CRDF Bactericide Survey Report Jan 2019

CRDF survey of the commercial use of bactericides in Florida citrus.

(2016/2017 and 2017/2018).

CRDF staff approached growers in the Central Ridge, Indian River, and Southwest FL

A total of 48 cooperator locations with various aged trees, rootstocks and scions.

Staff set up field trials over 2 years

Data: Fruit yield (kg/tree), fruit drop (%), PCR cycle threshold count (CT), and visual disease index score (DI).

48 locations Table 1

Tree age (years)

Table 1. Grower cooperator locations and dataset contribution

Tree age (years)	Region	Trial Site Code	Planting date	Rootstock	Scion	Yield Season 1	Yield Season 2	Drop Season 1	Drop Season 2	DI Season 1	DI Season 2	CT Season 1	CT Season 2
5	River	Grapefruit 1	2013	Sour	RayRuby	X	X	X	X	X	X	X	X
5	River	Grapefruit 3	2013	Sour	RayRuby	X	X	X	X	X	X	X	X
29	River	Grapefruit 5	1989	Swingle	Flame	X		X		X	X	X	X
29	River	Grapefruit 7	1989	Swingle	Flame	X	X	X	X	X	X	X	X
29	River	Grapefruit 8	1989	Swingle	Flame					X	X	X	X
6	SW	Hamlin 3	2012	Carrizo	Hamlin	X		X		X	X	X	
33	River	Hamlin 4	1985	Sour	Hamlin	X	X	X	X	X	X	X	X
4	SW	Hamlin 5	2014	Swingle	Hamlin					X	X	X	X
27	SW	Hamlin 6	1991	F80	Hamlin	X		X		X	X	X	
7	SW	Hamlin 7	2011	Carrizo	Hamlin	X		X		X	X	X	
6	SW	Hamlin 8	2012	Swingle	Hamlin	X		X		X	X	X	X
11	Ridge	Hamlin 12	2007	Cleo	Hamlin		X		X	X	X	X	X
11	Ridge	Hamlin 13	2007	Swingle	Hamlin		X		X	X	X	X	X
11	Ridge	Hamlin 14	2007	Carrizo	Hamlin		X		X	X	X	X	X
10	Ridge	Hamlin 15	2008	Swingle	Hamlin		X		X	X	X	X	X
11	SW	Hamlin 16	2007	Kuharske	Hamlin					X	X	X	X
11	Ridge	Hamlin 17	2007	Cleo	Hamlin		X		X	X	X	X	X
9	SW	Midsweet 2	2009	Carrizo	Midsweet	X		X		X	X	X	
10	SW	Midsweet 3	2008	Swingle	Midsweet	X		X		X	X	X	X
11	SW	Midsweet 4	2007	Swg/Kuhr	Midsweet		X		X	X	X		X
3	SW	Valencia 3	2015	Carrizo	Valencia	X		X		X	X	X	
16	SW	Valencia 4	2002	Kuharske	Valencia	X	X	X	X	X	X	X	X
16	SW	Valencia 5	2002	Kuharske	Valencia	X	X	X	X	X	X	X	X
10	SW	Valencia 6	2008	Kuharske	Valencia	X	X	X	X	X	X	X	X
10	River	Valencia 7	2008	Swingle	Valencia	X		X		X	X	X	X
10	River	Valencia 8	2008	Swingle	Valencia	X		X		X	X	X	X
10	River	Valenica 9	2008	Swingle	Valencia	X		X		X	X	X	X
26	SW	Valencia 12	1992	Carrizo	Valencia	X		X		X	X	X	X

Con’t …48 total locations

Bactericide treatment =

Region, tree age, rootstocks, scions,

bactericide products, timing, dosage,

number of applications, and tank mix

including choice of adjuvants

Data Year 1

+ Year 2

Var / Location Age/ RtSt	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	Adjuvant_May2016	BA_Jun2016	BA_Jul2016	BA_Aug2016	Adjuvant_Aug2016	BA_Sep2016	BA_Oct2016	BA_Nov2016	BA_Dec2016	BA_Jan2017	Adjuvant_Jan2017	BA_Feb2017	BA_Mar2017	Adjuvant_Mar2017	BA_Apr2017	Adjuvant_Apr2017	BA_May2017	Adjuvant_May2017	BA_Jun2017	Adjuvant_Jun2017	BA_Jul2017	BA_Aug2017	BA_Sep2017	BA_Oct2017		BA_Nov2017	BA_Dec2017	BA_Jan2018	BA_Feb2018	Adjuvant_Feb2018	BA_Mar2018	Adjuvant_Mar2018	BA_Apr2018	Adjuvant_Apr2018	BA_May2018	Adjuvant_May2018	BA_Jun2018	Adjuvant_Jun2018
Grfrt 1/Riv 5 / SO	Mycoshield	LI-700	FireLine	LI-700	FireLine	LI-700			FireWall	LI-700								Mycoshield	ZnSulphate	Mycoshield	ZnSulphate	Mycoshield	ZnSulphate	Mycoshield	ZnSulphate			Mycoshield					Mycoshield	ZnSulphate	Mycoshield	ZnSulphate	Mycoshield	ZnSulphate	Mycoshield	ZnSulphate	Mycoshield	ZnSulphate

	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	Adjuvant_2016	BA_May2016	Adjuvant_May2016	BA_June2016	BA_July2016	BA_Aug2016	Adjuvant_Aug2016	

	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	Adjuvant_May2016	BA_June2016	BA_July2016	Adjuvant_July2016	BA_Aug2016	Adjuvant_Aug2016	BA_Sep2016	BA_Oct2016	BA_Nov2016	Adjuvant_Nov2016
Ham 5/SW 4 / Swg	Mycoshield	LI_700	Mycoshield	LI_700		Mycoshield	LI_700	Mycoshield	LI_700			Mycoshield	LI_700

	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	Adjuvant_May2016	BA_Jun2016	BA_Jul2016	BA_Aug2016	BA_Sep2016	BA_Oct2016	Adjuvant_Oct2016
Ham 8/ SW 6 / Swg	FireLine	Tactic	FireWall	Tactic					FireLine	N_Sure

	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	BA_Jun2016	BA_Jul2016	Adjuvant_Jul2016	BA_Aug2016	BA_Sep2016	Adjuvant_Sep2016	BA_Oct2016	Adjuvant_Oct2016	BA_Nov2016	BA_Dec2016	BA_Jan2017	BA_Feb2017	Adjuvant_Feb2017	BA_Mar2017	Adjuvant_Mar2017	BA_Apr2017	Adjuvant_Apr2017
Ham 12/Rid 11/Cleo	Mycoshield	Pas-800	FireLine	Pas-800			Mycoshield	Pas-800		Mycoshield	LI-700	FireWall	LI-700				Mycoshield	Pas-800	Mycoshield	Pas-800	Mycoshield	Pas-800

	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	BA_June2016	Adjuvant_June2016	BA_July2016	Adjuvant_July2016	BA_Aug2016	BA_Sep2016	Adjuvant_Sep2016	BA_Oct2016	Adjuvant_Oct2016	BA_Nov2016	BA_Dec2016	BA_Jan2017	BA_Feb2017	Adjuvant_Feb2017
Ham 16/ SW 11 / Kuh	FireLine	Sil-MES	FireLine	Sil-MES		FireLine	Sil-MES	Mycoshield	LI-700		Mycoshield	LI-700	FireWall	LI-700				Mycoshield	LI-700

	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	BA_Jun2016	BA_Jul2016	BA_Aug2016	Adjuvant_Aug2016
MidSwt 2/SW 9 / Carr	FireLine	Tactic				FireLine	Tactic

	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	Adjuvant_May2016	BA_Jun2016	Adjuvant_Jun2016	BA_Jul2016	BA_Aug2016	Adjuvant_Aug2016	BA_Sep2016	BA_Oct2016	Adjuvant_Oct2016	BA_Nov2016	Adjuvant_Nov2016	BA_Dec2016	BA_Jan2017	BA_Feb2017	Adjuvant_Feb2017	BA_Mar2017	BA_Apr2017	BA_May2017	BA_Jun2017	Adjuvant_Jun2017	BA_Jul2017	BA_Aug2017	Adjuv Aug2	Adjuvant_Apr2018	BA_May2018	Adjuvant_May2018
Val 4/ SW 16 / Kuh	FireLine	Tactic	FireWall		Mycoshield	435_Oil		FireLine	435_Oil		Mycoshield	LI-700	FireWall	Tactic			FireLine	Exit				FireWall	435_Oil		FireWall	435_	Response	FireLine	Response

	BA_May2016	Adjuvant_May2016	BA_Jun2016	BA_Jul2016	Adjuvant_Jul2016	BA_Aug2016	BA_Sep2016	Adjuvant_Sep2016	BA_Oct2016	BA_Nov2016	Adjuvant_Nov2016	BA_Dec2016	BA_Jan2017	Adjuvant_Jan2017	BA_Feb2017	BA_Mar2017	BA_Apr2017	BA_May2017	BA_Jun2017	Adjuvant_Jun2017	BA_Jul2017	BA_Aug2017	Adjuvant_Aug2017	BA_Se 17
Val 12/ SW 26 /Carr	FireLine	KeyPlex445		FireWall	KeyPlex445		Mycoshield	LI-700		FireWall	PT_Surf_90_10		Mycoshield	LI-700					FireWall	LI-700		FireLine	LI-700	

	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	Adjuvant_Apr2016	BA_May2016	Adjuvant_May2016	BA_Jun2016	BA_Jul2016	BA_Aug2016	Adjuvant_Aug2016	BA_Sep2016	BA_Oct2016	BA_Nov2016	BA_Dec2016	BA_Jan2017	Adjuvant_Jan2017	BA_Feb2017	BA_Mar2017	BA_Apr2017	Adjuvant_Apr2017	BA_May2017	BA_Jun2017	Adjuvant_Jun2017	BA_Jul2017	BA_Aug2017	BA_Sep2017	BA_Oct2017	Adjuv Oct2
Val 17/ Rid 21 / Swg	Mycoshield	LI-700	Mycoshield	Orocit	FireLine				Mycoshield						Mycoshield	Orocit			Mycoshield	Orocit		Mycoshield	Enhance				Mycoshield	DW_Surfactant

	BA_Mar2016	Adjuvant_Mar2016	BA_Apr2016	BA_May2016	Adjuvant_May2016	BA_June2016	BA_July2016	Adjuvant_July2016	BA_Aug2016	BA_Sep2016	Adjuvant_Sep2016	BA_Oct2016	Adjuvant_Oct2016	BA_Nov2016	BA_Dec2016	BA_Jan2017	BA_Feb2017	BA_Mar2017	Adjuvant_Mar2017	BA_Apr2017	Adjuvant_Apr2017	BA_May2017	Adjuvant_May2017	BA_June2017	Adjuvant_June2017	BA_July2017	BA_Aug2017	BA_Sep2017	Adjuvant_Sep2017	BA_Oct2017	Adjuvant_Oct2017	BA_Nov2017	BA_Dec2017	BA_Jan2018	BA_Feb2018	BA_Mar2018	Adjuvant_Mar2018	BA_Apr2018	Adjuvant_Apr2018
Val 38/ Rid 20+/ Kuh	Mycoshield	Pas-800		FireLine	Pas-800		Mycoshield	Pas-800		Mycoshield	LI-700	FireWall	LI-700					Mycoshield	Pas-800	Mycoshield	Pas-800	Mycoshield	Pas-800	Mycoshield	Pas-800			Mycoshield	Pas-800	Mycoshield	LI-700					Mycoshield	LI-700	Mycoshield	LI-700

Adjuvants

- LI-700*
- Pas-800
- Enhance
- Zn Sulphate
- Tactic
- Keyplex-445
- Oil-435, Oil
- N_Sure*
- KNO_3
- Sil-MES
- PT_Surf_90_10
- Exit
- Orocit
- JointVenture*
- DW Surfactant
- Response …

Single block design

2 Block Design

Fruit Yield (40 kg = 90 lb box) 16 locations w/ 2 years:

Tree age

Table 2. Effect of bactericide application on citrus fruit yield (kg/tree)

Trial	Location	Rootstock	Scion	Year	Control		Bactericide Treated		SE	P ≤
Grapefruit_01	Indian_River	RayRuby	Sour_Orange	1	39		39		4.5	0.983
Grapefruit_01	Indian_River	RayRuby	Sour_Orange	2	35		25	box	4.5	0.141
Grapefruit_03	Indian_River	RayRuby	Sour_Orange	1	.75 30	<	45	1.1	4.5	0.023
Grapefruit_03	Indian_River	RayRuby	Sour_Orange	2	26		22		4.5	0.581
Grapefruit_07	Indian_River	Grapefruit	Sour_Orange	1	119		119		6.4	0.979
Grapefruit_07	Indian_River	Grapefruit	Sour_Orange	2	2.4 96	<	113	2.8	6.4	0.061
Hamlin_04	Indian_River	Hamlin	Sour_Orange	1	3.6 143	>	118	3	6.4	0.007
Hamlin_04	Indian_River	Hamlin	Sour_Orange	2	2.6 106	>	91	2.3	6.4	0.082
Valencia_04	SouthWest	Valencia	Kuharske	1	26		28		6.4	0.887
Valencia_04	SouthWest	Valencia	Kuharske	2	26		23		6.4	0.688
Valencia_05	SouthWest	Valencia	Kuharske	1	41		41		6.4	0.918
Valencia_05	SouthWest	Valencia	Kuharske	2	43		41		6.4	0.830
Valencia_06	SouthWest	Valencia	Kuharske	1	58		53		6.4	0.564
Valencia_06	SouthWest	Valencia	Kuharske	2	41		46		6.4	0.587
Valencia_15	Ridge	Valencia	Swingle	1	80		78		6.4	0.904
Valencia_15	Ridge	Valencia	Swingle	2	82		71		6.4	0.224
Valencia_16	Ridge	Valencia	Swingle	1	83		86		6.4	0.723
Valencia_16	Ridge	Valencia	Swingle	2	60		69		6.4	0.322
Valencia_17	Ridge	Valencia	Swingle	1	48		54		3.2	0.186
Valencia_17	Ridge	Valencia	Swingle	2	115		111		3.2	0.300
Valencia_23	Southwest	Valencia	Swingle	1	25		26		6.4	0.894
Valencia_23	Southwest	Valencia	Swingle	2	14		13		6.4	0.880
Valencia_28	Ridge	Valencia	Swingle	1	76		68		5.7	0.303
Valencia_28	Ridge	Valencia	Swingle	2	62		73		5.7	0.160

4
5
29
32
33

Treatment

Inc. yield

Not yr 2 w low yield

Inc yield yr 2

dec. yield

both yrs

ns.

(Table 2 con't) Fruit Yield (40 kg = 1 box) in both years

Trial	Location	Rootstock	Scion	Year	Control	Treated	SE	P ≤
Valencia_29	Ridge	Valencia	Kuharske	1	56	58	6.4	0.831
Valencia_29	Ridge	Valencia	Kuharske	2	47	43	6.4	0.591
Valencia_30	Ridge	Valencia	Kuharske	1	36	33	6.4	0.728
Valencia_30	Ridge	Valencia	Kuharske	2	35	22	6.4	0.147
Valencia_31	SouthWest	Valencia	Kuharske	1	62	56	6.4	0.493
Valencia_31	SouthWest	Valencia	Kuharske	2	36	42	6.4	0.469
Valencia_38	Ridge	Valencia	Kuharske	1	4.6 185 >	145 3.6	6.4	0.0001
Valencia_38	Ridge	Valencia	Kuharske	2	90	80	6.4	0.267

20+ yrs

Treatment

ns.

dec. yield

ns in yr 2 lower yd

Overall, of 16 two year data locations, Bact. Trt inc. yield in 2 sites, 3 sites dec. yield

Control averaged 1.6 boxes vs. Bactericide Trts 1.5 boxes (ns)

Fruit Yield (40 kg = 1 box) in Year 1 (2016-17); 15 locations, Bact. Trt. reduced yield

Table 4. Effect of bactericide application in year 1 only on citrus fruit yield (kg/tree)

Age	Trial	Location	Rootstock	Scion	Control		Treated		SE	P ≤	Treatment
29	Grapefruit_05	IndianRiver	Swingle	Grapefruit	3.4 136	>	80	2 boxes	9.18	< 0.0001	dec.
	Hamlin_03	Southwest	Carrizo	Hamlin	41		37		9.18	0.750	ns
	Hamlin_06	Southwest	F_80	Hamlin	160		139		9.18	0.113	
	Hamlin_07	Southwest	Carrizo	Hamlin	31		29		9.18	0.872	
	Hamlin_08	Southwest	Swingle	Hamlin	44		29		9.18	0.279	
9	Midsweet_02	Southwest	Carrizo	Midsweet	2.7 109	<	135	3.4	9.18	0.050	Inc.
	Midsweet_03	SouthWest	Swingle	Midsweet	98		94		9.18	0.729	ns
	Valencia_03	SouthWest	Carrizo	Valencia	3		0		9.18	0.834	
	Valencia_07	Indian_River	Swingle	Valencia	73		71		9.18	0.883	
	Valencia_08	Indian River	Swingle	Valencia	70		73		9.18	0.803	
	Valencia_09	Indian_River	Swingle	Valencia	77		80		9.18	0.815	
	Valencia_12	Southwest	Carrizo	Valencia	89		93		9.18	0.716	
	Valencia_13	Southwest	Carrizo	Valencia	104		100		12.99	0.773	
	Valencia_14	Southwest	Carrizo	Valencia	100		89		9.18	0.417	
26	Valencia_22	Southwest	Carrizo	Valencia	1.5 60	>	36	0.9	9.18	0.069	dec. yield

Overall 15 sites Year 1: Control averaged 2 boxes vs 1.8 boxes* Treated

Year 2 only 12 locations: 1.5 Control vs. 1.52 boxes NS

% Fruit Drop from 2 years data; 11 locations, treatment dec. drop at 2 sites, inc at 1

Overall, avg 33 % : No impact of bactericide

Treatment

Age

Year 1

Table 3. Effect of bactericide application on fruit dropped prior to harvest (% of total)

Age	Trial	Location	Rootstock	Scion	Year	Control		Treated		SE	P ≤
4	Grapefruit_01	Indian_River	RayRuby	Sour_Orange	1	50.8	>	40.4	%	3.18	0.024
5	Grapefruit_01	Indian_River	RayRuby	Sour_Orange	2	52.3	<	63.8		3.09	0.012
4	Grapefruit_03	Indian_River	RayRuby	Sour_Orange	1	55.5	>	37.5		3.11	< 0.0001
	Grapefruit_03	Indian_River	RayRuby	Sour_Orange	2	64.7		64.3		3.07	0.933
	Grapefruit_07	Indian_River	Grapefruit	Sour_Orange	1	5.3		5.9		1.83	0.834
	Grapefruit_07	Indian_River	Grapefruit	Sour_Orange	2	25.0		19.7		3.40	0.302
	Hamlin_04	Indian_River	Hamlin	Sour_Orange	1	12.5		18.9		3.33	0.140
	Hamlin_04	Indian_River	Hamlin	Sour_Orange	2	32.8		40.0		4.45	0.244
	Valencia_04	SouthWest	Valencia	Kuharske	1	44.9		43.9		4.54	0.877
	Valencia_04	SouthWest	Valencia	Kuharske	2	60.3		60.8		4.44	0.938
	Valencia_05	SouthWest	Valencia	Kuharske	1	24.1		29.3		4.04	0.347
	Valencia_05	SouthWest	Valencia	Kuharske	2	49.0		47.4		4.57	0.807
	Valencia_06	SouthWest	Valencia	Kuharske	1	15.5		14.8		2.95	0.873
	Valencia_06	SouthWest	Valencia	Kuharske	2	51.6		41.7		4.50	0.127
	Valencia_15	Ridge	Valencia	Swingle	1	10.9		13.0		2.76	0.578
	Valencia_15	Ridge	Valencia	Swingle	2	20.2		27.8		3.96	0.154
	Valencia_16	Ridge	Valencia	Swingle	1	16.9		11.2		2.56	0.162
	Valencia_16	Ridge	Valencia	Swingle	2	35.0		28.8		4.01	0.292
	Valencia_17	Ridge	Valencia	Swingle	1	33.1		32.7		2.10	0.900
	Valencia_17	Ridge	Valencia	Swingle	2	22.4		24.2		1.87	0.468
	Valencia_23	Southwest	Valencia	Swingle	1	40.9		43.6		4.54	0.681
	Valencia_23	Southwest	Valencia	Swingle	2	73.6		74.2		3.84	0.911

dec. drop

inc.

dec drop,

ns ↑ Yd, T2)

% Fruit Drop in Year 1 only; 15 sites: avg 16 % drop Cont vs 18% Treated *

Table 5. Effect of bactericide application in year 1 only on fruit dropped prior to harvest (% of total)

	Trial	Location	Rootstock	Scion	Control		Treated		SE	P ≤	Treatment
	Grapefruit_05	IndianRiver	Swingle	Grapefruit	5.7		10.0	%	2.14	0.106	ns
	Hamlin_03	Southwest	Carrizo	Hamlin	18.4		19.3		2.89	0.827	
	Hamlin_06	Southwest	F_80	Hamlin	6.0		6.8		1.75	0.756	
	Hamlin_07	Southwest	Carrizo	Hamlin	34.9		35.9		3.55	0.843	
5	Hamlin_08	Southwest	Swingle	Hamlin	25.4	<	48.5		3.71	0.000	Trt inc drop
	Midsweet_02	Southwest	Carrizo	Midsweet	13.4		12.6		2.40	0.824	
10	Midsweet_03	SouthWest	Swingle	Midsweet	8.1	<	14.1		2.52	0.063	Trt inc drop
	Valencia_03	SouthWest	Carrizo	Valencia	12.5		10.8		3.14	0.671	
	Valencia_07	Indian_River	Swingle	Valencia	19.1		19.6		2.90	0.913	ns
	Valencia_08	Indian River	Swingle	Valencia	21.2		17.9		2.80	0.423	
	Valencia_09	Indian_River	Swingle	Valencia	19.2		14.7		2.57	0.242	
	Valencia_12	Southwest	Carrizo	Valencia	22.3		22.4		3.06	0.995	
	Valencia_13	Southwest	Carrizo	Valencia	14.5		18.9		4.05	0.344	
	Valencia_14	Southwest	Carrizo	Valencia	14.0		17.3		2.76	0.371	
26	Valencia_22 *	Southwest	Carrizo	Valencia	22.4	<	30.5		3.40	0.083	Trt inc drop

% Fruit Frop in Year 2 only; of 17 locations, 2 inc. drop, 1 dec; 53% No Trt impact.

Table 6. Effect of bactericide application in year 2 only on fruit dropped prior to harvest (% of total)

Trial	Location	Rootstock	Scion	Control		Treated	SE	P ≤	Treatment
Hamlin_12	Ridge	Cleo	Hamlin	58.2		51.6 %	2.96	0.114	ns
Hamlin_13	Ridge	Swingle	Hamlin	52.4		48.1	2.96	0.304	
Hamlin_14	Ridge	Carrizo	Hamlin	62.3		56.8	2.93	0.184	
Hamlin_15	Ridge	Swingle	Hamlin	73.5		67.6	2.77	0.124	
Hamlin_17	Ridge	Cleo	Hamlin	66.4		68.0	2.77	0.672	
Midsweet_04	Southwest	Swingle_&_Kuharske	Midsweet	58.6		57.9	3.38	0.875	
Valencia_28	Ridge	Swingle	Valencia	48.0	>	40.1	2.60	0.037	dec. drop
Valencia_29	Ridge	Kuharske	Valencia	40.9	<	55.4	2.95	0.001	Inc. drop
Valencia_30	Ridge	Kuharske	Valencia	53.8		59.0	2.91	0.213	
Valencia_31	SouthWest	Kuharske	Valencia	23.6		23.8	2.51	0.958	
Valencia_32	SouthWest	Kuharske	Valencia	58.8	<	66.8	2.79	0.051	Inc. drop
Valencia_33	Ridge	Kuharske_&_US812	Valencia	63.5		61.3	2.88	0.584	ns
Valencia_34	Ridge	Kuharske	Valencia	59.9		65.0	2.82	0.213	
Valencia_35	Ridge	Kuharske	Valencia	48.2		53.4	2.96	0.216	
Valencia_37	Ridge	Kuharske	Valencia	39.0		40.5	2.91	0.725	
Valencia_38	Ridge	Kuharske	Valencia	49.3		50.5	2.96	0.787	
Valencia_39	Ridge	Kuharske	Valencia	46.3		40.9	2.91	0.196	

All locations (48), 2 yrs = 96 DIs: Overall, DI = 22 control vs. 22.2 *for treated trees. Of 20 locations impacted, 14 Inc. DI

6 dec. DI

Visual Disease Index (DI) significant (P< 0.10) impacts only

Table 7. Effect of bactericide application on disease index score (treatment-impacted locations only)

Trial	Location	Scion	Rootstock	Year	Control		Treated	SEM	P ≤	Treatment
Grapefruit_03	Indian_Rive	RayRuby	Sour_Orang	1	13.1	>	12.2	0.41	0.096	Improved (↑ Y,↓Dr)
Grapefruit_08	Indian_Rive	Grapefruit	Sour_Orang	2	25.8	<	27.2	0.58	0.092	Worse
Hamlin_04	Indian_Rive	Hamlin	Sour_Orang	1	21.7	<	24.4	0.58	0.001	appearance
Hamlin_06	Southwest	Hamlin	F_80	2	19.0	<	21.7	0.58	0.001	
Hamlin_16	Southwest	Hamlin	Kuharske	1	27.9	<	30.2	0.58	0.006	
Hamlin_16	Southwest	Hamlin	Kuharske	2	29.6	<	31.0	0.58	0.084	
Midsweet_03	SouthWest	Midsweet	Swingle	2	19.7	<	21.3	0.58	0.049	
Valencia_05	SouthWest	Valencia	Kuharske	1	20.2	<	21.6	0.58	0.089	
Valencia_05	SouthWest	Valencia	Kuharske	2	18.8	<	20.9	0.58	0.011	worse
Valencia_12	Southwest	Valencia	Carrizo	2	26.7	>	25.1	0.58	0.057	Improved
Valencia_13	Southwest	Valencia	Carrizo	2	24.6	<	26.5	0.58	0.018	
Valencia_14	Southwest	Valencia	Carrizo	1	22.4	>	20.9	0.58	0.063	Improved
Valencia_14	Southwest	Valencia	Carrizo	2	25.4	>	23.9	0.58	0.067	Improved
Valencia_21	Southwest	Valencia	Carrizo	2	23.7	<	25.8	0.58	0.011	
Valencia_23	Southwest	Valencia	Swingle	2	21.6	>	20.1	0.58	0.060	Improved
Valencia_30	Ridge	Valencia	Kuharske	1	25.3	<	27.0	0.58	0.039	
Valencia_32	SouthWest	Valencia	Kuharske	2	23.6	<	25.4	0.58	0.025	
Valencia_35	Ridge	Valencia	Kuharske	2	24.9	<	26.9	0.58	0.015	
Valencia_37	Ridge	Valencia	Kuharske	2	24.2	>	22.5	0.58	0.049	Improved
Valencia_38	Ridge	Valencia	Kuharske	2	23.0	<	24.4	0.58	0.074	Worse

76 sites had no treatment effects

PCR CT values significant impacts only (P < 0.01)

39 sites had 2 years, CT avg 29 (NS) Year 1 only: 5 dec. titer and 6 inc. titer In Year 2; no dec titer and 2 inc. titer

Table 8. Effect of bactericide application on PCR detection of HLB infection (CT Value; treatment-impacted locations only)

Trial	Location	Scion	Rootstock	Year	Control		Treated	SEM	P ≤	Treatment
Grapefruit_01	Indian_River	RayRuby	Sour_Orange	1	38.7	>	36.1	0.615	0.003	Inc. titer
Hamlin_05	Southwest	Hamlin	Swingle	1	36.3	>	34.2	0.870	0.093	> Inc.
Hamlin_08	Southwest	Hamlin	Swingle	1	33.8	>	30.1	0.870	0.003	> Inc.
Hamlin_13	Ridge	Hamlin	Swingle	1	26.4	<	29.6	0.870	0.011	Dec. titer
Hamlin_17	Ridge	Hamlin	Cleo	1	30.1	>	27.9	0.870	0.075	> Inc.
Valencia_07	Indian_River	Valencia	Swingle	2	31.7	>	28.3	0.870	0.006	> Inc.
Valencia_13	Southwest	Valencia	Carrizo	1	25.4	<	27.8	0.870	0.052	Dec. titer
Valencia_23	Southwest	Valencia	Swingle	1	34.5	<	36.9	0.870	0.058	Dec. titer
Valencia_28	Ridge	Valencia	Swingle	2	30.9	>	27.7	0.778	0.004	Inc. titer
Valencia_31	SouthWest	Valencia	Kuharske	1	25.4	<	27.8	0.870	0.060	Dec. titer
Valencia_34	Ridge	Valencia	Kuharske	1	30.2	>	26.7	1.227	0.020	Inc. titer
Valencia_38	Ridge	Valencia	Kuharske	1	36.9	>	33.6	0.870	0.008	> Inc.
Valencia_40	Ridge	Valencia	Swingle	1	28.9	<	34.3	0.870	< 0.001	Dec. titer

No 40s

Effects of Bactericide applications on:

Yield from 16 locations with 2 years of data (Table 2):

Bactericide Trts increased yield at 2 sites, decreased at 3 sites; the rest NS

Overall: Control averaged 1.6 boxes vs. 1.5 boxes Treated (ns)

Yield Yr 1 only: 15 sites: yield increased at 1 site, Yld dec. at 2 sites (Table 4)

Control Avg: 2 boxes vs 1.8 boxes*Treated; Year 2 (1.5 vs. 1.52 boxes NS

Fruit Drop: 2 years, 11 sites, 2 dec, 1 inc. drop. (Table 5) Avg 33% No Trt effect

Year 1 only, 15 sites, 3 inc. drop; Avg: 16 % drop Control vs. 18% Treated *

Year 2 only; 17 sites, 2 inc. drop, 1 dec. Average 53 %, no Trt effect (T 6).

DI : Overall 48 sites, 2 yrs = 96 DIs = 22 control vs. 22.2 * for treated trees.

76 sites had no bactericide trt effects on DI

Of 20 sites impacted 14 looked worse, 6 appeared better (Table 7).

PCR CT : 39 locations had CTs for both years, Avg CT = 29 (ns);

Of 13 locations impacted, 8 higher titer, 5 had decreased titer (Table 8)