Postharvest Handling Considerations for Organic Produce

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National Organic Standards

• Organic Foods Production Act (7 CFR Part 205) 1990
• National Organic Standards – definitions + authority USDA
• National Organic Standards Board – advisory to Sec of Ag
  http://www.ams.usda.gov/nop/indexE.htm
• National Organic Program – certification + enforcement USDA / AMS
• California Organic Products Act 2003 – CDFA and DHS
  http://www.cdfa.ca.gov/is/fveqc/organic.htm

Key Provisions for Organic Produce

✧ NOP defines “organic”
  An ecological production management system
  • Biodiversity
  • Biological cycles
  • Soil biological activity
  • Enhance ecological harmony
✧ Prohibits irradiation, sewage sludge, GMO
✧ Requires use of composted materials
  ➢ or validated thermal treatment
✧ National Organic Standards Board sets
  Allowable, Restricted, Prohibited
Algicides, disinfectants, and sanitizers

(1) Alcohols
   (i) Ethanol
   (ii) Isopropanol

(2) Chlorine materials –
   (i) Calcium hypochlorite
   (ii) Chlorine dioxide
   (iii) Sodium hypochlorite
   (4) Hydrogen peroxide

(4) Soap-based algicide/demisters

Residual chlorine levels in the water shall not exceed
the maximum residual disinfectant limit
under the Safe Drinking Water Act. (4ppm)

NOP § 205.601 Synthetic substances allowed for use
in organic crop production (Restricted Use)

2006 Revision:
Ethylene Generators – now allowed for postharvest ripening
of tropical fruit and flower induction of pineapple

“in protest”....

Alternatives to USDA Organic Certification
have been organized

credit: Dog Mountain Farm
Key Components of Compliance with National Organic Standards

- Organic integrity -- audit trail + labeling
- Certification – recognized auditor
  - Provisions for audits of certifiers
- Prevention/ Control of commingling
- Barriers to contamination
  - packaging
  - physical or spatial separation

NOP Final Rule [§ 205.201(a)]

Packer/Shippers must have a Handling System Plan for Organic Integrity

A description of the management practices and physical barriers established to prevent commingling of organic and non-organic products on a split operation and to prevent contact of organic production and handling operations and products with prohibited substances; and any additional information deemed necessary by the certifying agent to evaluate compliance with the regulations.
Organic Handlers Must File an Audited OHP for Certification and Compliance

Section B: Assurance of Organic Integrity

Objectives: To maintain, track, and protect the integrity of organic integrity, to ensure compliance, and to establish an organic integrity assurance system. The objective is to ensure that organic growers and handlers, in the provision of protected produce, have not inadvertently introduced non-organic products. The assurance system must incorporate the following elements:

1. **OHP Audits**
   - Audit of the OHP
   - Certification by an accredited third-party verifier

2. **Sanitary Standards**
   - Implementation of verified sanitary standards
   - Monitoring of produce from field to market

3. **Record Keeping**
   - Documentation of all OHP-related activities
   - Retention of records for at least 2 years

Certification requires approved SSOPs (Sanitary Standard Operating Procedures).

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**Cooling Organic Produce**

- Dedicated cooling equipment and cold rooms
- Hydrocool, Spray-Vacuum cooling at the beginning of the day after a complete water exchange
  - Overnight cold room storage
  - Use ozonation to mitigate pesticide residues

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**Certification Requires Approved SSOP**

Sanitary Standard Operating Procedure

Define - Validate - Document
After Daily Clean Out
Organic products are cooled first

Postharvest Organic Handling Quiz
Are “quats” allowed?
Yes, on non-food contact surfaces
Yes, on food contact surfaces if followed with clean rinse from approved water sources
No contact means you should never have Quat injury

http://omri.org
Examples of OMRI Approved Postharvest Materials

- Anti-Browning – NatureSeal
- CA/MA Systems – Tectrol
- DeFoamers – Foam Blast ORG
- Disinfectants – Peracetic acid (Spectrum, Tsunami, VigorOx)
- Ethylene Control – EC Power Pellets
- Fruit Coatings – Natralife BC
- Wax – Citrus Lustr (Decco Lustr)

OMRI – Organic Materials Review Institute

Special Postharvest Treatments

- **Waxes**: may not contain synthetic substances; carnauba and other natural waxes acceptable; waxed products must be labeled
- **Ethylene removal**: KMnO4 air filtration systems allowed - strict separation from product; UV light-ozone destruction system
- **X-ray irradiation** for metal detection for packaged products is permitted

Water Disinfection Options

Chlorine remains the predominant treatment
- Must allow for municipal treated water
- Must allow for decay control and safety
- Typically 50-75 ppm
- 4 ppm HOCl residual downstream

- Flotation aids: lignin sulfonates YES
- sodium silicates NO
Minimize chlorine dose by implementing automated injection system and maximizing contact by agitation within practical residence time.

Unexpected Sources of Organic Load

Compost teas have benefits in fertility and pest management
- Potential source of chlorine demand
- Potential for chloramine formation
Common Compost Tea Additives to Promote Microbial Growth

- Molasses
- Proprietary microbial nutrients
- Yeast extract & Whey blends
- Kelp Meal
- Blood Meal
- Bone and Feather Meal
- Cottonseed meal
- Fish Emulsion
- Humic Acids

Reduction in Inoculated Cantaloupes by Dip Immersion: 5% H₂O₂ at 70°C

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<th>Treatment Time (sec)</th>
<th>% Reduction</th>
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G. Sapers et al. 2002
### Allowed Non-Chlorine Antimicrobials

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<th>Class</th>
<th>Examples</th>
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<tr>
<td>Organic acids</td>
<td>Acetic Acid, Benzoic, Lactic acid</td>
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<tr>
<td>Spice extracts</td>
<td>Thymol, Clove, Cinnamon</td>
</tr>
<tr>
<td>Thiosulfonates</td>
<td>Allicin</td>
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<tr>
<td>Metals</td>
<td>Copper ions</td>
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</table>

### Organic Acids

- Acetic acid
- Propionic acid
- Lactic acid
- Succininc acid
- 2 - 4% alone
- 1% as combination

### Relative Effectiveness of Washing of Tomato

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<th>% of Initial</th>
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<th>Wash O</th>
<th>Wash O+C</th>
<th>Wash O-C</th>
<th>Wash O+C-A</th>
<th>2% Lactic acid</th>
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A new generation of preharvest and postharvest antimicrobials are being developed and evaluated.

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**Ozone Gas**

205.601(a)(5)
Final October 31, 2003
(68 Federal Register 61992)
Re-affirmed November 2007
Allowed with the annotation:
As cleaning agent for irrigation lines only

205.605 Allows broad O₃ use in postharvest
Ozone treatment during overnight storage may:
• Reduce ethylene
• Reduce airborne microbes
• Disinfect surfaces

Longer-term ozone use also helps:
• Prevent sporulation
• Reduce pesticide residues
• Works best in pack to order or repack

Empirically, ozone is being used to reduce superficial molds and extend shelf-life with chilling sensitive crops

Transportation and Distribution
Maintain Organic Integrity

Prevent transfer of any Prohibited Substances
- Prohibited pesticides
- Oil and grease
- Heavy metals
- Soil and debris
- Prohibited cleaners
Mixed use of cartons, pallets, bins, etc is prohibited/restricted

Separation and Maintenance of Organic Integrity in Cold Storage

Palletize Organics Above Conventional Produce
- Dry loads above wet loads
- Barriers to prevent contamination
Do retailers need to be certified under the National Organic Standards?

Retailers are not required to be certified.

- prevent commingling with non-organic certified
- prevent contamination with prohibited substances
- keep records of integrity through delivery to the customer

NOP rule 7 CFR Section 205

Organic produce should be stored separate from or above conventional produce
Key Elements of Retail Handling and Display of Organic Produce

- Organic produce is palletized and stored separately
- Produce that requires washing is washed in designated, sanitized basins and placed in designated totes, bins, or racks
- Trimming is performed with tools designated for organic foods
- Organic items are clearly marked and displayed to avoid commingling, customer confusion, or contamination.
- Bulk organic greens are stored in separate bins with separate tongs or scoops
- Produce staff are trained regarding procedures for organic products
- Specific and appropriate pest control procedures are employed

Organic Produce is sophisticated, large-scale, and growing

Larger organic handlers provide a marketing channel for transitional crops

Resources for more information