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Director's Note

We have finally reached the last month of 2020 (thank goodness) and are now within the Winter Holiday Season! The Postharvest Technology Center extends our wish to you for a peaceful and joyful holiday season, and health and prosperity in the coming year!

The Center just wrapped up another successful virtual course (Fresh Cut Products: Maintaining Quality and Safety). We will likely have 1 or 2 more completely virtual courses before we are able to shift back to in-person events. Luckily, we have gotten really good at offering engaging workshops online, so we invite you to join us at the next one (see below).

In a year when keeping people as healthy as possible by ensuring their produce is safe, flavorful and nutritious, the Postharvest Technology Center strives to be a robust and responsive resource. Continued development of our workshop-based trainings and **free** access to our website and Produce Facts Apps are made financially possible by the [UC Postharvest Program Endowment Fund](#) through the generous support of friends like you.

Please consider making a contribution and/or encouraging your organization to make a tax deductible contribution. You may make your contribution [online](#).

If you have any questions about the Postharvest Program Endowment Fund, please contact me by e-mail (ejmitcham@ucdavis.edu). Thank you in advance for your continued support.



*Interim Director,
Beth Mitcham*

Postharvest Education at UC Davis



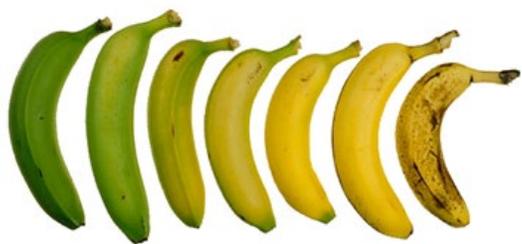
Fresh-cut Products: Maintaining Quality & Safety Virtual Workshop Completed!

Five Weekly Live Sessions

Tuesdays, November 17, 24, December 1, 8, 15, 2020

For more information about this workshop visit [this webpage](#).

We have successfully completed the first virtual Fresh Cut Products Workshop, covering topics as diverse as Flavor and Aroma Biology, Fresh-cut Quality, Temperature Management, Packaging Selection, Storage, Modified Atmospheres, Ripening Fresh-cut Products, and a host of Safety-related topics. By every measure the workshop was a huge success! Mark your calendar for September 2021 to attend the next Fresh Cut Workshop in Davis!



Fruit Ripening and Ethylene Management Workshop

Spring, 2021 Virtual Workshop (Details to follow)

This popular workshop focuses on how to increase profits by reducing losses at the receiving end, and delivering ready-to-eat, delicious fruits and fruit-vegetables to the consumer. Topics will include ripening facilities and equipment, maturity and quality relationships, biology of ethylene production, sensory quality, temperature management, retail, psychological disorders and other losses, and demonstrations on measuring sensory quality, instrumental quality, and environmental parameters. Please visit our [website](#) for more information.

[Click Here for More Information!](#)

Our Website & Social Media

New Publications on our Website

Edward S. Spang, Laura C. Moreno, Sara A. Pace, Yigal Achmon, Irwin Donis-Gonzalez, Wendi A. Gosliner, Madison P. Jablonski-Sheffield, Md Abdul Momin, Tom E. Quedsted, Kiara S. Winans, and Thomas P. Tomich. 2019. **Food Loss and Waste: Measurement, Drivers, and Solutions**. *Annu. Rev. Environ. Resour.* 2019.44:117-156.

Christopher G. Theofel, Thomas R. Williams, Eduardo Gutierrez, Gordon R. Davidson, Michele Jay-Russell, Linda J. Harris, 2020. **Microorganisms Move a Short Distance into an Almond Orchard from an Adjacent Upwind Poultry Operation**. *Applied and Environmental Microbiology*, August 2020 Volume 86 Issue 15 e00573-20

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Postharvest Highlights

Van Haute, Sam, Bin Zhou, Yaguang Luo, Imca Sampers, Martijn Vanhaverbeke, Patricia Millner. 2019. [The use of redox potential to estimate free chlorine in fresh produce washing operations: Possibilities and limitations](#). *Postharvest Biology and Technology* 156: 110957.

This study examined the relationship between oxidation reduction potential (ORP) and free chlorine (FC) under chlorine demand (CLO) free conditions and during fresh produce washing. A decrease in pH or temperature led to an increase in ORP. Using tap water to wash the produce instead of distilled water significantly changed the ORP. For different types of tested produce (fresh-cut carrot, onion, romaine, and iceberg lettuce and for whole tomatoes), increasing the product-to-water ratio (increasing the transfer of organics into the water) led to a decrease in ORP for a specific FC residual. ORP was better related to FC at the lower end (5 mg/L FC) than at the higher end (100 mg/L FC) of the FC range used in fresh produce washing. However, since the ORP in fresh produce wash water is affected significantly in multiple ways by the wash water and process conditions, the predicted FC values with ORP under certain fresh-cut washing conditions cannot be generalized for other conditions. The influence of these factors complicates the relationship between ORP and FC, and thus limits the usability of the ORP technology for estimating FC in produce wash water.

Luo, Yaguang, Bin Zhou, Sam Van Haute, Xiangwu Nou, Boce Zhang, Zi Teng, Ellen R. Turner, Qin Wang, Patricia D. Millner. 2019. [Association between bacterial survival and free chlorine concentration during commercial fresh-cut produce wash operation](#). *Food Microbiology* 70:120-128.

Determining the minimal effective free chlorine (FC) concentration for preventing pathogen survival and cross-contamination during produce washing is critical for developing science- and risk-based food safety practices. The correlation between dynamic FC concentrations and bacterial survival was investigated during commercial washing of chopped Romaine lettuce, shredded Iceberg lettuce, and diced cabbage. Wash water was sampled every 30 min and assayed for organic loading, FC, and total aerobic mesophilic bacteria after chlorine neutralization. Water turbidity, chemical oxygen demand, and total dissolved solids increased significantly over time, with more rapid increases in diced cabbage water. Combined chlorine increased consistently while FC

fluctuated in response to rates of chlorine dosing, product loading, and water replenishment. Total bacterial survival showed a strong correlation with real-time FC concentration. Under approximately 10 mg/L, increasing FC significantly reduced the frequency and population of surviving bacteria detected. Increasing FC resulted in further reductions of aerobic plate count to below the detection limit (50 CFU/100 mL), except for a few sporadic positive samples with low cell counts. This study confirms that **maintaining at least 10 mg/L FC in wash water strongly reduced the likelihood of bacterial survival** and thus potential cross contamination of washed produce.

Postharvest Opportunities



Farmer-to-Farmer program at Partners of the Americas

Farmer-to-Farmer (F2F) program at Partners of the Americas. F2F is a program that promotes economic development and food security abroad by sending volunteer technical specialists to developing countries to provide technical assistance to producers, cooperatives, agribusinesses, NGOs, and educational institutions.

As you can imagine, COVID-19 has drastically affected our program activities as we have had to evacuate all volunteers from the field. However, farmers, cooperatives, and agribusinesses all around the world are still in need of volunteer support and technical expertise. To respond to this need, we have developed new ways to support our constituents in Colombia, the Dominican Republic, Jamaica, Guatemala, Guyana and Myanmar through **remote technical assistance**.

The Myanmar Avocado Producer and Exporter Association (MAVO), needs help with Avocado Harvest and Post-Harvest. Please see a general description of the scope of work for this technical assistance below:

- In Myanmar, the expanding avocado industry seeks technical assistance on best practices for harvesting and post-harvest handling which can reduce the post-harvest losses in avocado production, and post-harvest diseases of avocado.
- To help improve the current status of the industry, a F2F volunteer is requested to train avocado farmers on proper harvesting, the use of new harvest equipment, harvest scheduling, and knowledge on fruit maturity by dry weight guidelines and best practices for post-harvest handling.
- It is expected that, at the end of the assignment, the host will have knowledge on harvest and post-harvest handling, how to schedule the harvest of their commercial varieties and a post-harvest guide to meet the needs of Myanmar's avocado industry.
- This assignment is fully remote and would mostly be conducted through virtual video training sessions. The Myanmar office usually likes to have its assignments last two weeks, with a 2-hour session every weekday, but if this is not convenient they can also accommodate to the volunteers' schedule.

Please contact Nathalia Vásquez at NVasquez@partners.net for more information.

Postharvest Calendar

- Spring, 2021. **Fruit Ripening & Ethylene Management Workshop**. UC Postharvest Technology Center. A virtual offering is expected. Details to follow.
- January 18-20, 2022. **Aligning the Food System** - Emerging technologies to address grand challenges in the produce industry. UC Postharvest Technology Center. Davis, CA

Ask the Produce Docs



Q. I'm a sweet potato grower and exporter based on the East Coast in the U.S. Some of our sweets were rejected during international shipment due to *Rhizopus* soft rot which was confirmed by lab analyses. I would like to ask for some help on controlling mold growing in our sweet potatoes. (J.C.)

A. This is, unfortunately, a recurring problem in sweet potatoes and the solution revolves around sanitation of the dump tank. The sweet potatoes are usually dumped from bins into a water dump tank which is changed once a day and contains no chlorine disinfectant. The microbial load builds up during the day and serves as a source of contamination. The reason for not using chlorine is that with all the soil in the dump tank it is ineffective. The dump tank is often followed by a high pressure wash of clean water. Because of the physical handling on the packing line, the sweet potatoes are being damaged and this damage is visible. The key to this situation is improved sanitation at the dump tank. A pre-dump wash will remove the sand adhering to the sweet potatoes and allow less contamination in the dump tank. Then the dump tank needs some disinfectant to minimize contamination. In addition to this, the sweet potato operation could also follow recommendations to cure the sweet potatoes after packing. This would be a good addition to the handling practices for export in particular. Curing is the process to heal surface wounds caused by handling and is a key operation after harvest and before storage of sweet potatoes. It can also be beneficial to heal damage from the packingline. The recommendations are 85/85 or 85°F (29°C) and 85% or higher relative humidity for a few days. This step would also allow an additional quality check before the sweet potatoes are loaded into containers for export. For marine container shipment at 58°F (14-15°C), container loading [see our [Marine Container Transportation](#) publication] is key to ensure proper airflow through the boxes. If open floor areas in the rear of the container are not blocked, cool air will not flow up through the boxes and will allow buildup of humidity which also favors mold growth.

The focus on washing bins to remove sand before dumping, improving the dump tank sanitation, and holding the sweet potatoes to recure them should all contribute to better arrival condition for your international shipments.

-Marita Cantwell

Postharvest Questions. If you have a postharvest question you'd like answered, please send it to postharvest@ucdavis.edu, and we'll see if one of our specialists can help.

Archived Items. Link to a data store of all our previous "[Ask the Produce Docs](#)" questions, or link to [archived copies](#) of our monthly e-newsletter as PDF documents.

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