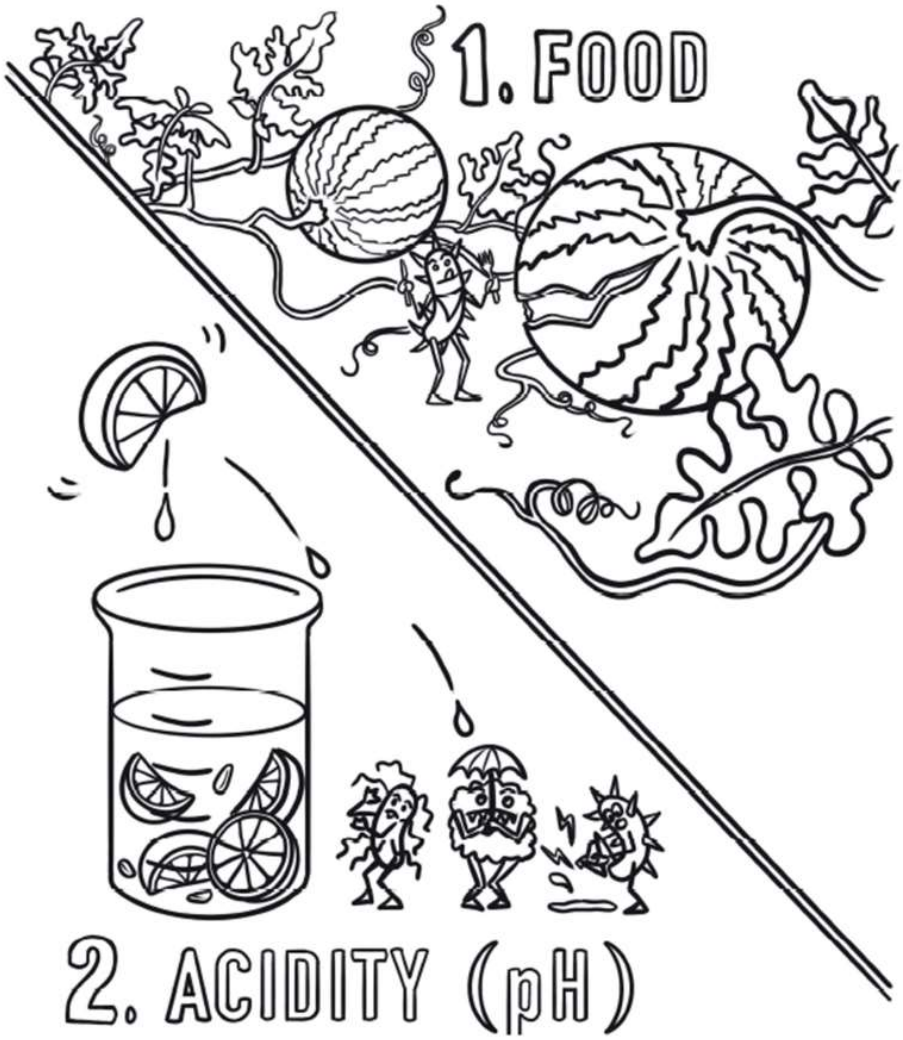
**Farm Food Safety How-To: Risk Assessment and Cleaning & Sanitizing Workshop Outline**

1. Workshop Overview
    a. Why make the effort?
    b. Thinking like an inspector
    c. Potential hazard identification
    d. Amplification of hazard risk
    e. Managing hazard risk
2. Why make the effort?
    a. It is illegal to introduce adulterated food into commerce.
    b. Foodborne illness is preventable. Children, people with health issues, and the elderly are at greater risk.
    c. Potential long-term effects of foodborne illness:
        i. Hemolytic Uremic Syndrome (Shiga-toxin producing E. coli)
        ii. Irritable bowel syndrome/inflammatory bowel disease
        iii. Reactive arthritis
        iv. Chronic kidney disease
        v. Guillain-Barre Syndrome
        vi. Neurological disorders (listeriosis and toxoplasmosis)
        vii. Cognitive and developmental deficits due to diarrheal malnutrition or severe acute illness
3. Thinking like an inspector
    a. Inspectors look for hazards and assess the risk of those hazards.
    b. Types of hazards:
        i. Chemical (lubricants, pesticides, etc.)
        ii. Physical (broken glass, etc.)
        iii. Biological (pathogenic microorganisms)
            1. Pathogenic microorganisms cause illness. Their presence can't be seen, tasted, or smelled.
    c. Biological hazards are the most likely cause of foodborne illness outbreaks.
    d. Microorganisms (Bacteria, Virus, Parasites):
        i. We can't see them.
        ii. They are everywhere but need help moving around.
        iii. Luckily, most of them are not human pathogens and keep pathogens in check through competition for resources.
        iv. The most likely sources of human pathogens are people and animals.
        v. Human pathogens can be in soil and water and can be dispersed by air from a concentrated source.
    e. Knowing your enemy
        i. Where do human pathogens come from?
            1. Soil:
                a. *Clostridium botulinum* (spore former)
                b. *Listeria monocytogenes*

2. Fecal matter contamination from humans or animals deposited onto surfaces, water, air:
    a. *Salmonella* spp.
    b. *Shigella* spp.
    c. *E. coli* O157:H7
    d. *Cryptosporidium* and *Cyclospora* (parasites, need host)
    e. Hepatitis A and Norovirus (viruses, need host)

ii. It's impossible to eliminate the risk in a farm environment so the goal is to minimize risk.
    1. Applying a microbial kill step before consumption is the only way to eliminate the risk.

iii. Microorganisms require specific conditions for survival and growth.
    1. Knowing these conditions can help us assess where microbial numbers are likely to be high and thus pose a greater risk.
    2. FAT TOM is an acronym used to remember these conditions.
        a. Food
        b. Acidity
        c. Time
        d. Temperature
        e. Oxygen
        f. Moisture



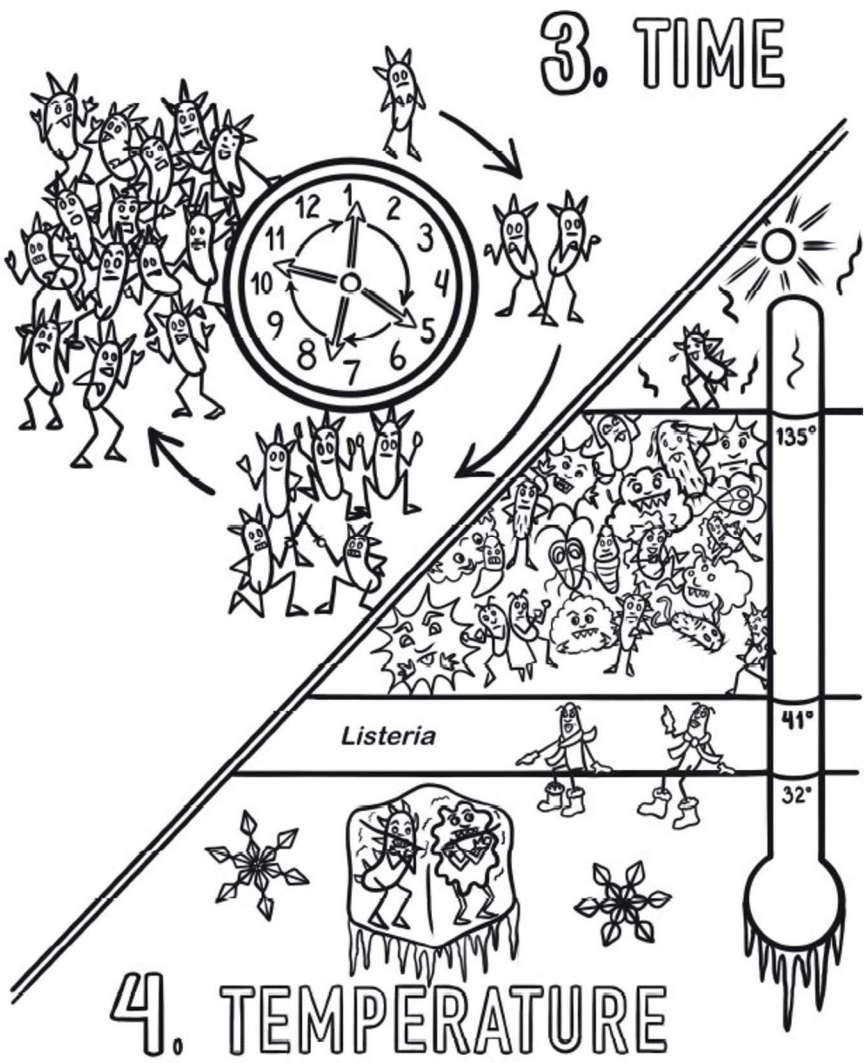

Artwork: Maine Dept. of Agriculture Safe Produce For All coloring book

1. Food source: Produce outer tissues protect the inner tissues that are an ideal food source for bacteria. Outer tissues can become damaged when dropped.

2. Acidity refers to the pH scale
- acid = low pH (lemon juice)
- base = high pH (bleach)

Table A-1 – Limiting Conditions for Pathogen Growth from the Fish and Fishery Products Hazards and Controls Guidance
- *Clostridium botulinum*: min pH 4.6
- *Listeria monocytogenes*: min pH 4.4
- *Salmonella* spp.: min pH 3.7
- *Shigella* spp.: min pH 4.8
- *E. coli*: min pH 4.0

Approximate pH of foods:
- Berries/fruit/rhubarb: around pH 3-4.5
- Veggies/melons: around pH 5-7
- Herbs: around pH 5-6

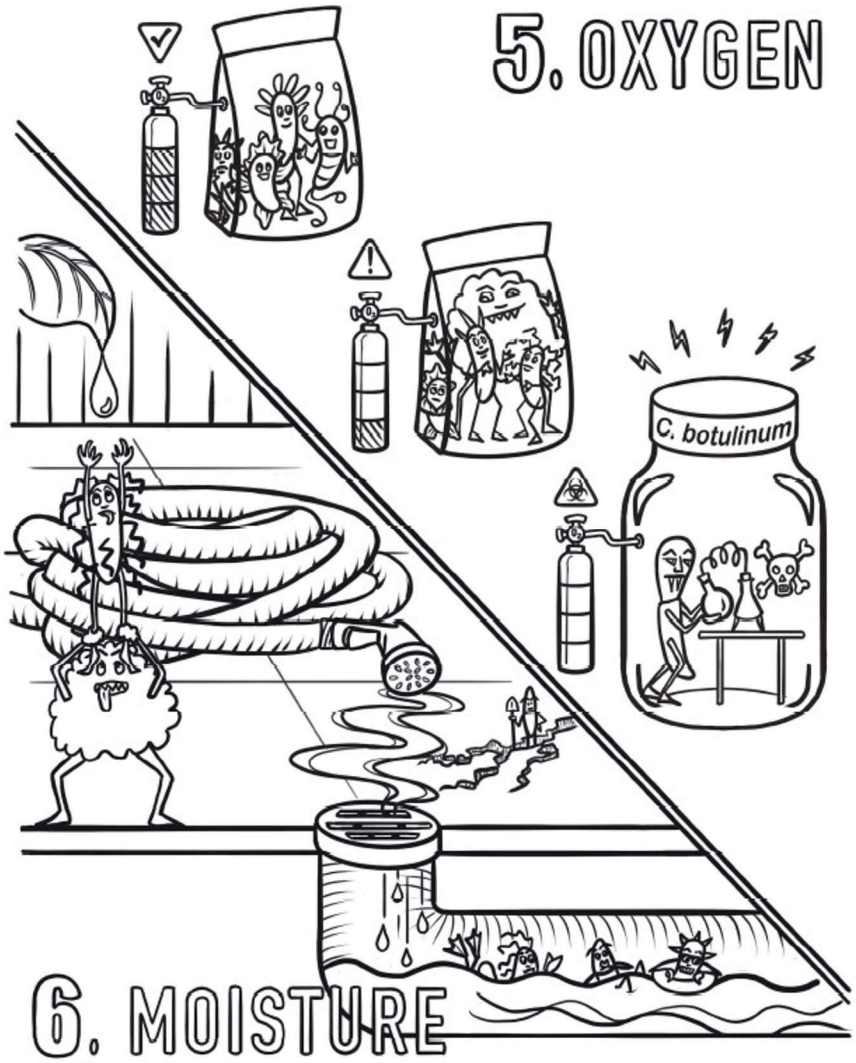



3. Time: When introduced to ideal growth conditions, it takes pathogens about 4 hours to adjust to their conditions (lag phase) before their numbers explode.

<u>Max Cumulative Exposure Time from the Seafood Hazards Guide Table A -2</u>:

- *Clostridium botulinum* : 11 hours @ 50-70F
- *Listeria monocytogenes*: 7 days @ 31.3-41F; 2 days @ 42-50F; 12 hours @ 51-70F; 3 hours above 70F
- *Salmonella* spp.: 14 days @ 41.4-50F; 6 hours @ 51-70F; 3 hours above 70F
- *Shigella* spp.: 14 days @ 43-50F; 6 hours @ 51-70F; 3 hours above 70F
- *E. coli*: 14 days @ 44.6-50F; 6 hours @ 51-70F; 3 hours above 70F

4. Temperature: The danger zone for pathogen growth is between 41 and 135F. Their growth is slowed above 135F until a lethal temp is reached. Below 41F will slow or stop their growth. Listeria is known for being problematic in refrigerated conditions because it can continue to grow down to 31.3F. Freezing does not kill pathogens.




5. Oxygen: May or may not be required for growth.

Fish and Fishery Products Hazards and Controls Guidance Table A-1 – Limiting Conditions for Pathogen Growth

- *Clostridium botulinum* : requires absence of oxygen *could happen through produce respiration if all oxygen used up in oxygen - impermeable packaging
- *Listeria monocytogenes*: grows either with or without oxygen
- *Salmonella* spp.: grows either with or without oxygen
- *Shigella* spp.: grows either with or without oxygen
- *E. coli*: grows either with or without oxygen

6. Moisture: All fresh produce inner tissues have adequate water activity for growth. Watch for condensation, constantly wet surfaces, pooling water.

4. Potential hazard identification
    a. What can contact the produce from growing, harvesting, storing, to leaving the farm?
        i. Water
        ii. Soil and amendments
        iii. Workers
        iv. Harvest containers/equipment/tools
        v. Door flaps
        vi. Wash/pack/transportation equipment
        vii. Condensation or water dripping from leaks, etc.
        viii. Floor debris
    b. What other surfaces are workers touching when handling produce?
    c. Systems Thinking Approach – The BIG PICTURE
        i. Map out traffic patterns on the farm with consideration for vectors:
            1. Footwear, vehicles, wildlife, domestic animals, toilets, handwashing, break areas.
        ii. Map out produce flow on the farm
            1. Where is it stored?
        iii. How do these vectors influence and interact with each other?

1. Consider topography, wind patterns, water movement, previous land use

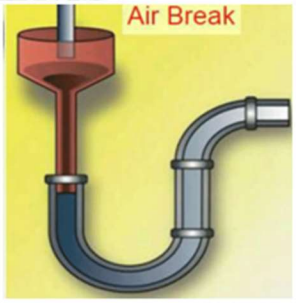
iv. Know that washing produce doesn't remove everything.
    1. Commercial washing needs to be scientifically proven to be relied on for control

v. Backflow prevention – protecting the quality and safety of your water supply
    1. Backpressure = negative pressure on supply side creates a vacuum effect
    2. Back-siphonage = downstream pressure becomes greater than supply pressure
    3. Devices
        a. Testable (for use with hazardous cross connections)
        b. Not testable (fail when leaking externally)
        c. Watts.com has great resources: https://dam.watts.com/AssetLink/553730.pdf?_gl=1*b6mp9i*_gcl_au*MTgxOTY1ODYzOS4xNzQ2NTQ0MTA0

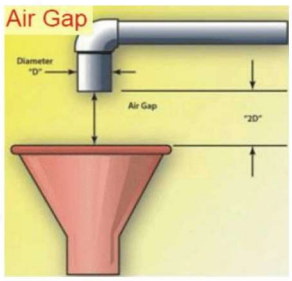
# Back-siphonage

| | | | |
|---|---|---|---|
| Pressure Type Atmospheric Vacuum Breaker |  | This device **protects against back-siphonage ONLY**. It does **not** protect against backpressure backflow. It is acceptable for this device to be under constant pressure. It may have shut-off valves located after it. | Must be installed (as measured from the center of the device) 12 inches higher than the highest point you are trying to protect – an example is the flood rim of a vessel or the highest sprinkler head in a "pop-up" sprinkler irrigation system. |
| Hose Bibb Atmospheric Type Vacuum Breaker (HBATVB) |  It is not acceptable for this device to be under constant pressure. | This device is good only for use on a faucet (see image to the right) to which an **open-ended hose** is attached. It may never be used where the hose attached to it has a shut-off valve on it. **Protects against back-siphonage** only (not backpressure), and is not acceptable for constant pressure. |  |
| Atmospheric Type Vacuum Breaker |  | This device may only be used in an application where the piping downstream from it **does not** contain a shut-off valve of any kind. **Protects against back-siphonage ONLY**, not backpressure. Also, it is not acceptable for this device to be under constant pressure. | Must be installed (as measured from the center of the device) 6 inches higher than the highest point you're trying to protect – an example is the flood rim of a vessel. |

# Backpressure

| | | | |
|---|---|---|---|
| Air Break |   | May only be used for drainage of non-potable water to the sewer.<br><br>Example is on an ice machine where the melting ice water is directed to the sewer. This does not protect against **back-siphonage backflow** if the line that enters the "break" is potable. | May never be used for draining potable water to the sewer.<br><br>Ideally an air break should have an open ancillary space 2 times the pipe diameter of the pipe discharging the water. |

# Back-siphonage & Backpressure

| | | | |
|---|---|---|---|
| Air Gap  |   | For all types of backflow prevention protection. **Protects against backpressure and back-siphonage** backflow. When used at a drain, it protects against sewage backup backflow. Not a mechanical device, so it never fails. This is the BEST type of backflow prevention available. | The air gap rule is that the air gap must be twice the diameter of the pipe discharging the water, but never less than one inch. Examples: a 2-inch line needs a minimum 4-inch air gap. A ¼-inch line would need a minimum 1-inch air gap. |
| Dual Check Valve w/Intermediate Atmospheric Break |  | This device is a good one! **It protects against back-siphonage backflow and backpressure backflow, and is good for constant pressure**. It may have vent piped to drain, but the piping to drain must be air-gapped at the drain and the pipe may not reduce the vent size. It is acceptable for this device to be under constant pressure. | Cannot be installed below grade subject to flooding. May be installed vertically, but preferably horizontally. Produced in ¾-inch and ½-inch sizes only. If vent is plugged, it is **not** acceptable. It may have shut-off valves located after it. |
| Reduced Pressure Zone Device (RPZ): Backflow Prevention Assembly |  | This device is acceptable for anything backflow. **Protects against backpressure backflow and back-siphonage backflow and is acceptable for this device to be under constant pressure.** Do not install below grade subject to flooding. | |

5. Amplification of hazard risk
    a. The risk associated with a potential hazard can become greater under certain conditions.
        i. Untrained workers
            1. Poor personal hygiene & practices, lack of awareness & monitoring
        ii. Sick workers (vomiting, diarrhea, fever, yellow eyes/skin)
        iii. Unsafe water
        iv. Poor facility hygiene
            1. Pests
            2. Condensation, water leaks
        v. Plumbing
            1. Backflow prevention to protect water sources
        vi. Unassessed changes like new equipment
        vii. Uncleanable food contact surfaces due to poor maintenance or equipment design creating bacteria harborage sites
        viii. Conditions for bacterial growth (FAT TOM, see coloring book pages)

ix. Crop characteristics
    1. Proximity to soil
    2. Staking (bird droppings)
    3. Proximity to pooling water
    4. Irrigation requirements
    5. Surface texture
    6. Handling – damage to fragile crops resulting in bruising to outer tissue impairment

b. Some example scenarios:
    i. You allow chickens in the garden. You kneel while harvesting and when you get up you brush the soil off your knees. You could have chicken manure on your hands now.
    ii. You are harvesting after a heavy rain event that could cause splash from soil, wildlife feces, or runoff to contact the produce before harvest. Muddy conditions will likely increase the soil load into wash/pack/storage areas.
    iii. The weather has been especially rainy causing water to pool in the field for longer than usual which is likely to result in increased microbial levels in the soil.
    iv. The farm septic leach field is old and is located within 100ft of the irrigation pond. The pond is not lined.
    v. The raw manure pile is located within 100ft of the well and the harvest tractor drives below or near the pile when traveling to/from the field.

6. Managing hazard risk
    a. Practices
        i. Use safe water
        ii. Use soil amendments appropriately
        iii. Assess and minimize contamination from animal activity
        iv. Provide readily accessible facilities for hygiene practices
        v. Assign responsibility for food safety oversight
        vi. Train workers on job tasks, food safety, health & hygiene
    b. Policies – prevent sick/injured workers from handling food or food contact surfaces
    c. Avoidance
        i. Manual harvest: scout for contamination before and during harvest
        ii. Mechanical harvest: scout row crops and remove contamination before harvest
        iii. Awareness when handling produce, wash hands if accidentally contaminated
    d. Managing microbial levels
        i. Maintaining food contact surfaces visually clean and in good condition
        ii. Pest monitoring in partially and fully enclosed buildings
        iii. Control wastewater, sewage, and garbage
        iv. Treat postharvest water
7. Maintaining food contact surfaces - Cleaning
    a. Method of cleaning is not specified in the FSMA Produce Safety Rule or Good Agricultural Practices.

i. FMSA Produce Safety Rule specifies that contaminated surfaces must be sanitized.
ii. Surfaces can become contaminated through:
    1. Cross-contamination
    2. Increasing microbial loads (determines cleaning frequency)
    3. Contact with crops that are rarely consumed raw that were not grown/handled in the same way crops consumed raw are
iii. GAPs specify that food contact surfaces are sanitized regularly, sanitized before use if stored outside

b. Wet cleaning steps:
    i. Pre-clean
    ii. Initial rinse
    iii. Detergent/cleaner application and scrub
    iv. Rinse
    v. Inspect – use a flashlight to inspect dark places. A mirror can be helpful for surfaces difficult to access like undersides of conveyor belts.
    vi. Sanitize (if desired/required)
    vii. Dry before use
c. Dry cleaning steps – when introduction of water to dry handling may increase risk
    i. Pre-clean, detail clean, final clean
    ii. Inspect – same tips as above in wet cleaning
    iii. Sanitize if desired/required. Examples of dry sanitizers: Dry heat, UV light, Alcohol-based sanitizers.
        1. Alcohol-based sanitizers are expensive. They are usually isopropyl alcohol blended with quats. Examples: Best Sanitizers, Inc. Alpet D2 (58.6% isopropyl alcohol with some quats); Ecolab Drysan Duo Cleaner and Sanitizer (10% Isopropanol with some Hydrogen Peroxide). Rubbing alcohol is 70% isopropyl so don't use that, it's too strong.
    iv. Tools: brushes, scrapers, vacuum with HEPA filtration of discharge air, compressed air, abrasive blasting with dry ice, calcium carbonate, sodium bicarbonate
d. Corrective actions
    i. Re-clean: prior cleaning was inadequate, use or conditions require additional cleaning
    ii. Re-sanitize: length of time after last sanitizing before use
    iii. Disinfect: contaminated with fecal matter, bodily fluids, by sick workers, etc.
    iv. Repair/replacement: when necessary and appropriate
    v. Procedures: train employees so they know when, why, and how to take corrective actions. Re-train employees as needed, e.g., after changes in policies, produce flow, traffic patterns, equipment, etc.
e. Cleaning considerations
    i. Ensure easy access and adequate space for cleaning (facility layout)
    ii. Cleaning and sanitizing method must not damage your equipment or contaminate something else…

1. Aerosolization while pressure washing
2. Equipment damage from pressure washing
3. Mops and damaged/dirty cleaning tools breed and spread bacteria
4. Equipment corrosion from incompatible chemical or incorrect chemical contact time

iii. It is very hard to clean a food contact surface that has crevices where soil accumulates.
iv. Wood food contact surfaces are not prohibited but are best in dry applications. You can't "sanitize" wood.
v. Biofilms: Are like a protective slime home that microorganisms can create on both wet and dry surfaces. They are hard to remove. Sanitizers can prevent biofilms but can't penetrate biofilms once formed, encouraging resistance.
vi. Consider wastewater drainage capacity.

f. Cleaning frequency
   i. Make a Master Sanitation Schedule for your food contact and non-food contact surfaces.
      1. Food contact surfaces may be cleaned every few hours or daily depending on their use. Heavier soil load would likely cause higher microbial loads requiring more frequent cleaning.
      2. Large food processors conduct studies of indicator microorganisms like yeast and mold to determine how frequently they need to clean food contact equipment surfaces to maintain safety of the finished product.
      3. Washing with or without sanitizing may happen more frequently than a deep clean where the equipment is taken apart, cleaned, and sanitized.
   ii. When making a Master Sanitation Schedule, list what you need to clean. Some of the items may be cleaned once a year (cooling unit condensers), weekly (bathrooms), or daily (produce wash line).
   iii. Pair your Master Sanitation Schedule with Standard Operating Procedures (instructions) on how you clean.
g. Cleaning frequency considerations
   i. How quickly does soil accumulate on the surface?
   ii. Does soil and debris accumulation support micro growth?
      1. Residues with low pH or inhibitory substances might not need to be cleaned as frequently as other residues.
   iii. How likely is the soil to contain human pathogens?
   iv. What is the temperature while the surface is in use?
      1. Warmer temperatures are conducive to faster growth.
   v. How long is the surface in use?
   vi. Is a clean break helpful for traceability by limiting affected product in a recall?
   vii. Is the food contact surface used for different crops that are not grown/handled with the same food safety considerations or risks?
   viii. Is the surface prone to bacteria harborage?

1. Listeria in wet/cool areas like floor drains and walk-in coolers.
2. Equipment with surfaces that are difficult to clean (crevices, complexity) due to poor hygienic design or condition.

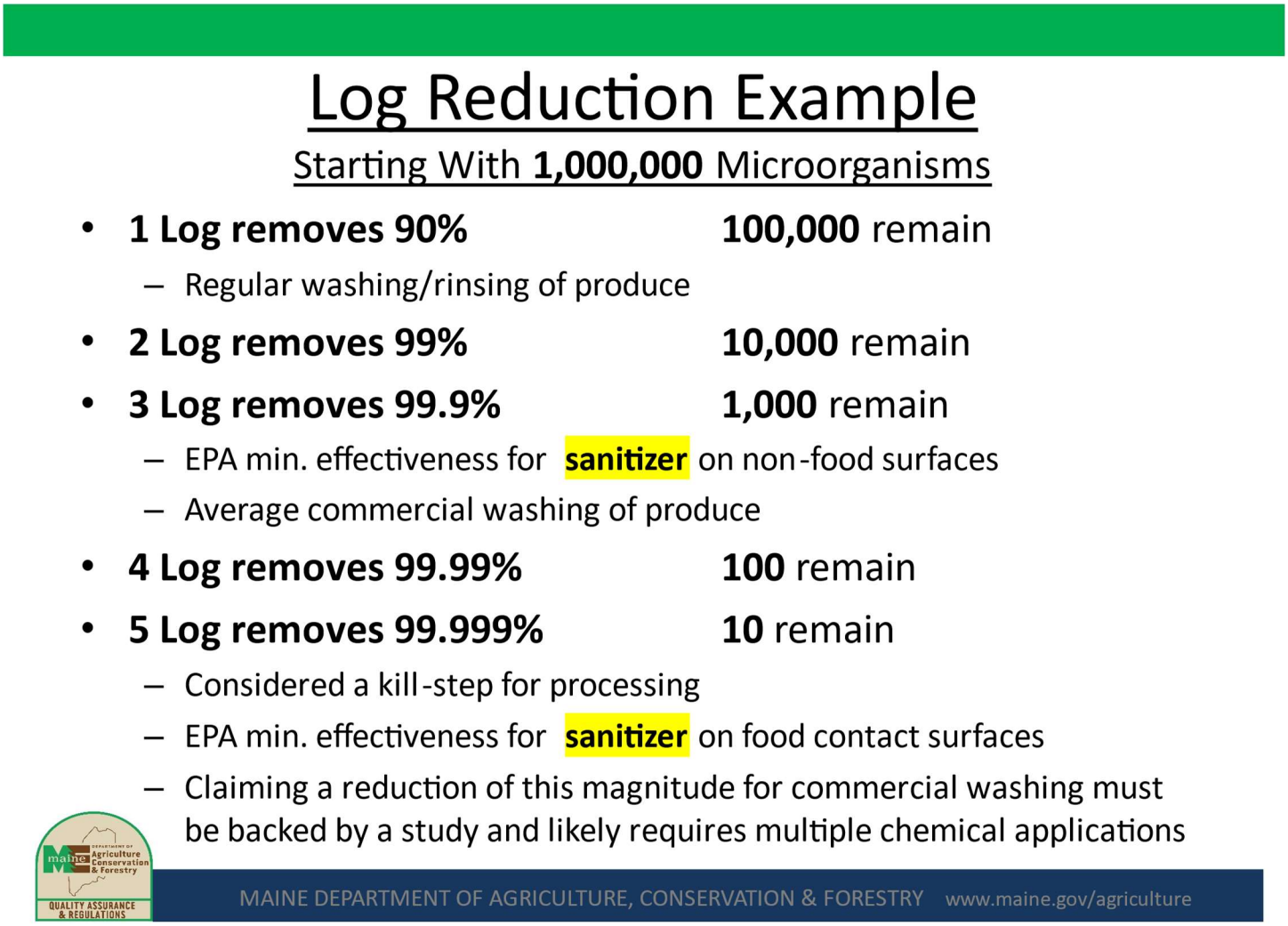
h. Detergents/cleaners – is a detergent required? It depends…
   i. A detergent might not be helpful unless a residue is difficult to remove. This may be an issue with only certain crops (tomatoes, cucumbers, etc.)
   ii. Sanitizers can have cleaning properties. When using sanitizers as a cleaner, know that you are not "sanitizing" the surface, you are cleaning it.
      1. Sanitizer chemicals are likely not labeled for this use, but it is a common industry practice.
   iii. Some sanitizers are labeled for cleaning and sanitizing via a 2-application process. Generally, a cleaning application followed by rinsing before the final sanitizing application.
   iv. Detergents require contact time to work. Temperature, concentration, and scrubbing help.
   v. Low foaming detergents are easier to rinse.
   vi. Dish detergent should be adequate for produce residues.
      1. Disposal considerations in the field: use a phosphorous-free detergent or cleaning to protect water sources.
   vii. Soil type and surface compatibility must be considered when using industrial cleaners.
      1. Acid and alkaline cleaners are corrosive and best used on certain surfaces. Check in with an expert before use.
      2. Clean equipment frequently to avoid needing an industrial cleaner.

i. Choosing a detergent/cleaner – note, detergents do not require registration with EPA because they don't usually contain pesticides and are always rinsed unless specific for dry cleaning.
   i. Acid detergents – mineral deposits (inorganic soils). Stainless steel only.
   ii. Alkaline detergents – carbohydrate (sugar, starch), protein (casein), fat. Need to be very strong to remove protein. Stainless steel, painted and plastic surfaces, safer for soft metals.
   iii. Chlorinated alkaline detergents – protein (casein). *Although pH swings kill bacteria, do not mix with acids.
   iv. Enzyme detergents – carbohydrate (sugar, starch), protein (casein), fat. Expensive. Stainless steel, painted surfaces and plastic surfaces.
   v. Solvents – grease, oil, lubricants (petroleum based)
   vi. Dish detergents – Example: Dawn
   vii. General purpose cleaners – Example: Simple Green

8. Maintaining food contact surfaces – Antimicrobial pesticides (sanitizers)
   a. Antimicrobial pesticides disinfect, sanitize, reduce or mitigate growth or development of microorganisms. Categories:
      i. Growth Inhibitors – slow spoilage and decay of crops in storage.

ii. Sanitizers – reduce bacteria remaining on hard, non-porous food contact surface that have been cleaned with detergent by 99.999% (5 Log reduction) within 30 seconds.
    1. Do not need to be rinsed. Chemical residue is minimal and considered incidental food additives under FD&C Act.
iii. Disinfectants – destroy or inactivate fungi, viruses, or bacteria but not necessarily spores, on hard, non-porous surfaces.
    1. Need to be rinsed from food contact surfaces usually, depending on the chemical.
iv. Germicides – are disinfectants when applied to inanimate objects and antiseptics when applied to living tissue/skin (isopropyl alcohol).
v. Sterilant – eliminate or destroy including spores.

b. Log Reduction Example




c. Sanitizer 5 Log reduction
    i. You can't "sanitize" a dirty surface because of variability in the number of microbes remaining.
        1. A "sanitizer" must achieve a 5 Log reduction.

2. An adequate reduction can't be guaranteed in the presence of soil or a very high microbial load on the surface being sanitized.
    a. Soil/organic matter bind the chemical reducing its effectiveness.
    b. A 5 Log reduction on a surface with a very high microbial load might not be enough to prevent illness.

9. Treating water with antimicrobial pesticides
    a. Treating postharvest wash water – antimicrobials reduce biofilms and prevent cross-contamination when washing produce.
        i. When batch washing via dunking or single-pass spray bar:
            1. Added manually to batch washing water
            2. Added via injector to single-pass water. This equipment is usually installed and maintained under a service contract with your chemical supplier. If you do it yourself, the injector must be calibrated and monitored to verify concentration.
        ii. When using recirculated water:
            1. Added via injector or manually.
            2. Bleach is not the best choice for recirculated water because of the extra maintenance of pH to prevent worker injury and sanitizer effectiveness.
            3. Peroxyacetic acid is common in industry. It's more expensive than bleach but easier to maintain.
10. Choosing a sanitizer
    a. Hypochlorite (Bleach)
        i. Corrosive, reactive, affected by organic matter and pH, tolerant of hard water.
        ii. Harsh on environment as breaks down to carcinogenic trihalomethanes.
        iii. Scented or no-splash will never be labeled for use on food contact surfaces.
    b. Quaternary ammonium compounds (QAS)
        i. Not corrosive, residual antimicrobial activity, slightly affected by water hardness and pH, moderately affected by organic matter, high foaming.
        ii. Harsh on environment as breaks down to carcinogenic trihalomethanes.
    c. Peroxyacetic acid (PAA)
        i. Slightly corrosive to soft metals, slightly affected by water hardness, partially affected by organic matter and pH, ok with septic systems.
        ii. Lesser environmental impact, breaks down to oxygen and water.
    d. Alcohol-based (Ethyl or Isopropyl)
        i. Usually mixed with QAC for use with dry cleaning methods.
    e. Chlorine dioxide
        i. Requires equipment to activate sodium chlorite.
        ii. Lesser environmental impact than QAC or Bleach as rapidly breaks down to water, oxygen and salt. Low concentration: 5ppm on food-contact surfaces.
        iii. Effective on biofilms, less corrosive/affected by organic matter and pH than Bleach, tolerant of hard water, residual antimicrobial activity.
    f. Iodine

i. Test strips can't be used because of brown color, even when diluted.
ii. Acid cleaner/sanitizer, gentle on hands, common in breweries, aids removal of mineral accumulations.

g. Hot water, steam, dry heat

11. Pesticide labels are confusing
    a. Pesticides can have uses other than controlling microorganisms of public health significance (pathogens). E.g. spoilage bacteria, algae, etc.
    b. Pesticides can have uses other than antimicrobial. E.g. pest control, plant regulators, plant defoliators, plant desiccant, nitrogen stabilizer, boosters for industrial cleaners, etc.
    c. Pesticides must be used as labeled for:
        i. Where to use them (use site)
        ii. How to use them to protect human health and the environment
    d. Pesticides intended for direct or indirect food use are subject to FFDCA (FD&C Act) clearance to establish tolerances, otherwise residues would render the food adulterated.
    e. Antimicrobial Use Site Index – the same chemical can have multiple use patterns on one label (surfaces and locations).
        i. Direct food uses
            1. Agricultural Premises and Equipment – Food crop irrigation systems
            2. Food Handling/Storage Establishments, Premises and Equipment – Fruit and Vegetable Treatments
        ii. Indirect food uses
            1. Agricultural Premises and Equipment – Food crop greenhouses, Food storage premises, Food contact surfaces
            2. Food Handling/Storage Establishments, Premises and Equipment – Food contact surfaces
        iii. Nonfood uses
            1. Agricultural Premises and Equipment – Food/Feed Storage Premises (food not present during treatment)
            2. Aquatic Areas – Lakes/Ponds/Reservoirs/Streams/Rivers/Channeled Water

SaniDate 5.0 – difference between disinfection and sanitization. Notice the difference in concentration and organisms it will control at those concentrations.

## GENERAL DISINFECTION

SaniDate 5.0 is an effective one-step cleaner and disinfectant, when used according to the directions for use. This product can be used to clean, disinfect, and deodorize floors, walls and other hard, nonporous surfaces such as tables, chairs, countertops, garbage bins/cans, bathroom fixtures, sinks, bed frames, shelves, racks, carts, refrigerators and coolers (at room temperature), glazed tile, and use sites listed on this label made of linoleum, vinyl, glazed porcelain, plastic polyethylene, stainless steel, or glass. This product is not to be used for the disinfection of surfaces made of wood.

SaniDate 5.0 is an effective disinfectant against the following bacteria and fungi:

*Aspergillus fumigatus*
*Pseudomonas aeruginosa*
*Staphylococcus aureus*
*Enterobacter aerogenes*
*Bacteroides melaninogenica*
*Streptococcus uberis*
*Salmonella enterica*
*Klebsiella pneumoniae*
*Listeria monocytogenes*
*Streptococcus agalactiae*
*Bordetella bronchiseptica*
*Fusobacterium necrophorum*

**FOR USE AS A VIRUCIDE AGAINST HUMAN INFLUENZA VIRUS (H1N1), CANINE DISTEMPER VIRUS, AVIAN INFLUENZA VIRUS (H9N2)**

This product kills the following viruses at a dilution of 0.5-2.2 fl. oz. of SaniDate 5.0 per gallon of water (230-1,000 ppm of peroxyacetic acid) when applied to hard, non-porous surfaces:

Human Influenza Virus (H1N1)
Canine Distemper Virus
Avian Influenza Virus (H9N2)

## FIELD EQUIPMENT DISINFECTION

Use SaniDate 5.0 to disinfect hard, non-porous harvest equipment such as pickers, harvesters, trailers, trucks (including truck body parts and tires), bins, packing crates, ladders, power tools, hand tools, gloves, rubber boots, pruning shears or other equipment.

1. Remove visible contamination with a cleaner or other suitable detergent and rinse with water.
2. Use SaniDate 5.0 at a dilution rate of 1:256-1:50 (0.5-2.2 fl. oz./gal) as a general coarse spray.
3. Allow solution to contact surface.
4. Treated surfaces must remain visibly wet for ten (10) minutes.
5. Allow to air dry, do not rinse.

## SANITIZATION OF FOOD CONTACT SURFACES

SaniDate 5.0 is an effective sanitizer against *Escherichia coli*, *Staphylococcus aureus* and *Escherichia coli O157:H7*. Also effective against beverage spoilage organisms *Pediococcus damnosus*, *Lactobacillus malefermentans*, and *Saccharomyces cerevisiae*. SaniDate 5.0 is for use in circulation cleaning and institutional/industrial sanitizing of pre-cleaned, hard, non-porous food contact surfaces and equipment.

Use as a sanitizer on hard, non-porous surfaces as tanks, vats, piping systems, pipelines, beverage dispensing equipment, evaporators, filters, pumps, evaporators, clean-in-place systems, pasteurizers and aseptic equipment used in dairies, breweries, wineries, beverage and food processing plants, conveyors, boxing or packing equipment, peelers, corers, de-boners, scrapers, collators, slicers, dicers, knives, saws, non-wooden cutting boards, tabletops, trays, pans, racks, platters, and cans. This product is not to be used for sanitization of surfaces made of wood.

This product can be used in Federally Inspected Meat and Poultry facilities as a sanitizer.

### Clean equipment immediately after use:

1. Remove all products from equipment unless treating only the return portion of a conveyor.
2. Remove visible food particulate matter and soil by a warm water flush, or pre-flush, or a pre-scrape and, when necessary, pre-soak treatment.
3. Wash surfaces or equipment with a good detergent or compatible cleaning solution. Rinse with potable water.
4. Add 1.6-5.4 fl. oz. of SaniDate 5.0 to 5 gallons of potable water (147-500 ppm of peroxyacetic acid), and apply by wiping, mopping, or coarse spray, or by adding to closed system.
5. If applicable, fill closed systems with diluted sanitizer solution at a temperature of 5°C (41°F) to 40°C (104°F).
6. Treated surfaces must remain visibly wet for one (1) minute.
7. Allow items and/or surfaces to drain thoroughly before resuming operation. Do not rinse.

SaniDate 5.0 vs 12.0 – SaniDate 5.0 can be used in irrigation water to control algae, bacterial slime and odors, and sulfides. SaniDate 12.0 has labeling for use in irrigation water to control foodborne bacterial pathogens.

**FOR COMMERCIAL USE**
**EPA REGISTRATION NO.** 70299-19
**ACTIVE INGREDIENTS:**

| | |
|---|---|
| Hydrogen Peroxide | 23.0% |
| Peroxyacetic Acid | 5.3% |
| **INERT INGREDIENTS:** | 71.7% |
| **TOTAL:** | 100.0% |

**CONTROL OF ALGAL AND SLIME-FORMING BACTERIAL GROWTH IN AGRICULTURAL IRRIGATION SYSTEMS AND WATER**

**FOR AGRICULTURAL IRRIGATION WATER AND DRAINAGE DITCHES**
Use SaniDate 5.0 to treat water to suppress/control algae, bacterial slime and odors, and sulfides in agricultural irrigation and drainage water and ditches. For irrigation water, apply 4.8 to 24 fluid ounces of SaniDate 5.0 per 1,000 gallons of water. This amount will provide 2-11 ppm of peroxyacetic acid. Product can be simply added to the body of water. SaniDate 5.0 as needed to control and prevent algae growth; apply more often in times of higher water temperatures.

**FOR COMMERCIAL USE**
**EPA REGISTRATION NO.** 70299-18
**ACTIVE INGREDIENTS:**

| | |
|---|---|
| Hydrogen Peroxide | 18.5% |
| Peroxyacetic Acid | 12.0% |
| **OTHER INGREDIENTS:** | 69.5% |
| **TOTAL:** | 100.0% |

**FOR THE REDUCTION AND CONTROL OF FOODBORNE BACTERIAL PATHOGENS IN PREHARVEST AGRICULTURAL WATER**

Use SaniDate 12.0 to reduce and control foodborne pathogens in pre-harvest agricultural water. To control Shiga-toxin producing *Escherichia coli*, including O157:H7 and *Salmonella enterica*, apply this product through sprinkler or drip irrigation systems, including flood irrigation systems. Use SaniDate 12.0 at a minimum dilution rate of 1:22,069 up to 1:13,196 (5.8-9.7 fl. oz. per 1,000 gallons of water); equivalent to approximately 6-10 ppm of peroxyacetic acid, with a minimum contact time of 5 minutes. Confirm residual ppm throughout the distribution system during treatment. It is recommended to use current AOAC and/or Standard Methods (https://www.epa.gov/dwanalyticalmethods) for confirmation of residual PAA in water post treatment (e.g. test strip, titration, or other method.) Do not irrigate with untreated irrigation water after treatment. Use this product on any crop during all phases of crop production including pre-plant irrigation and throughout the crop cycle. **Contact your BioSafe Systems Technical Representative for additional support.**

SaniDate 5.0 labeling for post harvest treatment of raw fruits and vegetables or fruit and vegetable processing waters.

**POST HARVEST TREATMENTS**

Use SaniDate 5.0 for the treatment of waters used in the handling, processing, packing or storage of raw fruits and vegetables. SaniDate 5.0 may also be used to control the growth of spoilage and decay causing bacterial and fungal diseases on post harvest fruits and vegetables. For post harvest applications, fruits and vegetables can be sprayed or submerged in the resulting solution for a minimum contact time of 45 seconds, followed by adequate draining.

**Note: May cause bleaching of treated surfaces, test commodity if unsure.**

**TREATMENT OF FRUIT AND VEGETABLE PROCESSING WATERS**

Use SaniDate 5.0 for the treatment of waters used in the processing of raw fruits and vegetables. Mix SaniDate 5.0 with water either batch-wise or continuously at a rate of 59.1-209.5 fl. oz. of SaniDate 5.0 solution to 1,000 gallons of water. This will provide 512-1,817 ppm of SaniDate 5.0, or 27-96 ppm peroxyacetic acid in the use solution. The fruits and vegetables can be sprayed or submerged in the resulting solution for a minimum contact time of 45 seconds, followed by adequate draining. At this use dilution, SaniDate 5.0 will control the growth of spoilage and decay causing non-public health organisms in process waters and on the surface of post harvest fruits and vegetables. This product is not intended for control of any public health organisms on fruit and vegetable surfaces.

**TREATMENT FOR NON-POTABLE WATER SYSTEMS (wash tanks, dip tanks, drench tanks, evaporators, humidification systems and/or storage tanks)**

Treat water containing plant pathogens with 0.6-2.1 fl. oz. of SaniDate 5.0 for every 10 gallons of water or use a dilution rate of 1:2,200-1:620. This will provide 462-1636 ppm of SaniDate 5.0, or 24-85 ppm peroxyacetic acid in the use solution.

**POST HARVEST SPRAY TREATMENTS ON PROCESS AND PACKING LINES**

Inject SaniDate 5.0 directly into spray, misting, humidification, and spray bar system make up system water on process and packing lines to prevent bacterial and fungal diseases on post-harvest fruits and vegetables. Inject the product concentrate into clean water at a dilution ratio of 1:588-1:2,451. This will provide 24-100 ppm of peroxyacetic acid in the use solution. For best results, where dump tanks are used, make post harvest spray treatment as produce is leaving dump tanks. Applicable for use on all types of post harvest commodities.

12. Antimicrobial pesticide dilutions – notes: The UVM calculator calculates for higher ppm limit on label instructions based on % PAA for SaniDate 5.0. Their math calculates 1.8T, 0.9fl.oz., or 26.78mL SaniDate 5.0 when missing disinfectant solution at 1000ppm. Doing conversions from label instructions calculate 1.65T, 0.825fl.oz., or 24.40mL for 1000ppm.

# Antimicrobial Pesticide Dilutions

- Sanidate 5.0 instructions for disinfectant use are 0.5-2.2 fl. oz. per gallon (230-1000ppm)
  - Fill 48oz pump sprayer
  - 1 gallon = 128 fl. oz.
  - Add 0.1875 to 0.825 fl. oz to 48 fl. oz water.

$$\frac{0.5}{128} = \frac{0.1875}{48}$$

$$\frac{2.2}{128} = \frac{0.825}{48}$$

- Converting units from fluid ounces to mL to Tablespoons
  - 1 fl. oz. is 2 T and 1 fl. oz. is 29.5735295 mL

$$\frac{0.1875\,\text{oz}}{1} \times \frac{2\text{T}}{1\text{oz}} = 0.375\text{T}$$

$$\frac{0.1875\,\text{oz}}{1} \times \frac{29.5735295}{1\text{oz}} = 5.55\text{mL}$$

- UVM Sanitizer Dose Calculator: https://ageng.w3.uvm.edu/sanitizer/index.html
  - *based off starting concentration and desired ppm, not label instructions



a. Dilution safety
   i. Recommended Personal Protective Equipment (PPE) when handling concentrated chemicals:
      1. Eye wash
      2. Goggles
      3. Chemical resistant gloves
      4. Face shield
      5. Boots
      6. Dispensing tools – get a spigot or pump so the concentrated chemical doesn't drip all over the place.
   ii. Confirm your dilution accuracy with test strips or titration kits.
      1. Make sure test strips will measure the correct concentration range.

b. Pesticide use in Maine
   i. EPA reviews claims on the EPA master label (all possible uses).
   ii. Pesticide products must be registered by states for use in that state.
   iii. Maine Board of Pesticides Control registers products by EPA registration number, product name, and company name on the container label.

iv. Container label instructions = the law, not the master label. Unless you obtain a technical bulletin/sheet approved by the EPA from the product company.
v. Use The National Pesticide Information Retrieval System (NPIRS) to search for pesticides registered by state: http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=ME
vi. A pesticide applicator license is required if you sell more than $1000 of produce annually , and you are using pesticides for a use other than sanitizing/disinfecting food contact surfaces. Even if you are only applying minimum risk pesticides or OMRI listed pesticides. E.g. field crop sprays, produce wash water, crop storage treatments, etc.

c. Finding a sanitizer

# Finding a Sanitizer

- Produce Safety Alliance Tool: https://resources.producesafetyalliance.cornell.edu/sanitizer/

| | | EPA Master Label Details | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | EPA Master Label | | Preharvest Labeled Uses | Postharvest Labeled Uses | | | Efficacy Statement |
| Name on EPA Master Label | Active Ingredient (% Strength) | EPA Registration Number | Labeled Use Info Based on Version Date | Labeled For Use in Irrigation Water Systems | Labeled For Use on Non-Porous Food Contact Surfaces | Labeled For Use on Postharvest Water Distribution Systems | Labeled for Use in Fruit and Vegetable Wash Water | Labeled to Control Human Pathogens |
| SaniDate 12.0 | PAA (12.0%); Hydrogen peroxide (18.5%) | 70299-18 | 7/9/24 | Yes, see page 6 | *No* | Yes, see page 11 | Yes, see page 11 | For Pre-Harvest Agricultural Water |

| Product Information | | | |
|---|---|---|---|
| Organic Materials Review Institute (OMRI) Listing | Amount Purchasable per EPA Label | Manufacturer/ Distributor | Notes |
| Allowed with restrictions | Gallons: 5, 30, 55, 275, 330 | Biosafe Systems | • EPA Master Label identifies State-level restrictions<br>• EPA Master Label allows for foliar sprays in addition to irrigation water |



d. Chemical application tools
i. Spray bottles – make sure they are designed for use with chemical solutions. Cheap ones don't have components that can withstand chemical exposure.
ii. Manual pump or compressed air sprayers or foamers.
1. Foamers have a different tip than non-foaming sprayers. A foaming agent is added to the sanitizer solution. Adding dish detergent will not make it foam.

2. Adding a foam increases the contact time of the chemical application.

iii. Wipes – must be labeled for food contact surfaces if for sanitizing.
iv. Brushes – industrial ones will last longer (Vikan, Remco)
v. Chemical solution temperature
vi. Sanitizer concentration test strips or titration kits
vii. Automatic dosing injectors – need to be calibrated and monitored. Usually maintained through a service contract with a chemical supplier.

13. Cleaning application tool tips
    a. Clean all tools, even the cleaning tools
    b. Allow them to dry
    c. Inspect tool cleanliness and condition, replace as needed
    d. Don't use food contact surface tools on non-food contact surfaces.
    e. Store tools where they won't be contaminated or misused
        i. Keep bathroom cleaning/floor cleaning tools away from food contact surface cleaning tools
        ii. Keep food contact surface cleaning tools off the floor
        iii. Having a designated place to store tools will increase the likelihood of appropriate use.
14. Chemical suppliers:
    a. Chemical manufacturers:
        i. Alpha Chemical
        ii. Ecolab
        iii. Bio Safe Systems
        iv. Others are listed in the Manufacturer/Distributor column of the PSA Sanitizer Tool
    b. Chemical distributors: There are likely more!
        i. Helena Agri of Presque Isle (SaniDate)
        ii. Paris Farmers Union (SaniDate)
    c. Chemical test strip manufacturers:
        i. Hydrion: Hydrion Sanitizer Test Kits | Chlorine Test Kit | Micro Essential Lab
        ii. LaMotte: Food / Beverage / Laundry & Sanitation - Products (lamotte.com)
        iii. Bartovation: Disinfectants & Sanitizers | Bartovation
15. Equipment suppliers: when searching chemical equipment supplier catalogs, search their industrial/food processing products
    a. FOAMit.com (recommended by a chemical manufacturer)
    b. Nelson Jameson (also sells chemicals)
        i. Sell Lafferty, Dosatron International, Strahman, FOAMit dispensing equipment
    c. RS Quality (also sells chemicals)
    d. Grainger (also sells chemicals)
    e. U.S. Plastics Corp.
    f. Uline
    g. Webstaurantstore.com
    h. Swish

i. Zoro
j. Union Jack Tools
k. Vican.com (look up available tools and where you can buy them)

16. Resources
    a. UVM Hygienic Design: Hygienic and Sanitary Design for Produce Farms – UVM Extension Ag Engineering
    b. UVM SCRUB: SCRUB Project Resources – UVM Extension Ag Engineering
    c. PSA Sanitizer Tool
    d. Plant Science Food Safety Group Videos on YouTube: Plant Science Food Safety Group - YouTube
    e. Take a food processing sanitation training
    f. Contact webinar recordings: Resources - CONTACT Produce Safety Research - University of Florida, Institute of Food and Agricultural Sciences - UF/IFAS
    g. Maine DACF Library of Resources: Food Safety Modernization Act - FSMA - Maine DACF

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