

Flavor Management and Quality Services



Presented by :

**Wil Sumner, Director of Food and Agriculture Testing Services,
and Lien Ha, Testing Associate,
Scientific Certification Systems**

Speaker



Wil Sumner, Director of Food and Agriculture Testing Services at SCS and head of our Flavor Services. Wil maintains strong connections with his Alma Mater, UC Davis, whose expert research team has reviewed and audited SCS's flavor programs, such as our Flavor Rich Certification and sensory services.

Wil graduated from UC Davis College of Ag with a BS in Chemistry and then moved on to the University of Minnesota for his MS in Toxicology. Before joining SCS in 1990, Wil worked with the FDA as a Supervisory Food Scientist, with the University of Minnesota as Lab Director, and with the USDA as a Physical Scientist developing analytical methods to measure quality in foods.

He participates on the technical boards of numerous industry groups including the FMI Technical Committee on Food Safety; the Institute of Food Technology; the International Sprout Growers Association; and the United Produce Quality Board.

SCS Services

Certification, auditing, testing and custom services and programs

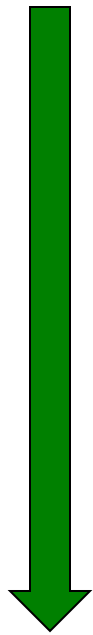


GLOBALG.A.P.



A Decade of Fresh Produce Flavor Research and Services

2001



2011

- With UC Davis, developed flavor specifications and evaluation tools for stone fruit based on consumer expectations.
- Participated in collaborative study with USDA on Certified Sweet Onions.
- Developed comprehensive flavor evaluation services for growers and seed companies.
- Developed training and evaluation tools on flavor and quality for the retail produce department.
- Developed flavor specs for many categories, such as stone fruit, onions, carrots, corn, tomatoes, avocados, garlic, citrus, melons.

Flavor and Quality Management in Produce

- Produce quality is largely defined by standards created by the USDA in the 1940's, and is focused on size, color, and visual defects.
- Flavor matters! Consumer Trends Magazine identified lack of flavor as the principal reason for the drop in sales of fresh produce, especially peaches, apricots, grapefruit, nectarines, and strawberries.
- Some retailers have begun to add flavor parameters to their quality specs, such as minimum brix (sweetness) or pressure. These parameters do not fully capture the factors that influence consumer acceptability.



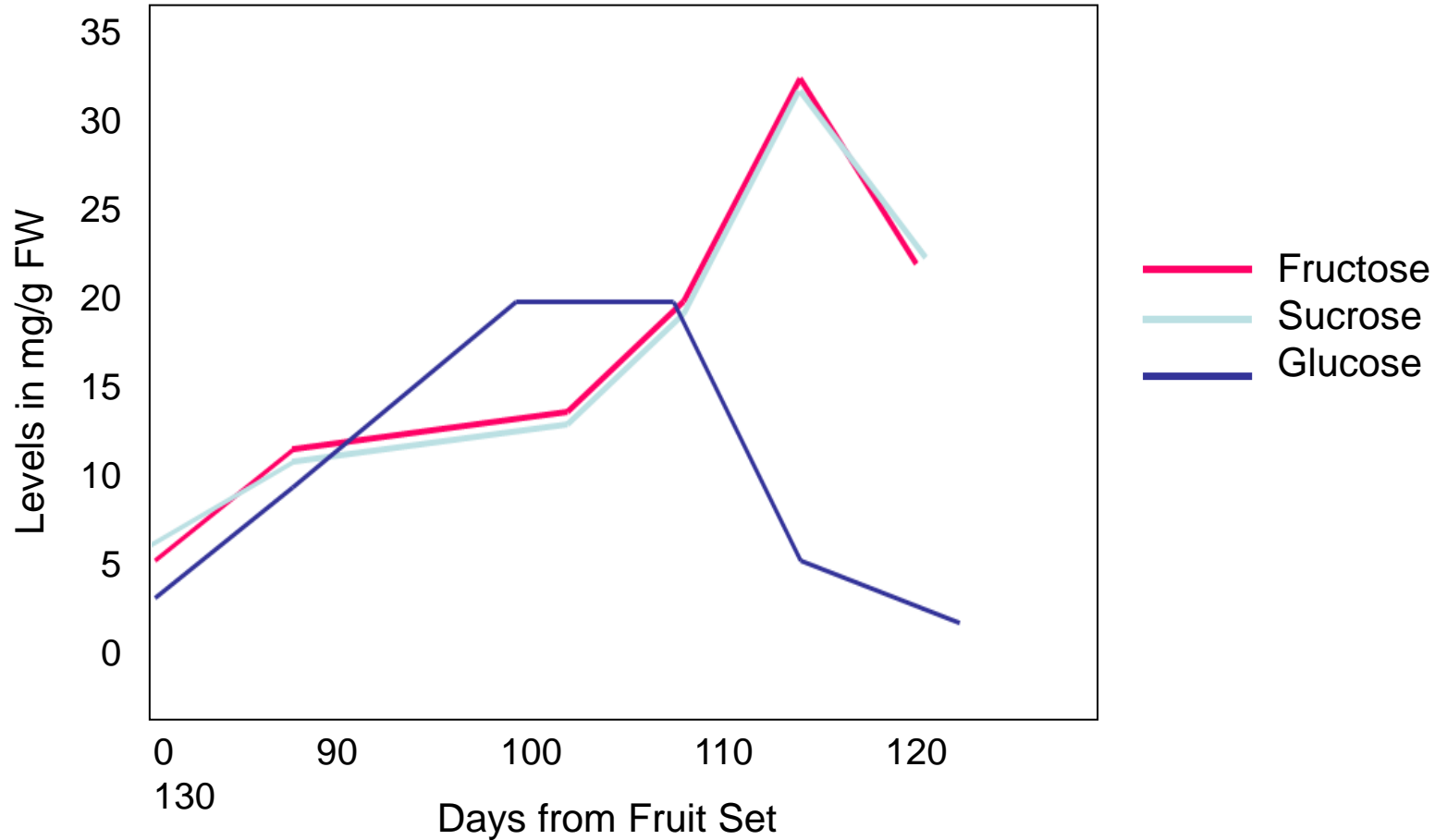
Influences on Flavor In Produce

- **Genetics:** The DNA in the fruit determines its flavor potential.
- **Maturity:** As fruit matures, its sugars and organic acids change to their maximum levels and acceptance. Delayed maturity due to cool weather delays these changes.
- **Ripening After Harvest ?:** Prematurely harvested fruit generally will not continue to develop sugars and organic acids post-harvest. Softening of fruit, and color changes can be managed with temperature.
- **Post-Harvest Handling:** Mature fruit should be held at cool temperatures or modified atmospheres to slow down ripening.

QUESTIONS?

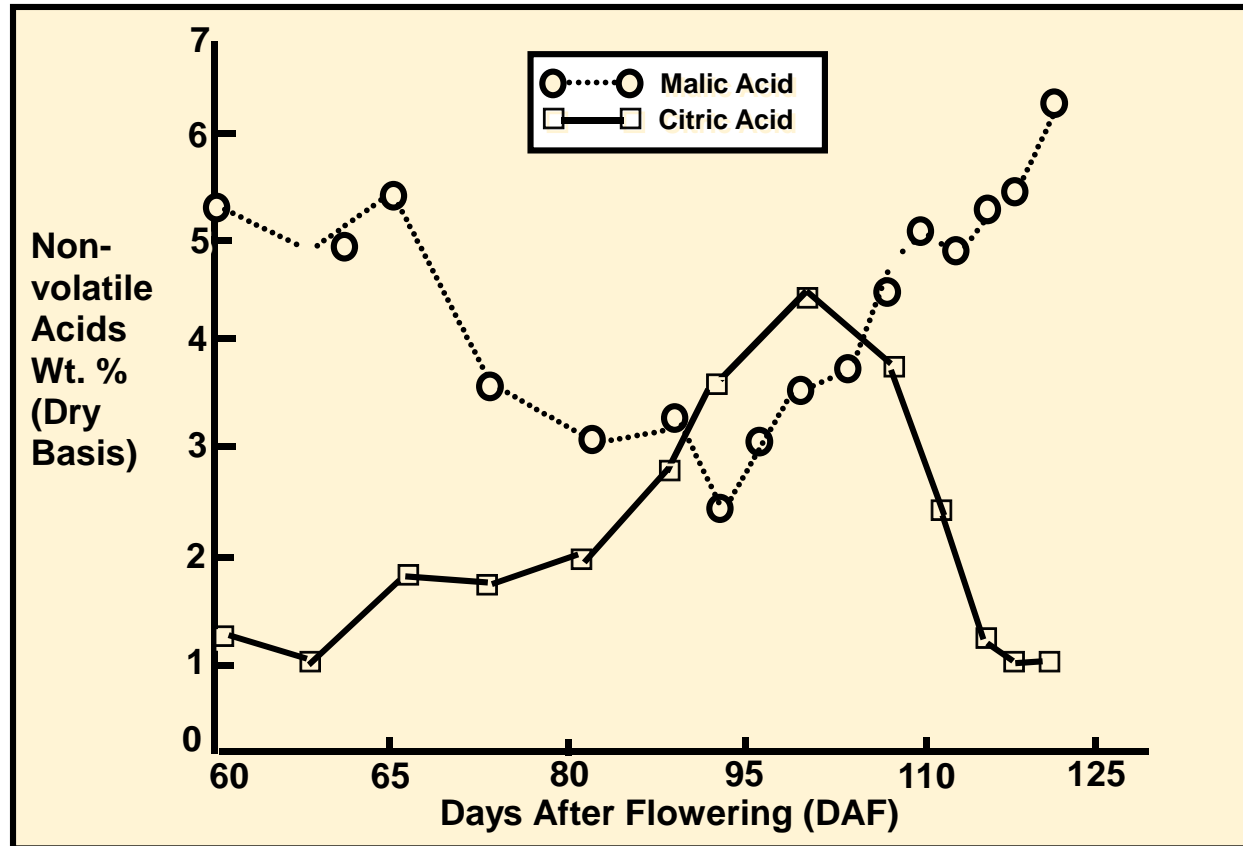


Sugar Development in Peaches



Malic-to-Citric Acid Ratio is Important for Peak Flavor

Trends During Peach Maturation on the Tree



Malic to Citric acid balances change with maturity.

Pre-Harvest Factors That Influence Flavor

- **Inherent differences between varieties** (firmness, relative levels of sugars, acids, flavonoids)
- **Growing region** (soil, climate, microclimate)
- **Plant age** (nutrient delivery)
- **Pruning and thinning** (sunlight or nutrients)
- **Irrigation** (practices and water quality)
- **Fertilization** (balanced for optimum fruit growth)
- **Pests and diseases** (restricted nutrient flow)
- **Sufficient “hang-time”** (for optimum maturity)



QUESTIONS?

Using Sensory Science To Define Flavor

- Objective method to determine flavor components in food
- Method uses flavor panels in conjunction with chemical/physical testing.
- Provides basis for analyzing consumer acceptability and establishing minimum flavor specifications.



Flavor Attributes

Appearance: Color, Defects, Surface condition.

Taste: Sweet (fructose, glucose, sucrose), Sour (malic or citric acid), Bitter (minerals or antioxidants),

Texture: Juice, Density, Mealy/Grainy, Astringency

Aroma: Aromatic Acids (fruity odor), Phenolics (pungent odor), Off (chemical) Odor.



Factors Influencing Flavor Panels

- **Foreground vs. Background** - Taster must focus on each attribute one at a time.
- **Adaptation** – The brain can shut off senses subjected to continued exposure (i.e., Iodine smell at a hospital). Flavor panelists must clear his/her pallet with water and/or crackers.
- **Data Reduction** - The brain will attempt to interpret sensory messages and may come to the wrong conclusion (e.g., allowing a visual assessment to pre-determine taste or aroma ratings). Panelists should be shielded from external cues that could alter their taste impressions.

The Role of Analytical Tools

More traditional methods of evaluating attributes such as sweetness, density and color should be used in conjunction with sensory taste testing.

Refractometers measure both Brix and Soluble Solids, but cannot differentiate.



Penetrometers measures the density of a surface by calculating the amount of pressure required to penetrate a surface. However, its usage is not standardized, and it is temperature dependent.

Flavor Panelists

SCS pulls from multiple groups with flavor experience to create our Expert Panels

For example:

- **Executive Chefs** (from Napa, San Francisco, Sonoma Culinary Institute)
- **Food Scientists** (UC Davis Food Science Dept., Food Manufacturers)
- **Produce Experts** (Buyers, QC Personnel, Merchandisers)
- **Consumer Groups**

QUESTIONS?



Descriptors used in this Demonstration: Cantaloupe

Aroma	Melon/ tropical scents representing a mixture of the aromatics associated with melons (cantaloupes, honeydews, watermelon, etc.) and other fresh fruits.
Taste	Sweetness equals the taste on the tongue associated with sugars.
Texture / Mouthfeel	Juiciness equals the amount of wetness or juice released from the fruit during chewing.
Appearance	Vividness and intensity of orange color in the internal flesh of the product.



Cantaloupe Scorecard

Scorecard for Cantaloupe		Trace					Light					Moderate					Strong					
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aroma																						
•	Musky/Melony	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Flavor																						
•	Sweetness	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Texture/Mouthfeel																						
•	Juiciness	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Visual Characteristics																						
•	Flesh Color (orange)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					

How to Taste Test Fresh Produce

Sensory Input Markers

Start with product that is in the range of room temperature.

- **Odor:** Sample both an intact piece and again during the chewing process. (To verify, inhale and recalibrate.)
- **Taste:** Bite, chew and move the food around (taste buds are on different locations of the tongue). Is there any after-taste?
- **Texture:** Assess primary moisture level or juice content (or lack thereof). Take note of astringency (pucker power).

Speaker



Lien Ha has been a Testing Associate for 6 years and responsible for Flavor at SCS for 4 years. Prior to joining SCS, Lien worked for a semiconductor device manufacturing company where she managed daily office operations, shipping and receiving, imports and exports, accounting and company event planning.

In her free time, you can find Lien hiking Half Dome in Yosemite, teaching her cat new cat tricks, or trying adventurous activities like skydiving and canyoning.

She received her Bachelor of Arts degree with a double major in Business Economics; and Sociology from the University of California, Santa Barbara.



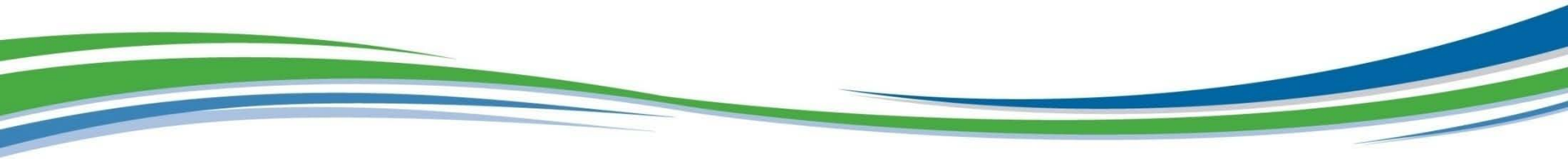
Flavor Panel Example: Cantaloupe



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Flavor Panel Example: Cantaloupe

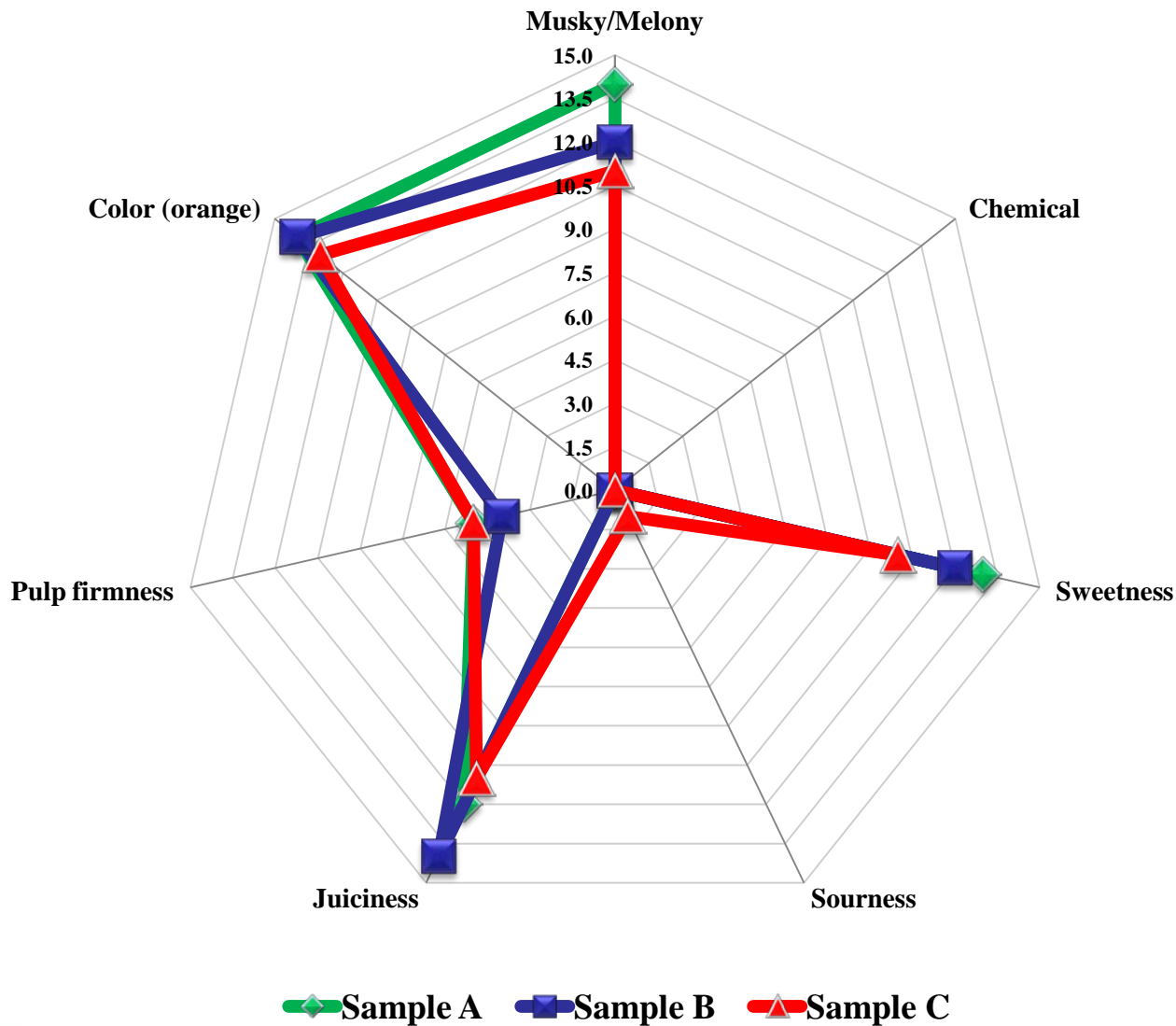


Common Mistakes

- Reading only BRIX as the primary determination for sweetness*
- Taking the Pressure Reading at the wrong location or temperature.
- Not training & calibrating a sensory panel to the descriptors and score card .
- Using only an in-house panel versus getting an outside panel to calibrate.

*BRIX measures all sugars and other soluble material in the fruit. If the wrong sugar is dominant (i.e. glucose), or the produce is over-mature (sugars are converting to alcohol) you will get a false reading of sweetness.

Spider Graph Example: Cantaloupe



SCS Has Flavor Rich Specs for ...

Fruit

- Stone Fruit
(Peaches, Plums, Nectarines, Cherries)
- Oranges
- Apples
- Melons
(Cantaloupe, cantaloupe, Honeydew)
- Strawberries
- Table Grapes

Vegetables

- Sweet Onions
- Tomatoes
- Garlic
- Red Bell Pepper
- Carrots
- Avocado
- Sweet Corn
- Cucumbers

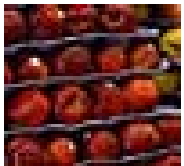


Success! Certified Flavor Rated™



In Summary

- Flavor matters to consumers
- Informed flavor management involves a combination of sensory science and analytical methods
- For growers and seed companies, informed flavor management & Flavor Rich Certification can ensure that products deliver full flavor, meet customer specifications, and provide a point of differentiation in the market
- For retailers, informed flavor management can provide the information needed to set specifications, monitor supplier conformance, stay competitive, reduce shrink, and drive sales



Questions?

For more information:

Wil Sumner, MS
Director of Testing Services,
Food and Agriculture
Scientific Certification Systems
wsumner@scscertified.com
(510) 452-8019

Nova Sayers
Sales Manager,
Food and Agriculture
Scientific Certification Systems
nsayers@scscertified.com
(510) 452-9083