Polk County OJ Break Field Tour

January 7, 2016

St. Helena c/o Orie Lee
Dundee, Florida

Field Day at The St. Helena Project


CRDF
Citrus Research and
Development Foundation, Inc.


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Field Day Overview – January 7, 2016

The St. Helena Project is a collaborative field research effort with Mr. Orie Lee, the UF/IFAS Citrus Research and Education Center (CREC), and the Citrus Research and Education Foundation (CREF) to evaluate mid-season Valencia quality processing sweet orange selections combined with a series of new rootstocks. The original primary goal was to identify superior disease-resistant rootstocks that will facilitate ACPS (Advanced Citrus Production Systems). This includes fast growth in the nursery and the first few years in the field followed by substantial early yield and subsequent production of high quality fruit on trees of rootstock-controlled size as needed for higher density plantings. More recently, focus is on identifying rootstocks that have potential to produce and sustain a profitable grove under heavy HLB pressure.

Valquarius sweet orange **Vernia sweet orange**

SCIONS: Processing sweet oranges Vernia and Valquarius (a new early-maturing clone of Valencia, recently released by IFAS); both produce juice of Valencia quality, but with

optimal harvest dates between mid-January to March 1st (potential for a single season Valencia crop amenable to mechanical harvesting).

ROOTSTOCKS: More than 80 selections, mostly from the research program of Dr. Jude Grosser, but also including selections provided by Drs. Fred Gmitter and Bill Castle (including selections from Argentina and Italy) and commercial controls. 12 acres were planted in April of 2008. Additional selections have been planted as trees have become available. Several hundred newly planted trees were lost in freezes during 2011 and 2012. We have continued to plant new rootstocks as identified in Tables 5 & 6.

Description of Rootstocks

1. **Conventionally bred diploid (2x) rootstocks**. This group includes trifoliate hybrids provided by Dr. Bill Castle, developed by retired Argentine rootstock breeder Jose Luis Foguet. These rootstocks were all selected in Argentina for superior performance with lemon and sweet orange scions. Trees on these rootstocks vary in tree size with Pink 1802 producing the smallest trees. Featured selections include:
   1. **Yellow 1800** (grapefruit x trifoliate orange)
   2. **White 1801** (Ruby blood orange x Barnes trifoliate orange)
   3. **Pink 1802** (Cleopatra mandarin x Swingle citrumelo
   4. **Aqua 1803** (Cleopatra mandarin x trifoliate orange)
   5. **Orange 1804** (Cleopatra mandarin x trifoliate orange)
   6. **White 1805** (Ruby Blood orange x Barnes trifoliate orange)

   This group also includes *Citrus latipes* (papeda) x trifoliate orange hybrids provided by Dr. Fred Gmitter, developed by Guiseppe Reforgiato in Sicily. *C. latipes* is reported to be tolerant of HLB in India. Featured selections include:
   1. **68-1G-26-F4-P2**
   2. **68-1G-26-F4-P6**
   3. **68-1G-26-F4-P20**

2. **Allotetraploid (4x) Somatic Hybrids**: produced in the Grosser laboratory (test tube babies) by fusing cells from two conventional diploid citrus genotypes with complementary traits and then regenerating a tetraploid plant that contains the entire diploid genome of each parent (additive hybridization). Featured somatic hybrid rootstock candidates include:
   1. **Sour orange + Carrizo citrange**
   2. **Cleopatra mandarin + Carrizo citrange**
   3. **Changsha mandarin + trifoliate orange 50-7**
   4. **Changsha mandarin + Benton citrange**
   5. **Sour orange + trifoliate orange 50-7**
   6. **White grapefruit + trifoliate orange 50-7**
   7. **Amblycarpa mandarin + Hirado Buntan pummelo sdlg.#1**

3. **Allotetraploid (4x) Tetrazygs**: produced by the conventional breeding of somatic hybrid parents at the tetraploid level. This approach is quite powerful genetically, because it allows for the mixing of genes from the genomes of four conventional diploid genotypes

simultaneously. The tetrazygs featured in the Field Day all have the Nova mandarin+Hirado Buntan seedling pummelo somatic hybrid as a mother – this is because it is a sour-orange like hybrid that has shown tolerance to CTV and to the Diaprepes/Phytophthora complex, and it produces zygotic seed (as needed to make hybrids). Featured Tetrazyg roostock candidates include:

A. Cross of Nova mandarin+Hirado Buntan seedling pummelo x Cleopatra mandarin+Argentine trifoliate orange: **Orange #2; Orange #4; Orange #13; Orange #14; Orange #15; Orange #16; Orange #18; Orange #19; and Orange #21.**

B. Cross of Nova mandarin+Hirado buntan seedling pummelo x sour orange+Carrizo: **Green #7.**

C. Cross of Nova mandarin + Hirado buntan seedling pummelo x sour orange+Palestine sweet lime: **Blue #1; Blue #2, Blue #3, Blue #4 and Blue #9**

D. Cross of Nova mandarin + Hirado buntan seedling pummelo x Cleopatra+sour orange: **Purple #4.**

4. **Commercial Diploid Rootstocks as Controls: Swingle, Volk, rough lemon, Cleopatra and Kuharske. X639 and US-897 were added in 2011.**

ROOTSTOCK SEED TREES: Three rows along the clay road into the trial are available for rootstock seed trees (planting in progress, with the fence row completed).

GROVE OUTLAY: The grove is split into 3 sections, each with a different tree spacing. The Eastern block is planted in a 9 x 20 [242 trees/acre] higher density spacing. This block did not have water for cold protection, and there was significant cold damage and young tree loss following the 2011 freeze. The Southwestern block is planted in a 12 x 20 [181 trees/acre] medium-high density spacing. The Northwestern block is planted in a traditional 15 x 25 [116 trees/acre] spacing, and includes the commercial control rootstocks. The latter two blocks had water for cold protection.

PLANTING: Approximately 12 of the 19.9 acres were planted in April, 2008 and are now about 6 ½ years old. Trees were planted in 4-tree rectangles to facilitate yield data collection. The remaining acreage was planted as new trees became available, with trees on additional new rootstock selections from the CREC citrus improvement program. The latest planted rootstocks include diploid hybrids of Flying Dragon trifoliate orange developed by Fred Gmitter, diploid Shekwasha mandarin x pummelo hybrids developed by Jude Grosser, as well as new somatic hybrids and tetrazygs. **Resets in the older trees**: a few of the rootstock selections were from seed trees that unexpectedly produced zygotic seeds rather than nucellar-derived seeds, and thus many of these zygotic rootstocks were not growing off well – these trees were replaced with more promising selections.

CULTURAL PRACTICES: the goal was to apply the principles of open hydroponics, but with lower initial costs and inputs. Trees are being grown with slow release fertilizer from Harrell's, with daily 45 – 60 minutes per zone irrigation (unless there is adequate rainfall). The initial planting was started on Harrell's 12-month nursery mix and was used for the first two years; in 2010 we switched to a Harrell's/UF-CREC research mix (10-month) containing calcium nitrate, boron and additional micronutrients (formulas provided). All fertilizers were applied by hand

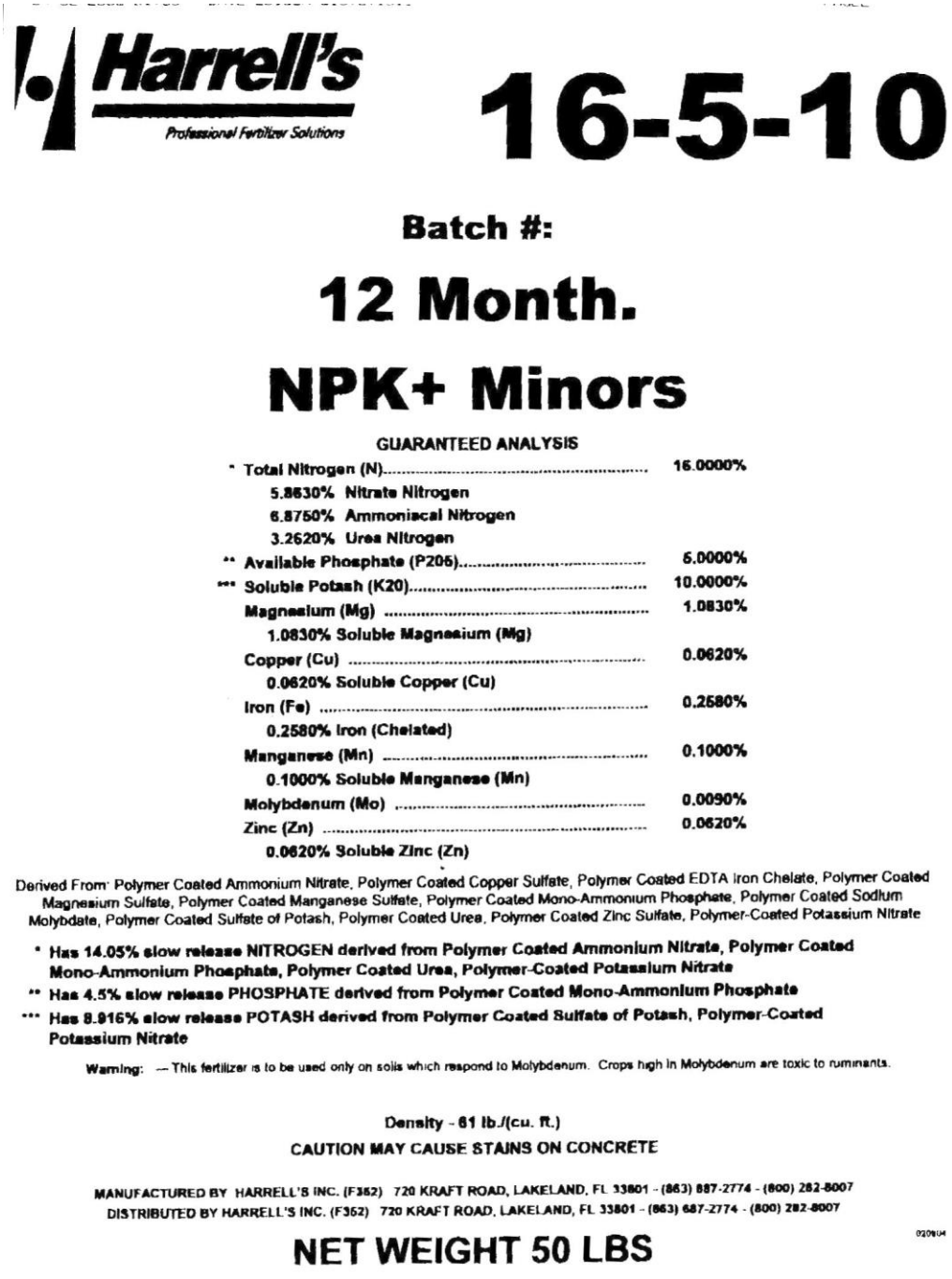
thru 2010, after which they were applied using a Killebrew young tree spreader. Since 2008, the SR-Fertilizer has been applied in staggered applications in January and July as follows:

Year 1 (2008) 1.5 lbs/trees Harrell's 15-5-10 Nursery mix split into 2 applications (0.5lb @ planting, 1 lb summer)
Year 2 (2009) 2.5 lbs/tree Harrell's 15-5-10 Nursery mix split into 2 applications
Year 3 (2010) 5.2 lbs/tree Harrell's 13-4-9 UF mix split into 2 applications
Year 4 (2011) 5.2 lbs/tree Harrell's 13-4-9 UF mix split into 2 applications
Year 5 (2012) 6.0 lbs/tree Harrell's 13-4-9 UF mix split into 2 applications
A supplemental Zn application was applied to correct a minor element deficiency (Tiger-Sul 18% Zn - 65% S, 1 oz/tree July/2012)
Year 6 (2013) 6.0 lbs/tree Harrell's 13-4-9 UF mix split into 2 applications
Supplemental Tigersul Zn (5.85%), Mn (15%), Fe (3.85%), S(62%) custom mix applied in July 2013, 0.33lbs/tree.
Years 7&8 (2014/2015) 6.6 lbs/tree Harrell's 12-3-8 UF mix containing Tigersul Zn,Mn,Fe and split into 2 applications (includes increased manganese and boron). In year 7, we accidentally added the TigerSul micros to an older formula containing less boron (0.024). We compensated for this error by making up the difference with Florikan polycoated sodium borate, put out by hand. The Harrells mix used in Year 8 contained 0.054% boron (not polycoated).
Estimated fertilizer cost (commercial) thru year 8 was $39.80 per tree.

HLB INCIDENCE and IMPACT: Considering the location of the grove, a high HLB incidence was expected due to the neighbor effect. We have an older unsprayed block of K-Earlies to the northeast, and both a top-worked and organic grove to the south. The last inspection by the CREC HLB/canker scouts was completed in November, 2014. The HLB incidence in fall of 2011 was about 8% and increased to 26% in the fall of 2012; infection increased to 59% in 2013, was at 92%, and now approaches 100% on the original trees. The highest initial infection frequencies were on commercial rootstocks, and tetraploid rootstocks in general were slower to develop symptoms. During 2014, we began removing trees based on their performance, removing unproductive, declining trees. Tree removal per rootstock data is being collected and presented in Table 3. The first tree with HLB was found in 2009 on UFR-14, and is still present in the grove – this tree has shown significant recovery and is still productive after 6+ years of infection. We are now studying rootstock effects on disease severity. Rootstock differences are apparent, but need to be studied over time. A present goal is to identify rootstocks that can remain productive after infection, and that could possibly grow through the disease. Overall, 2013 yield for the trial was down 18% from that of 2012. This drop in yield can be mostly attributed to HLB, but could also be partially due to alternate bearing, especially in the juvenile budline Valquarius trees. Remarkably, the 2014 yield increased 42% over the 2013 yield, with good yield increases across most of the rootstocks, particularly the commercial controls (Tables 1-3). The current visual assessment of the trial suggests that overall yield for the 2016 harvest will be about equal or slightly lower than the 2015 harvest, as higher levels of fruit drop have been observed. Fruit drop is sporadic throughout the grove.

OTHER ISSUES: We have had a significant problem with clogged micro-jets causing severe tree wilting; this problem was corrected by more frequent scouting and jet clearing, and this year by repairing a broken mainline that went undetected for some time. Excessive thorniness on

some of the Valquarius trees is due to the fact that the trees were propagated from 1st generation budwood (less thorny 2nd and 3rd generation sources of budwood were destroyed by the state-run canker eradication effort). We have re-entered a more mature and less thorny budline of Valquarius into the DPI Parent Tree Program; pathogen-free budwood is now being grown in Chiefland and is available for nurseries.



Harrell's
Professional Fertilizer Solutions

16-5-10

Batch #:

12 Month.

NPK+ Minors

GUARANTEED ANALYSIS

* Total Nitrogen (N)	16.0000%
5.8630% Nitrate Nitrogen	
6.8750% Ammoniacal Nitrogen	
3.2620% Urea Nitrogen	
** Available Phosphate (P2O5)	5.0000%
*** Soluble Potash (K2O)	10.0000%
Magnesium (Mg)	1.0830%
1.0830% Soluble Magnesium (Mg)	
Copper (Cu)	0.0620%
0.0620% Soluble Copper (Cu)	
Iron (Fe)	0.2580%
0.2580% Iron (Chelated)	
Manganese (Mn)	0.1000%
0.1000% Soluble Manganese (Mn)	
Molybdenum (Mo)	0.0090%
Zinc (Zn)	0.0620%
0.0620% Soluble Zinc (Zn)	

Derived From: Polymer Coated Ammonium Nitrate, Polymer Coated Copper Sulfate, Polymer Coated EDTA Iron Chelate, Polymer Coated Magnesium Sulfate, Polymer Coated Manganese Sulfate, Polymer Coated Mono-Ammonium Phosphate, Polymer Coated Sodium Molybdate, Polymer Coated Sulfate of Potash, Polymer Coated Urea, Polymer Coated Zinc Sulfate, Polymer-Coated Potassium Nitrate

* Has 14.05% slow release NITROGEN derived from Polymer Coated Ammonium Nitrate, Polymer Coated Mono-Ammonium Phosphate, Polymer Coated Urea, Polymer-Coated Potassium Nitrate
** Has 4.5% slow release PHOSPHATE derived from Polymer Coated Mono-Ammonium Phosphate
*** Has 8.916% slow release POTASH derived from Polymer Coated Sulfate of Potash, Polymer-Coated Potassium Nitrate

Warning: — This fertilizer is to be used only on soils which respond to Molybdenum. Crops high in Molybdenum are toxic to ruminants.

Density - 61 lb./(cu. ft.)
CAUTION MAY CAUSE STAINS ON CONCRETE

MANUFACTURED BY HARRELL'S INC. (F352) 720 KRAFT ROAD, LAKELAND, FL 33801 - (863) 687-2774 - (800) 282-8007
DISTRIBUTED BY HARRELL'S INC. (F352) 720 KRAFT ROAD, LAKELAND, FL 33801 - (863) 687-2774 - (800) 282-8007

NET WEIGHT 50 LBS

Harrell's
Professional Fertilizer Solutions

13-4-9

Batch #: 1101-0201

Fertilizer - UF Citrus Research Center

GUARANTEED ANALYSIS

*	Total Nitrogen (N)	13.0000%
	7.4700% Nitrate Nitrogen	
	5.0000% Ammoniacal Nitrogen	
	0.5300% Urea Nitrogen	
**	Available Phosphate (P205)	4.0000%
***	Soluble Potash (K20)	9.0000%
	Calcium (Ca)	4.2800%
	Magnesium (Mg)	1.1180%
	1.1180% Water Soluble Magnesium (Mg)	
	Boron (B)	0.0360%
	Copper (Cu)	0.0460%
	0.0460% Water Soluble Copper (Cu)	
	Iron (Fe)	0.9480%
	0.1620% Water Soluble Iron (Fe)	
	0.3000% Iron (Chelated)	
	Manganese (Mn)	0.1580%
	0.1580% Water Soluble Manganese (Mn)	
	Molybdenum (Mo)	0.0070%
	Zinc (Zn)	0.0630%
	0.0630% Water Soluble Zinc (Zn)	

Derived From: Calcium Nitrate, Polymer Coated Ammonium Nitrate, Polymer Coated Copper Sulfate, Polymer Coated EDTA Iron Chelate, Polymer Coated Magnesium Sulfate, Polymer Coated Manganese Sulfate, Polymer Coated Mono-Ammonium Phosphate, Polymer Coated Sodium Molybdate, Polymer Coated Sulfate of Potash, Polymer Coated Sulfate of Potash-Magnesia, Polymer Coated Sulphate of Potash, Polymer Coated Urea, Polymer Coated Zinc Sulfate, Iron Chelate, Iron EDTA, Iron Humate, Iron Oxide, Iron Sulfate, Iron Sucrate, Manganese Sulfate, Sodium and Calcium Borate, Zinc Sulfate

* **8.611% slow release NITROGEN derived from Polymer Coated Ammonium Nitrate, Polymer Coated Mono-Ammonium Phosphate, Polymer Coated Urea**

** **3.984% slow release PHOSPHATE derived from Polymer Coated Mono-Ammonium Phosphate**

*** **8.134% slow release POTASH derived from Polymer Coated Sulfate of Potash, Polymer Coated Sulfate of Potash-Magnesia, Polymer Coated Sulphate of Potash**

Warning: --- Some crops may be injured by Application of Boron.
--- This fertilizer is to be used only on soils which respond to Molybdenum. Crops high in Molybdenum are toxic to ruminants.

Density - 54 lb./(cu. ft.)

CAUTION MAY CAUSE STAINS ON CONCRETE

Directions for Use

MANUFACTURED BY HARRELL'S LLC (F352) 720 KRAFT ROAD, LAKELAND, FL 33801 - (863) 687-2774 - (800) 282-8007
DISTRIBUTED BY HARRELL'S LLC. (F352) 720 KRAFT ROAD, LAKELAND, FL 33801 - (863) 687-2774 - (800) 282-8007

Net Weight 50 LBS

1101-0201 101101

Note that the calcium nitrate has a 6-month polymer coating, whereas all other nutrients have a 12-month polymer coating. Overall this makes for a 10-month product.

Harrell's
Growing a Better World™

12-3-8

Batch #: 1407-0797

FERTILIZER ~ CREC Mix with Tiger micros

GUARANTEED ANALYSIS

* Total Nitrogen (N)	12.0000%
6.9400% Nitrate Nitrogen	
4.5500% Ammoniacal Nitrogen	
0.5100% Urea Nitrogen	
** Available Phosphate (P2O5)	3.0000%
*** Soluble Potash (K2O)	8.0000%
Calcium (Ca)	4.5270%
Magnesium (Mg)	0.9850%
0.9850% Water Soluble Magnesium (Mg)	
Boron (B)	0.0540%
Copper (Cu)	0.0400%
0.0400% Water Soluble Copper (Cu)	
Iron (Fe)	1.0980%
0.1100% Water Soluble Iron (Fe)	
0.2200% Chelated Iron (Fe)	
Manganese (Mn)	0.9160%
0.0690% Water Soluble Manganese (Mn)	
Molybdenum (Mo)	0.0060%
Zinc (Zn)	0.7150%
0.0400% Water Soluble Zinc (Zn)	

Derived From: Polymer Coated Ammonium Nitrate, Polymer Coated Calcium Nitrate, Polymer Coated Copper Sulfate, Polymer Coated Iron EDTA, Polymer Coated Magnesium Sulfate, Polymer Coated Manganese Sulfate, Polymer Coated Monoammonium Phosphate, Polymer Coated Sodium Molybdate, Polymer Coated Sulfate of Potash, Polymer Coated Sulfate of Potash-Magnesia, Polymer Coated Urea, Polymer Coated Zinc Sulfate, Elemental Sulfur, Ferrous Sulfate, Iron EDTA, Iron Humate, Iron Oxide, Iron Sucrate, Manganese Oxide, Sodium and Calcium Borate, Zinc Oxide

*** 11.46% slow release NITROGEN derived from Polymer Coated Ammonium Nitrate, Polymer Coated Calcium Nitrate, Polymer Coated Monoammonium Phosphate, Polymer Coated Urea**

**** 3.195% slow release PHOSPHATE derived from Polymer Coated Monoammonium Phosphate**

***** 8.01% slow release POTASH derived from Polymer Coated Sulfate of Potash, Polymer Coated Sulfate of Potash-Magnesia**

Warning: ---Some crops may be injured by Application of Boron.
---This fertilizer is to be used only on soils which respond to Molybdenum. Crops high in Molybdenum are toxic to ruminants.

Density - 46 lb./(cu. ft.)

CAUTION MAY CAUSE STAINS ON CONCRETE

Directions for Use

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

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DISTRIBUTED BY HARRELL'S LLC. (F352) 720 KRAFT ROAD, LAKELAND, FL 33801 - (863) 687-2774 - (800) 282-8007

1407-0797 281403

Net Weight 50 LBS

Note that the calcium nitrate has a 6-month polymer coating, whereas all other nutrients have a 12-month polymer coating. Overall this makes for a 10-month product. Boron is not coated.

Table 1. St. Helena yield data in boxes per tree for each scion/rootstock combination for 2014 and 2015, lbs. solids per box for 2015, and percent change in yield from 2014-2015. Yield data is the average of two 4-tree plots in most cases, one 4-tree plot where tree numbers were limited. Rootstocks are sorted by projected cumulative 2011-2015 yield at optimal spacing.

Scion	Rootstock	Bx/Tr 2014 (71mo.)	Bx/Tr 2015 (83mo.)	PS/box2015	% change in yield 2014-2015
Valquarius	UFR-13 (FG 1731)	2	2.38	6.04	19.00
Vernia	Blue1	1.62	1.81	5.70	11.73
Valquarius	Cleo+CZO	1.81	2.75	5.95	51.93
Vernia	Chang+Bent	1.44	1.19	5.47	-17.36
Valquarius	Orange 14	1.33	1.92	6.05	44.36
Vernia	Cleo+CZO	1.31	1.28	6.41	-2.29
Valquarius	UFR-1 (Orange 3)	1.81	3.08	4.88	70.17
Valquarius	Orange 13	1.5	1.75	5.88	16.67
Vernia	Aqua1803	1.56	2.50	6.12	60.26
Valquarius	Aqua1803	2.08	1.62	5.24	-22.12
Valquarius	UFR-14 (FG 1733)	1.5	2.00	6.75	33.33
Valquarius	White1805	2.37	2.25	5.88	-5.06
Valquarius	SO+50-7	1.12	1.25	5.34	11.61
Valquarius	AMB+HBJL1	0.75	1.25	5.25	66.67
Vernia	Purple 4	1.44	1.12	6.65	-22.22
Vernia	Blue2	1.19	1.44	6.44	21.01
Vernia	Amb+HBJL-2B	1.21	1.29	6.49	6.61
Vernia	WGFT+50-7	1.31	1.56	5.89	19.08
Valquarius	FG1709	1.33	1.67	5.82	25.56
Valquarius	Blue 9	1	2.25	5.60	125.00
Valquarius	UFR-5 (White 4)	1.37	1.50	5.69	9.49
Valquarius	UFR-6 (Chang+50-7)	1.13	1.31	5.41	15.93
Vernia	Blue4	0.94	1.17	5.49	24.47
Valquarius	Orange 2	1	1.22	5.87	22.00
Vernia	MG11	1.40	1.48	6.11	5.71
Valquarius	SO+CZO	1	1.46	6.32	46.00
Valquarius	68-1G26F4-P6	2.12	2.42	5.46	14.15
Vernia	SO+50-7	1.25	0.88	5.67	-29.60
Vernia	Blue3	1.02	1.08	6.67	5.88
Valquarius	UFR-2 (Orange 4)	1.5	2.22	5.76	48.00
Vernia	UFR-4 (Orange 19)	1.31	1.44	5.62	9.92
Valquarius	Purple 4	1.15	1.57	5.37	36.52
Valquarius	68-1G26F6-P20	1.88	2.03	5.72	7.98
Vernia	UFR-6 (Chang+50-7)	1.00	1.09	5.75	9.00

Table 1. Continued.

Vernia	UFR-5 (White 4)	**1.31**	**1.75**	**5.86**	**33.59**
Vernia	Orange 2	1.27	1.16	6.60	-8.66
Valquarius	FG1793	1.62	1.75	5.98	8.02
Valquarius	UFR-3 (Orange 15)	1.56	2.06	5.65	32.05
Valquarius	Chang+Bent	1.25	1.22	6.03	-2.40
Vernia	Orange 1804	1.50	1.94	5.86	29.33
Valquarius	AMB+HBJL2B	1.5	3.00	5.75	100.00
Vernia	Blue 9	1.00	1.25	5.66	25.00
Vernia	UFR-1 (Orange 3)	1.22	1.67	5.72	36.89
Valquarius	Blue 2	1.02	1.31	5.51	28.43
Vernia	Orange 18	1.25	1.06	5.43	-15.20
Valquarius	MG11	1	2.50	5.78	150.00
Vernia	Orange 14	1.13	1.88	5.84	66.37
Vernia	UFR-3 (Orange 15)	0.94	1.75	6.13	86.17
Valquarius	Blue4	0.91	1.33	6.02	46.15
Valquarius	FG1707	1.33	1.83	5.51	37.59
Valquarius	68-1G26F2-P12	1.12	1.75	5.54	56.25
Vernia	Green 7	0.96	1.41	6.42	46.88
Valquarius	Purple2	1.13	1.75	5.50	54.87
Valquarius	68-1G26F4-P2	1.81	1.89	6.06	4.42
Valquarius	Orange 16	1.31	1.62	5.37	23.66
Valquarius	Kuharske	1.13	2.50	6.76	121.24
Valquarius	Pink1802	1.5	1.21	5.86	-19.33
Vernia	Purple 2	1.00	1.00	6.66	0.00
Valquarius	Blue1	1.06	1.37	5.47	29.25
Vernia	Orange 1	1.41	1.37	6.15	-2.84
Vernia	SO+CZO	0.88	1.13	6.61	28.41
Vernia	Orange 13	1.16	1.19	5.99	2.59
Valquarius	FG1792	0.75	2.00	5.95	166.67
Vernia	Yellow 1800	1.19	1.35	6.07	13.45
Vernia	Orange 21	0.94	1.40	5.58	48.94
Valquarius	WGFT+50-7	1	1.09	5.31	9.00
Valquarius	Orange 21	1	0.97	5.38	-3.00
Vernia	SO+RPxSH99-5	0.88	1.16	6.15	31.82
Vernia	White1805	0.81	0.81	6.24	0.00
Valquarius	Volk	2	2.88	4.93	44.00
Valquarius	Swingle	0.88	2.00	5.92	127.27
Valquarius	Green7	1.04	1.37	5.55	31.73
Valquarius	Orange1804	1.12	1.41	4.85	25.89
Valquarius	Rough Lemon	1.12	1.85	4.97	65.18

Table 1. Continued.

Vernia	**White1801**	**0.83**	**0.50**	**5.83**	**-39.76**
Valquarius	White1801	0.88	0.44	6.11	-50.00
Vernia	UFR-2 (Orange 4)	0.87	0.94	5.28	8.05
Valquarius	FG1702	1	1.25	5.76	25.00
Valquarius	UFR-4 (Orange 19)	0.87	1.00	5.57	14.94
Valquarius	Cleo	0.75	2.13	5.54	184.00
Vernia	Swingle	0.75	1.25	5.55	66.67
Valquarius	69LTXamF14P37	0.5	0.75	5.08	50.00
Vernia	Volk	1.13	2.63	4.93	132.74
Valquarius	Orange 18	0.41	0.55	5.68	34.15
Valquarius	Blue3	0.56	1.04	5.43	85.71
Vernia	Kuharske	0.50	1.13	5.24	126.00
Valquarius	SO+RPxSH99-5	1.25	1.13	5.70	-9.60
Vernia	AMB51992	0.5	1.50	6.23	200.00
Vernia	Cleo	0.88	1.13	5.26	28.41
Valquarius	White1	0.53	1.40	6.02	164.15
Valquarius	SO+RPxSH99-4	0.38	0.96	5.22	152.63
Vernia	Pink1802	0.81	0.85	5.97	4.94
Vernia	6058x2071-01-02	0.75	1.00	5.41	33.33
Vernia	Amb+Volk	0.44	1.19	5.58	170.45
Vernia	46x31-02-S3	0.50	1.38	5.33	176.00
Vernia	46x31-02-S9	0.88	0.75	5.25	-14.77
Valquarius	HBJL-2B(n)	0.62	0.90	5.86	45.16
Vernia	N+HBP-SS-8	0.23	1.25	5.49	443.48
Vernia	Nova+7-2-99-2	0.50	0.83	5.83	66.00
Vernia	UFR-17 (Green 2)	na	1.25	5.66	n/a
Vernia	UFR-16 (46x31-02-13)	na	1.25	5.65	n/a
Vernia	A-Mac	0.66	0.65	4.84	-1.52
Vernia	46x31-02-9	0.38	0.67	4.89	76.32
Vernia	SR+SH-99-11	0.19	0.50	6.46	163.16
Vernia	N+HBP-SS-9	0.33	0.52	5.34	57.58
Vernia	Wmur+HBJL-7	0.44	0.66	5.55	50.00
Vernia	N+HBP-SS-8	0.33	1.00	5.14	203.03
Vernia	6058x6056-00-2	0.56	1.35	4.79	141.07
Vernia	Nova+7-3-99-1	0.50	0.29	5.87	-42.00

Green indicates trees planted in 2010; all others in 2008.

Table 2. St. Helena Project, Dundee (C/) Orie Lee– Projected Cumulative PS/Acre – 2011-2015 Top 24 combinations. Trees 7-years old in April, 2015; now 95% infected with HLB.

Scion	Rootstock	Tree Width	OptimalTrees/ acre	Boxes/ acre 2014	Boxes/ acre 2015	PS / Acre 2014	PS / Acre 2015	Cumulative PS / Acre	% change in yield 2014-2015
Valquarius	UFR-13	8.3	264.0	528.0	628.3	3373.9	3795.1	12170.8	19.0
Vernia	Blue1	7.6	285.6	462.7	517.0	2461.8	2946.9	10311.2	11.7
Valquarius	Cleo+CZO	8.4	258.1	467.2	709.9	2280.0	4223.7	10107.9	51.9
Vernia	Chang+Bent	6.9	316.8	456.2	377.0	3015.4	2062.1	10072.2	-17.4
Valquarius	Org14	7.8	281.0	373.8	539.6	1767.9	3264.5	9804.3	44.4
Vernia	Cleo+CZO	7.8	281.0	368.2	359.7	2260.5	2305.8	9343.6	-2.3
Valquarius	UFR-1	8.9	243.7	441.1	750.6	2064.3	3662.8	9338.6	70.2
Valquarius	Org13	8.4	260.1	390.1	455.1	2305.4	2676.0	9296.4	16.7
Vernia	Aqua1803	10.3	211.2	329.5	528.0	2032.8	3231.4	9086.2	60.3
Valquarius	Aqua1803	9.1	238.7	496.5	386.7	2675.9	2026.1	8943.2	-22.1
Valquarius	UFR-14	10.0	217.8	326.7	435.6	1793.6	2940.3	8877.6	33.3
Valquarius	White1805	11.0	198.0	469.3	445.5	2266.5	2619.5	8854.0	-5.1
Valquarius	SO+50-7	5.8	378.8	424.2	473.5	2511.5	2528.4	8850.8	11.6
Valquarius	AMB+HBJL1	7.3	300.4	225.3	375.5	1198.7	1971.5	8637.7	66.7
Vernia	Purple4	7.0	311.1	448.0	348.5	2822.7	2317.4	8562.7	-22.2
Vernia	Blue2	7.4	292.8	348.5	421.7	2188.5	2715.7	8470.6	21.0
Vernia	Amb+HBJL-2B	7.9	274.4	332.0	354.0	2058.5	2297.3	8357.5	6.6
Vernia	WGFT+50-7	8.2	266.0	348.5	415.0	2272.1	2444.3	8231.5	19.1
Valquarius	FG1709	7.9	276.7	368.1	462.2	2248.9	2689.8	8189.9	25.6
Valquarius	Blue9	8.3	264.0	264.0	594.0	1380.7	3326.4	8171.5	125.0
Valquarius	UFR-5	8.5	256.0	350.7	384.0	1971.0	2185.0	8104.1	9.5
Valquarius	UFR-6	8.4	258.1	291.7	338.2	1636.4	1829.4	8048.2	15.9
Vernia	Blue4	7.5	292.0	274.5	341.7	1669.0	1875.7	8016.8	24.5
Valquarius	Org2	7.2	303.0	303.0	369.7	1875.7	2170.1	8013.2	22.0

Selections highlighted in green indicate entry into DPI Parent Tree Program.

Table 3. St. Helena Project – Dundee, FL (C/O Orie Lee) – Projected Yield Comparison of UFR-Fast Track released Rootstocks versus Commercial Control Rootstocks after 7 years.

Scion	Rootstock	Tree Width	OptimalTrees/ acre	Boxes/ acre 2014	Boxes/ acre 2015	PS / Acre 2014	PS / Acre 2015	Cumulative PS / Acre	% change in yield 2014-2015
Valquarius	UFR-13	8.3	264.0	528.0	628.3	3373.9	3795.1	12170.8	19.0
Valquarius	UFR-1	8.9	243.7	441.1	750.6	2064.3	3662.8	9338.6	70.2
Valquarius	UFR-14	10.0	217.8	326.7	435.6	1793.6	2940.3	8877.6	33.3
Valquarius	UFR-5	8.5	256.0	350.7	384.0	1971.0	2185.0	8104.1	9.5
Valquarius	UFR-6	8.4	258.1	291.7	338.2	1636.4	1829.4	8048.2	15.9
Valquarius	UFR-2	9.7	225.3	338.0	500.2	1973.7	2881.1	7720.2	48.0
Vernia	UFR-4	9.8	222.0	290.8	319.6	1986.0	1796.3	7719.5	9.9
Vernia	UFR-6	8.0	274.0	274.0	298.7	1934.4	1717.3	7573.8	9.0
Vernia	UFR-5	9.4	230.8	302.3	403.9	1865.3	2366.7	7521.2	33.6
Valquarius	UFR-3	9.3	235.5	367.3	485.0	1961.5	2740.5	7503.7	32.1
Vernia	UFR-1	9.4	232.7	283.9	388.6	1876.5	2222.8	7322.1	36.9
Vernia	UFR-3	9.6	227.8	214.1	398.6	1393.8	2443.3	7182.4	86.2
Valquarius	Kuharske	11.4	191.6	216.5	478.9	1175.4	3237.3	6835.9	121.2
Valquarius	Volk	11.6	187.4	374.9	539.8	1237.1	2661.3	5890.7	44.0
Valquarius	Swingle	9.5	229.3	201.8	458.5	1246.8	2714.5	5890.6	127.3
Valquarius	Rough Lemon	10.2	213.8	239.4	395.5	1142.2	1965.7	5613.5	65.2
Vernia	UFR-2	8.8	247.1	215.0	232.3	1378.3	1226.6	5438.6	8.0
Valquarius	UFR-4	8.9	243.7	212.0	243.7	1257.2	1357.4	5315.6	14.9
Valquarius	Cleo	10.3	212.5	159.4	452.6	924.3	2507.4	5313.7	184.0
Vernia	Swingle	9.8	223.4	167.5	279.2	854.4	1549.7	5148.0	66.7
Vernia	Volk	12.3	177.8	200.9	467.6	721.3	2305.3	4703.9	132.7
Vernia	KCZ	9.8	223.4	111.7	252.4	577.4	1322.7	4178.5	126.0
Vernia	Cleo	10.8	202.6	178.3	228.9	939.6	1204.2	3555.7	28.4

Selections highlighted in green indicate entry into DPI Parent Tree Program.

Table 4. Tree removal from the original planting based on performance was initiated in the summer of 2014, and a second round of removal just completed. Trees not expected to make a profit moving forward removed for resetting. Tree removal data per diploid and tetraploid rootstocks provided below. HLB was the cause of most of the removals.

Rootstock	# trees in trial	Percent Removed	Ploidy
68-1G-26-F2-P12	9	0	2x
68-1G-26-F4-P6	13	0	2x
69-LTX-AM-F14 P37	4	0	2x
UFR-6 (Chang+50-7)	55	0	4x
Cleo+Czo	79	0	4x
FG 1702	2	0	2x
FG 1707	3	0	2x
FG 1709	4	0	2x
FG 1712	1	0	2x
FG 1714	1	0	2x
FG 1715	1	0	2x
FG 1722	1	0	2x
UFR-13 (FG 1731)	5	0	2x
UFR-14 (FG 1733)	5	0	2x
FG 1792	2	0	2x
Green 6	6	0	4x
Orange 16	24	0	4x
Orange 1804	18	0	2x
Orange 21	46	0	4x
UFR-2 (Orange 4)	47	0	4x
Volk	19	0	2x
UFR-5 (White 4)	71	0	4x
Yellow 1800	11	0	2x
Purple 4	64	2	4x
SO+CZO	121	2	4x
WGFT+50-7	85	2	4x
SO+50-7	41	2	4x
Chang+Bent	33	3	4x
Blue 4	32	3	4x
Blue 9	29	3	4x
Orange 13	54	4	4x
UFR-3 (Orange 15)	42	5	4x

Table 4. Continued – Tree Removal data.

Rootstock	# trees in trial	Percent Removed	Ploidy
UFR-1 (Orange 3)	60	5	4x
Aqua 1803	19	5	2x
White 1805	18	6	2x
UFR-4 (Orange 19)	125	6	4x
68-1G-26-F4-P2	12	8	2x
White 1801	12	8	2x
Orange 1	23	9	4x
Blue 2	22	9	4x
Orange 14	44	9	4x
SO+RPXSH99-5	11	9	4x
Orange 18	42	10	4x
Blue 1	58	10	4x
Orange 8	36	11	4x
68-1G-26-F6-P20	17	12	2x
Purple 2	17	12	4x
Green 7	45	16	4x
Orange 12	32	16	4x
Orange 10	19	16	4x
CLEO	15	20	2x
Murc+SN3	5	20	4x
Blue 3	35	23	4x
Pink 1802	17	24	2x
Kuharske	53	25	2x
Milam+Kinkoji	4	25	4x
Purple 3	4	25	4x
Swingle	19	26	2x
AMB+HBJL-2B	14	29	4x
Amb+Chan69	3	33	4x
Rough Lemon	15	33	2x
Orange 2	58	36	4x
FG 1793	5	40	2x
48-OP-01	22	41	2x
AMB+HBJL1	15	47	4x
Amb+SN7	6	50	4x
FG 1794	2	50	2x
HBJL-2B (n)	21	52	2x

Table 5. Tree removal from resets planted during 2010-2011 based on performance. Trees not expected to make a profit moving forward removed for resetting. Tree removal data per diploid and tetraploid rootstocks provided below. Rapid and severe HLB was the cause of most of the removals.

Rootstock	# trees in trial	% trees removed	ploidy
46x31-02-05	1	0	2x
46X31-02-11	11	0	2x
UFR-16 (46X31-02-13)	9	0	2x
46X31-02-9	11	0	2x
46X31-02-S-11	2	0	2x
6058X2071-01-02	23	0	4x
6058X6056-00-2	17	0	4x
AMB+BENT	14	0	4x
AMB-BENTON	4	0	4x
Chandler A1-11	4	0	2x
UFR-17 (Green 2)	17	0	4x
N+HBP-SS-8	18	0	4x
Nova+5-1-99-2	4	0	4x
Nova+7-3-99-1	9	0	4x
Nova+8-1-99-2B	1	0	4x
Nova+8-2-99-1	6	0	4x
SO+RPXSH-99-1	8	0	4x
SR+SH-99-11	5	0	4x
SR+SH-99-18	6	0	4x
SR+SH-99-6	5	0	4x
S+HBPxCleo+Czo-02-26	9	0	4x
X-639	8	0	2x
WM-HBJL-12	7	0	4x
Nova+7-2-99-2	35	3	4x
SO+RPXSH 99-4	24	4	4x
N+HBP-SS-9	23	4	4x
46X31-02-S3	10	10	2x
A-MAC	18	11	4x
US-897	8	13	2x
White 1	23	13	4x
2247X6070-02-1	7	14	4x
46X31-02-5	13	15	2x
AMB+FD	6	17	4x
AMB+Volk	30	27	4x

Table 5. Continued – Tree Removal data.

Rootstock	# trees in trial	% trees removed	ploidy
46X31-02-S9	11	27	2x
AMB+5-1-99-2	14	29	4x
NOVA+8-1-99-4B	4	50	4x
SR+SH-99-04	2	50	4x
WMUR+HBJL-7	17	88	4x
AMB+HBJL-12	2	100	4x
WMUR-4-3-99-2	1	100	4x

Table 6. Tree removal from resets planted during 2012-2013 based on performance. Trees not expected to make a profit moving forward removed for resetting. Tree removal data per diploid and tetraploid rootstocks provided below. Rapid and severe HLB was the cause of most of the removals.

Rootstock	# trees in trial	% trees removed	ploidy
2247x6070-02-2	17	0	4x
B2-55-16	4	0	2x
S+HBPxCL+CZO-02-26	26	0	4x
White 3	25	4	4x
B21-R1-T2	12	17	2x
B11-R4-T1	10	20	2x

St. Helena Spray Program History (Administered by Troy Gainey, CREC Field Manager).

2008

May	Admire 2F	4oz acre
June	Admire 2F	4oz acre
August	Admire 2F	4oz acre
October	Admire 2F	4oz acre

2009

February	Danitol 2.4 EC	1 pint acre
March	Admire 2F	8 oz acre
April	Dimethoate 4E	1 pint acre
	435 spray oil	4 gallons acre
	Kocide	4 lbs acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre

May	Alias 2F	8 oz acre
June	Provado 1.6F	10 oz acre
	435 spray oil	4 gallons
	Kocide	4 lbs acre
July	Lorsban 4E	5 pints acre
	435 spray oil	4 gallons
	Kocide	4 lbs acre
Early July	Alias 2F	8 oz acre
September	Movento	10 oz acre
	435 spray oil	4 gallons
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons
	Kocide	3 lbs acre
Late Sept.	Alias 2F	8 oz acre
October	Danitol 2.4 EC	1 pint acre

2010

January	Danitil 2.4 EC	1 pint acre
February	Dimethoate 4E	1 pint acre
	Man-zinc	1 quart acre
	Boron	10 oz acre
	Copper Sulfate	2 lbs acre
	Li 700	.25 % V/V
March	Alias 2F	8 oz acre
April	Nexter	4.3 oz acre
May	Alias 2F	8 oz acre
	Movento	10 oz acre
	435 spray oil	4 gal acre
	11-8-5	.5lbs acre
	Ksar	10 oz acre
	Kocide	2.5lbs
June	Delegate WG	4 oz acre
	435 spray oil	4 gallons
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons
	Kocide	2.5 lbs acre
July	Alias 4F	4 oz acre
	Imidan 70W	1 lb acre
	435 spray oil	2 gallons
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
	Trigger	7 oz acre
	Li 700	.25% v/v
	Kocide 3000	2.5 lbs acre
Late August	Actrara 25WG	4 oz acre
	Delegate	4 oz acre
	435 spray oil	2.5 gallons acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
	Kocide 3000	2.5 lbs acre

September	Alias 4F	4oz acre
October	Danitol 2.4 EC	16 oz acre
	435 spray oil	2 gallons acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
2011		
January	Dimithoate 4E	16 oz acre
	Urea 3.26%	27lbs acre
	Li 700	.25% v/v
February	Danitol 2.4 EC	16 oz acre
	Solubor	1 lb acre
	Calcium Nitrate	5 lbs per 100 gallons water
April	Alias 4F all resets	4 oz acre
	Mustang	4.3 oz acre
	435 spray oil	3 gallon acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
May	Provado 1.6F	10 oz acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
	435 spray oil	2 gallons acre
June	Alias 4F all resets	4 oz acre
	Movento	10 oz acre
	435 spray oil	3 gallons
	Delegate	4 oz acre
	Nitro 30 SRN	1 gallon acre
	Recover RX 3-18-18	2 gallons acre
	Microtech AG	2 quarts acre
	TKO 0-29-26	1 quart acre
	Compainion 2-3-2	1 quart acre
Late June	Admire Pro all mature trees	14 oz acre
July	Imidan	1 lb acre
	Li 700	.25% v/v
	435 spray oil	2 gallons acre
	Zn 2.0% Mn 2.0% Fe 1.6%	2 gallons acre
August	Alias 4F all resets	4oz acre
September	Actara 25wg	4 oz acre
	435 spray oil	2 gallons acre
	Calcium Nitrate	5 lbs per 100 gallons
	Magnesium Sulphate	5lbs per 100 gallons
October	Alias 4F all resets	4 oz acre
	Danitol 2.4 EC	16 oz acre
	Calcium Nitrate	5 lbs per 100 gallons
December	Imidan 70 W	1 lb acre
2012		
January	Danitol 2.4 EC	16 oz acre
	Calcium Nitrate	5 lbs per 100 gallons
	Solubor	1 lb per 100 gallons
	Induce	16 oz per acre

February	Dimethoate 4E		1 pint acre
	TKO		30 oz acre
	Induce		16 oz per acre
February	Admire	Resets	2.8 oz acre
March	Mustang		4.3 oz acre
	Oil 435		2 gallon acre
	Kocide 3000		2 lbs acre
Late March	Imidan 70 W		1 lb acre
	Pottassium Nitrate		5 lbs acre
April	Admire	Resets	2.8 oz acre
	Delegate		4 oz acres
	Oil 435		2 gallon acre
	Kocide 3000		2 lbs acre
May	Agri-flex		8 oz acre
	Oil 435		2 gallon acre
	Zn 2.0% Mn2.0% Fe1.6%		2 gal acre
	Kocide 3000		2 lbs acre
June	Admire	Resets	2.8 oz acre
	Actara		4 oz acre
	DPK		2 gallon acre
	Kocide 3000		2 lbs acre
July	Kocide 3000		2 lbs acre
	Danitol 2.4 EC		16 oz acre
	Oil 435		2 gallon acre
	Pottassium Nitrate		5 lbs acre
	Key Plex		5 pints acre
August	Admire	Resets	2.8 oz acre
	Delegate		4 oz acres
	Oil 435		2 gallon acre
	Kocide 3000		2 lbs acre
September	VoliamFlexi		7 oz acre
	Key Plex		5 pints acre
	Kocide 3000		2 lbs acre
October	Admire	Resets	2.8 oz acre
	Mustang		4.3 oz acre
	Oil 435		2 gallon acre
	Kocide 3000		2 lbs acre
November	Malathion		5 pints acre
	CN9		36 oz acre
	Induce		16 oz acre
	Solubor		1 lbs acre
December	Admire	Resets	2.8 oz acre

2013

January	Danitol		16 oz acre
	CN9		36 oz acre
	Induce		16 oz acre

	Solubor		1 lbs acre
February	Admire	Resets	2.8 oz acre
	Movento		16 oz acre
	Oil		3 gal acre
	TKO		29 oz acre\
	Recover RX		2 gal acre
March	Actara		4 oz acre
	Pottasium Nitrate		5 lbs acre
	Microtech CT		1Gal acre
	Induce		16 oz acre
	Copper		2 lbs acre
March	Admire	Resets	2.8 oz acre
April	Dimethoate 4E		1 pint acre
	TKO		29 oz acre
	Induce		16 oz per acre
	Recover RX		2 gal acre
	Induce		16 oz acre
	Citrus Fix		5 mil acre
Late May	AgriFlex		5 oz acre
	Oil		2 gal acre
	Copper		2 lbs acre
June	Admire Resets		2.8 oz acre
	Delegate		4 oz acres
	Oil		2 gallon acre
	Recover RX		2 gallon acre
	Copper		2 lbs acre
July	Mustang		4.3 oz acre
	Oil		2 gallon acre
	Pottasium Nitrate		5 lbs acre
	Microtech CT		1Gal acre
Early August	Copper		2 lbs acre
August	Admire Resets		2.8 oz acre
Late August	Imidan		1 lbs acre
	Oil		2 gal acre
	TKO		29 oz acre
	Recover RX		2 gal acre
September	VoliamFlexi		7 oz acre
	Copper		2 lbs acre
October	Actara		4 oz acre
	Oil		2 gallon acre
	Pottasium Nitrate		5 lbs acre
	Microtech CT		1Gal acre
December	Delegate		4 oz acre
	Oil		2 gal acre
	TKO		29 oz acre
	Recover RX		2 gal acre

2014

Late January	Malathion	5 pt/acre
	Induce	16 oz/acre
	CN9	36 oz/acre
	Solubor	1 lb/acre
	Platinum 75 SG	0.0131 oz/tree (resets to 5')
Mid February	Movento	16 oz/acre
	Oil	3% v/v
	TKO	30 oz/acre
	Recover RX (3-18-18)	2 gal/acre
Late February	Border spray	
	Mustang	4.3 oz/acre
Early March	Admire Pro	0.05oz/tree (resets to 5')
Mid March	Closer	4 oz/acre
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Molybdate	0.85 oz/acre
	Sodium Borate (Solubor)	3.3 lbs/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre
	435 oil	2.5 gal/acre
	Enable	8 oz/acre
	Belay 50 WDG	0.0458 oz/tree (resets 5' to 9')
Mid April	Imidan	1 lb/Acre
	Oil	3% v/v
	TKO	30 oz/acre
	Recover RX (3-18-18)	2 gal/acre
	ManZinc	2 qt/acre
	Copper	2 lb/acre
	Admire Pro	0.05oz/tree (resets to 5')
Early May	Platinum 75 SG	0.0262 oz/tree (resets 5' to 9')
Late May	Belay 50 WDG	0.0229 oz/tree (resets to 5')
Early June	Border spray	
	Agri-Flex	5 oz/acre
	Oil	3% v/v
Mid June	Delegate	4 oz/acre
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Molybdate	0.85 oz/acre
	Sodium Borate (Solubor)	3.3 lbs/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre
	435 oil	2.5 gal/acre

	Copper	2 lb/acre	
	Admire Pro	0.1 oz/tree (resets 5’ to 9’)	
Early July	Belay 50 WDG	0.0229 oz/tree (resets to 5’)	
Mid July	Border spray		
	Danitol	1 pt/acre	
Late July	Agri-Flex	5 oz/acre	
	Oil	3% v/v	
	Potassium Nitrate	5 lbs/acre	
	Copper	2 lbs/acre	
	Belay 50 WDG	0.0458 oz/tree (resets 5’ to 9’)	
August	Imidan	1 lbs/acre	
	Epson Salt (Mg sulfate)	8.5 lbs/acre	
	Techmangam (Mn sulfate)	8.5 lbs/acre	
	Zinc Sulfate	2.8 lbs/ acre	
	Sodium Molybdate	0.85 oz/acre	
	Sodium Borate (Solubor)	3.3 lbs/acre	
	KNO3 spray grade (13-0-44)	8.5 lbs/acre	
	Salicylic Acid (Saver)	1 quart/acre	
	435 oil	5 gal/acre	
	Copper	2 lb/acre	
	Admire Pro	0.05 oz/tree	(resets to 5’)
Early September	Border spray		
	435 Oil	2 gal/acre	
	Admire Pro	0.1 oz/tree	(resets 5’ to 9’)
October	Voliamflexi	7oz/acre	
	Epson Salt (Mg sulfate)	8.5 lbs/acre	
	Techmangam (Mn sulfate)	8.5 lbs/acre	
	Zinc Sulfate	2.8 lbs/acre	
	Sodium Molybdate	0.85 oz/acre	
	Sodium Borate (Solubor)	3.3 lbs/acre	
	KNO3 spray grade (13-0-44)	8.5 lbs/acre	
	Salicylic Acid (Saver)	1 quart/acre	
	435 oil	2.5 gal/acre	
	Copper	2 lb/acre	
	Admire Pro	0.05 oz/tree	(resets to 5’)
November	Border Spray Malathion	5 pt/acre	
2015			
January	Malathion	5 pt/acre	
	Induce	16 oz/acre	
	CN9	36 oz/acre	
	Solubor	1 lb/acre	
	Platinum 75 SG	0.0131 oz/tree	
February	Movento	16oz/acre	
	Oil	3%v/v	
	Mustang (late)	4.3oz/acre	
Early March	Admire Pro	0.05oz/tree	(resets to 5’)

Mid March	Closer SC or Sivanto	4oz/acre or 10.5oz/acre
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Borate (Solubar)	3.3 lbs/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre
	435 oil	2.5 gal/acre
	Enable	8 oz/acre
Late March	Mustang (late)	4.3 oz/acre
	Border Spray	
Mid April	Imidan	1 lb/acre
	Li 700	16oz/acre
	Oil	3%v/v
	ManZinc	2 qt/acre
	Copper	2 lb/acre
	Admire Pro	0.05oz/tree (resets to 5')
Early May	Platinum 75 SG	0.0262 oz/tree (resets 5' to 9')
Late May	Belay 50 WDG	0.0229 oz/tree (resets to 5')
June	Agri-Flex	5 oz/aqcre
	Oil	3% v/v
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Borate (Solubar)	3.3 lbs/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre
	Copper	2 lb/acre
	Admire Pro	0.1 oz/tree (resets 5' to 9')
Early July	Belay 50 WDG	0.0229 oz/tree (resets to 5')
Mid July	Border spray	
	Mustang and Copper	4oz & 8 lbs/acre
Late July	Agri-Flex	5 oz/acre
	Oil	3% v/v
	Potassium Nitrate	5 lbs/acre
	Copper	2 lbs/acre
	Belay 50 WDG	0.0458 oz/tree (resets 5' to 9')
August	Imidan	1 lb/acre
	Li700	16 oz/acre
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Borate (Solubar)	3.3 lbs/acre
	Sodium Molybdate	.85 oz/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre

	Copper	2 lb/acre
	435 oil	5 gal/acre
	Admire Pro	0.05 oz/tree (resets to 5')
September	Actara	4 oz/acre
	Border Spray	
	Admire Pro	0.1 oz/tree (resets 5' to 9')
October	Dimethoate	1 pint/acre
	Epson Salt (Mg sulfate)	8.5 lbs/acre
	Techmangam (Mn sulfate)	8.5 lbs/acre
	Zinc Sulfate	2.8 lbs/acre
	Sodium Borate (Solubar)	3.3 lbs/acre
	Sodium Molybdate	.85 oz/acre
	KNO3 spray grade (13-0-44)	8.5 lbs/acre
	Salicylic Acid (Saver)	1 quart/acre
	Copper	2 lb/acre
	435 oil	5 gal/acre
	Admire Pro	0.05 oz/tree (resets to 5')
November	Border Spray	Malathion 5 pt/acre
December	Danitol	1 pt/acre

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