



May 2012

News from the UC Davis Postharvest Technology Center

Director's Update



The UC Davis campus recently had the privilege of hosting a World Affairs Council Roundtable on Trade, with special guest Ambassador Isi Siddiqui, the Chief Agricultural Negotiator, Office of US Trade Representative. The roundtable was well attended, and participants had an opportunity to hear the latest details on international trade agreements affecting U.S. and California agricultural Exports.

The June 18-29, 2012 [Postharvest Technology Short Course](#) is quickly approaching and we are pleased that we have a full enrollment, and have begun a wait list. Though this is the 34th time that we've offered this course, we are as excited and enthusiastic about it as ever. We have some interesting new topics and speakers for this year, as well as an action-packed field tour for those who will be attending that option.

After some technical challenges due to an incorrect deployment, we're happy to announce that our [Postharvest Online Bookstore](#) is again available for orders of all our postharvest titles being shipped to US and Canadian addresses.

—[Elizabeth Mitcham](#)

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Postharvest Workshops @ UC Davis



Join Us for September's Fresh-cut Products Workshop

Dr. Marita Cantwell is the course organizer for the September 18-20, 2012 "Fresh-cut Products: Maintaining Quality & Safety Workshop" to be held on the UC Davis Campus. Participants will gain a working knowledge of established and new procedures for the fresh-cut product category through topic-related sessions and demonstrations.

The 2012 workshop will feature discussions on microbial food safety and the effects of temperature and modified atmospheres, and the sensory quality of fresh-cut fruit and vegetable products. The registration fee of \$1150 for this 3-day workshop includes all instruction and instructional materials, lunches, and morning and afternoon breaks. For more information or to register online see the [web page](#), or contact [Ms. Penny Stockdale](#), Registration Coordinator.

November 5-6: Suslow Offers UCGAPs Practical Skill Building for On-Farm Risk Assessments Workshop

Dr. Trevor Suslow will be presenting a one-day workshop on November 5th that will provide entry-level information for those businesses beginning to respond to the need to have a food safety management plan that addresses key risks and controls that prevent contamination.

Growers, shippers, brokers, farm supervisors, and packinghouse managers will benefit from the development and improvement of skills in hazard identification and risk-based corrective actions that are essential to designing and implementing an on-farm safety plan.

There will also be a half-day optional "build your own on-farm food safety manual" session on November 6th. For more information, or to register, visit the workshop's [web page](#), or contact [Ms. Penny Stockdale](#), Registration Coordinator.



Specialists' Outreach Activities



Suslow honored by United Fresh Produce Association

by Diane Nelson

UC Cooperative Extension Specialist Trevor Suslow has been awarded the 2012 United Fresh Produce Association Technical Award for his commitment to food quality and safety.

David Gombas, senior vice president of food safety and technology for United Fresh Produce Association, lauded Suslow as the “go-to guy” for the produce industry, providing timely guidance on how best to meet food-safety standards.

He is best known for his fearless attitude to tackling tough in-field research questions and being able to translate that into a solution that the industry needs in order to make practical, effective improvements,” Gombas said.

Suslow received the award in Dallas in May at a special presentation during the United Fresh Produce Association’s annual conference, a presentation organizers had to trick Suslow into attending.

“They told me they needed me to attend a 7 a.m. meeting to discuss the logistics of a presentation I was making later in the conference,” Suslow said. “I didn’t see any need for that, but I showed up anyway. I sat way in the back of the room, doing some work on my iPad, and I hear them call my name.”

Suslow made the long walk to the stage wearing a Hawaiian shirt and a grateful, if embarrassed, grin.

“They knew if they had told me I was receiving an award, I probably wouldn’t have shown up,” Suslow said. “I’m not that big on awards, but I certainly appreciate it. It’s nice to be recognized for your work.”

The Suslow program combines lab and on-farm research related primarily to *E. coli* and *Salmonella*, in conventional and organic production systems, for the purpose of identifying opportunities for preharvest and postharvest controls and delivery of safe food to the consumer.

Cook Invited Speaker at Blueberry Seminar in Chile

Dr. Roberta Cook spoke at the International Blueberry Seminar in Santiago, Chile on May 23. Her talk was entitled “Retail Trends and the Development of the Blueberry Category.”

Cook’s North Carolina Meeting includes Tour of North Carolina Research Campus

The Monsanto Vegetable Seeds Advisory Council recently met in Charlotte, NC, and Roberta Cook, a member of the Council, attended the meeting. As part of the meeting, the Council toured the new North Carolina Research Campus in Kannapolis which is anchored by Dole fruit and vegetable research facilities and which also houses research labs of Monsanto and General Mills. The research installations and equipment are state-of-the-art and other companies are expected to join the campus, which is a partnership between several academic institutions and the private sector.

Featured Postharvest Publication



25% Produce Quality Discount Offer Extended

Now extended through the end of June, we are pleased to continue to offer a special 25% discounted price of \$75 when you purchase both the binder and CD of our excellent resource “**Produce Quality Rating Scales and Color Charts**.” For a description and to view the complete table of contents for this publication please link to <http://postharvest.ucdavis.edu/files/93651.pdf>. To order a copy shipped to the US or Canada, please use our new Postharvest Technology Center [Online Bookstore](#).

If you live outside of the United States or Canada, please use our (PDF) [order form](#) and fax or mail your order for this great resource. Be sure to note “25% Produce Quality Discount” on your order form.

What's New on Our Website

New Additions to Postharvest Publications Organized by Topic Library

This library currently contains more than 1,400 postharvest documents, organized by topic. It is searchable by title or author, and is one of the premiere sources of postharvest information.

Note: The new Category Topics of “Chilling Injury” and “Wounding” were added this month to our [Postharvest Publications Organized by Topic](#) library. Many thanks to Dr. Mikal E. Saltveit who provided us with copies of many of his papers for this library resource. Some of these papers are listed below, the rest will be listed in the June edition of the e-newsletter.

Chilling Injury

Kang, Ho-Min, Kuen-Woo Park, Mikal E. Saltveit. [Elevated growing temperatures during the day improve the postharvest chilling tolerance of greenhouse-grown cucumber \(*Cucumis sativus*\) fruit](#). *Postharvest Biology and Technology* 24 (2002) 49-57

Saltveit, Mikal E. [The rate of ion leakage from chilling-sensitive tissue does not immediately increase upon exposure to chilling temperatures](#). *Postharvest Biology and Technology* 26 (2002) 295-304

Saltveit, Jr., Mikal E. [Prior temperature exposure affects subsequent chilling sensitivity](#). *Physiologia Plantarum* 82 (1991) 529-536

Citrus Fruit

Obenland, D., M.L. Arpaia. [Variability in waxing-induced ethanol and aroma volatile production among Mandarin Genotypes](#). *Acta Hort.* 945 (2012) 405-412

Ethylene

Saltveit, Mikal E., [Effect of ethylene on quality of fresh fruits and vegetables](#). *Postharvest Biology and Technology* 15 (1999) 279-292

Fresh-cut Vegetables

Kang, Ho-Min, Mikal E. Saltveit. [Antioxidant Capacity of Lettuce Leaf Tissue Increases after Wounding](#). *Journal of Agricultural and Food Chemistry* 50 (2002) 7536-7541

Jamie, Pilar, Mikal E. Saltveit. [Postharvest changes in broccoli and lettuce during storage in argon, helium, and nitrogen atmospheres containing 2% oxygen](#). *Postharvest Biology and Technology* 26 (2002) 113-116

Avena-Bustillos, Roberto J., Luis A. Cisneros-Zevallos, John M. Krochta, Mikal E. Saltveit, Jr. [Application of casein-lipid edible film emulsions to reduce white blush on minimally processed carrots](#). *Postharvest Biology and Technology* 4 (1994) 319-329

Saltveit, Mikal E. [Wound induced changes in phenolic metabolism and tissue browning are altered by heat shock](#). *Postharvest Biology and Technology* 21 (2000) 61-69.

Campos-Vargas, Reinaldo, Mikal E. Saltveit. [Involvement of putative chemical wound signals in the induction of phenolic metabolism in wounded lettuce](#). *Physiologia Plantarum* 114 (2002) 73- 84

Fruit Ripening

Ritenour, M.A., M.E. Mangrich, J.C. Beaulieu, A. Rab, M.E. Saltveit. [Ethanol effects on the ripening of climacteric fruit](#). *Postharvest Biology and Technology* 12 (1997) 35-42

Grape

Ozkan, Ragip, Joseph L. Smilanick, Ozgur Akgun Karabulut. [Toxicity of ozone gas to conidia of *Penicillium digitatum*, *Penicillium italicum*, and *Botrytis cinerea* and control of gray mold on table grapes](#). *Postharvest Biology and Technology* 60 (2011) 47-51

Smilanick, J.L., F. Mlikota Gabler, D.A. Morgosan. [Evaluation under commercial conditions of the application of continuous, low concentrations of Ozone during the cold storage of table grapes](#). *Acta Hort.* 945 (2012) 357-352

Lettuce

Ritenour, Mark A., Mikal E. Saltveit. [Identification of a phenylalanine ammonia-lyase inactivating factor in harvest head lettuce \(*Lactuca sativa*\)](#). *Physiologia Plantarum* 97 (1996) 327-331

Saltveit, Mikal E., Oswaldo Ochoa, Reinaldo Campos-Vargas, Richard Michelmoro. [Lines of lettuce selected for ethylene insensitivity at the seedling stage displayed variable responses to ethylene or wounding as mature heads](#). *Postharvest Biology and Technology* 27 (2003) 277-283

Tomás-Barberán, Francisco A., María I. Gil, Marisol Castañer, Francisco Artés, Mikal E. Saltveit. [Effect of selected browning inhibitors on phenolic metabolism in stem tissue of harvested lettuce](#). *J. Agric. Food Chem.* 45 (1997) 583-589

What's New on Our Website (cont.)

Mango

Brecht, Jeffrey (editor). [Mango Best Practices Manual \(Portuguese\)](#). National Mango Board. (2011) 77 pgs.

Melons

Miccolis, Vito, Mikal E. Saltveit. [Influence of storage period and temperature on the postharvest characteristics of six melon \(*Cucumis melo* L., *Inodorus* Group\) cultivars](#). *Postharvest Biology and Technology* 5 (1995) 211-219

Modified Atmospheres

Saltveit, Mikal E. [Is it possible to find an optimal controlled atmosphere?](#) *Postharvest Biology and Technology* 27 (2003) 3-13

Pears

Macnish, A.J., E.J. Mitcham, D.M. Holcroft. [Endogenous and exogenous ethylene modulates the response of 'Bartlett' Pears to 1-Methylcyclopropene](#). *Acta Hort.* 945 (2012) 309-316

Postharvest Losses

Buzby, Jean C., Jeffrey Hyman, Hayden Stewart, Hodan F. Wells. [The value of Retail- and Consumer-Level Fruit and Vegetable Losses in the United States](#). *The Journal of Consumer Affairs* (Fall 2011) 492-515

Hodges, R.J., J.C. Buzby, B. Bennett. [Postharvest losses and waste in developed and less developed countries: opportunities to improve resource use](#). *Journal of Agricultural Science* 149 (2011) 37-45

Squash

Jesús Avena-Bustillos, John M. Crochta. [Optimization of edible coating formulations on zucchini to reduce water loss](#). *Journal of Food Engineering* 21 (1994) 197-214

Tomato

Atta-Aly, Mordy A., Mikal E. Saltveit, Adel S. El-Beltagy. [Saline growing conditions induce ripening of the non-ripening mutants *nor* and *rin* tomato fruits but not of *Nr* fruit](#). *Postharvest Biology and Technology* 13 (1998) 225-234

Beaulieu, John C., Galen Peiser, Mikal E. Saltveit. [Acetaldehyde is a causal agent responsible for ethanol-induced ripening inhibition in tomato fruit](#). *Plant Physiol.* 113 (1997) 431-439

Saltveit, Jr., Mikal E. [Determining tomato fruit maturity with nondestructive in vivo nuclear magnetic resonance imaging](#). *Postharvest Biology and Technology* 1 (1991) 153-159

Postharvest Positions

Ready Pac Searching for a Quality Assurance Manager

Located at their Swedesboro, NJ facility, Ready Pac Foods, Inc. has an opening for a Quality Assurance Manager. This position will plan, coordinate, and direct the quality control program designed to ensure continuous production of products consistent with established standards. Candidate must have a BA degree in Food Science or related field, 5+ years experience in Quality Assurance Management, including multi-plant QA Management. Strong organizational, communication and computer skills are required, as well as a solid technical background including understanding of HACCP, GMP's, microbiological and sanitation principals, regulatory compliance and audit systems. Position includes up to 25% travel, up-to-date car insurance required. Contact [Sheila Barnett](#) for more information or to submit a resume.

Junior Specialist—Regional Center Specialist Position with the Horticulture CRSP

The Horticulture Collaborative Research Support Program has an opening for a Junior Specialist position, located with the Dept. of Plant Sciences at UC Davis. This position would be responsible for the establishment and liaison to the Horticulture CRSP Regional Centers of Innovation (RCI), starting with Thailand, Kenya and Honduras. The position will develop the Center's training and technology programs through a collaborative effort with the Centers' host institutions, USAID Missions and Horticulture CRSP PIs. The candidate would also develop manuals for horticultural technologies, and then travel to sites to assist in building various technologies. For more information contact [Diana Puccetti](#).

Food Safety Supervisor needed at Earthbound Farm

This position is located at San Juan Bautista, Calif., and requires a BS in Food Science, Ag Science or a related field. The Food Safety Supervisor assists the Food Safety Manager in the oversight and coordination of Food Safety and QA programs, including microbiological sampling, HACCP programs, in house and third party audits and compliance certifications. Supervisory experience desired, along with availability to work additional hours and weekends as needed. Spanish language skills and HACCP certification are preferred, and strong computer and analytical skills are required. For complete information or to apply online see: https://www.prospera.com/CareerHubViewer/Post.aspx?ID=earthboundfarm_external_Gy2w4S7Hcx9Y_Checksum=PRS358

Postharvest Calendar: Upcoming Conferences, Courses and Workshops

- May 1-3, 2012. [United Fresh Produce Association Convention](#). Dallas, Texas.
- May 21-25, 2012. [Post-Harvest Management and Value-added Agriculture International Conference](#). Jimma, Ethiopia.
- June 18-29, 2012. [34th Annual Postharvest Technology Short Course](#). UC Davis Campus, optional field tour.
- June 25-29, 2012. [7th International Postharvest Symposium](#). Kuala Lumpur, Malaysia.
- July 8-13, 2012. [2012 Gordon Research Conference on Plant Senescence](#). Stonehill College, Easton, MA.
- July 20-22, 2012. [PMA Food Service Conference and Exposition](#). Monterey, California.
- September 18-20, 2012. [17th Annual Fresh-cut Products: Maintaining Quality & Safety Workshop](#). UC Davis campus.
- September 18-20, 2012. [II Asia Pacific Symposium on Postharvest Research Education and Extension: APS2012](#). Bogor, Indonesia
- October 15-19, 2012. [9th International Conference on Controlled Atmosphere and Fumigation in Stored Products](#). (CAF 2012). Antalya, Turkey.
- October 16-19, 2012. [X International Symposium on Postharvest Quality of Ornamental Plants](#). Porto de Galinhas, Pernambuco, Brazil. Contact Prof. Fernando Luiz Finger (55) 3138991128 or ffinger@ufv.br.
- October 26-29, 2012. [PMA Fresh Summit International Conference and Exposition](#). Anaheim, California.
- October 27, 2012. [UC Davis Reception at the Anaheim Marriott](#), PMA Fresh Summit International Conference and Exposition
- November 5-6, 2012. [UC GAPs Practical Skill-Building for On-Farm Risk Assessments](#). UC Davis campus.
- November 25-28, 2012. [Postharvest Africa 2012](#): The 7th Technical Symposium of CIGR Section VI and 2nd International Conference on Postharvest Technology & Innovation. Stellenbosch, South Africa.
- June 23-27, 2013. [VII International Cherry Symposium](#). Plasencia, Spain.

Ask the Produce Docs



Q. Please advise on what factors could cause bananas to soften on the inside but remain somewhat green on the outside even after ripening with ethylene, i.e. the edible part of the banana is ripe/soft while the peel/skin shows no or little signs of ripening? (C.P.)

A. Exposure of bananas to temperatures above 30 C before and/or during ripening can inhibit ripening of the peel more than the flesh (edible portion).

Another possible reason for the disconnect between peel and flesh ripening is exposure to chilling temperatures between 10 and 13 C before ripening with ethylene.

—[Adel A. Kader](#)

Q. We package peeled garlic cloves in a thick plastic bag and although they are held at low temperature (near 0°C [32°F]) the bags inflate after about one week. What is going on? What will happen to the shelf-life of this product?



A. The thick plastic bag is likely HDPE (high density polyethylene) and is virtually impermeable. Therefore there will be no gas exchange once the bag is sealed.

The garlic will respire even at low temperature and consume the oxygen in the sealed bag and produce carbon dioxide. When there is no longer oxygen, there will be a shift to anaerobic respiration and carbon dioxide is produced without consuming oxygen, and therefore the bag will begin to inflate. The shelf-life will be less in your condition than if more appropriate packaging were used since very high carbon dioxide concentrations (about 20%) will cause browning and eventual death of the cloves with time. A simple solution is to have a small hole in the bag you currently use which allows some oxygen and some accumulation of carbon dioxide. It will allow, though, escape of odor molecules as well. The exact concentrations will depend on how large the hole is. I do not have an example with garlic, but below is a table that illustrates this issue using retail bags of coleslaw held at 2 temperatures. At the temperature abuse condition of 7.5°C, the bags have 0, 1 or 4 holes. You probably need to select packaging that retains the garlic odor but has sufficient permeability so that anaerobic conditions are not developed.

—[Marita Cantwell](#)

Table 1. Example of the effect of holes in bags. Effect of temperature and pinholes on gas composition of retail coleslaw.

	Temperature	Days	% O ₂	% CO ₂
Coleslaw	0°C (32°F)	1	3.5 ± 2.2	6.1 ± 0.5
		3	1.2 ± 1.7	6.0 ± 0.8
		6	3.1 ± 2.9	6.2 ± 1.1
Coleslaw	7.5°C (45°F)	1	0.2 ± 0.2	6.8 ± 0.4
		3	0.0 ± 0.0	8.1 ± 0.5
		6	0.0 ± 0.0	7.5 ± 0.2
Coleslaw 1 hole	7.5°C (45°F)	1	8.0 ± 3.0	6.2 ± 1.5
		3	7.0 ± 0.7	5.8 ± 0.4
		6	9.0 ± 0.5	5.3 ± 0.5
Coleslaw 4 holes	7.5°C (45°F)	1	13.6 ± 0.6	5.4 ± 0.5
		3	15.3 ± 0.8	5.2 ± 0.6
		6	15.8 ± 0.5	5.3 ± 0.6

- 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-Newsletter](#) as PDF documents.

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Editorial Review: Beth Mitcham

Writing: Mary Reed, Diane Nelson, Beth Mitcham, Marita Cantwell, Adel Kader

Layout & Design: Mary Reed

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