



Is Bigger Ultimately Better?

An update on large-scale rootstock evaluations on a ridge and flatwoods site

Ute Albrecht

Southwest Florida Research and Education Center,
Immokalee, FL



CRDF Project No. 18-029C

Evaluation of citrus rootstock response to HLB in
large-scale existing field trials





Objective

Investigate rootstock effects on the horticultural performance of Valencia and Hamlin trees grown on a typical Ridge and flatwoods site under HLB-endemic conditions



Trials

Planting date: October 2015

→ Drs. Bill Castle, Fred Gmitter, Jude Grosser

Collaborator: Lykes Bros.

Locations: Highlands County and Polk County
(near Fort Basinger and Lake Wales)

Scions: Valencia and Hamlin

Rootstocks: 30+ (UF, CA, Spain, few USDA)



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UF rootstocks

Rootstock name	Parentage	Origin
UFR-1	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
UFR-2	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
UFR-3	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
UFR-4	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
UFR-5	Nova+HBP x Succari+Arg. Trifol. Or.	Florida (UF)
UFR-6	Changsha + Trifol. Or. 50-7	Florida (UF)
UFR-17	Nova+HBPummelo x SO+Carrizo	Florida (UF)
6058 + 2071-02-2	SO+Rangpur x Cleopatra+Trifol. Or.	Florida (UF)
Amb + Benton	Amblycarpa + Benton citrange	Florida (UF)
Amb + Czo	Amblycarpa + Carrizo citrange	Florida (UF)
Changsha + Benton	Changsha + Benton citrange	Florida (UF)
Green 3	Nova+HBPummelo x SO+Carrizo	Florida (UF)
Green 7	Nova+HBPummelo x SO+Carrizo	Florida (UF)
Orange 13	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
Orange 14	Nova+HBP x Cleo+Arg. Trifol. Or.	Florida (UF)
Sorp + Sh-991	SO+Rangpur x Cleo+Trifol. Or.	Florida (UF)
Wgft + 50-7	White grapefruit + Trifol. Or. 50-7	Florida (UF)
White 1	Nova+HBP x Succari+Arg. Trifol. Or.	Florida (UF)
White 3	Nova+HBP x Succari+Arg. Trifol. Or.	Florida (UF)

Other rootstocks

Rootstock name	Parentage	Origin
C-146	Sunki Mandarin x Swingle Trifol. Or.	California (UCR)
C-22	Bitters Sunki x Swingle Trifol. Or.	California (UCR)
C-54	Carpenter Sunki x Swingle Trifol. Or.	California (UCR)
C-57	Furr Sunki x Swingle Trifol. Or.	California (UCR)
FA-5	Cleopatra x Trifol. Or.	Spain (IVIA)
FA-13	Cleopatra x Trifol. Or.	Spain (IVIA)
FA-31	Cleopatra x Trifol. Or.	Spain (IVIA)
FA-5155	King Mandarin x Trifol. Or.	Spain (IVIA)
FA-5128	King Mandarin x Trifol. Or.	Spain (IVIA)
FA-517	King Mandarin x Trifol. Or.	Spain (IVIA)
V-17	Volkamer lemon x Trifol. Or.	Spain (IVIA)
Swingle	Duncan Grapefruit x Trifol. Or.	Florida USDA
US-897	Cleopatra x Flying Dragon Trifol. Or.	Florida USDA
X-639	Cleopatra x Rubidoux Trifol. Or.	Developed in South Africa
B Sour	Sour orange	

UCR = University of California, Riverside

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IVIA = Instituto
Valenciano de
Investigaciones
Agrarias

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Lake Wales (Polk County)



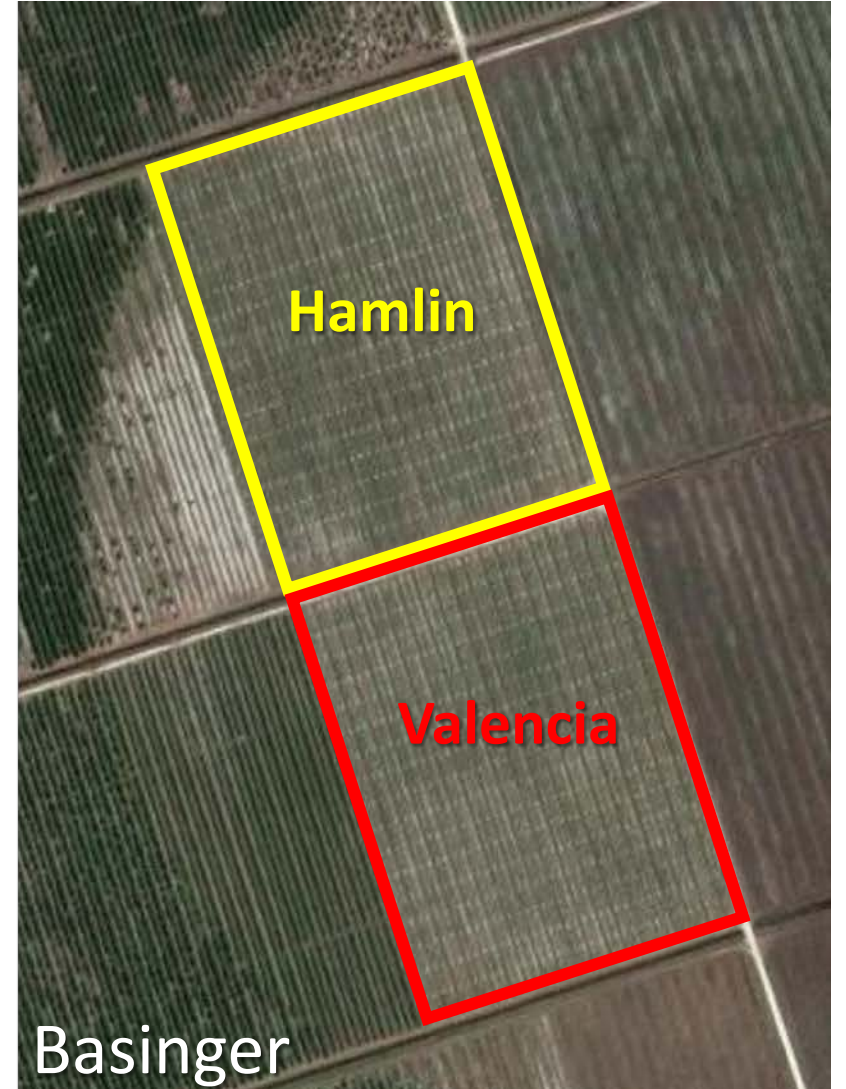
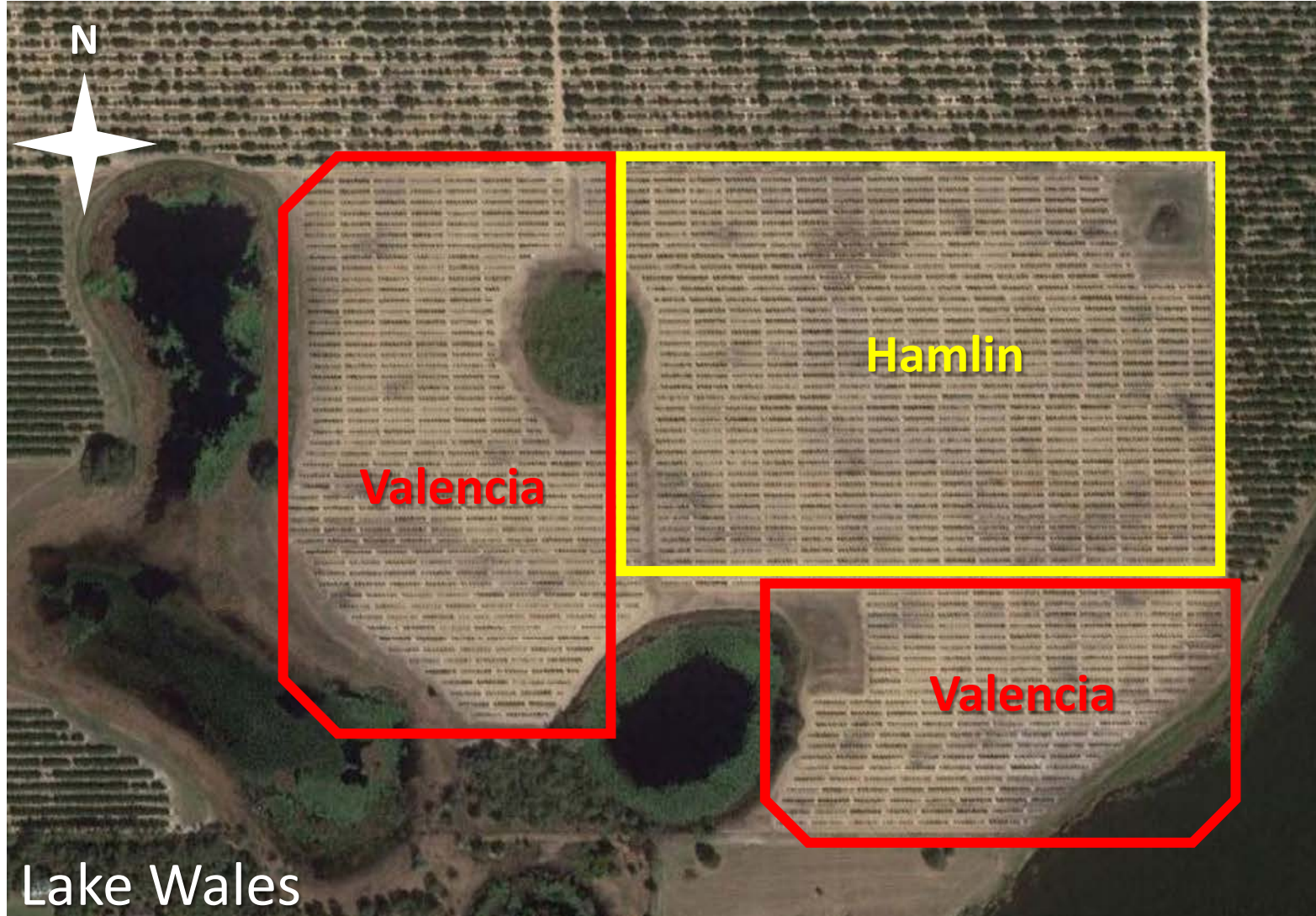
Ft. Basinger (Highlands County)



Experimental units



Aerial view





Data presentation

Heatmaps - a data visualization technique that shows the magnitude of a phenomenon as color in two dimensions (low and high).

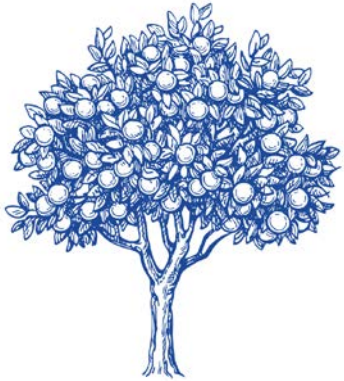


The variation in color is presented by hue and intensity, with the darkest blue representing the lowest value and the darkest red representing the highest value.



Valencia Data

Size 2020



	Lake Wales				Basinger		
	Height (ft)	Canopy spread (ft)	SRR		Height (ft)	Canopy spread (ft)	SRR
X-639	7.32	7.38	0.79		7.52	7.50	0.75
FA-5115	7.11	6.96	0.78		6.85	6.87	0.83
FA-31	5.97	6.53	0.75		6.78	7.29	0.78
C-54	5.94	6.52	0.80		6.70	7.09	0.85 ▲
FA-13	6.42	7.00	0.80		6.69	6.92	0.78
C-146	6.00	6.54	0.80		6.67	6.49	0.76
Swingle					6.62	6.77	0.64 ▼
White 1	5.85	5.95	0.73		6.58	6.75	0.73
B Sour	6.92	6.90	0.86		6.48	6.59	0.85 ▲
FA-5	6.23	6.27	0.77		6.41	6.41	0.79
FA-5128	6.17	6.69	0.80		6.38	6.54	0.81
US-897	6.25	6.98	0.75		6.27	7.05	0.75
UFR-5	5.48	5.57	0.79		6.22	6.36	0.79
C-57	5.61	6.20	0.83		6.12	6.25	0.82
V-17	5.60	6.05	0.80		5.93	6.29	0.78
Wgft+50-7	5.56	5.53	0.69		5.92	6.09	0.65 ▼
C-22	5.33	6.46	0.81		5.89	6.12	0.85 ▲
UFR-17	4.79	4.98	0.67		5.88	6.00	0.72
Green 7	4.99	5.55	0.72		5.82	5.57	0.70
UFR-4	5.89	6.11	0.82		5.80	6.28	0.83
FA-517	5.72	5.82	0.76		5.68	5.76	0.84
6058+2071-02-2	4.43	4.96	0.68		5.65	6.27	0.70
Amb+Czo	5.34	5.56	0.84		5.56	5.58	0.83
UFR-1	5.05	5.74	0.83		5.49	6.07	0.78
UFR-6	4.77	5.09	0.82		5.26	5.76	0.85 ▲
UFR-2	4.69	5.00	0.74		5.25	5.76	0.71
Orange 14	4.60	4.74	0.80		5.25	5.61	0.76
UFR-3					5.04	5.60	0.68
Amb+Benton	4.54	4.45	0.83		4.98	5.18	0.79
Green 3	4.26	4.89	0.73		4.96	5.23	0.65 ▼
Changsha+Benton	4.66	4.77	0.87		4.86	5.42	0.82
Sorp+Sh-991	4.60	4.76	0.73		4.84	5.12	0.70

SRR = scion to
rootstock trunk
diameter ratio

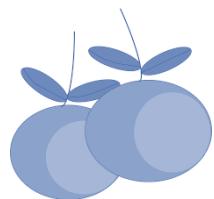
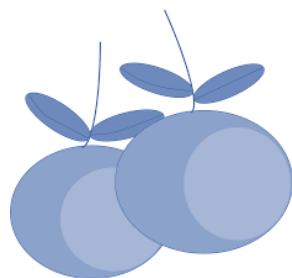
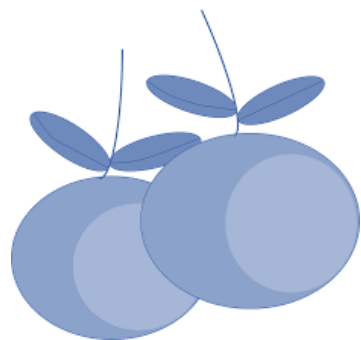
Sorp+Sh-991



X-639



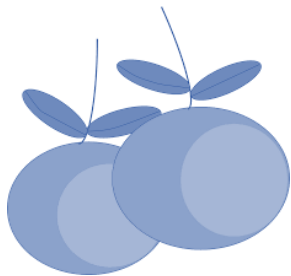
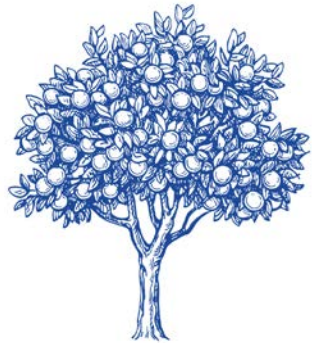
Yield



	Lake Wales				Basinger			Average cumulative
	2018/19 (lbs/tree)	2019/20 (lbs/tree)	Cumulative		2018/19 (lbs/tree)	2019/20 (lbs/tree)	Cumulative	
C-22	38.5	33.0	71.5		52.7	36.0	88.7	80.1
C-146	45.5	36.1	81.6		33.9	41.3	73.1	77.7
C-54	23.7	32.8	56.4		43.2	50.0	93.2	74.8
US-897	29.1	39.1	68.1		39.4	38.3	77.7	72.9
B Sour	28.3	36.1	64.4	LG	22.3	57.9	80.2	72.3
White 1	21.4	25.3	46.7		43.4	54.1	97.5	72.1
FA-5128	31.5	33.8	65.2	LG	27.9	47.7	75.6	70.4
FA-31	19.9	37.1	57.0	LG	26.3	57.4	83.8	70.4
V-17	38.9	31.7	70.6		25.6	42.0	67.6	69.1
FA-13	26.4	35.3	61.7	LG	26.6	46.8	73.4	67.6
FA-5A	23.7	32.3	56.1		34.2	39.9	74.1	65.1
C-57	29.6	29.7	59.3		38.2	32.4	70.7	65.0
FA-5115	26.0	35.6	61.6	LG	18.9	48.8	67.7	64.6
X-639	28.5	40.3	68.9	LG	11.9	47.3	59.2	64.1
Wgft+50-7	25.8	17.4	43.2		34.0	47.7	81.7	62.4
Amb+Czo	22.4	25.0	47.4		38.0	35.0	73.0	60.2
UFR-5	19.6	17.9	37.5		37.1	42.1	79.2	58.4
FA-517	35.2	17.7	52.8		40.0	20.6	60.6	56.7
UFR-17	17.2	17.6	34.8		39.0	39.3	78.2	56.5
UFR-1	18.6	16.5	35.1		35.4	42.5	77.9	56.5
6058+2071-02-2	21.3	23.7	44.9		31.5	39.5	72.4	55.9
Green 7	22.1	18.8	40.9		28.4	42.0	70.4	55.6
UFR-6	23.6	16.2	39.8		34.2	37.5	72.9	54.8
UFR-4	22.0	26.0	48.0		30.7	29.8	60.6	54.3
Changsha+Benton	23.5	15.3	38.8		40.4	28.3	68.6	53.7
Sorp+Sh-991	12.6	15.9	28.9		30.1	41.1	71.1	51.9
Green 3	17.8	15.4	33.2		23.3	41.4	64.8	49.0
Orange 14	15.4	16.7	32.1		27.4	34.3	61.7	46.9
Amb+Benton	14.5	10.5	25.0		27.1	32.0	59.1	42.1
UFR-2	19.0	18.3	37.3		16.0	29.7	45.7	41.5
UFR-3					28.2	32.2	60.4	
Swingle					33.2	45.5	78.6	

Fruit drop

Yield vs Size



	Lake Wales			Basinger	
	Height (ft)	2019/20 (lbs/tree)		Height (ft)	2019/20 (lbs/tree)
X-639	7.32	★ 40.3	B Sour	6.48	57.9
US-897	6.25	39.1	FA-31	6.78	57.4
FA-31	5.97	37.1	White 1	6.58	54.1
C-146	6.00	36.1	C-54	6.70	50.0
B Sour	6.92	36.1	FA-5115	6.85	48.8
FA-5115	7.11	35.6	Wgft+50-7	5.92	47.7
FA-13	6.42	35.3	FA-5128	6.38	47.7
FA-5128	6.17	33.8	X-639	7.52	47.3
C-22	5.33	33.0	FA-13	6.69	46.8
C-54	5.94	32.8	Swingle	6.62	45.5
FA-5	6.23	32.3	UFR-1	5.49	42.5
V-17	5.60	31.7	UFR-5	6.22	42.1
C-57	5.61	29.7	V-17	5.93	42.0
UFR-4	5.89	26.0	Green 7	5.82	42.0
White 1	5.85	25.3	Green 3	4.96	41.4
Amb+Czo	5.34	25.0	C-146	6.67	41.3
6058+2071-02-2	4.43	23.7	Sorp+Sh-991	4.84	41.1
Green 7	4.99	18.8	FA-5	6.41	39.9
UFR-2	4.69	18.3	6058+2071-02-2	5.65	39.5
UFR-5	5.48	17.9	UFR-17	5.88	39.3
FA-517	5.72	17.7	US-897	6.27	38.3
UFR-17	4.79	17.6	UFR-6	5.26	37.5
Wgft+50-7	5.56	★ 17.4	C-22	5.89	36.0
Orange 14	4.60	16.7	Amb+Czo	5.56	35.0
UFR-1	5.05	★ 16.5	Orange 14	5.25	34.3
UFR-6	4.77	16.2	C-57	6.12	32.4
Sorp+Sh-991	4.60	★ 15.9	UFR-3	5.04	32.2
Green 3	4.26	★ 15.4	Amb+Benton	4.98	32.0
Changsha+Benton	4.66	15.3	UFR-4	5.80	29.8
Amb+Benton	4.54	10.5	UFR-2	5.25	29.7
Swingle			Changsha+Benton	4.86	28.3
UFR-3			FA-517	5.68	20.6

High yield
efficiency

Low yield
efficiency



Yield efficiency

Low



High



Fruit quality 2020



	Lake Wales						Basinger				
	Fruit wt. (lbs)	Juice (%)	TSS(%)	Acid (%)	Ratio		Fruit wt. (lbs)	Juice (%)	TSS(%)	Acid (%)	Ratio
UFR-5	0.441	60.3	9.7	0.472	20.7		0.426	62.3	10.5	0.580	18.1
FA-517	0.473	59.7	9.6	0.315	33.1		0.531	62.4	10.4	0.567	18.7
Amb+Czo	0.471	56.9	9.2	0.380	24.2		0.495	61.1	10.2	0.568	18.0
Amb+Benton	0.493	55.8	8.9	0.402	22.3		0.543	62.0	10.1	0.560	18.2
Wgft+50-7	0.405	62.1	9.8	0.525	18.8		0.487	60.4	10.0	0.572	17.6
White 1	0.422	62.1	9.8	0.505	19.5		0.466	61.4	10.0	0.618	16.4
UFR-6	0.438	62.5	9.8	0.475	20.7		0.484	61.3	9.9	0.548	18.4
Sorp+Sh-991	0.420	59.9	9.7	0.437	22.4		0.499	62.9	9.9	0.548	18.4
Changsha+Benton	0.479	62.9	10.2	0.467	21.9		0.523	60.4	9.9	0.518	19.2
Swingle							0.473	64.0	9.8	0.566	17.3
UFR-1	0.455	59.0	9.0	0.473	19.5		0.496	61.4	9.7	0.583	16.8
Green 3	0.456	58.4	9.6	0.452	21.5		0.522	62.5	9.7	0.530	18.3
UFR-4	0.420	59.0	9.1	0.442	20.5		0.454	60.7	9.6	0.537	18.0
Green 7	0.450	60.2	9.8	0.450	21.8		0.484	61.1	9.4	0.503	18.8
UFR-3							0.519	61.5	9.4	0.563	16.7
UFR-17	0.427	59.9	9.5	0.463	20.7		0.483	61.6	9.3	0.532	17.7
FA-5115	0.477	52.9	8.5	0.402	21.4		0.489	59.9	9.3	0.495	18.9
B Sour	0.451	56.0	8.6	0.443	19.6		0.473	59.5	9.2	0.498	18.5
V-17	0.414	57.0	9.5	0.438	21.8		0.476	59.1	9.2	0.497	18.7
US-897	0.435	59.1	8.6	0.447	19.3		0.444	61.0	9.1	0.550	16.6
C-54	0.413	59.0	8.8	0.448	19.6		0.479	59.2	9.1	0.500	18.1
FA-5	0.468	53.8	8.3	0.397	21.1		0.475	61.2	9.0	0.478	18.9
FA-5128	0.476	47.7	7.7	0.235	32.8		0.499	59.0	9.0	0.528	17.3
Orange 14	0.442	56.9	9.0	0.413	21.7		0.531	58.7	8.9	0.488	18.3
6058+2071-02-2	0.422	60.0	9.5	0.443	21.4		0.474	58.4	8.9	0.503	17.8
C-22	0.488	58.7	8.7	0.402	21.8		0.466	60.4	8.9	0.535	16.8
C-146	0.454	58.6	8.5	0.417	20.6		0.464	57.9	8.9	0.508	17.5
C-57	0.447	56.7	8.8	0.438	20.6		0.498	59.0	8.8	0.470	18.8
FA-13	0.446	49.0	7.7	0.397	19.5		0.441	58.2	8.8	0.524	16.9
UFR-2	0.421	55.0	8.8	0.410	21.7		0.506	57.5	8.8	0.478	18.3
FA-31	0.462	42.1	7.6	0.368	21.1		0.493	55.0	8.5	0.487	17.7
X-639	0.449	50.1	8.1	0.397	20.5		0.472	57.5	8.5	0.527	16.1

Small tree-size
inducing rootstocks
usually produce
fruit with more
soluble solids than
large tree-size
inducing rootstocks



Hamlin Data

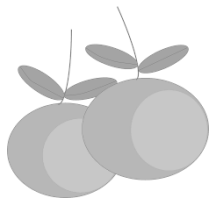
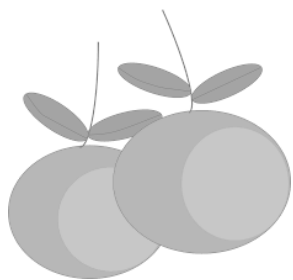
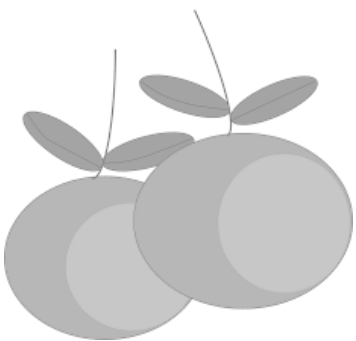
Size 2020



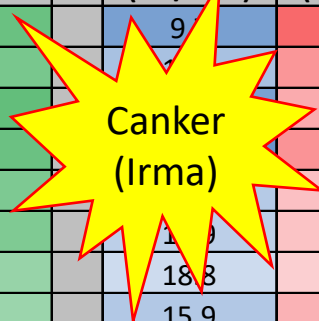
	Lake Wales				Basinger		
	Height (ft)	Canopy spread (ft)	SRR		Height (ft)	Canopy spread (ft)	SRR
C-146	7.31	7.07	0.77		7.55	7.16	0.75
X-639	7.58	7.86	0.75		7.53	7.16	0.77
C-54	7.50	7.45	0.81		7.52	7.55	0.79
C-57	7.63	7.53	0.79		7.49	6.95	0.80
FA-5	7.22	7.04	0.76		7.25	6.98	0.76
FA-31	6.85	7.05	0.76		7.15	6.84	0.75
C-22	6.62	6.84	0.82		7.04	7.03	0.84
UFR-4	6.16	6.59	0.83		7.02	6.99	0.80
Green 7	6.14	5.68	0.71		6.84	6.56	0.71
Orange 14	6.92	6.68	0.79		6.80	6.63	0.78
UFR-5	6.45	6.67	0.75		6.79	6.66	0.76
FA-5128	6.79	6.79	0.86		6.78	7.05	0.84
V-17	6.90	6.32	0.80		6.68	6.55	0.79
B Sour					6.62	6.36	0.86
FA-5115	7.08	6.33	0.83		6.61	6.16	0.86
FA-13	6.96	7.36	0.80		6.58	6.62	0.79
Wgft+50-7	6.08	5.48	0.69		6.58	6.10	0.63
UFR-17	6.19	6.28	0.73		6.45	6.15	0.70
US-897	6.50	6.79	0.78		6.41	6.65	0.75
Swingle	6.32	6.66	0.63		6.26	6.31	0.63
UFR-2	6.10	5.99	0.78		6.13	6.67	0.75
Sorp+Sh-991	4.67	4.92	0.72		5.96	5.72	0.71
FA-517	6.52	6.25	0.85		5.95	5.95	0.84
Amb+Czo	5.94	5.91	0.87		5.91	5.91	0.84
UFR-6	5.98	6.05	0.84		5.85	5.84	0.81
UFR-1	6.20	6.26	0.78		5.83	6.07	0.75
6058+2071-02-2	5.60	5.95	0.73		5.80	5.94	0.74
White 1	6.00	6.15	0.76		5.64	5.91	0.73
Orange 15	5.23	4.85	0.65		5.39	5.22	0.71
Amb+Benton	5.13	5.20	0.82		5.15	5.46	0.82
Changsha+Benton	4.61	4.77	0.88		4.98	5.43	0.83
Green 3	4.95	4.78	0.73		4.94	5.02	0.72

SRR = scion to
rootstock trunk
diameter ratio

Yield

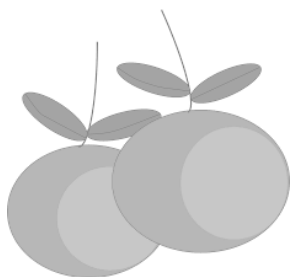


	Lake Wales				Basinger			Average cumulative
	2018/19 (lbs/tree)	2019/20 (lbs/tree)	Cumulative		2018/19 (lbs/tree)	2019/20 (lbs/tree)	Cumulative	
FA-5	39.7	35.9	75.6		9	44.6	54.3	64.9
UFR-5	44.6	25.9	70.5			38.4	53.1	61.8
C-54	38.0	40.3	78.2			35.3	45.1	61.7
X-639	31.7	43.9	75.6			38.7	46.8	61.2
C-57	29.6	39.0	68.7			32.4	48.6	58.6
FA-517	37.7	30.2	67.9			32.0	49.0	58.4
US-897	29.9	29.2	59.1		18.8	30.4	49.2	54.1
Swingle	30.7	26.7	57.4		15.9	34.3	50.2	53.8
V-17	22.7	37.8	60.4		9.9	36.8	46.7	53.5
FA-5128	25.1	26.2	51.2		11.2	41.6	52.8	52.1
FA-5115	31.8	27.3	59.1		6.2	37.8	44.0	51.5
Green 7	23.2	19.9	43.1		16.0	43.2	59.2	51.1
C-22	29.1	30.2	59.3		13.1	29.3	42.5	50.9
Orange 14	26.3	29.0	55.4		16.7	29.0	45.7	50.5
FA-31	26.0	23.0	49.0		8.8	41.3	50.0	49.5
Amb+Czo	27.6	16.8	44.5		13.3	40.0	53.4	48.9
6058+2071-02-2	20.5	22.6	43.2		13.8	40.4	54.3	48.7
UFR-4	25.9	21.1	46.9		10.8	38.4	49.3	48.1
C-146	29.7	30.4	60.2		10.8	25.1	35.9	48.0
White 1	23.7	24.8	48.5		11.0	33.4	44.4	46.5
UFR-1	20.4	21.2	41.6		10.6	36.0	46.6	44.1
Wgft+50-7	13.3	20.9	34.1		13.4	40.1	53.5	43.8
UFR-17	24.0	18.5	42.4		9.9	34.3	44.3	43.4
UFR-6	22.3	15.7	38.0		14.9	30.4	45.3	41.7
UFR-2	16.8	16.1	32.9		13.8	36.1	49.9	41.4
FA-13	24.5	23.8	48.4		8.6	24.7	33.3	40.8
Green 3	18.2	19.9	38.1		9.2	27.8	36.9	37.5
Amb+Benton	14.9	16.1	31.0		12.0	25.8	37.8	34.4
Changsha+Benton	19.8	10.1	29.9		14.3	23.2	37.5	33.7
Sorp+Sh-991	10.2	10.8	21.0		9.5	31.8	41.3	31.2
Orange 15	13.7	12.5	26.1		10.7	21.1	31.8	29.0
B Sour					16.3	29.2	45.8	



Fruit drop

Yield vs Size



	Lake Wales			Basinger	
	Height (ft)	2019/20 (lbs/tree)		Height (ft)	2019/20 (lbs/tree)
X-639	7.58	43.9	FA-5	7.25	44.6
C-54	7.50	40.3	Green 7	6.84	43.2
C-57	7.63	39.0	FA-5128	6.78	41.6
V-17	6.90	37.8	FA-31	7.15	41.3
FA-5	7.22	35.9	6058+2071-02-2	5.80	40.4
C-146	7.31	30.4	Wgft+50-7	6.58	40.1
FA-517	6.52	30.2	Amb+Czo	5.91	40.0
C-22	6.62	30.2	X-639	7.53	38.7
US-897	6.50	29.2	UFR-4	7.02	38.4
Orange 14	6.92	29.0	UFR-5	6.79	38.4
FA-5115	7.08	27.3	FA-5115	6.61	37.8
Swingle	6.32	26.7	V-17	6.68	36.8
FA-5128	6.79	26.2	UFR-2	6.13	36.1
UFR-5	6.45	25.9	UFR-1	5.83	36.0
White 1	6.00	24.8	C-54	7.52	35.3
FA-13	6.96	23.8	UFR-17	6.45	34.3
FA-31	6.85	23.0	Swingle	6.26	34.3
6058+2071-02-2	5.60	22.6	White 1	5.64	33.4
UFR-1	6.20	21.2	C-57	7.49	32.4
UFR-4	6.16	21.1	FA-517	5.95	32.0
Wgft+50-7	6.08	20.9	Sorp+Sh-991	5.96	31.8
Green 7	6.14	19.9	UFR-6	5.85	30.4
Green 3	4.95	19.9	US-897	6.41	30.4
UFR-17	6.19	18.5	C-22	7.04	29.3
Amb+Czo	5.94	16.8	B Sour	6.62	29.2
Amb+Benton	5.13	16.1	Orange 14	6.80	29.0
UFR-2	6.10	16.1	Green 3	4.94	27.8
UFR-6	5.98	15.7	Amb+Benton	5.15	25.8
Orange 15	5.23	12.5	C-146	7.55	25.1
Sorp+Sh-991	4.67	10.8	FA-13	6.58	24.7
Changsha+Benton	4.61	10.1	Changsha+Benton	4.98	23.2
B Sour			Orange 15	5.39	21.1

High yield
efficiency

Low yield
efficiency

Fruit quality 2020



	Lake Wales						Basinger				
	Fruit wt. (lbs)	Juice (%)	TSS(%)	Acid (%)	Ratio		Fruit wt. (lbs)	Juice (%)	TSS(%)	Acid (%)	Ratio
Green 3	0.346	55.0	9.5	0.510	18.6		0.383	57.2	9.8	0.565	17.4
White 1	0.341	57.2	9.6	0.507	18.9		0.356	56.6	9.5	0.547	17.5
B Sour							0.336	56.5	9.4	0.518	18.2
Changsha+Benton	0.356	57.9	9.6	0.522	18.6		0.372	57.4	9.3	0.558	16.7
Wgft+50-7	0.351	57.9	9.5	0.537	17.6		0.376	58.1	9.3	0.562	16.6
UFR-6	0.350	56.6	9.4	0.508	18.5		0.363	57.6	9.3	0.563	16.5
Amb+Benton	0.370	57.2	9.4	0.497	19.0		0.368	57.0	9.2	0.547	16.9
UFR-1	0.327	57.4	9.5	0.515	18.4		0.349	57.1	9.2	0.543	16.9
Amb+Czo	0.328	57.8	9.6	0.505	19.1		0.361	57.1	9.1	0.548	16.7
Sorp+Sh-991	0.329	55.8	9.4	0.503	18.8		0.347	55.2	9.1	0.515	17.7
FA-517	0.344	54.9	9.0	0.322	28.4		0.354	59.1	9.1	0.52	17.5
Swingle	0.330	58.3	9.2	0.526	17.4		0.328	57.2	9.1	0.522	17.3
UFR-5	0.338	57.2	9.8	0.557	17.7		0.345	57.1	8.9	0.542	16.5
Orange 15	0.337	53.8	9.3	0.498	18.8		0.362	55.0	8.8	0.518	17.0
6058+2071-02-2	0.355	53.2	8.8	0.502	17.5		0.366	53.4	8.7	0.507	17.3
US-897	0.326	58.0	9.1	0.458	19.8		0.319	57.8	8.7	0.487	18.0
FA-5115	0.333	54.2	9.3	0.477	19.5		0.355	52.8	8.7	0.473	18.4
Green 7	0.345	54.9	9.2	0.510	18.0		0.361	51.2	8.6	0.492	17.4
UFR-2	0.345	55.2	8.9	0.478	18.6		0.348	55.0	8.5	0.487	17.6
UFR-17	0.354	54.3	9.4	0.493	19.0		0.373	53.7	8.5	0.515	16.5
FA-5	0.348	52.8	8.7	0.447	19.4		0.337	53.8	8.4	0.465	18.1
C-54	0.328	55.7	8.8	0.460	19.3		0.322	52.4	8.4	0.458	18.3
UFR-4	0.334	55.4	9.1	0.445	20.4		0.360	53.4	8.3	0.487	17.2
C-57	0.349	52.7	8.6	0.432	20.0		0.324	51.5	8.3	0.462	18.0
FA-31	0.332	50.0	8.4	0.448	18.8		0.340	50.7	8.3	0.458	18.1
V-17	0.344	49.9	8.8	0.408	21.5		0.316	48.6	8.3	0.457	18.2
FA-5128	0.350	53.6	8.5	0.348	24.6		0.369	51.7	8.3	0.463	17.9
Orange 14	0.345	55.9	9.1	0.500	18.2		0.367	51.6	8.2	0.503	16.2
X-639	0.342	54.0	8.7	0.452	19.2		0.321	52.8	8.2	0.475	17.2
FA-13	0.323	53.3	8.4	0.438	19.2		0.308	51.5	8.1	0.443	18.3
C-146	0.351	53.6	8.7	0.438	20.0		0.329	51.7	8.1	0.49	16.6
C-22	0.339	53.1	9.0	0.432	20.8		0.317	50.5	8.0	0.465	17.3



Take Home Message

- ❖ Tree size can be considerably influenced by rootstock.
- ❖ 2018-19: The largest, best looking trees were not necessarily the most productive trees.
- ❖ 2019-20: The largest, best looking trees were often the most productive trees.



Take Home Message

- ❖ 2018-19: Several of the small tree size inducing rootstocks were very productive and yield efficient.
- ❖ 2019-20: Few of the small tree size inducing rootstocks could compete in productivity with the larger tree size inducing rootstocks.



Take Home Message

- ❖ Rootstocks that induce small yield-efficient trees can be planted at higher-density and may be profitable during the early production years.
- ❖ But - growth and productivity may change as trees mature. *Long-term evaluation of rootstocks is necessary to assess economic benefits.*



Take Home Message

- ❖ For some rootstocks, effects on tree size and yield varied between the two locations.
- ❖ For some rootstocks, effects on tree size and yield varied between the two scion cultivars.



Take Home Message

- ❖ Many factors need to be considered when choosing the right rootstock.
- ❖ Choosing the right rootstocks will result in higher profit at no additional cost.





Awesome!



Awesome



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Questions?

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