Sanitizers in Packinghouses

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Sanitation

Usually associated with practices to reduce disease causing microbes on foods or food contact surfaces

Means "to promote health"

In Packinghouses:

Includes reducing the number of fungal spores on fruit contact surfaces (e.g. brushes and belts)

Includes reducing the number of fungal spores on fruit surfaces

Fungicides

Fungicides are organism specific and will work for prolonged periods.

Fungicides can be:
Protectants
Eradicants
Systemic

Sanitizers

Sanitizers are not specific for only certain microorganisms

Sanitizers have no residual effect

Effectiveness depends upon a number of factors:

These factors include:

amount of organic material in the sanitizer solution

pH

contact time

concentration

health and type of commodity

Sanitizers...

Should be part of an integrated program that begins with good agricultural practices in the groves:

Goal is to harvest fruit with minimum peel damage (wounds or disease) and no latent infections

In the packinghouse:

Cull split or decayed fruits from the line and remove them from the area to avoid re-contamination of healthy fruit

Employ the use of sanitizers on the lines and the fruit

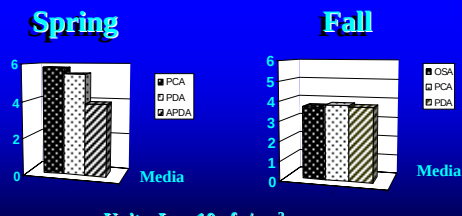
Comparing Sanitizing Methods

Chlorine

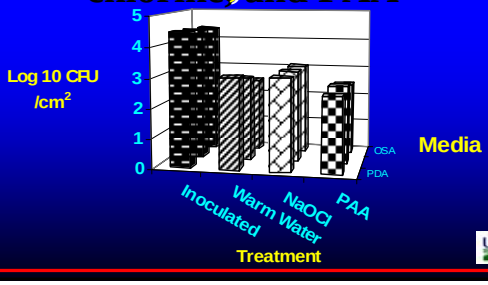
Warm Water

Peroxyacetic acid (PAA)

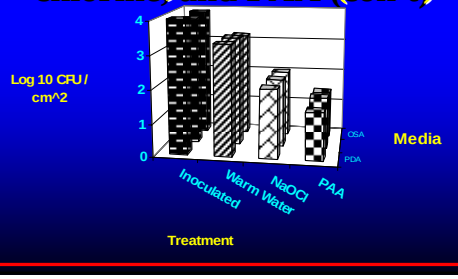
Total counts of microorganisms on fruit surfaces fall and spring



Reduction in microbial counts after treatments with water, chlorine, and PAA



Reduction in microbial counts after treatments with water, chlorine, and PAA (con't)



Sanitizers

Ozone:

Strong oxidizer (approximately 50% stronger than chlorine)

Mode of action not strictly antimicrobial (stimulate plant phytoalexins: reduce pesticide residue in process water & mycotoxins in durable commodities)

Strong antimicrobial for surface contaminants and biofilms

Ozone:

Precondition water before ozone is added

Effective contact time greater than 2 minutes

Does not prevent growth of organisms in wounds

Unstable at ambient temperatures (0 & 0_2)

Concentrations of < 0.1ppm not allowed by OSHA: con'c in water above 1ug/mL can liberate this amount in the air

Although less toxic than chlorine, can damage fruit

Chlorine dioxide:

Active across a wide pH range

Strong oxidizer (unlikely to form chlorinated organic compounds)

ClO_2 is desirable whenever the organic content of the water is high

3-5 ppm (in clean water) is effective against some fungal pathogens

Chlorine dioxide:

More expensive than chlorine (generator necessary to make ClO2 on site)

Fumes from overcharged water (5-10 ppm) can cause discomfort without adequate ventilation

Highly reactive (explosive if in high concentration or in contact with ammonia compounds): decomposes when exposed to light

Difficult to maintain concentrations

Quaternary Ammonium Compounds:

QACs are odorless, colorless, non-toxic in diluted forms

Effective against some bacteria G+ bacteria; slow acting against some common spoilage bacteria

No rinse necessary if 200 ppm is not exceeded

May help remove biofilms on fruit surfaces

Useful for washing bins and equipment

QACs

Films on equipment should be rinsed with fresh water

Not compatible with ionic detergent compounds or chlorine sanitizers

Can cause some peel injury if fruit is exposed to concentrations 2000 ppm and are not rinsed

New methods of sanitizing fruit and fruit contact surfaces are being developed

Successful sanitation programs which result in high quality fruit incorporate GAPs, vigilant discarding of decayed fruit and use of efficient sanitizers which give consistent results

Any surface that has contact with the fruit has the ability to contaminate it if this surface is not considered in the sanitation system

Tests for microbial populations on fruit surfaces and equipment show an increase in these populations (re-inoculation of fruit) when adequate sanitary measures are not undertaken

Type of sanitizer used depends on the commodity, packing facilities and required shelf-life (shipped or stored) of the fruit

Use only clean water for rinsing

Thank-you for your attention