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Home Food Safety: Use of Readily Available Sanitizers on Cantaloupes

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The use of good cleaning and sanitizing practices is crucial during production and distribution of fresh fruits and vegetables to reduce the risk of microbial contamination. The implementation of such practices is standard in most production facilities because soil, compost, water, personnel, and/or harvesting/processing equipment can all be sources of harmful microbes that could result in a foodborne illness.

Outbreaks associated with the consumption of cantaloupes contaminated with the bacteria *Salmonella* Typhimurium and *Listeria monocytogenes* have occurred in recent years (CDC, 2012a; CDC, 2012b). The U.S. Food and Drug Administration (FDA) put together guidelines to advise consumers to clean cantaloupe before eating (2018). These recommendations include: 1) examining for visible damages on the surface of cantaloupe, 2) washing cantaloupe under running water with a brush, 3) using clean utensils and cutting boards to avoid cross contamination, and 4) keeping cantaloupe below 40°F.

In addition to the FDA recommendations, this article aims to provide suggestions on the use of

inexpensive sanitizers that anyone can use in their homes to effectively reduce the risk of bacterial contamination before eating cantaloupes or other fruits and vegetables.

What is the difference between cleaning and sanitizing?

Let us first define these two terms. Cleaning refers to the removal of soil or any other visible contaminants from the surface of the object. Sanitizing is the process of removing the contaminants not visible to the naked eye (for example, bacteria). The latter is an excellent complement to the cleaning step of the food commodity, and commonly involves the use of a chemical to reduce the number of microbes that could still be associated with a surface, fruit, and/or vegetable after cleaning. Examples of sanitizers that consumers can use on cantaloupes and other fresh produce include unscented household bleach and hydrogen peroxide, vinegar, iodine, and hot water (Robbins et al., 2005). The washing and sanitizing process for fresh produce recommended by the FDA involves washing and scrubbing to remove the dirt and microbes (FDA, 2018). To increase the removal of possible microbial contaminants, the washed produce is then soaked in a diluted solution of the sanitizer for a given period of time (typically around 5 minutes). Consumers should be aware that shortening the recommended time of exposure to a sanitizer may reduce how well the sanitizer can kill any bacteria that are present.

Hot water as a sanitizer

As an alternative to chemical sanitizers, consumers can use hot water. This is commonly used as a sanitizer in food facilities and restaurants to sanitize equipment, dishes, and other utensils. The U.S. Department of Agriculture (USDA) recommends a minimum temperature of 180°F for sanitation purposes (USDA, 2005). Hot water sanitizing is very practical because it is easy to obtain, apply, and remove, in comparison to chemical alternatives. Previous research in our laboratory has shown the efficacy of hot water to reduce *Listeria monocytogenes* and *Salmonella* Typhimurium in cantaloupe. Water temperature must be kept at 180°F to ensure effective sanitizing. Using a thermometer to check the water temperature is recommended.

How to use hot water as a sanitizer

Bring the fresh cantaloupe to the sink. Use a brush to scrub the outer surface of the cantaloupe under running water for 1 minute. This step is recommended by the FDA to achieve greater reduction of bacteria. Surface cleaning is followed by sanitizing, which involves soaking the whole cantaloupe in the hot water bath at 180°F for 5 minutes. After this sanitation period, the consumer can proceed to cut the cantaloupe using a clean knife.

How effective is hot water at destroying biofilms?

A biofilm is an aggregate of bacteria that occurs when the bacteria produce a slimy substance that coats the bacterial community, allowing the bacteria to attach to a surface. Biofilms act as an impenetrable fortress, protecting the bacterial community from the killing effect of sanitizers. This makes biofilms difficult to destroy, especially when using chemical sanitizers (Joseph et al., 2001; Pan et al., 2006). However, another method worth considering is the use of hot water, given its effectiveness in destroying individual bacterial cells as well as those contained in biofilms (Miyano et al., 2003).

Our research group demonstrated that hot water was capable of reducing the number of *Salmonella* Typhimurium and *Listeria monocytogenes*, under laboratory conditions (as observed in Table 1). Some differences in bacterial reduction were observed

Table 1. Specifications for hot water sanitizing of whole cantaloupes

Cleaning Up	Sanitation Process		Results	
Time for scrubbing under running water	Minimum wash temperature	Sanitizing time	Reduction of Salmonella Typhimurium	Reduction of Listeria monocytogenes
1 minute	180 F	5 minutes	99.98%	99.4%

between these two bacteria when hot water was used as a sanitizer. These differences were likely due to *Listeria* biofilms being biologically more resistant to heat compared to *Salmonella*.

Does hot water affect the quality of your cantaloupe?

No, it does not. After soaking the whole cantaloupe in hot water for 5 minutes, the fruit smells like blanched vegetables. But this odor disappears after the moisture on the surface dries out. Moreover, our group demonstrated in an experiment that the hot water treatment did not affect the color of the cantaloupe (Figure 1).

Figure 1. Visual test of cantaloupes. a - Cantaloupes after 5-minute hot water treatment; b - Cantaloupes without treatment.

Alternative sanitizers

A few chemical options deserve consideration for use as sanitizers at home. Some of the most efficient chemical sanitizer options can be found in Table 2. It is important to remember to completely rinse the produce with water after the chemical sanitizer treatment in order to remove all chemical residues from the rind.

Takeaway key points

Good home sanitizing practices reduce the risk of getting sick from eating contaminated fresh produce, such as cantaloupes. The use of a readily available sanitizer at home, such as a hot water treatment, has shown to be an effective practice to ensure your family safe and high-quality fresh fruits and vegetables for consumption. The exposure time to the hot water may need to be reduced if you are using the hot water method to sanitize other fruits and vegetables that don't have a thick rind like cantaloupes. This method would not be recommended for leafy greens, berries, herbs, or other fruits and vegetables that easily bruise or do not have a peel or a rind. An excellent way of helping to promote food safety is to disseminate these guidelines and recommendations to your peers, family, and friends.

Table 2. Specifications for household chemical sanitizers for use on whole cantaloupes

Chemicals Needed	Sanitizer solution preparation	Time for scrubbing under running water (minutes)	Sanitizing time (minutes)	Reduction of Salmonella Typhimurium (%)	Reduction of Listeria monocytogenes (%)
Vinegar (5% acetic acid) and table salt	1/3 cup vinegar and 6.7 TBSP of salt and fill to one (1) gallon with water	1	10	99.94	95.93
Iodine solution (10%)	1.6 cups of iodine solution and fill to one (1) gallon with water	1	5	99.92	80.5
Hydrogen peroxide (3%)	1/3 gallon of hydrogen peroxide and fill to one (1) gallon with water	0	10	99.77	98.14
Unscented bleach (7.86% chlorine)	1/2 cup bleach and fill to one (1) gallon with water	1	5	98.49	97.96

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