

Peach Flesh Types: Some Curiosities Uncovered

***2014 Mid-Atlantic Fruit and Vegetable
Convention***

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Peach Flesh Types

- Melting (cling or freestone)
- Slow melting (freestone, cling?)
- Non-melting (cling)
- Non-softening (cling)
- Stony hard (cling or freestone)
- Slow ripening (freestone, cling?)



What Makes These Flesh Types Differ?

- Several factors, and are genetically controlled
 - Ethylene production by the fruit
 - Breakdown of pectin by enzymes (particularly endopolygalacturonase)
 - Presence or absence of these factors and genes controlling these

So What! Does Any of this Amount to Anything to Peach Growers?

- The biggest issue is *if more mature fruit can be achieved* and still be able to get it to the customer
- Since consumer frustrations with peaches often are based on unripe fruit being harvested, resulting in low quality and mealiness etc., it appears that flesh types that can allow more mature fruit harvested can have potential

My Background and Experience

- The first years of my career in peach breeding were spent with non-melting flesh for processing peaches for baby food
- Melting flesh was only seen when it showed up in progenies (it is dominant, thus commonly seen if a parent is melting)
- And, the idea incorporating non-melting flesh in nectarines and white peaches was well underway in Arkansas when I came along in the 80s; but were all clings



New Flesh Types Show Up

- In the early 1980s, Dr Fred Hough from Rutgers Univ sent seeds from crosses to Arkansas
- These populations contributed new “genes” or flesh types
- But, it was not sure what these were, they were simply “different” from melting or non-melting flesh types

How Were These “Different”?

- One population produced offspring that were more firm than non-melting; non-softening flesh likely (and cling), of which ‘White Rock’ peach resulted in the early 2000s; 0 and 3 weeks storage shown here



How Were These “Different”?

- Another population produced offspring that were freestone, very firm and then softened when fully ripe; now termed “slow melting” – White County and White Diamond resulted- 3 weeks storage shown here
- Both populations had low acid progeny



And, In Place In the Program Were Lots
of Non-Melting and Some Melting
Bradley (NM) left)
Redhaven (M) right



For Years, Only **Phenotypic Evaluation** Was Done (a fancy word for me looking at and feeling these in the field)



- And, I had a hunch “something” was going on with these flesh types but did not know
 - What genes were involved
 - How these were inherited
 - How the genes “interacted” amongst themselves to produce these “differences”
 - Maturity influences had major influences in evaluations

So, What Did I “Do”?

- First, went on breeding and releasing varieties (Westbrook, Arrington, Bradley nectarines; White River, White Rock, White County, White Diamond, White Cloud peaches from 2000-2009) (I knew how to “do” this)
- Began to focus on postharvest storage evaluations more formally (I had to have someone learn how to “do” this; Paul Sandefur, MS student at the time)
- Looked to molecular evaluation cooperation (I didn’t know nuttin bout how to “do” this new technology)

RosBREED Came Along

- This project allowed one with little knowledge of molecular techniques to become involved
- Flesh type differentiation was a key trait of focus
- Leaders such as Dr Gasic at Clemson and Dr Peace at Washington State made progress possible



The Value of Molecular Methods

- Allows one to look “behind the curtain” to see what “genes” or alleles are present without the confusion of maturity and other factors
- In theory takes the guesswork out of determining what is present or not genetically
- Predicting performance of a seedling or selection more precisely for program efficiency – way-before the tree matures!

Curiosities Uncovered

- The major molecular focus has been on the endopolygalacturonase molecular marker
- This marker allows separation of various flesh types
- It is one of the hands to “grab the curtain” to throw it back to peek at what genes are “on stage”

Curiosities Uncovered

- Non-softening flesh presence:
 - Confirmed in the Arkansas program
 - Found in A-665 (right)
 - NOT found in its sister White Rock (left)
 - I thought they had the same flesh type



Curiosities Uncovered

- Non-softening flesh presence:
 - Surprisingly found in the new nectarines Amooore Sweet (left) and Bowden (right)
 - And one of their parents (A-663CN) has this gene (that is a surprise)



Curiosities Uncovered

- Non-softening flesh presence:
 - Found in Roygold processing peach
 - Where did THAT come from?
 - So, is non-softening involved with traditional processing peaches?

Curiosities Uncovered

- Non-melting flesh presence:
 - Confirmed in the Arkansas program (no breakthrough here)
 - Bradley nectarine confirmed non-melting



Curiosities Uncovered

- Alleles (components of genes) at the EndoPG locus include 'F', 'f', 'f1', 'f2'; therefore, F- results in freestone-MF, ff, ff1, and ff2 results in clingstone-MF, f1f1 and f1f2 results in clingstone-NMF, and f2f2 results in clingstone-NSF
- I HAVE A HUNCH (won't go so far as to say "a dream") that these and other alleles/genes at other loci interact to make the true flesh types expressed in the phenotypes

Curiosities Uncovered

- Further, I believe that “stirring the genetic pot” will result in further flesh combinations
- I believe we are seeing this in the Arkansas program in newer selections
- These combinations can provide a new generation or phase of flesh types for potential commercial use



Curiosity NOT Uncovered

- The EndoPG marker did not differentiate the melting and slow-melting flesh
- Another marker is being pursued to differentiate these, based on ethylene production of the fruits

So, An Academic Curiosity or Something More Important?

- I believe:
 - these flesh types can expand options for harvest maturity and product diversification, and can expand the genetic basis in flesh types in ongoing breeding programs
 - The molecular component can increase efficiency in breeding
- Progress, ***that makes a difference to the grower and consumer, can be achieved!***

New Peach Variety- Souvenirs



Souvenirs – released 2012

-yellow

-slow-melting

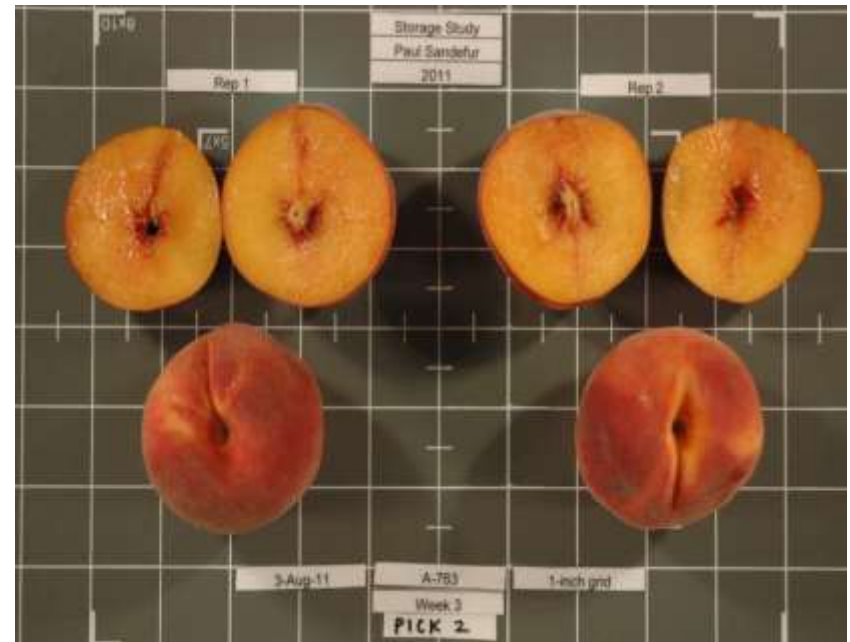
-low-acid

-high skin color

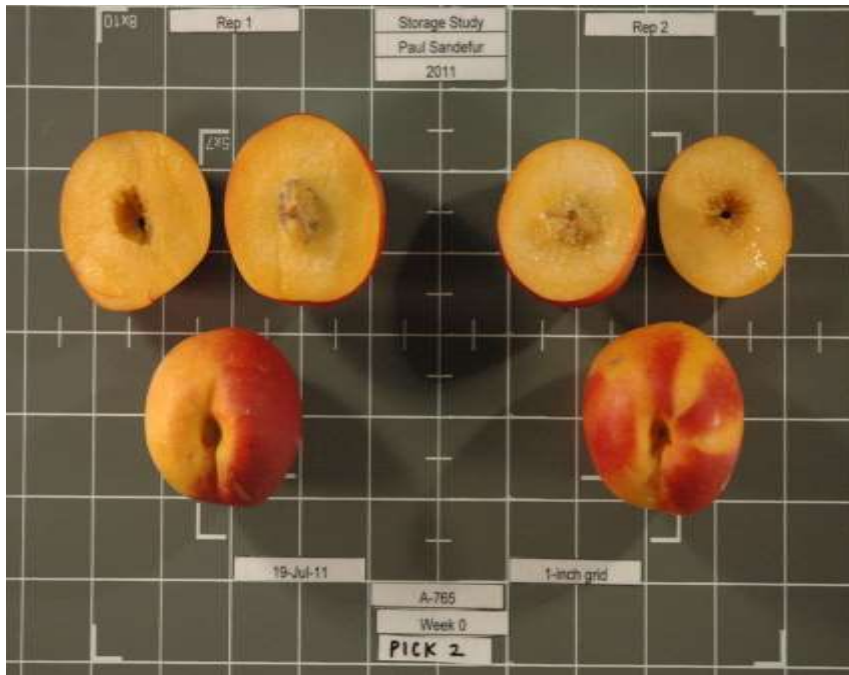
-freestone



Souvenirs Stored 0 (L) and 3 (R) Weeks



Amoore Sweet Stored 0 (L) and 3 (R) Weeks



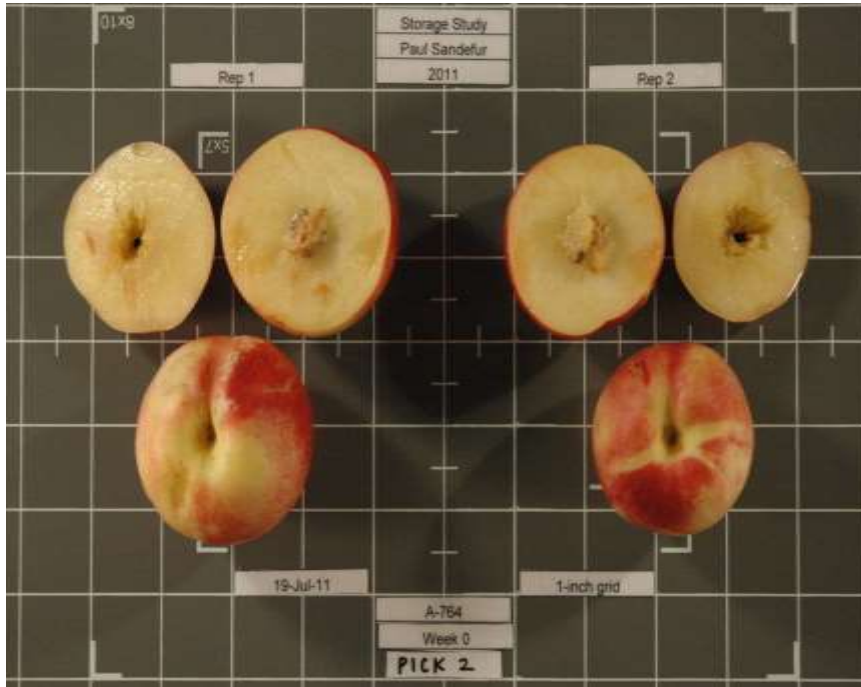
New Nectarine - Bowden



Bowden

- non-softening, cling
- white flesh
- standard acid, great flavor
- July 4
- bacterial spot resistance

Bowden Stored 0 (L) and 3 (R) Weeks



Peach Varieties - White



White Rock – Non-melting; June 25

White Cloud – Non-melting; July 5

White County – Slow-melting; July 15

White River – Melting; July 20

White Diamond – Slow-melting; August 1

Nectarine Varieties



Westbrook – Melting;
June 15

Arrington – Non-melting;
June 22

Bradley – Non-melting;
July 1

*Arkansas Fruit Breeding-Still More Good Things Coming! **For 50 Years!!!**
AND THANKS FOR YOUR TIME!*



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