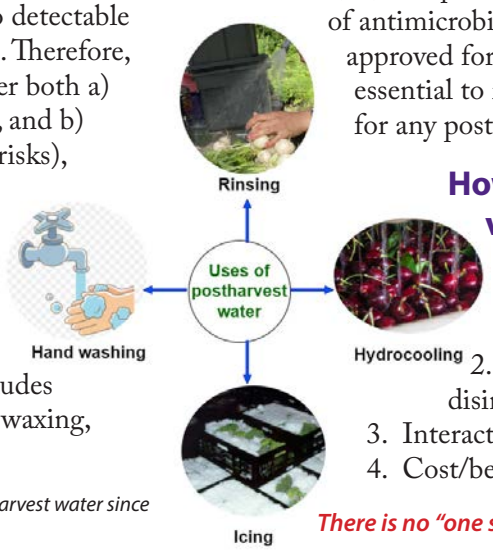
QUICK REFERENCE GUIDE

Approaches for Treating Ag Water for Postharvest Use

The Food Safety Modernization Act (FSMA) Produce Safety Rule specifies that all agricultural water must be safe and of adequate sanitary quality for its intended use. For postharvest water, this means no detectable generic *E. coli* in a 100 mL water sample. Therefore, managing the quality of postharvest water both a) at the start of use (ensure potable water), and b) during use (reduce cross-contamination risks), using physical or chemical treatments, is very important to reduce contamination risks.

Postharvest water is any water that contacts fresh produce or food contact surfaces during or after harvest. This includes water used for rinsing, washing, cooling, waxing, icing, or moving fruits and vegetables.

Note: Water used for hand washing also counts as postharvest water since it can potentially contact the produce surface.



How do you treat your postharvest water?

There are several ways to treat postharvest water. Chlorine (Cl) and peroxyacetic acid (PAA) are two examples of antimicrobial pesticide products that have been approved for postharvest water treatment. It is essential to read and follow product label directions for any postharvest treatments.

How do you decide the best intervention for your operation?

1. Disinfection volume (how much water needs to be treated and the flow rate of the system)
2. Contact time (time needed for the disinfectant to work)
3. Interaction with organic matter
4. Cost/benefit of the available options

There is no "one size fits all" selection for ag water treatment!

What are chlorine and PAA and how do they work?

Chlorine: Chlorine is a strong oxidizer and reacts with other compounds in the source water, including pathogens.

Advantages

- Cost-effective.
- Available in powder, liquid, and gas.
- Longest historical use to disinfect water.
- Effective in preventing plant pathogens.

Disadvantages

- Formation of by-products, including chlorine gas, which can be harmful to those working nearby.
- Irritable and toxic at high concentrations.
- Efficacy affected by pH and the presence of organic matter in water.
- Need to ensure that available chlorine level is adequate, not just total chlorine level.

Chlorine can be corrosive to certain materials; for instance, stainless steel

PAA is widely used in postharvest washing to prevent microbial cross-contamination in produce.

Advantages

- Widely used in postharvest washing.
- More resilient to organic matter compared to chlorine.
- Greater activity in the presence of organic material and inorganic soils.
- Non-corrosive.

Disadvantages

- More costly than chlorine.
- Irritative to the skin at high temperatures.
- Strong vinegar-like smell.

Factors affecting the efficacy of chlorine and PAA *(note: must follow product label directions)*

- Water pH
- Cl and PAA concentration
- Contact time
- Organic matter in the water
- Water temperature

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ksre.k-state.edu/foodsafety/produce/index.html

QUICK REFERENCE GUIDE

How to use chlorine and PAA to sanitize your postharvest water

How to adjust the treatment parameters

Monitoring pH:

- pH can be monitored by pH test strips, pH meters, and/or titration kits.
- pH should be adjusted to be within the parameters listed on the label.
- To reduce the pH, add food-grade acids like sodium bisulfate or citric acid; to increase the pH, add a base such as sodium carbonate or sodium hydroxide.
- pH adjustment kits are available.

Turbidity:

- Turbidity is the level of cloudiness in water. It can be used as an indicator of when to change your postharvest water.
- Turbidity can be monitored visually or by using the Secchi method.
- Turbidity can affect the treatment efficacy, so may need to add more sanitizer to keep the effectiveness.

Temperature:

- Large temperature differences between the post-harvest water and the produce may cause infiltration of micro-organisms to occur.
- Use properly calibrated thermometers to monitor the water temperature.
- Ensure water temperature on product label is followed.
- Chemical activity slows as the temperature drops, so it needs more contact time.

If water temperature is too high and pH is too low, toxic chlorine may "off gas" and can be hazardous for humans.

Primary things to consider when using chlorine and PAA in postharvest water

- Follow label directions for the following parameters: temperature; pH; contact time; product concentration.

Follow all label instructions when using any disinfectant products.

Things to consider to ensure the safety of postharvest water

- Avoid water contact with harvested produce, unless necessary.
- Single pass water use is generally safer than batch or multiple pass water use.
- Start with clean water; water must have no detectable generic *E. coli* in a 100 mL water sample.
- Best practice: treat water with sanitizers or in some other way to maintain water quality during use and to prevent biofilm formation.
- Change batch tank water regularly.
- Make sure the water temperature is appropriate to avoid infiltration.
- Always monitor the water pH and temperature for the best use of sanitizing products.
- Clean and sanitize tanks/bins and contact surfaces regularly.
- Always empty any used wash water into the appropriate drain.
- If using a sanitizer, ensure that workers are trained to handle the antimicrobial appropriately.
- Record keeping/ log sheet of water treatments is essential.
- Test your water quality regularly, if using a source other than municipal water.

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