



What can Variety Improvement Do to Solve the Brix Crisis in Florida NFC? And, New Grapefruit Opportunities!

Jude Grosser & Fred Gmitter
Manjul Dutt
Welcome: John Chater!

UF/CREC Lake Alfred



New Sweet Oranges

BETTER ORANGES MAKE BETTER JUICE!

Improved Processing Sweet Oranges can significantly improve our NFC product! Better flavor and color makes the product more attractive in the store, and will certainly have purchasers coming back for more! This will facilitate marketing and build a larger consumer-base. **Current and future replanting should be only with varieties that put improved products into the marketplace!**



Left: juice from OLL-8:

Right: Florida NFC
purchased at Publix



OLL-8 vs Valencia

Table 1. Pilot Plant juice data from mid-February (current 2021 season) showing the higher soluble solids and juice color of OLL-8 juice on rough lemon (RL) and Carrizo (CZO) rootstocks, as compared to standard Valencia (4th consecutive year). Fruit was harvested from Ori Lee Family Groves in St. Cloud, FL. At 400 boxes/acre, at \$2.50/lb. solid this would translate to \$1,000/acre additional profit; and OLL trees also grow off faster than standard Valencia!

Sample ID	Wt. Sample	Wt. Juice	Lbs. Juice Per Box	% Acid	Total Brix	Ratio	Lbs. Solids Per Box	Juice Color
OLL-8/RL	20.88	12.54	54.052	1.03	12.99	12.61	7.02	38.4
VAL / RL	22.06	12.99	52.996	0.82	11.41	13.91	6.05	36.9
OLL-8/CZO	18.27	10.77	53.054	1.09	14.18	13.01	7.52	36.9
VAL/CZO	16.79	10.14	54.354	0.95	11.41	12.01	6.20	35.9

Fruit/Juice Displays, 4-5 per year; your chance to participate!



**February 2022 Juice/Fruit Display;
OLL-20 was the favorite; all juice was
extracted from fruit harvested from field
grown trees in Lake Alfred.**

UF Sweet Oranges –Accelerated Entry into PTP for CRDF Scion Trials

Early Vernia Clones (candidates to replace Hamlin)

- MB-26-10 early December maturity Vernia
- MB-25-12 early December maturity Vernia
- MB-26-14 early December maturity Vernia
- MB-25-2 early December maturity Vernia
- **MB-25-7 early December maturity Vernia (higher brix)**
- MB-25-9 early December maturity Vernia, best HLB tolerance

OLL Clones

- OLL-FB-7-35 early-January maturity, high soluble solids OLL
- OLL-FB-9-33 mid-January maturity, high soluble solids OLL
- OLL-FB-4-13 January maturity OLL
- OLL-FB-1-22 high brix, exceptional soluble solids
- OLL-5 highest cumulative yield in trial of original OLL somaclones

Valencia HLB-tolerant Mutants

- Sweet Orange UF RBA-21-36
- Sweet Orange UF RBA-SF



MB-25-7 at Lee Family Groves; no psyllid control



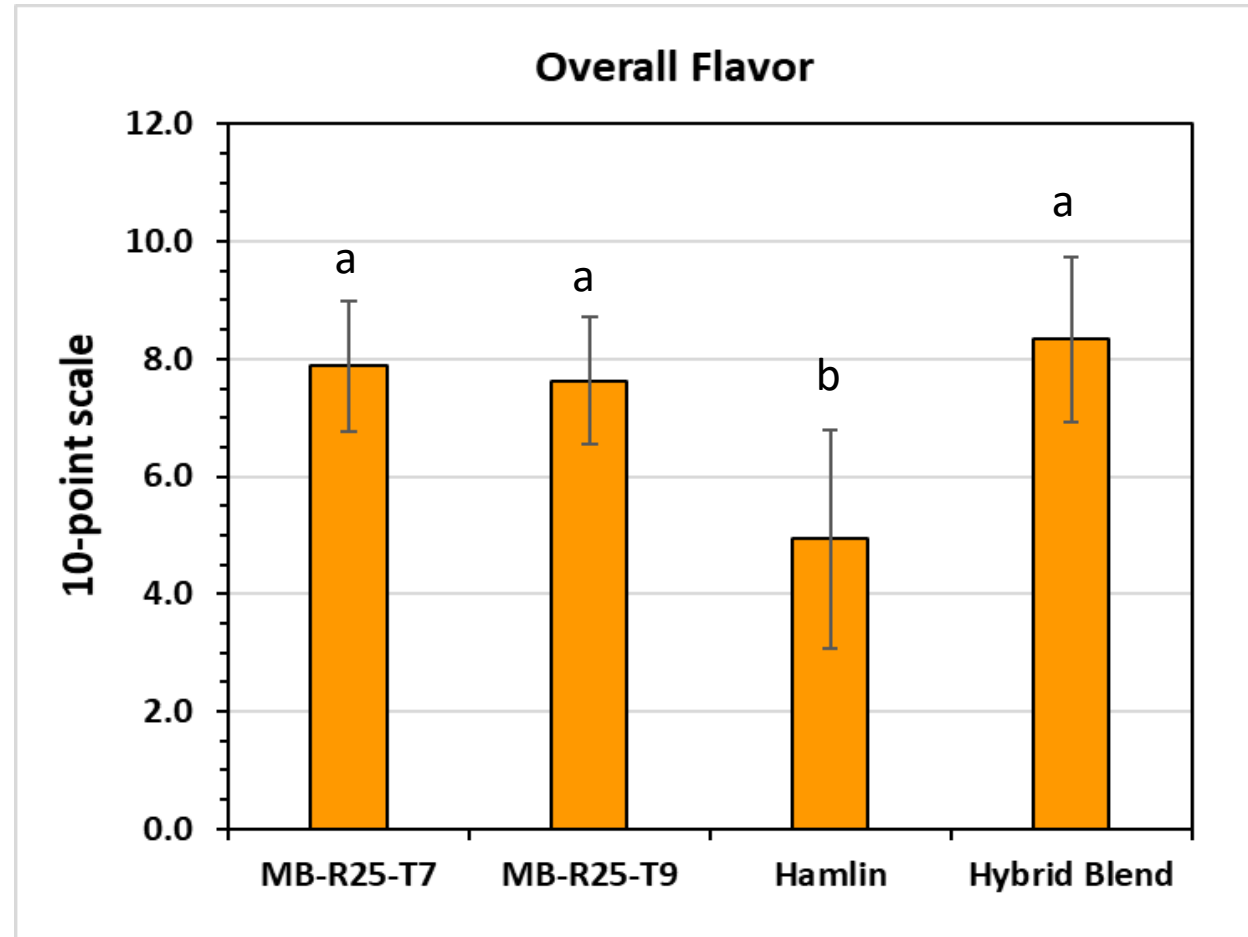
Cut fruit of
OLL-FB-7-35
(January, 2023)



New Vernia Somaclone-Derived Clone MB-R25-T9 selected for December maturity; showing strongest HLB tolerance among 10 early-maturing clones. Trees 9 years old, grown with no psyllid control.

12/16/2021 Fruit Display: Processed Oranges

Two new early-maturing Vernia clones and a blend out-perform Hamlin for flavor, soluble solids and color!



	Sample ID	No. Boxes	Wt. Sample Lbs.	Wt. Juice Lbs.	Lbs. Juice Per Box	% Acid	Total ° Brix	Ratio	Bin No.	Lbs. Solids Per Box	Juice Color
5	R4T4	1	16.81	10.35	55.413	0.93	13.03	14.01	38	7.2203	38.4
6	R4T5	1	20.32	12.21	54.080	0.71	12.03	16.94	41	6.5058	39.5
7	R4T6	1	15.78	9.70	55.323	0.69	12.52	18.14	33	6.9264	39.0
8	R4T7	1	16.38	9.65	53.022	0.65	10.62	16.34	29	5.6309	39.5
4	R4T12	1	16.02	9.79	55.000	0.88	10.79	12.26	37	5.9345	39.4
9	R5T2	1	18.11	10.71	53.225	0.94	11.97	12.73	49	6.3710	38.8
10	R5T3	1	16.92	10.39	55.266	1.13	12.86	11.38	43	7.1072	38.9
11	R5T33	1	17.94	10.44	52.375	0.85	12.40	14.59	45	6.4945	38.7
14	R6T8	1	17.59	10.75	55.003	0.85	12.14	14.28	47	6.6774	39.1
12	R6T11	1	9.77	5.87	54.074	0.94	11.18	11.89	24	6.0455	38.9
13	R6T32	1	7.15	4.64	58.406	1.06	12.16	11.47	18	7.1022	39.6
15	R7T26	1	16.47	10.11	55.246	0.74	9.11	12.31	36	5.0329	39.0
16	R7T29	1	16.45	9.77	53.453	0.66	11.07	16.77	33	5.9172	40.1
17	R7T35	1	12.92	7.50	52.245	0.60	11.19	18.65	28	5.8462	39.1
18	R9T10	1	18.36	11.03	54.069	1.06	12.27	11.58	60	6.6343	38.7
19	R9T15	1	16.14	9.84	54.870	0.79	11.56	14.63	35	6.3430	39.1
1	R10T19	1	16.03	9.39	52.720	0.85	11.92	14.02	40	6.2842	38.8
2	R10T24	1	15.95	9.37	52.871	0.95	12.14	12.78	43	6.4185	38.7
3	R10T30	1	17.55	10.72	54.974	0.85	11.73	13.80	40	6.4485	38.7

Mid-April harvest

**New OLL Somaclone-Derived Clones selected for higher brix;
Trees 8.5 years old, grown with no psyllid control.**



**New OLL Somaclone-Derived Clones selected for higher brix;
Trees 8.5 years old, grown with no psyllid control.**

Juice analyses Test results

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Customer: **Jude Grosser**

UF/IFAS CITRUS RESEARCH

700 EXPERIMENT STATION ROAD

**St. Cloude
Hamlin (100)**
TYPE FRUIT

**340
12/6/22**
DATE

	Sample ID	FRUIT DEALER OR LICENSEE	Load Identity	Variety	No. Boxes	Wt. Sample Lbs.	Wt. Juice Lbs.	Lbs. Juice Per Box	% Acid	Total °Brix	Ratio	Bin No.	Lbs. Solids Per Box	Lbs. Solids Per Box	Juice Color
6	N13-32 TP	9999 FDACS	340205	HAMLI	1	23.18	12.15	47.174	0.62	9.71	15.66	74	4.5806	30.5	4.58
7	N14-10 TP	9999 FDACS	340206	HAMLI	1	17.29	9.04	47.056	0.62	11.82	19.06	59	5.5620	31.8	5.56



Hamlin N13-32 reset

New Hamlin somaclone N14-10 showing increased brix and soluble solids (selected from 1000 clones evaluated).



Sweet Orange-like Hybrids



Good Hybrid Juice!

December color for blending

Several sweet orange-like hybrids have been selected for OJ improvement and entered into the PTP; some with better HLB tolerance

ie. 1859

3-3-52

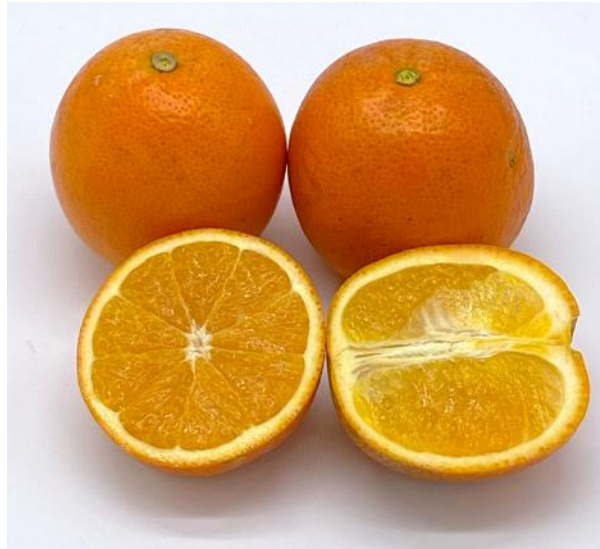
KE-6-3

C4-15-50

C7-11-7

UF 1859 Hybrid

- Original tree has good HLB tolerance
- High Brix, tropical flavor notes
- Attractive fruit for fresh market
- Juice processing characteristics TBD
- Included in MAC, topworking, and nursery trials
- **RELEASED!**



18 year old tree in 2021

Juice analyses Test results												
PAGE 1 OF 1 Customer: Jude Grosser												
UF/IFAS CITRUS 700 EXPERIMENT STATION ROAD										CREC Block		024
ADDRESS										Mandarin hyb (342)		1/24/22
										TYPE FRUIT		DATE
Sample ID	Variety	No. Boxes	Wt. Sample	Wt. Juice	Lbs. Juice Per Box	Acid	Total Brix	Ratio	Bin No.	Lbs. Solids Per Box	Juice Color	
1	C4-11-50	TEMPT	1	23.12	10.41	42.775	0.76	11.68	15.37	43	5.00	41.9
2	C7-11-7	TEMPT	1	22.60	14.26	59.942	0.92	13.87	15.08	54	8.31	39.3



Orange-like hybrid C7-11-7; productive, high solids, seedless hybrid with January maturity. Processing and fresh-fruit potential!



Other Hybrid Blending Candidates with Tasty Juice



Flavors of Florida Annual IFAS Event BHG Stadium Champions Club



We served 3 juices without identifying their contents:

- A. A 50/50 blend of pasteurized SugarBelle (fruit from young field trees) and a top brand of NFC purchased at Publix.
- B. A 10/90 legal blend of pasteurized SugarBelle (fruit from young field trees) and a top brand of NFC purchased at Publix.
- C. 100% of a top brand of NFC purchased at Publix.

We asked attendees tasting the juices to vote for their favorite; here are the results:

Juice A: 57 votes
Juice B: 16 votes
Juice C: 4 votes



OUT OF THE BOX OPPORTUNITIES!

We need to take advantage of our blending opportunities for NFC and beyond!

Juice analyses Test results

1 1

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Custo
mer: **Jude Grosser**

UF/IFAS CITRUS RESEARCH

700 EXPERIMENT STATION ROAD

ADDRESS

Block 4

Mandarin hyb (342)

TYPE FRUIT

013

1/13/22

DATE

	Sample ID	FRUIT DEALER OR LICENSEE	Load Identity	Variety	No. Boxes	Wt. Sample	Wt. Juice	Lbs. Juice Per Box	Acid	Total Brix	Ratio	Bin No.	Lbs. Solids Per Box	Lbs. Solids Per Box	Juice Color
1	C4-13-22	9999 FDACS	013101	TEMPT	1	17.02	8.46	47.221	0.74	13.32	18.00	39	6.2898	6.29	42.0
2	KE-9-15	9999 FDACS	013102	TEMPT	1	19.06	12.04	60.010	0.86	14.46	16.81	50	8.6774	8.68	43.4
3	C4-14-50	9999 FDACS	013103	TEMPT	1	22.04	10.56	45.517	0.76	14.39	18.93	60	6.5499	6.55	41.9



Blending candidate KE-9-15: Temple x [Page + (Clementine x Satsuma)]. Tree exceptionally tolerant of HLB, rich orange juice flavor!



New Grapefruit-like Hybrids

Released!



Grapefruit-like hybrid C2-5-3: a new and distinct early season fruit for the fresh market. Reaches 15 ratio late September. More tolerant of HLB than standard grapefruit and also canker tolerant!

Released!



Grapefruit-like hybrid C2-5-3: a new and distinct early season fruit for the fresh market. Original tree on Swingle, more than 15 years old!



New HLB-tolerant triploid grapefruit-like hybrids 1924 (left) and 1862 (right). Available for trials.

NB-19-17
Red grapefruit-like hybrid



Matures in November

NB-19-17: sibling of UF-914, matures in November, trees more canker tolerant and more robust against HLB than traditional grapefruit



New HLB-Tolerant Rootstocks that Encourage Early High Brix

Super Root Mutants



New OLL clone on 'Fast Eddy' (3.5 years old, no psyllid control), a super-root mutant of UFR-1: clone #28 discovered by Beth Lamb at the Phillip Rucks Nursery TC Lab

Sample ID	Scion/ rootstock	Wt. Sample Lbs.	Wt. Juice Lbs.	Lbs. Juice Per Box	% Acid	Total ° Brix	Ratio	Lbs. Solids Per Box	Juice Color
R1T9	OLL-DC-3-40/UF-1 CL.55 SUPER ROOTS	4.54	2.58	51.145	1.50	11.50	7.67	5.88	36.8
R1T11	OLL-3-IR 46x 20-04-42	11.07	6.41	52.114	1.31	10.26	7.83	5.35	36.2
R1T12	OLL-DC-3-36/ UF-1 CL.55 SUPER ROOTS	4.96	2.97	53.891	1.15	11.30	9.83	6.09	37.1
R1T13	OLL-DC-3-40/ UF-1 CL.28 Fast Eddy	2.99	1.57	47.258	1.25	10.40	8.32	4.92	35.5
R2T6	OLL-DC-3-40/ UF-1 CL.2 SUPER ROOTS-2	17.20	9.97	52.169	1.06	10.06	9.49	5.25	37.3
R2T14	OLL DC-3-40/ UF-1 CL.28 Fast Eddy	5.81	3.41	52.823	0.97	10.10	10.41	5.33	36.7
R2T15	OLL DC-3-36/ UF-1 CL.28 Fast Eddy	4.81	2.80	52.391	1.17	10.70	9.15	5.61	36.1
R2T16	OLL-DC-3-36/ UF-1 CL.55 SUPER ROOTS	12.40	7.35	53.347	1.38	11.92	8.64	6.36	36.3
R4T1	OLL-DC-3-36/ UF-1 CL.2 SUPER ROOTS-2	13.22	7.59	51.672	1.04	10.20	9.81	5.27	36.7
R7T28	OLL-DC-3-36/ UF-1 CL.2 SUPER ROOTS-2	18.28	10.55	51.942	1.24	10.72	8.65	5.57	36.3

High solids on 3.5 year-old resets, trees grown with no psyllid control. Improves scion/rootstock effect. UFR-1 clone#55 is a super-root mutant identified by Beth Lamb at the Rucks TC Lab. Note: this is January data for a March orange, so soluble solids and ratio would go up before harvest.



Possible Resistance via the rootstock?

Gauntlet rootstock S11x50-7-16-6

<u>CT Values</u>	<u>roots</u>	<u>leaves</u>
Year		
2021	34.9	30.1
2022	36.3	33.2

Micropropagation of this rootstock clone underway at Agromillora!



One-year old 'gauntlet' tree of HLB+ Valencia/S11x50-7 [(salt tolerant HBPummelo X Shekwasha) x trifoliolate orange 50-7)].

x639 mutant



1.5 year old Valencia on x639 planted HLB+ under DPI permit.
Putative deletion mutant of x639 (flow cytometry shows DNA missing).



Putative x639 deletion mutant tree rescued; grafted tree and 35+ rooted cuttings also produced.

2016



This week!



OLL-8 on UFR-4 at Tropicana Project. Continued good tree health with excellent fruit size (similar trees with OLL-8 on UFR-2)!

The Ticket For the Immediate Future

Improved Scion Genetics for HLB Tolerance

Plus

Improved Rootstock Genetics for HLB Tolerance

Plus

Improved Affordable Production Systems w/ Enhanced Root Nutrition

\$\$ Success \$\$

To the late HALL OF FAME CITRUS GROWER-RESEARCHER
And Outstanding Industry Collaborator Mr. Orie Lee

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Thank You!

