More Melons

Cooler system coil maintenance and sanitation are also important (any pathogens growing in the air handlers can be blown into the stored commodity, possibly infecting the entire store of product). **Use ice made from potable water.**

Wash water quality

Use potable water for all washes. Maintain clean water in dump tanks by sanitizing and changing water regularly (once per day minimum).

- Chlorinate wash water and monitor chlorine levels to maintain 150 ppm to 500 ppm.
- Maintain water pH at 6.0 to 7.0
- Provide final rinse if using more than 100 ppm chlorine.
- Maintain tank water at temperatures 10^{0}F warmer than produce temperature for melons.

Storage room and vehicle cleanliness

Packing house.

- Clean and sanitize loading, staging, and all food contact surfaces at end of each day.
- Exclude all animals, especially rodents and birds.
- Do not smoke or eat in packing area.

Transportation and refrigeration.

- Check and clean trucks prior to loading.
- Sanitize vehicles if animals were previously hauled.
- Precool vehicles prior to loading.
- Ensure that refrigeration equipment is working.

Cleaning and sanitation of cold rooms is critical, and many steps can easily be overlooked.

- Physically remove dirt and debris. This is done with detergent and physical labor (such as scrubbing or pressure-washing, etc.).
- Use sanitizers of various types to kill microbes on clean surfaces. *Sanitation is most effective **after** a surface has been cleaned.* This is true of walls, floors, hands, equipment, etc.
- Remove debris accumulation from all surfaces.
- Clean all surfaces that produce or employees may contact, including bench/table tops, drains, walls, cooler coils, ceilings, etc., as appropriate.
- Use a top-to-bottom method of cleaning to avoid re-soiling already cleaned surfaces.
- Fumigate closed-in spaces for sanitation.
- Never put fruit that has fallen to the floor back into containers.
- Have waste receptacles available for employee use, and regularly empty and clean them.
- Clean regularly to reduce opportunities for pathogen buildup and inoculation.

Be sure truck trailers are clean. If a vehicle previously hauled raw meat or poultry, there is great potential for contamination. Trailers should be cleaned if there are traces of odors or visible signs of foreign matter.

Reefer maintenance

Reefer (a refrigerated vehicle) maintenance should be done and details recorded to avoid possible mishaps due to improper shipping temperatures.

"The Cold Chain"

To maintain "the cold chain" (the total refrigerated atmosphere), fruit should never leave refrigeration, including loading/unloading docks. Once fruit has been cooled to storage temperature, it must remain at that temperature to maintain an environment in which bacterial growth will be minimized. If fruit is warmed to a level where microbial growth may begin, it is called "breaking the cold chain." At this point, pathogenic cells may begin to multiply, and they will not be eliminated by a return to a cold environment.

Loading and unloading

Use the same good agricultural practices and sanitary guidelines when dealing with employee handling, loading, and unloading that were used in field operations. This is particularly important if handlers are expected to remove occasional pieces of decayed fruit or otherwise directly contact fruit. **Repackers should follow all of the cleanliness procedures described above for initial packing.**

Unpacking and Display

Product quality

Even at the consumer level, the cold chain must be maintained. Removal of bruised and decaying fruit while setting up and rotating displays reduces chances for human pathogen proliferation as well. Use sanitation procedures in the back room and display area as outlined previously to avoid contamination.

Limit consumer handling

Consumer packs may be preferable to bulk displays because they avoid possible contamination of fruit by consumers while selecting produce.

Record-Keeping

Keeping records is important. It will help document adherence to good agricultural practices and identify potential problem areas.

- Keeping records helps alleviate legal responsibilities in a trace-back situation.
- Keep track of microbial test results, reefer and storage room temperature levels, any and all cleaning and maintenance activities, employee training, etc.
- History has shown that, in a trace-back situation following an outbreak, responsibility is often pinned on those with the least- (or worst-) kept records.
- Self-check lists are available from several commercial auditing companies to aid in record-keeping.

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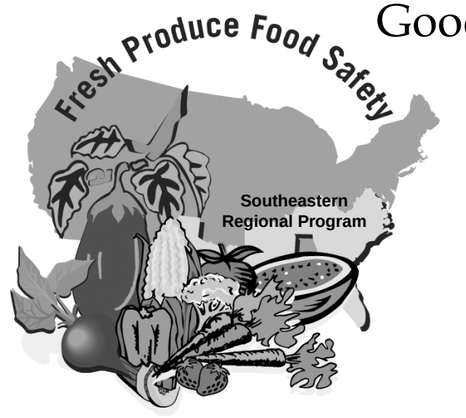

Good Agricultural Practices for the Production and Handling of Melons

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Introduction

From planting to consumption (farm to fork) melon production consists of many steps, each of which creates an opportunity for microorganisms to enter or attach themselves to the crop. Some of these organisms may harm humans.

Maintaining good sanitation throughout production and handling is important. Once a fruit is infected, pathogens are difficult or impossible to remove by any means other than cooking. Crops that are field-packed without washing have a higher likelihood of reaching consumers with field contamination. An extra benefit of good sanitation to growers and shippers is that it retards infection and reduces decay during shipping and storage.

Risks can be reduced if preventive steps are taken before produce leaves the farm. This document focuses on how best to reduce contamination.

Preharvest

Irrigation water

Application method affects water quality requirements. The more the water contacts the commodity directly, the cleaner the water must be.

- If overhead or furrow irrigation is used, water should be tested for the presence of coliform bacteria.
- With drip irrigation, emitters under plastic mulch are not likely to transmit pathogens to fruit, so using clean water is not as critical.
- Irrigation systems must be kept free of contaminants like scum buildup, human/animal waste products, etc. If a pump is contaminated, any water passing through the pump will be contaminated.
- Allow a drying period before harvest. The longer the period between harvest and the last irrigation, the less likely any contaminating pathogens will survive.
- Irrigation water quality matters.
  - Potable well water presents a minimal risk if the well casing is maintained and livestock are excluded from active recharge area.
  - Test irrigation quarterly or during season and keep records.
  - Filter or use settling ponds to improve water quality.
  - Use potable water for crop-protection sprays.
  - Maintain records of water tests.

Pesticide mixing

Since the water used to mix pesticides water does come into direct contact with fruit, this water should be from a potable source. Fresh produce has been contaminated by tainted water used to mix pesticides.

In any case where water quality is a concern, numerous factors may affect the microbial load. However, the contamination potential can be minimized by opting for groundwater, which is less likely to be contaminated by animals. Periodically, have your groundwater tested by a laboratory.

Human hygiene

Attention should be paid to worker hygiene in the field and packing house. Workers who pick, sort, grade, or pack produce ***must*** wash their hands after restroom use. Hepatitis A outbreaks have been linked to infected workers. Teach workers about microbial risks. Provide soap, clean water, and single-use towels in the field, and insist that all workers wash their hands before handling fruits.

Appropriate hand-washing facilities are also needed in conjunction with portable toilets. Supply soap, clean water, and single-use towels for hand washing and enforce use. Portable sinks with foot-pumped water work well.

Animal exclusion

Most pathogens harmful to humans are carried by other animals (birds, dogs, cats, deer, raccoons, etc.). Excluding animals from the fields will decrease the likelihood of contamination.

Select produce fields carefully. Be aware of land use near the field. Establishment of melon fields near animal operations or waste-handling facilities should be avoided. *Manure should never have an opportunity to come into contact with fruit.*

- Review land history for prior use and applications of sludge or animal manure.
- Choose fields upstream from animal housing.
- Prevent runoff or drift from animal operations.

Animal manure applied as fertilizer must be composted unless it is incorporated into the soil not fewer than 120 days before harvest for crops that are not in contact with the soil. Fully composted manure should be handled in such a way that contact between the material and the edible portion of the crop is avoided. Composting manure, incorporating it prior to planting, and avoiding top-dressing with fresh manure are steps to reduce the risk of contamination while making use of this important source of nutrients.

- Keep records of application rates, source, and dates.
- *Allow NO* grazing of livestock near produce fields.

Any animal materials (waste, carcasses, etc.) should be removed immediately from a field if possible (and practical). Workers who come into contact with live animals, animal carcasses, or animal waste should wash their hands before they continue working.

Biosolids (human wastes) are strictly regulated and are best avoided outright (Code of Federal Regulations, Title 40 Part 503).

Harvest and Packing

Animal exclusion

Animals can easily transmit pathogens. *Minimizing animal contact in fields and packing facilities reduces the risk of contamination.* Avoid raising dust, as it has been implicated as a vector for disease.

- Keep domesticated animals out of the field at harvest.
- Keep children out of the field at harvest.
- Control animals and insects around harvesting equipment and storage areas.

Culling

Remove rotten fruit from the field. Evidence suggests that human pathogens proliferate more readily in injured and decaying fruit. This makes it important that fruit showing bruises or decay symptoms to be culled as a preventive measure. Do not leave discards to the aisles between beds.

Ideally, harvest workers should not handle culls in the field. Culls should be removed by a separate worker, if possible, so as not to contaminate sound produce.

Bin and bucket cleanliness

Melons may be more prone to contamination than tree fruits because melons grow on the ground. At the end of each day, clean all bins and work surfaces. Sanitize surfaces using recommended chemicals and procedures.

Make sure bins are clean and in good repair; pressure-wash and sanitize bins before to harvest, and clean bins daily during harvest. Ensure that packing containers are not overfilled, and protect melons from bruising and damage.

Handle produce carefully during harvest.

- Avoid standing in bins during harvest to reduce disease spread by shoes.
- Minimize bruising of fruit during harvest.
- Remove excess soil from produce in the field.

Promote cleanliness at U-pick operations.

- Invite customers to wash their hands before entering fields.
- Provide clean and convenient restrooms.
- Supply soap, clean water, and single-use towels and encourage their use. Portable sinks with foot-pumped water work well.

Personnel Cleanliness

Exclusion of ill workers

It is important to recognize symptoms of illness to keep sick workers away from the commodity. Some symptoms may include fever, diarrhea, vomiting, sore throat, or jaundice (yellow skin and eyes).

Employees who display symptoms of illness should either have appropriate measures put in place to protect the fruit from exposure (gloves, a mask to prevent sneezing contamination, etc.) or, if this is not feasible, be disallowed from coming in contact with fruit or any equipment that will contact fruit.

- Workers who have recently had intestinal disease should, if allowed to work at all, be utilized in a non-fruit handling capacity.
- Sending sick employees home is, unfortunately, usually the best method of dealing with this.

Disease transmission and cross contamination

Probably the #1 source of foodborne illness is unsanitary worker conditions.

Most of the diseases transmitted via fresh produce occur as part of the "fecal-oral pathway." This is the movement of human pathogens from an infected individual's waste to material ingested by a healthy person. Most commonly, this occurs when the infected individual handles food without properly washing his/her hands.

Employee hygiene, including hand washing and proper facility use, is an important step in breaking the infection cycle.

- Provide clean restrooms with soap, clean water, and single-use towels.
- Use modesty panels and not doors on restrooms.
- Post signs in English and Spanish in restrooms and enforce hand washing.

Open wounds also may contain pathogens. Using a sealed covering (rubber or latex gloves; just a bandage is not sufficient), is the only way to contain them. The best method of reducing contamination from open sores or wounds is by removing affected employee(s) from situations where they may come in contact with fruit, directly or indirectly.

Restrooms in cooling facilities must have appropriate hand-washing facilities:

- A place to remove aprons, smocks, and gloves and hang them outside the restroom.
- Hand-washing stations located outside restrooms. This can aid supervisors in ensuring employee compliance.
- A fresh water source (*not re-circulated water*).
- Soap.
- A non-reusable hand-drying system (disposable towels, air dryer, etc.)
- Possibly a sanitizing solution for use *in conjunction with, but* ***not*** *to replace,* proper hand washing.

Employees can only maintain good hygiene if the proper facilities are available to them.

Storage and Transport

Cooling

Quickly achieving and maintaining low storage temperatures are critical in delivering a wholesome product. Human pathogens tend to grow slowly or not at all below 45°F, but melons should be kept at 55°F, thus adding to the importance of cleanliness throughout the operation. The 55°F mark is the "safe" upper maximum refrigeration temperature. Packing and cooling melons directly in the field minimizes residual heat and gets the fruit to "safe" temperatures faster.