



Good Agricultural Practices (GAP's) for Small Fresh Produce Farmers and Vendors

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The majority of fresh fruits and vegetables consumed in the United States are free of microbial pathogens which cause illness in humans. Additionally, many whole fruits and vegetables have natural barriers which prevent pathogens from entering the edible parts. However, fruits and vegetables may come in contact with harmful pathogens at any point along the supply chain. Consumption of fresh fruits and vegetables has increased over the past few years, as have the number of illnesses attributed to foodborne pathogens. The diversity of environments involved from production to consumption makes it quite difficult to determine sources of foodborne illnesses though recent outbreaks have been linked to contamination sources that occurred on the farm. Since total elimination of pathogens is not possible, eliminating potential contamination sources is the most effective way to minimize the risk of on-farm contamination.

Establishing and following a food safety plan, such as good agricultural practices (GAP's) reduces potential sources of

contamination and may be the first step to ensuring our food supply is free of harmful bacteria.

The purpose of this document is to provide general information about GAP's as well as to provide producers with solutions that may be implemented on any scale to minimize risk of contamination. This document should be utilized in conjunction with other resources to assist farmers maintain the safety of fresh fruits and vegetables intended for direct to consumer sales. A list of additional resources can be found at the end of this document.



What are GAP's?

GAP's were developed in response to the growing number of foodborne illness outbreaks associated with fresh produce. GAP's are a set of recommendations which help producers identify potential sources of on-farm contamination and propose solutions for remediation. GAP's can be tailored to fit any size farm operation and encompass all aspects of food production but primarily focus on minimizing the following sources of contamination; worker health and hygiene, water, soil, and surface contamination.

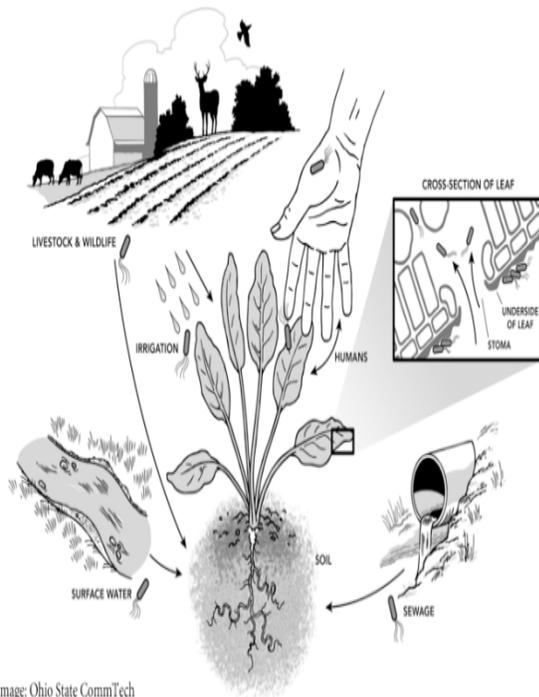


Image: Ohio State CommTech

Worker Health and Hygiene

Many foodborne illness outbreaks identify fecal material as the source of contamination. The most effective way to reduce contamination carried by fecal material is to prevent it from entering the field. Since produce is often harvested and packed by hand it is imperative that workers and producers alike not only understand but

practice proper hygiene during all phases of production, harvest and packing.

Unintentional contamination can occur if basic hygiene principles are not understood and followed.

GAP's to Consider:

- Producers should develop a training program which emphasizes proper hand washing techniques and the importance of utilizing toilet facilities. All workers, even family members should participate in the training program.
- Producers should ensure everyone, including farm visitors, wash their hands before and after using the restroom, before starting or returning to work, and before and after eating or smoking.
- Producers should provide clean, accessible, well stocked restrooms and hand washing stations for everyone who comes in contact with fresh produce. This is particularly important for operations that utilize “u-pick” or seasonal laborers for harvest.

Water Use

Water is a critical component in the production of fruits and vegetables but may also be a carrier of microorganisms known to cause illness.

Producers must effectively manage the quality of water used throughout the production and post-harvest process. Using water from a municipal water source for all farm operations is the best way to minimize risk; however this is not always practical. Often, water must be sourced from rivers, streams, or other untested sources which may allow potentially harmful pathogens to come in contact with fruits and vegetables.

Producers can minimize contamination risk by identifying the source of water, determining its use, and by applying measures that limits contamination. The water supply should be of adequate quality in relation to its intended use. For example, irrigation water may be of lesser quality than water used for final wash.

Pre-Harvest Water Use

Irrigation water should be potable and of adequate quality whenever possible. Irrigation water from untested sources should only be utilized in combination with a drip irrigation system. Untested water used for irrigation, pesticide or fertilizer application should never be sprayed on foliage or produce. Spray water should only be sourced from a municipal or treated water source. Operations utilizing water sourced from surface water such as lakes, streams, ponds, untreated wells, etc. should implement a rigorous testing protocol. Water should be tested frequently throughout the season but even routine testing may fail to identify contamination if the pathogen is not present at time of sampling.

GAP's to Consider:

- Producers should first identify water source and assess its potential for contamination prior to determining its use.
- Routinely monitor sediment levels.
- Never use cloudy water.
- Maintain wells, ensuring they are adequately constructed, capped and tested regularly.
- Protect all water sources from livestock and wildlife access.
- Implement soil and water conservation practices such as grass waterways, runoff control, and buffer zones.

- Consult with water quality experts and extension service personnel to determine water management practices that are appropriate to the area and specific operation.
- Maintain accurate records of water quality and testing/treatment regimens.

Manure Use

When properly used, treated manure is an effective and safe fertilizer for crop production. Improperly treated or improperly used manure may become a contamination source for soil, groundwater and produce. Contamination by manure is most problematic for crops grown in or near the soil, though manure has the potential to contaminate any crop via irrigation, heavy rainfall, or wild and domestic animals entering the growing area. Furthermore pathogens may be transferred to produce by equipment and tools used for compost and manure management.

Contamination risk from manure can be greatly minimized by implementing management practices which limits the possibility of manure coming in contact with fresh produce and maximizing time between application and harvest.

GAP's to Consider:

- Locate manure and compost storage areas as far away from growing areas as possible.
- Ensure manure is properly composted.
- Never utilize raw manure as a source of fertilizer.
- Allow a minimum of 120 days between manure application and harvest.
- Incorporate manure into the soil.

- Thoroughly clean equipment used for turning or moving compost and manure.
- Consider designating tools specifically for compost and manure use.
- Sanitize tools and equipment used for both compost management and production.

Implementing GAP's during production greatly minimizes the risk of contamination occurring in the field, however, contamination may still occur during washing, storing, transporting, and sales.

Post-Harvest Water

Cooling, washing and rinsing produce post-harvest serves a critical role in assisting producers to provide a quality product to their customers. Post-harvest water should be managed in a way that prevents contamination. Improperly managed water used during post-harvest processing may be a source of contamination. Water used during these steps should be sourced from a municipal water supply or adequately treated source. Additionally, ice used for cooling, storing or transporting produce should be made only from potable water. Using a disinfectant in cooling and rinse water helps minimize risk of contamination and may be effective in eliminating contaminations that occur during production or harvesting.

GAP's to Consider:

- Change water frequently in tubs, sinks, or other containers used for washing produce.
- If sanitizer is added to wash water, monitor sanitizer strengths daily.

Sanitizing and Cleaning

Any surface that comes in contact with fresh fruits and vegetables may be a potential source of contamination. All surfaces, including those used during harvest, washing, packing, storage, transport and display should be properly sanitized after each use. Establishing a regular and thorough cleaning routine for all food contact surfaces contributes to the reduction of potential contamination sources. Implementing common sanitizing practices while at the market will further limit the possibility of food becoming contaminated before it reaches the consumer.



GAP's to Consider:

- Develop and follow a routine cleaning procedure for all surfaces which may come in contact with food.
- Clean all harvest containers before use.
- Be aware of and eliminate sources of cross contamination.
- Avoid mixing produce.
- Store containers in a manner that minimizes exposure to animals and rodents.

GAP's are intended to minimize the risk of on-farm contamination during growing, harvesting packing and processing though produce may become contaminated during

transport to the market or while at the market. Vendors can minimize the risk of fruits and vegetables becoming contaminated while at market by implementing sensible and common handling techniques which further mitigate the risk of produce becoming contaminated at the market.



Vendors Should Consider the Following Practices:

- Participate in a food safety and handling training program such as GAP's.
- Ensure transport containers and vehicles are clean and free of contaminants.
- Ensure anyone who handles produce receives and understands food sanitation training.
- Regularly clean display tables prior to each use. Sanitize after each use
- Avoid re-using single use containers.
- If containers are re-used, ensure they are properly sanitized between uses.
- Use plastic or other non-porous containers that may be easily cleaned.
- Line wooden or wicker containers with foil or plastic.
- Utilize a portable hand wash station. Use hand sanitizer in conjunction with proper hand washing, never as a substitute.

- Limit customers handling produce.
- Store produce off the ground to minimize cross contamination potential.
- Educate customers regarding the importance of washing produce prior to consumption.
- Participate in a food safety & handling training program such as GAP's.
- Ensure transport containers and vehicles are clean and free of contaminants.
- Ensure anyone who handles produce receives & understands food sanitation training.

Developing and implementing a food safety program is the most effective way to minimize the risk of fruits and vegetables becoming contaminated. It is imperative that producers develop a written food safety plan and maintain adequate records that detail the steps and procedures that have been or will be taken to reduce identifiable contamination risks. Producers should contact local extension services for requirements and training opportunities.

Below is a list of additional resources:

References and Resources:

Food and Drug Administration. 1998. Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. Available at:

<https://www.fda.gov/downloads/Food/GuidanceRegulation/UCM169112.pdf>

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<http://ucfoodsafety.ucdavis.edu/files/26427.pdf>

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