Sanitation

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Contamination

Microbiological

Chemical

Physical

Microbiological

Bacteria

single-celled organisms; live independently

Viruses

small particles live and replicate in a host

Parasites

intestinal worms or protozoa that live in a host animal or human

Fungi

spoilage agents; molds can create toxin

Harmful Microorganisms on Fresh Produce

Bacteria

- *Salmonella* species
- *E. coli* O157:H7
- *Shigella* species
- *Bacillus cereus*
- *Listeria monocytogenes*

Viruses

- *Hepatitis A* virus
- Norovirus

Parasites

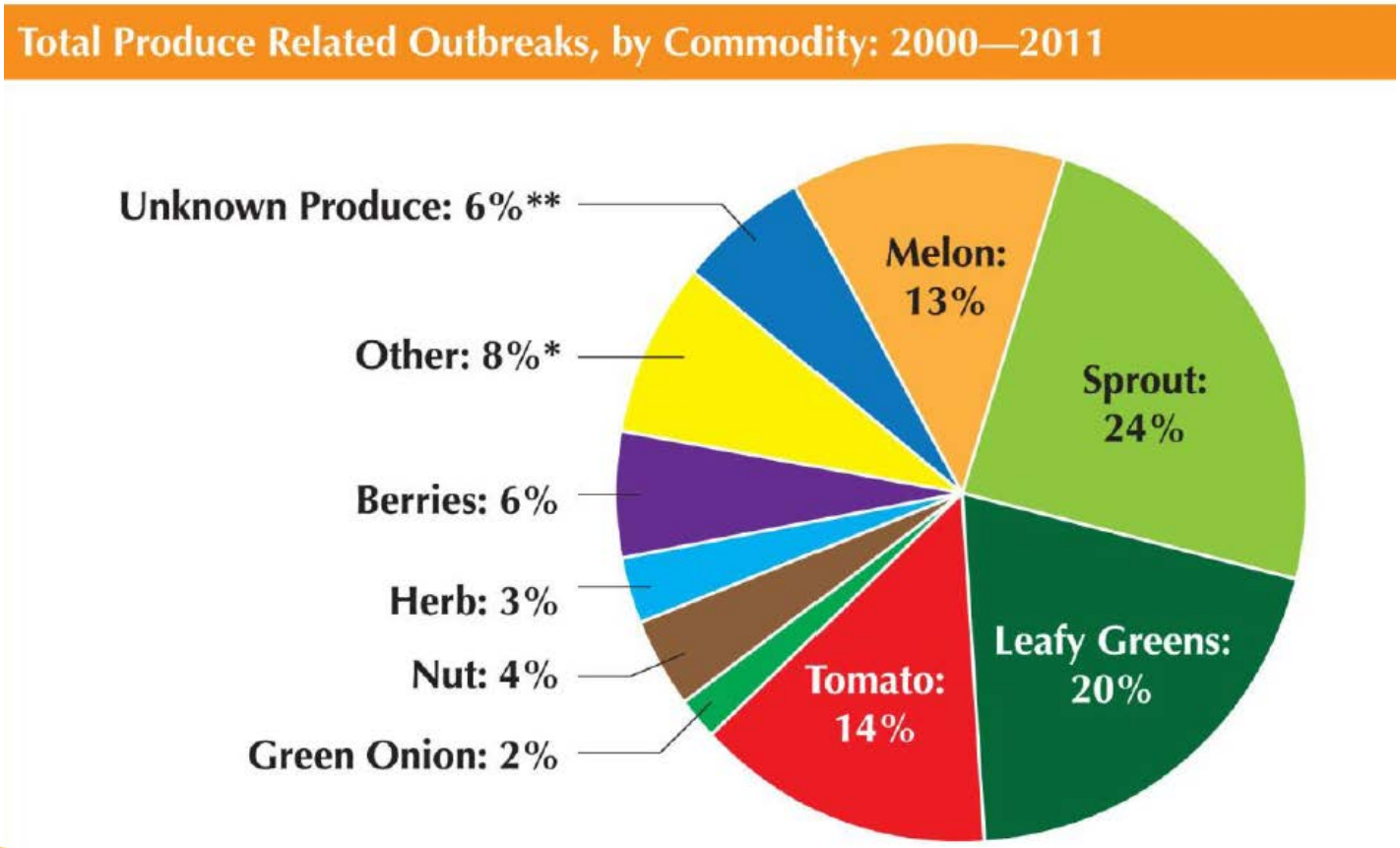
- *Cyclospora*
- *Cryptosporidium*
- *Giardia*

Pathogenic Organisms

Illness can range from mild to life-threatening

- Onset of symptoms ranges
- Common symptoms include:
  - ✓ Nausea
  - ✓ Vomiting
  - ✓ Abdominal cramps
  - ✓ Diarrhea
  - ✓ Fever

Food and Drug Administration



Produce Safety Challenges

- Fresh produce is often consumed raw
- Contamination is often sporadic and difficult to detect
- Microbial contamination on produce is extremely difficult to remove once it is present
- Rough surfaces, folds and crevices
- Bruises , cuts and stem scars

Impact of Unsafe Produce

- Consumers become ill
- Consumers lose confidence in safety of food
- People eat less produce – decreasing sales
- One instance harms ALL producers of that product
- Leads to unwanted legislation or regulation

Practices to Control Food-borne Illnesses

- Personal hygiene
- Basic housekeeping
- Cleaning and sanitizing
- Storage time and temperature

Personal Hygiene

- Washing hands
- Cover cuts
- Correct sink

Handwashing 101

Six steps …
Do you know them?

Handwashing 101

1. Wet hands with hot running water.

2. Apply soap.

3. Rub hands 10-15 seconds.

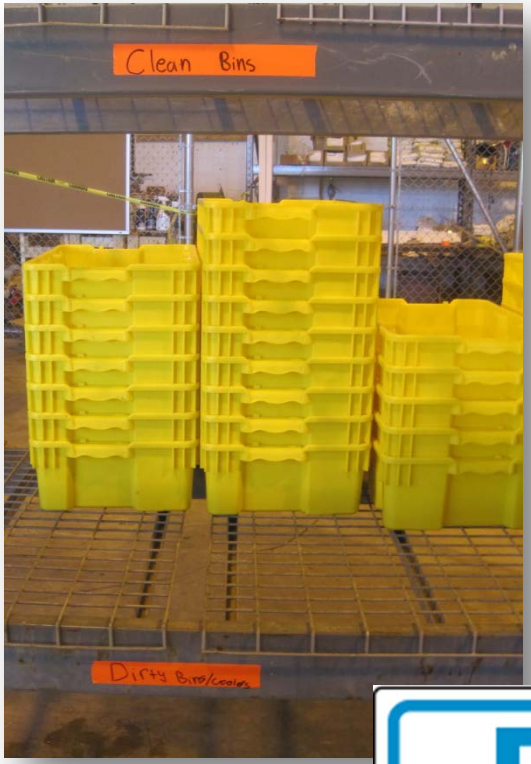
4. Clean under fingernails; between fingers.

5. Rinse hands thoroughly under running water.

6. Dry hands.

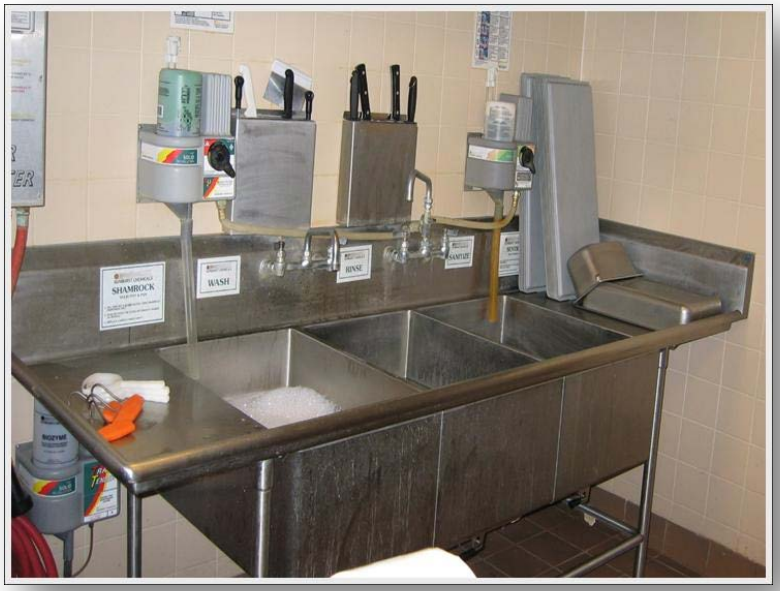
Good Housekeeping

- **Neat / organized / maintained**
- **Chemicals handled correctly**



Clean Surfaces

- All contact surfaces
- Equipment
- Clean versus sanitize


SHAMROCK
WASH
RINSE
SANITIZE

Cleaning

Removing soil and residue

3-step process:

- Rinse away surface debris
- Wash and scrub with soap or detergent
- Rinse away surface of detergent residue

Disinfecting versus Sanitizing

Disinfect:	Sanitize:
To destroy or irreversibly inactivate specified infectious fungi and bacteria on hard surfaces	A process that reduces the contamination level of a product or food contact surface by 99.999% in 30 seconds

Sanitizer

Chemical compound designed to kill microorganisms

Bleach as a sanitizer

Tips for Use

- Room temperature water
- 1 TBS. gallon of bleach for a 100 ppm
- Use test strips
- Use after cleaning
- Fine spray and not wiped or rinsed off
- Air dry

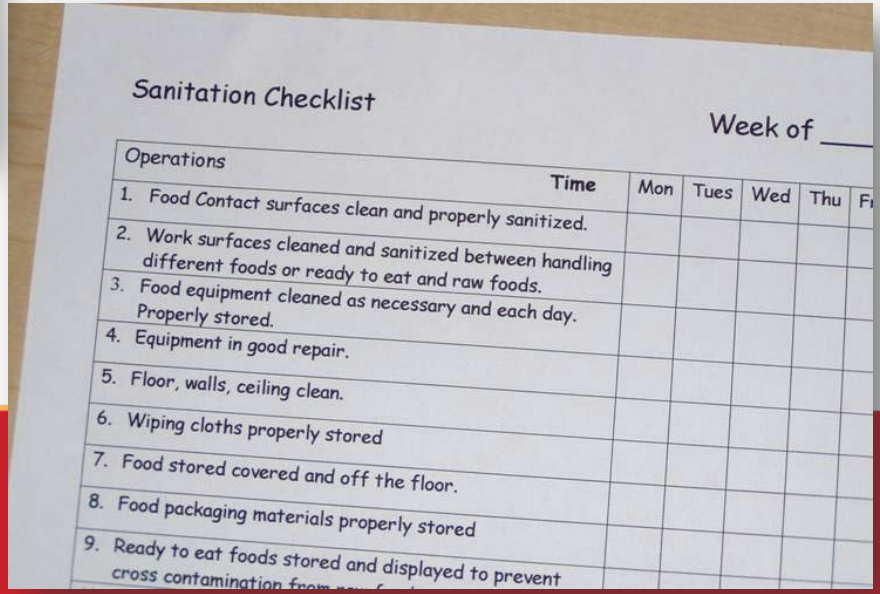
Sample Chemical Sanitizer Monitoring Form

Date	Initials	Test Strip Result	Use
8/15/10	DH	Chlorine 50 ppm—OK	Surfaces
8/15/10	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.

Who's Job is it?



Sanitation Checklist

Week of ____

Operations	Time	Mon	Tues	Wed	Thu	Fr
1. Food Contact surfaces clean and properly sanitized.						
2. Work surfaces cleaned and sanitized between handling different foods or ready to eat and raw foods.						
3. Food equipment cleaned as necessary and each day. Properly stored.						
4. Equipment in good repair.						
5. Floor, walls, ceiling clean.						
6. Wiping cloths properly stored						
7. Food stored covered and off the floor.						
8. Food packaging materials properly stored						
9. Ready to eat foods stored and displayed to prevent cross contamination from						

Sanitation is a Foundation of Food Safety

Summary

- Cleaning and sanitizing is a multiple step process
- Understand the difference between cleaning and sanitizing
- Develop written SOP's
- Monitoring is critical to identify sanitation failures

Good Agricultural Practices (GAPs) can improve produce quality and safety and protect your business. 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.

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On-farm Food Safety:
Cleaning and Sanitizing Guide

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 and nonporous 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: Food Handling Guide" (PM 1974b).

Cleaning

Cleaning means removing soil and residues. For product (fruits and vegetables) the cleaning steps vary with how dirty the product is, and the tenderness and perishable nature of the food. For example, root vegetables often require initial rinsing, scrubbing, followed by one or two additional rinses to remove soil residue, while only rinsing can be safely used on leafy green vegetables. Fruits and vegetables that grow well above the ground may be brushed or wiped when soil and other residue are minimal. Other tender or highly perishable products such as strawberries or raspberries should not be washed with water until just prior to use, as should all fruits and vegetables. When water is used for cleaning, it should be potable (safe to drink). New research shows that for certain vegetables, such as tomatoes, bacteria can be pulled into openings if the wash water temperature is colder than that of the produce item.

Cleaning of food contact surfaces means removing soil and residues. This involves a three-step process of rinsing away surface debris, washing and scrubbing with soap or detergent, followed by rinsing with clean potable water. Rinsing surfaces thoroughly is important so that any detergent residue is removed.

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 (for physical removal) as well as sanitizers (for killing of biofilm microbes.)

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 product or food contact surface surface by 99.999 (5-log reduction) percent in 30 seconds.

- **Sanitizer** is a chemical compound designed to kill microorganisms. Chlorine bleach (sodium hypochlorite concentrations 5.25 to 6.3 % in liquid form) and quaternary ammonium compounds (quats) are commonly used sanitizers for food contact surfaces. Chlorine and hydrogen peroxide, at proper concentrations, can be used for food products.

PM 1974C Revised March 2013

Guide to Using Liquid Sanitizer Washes with Fruits and Vegetables

Food safety of fruits and vegetables begins with growers following Good Agricultural Practices (GAPs) to reduce the risk of food-borne illness. After harvest, growers should incorporate Good Manufacturing Practices (GMPs) into their protocols, including sanitation principles. For additional guidance on good sanitation practices during production, harvesting, and packaging, review PM 1974C, *On-farm Food Safety: Cleaning and Sanitizing Guide*, which provides an overview of cleaning and sanitizing food contact surfaces and products.

This publication provides additional information about the best post-harvest sanitizing practices for fresh fruits and vegetables. It includes a comparison chart of five commonly used liquid sanitizers, with information on mechanisms for killing pathogenic bacteria, testing methods, recommended concentrations, positive and negative considerations, and product examples.

Factors that Affect Liquid Sanitizer Wash Effectiveness

- **Water source** should be potable and free from debris, odor, and microorganisms. Water hardness can affect the concentration of the sanitizer. Water hardness is the amount of minerals within the water. (*Very soft* is less than 60 ppm. *Moderately hard* is 61-120 ppm. *Hard* is 121-180 ppm. *Very hard* is more than 180 ppm.) The higher the water hardness concentration, the less effective the sanitizer is on produce as mineral deposits can trap bacteria or bind to the active ingredients that cause bacteria to die. For example, in Ames, Iowa, the water supply ranges from 150-165 ppm, while in Des Moines, Iowa, it ranges from 100-135 ppm. Using this example, Des Moines could use less sanitizer wash to achieve the same sanitizer concentration as Ames.

- **Soil** presence reduces the effectiveness of all types of liquid sanitizers. Soil binds to the active ingredients within the sanitizer wash and results in a lower concentration of active ingredients. Removal of as much soil as possible prior to rinsing produce with a sanitizer will maximize the sanitizer's effect.

- **Water temperature** can affect the safety and effectiveness of sanitizer. High temperatures can result in sanitizer vaporization, producing a toxic gas that could be dangerous to human health. Low temperatures can reduce the efficacy in some types of sanitizer, as well as reduce the activity of their active ingredients. It is important to be aware of the appropriate temperature for a specific sanitizer.

- **pH** of the water and product can affect a sanitizer's effectiveness. pH is a measure of the acidity of a concentration and is observed on a scale of 1-14. A pH less than seven is acidic, and a pH greater than seven is basic. As shown in the chart, some sanitizers work best in acidic or neutral pH conditions, while others are not affected by pH. For those affected, water testing is important to ensure that the correct type of sanitizing agent is selected for water conditions to achieve maximum impact and value.

- **Contact time on product** can significantly affect the efficacy of the sanitizer in removing disease-causing microorganisms. It is important to read the manufacturer's instructions on how long and under what conditions contact of the fruits or vegetables with the sanitizer solution is most effective. Temperature and pH affect the rate at which sanitizers can kill microorganisms on the surface. For example, warmer water temperatures, along with a neutral pH in the presence of low organic matter (soil), can reduce contact time for chlorine bleach.

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