

## Postharvest Water

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### Water Quality Criteria for Harvest and Postharvest

- Water must be tested and have no detectable generic *E. coli* per 100 mL sample
  - Contact with produce during or after harvest
  - Contact with food contact surfaces
  - To make ice
  - For handwashing
  - Rinsing/ washing
  - Sanitation
- Untreated surface water must not be used for these purposes



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### All "Post Harvest Water" Must Be free of

**Detectable generic e-coli per 100 ml of water**

#### PRODUCE RULE WATER TEST REQUIREMENTS

Public Water – Treated	Copy of test results or current certificate of compliance
Ground Water – Untreated	1 <sup>st</sup> year: 4 times within the year then 1 or more per year
Surface Water – Untreated	Do not use for postharvest

- Where to take the sample
- Keep records of test results



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FDA will begin enforcement for harvest and post-harvest agricultural water

Business Size	Water Enforcement Dates
All other businesses (>\$500K)	January 26, 2023
Small businesses (>\$250K-500K)	January 26, 2024
Very small businesses (>\$25K-250K)	January 26, 2025

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### Where To Get Water Tested

- Be certain the lab can provide the test you need
  - Analysis using a method accepted by FDA
  - Upper limit high enough to get a number to calculate GM and STV, when needed (production water)
- Be sure the lab provides sampling instructions
  - Labs should provide instructions for acceptable sampling containers, hold times, storing, and transport expectations

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### Postharvest Water

#### If Generic E. Coli Is Detected:

Stop using the water source until:

- You re-inspect your water distribution system to see if you can determine what's wrong
- Rectify it
- Test: verify that your action was effective to bring the water back under the threshold
- Repeat 4 test in a year

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### Minimize The Potential For Contamination

- Pathogens may be introduced by:
  - Worker's hands
  - Other produce
  - Water
  - Food Contact Surfaces
- Anything that comes in contact with produce could result in cross-contamination including:
  - Worker's hands
  - Worker clothing
  - Produce containers
  - Packing tables, conveyor belts
  - Water
  - Tools



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**ZONE Management**

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### RISK ASSESSMENT WASHING PRODUCE

**Wash systems need to be evaluated for food safety risk. Farms may change their practices as a result.**

#### DUNK TANKS INCREASE RISK

- Pathogens can **transfer** from product to product
- Pathogens can **be imbibed**
  - Depth
  - Length of time
  - Temperature difference
  - Type of crop
  - Produce wounding
  - Maturation of produce



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**Infiltration is particularly likely to occur in apples, melons, peppers, and spinach.**

**Minimize infiltration by controlling factors that affect the process:**

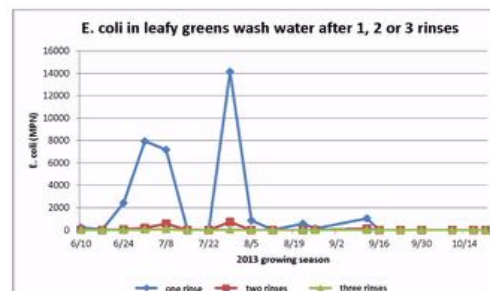
- Minimize the amount of time warm produce spends in cold dunk tank water
- Avoid deep dunk tanks
- Pre-cool produce using methods other than dunk tanks.



**Use a sanitizer!**

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### Risk of Using Dunk Tanks



**Do Not Interpret This Research To Mean That Pathogens Can Be Washed Off Of Produce!**

-- Vern Grubinger – University of Vermont

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# Why do we use water?

Clean

Cool

Crisp

Is there a way to accomplish our goals without dunk tanks?

If there is a food safety consequence, it trumps cleaning, cooling, and crisping

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A person wearing a purple shirt and a yellow apron is harvesting green leafy vegetables, possibly kale, in a field. They are wearing a straw hat and are focused on the task.

Zone 1 — Produce and Contact Surfaces

Zone 2 — Areas and surfaces that can easily contaminate Zone 1

Zone 3 — Areas and materials in area, but less likely to contaminate

Zone 4 — Outside or adjacent to produce area

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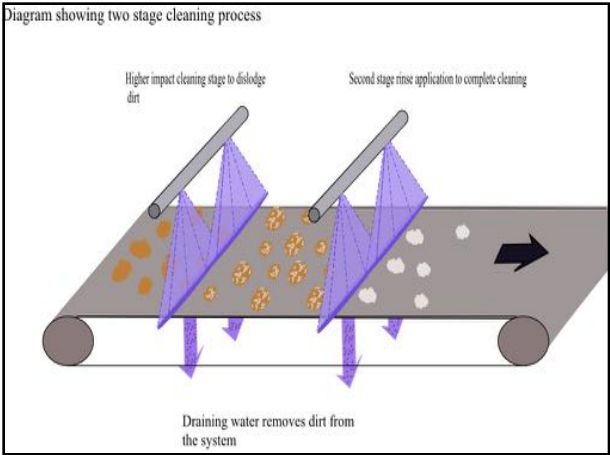
ways to avoid dunk tanks

A person wearing a yellow apron is using a high-pressure hose to clean a metal grate. The grate is part of a larger piece of equipment, and the person is standing next to it.

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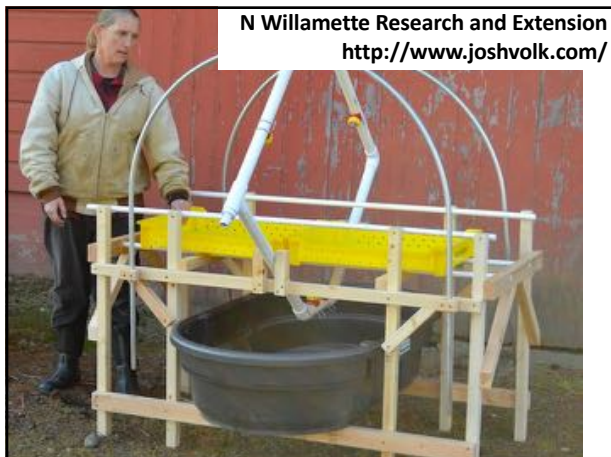


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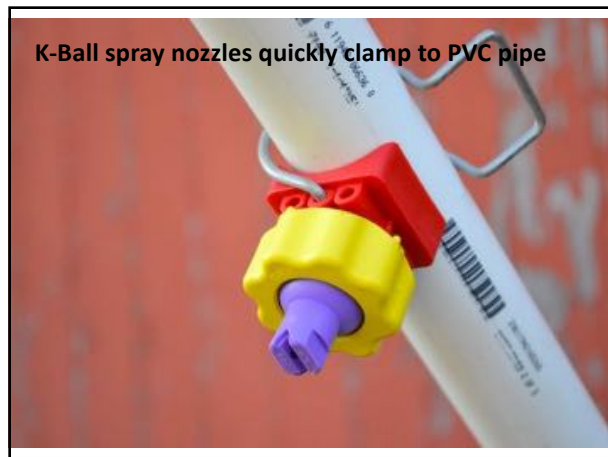


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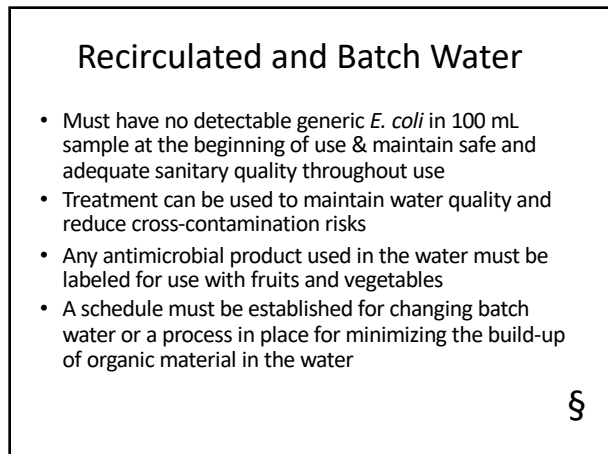
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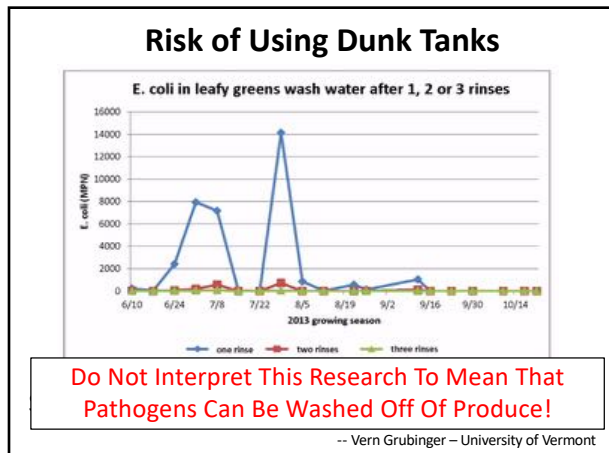
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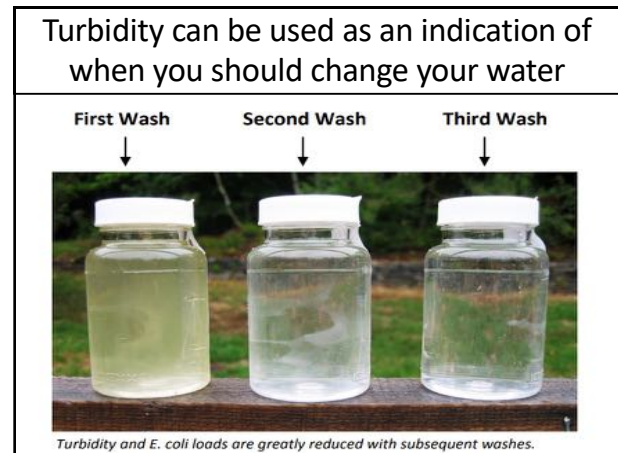
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### When Should I Change My Water?

- Post-harvest water must be managed, including changing water when necessary
- Water changing schedules should consider:
  - Organic load (soil, leaves, decaying or damaged product)
  - Turbidity measurements
  - Volume of produce
  - Type of produce
  - Product flow and operating conditions
  - Type of antimicrobial product
  - Type of equipment

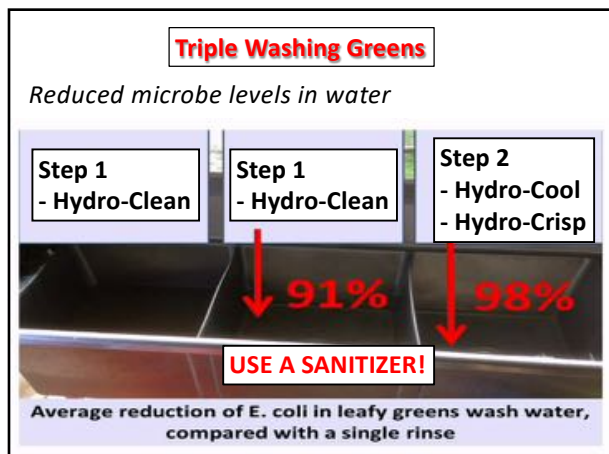
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### Still PLAN To Use A Dunk Tank?

1. Clean and sanitize the container before and after use
2. Use water that is tested free of generic e-coli.
3. Change water at a frequency sufficient to ensure that it is of appropriate microbial quality
4. Use a water sanitizer

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What Do You Want To Improve?



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### NEED ANOTHER REASON NOT TO DUNK?

must **maintain and monitor** the temperature of **water** at a temperature that is appropriate for the **commodity and operation (considering the time and depth of submersion)** and is adequate to minimize the potential for infiltration of microorganisms . . .



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Poll: Instruments or controls you use to measure, regulate, or record temperatures, pH, sanitizer efficacy or other conditions, in order to control or prevent the growth of microorganisms of public health significance, must be:

1. Accurate and precise as necessary;
2. Adequately maintained; and
3. Adequate in number for their designated uses
4. All of the above



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### Sanitizer: Goal, Prevent Cross Contamination

**Sanitizers Treat The Water Not The Produce!**



- Reduces item to item transfer
- Reduces risk of pathogen infiltration
- + Reduces plant pathogens that affect shelf life

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### Sanitizers For Fresh Produce Washing



	Rinse Required	pH Control	NOP Allowed	Use
Tsunami™ (Ecolab)	NO	NO	YES	Produce only
StorOx (BioSafe)	NO	NO	YES	Produce & contact
SaniDate (BioSafe)	NO	NO	YES	Produce & contact

#### BENEFITS of peroxide based cleaners:

- No taste residue
- No dumping restrictions, environmentally responsible
- Less affected by organic matter than chloride
- Effective against microorganisms that affect shelf-life


Chlorine Bleach	YES	YES	YES	Produce & contact
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Sanitizer must be labeled for contact with product – Read the label  
Download process, UC Davis, IA State, U of M, Penn State

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## Turbidity Interferes with Chlorine Dose and Microbial Control Goals



The image displays five identical square-shaped bottles with black caps, arranged in a row. Each bottle contains water of a different level of turbidity, corresponding to the values 0, 15, 150, 300, and 3000 NTU. The water starts as clear at 0 NTU and becomes progressively more opaque and yellowish-brown as the turbidity increases.

0 15 150 300 3000

**FAU = NTU**

The unit of measure for water clarity (dissolved and suspended solids)

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[illegible]

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## Use Sanitizer According To The Label And Test



The main image shows a person wearing a blue hairnet and white gloves, working in a food processing facility. They are holding a small white test strip over a large metal tank filled with water and colorful vegetables (peppers, tomatoes). An inset image shows a 'Sani Safe' sanitizer test strip with a color scale from 10 to 200 ppm. The strip is labeled 'Sani Safe Chlorine Sanitizer Test Paper', 'FEMA', 'Famlok Machine Packaged', and 'No. 81118'. The scale has markings for 10, 50, 100, and 200 ppm.

- Test strips: Correct Concentration. Record.
- Efficacy decreases with time dirt.
- Discard and change water as needed.


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Spray use water can also benefit from sanitizer.

Sanitizer is not required by the Produce Rule. Many Audits require

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## SOP For Sanitizer Use




**EXCEPT Don't Use Sanidate with Fresh Snap Peas: Causes Bronzing**

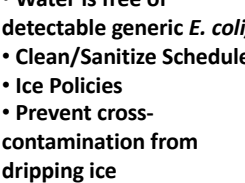
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## Ice Cooling

- Water is free of detectable generic *E. coli*/
- Clean/Sanitize Schedule
- Ice Policies
- Prevent cross-contamination from dripping ice



The image shows a white chest freezer with its lid open, revealing a red bucket inside. Below the freezer, several cardboard boxes are stacked, some containing ice and others containing produce. The boxes are labeled 'CABBAGE' and 'ICE'. The setup is used for cooling produce.



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### SOPs for Postharvest Water Management

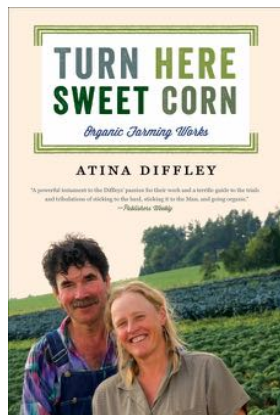
- Monitoring and adding antimicrobial product
- Monitoring and modifying pH
- Monitoring water and produce temperatures
- Monitoring turbidity and changing/adding water
- Calibrating thermometers and sensors

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### Take Away Action Steps

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**THANK-YOU**



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