University of Idaho

TIPS FOR STORING COMPROMISED POTATOES

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GOALS OF STORAGE

- **Maintain quality and minimize losses**
  - Minimize carbohydrate loss – respiration loss
  - Provide humidity to minimize evaporation loss
  - Provide oxygen (fresh air)
  - Remove carbon dioxide
  - Remove heat; maintain desired temperature
- **Others**
  - Dry out wet potatoes
  - Prevent disease spread/breakdown
  - Avoid condensation
  - Deal with sub-optimal or compromised potatoes.
    - Consequences on sound potatoes?

Photos courtesy of Eugenia Banks

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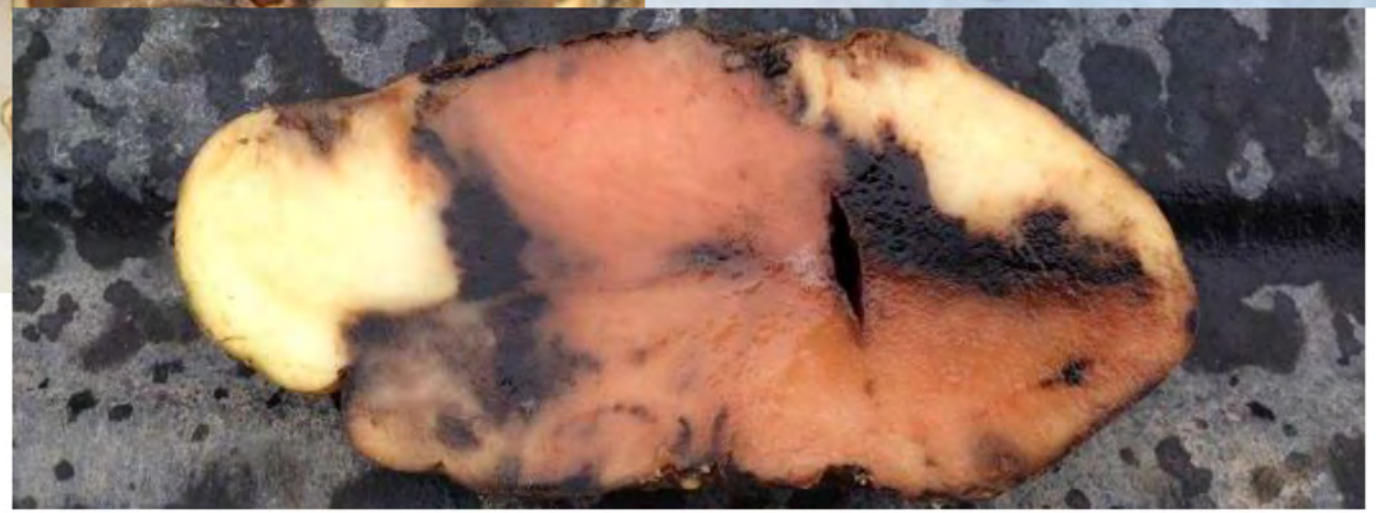


Idaho 2019

MANAGING STORAGES WITH DISEASE

1. Airflow

- Maximize outside air
- Periodically close off ducts to good potatoes
- Duct (grain) fans
- Additional pile fans and heaters
  - Condensation management
  - Artificially increase return air with heaters – increase fresh air
  - Cut back on humidity*

2. Rank storages

- Prioritize and plan
- % of disease, logistics of storage conditions (split), building capabilities
- Consequences on sound potatoes
- Reasonable outcome by month
- Manage for best profit
- Be realistic!

Management decisions based upon…

Single-bay storage, one ventilation system

Management decisions based upon…

Single-bay storage, one ventilation system

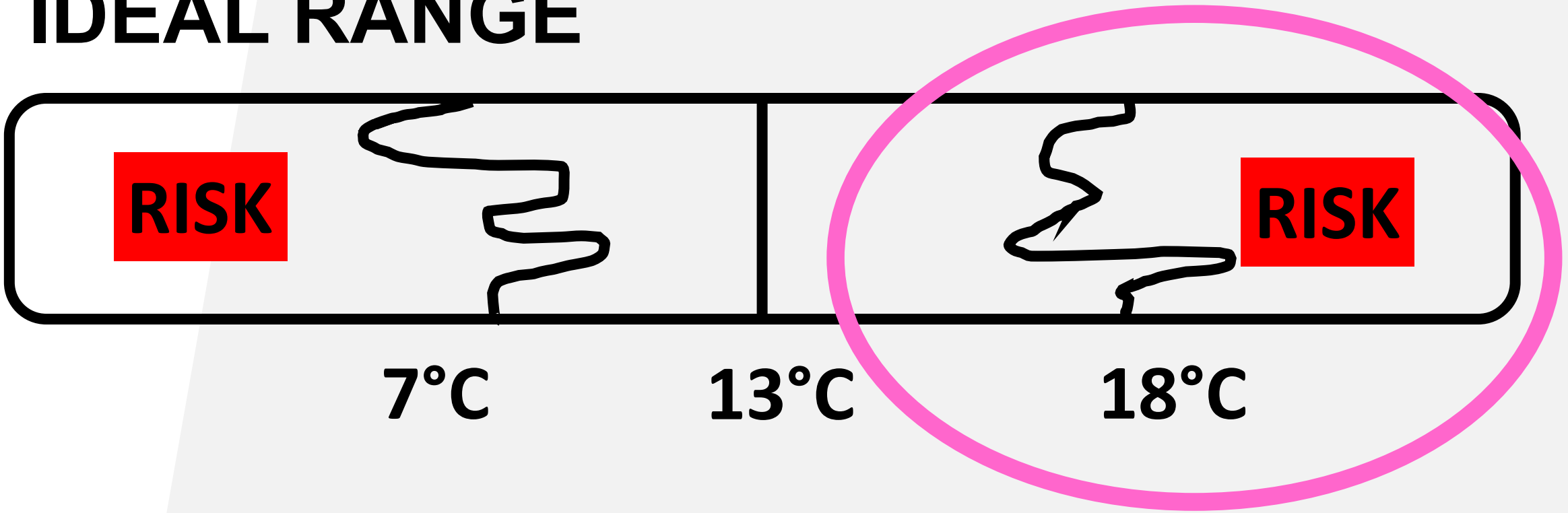
Management decisions based upon…

Split-bay storage, one ventilation system

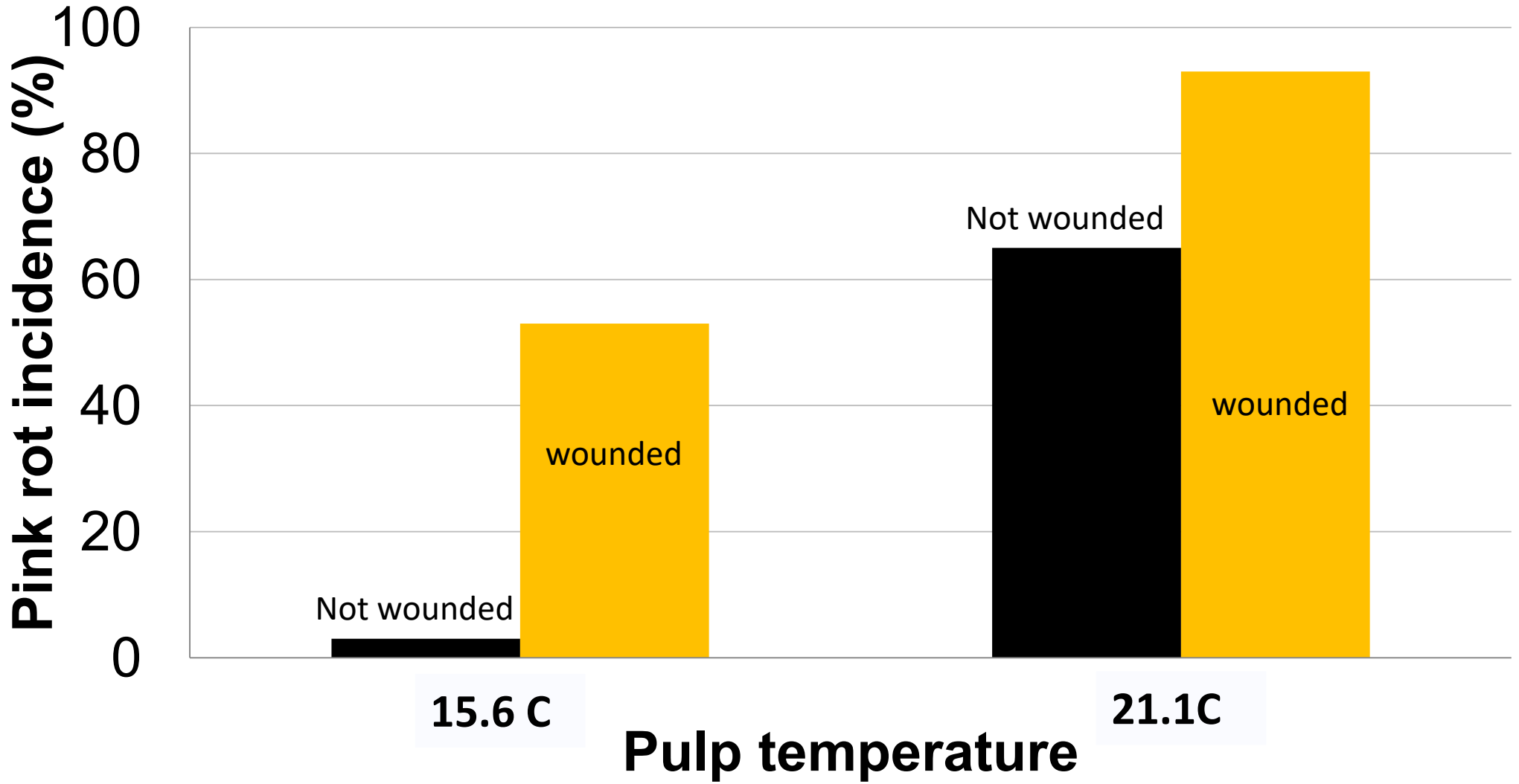
Late blight in storage

- Know cultivar susceptibility
- Control in field
- Avoid warm pulp temperatures and wounding; wet conditions
- Eliminate when loading
- Remove field heat quickly; 10°C curing temperatures
- Immediate air
- High ventilation rates
- Lower holding temperatures
- Post harvest products

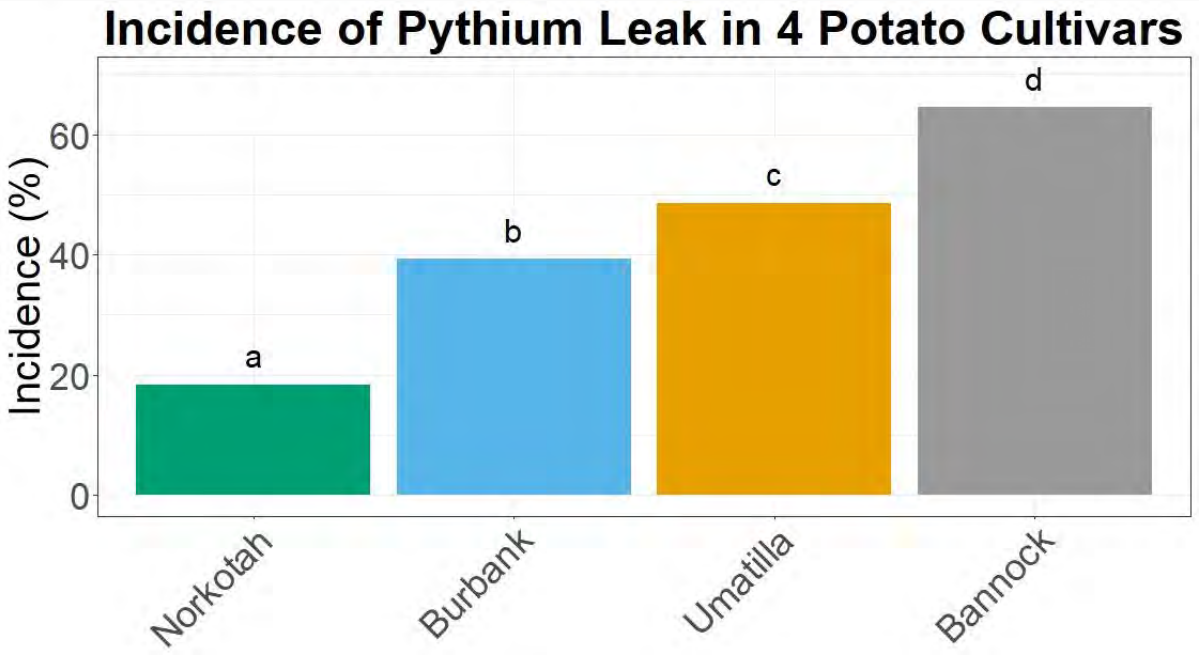
RISK WHEN HARVEST OUTSIDE IDEAL RANGE

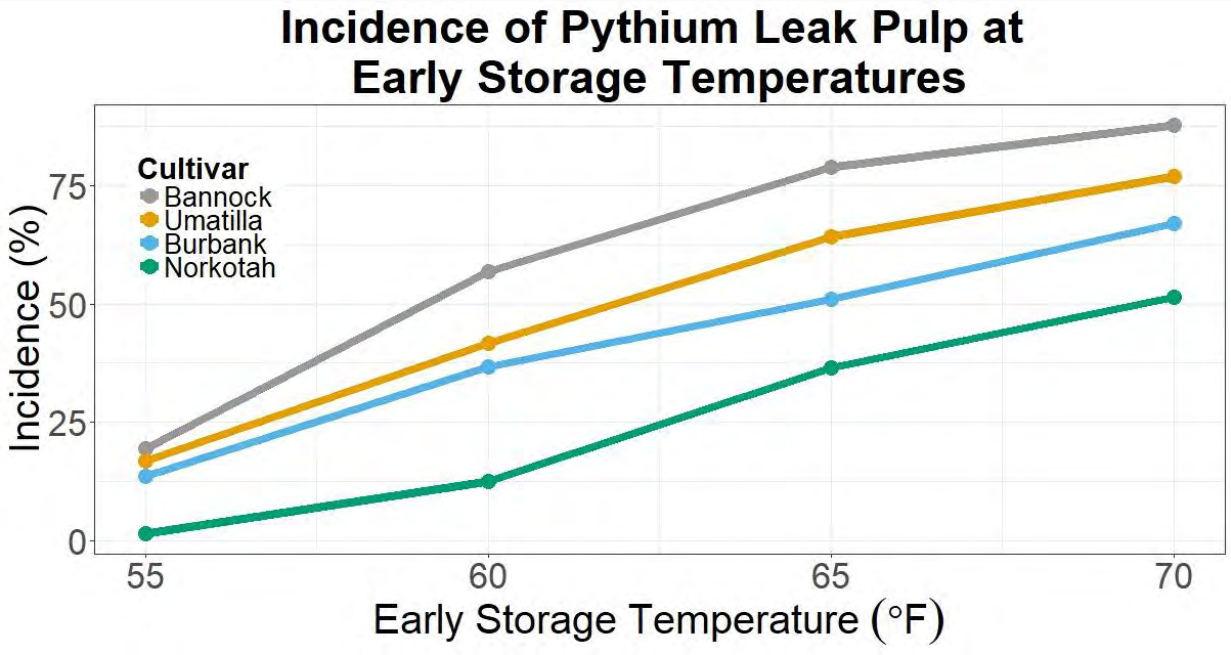


EFFECT OF TEMPERATURE ON PINK-ROT DEVELOPMENT



Cultivar and storage temperature on leak





Values followed by the same letters are not significantly different (α<0.05) for each graph.


310C
496

Jessica VanderZaag

Photo received from Eugenia Banks

Current industry recommendation:

- Harvest with pulp temperatures 7-18°C
- **Remove field heat immediately**
  - *Remove heat, heat of respiration, provide oxygen, remove CO2*
- **Cure at 10 - 12.8°C for 2-3 weeks**
- **Followed by ramping to holding temperature** (0.1 to 0.3°C/day)

If harvesting stopped at 18°C…

- Theoretically, if put in storage and no cooling air…
- Respiration:

$$C_6H_{12}0_6 + O_2 \longrightarrow CO_2 + H_2O + \text{energy (heat)}$$

- Heat of respiration = 0.5 BTU/cwt/hour
  - 10 times higher if wounded, immature, diseased, etc.

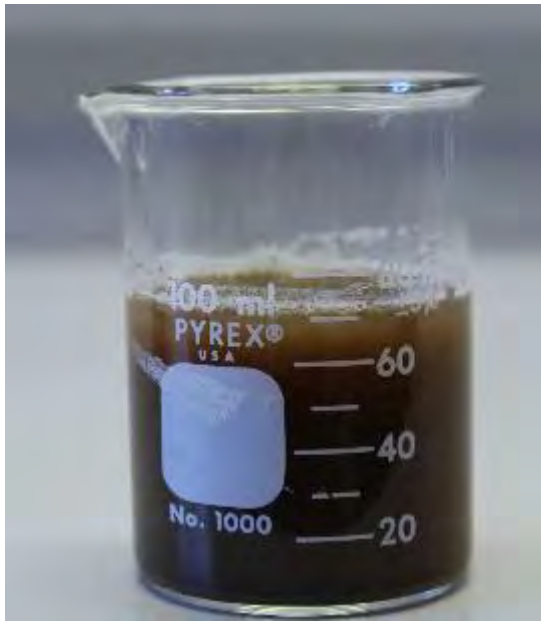
…18°C turns into 21°C after 12 hours


3
NordicAire

Frost example: How much liquid?







Russet Burbank
70ml

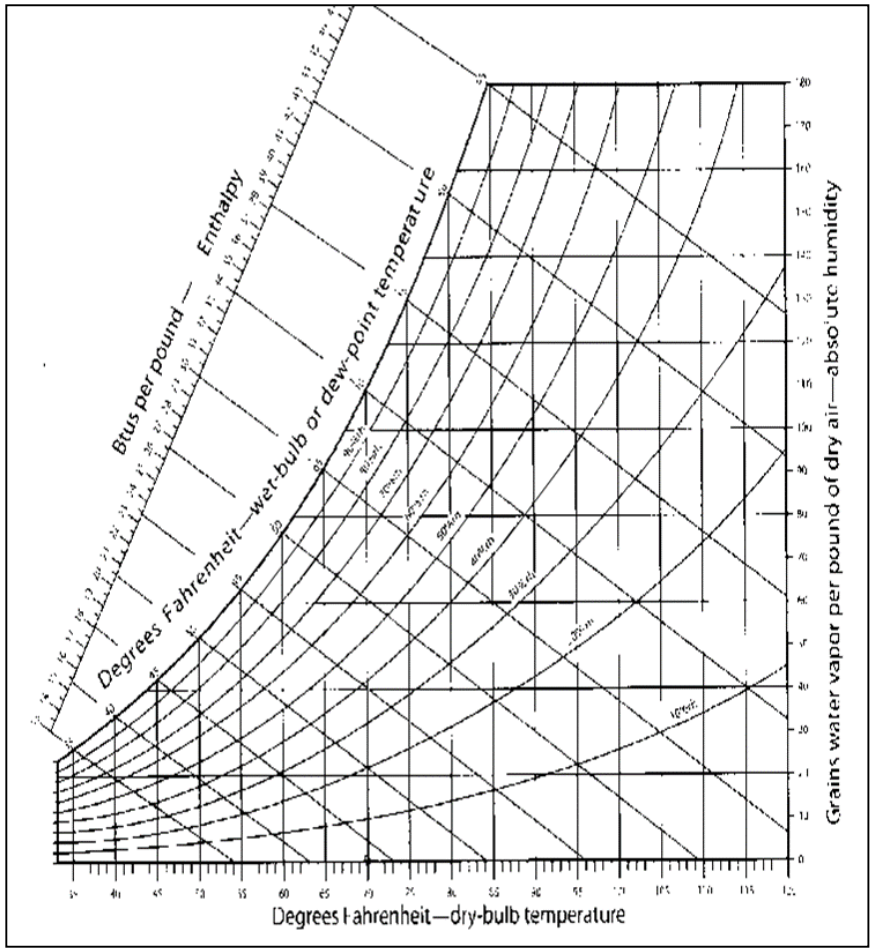
10% frozen = 148,000 gal. of water =

23

Z Temperature and humidity

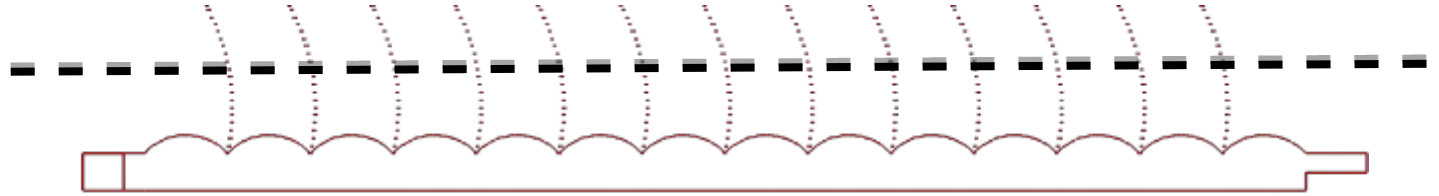
Y Temperature and humidity

X Temperature and humidity



Ventilation

- Make sure there is adequate ventilation
  - Desired ΔT
  - Minimum for VFD – calculate what % is in cfm/ton
    - e.g. if 12 cfm/ton storage and at 40% = 5 cfm/ton
    - e.g. 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 is designed to deliver



Sprinkler hose - correct holes / uniform distribution

Monitor storage - depressions, temperature changes, odor

Soft rot

Decreased ability for soft rot to multiply as temperature falls

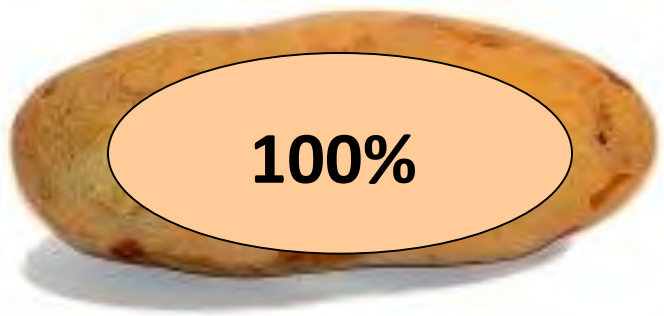
- Above 15.5°C = high level
- Below 15.5°C dramatic decrease in multiplication

Cool down ASAP

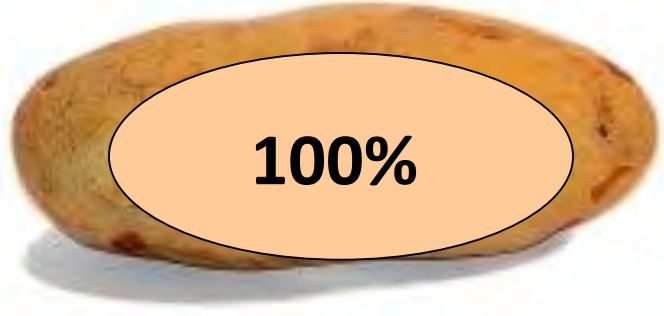
Pathogen exposure to air – Viability (%) on tuber surface

Time 0

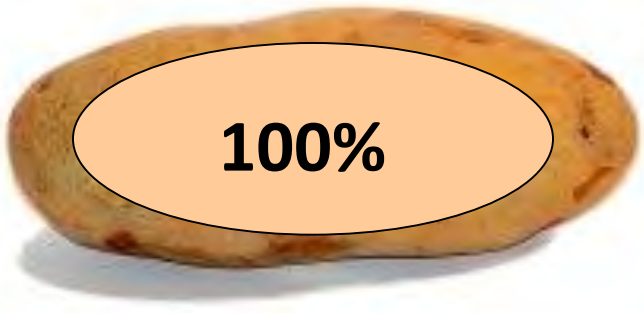
Late blight



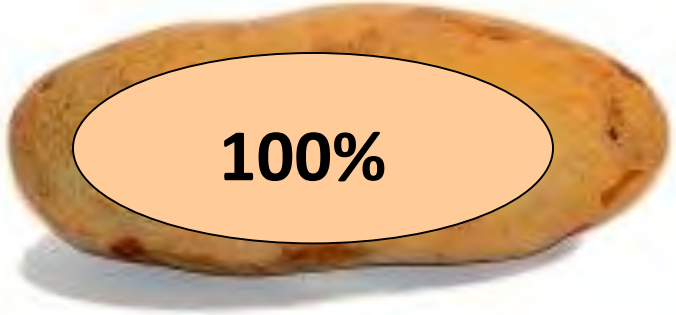
Dry rot



Soft rot



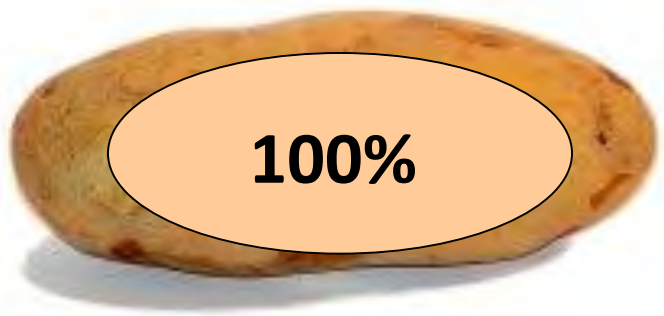
Silver scurf



Pathogen exposure to air – Viability (%) on tuber surface

Time ½ hour

Late blight



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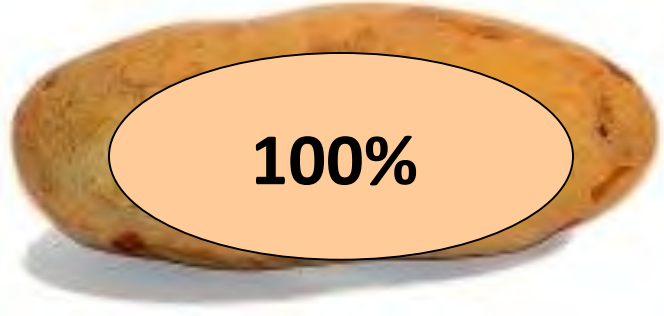

Soft rot

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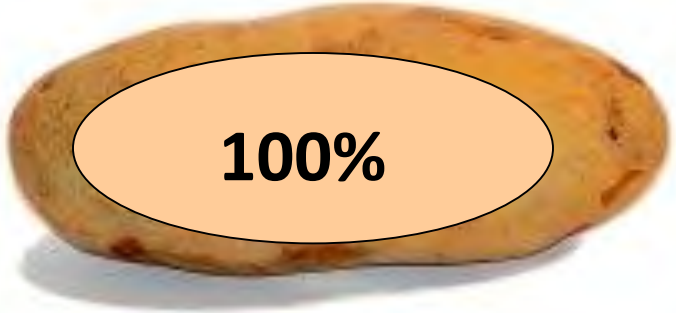
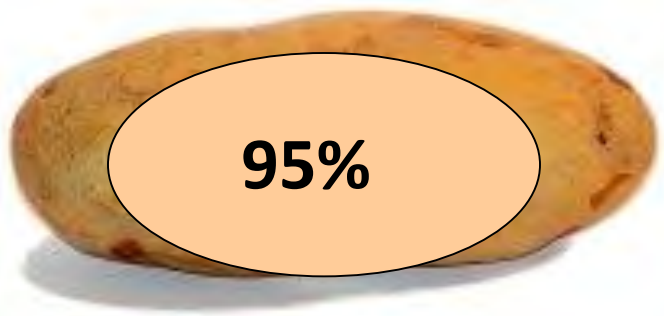


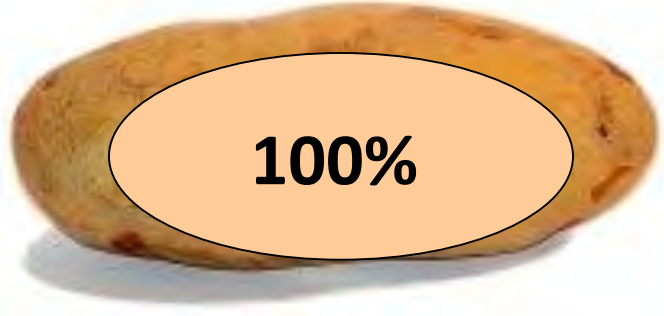
Pathogen exposure to air – Viability (%) on tuber surface

Time 1 hour

Late blight

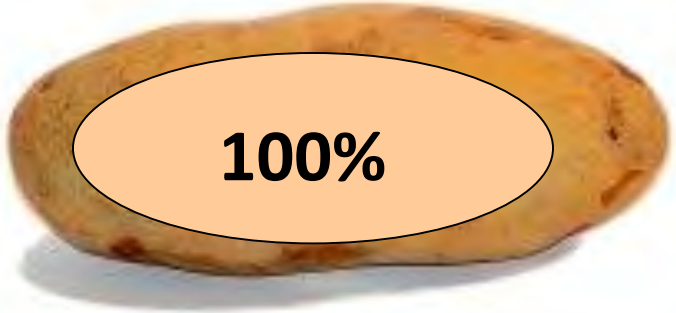


Dry rot



Soft rot

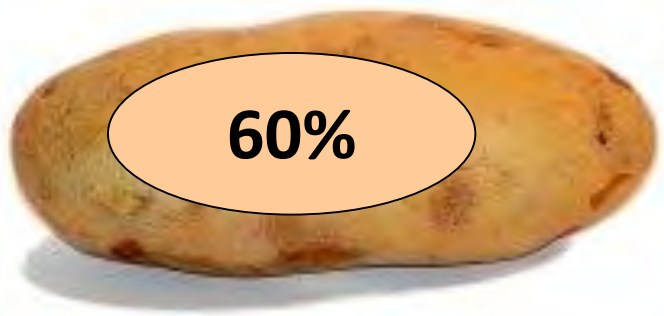
Silver scurf



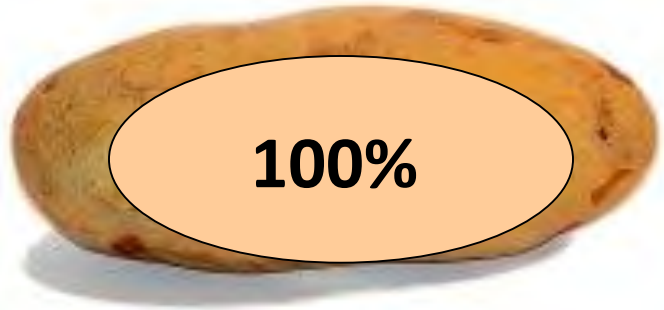
Pathogen exposure to air – Viability (%) on tuber surface

Time 2 hours

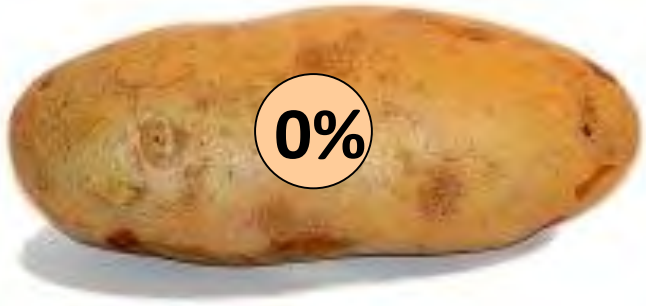
Late blight



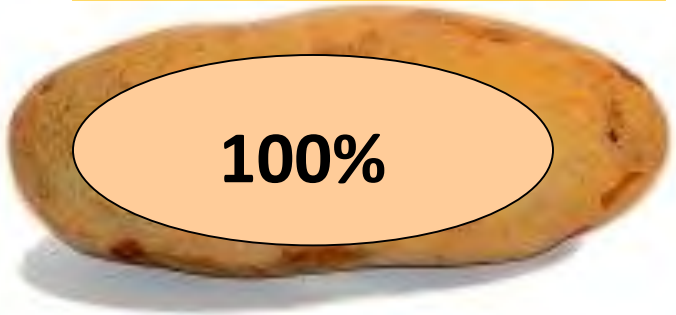
Dry rot



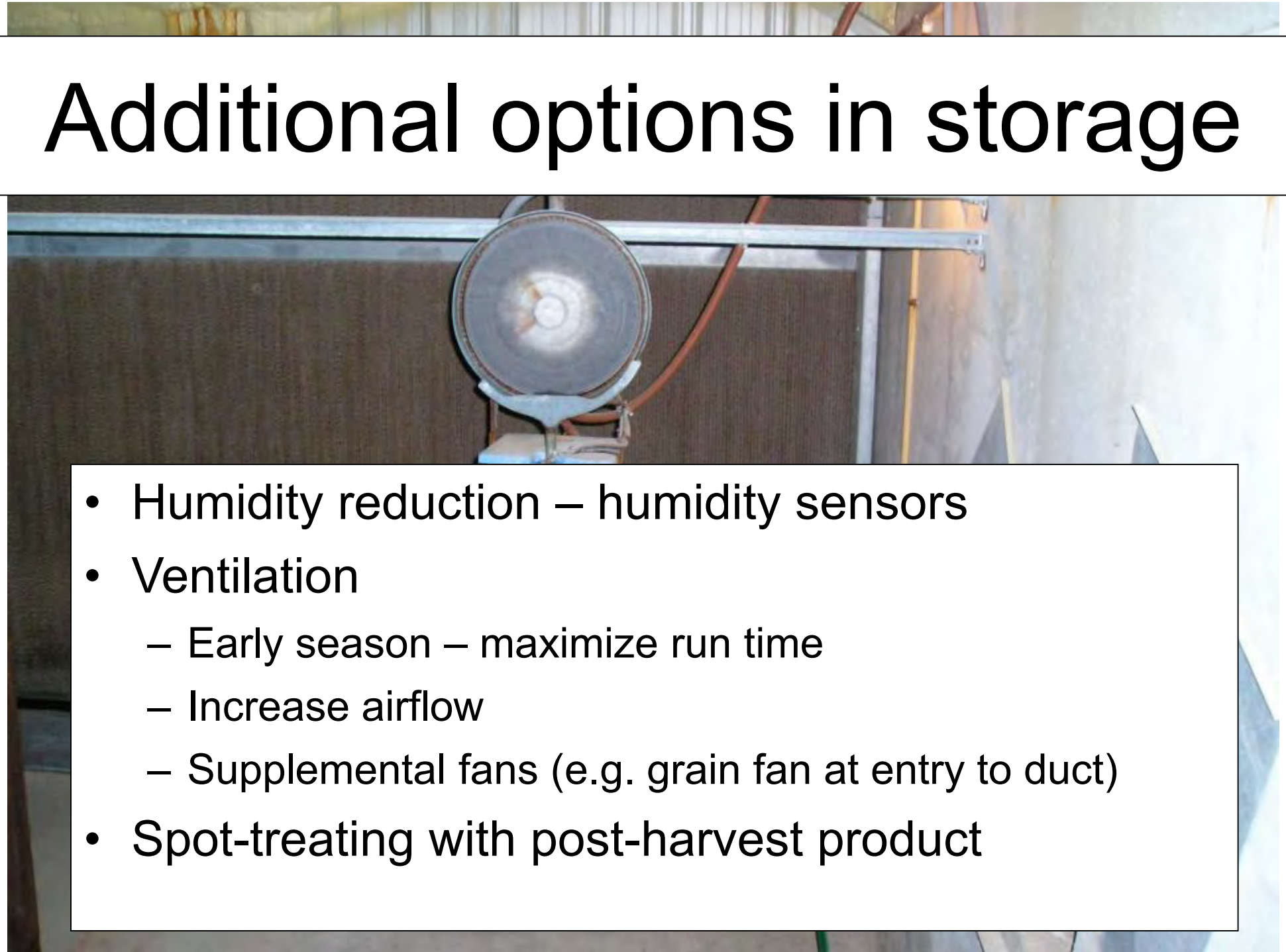
Soft rot



Silver scurf



Additional options in storage



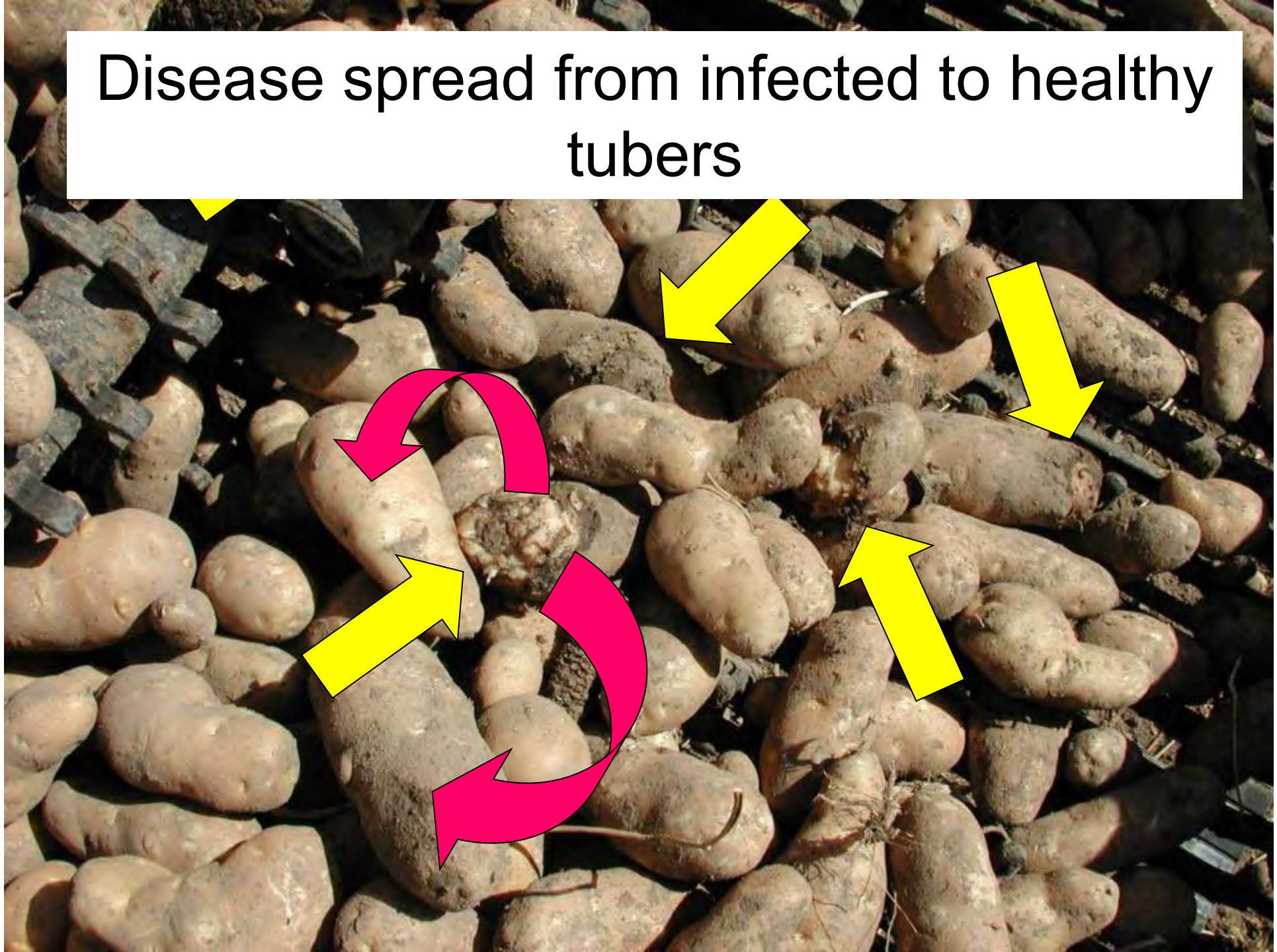
- Humidity reduction – humidity sensors
- Ventilation
  - Early season – maximize run time
  - Increase airflow
  - Supplemental fans (e.g. grain fan at entry to duct)
- Spot-treating with post-harvest product

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 80%RH
  - Reduce curing temperatures to 10°C


Double L

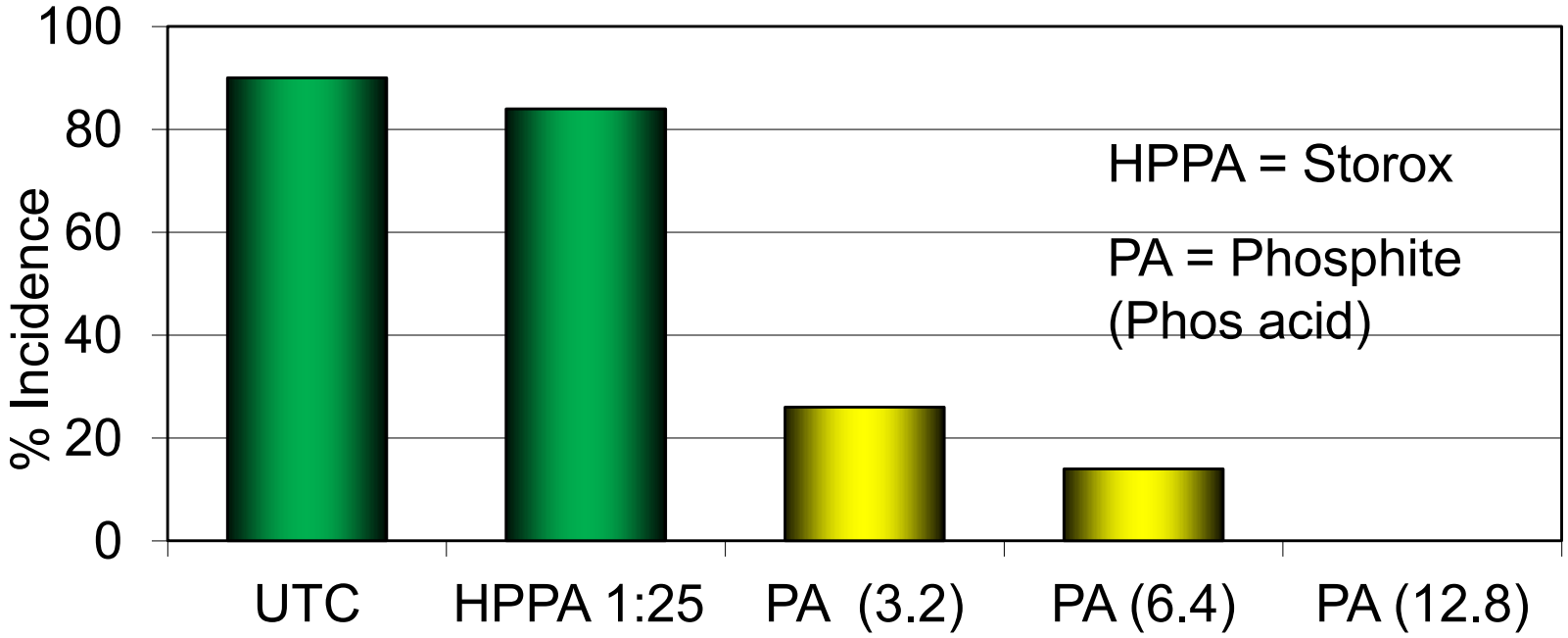
Disease spread from infected to healthy tubers

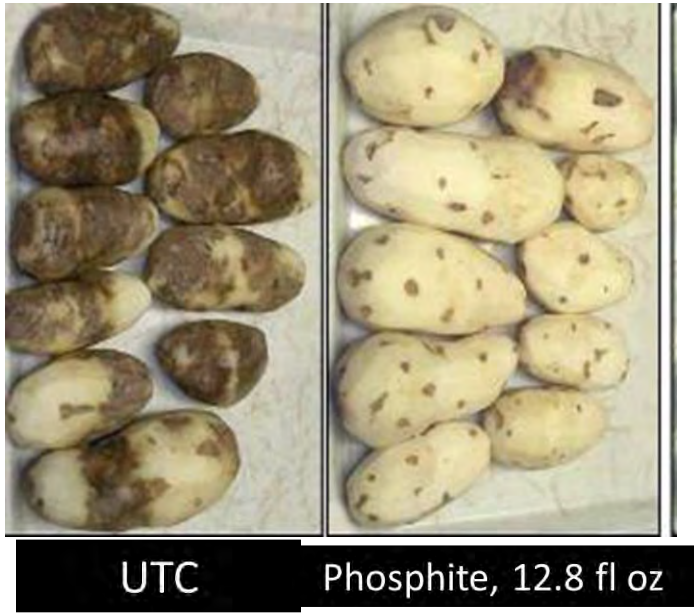


USE OF PHOSPHITE PRODUCTS IN STORAGE

Post-harvest spray application volumes

Effect of post-harvest applications on late blight 1-ton bin trial





Late-blight or compromised-potato management in storage

- Integrated two-pronged approach:
  - Deal with field-infected tubers
  - Minimize spread and breakdown of healthy in storage

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