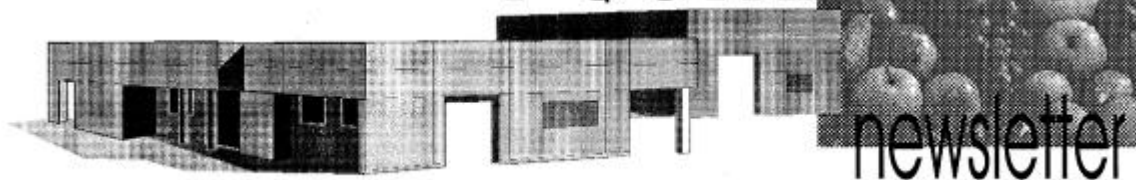




Central Valley **POSTHARVEST**



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[http://www.uckac.edu/programs/Postharvest
for_fruits_and_nuts/](http://www.uckac.edu/programs/Postharvest_for_fruits_and_nuts/)

Also visit:

<http://postharvest.ucdavis.edu>
<http://www.plantsciences.ucdavis.edu>

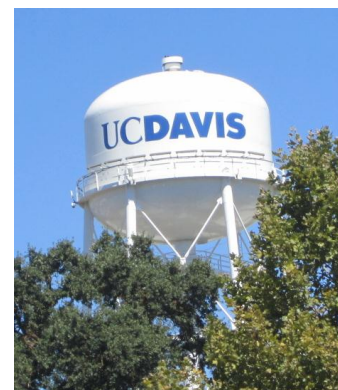
INFORMATION ABOUT CALIFORNIA FRESH FIG RESEARCH AT UC DAVIS

This briefing is for general information only. It is based on notes describing observations during a visit to the research site on August 23rd and is not a scientific report on the research in progress. The sensory protocol from UC Davis researcher, Carlos Crisosto, with a detailed overview of the process, has been sent out. For information about the study, research methodology, terminology, definitions and other details related to the research, please consult Gayle Crisosto at gmcrisosto@ucdavis.edu.

California fresh fig research is being conducted in Hildegard Heymann's Sensory Laboratory located at the Robert Mondavi Institute (RMI) for Wine and Food Science and the Postharvest Laboratory in Wickson Hall on the University of California, Davis campus from August to September 2011.

Descriptive Analysis

The sensory staff noted that research describing the sensory characteristics of figs is extremely limited. This research will help to identify the flavor characteristics of figs using descriptive analysis.



Descriptive analysis is used by sensory scientists to break down product characteristics into individual attributes. (Dr. Heymann came by during the fig testing. She is well known in the sensory science community and is the co-author [with Harry T. Lawless from Cornell University] of the sensory textbook, *Sensory Evaluation of Foods: Principles and Practices*, currently the most prescribed sensory textbook worldwide. She was consulted during the initial design of the study.)

“Like is not the goal,” said Helene Hopper, Postdoctoral Scholar, noting that the panelists are not being asked whether or not they like figs. “The descriptive analysis does not tell if something is good or bad or how much of the particular attributes are in that fruit.” Rather, she explained, “It is the characterization of the fruit” based on key descriptors that the panelists have been trained to identify. The on-site work with participants in the study runs three days a week (Tuesday, Wednesday, and Thursday) for five weeks.



Helene Hopper is shown at right with Gayle Crisosto, UC Davis Specialist, center and left to right Jennifer Orsi, graduate student, and Kevin Scott, Staff Research Associate. Panelists are used as “human instruments” to measure the attributes of figs, said Hopper. “There are no preconceived notions,” she said.

The panelists are carefully trained so that they can identify what is meant by terminology, such as honey, grassy, fruity, berry, nutty... retronasal aroma (aroma/flavor reference standards), texture, whole fruit shape/appearance, cut fruit appearance (color, pulp, pith, seeds), skin thickness, elasticity... are evaluated to identify the predominant sensory characteristics of the fig cultivars/selections to develop a flavor code.



Panelists receive special training by research staff. Each of the wine glasses in the photo has the aroma of the descriptor noted on the glass.

Panelists identified the aroma references and agreed on the terminology used for each during their group training.



The group is then able to assign specific aromas/flavors to the samples being tasted using a list of descriptors. They also rate the samples for some of the specific attributes on an intensity scale, such as skin texture from not smooth to very smooth; fruit firmness from not firm to very firm, and sweet from not sweet to very sweet. Panelist, left, reviews the aromas carefully before beginning the test.

During the descriptive analysis sessions, panelists are placed in a closed room surrounding the main laboratory, in specially designed booths with partitions that separate them from other panelists. The researchers are in the main laboratory so there are no

outside influences. The laboratory contains 24 tasting booths making it possible to run individual multi-tasting sessions simultaneously. Booths can be environmentally adjusted.

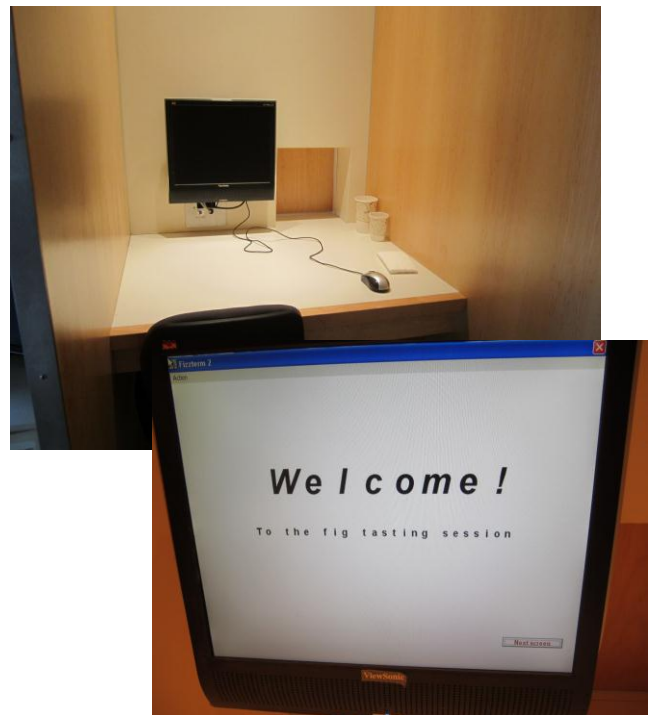
Participants signal when they are ready for a sample by turning on a light switch that is seen by the researchers in the laboratory located on the other side of the wall. The sample is provided to each panelist through a small pass-through door at the front of each booth which is kept closed during the sample tasting.

Panelists are given one sample at a time in a coded cup so that every sample tested is tracked and identified.



All panelists receive figs from the same sample lots, in random order. They begin by making a visual observation. Then they cut the fig in half. One half is for tasting and the other half is placed back in the coded cup and returned through the window to be taken back to the postharvest laboratory for physical and chemical evaluation as delineated in the study plan (e.g. compression force, visual maturity stage, skin thickness, soluble solids concentration).

A computer is in each testing booth and respondents use a mouse and keypad to answer the questions that appear on the screen. Panelists answer a set of standardized questions related to each sample received. The respondents are focused on the fruit in front of them. They evaluate the fruit as they learned in training and answer the questions in the order that they appear on the computer screen. Once one sample is complete, they press the light in their booths and receive another coded cup with a fig sample through the pass-through window. They continue with the process until all nine fig samples are completed. It takes about 1-1/2 hours per session to complete the nine samples. The same panelists who volunteered for the panel come three times a week for the five week study.





Sample tray is shown at left for the August 23, 2011 testing. A tray is made up in advance for each of the panelists and is marked with the name of the participant.

In summary, for each day's session there are nine samples, three samples (cultivar-grower-location) with three repetitions per sample. There are three days of testing each week for a total of nine samples (cultivar-grower-location). Each panelist tastes 27 samples (nine cultivar-grower-locations with three replications) in a week.

A light box with fig samples identified is used for visual observation responses by the panelists. The light box simulates daylight. The objective is for every panelist to be able to view the fruit in the same position and in the same lighting conditions.

Wickson Hall, Postharvest Laboratory

Several steps are taken to identify and quantify the physical and chemical characteristics of the fresh figs. After the descriptive analysis the fig halves from the figs analyzed by the panel are returned to the laboratory. Each is coded for identification. Additional initial quality evaluations of whole figs from a subset for each sample are measured. The descriptions which follow show some of the steps. This briefing is for general information purposes only and there is no specific ordering of the process.



1. Visual Maturity Stage and Color

Bill Biasi, Staff Research Associate, Postharvest Laboratory, is at left with Gayle Crisosto with fig samples. At right Crisosto and Catherine Hsu carefully inspect Calimyrna fig samples.



Each fig is cut in half for visual observation of maturity stage, see examples below. The fig at left is an example of commercial maturity (opaque, not fully translucent) and the fig at right is tree ripe (fully translucent). Another indicator at harvest when a fig is tree ripe is when the stem is drooping and the flesh is translucent and full color for the specific cultivar.



Skin and flesh color are measured with a Minolta colorimeter. Ioannis Minas (left) is measuring flesh color of each fig sample.

2. Skin Thickness and Ostiole Diameter

Catherine Hsu uses calipers to measure skin thickness. Ostiole diameter is also measured.



3. Juicer

Figs are juiced so that follow up measures can be taken of soluble solids concentration (sweetness) and titratable acidity (sourness perception). Juan Salazar, right, juices a Calimyrna fig sample.



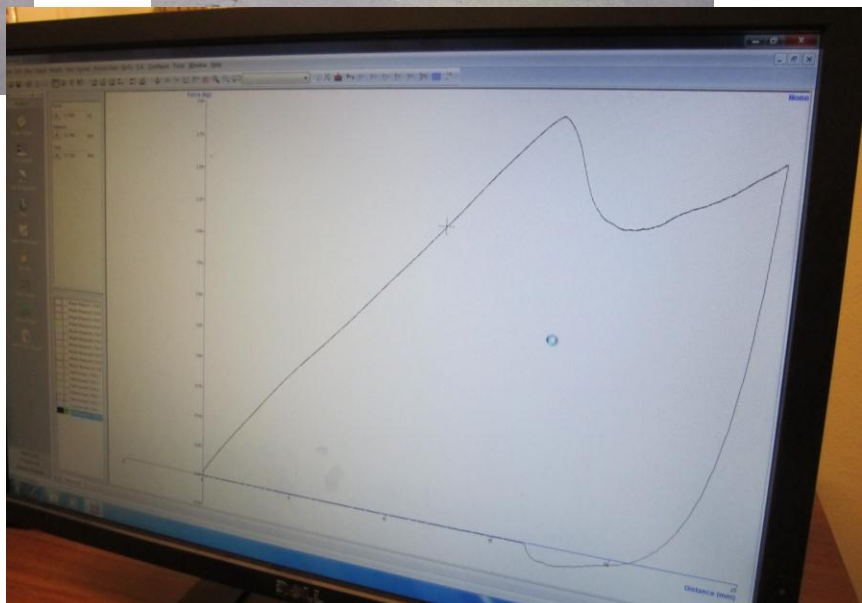
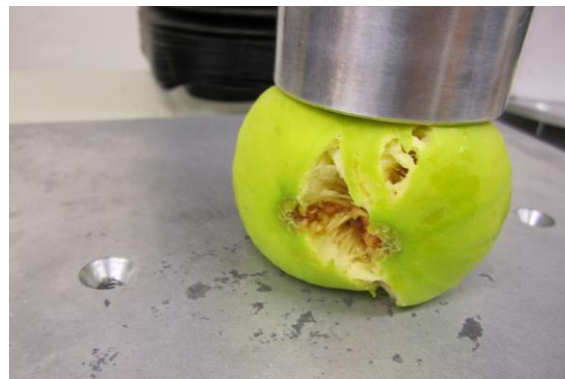
4. Weight

Fig weight is measured on a balance in grams. The fig at right is 68.64 g (almost 2-1/2 oz.)



5. Texture Analysis

The Fruit Texture Analyzer is used to measure the compression force to split whole figs. The Calimyrna fig tested required 2.9 Kg of force to split. The computer graph screen below visually shows the point at which the fig split.



Information from Thomas J. Payne Market Development for the California Fig Institute, August 24, 2011.

MOST USEFUL INTERNET SITES FOR POSTHARVEST INFORMATION

This was current in May 2011. If you know of another Internet site that should be added to this list, please let me know.

Adel Kader (aakader@ucdavis.edu)

[Link to pdf version](#)

Comprehensive Postharvest Handling Resources

- <http://postharvest.ucdavis.edu> – University of California Postharvest Technology Center.
- <http://www.ba.ars.usda.gov/hb66/index.html> – A draft version of the forthcoming revision to USDA Agricultural Handbook 66 (Commercial Storage of Fruits, Vegetables and Florist and Nursery Stocks).

Global Postharvest Handling

- <http://www.fao.org/inpho/> – Postharvest information site of the Food and Agriculture Organization of the United Nations.
- <http://www.foodnet.cgiar.org/PhAction/index.htm> – Global postharvest research & development.
- <http://www.avrdc.org/index.php?id=10> – World Vegetable Center Postharvest Information.
- <http://www.postharvest.org> – Postharvest Education Foundation (training in postharvest technology).
- <http://www.poscosecha.com> and <http://www.postharvest.biz> – International Directory of Postharvest Suppliers.

Other University and Commodity Specific Postharvest Handling

- <http://www2.uckac.edu/postharv/> – University of California Kearney Agricultural Center (emphasis on stone fruits, kiwifruits, and grapes).
- <http://www.avocadosource.com> – Production and Handling of Avocado Information.
- <http://postharvest.ifas.ufl.edu> – University of Florida Postharvest Group.
- <http://flecitrus.ifas.ufl.edu> – University of Florida Citrus Resources Website.
- <http://www.citrusresearch.org> – California Citrus Research Board – supported research reports.
- <http://postharvest.tfrec.wsu.edu> – Washington State University postharvest information (emphasis on apple, pear, and cherry).
- <http://www.bae.ncsu.edu/programs/extension/publicat/postharv/> – North Carolina State University postharvest information.
- http://www.agrifoodgateway.com/fresh_produce/postharvest – University of Missouri, Global Agribusiness Program, Postharvest Information.
- <http://postharvestinstitute.illinois.edu/index.html> – Reducing postharvest loss in corn, wheat and oilseeds.
- <http://www.hort.cornell.edu/mcp/> – A summary of published information about effects of 1-methylcyclopropene (1-MCP) on fruits, vegetables, and ornamental products.
- <http://www.chainoflifenet.org> – A comprehensive information resource about postharvest handling of floral crops.
- <http://www.postharvest.com.au/> – Sydney Postharvest Laboratory information.

Quality Standards

- http://www.codexalimentarius.net/web/index_en.jsp – FAO-WHO Food Standards.
- <http://www.ams.usda.gov> – U.S. Department of Agriculture, Agricultural Marketing Service information on quality standards, transportation, and marketing.
- <http://www.unece.org/trade/agr/standard/fresh/FFV-StandardsE.htm> – European Standards for Fruit and Vegetables.
- http://www.oecd.org/document/21/0,3746,en_2649_33905_44188949_1_1_1_1,00.html – Brochures of the OECD International Fruit and Vegetable Standards.

Pesticides, Additives, Organics, and Quarantine Requirements

- <http://www.cdms.net/manuf/manuf.asp> – Labels and material safety datasheets for pesticides.
- <http://www.mrlatabase.com/> – International Maximum Residue Limit Database (Pesticide residue information).
- http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp – Pesticide Residues in Food.
- <http://www.fao.org/ag/agn/jecfa-additives/search.html?lang=en> – FAO-WHO Combined Compendium of Food Additive Specifications.
- <http://www.ams.usda.gov/nop/> – National organic program standards.
- http://www.aphis.usda.gov/import_export/ – U.S. Department of Agriculture, Animal and Plant Health Inspection Service information on phytosanitary and quarantine requirements.
- <http://www.epa.gov/ozone/mbr/> – Methyl bromide phase out information.
- <http://www.mbao.org/> – Methyl bromide alternatives outreach information.

Nutrition

- <http://www.nutrition.gov> – Gateway to U.S. government information on human nutrition and nutritive value of foods.
- <http://www.choosemyplate.gov> – USDA interactive website about application of the 2010 Dietary Guidelines to individual consumers.
- <http://www.ars.usda.gov/ba/bhnrc/ndl> – Composition of foods.
- <http://www.fruitsandveggiesmorematters.org> – Produce for Better Health Foundation's promotion of produce consumption.
- <http://www.fruitsandveggiesmatter.gov> – U.S. government (CDC, DHHS, NCI) site for promotion of produce consumption.

Food Safety, Traceability, and Defense

- <http://www.fightbac.org> – Partnership for Food Safety Education.
- <http://www.foodsafety.gov> – Gateway to U.S. government information on food safety.
- <http://www.fda.gov/Food/FoodSafety/default.htm> – U.S. Food and Drug Administration's Guidance Documents on Food Safety.
- <http://www.ucfoodsafety.ucdavis.edu> – University of California's food safety information.
- <http://ucgaps.ucdavis.edu> – University of California's Good Agricultural Practices.
- <http://cps.ucdavis.edu/> – Center for Produce Safety, University of California at Davis.
- <http://wifss.ucdavis.edu> – Western Institute for Food Safety and Security (WIFSS).
- <http://www.fda.gov/Food/FoodDefense/FoodSecurity/default.htm> – Food security guidance documents.

- <http://www.globalgap.org/> – GLOBALGAP is a private sector body that sets voluntary standards for the certification of agricultural products around the globe.
 - <http://www.producetraceability.org> – Current information about the produce traceability initiative.
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