

Tomato Best Practices Manual

A Guide to Tomato Good Agricultural Practices (T-GAP) & Tomato Best Management Practices (T-BMP)

Purpose

The purpose of the outlined practices in this document is to enhance the safety of fresh tomatoes produced, packed, repacked, distributed, and sold in Florida or from Florida. This document is a compilation of previously published guidelines, recent research on tomatoes and recommendations of food safety professionals.

For tomatoes and other fruits and vegetables to be safely consumed, many practices to prevent and reduce microbial or chemical contamination must be followed in the production, handling, packing, distributing, transporting, selling, and serving of product. Florida provides consumers with a nutritious, abundant, and safe harvest of fresh tomatoes and other fruits and vegetables. Tomatoes are recognized as an important component of a healthy diet because of the rich content of such nutrients as lycopene and other carotenoids, vitamin A, vitamin C, folate, fiber and potassium. Yet, foodborne illnesses continue to be associated with many foods and the Centers for Disease Control and Prevention (CDC) has estimated that in the 1990s an estimated 12% of foodborne outbreak associated illnesses have involved fresh produce.¹ The purpose of these practices will therefore be to: 1) enhance the safety of tomatoes to the consuming public by the implementation of safer handling, production and packing practices; 2) prevent or minimize contamination of tomatoes either in the natural environment in which they are grown or in the handling, packing, repacking or selling of tomatoes once harvested since once contaminated removing or killing pathogens is difficult; and 3) provide the necessary education and training on food safety practices to workers at all levels. Furthermore, it is the goal of these practices to meet the objectives of the U.S. Food and Drug Administration Produce Safety Action Plan. These practices will be modified as science and knowledge provide additional data to improve handling and enhance safety further.

Establishment of Good Agricultural Practices and Best Management Practices

Tomato Good Agricultural Practices (T-GAP) and Tomato Best Management Practices (T-BMP) are established for the production and handling of tomatoes in Florida through all channels of commerce. The T-GAP and the T-BMP are to establish and implement needed practices and procedures for safe handling of tomatoes as a cooperative effort between the regulatory oversight by the Florida Department of Agriculture and Consumer Services (the Department), the input of scientific research and the cooperation of the Florida tomato industry.

- **Recovery of the Costs of Inspections (Fees/Costs of Regulatory Oversight)**

The Inspection fees adopted in Rule 5G-6.005, F.A.C., are required for the tomato industry to reimburse the Department for the cost of the regulatory inspections to enhance the safety of Florida tomatoes.

- **Education Requirements for Growers, Packers, Repackers and Workers**

¹ FDA Public Meeting on Produce Safety, March 20, 2007, *Produce Related Foodborne Infections: Review of the Center for Disease Control Foodborne Outbreak Surveillance*, Michael Lynch, M.D., M.P.H., Enteric Diseases Control Epidemiology Branch, Center for Disease Control and Prevention, Atlanta, GA.

- (1) To ensure that safety practices will be enhanced, basic food safety knowledge at all levels is needed. Annual education is required throughout the tomato industry to provide the knowledge of food safety practices for all in the industry.
- (2) Annual education may be provided in person, at county extension offices, or computer via on-line or video presentations.
- (3) Certification of course completion shall be documented and training records maintained for a period of three years.
- (4) The following educational requirements shall be met by those growing or handling tomatoes at any level of commerce:
 - (a) To fulfill the requirements of the T-GAP all producers/growers shall successfully complete a Good Agricultural Practices course annually.
 - (b) To fulfill the requirements of the T-BMP, all packers and repackers shall successfully complete the Workshop on Sanitation of Dump Tanks and Packing Lines or other approved training as established annually.
 - (c) Any producer that field packs tomatoes shall successfully complete a course on In-Field Sanitation each year.
 - (d) All producers, packers, and repackers shall require their workers to annually complete education and training regarding worker hygiene and field and plant sanitation.

- **Assurance of Compliance with Good Agricultural Practices and Best Management Practices through Regulatory Inspections**

- (1) Compliance with the practices of T-GAP or T-BMP will be verified by Department inspections.
- (2) Regulatory Inspections
 - (a) Regulatory inspections will be performed at least once annually to verify adherence to T-GAP or T-BMP for product grown, packed or repacked.
 - (b) Industry will reimburse the Department for cost of regulatory inspections as specified by Rule 5G-6.005, F.A.C.

- **Compliance and Penalty for Violations**

- (1) Compliance with the practices outlined in this document shall take effect July 1, 2008.
- (2) Rule 5G-6.013, F.A.C., sets forth the guidelines the Department will follow in imposing the penalties authorized under Sections 500.121 and 500.70(3)(b), Florida Statutes.

- **Exemptions**

As provided by Rule 5G-6.011, F.A.C., the following categories of tomatoes are exempt from the requirements of the T-GAP and T-BMP:

- (1) Tomatoes sold by an individual grower to a consumer on the premises where the tomatoes were grown not to exceed two (2) twenty-five pound boxes per customer, per day
- (2) Tomatoes sold by an individual grower to a consumer at a local farmers' market, roadside stand, or U-pick operation not to exceed two twenty-five pound boxes per customer, per day.

- **Continued Requirement of Federal Marketing Order Standards**

Nothing in this document will extend or preclude the requirements of 7 C.F.R. Pt. 966 (2014), Tomatoes Grown in Florida, on persons handling any lot of tomatoes produced in the production area for shipment outside the regulated area. The Federal Marketing Order in these provisions will remain in effect.

- **Adoption and Recognition of Good Agricultural Practices**

- (1) This document hereby accepts and adopts the guidance in the Commodity Specific Food Safety Guidelines for the Fresh Tomato Supply Chain, 2nd Edition, developed by the North American Tomato Trade Working Group composed of the United States, Canada and Mexico. A copy of this document may be obtained electronically as described in Rule 5G-6.009, F.A.C., at: <http://www.flrules.org/Gateway/reference>.
- (2) This document hereby adopts the recommendations contained in the following Good Agricultural Practices documents:
 - (a) **Good Agricultural Practices for the Production and Handling of Tomatoes**, USDA-CSREES National Integrated Food Safety Initiative, Project No. 00-51110-9722, 2002, <http://www.flrules.org/Gateway/reference.asp?No=Ref-05937> Florida Administrative Code;
 - (b) **Food Safety Begins on the Farm – Good Agricultural Practices for Fresh Fruits and Vegetables**, Cornell University, 2000, <http://www.flrules.org/Gateway/reference.asp?No=Ref-05938> Florida Administrative Code;
 - (c) **Guide to Identifying and Controlling Postharvest Tomato Diseases in Florida** – Mahovic, Sargent and Bartz, University of Florida, Institute of Food and Agricultural Sciences, Revised July, 2013, , <http://www.flrules.org/Gateway/reference.asp?No=Ref-05939> Florida Administrative Code
 - (d) **Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables**, U.S. Department of Health and Human Services, Food and Drug Administration, Center for Food Safety and Applied Nutrition (CFSAN), 1998, <http://www.flrules.org/Gateway/reference.asp?No=Ref-05940> Florida Administrative Code;

PART A

Tomato Good Agricultural Practices (T-GAP) for Field and Greenhouse Production

- (1) **Approved Tomato Good Agricultural Practices (T-GAP) for Field and Greenhouse Production**
 - (a) **Prevention/Minimizing Risks in the Field - Field Management**
 1. Tomato fields shall not be located in any area that can receive drainage or drift from an animal operation or any other source of contamination.
 2. Run-off or drift from any animal operation shall be prevented.
 3. Tomato growers shall determine previous usage of land if at all possible and shall assess potential sources of contamination on land used.
 - (b) **Land Usage and Greenhouse Usage**
 1. Animal Exclusion
 - a. Domestic animals and livestock shall be excluded from tomato fields during the growing and harvesting seasons.
 - b. Wild animal presence can not be excluded but shall be minimized to the degree possible by methods identified by wildlife experts.

2. Pest Control
 - a. Establish and maintain a pest control program including removal of debris materials that might harbor or provide habitat for pest reproduction.
3. Environmental Review and Monitoring
 - a. Prepare and update annually a narrative statement that describes the previous uses of the land used for tomato fields and greenhouses and all contiguous properties. The statement shall include an evaluation of potential sources of contamination, such as previous agricultural uses (i.e. crop rotations), any non-agricultural uses, and domesticated animal access.
 - b. Review field and greenhouse environments for compliance with the provisions of this manual and maintain records of findings and assessments for a minimum of three years.

(c) Irrigation Water in the Field

1. Water Source
 - a. Ensure any water being utilized for irrigation is not contaminated with animal or human feces and meets the standard for E. coli in recreational waters contained in 40 C.F.R. § 131.41(c) (2013).
 - b. Identify potential sources of contamination of irrigation water.
 - c. Ensure that any well used is properly designed, constructed and maintained in such a way as to prevent contamination.
 - d. Document the source of water for irrigation for each crop.
 - e. Allow for approved water treatment methods to bring water into compliance with the quality standards published in 40 C.F.R. § 131.41(c) (2013).
 - f. Required water standards for safety must not be in conflict with local requirements for water reuse. Should conflict arise, contact FDACS, Office of Agricultural Water Policy, for assistance.
2. Water Use
 - a. Any foliar application of water to tomatoes at time of harvest shall meet the microbial standards for potable water contained in 40 C.F.R. § 141.63 (2014).
3. Monitoring
 - a. Growers shall test agricultural waters used with tomato production to minimize potential for microbial contamination.
 - (i) Ground water shall be tested at least annually.
 - (ii) Surface water shall be tested at least quarterly.
 - b. Growers shall maintain documentation of testing results.

(d) Workers in Tomato Fields/Greenhouses

1. Cleanliness/Sanitation for Workers
 - a. Sanitation facilities shall be provided for all field workers during planting, harvest or other field activities in accordance with OSHA, (29 C.F.R. § 1928.110 (2014)), FDA

(21 C.F.R. § 110 (2014)). See also Florida Department of Health, Rule 64E-14.016, F.A.C., requirements for field sanitary facilities.

- b. Health
 - (i) Grower shall establish and communicate an employee health policy that allows workers who report or are observed to have diarrhea or symptoms of illness that could impact food safety to be reassigned to activities that do not involve food contact.
- c. Hygiene
 - (i) Training and education with respect to safety, hygiene and sanitation practices is recommended.
 - (ii) Document and monitor worker hygiene and sanitation practices and improve practices through training and education.

(e) Crop Production Practices

- 1. Fertilizer – Commercial
 - a. Grower shall comply with the Department’s regulations in Chapter 5E-1, F.A.C., regarding fertilizer usage, storage and testing.
- 2. Manures
 - a. Only manure composted in accordance with guidelines in Section III of the **Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables**, 1998, shall be used in tomato fields and greenhouses.
 - b. If manures are used, the dates of composting, methods utilized and application dates must be documented.
 - c. Biosolids are not permitted.
- 3. Pesticides
 - a. Pesticide chemicals used must comply with all requirements of Chapter 487, Florida Statutes, and regulations in Chapter 5E-2, F.A.C.
 - b. Pesticides must be appropriately registered for such use in the State of Florida and must be used in accordance with label directions
 - c. Foliar application of pesticides may only be mixed with water that meets microbial standard for potable water contained in 40 C.F.R. § 141.63 (2014).
- 4. Chemicals Used on Product
 - a. Chemicals used on product that are not registered pesticides may be permitted for food contact use if allowed under regulations of the U.S. Food and Drug Administration (FDA).

(f) Tomato Harvesting

- 1. Crews
 - a. Growers shall ensure that harvest contractors and crews are aware of food safety risk reduction principles as outlined in this document and that they agree to adhere to these principles.
 - b. Containers
 - (i) Any containers used to hold tomatoes that are received back from a packinghouse must be checked for cleanliness prior to use.

- (ii) No final use packing containers such as corrugated boxes shall be used for harvest or packing in the field unless a microbial reduction method for field packed tomatoes has been approved. Only those containers that can be easily cleaned and sanitized shall be used for field harvest.
- (iii) Clean and sanitize harvest containers or bins at least weekly, more often if needed, to remove sand, grit, dirt and other residue.

(g) Equipment

1. Any surfaces or equipment that touches fresh produce is a food contact surface and must be cleaned and sanitized as such.
2. Establish routine cleaning and sanitizing procedures and document these standard operating procedures in writing.
3. Maintain all equipment and surfaces in such a way as to minimize contamination of and injury to tomatoes.

(h) Debris Removal

1. Dirt and debris shall be removed from tomatoes to the degree possible in the field.

(i) Culling, Sorting and Removal of Injured Fruit

1. Diligent removal of injured fruit will provide the best opportunity to reduce microbial contamination. To the degree possible, tomatoes in the damaged, soft, or decayed category must be removed to minimize microbial contamination.

(j) Reduction of Microbial Contamination in Field Packing

1. The packing of tomatoes in the field (or field pack tomatoes) is not permitted unless compliance with the Tomato Good Agricultural Practices (T-GAP) is achieved and one of the sanitizing procedures listed in the Tomato Best Management Practices (T-BMP), Sanitization of Tomatoes/Chlorination Procedures and Other Approved Methods, is used that will achieve a 3 log reduction for *Salmonella* or like organisms.

(k) Record Keeping

1. Records documenting adherence to these T-GAPs, including those addressing environmental review, water usage, record of completed education and training, pest control and crop production practices for the operation must be maintained and producible within 48 hours.
2. All required record keeping shall be for 3 calendar years unless a longer period is required by state or federal law.
3. Other records – Requirements for records relating to other state or federal laws may also apply.

PART B

Tomato Best Management Practices for Packing House Operations and Post Harvest Handling (T-BMP)

(1) Approved Tomato Best Management Practices for Packing House Operations and Post Harvest Handling (T-BMP)

(a) General Facility Requirements and Procedures for Operation

1. The General requirements for the manufacturing, processing, packing, holding and retailing of foods included in Chapter 5K-4, F.A.C., relating to plant and grounds, equipment and utensils, sanitary facilities and controls, sanitary operations and processes and controls shall be followed except that packinghouses are not required to have the enclosed structures required of processing facilities.
2. Packers shall establish written Standard Operating Procedures (SOPs) for sanitation in all facilities. These procedures should be Hazard Analysis Critical Control Point (HACCP) based.

(b) Water Used in Packing House and Post Harvest

1. The quality of water used in washing tomatoes after harvest is critical. Only water that meets the microbial standards for potable water contained in 40 C.F.R. § 141.63 (2014) shall be used in the packing facility. Documentation of microbial test results for the source water shall be maintained and producible in a reasonable amount of time.
2. The dump tank shall be cleaned and the water changed daily.
3. Comply with Good Manufacturing Practices (GMPs) as set forth in 21 C.F.R. § 110.37(a) (2014) and § 110.80(a)(1)(2014), to ensure that all water is of adequate quality throughout all packing operations.
4. Untreated surface waters are not permitted for any use in packinghouses or other post harvest contact.
5. If using a dump tank, water temperatures shall be maintained 10°F above the incoming fruit pulp temperature to minimize the risk of intrusion of microorganisms into the tomatoes to the degree possible.

(c) Removal of Injured/Damaged Tomatoes

1. Establish and monitor careful procedures to identify and remove injured and damaged tomatoes to reduce microbial contamination.
2. Diligent removal of injured fruit will provide the best opportunity to reduce microbial contamination. To the degree possible, tomatoes in the damaged, soft or decayed category must be removed to minimize microbial contamination.

(d) Equipment

1. Any surfaces and equipment that touch fresh produce is a food contact surface and must be cleaned and sanitized as such.
2. Establish routine cleaning and sanitizing procedures and document these sanitation standard operating procedures (SSOPs) in writing.
3. Maintain all equipment and surfaces in such a way as to minimize contamination of or injury to tomatoes

(e) General Sanitation

1. Only sanitizing products, defined in 21 C.F.R. § 178.1010 (2014) and registered by the EPA and the Department, will be permitted for use as facility sanitizers in tomato packinghouses.

(f) Employees

1. Employees inspecting and handling tomatoes shall comply with the hand washing and sanitizing procedures adopted in Chapter 5K-4, F.A.C.

(g) Sanitization of Tomatoes/Chlorination Procedures and Other Approved Methods

1. Current Approved Method for Sanitization of Dump Tank and Flume Water in Packing Houses
 - a. Chlorination Method
 - (i) A minimum of 150 ppm free chlorine, used in the following manner:
 - (1) pH 6.5-7.5
 - (2) Water temperature 5°C/10°F above pulp temperatures
 - (3) Time – maximum of 2 minutes
2. Monitoring Required
 - a. Free chlorine concentration, water temperature and pH must be monitored at start-up and every hour by hand thereafter and recorded in writing.
 - b. When electronic monitoring of oxidant concentrations in handling water is used, the monitoring shall be verified against a chemical test that measures free-chlorine and pH at start-up and every 2 hours thereafter.
 - c. When water temperature and pH monitoring are done electronically, verification procedures must be conducted.
3. Approved Sanitization Products
 - a. Peroxyacetic Acid - Peroxyacetic acid products currently registered by the Department, pursuant to Section 487.041, Florida Statutes, and Rule 5E-2.031, F.A.C., may be used for sanitization if labeled for this use. The directions for concentration of product and adequate contact time must be followed closely and recorded in writing.
 - b. Aqueous Chlorine Dioxide - Aqueous chlorine dioxide products currently registered by the Department, pursuant to Section 487.041, Florida Statutes, and Rule 5E-2.031, F.A.C., may be used for sanitization if labeled for this use. The directions for concentration of product and adequate contact time must be followed closely and recorded in writing.
 - c. Free chlorine - Products delivering free chlorine for overhead spray application may be used if the products are currently registered by the Department, pursuant to Section 487.041, Florida Statutes, and Rule 5E-2.031, F.A.C., labeled for this use, and used at the concentration of product and contact time stated on the label. Records of procedure must be followed closely and documented in writing.
 - d. Gas-phase and Aqueous Ozone – Gas-phase or aqueous ozone may be used for tomato packing if it can be shown through a reproducible scientific study that the product, if used at a stipulated agent concentration and contact time can achieve a

minimum 3 log reduction of Salmonella or like organisms. Additionally, the ozone generator must bear an EPA establishment number and must be labeled for this use on fruits and vegetables and the user must meet OSHA standards for worker protection. Label directions must be followed and procedures documented in writing.

- e. Other Chemical Usage – Any other chemical product, proposed for use for tomato packing, must be registered by the Department pursuant to Section 487.041, Florida Statutes, and Rule 5E-2.031, F.A.C., and labeled for this use. Additionally, it must be shown through a reproducible scientific study that the product or process used can achieve a minimum 3 log reduction of Salmonella or like organisms. Label directions must be followed and procedures documented in writing.

(h) Hand Washing Facilities

- 1. Sanitary hand washing facilities shall be provided and maintained as required by Chapter 5K-4, F.A.C.
- 2. Hand washing must be performed by all employees after toilet use.
- 3. Hand washing facilities must be maintained in a clean and sanitary manner at all times.

(i) Toilets and Sanitary Facilities

- 1. Toilet and sanitary facilities shall be provided as required by Chapter 5K-4, F.A.C.
- 2. Toilet and sanitary facilities shall be maintained in a clean and sanitary manner at all times.

(j) Animal Exclusion

- 1. No domestic animals or other animals are permitted in areas where tomatoes are packed or handled.

(k) Pest Control

- 1. Pest control programs shall be routinely maintained and documented for:
 - a. Insects
 - b. Rodents
 - c. Birds

(l) Storage and Ripening Areas

- 1. Store products in a sanitary manner to prevent contamination of product.
- 2. A written sanitation program should be established to minimize risk with specified cleaning and sanitizing procedures for coolers and storage areas.

(m) Chemical Usage in Packing Houses

- 1. Only those chemicals allowed by the U.S. Food and Drug Administration (FDA), as specified in the FDA Food Code and adopted by reference in Rule 5K-4.002, F.A.C., shall be used for food contact waxing materials or food additives. Authorized nonfood chemicals registered for use can be located at:
http://www.nsf.org/business/nonfood_compounds.

2. Store chemicals in a sanitary manner to prevent contamination of product.
3. Chemicals used as sanitizers are pesticides under state and federal law and must comply with all requirements of Chapter 487, Florida Statutes, and Chapter 5E-2, F.A.C.
4. Chemicals used in packinghouses that are pesticides must be appropriately registered for such use in the State of Florida and must be used in accordance with label directions.

(n) Transportation

1. Inspect any transportation vehicle for cleanliness, dirt and debris before loading product and make sure the trailer or container is cleaned and sanitary before loading. Records documenting inspection of vehicles shall be maintained and producible in a reasonable amount of time.
2. If there is any doubt regarding previous loads transported in a vehicle, verify records of previous loads with transportation firm to prevent contamination.
3. To facilitate possible tracebacks, ensure that transporters maintain positive lot identification for all products as implemented by the tomato industry.

(o) Recordkeeping

1. All required record keeping shall be maintained for 3 calendar years unless a longer period is required by state or federal law and shall be producible in a reasonable amount of time upon request.
2. Records shall be maintained for:
 - a. Product packed, shipped, handled
 - b. Product transported or stored
 - c. Standard Operating Procedures (SOP) and Sanitation Standard Operating Procedures (SSOP)
 - d. Sanitization Monitoring Records as applicable:
 - (i) Chlorination of dump water tank
 - (ii) pH
 - (iii) Wash water temperature
 - (iv) Aqueous Chlorine Dioxide: Registered product used, concentration, contact time and operating procedure
 - (v) Peroxyacetic Acid: Registered product used, concentration, contact time and operation procedure
 - (vi) Overhead application of chlorine spray: Registered product used, concentration, contact time and operating procedure
 - e. Testing and Monitoring Records for
 - (i) Water Usage including microbiological monitoring of wash waters, well water and surface irrigation water monitoring
 - (ii) Calibration of any automated equipment to monitor chlorine
 - (iii) Calibration of pH measuring device
 - (iv) Calibration of thermometer
 - (v) Any microbial testing for product, equipment, etc.
 - f. Sanitation Monitoring Records
 - (i) Daily logs of sanitation procedures
 - (ii) Housekeeping sanitation records
 - (iii) Equipment sanitation records
 - (iv) Monitoring records for hand washing facilities and toilets

3. Other records – Requirements for records relating to other state or federal laws may also apply.

(p) Product Labeling and Containers

1. Reuse of final tomato packing containers to pack additional tomatoes is prohibited.
2. The address on the container must be the address of the packer packing the contents or the individual grower.
3. Tomatoes will have positive lot identification.
4. Containers will be identified as to the lot of product along with the name of the producer or packing facility.

(q) Repacking Tomatoes

- (1) Tomatoes undergoing repackaging shall not be commingled with tomatoes from other producers or lots.
- (2) Bulk or loose tomatoes must be repacked in sanitized containers or into new containers that will carry forward appropriate identification.
- (3) Prepackaged and/or consumer pack tomatoes may be repacked into the same containers (if in good condition), new or sanitized containers.
- (4) Containers shall have positive lot identification.

(r) Traceback and Recall

- (1) All who handle tomatoes in accordance with these BMP's must be able to identify and traceback product for which they have handled in some manner so that product may be traced back and, if necessary, recalled from the point of production to the point of retail sale.

(s) Transparency

- (1) All producers, packers and repackers of tomatoes shall maintain adequate records of operating procedures to allow for transparency and documentation of handling procedures and shall make these readily available to regulatory officials as required.

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