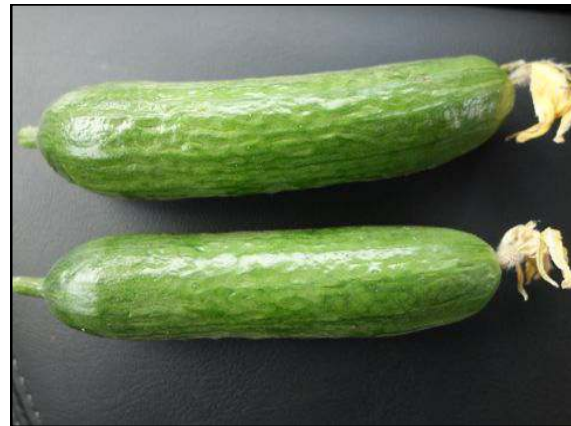




**Cleaning and Drying**

***2<sup>nd</sup> Step In The Cold Chain***

<ol style="list-style-type: none"> <li>1. All produce should be <u>clean</u> when sent to market.</li> <li>2. Clean: Visually free of dust, dirt, soil, and other debris.</li> <li>3. Page 62</li> </ol>	<p><b>Cleaning Options</b></p> <ul style="list-style-type: none"> <li>• Do Not Wash</li> <li>• Dry Brushing</li> <li>• Water Tank</li> <li>• Water Spraying</li> <li>• Wet Brush</li> <li>• Mechanical Washers</li> </ul>
--	---





### WASHING PRODUCE

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

**Food Safety and Water**

- Pathogens can transfer from product to product
- Pathogens can be imbibed
  - Depth
  - Length of time
  - Temperature



DUNK TANKS INCREASE THE RISK



### All "Post Harvest Water"

No detectable e-coli per 100 ml of water

Test for total generic coliforms test, (nitrites and nitrates)


**FSMA Produce Rule**

Ground: 4 times a year base, then once a year

Municipal: Request municipal records?

Untreated Surface: Do not use for postharvest

- Test close to end use
- Keep records of results



### Postharvest Water MUST Test Free of Generic E.coli

- washing hands during and after harvest
- on food-contact surfaces and ice for post harvest
- used to directly contact produce during or after harvest
- used for sprout production
- for agricultural tea










Water for these uses may not be from untreated surface water

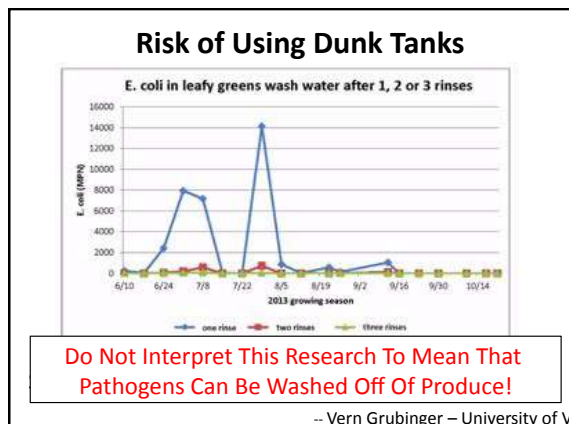
## Why do we use water?

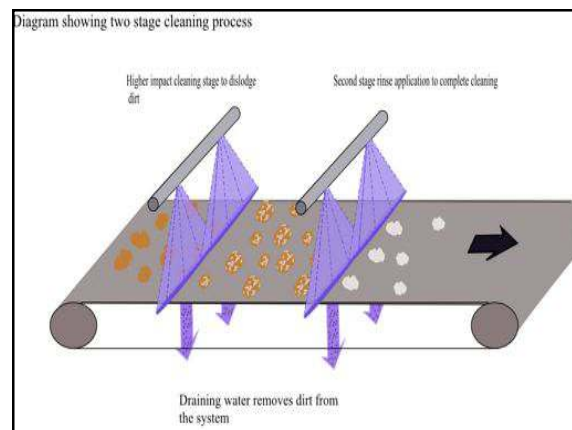
Clean  
Cool  
Crisp

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



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



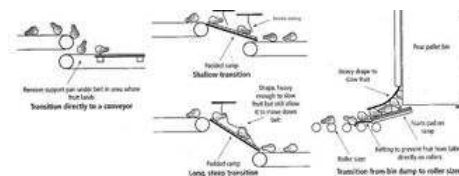


*cucumbers - winter squash - peppers - potatoes - melons*



### Roeters Farm Implement

**AZS Brusher Equipment 821 Crooked Ln, Ephrata, PA 17522  
717-733-2584**



Lu Yoder <bravelittleship@gmail.com>

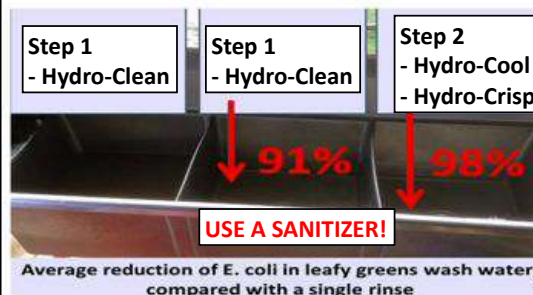


387# per hour  
158# by hand  
--Veggie  
Compass

### For Root Crops A Barrel Washer Can Be A Good Option

## Triple Washing Greens

*Reduced microbe levels in water*





**Prevent The Need To Crisp**

- Harvest crop that is well hydrated
- Harvest when crop is cool
- Quickly move crop to cooling and cold storage

**Still Need To Crisp?**

- Clean and sanitize the sink or container first
- Use water supplies that meet drinking water standards for crisping
- Change water at a frequency sufficient to ensure that it is of appropriate microbial quality
- Use a water sanitizer



**ZONE Management**

**FDA** **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 . . .

**Harmonized GAP and Water Temperature**  
*For crops that have research and published guidance.*

**Sanitizer: Goal, Prevent Cross Contamination**

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

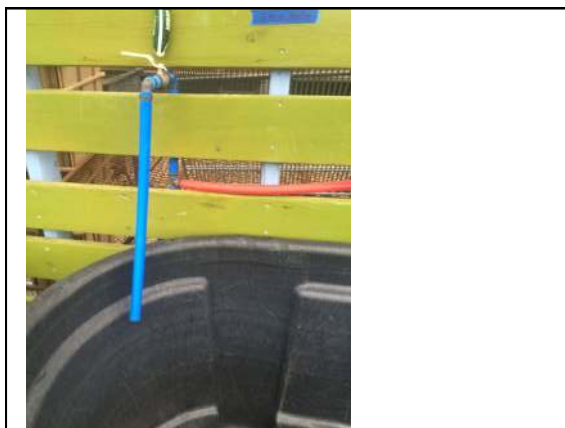
- Reduces item to item transfer
- Reduces risk of pathogen infiltration
- + Reduces plant pathogens that affect shelf life

Sanitizers For Fresh Produce				
	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
<b>BENEFITS of peroxide based cleaners:</b> <ul style="list-style-type: none"> <li>• No taste residue</li> <li>• No dumping restrictions, environmentally responsible</li> <li>• Less affected by organic matter than chloride</li> <li>• <u>Effective against microorganisms that affect shelf-life</u></li> </ul>				
Chlorine Bleach	YES	YES	YES	Produce & contact
<b>Sanitizer must be labeled for contact with product – Read the label</b> Download process, UC Davis, IA State, U of M, Penn State				

**Use Anti-Microbial According To The Label And Test**



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

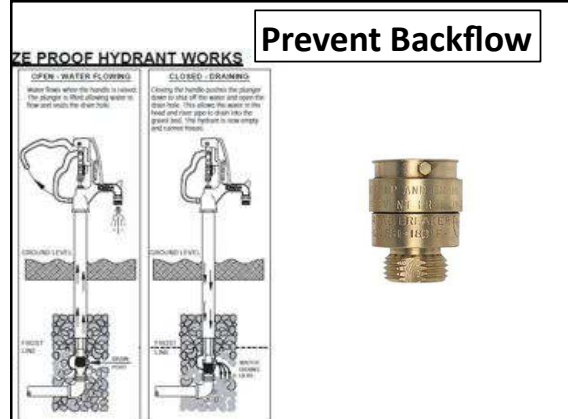


**Prevent Backflow**

**SIZE PROOF HYDRANT WORKS**

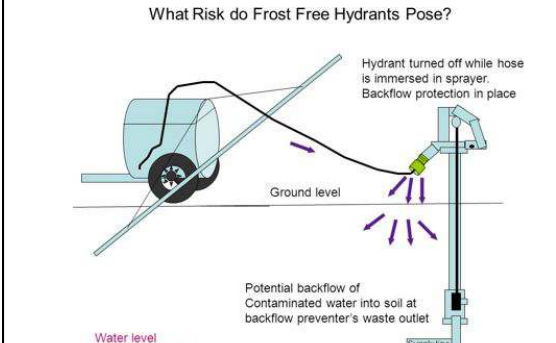
**OPEN - WATER FLOWING**  
Water flows when the handle is raised. The plunger is lifted, allowing water to flow and reach the spray nozzle.

**CLOSED - DRAINING**  
Closing the handle causes the plunger down to stop the water and open the upper hole. This allows the water in the hose and gun pipe to drain into the ground hole. The hydrant is now empty and cannot backflow.

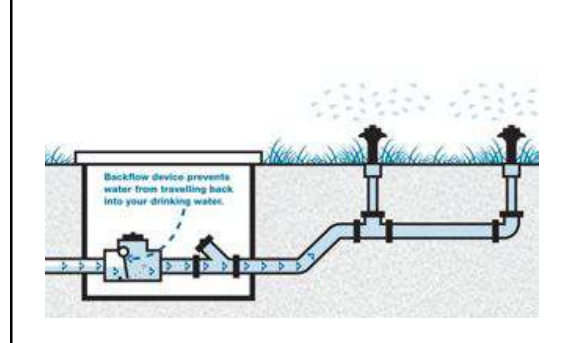


**DO YOU NEED DESIGNATED HOSES FOR POSTHARVEST?**

**What Risk do Frost Free Hydrants Pose?**



**Prevent Backflow**





**Minimize The Potential For Contamination**

- **Wear clean outer garments.**
  - Change clothing or don aprons if coming from the field.
- **Maintain personal cleanliness.**
- **Wash hands thoroughly:**
  - Before starting work.
  - After each absence from work station.
  - At any time when hands become soiled.

**ways to avoid dunking**

## COOLING

### 3<sup>rd</sup> step in Cold Chain

CROP	Harvest Quality	Cooling Method	Respiration Rate	ICED	Cool To Store Temp
Apples,		R, F, H	low		32-38
Asparagus	bracts at tip closed	H, I	extremely high	YES	35
Basil	fresh, tender leaves		high	NO	50
Beans, snap	seeds developed, plump	R, F, H	very high	NO	41-46
Beans, lima	crisp pods, seeds immature	R, F, H	high	NO	41-43
Beets, bunched	crisp fresh leaves	H, I	high	YES	32
Beets, root	firm, deep red roots	R	moderate	Can	33-36
Blackberries	full color, sweet	R, F	high	NO	32

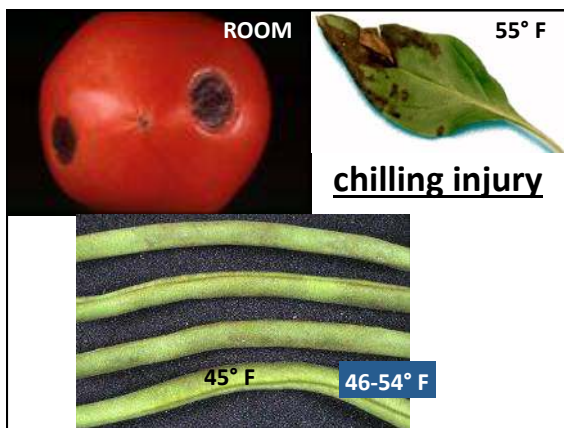
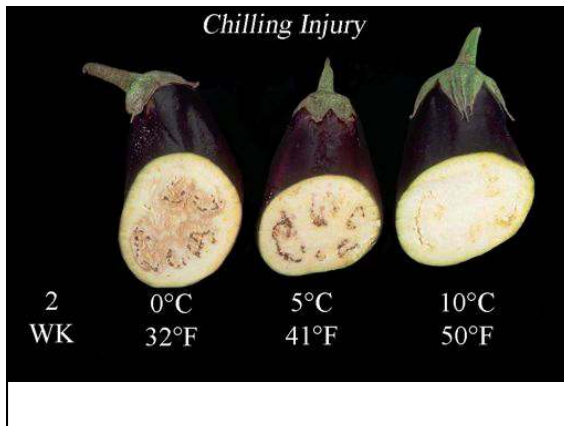


Full table available in the Wholesale Success Manual. [WholesaleSuccess.org](http://WholesaleSuccess.org)

**Cool Produce to the Core!**

**Immediately removing field heat is KEY to extending shelf life!**





**Options for Cooling**

	Room Cooling	Forced-Air	Hydro Cool	Water Spray	Ice
Cooling Time (Hours)	20 to 100	1 to 10	.1 to 1.0	0.3 to 2.0	0.1 to 0.3
Water Contact	No	No	Yes		

**Combination**

The image shows three different cooling methods: a walk-in cooler, a forced-air cooling unit, and a water spray system.

**Room Cooling**

- Not fast enough for High respiration crops
- May be OK for chilling sensitive crops.
- May be OK if crops are harvested cool.

**Low cost, but very slow**

The image shows two types of room cooling equipment: a walk-in cooler and a semi-trailer.

**Air Flow is CRUCIAL in the Cooling Process**

Fans should move cold air through the room.

The image includes a diagram showing air flow through a cooling system and two photographs of cooling equipment: a walk-in cooler and a semi-trailer.

