

# Fruit & vegetable decontamination

Corbion keeps it safe & fresh



- ▶ Effective pathogen control
- ▶ Wash-water sanitization
- ▶ Biodegradable solutions
- ▶ Safe & convenient use

As consumers continue to seek healthy and convenient options to ensure the daily consumption of nutritious fruits and vegetables, the demand for fresh-cut produce is increasing at a steep rate and the industry is thriving. The safety of fresh-cut produce is another important aspect for producers to consider.

Another problem for commercial producers is the limited shelf life of fresh-cut fruits and vegetables. When compared with intact, unprocessed fruits and vegetables, the shelf life is reduced due to deterioration of the sensorial and microbial quality during storage.

Washing treatments can guarantee quality and safety and can also be effective at reducing or eliminating pathogenic microorganisms on fresh-cut fruits and vegetables.

Corbion offers a versatile, biodegradable product portfolio proven to be effective against *Salmonella Typhimurium*, *Escherichia coli* and *Yersinia enterocolitica* species on fruits and vegetables. Corbion's lactic acid can be applied as a wash or spray disinfectant for pathogen control.

To prevent contamination of the produce through microbiologically unsafe water Corbion lactic acid can also sanitize wash-water. Compared to chlorinated water, the use of PURAC® greatly reduces the costs of waste water treatment and disposal.

Product	Chlorine solutions	PURAC®
<b>Benefits</b>	<ul style="list-style-type: none"><li>- Inexpensive</li><li>- Available in solid, liquid and gas injection forms</li></ul>	<ul style="list-style-type: none"><li>- Safe in use</li><li>- Available in dip and spray</li><li>- Effective against common pathogens</li><li>- Just as effective as chlorine</li></ul>
<b>Drawbacks</b>	<ul style="list-style-type: none"><li>- Possible formation of carcinogenic chlorinated compounds</li><li>- Potential production of toxic fumes</li><li>- Increasing regulatory and environmental constraints</li></ul>	<ul style="list-style-type: none"><li>- Regulatory guidelines vary per country</li><li>- Higher cost-in-use</li></ul>

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## Internalized pathogen control

Populations of *Salmonella Typhimurium* and *Escherichia coli O157:H7* were not detected inside tomatoes which had been sprayed with PURAC lactic acid at 5°C / 41°F (Figure 1). Spray treatment tests consisted of 250 ml of 2% PURAC lactic acid or 250 mg/liter of chlorine being sprayed for 15 seconds at 69 kPa on four tomatoes using a hand held compressed-air sprayer. The lack of recovery of internalized pathogens in tomatoes may be due to the fast bacterial reduction on the surface, preventing live pathogens from diffusing into the tomatoes.

## Quick and effective spray treatment

An application of 2% PURAC lactic acid spray results in significantly lower counts of *Salmonella Typhimurium* and *Escherichia coli O157:H7* on fresh cantaloupes compared to chlorine treatments (Figure 2). Spray treatment tests consisted of 250 ml of 2% PURAC lactic acid being sprayed for 15 seconds at 69 kPa on the cantaloupes using a hand held polyethylene compressed-air sprayer. Dip-wash treatment with PURAC lactic acid shows equal effectiveness.

The effectiveness of 0.5% lactic acid with and without 100 ppm chlorine against *Yersinia enterocolitica* on shredded lettuce was examined compared to 0.5% acetic acid with and without 100 ppm chlorine, and just 100 ppm chlorine (Figure 3).

Lettuce leaves were washed with tap water, drained, cut and placed in plastic bags. Each bag of 50 g was inoculated with a suspension of 0.5 ml 107 CFU of *Yersinia enterocolitica*. Vegetables were stored overnight at 4°C (39.2°F) before being exposed to various disinfectants. 100 grams of inoculated vegetables were dipped for 1, 2, 5 or 10 minutes into 1 liter of disinfectant solution at 22°C (71.6°F). The dip-wash treatment of 0.5% lactic acid for 5 minutes proved to be most efficient with respect to exposure time to reduce the amount of *Yersinia enterocolitica* with 2.5 log10.

A combination of 0.5% lactic acid + 100 ppm chlorine, however, fully inhibited the growth of *Yersinia enterocolitica* after only 1 minute exposure time.

Recommended Dosage	Spray	Dip
<b>PURAC L-lactic acid</b>	2.0%	1.0%

\* PURAC available in blend with vinegar, citric acid, and malic acid

\* Applicability is dependent on regional regulatory requirements

## Detection of internalized pathogens in tomatoes after spraying with different disinfectants (5°C/41°F)

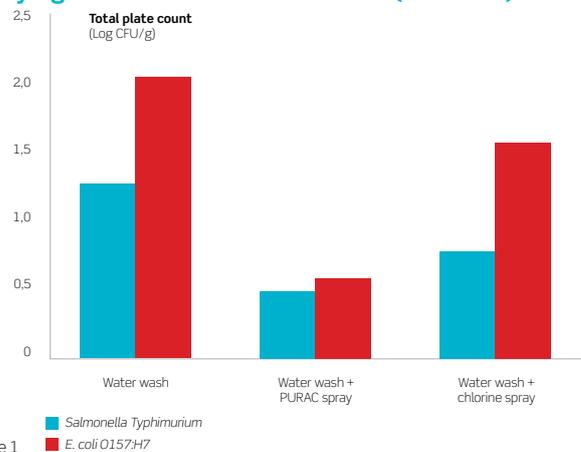


Figure 1

## Reduction of *Salmonella Typhimurium* and *E. coli O157:H7* on fresh cantaloupes by selected treatments

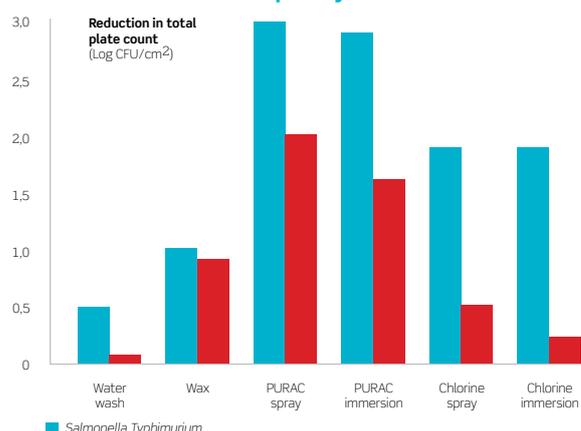


Figure 2

## Reduction of *Y. enterocolitica* on shredded lettuce, temperature dip water 22°C/71.6°F

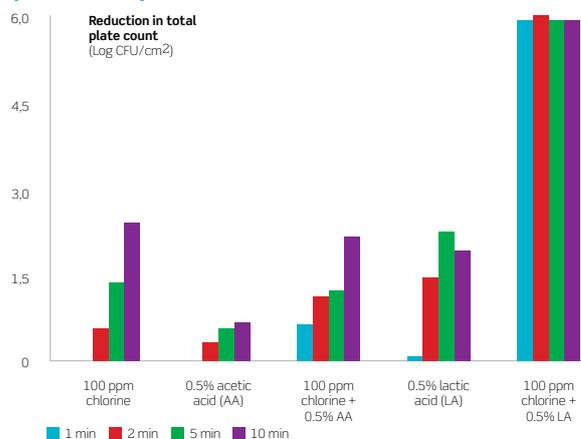


Figure 3

Interested in our solutions? Go to [corbion.com/fruits-and-vegetables](http://corbion.com/fruits-and-vegetables)



Corbion creates innovative ingredient solutions for leading food manufacturers around the world. Our expertise inspires customers to craft foods that start flavorful, stay fresh and remain safe, from date of production to date of consumption. Using sustainable solutions that deliver real, consumer-focused value, we work side-by-side with customers, helping them grow and create delicious food that capture peoples' palates and earn their trust. At Corbion our priorities as consumers shape the solutions we create, and as a result, feel confidence and pride in serving our own families and friends the products we help make possible.

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