



### What's Key in this Issue

[Upcoming Workshops](#)

[What's New on the Website](#)

[Postharvest Opportunities](#)

[Research Highlights](#)

[Postharvest Calendar](#)

[Ask the Produce Docs](#)

### Director's Note

We are all keenly aware of the unprecedented times we are living in these days! No person or organization is unaffected. At the Postharvest Technology Center, we were forced to postpone our Fruit Ripening & Ethylene Management Workshop to a later date, to be determined. We are still hopeful we can offer our Postharvest Technology of Horticultural Crops Short Course at the end of June, but time will tell. If you would like to register, please be assured that a full refund will be given if the course must be cancelled.

I encourage you to familiarize yourself with the free information available on our [website](#), and our postharvest experts are here to answer your questions at [postharvest@ucdavis.edu](mailto:postharvest@ucdavis.edu). A few new additions to the website are highlighted below, including a factsheet for food handlers related to COVID-19. While there is currently no evidence of food or food packaging spreading COVID-19, this factsheet highlights what food processors can do to help ensure food safety and mitigate risks associated with COVID-19.



*Interim Director,  
Beth Mitcham*

### Postharvest Technology of Horticultural Crops Short Course Scholarship Awardee

Once again, we acknowledge that the need is strong for scholarships for our Postharvest Technology of Horticultural Crops Short Course. We saw approximately 50 applicants for this years' scholarship opportunity. The applicants competing for this scholarship come from 23 countries. After thoughtful consideration, the review committee selected Judith Ndeme from the University of Nairobi as the 2020 scholarship recipient. Congratulations Judith!! Judith says her first priority will be to share her new knowledge about postharvest technologies with her fellow students at the university. For the other applicants, we hope you can find another way to attend the course.

Stay healthy and safe,

Beth Mitcham

### Postharvest Education at UC Davis



## Postponed to a Later Date

### Fruit Ripening & Ethylene Management Workshop March 31-April 1

This 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 handling, and phythological disorders. Learn from experts from the produce industry and the University of California and University of Florida. Demonstrations of how to measure produce physical and sensory quality and environmental conditions will be included. Join us to experience the flavor benefits of ripe fruit! Please visit the [website](#) for more information.



### Postharvest Technology of Horticultural Crops Short Course beginning June 15

This course is a one or two-week intensive study of the current technologies used to handle fruits, nuts, vegetables and ornamentals, along with an overview of the underlying biology. It is designed for quality control personnel in the produce industry, along with research, extension, business and government professionals interested in postharvest handling of horticultural crops. Week two is an optional tour of produce operations in California, including harvesting, packing, cooling and transportation. Please visit the [website](#) for more information.

[Enroll Here!](#)

## On Our Website

Stay up-to-date with the Postharvest Technology Center by joining our [LinkedIn Group](#).



### New Publications on our Website

DeCaprio, Erin. 2020. [What do food handlers need to know about coronavirus infectious disease 2019 \(COVID-19\) and the associated virus, SARS-CoV-2?](#) University of California Food Safety (<http://ucfoodsafety.ucdavis.edu>).

Mahta Moussavi, Vanessa Lieberman, Chris Theofel, Javad Barouei, and Linda J. Harris. [Growth of Salmonella on inoculated in-hull pistachios during postharvest handling](#). Journal of Food Protection, Vol. 82, No. 2, 2019, Pages 217–225  
doi:10.4315/0362-028X.JFP-18-351.

Stefan Petrasch, Christian J. Silva, Saskia D. Mesquida-Pesci, Karina Gallegos, Casper van den Abeele, Victor Papin, Francisco J. Fernandez-Acero, Steven J. Knapp and Barbara Blanco-Ulate. [Infection strategies deployed by Botrytis cinerea, Fusarium acuminatum, and Rhizopus stolonifer as a function of tomato fruit ripening stage](#). (2019) Frontiers in Plant Science | [www.frontiersin.org](http://www.frontiersin.org) Volume 10 | Article 223

## Postharvest Opportunities



## Fresh Produce Food Safety Specialist—Assistant Professor

The Department of Horticulture at Auburn University is seeking candidates for the position of Fresh Produce Food Safety Specialist – Assistant Professor. This is a 12-month, tenure-track position (75% Extension and 25% research). The successful candidate will develop an extension/research program focused on food safety of fresh produce (from producer to consumer) for fruit and vegetable growers and processors in Alabama.

For more information about the position and to apply, visit <http://aufacultypositions.peopleadmin.com/postings/4098>

## Research Highlights

Stefan Petrasch, Christian J. Silva, Saskia D. Mesquida-Pesci, Karina Gallegos, Casper van den Abeele, Victor Papin, Francisco J. Fernandez-Acero, Steven J. Knapp and Barbara Blanco-Ulate. *Infection strategies deployed by Botrytis cinerea, Fusarium acuminatum, and Rhizopus stolonifer as a function of tomato fruit ripening stage.* (2019) *Frontiers in Plant Science* | [www.frontiersin.org](http://www.frontiersin.org) Volume 10 | Article 223

These authors profiled global gene expression of three fungal pathogens that display necrotrophic (meaning they kill the living cells of their host and then feed on the dead matter) behavior— *Botrytis cinerea*, *Fusarium acuminatum*, and *Rhizopus stolonifer*—during interactions with unripe and ripe tomato fruit. Though each pathogen's strategy differed in the details, interactions with unripe fruit were commonly characterized by an emphasis on the degradation of cell wall components, particularly pectin, while colonization of ripe fruit featured more heavily redox processes, proteolysis, metabolism of simple sugars, and chitin biosynthesis. They also determined that the three fungi were unable to infect fruit from the non-ripening (nor) tomato mutant, confirming that to cause disease, these pathogens require the host tissues to undergo specific ripening processes. Research such as this enables a better understanding of fungal necrotrophic infection strategies, enhancing our ability to generate accurate models of fruit diseases and develop early detection tools and effective management strategies.

Mahta Moussavi, Vanessa Lieberman, Chris Theofel, Javad Barouei, and Linda J. Harris. *Growth of Salmonella on inoculated in-hull pistachios during postharvest handling.* *Journal of Food Protection*, Vol. 82, No. 2, 2019, Pages 217–225  
doi:10.4315/0362-028X.JFP-18-351.

Salmonella has been isolated from dried pistachios in both postharvest and retail surveys. The source of Salmonella in pistachios is unknown, but introduction is possible at points during production, harvest, and postharvest activities. To examine the behavior of Salmonella on pistachios during simulated postharvest conditions, early-, mid-, and late-season in-hull pistachios were collected from two commercial processors over five different harvests. Pistachios were inoculated with cocktails of Salmonella at low and high concentrations and were held for up to 30 h under commercially relevant conditions (73.4, 95 or 98.6°F and 50 or 90% relative humidity). Salmonella multiplied under all storage conditions except for one single late-season lot. The rate of Salmonella growth and the maximum increase in population were lower at 73.4°F and 50% relative humidity compared with 95 or 98.6°F at 90% relative humidity. Managing the time between harvesting and hulling will reduce the potential for growth of Salmonella on pistachios during postharvest handling.

## Postharvest Calendar

- June 15-26, 2020. *Postharvest Technology of Horticultural Crops Short Course.* Davis, CA
- September 22-24, 2020. *Fresh-cut Products: Maintaining Safety and Quality Workshop.* Davis, CA
- November 9-13, 2020. *9th ISHS International Postharvest Symposium.* Rotorua, New Zealand - **POSTPONED**
- March 15-17, 2021. *Aligning the Food System - Emerging technologies to address grand challenges in the produce industry,* Davis, CA

## Ask the Produce Docs



Q. I receive the Postharvest newsletter, and find it very interesting! I would like to know if any research has been done on the use of ethylene absorbers for apples, and the efficacy thereof or not. If so, would this differ for certain varieties, e.g. Royal Gala, Golden Delicious, Granny Smith or Red Delicious? (C.F.)

A. Research has been done on ethylene absorbers for apples, and a number of strategies have been tested, with some success. I'm familiar with the use of potassium permanganate absorbers and catalytic oxidizers (Swingtherm). Ozone lamps (which absorb ethylene by oxidation by singlet oxygen at the lamp surface, sometimes mediated by a titanium glass catalyst) might also be effective. As you probably know, apples produce a lot of ethylene in storage if they are harvested close to the ideal maturity. CA storage greatly reduces production and response to ethylene and this is probably one of the reasons that it is so effective. The spectacular effects of 1-MCP on quality of stored apples is another demonstration of the importance of reducing the effects of ethylene in apples. I'm copying Beth Mitcham on this reply - she is closer to the current state of play than I.

Michael Reid

I agree with Michael's comments. The trick with ethylene scrubbing is to get the ethylene concentration low enough. Usually it must be below 1ppm for benefit. This can be challenging for varieties that produce more ethylene, such as Royal Gala, and easier for those that produce less ethylene, such as Granny Smith. The temperature of the fruit will also influence ethylene production. You will want to have the fruit temperature at 0 degrees Celsius or very close to that temperature.

Beth Mitcham

**Postharvest Questions.** If you have a postharvest question you'd like answered, please send it to [postharvest@ucdavis.edu](mailto: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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**Editorial Review.** Beth Mitcham

**Writing and Coordinating Publisher.** Pam Devine, Beth Mitcham, Micael Reid

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