

Food Safety on the Farm: Good Agricultural Practices and Good Handling Practices—an Overview¹

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As part of the Food Safety on the Farm series, a collection that reviews the generally recognized principles of GAPs as they relate to produce, primarily at the farm level and with particular focus on fresh Florida crops and practices, this publication provides an overview of GAPs. The publications in this series can be found online at the EDIS website at http://edis.ifas.ufl.edu/topic_series_food_safety_on_the_farm.

Introduction

The principles of Good Agricultural Practices (GAPs) were introduced by the US Food and Drug Administration (FDA) in the 1998 Guidance for Industry *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables* (FDA 1998). This guidance document for the fresh fruit and vegetable industry provided general guidelines for reducing the risk of contamination of fresh produce by microbial organisms. In response to this guidance, the United States Department of Agriculture (USDA) formally implemented the Good Agricultural Practices & Good Handling Practices (GAPs and GHPs) audit verification program.

The USDA incorporated the Produce GAPs Harmonized Food Safety Standard into its GAP & GHP audit program in 2011. The USDA further combined these two into

a harmonized GAPs (H-GAPs) program in May 2018. To make the oversight of food safety stronger and more efficient, the FDA and the USDA announced the alignment of the USDA H-GAP with the requirements of the FSMA's Produce Safety Rule (PSR) in June 2018. Since H-GAP is not equivalent to the Global Food Safety Initiative (GFSI), the USDA augmented the H-GAP audit to meet GFSI equivalence standards. The new USDA Harmonized GAP Plus+ audit is the only USDA GAP audit recognized as being GFSI technically equivalent. Regardless, all these programs adhere to the same basic principles of GAPs.

Under the new Food Safety Modernization Act (FSMA), GAPs are the foundation of the PSR. Up until the PSR, GAPs programs have been voluntary, imposed by the industry or buyers. Exceptions are the Florida Tomato Good Agricultural Practices (T-GAP) and Tomato Best Management Practices (T-BMP) regulations, which are state laws regulating the safe production of tomatoes. The current PSR mandates all non-exempt operations to follow the new FSMA federal guidelines (FDA 2017), except for exempt commodities (as outlined in the regulation) and for those producers exporting to foreign countries. In those circumstances, voluntary GAPs programs may still be required by buyers or trade organizations.

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The aim of both the mandatory PSR and the voluntary GAPs program is to reduce the foodborne illness burden associated with produce (FDA 2018, 2019). The FDA has compiled information from the Centers for Disease Control and Prevention (CDC) data regarding produce-associated outbreaks that occurred between 1996 and 2010 where contamination was likely to have happened early in the production chain, during growing, harvesting, manufacturing, processing, packing, holding, or transportation (CDC 2018; FDA 2018). An updated report from the CDC estimates that produce accounted for 51.6% (21,280 of 41,269) of all foodborne outbreaks in the United States from 1998 to 2016 (CDC 2018).

This fact sheet is intended to review the generally recognized principles of GAPs as they relate to produce, primarily at the farm level. Other UF/IFAS Extension fact sheets in the Food Safety on the Farm series cover the individual principles in detail with a focus on fresh Florida crops and practices.

Are GAPs required?

From a regulatory standpoint, GAPs are considered guidelines and are not mandatory. The Harmonized GAP (H-GAP) audits of the USDA are a voluntary way to demonstrate to buyers that producers have met the requirements of the H-GAP Initiative and have essentially implemented the requirements of the PSR (USDA 2018; FDA 2017, 2019). The final PSR went into effect on January 26, 2016. Compliance dates are tiered based on average annual produce sales. The first major compliance date for covered large farms, other than sprout operations, was on January 26, 2018. For covered small and very small businesses, the compliance dates are January 28, 2019 and January 27, 2020, respectively. For agricultural water requirements, compliance dates are extended an additional four years. Routine inspections related to implementation of the PSR will not begin until the spring of 2019 (FDA 2019).

From a commercial standpoint, purchasing requirements and approved vendor programs may require that a particular grower or packer have a formal, documented GAPs program in place. This is often true for large, national customers and for product intended for export to other countries. Additionally, some states and some commodities operating under specific marketing orders may have specific requirements related to GAPs or GAPs-like programs.

Background

In 1998, the US Food and Drug Administration (FDA) published the *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables* (FDA 1998). This document was intended to assist domestic and foreign producers, packers and shippers of unprocessed or minimally processed (still raw) fresh fruits and vegetables by increasing awareness of potential foodborne hazards and providing suggestions for individual operations. The FDA stated that these guidelines were broad-based and voluntary. The topics outlined in the *Guide* form the basis for GAPs, as outlined below.

Concurrently, Cornell University launched the National GAPs Program with the objective of serving as the main university-based clearinghouse for GAPs research and extension information (Cornell 2002). The program's website serves as a valuable resource about GAPs for producers, packers, and trainers. Another resource for growers that is based on the *Guide* also can be downloaded from the site. This pamphlet, *Food Safety Begins on the Farm – A Grower's Guide*, is written in easily understood language and is available in both English and Spanish.

In response to and in recognition of growing food safety issues, the FSMA was passed by Congress and signed into law in January 2011. The new law requires companies to implement a food safety program that significantly minimizes potential hazards and risks of foodborne illness. The FDA used science-based standards to help design this regulation to ensure the safe production of fresh produce. In light of the new law, GAPs programs are increasingly important. Programs that aim to standardize GAPs globally and across industries include GLOBALG.A.P. (the worldwide standard for good agricultural practices) and the United Fresh Produce GAPs Harmonization Initiative (GLOBALG.A.P. 2017; United Fresh Produce Association 2010).

As of June 5, 2018, the USDA and the FDA aligned the USDA's voluntary H-GAP audit program with the FDA's FSMA PSR. This alignment is the first step the federal government will take to streamline the complex regulatory requirements for the US specialty crop sector and facilitates market access for the specialty crop industry (USDA 2018).

GAPs Topics

The following GAPs statements and explanatory comments should be considered in any comprehensive produce food safety program. The accompanying checklist can be used as a preliminary assessment tool for individual operators.

Water

Water has the potential to transmit both biological and chemical hazards to fresh produce. It is used in every phase of operation: irrigation, transplant establishment, application of pesticides and fertilizers, frost protection, product rinsing and washing, direct processing, facility cleaning, cooling operations, and personal hygiene for workers. The application of contaminated water at any of these points can introduce pathogens (microorganisms that can cause harm) that could potentially reach the consumer.

Prevention of contamination is preferred over application of antimicrobial chemicals after contamination occurs (FDA 1998).

- This consideration should include water used for irrigation, mixing pesticides and other foliar-applied products, frost protection, processing water (such as flumes, product sanitation, and cooling operations), and equipment sanitation.
- The operator should be aware of the source, distribution, and quality of all water utilized, making sure to be aware of current and historical use of the land to ensure water safety. The operator should also consider practices that will ensure and maintain water quality (FDA 1998).

Manure and Municipal Biosolids

Properly treated manure or biosolids can be an effective and safe fertilizer if the proper precautions are in place to minimize microbial hazards that can contaminate produce.

- Use treatments to reduce pathogens in manure and other organic materials used as soil amendments. Treatments may be active (e.g., composting) or passive (e.g., aging in conjunction with environmental factors).
- Handling and application of both untreated and treated manure should be evaluated for identification of possible sources of contamination.
- Time between application of manure or biosolids to production areas and the harvest of the crops should be maximized. Consider incorporating manure into the soil prior to planting (FDA 1998).
- Manure storage and treatment sites should be located as far as practicable from fresh-produce production areas (FDA 1998).
- Consider factors such as slope and rainfall and the likelihood of runoff into fresh-produce production areas.
- Use barriers or physical containment to secure storage and treatment sites.

- Consider practices to minimize the potential recontamination of treated manure, such as using dedicated tools for raw inputs and treated amendments (FDA 1998).

Worker Health and Hygiene

Infected and/or unhygienic employees who work with fresh produce can increase the risk of transmitting foodborne illness. Requirements for health and hygiene include:

- Take measures to prevent contamination of produce and food-contact surfaces by ill or infected persons.
- Instruct employees to keep their supervisors informed if they have a health condition that may result in contamination of produce (produce likely to be eaten raw) or food-contact surfaces.
- Establish a training program about health and hygiene. Include basics, such as proper handwashing techniques and the importance of using toilets.
- Become familiar with typical signs and symptoms of infectious diseases.
- Offer protection to workers with cuts or lesions on parts of the body that may make contact with fresh produce.
- Ensure good hygienic practices are followed by visitors to the farm, packing, or transport facilities whenever they come into contact with fresh produce (FDA 1998).
- All farm workers who handle produce and/or food-contact surfaces are required to undergo a combination of training and education so they can adequately perform their assigned responsibilities. Their supervisors are also required to undergo this training and education.

Sanitary Facilities

Poor management of human and other wastes in the field or packinghouse can significantly increase the risk of contaminating produce.

- Toilet facilities should be properly located.
- Toilet facilities and handwashing stations should be accessible, well supplied, and properly maintained.
- All facilities should be kept clean and regularly inspected for replenishment of toiletries, such as disposable towels, soap, etc.
- Have a plan for containment and treatment of any effluent in the event of leakage or a spill (FDA 1998).

Field Sanitation

Fresh produce can become contaminated from contact with soil, fertilizers, soil amendments, water, workers, and harvesting equipment during preharvest and harvest activities.

- Clean harvest storage facilities, including containers or bins that will be used for transport, prior to use.
- Discard damaged containers that are no longer cleanable to reduce potential of microbial contamination of fresh produce.
- Take care not to contaminate fresh produce that is already washed, cooled, or packaged.
- Use harvesting and packing equipment appropriately and keep it as clean as practicable. Avoid cross-contamination of fresh produce products.
- Assign responsibility for equipment to the person in charge.

Packing Facilities

Operations with poor sanitation in the packing environment can significantly increase the risk of contaminating fresh produce and water used on produce. Maintain packing facilities in good condition to reduce the potential for microbial contamination.

- Remove as much dirt from shoes, tools, harvest bins, hand trucks, etc., as practicable outside of the packing facility before entry. Clean pallets, containers or bins before use. Discard damaged containers.
- Keep packing equipment, packing areas, and storage areas clean.
- Store empty containers in a way that protects them from contamination.
- Keep equipment or machinery that comes in contact with fresh produce as clean as practicable (FDA 1998).
- Establish and maintain an in-house pest-control program.

Transportation

Proper transport of fresh produce will help reduce the potential for microbial contamination.

- Good hygienic and sanitation practices should be used when loading, unloading, and inspecting fresh produce.
- Inspect transportation vehicles for cleanliness, odors, obvious dirt and debris, and pests before loading. Keep

and maintain a log to make sure inspections are regularly conducted.

- Keep vehicles clean to reduce risk of microbial contamination of fresh produce.
- Avoid leaving harvested crop in the sun, and maintain proper temperatures throughout the transportation process.
- Load produce in a way that will minimize physical damage.
- Use dedicated transport vehicles (transporting and storing fresh-cut produce/ products in vehicles and containers that are dedicated to carrying food products and have been treated by a process that is effective in destroying vegetative cells of microorganisms of public health significance).
- Utilize checklist and reporting systems to ensure that product is shipped under proper conditions.

Traceback

The ability to identify the source of a product can serve as an important complement to good agricultural and management practices intended to minimize and/or prevent the occurrence of food safety problems. Under the Bioterrorism Act of 2002, traceback is now mandatory for any shipper or packer of fresh fruits and vegetables (FDA 2009).

- Documentation should include the source of the product, the date of harvest, farm identification, and a record of who handled the product.
- The product must be traceable from the farm through the packers, distributors and transporters, and retailers. It is important to ensure that the GAPS process is working correctly once in place.

Summary

The principles of GAPs, introduced by the FDA in 1998, served as a starting point for improving the safety of produce. The evolution of this program from GAPs and GHPs to H-GAPs (and Florida T-GAPs) have all been precursors for the FSMA PSR. Despite these ongoing changes, the roots of the PSR are still firmly set in the core tenets of GAPs.

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