

On-farm Food Safety: Guide to Cleaning and Sanitizing



Good Agricultural Practices (GAPs) help improve produce quality and safety. Producers also use standard cleaning and sanitizing practices to reduce sources of microbial contamination on their products.

This publication focuses on the best cleaning and sanitizing practices for food products and food contact surfaces. It includes a resource list plus a sample form for monitoring sanitizer effectiveness and a sample cleaning schedule.

Washing, rinsing, and sanitizing may appear to increase costs but they enhance product quality and offer these benefits:

- **Soil and particles that can cause decay or spoilage are removed.**
- **Microorganisms that cause foodborne illness can be eliminated or reduced to a safe level.**
- **Clean produce is more visually appealing to customers.**
- **Product shelf life increases when spoilage organisms are removed.**

Using good sanitation practices during production, harvesting, and packaging can help reduce the risk of microbial contamination of fresh produce. Soil, fertilizers, harvesting equipment, water, workers, or animals such as livestock, pets, and pests can be sources of harmful microorganisms that cause foodborne illness. Surfaces that come in contact with produce must be washed, rinsed, and sanitized regularly. Employees need to understand and use appropriate food handling practices.

Food Contact Surfaces

Any surface that comes in contact with food, either directly or indirectly, is a food contact surface. Examples include preparation tables, spinners, food bags, and cartons for transporting produce. Food contact surfaces should be smooth to allow for easy and effective cleaning. Rough surfaces, such as wood, can harbor dirt and microorganisms. Stainless steel tables and counters are commonly used in foodservice and processing facilities due to durability and ease of cleaning.

Other surfaces that can come into contact with product include containers for harvesting and transportation, tables in packing areas, bags and other packaging materials, conveyors, processing equipment, employee aprons, outerwear, and gloves. Hands also may come into contact with the food. For more information about food handling practices, see “On-farm Food Safety: Guide to Food Handling” (PM 1974b).

Cleaning

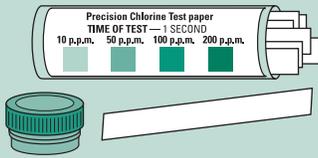
Cleaning means removing soil and residues from food contact surfaces. This is usually a two-step process of washing with soap or detergent followed by rinsing with clean potable (safe to drink) water. Rinsing surfaces thoroughly is important so that any detergent residue is removed. Because many detergents can degrade produce, products also can be cleaned just by using potable water at room temperature. Under certain conditions, microorganisms (bacteria, yeasts, and molds) can form invisible films (biofilms) on surfaces. Biofilms can be difficult to remove and usually require cleaners as well as sanitizers.

Sanitizing

Sanitizing is the process of treating a food contact surface with a sanitizing solution that will kill most microorganisms or reduce them to a non-harmful level. For sanitizers to be effective, surfaces must first be cleaned because soil and soap residues can make the sanitizing solution less effective.

- **Sanitizing** is a process that reduces the contamination level of a food product contact surface by 99.999 percent in 30 seconds.
- **Sanitizer** is a chemical compound designed to kill microorganisms. Chlorine bleach and quaternary ammonium compounds (quats) are commonly used sanitizers for food contact surfaces. Chlorine, quats, and hydrogen peroxide, at proper concentrations, can be used for food contact surfaces.

Chlorine Test Kit



How to use test strips

- Make sure the test strip is appropriate for the type of sanitizer.
- Prepare the sanitizing solution.
- Dip a strip into the solution for at least 10 seconds.
- Compare the color the strip changed to with the guide on the outside of the package to determine the solution strength.

Cleaning tips

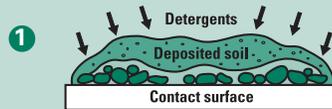
- Have tools, supplies, and waste receptacles easily available for employee use.
- Make sure waste receptacles are regularly emptied and cleaned.
- Have a place to properly store all equipment at the end of the day.
- Encourage employees to share ideas related to cleaning and sanitizing.
- Look for potential problems when walking through your operation.
- Evaluate all cleaning and processing equipment and utensils daily.
- Conduct a visual inspection to make sure surfaces are in good condition and cleaned and sanitized regularly.
- Establish a cleaning and sanitizing schedule for equipment and food contact surfaces.

• **Sanitizing solution** is the mixture of a specific amount of a sanitizer with potable water according to the directions given by the manufacturer to create the proper concentration.

Sanitizing solutions gradually lose effectiveness over time. As the solution is continually exposed to air or debris, reactions cause some of the chemical to dissipate. The best way to check whether a sanitizing solution is effective is to use a test strip. Sanitizing solutions should be made and checked at least daily. They also should be recorded.

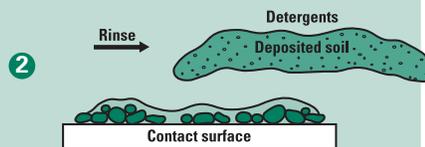


How the cleaning and sanitizing process works

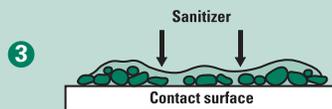


Washing helps loosen soils and other organic material from the surface.

Detergent also helps break the adhesion of microorganisms to the surface.



Rinsing removes loosened soil and detergent from the surface. This step is important because organic material and detergent can bind up sanitizer making it less effective.



Applying the sanitizer to clean surfaces actually provides a “kill” step for reducing the number of microorganisms. The surface is not completely free of microorganisms but the number is greatly reduced.

Choosing a Sanitizer

Producers should select a sanitizer based on the following characteristics. Sanitizers should be safe and leave no harmful residues on produce, stable and non-corrosive, and safe to workers and the environment.

Several types of sanitizer are available for product and/or food contact surfaces: chlorine, quaternary ammonium, and other commercial sanitizers such as ProSan™. Chlorine and hydrogen peroxide are commonly used for products because they are readily available and cost effective. For a complete list of approved sanitizers for products and food contact surfaces, check with state regulatory agencies or the Environmental Protection Agency (<http://www.epa.gov>).

Sanitizers may have multiple uses. For example, chlorine can be used on fresh produce or on food contact surfaces, depending on the concentration. Room temperature water should be used to minimize chlorine loss.

Guidelines for preparing chlorine sanitizer solutions

Amount of chlorine bleach per gallon of room temperature water ¹	Approximate concentration (ppm) ²
1 teaspoon	65
1 tablespoon	200
1 fluid ounce	400
¼ cup	800
½ cup	1600
1 cup	3200

Adapted from: McGlynn, W. Guidelines for the use of chlorine bleach as a sanitizer in food processing operations. Oklahoma State University Cooperative Extension. Pub FAPC#116. Available at:<http://osueextra.okstate.edu/pdfs/FAPC-116web.pdf>

1. Assuming 5.25% sodium hypochlorite in chlorine bleach
2. ppm = parts per million

The proportion of sanitizer to water must be accurate to make sure the solution will be effective. A common recipe for a sanitizing solution is 1 tablespoon household bleach (non-scented) per 1 gallon room temperature water. This will result in a solution of 200 parts per million (ppm), which is acceptable for products. Sanitizing solution for surfaces should be 50 ppm.

Chlorine bleach can be purchased in several concentrations. Check the manufacturer's label to see the concentration. A typical concentration is 5.25%. A higher concentration of sodium hypochlorite (the active ingredient in bleach) will require less bleach to make the same solution. Water quality can significantly impact the effectiveness of the sanitizer solution. Most solutions will require more sanitizer when used with "hard" water. Check the concentration of the solution using a test strip to adjust the amount of sanitizer to reach the appropriate concentration for the intended use.

Hydrogen peroxide is another common sanitizer for products. It should be used as a 2-5% solution and can normally be purchased as 3% solution. Using a stronger solution can possibly damage produce. Research has shown that adding ½ cup acid such as acetic, citric, or lactic acid to 1 gallon of hydrogen peroxide solution can significantly improve the effectiveness of the 3% solution.



Set up Cleaning and Sanitizing Schedules

The key to effective cleaning and sanitizing is making these practices part of normal operations. Equipment should be cleaned from top to bottom to avoid re-soiling already cleaned surfaces. In general, four questions need to be answered.

1. **What** should be cleaned?
2. **How** should each piece of equipment or food contact surface be cleaned and sanitized?
3. **When** should equipment be cleaned? Daily, weekly, as needed?
4. **Who** is responsible? Is a specific person or a position responsible for each cleaning task? Who will check to make sure the list is done according to schedule?

Many steps can be easily overlooked during cleaning. Action items in the schedule should be incorporated into the regular duties of employees. Employees should initial the form to document that the task is completed. Regular cleaning reduces the build-up of microorganisms.

Sample Cleaning Schedule

Area	Cleaning Frequency	Cleaning and Sanitizing Method	Person Responsible
1. Preparation table in Packaging area	Beginning of the day and between packaging different products	1-Remove debris accumulation using clean cloth and soapy water. 2-Rinse table top with clean water. 3-Sanitize with clean cloth and chlorine sanitizer solution of 50 ppm.	Bill / 11-1-2004
2.			
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Sample Chemical Sanitizer Monitoring Form

Date	Initials	Test Strip Result	Use
10/01/04	DH	Chlorine 50 ppm—OK	Surfaces
11/01/04	DH	Chlorine 200 ppm—OK	Product

Directions:

1. Complete this form daily.
2. Record date, your initials, and test strip result.
3. Indicate whether the test strip turned the appropriate color to meet the sanitizer concentration standard. The result is either "OK" or "CHANGED." If the solution is changed, indicate corrective action on the form.
4. If the sanitizer solution is redone, log the new concentration on the form.

Sanitizer Standards:

- Chlorine – 50 (surfaces) to 200 ppm (product)
- Quaternary ammonium – 200 ppm (product)
- Hydrogen peroxide – 300 ppm (product)

Visit www.iowahaccp.iastate.edu for sample cleaning procedures and schedules



Summary

Cleaning and sanitizing are part of an overall food safety plan to provide the safest and best quality produce to customers. Checklists, standard procedures, and schedules are typically the best ways to communicate information to employees and document that proper cleaning and sanitizing practices are followed.

References and Resources

More information about general produce food safety, GAPs, and food safety plans is available at the following Web sites.

Local Foods: From Farm to Foodservice, Hotel, Restaurant, and Institution Management Extension, Iowa State University

<http://www.extension.iastate.edu/hrim/localfoods/>

Foodborne Illness Education Information Center, USDA/FDA

<http://peaches.nal.usda.gov/foodborne/fbindex/Produce.asp>

Good Agricultural Practices Project, Cornell University

<http://www.gaps.cornell.edu>

Good Agricultural Practices, New England Extension Food Safety Consortium

<http://www.hort.uconn.edu/IPM/foodsafety/index.htm>

Guidelines for the use of chlorine bleach as a sanitizer in food processing operations, (Publication FAPC#116), W. McGlynn, Oklahoma State University Cooperative Extension

<http://osueextra.okstate.edu/pdfs/FAPC-116web.pdf>

Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, Center for Food Safety and Applied Nutrition (CFSAN), U.S. Food and Drug Administration

<http://vm.cfsan.fda.gov/~dms/prodguid.html>

HACCP: Hazard Analysis Critical Control Point Information Center, Iowa State University Extension

<http://www.iowahaccp.iastate.edu/sections/farmfoodsafety.cfm?action=resources>

ISU Extension publications

<http://www.extension.iastate.edu/pubs>

Vegetable Research and Information Center, University of California Cooperative Extension

<http://vric.ucdavis.edu>

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