A Guide to Cleaning, Sanitizing, and Disinfecting for Produce Farms

Introduction

This guide is intended to provide information about the differences between cleaning, sanitizing and disinfecting hard surfaces on produce farms. The motivation for this guide is the current COVID-19 pandemic and questions from growers about what can be used and how much should be used. It is important to note that COVID-19 has not been found to be transmitted via food and that this guide is not supporting the disinfection or sanitization of produce. Also remember that cleaning should be a first step in any of these activities. Follow the EPA label for your product and always wear personal protective equipment as indicated.

What is the difference between cleaning, sanitizing, and disinfection?

The CDC provides more detail on their cleaning website, but the take-homes are:

"**Cleaning** removes germs, dirt, and impurities from surfaces and objects…using soap (or detergent) and water to physically remove [them]."

"**Sanitizing** lowers the number of germs on surfaces or objects to a safe level, as judged by public health standards or requirements."

"**Disinfecting** kills germs on surfaces or objects. Disinfecting works by using chemicals to kill germs on surfaces or objects. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface after cleaning, it can further lower the risk of spreading infection."

When should I sanitize and when should I disinfect?

Deciding whether to sanitize or disinfect depends on whether the hazard being addressed is either possible, probable (likely) or known to exist.

If you have a **possible** hazard (e.g. pathogenic E. coli in growing environment) **cleaning and sanitizing** is appropriate for food contact surfaces such as harvest bins, wash line food contact surfaces, and sorting and packing tables. This is doing what you would normally do within a farm food safety plan or cleaning and sanitizing SOP. Each farm and situation is unique, but some examples of when you might choose to sanitize include:

- Sorting table in an open wash/pack shed
- CSA bins returning from community distribution with no known illnesses
- Farm stand counters

If you have a **known or probable** (likely) hazard (e.g. visible feces, bodily fluids, or blood or an employee is found to be ill with communicable disease) **cleaning and disinfecting** is appropriate. This is generally an activity focused on specific surfaces that uses a higher concentration of disinfecting chemical and/or longer contact times, when compared to sanitizing. These surfaces may be high touch areas that many people touch regularly or they may be surfaces with visible contamination. Each farm and situation is unique, but some examples of when you might choose to disinfect include:

- Visible feces, blood, or other bodily fluid on food contact surfaces
- CSA bin returned from a household with a known transmittable illness
- CSA bins returned from a high volume distribution in a location with high probability of known illness
- Tractor / truck cab after operator has been diagnosed with a known transmittable illness
- Credit / debit card machine key pads

Can I use a sanitizer or disinfectant not labeled for coronavirus for protecting against coronavirus?

Unfortunately, nothing is currently labeled for killing SARS-CoV-2, the novel coronavirus we're dealing with. The virus is too new to have had anything be tested for efficacy. Even though many commonly-used sanitizers are labeled for sanitizing and disinfecting food contact surfaces, the labels will not list SARS-CoV-2 as a target organism. Use of the product may be appropriate to the label when the target is

more generally pathogenic microorganisms such as in routine sanitation. Routine sanitation practices are expected to also control SARS-CoV-2 levels.

Some products are labeled for other coronavirus or viruses that are more difficult to kill, however. The EPA does provide "List N" which are disinfectants that they approve for use against SARS-CoV-2. For example, both Ultra Clorox Brand Regular Bleach (EPA#5813-103) and CloroxPro Clorox Germicidal Bleach are included in this list (EPA#67619-32). This list includes products with the same active ingredients as some sanitizer products used on the farm. For example, there are PAA/Hydrogen Peroxide solutions on this list which use the same active ingredients as the Sanidate, Tsunami, and Vigorox branded products which are common on many fruit and vegetable farms. It stands to reason that these other products would also be effective when used accordingly (at the right dose, in the right application, with the right amount of time, etc.) These are not normal times, and sourcing products that are on List N may not be possible. If you have a sanitizer with common active ingredients, it may be your best choice.

How do I adjust my use of a sanitizer for disinfection?

Remember that cleaning, sanitizing, and disinfecting are three different things. For hard surfaces known to have been or probably (likely) exposed to the SARS-CoV-2 virus, you should be disinfecting. Disinfecting requires a higher concentration of and contact time with active ingredients when compared to sanitizing. Refer to the label on your existing sanitizer for directions about whether and how to use it for disinfection against viruses. See the examples below and the table at the end of this document for information about sanitizers often used on produce farms.

Sanidate Example

Reviewing the label for Sanidate 5.0 (p.12, "General Disinfection"), a 5.3% peroxyacetic acid and 23.0% hydrogen peroxide product, we note that the concentration used for disinfection is 0.5-2.2 fl. oz. per gallon of water (230-1000 ppm of peroxyacetic acid in water) with a contact time of 10 minutes compared to the lower rate used for sanitizing (p.10, "Sanitization of Food Contact Surfaces") of 1.6-5.4 fl. oz. to 5 gallons water (147-500 ppm) with a 1 minute contact time followed by draining. Later in the label, we find the postharvest water application to control cross contamination that we're most familiar with (p. 20, "Treatment of Fruit and Vegetable Processing Waters") where the rate of use is 59.1-209.5 fl. oz. per 1000 gallons of water (27-96 ppm).

Tsunami Example

Reviewing the label for Tsunami 100, a 15.2% peroxyacetic acid and 11.2% hydrogen peroxide product, we note that there is no labeled use as a disinfectant. The label guidance for sanitization (p.4, "Sanitizing Food Contact Surfaces") is 1.0 to 1.8 fl. oz. per 8 gallons water (1000-1800 ppm of product, 150-270 ppm of PAA) with a contact time of 1 minute with draining and air drying afterward. We also note that the postharvest water application to control cross contamination that we're most familiar with (p. 2, "For Pathogen Reduction and Control in Fruit and Vegatable Processing Waters in Food Facilities") has a rate of use of 2.5 to 6.7 fl. oz. per 100 gallons of water (30-80 ppm PAA).

Vigorox Example

Reviewing the label for Vigorox SP-15 (p.5 "Surface Disinfection"), a 15.0% peroxyacetic acid and 10.0% hydrogen peroxide product, we note that the concentration used for disinfection is 0.5-2.2 fl. oz. per gallon of water (230-1000 ppm of peroxyacetic acid in water) with a contact time of 5 minutes and air drying compared to the lower rate used for sanitizing (p.4, "Sanitization of Non-Porous Food Contact Surfaces") of 3.1 fl. oz. to 50 gallons water (85 ppm PAA) with a contact time of 1 minute with air drying. The postharvest water application to control cross contamination that we're most familiar with (p.6, "For Reducing Pathogenic Foodborne Bacteria in Processing Waters for Fruits and Vegetables") where the rate of use is 0.54 fl. oz. per 16 gallons of water (45 ppm PAA).

Clorox Bleach Example

Reviewing the label for Ultra Clorox(R) Brand Regular Bleach (alternate name, "Clorox Germicidal Bleach"), a 6.0% sodium hypochlorite product, we note that this product is labeled as effective against human coronavirus (p.35 revised). We also note that the concentration used for disinfection of hard, nonporous surfaces (p. 14 and 22 of PDF) is 2700 ppm (¾ cup per gallon of water) available chlorine, a contact time of 5 minutes is required, and a rinse with potable water and air drying is required. This is a higher concentration and longer contact time compared to the lower rate used for sanitizing (p. 14 of PDF) of 200 ppm (1 tbsp per 1 gallon of water) with 2 minutes of contact time followed by air drying. For

treatment of water use for fruit and vegetable washing (p.37, "For Fruit and Vegetable Washing") the concentration is 25 ppm with a submersion time of 2 minutes. The effectiveness of chlorine depends on the pH of water.

For help determining appropriate mixing rates for volumes other than those above, see the sanitizer dose calculator available online.

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Acknowledgments

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Agricultural ENGINEERING

Christopher W. Callahan, PE
UVM Extension

with review and input from team members of the Produce Safety Alliance (Cornell University), Hans Estrin (UVM Extension), Lisa McKeag (UMass Extension), Phil Tocco (Michigan State University), and Annalisa Hultberg (University of Minnesota)

ageng@uvm.edu go.uvm.edu/ageng

An online version of this publication is available at go.uvm.edu/clean-sanitize-disinfect

Product	Active Ingredients as Received	Labeled Concentration for Wash Water Treatment	Labeled Concentration for Sanitizing Hard Surfaces	Labeled Concentration for Disinfecting Hard Surfaces
Ultra Clorox Brand Regular Bleach	6.0% sodium hypochlorite	**25 ppm** free chlorine 0.05 fl. oz. (0.3 teaspoon) per gallon of water *2 minute submersion time*	**200 ppm** 1 tbsp per 1 gallon of water. *2 minutes contact time.* *Air dry.*	**2700 ppm** ¾ cup per gallon of water. *5 minutes contact time.* *Rinse with potable water.* *Air dry.*
Sanidate 5.0	5.3% peroxyacetic acid (PAA) and 23.0% hydrogen peroxide	**27-96 ppm PAA** 0.07-0.23 fl. oz. (0.4-1.4 teaspoons) per gallon of water	**147-500 ppm PAA** 0.36-1.21 fl. oz. (2.1-7.2 teaspoons) per gallon water. *1 minute contact time.* *Drain.*	**230-1000 ppm PAA** 0.56-2.4 fl. oz. (3.3-14.5 teaspoons) per gallon of water. *10 minutes contact time.*
Tsunami 100	15.2% peroxyacetic acid (PAA) and 11.2% hydrogen peroxide	**30-80 ppm PAA** 0.03-0.07 fl. oz. (0.15-0.40 teaspoons) per gallon of water	**150-270 ppm PAA** 0.13-0.23 fl. oz. (0.76-1.36 teaspoons) per gallon of water *1 minute contact time.* *Drain and air dry.*	**Not Labeled**
Vigorox SP-15	15.0% peroxyacetic acid (PAA) and 10.0% hydrogen peroxide	**45 ppm PAA** 0.04 fl. oz. (0.08 teaspoon) per gallon of water	**85 ppm PAA** 0.07 fl. oz. (0.44 teaspoon) per gallon of water. *1 minute contact time. Air dry.*	**800 ppm PAA** 0.68 fl. oz. (1.37 teaspoon) per gallon of water. *5 minutes contact time.* *Air Dry.*

Table 1 – Summary of sanitizing chemicals commonly used on many farms showing the differences in concentrations and contact time for the different intended applications of produce wash water treatment, sanitizing, and disinfecting. Based on review of EPA labels. Reference the label for your specific product to confirm applications, concentrations, and contact times. For help determining appropriate mixing rates for volumes other than those above, see the sanitizer dose calculator available online. Always wear appropriate personal protective equipment (PPE).