

Safe Handling and Storing of Raw Fruits and Vegetables

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Fruits and vegetables are essential for a healthy diet. Nutritious produce can be purchased at your local grocery store or farmers market, or even grown in your backyard. While produce is usually safe, it can become contaminated throughout the farm-to-fork continuum with harmful microorganisms, including bacteria, viruses, and parasites, that can cause illness (pathogens). A foodborne illness, often referred to as “food poisoning,” can occur through consumption of contaminated foods.

There can be a risk of foodborne illness from the consumption of fresh fruits and vegetables because they are eaten raw or minimally processed. Fresh produce frequently lacks a kill step (cooking, for example) to destroy pathogens. The Centers for Disease Control and Prevention (2014) estimates

that 1 in 6 people are affected by foodborne illnesses annually in the U.S. When you purchase, prepare, store, and consume fresh fruits and vegetables, follow these best practices to protect yourself and others.



Once microorganisms contaminate fresh produce, they are difficult to wash off. Therefore, it is important to prevent contamination in the first place! Washing (with clean running water) can reduce the number of bacteria on produce by 99 percent; however, this does not guarantee that no pathogens are present. Pathogens, even at low numbers, can still cause illness. Using proper temperature control (including keeping cut leafy greens, diced or sliced tomatoes, cut melons, or sprouted seeds below 41 degrees Fahrenheit [41 F]) and cleaning and sanitation practices can reduce your risk of foodborne illness.



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Best Practices for Handling Fruits and Vegetables

Following are guidelines and tips for purchasing, storing, and preparing fresh produce safely.

Purchasing Produce From a Grocery Store or Farmers Market

- Avoid buying fruits and vegetables that are bruised or damaged. These areas can be entry points for pathogens or provide moisture for pathogen growth.
- If purchasing pre-cut produce (for example, cut leafy greens, diced tomatoes, etc.), select items that have been refrigerated or placed on ice at the grocery store or farmers market.
- Keep fresh fruits and vegetables separate from raw meat, seafood, and poultry products in the grocery cart and bags.
- After purchasing your food, go straight home. Perishable foods, such as fresh cut produce, raw meat, poultry, seafood, and eggs, should be refrigerated within four hours. However, when outside temperatures are 90 F or higher, foods should be refrigerated within one hour.

Tip: If these transport time recommendations are not possible (for example, if your market is 30 minutes or more away), bring a cooler to store perishable foods for the trip home.

Storing Produce

- Refrigerate perishable produce (such as strawberries, leafy greens, pre-cut and ready-to-eat bagged produce, etc.) in a clean refrigerator at 41 F or below to maintain quality and safety.
- Discard produce if it has not been refrigerated within four hours after cutting, peeling, or cooking.

Tip: Keep a thermometer in the refrigerator to ensure that foods are kept below 41 degrees Fahrenheit.

- Store raw produce on shelves or in bins above meats, poultry, and seafood to reduce the risk of cross-contamination from dripping juices.
- To maintain freshness and quality, place produce in perforated bags when refrigerating.



Image from FDA, 2012

- Store produce that does not require refrigeration on a clean countertop or in a cupboard or pantry out of direct sunlight.
- Separate the produce that releases ethylene gas during ripening (such as apples, pears, bananas, and mangoes) from other produce to extend its shelf life by preventing premature spoilage. This can be done by placing it in a separate refrigerator bin.

Rinsing Produce

- Rinse produce with clean, running tap or distilled water immediately before use. (Do not wash prior to storing because this can add moisture that can increase microbial growth.) This will remove any dirt or residue and prevent its transfer into the product.

Tip: Avoid rinsing produce prior to storage. Water or moisture can speed up microbial spoilage.

- A clean brush can be used to scrub produce that has a hard rind or firm exterior (for example, potatoes, carrots, and cantaloupes).
- Do not wash produce with soap, baking soda, or other cleaning solutions. Many fruits and vegetables are porous, and soap and cleaning solutions can be absorbed by the produce and expose consumers to harmful chemicals.
- Produce washes and baking soda have not been scientifically validated to be more effective than rinsing with clean water. In addition, these washes and baking soda rinses could affect the flavor of the produce.
- Rinsing packaged ready-to-eat and pre-washed produce is unnecessary because re-rinsing

Table 1. Recommended storage temperature and shelf life of common produce items. The storage times listed in this chart are helpful guidelines, not set rules.

Storage location	Fruits	Shelf life	Vegetables, herbs, spices	Shelf life	Vegetables, herbs, spices	Shelf life
Store in refrigerator (set at 41 F or lower)	Apples	>7 days	Artichokes	1-2 weeks	Green onions	1-2 weeks
	Apricots	2-3 days	Asparagus	3-4 days	Herbs	1 week
	Blackberries	1-2 days	Beets	7-10 days	Leeks	1-2 weeks
	Blueberries	1-2 days	Broccoli	3-5 days	Lettuce	1 week
	Cherries	1-2 days	Cabbage	1-2 weeks	Lima beans	3-5 days
	Citrus fruits	1-2 weeks	Carrots	3 weeks	Mushrooms	2 days
	Cut fruits	2-4 days	Cauliflower	3-5 days	Peas	3-5 days
	Grapes	3-4 days	Celery	1-2 weeks	Peppers	4-5 days
	Mango	1 week	Cucumbers	4-5 days	Radishes	10-14 days
	Raspberries	1-2 days	Eggplant	3-4 days	Spinach	3-7 days
	Strawberries	1-2 days	Ginger	1-2 weeks	Summer squash	4-5 days
			Green beans	1 week	Sweet corn	1-2 days
	Ripen, then store in refrigerator	Avocados	3-5 days			
Kiwifruit		3-4 days				
Nectarines		3-4 days				
Peaches		3-4 days				
Pears		3-4 days				
Plums		3-4 days				
Store out of direct sunlight and at room temperature	Apples	<7 days	Basil	1 week	Sweet potatoes	2-3 weeks
	Bananas	Until ripe	Dry onions*	2-4 weeks	Winter squash	1 week
	Citrus fruit	10 days	Garlic*	1 month		
	Mangoes	3-5 days	Potatoes	1-2 months		
	Melons	1-2 days	Pumpkins	2-3 months		
	Pineapple	5-7 days	Tomatoes	Until ripe		

Sources: Kader et al. (2012); McCurdy, Peutz, and Wittman (2009).

*Potatoes, onions, and garlic should be stored in a cool, well-ventilated location, such as a pantry.

(the addition of water/moisture) can provide opportunities for contamination. Check the package label to see if rinsing is required.

- To reduce some bacteria that could be present after rinsing, dry produce with a clean, disposable paper towel. Do not dry with kitchen towels or clothing.

Preparing Produce

- Wash hands for 10-20 seconds with warm water and soap before and after preparing produce.

- Designate a cutting board for preparing fresh produce that is separate from the one used for raw meat, poultry, and seafood (to prevent cross-contamination).
- Wash the cutting board with hot soapy water and rinse with clean water or place in a dishwasher for cleaning before use.

Tip: Produce that has been peeled or cut should be consumed within two to four days or discarded.

- Before cutting or peeling produce, utensils and countertops should be cleaned with hot, soapy water.
- Cut out bruised spots on produce before consumption. Cut the tops of celery and trim exterior areas of lettuce and other leafy vegetables that appear dirty. Spoiled produce should be discarded.
- Additional information on shelf life and storage recommendations for fresh fruits and vegetables can be found in “Food Storage Guidelines for Consumers” (Boyer and McKinney 2013), listed in the References section.

Eating fresh fruits and vegetables is an essential component of a healthy diet; however, produce consumed raw or minimally processed can pose a food safety risk. Following best practices for handling and storing produce will help reduce the likelihood of foodborne illness.

Resources

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