Orchard Management to restrict foodborne Pathogen Contamination & Proliferation

Ines Hanrahan
WTFRC

…BUT TREE FRUIT IS SAFE, RIGHT??

Why do we care?

- Once introduced, pathogens are difficult to remove
  - We have **no** kill step!!!



2015 Caramel Apple Outbreak

- Multi-state outbreak 2014-15:
  - 12 states
  - 35 illnesses, 34 hospitalized
  - 11 illnesses associated with pregnancy, 1 fetal loss
  - 7deaths reported, listeriosis contributed to at least 3 deaths

Listeria: Where was it found?

FDA Inspection Report from Bidart Bros: Positive samples for LM:

1. Polishing brush
2. Drying brush
3. Auto line lane
4. Main packing line drain
5. Inside of wood bin

Problem areas associated with outbreaks/detections

1. Facility design
   - Pooled water
   - Facility floor not easily cleanable
   - Re-purposed equipment

2. Equipment design
   - Not easily cleaned or sanitized
   - Dirt and product buildup
   - Niches and Harborages

3. Postharvest Practices
   - Formation of condensation (pre-cooling before cold storage insufficient)
   - Packing/Handline practices

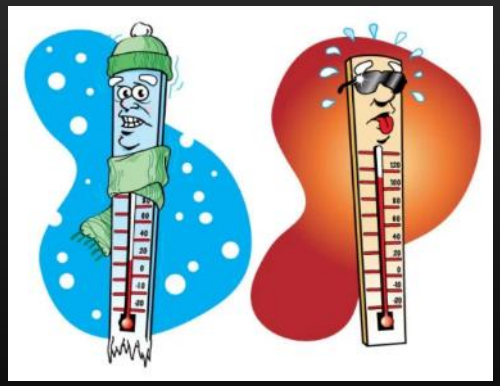
Adapted from: United Fresh 'Guidance on Environmental Monitoring and Control of *Listeria* for the Fresh Produce Industry'

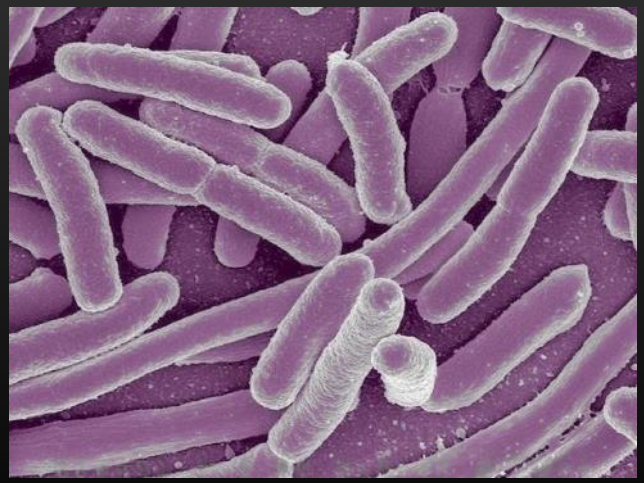
Listeria: Where is it found?

- **Abundant in the environment and readily transported or transferred:**
  - Water
  - Compost
  - Harvesting equipment
  - Packinghouses/packing sheds
  - Processing and packaging equipment
  - Facility structures, drains, floors, walls, cooling units
  - Transportation equipment, truck tires
  - Forklifts, produce harvest and handling containers, pallets

Listeria

- Capable of functioning under varying environmental conditions
  - pH 4.39-9.4 (apple=3.3-3.9)
  - 32 – 113°F
- 'facultative anaerobe' = can grow in CA rooms and/or MAP packages
- Biofilm





Adapted from: United Fresh 'Guidance on Environmental Monitoring and Control of *Listeria* for the Fresh Produce Industry'

Washington Tree Fruit Industry Response to *Listeria monocytogenes* Caramel Apple Outbreak

1. Approach to food safety before outbreak
2. Approach to food safety after outbreak
3. Key learnings

WASHINGTON TREE FRUIT RESEARCH COMMISSION

Approach to food safety *before* outbreak

- Meeting private audits requirements
  - GAP and Global GAP in orchards
  - SQF, Primus etc. in packing facilities
- Working groups, NHC food safety committee
- CPS
- WTFRC
- WSTFA (GAP training)

TREE FRUIT RESEARCH

Approach to food safety *before* outbreak

Research Projects:

- Use of agricultural water on edib[illegible]ce:
  - Level of microbial contaminati[illegible]
  - Risk ass[illegible]
- Avoi[illegible] cross co[illegible]vest environment
  - [illegible] for packinglines (dumptanks, spray bars, dryer)
  - Bin sanitation

E-coli

Approach to food safety *before* outbreak

In summary:

PROACTIVE

TREE FRUIT RESEARCH

Approach to Food Safety *after* outbreak

1. NHC Food Safety Committee
   - Listeria sub-committee ID of priorities
   - 2015 + 2016 annual meeting focus on Lm
2. Industry organizations working together
3. WTFRC 'out of cycle' funding

WASHINGTON TREE FRUIT RESEARCH COMMISSION

Approach to Food Safety *after* outbreak

Listeria sub-committee priorities:

1. ID of training needs
2. Research needs
3. Guidance documents

* Western Center for Food Safety

TREE FRUIT RESEARCH

Approach to Food Safety *after* outbreak

Cleaning and Sanitation: Putting Principles into Practice

A Hands-On Workshop for Sanitation Supervisors and Packing Line Managers

1. Overview of *Listeria* Risk and the Importance of Cleaning and Sanitation
2. Hands-on demonstrations of effective cleaning and sanitation practices including:
    - Identifying areas of risk within your facility
    - How to handle challenging areas, including drains
    - Proper use of cleaning equipment and products
3. Strategies for successful implementation

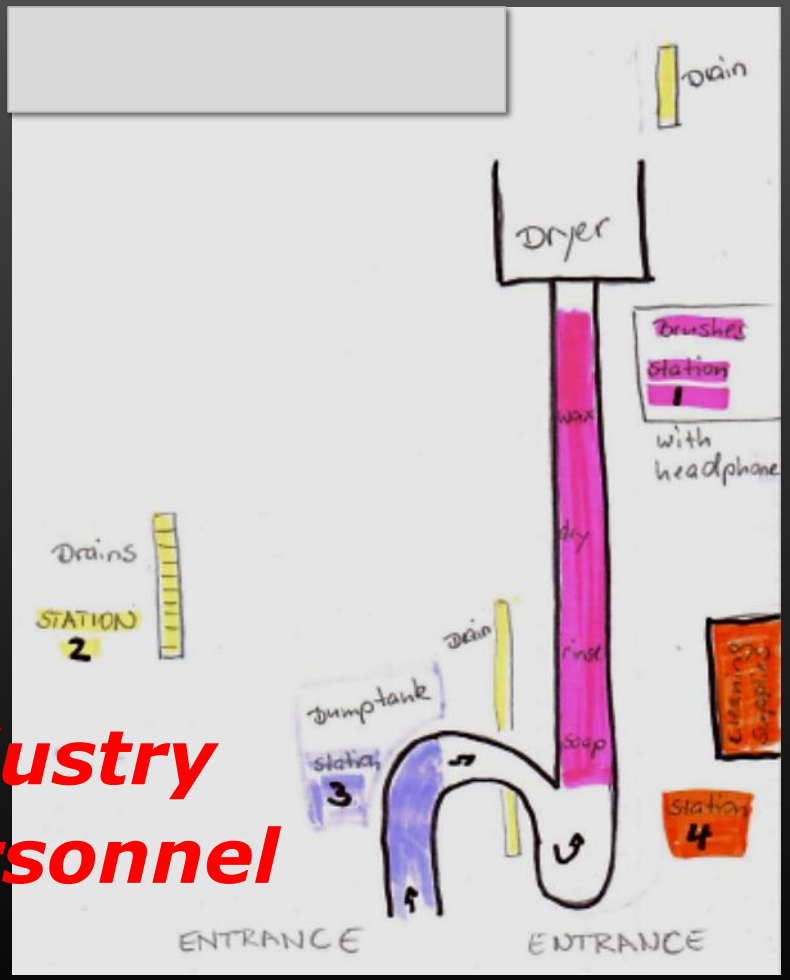
Washington State University Extension

Washington State Tree Fruit Association

Washington Tree Fruit Research Commission

Cleaning and Sanitation: Putting Principles into Practice

- Dump Tank and Flumes
- Brushes
- Cleaning supplies
- Floors and Drains



Demonstrations with industry suppliers and facility personnel volunteers

Identification of challenges

WASHINGTON TREE FRUIT RESEARCH COMMISSION

How would you clean and sanitize this area?

Identification of challenges

Sanitation

- More attention to detail
- Avoid standing water
- Cleaning of zones with food contact every day, very accurately

New packinglines wishlist

- Drains accessible for cleaning
- Good lighting
- High ceiling
- Adequate handwashing facilities
- Clean-in-place equipment
- Adequate water supply

Great stuff!!!!

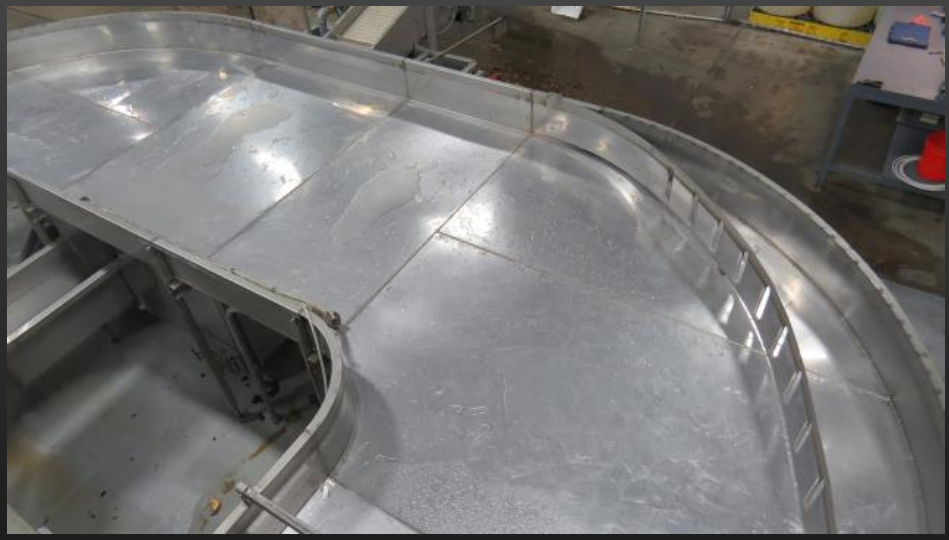
Dry floors with minimum organic matter at the end of the shift!

Adjustments

New material

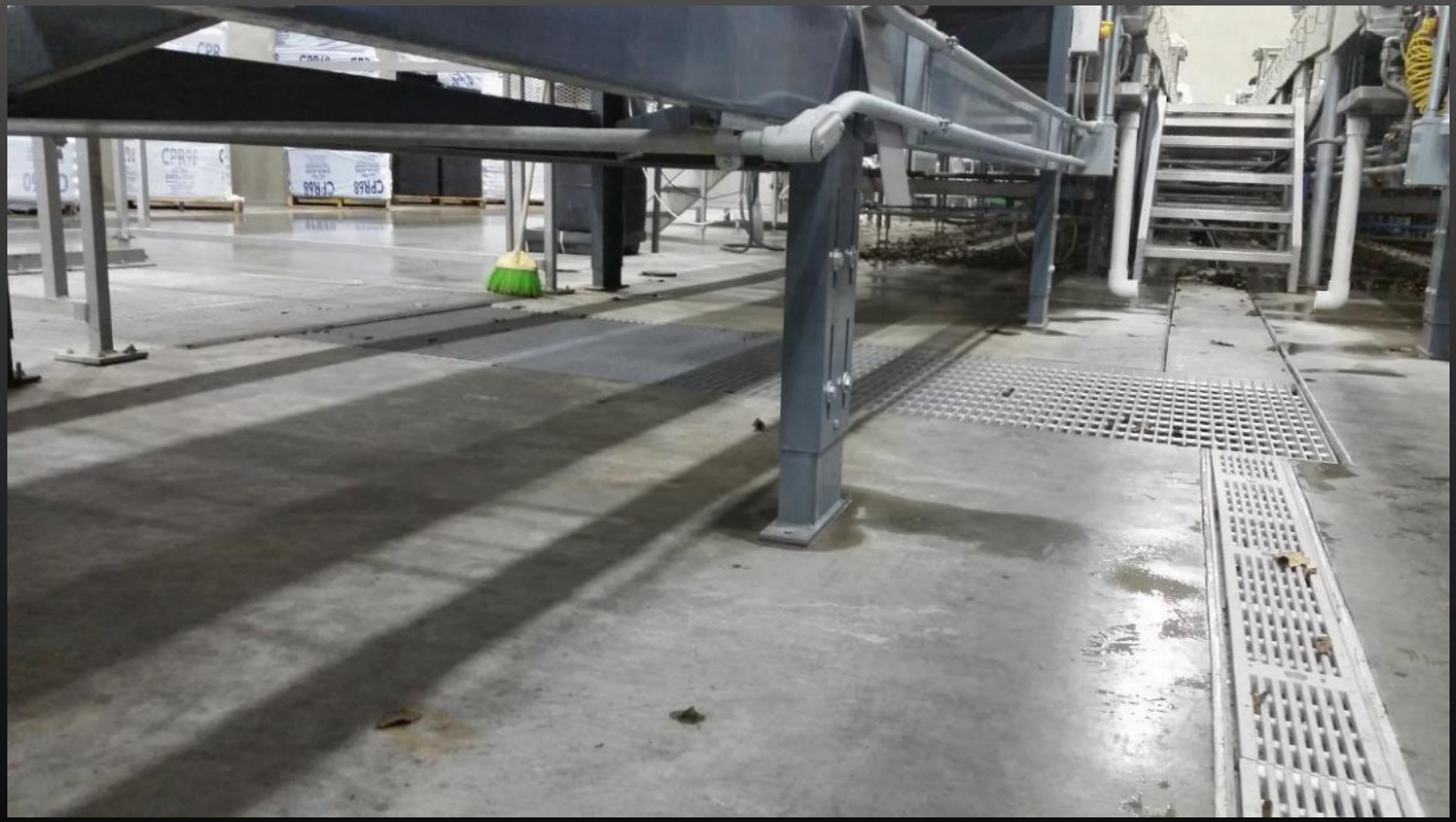
Brush cleaning

Dumptank

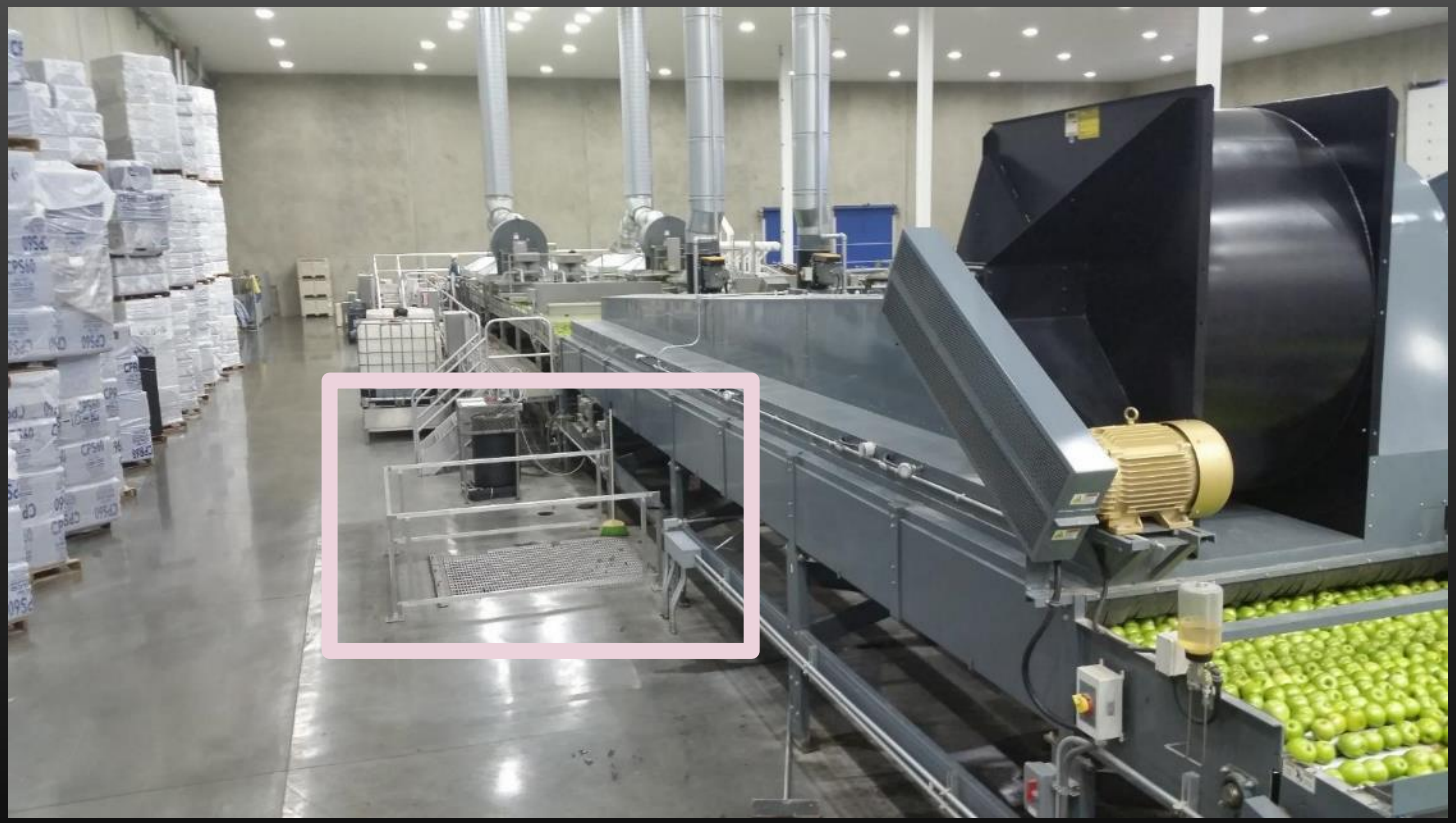


Drains

Accessible Drains!



Accessible Drains!



Does everybody know what to do with a wet mouse?

Great Stuff!!!! if they would hang bristle down

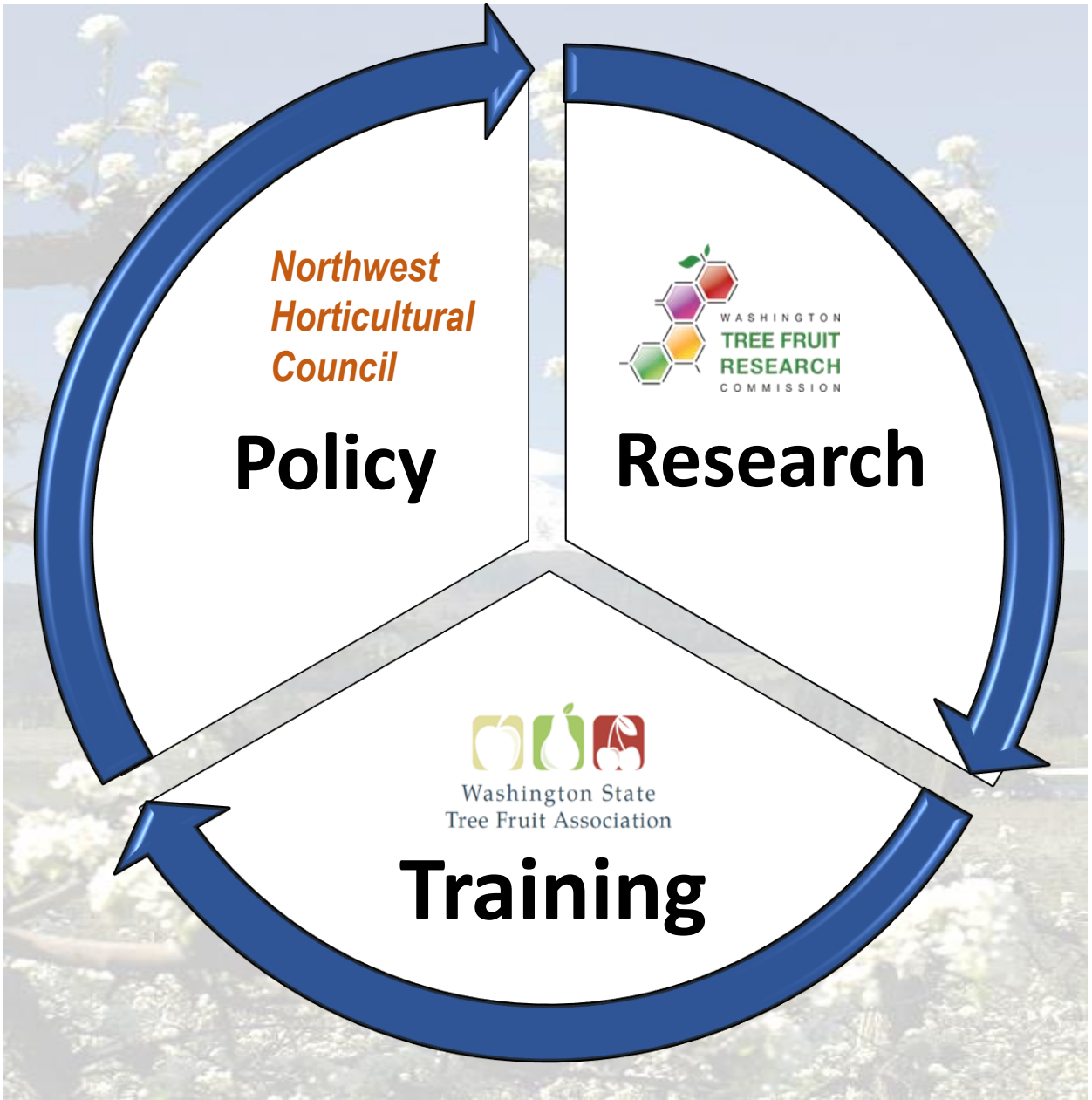
Where are the risks?

Incoming product

Environment

People

Industry Organizations working together



The Team

Ines Hanrahan

WASHINGTON TREE FRUIT RESEARCH COMMISSION

Northwest Horticultural Council

Laura Grunenfelder

Washington State Tree Fruit Association

Jacqui Gordon

Northwest Horticultural Council

Kate Woods

Cleaning and Sanitation Personnel

- Bigger cleaning crews
  - Motivated crew leader (not just a job)
  - Management buy in
- Longer time to clean + master schedule
- Advanced training
- Rewards systems
- Increased pay rates

Key Impacts of Cleaning & Sanitation Workshops

- Facilities opened doors to direct competitors to share their processes and expertise
- Coffee groups
- Expanded/strengthened industry connections
- Continuation of workshop series

WASHINGTON TREE FRUIT RESEARCH COMMISSION

ADDITIONAL TRAINING

2016

FSMA water quality testing

- Where, when to sample
- Surface water
- Piped water
- Sampling equipment

Water sampling done simply

WSU Tree Fruit

Search

Home

Water Sampling Done Simply

PUBLISHED ON JULY 11, 2016 BY TIANNA.DUPONT

By: Melissa L. Partyka-University of California, Davis, Western Center for Food Safety; Ronald F. Bond-University of California, Davis, Western Center for Food Safety; Ines Hanrahan-Washington Tree Fruit Research Commission, Union Gap, WA

This document is meant to provide simple, easy to follow recommendations for water quality sampling under the FSMA Produce Safety Rule for Agricultural Water testing. The methods described here are not meant to be prescriptive, as there are many ways to take a water sample, but represent best practices used by researchers at the Western Center for Food Safety, and FDA Center of Excellence at UC- Davis. Guidance documents from FDA regarding water sampling are expected soon, and this document will be adjusted, should FDA recommendations be different from what has been described herein.

Printable version. Water sampling made simple.

Safety First

Whether you are sampling open water sources (e.g. rivers, canals and ponds) or piped sources, there are some simple techniques that will keep you safe from dangerous situations and protect the integrity of your samples:

Figure 1. Ideal sampling point low bridge, cut grass, away from eddying point. Photo credit WTFRC.

Know your sample site

It's always best to do some reconnaissance near your water source to determine the easiest access point and potential hazards. It's a good idea to remove any obstacles that will hamper your ability to get a clean, representative sample. For example, if you're sampling a canal, high grass, or dense brush should be trimmed or removed at your access point (**Figure 1**). Avoid areas of the canal that are under maintenance and look for signs of wildlife (i.e. avoid the rattlesnake den!).

For piped water sites, make sure there is an obvious sample point, such as a valve or spigot, and avoid using old garden hoses that can harbor bacteria (**Figure 2**).

It's also a good idea to clear vegetation and insect nests away from your sampling point since it's hard to take a clean sample when standing on an ant mound or shoving aside thistles.

Figure 2. Garden

Maintain your sample site

You are likely to be sampling this source of water for years to come, so take the time to keep your site maintained and easy to access. If you're sampling from an open source, keep an eye out for algae growth (Figure 3) and fouling near your intake.

Washington State University

Tree Fruit
Upcoming Events
About
Varieties & Breeding
Crop Protection
Orchard Management
Postharvest
Economics
Videos
Tools & Resources
Backyard Fruit Trees

ZZUSIS ACCESS POLICIES ©

DAS
AgWeatherNet

UPCOMING EVENTS

WA 38 & WA 2 Fall Field Visit – Quincy & Rock Island
September 22 @ 10:00 am - 12:30 pm

Orchard Floor Management – Organic Intensive Workshop
October 11 @ 8:30 am - 4:30 pm

View All Events

Supported by the WSU Tree Fruit Endowment

Washington Tree Fruit Research Commission

WCFS UCDAVIS

Washington Tree Fruit Research Commission

http://treefruit.wsu.edu/news/water-sampling-for-fsma-compliance-done-simply/

Cleaning and sanitation workshops

- Classroom + hands-on portion
- Cherry line: drains, sorting tables, belts, dump tank
- Spanish translation

Environmental monitoring workshop

- Train food safety leaders
- Verification of cleaning and sanitation practices
- Classroom + hands-on demonstrations

WASHINGTON TREE FRUIT RESEARCH COMMISSION

RESEARCH

Can we continue to use overhead evaporative cooling?

Ines Hanrahan

Washington Tree Fruit Research Commission

Study Design

	2014			2015			2016		
	Gala	Golden	Fuji	Gala	Golden	Fuji	Gala	Golden	Fuji
Mature Fruit	X			X	X	X	X	X	X
Immature Fruit		X		X	X				
Location(s)/tree architecture						X			X
Misting system						X			X
Fruit position									
top/bottom	X	X					X	X	
top/bottom inside/bottom outside				X	X	X			
old trees (full sun vs. full shade)									X
Lower inoculum level (3-4 log)							X	X	X

note rain events around inoculation time

How to best track and manage *Listeria sp.* in cold storage

Lauren Walter, WSU

Ines Hanrahan, WTFRC

Assessment of Apple Packing for *Listeria* Risk

Funded out of cycle in March 2015 to address immediate industry need

Ines Hanrahan

In collaboration with Karen Killinger, Trevor Suslow, and multiple industry partners

Goals

Understand environmental sources of *Listeria* contamination

Determine accuracy of commonly used test kits for *Listeria* detection

Determine harborage sites in cold storage facilities

Document the impact of cleaning practices for cold rooms

Normal vs. Aggressive Cleaning

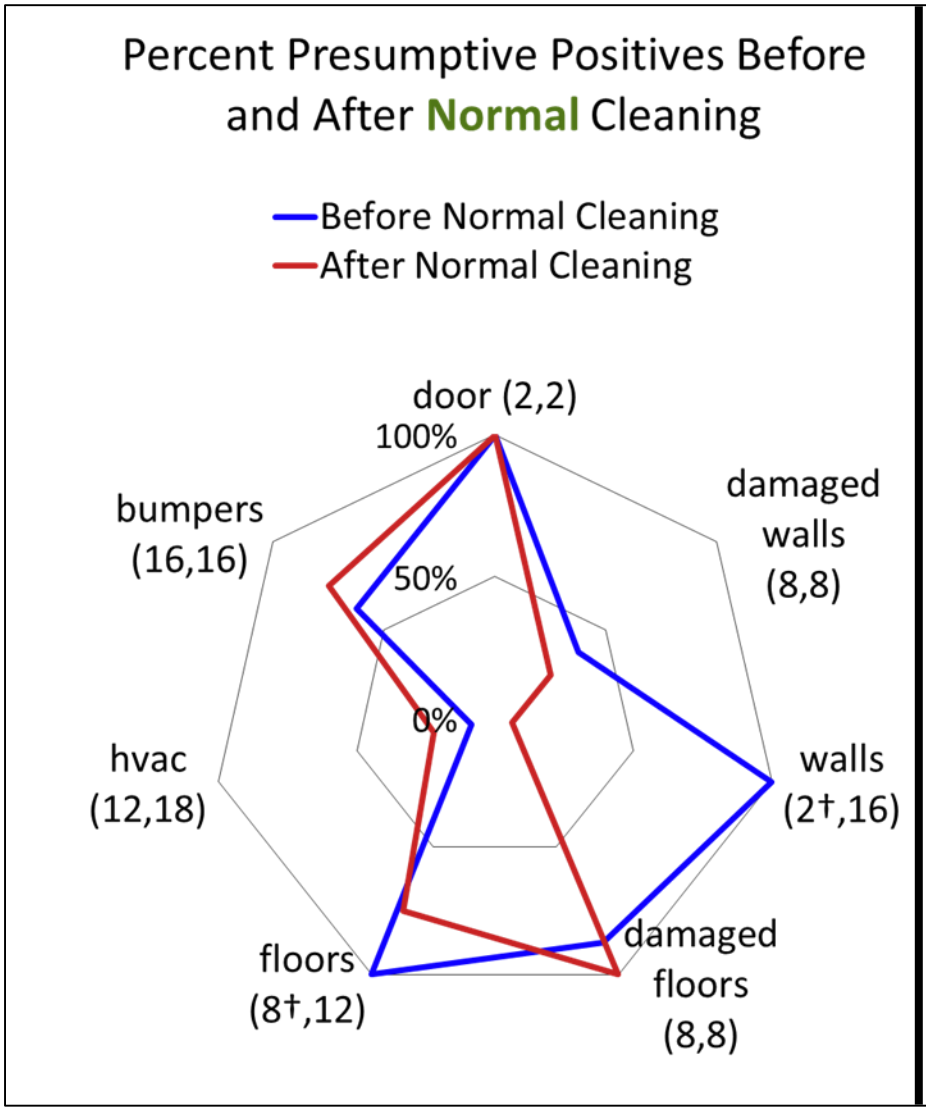
Normal

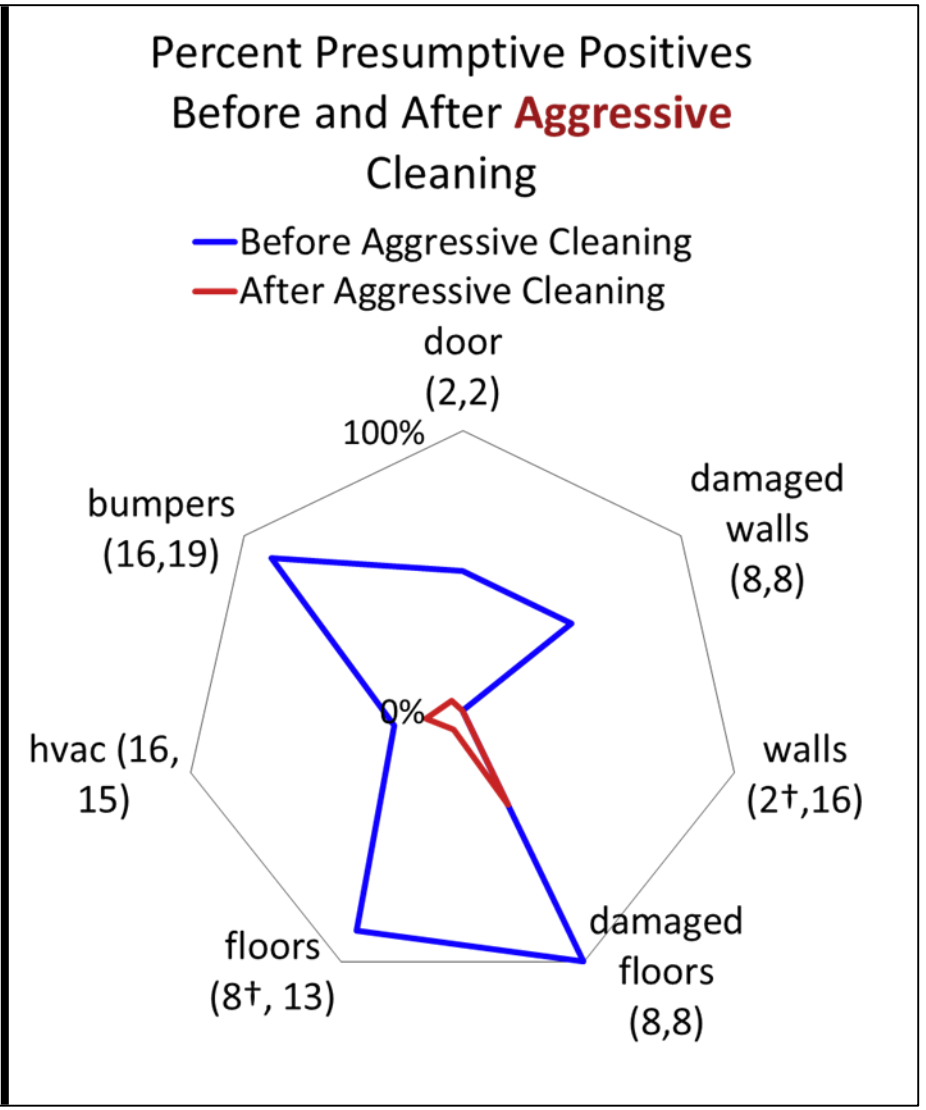
- Full clean with untreated pressurized water
- Full clean on coils, pans, and cones
- Walls and ceiling scrubbed with brushes and pressure washer
- Floor dried with squeegee vacuum
- Chemical fogger used for about 2 hours (SaniDate 5.0 (PAA + Hydrogen Peroxide) and the PACE Fogger)
  - *Fans on, cooling off, doors closed*

Aggressive

- Chlorinated pressure wash of all sections (pH 6.5, 200ppm, sodium hypochlorite)
- Full clean of coils, pans, and cones
- Scrubbed walls and parts of ceiling with brushes and pressure washer
- Floors rinsed with chlorinated water and scrubbed with brushes, dried using squeegee vacuum

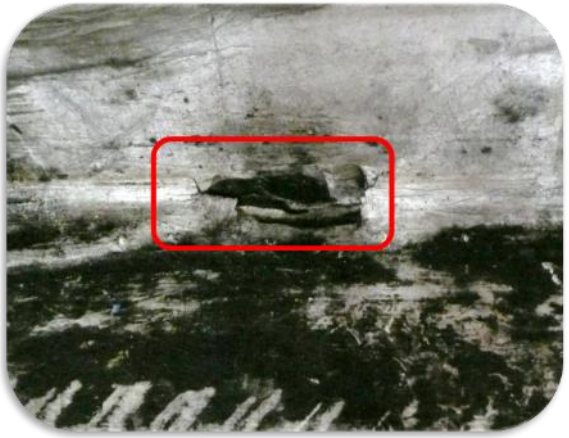
Comparison of cleaning methods





Before Cleaning

Cleaning Equipment



After Cleaning

Summary – Examination of cleaning methods for cold storage rooms

Aggressive cleaning and sanitizing was necessary to reduce risk of *Listeria spp.* contamination

After normal cleaning, **damaged floors and walls (hard-to-clean-areas),** remained positive *Listeria spp.* and could serve as sources of contamination

Regular maintenance such as for damaged floors is important to limit harborage sites

Cleaning devices (floor scrubber) were positive *Listeria spp.* and could serve as sources of contamination

Maintaining cleaning equipment to prevent devices from becoming a source of contamination is important

PRACTICAL TIPS

Preharvest

How do we control pathogens?

Contamination	Proliferation	Survival

Bathrooms and handwashing

Bathrooms and handwashing

Bathrooms and handwashing

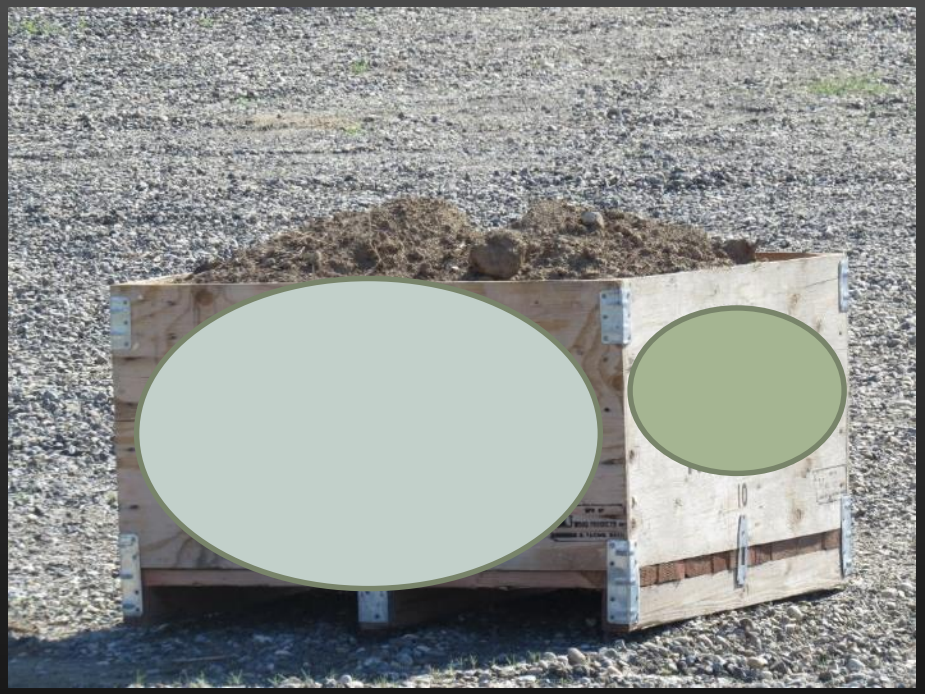
Make it easy to do the right thing!

Cause and Effect

Cause and Effect

Water Source

Bins



WASHINGTON TREE FRUIT RESEARCH COMMISSION

Bins

Bins

Bins

Remember, you can always reach out and ask an expert

Trevor Suslow, UC Davis

Key Learnings

- Don’t wait for an outbreak to get organized
- Work together on all levels
- Research answers insufficient: creating insecurity and delay active approach
    - Missing methodology/clear guidance
    - Limited ‘practical’ research
- Dealing with snake oils
- Food safety is not a marketing tool
    - we are all in this together, non-competitive

WASHINGTON TREE FRUIT RESEARCH COMMISSION


Kai Hanrahan, 2.5 years old

Acknowledgement

- Assistance in preparation of talk
  - Kate Woods, Laura Grunenfelder, Jacqui Gordon
- Collaborators in studies
  - WSU: Karen Killinger, Meijun Zhu
  - UC Davis: Trevor Suslow
- Industry groups
  - Northwest Horticultural Council
  - Washington State Tree Fruit Association
- Students and summer interns

Ines Hanrahan

Project Manager, WTFRC

hanrahan@treefruitresearch.com

509-669 0267