



Owari Satsuma





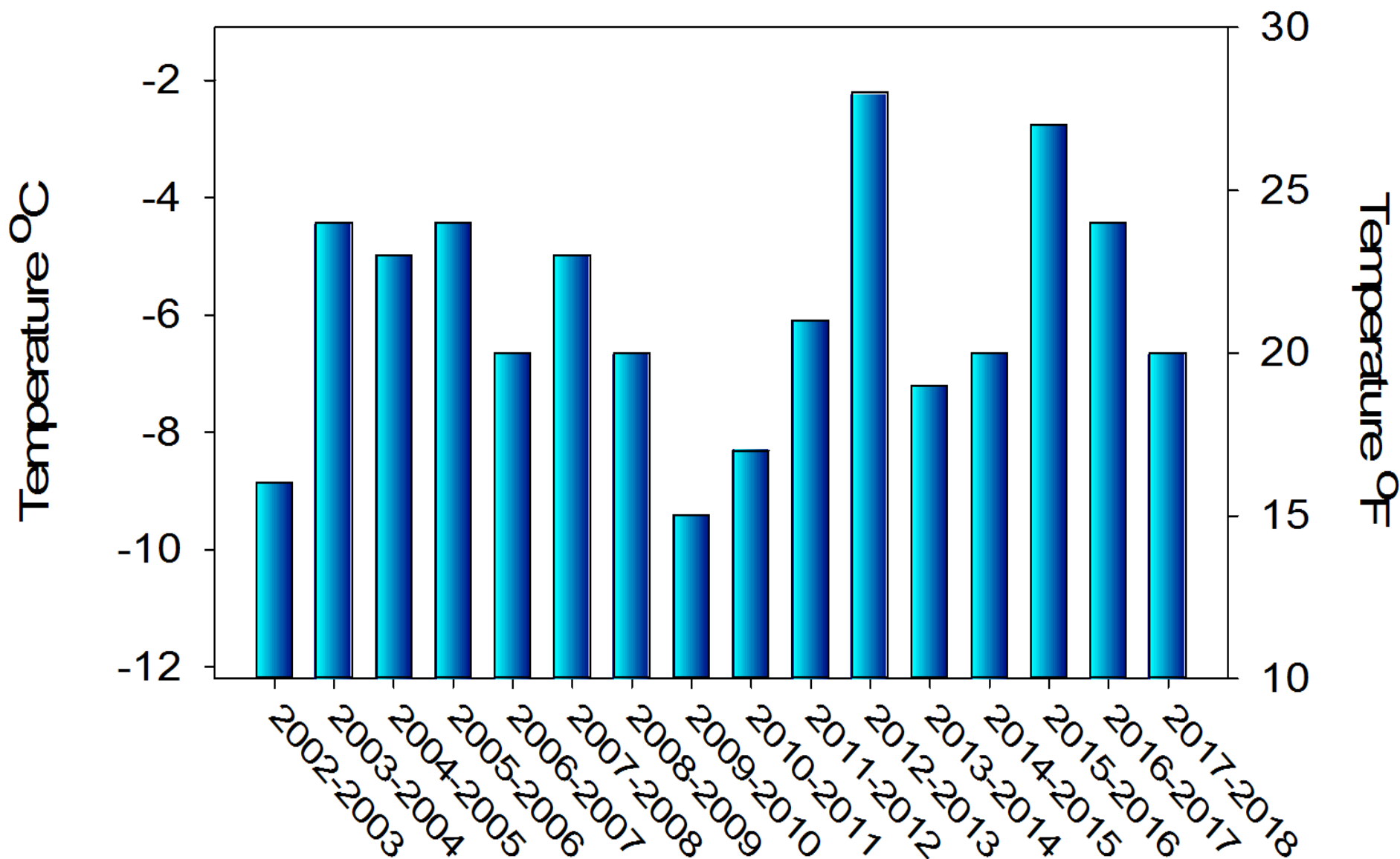
Satsuma yield and quality at NFREC-Quincy from 2009-2014

Scion/Rootstock				
	Brown Select/ Rubidoux	Brown Select/ Flying Dragon	Owari/ Rubidoux	Owari/ Flying Dragon
Fruit Yield (lbs)	246	143	218	107
Fruit Size (g)	154	151	144	139
Acidity (pH)	3.73	3.75	3.70	3.73
Soluble Solids (Brix)	9.6	10.3	9.8	10.3

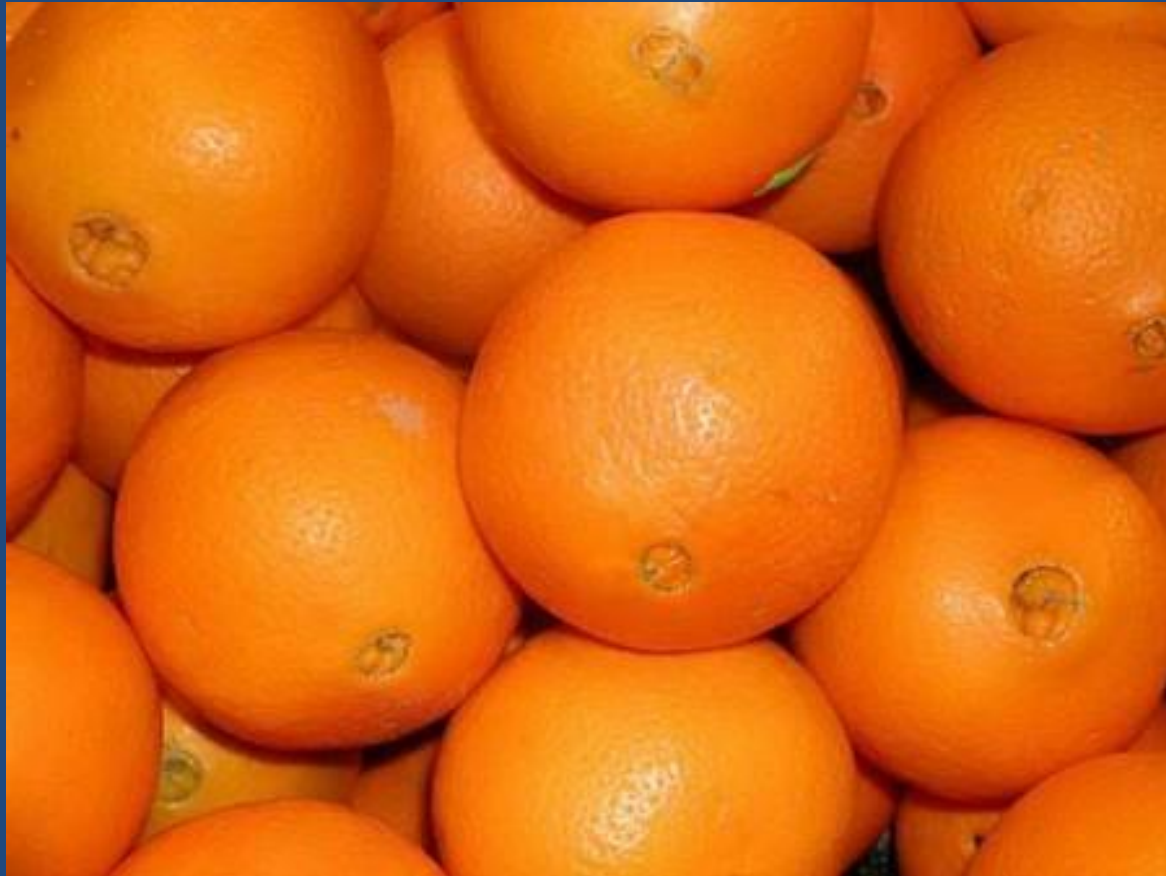
Satsuma yields and quality at NFREC-Quincy for 2016.

Scion/Rootstock				
	Brown Select/ Rubidoux	Brown Select/ Flying Dragon	Owari/ Rubidoux	Owari/ Flying Dragon
Fruit Yield (lbs)	487 ± 23	220 ± 19	335 ± 21	106 ± 12
Cull Yield (lbs)	94 ± 20	46 ± 9	109 ± 11	28 ± 5
Total Yield (lbs)	580 ± 24	266 ± 22	448 ± 22	134 ± 16
Fruit Size (g)	120 ± 3	111 ± 3	109 ± 4	108 ± 3
Acidity (pH)	3.38 ± 0.01	3.43 ± 0.02	3.42 ± 0.02	3.46 ± 0.02
Soluble Solids (Brix)	10.8 ± 0.1	11.2 ± 0.1	10.6 ± 0.1	10.3 ± 0.1

Figure 1. Minimum Temperatures at NFREC-QUINCY
2002-20018







Navel Orange

Glen Navel



Red Navel





Minneola Honeybell



Sugar Belle



Sugar Belle



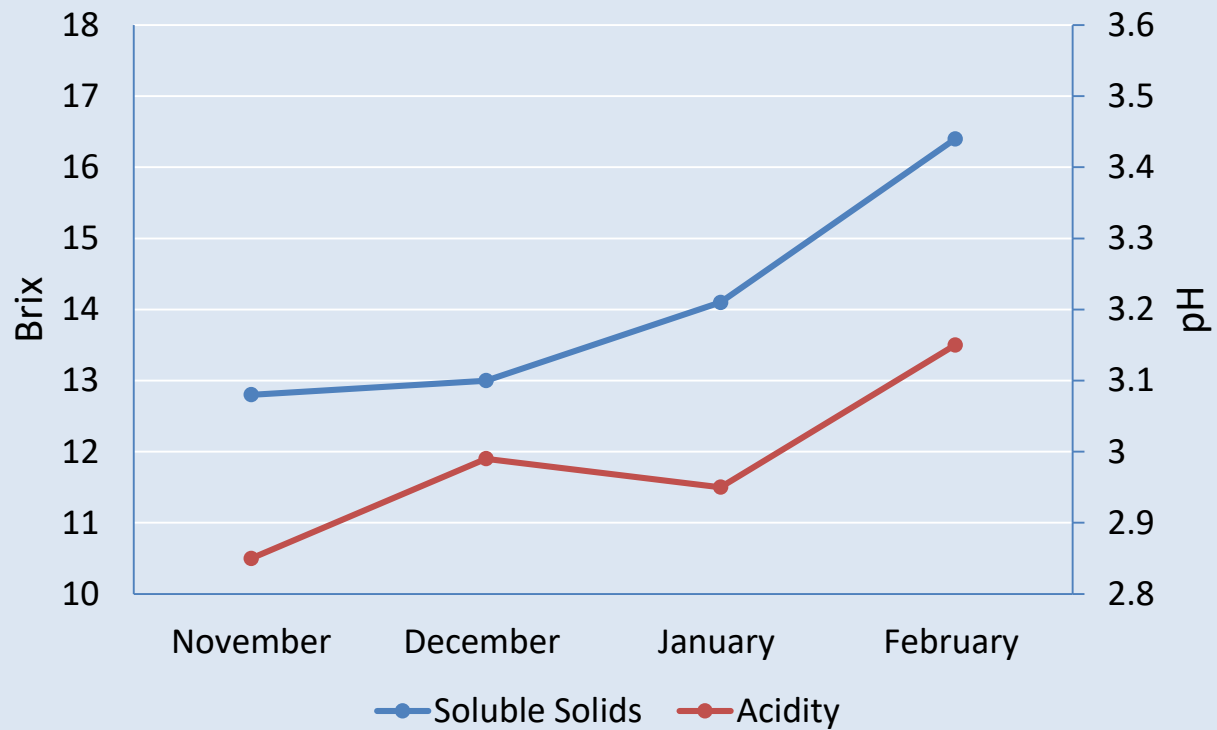


Sugar Belle (Mandarin Orange Hybrid)

Sugar Belle



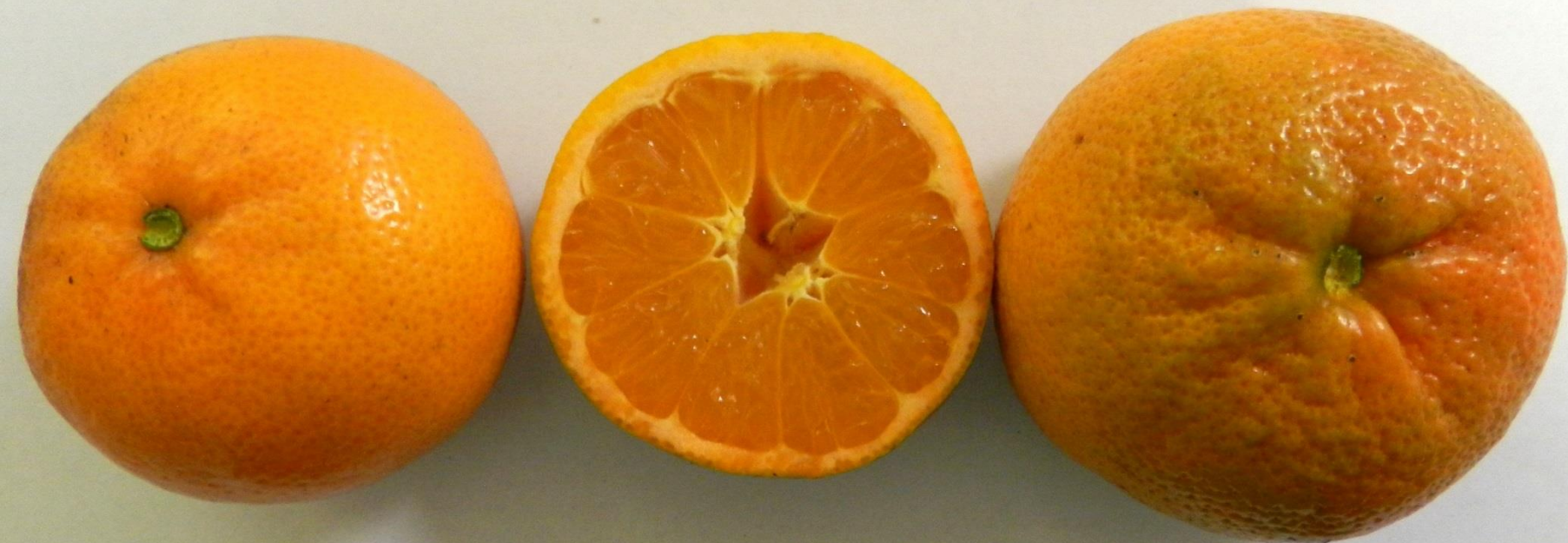
Sugar Belle/Swingle (9 years old)



Tango



Tango



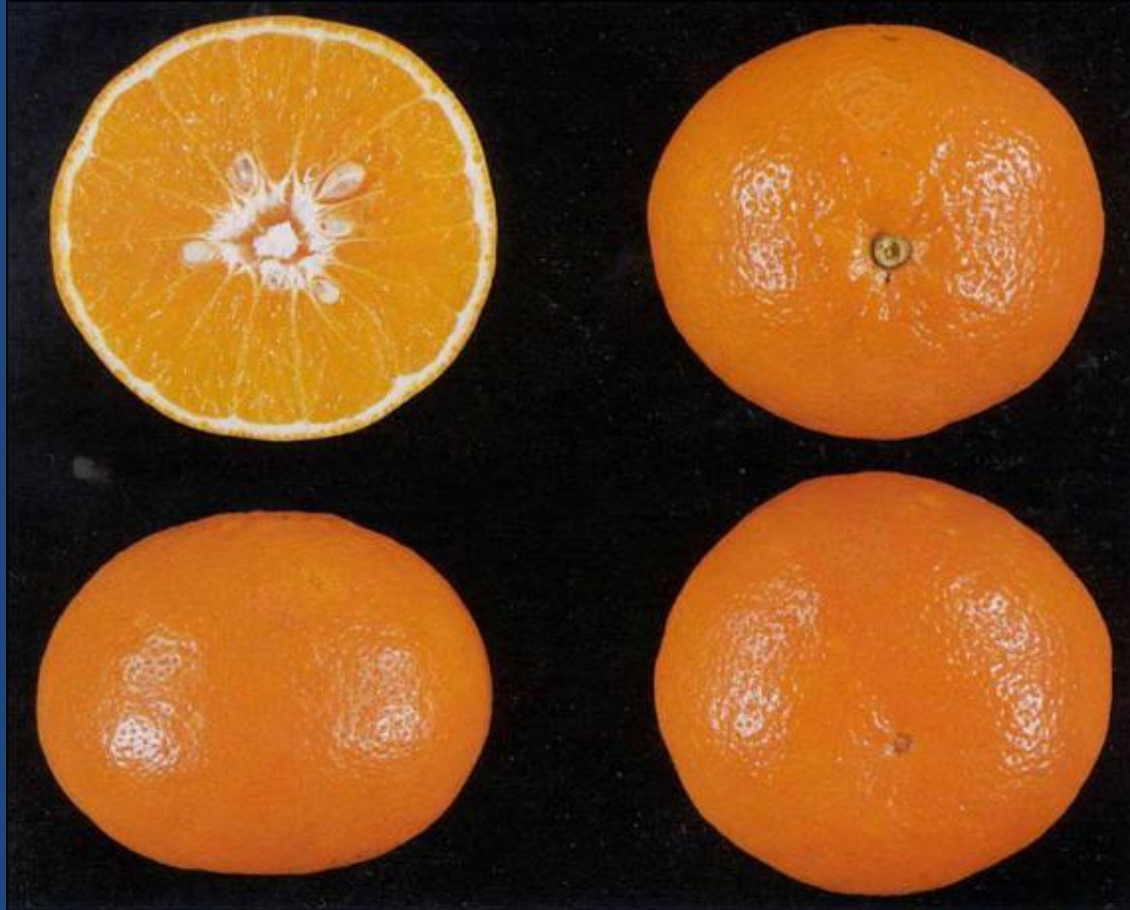


Early Pride (Mandarin hybrid)

Early Pride



Orlando Tangelo



Valencia



Valencia EV1 Dec.



Credit: New Variety Development Corp.

Nova



Bud Blood



Fruit Characteristics of young (< 8 years) citrus at NFREC-Quincy (2016).

Scion	Rootstock	Fruit Size (g)	Soluble Solids (Brix)	Acidity (pH)
Tango	Swingle	102	12.4	3.27
Nova	Kinkjoi	136	11.7	3.47
Bud Blood	Trifoliate	124	12.6	3.46
Early Pride	Swingle	137	13.0	3.47
Sugar Belle	Swingle	137	15.5	3.17
Glen Navel	Swingle	192	12.6	4.10
Glen Navel	US897	199	14.5	4.06
Xie Shan satsuma	Swingle	137	11.2	3.24
Owari satsuma	Swingle	136	11.0	3.67
Brown Select satsuma	Swingle	168	10.5	3.32

Yields, fruit weight and soluble solids for 2017.

Scion/Rootstock	Age	Yield (lbs/tree)	Fruit size (g)	Soluble Solids Brix
Tango/897	4	52.8	110	11.4
Tango/Swingle	4	2.8	101	11.8
Tango/Swingle	6	45.9	128	10.7
Tango/Swingle	8	153.2	128	10.7
Bud Blood/Trifoliata	4	12.8	153	11.3
Nova/Kinkoji	4	22.4	157	12.0
Orlando Tan/Swingle	4	38.3	210	10.1
Glen Navel/Swingle	4	13.2	293	10.4
Glen Navel/897	4	41.8	375	10.1
Sugar Belle/897	4	31.5	162	13.0
Early Pride/ Swingle	6	11.8	165	11.9
SugarBelle/Swingle	4	16.2	168	12.4
Sugar Belle/Swingle	6	52.0	177	13.7
Sugar Belle/Swingle	8	298.3	180	13.6
Wash. Navel/Carrizo	13	168.3	356	10.1
Red Navel/Carrizo	13	163.9	392	9.1
Honeybelle/Carrizo	13	143.4	260	11.5

Yields, fruit weight and soluble solids for 2018/2019.

Scion/Rootstock	Age	Yield (lbs/tree)	Fruit size (g)	Soluble Solids Brix	Acidity pH
Xie Shan Satsuma/Swingle	11	356	129	10.9	3.66
Brown Select Satsuma/Swingle	9	266	145	10.9	3.47
Owari Satsuma/Swingle	9	297	159	11.2	3.61
Bud Blood/Trifoliata	5	55	207	13.1	3.62
Early Pride/US-897	7	13	187	11.6	3.61
Early Pride/Swingle	7	43	187	12.3	3.46
Glen Navel/Swingle	5	95	387	12.0	3.73
Nova/Kinjoi	5	60	178	13.3	3.66
Orlando tangelo/Swingle	5	156	188	12.3	3.71
Sugar Belle/US-897	5	163	173	14.6	3.27
Sugar Belle/Swingle	9	213	168	16.4	3.15
Tango/US-897	5	84	119	12.3	3.63
Tango/Swingle	5	32	109	13.5	3.63
Tango/Swingle	9	174	123	13.0	3.45
Washington Navel/Carrizo	14		302	12.6	3.88
Minneola Honeybelle/Carrizo	14		332	12.4	3.33

Ranking of Freeze Tolerance

- For mature trees ranking:
 - Satsuma (Trifoliate orange rtsk) most tolerant - No damage.
 - Mature Navel and Honeybell (Carrizo rtsk)- Tip burn.
- For young trees (All Swingle rtsk) ranking:
 - Satsuma - little or no damage.
 - Sugar Belle - 9 of 16 survived. Trunk sprouts. Leaf burn.
 - Tango - 2 of 16 trees survived. Trunk sprouts. Most trees killed above soil mound.
 - Minneola Honeybell - 0 of 16 survived. Some trunk sprouts. Trees killed above soil mound.
 - Early Pride - 0 of 16 survived. Some trunk sprouts. Trees killed above soil mound.

New UF Mandarin/hybrids

- UF 900 - Early season (Sept./ Oct.). Seeds.
- Marathon – Early season. Sweet. Seedless.
- UF C4-15-19 - Early to Mid Season (Oct./Nov.)
Very Sweet. Excellent Color. Seedless.
- Bingo - Early to Mid Season. Seedless.
- Seedless Snack - Mid Season (Nov.). Seedless.
- UF Glow - Mid Season. Seedless.
- UFSunrise - Mid Season. Seedless.
- UF950 - Late Season (Dec.) Seedless.
- UFDawn - Late Season (Dec.). Seedless.

UF900 Sept. to Oct.



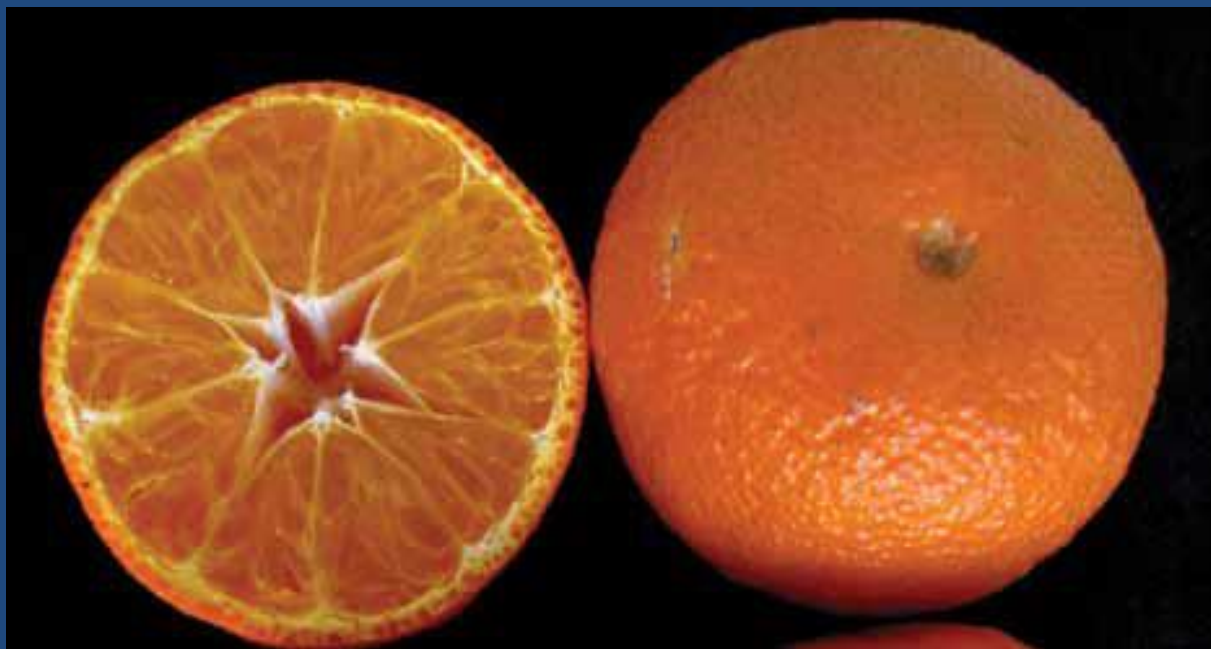
Credit: New Variety Development Corp.

Marathon



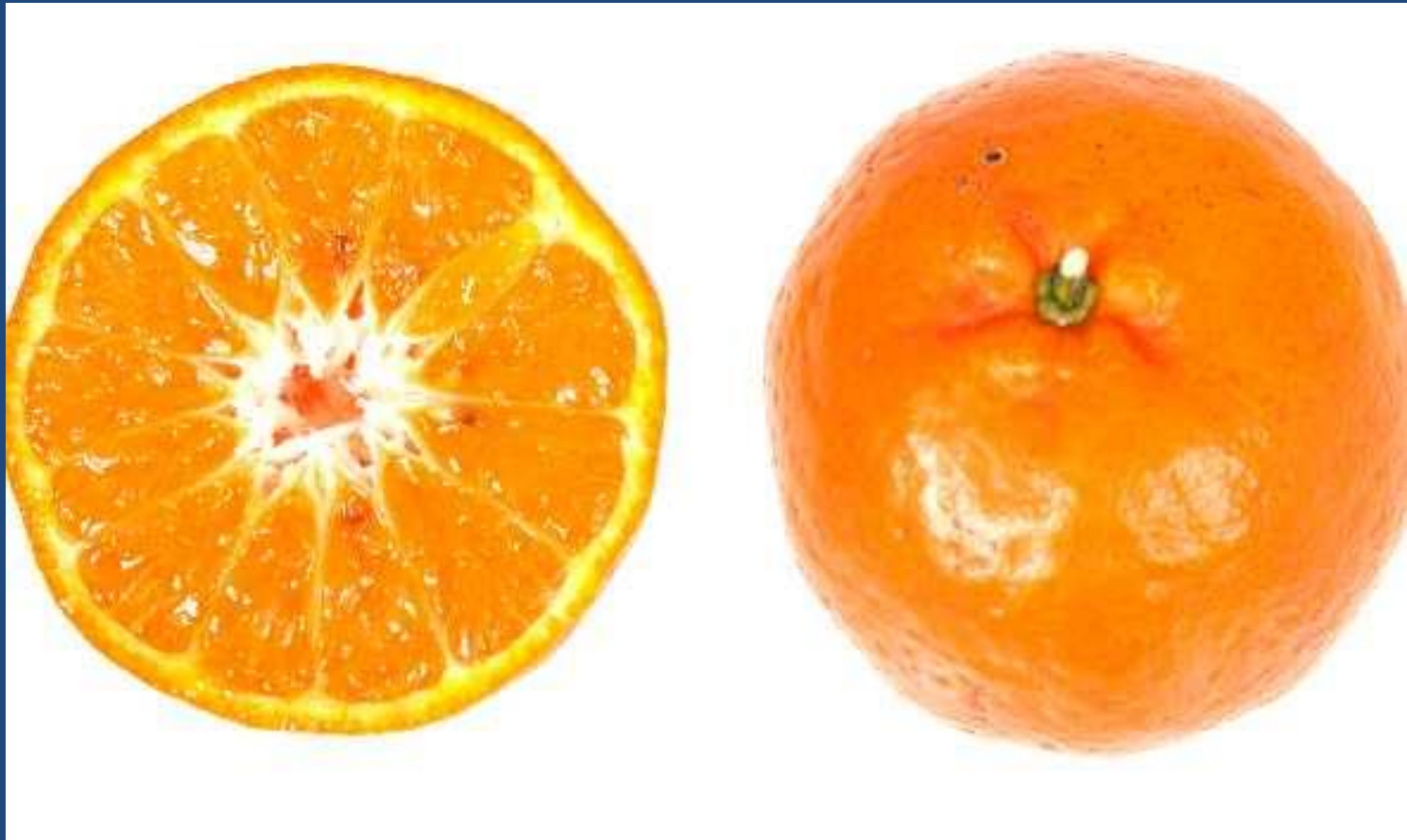
Credit Fred Gmitter

UF C4-15-19 Oct. to Nov.



Credit: Fred Gmitter, Jude Grosser and Bill Castle

Bingo Oct. to Nov.



Credit IFAS communications

Seedless Snack Late Oct. to Nov.



Credit: Fred Gmitter

UFGlow Mid-Oct to mid-Dec.



Credit: Kamille Chaparro

UFSunrise Mid-Nov. to mid-Dec.



Credit: Kamille Chaparro

UF950 Dec.



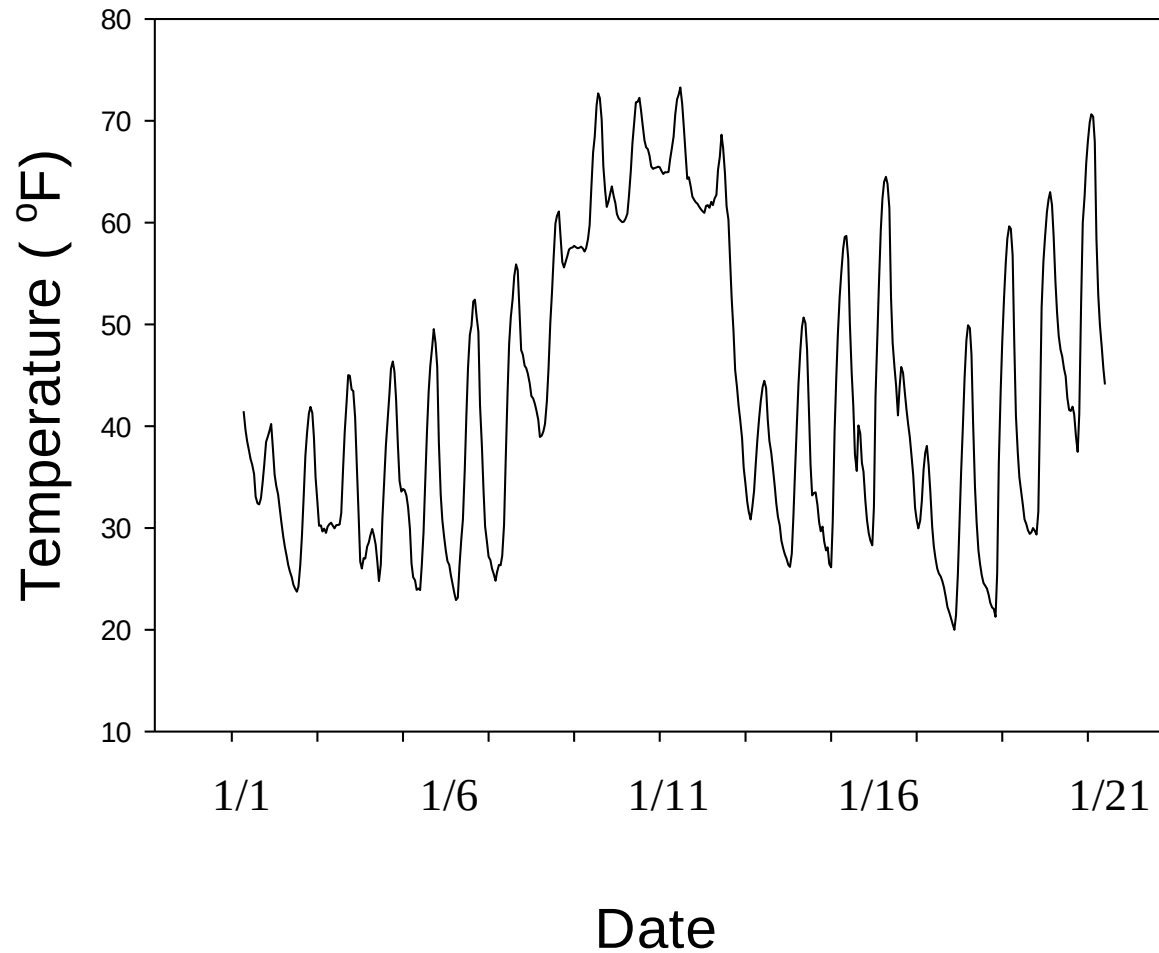
Credit: Fred Gmitter, Jude Grosser and Bill Castle

UFDawn Early to mid-Dec.



Credit: Kamille Chaparro

Temperatures at NFREC-Quincy, Jan1-21, 2018



Older Planting



Cold Hardiness (1-10, 10=Best)

- Tango/ US 897 9.4
- Sugar Belle/ US897 9.2
- Wash. Navel/ Carizzo 9.1
- Minneola/ Carizzo 9.0
- Sugar Belle/ Swingle 8.9
- Glenn Navel/ Swingle 8.8
- Glenn Navel/ US 897 8.8
- Orlando Tangelo/ Swingle 8.3
- Nova/ Kinkoji 8.2
- Bud Blood/ P. trifoliata 8.0
- Early Pride/ Swingle 6.5

New Planting





UFSunrise



Cold Hardiness (1-10, 10=Best)

• Sugar Belle/ Swingle	7.8	UF Sunrise/ Swingle	5.5
• UF 950/ Swingle	7.5	UF Sunrise/ US 897	4.7
• UF 950/ US 897	6.5	UF Dawn/ US 897	4.7
• Tango/ US 897	6.4	UF Dawn/ Swingle	4.7
• UF 900/ US 897	6.4	UF Glow/ Swingle	4.4
• Seedless Snack/ US 897	6.4	UF 4-15-19/ Swingle	4.2
• Seedless Snack/ US 942	6.0	UF Glow/ US 897	3.7
• UF 900/ Swingle	5.6	Bingo/ US897	3.2

Hurricane Michael







Marathon

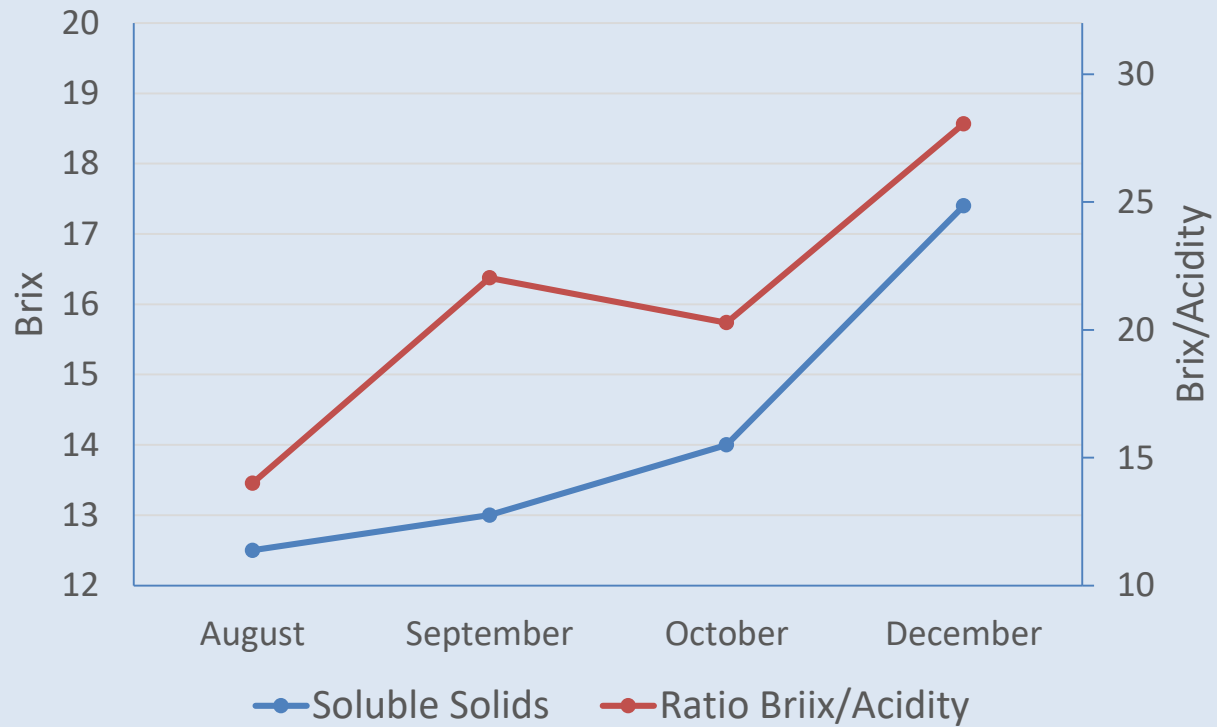


Credit Fred Gmitter

- **‘Daisy’ mandarin x ‘Mukaku Kishu’ parentage**
- **Seedless under all circumstances, and easy to peel**
- **Acceptable color, good flavor, and segment structure**
- **Very early maturity, with long on-tree storage capacity**
- **Firm fruit most likely can be harvested without clipping, saving labor costs at harvest**
- **Responds well to ethylene, and performs very well in long term cold storage**

Unique Characteristics

Marathon (credit: Fred Gmitter)

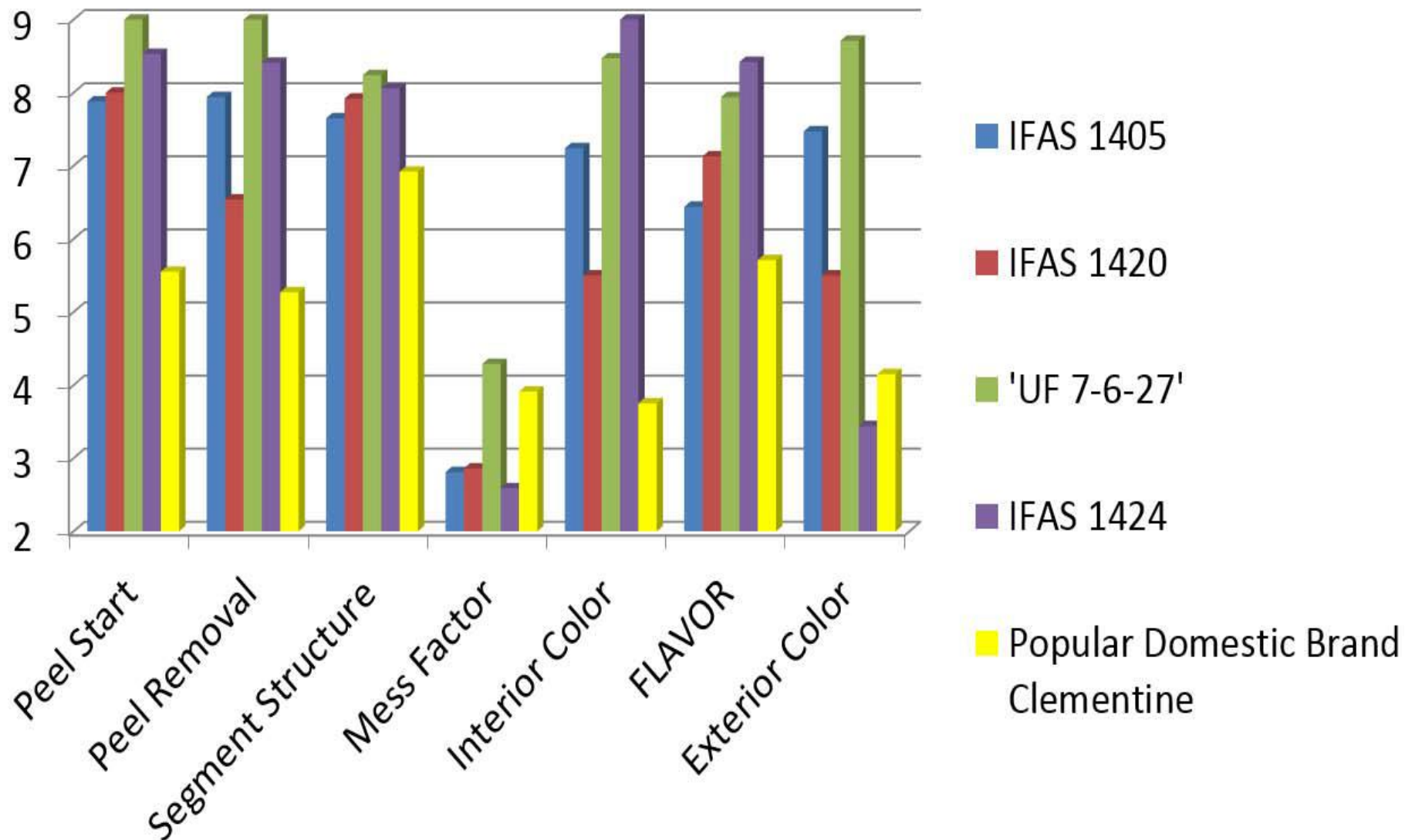


- **Appears to be self-fertile under cages to exclude bees**
- **Not tested outside of Florida**
- **Presumed limits of adaptation not different from other citrus**
- **Plant patent protection to be sought in US, PBR elsewhere**
- **Fits an early maturity window gap in the current US market**
- **Global potential, because of very long season of maturity**
- **Initial budwood increase by CREC, now available to licensed nurseries**

Other Issues

- **HLB susceptible, but not overly sensitive**
- **No other testing conducted**
- **No canker or Alternaria observed on leaves or fruit from test trees in Lake Alfred or Vero Beach; however, recent lab tests suggest it may be Alternaria sensitive**
- **No scab lesions found**
- **No obvious issues with mites**
- **Some dieback, similar to other Seedless Kishu hybrids**

Disease and Pest Issues



Fruit Display Day Results

Selection	Degreening	6 weeks of storage	8 weeks of storage		
		Healthy Fruit (%)	Healthy Fruit (%)	Total Decay (%)	Total Peel Breakdown (%)
BB-4-8-20	yes	100.00	62.50	25.00	12.50
	No	100.00	75.00	12.50	12.50
Bingo	yes	100.00	92.30	7.70	0.00
	No	100.00	92.85	0.00	7.15
1420	Yes	100.00	100.00	0.00	0.00
	No	100.00	100.00	0.00	0.00
Fallglo	Yes	100.00	66.66	33.33	0.00
	No	100.00	83.33	16.66	0.00

Post-Harvest Behavior