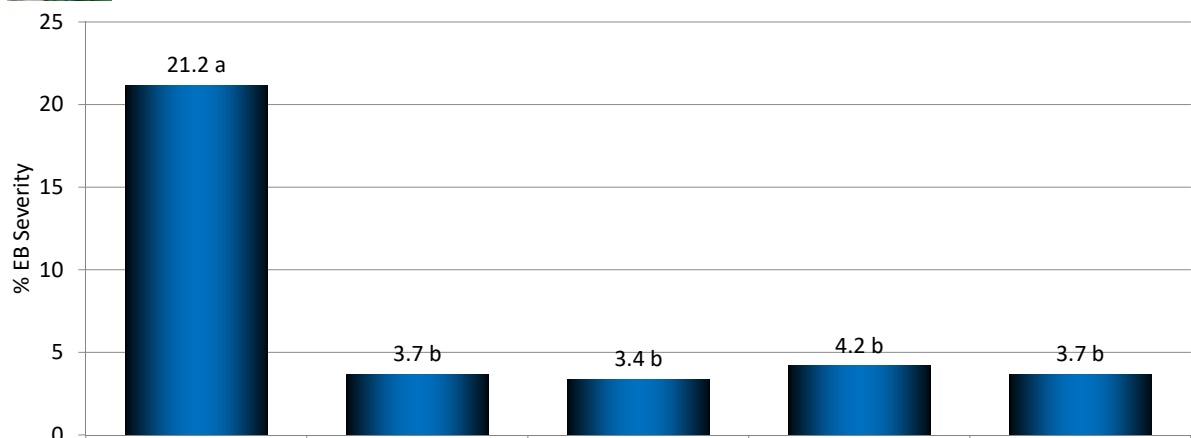
Late July, before the rainstorm



Same program on both sides



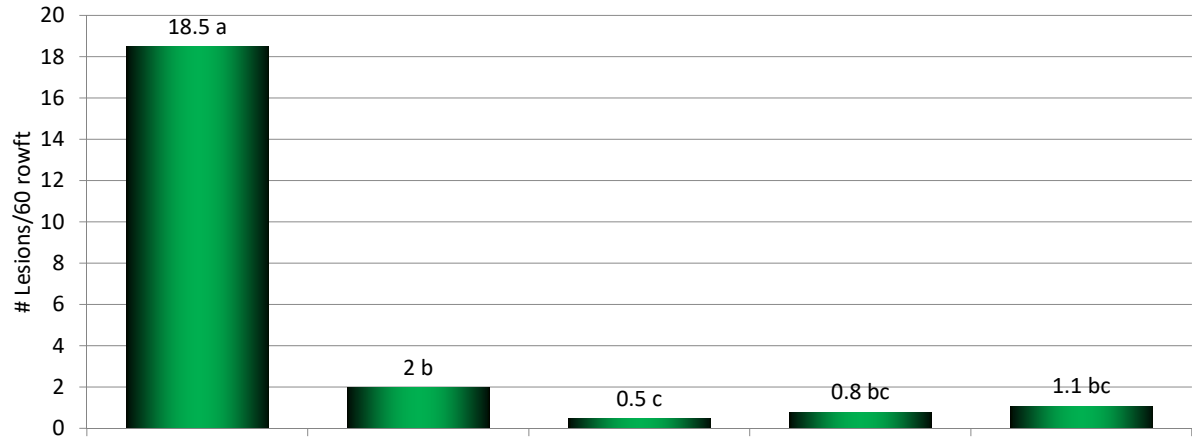
How did the new programs compare for early blight?



8" plants	UTC	--	--	AmistarTop(10)+RG	--
Row closure		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)+RG	Endura(5.5)+Provysol(3)
Early July		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)	Endura(5.5)+Provysol(3)
Late July		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)
Early August		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)



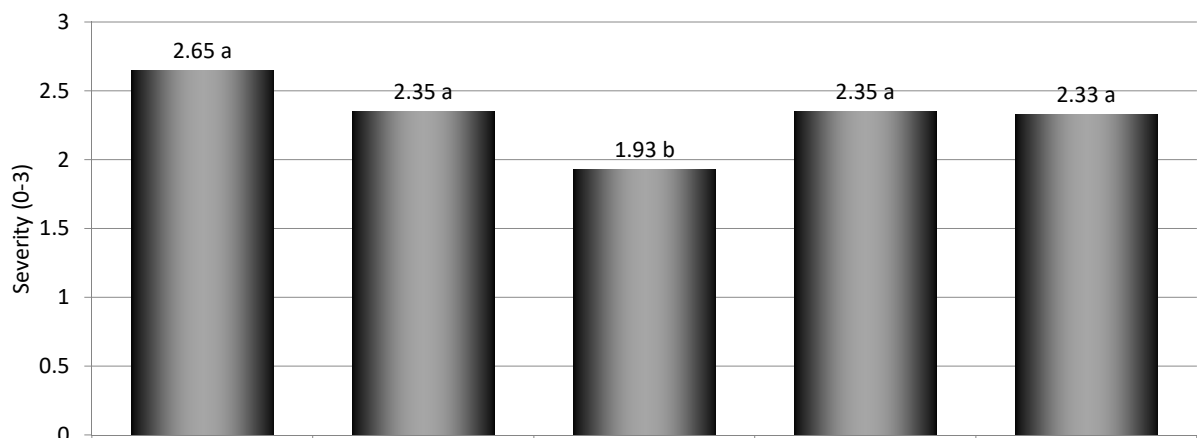
How did the new programs compare for white mold?



8" plants	UTC	--	--	AmistarTop(10)+RG	--
Row closure		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)+RG	Endura(5.5)+Provysol(3)
Early July		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)	Endura(5.5)+Provysol(3)
Late July		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)
Early August		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)



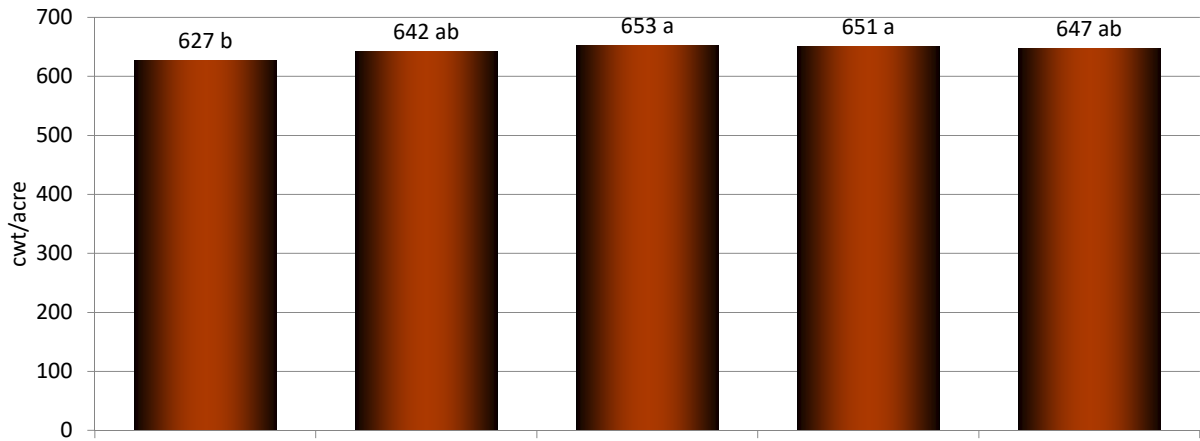
How did the new programs compare for black dot?



8" plants	UTC	--	--	AmistarTop(10)+RG	--
Row closure		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)+RG	Endura(5.5)+Provysol(3)
Early July		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)	Endura(5.5)+Provysol(3)
Late July		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)
Early August		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)



How did the new programs compare for total yield?



8" plants	UTC	--	--	AmistarTop(10)+RG	--
Row closure		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)+RG	Endura(5.5)+Provysol(3)
Early July		LunaTran(11)+Bravo(1)	MiravisPrime(11.4)	MiravisPrime(11.4)	Endura(5.5)+Provysol(3)
Late July		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)
Early August		Bravo (1.5)	Bravo (1.5)	Bravo (1.5)	Bravo (1.5)

Soil-Borne In-Season Diseases

- Verticillium wilt (*Verticillium dahliae*)
- Pink rot (*Phytophthora erythroseptica*)
- Powdery scab (*Spongospora 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

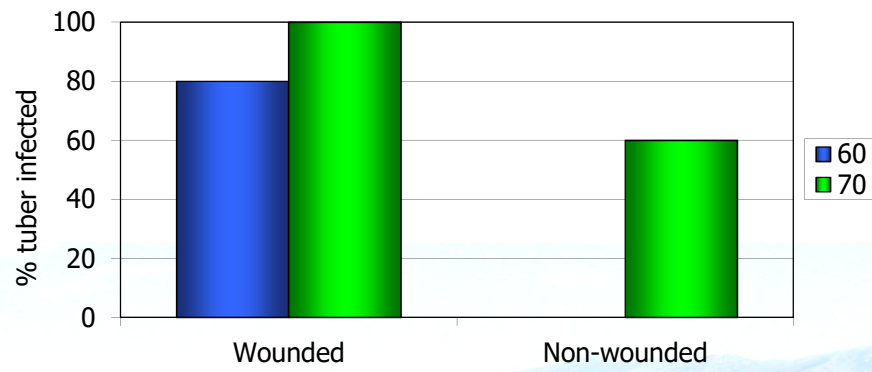


Managing Pythium Leak

- 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



Questions/Comments

