Produce Safety
ALLIANCE

Produce Safety Educator's Call #35

October 29, 2018

Instructions

- **All participants are muted.**
- **There will be time for questions and answers throughout the meeting.**
  - We may not get around to all comments/questions, BUT you may leave additional comments in the comment box to be compiled after the session.
- **This session will be recorded and notes will be shared via the listserv and on our website after the call.**

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Agenda

- Introductions
- Postharvest Sanitizers for Fruits & Vegetables
  - Dr. Amanda Deering, Clinical Assistant Professor, Department of Food Science, Purdue Extension
- PSA Sanitizer Resources
  - Ms. Donna Pahl Clements, Southwest Extension Associate

POSTHARVEST SANITIZERS FOR FRUITS AND VEGETABLES

Amanda Deering Ph.D.
Clinical Assistant Professor
Department of Food Science

October 29th, 2018

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Sanitizing

- What is the purpose of sanitizing?
  - Hygienic measures used to ensure the safest possible food
  - Goal of a reduction of microorganisms to a safe level
  - Good sanitizers will achieve a 3-5 log reduction

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What Does Log Reduction Mean?

- A log reduction is when the population of bacteria is reduced by 90%.

Number of Bacteria	Total Log Reduction	Percent Reduction
1,000,000	--	--
100,000	1	90%
10,000	2	99%
1,000	3	99.9%
100	4	99.99%
10	5	99.999%

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Why Use Sanitizers?

- Large amounts of produce, possibly from different growing areas, come in contact with postharvest water.
- If the water is not properly sanitized, bacteria (pathogenic and/or spoilage) can be transferred to other products = cross contamination.

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Postharvest Processing

- Can help to reduce bacteria, yeasts, and molds that may cause spoilage that decreases the shelf-life of a product.
- Also, pathogenic bacteria that can cause disease to humans.

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Sanitizers/Pesticides

- A pesticide is any substance or mixture of substances intended for:
  - preventing
  - destroying
  - repelling or
  - mitigating any pest.
- Often misunderstood to refer to insecticides, but also refers to herbicides, fungicides, and various other substances used to control pests.
- Under United States law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

www.epa.gov

What is a Pest?

- Pests are living organisms that occur where they are not wanted or that cause damage to crops, humans or other animals. Examples include:
  - insects,
  - mice and other animals,
  - unwanted plants (weeds),
  - fungi,
  - microorganisms such as bacteria and viruses

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Which Sanitizers Can I Use for Postharvest Processing of Fruits and Vegetables?

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What We Will Cover Today

1) How to identify if a sanitizer can be used as a sanitizer for washing fresh fruit and vegetables.
2) What a product label should tell you.
3) Who to contact if you have questions regarding postharvest sanitizers.
4) Testing sanitizer concentrations

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Regulation of Products

- Postharvest sanitizers are considered a pesticide and regulated by the Environmental Protection Agency (EPA).
- EPA will review toxicity data and results from tests to show how well the product kills bacteria (and not us!) to determine if the product should be approved.

Pesticide Registration

- Postharvest sanitizers also need to be registered and approved for use in the state that they are being used:
  - Indiana: Ed White, Office of the Indiana State Chemist
  - Ohio: Diana Roll, Ohio Department of Agriculture

Office of Indiana State Chemist

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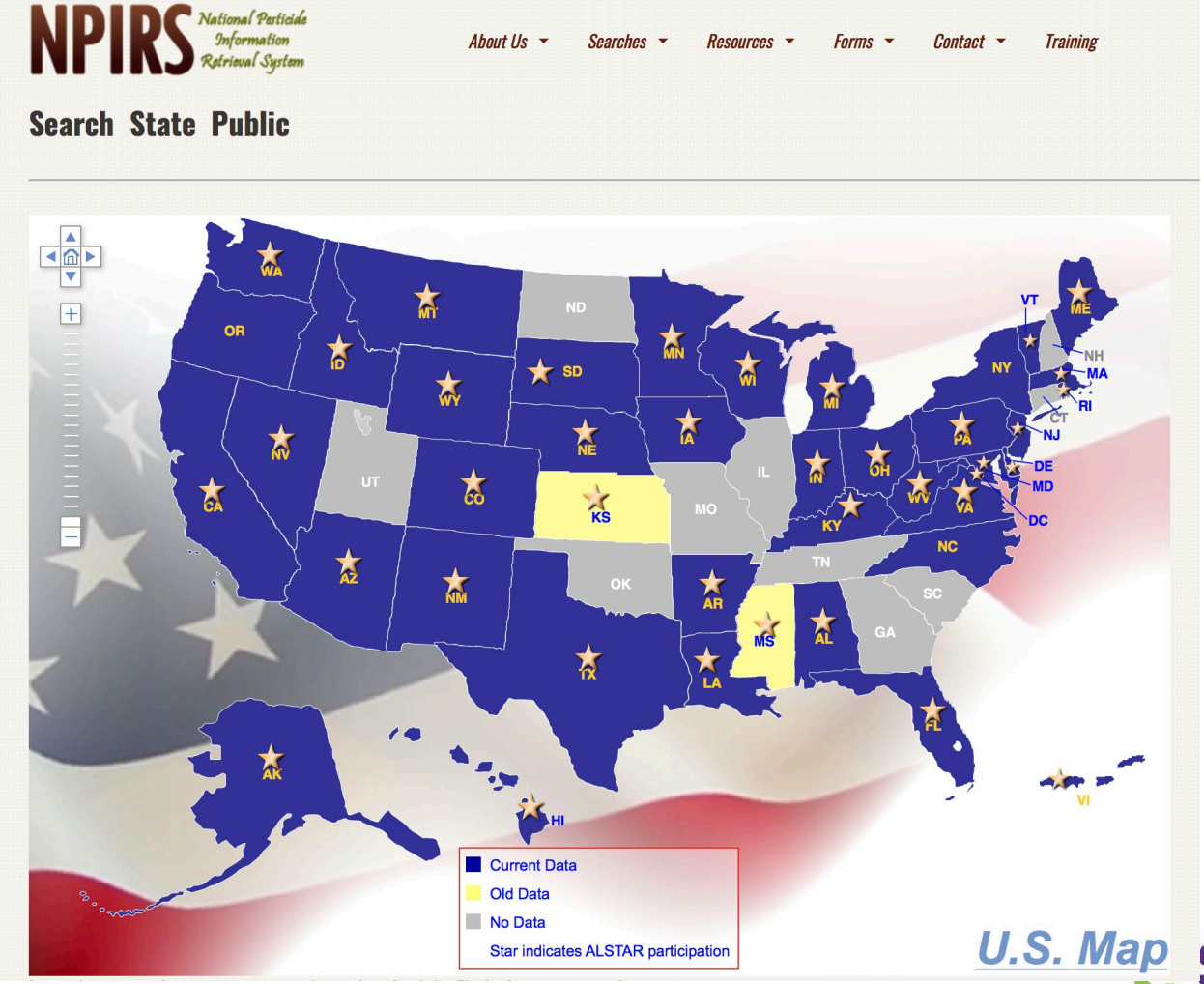
NPIRS – National Pesticide Information Retrieval System



U.S. Map

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EPA Registration Number

- All products must have an EPA registration number on the label
  - This means the product should perform as stated on the label and not pose unreasonable hazards to your health **IF** used according to the label on the instructions
  - This should be the first thing you look for when checking to see if a particular product can be used

EPA Registration Numbers

- If an EPA number is not clearly displayed on the product =

- Contact the manufacturer to determine if they do have an EPA number and request the number.
- Product EPA numbers can be found at: https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1

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EPA Registration Numbers

- These logos don’t replace an EPA number:

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Minimum Risk Pesticides

- List of approximately 30 compounds that do not have to be registered with the EPA.
- However:
  - The product must not bear claims either to control or mitigate microorganisms that pose a threat to human health
  - The product must contain ONLY active ingredients that are listed in the table (next slide) and inert ingredients that have been classified by EPA as "Inert Ingredients of Minimal Concern"
  - The product still needs to be registered for use in the state that it is being used

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Minimum Risk Pesticides

Castor Oil	Linseed Oil
Cedar Oil	Malic Acid
Cinnamon and Cinnamon Oil	Mint and Mint Oil
Citric Acid	Peppermint and Peppermint oil
Citronella and Citronella Oil	2-Phenethyl Propionate
Cloves and Clove Oil	Potassium Sorbate
Corn Gluten Meal	Putrescent Whole Egg Solids
Corn Oil	Rosemary and Rosemary Oil
Cottonseed Oil	Sesame and Sesame Oil
Dried Blood	Sodium Chloride
Eugenol	Sodium Lauryl Sulfate
Garlic and Garlic Oil	Soybean Oil
Geraniol	Thyme and Thyme Oil
Geranium Oil	White Pepper
Lauryl Sulfate	Zinc Metal Strips
Lemongrass Oil	

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EPA Registration Number

Tsunami® 100

PROPERTIES

Form	Liquid
Color	Colorless
Odor	Acetic acid
Foam	none
Spec. Grav. @ 68°F (20°C)	1.114
Pounds per gallon	9.28 (4.21kg)
1% pH	2.83

Active Ingredients:	
Peroxyacetic Acid	15.2%
Hydrogen Peroxide	11.2%
Inert Ingredients	73.6%
TOTAL	100.0%

EPA Reg. No. 1677-164

US Patent No. 5,409,713

Other Patents Pending

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EPA Registration Numbers

Examples: EPA Reg. #xxxxxx-yyyy

EPA Reg. #xxxxxx-yyyy-zzzzz

xxxxxx = Company I.D. Portion

yyyy = Product I.D. Portion

zzzzz = Distributor Suffix

The 3rd field designates that the product is likely a private label and that the true manufacturer's name has been replaced with the private label.

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EPA Registration Numbers

- EPA numbers and information about products can be found on the Pesticide Product Label System (PPLS) website.
  - Product name
  - Company name
  - EPA registration number

http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1

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EPA Registration Number

- Products that have the same EPA registration number should have the same ingredients.

- The third field may vary as that field are supplemental registrations or private label products derived from the same federal registration.

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Examples

- EPA No. 63838-1
- PERCENT ACTIVE INGREDIENT
  - 26.5% Hydrogen Peroxide
  - 5.6% Peroxyacetic Acid (also called peracetic acid)

- 20 products registered in Indiana with same EPA number and different companies
  - Perasan A
  - Arkema PAA 6
  - Peroxysan RS
  - WC-237
  - SB-Peracetic Acid

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Products with the Same EPA Number

- Even though they are the same chemical they may not have a label that states use for fruits and vegetables.
- Label must give use rates for postharvest processing of fruits and vegetables and the label must be followed exactly.

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Example – Tsunami®100

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. FOR PATHOGEN* REDUCTION AND CONTROL IN FRUIT AND VEGETABLE PROCESSING WATERS:

A. Batch systems with no makeup water added:
   1. Ensure that water is mixing in the processing vessel.
   2. Add Tsunami 100 at a rate from 2.5-6.7 fluid ounces per 100 gallons of process water. This will produce about 215-575 ppm total product and about 30-80 ppm peroxyacetic acid. At this use dilution, Tsunami 100 will provide a 99.9% reduction against the pathogens *Escherichia coli* 0157:H7*, *Listeria monocytogenes** and *Salmonella enterica**.
   3. Measure the residual peroxyacetic acid concentration in the water using a Test Kit (consult Ecolab Representative) and adjust dose as needed. Allow a 1.5 minute mixing time.

B. Continuous systems with makeup water continuously added:

   Initial dose:
   1. Ensure that water is mixing in the processing vessel and/or piping.
   2. Add Tsunami 100 at a rate from 2.5-6.7 fluid ounces per 100 gallons of process water. This will produce about 215-575 ppm total product and about 30-80 ppm peroxyacetic acid. At this use dilution, Tsunami 100 will provide a 99.9% reduction against the pathogens *Escherichia coli* 0157:H7*, *Listeria monocytogenes** and *Salmonella enterica**.
   3. Measure the residual peroxyacetic acid concentration in the water using a Test Kit (consult Ecolab Representative) and adjust dose as needed. Allow a 1.5 minute mixing time.

   Continuous Dosing:

   Meter Tsunami 100 at a rate from 2.5-6.7 fluid ounces per 100 gallons of fresh makeup water added to the system. This will produce about 215-575 ppm total product and about 30-80 ppm peroxyacetic acid. Measure the residual peroxyacetic acid concentration in the water using a Test Kit (consult Ecolab Representative) and adjust dose as needed. Allow a 1.5 minute mixing time.

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Product Labels

- The label should tell you:
  - Concentration for use and how to dilute it
  - Contact time
  - Possibly what types of organisms the product can kill (*Listeria monocytogenes*, spoilage microorganisms, etc.)
  - If a final rise of the produce with potable water is needed following contact with the sanitizer
  - Disposal of product and containers
  - First aid procedures

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Example – Tsunami®100

BENEFITS

Promotes Quality Assurance

- Low reactivity with organics and soils assures consistent dosage is available for microbial control.
- Successfully applied in all major processing steps including multi-stage flumes, chill tanks, coolers and various washing equipment in fresh cut, post harvest and further processed facilities.
- Tsunami is OMRI certified for organic production.
- No pH control necessary - effective microbial control at acid to slightly alkaline pH.
- Broad applicability to all vegetables and fruits, both whole and cut.
- No rinse required.

Environmental Implication

- Single product, ready-to-feed liquid; requires no precursor chemicals or on-site generation equipment.
- Rapidly breaks down after use into water, oxygen and acetic acid.

Enhances Overall Plant Economics

- Eliminates need for generation equipment, precursor chemicals and maintenance.
- Reduced labor, water and chemical costs.
- Controls fruit and vegetable surface microbial activity so product spoilage is minimized and shelf life is enhanced.

Example – Tsunami®100

Used as directed, Tsunami 100 reduces 99.9% of the pathogens Escherichia coli O157:H7*, Listeria monocytogenes* and Salmonella enterica* in fruit and vegetable processing waters. Tsunami 100 also provides control of spoilage and decay causing non-public health organisms present in processing waters and on the surface of post-harvest, fresh-cut and processed fruits and vegetables.

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Example – Chlorguard

RMC
Rochester Midland Corporation

Food Safety Division

Chlorguard

Chlorinating Solution

LIQUID BACTERICIDE·DISENFECTANT
SANITIZER·DEODORIZER

BrandGuard

For dairy, dairy farm, beverage, meat, poultry, commissary and food processing plants.

ACTIVE INGREDIENTS:	
Sodium Hypochlorite	12.5%
Inert Ingredients	87.5%
Total	100.0%

EPA REG. NO. 9613-20001-527 EPA EST. NO. 527-NY-1

KEEP OUT OF REACH OF CHILDREN

DANGER

See Side Panels for Precautionary Statements

NET CONTENTS: 1 Gallon · 3.8 Liters

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Example – Chlorguard

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING

FRUIT AND VEGETABLE WASH:

For in-plant chlorination of water used for washing fruits and vegetables, use a chlorinator to obtain a 25 ppm available chlorine residual in wash water as determined by a chlorine test kit. Addition of 5 ounces of this product per 200 gallons of water will provide approximately 25 ppm available chlorine by weight. Product must be thoroughly rinsed with potable water after treatment.

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Example – Chlorguard

DILUTION GUIDE FOR USE OF CHLORGUARD CHLORINATING SOLUTION

Chlorine to Water			=	PPM Chlorine
1 ounce	-	40 gal	=	25 ppm
1 ounce	-	20 gal	=	50 ppm
1 ounce	-	10 gal	=	100 ppm
1 ounce	-	5 gal	=	200 ppm
3 ounces	-	5 gal	=	600 ppm

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Example – Chlorguard

ENVIRONMENTAL HAZARDS:
This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public waters unless this product is specially identified and addressed in an NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

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Example – Chlorguard

STORAGE AND DISPOSAL:
Store in a cool, dry area away from direct sunlight. In case of spill, flood area with large quantities of water.
DISPOSAL INSTRUCTIONS: IF EMPTY: Do not reuse this container. Place in trash or offer for recycling if available. IF PARTLY FILLED: Call your local Solid Waste Agency or 1-800-CLEANUP for disposal instructions. Never place unused product down any indoor or outdoor drain.

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Example – Chlorguard

FIRST AID	
If Inhaled	• Move person to fresh air • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
If on skin or clothing	• Remove contaminated clothing. • Rinse exposed area immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for further treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. • Call a poison control center or doctor for further treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.

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What Products Can Be Used?

- Once a product is registered with the EPA it must also be registered in the state that it is used.
- The product is registered through each state (ex. Office of the Indiana State Chemist (OISC) in Indiana) and has to be renewed each year.
- Product registration data is maintained on the National Pesticide Information Retrieval System (NPIRS): http://npirspublic.ceris.purdue.edu/npirs.html

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Approved Sanitizers for Fruits and Vegetables

- Handout of approved sanitizers for postharvest processing of fruits and vegetables was developed.
- Although the list is specific to Indiana, it may help as a guide to determine the right sanitizer for your farm.

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Measuring Concentrations

- The sanitizer concentration needs to be measured to ensure it is correct.
- Depending on the sanitizer used (such as chlorine) you may also need to measure pH

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Know the Limitations!

This color indicates 160 ppm PPA

But could also be 500 ppm PPA!!

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Final Thoughts

- Ask the sanitizer manufacturer for recommendations
- Likely can purchase on Amazon or other online sources at lower costs
- Growers will need to have this if doing a 3rd Party Audit
- Do growers HAVE to use postharvest sanitizers for washing fruits and vegetables? NO!
  - It depends on what the buyer wants
  - Things can be made worse (cross contamination) if the wash step is not done correctly

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Thank You!

Contact Info:
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Email: adeering@purdue.edu
www.safeproducein.com

Questions?

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PSA Sanitizer Resources

Resources → General Resource Listing

Two resource updates:

- Selecting an EPA-Labeled Sanitizer (Factsheet)
- Labeled Sanitizers for Produce Excel Tool

Resources News Food Safety Modernization Act The Alliance Contact Us

General Resource Listing

Home / Resources / General Resource Listing

Water

- The Water Analysis Method Requirement in the FSMA Produce Safety Rule (Updated August 2018 to reflect recent FDA announcements)
- FSMA Produce Safety Rule Water Requirements: Insights to Get You Organized!
- MWQP Agricultural Water Calculators (online tools)
- Geometric Means, Statistical Threshold Values, and Microbial Die-Off Rates (longhand calculations)

Soil Amendments

- South Central Soil Summit Resources
- Southeastern Soil Summit Resources

Land Use Issues

- Food Safety for Flooded Farms

Sanitation

- Introduction to Selecting an EPA-Labeled Sanitizer
- Labeled Sanitizers for Produce - Excel Tool Version 2 updated 9/27/18
  - Video Tutorial: How to Use the Excel Tool Labeled Sanitizers for Produce
- United Fresh—Guidance on Environmental Monitoring and Control of Listeria for the Fresh Produce Industry

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Factsheet: Introduction to Selecting an EPA-labeled Sanitizer

- Help educators assist growers in selecting an appropriate sanitizer
- What to look for in an EPA label
- Encourage educators to develop a state-specific list of sanitizer names

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Introduction to Selecting an EPA-Labeled Sanitizer

Donna Pahl Clements, Gretchen Wall, Don Stoeckel, Connie Fisk, Kristin Woods, and Elizabeth Bihn

October 2018

The use of properly labeled sanitizers (i.e., antimicrobial pesticides) in water that comes in contact with fruits and vegetables at or after harvest is highly encouraged to reduce the risk of cross-contamination by human pathogens. The use of sanitizers that have a United States Environmental Protection Agency (EPA) label are encouraged since these products have been evaluated by the EPA to limit the product's impact on the environment and human health. Sanitizers are employed as a water treatment to prevent the spread of contamination in harvest and postharvest systems, such as dump tanks (or high volume tanks) and flumes. Sanitizers also can be used as part of a multi-step cleaning and sanitizing routine to reduce the level of pathogens on food contact surfaces to acceptable levels (see 'sanitizer' in Produce Safety Alliance glossary)[1]. Once growers realize the significant role that sanitizers play, they often ask how to find and select an EPA-labeled sanitizer. This document has been developed for educators to help growers understand the importance of selecting a labeled sanitizer and using the right sanitizer for their operation.

Why should growers use an EPA-labeled sanitizers?

Sanitizers fall under the EPA definition of an antimicrobial pesticide because they are "substances or mixtures of substances used to destroy or suppress the growth of harmful microorganisms such as bacteria, viruses, or fungi…"[2]. All pesticides distributed in the U.S. are regulated by the EPA Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA ensures that using a product correctly will help to limit the product's risk to humans, wildlife, and the environment. All pesticides sold in the U.S. must be registered and list an EPA registration number. Additionally, EPA must review any statements made on the product's label; this information may include efficacy statements describing the organism(s) that the sanitizer will control if used according to label instructions, and directions for use, storage, and disposal. More information can be found in the EPA FIFRA summary document[3]. Though the FSMA PSR does not expressly require growers to use an EPA-labeled sanitizer, it is one way to determine if a sanitizer will be effective. If a grower uses a sanitizer that does not have an EPA label, the grower should be able to prove that the product is suitable for the intended use (such as washing fresh produce) and for reducing contamination risks.

What should a grower look for in a sanitizer label?

Here are key elements of a sanitizer label that should be reviewed by growers. They are each addressed in detail below:

- EPA registration number to identify the product
- Labeled use(s) for the sanitizer, such as sanitizing nonporous food contact surfaces
- Instructions to guide the use of the sanitizer
- Efficacy statement listing organisms the product is labeled to treat

When selecting a sanitizer to incorporate into food contact surface sanitation activities or postharvest water treatment, growers should first determine whether the sanitizer has an EPA registration number; this unique identifier demonstrates that the product is registered with EPA. The EPA number may be listed in several places including on the label on the outside of the product bottle, on the EPA label that may or

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Labeled Sanitizers for Produce Excel Tool, Version 2.0

Last revised: 9/6/2018

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Click here for: Single Product Sheet

Trade Name	Other Trade Names	Active Ingredients	Label Information	Product Information
Accutab	PPG Calcium Hypochlorite Tablets	Click here for:	Click here for:	Click here for:
Adox 3125	Adox 8125 Adox BCD-25 Aseptrol 8125			
Adox 750	Adox BCD-7.5			
Agchlor 310	Agchlor 310F			
Alpet D2	Alpet D2 Surface Sanitizer Alpet Surface Sanitizer D2			
Anthium Dioxcide	Anthium Dioxcide stabilized chlorine dioxide			
Antimicrobial Fruit and Vegetable Treatment	None			
Bacticide	Sodium Hypochlorite - 12.5 Hypure Sodium Hypochlorite 12.5			
BioSide HS 15%	Pentagreen 15% Peragreen WW			

- Designed to assist growers find an EPA-labeled sanitizer
- Version 2.0 contains several new sanitizers and minor formatting updates
- Video tutorial available walk through how to use the tool

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Labeled Sanitizers for Produce Excel Tool, Version 2.0

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Choose your sanitizer from the list:

Sanidate 5.0

BACK to MAIN PAGE

Using the Single Product Sheet:
This page contains all of the information within the PSA Sanitizer Excel tool for one single sanitizer (active ingredients, labeled uses, and product information).
Select your sanitizer from the dropdown menu and the information will automatically show up under each heading.
This product information sheet is formatted to print out in a convenient single-page format.

Other Trade Names	Storox 5.0 Post Harvest Treatment Greenclean Max Algaecide Greenclean Liquid 5.0 Greenclean WTO Sanidate WTO

Sanitizer Active Ingredients	*Strength (percent)*	*Chemical*
Oxidizers	5.3% 23.0%	PAA with Hydrogen peroxide
Organic Acids	NA	None
Quaternary Ammoniums	NA	None
Enhancers	NA	None

Labeled Uses	
Organic Materials Review Institute (OMRI) Listing	Allowed with restrictions
EPA Reg. No.	70299-19
EPA Accepted Date	6/28/2017
Link to EPA Label	Label PDF
Notes	None

	Labeled for use	*EPA label page number*
Washing Fruits and Vegetables	Yes	Page 22

New feature includes the Single Product Sheet, which contains all relevant information on a single page.

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Trade Name	Other Trade Names	Active Ingredients	Label Information	Product Information
Accutab	PPG Calcium Hypochlorite Tablets	Click here for:	Click here for:	Click here for:
Adox 3125	Adox 8125 Adox BCD-25 Aseptrol 8125			
Adox 750	Adox BCD-7.5			
Agchlor 310	Agchlor 310F			
Alpet D2	Alpet D2 Surface Sanitizer Alpet Surface Sanitizer D2			
Anthium Dioxcide	Anthium Dioxcide stabilized chlorine dioxide			
Antimicrobial Fruit and Vegetable Treatment	None			
Bacticide	Sodium Hypochlorite - 12.5 Hypure Sodium Hypochlorite 12.5			
BioSide HS 15%	Pentagreen 15% Peragreen WW			

If you have any sanitizers that are not listed in the sheet, please send them on to me:

Donna Pahl Clements, dmp274@cornell.edu

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Next Meeting

Produce Safety ALLIANCE Educator's Group

- December 17, 2018 at 2 pm Eastern
- Topic: Discussion of PSR Draft Guidance
- Meeting info to be sent out via the listserv closer to the time of the call
- Submit other topics for discussion to Gretchen (glw53@cornell.edu)

Produce Safety Alliance Team

Northeast:
Betsy Bihn, Ph.D.
Gretchen Wall, M.S.
Laura Acuña-Maldonado, Ph.D.
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Rob Way

Northwest:
Connie Fisk, Ph.D.

Midwest:
Don Stoeckel, Ph.D.

Southwest:
Donna Clements, M.S.

Southeast:
Kristin Woods, Ph.D.

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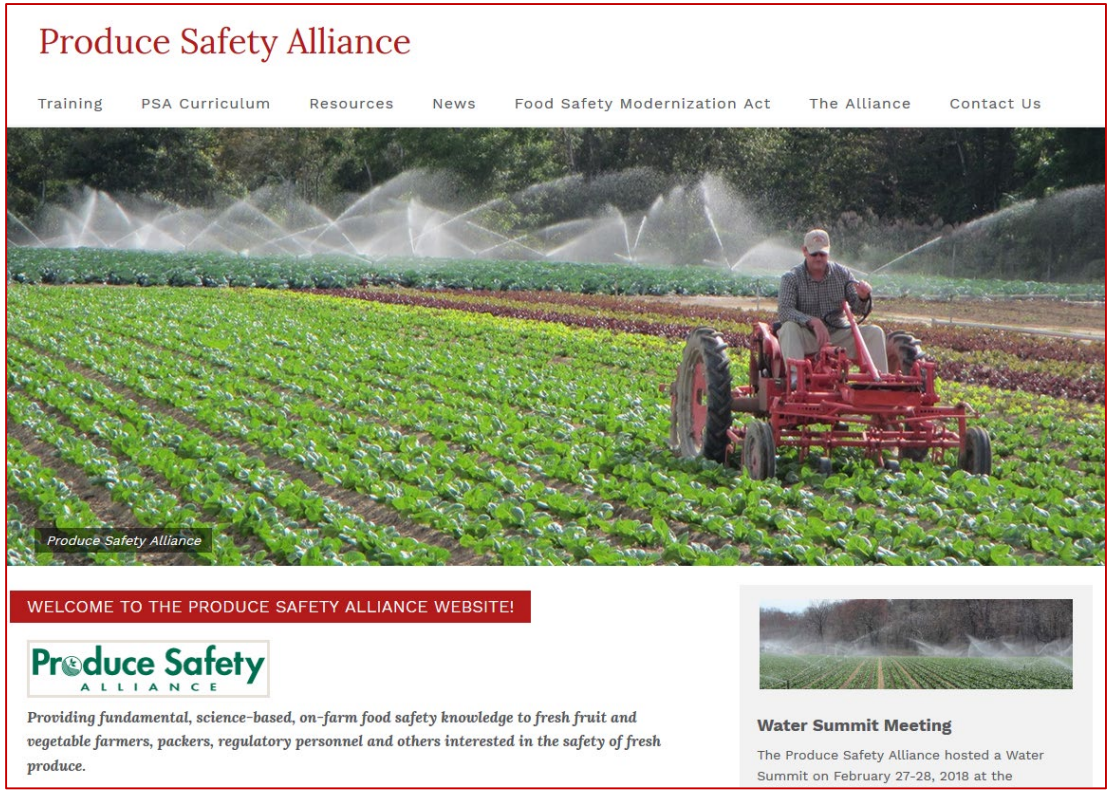
The PSA Website

http://producesafetyalliance.cornell.edu/



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