

# Rejuvenation of HLB Trees with Pruning and Subsequent Nutritional Programs to Maintain Tree Growth

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# Objective

1. Salvage and Rehabilitate HLB Trees to Avoid Replanting
2. Rebalance the Shoot Root/Ration Trees with Decline
3. Prune to Stimulate Regrowth and Feed new Foliage with Nutritional
4. Maintain Psyllid Mangement

# Rationale

- \$ = Tree Removal of Declining Tree
- \$ = Cost of New Nursery Tree
- \$ = Planting New Tree
- \$ = Care Costs for 4 yrs. till Production Begins
- \$ = Care Costs for additional 3 yrs. till Yield covers Production costs

# Rejuvenation of HLB trees

or what can growers do to stay in business?

## Treatments:

- A. Buckhorn pruned and standard un-pruned trees
- B. Foliar Nutritional to feed re-growth
  1. Boyd cocktail
  2. 2010 - Fortress (Phosphites Mg, Zn, Mn, Mo, Ca, Cu, Co, + B, Ni)  
2011 - added *20 lbs/ac KNO3 + Calcium Nitrate ground applied*
  3. 2010 - Fortress (Phosphites Mg, Zn, Mn, Mo, Ca, Cu, Co, + B, Ni)  
2011 - added *Urea + Calcium nitrate ground applied*
  4. *Control with 2 qts./ac liquid foliar*







# 2010 CROP YIELD after 1 season treatment

Unpruned trees		Lbs./tree	Boxes/acre
Control		33.6 b	49.3 b
Boyd		52.8 a	77.4 a
Fortress + KNO <sub>3</sub>		51.6 a	75.7 a
Fortress + Urea		51.6 a	75.7 a
Pruned (Buckhorn)			
Control		18.7 c	27.4 c
Boyd		15.0 c	22.0 c
Fortress + KNO <sub>3</sub>		20.1 c	29.5 c
Fortress + Urea		20.1 c	29.5 c



February 2010



February 2010







# 2010 Regrowth Shoot Lengths (cm)

Nutrient Treatment	March flush (Buckhorn)	May flush (Buckhorn)	Summer flush (Budkhorn)
Control	19.8 a	42.1 ab	26.8 a
Boyd	19.0 a	39.0 b	25.3 a
Fortress	18.8 a	43.1 a	26.5 a
Energy	20.3 a	42.2 ab	26.9 a
	(Standard)	(Standard)	(Standard)
Control	10.1 b	16.6 c	23.3 bc
Boyd	10.5 b	17.3 c	23.3 bc
Fortress	10.4 b	14.9 c	22.0 c
Energy	10.4 b	17.9 c	22.0 c

Tree Shape	March flush	May flush	Summer flush
Buckhorn	19.5 a	41.6 a	26.4 a
Standard	10.4 b	13.7 b	22.7 b

# 2011 Regrowth Shoot Lengths (cm)

Nutrient Treatment	March flush (Buckhorn)	Simmer flush (Buckhorn)	Fall flush (Budkhorn)
Control	22.8 ab	24.1 bc	11.6 ab
Boyd	23.5 a	29.0 a	12.1 ab
Fortress + KNO <sub>3</sub>	23.1 ab	28.1 a	11.9 ab
Fortress + Urea	24.7 a	27.2 b	12.7 a
	(Standard)	(Standard)	(Standard)
Control	18.8 d	21.1 d	11.2 bc
Boyd	21.0 bc	25.3 bc	11.0 bc
Fortress + KNO <sub>3</sub>	18.5 d	24.2 bc	10.3 c
Fortress + Urea	19.3 cd	24.0 bc	11.8 ab

Tree Shape	March flush	May flush	Summer flush
Buckhorn	23.5 a	27.1 a	16.1 a
Standard	19.4 b	23.7 b	11.1 b

01/24/11



March 2011







# Boyd Cocktail



Fortress + KNO<sub>3</sub>



Fortress + Urea



Control



Pruned June 2010, picture 01/15/2011



March 30, 2011









01/18/2011



January 18, 2011







Element (lb/ac/yr)		Boyd	Chemical Dynamics	Diamond R	Florida Phosphorus	Griffin	KeyPlex	Plant Food Systems
N		21	5	16	6	20	13	34
P		39	2	14	5	11	7	31
P2O5		54	7	37	18	26	3	33
B			0.58	0.12	0.05	0.18	0.08	0.11
Ca			1.32		0.32		0.24	
Co					0.01			
Cu			0.02		0.05	0.17		
Fe			0.78	0.67		0.16	0.41	0.46
Mg		2.5	0.53	2.78	0.24	2.13	0.57	1.30
Mn		8.16	3.77	4.60	0.28	1.12	0.83	0.93
Mo		0.06	0.01	0.02	0.01			0.01
Ni					0.01			
S		9.63		4.5		1.30	0.65	0.50
Zn		2.98	3.78	5.04	0.48	1.15	0.81	1.72
SA		yes	no	yes	yes	no	no	yes
H3PO3		yes	no	Yes	Yes	Yes	yes	Yes

# Cost Comparison of Nutrient Spray Programs for HLB

Program Name	Spray rate (gpa)	Total materials (\$/acre)	Nutrient only (\$/acre)	Number sprays (year)	Spray cost (/spray)	Total cost (\$/acre)
Boyd	250	518	313	3	40	433
Chemical Dynamics	125	90	90	4	25	190
Diamond R	125	266	210	5	25	335
Florida Phosphorus	125	157	157	4	25	257
Griffin	125	167	167	4	25	267
KeyPlex	125	193	193	5	25	318
Plant Food Systems	125	273	273	6	25	423

Citrus oil, SAver, Serenade, and hydrogen peroxide not considered nutrient products.  
Spray costs from R. Muraro, 2009-10.

# Take Home Message

## Bottom Line

1. Psyllid Management + Foliar Nutritional  
Reduces Re-inoculations & Allows Foliar  
Nutrition to Improve and Maintain Tree  
Health while Maintaining Economical  
Production.
2. Observation: (Most citrus growers are  
practicing a foliar nutrition program and  
seeing positive results)
3. HLB Trees can be Rehabilitated



# Appreciation to:

- CRDF (Citrus Research & Development Foundation)
- The citrus growers in Florida
- Diamond R Fertilizer
- Plant Food Systems
- The Scotts Company
- AgraQuest
- Flo-Tec, Inc.
- Bayer CropScience
- Valent USA
- Yara
- Florida Phosphorus, Inc.
- Triangle Chemical