Advances in Fresh Fruit Variety Development by the UF/CREC Citrus Improvement Team

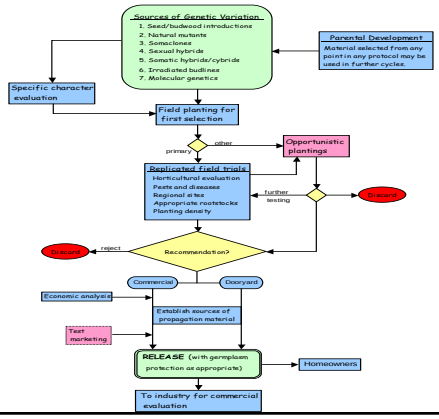
The Team:
Jude Grosser, Fred Gmitter and Bill Castle
University of Florida - IFAS
Citrus Research and Education Center

Gloria Moore
University of Florida – IFAS
Horticultural Sciences, Gainesville

UNIVERSITY OF FLORIDA IFAS

CREC

CREC Cultivar Development and Release: Scion Protocol



LB8-9: A New Mandarin Hybrid

LB8-9


Duncan grapefruit

Dancy tangerine


Clementine Mandarin


Minneola tangelo


LB8-9


LB8-9 mandarin hybrid is a mid-season maturing hybrid that combines medium fruit size, attractive orange color & good fruit flavor.

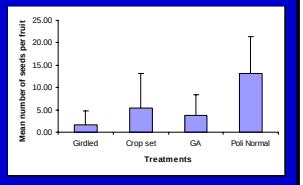
Tree characteristics:

- Shape : Obloid
- Growth habit : Drooping with dense branches
- Height : Over 6m if unpruned, vigorous.
- Scion : Smooth trunk surface
- Branches : At a medium angle.
- Spines : Absent
- Shoot tip : Green & slightly pubescent
- Vegetative cycle : Evergreen

	Yield data				
1	Girdled	# of fruits	Total seed #	Mean	SD
	Good	180	309	1.72	3.21
	Moderate	30	46	1.53	2.6
2	GA				
	Low	135	685	5.07	5.76
	Moderate	270	820	3.04	3.88
	Good	30	160	5.33	3.87
	Heavy	150	534	3.56	4.73
3	Crop set				
	Low	30	31	1.03	1.61
	Moderate	150	358	2.39	3.02
	Heavy	120	1231	10.26	9.93
4	Poli Normal				
	Low	30	449	14.97	8.76
	Moderate	150	1761	11.74	7.141
	Heavy	120	1714	14.28	9.13

Seed number in commercial block

Pollinator Normal : 11.74 seeds
Girdled : 1.5 seeds
GA3 : 3 seeds
"Crop Set" : 2.39 seeds



Post-harvest (PH) qualities:

When stored at 22 °C & 92-96% relative humidity for:

2 weeks : 35-37% decay (comparable to SB) > than MIN (16%)

Post-harvest pitting incidence : 0% in LB8-9, MIN & 3% in SB

Fruit peel color : hue: 60 in LB8-9 and SB and hue:65 in MIN

When stored at 4 °C & 92-96% relative humidity for:

6 weeks: No differences in peel color, chilling injury or decay among the 3 cultivars

Juice color : Best in SB (44) followed by LB8-9 with 40, & MIN with 38

Fruit taste after 50 days : Better score of acceptance for LB8-9 than MIN

Summary

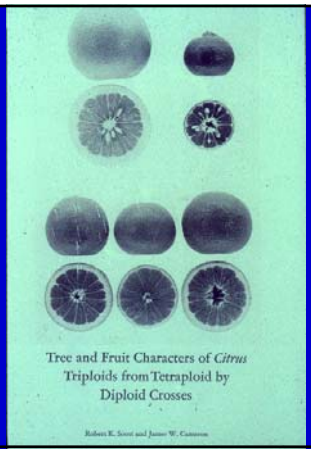
- LB8-9 fruit resemble Minneola tangelo
- Fruit mature 4 to 6 weeks before Minneola; this is a market advantage
- The color and flavor equals or exceeds Minneola
- Trees are very vigorous and will require horticultural manipulation to control size and cropping
- Fruit are seedy when cross pollinated, but can be much lower seeded in a solid block
- Foliage and fruit have much greater tolerance of Alternaria than Minneola, minimizing fungicide applications

PREPARING FOR RELEASE!

Fresh market sweet orange Valencia Somaclone N7-3

- seedless
- attractive large fruit with rounder shape
- peels easier than typical Valencia
- holds quality late in season

Valencia N7-3, for the Fresh Market



Interploid hybridization using tetraploid somatic hybrids as pollen parents to produce seedless triploids for mandarin improvement:

- **more than 8000 triploids produced to date,many fathered by somatic hybrids (under direction of FG Gmitter,CREC)**
- **oldest hybrids are now fruiting!!!!!**

Nova + Osceola
harvested December 6, 2005
brix= 14.8, acid=1.15, ratio= 12.9

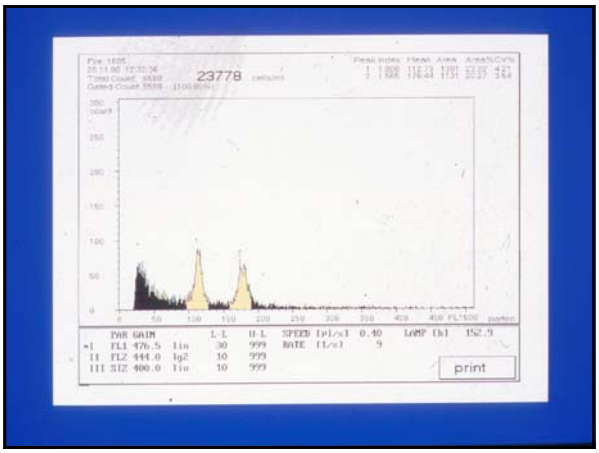
Rohde Red Valencia + Dancy
harvested January 28,2004
brix=11.4, acid=1.57, ratio= 7.26
3 seeds/fruit

Valencia + (Robinson x Temple)
harvested January 22,2004
brix=11.4, acid=0.57, ratio=20
3 seeds/fruit

Valencia + Murcott, fruits taken on Jan 15, 2003
(nearly seedless)

Potential juice fruit?

New triploid mandarin hybrids following embryo rescue and micro-grafting (F.G. Gmitter, Jr.)



TRIPLOIDS
THE FUTURE OF SEEDLESSNESS!

Crec-9505 triploid mandarin hybrid

- **> 8000 triploid mandarin hybrids**
- **Focus: seedless fresh market**
- **CREC 9505 – proof of concept – 0 seed!**
- **many beginning to fruit!**

Another triploid mandarin hybrid fruiting for the first time in 2005with 0 seed - again shows proof of concept!

CAN VARIETY IMPROVEMENT SOLVE THE GRAPEFRUIT/CANKER DILEMMA?

- **Pummelo hybrid – photo taken 10-25-05**
- **beautiful grapefruit sized fruit, early maturity with good flavor; testing for canker tolerance, and budwood irradiation in efforts to develop a seedless clone underway**
- **Hundreds of triploid grapefruit/pummelo hybrids produced to date, a few beginning to fruit!**
- **recent test shows resistance to citrus bacterial spot suggesting potential resistance to citrus canker!**
- **a great breeding parent**

Canker-resistant acid fruit development(lime/lemon types) (collaboration with J.H. Graham)

Citrus Canker Assay – Stomatal Inoculation Method
'Meiwa' kumquat B. 'Lakeland' limequat
C. Resistant triploid D. Susceptible 'Giant Key' lime

CYBRIDIZATION: transfer of cytoplasmic male sterility from Satsuma using a protoplast fusion technique – goal: Making seedy varieties SEEDLESS!

'Sunburst'
James Saunt, 1990. Citrus Varieties of the World

Somatic cybrid plant of Sunburst tangerine containing Guoqing Satsuma cytoplasm (mitochondrial genome).

Somatic Cybridization Results – Scion Improvement Fusions

Embryogenic Parent	Leaf Parent	Microcalli	Embryos	Plantlets	Ploidy
G1 Satsuma	Kinnow	x	x	x	2x,4x
G1 Satsuma	W-Murcott	x	x	x	4x
G1 Satsuma	Dancy	x	x	x	2x
G1 Satsuma	LB8-9	x	x	x	2x
G1 Satsuma	Sunbust	x	x	x	2x
G1 Satsuma	Murcott	x	x	x	2x
G1 Satsuma	Furr tangerine	x	x	x	2x,4x
G1 Satsuma	FG#303	x	x	x	2x
G1 Satsuma	FG#304	x	x	x	2x

Budwood Irradiation: shotgun method to generate seedless cultivars from high quality seedy cultivars
- numerous outstanding diploid hybrids in this program
- requires lots of field space

Low-seeded Murcott from budwood irradiation

Thanks to YOU!

- Industry Partners
- Collaborators
- IFAS Administration
- CREC Faculty and Staff
- FCPRAC – our primary funding source!

TAKE HOME MESSAGE:
THE BEST IS YET TO COME,
AND SOONER THAN YOU THINK!