



May 2013

News from the UC Davis Postharvest Technology Center

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Director's Update

A few spaces left...

We have just a few spaces left for the June 17-21 (1-week session) of the 2013 Postharvest Technology Short Course. If you've been thinking about attending, we encourage you to enroll soon as these last few spaces will fill quickly. Now in its 35th year, the course offers an intensive study of the biology and current technologies used for handling fruits, nuts, vegetables and ornamentals in California.

The Postharvest Technology Short Course's week 2 field tour stops will include some interesting new destinations as well as some long-standing favorites. Attendance in the first week session is a pre-requisite for attending the field tour so that participants can fully integrate the critical learnings and see how they are implemented in a variety of postharvest handling situations around California. For more information or to enroll, contact Penny Stockdale at pastockdale@ucdavis.edu.

New Section Added: Postharvest Article Reviews

We are pleased to add a new feature to our newsletter, [Postharvest Article Reviews](#). Each month, a few interesting articles will be selected and a brief summary of the article including the main take away message will be provided for our readers.

Produce Professional Certificate Program

With a cadre of some of the most respected experts in the field of postharvest technology, the UC Davis Postharvest Technology Center is well poised to introduce the comprehensive Produce Professional Certificate Program. Link to the web page to learn more about this exciting new program or to enroll: http://postharvest.ucdavis.edu/Education/Produce_Professional_Certificate.

-- [Beth Mitcham](#)



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Postharvest Workshops at UC Davis

Excellent Educational Opportunities

June 2013 Postharvest Technology Short Course

We are very excited about the great group of participants who have enrolled in the 35th Annual Postharvest Technology Short Course, which will be held June 17-21, 2013. The optional field tour will be held the week of June 24-28.

The course is designed for research and extension workers, quality control personnel and other professionals interested in current advances in the postharvest technology of horticultural crops.

Enrollment for the complete 2-week session (lecture-labs plus the optional field tour) runs \$2895 and this session is now full and has a wait list. Enrollment for the first week (lecture-labs only) costs \$1895. An additional lodging fee must be paid by all participants going on the field tour. Enrollments are made on a first-come, first-paid basis. For complete information or to register for this world-renowned course, please visit the [webpage](#), or contact [Ms. Penny Stockdale](#).



Fresh-cut Products Workshop

The 18th annual Fresh-cut Products: Maintaining Quality & Safety workshop will be held September 24-26 at the UC Davis Alumni & Visitors Center. This 3-day workshop is organized by Dr. Marita Cantwell and a team of fifteen other experienced academic and industry instructors. The workshop provides an overview of many aspects of the production, processing, packaging, distribution and quality assurance of fresh-cut fruit and vegetable products. The workshop is relevant to all levels of fresh-cut produce industry professionals – from small, local and regional produce processors to large businesses with nationwide distribution.

The enrollment fee is \$1150 for this 3-day workshop, and includes all instruction, instructional materials, lunches, morning and afternoon breaks, and an evening networking reception. To learn more, or to enroll, we invite you to visit the [web page](#) or contact [Ms. Penny Stockdale](#).

Introducing! Produce Safety: A Science-based Framework Workshop

We are pleased to introduce this new workshop, organized by Dr. Trevor Suslow, which will feature an integrated approach to building a foundation of awareness and improved understanding of the current scientific basis for produce microbial safety systems and preventive controls. Held November 5-7, 2013 on the UC Davis campus, this two-and-a-half day interactive workshop is one of the core required components for the Produce Professional Certificate program.



The course delivery is largely interactive, with formal lectures, group assessment of case examples, and break-out group problem-solving challenges. The emphasis of the curriculum is the scientific-basis for audit standards, preparing for using audits, and targeted microbiological testing to improve performance. Key resources and tools for hazard awareness, risk identification, risk-based preventive controls, and verification of corrective actions will be provided. The enrollment fee for this workshop is \$950. To learn more about it or to enroll, please visit the [web page](#) or contact [Ms. Penny Stockdale](#).

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Featured Postharvest Publication

25% Discount on Rice Quality Handbook

Through the end of June, we're offering a 25% discount on the Rice Quality Handbook. Learn about producing high-quality rice, covering planting to postharvest handling, in a methodical and step-by-step system. While written primarily for the Sacramento Valley rice industry, worldwide rice operations including growers, buyers, operators of dryers, warehouses, and processing operations will benefit from this handbook.

We invite you to order a copy for your library today. For a complete table of contents, with quick links to order a copy, please visit the [Rice Quality Handbook](#) webpage.



Postharvest Endowment Fund Update



New Milestones Reached!

In recent months we have received many generous contributions in memory of Dr. Adel A. Kader. More than \$30,000 in contributions have been received, and the total of the Postharvest Program Endowment Fund has now, at long last, surpassed the \$500,000 mark.

We are thankful for these contributions to the Postharvest Program Endowment Fund, which Dr. Kader began in 1994, and continue to welcome additional gifts. To make a contribution to the Postharvest Program Endowment fund in memory of Dr. Adel Kader, or to assist with providing scholarship funds for worthy students attending the annual Postharvest Technology Short Course, please visit our [Make a Gift](#) web page, or contact Center Manager, Mary Reed at postharvest@ucdavis.edu.

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Postharvest Article Reviews

Singh, Z. et al. 2013. Mango – Postharvest Biology and Biotechnology. Critical Reviews in Plant Sciences 32 (4):217-236.

This article covers current applications in the postharvest processes of mangoes, a fruit blessed with hundreds of cultivars, great taste and health benefits yet confounded by a short shelf life, variable responses to postharvest handling among cultivars, and high susceptibility to chilling injury and disease. The article discusses the benefits and threats of standard postharvest practices for mangoes and highlights cutting edge methods, such as low pressure (hypobaric) storage, modified atmosphere packaging, and edible coatings. Advances in the commercialization of biodegradable films or low cost ripening sensors, along with more research to develop cultivars that have extended shelf life, are needed to overcome the 30% postharvest losses of mangoes that globally occur each year. The significance of such advances is improved fruit quality, increased returns to the mango industry, and greater global availability of mangoes. <http://www.tandfonline.com/doi/pdf/10.1080/07352689.2012.743399>

Zheng, M. et al. 2013. Antimicrobial effects of volatiles produced by two antagonistic Bacillus strains on the anthracnose pathogen in postharvest mangos. Biological Control 65:200-206.

Various strains of Bacillus spp. were isolated, screened, and proven to significantly inhibit growth of the anthracnose pathogen, the most prevalent postharvest disease in mangos. These tested strains suppressed mycelia growth, and at least four volatiles produced by the bacteria completely inhibited growth of the anthracnose fungus in vitro. Anthracnose on mangos is currently suppressed by fungicide treatments and postharvest hot water treatments (sometimes with fungicides), but not fully controlled. The anthracnose-inhibiting volatiles discussed in this article have the potential to reduce postharvest losses due to anthracnose. The authors plan to look into the acceptability of and practical ways to use Bacillus spp. as a biological control for anthracnose in postharvest storage, distribution and marketing of mangos.

<http://www.sciencedirect.com/science/article/pii/S1049964413000327>

Mayuoni-Kirshinbaum, L., A. Daus, and R. Porat. 2013. Changes in sensory quality and aroma volatile composition during prolonged storage of 'Wonderful' pomegranate fruit. International Journal of Food

Science and Technology DOI: 10.1111/ijfs.12126:1-10.

The authors determined that consumers preferred 'Wonderful' pomegranate arils from fruit stored under commercial modified atmospheres for 12 weeks at 7°C (44.6°F) over those stored longer, and highlight the significant decrease in sensory quality after 16 and especially 20 weeks of modified atmosphere storage. The changes in sensory quality included decreases in typical pomegranate flavor and increases in 'overripe' and 'off-flavor' odors. Strong correlations were found between the accumulation of ethanol and various sesquiterpene volatiles, and a decrease in fruit flavor and consumer preference around 16 weeks from harvest. Most importantly, the authors identified several volatiles that correlated with the observed decrease in fruit flavor and preference. Ultimately, the notion that consumer flavor preference begins to deteriorate before commercially acceptable appearance remains true in "Wonderful" pomegranate arils.

<http://onlinelibrary.wiley.com/doi/10.1111/ijfs.12126/pdf>

Minas, I., G. M. Crisosto, D. Holcroft, M. Vasilakakis, and C. H. Crisosto. 2013. Postharvest handling of plums (*Prunus salicina* Lindl.) at 10°C to save energy and preserve fruit quality using an innovative application system of 1-MCP. *Postharvest Biology and Technology* 76:1-9.

This article exposes the benefits of treating harvested plums with 1-methylcyclopropene (1-MCP), a gas which inhibits softening and allows plum storage to occur at 10°C (50°F), a higher than normal temperature. Storage at 10°C avoids chilling injury and also conserves energy during storage. A new and easily adaptable technology for applying 1-MCP during forced air cooling (FAC) is presented, reducing the application time from 24 to 6 hours without affecting the performance of the 1-MCP on the plum fruit. The authors determined that consumer preference was the same for fruit treated with 1-MCP-FAC and not treated, unless the treatment was applied to plums with high acidity, in which case consumers' preference decreased for the 1-MCP-FAC treated plums. In short, 1-MCP-FAC treatment followed by storage at 10°C is a methodology that avoids chilling injury, reduces 1-MCP application duration, has significant energy savings, and can maintain the quality of low-acid plums. With further research on commercial scalability, this treatment should prove to be very promising. <http://ucce.ucdavis.edu/files/datastore/234-2444.pdf>

Completed by Edward Silva

Edited May 30 2013

Postharvest Specialists' Section

Meet the Postharvest Specialists: An Interview with Dr. Mary Lu Arpaia

When you were going to school, was there any single course, or professor, who helped you more clearly define, or even played a role in changing, your goals for the future?

Two events greatly influenced where I am today.

First, after graduating from UC Berkeley (UCB) with a Botany degree I went to Sierra Leone, West Africa to visit my then boyfriend (later husband for 23 years), and ended up teaching secondary school there. I was thinking about going to graduate school in ecology. While in Sierra Leone, a professor from Rutgers (B. L. Pollack) came to give training to the agricultural Peace Corp volunteers, which I attended even though I was not a volunteer. I spoke to him about my graduate school plans, and he encouraged me to pursue agriculture and to apply to UC Davis. This is what I did. The other thing in Sierra Leone that greatly influenced me was, wherever you talked to people involved in agriculture, it was a near unanimous consent that everyone wanted to go to a place called DAVIS to study. Coming from UCB, this blew my mind.



Mary Lu Arpaia with Edna Pesis at the Volcani Institute.

Secondly, I ended up in postharvest due to the guidance of two people, F. Gordon Mitchell and Adel Kader, two individuals that had a lasting influence on me. My grades at UCB, while good, were not stellar, so at that time in 1978 I did not get a graduate assistantship, but work study. Gordon hired me to work in the postharvest lab and provided me the freedom to learn about extension and how to do research. Adel helped by offering encouragement and also allowing me to learn how to conduct research and extension programs. I feel that I am extremely fortunate to have studied under them. They both had different approaches to science and extension, etc. but both were exceptional mentors, both during my graduate student years but also during my career. Both their "doors" were always open.

You travel quite a bit. In the past year, have you had any extraordinary experiences while traveling?

Extraordinary? ... No. But I like to travel to other countries that grow subtropical fruit, no matter how advanced the industry. Why? Because there is always something new to learn and to bring back that influences how I approach my job in California. The important thing is always to try to have an open mind and not have preconceived notions about what should or should not be. I often feel that I learn more than any knowledge that I leave behind.

In the past six months or so, have you learned anything new that you find especially interesting?

In March, I traveled to Israel with David Obenland and Anne Plotto on a BARD project. Although I have been there before, the previous trips focused on avocados. Much of this 2013 trip focused on citrus, and we visited with Ron Porat and his colleagues. This was a very worthwhile trip since we visited orchards, packinghouses and attended a one day symposium on Flavor held at the Volcani Institute. This symposium was very interesting and stimulated much discussion about sensory studies and its role in postharvest research, an area where much of my effort is focused.

NPR Canned Peach Nutrition

Dr. Christine Bruhn was interviewed by National Public Radio (NPR) reporter Allison Aubrey for "The Salt: What's on Your Plate", a feature blog on eating and health. The [blog article](#) discusses a new study published in the Journal of the Science of Food and Agriculture, finding that canned peaches are loaded with equal, or even more, nutrients than fresh peaches. Dr. Bruhn discusses some of the reasons that this nutrient boost occurs.

Center for Advanced Processing & Packaging Meeting

Dr. Diane Barrett attended the April 30-May 1st Center for Advanced Processing & Packaging meeting, held at The Ohio State University in Columbus, Ohio. She presented an update on a research project designed to identify markers of thermal abuse in concentrated fruit juices.

Annual Hort CRSP Meeting, Nairobi, Kenya

Dr. Beth Mitcham, Hort CRSP Director and Dr. Diane Barrett attended the May 6-9 [Annual Meeting of the USAID funded Horticultural Collaborative Research Support Program](#). Held in Nairobi, approximately 60 scientists from U.S. universities and collaborators from Africa, Asia and Central America attended the meeting and presented updates on their research projects.

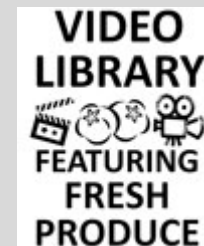
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What's New on Our Website

Video Library offers useful Videos

Check out these videos featuring cherries, cabbage, broccoli, grapes and more as "stars" of the show. Most of the videos are hosted on our YouTube postharvest channel. Many include useful harvest and postharvest handling tips. Also included are several produce safety videos, as well as small-scale and transportation and cooling topics. Link to the **Video Library** page:

<http://postharvest.ucdavis.edu/libraries/video/>



New this month in the "Postharvest Publications Organized by Topic" Library

Access the [listing of main topics](#) for this free, comprehensive postharvest library.

Flavor Quality

Vallone, Simona, Hanne Sivertsen, Gordon E. Anthon, Diane M. Barrett, Elizabeth J. Mitcham, Susan E. Ebeler, Florence Zakharov, [An integrated approach for flavor quality evaluation in muskmelon \(*Cucumis melo* L. *reticulatus* group\) during ripening](#). Food Chemistry 139 (2013) 171-183

Fresh-cut Vegetables

Tomás-Callejas, Alejandro, Gabriela López-Velasco, Alex B. Camacho, Francisco Artés, Francisco Artés-Hernández, Trevor V. Suslow. [Survival and distribution of *Escherichia coli* on diverse fresh-cut baby leafy greens under preharvest through postharvest conditions](#). International Journal of Food Microbiology 151 (2011) 216-222

Spinach

Gutiérrez-Rodríguez, E., J.H. Leith, J.A. Jernstedt, T.V. Suslow. [Prediction of spinach quality based on pre- and](#)

Water Disinfection

López-Velasco, Gabriela, Alejandro Tomás-Sallejas, Adrian Sbodio, Francisco Artés Hernández, Trevor V. Suslow. [Chlorine dioxide dose, water quality and temperature affect the oxidative status of tomato processing water and its ability to inactivate *Salmonella*](#). Food Control 26 (2012) 28-35

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Postharvest Calendar

- June 3-7, 2013. [XI International Controlled and Modified Atmosphere Research Conference](#). Bari, Italy
- June 17-28, 2013. [35th Annual Postharvest Technology Short Course](#). UC Davis
- June 23-27, 2013. [VII International Cherry Symposium](#). Plasencia, Spain
- June 27, 2013. **Webinar: [How to Sell Fruits and Vegetables to the USDA](#)**. (2:00-3:00 Eastern Time)
- July 1-5, 2013. [III International Conference on Quality Management of Horticultural Products of Interest in the Tropics](#). Port of Spain, Trinidad
- July 25, 2013. **Webinar: [Market News: New Custom Average Tool Explained](#)**. (2:00-3:00 Eastern Time)
- August 5-8, 2013. [International Symposium on Quality Management of Fruit and Vegetables for Human Health](#). Bangkok and Pattaya, Thailand
- August 5-8, 2013. [International Symposium on Agri-Foods for Health and Wealth](#). Bangkok and Pattaya, Thailand
- August 5-8, 2013. [International Symposium on Tropical and Subtropical Ornamentals](#). Bangkok and Pattaya, Thailand
- August 19-21, 2013. [I International Symposium on Marketing and Consumer Research in Horticulture](#). Portland, Oregon
- August 22, 2013. **Webinar: [The PACA Complaint Process – An Interactive Discussion](#)** (2:00-3:00 Eastern Time)
- September 2-5, 2013. [VI International Conference on Managing Quality in Chains MQUIC 2013](#). Cranfield, United Kingdom
- September 17-19, 2013. [18th Annual Fresh-cut Products: Maintaining Quality & Safety Workshop](#). UC Davis campus
- October 22-24, 2013. [EAPR Post-Harvest Section Meeting](#). Warsaw, Poland
- November 6-8, 2013. [Produce Safety: A Science-based Framework Workshop](#). UC Davis campus.
- December 4-6, 2013. [Southeast Asia Symposium on Quality Management in Postharvest Systems](#). Vientian, Lao, P.D.R.
- March 25-26, 2014. [20th Annual Fruit Ripening & Retail Handling Workshop](#). UC Davis campus
- June 10-13, 2014. [V International Conference Postharvest Unlimited](#). Lemesos, Cyprus
- June 16-27, 2014. [36th Postharvest Technology Short Course](#). UC Davis
- August 27-22, 2014. [XXIX International Horticultural Congress](#). Brisbane, Australia
- September 16-18, 2014. [19th Fresh-cut Products: Maintaining Quality & Safety](#). UC Davis campus
- November 4-6, 2014. [Produce Safety Workshop](#). UC Davis campus

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Ask the Produce Docs

Q. I'm an engineering student in industry and food safety in Morocco. My final project focuses on tomatoes, my theme is the improvement of the postharvest life of tomatoes. We have made some tests to decrease some defects, for example:

- treatment by NaCl to reduce tomato cracking
- storage in cool room
- oxidation of ethylene by KMnO_4

Do you have additional technical suggestions concerning this postharvest tomato theme? (A.B.)



A. Other technologies that are used commercially or being tested commercially that you should be aware of are:

- 1) Use of 1-MCP to regulate tomato ripening
- 2) Use of ozone in storage rooms to maintain low levels of spores
- 3) Analysis of aroma volatiles with respect to storage temperatures

Some information on these topics can be found on our website:

- [Tomato](#)
- [Ethylene and 1-MCP](#)

--[Marita Cantwell](#)

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- If you have a perplexing postharvest question that you'd like answered, please send it to postharvest@ucdavis.edu
- Link to a data store of all our previous "[Ask the Produce Docs](#)" questions and answers, or link to archived copies of our [monthly E-Newsletters](#) as PDF documents.

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