



Melting & Non-melting Flesh Peaches: *Harvesting for Optimum Fruit Quality*

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Increasing Consumption of Specialty Crops by Enhancing their Quality & Safety

Goal of the Project:

Help producers remove postharvest handling impediments that keep consistently great tasting fruits and vegetables from being marketed



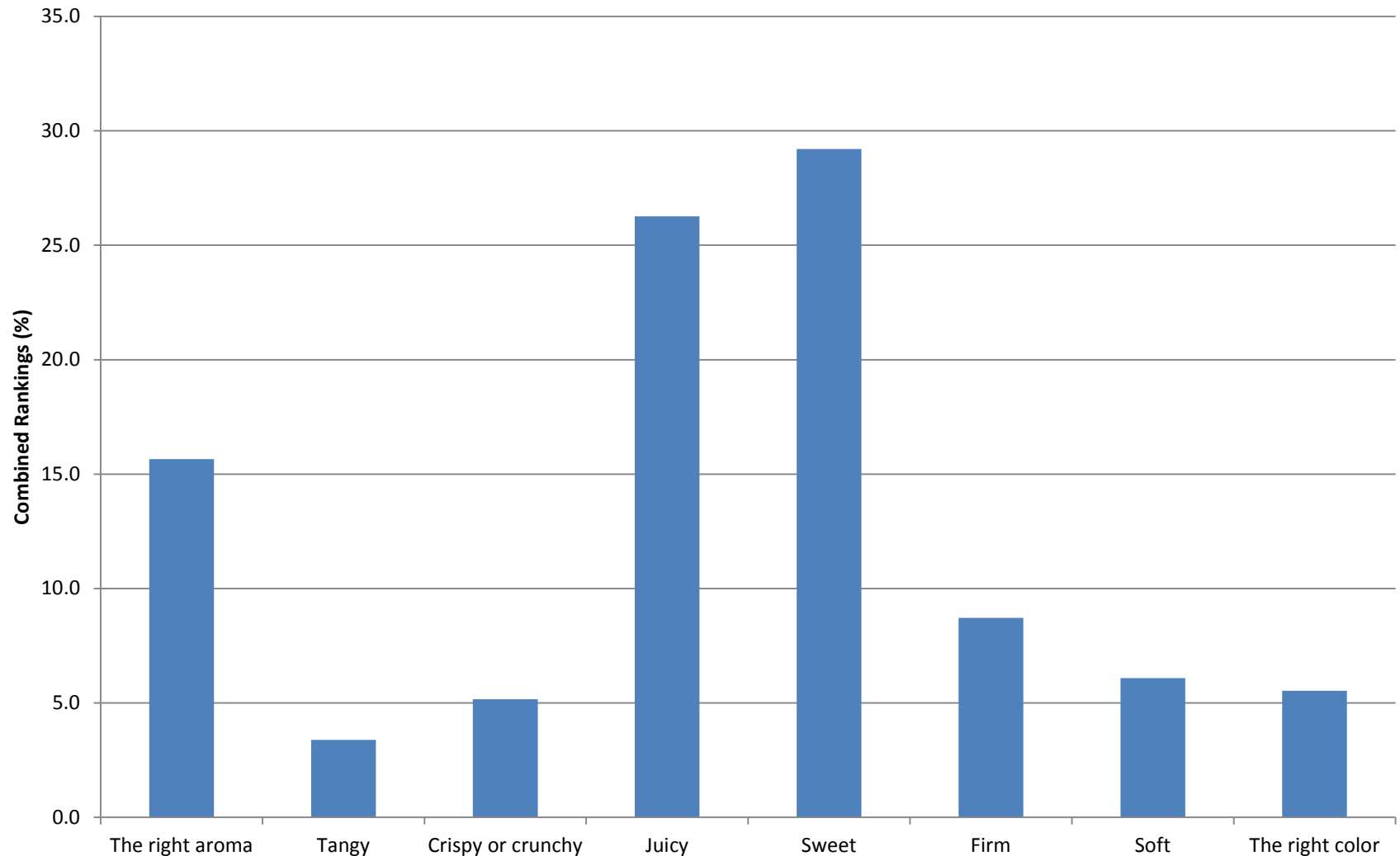
Consumer Behavior and Attitudes

- How does flavor, as affected by harvest and postharvest practices, influence consumer behavior and attitudes regarding fruit (peach) consumption?



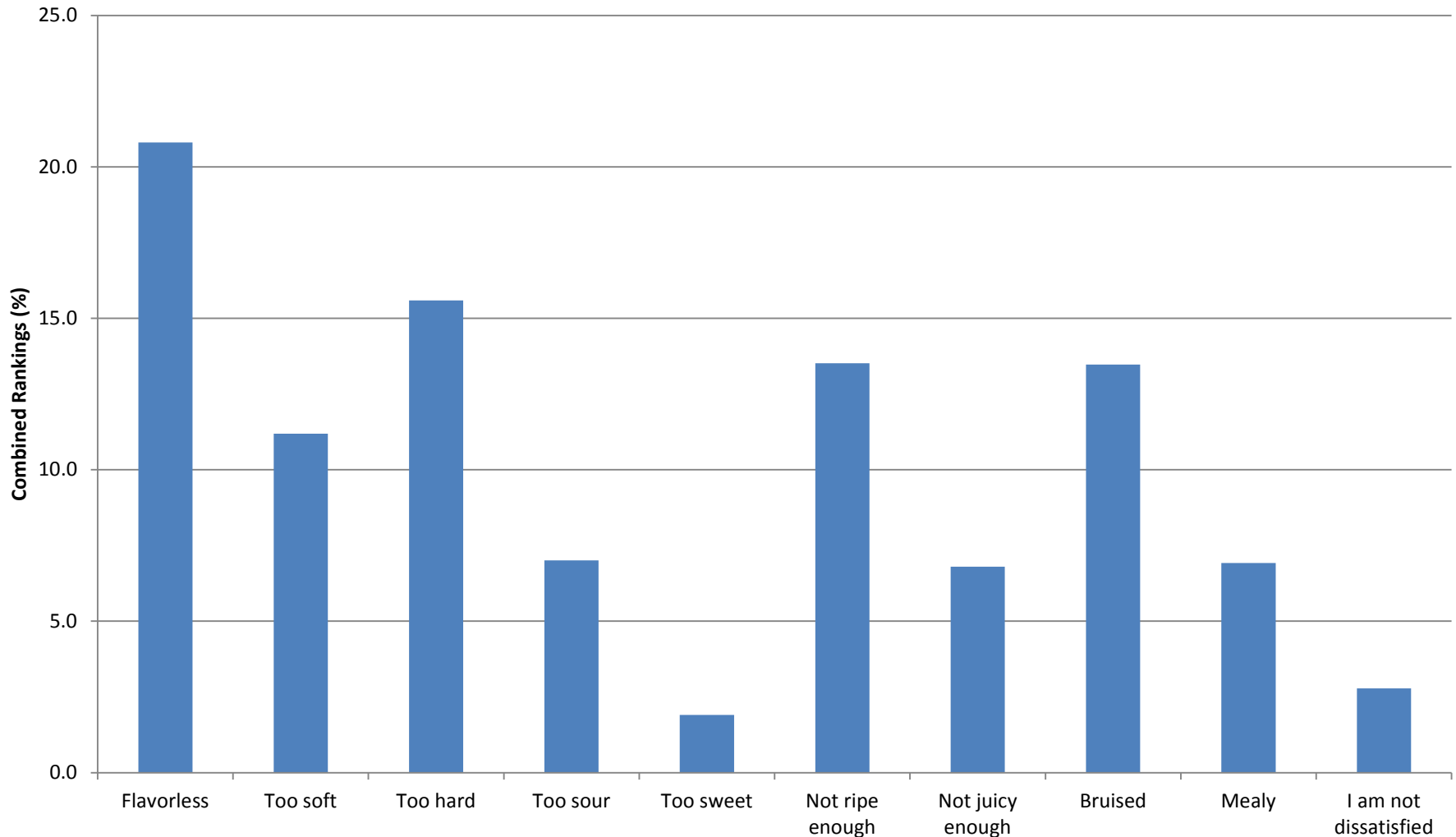
Consumers' three highest preferences for peach attributes.

Most Important Attributes in Peaches



Consumers' three most common reasons for dissatisfaction with peaches.

Reasons for Dissatisfaction with Peaches



Maturity

- Optimum harvest maturity corresponds to maximum taste and storage quality (adequate shelf life)



Maturity

- Harvest maturity determines a peach's postharvest potential:
 - **Too early** = poor flavor potential, and greater susceptibility to physiological disorders, abrasion injury, and water loss
 - ➡ The ability of the fruit to ripen properly can be compromised
 - ➡ More susceptible to chilling injury (internal breakdown)
 - **Too late** = greater susceptibility to bruising and decay; possible off-flavor

Maturity Indices

- **Size** (minimum diameter)
 - Peaches may begin ripening before they reach full size
- **Ground color** development (green to yellow)
- **Softening** first occurs at the blossom end
- **Location on tree**: top and outside fruit normally mature first
- Also, flesh color, **soluble solids content** (SSC, aka Brix), acidity, and SSC/acidity ratio all change



Best Maturity Indices for Harvesting

Ground color has been found to be the most reliable nondestructive maturity index and the most easily understood by pickers (Kao et al. 2012)

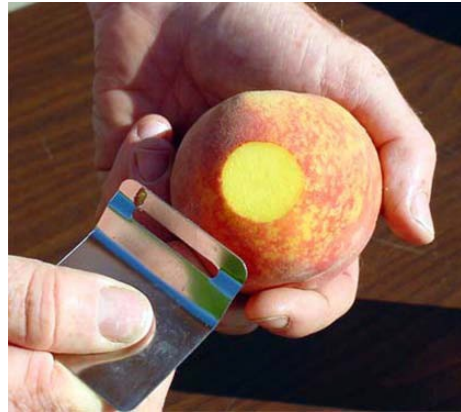
- the best ground color at harvest varies by variety and intended market, so workers should be shown examples before harvest commences



Best Maturity Indices for Harvesting

For varieties with 100% red color, fruit **firmness** is the next best maturity criteria (Brovelli et al., 1998)

- Firmness at harvest is very well correlated with consumer satisfaction after storage/shipping
- Of course, SSC must be acceptable



http://msue.anr.msu.edu/news/monitoring_peach_and_nectarine_ripening

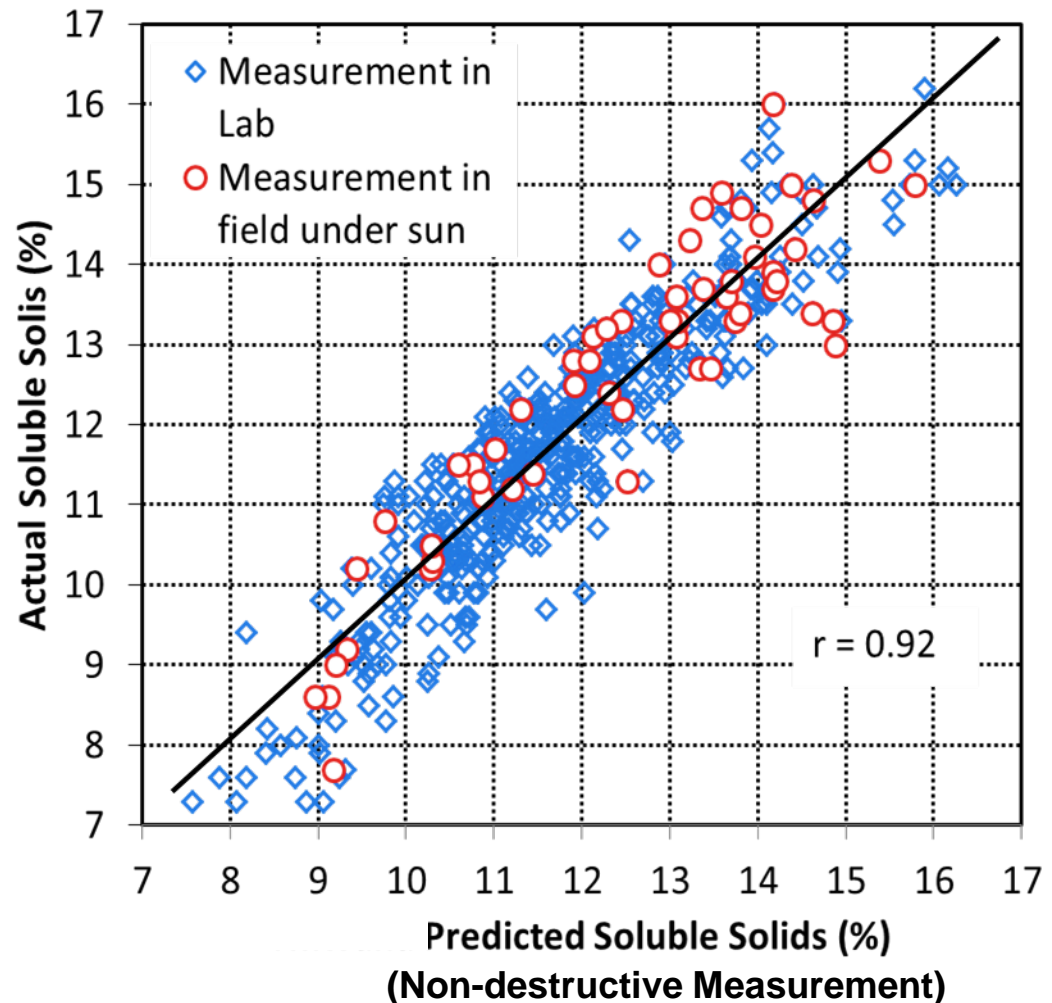
Example Handheld Instrument Results for Soluble Solids (°Brix)

Results for a local peach calibration done at UC Davis

Non-destructive measurement
on whole fruit.



Felix F-750
optical (near infrared)
instrument



The most significant harvest maturity indices for some Florida nonmelting flesh (NMF) and melting flesh (MF) peach varieties based on sensory evaluation of ripe fruit (Ernesto Brovelli Ph.D. dissertation research).

Oro A (NMF)	FL 90-20 (MF)	FL 86-28C (NMF)	TropicBeauty (MF)
Cheek firmness (-0.85**)	Ground color hue (-0.88**)	Blossom end firmness (-0.91**)	
Blossom end firmness (-0.82**)	Ground color Lightness (-0.88**)	Cheek hue (-0.90**)	Cheek firmness (-0.83**)
Cheek chroma (-0.82**)	Cheek firmness (-0.81**)	Cheek firmness (-0.90**)	Blossom end firmness (-0.79**)
SSC:TA (0.80**)	Blossom end firmness (-0.75**)	Blossom end hue (-0.87**)	Ground color hue (-0.70**)
TA (-0.77*)		Ethylene production (0.80*)	pH (0.65**)

* and ** indicate significance at the 5% and 1% levels, respectively.

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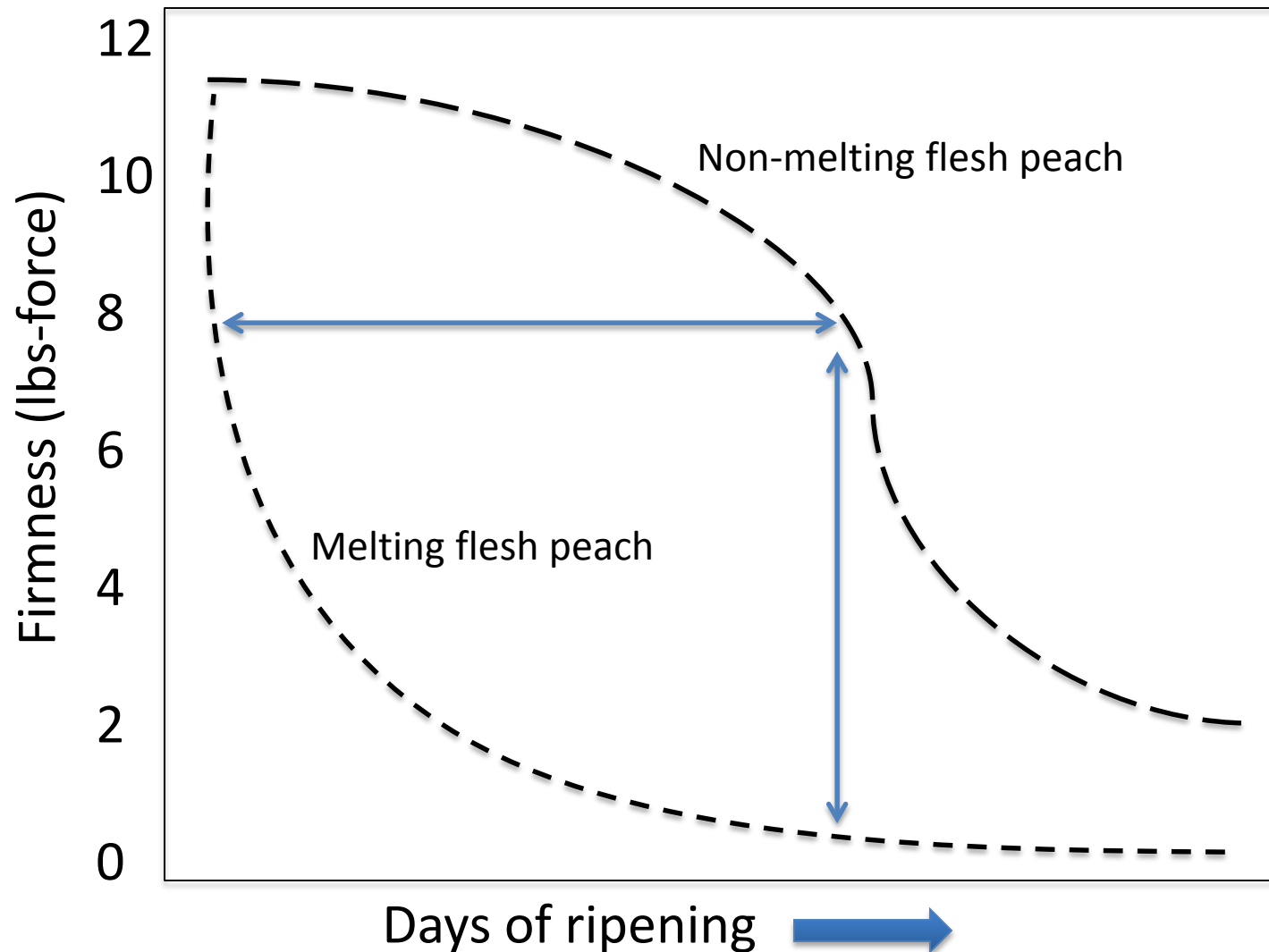
Melting Flesh vs Nonmelting Flesh

- **Melting flesh varieties** need to be harvested before ripening gets substantially underway because excessive softening limits their shelf life
- **Non-melting flesh varieties** can be harvested at a riper stage and still be firm enough to withstand handling
 - = higher SSC (Brix, sugar) and lower acidity
 - = better color and more peach flavor
 - = less susceptibility to internal breakdown (chilling injury)

Melting Flesh vs Nonmelting Flesh

- Let's say that 8 lbs is the minimum firmness/maximum maturity that can be run over your packingline or shipped without incurring bruising
 - ➡ *An 8-lb non-melting flesh peach is a much riper fruit than an 8-lb melting flesh peach*
- (Actual bruising thresholds actually vary substantially and therefore must be determined for each variety)

Melting Flesh and Nonmelting Flesh Peaches Have Different Softening Patterns



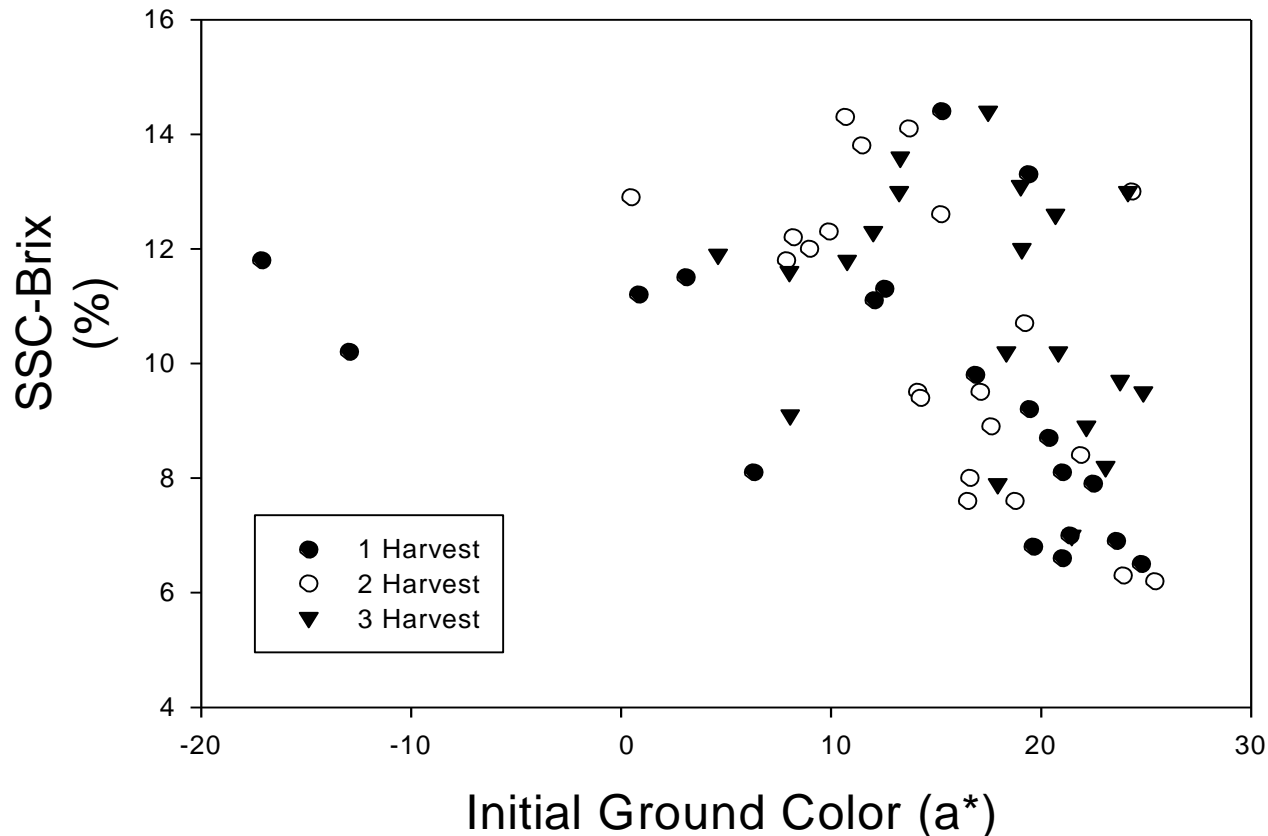
Quality Indices

- High SSC is the most important attribute for high consumer acceptance
- Fruit acidity, SSC:acidity ratio and phenolic content are also important for consumer acceptance
- Fruit below 6-8 pounds-force are more acceptable to consumers than firmer fruit

(from Crisosto, Mitcham & Kader, *"Nectarine & Peach: Recommendations for Maintaining Postharvest Quality"*
<http://postharvest.ucdavis.edu/PFfruits/NectarinePeach/>)

Unfortunately, ground color isn't well-correlated with Brix

'Gulfking' - Initial Ground Color vs SSC Determined after Ripening for 7 Days at 20C for 3 Harvests



Best Maturities for Direct Marketing *versus* Refrigerated Handling

(Sherry Kao Ph.D. dissertation research)

MF Cultivars



‘Flordaprince’



‘TropicBeauty’

NMF Cultivars



‘Gulfking’



‘UFSun’

- 100 Tagged marker fruit per variety were monitored in 2007 and 2008
- All fruit >2½ inch diameter were randomly harvested when 50%, 70%, and 90% of the marker fruit reached commercial harvest stage (based on ground color break)
- **Collect a population of peaches with a broad range of maturity stages**



Sorted into Maturity Groups by Ground Color



Storage Conditions

**7 days at 68°F
(ripening)**



**14 days at 32°F then
7 days at 68°F**



Potential Maturity Indices Measured

Non-Destructive:

- Ground color (a^*)
- Size (diameter or weight)



95%



20%

Peel blush can obscure
ground color

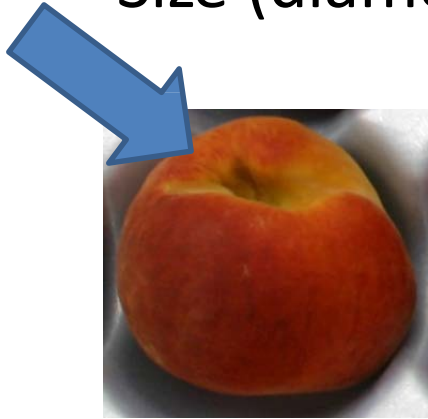
Destructive:

- Flesh firmness
- Soluble solids content (SSC)
- Titratable acidity (TA)
- SSC/TA ratio
- Total sugars
- Flesh color (a^*)

Potential Maturity Indices Measured

Non-Destructive

- Ground color
- Size (diameter)



95%

Peel blush c
ground



e:

ness

olids content

acidity (TA)

ar

or change (a^*)

rdner 1985; Crisosto 1994)

Optimum Harvest Maturities

Storage at 20°C for 7 days			
Cultivar	Year 2007	Year 2008	Common Mat
MF 'Flordaprince'	5 to 10	< 0 to 20	5 to 10
MF 'TropicBeauty'	0 to 10	5 to 20	5 to 10
NMF 'UFSun'	5 to 20+	15 to 35+	15 to 20
NMF 'Gulfking'	15 to 20+	10 to 25+	15 to 25

Storage at 0°C for 14 days + 20°C for 7 days			
Cultivar	Year 2007	Year 2008	Common Mat
MF 'Flordaprince'	-5 to 10	0 to 20	0 to 10
MF 'TropicBeauty'	0 to 10	< 0 to 20	0 to 10
NMF 'UFSun'	10 to 20+	5 to 15	10 to 15
NMF 'Gulfking'	0 to 15	<0 to 10	0 to 10

*(Numbers indicate ground color: negative numbers are green; positive numbers are more yellow)

Optimum Harvest Maturities

Storage at 20°C for 7 days			
Cultivar	Year 2007	Year 2008	Common Mat
MF 'Flordaprince'	5 to 10	< 0 to 20	5 to 10
MF 'TropicBeauty'	0 to 10	5 to 20	5 to 10
NMF 'UFSun'	NMF – can be harvested at more advanced stages		15 to 20
NMF 'Gulfking'			15 to 25

Storage at 0°C for 14 days + 20°C for 7 days			
Cultivar	Year 2007	Year 2008	Common Mat
MF 'Flordaprince'	-5 to 10	Low temp storage – must harvest at less advanced stages	0 to 10
MF 'TropicBeauty'	0 to 10		0 to 10
NMF 'UFSun'	10 to 15		10 to 15
NMF 'Gulfking'	0 to 15		0 to 10

*(Numbers indicate ground color: negative numbers are green; positive numbers are more yellow)

Peach Harvesting Practices

- Hand harvest (ladders)
 - maturity selection
 - avoidance of defective fruit
 - avoidance of injuries
- Picked into buckets or bags (usually collected into field bins unless tree ripe)
- Multiple pickings of fruit within a fairly narrow maturity range



Harvest Quality Control

- Train workers to recognize maturity criteria
- Incorporate some grading (avoidance/removal of defective fruit) into the harvest operation
 - difficult when pickers are paid by quantity picked
- Supervision is critical



Harvest Quality Control

- Train workers to minimize fruit injury
 - gentle fruit removal from the tree
 - no dropping fruit into buckets and bags
 - avoid overfilling buckets, bags and bins
 - avoid bumping picking bags against limbs and ladders, etc.
 - carefully transfer fruit into bins (pour, don't drop)
- Supervision is critical



Harvest Quality Control



Harvest Quality Control



Harvest Quality Control

- Equipment maintenance
 - **Harvesting buckets and bags:** regular cleaning; repair or replace sharp edges
 - **Field bins:** routed edges and smooth inside surfaces (plastic liners reduce vibration damage during transport to packinghouse)
- Sanitation & worker hygiene
 - No drops collected
 - No hands on ladder rungs (avoid soil transfer)

Additional Resources

- “*Southeastern Peach Growers Handbook*”
(<http://www.ent.uga.edu/peach/peachhbk/toc.htm>)
– contains chapters on “*Harvesting and Handling Peaches*” and “*Postharvest Decay*.”
- “*How to Determine Peach Ripeness*” – video by Dr. Desmond Layne, Clemson University
(<http://www.youtube.com/watch?v=I5aU7QqBBgw&feature=related>)

- The UF/IFAS Extension/Research Team is currently preparing a manual for Florida stone fruit:

***“Harvesting & Postharvest Handling of Stone Fruit
in Florida”***



Thank you for your attention

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