Storage: Dealing with Late blight

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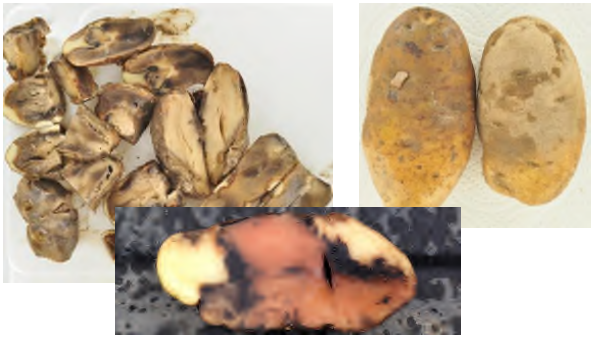
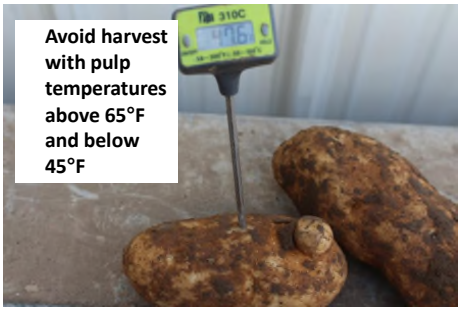


Maturity and Wounding

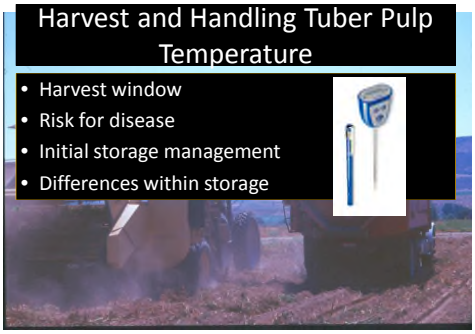
- Lack of skin set
- Entry points and more prone to disease invasion – Pythium leak, pink rot, **late blight**, Fusarium dry rot
- More susceptible to non-pathogenic growth
- Potential for greater weight loss in early storage
- Watch pulp temperatures and handling



Avoid harvest with pulp temperatures above 65°F and below 45°F

Harvest and Handling Tuber Pulp Temperature

- Harvest window
- Risk for disease
- Initial storage management
- Differences within storage



Air, Temperature and Humidity

- Maximize run time
- Immediate air and aggressive ventilation program
- Set point -- Watch temperatures
- Refrigeration
- Humidification –use evaporative cooling pads to extend cooling time
- Watch storage closely; know disease and level
- Use low storage temperatures to advantage
- Minimize free moisture (condensation)

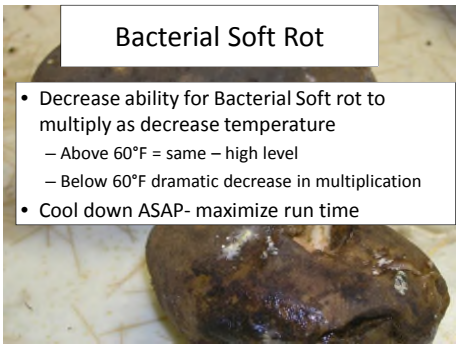
Heat load in Storage

- For a 100,000 cwt storage
- Mature "normal" respiration = 3,300,000 BTU/storage/day
- Immature respiration = 10 times greater = 33,000,000 BTU/storage/day
- Disease – significantly increases respiration

REMOVE HEAT... fan capacity and run time

Bacterial Soft Rot

- Decrease ability for Bacterial Soft rot to multiply as decrease temperature
  - Above 60°F = same – high level
  - Below 60°F dramatic decrease in multiplication
- Cool down ASAP- maximize run time



Pathogen Exposure to Air –
Viability (%) on Tuber Surface

Time 0

Late blight	Dry rot
100%	100%
Soft rot	**Silver scurf**
100%	100%

Pathogen Exposure to Air –
Viability (%) on Tuber Surface

Time ½ hour

Late blight	Dry rot
100%	100%
Soft rot	**Silver scurf**
30%	100%

Pathogen Exposure to Air –
Viability (%) on Tuber Surface

Time 1 hour

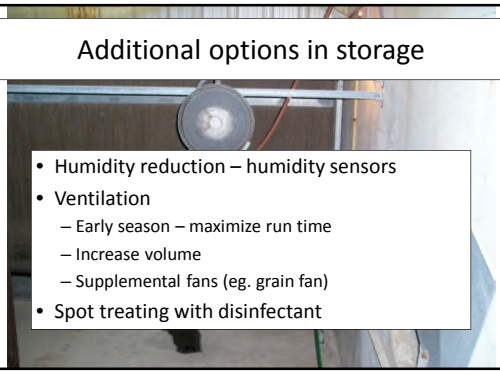
Late blight	Dry rot
95%	100%
Soft rot	**Silver scurf**
10%	100%

Pathogen Exposure to Air –
Viability (%) on Tuber Surface

Time 2 hours

Late blight	Dry rot
60%	100%
Soft rot	**Silver scurf**
0%	100%

Additional options in storage



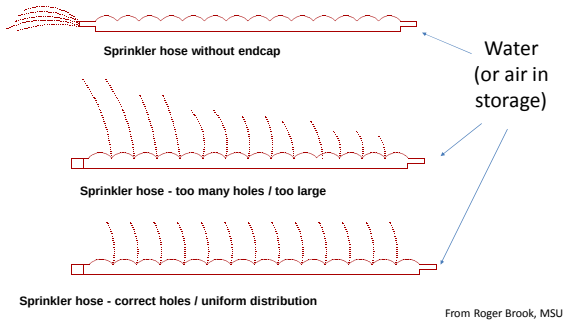
- Humidity reduction – humidity sensors
- Ventilation
  - Early season – maximize run time
  - Increase volume
  - Supplemental fans (eg. grain fan)
- Spot treating with disinfectant

Evaporative cooling pads

- Humidity ~85%+RH
- Allows you to bring in warmer air, cool thru pads– extends run time for cooling air
- Example:
  - Outside air into storage:
    - 60°F and 50%RH
  - After pads:
    - ~52°F and 85%RH

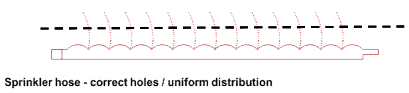
Early Storage Management Study: Impact on Soft Rot

- Less development of soft rot from late blight or pink rot infected tubers when
  - Reduce humidity to 85%RH
  - Reduce curing temperatures to 50°F



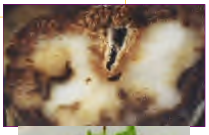
Air supply

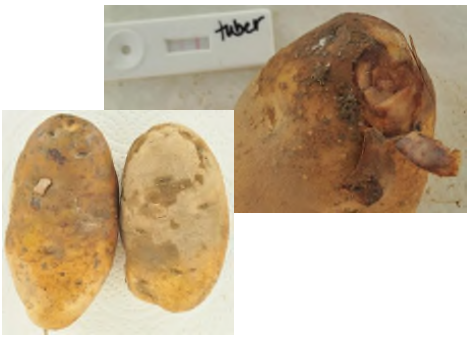
- Make sure adequate ventilation
  - Minimum for VFD – calculate what % is in cfm/ton
    - Eg. if 12 cfm/ton storage and at 40% = 5 cfm/ton
    - Eg. if 22 cfm/ton storage and at 40% = 9 cfm/ton
  - Can get pockets of condensation; convection; hot spots
- Ducts aligned and sealed
- Deliver the air the system was designed to deliver



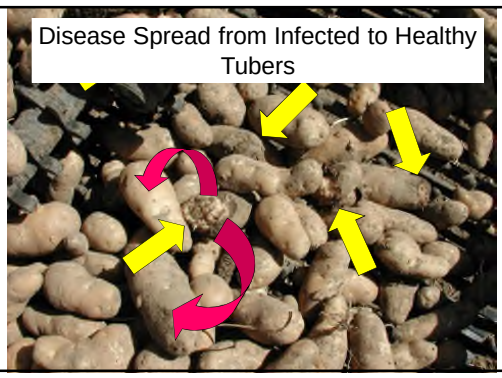
Late Blight in Storage

- Control in field
- Eliminate when loading
- Avoid warm pulp temperatures
- 50°F curing temperatures
- Humidity
- Immediate air
- Low holding temperature
- Post harvest products

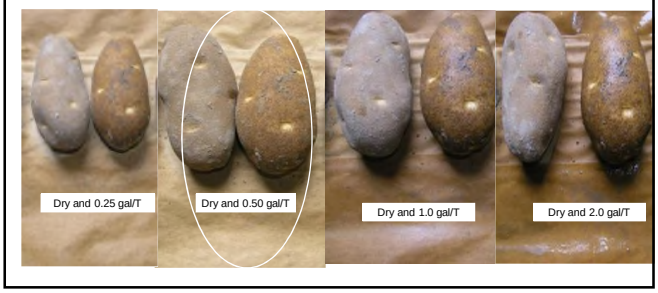




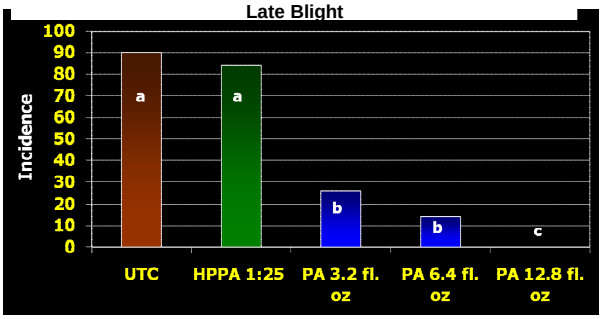
Disease Spread from Infected to Healthy Tubers



Post-harvest spray application volumes



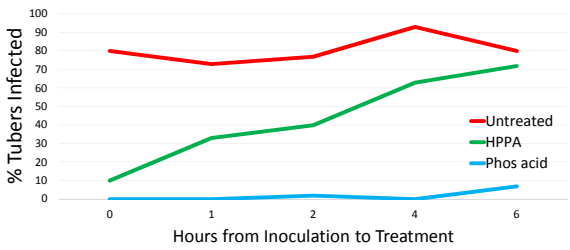
Large –scale study: Effect of Post Harvest Applications on Late Blight



Late blight results – Heavy disease pressure

On-line spray vs. in-storage application

Post-Harvest Fungicides on late blight – Timing of Application



Store infected lots where can move easily

Monitor Storage- depressions, temperature changes, odor

Summary

- Pulp temperatures
- Wounding
- Ventilation
- Temperature
- Humidity
- Post-harvest products