

Hello and welcome to Food Safety for Wash/Pack facilities, a training series brought to you by the CCE Cornell Vegetable Program. Implementing food safety practices in wash/pack facilities is critical for ensuring that foodborne pathogens are not introduced or spread as produce is sorted, graded, washed, and packed.

This is Caitlin Tucker, Program Assistant for the Cornell Vegetable Program. Throughout this series, I will walk you through principles of food safety, the ideal wash/pack facility layout, post-harvest water management, cleaning and sanitizing, and tips for cleaning larger washing equipment. Because food safety is a company-wide responsibility, we invite all farm employees to participate in this training.

Here are some highlights from Part 3: Post-Harvest Water Management

- Water quality is critical for preventing the introduction of pathogens of spread.
- Surface water should never be used to wash produce.
- Sanitizers can be used to kill pathogens in wash water and prevent contamination.
- It is **very** important that water temperature, pH, turbidity, and sanitizer levels be regularly monitored to ensure sanitizer effectiveness.
- All of the above variable can help to determine when to change water.
- There is no one right way to wash produce – consider water quality, type of produce being washed, how dirty produce is, sanitizers being used, etc.

Let's begin Part 4: Cleaning and Sanitizing

Objectives for Part 4:

- Highlight why cleaning and sanitizing of wash/pack facilities, including equipment, tools, and other food contact surfaces is important
- Review the difference between cleaning and sanitizing
- Describe the 6 steps of cleaning and sanitizing
- Outline important features of detergents and sanitizers
- Provide suggestions for cleaning bins, tools, tables, work spaces, floors and walls.

Introduction

We know that workers, animals, buildings, equipment, and produce can introduce contamination in the facility. Our goal with cleaning and sanitizing is to keep food borne pathogens from establishing. If you recall from Part 1, Principles of Food Safety, foodborne pathogens, like bacteria can multiply rapidly under the right conditions. Bacteria form densely packed communities, and in order to protect themselves from harsh environmental conditions, they secrete a slimy, glue-like substance, that we call biofilms. This is similar to when you go the dentist for your 6 month cleaning, and have them remove dental plaque due to inadequate brushing and flossing. Dental plaque is a biofilm. Biofilms are particularly concerning in wash/pack facilities because they can be found on living or non-living surfaces. Especially in cracks, crevices, and other harborage points on equipment, and other food contact surfaces that are hard to reach for cleaning and sanitizing.

The removal of dried debris, vegetable matter, soil, and oils with water, detergent and scrubbing can help to reduce the build of biofilms. Because some bacterial cells may still remain after cleaning and scrubbing, it is important to follow up with a sanitizer to reduce the remaining bacterial count.

But what do I mean by cleaning and sanitizing?

The next few slides have been borrowed from the Produce Safety Alliance and effectively describe the difference between cleaning and sanitizing.

Cleaning is defined as the physical removal of dirt (or soil) from surfaces. This may involve the use of clean water and detergent.

Sanitizing is defined as the treatment of a cleaned surface to reduce or eliminate microorganisms, including foodborne pathogens.

It is impossible to sanitize a dirty surface! Cleaning always comes first!

“Wet” Cleaning and Sanitizing

If you use water in your wash/pack line, you should follow the 6 steps of “Wet” Cleaning and Sanitizing.

Step 1: Pre-clean. Remove any obvious dirt and debris from the food contact surface. You may have to use brushes or scrubbers, and water to loosen the debris.

Step 2: Initial rinse. Rinse the surface with water to remove the loosened debris.

Step 3: Clean. Apply an appropriate detergent for food contact surfaces and scrub the surface. The detergent will help to break down oils and biofilms left behind from foodborne pathogens.

Step 4: Post Rinse. Rinse the surface with clean water, making sure to remove all of the detergent and soil.

Step 5: Inspection. Check the equipment, tools, or food contact surface for any remaining soil or residue.

Step 6. Sanitize. Use a sanitizer that is appropriate for use on food contact surfaces. Follow the label instructions. Rinsing may or may not be necessary. Let the surface air dry.

Now that we all understand the concept of cleaning and sanitizing, let’s review practices that can reduce food safety risks on the farm.

Some produce operations do not typically introduce water into their pack lines, such as the dry bulb onion industry, or almond industry. They do not use water to wash or clean produce as this can significantly reduce shelf life as well as introduce post-harvest pathogens that can go on to reduce quality. Nonetheless, these industries should still clean and sanitize their equipment, facilities, and other food contact surfaces in order to comply with the Food Safety Modernization Act or other 3rd party auditing programs. Furthermore, regular cleaning and sanitizing can help to extend the lifespan of wash/pack equipment. This can be done through “Dry” Cleaning and Sanitizing.

“Dry” Cleaning and Sanitizing

The 7 steps of dry cleaning are:

Step 1: Preparation

Gather all of the required tools, detergents, sanitizers, cleaning supplies, personal protective equipment that you’ll need.

Step 2: Secure and Disassemble Equipment

Disassemble equipment as much as needed to adequately clean. Take belts off of conveyors. Equipment that requires wet-cleaning should be transported outside or into an area with a floor drain.

Step 3: Dry Clean

Manually clean with brushes and scrapers, vacuum cleaning with HEPA air filtration, compressed air, pelletized carbon dioxide (CO₂) blasting, sodium bicarbonate blasting, dry or low moisture steam.

If isolated wet cleaning is required for some equipment, verify that the parts are completely dry before re-assembling. Cleaning should always be done from top to bottom, Inside to outside.

Step 4: Detail Clean

Specifically focus in on the harder to reach spaces on equipment including chains, conveyor belts, rollers, axles, brush sets for de-stoner/soil, etc. These areas make take more time to clean. You may need to use flash lights, mirrors, extendable brushes, and so on to adequately reach these areas.

Step 5: Post Inspection and Re-Clean

Verify that all of the soil, dust, debris, etc. has been removed and re-clean areas, if needed.

Step 6: Final Inspection

Inspect the equipment one last time.

Step 7: Sanitize

Use an appropriate sanitizer for the type of equipment you are using. As a reminder, always follow label instructions.

Additional Tools Used in Cleaning

And finally, here are some additional tools that may be helpful in either dry or wet cleaning situations. I won't list all of them, but will say that ladders or extendable tools can help you to reach hard to reach spaces, mirrors, flashlights, or LED drop lights can provide sufficient lighting so that you can tell whether you've adequately cleaned equipment, color coded tools are helpful in separating out tools that should be used for cleaning and sanitizing equipment, vs. floors, vs. bathrooms, vs. trash cans, etc. And finally, Personal Protective Equipment, which may include aprons, goggles, respirators, dust masks, are always important to have on hand to ensure the safety of your employees.

Choosing Detergents

Here are some things to consider when choosing detergents:

- As a reminder detergents are used to soften up dried crud, vegetable oils, and biofilms. You should always check the label to verify that they can be used on food contact surfaces.
- Hard water can affect cleaning action. Hardens in water is caused by the presence of Calcium, Magnesium, and occasionally Iron and Manganese. These minerals can react with soap to form soap film or scum resulting in the soap being hard to rinse away.
- If possible, find detergents that are "low-suds". This will help speeding up the rinsing step.
- And finally, if you a Certified Organic operation, according to USDA guidance on detergents, the cleaning agent itself is not required to be organic. Any cleaner or detergent may be used provided that

the cleaning agent is disclosed in the handler's organic system plan and also meets the Food and Drug Administration's requirements.

Choosing Sanitizers

Some things to consider when choosing sanitizers:

- As a reminder you can't sanitize a dirty surface. Cleaning must always come first.
- Verify that the sanitizer can be used on food contact surfaces and always follow label directions for concentration and application.
- Dedicated hand or pump/backpack sprayers may be used for applying the sanitizer to food contact surfaces and equipment. A spray wand with an adjustable nozzle can be used for getting into tight spaces inside equipment.

Sanitizers for Certified Organic Operations

For Certified organic operations, guidance states that sanitizers merit more scrutiny. Sanitizer residues are not allowed in contact with organic food. **Sanitizers merit more scrutiny.**

The following active ingredients are allowed:

- Hydrogen peroxide
- Ozone
- Peracetic acid/ peroxyacetic acid
- Phosphoric acid
- Potassium hydroxide
- Sodium Hydroxide.
- Chlorine materials may also be used, provided that the manufacturer's instructions are followed with regards to the concentration. There is no requirement that you have to follow the chlorine sanitizer with a water rinse.

Other active sanitizing agents can be used, provided steps are taken to prevent contact with organic food products...acetic acid, ethyl alcohol, isopropyl alcohol, vinegar, quaternary ammonia, to name a few.

Tips for Cleaning Common Tools and Surfaces throughout the Wash/Pack Facility

What Should be Cleaned?

Items that should be regularly cleaned and sanitized include:

- Harvest bins – especially if they have sat on the ground
- Wash tubs, sinks, tanks, greens spinners
- Harvesting tools, equipment
- Cull bins/trash cans
- Shelving for storage of packing material, labels
- Pallets, pallet jacks
- Cold storage units
- Trucks, wagons, other vehicles
- Any other surface that food comes into contact with!!

Create Standard Operating Procedures (SOPS) for Cleaning and Sanitizing

As you begin to think about cleaning and sanitizing, I'd encourage you to strongly consider using Standard Operating Procedures (SOPS)

- Think of SOPS as a "Recipe card" that has simple step by step instructions.
- These should be written with enough detail so that anyone should be able to follow instructions and complete the task.
- It's a good idea to keep SOPS in easy to access areas. This might mean having a binder in the wash/pack facility with all wash/pack facility related SOPS, OR laminating SOPS and placing next to washing tables, handwashing stations, packing tables, etc.
- Keep in mind though, that whenever you change your practices, whether that means using a different sanitizer, using new equipment, etc., you need to take the time and revise your SOPS.

Inventory of Cleaning and Sanitizing Supplies

If you have an "off-season", this would be a good time to take stock of all of the cleaning and sanitizing supplies you have on hand. Perhaps your food safety manager could be in charge of this. You'll want to make sure you have Personal Protective equipment such as gloves, aprons, goggles, or facemasks on hand to protect your employees. An assortment of brushes and scrubbies of different sizes and shapes will come in handy for reaching hard to reach parts of wash/pack equipment. Powerwashers can be useful in removing stuck on vegetable matter or soil. Floor squeegees can be used to direct the flow of water to the facility's drain. Larger barrel fans as well as small clip on fans can aid in drying equipment. And finally, consider using color coded cleaning tools. For example, red tools are used for cleaning cull bins, blue tools are using for cleaning harvest bins, green tools are used for cleaning floors. Distinguishing which tools are used for which purposes can go a long way in reducing cross-contamination. *If workers are color blind, then color coding needs to be altered to fit circumstances – letter codes!*

Powerwashers

I mentioned that powerwashers can be useful for tackling stuck on dirt, vegetable matter, and debris. Here are a few things you should know:

- Powerwashers should only be use outdoors, and not in the wash/pack facility. If used inside the building, there is a risk that the water will spray a fine mist of contaminants throughout the building.
- Electric power washers are good for smaller, light duty jobs, they should have a pressure, or PSI (pounds per square inch) 1200-1400
- Make sure you plug the powerwasher into a GFCI (ground fault circuit interrupter) outlet.
- Try using different angled nozzles for different jobs
 - Most powerwashers require 1-1.5 gallons per minute for EPW to fill and work properly
 - And finally, remember to wear personal protective equipment – this may include eye wear, gloves, ear plugs!

Cleaning Harvest Bins

1. Start with thorough cleaning with detergent and water
2. Scrub inside and out using brushes and pails dedicated to harvest bin cleaning
3. Rinse off with water
4. And Spray down with sanitizer

**If bins are kept relatively clean, a quick daily rinse may be adequate.

Tools that should be cleaned

- Harvest tools like knives, shears, as well as gloves
- Wagons, carts, or trailers
- Hand tools used in field touching produce just prior to harvest – clean only if these might have been contaminated
- Rinse off the debris & scrub (using detergent mixture) to remove dried on material
- Rinse again, sanitize, and hang up to dry in location dedicated for harvest or trimming tools

For produce operations that use field harvesters

- If this harvesting equipment comes into contact with produce, it should also be regularly cleaned...
- Especially if the harvesting equipment is left in the field until it is used again
- This equipment may require more detailed cleaning and should be prioritized in the off season.

Tables – Cull/Sorting, Rinsing, Packing

- All tables used for sorting, rinsing, and packing should be cleaned and sanitized.
- Pay special attention to harborage points – joints, welds, underneath equipment, and any and all tiny cracks or crevices.
- Use detergent with water to remove dried on crud, Rinse with water, Sanitize and dry
- It is best to clean tables at the end of each day's use to avoid debris drying on.

**To aid in cleaning and sanitizing, consider purchased or modifying tables with locking wheels so that they can be moved to sweep and clean floor underneath

Sinks for Washing Produce

- Sinks need to be cleaned after use to reduce debris accumulating and drying in place
- Look for harborage points behind faucets, curled lips/edges, drains, leg connections
- Clean with detergent and water using scrubber sponge and/or brushes
- Rinse then sanitize after daily use
- Clean sink sides and sweep floor

**Be sure drains working properly. Clogs can backup contaminating produce

For Tanks, Basins, or Other Containers

- Keep hoses off of the ground to reduce chance contamination or cross contamination
- Inspect drains if present
- Be aware of harborage points
- Clean daily after use with water and use detergent if needed
- Scrub out soil and any debris that can dry on
- Clean outer surfaces
- Rinse with water then sanitize and then dry off.

**Be able to move these out of the way to sweep underneath

Tank/Sink Aerator also known as (Air Bubblers) are often used for *washing greens*

- When assembling PVC piping do not glue all of the pieces so that you can disassemble for cleaning.
- Rinse off pipes and run water internally to flush out soil and debris
- Sanitize and let dry

Cleaning Tools

- I know this might sound strange, but cleaning tools should also be cleaned and sanitized, otherwise you risk cross-contamination every time you bring them out to clean equipment of food contact surfaces.
- This would include buckets, sponges, brooms, or scrub brushes
- Set aside in designated space for drying and storage
- Color code tools that are only to be used for cleaning specific areas
 - Ex. blue for food contact surfaces, yellow for floors, walls, and red for outdoor cleaning

Walls and Ceilings

- To facilitate this, avoid bare wood for walls and ceilings – it is *impossible to sanitize*
- Opt for washable walls that are smooth & cleanable
 - One option would be water-resistant paneling, i.e. fiberglass reinforced panels (RFP)
- Avoid splashing while cleaning other areas. Wash from top to bottom.
- Avoid condensation – have good air circulation through vents/fans and heat
- Do not use power washer or high pressure water for cleaning equipment or floors

Floors

- Floors should be cleaned next to last
- If floor is dry, sweep up debris/soil with broom, and dispose in the trash
- Hose down the floor if needed to remove anything that is stuck on
- Floor/deck brushes can aid in removing stuck on debris
- Floor squeegees can help to direct flow of water to drains
- A well planned facility will have a “dirty” side and a “clean” side. Soil and debris will primarily be on the “dirty” side, allowing clean up to be easier on the “clean” side.

Cleaning Drains

- Make sure your facility has a sufficient number of drains to allow for quick drainage
- Drains need to be in good working order to avoid back-flooding
- They need to be cleaned out regularly to avoid clogging
- Drains need to be cleaned sufficiently to avoid bacteria, such as *Listeria*, from becoming established
- Squeegees should be used to move water off floor into drains as needed. Floor squeegees should only be used for this purpose
- And as a reminder, your squeegees need to be cleaned regularly as well.

Drying Food Contact Surfaces

In general, once you've cleaned and sanitized a food contact surface, you should always follow up by drying

- This helps to reduce moisture on surfaces which can serve as a favorable environment for bacterial to live on.
- Fans can be on floor and others hung up to speed up drying process
- Use fans with high velocity, such as barrel fans
- Clip on fans can be attached to parts of equipment to quickly dry internal parts.

In Summary...

- Cleaning and sanitizing equipment, tools, food contact surfaces is critical for preventing foodborne pathogens from establishing and/or spreading.
- Thorough cleaning and sanitizing is a 6 step process
- Dry cleaning is an option for those operations that do not typically introduce water into their wash/pack lines
- Efficient and thorough drying is important to eliminate moisture
- Power washers are a useful tool, but should be limited to outdoors use.

Thank you to the Produce Safety Alliance for providing slides on the 6 steps of cleaning and sanitizing. For more information on the Produce Safety Alliance, you can visit producesafetyalliance.cornell.edu

Thank you for watching Part 4: Cleaning and Sanitizing. If you have any questions or would like clarification or help identifying resources, do not hesitate to reach out. You can reach Extension Specialist Robert Hadad via email at rg26@cornell.edu or by phone at 585-739-4065. You can reach Program Assistant, Caitlin Tucker, at cv275@cornell.edu or by phone at 5735444783.

If you would like to learn more about the Cornell Vegetable Program visit cvp.cce.cornell.edu.

Up Next: Part 5: Cleaning Common Wash/Pack Equipment