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PRACTICAL SOLUTIONS FOR IMPROVED WINERY SANITATION

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Why is sanitation important in wine processing operations?

- Wine's chemical make-up (low pH, 10+% alcohol, tannin content, SO₂) makes it a natural preservative and eliminates a need to worry about [foodborne] pathogens.
- Wine quality, however, is influenced by several factors. Interestingly, sanitation influences each of these factors as well:
 - Cleanliness of fruit and contamination of clean fruit by rotted fruit
 - MOG (material other than grape)
 - Processing operations environment
 - Wine quality consistency
 - Wine's natural microflora
- Wine microflora is isolated to a few classes of microorganisms:
 - Bacteria
 - Lactic Acid Bacteria
 - Acetic Acid Bacteria
 - Yeast
 - Saccharomyces
 - Film-Forming Yeast Genera
 - Zygosaccharomyces
 - Brettanomyces
 - Fungi/Mold
 - Aspergillus
 - Penicillium
 - Botrytis
- Most common microbiological contamination sites in a winery:
 - Harvest or crush equipment
 - Wine thieves
 - Winery floor drains
 - Bottling filler bowls or filler heads

Cleaning vs. Sanitizing

- **Cleaning:** physical removal of mineral and organic material or debris from equipment surfaces
- **Sanitizing:** reduction of microorganisms through such means as addition of chemicals or heat
- **Sterilizing:** killing 100% of all viable microorganisms, associated spores, and viruses; rarely achieve in commercial processes
- General rules regarding cleaning and sanitation processes:
 - Cleaning equipment does not indicate the equipment is properly sanitized
 - Dirty equipment cannot be sanitized
 - Equipment must be cleaned before being sanitized
 - Sanitation is one step in producing quality wines
 - Routine cleaning can be helpful
 - Regular cleaning and sanitation can improve production efficiency long-term
- Detergents are cleaning agents used to solubilize debris or solid/liquid deposits
 - Alkaline (high pH)
 - Sodium hydroxide
 - Potassium hydroxide
 - Sodium silicates
 - Sodium carbonate
 - Acidic (low pH)
 - Phosphoric acid
 - Nitric acid
- Sanitizers are sanitation agents used to reduce the viable cell populations to acceptable lower levels

Sanitizer	Advantages	Disadvantages
Chlorine Dioxide	No toxic byproducts; Better sanitizing agent (compared to chlorine); No rinse cycle on surfaces when used at certain concentrations	Safety risk; High toxicity; Rapidly decomposes in light and warm temperatures; Cost
Quaternary Ammonium Compounds (QUATS)	Broad pH spectrum; Residual activity if not rinsed; Heat stable; Noncorrosive	Limited low temperature efficacy; Excessive foaming; Variable antimicrobial activity; Potential microorganism resistance if used too often
Peroxyacetic Acid (PAA)	Stable (at 100-200 mg/L concentrations); Compatible with hard water; Reduced foaming; Biodegradable; Less corrosive than chlorine; No residue; Phosphate free; Active over a broad pH range	Metal ion sensitivity; Corrosive to soft metals; Odor; Varied activity against fungi

Hot Water (>82°C/180°F)	Safe; Easily Available; Broad antimicrobial activity; Non-corrosive; Penetrates hard-to-reach areas	Slow; Film formation; Long-term equip. damage; Condensation formation; Scale formation (hard water); High energy cost
Steam	More effective and quicker than hot water; Effective against Brett; Not toxic; Can be used on several types of equipment; Broad antimicrobial activity; Penetrates hard-to-reach areas	Degrades gaskets, valves and liners; Expensive installation; Slightly dangerous; Potential TCA/TBA contamination source; High energy cost; Condensation and film formation
Acidulated Sulfur Dioxide	Inexpensive; Easy to use and make; Ingredients naturally found in wine; Wine pH	Strong solutions can damage rubber and plastic materials; Requires good ventilation; Requires use of cold water; Toxic
Ozone	Better sanitizer than chlorine; Effective against Brett; Works at low concentrations; No toxic byproducts; Generated onsite; As a gas, disinfects package materials	Toxic; Exposure limited by OSHA; Requires trained staff; Requires good ventilation; Efficacy affected by pH, temperature, organics/inorganics; Cost; Corrosive to soft metals, mild steel, rubber, and plastics

Information in the above table adapted from Fugelsang and Edwards, 2007

Receiving and Storing Chemicals in the Winery

- Both Bioterrorism Act (BTA) and Food Safety and Modernization Act (FSMA) influence how chemicals and food ingredients must be managed by commercial food/beverage facilities.
- When ordering non-food grade chemicals (e.g., detergents, sanitizers, lab chemicals), ask for and maintain copies of the following information:
 - Product Specification Sheet (which may look like marketing material)
 - Letter of Guarantee from supplier OR documentation of a 3rd party food safety audit.
- When chemicals are received at the winery, it is a good habit to maintain a log of BTA-required information
- To use chemicals in the winery:
 - Develop and write Sanitation Standard Operating Procedures (SSOPs)
 - Designate specific positions (personnel) to manage SSOPs
 - Train designated personnel in sanitation
 - Document training procedures
 - Review training annually
- Storing sanitation chemicals
 - Allocate non-food grade storage areas in the winery
 - Store chemicals according to manufacturer's recommendations

- Separate acids and bases
- Double check labels and ensure every chemical (or holding container) is properly labeled
- Maintain an inventory of additional materials:
 - Provide adequate application materials
 - Consider colored brushes
 - Provide employee safety clothing
- Develop Corrective Actions in case anything above is not received, stored, or used properly.
 - **Corrective Action:** “improvements to an organization’s processes taken to eliminate causes of non-conformities or other undesirable situations.” (*Wikipedia*)
- General Sanitation Procedures
 1. Manual Cleaning
 2. Chemical Cleaner (Detergent/Surfactant) Application
 3. Warm Water Rinse
 4. Sanitizer Application
 5. Potential Rinse (Some sanitizing agents are no-rinse sanitizers)

SSOPs for the Winery

- SSOP = **Sanitation Standard Operating Procedure**, written procedures for carrying out sanitation practices in operation
- Information that should be on the SSOP:
 - Facility name, address, phone number and establishment number
 - Preoperational (cleaning) procedures
 - SSOP frequency
 - Employee position responsible for implementing SSOP
 - Employee position responsible for maintaining SSOP documentation
 - Corrective Actions
 - Identify documentation records that are kept at the winery
 - Identify individual with overall authority to ensure SSOPs are implemented

Do you need assistance developing your operation’s sanitation procedures or writing SSOPs? Do you need help determining if your winery falls under FSMA’s new policies? Check out Denise Gardner Winemaking (www.dgwinemaking.com) for wine production information, including a (free!) weekly blog series, and wine consulting service packages. Or email me directly at denise@dgwinemaking.com for more information.