

Food Safety for Organic Production and Handling of Fresh Produce

Using Sanitizers On The Farm For Sanitation or Mitigation

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Cleaning and Sanitizing Objectives....

SANITATION IS A
PROCESS :

Cleaning and Sanitizing Objectives....

- i Control microbiological activity
- i Preserve quality, freshness, palatability of food products
- i Insure healthfulness and freedom of disease
- i Contributes to worker health
- i Add value to the product

Cleaning Objectives....

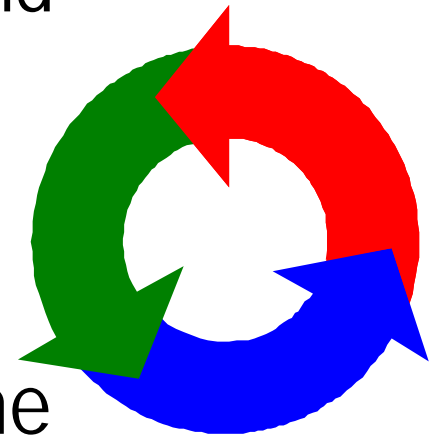
- i Sanitation Begins With An Effective Cleaning Program
- i Soils Not Only Harbor Bacteria, but May Actually Prevent The Sanitizer From Coming Into Contact With The Surface That Needs To Be Sanitized
- i Organic Deposits May Inactivate or Reduce the Effectiveness Of Some Types Of Sanitizers, Such as Sodium Hypochlorite (Bleach)
- i Biofilm Removal

Requirements For An Effective Cleaning and Sanitizing Program...

- | Trained personnel
- | Establishment and adherence to SOP's and GAP's (Standard Operating Procedures and Good Agricultural Practices)
- | Adequate "high quality" water supply detergent performance and selection
- | Knowledge of sanitizing agents
- | Understand the factors (variables) of cleaning
 - § Concentration
 - § Time
 - § Temperature
 - § Force

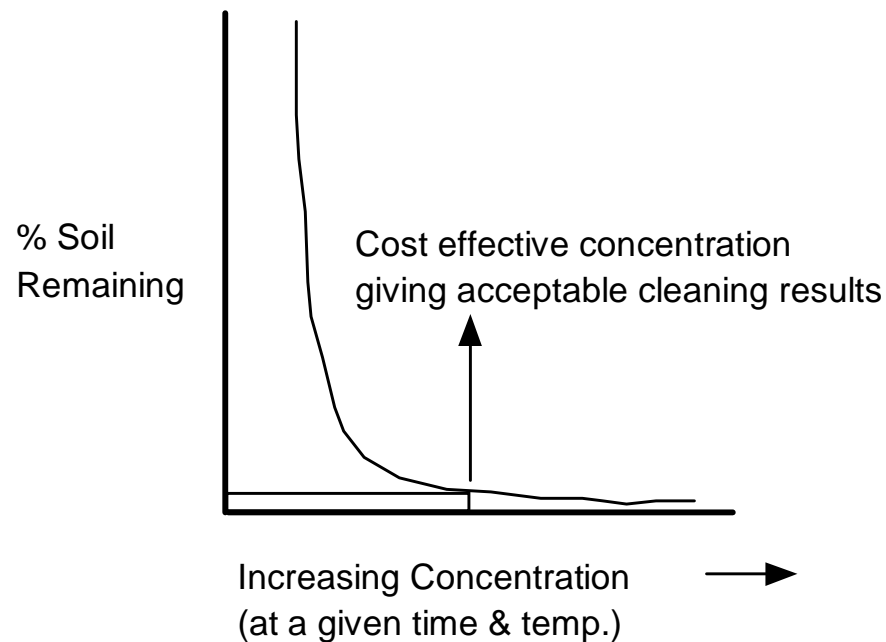
Factors in Cleaning...

- i Factors of Cleaning
 - § Concentration of the Cleaning Compound
 - § Temperature of the Cleaning Solution
 - § Time/Length of Cleaning
 - § Physical Action
- i Factors can be adjusted to achieve the greatest cleaning efficiency
- i Water quality is foremost variable



Concentration...

- Minimal Concentrations Should Be Avoided
- Increasing Concentrations, Increases Efficiency but at a Decreasing Rate(Time, Temp Constant)
- Too Much Detergent Reduces Cleaning



Temperature...

i Increasing Temperature

- § Decreases the bonds soil and surface
- § Solubility of soils increases
- § Decreases viscosity and increases turbulent action
- § Chemical reactions increase

i Cleaning Temperatures

- § Increasing cleaning temperatures 18°F will approximately double the cleaning efficiency
- § Rinse temperatures should be ambient to avoid “flash drying”
- § Many chemical cleaners are designed to be used in warm water

Time...

- i All factors being constant, the cleaning performance can be improved by increasing time
 - § Minimal time for effectiveness
 - § Maximum practical economical time
 - § Longer contact with soil results in more soil removal
 - § Excessively long contact may decrease soil removal

Force...

- i Physical action is extremely important
 - § Force assists the chemical in overcoming the bond between the soil and equipment surfaces.
 - § In manual cleaning force is applied by “elbow grease”.
 - § In high pressure cleaning “impact force” as much as 1000 psi is applied to the equipment surface

Choosing the Proper Cleaner...

- | Personnel Safety
- | Nature of Soil
- | Amount of Soil On The Surface
- | Water Chemistry (Total Hardness, Iron etc.)
- | Equipment Metallurgy
- | Time to Clean, Temperature, Concentration, Costs
- | Test ability (Concentration, Surface Residuals)
- | How the cleaner is to be applied
- | Product Composition
- § Alkalinity
- § Salt Content
- § Biodegradability
- § Rinse ability

The Ideal Cleaner...

- Mild Alkaline
- High Level of Detergency
- Excellent Degreaser/Emulsifier
- Non /Low Corrosivity to Ferrous , Aluminum, Galvanized, Brass and Copper
- High Concentration of Chelants
- Low to Mid Foaming
- Easy to Test (Concentrations)
- Low Salt Content
- Good Biodegradability
- Free Rinsing

Cleaning and Sanitation Procedure...

- i Rinse With Potable Water
 - § Removal of debris, dirt etc.
- i Apply Cleaning Solution
 - § Foaming
 - § Manually
 - § High Pressure
- i Rinse With Potable Water
 - § Removal of Detergent and Soil
- i Sanitize(Do Not Rinse)
 - § Coarse Spray
 - § Foaming

To Sanitize...

- i To Sanitize Means To Reduce The Number Of Microorganisms To A Safe Level
- i A Sanitizer
 - § Must Have Proper Authorizations/Certifications (EPA, FDA Title 21 CFR 178.1011, NOP List 205.600-205.607)
 - § Must Be Capable of Killing 99.999% (5 Log Reduction) of a Specific Bacteria in 30 seconds.
 - § Hard Surface Sanitizer Must Be Capable of Killing 99.9% (3 Log Reduction) of a Specific Bacteria in 30 seconds
 - § Sanitizers Kill Vegetative Cells
 - § Sanitizers Damage Various Structures Of The Bacterial Cell, Inhibiting The Bacteria's Ability To Reproduce Resulting In Cell Death

Why Sanitize??

- i Even The Most Ideal Cleaning Procedure Is “Never” 100% Effective In Completely Eliminating The Microbiological Population
- i Bacteria Can Lie Dormant After Cleaning and Begin To Grow After Nutrients are Provided
- i Bacteria Reproduce By Binary Fission
 - § Bacteria Reproduce Exponentially (i.e. One Becoming Two)
 - § Under Ideal Conditions, Coliform Can Double There Population Size Every 12.5 minutes
 - § If Just 1 Bacteria Were To Survive The Cleaning Process, In 8 Hours You Would Have 360 Billion

When Do We Sanitize??

- i Sanitizers Should Be Applied Immediately After Finalizing The Cleaning Process
- i Sanitizers Should Be Applied Prior To Start-up Of Equipment and/or Processes That Have Been Shutdown For Over Some Predetermined Period of Time

Surface Sanitizers For Organic Produce Harvesting/Processing...

- i Sodium Hypochlorite
- i Chlorine Dioxide (Acidified Sodium Chlorite)
- i Peracetic Acid

Surface Sanitizers For Organic Produce Harvesting/Processing...

i Sodium Hypochlorite

§ Advantages

- Broad Spectrum Kill
- As Surface Sanitizer, Use Rate is 200 ppm, No Rinse Required
- Low Cost, Readily Available
- Easily To Handled, Control and Test

§ Disadvantages

- Functions Best Within a Narrow pH Range (5-7)
 - Approximately 80% reduction in germicidal efficiency at pH 8.0 versus 6.0
- Does Not Remove Biofilms
- High Sodium Content
- Adversely Effected By Organic Matter and Ammonia Levels
- Corrosive to Ferrous Metallurgy and Stainless Steel
- Forms Chlorinated Organic Compounds (THM's, etc.)
 - Many are Known Carcinogens

Surface Sanitizers For Organic Produce Harvesting/Processing...

i Chlorine Dioxide/Acidified Sodium Chlorite

§ Advantages

- Broad Spectrum Kill, 2.6 Times More Powerful Oxidant
- As Surface Sanitizer, Use Rate is 50 ppm, No Rinse Required
- Does Not Form Chlorinated Organic By-Products
- Is pH Independent (3-12)
- Excellent Removal Biofilms
- 10 Fold Less Corrosive to Ferrous and Stainless Metallurgy
- Because No pH Variable, Easier To Handled, Control and Test
- Lower Sodium Content

§ Disadvantages

- Higher Cost
- Most Be Generated/Prepared On Site
- Fire Hazard

Surface Sanitizers For Organic Produce Harvesting/Processing...

i Peracetic Acid Versus Sodium Hypochlorite

§ Advantages

- Broad Spectrum Kill, Very Strong Oxidant
- Excellent in Cold Water
- As Surface Sanitizer Use Rate 85 ppm, No Rinse Required
- pH Dependent (5-8)
- Easy To Handle, Control and Test
- Fair Removal of Biofilms
- Does Not Form Harmful Chlorinated Organic By-Products
- Non Corrosive to Stainless Metals, Less Corrosive to Ferrous
- Low Salt Content, Breakdown Products = Water + Oxygen + Acetic Acid

§ Disadvantages

- Higher Cost
- Rapid Decomposition Temperature $>86^{\circ}\text{F}$, Rate Doubles For Every 10°F
- Fire Hazard
- Strong Vinegar Odor

Surface Sanitizers For Organic Produce Harvesting/Processing...

- i Quaternary Ammonium Chloride (Quats)
 - § Cationic (Polymer Based) Organic Compounds
 - § As Surface Sanitizer Use Rate 200 ppm
 - § Leave a Non-Volatile Residue On Surfaces
 - § **Not Listed in NOP List of Allowed Substances**
 - § Because This Class of Sanitizers Are Not Approved, Must Be Washed and Rinsed Completely From the Equipment Surface Prior To Food Processing/Use
 - § This Makes Their Use Illogical

Thank You
Questions??

