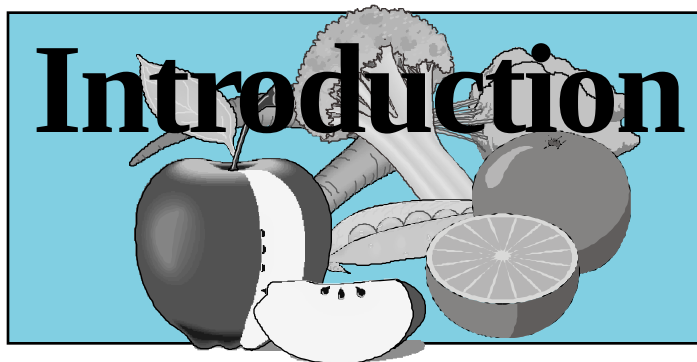




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In 1998 the U.S. Food and Drug Administration published the *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables*. It was written to support continuing efforts to develop national guidelines for food safety of fruits and vegetables. It is a broad-based document that provides a framework for identifying and implementing measures to minimize risk on the farm, in the packing house and during transport.

The *Guide* focuses on microbial hazards, risk reduction instead of risk elimination, and broad, scientific principles. It is a working document and will be updated as needed.

This series of publications is an adaptation of the *Guide*, presented in a reader-friendly format for the grower. The intent is to provide easily accessible information, so growers can evaluate their operations for potential risks from food safety hazards. Topics are as follows:

- MF-2479 Agricultural Water**
- MF-2480 Processing Water**
- MF-2481 Health and Hygiene**
- MF-2482 Sanitation and Traceback**
- MF-2483 Manures and Municipal Biosolids**

Like the *Guide*, these publications are based upon good agricultural and management practices and incorporate basic principles associated with minimizing microbial food safety hazards. By identifying these basic principles within the realm of growing, harvesting, packing and transporting fresh produce, the reader will be better able to recognize and address the principal causes of microbial food safety concerns.

Basic microbial food safety principles

1. Prevention of microbial contamination of fresh produce is favored over reliance on corrective actions after contamination has occurred.
2. To minimize microbial food safety hazards in fresh produce, growers, packers or shippers should use good practices in the areas over which they have control.
3. Fresh produce can become microbiologically contaminated at any point along the farm-to-table food chain. The major source of microbial contamination with fresh produce is associated with human or animal feces.
4. Whenever water comes in contact with produce, its source and quality dictate the potential for contamination. Minimize the potential of microbial contamination from water.
5. Practices using animal manure or municipal biosolid wastes should be managed closely to minimize the potential for microbial contamination of fresh produce.
6. Worker hygiene and sanitation practices during production, harvest, sorting, packing and transport play a critical role in minimizing the potential for microbial contamination of fresh produce.
7. Follow all applicable local, state, and federal laws and regulations, or corresponding or similar laws, regulations or standards for agricultural practices for operators outside the United States.
8. Accountability at all levels of the agricultural environment is important to a successful food safety program.

Definitions

The following definitions are used in this series of publications:

Agricultural water refers to water used in the growing environment (for example, field, vineyard or orchard) for agronomic reasons. It includes water used for irrigation, transpiration control (cooling), frost protection or as a carrier for fertilizers and pesticides. Occasionally a more specific term such as “irrigation water,” may be used. Typical sources of agricultural water include flowing surface waters from rivers, streams, irrigation ditches, open canals, impoundments (such as ponds, reservoirs and lakes), wells and municipal supplies.

Adequate means that which is needed to accomplish the intended purpose in keeping with good practice.

Clean means that food or food-contact surfaces are washed and rinsed and are visually free of dust, dirt, food residues and other debris.

Composting refers to a managed process in which organic materials, including animal manure and other wastes, are digested aerobically or anaerobically by microbial action.

Control means (a) to manage the conditions of an operation in order to be consistent with established criteria, and (b) to follow correct procedures and meet established criteria.

Control measure means any action or activity that can be used to prevent, reduce or eliminate a microbiological hazard.

Facility means the buildings and other physical structures used for or in connection with the harvesting, washing, sorting, storage, packaging, labeling, holding or transport of fresh produce.

Food-contact surfaces are those surfaces that contact fresh produce and those surfaces from which drainage onto the produce or onto surfaces that contact the produce may occur during the normal course of operations. “Food-contact surfaces” includes equipment, such as containers and conveyor belts that contact fresh produce used in harvesting, post harvesting and packing operations. It would not include tractors, forklifts,



Farmers' markets provide a variety of locally grown fruits and vegetables.

handtrucks, pallets, etc., that are used for handling or storing large quantities of contained or packed fresh produce and that do not come into actual contact with the food.

Fresh fruits and vegetables refers to fresh produce that is likely to be sold to consumers in an unprocessed or minimally processed (i.e., raw) form. Fresh produce may be intact—such as strawberries, whole carrots, radishes, and fresh market tomatoes—or cut during harvesting—such as celery, broccoli and cauliflower. The guidance in this document is also applicable to “fresh cut” produce, such as pre-cut, packaged, ready-to-eat salad mixes. However, some fresh produce specialty items, such as fresh-cut produce, may be subject to additional processing steps and /or handling that may warrant consideration of specific good manufacturing practices in addition to the good agricultural and management practices covered in this guide.

Good management practices refers to general practices to reduce microbial food safety hazards. The term may include both “good agricultural practices” used in growing, harvesting, sorting, packing and storage operations, as well as “good manufacturing practices” used in sorting, packing, storage and transportation operations.

Microorganisms include yeasts, molds, bacteria, protozoa, helminths (worms) and viruses. Occasionally, the term “microbe” or “microbial” is used instead of the term “microorganism.”

Microbial hazard means occurrence of a microorganism that has the potential to cause illness or injury.

Municipal biosolids (biosolids) are the by-product of human waste treatment by local government that may be used as fertilizer or as a soil amendment.

Operator means the person or persons who have day-to-day responsibility for the production, harvesting, washing, sorting, cooling, packaging, shipping or transportation of fresh fruits and vegetables, and responsibility for management of all employees who are involved in each of these activities.

Pathogen means a microorganism capable of causing disease or injury.

Pest refers to any animal or insect of public health importance including, but not limited to, birds, rodents, cockroaches, flies and larvae that may carry pathogens that can contaminate food.

Processing water means water used for post-harvest treatment of produce, such as washing, cooling, waxing and product transport.

Sanitize means to treat clean produce by a process that is effective in destroying or substantially reducing the numbers of microorganisms of public health concern, as well as other undesirable microorganisms, without adversely affecting the quality of the product or its safety for the consumer.

Sanitize (food contact surfaces) means to adequately treat clean food-contact surfaces by a process that is effective in destroying or substantially reducing the numbers of microorganisms of public health concern, as well as other undesirable microorganisms, without adversely affecting the quality of the involved product or its safety for the consumer. It means the application of cumulative heat or chemicals on cleaned food-contact surfaces that, when evaluated for efficacy, is sufficient to reduce populations of representative microorganisms by 5 log or 99.999%. Usually, it is the destruction of all vegetative cells of pathogens and the reduction of the number of spores.

Transporter means the operator of a conveyance such as a truck, railcar, vessel or aircraft used to transport fresh produce from grower to market.

Reference

Guide to Minimize Microbial Food Safety Hazard for Fresh Fruits and Vegetables, U.S. Food and Drug Administration. Available on the World Wide Web at <http://vm.cfsan.fda.gov/~dms/prodguid.html>.

Helpful Information

The publications in this series refer to numerous regulatory documents available from U.S. public agencies. Information on how to obtain these documents is presented here.

Copies of federal regulations in the Code of Federal Regulations (CFR) may be purchased from the U.S. Government Printing Office or by telephone at (202) 512-1800.

The CFR is also available at local branches of the U.S. Government Printing Office Bookstores. Information on location of regional branches is available on the World Wide Web at the following address: <http://vm.cfsan.fda.gov/~lrd/ob-reg.html>.

Sections of the CFR that are referenced in this series can be viewed and printed from the Web at: <http://www.access.gpo.gov/nara/cfr/index.html>.

How to obtain FDA regulations

Title 21, Code of Federal Regulations: 21 CFR 100-169 and 21 CFR 170-199.

Sections of Title 21, such as 21 CFR 110.10, that are referenced in this series can be viewed and printed from the Web at the following address: <http://www.access.gpo.gov/nara/cfr/>.

You may purchase 21 CFR 100-169 or 21 CFR 170-199 from the U.S. Government Printing Office or by telephone purchase at (202) 512-1800. FDA regulations also may be purchased at local branches of the U.S. Government Printing Office Bookstores.

How to obtain OSHA standards

OSHA General Industry standards, Title 29 CFR 1910, and OSHA Agricultural Industry standards, Title 29 CFR 1928, may be purchased through a U.S. Government Printing Office or by telephone at (202) 512-1800. 29 CFR 1910.141 and 29 CFR 1928.110, that are referenced in the guide

are available on the Web at: http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc.html.

How to obtain EPA regulations

EPA regulations may be obtained by contacting the U.S. EPA / NCEPI, P.O. Box 42419, Cincinnati, OH 45242-2419. Telephone: 1-800-490-9198; FAX (513) 489-8695. You must give the EPA catalog number for the publication.

Electronic versions of additional EPA documents, such as criteria and supporting documents, are available at <http://www.epa.gov>.

Additional Helpful Information

1. U.S. EPA. Ambient Water Quality Criteria for Bacteria, EPA Office of Water Regulations and Standards, EPA 832-B-92-005, January 1986.

2. USDA. List of Proprietary Substances and Nonfood Compounds Authorized for Use Under USDA Inspection and Grading Programs.

3. U.S. EPA. Domestic Septage Regulatory Guidance, A Guide to the EPA 503 Rule. EPA, Office of Water Regulations and Standards, 832-B-92-005, September 1993.

4. Reiners, S., A. Rangarajan, M. Pritts, L. Pedersen, and A. Shelton. "Prevention of Foodborne Illness Begins on the Farm." Cornell Cooperative Extension, Cornell University, Ithaca, NY.

5. USDA Agricultural Marketing Service program "Qualified Through Verification for Fresh Cut Produce" is available from: Branch Chief, Processed Products Branch, Fruit and Vegetable Programs, Agricultural Marketing Service, USDA, P.O. Box 96456, Rm. 0726, South Building, Washington, DC, 20090-6456. (202) 720-4693.

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