## 'Vernia' Rootstock Trial, Fort Pierce

#### Dr. Bill Castle - Dr. Jude Grosser – Dr. Fred Gmitter



May 28, 2021 - Updated November 16, 2020 - Updated December 7, 2018 - Posted CREC Citrus Plant Improvement

### <u>'Vernia' Rootstock Trial, Fort Pierce - Summary</u>

This replicated trial planted in 2011 west of Ft. Pierce consists of 'Vernia' scion on 17 tetraploid rootstocks from the UF/CREC plant breeding program and 3 diploid commercial rootstocks (x639, C-35 and Kuharske) on Indian River flatwoods soil. The main purposes of this trial are to evaluate new rootstocks that, while under investigation elsewhere in Florida, have limited evaluation in flatwoods sites; and, determine HLB response. The tetraploid rootstocks selected for the trial are either somatic hybrids or "tetrazyg" hybrids produced by the conventional breeding of tetraploid somatic hybrids that have shown promise at other locations.

### 'Vernia' Rootstock Trial, Fort Pierce - Description

- Location: Fort Pierce, St. Lucie County
- Scion: Vernia 20 rootstocks:
- Date planted: 2011
- Design: Randomized complete-block with 2 or 3 replications
  - Plot size: 2-8 trees
  - Spacing: 10 x 25 ft. [175 trees/acre]
- ➢ Data:
  - ➤ 2015/16: Yield.
  - > 2017/18: Yield; HLB rating; tree size rating.
  - > 2018/19: Yield; HLB rating; juice quality, PS/acre.
  - > 2019/20: Yield; HLB rating.
  - > 2020/21: HLB rating and juice quality
  - ➤ 4-year cumulative yield

#### > Trial status: **ACTIVE**

### <u>'Vernia' rootstock trial, Fort Pierce – Interpretive Summary as of May 2021:</u>

This replicated trial was initiated in 2011 with 17 tetraploid hybrid rootstocks and 3 commercial rootstocks in a flatwoods site.

*Tree survival.* 100% after 10 years except for one rootstock [Table 2].

**Tree height.** At tree age 6 years, tree height ranged from 4ft to >8 ft [Fig. 4]. The smaller trees were those on Green 7, Orange 13, Blue 3 and others. Among the taller trees were ones on Orange 1, UFR 5, x639 and Kuharske. C-35 produced trees of intermediate size.

**HLB**. Visual symptoms were present among the trees, but the difference among rootstocks was not remarkable.

**Yield.** The cumulative yield of 4 years across the first 5 years of bearing was highest for trees on such rootstocks as x639, UFR-5, several Orange selections and Kuharske [Fig. 2]. Individual analysis of those 4 years indicated there were statistically significant differences among rootstocks when the yield difference between a pair of rootstocks exceeded about 0.5 to 0.7 boxes [Table 3].

*Juice quality.* The juice quality variables [Brix, acid, etc.] were not remarkably affected by rootstock.

**PS/acre.** In the 2018-19 season when the trees were 7 years old, the combination of yield with juice quality showed the trees on x639 to have the highest PS/acre [Fig. 11].

**Rootstocks.** In consideration of all the variables measured and rated, those rootstocks consistently among the top performers were x639 and Kuharske which grew well at the trial site, making relatively large, fruitful trees. Likewise, several of the new hybrids like UFR-5 and a few Orange selections would merit further field study.

Note that the outcomes experienced so far in this trial also point to particular rootstocks that could be considered advantageous in flatwoods sites. With emphasis placed on tree size and tree planting density, there are rootstocks like C-35 and others that had comparatively good overall credentials, but did not appear among the best performers because of smaller tree size. Nevertheless, those rootstocks would be quite acceptable at a more appropriate, "sweet spot," spacing.

#### Table 1. 'Vernia' rootstock trial, Fort Pierce – List of rootstocks: parentage and number of trees.

Rootstock	Parentage	Number of Trees
Blue 1	[Nova + HBPummelo] x [sour orange + Palestine sweet lime]	24
Blue 3	[Nova + HBPummelo] x [sour orange + Palestine sweet lime]	25
C-35	Ruby swt. x WF TF	61
Green 7	[Nova + HBPummelo] x [sour orange + Carrizo]	24
Kuharske	Kuharske citrange, Carrizo open-pollinated zygotic	14
Orange 1	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	26
Orange 13	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	30
Orange 14	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	21
Orange 16	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	5
Orange 2	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	23
SO+50-7	Sour orange + trifoliate orange 50-7	28
SR+SH99-11	tetrazygs SO+Rangpur, Sour orange + rangpur, open pollinated	10
SR+SH99-18	tetrazygs SO+Rangpur	19
SR+SH99-6	tetrazygs SO+Rangpur	20
UFR-2:Orange 4	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	30
UFR-4:Orange 19	[Nova + HBPummelo] x [Cleopatra + Argentine trifoliate orange]	30
UFR-5:White 4	[Nova + HBPummelo] x [Succari + Argentine trifoliate orange]	29
UFR-6:Changsha+50-7	Changsha mandarin + trifoliate orange 50-7	31
Wgft+50-7	White grapefruit + trifoliate orange	25
X 639	x-639 Cleopatra x Rubidoux TF	101

#### Table 2. 'Vernia' rootstock trial, Fort Pierce – Number of trees and percent of survival.

	2011/12	2020/21	
Rootstock	Original No. of	of % Survival	
	Trees		
Orange 2	23	61	
SR+SH99-18	19	100	
SR+SH99-11	10	100	
SR+SH99-6	20	100	
Blue 1	24	100	
Blue 2	25	100	
UFR-5:White 4	29	100	
C-35	61	100	
Green 7	24	100	
Kuharske	14	100	
Orange 1	26	100	
Orange 13	30	100	
Orange 14	21	100	
Orange 16	5	100	
SO+50-7	28	100	
UFR-2:Orange 4	30	100	
UFR-4:Orange 19	30	100	
UFR-6:Changsha+50-7	31	100	
Wgft+50-7	25	100	
X 639	101	100	

Fig. 1. 'Vernia' rootstock trial, Fort Pierce – Yield: mean + SE\* [boxes/tree] for 2015/16, 2017/18, 2018/19 & 2019/20.



**CREC** Citrus Plant Improvement

Fig. 2. 'Vernia' rootstock trial, Fort Pierce – 4-year cumulative yield: mean [boxes/tree] for 2015/16, 2017/18, 2018/19 & 2019/20.



Table 3. 'Vernia' rootstock trial, Fort Pierce – Yield: mean [boxes/tree] for 2015/16, 2017/18, 2018/19 & 2019/20.

	Yield [boxes/tree]			
Rootstock	2015/16*	2017/18*	2018/19*	2019/20**
Blue 1	0.8 <sup>a,b,c,d</sup>	<b>0.8</b> <sup>a,b,c,d,e</sup>	0.8 <sup>b,c,d</sup>	0.8
Blue 3	0.5 <sup>b,c,d</sup>	0.4 <sup>c,d,e</sup>	0.5 <sup>c,d</sup>	0.7
C-35	1.0 <sup>a,b,c</sup>	<b>0.9</b> <sup>a,b,c,d,e</sup>	0.7 <sup>b,c,d</sup>	0.8
Green 7	0.6 <sup>a,b,c,d</sup>	<b>0.9</b> <sup>a,b,c,d,e</sup>	1.0 <sup>b,c</sup>	1.0
Kuharske	1.3ª	1.2 <sup>a,b,c,d,e</sup>	1.3 <sup>b</sup>	1.4
Orange 1	1.2 <sup>a,b</sup>	1.1 <sup>a,b,c,d</sup>	1.0 <sup>b,c</sup>	1.4
Orange 13	0.9 <sup>a,b,c</sup>	<b>1.0</b> <sup>a,b,c,d,e</sup>	1.3 <sup>b</sup>	1.1
Orange 14	1.1 <sup>a,b,c</sup>	1.6ª	1.2 <sup>b</sup>	1.2
Orange 2	1.1 <sup>a,b,c</sup>	0.5 <sup>b,c,d,e</sup>	0.7 <sup>b,c,d</sup>	0.3
SO+50-7	0.6 <sup>a,b,c,d</sup>	<b>0.8</b> <sup>a,b,c,d,e</sup>	0.7 <sup>b,c,d</sup>	0.4
SR+SH99-11	0.4 <sup>c,d</sup>	0.2 <sup>e</sup>	0.1 <sup>d</sup>	0.1
SR+SH99-18	0.2 <sup>d</sup>	0.5 <sup>b,c,d,e</sup>	0.4 <sup>c,d</sup>	0.5
SR+SH99-6	0.3 <sup>d</sup>	0.4 <sup>d,e</sup>	0.1 <sup>d</sup>	0.2
UFR 2: Orange 4	1.1 <sup>a,b,c</sup>	1.4 <sup>a,b</sup>	1.1 <sup>b,c</sup>	1.4
UFR 4: Orange 19	1.0 <sup>a,b,c</sup>	1.3 <sup>a,b,c</sup>	1.2 <sup>b</sup>	1.3
UFR 5: White 4	1.1 <sup>a,b,c</sup>	1.4 <sup>a,b</sup>	1.2 <sup>b</sup>	1.4
UFR 6: Changsha+50-7	0.8 <sup>a,b,c,d</sup>	1.1 <sup>a,b,c,d,e</sup>	1.1 <sup>b,c</sup>	1.0
WGFT+50-7	0.8 <sup>a,b,c,d</sup>	0.7 <sup>b,c,d</sup>	0.9 <sup>b,c</sup>	0.6
X 639	1.1 <sup>a,b</sup>	1.4 <sup>a,b</sup>	1.5ª	1.1

(\*) Numbers not connected by the same letter are significantly different.

(\*\*) No significant differences.

#### Fig. 3. 'Vernia' rootstock trial, Fort Pierce – Mean HLB rating [November 2017].



# Fig. 4. 'Vernia' rootstock trial, Fort Pierce – Tree size rating: mean + std. dev. [November 2017].



#### Fig. 5. 'Vernia' rootstock trial, Fort Pierce – HLB rating: mean + std. dev. [October 2018].



#### Fig. 6. 'Vernia' rootstock trial, Fort Pierce – juice Brix: mean + std. dev. [January 2019].



#### Fig. 7. 'Vernia' rootstock trial, Fort Pierce – juice Acid: mean + std. dev. [January 2019].



#### Fig. 8. 'Vernia' rootstock trial, Fort Pierce – juice Ratio: mean + std. dev. [January 2019].



CREC Citrus Plant Improvement

#### Fig. 9. 'Vernia' rootstock trial, Fort Pierce – juice Color: mean + std. dev. [January 2019].



#### Fig. 10. 'Vernia' rootstock trial, Fort Pierce – PS/box: mean + std. dev. [January 2019].



#### Fig. 11. 'Vernia' rootstock trial, Fort Pierce – PS/acre: mean + std. dev. [February 2019].



# Fig. 12. 'Vernia' rootstock trial, Fort Pierce – HLB Rating, PS/box and yield [boxes/tree]: mean + std. dev. [February 2019].



Fig. 13. 'Vernia' rootstock trial, Fort Pierce – HLB Rating: mean + std. dev. [February 2020].



# Fig. 14. 'Vernia' rootstock trial, Fort Pierce – HLB Rating: mean + std. dev. [December 2020].



Fig. 15. 'Vernia' rootstock trial, Fort Pierce – HLB rating: mean + std. dev. [November/17, October/18, February/20 and December/20]. Sorted by December/20 data.



#### Fig. 16. 'Vernia' rootstock trial, Fort Pierce – juice Brix: mean + std. dev. [January 2021].



#### Fig. 17. 'Vernia' rootstock trial, Fort Pierce – juice Acid: mean + std. dev. [January 2021].



#### Fig. 18. 'Vernia' rootstock trial, Fort Pierce – juice Ratio: mean + std. dev. [January 2021].



#### Fig. 19. 'Vernia' rootstock trial, Fort Pierce – juice Color: mean + std. dev. [January 2021].



#### Fig. 20. 'Vernia' rootstock trial, Fort Pierce – PS/box: mean + std. dev. [January 2021].

