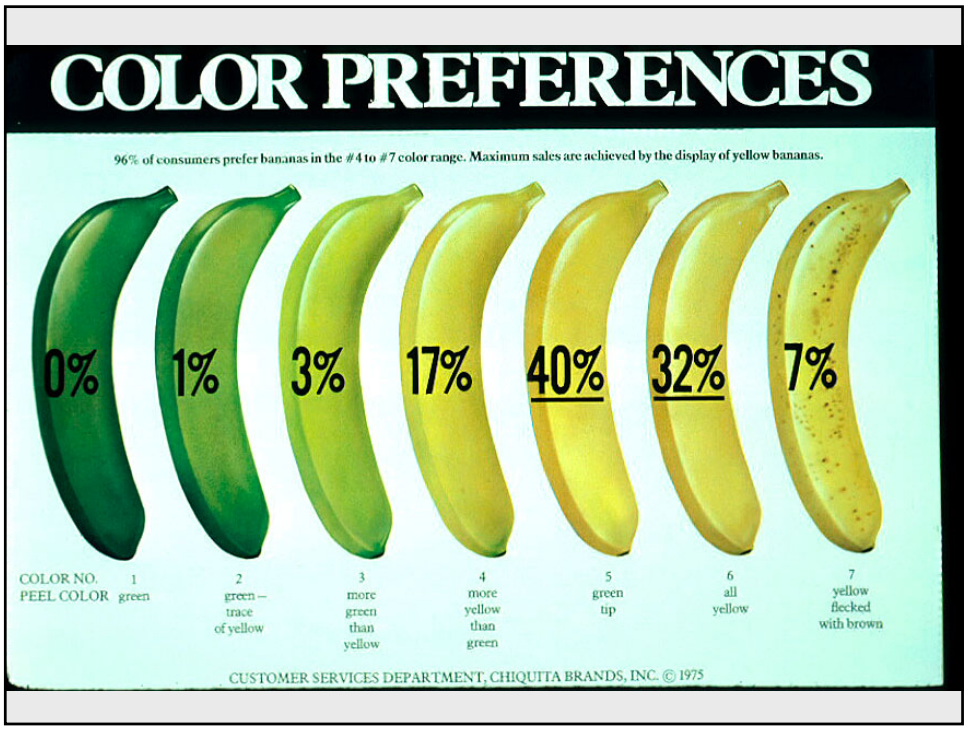
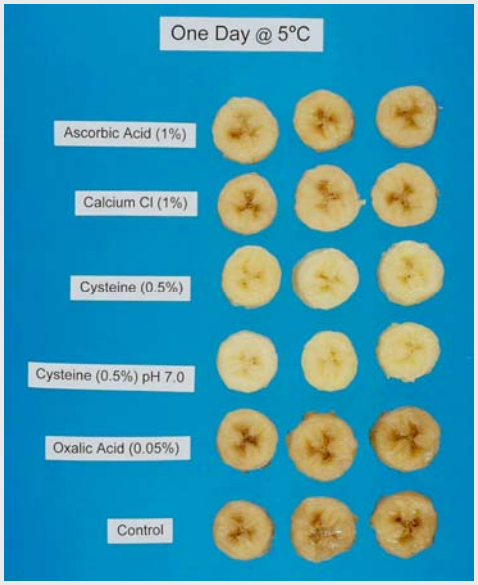
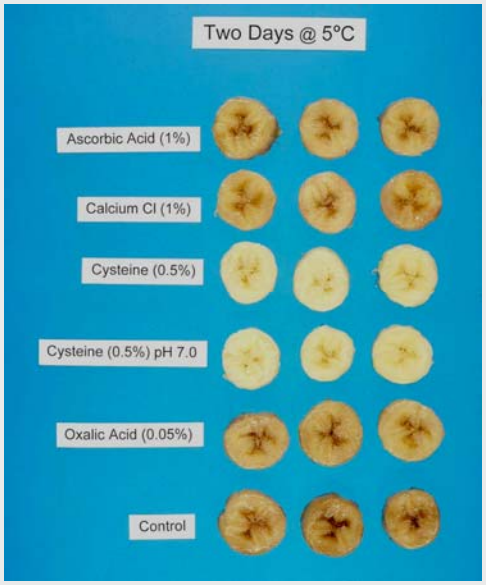
Product Considerations: Banana, Mango, Pineapple, Citrus

Adel Kader

UCDavis




One Day @ 5°C
Ascorbic Acid (1%)
Calcium Cl (1%)
Cysteine (0.5%)
Cysteine (0.5%) pH 7.0
Oxalic Acid (0.05%)
Control


Two Days @ 5°C
Ascorbic Acid (1%)
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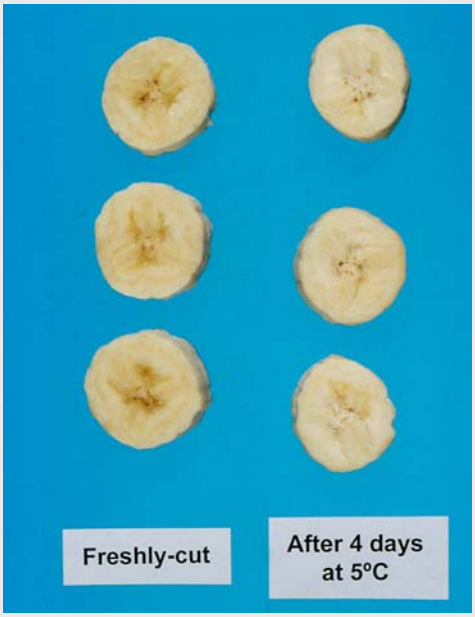
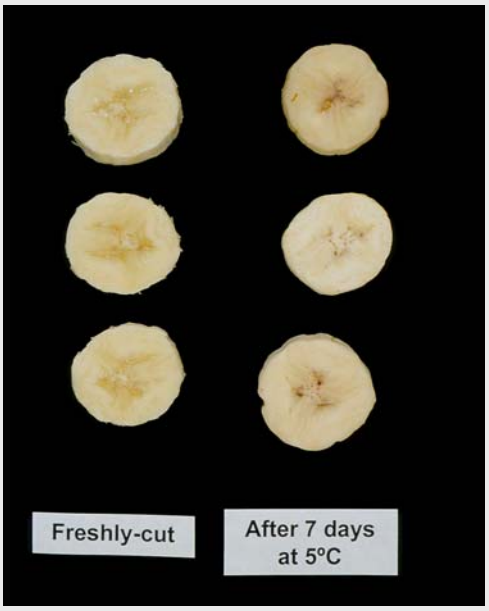
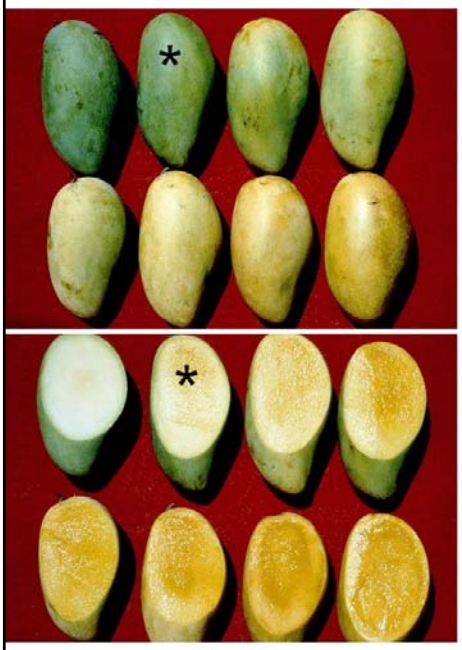
Cysteine (0.5%)
Cysteine (0.5%) pH 7.0
Oxalic Acid (0.05%)
Control


Freshly-cut
After 4 days
at 5ºC


Freshly-cut
After 7 days
at 5ºC

Mango Maturity and Ripeness Stages



Manilla

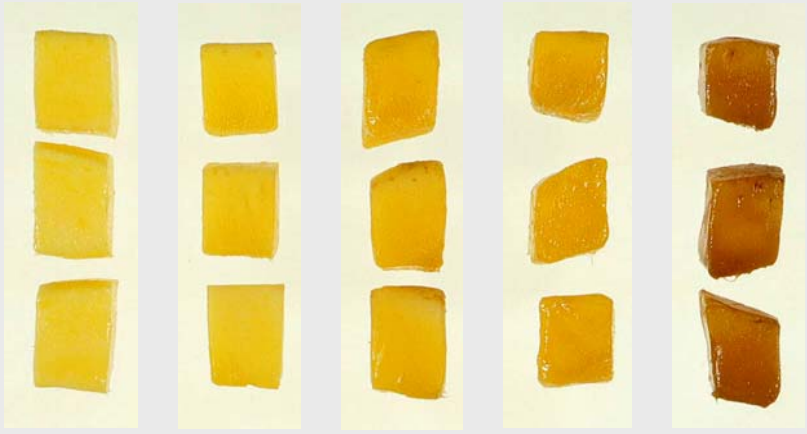
Kent

* *Minimum Stage for Harvest*

Rating Scale For Overall Visual Quality Of Fresh-cut Produce

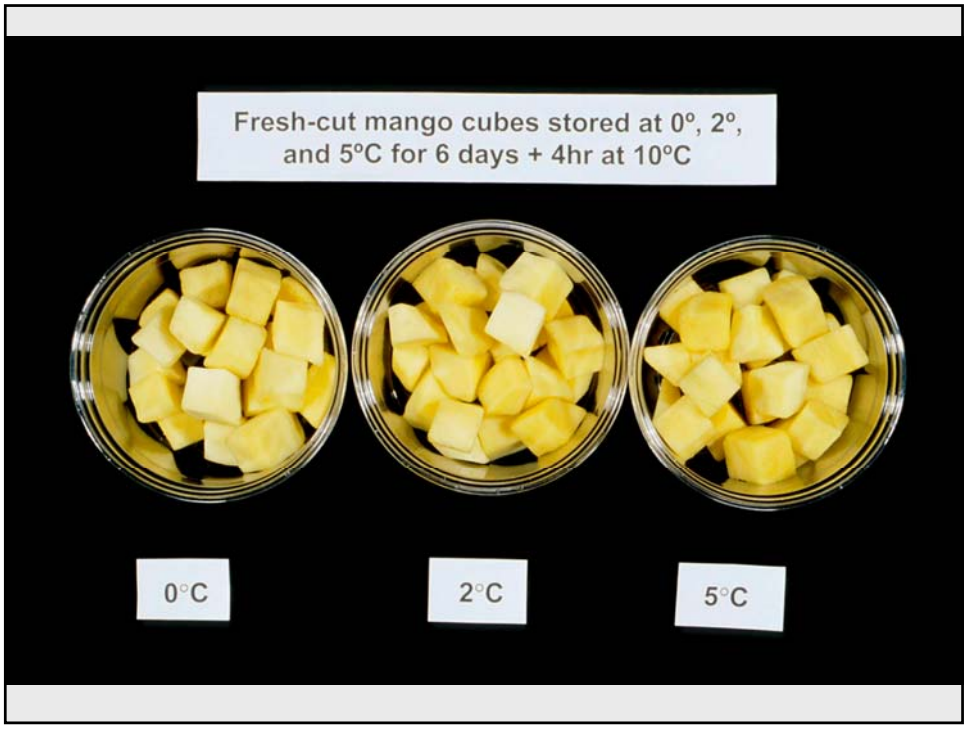
9	***Excellent*****,** essentially no symptoms of deterioration*
7	***Good*****,** minor symptoms of deterioration*, not objectionable
5	***Fair*****,** deterioration* evident, but not serious, limit of saleability
3	***Poor*****,** serious deterioration*, limit of useability
1	***Extremely poor*****,** not usable, off-odors, fungal decay

Increased brown discoloration, softening, water-soaked appearance, tissue disintegration

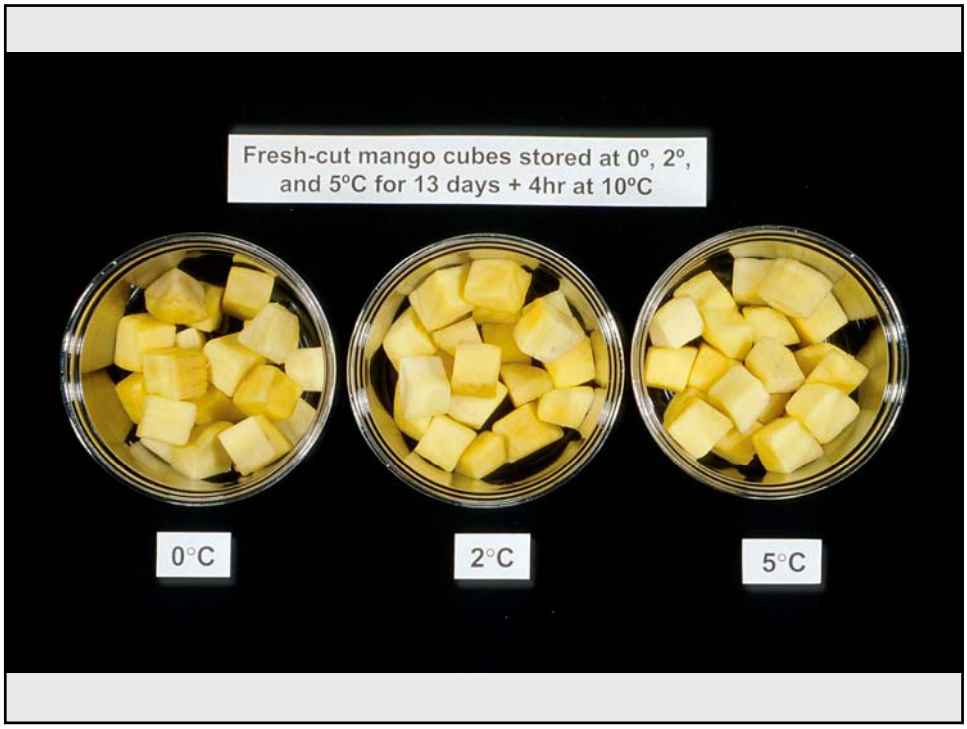


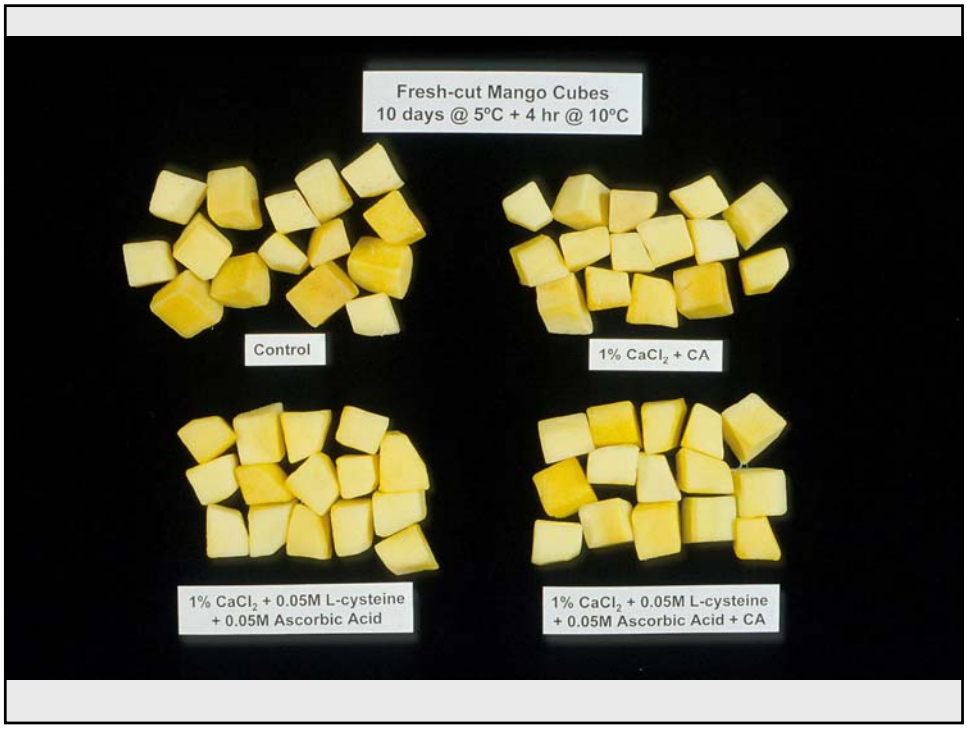
9 7 5 3 1

Visual Quality Scores for Mangos


Fresh-cut mango cubes stored at 0º, 2º,
and 5ºC for 6 days + 4hr at 10ºC
0°C
2°C
5°C

Fresh-cut mango cubes stored at 0º, 2º,
and 5ºC for 10 days + 4hr at 10ºC
0°C
2°C
5°C


Fresh-cut mango cubes stored at 0º, 2º, and 5ºC for 13 days + 4hr at 10ºC
0°C
2°C
5°C

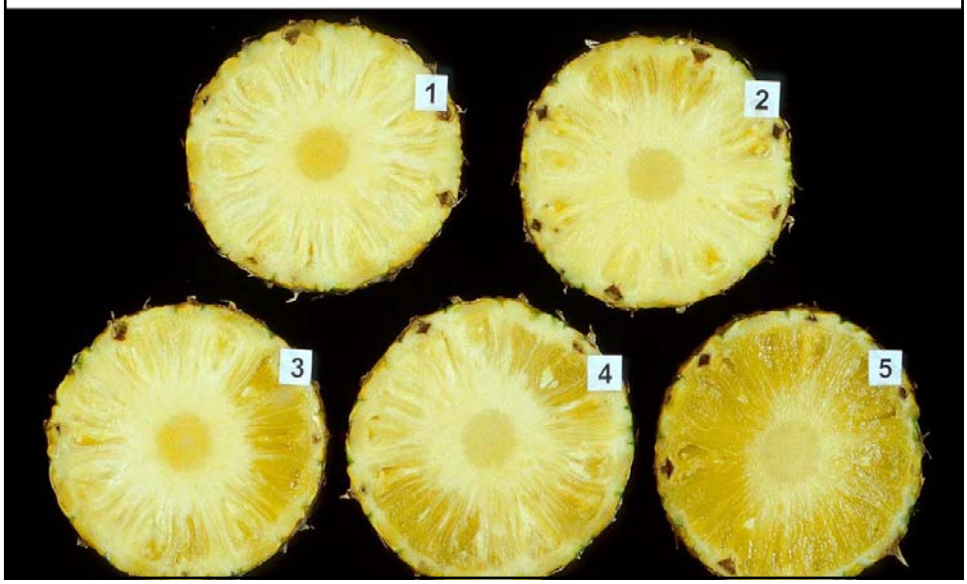

Fresh-cut Mango Cubes
10 days @ 5ºC + 4 hr @ 10ºC
Control
1% $CaCl_2$ + CA
1% $CaCl_2$ + 0.05M L-cysteine + 0.05M Ascorbic Acid
1% $CaCl_2$ + 0.05M L-cysteine + 0.05M Ascorbic Acid + CA

Fresh-cut Pineapples

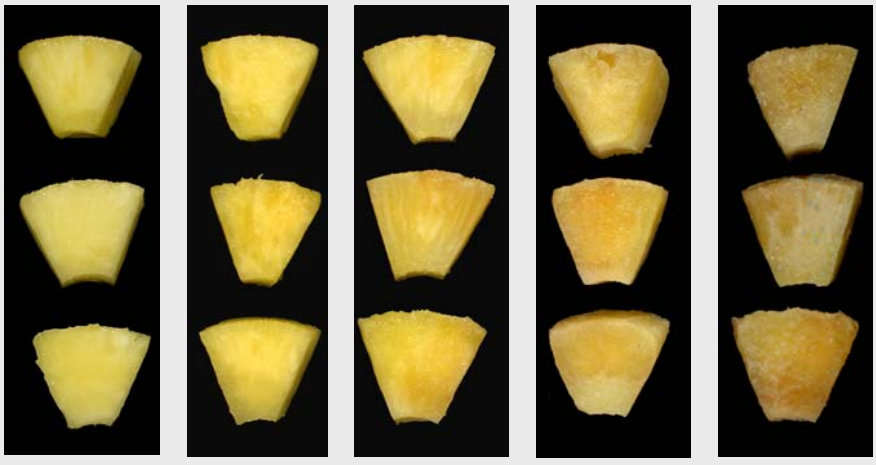
Constituent (unit)	Cultivar	
	Champaka	Premium Select
Total solids (%)	16.9 ± 0.9	22.2 ± 0.8
Soluble solids (%)	12.7 ± 1.2	16.9 ± 0.3
Titratable acidity (%)	0.67 ± 0.1	0.54 ± 0.0
pH	3.60 ± 0.1	3.92 ± 0.0
Total ascorbic acid (mg/100g FW)	8.5 ± 0.7	30.8 ± 1.0
Beta carotene (μg/100g FW)	323.3 ± 94.2	929.9 ± 84.2
Total phenolics (mg/100g FW)	31.4 ± 0.9	63.5 ± 4.7
Antioxidant activity [DPPH] (μM/100g FW)		
Ascorbic acid equivalent	62.0 ± 9.8	217.0 ± 22.2
Trolox equivalent	59.4 ± 9.8	206.8 ± 22.2

Intercultivar Differences in Composition of Pineapples

Rating Scale for Translucency of Pineapples



Experimental Setup for Measuring Respiration and Ethylene Production

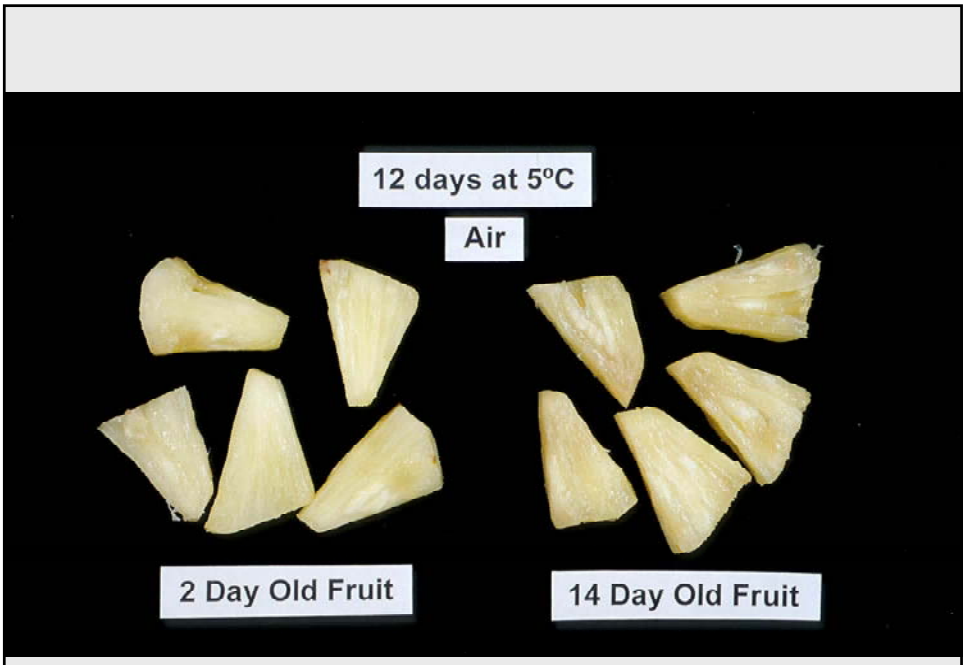


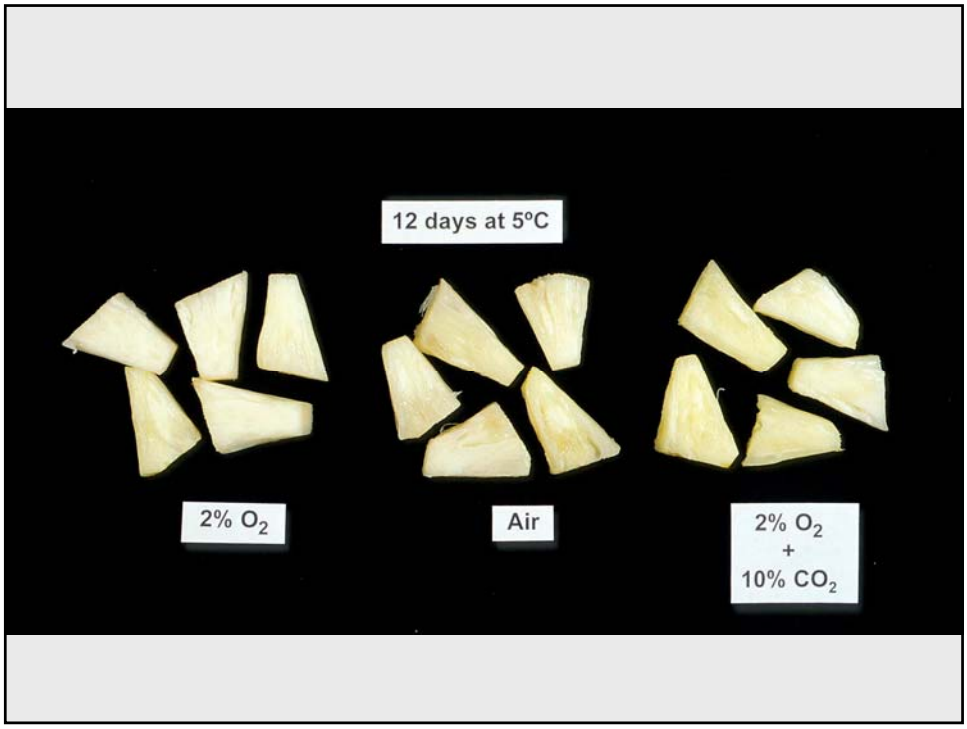
9 7 5 3 1

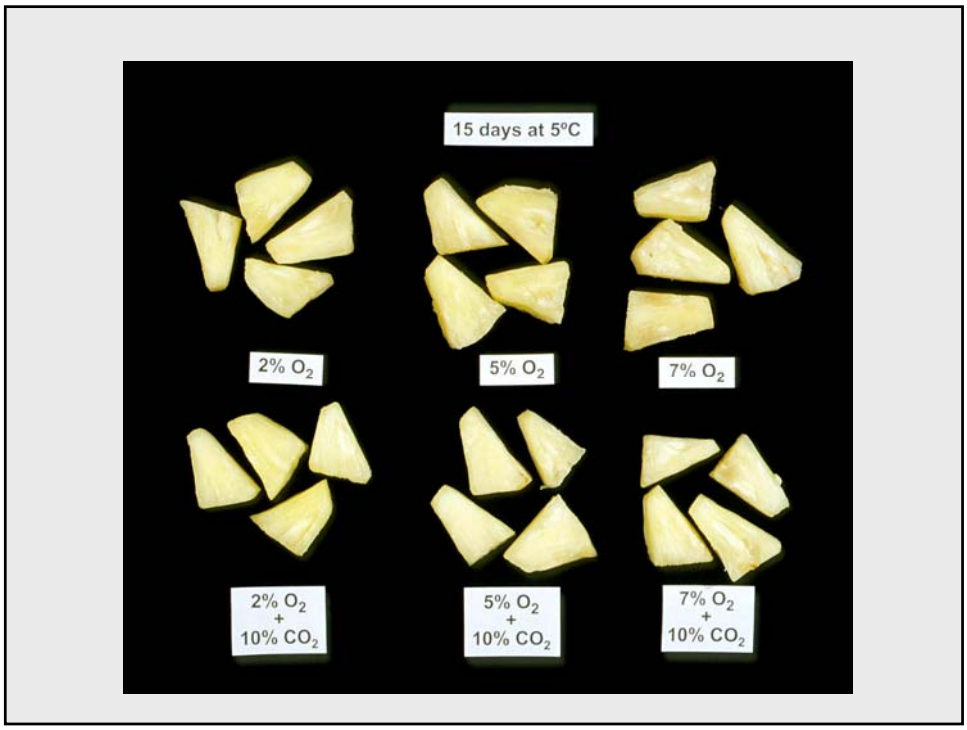
Visual Quality Scores for Pineapples

Green
Ripe
0°C
10°C

After 7 Days


12 days at 5°C
Air
2 Day Old Fruit
14 Day Old Fruit


12 days at 5ºC
2% O_2
Air
2% O_2 + 10% CO_2


15 days at 5ºC
2% O_2
5% O_2
7% O_2
2% O_2 + 10% CO_2
5% O_2 + 10% CO_2
7% O_2 + 10% CO_2

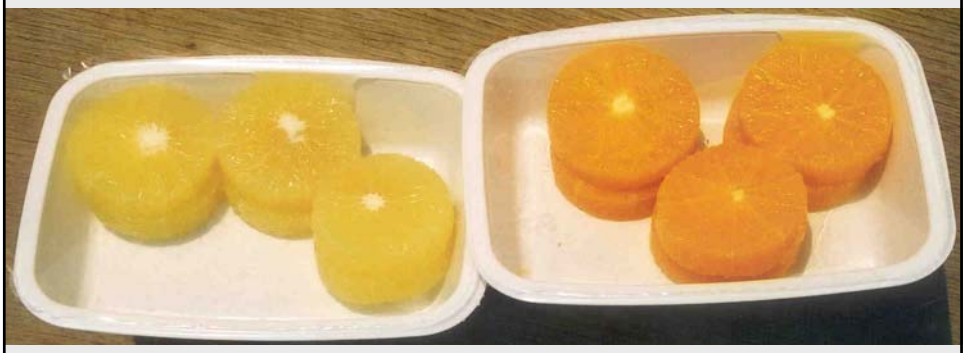
Premium Select
MA 0°C
2 weeks
Premium Select
MA 5°C
2 weeks

Chambaka
Air 0°C
3 weeks
Premium Select
Air 0°C
3 weeks

CITRUS FRUITS

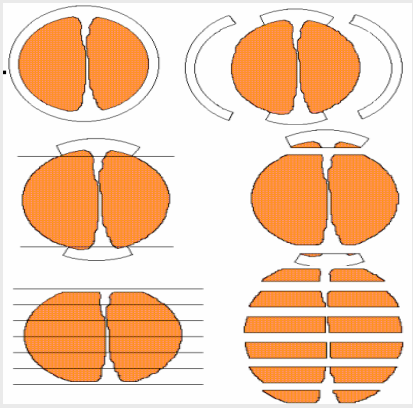
Fresh-cut Pummelo in Thailand

Fresh-cut Citrus Fruits in Spain

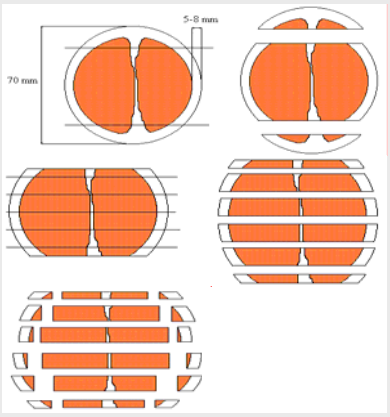


AINIA
Prototype Citrus
Peeling and Slicing Technology

Peeling and Cutting



Option A). Peeled and sliced.
More shelf life problems



Option B). Sliced, classified and peeled.
(Ainia, Spain)

From Francisco Artes-Hernandez

Peeling and Cutting

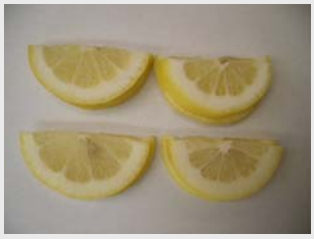
Peeling of citrus
(Ainia, Valencia, Spain)

Sorting orange slices
(Ainia, Valencia, Spain)

From Francisco Artes-Hernandez

Prof. Dr. Adel A. Kader
Dr. Francisco Artés-Hernández
Dr. Fernando Rivera-Cabrera

Main disorders



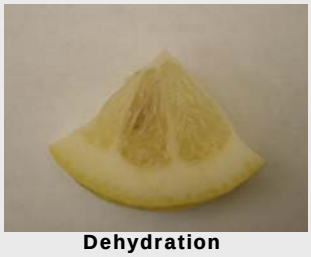
Dehydration

Segment separation

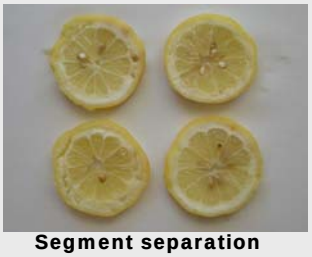
Albedo Browning

Membrane Browning

Extreme disorders

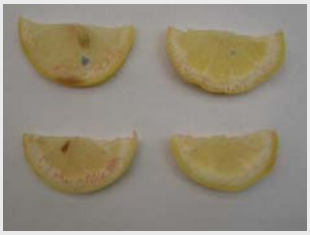


Dehydration



Segment separation

Browning



Yeast, Decay and Browning

Fresh-cut Lemons

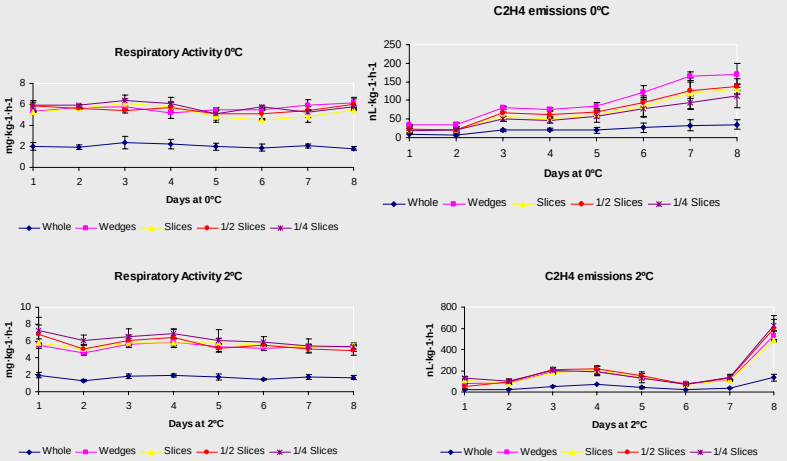
- 2 experiments with unpeeled:
  - Cv 'Eureka'
  - Cv 'Lisbon'
- 4 ≠ kinds of cut at 10ºC
  - Wedges
  - Slices
  - ½ slices
  - ¼ slices
- Washed 2 min (100 ppm NaClO)
- Rinsed 1 min at 5ºC
- Drained
- Packed rigid plastic containers

Analysis

- Respiration rates & C_2H_4 emissions
- For each type of cut at ≠ Temp after each analysis day:
  - Sensorial analysis
  - Segment color
  - SSC
  - TA
  - pH
  - Fermentative Metabolites
  - Vit C
  - Total Phenolic compounds
  - Total Antioxidant Capacity

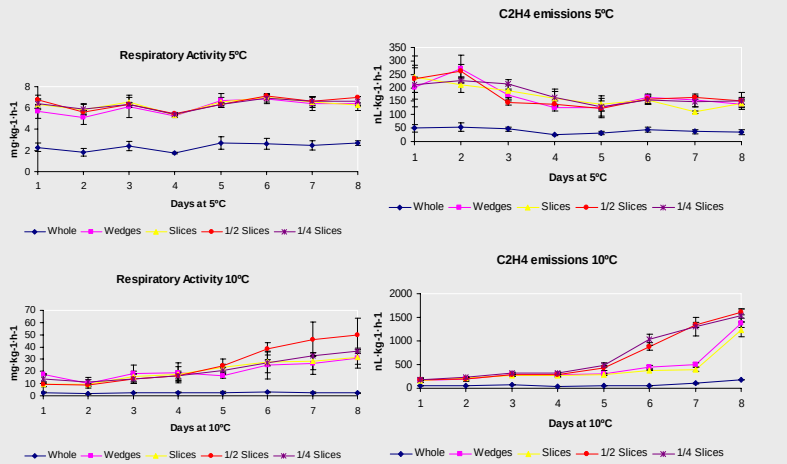
Cv. 'Eureka'

Postharvest Physiology



Cv. 'Eureka'

Postharvest Physiology

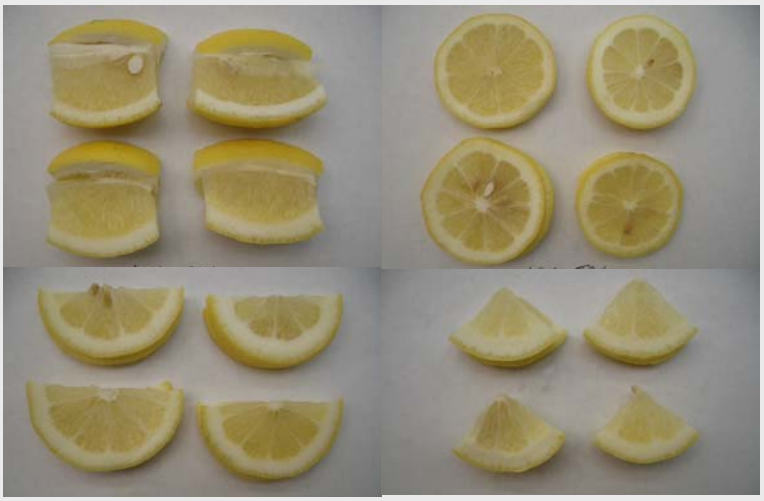


Cv. 'Eureka'
Sensorial Analysis: Overall Quality

Kind of cut	Temperature	After 4 days	After 7 days	After 10 days
Wedges	0ºC	5.0	4.5	4.0
Wedges	2ºC	5.0	4.0	3.5
Wedges	5ºC	5.0	4.5	3.0
Wedges	10ºC	5.0	3.5	2.5
Slices	0ºC	5.0	4.0	3.0
Slices	2ºC	4.0	3.5	3.0
Slices	5ºC	4.0	3.5	3.0
Slices	10ºC	4.0	3.5	1.0
1/2 Slices	0ºC	5.0	3.5	3.0
1/2 Slices	2ºC	5.0	3.5	3.0
1/2 Slices	5ºC	4.0	3.5	3.0
1/2 Slices	10ºC	4.0	3.0	2.0
1/4 slices	0ºC	5.0	3.0	2.5
1/4 slices	2ºC	4.0	3.5	2.5
1/4 slices	5ºC	4.0	3.5	2.5
1/4 slices	10ºC	4.0	3.0	1.5

Scale for Global quality
1: extremely poor; 2: poor; 3: acceptable as consumption limit; 4: good; 5: excellent

Cv. 'Eureka'
10 d @ 5°C



Cv. 'Lisbon'
Sensorial Analysis

Kind of cut	Temperature	After 4 days	After 7 days	After 10 days
Wedges	0ºC	5.0	4.0	3.0
Wedges	2ºC	4.5	4.0	3.0
Wedges	5ºC	4.5	3.0	3.0
Wedges	10ºC	4.0	3.5	2.0
Slices	0ºC	4.5	3.5	3.0
Slices	2ºC	3.5	3.5	3.0
Slices	5ºC	3.5	3.5	3.0
Slices	10ºC	4.0	3.0	1.0
1/2 Slices	0ºC	5.0	4.0	3.0
1/2 Slices	2ºC	4.0	4.0	3.0
1/2 Slices	5ºC	4.0	3.5	3.0
1/2 Slices	10ºC	4.0	3.0	1.0
1/4 slices	0ºC	4.5	3.0	2.5
1/4 slices	2ºC	4.0	3.0	2.0
1/4 slices	5ºC	4.0	3.5	2.0
1/4 slices	10ºC	4.0	3.0	1.0

Scale for Global quality
1: extremely poor; 2: poor; 3: acceptable as consumption limit; 4: good; 5: excellent

Cv. 'Lisbon'