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

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Sources of Genetic Variation
1. Seed/budwood introductions
2. Natural mutants
3. Somaclones
4. Sexual hybrids
5. Somatic hybrids/cybrids
6. Irradiated budlines
7. Molecular genetics

Parental Development Material selected from any point in any protocol may be used in further cycles.

Replicated field trials Horticultural evaluation Pests and diseases Regional sites Appropriate rootstocks Planting density

Opportunistic plantings

Economic analysis Establish sources of propagation material to industry for commercial evaluation

Test marketing Homeowners

RELEASE (with germplasm protection as appropriate)

Recommendation?

Dooryard Commercial

LB8-9: A New Mandarin Hybrid

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

Tree characteristics:
Shape: Oblate
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

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<tr>
<th>Yield data</th>
<th>Poll. Normal</th>
<th>Girdled</th>
<th>GA</th>
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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 (36%)
- Post-harvest pitting incidence: 0% in LB-9, MIN & 3% in SB
- Fruit peel color: hue: 60 in LB-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 LB-9 with 40, & MIN with 38
- Fruit taste after 50 days: Better score of acceptence for LB-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 2005 with 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!

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

Citrus Canker Assay – Stomatal Inoculation Method
A. ‘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’
Somatic cybrid plant of Sunburst tangerine containing Guoqing Satsuma cytoplasm (mitochondrial genome).

**Somatic Cybridization Results**

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<tr>
<th>Embryogenic Parent</th>
<th>Leaf Parent</th>
<th>Microcalli</th>
<th>Embryos</th>
<th>Plantlets</th>
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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

Thanks to YOU!
- Industry Partners
- Collaborators
- IFAS Administration
- CREC Faculty and Staff
- FCPRA - our primary funding source!

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