

POST HARVEST TECHNOLOGY

By Ann King Filmer

Quality and Safety From Field to Consumer

In the world of fresh fruits, vegetables, and flowers, UC Davis is unquestionably an international leader in developing postharvest technologies that prolong the life, quality, and safety of fresh produce. Most produce and floral products in commercial markets have been processed, packaged, stored, or delivered using techniques and materials developed at UC Davis.

Many factors affect deterioration of fruits, vegetables, and flowers, including time, temperature, pests, and ethylene (a natural gas produced by ripening and decaying plant materials).

Postharvest researchers at UC Davis have spent decades studying how all of these factors affect quality and how this information can be used by industry professionals to provide consumers with fresher flowers and safer, fresher, better-tasting produce. As a result, consumers now have produce and flowers that last much longer than they did 20 years ago and that are available more months of the year.

CA&ES postharvest scientists cover a range of topics including crop production, food processing, nutrition, engineering, biochem-

istry, plant physiology, and genetics. They provide information for farmers, packers and shippers, food processors, food safety agencies, and home consumers.

We've briefly outlined five projects that represent the work of our postharvest research group and show how CA&ES research benefits California consumers and agricultural producers.





Increased Longevity of California Flowers

The longevity of cut flowers in the home is closely related to the temperature at which the flowers are held after harvest. When temperature is not low enough, longevity usually decreases.

Commercially, most cut flowers are cut, bunched, boxed, cooled, and then ideally held at temperatures just above freezing during the entire shipping and distribution period. California, a major producer of cut flowers in the U.S., routinely ships flowers across country by truck.

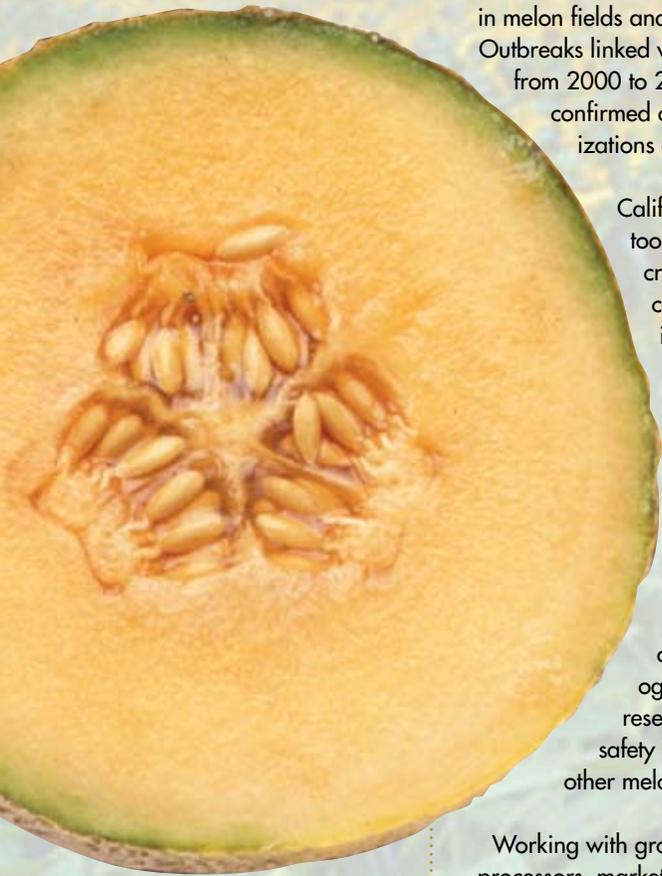
Michael Reid, a postharvest researcher in the plant sciences department, is working with the California Cut Flower Commission and floral wholesalers across the U.S. to develop methods to keep flowers cool during shipping. He is working with Infratab, Inc. to develop radio frequency identification tags placed in individual boxes of cut flowers so that temperature can be monitored during cross-country transport.

"Americans buy far fewer cut flowers than most Europeans," Reid said, "and they often cite poor longevity as a primary reason."

In Great Britain, cut flower sales doubled in a five-year period because the floral industry guarantees a home vase life of at least seven days. Reid feels that California flower growers would benefit by making similar promises to customers. ■



Left: The influence of temperature on flower quality is examined by Professor Michael Reid and Annemarie de Theije, a graduate student from the Netherlands.



Improving Melon-Handling Systems

In 2002, the importation of Mexican cantaloupes was banned due to successive outbreaks of salmonellosis and unsanitary conditions in melon fields and processing facilities. Outbreaks linked with Mexican cantaloupes from 2000 to 2002 resulted in over 150 confirmed cases, including 18 hospitalizations and at least two deaths.

California cantaloupe growers took a financial hit during this crisis, although California cantaloupes were never implicated in the salmonella outbreaks.

To head off the possibility of such an outbreak occurring in California-grown cantaloupes, researchers **Trevor Suslow**, Department of Plant Sciences, and **Linda Harris**, Department of Food Science and Technology, developed a proactive research program to assure safety in California cantaloupe and other melon-handling systems.

Working with growers, distributors, fresh-cut processors, marketers, consumers, and public health officials in California and Mexico, Suslow developed data-based GAPs ("good agricultural practices") for cantaloupes and other melons.

Focusing on the consumer, Suslow and Harris also developed consumer handling and preparation practices, along with publications such as *Cantaloupe: Safe Methods to Store, Preserve, and Enjoy* (download at <http://anrcatalog.ucdavis.edu/pdf/8095.pdf>). Additional publications for commercial melon producers are available through the UC Vegetable Research and Information Center (<http://vric.ucdavis.edu/>).

Food safety in the melon industry is an important part of postharvest handling, and CA&ES research is addressing this consumer and industry need. ■

New Packaging Reduces Contamination

Mechanical damage to soft fruits such as pears, peaches, and avocados is a common problem in the postharvest distribution chain. By the time these ripe fruits reach the consumer in the supermarket, a lot of fruit loss occurs due to bruising and puncturing.

Protection from mechanical damage reduces loss during shipping and handling and provides consumers with better quality fruit. It also could provide a means of protecting fruit from pathogen contamination.

According to **Jim Thompson**, Department of Biological and Agricultural Engineering, "At a typical supermarket, many shoppers may touch a piece of fruit before it reaches the final consumer. Packaged fruit reduces the likelihood of this contamination."

Thompson and UC Davis engineer **David Slaughter** developed a new shipping and retail package for soft fruits that provides protection from mechanical damage and reduces the number of hands that contact the fruit. Their prototype (pictured below) protects fruit by providing a suspended tray within a protective plastic clamshell container.

The system provides protection from vibration during shipping and from 'squeezing hands' in the supermarket, according to Thompson.

Thompson and Slaughter are commercially testing their product with FDS Manufacturing Co., Inc. in Pomona. While the container itself adds a small cost to the producer, it could be offset by savings in lost fruit. Watch for this new package in supermarkets next year. ■



PHOTO: Ann King Filmer

Treating Fresh Walnuts to Control Navel Orangeworm

Consumers have little tolerance for cracking open walnut shells only to find larvae of navel orangeworm tunneling through the walnuts.



"Farmers and food processors know that consumers do not want pests in their food. They also know that consumers want safe methods for treating food," explained **Elizabeth Mitcham**, postharvest research scientist in the plant sciences department.

Navel orangeworm (which has nothing to do with oranges but has everything to do with walnuts) is a difficult pest to control [see related article on page 13]. Methyl bromide, which has been used to control navel orangeworm on harvested nuts, soon will be phased out as a control option.

Mitcham developed an innovative method to treat harvested in-shell walnuts with radio frequency heating, the same energy source used by cell phones. The process is similar to microwaves, but provides a more uniform penetration into the walnuts.

"This nonchemical treatment is effective in controlling larvae, and has no negative impacts on walnut quality," said Mitcham. Walnut processors are excited about this new control method and currently are working with Mitcham to try it on a commercial scale. The cost of the equipment is high, but will eliminate the use of methyl bromide and save time.

Working with Mitcham on this project are research associate **Bill Biasi**, graduate student **Maria Monzon**, California walnut processors, scientists at the USDA Agricultural Research Service, and Washington State University researchers. ■

Postharvest Research and Information Center

The UC Postharvest Research and Information Center offers a wealth of information on postharvest handling to consumers, industry professionals, and academics from around the world.

Researcher **Adel Kader**, Department of Plant Sciences, spearheaded an extension program aimed at developing useful postharvest educational resources. He helped pioneer the Postharvest Research and Information Center and its internationally recognized Web site.

Many UC Davis postharvest researchers contribute to the site, which, according to Kader, receives a phenomenal 70,000 to 90,000 hits each month.

Industry short courses and publications for consumers and industry are some of the many offerings. The most-used link on the site is "Produce Facts," an extensive database of postharvest handling practices for individual fruits, vegetables, and ornamental crops.

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For consumers, the site (<http://postharvest.ucdavis.edu>) has downloadable publications on home storage and handling of fruits and vegetables. For industry professionals, the publication "Postharvest Technology of Horticultural Crops" is a bestseller. ■

Left: Navel orangeworm

