



Director's Update

Get up to speed on Postharvest Biology and Technology

Always wanted to attend the annual **Postharvest Technology of Horticultural Crops Short Course (See Postharvest Education below)** but didn't feel you could devote a full week...or two? For the first time, we are offering a Two-Day option on June 19-20 to get the basics of postharvest biology essentials and optimal quality management. We have rearranged the core topics to style the first two days as an 'executive crash course' but encourage you to look over the 2016 [agenda](#) to get an idea of the broad range of topics we cover.



Water Harvesting and Cistern Water Safety

As we transition from spring to summer, a big bump in questions regarding rain harvesting and cistern safety has been happening over the past two months. Whether by e-mail or in workshops, small-farm and urban farm enterprise owners or managers, in particular, have developed an awareness of potential food safety issues with water harvesting by run-off capture and storage. Most descriptions we have received are roof runoff, but a few include capture from paved surface runoff around industrial yards or parking areas. It is a little ironic that installation of water harvesting systems from roof runoff, among California small growers, community and school gardens, correctional facility farms, and homeowners spiked up over the past two years due to an extended severe drought condition and local or statewide water use restrictions and reduced allocation to farms (zero allocations in some areas). Following this upswing in water harvesting, 2017 rainfall and snow-pack was above normal and we saw severe flooding in both coastal and inland valley regions. Regardless, in many operations, storage in multiple barrels or cisterns of varying size, including some very large polymer or concrete holding tanks, are an integral part of the irrigation and crop management water supply.

Historically a common practice worldwide, heightened awareness has understandably brought attention to practicing safe water harvest use during irrigation, foliar contact sprays, and postharvest washing. With some common sense precautions, rainwater capture can provide very good quality source water, as compared to common surface water sources. Although recent regional surveys or publically available database information from this increase in installments is sparse, limited shared data and anecdotal conversations regarding water harvesting is reported to typically have,

- Low hardness (< 60 mg/L CaCO_3)
- Low total dissolved solids (< 200 mg/L)
- Low heavy metal content
- Low turbidity (≤ 5 NTU)
- Regionally low *E. coli* counts (< 2.2 MPN/100 ml)
- Typically compliant *E.coli* counts (≤ 126 MPN/100 ml)

In many areas, cistern rainwater is a much better and safer water source for crop management than typical natural surface water sources.

Clearly, there are risks associated with water harvesting from catchment systems. Environmental sources of lead, zinc, polycyclic aromatic hydrocarbons, and human pathogens from fecal droppings of birds and rodents have been identified as particular concerns in most areas. In some areas, gulls, pigeon, crow, rats, and squirrels are likely sources of bacterial pathogen contaminants. Keeping cistern openings protected from animal intrusion is an additional expected prevention practice. In larger cistern or catchment systems, extended storage may lead to algal growth, which in turn has the potential to allow growth of pathogens such as Salmonella at conducive temperatures. Any paved surface runoff catchment would carry additional likely risks of oil, lubricants, and other potential industrial contaminants. In our Mediterranean climate, with strong seasonality to rainfall, Best Practice would dictate that first light rains and subsequent flush of significant rainwater be diverted from cisterns and basins. If used without filtering or treatment, it is sensible to

allow much of these sources to wash off without entering water harvest systems. In addition, the optimal use of this water for irrigation would be through a drip or trickle irrigation method or other mode, which minimizes direct contact with the harvested produce.

Treatment may be an option for both small farm and urban-ag enterprises. Although sodium hypochlorite (liquid bleach) remains common (food grade sources from home brewing suppliers is popular), contacts have identified medium-fines filtration and ozone or UV purification systems as preferred and affordable. Water harvesting may be a good candidate for application of Zero Valent Iron disinfection. Responsible harvest and postharvest uses would necessitate periodic water analysis to ensure heavy metals and other environmental and industrial contaminants were below the allowable US EPA National Primary and Secondary Drinking Water Standards. Read more about Zero Valent Iron in the [CPS Mitigation of irrigation water](#), [Crane vZVI future prospects](#) and the [Bactericidal Effect of Zero-Valent Iron Nanoparticles on *Escheichia coli*](#) articles.

Postharvest Education at UC Davis



Postharvest Technology of Horticultural Crops Short Course June 19-20, 19-23 and 26-30 (optional tour), 2017

This course at the UC Davis ARC is an intensive study of the biology and current technologies used for handling fruits, nuts, vegetables and ornamentals in California. Week two is a field tour through central California.

[Read More](#)



Fresh-Cut Products: Maintaining Quality & Safety Workshop September 26-28, 2017

This workshop provides an intensive and substantive overview of many aspects of fresh-cut production, processing, packaging, distribution and quality assurance. Participants gain working knowledge of established and new procedures through topic-related sessions and demonstrations. Registrations opening soon!

[Read More](#)

Featured Postharvest Bookstore Item

Sale! Receive 25% off any of our Transportation Series Publications

Marine Container Transport of Chilled Perishable Produce

An indispensable guide for shippers, transport company personnel, inspectors, surveyors, insurers and receiving company employees. Inside you'll find comprehensive information on how to select the proper boxes for shipment, plan a load, select the correct temperature for loading, keep containers under optimum operating conditions, and monitor and record temperatures during transit.

This booklet includes two 22x34 inch color posters, one in English and one in Spanish that summarize the major steps for successful loading.

Refrigerated Trailer Transport of Chilled Perishable Produce

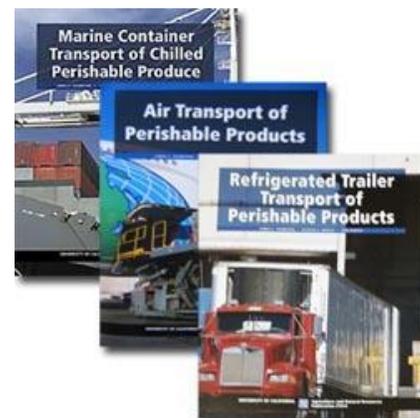
This publication is a guide to the proper use of refrigerated highway trailers for shipping perishable products. The publication focuses on fresh fruit and vegetables but also contains information on the transport of meat, dairy and frozen items.

Air Transport of Perishable Products

This publication includes comprehensive information on protecting the product from the temperature extremes that are common in air freight, selecting the proper boxes for shipment, how to plan a load, product compatibility, loading air freight containers, and how to monitor and record temperatures during transit. The publication also describes the advantages and disadvantages of air freight and describes the services provided by freight forwarders.

Use sale code TS25 to apply your discount. And, as always, if you order the whole series, you are automatically given a 25% discount and an additional 10% during our promotional period.

For a complete listing of all our publications see our [bookstore](#).





Mitcham to participate at the 1st All-Africa Postharvest Congress

Beth Mitcham, Director of the UC Davis Horticulture Innovation Lab, spoke on a panel and gave a presentation as the leader of a special symposium hosted by the Lab. The Lab sponsored the March 28–31 1st All Africa Postharvest Congress in Nairobi, whose theme was “Reducing food losses and waste: Sustainable solutions for Africa.” According to their blog, “The event addressed aspects of postharvest management related to perishable crops, perishable animal products, non-perishable food commodities, capacity development, and related social issues that affect postharvest management.” The event attracted more than 600 participants and exhibitors from more than 40 countries. You can read more about it [here](#).



Deltsidis Invited to Present at Kansas State University

On April 18, Angelos Deltsidis traveled to Olathe to present his talk, “Horticulture Innovation Lab Interventions to Support Food Security in Developing Countries” at the Kansas State University Postharvest Challenges in Developing Countries spring seminar series. He was one of 17 speakers.

Angelos also participated in the 1st All-Africa Postharvest Conference in March where he was responsible for the Horticulture Innovation Lab exhibit display on postharvest technologies, such as drying beads, the DryCard and the chimney solar dryer.



Arpaia and Zakharov host Successful Fruit Ripening Workshop

The 23rd annual Fruit Ripening & Ethylene Management Workshop was held at UC Davis on April 19–20. The meeting was organized by Mary Lu Arpaia (UC Riverside) and Florence Negre-Zakharov (UC Davis). There were 57 attendees representing 5 countries, including the United Kingdom, Chile, Germany, Netherlands and the USA. The meeting included technical presentations, interactive demonstrations and open discussion forums. If you would like further information on this annual meeting, which is held in the spring contact Penny Stockdale (pastockdale@ucdavis.edu) or one of the organizers.



Arpaia Co-hosts Annual Citrus Postharvest Pest Control meeting

The 38th Annual Citrus Postharvest Pest Control meeting was held in Oxnard, CA on April 11–12. This meeting is co-organized by the Citrus Research Board and the University of California (Mary Lu Arpaia) and focuses on postharvest disease and insect management with an emphasis on citrus. This year’s program included several presentations on food safety including a presentation by Donald Schaffner (Rutgers University, NJ), Lise Korsten (University of Pretoria, South Africa), Mark Ritenour (University of Florida, Cooperative Extension, and Trevor Suslow. Dr. Korsten also gave an historical overview of biocontrol of postharvest pathogens and provided a perspective of the challenges facing successful implementation of this approach. There were 65 participants representing 5 countries (Belgium, Brazil, Chile, South Africa and the USA). If you want to learn more about the 2018 meeting, which is held in the spring, please contact Mary Lu Arpaia (mlarpaia@ucanr.edu) or Carolina Evangelo (carolina@citrusresearch.org).



Trevor Suslow Leads FSMA Trainings in Hawaii; Addresses New Increases in Rat Lungworm Infections

This week, PTC director Trevor Suslow traveled to Hilo, Hawaii as Lead Instructor to deliver Food Safety Modernization Act (FSMA) Produce Safety and Preventive Controls trainings. Trainings were coordinated and co-instructed by Sharon Wages Motomura, Lynn Nakamura-Tengan, and Jensen Uyeda of University of Hawaii Cooperative Extension, and Nina Tanabe, a food processing and safety consulting professional. Additional instructors included Luisa Castro and other members of State of Hawaii Department of Agriculture. The trainings were sponsored by the Hawaii County Department of Research and Development. Glenn Sako, of Hawaii County DRD, provided course introductions and welcome. In addition to general food safety training concepts, curriculum was specifically modified to include discussions and informational resources on current methods of combating Rat Lungworm. Slugs are the primary vector

of this parasitic disease that attacks the brain and spinal cord and has had an unusually high detection rate in Hawaii over the last three months. People can become infected by consuming snails and slugs, and control on any raw produce, especially leaf greens, has been a challenge. Attention to process control points of pathogen contamination and food handling techniques taught in these trainings aim to build a generally safer food supply chain and alleviate stress surrounding this and other recent recalls and outbreaks.

Here are links with information.

http://health.hawaii.gov/docd/disease_listing/rat-lungworm-angiostrongyliasis/
<https://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-39.pdf>

Look for announcements of a Produce Safety Alliance training in Spanish in next month's newsletter.

Resource Spotlight

DryCard™ Wins the Grand Prize at the 1st All-Africa Postharvest Technologies and Innovation Challenge

Since we first introduced you to the DryCard, it has become a coveted technology. This tool shows farmers when they will be able to safely and successfully put their foods into storage by measuring its moisture content.

At the conference, Beth Mitcham successfully pitched the virtues of the invention and it was chosen as the standout amongst 200 entries. Read more about it [here](#).

Jim Thompson, left, and Michael Reid, both UC Cooperative Extension specialists and co-inventors of the DryCard, work on a drying experiment with kale at the Horticulture Innovation Lab's Demonstration Center at UC Davis.
(Brenda Dawson/UC Davis)



Doing Good Work Around the Globe

In our continued effort to improve the Postharvest Technology Center's (PTC) core curriculum, and its benefits and impact on industry professionals who attend, we reached out to Short Course Scholarship recipient Chiamaka Nwamadu to learn how attending the Short Course enriched her postharvest knowledge and career goals.

Currently, Chiamaka is working on a United States Agency for International Development (USAID) sponsored project that researches and disseminates postharvest management techniques of grain harvesting in Imo State, Nigeria. Since attending the Short Course, Chiamaka has a better understanding of how to affordably manage and process excess harvest saying, "Before this course, I saw excess harvest as a waste but now I've learned how to manage and process excess harvest to reduce waste."

In 2015, Chiamaka was able to participate in an agriculture and food insecurity project on the postharvest management of cucumber. After being unable to find sufficient cucumber texture analyzers, the PTC provided texture specifications that allowed Chiamaka to complete the project and present her findings.

She has extended her cucumber research experience into a long-term community teaching effort and now owns a cucumber farm where she manages and stores excess harvest and uses her farm as a tool to instruct local farmers on the best postharvest management practices that help cucumbers maintain their best physio-chemical properties.

Postharvest Positions



Postharvest Specialist

We are seeking a dynamic, innovative, self-motivated, and service-orientated professional for the position of Postharvest Specialist, at the post-doctoral fellow or associate scientist level, depending on the experience and qualifications of the successful candidate, to work at the Sustainable Intensification Program (SIP) in Latin America. The position is part of an ambitious strategic research program that generates knowledge to support CIMMYT's Sustainable Intensification activities worldwide. See complete position description [here](#).

Research Manager Biotechnology

As Research Manager you will lead the biotechnology department with 9 team leaders. Together with the researchers you are responsible to set up the biotech research plan and for implementing and executing it. You take care that the biotech research strategy is aligned with Rijk Zwaan's company policy and goals. See position description [here](#).

On Our Website

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



New Publications on our Website

Sebastián A. Rivera, Raúl Ferreyra, Paula Robledo, Gabriel Selles, Mary Lu Arpaia, Jorge Saavedra, Bruno G. Defilippi, 2017. [Identification of preharvest factors determining postharvest ripening behaviors in 'Hass' avocado under long term storage](#). *Scientia Horticulturae* 216 (2017) 29–37.

Giuseppe Ferrara, Andrea Mazzeo, Carmela Pacucci, Angela Maria Stella Matarrese, Annalisa Tarantino, Carlos Crisosto, Ornella Incerti, Ilaria Marcotuli, Domenica Nigro, Antonio Blanco, Agata Gadaleta 2016. [Characterization of edible fig germplasm from Puglia, southeastern Italy: Is the distinction of three fig types \(Smyrna, San Pedro and Common\) still valid?](#), *Scientia Horticulturae* 205 (2016) 52–58.

Postharvest Calendar

- June 19-30, 2017. [Postharvest Technology of Horticultural Crops Short Course](#). UC Davis Campus and Central CA
- July 2-6, 2017. [IX International Peach Symposium](#). București, Romania.
- September 26-28, 2017. [Fresh-cut Products: Maintaining Quality & Safety Workshop](#). UC Davis Campus
- October 17-20, 2017. [International Postharvest Unlimited Conference \(ISHS\)](#). Madrid, Spain
- November 29-December 1, 2017. [IX Congreso Iberoamericano de Tecnología Postcosecha y Agroexportaciones](#). Chile

Ask the Produce Docs



Q

We are overhauling our fruit handling system and trying to minimize high-pressure wash down especially on roller conveyers. Rind oil and organic build up is rapid and if not removed frequently it becomes hard, black, and almost impossible to scrub off. These PVC rollers and raised sides were spotless before the first shift. Any ideas for dealing with these surfaces without a lot of water and foamers? CJW

A

I would definitely contact a food systems sanitation specialist and specialized cleaner and sanitizer chemical supplier as they have extensive experience removing challenging residues. One possible option to consider is dry ice blasting, which I have seen in action to remove accumulated stickers and labels from shipping containers as well as heavy desposits on rollers much worse than pictured.

Here are a couple links for ice blasting:

<http://www.coldjet.com/en/index.php>

<http://www.coldsweep.com/dry-ice-blasting/>

Let me know what you worked out as others would likely benefit from your experience.

Trevor Suslow

End Notes and Disclaimers

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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