

# Best Management Practices for Managing Pink Rot and Pythium Leak

Jeff Miller and Trent Taysom



## Pythium Leak vs. Pink Rot



Pythium Leak



Pink Rot

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Pythium Leak



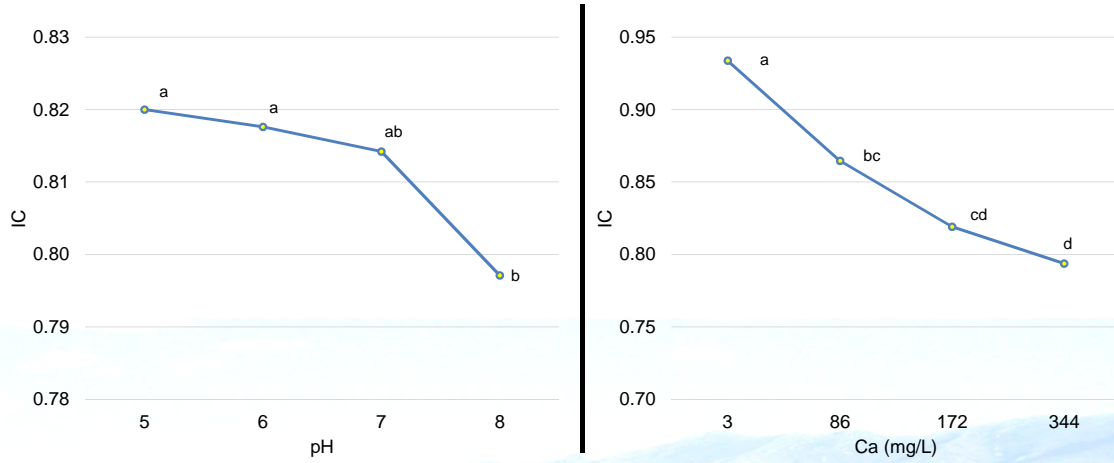
Pink Rot

## 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
5. Use appropriate fungicides
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

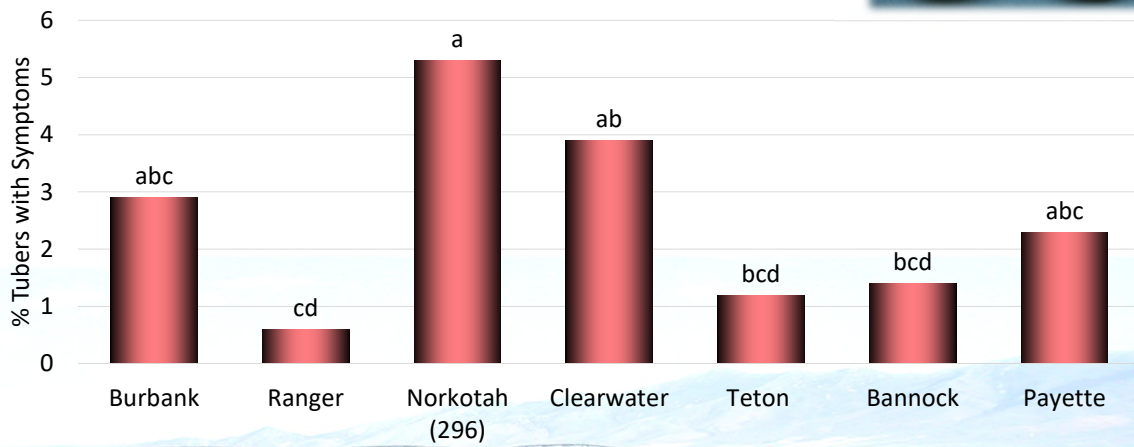


## Effect of pH and Ca on Pink Rot

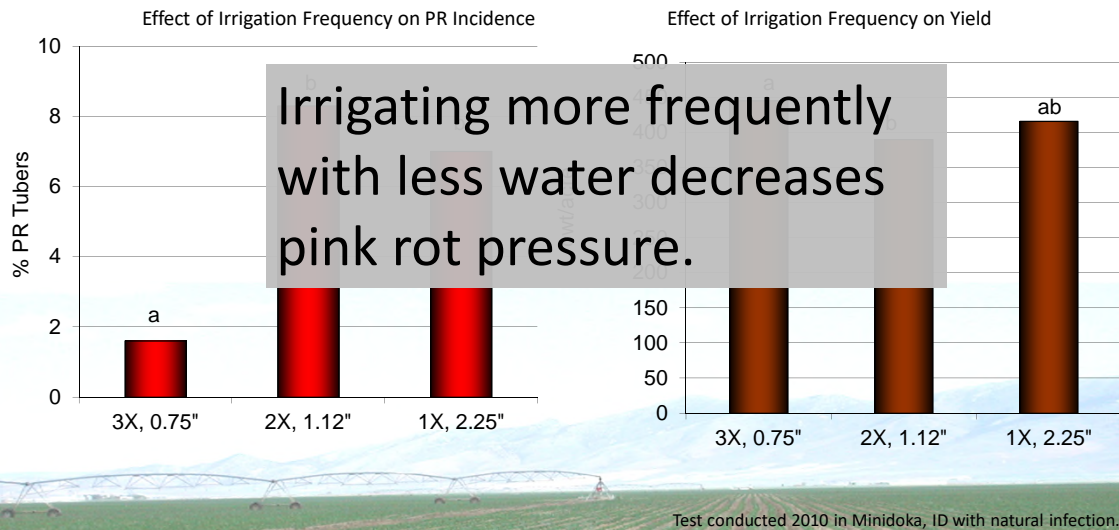


From Benson et al., 2009, Am. J. Potato Res. 86:472-475  
and Benson et al., 2009, Am. J. Potato Res. 86:466-471

## Cultivar Susceptibility



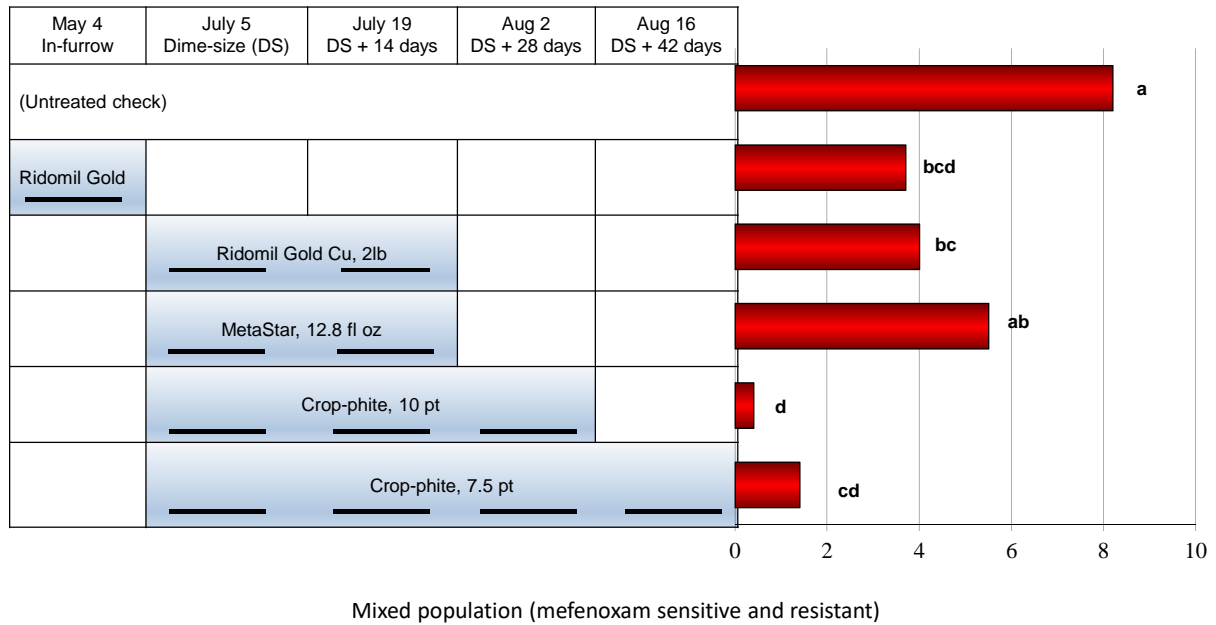
## Effect of Irrigation Management



## Fungicides for Pink Rot Control

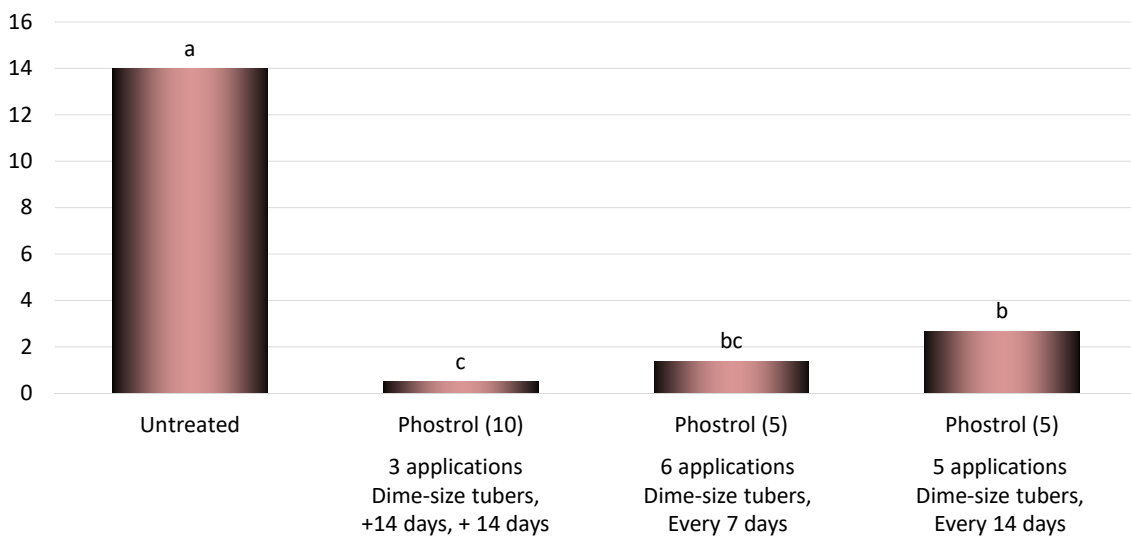
- Mefenoxam/metalaxyl (Group 4)
  - Ridomil Gold products
  - Ultra Flourish
  - MetaStar
  - Xylar FC
- Oxathiapiprolin + Mefenoxam (in-furrow only; Group 49 + 4)
  - Orondis Gold
- Phosphorous acid (Group 33)
  - Phostrol
  - Resist 57
  - Phiticide
  - (Others)
- Cyazofamid (Group 21)
  - Ranman
- Ethaboxam (Group 22)
  - Elumin

### Effect of Fungicide Programs on Pink Rot

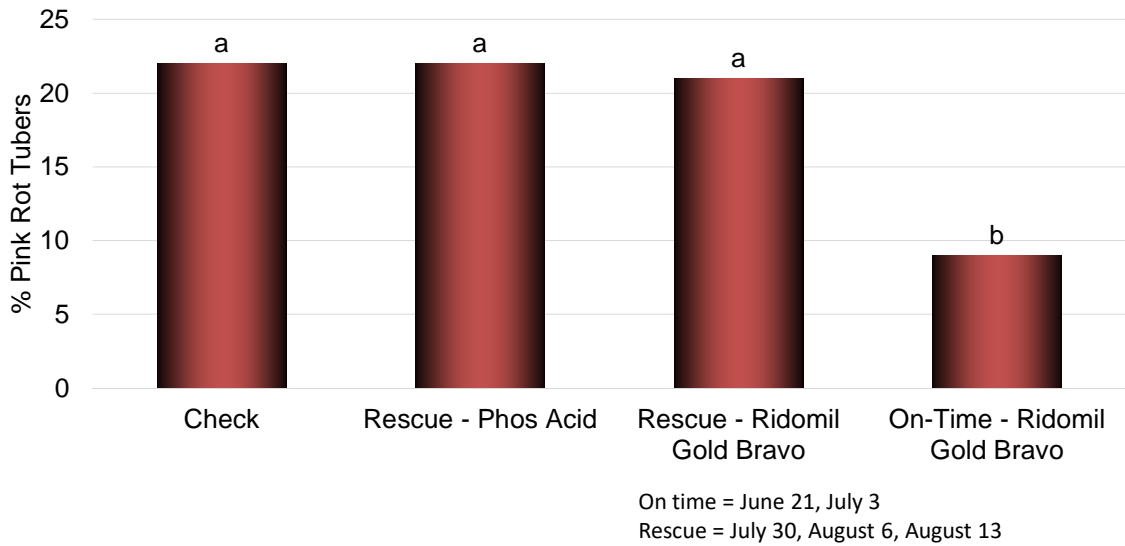


### Effect of Phosphite Rate and Timing on Pink Rot

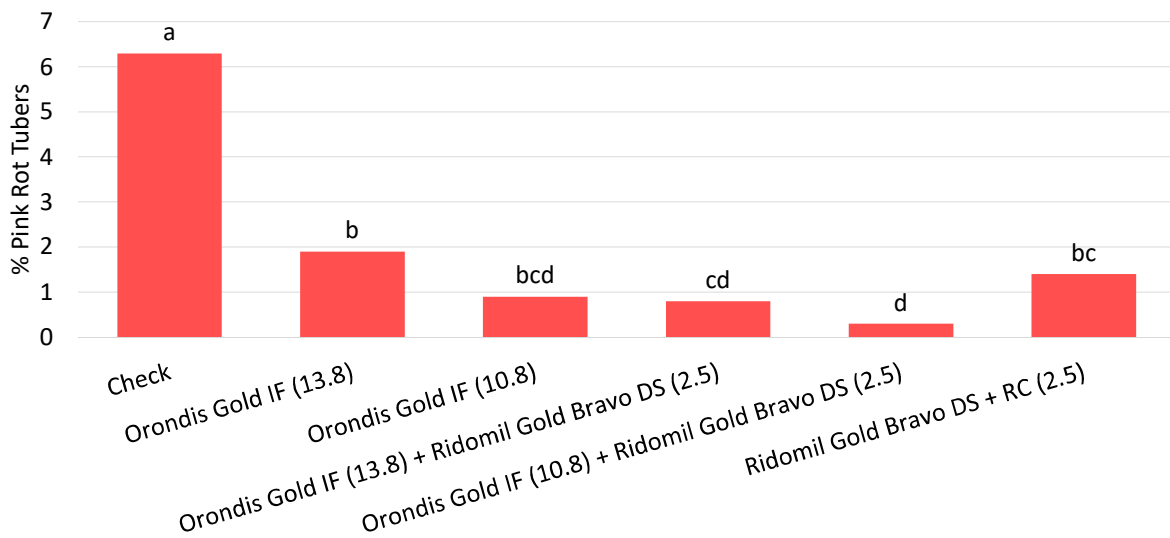
Russet Norkotah, natural infection, Minidoka, ID, 2008



### Effect of Fungicide Timing on Pink Rot



### Effect of Orondis Gold on Pink Rot - 2018

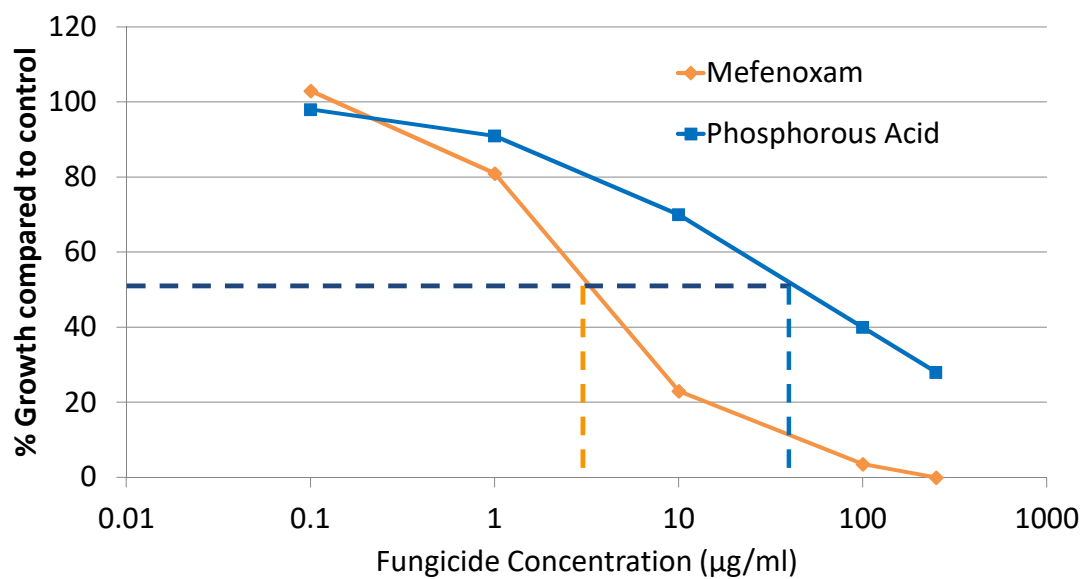


## Phosphites not working as well as expected?

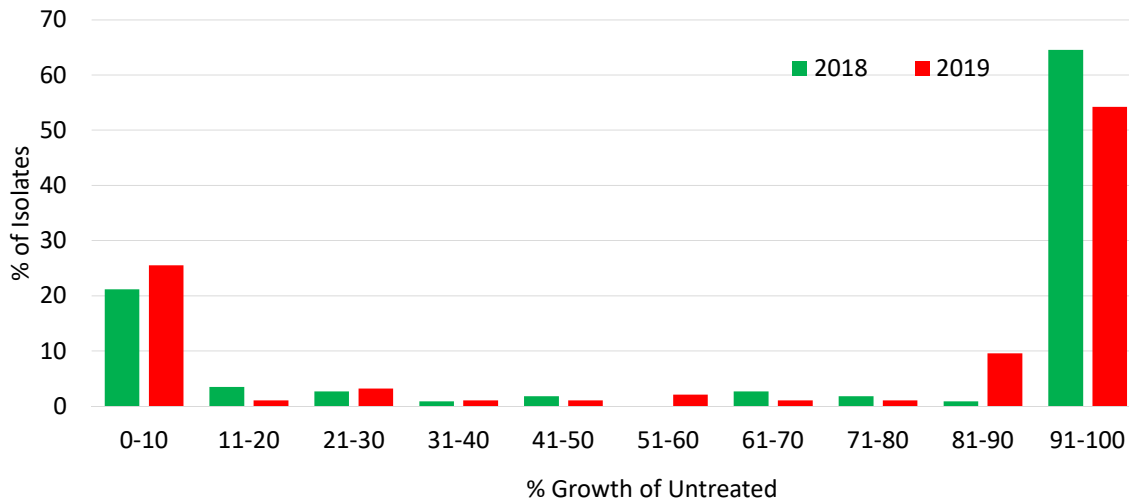
- Is resistance developing to the phosphites?
- Is irrigation interfering with product uptake?
- Is the timing of application optimal?



Effect of Phosphite and Mefenoxam on *P. erythroseptica* Growth



### *P. erythroseptica* Isolate Sensitivity - Mefenoxam



Mefenoxam sensitivity is similar for submitted samples between 2018 and 2019.

### Isolate Testing – Columbia Basin, 2018

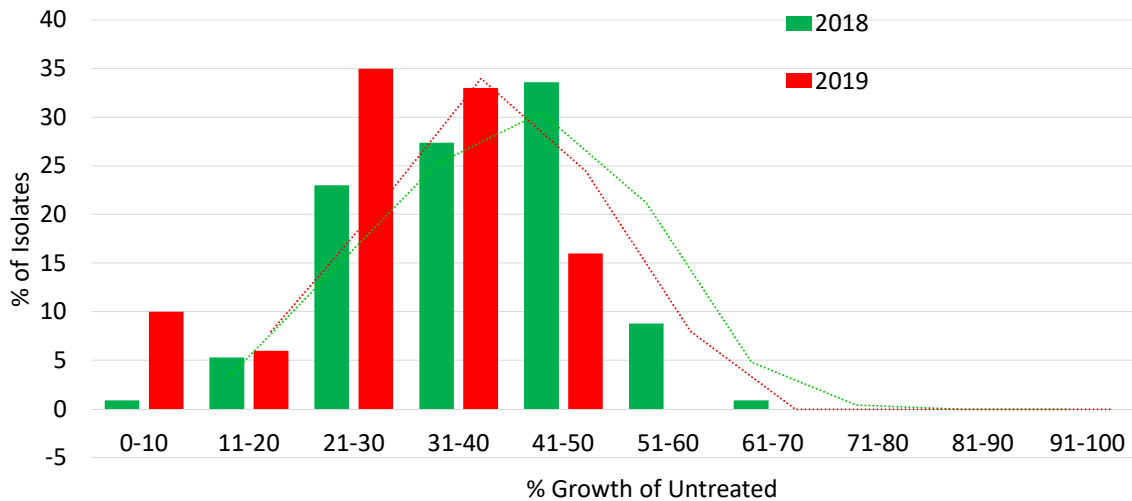
Rachel Bomberger, Carrie Wohleb

	Number	Percentage
Total Tubers Evaluated	140	
Tubers with Suspect Symptoms	97	69
Pink Rot ( <i>Phytophthora</i> ) Tubers	33	24
Mefenoxam Resistant	6	18
Mefenoxam Sensitive	27	82
Pythium Leak Tubers	10	7
Mefenoxam Sensitive	10	100

Mefenoxam resistance is not common in the Basin.



## *P. erythroseptica* Isolate Sensitivity - Phosphite



It does not appear that *P. erythroseptica* is resistant to phosphite fungicides.

## Phosphites not working as well as expected?

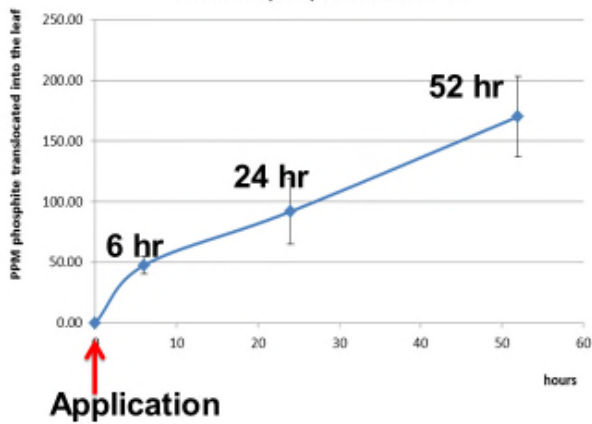
- Is resistance developing to the phosphites? **No**
- Is irrigation interfering with product uptake?
- Is the timing of application optimal?



## Maximum translocation to inside of leaves requires up to 2 days

Gefu Wang-Pruski, Dalhousie, NS

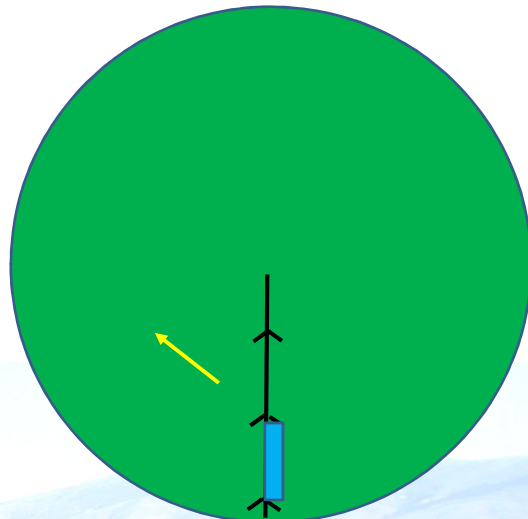
Kinetics of phosphite translocation



How important is the time between application and irrigation?

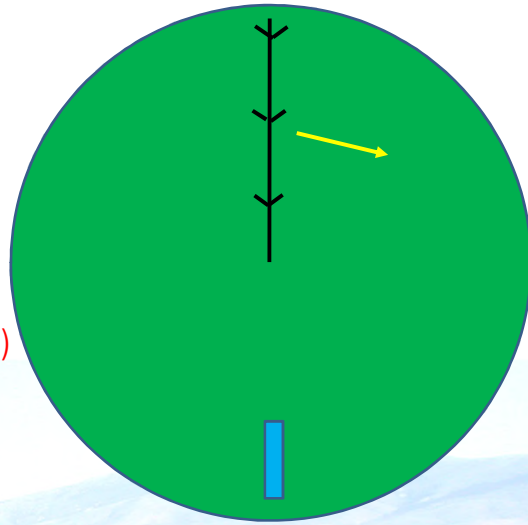
## Treatments

1. Non-treated check
2. 48 hours pre-irrigation (PI)
3. 24 hours PI
4. 12 hours PI
5. 6 hours PI



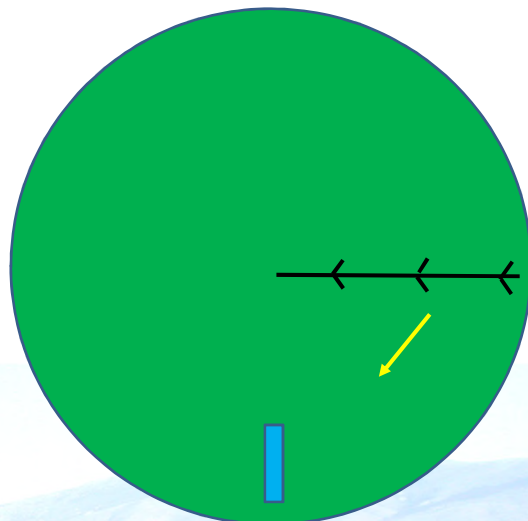
## Treatments

1. Non-treated check
2. 48 hours pre-irrigation (PI)
3. 24 hours PI
  - Starting at full emergence
  - Starting at dime-size tubers (0.5")
  - Starting at row closure
4. 12 hours PI
5. 6 hours PI



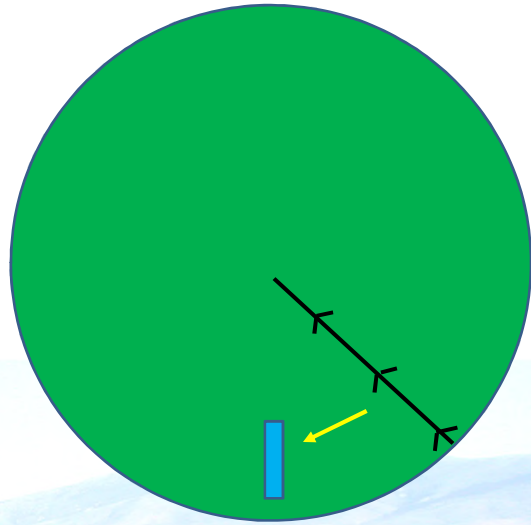
## Treatments

1. Non-treated check
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## Treatments

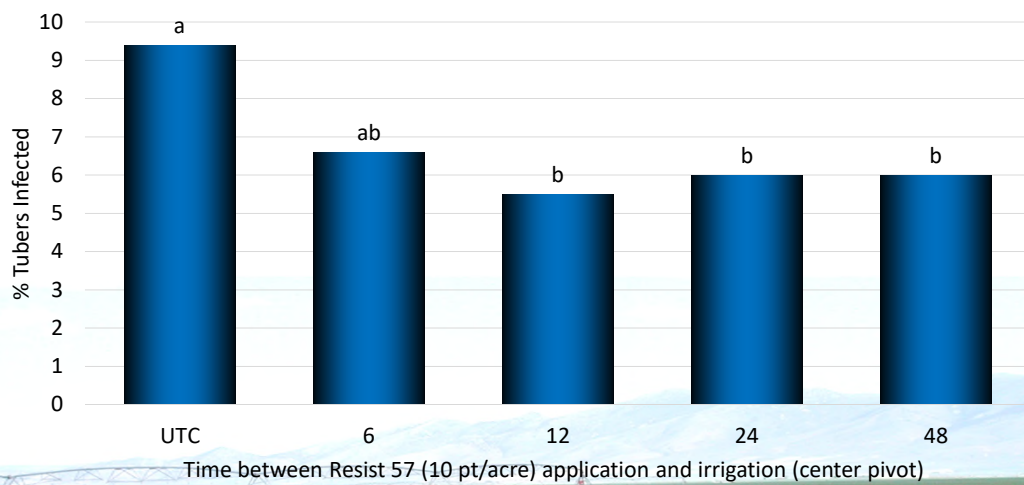
1. Non-treated check
2. 48 hours pre-irrigation (PI)
3. 24 hours PI
4. 12 hours PI
5. 6 hours PI



## How important is the time between application and irrigation?

Natural Infection

% Pink Rot - 2018

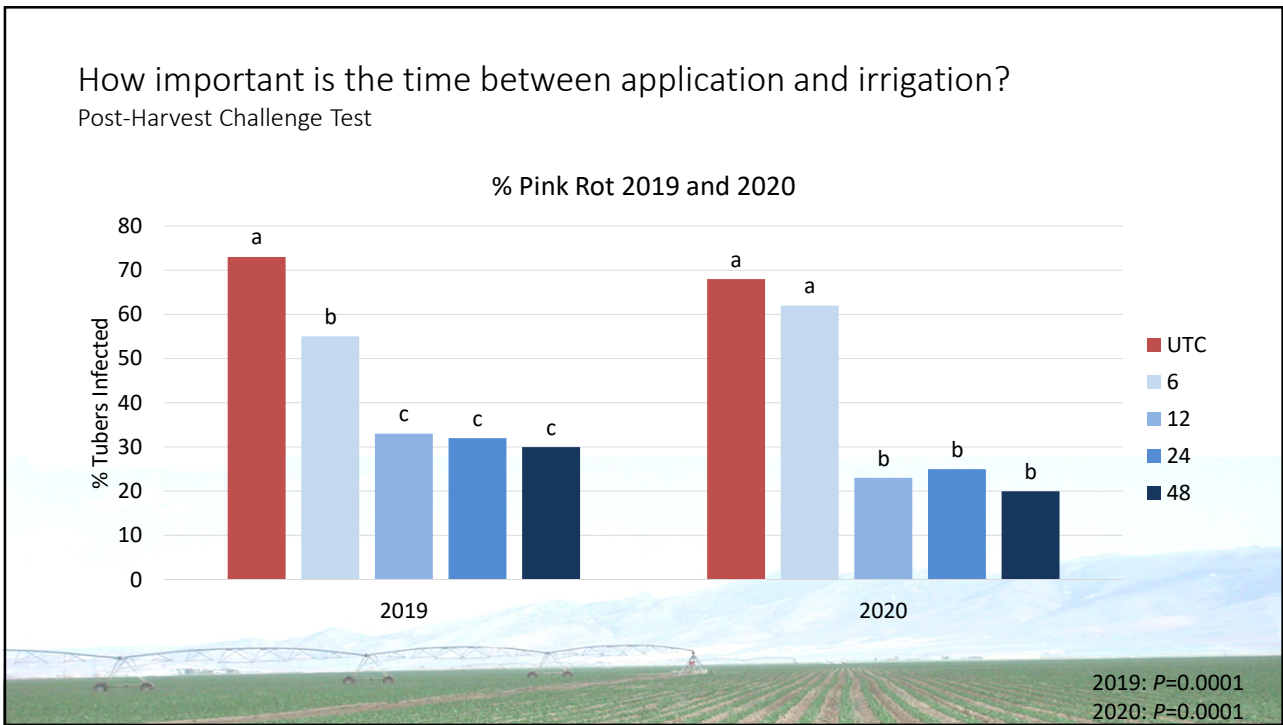


$P=0.0280$



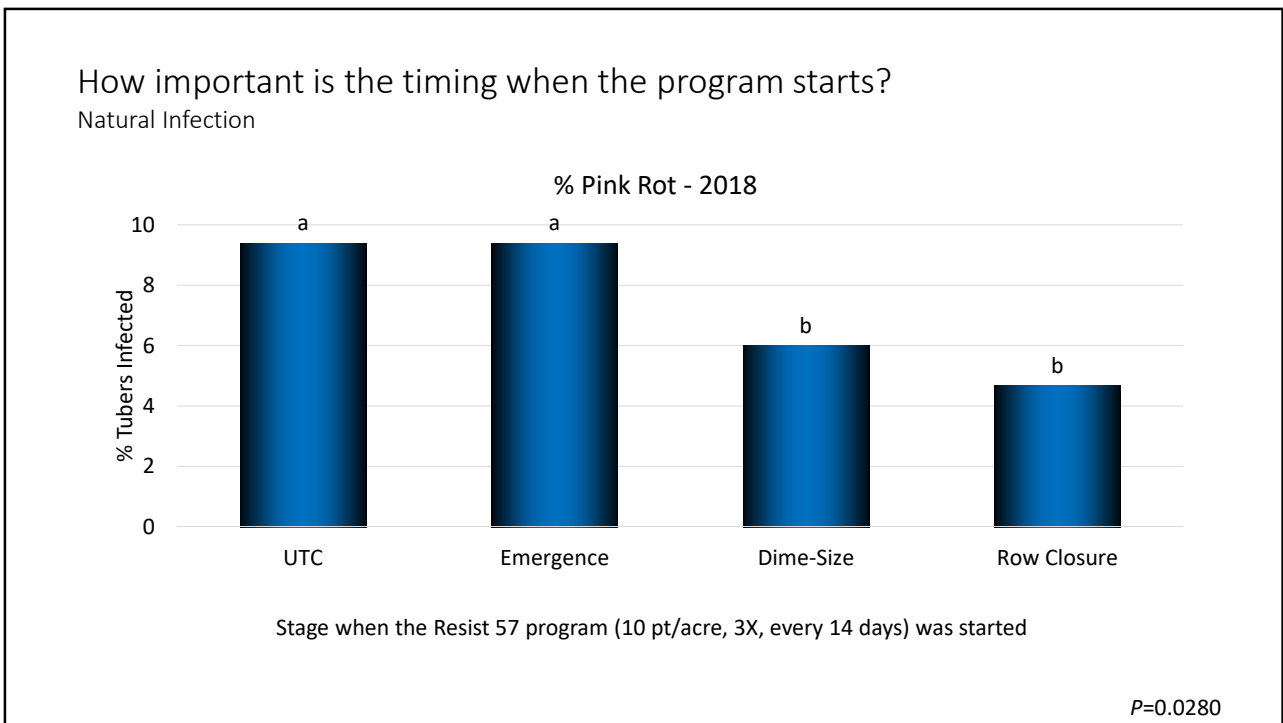
### How important is the time between application and irrigation?

Post-Harvest Challenge Test



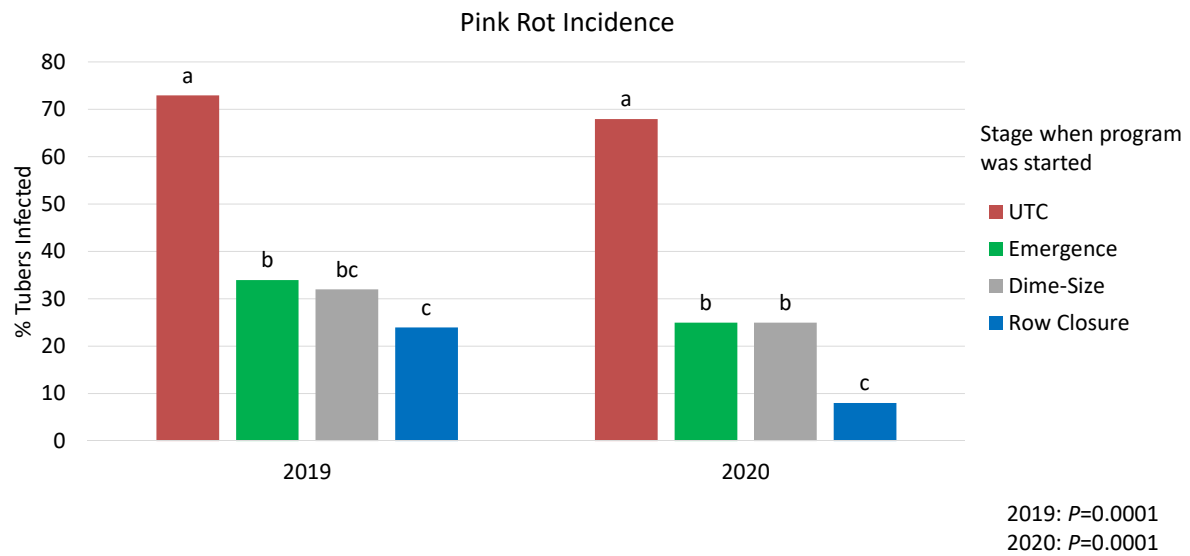
### How important is the timing when the program starts?

Natural Infection



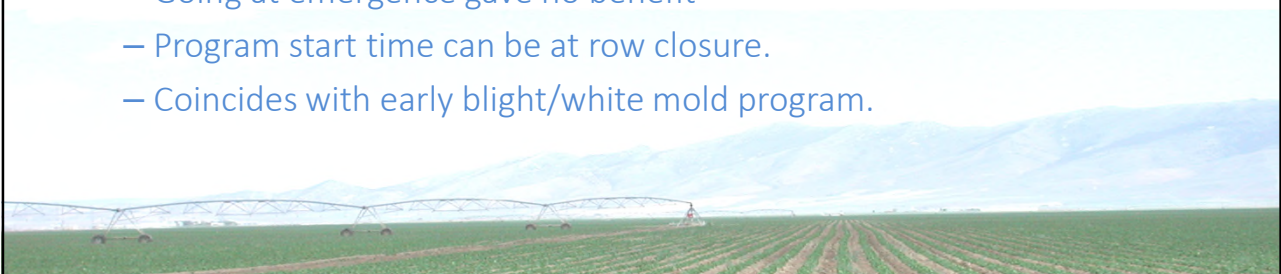
## How important is it when the program starts?

Post-Harvest Challenge Test

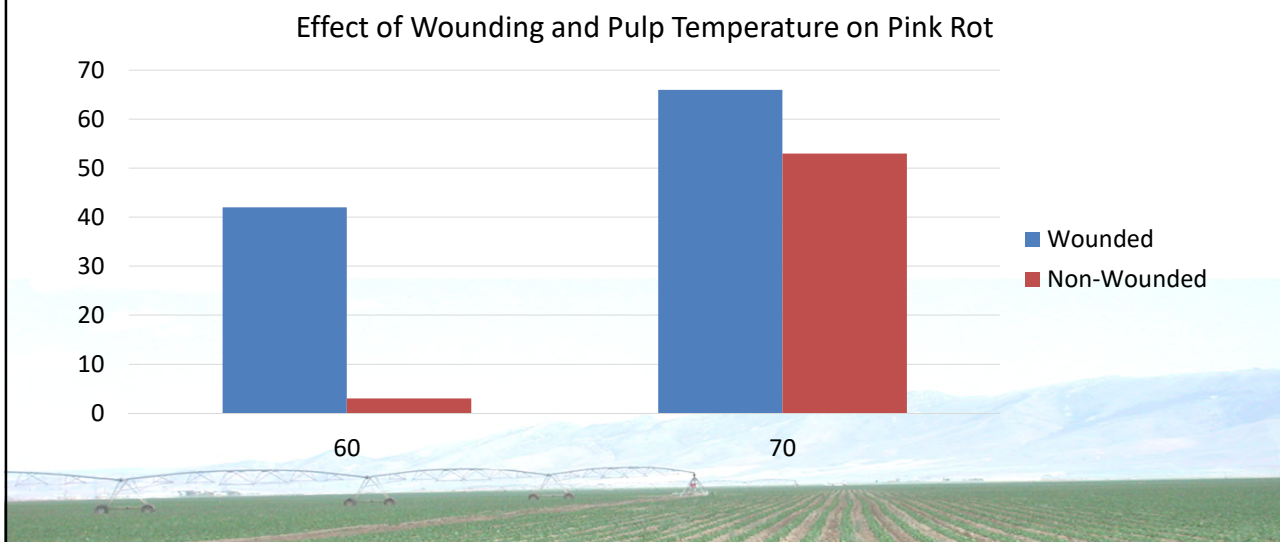


## Phosphites not working as well as expected?

- Is resistance developing to the phosphites? **No**
- Is irrigation interfering with product uptake?
  - Wait at least 12 hours between application and irrigation, if possible.
- Is the timing of application optimal?
  - Going at emergence gave no benefit
  - Program start time can be at row closure.
  - Coincides with early blight/white mold program.



## Avoid Disease Favorable Conditions at Harvest

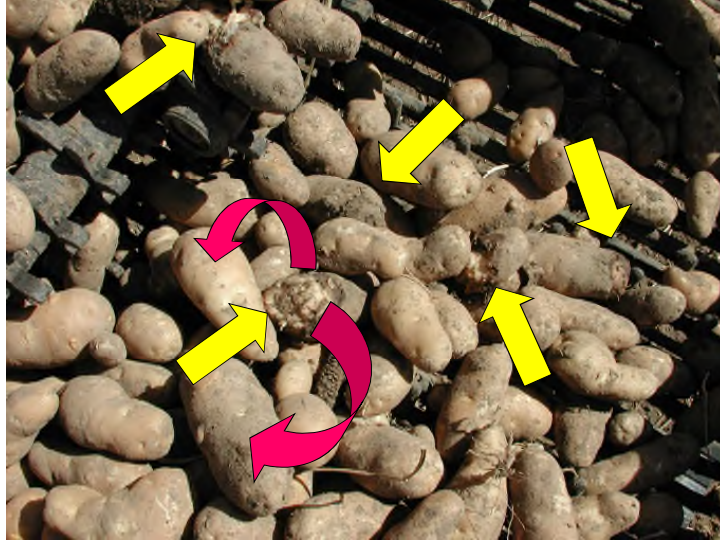


If I have a good foliar fungicide program, do I need to worry about a post-harvest application?

- Was the field program sufficient?
- Is disease present in the field prior to harvest?



## Apply Post-Harvest Fungicides



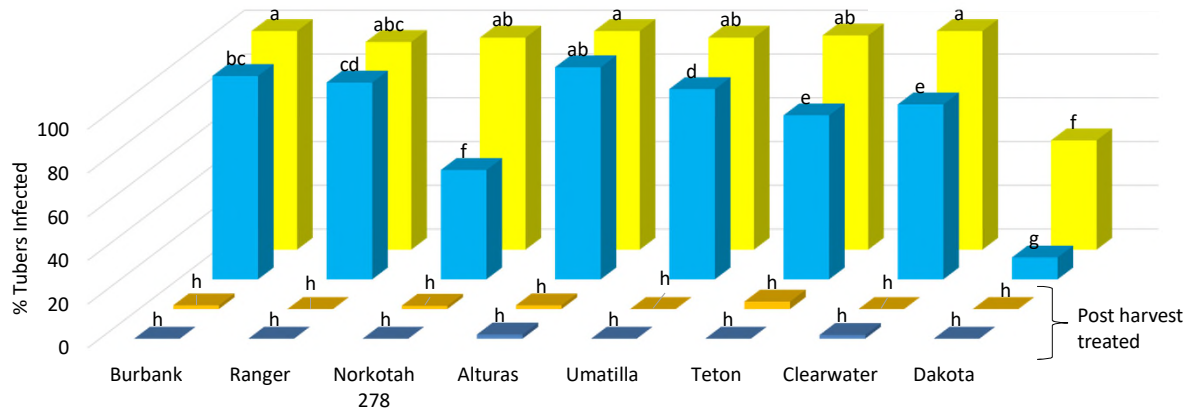
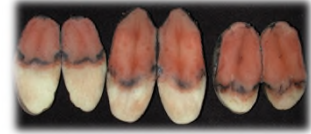
## Apply Post-Harvest Fungicides

- Phosphorous acid:
  - 12.8 fl oz/ton tubers
  - Apply in 0.5 gal water/ton tubers





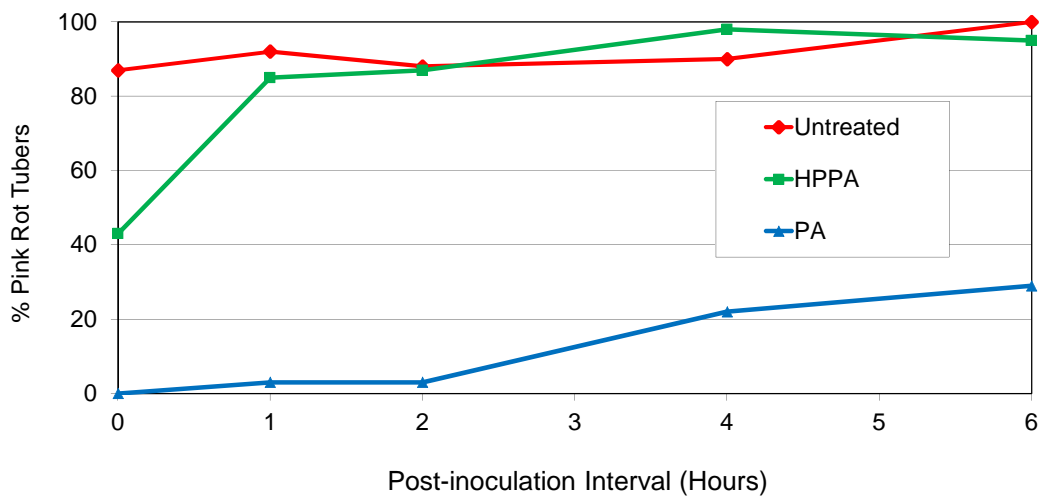
## Post-Harvest Pink Rot Challenge Inoculation



Field Treatment:  
Resist 57 (10 pt/acre, 3X)  
Post-Harvest Treatment:  
Resist 57 (12.8 fl oz/ton)

■ Field TRT, PH TRT   ■ Field UTC, PH TRT   ■ Field TRT, PH UTC   ■ Field UTC, PH UTC

## Time Between Inoculation and Treatment



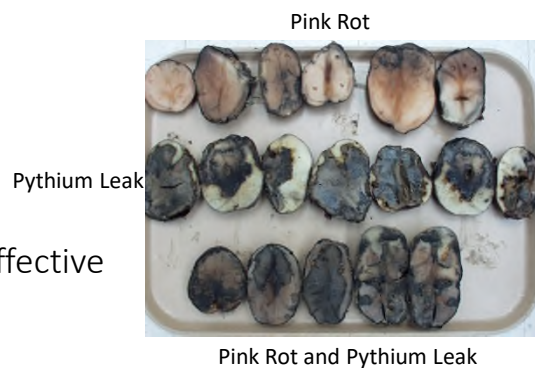
## Pink Rot Management

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
- Use less susceptible varieties
- Ensure skin set prior to harvest
- Minimize wounding
- Do not harvest when pulp temps are > 65°F



## Pythium infections through lenticels and eyes

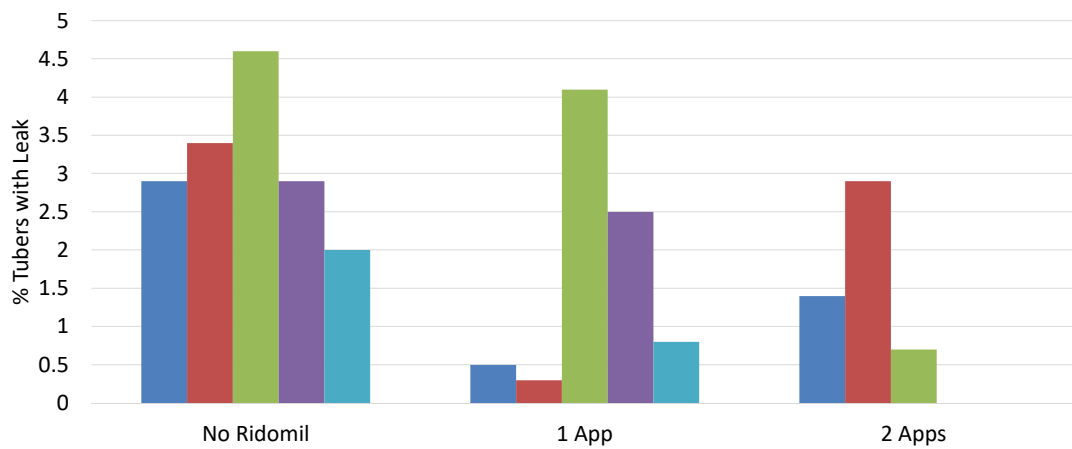


Photo courtesy of Blaine Meeks

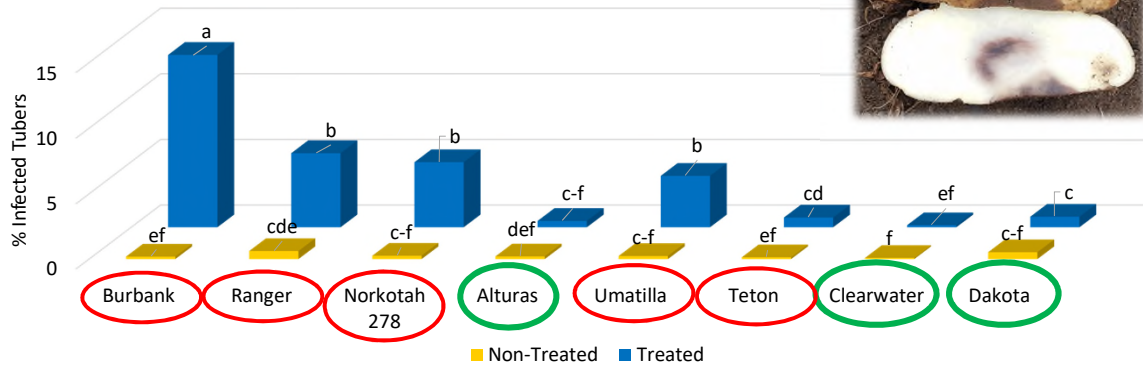


## Effect of Ridomil on Pythium Leak

Results from Grower Split Fields



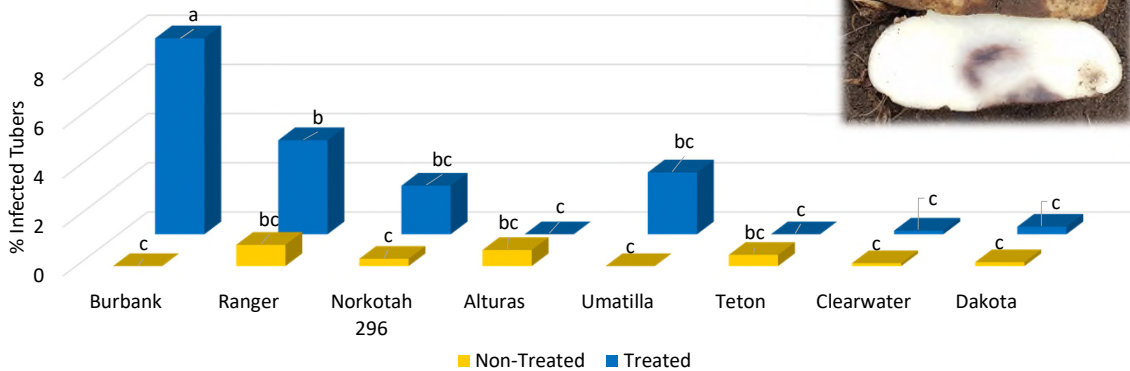
## Pythium Leak – 2019 Incidence at Harvest



**Treatment:**

- Dime size tubers: Resist 57 (10 pt)
- Row closure: Resist 57 (10 pt) + Luna Tranquility (11.2 fl oz) + Bravo WS (1.0 pt)
- Row closure + 2 wks: Resist 57 (10 pt) + Luna Tranquility (11.2 fl oz) + Bravo WS (1.0 pt)
- Row closure + 4 wks: Bravo WS (1.5 pt)
- Row closure + 6 wks: Bravo WS (1.5 pt)

## Pythium Leak - 2020 Incidence at Harvest

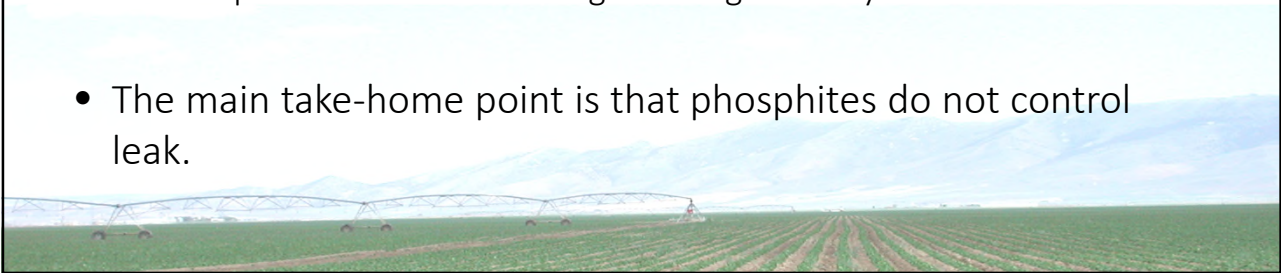


**Treatment:**

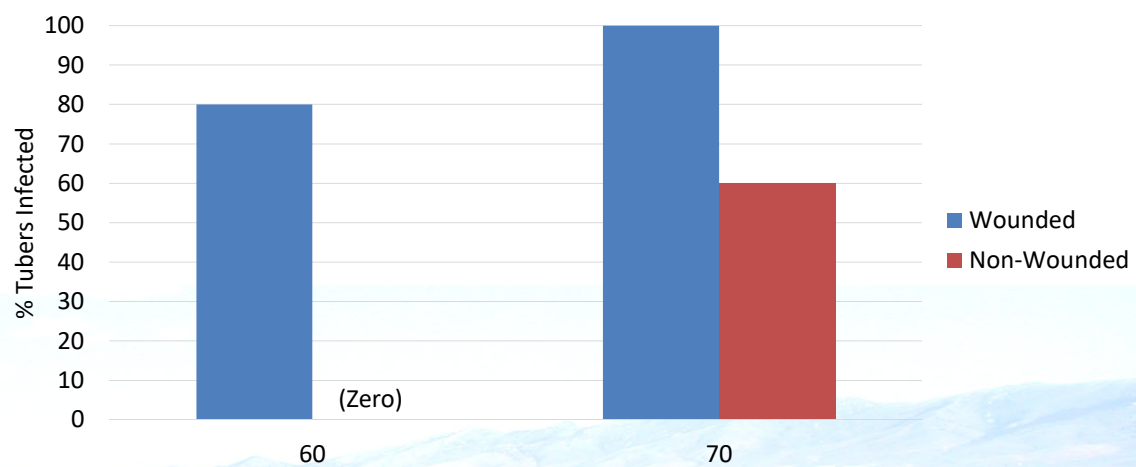
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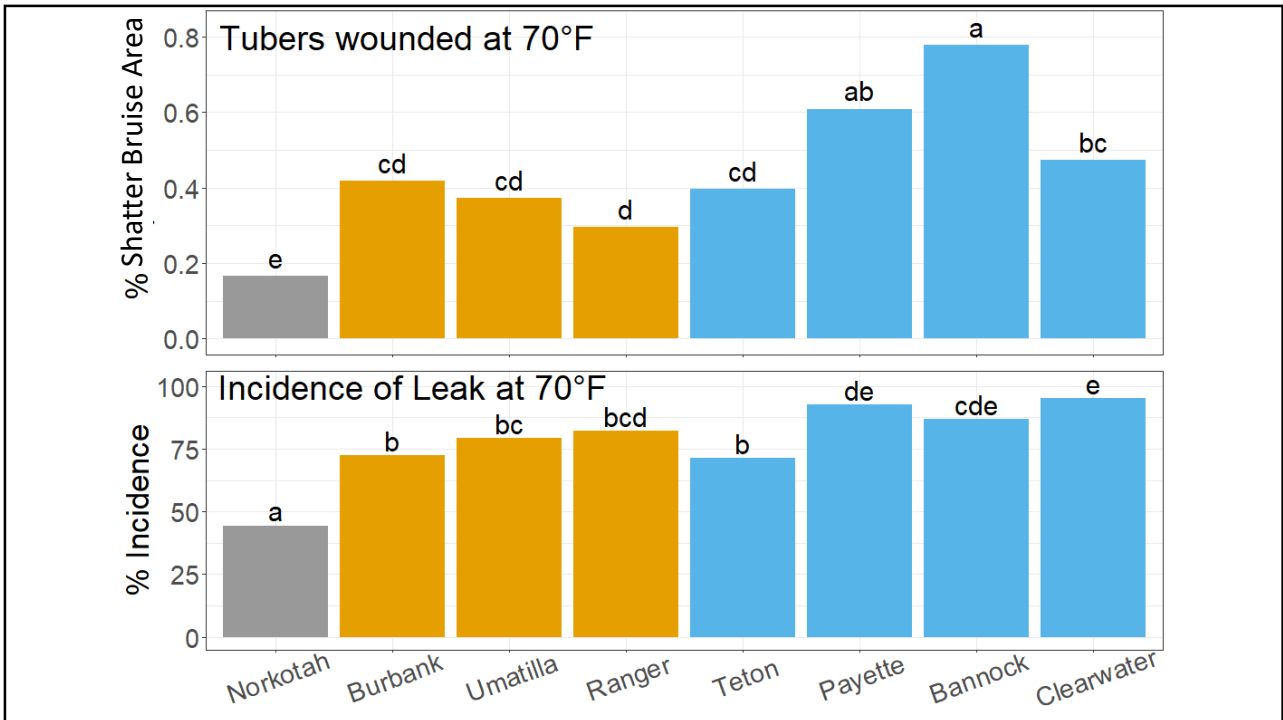
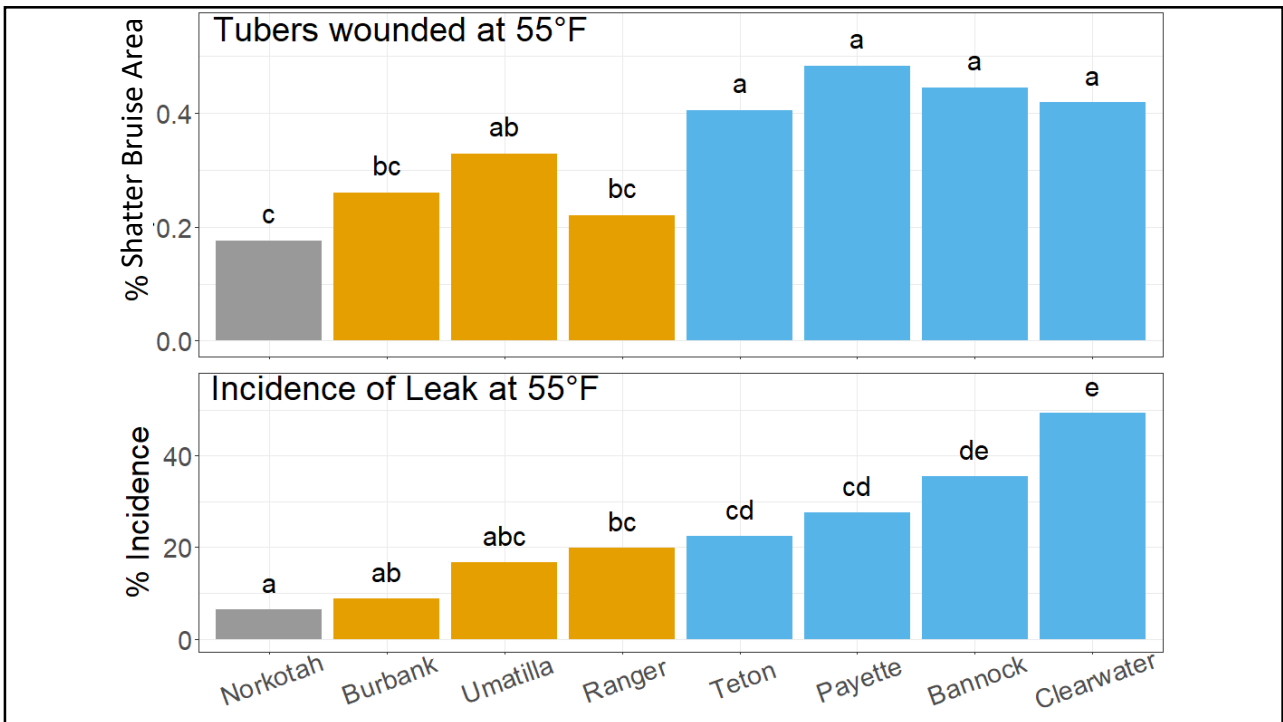
## Does this mean phosphites will increase leak?

- These trials may be an anomaly.
  - Phosphite research since 2002.
- Artifact of trial conditions?
  - Multiple varieties under a single management system
- The main take-home point is that phosphites do not control leak.



## Effect of Wounding/Pulp Temperature on Leak





## 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  $> 65^{\circ}\text{F}$



Thank You!

