Cultural Practices to Help Protect Young Trees from ACP and HLB

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SWFREC, Immokalee

Young Tree Issues

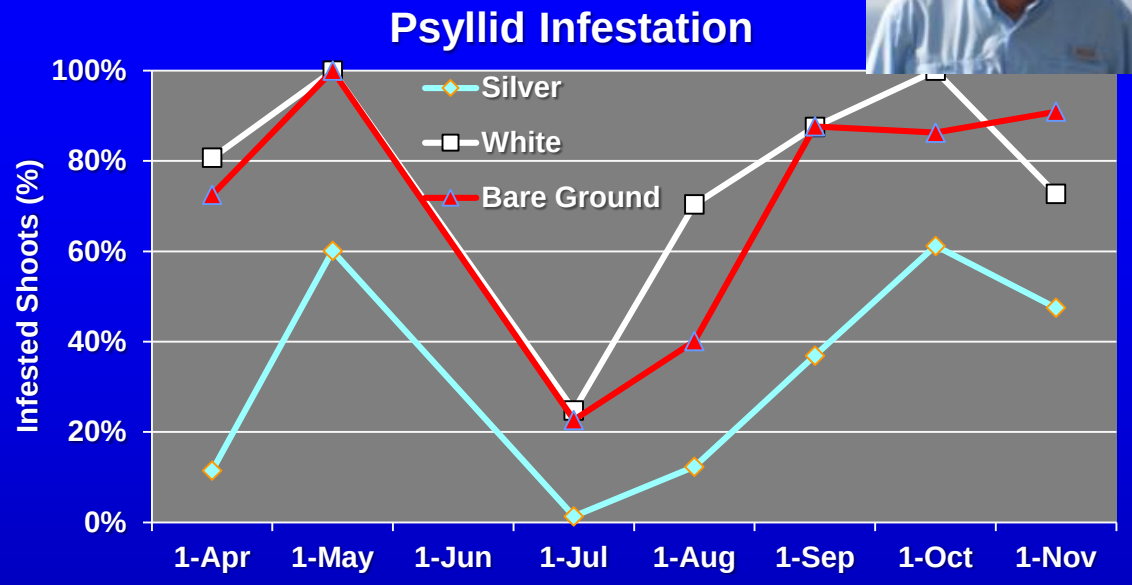
- Future of the Industry
- Objective accelerate economic return
  - Tree density
    - Resets vs solid set
  - Optimize growing conditions
  - ACP management
    - Local and regional control

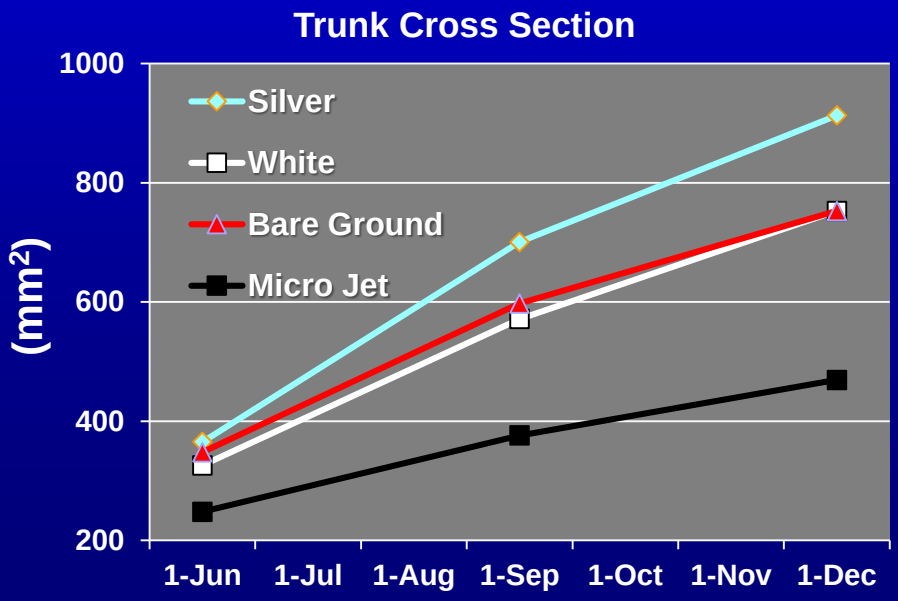
✓ Insecticides not sufficient

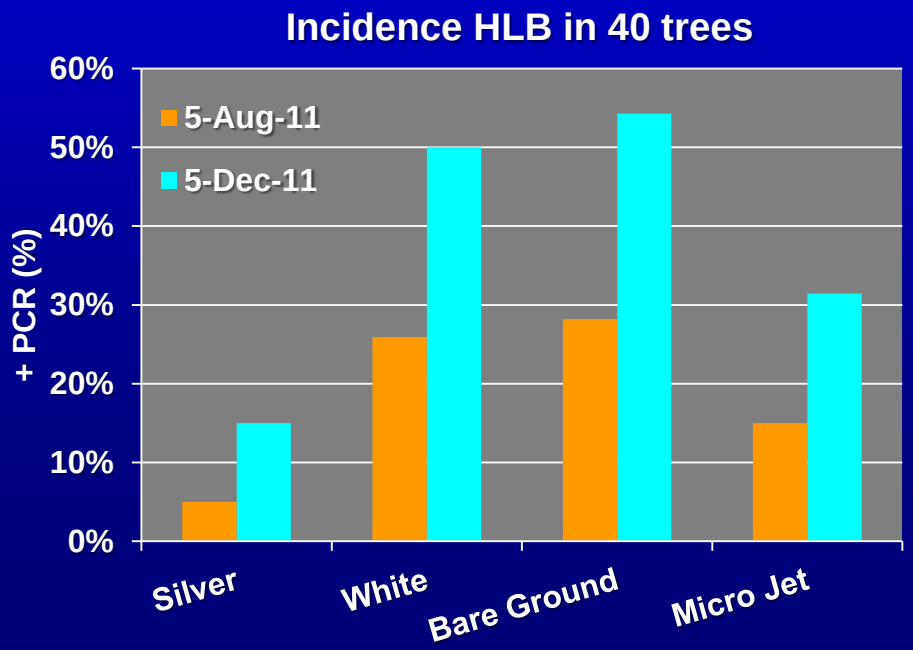
- Non-chemical strategies
  - UV Reflective Mulch
  - CUPS
  - Mini-CUPS
  - Other horticultural practices

Preliminary trial: Metalized UF Reflective Mulch

Croxton, S. D., & Stansly, P. A. (2014). Metalized polyethylene mulch to repel Asian citrus psyllid, slow spread of huanglongbing and improve growth of new citrus plantings. Pest management Sci, 70: 318-323





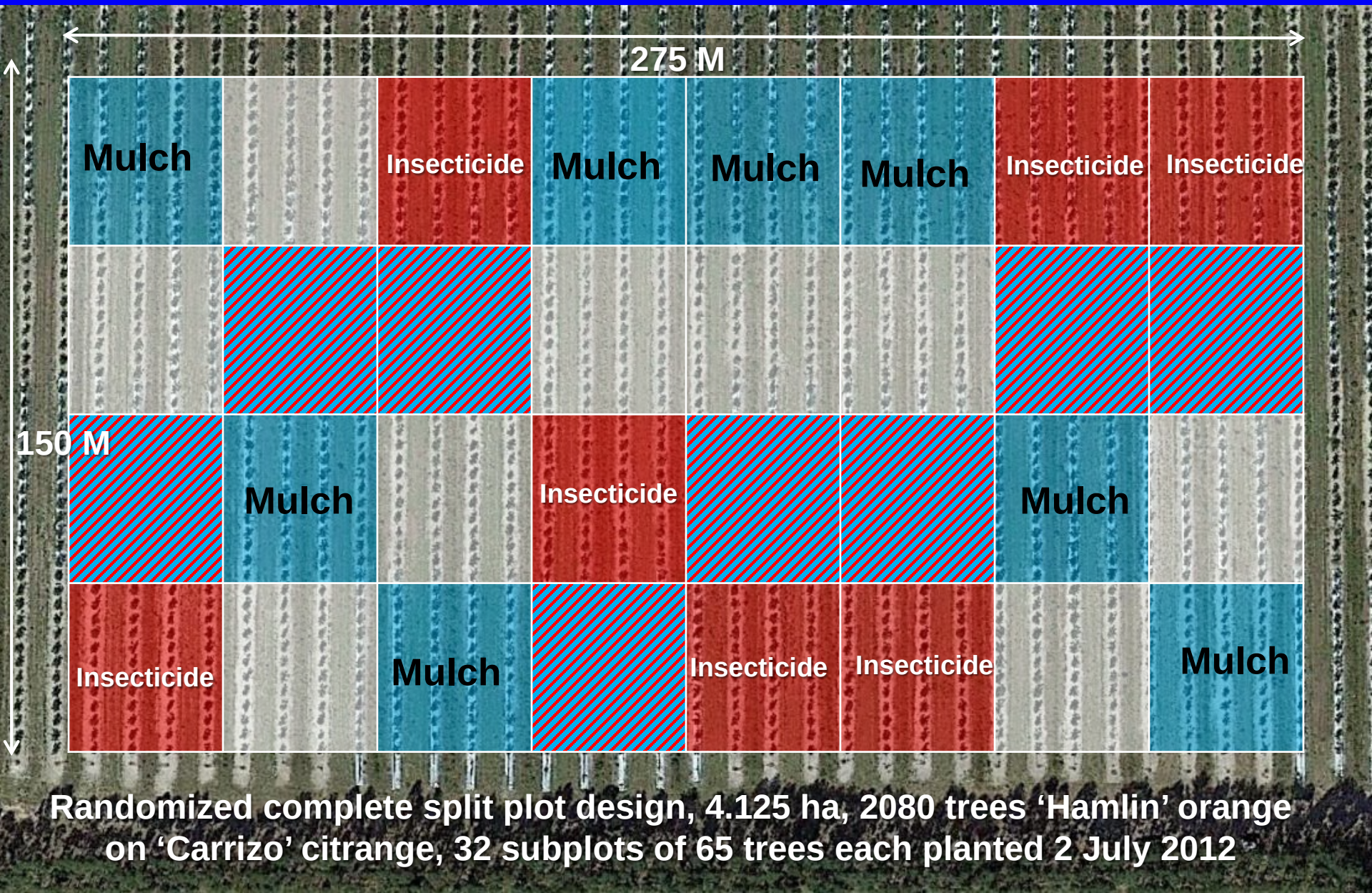


Large Scale Trial: Objective

Determine impact of metalized mulch, foliar nutrition, and insecticides on ACP, HLB, citrus growth and yield

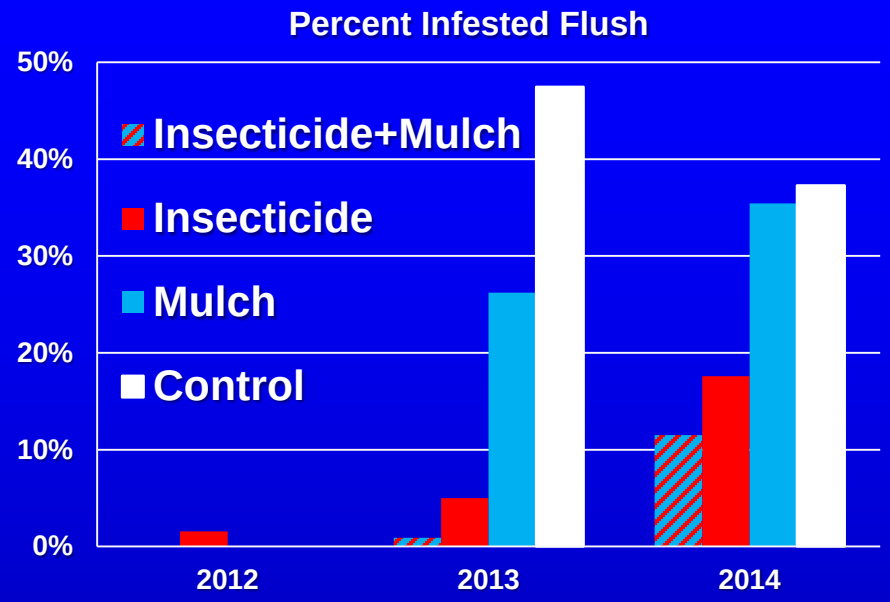
Plot plan, LaBelle FL 26° 38’ N, -81° 27’ W

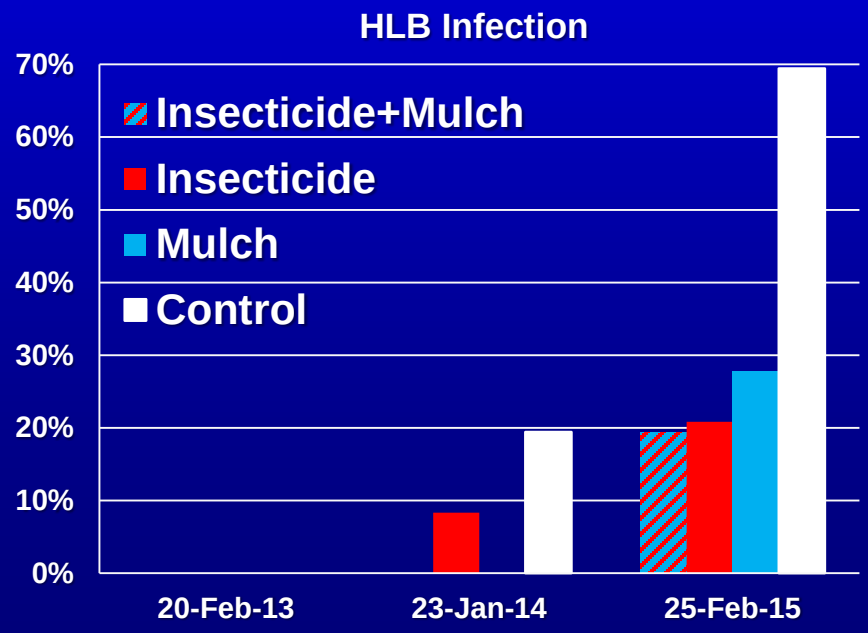
Nutrition factor not significant

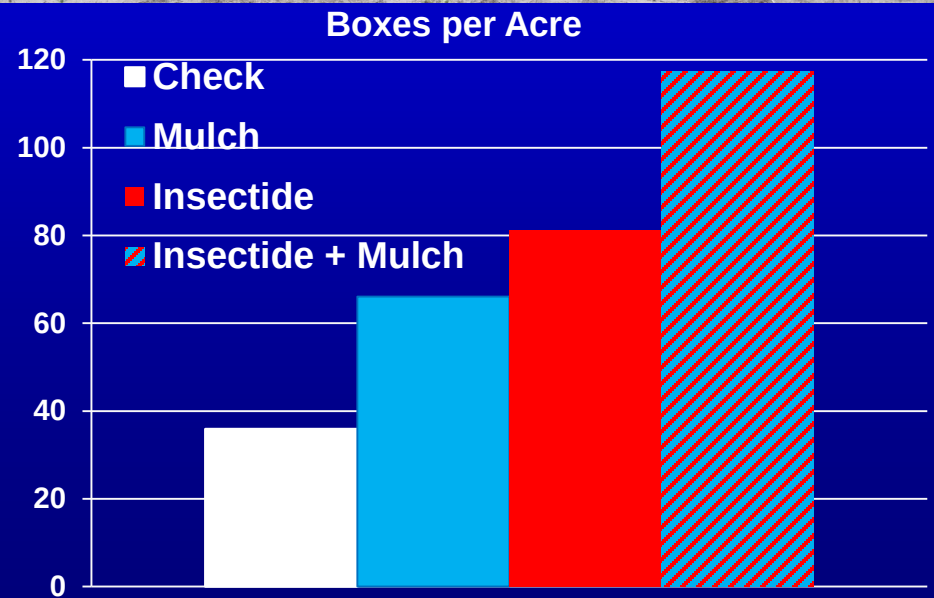


Randomized complete split plot design, 4.125 ha, 2080 trees ‘Hamlin’ orange on ‘Carrizo’ citrange, 32 subplots of 65 trees each planted 2 July 2012

Chemical Control + Reflective Mulch = Maximum Protection, Growth and Yield



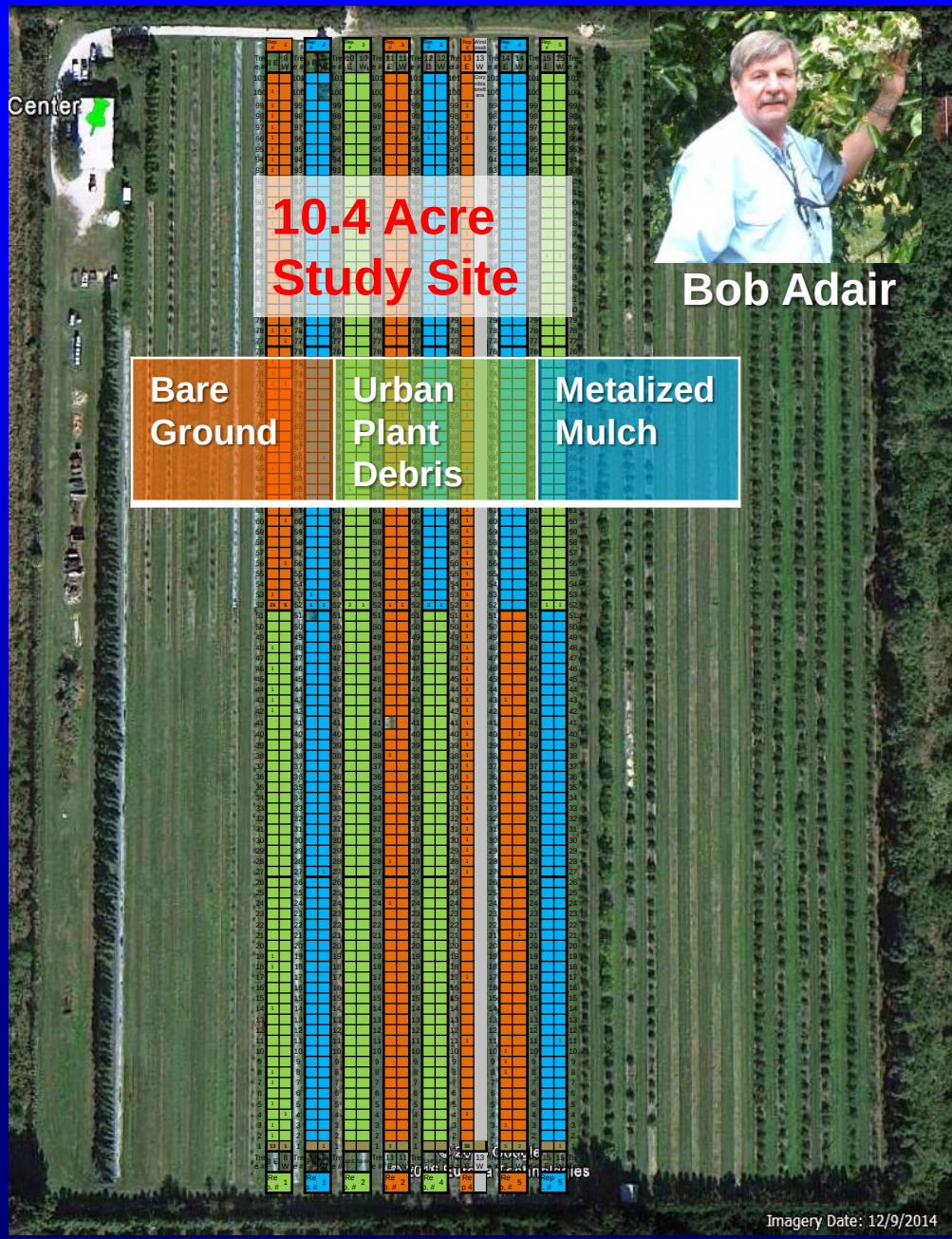




Stansly, Croxton & Sherrod, Citrus Industry, Mar 2016

Trial at FLARES, Vero Beach

- Ray Ruby Grapefruit on Sour Orange planted 17 Mar 2014 on 8 double beds @ 12’ x 25’
- 5 reps of 3 Treatments: (1)Bare Ground, (2) Compost (3) Metalized Reflective Mulch (MRM) in an RCB Design
- All trees received identical horticultural caretaking i.e. neonic drenches, sprays, fertilization, irrigation, etc.



Ground Preparation: Important!

Roller to firm up soil prior to laying MRM

MRM* Installation

Kennco Bedding Machine
Ruskin, Fla.

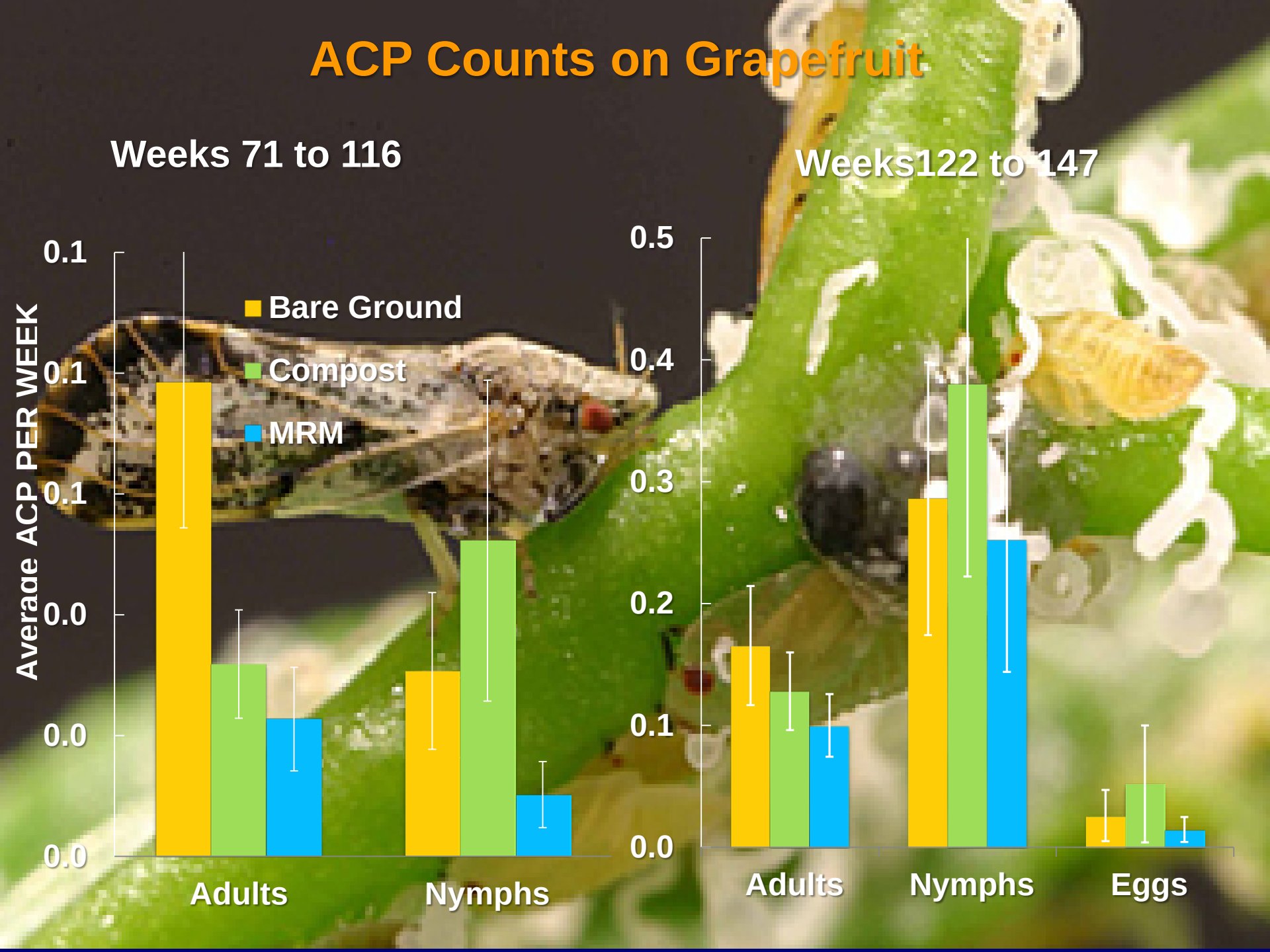
***Shine N' Ripe XL® is a 3 mil, 3 layer metalized polyethylene film 72 inches wide manu-factured by Imaflex Inc., Montreal CANADA**

Planting and Irrigation

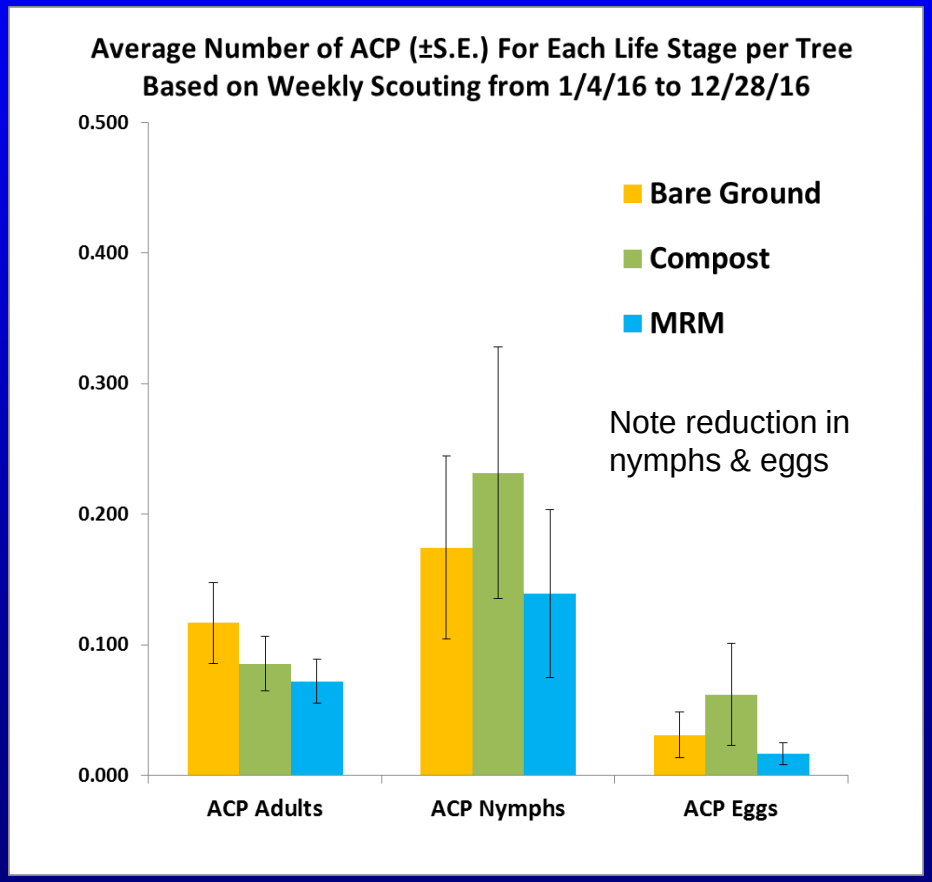
Each tree equipped with 2 Bowsmith® 2GPH Drippers

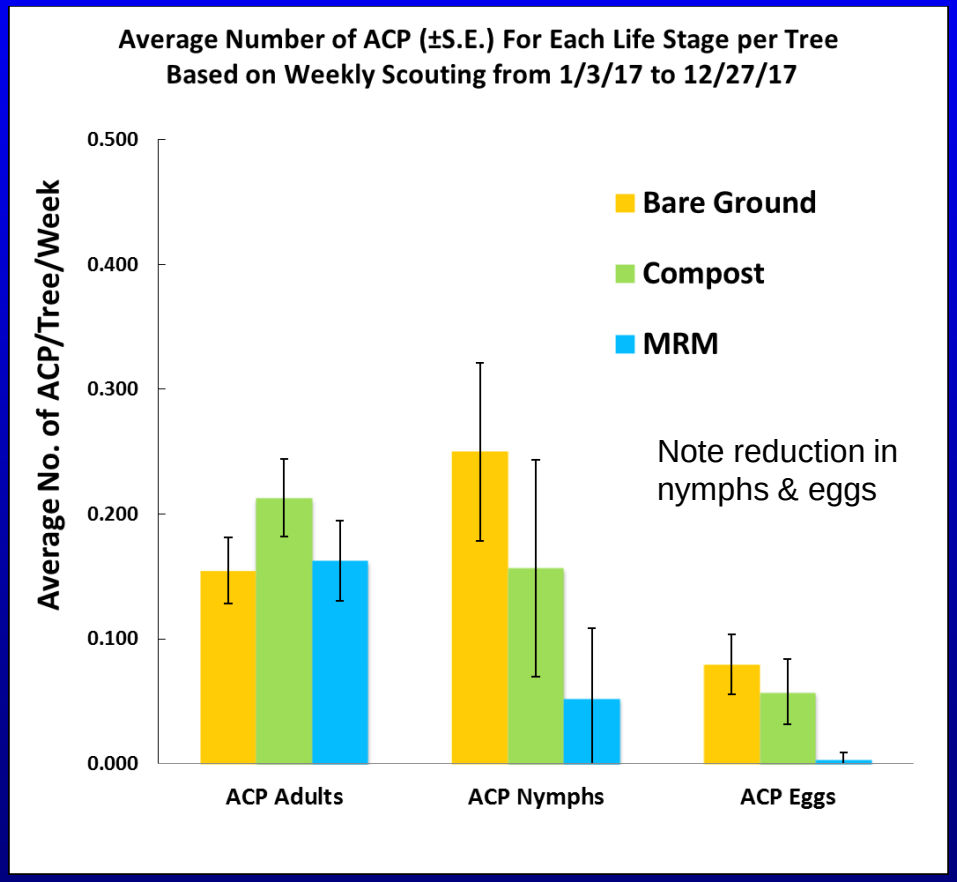
Weed Control

ACP Counts on Grapefruit



Average no. of ACP for Each Life Stage per Tree (±S.E.) Based on Weekly Scouting Annually For 2016 and 2017





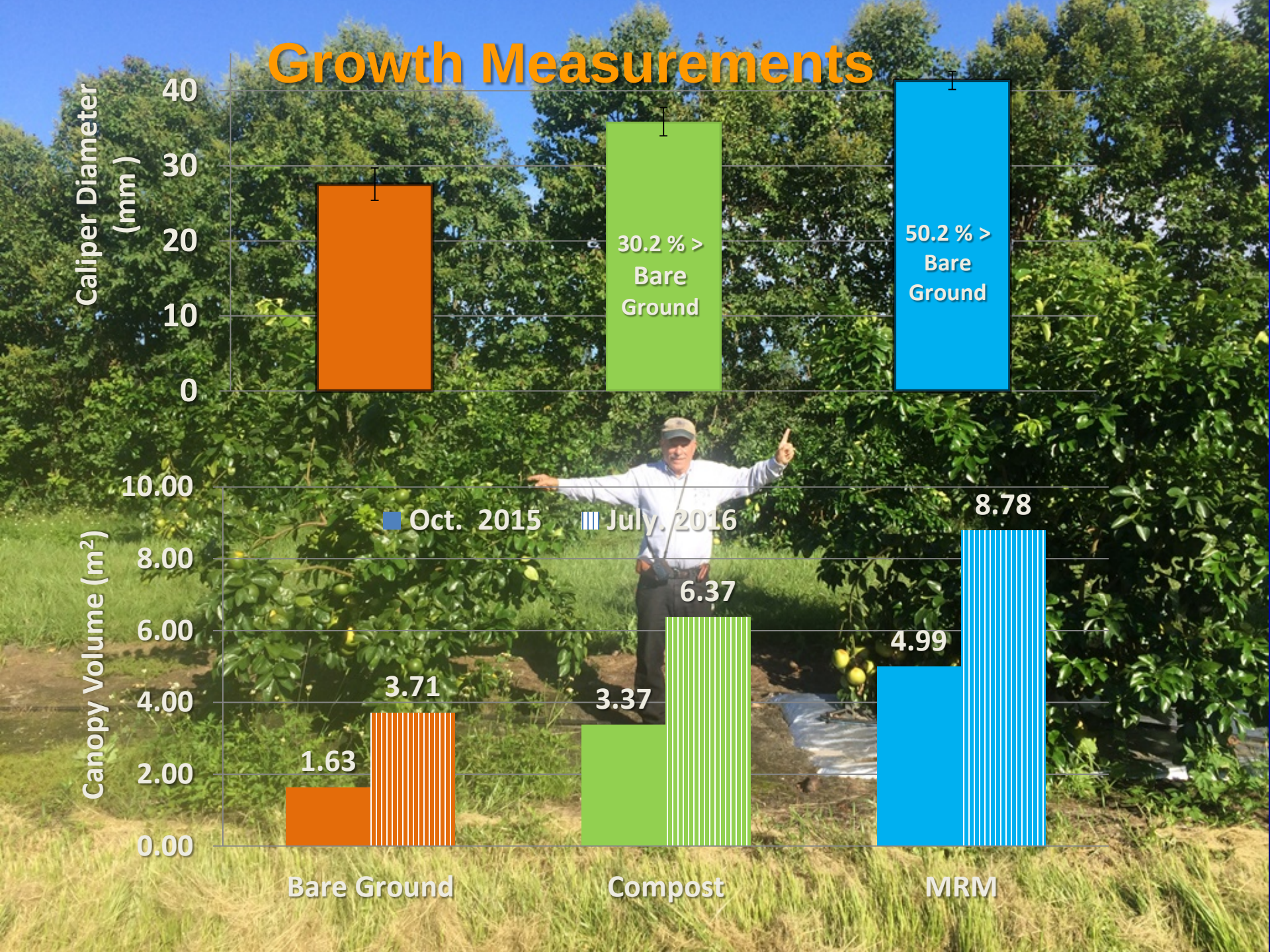
Relative HLB Incidence For Each Treatment Based on Real-Time PCR Analysis*

% HLB Positive Trees Based on Real-Time PCR Analysis* (n=20)		
Sample Date:	**02/14/2017**	**01/10/2018**
Bare Ground	**20%**	**100%**
Compost	**20%**	**100%**
MRM	**10%**	**85%**

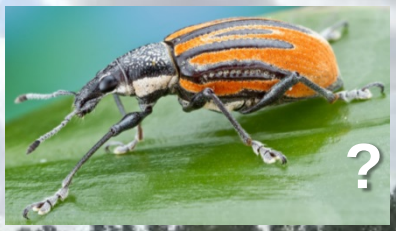
Average Ct Value for Each Treatment Based on Real-Time PCR Analysis* (n=20)		
Sample Date:	**02/14/2017**	**01/10/2018**
Bare Ground	**37.70** S.E. ± 1.10	**24.56** S.E. ± 0.48
Compost	**37.42** S.E. ± 1.01	**25.36** S.E. ± 0.76
MRM	**38.91** S.E. ± 0.85	**28.41** S.E. ± 1.20

*Data: Courtesy of Dr. Ozgur Batuman SWFREC

Growth Measurements



Yield 3rd and 4th years



Boxes/Tree

1.40
1.00
0.60
0.20
-0.20

0.62
0.52
0.83
0.54
1.18
1.40

Bare Ground
Compost
MRM

Cost of Production, Revenue and Return For Each Treatment

Crop Return 3rd year

2016 Crop (12/14/2016)	Price/Field Box Back to the Tree (56% Packout)	Boxes/ Tree	Boxes/Acre @ 145 trees/acre	Revenue Per Acre	Production Cost/Acre	Net Return Per Acre	Application or Installation Costs		Net Return/Acre Minus Installation Costs
Bare Ground	$ 12.78	0.62	90	$ 1,149	$ 1,899	$ (750)	N/A		$ (750)
Compost	$ 12.78	0.83	120	$ 1,538	$ 1,899	$ (361)	$ 112.52	*	$ (474)
MRM	$ 12.78	1.18	171	$ 2,187	$ 1,899	$ 287	$ 222.90	†	$ 65

Crop Return 4th year

2017 Crop (12/01/2017	Price/Field Box Back to the Tree (70% Packout)	Boxes/ Tree	Boxes/Acre @ 145 trees/acre	Revenue Per Acre	Production Cost/Acre	Net Return Per Acre	Application or Installation Costs		Net Return/Acre Minus Installation Costs
Bare Ground	$ 15.10	0.52	75	$ 1,128	$ 2,333	$ (1,206)	N/A		$ (1,206)
Compost	$ 15.10	0.54	79	$ 1,186	$ 2,333	$ (1,147)	$ 112.52	*	$ (1,260)
MRM	$ 15.10	1.40	203	$ 3,065	$ 2,333	$ 732	$ 222.90	†	$ 509

* Compost applied Annually

† MRM Installation Amortized 3 Years

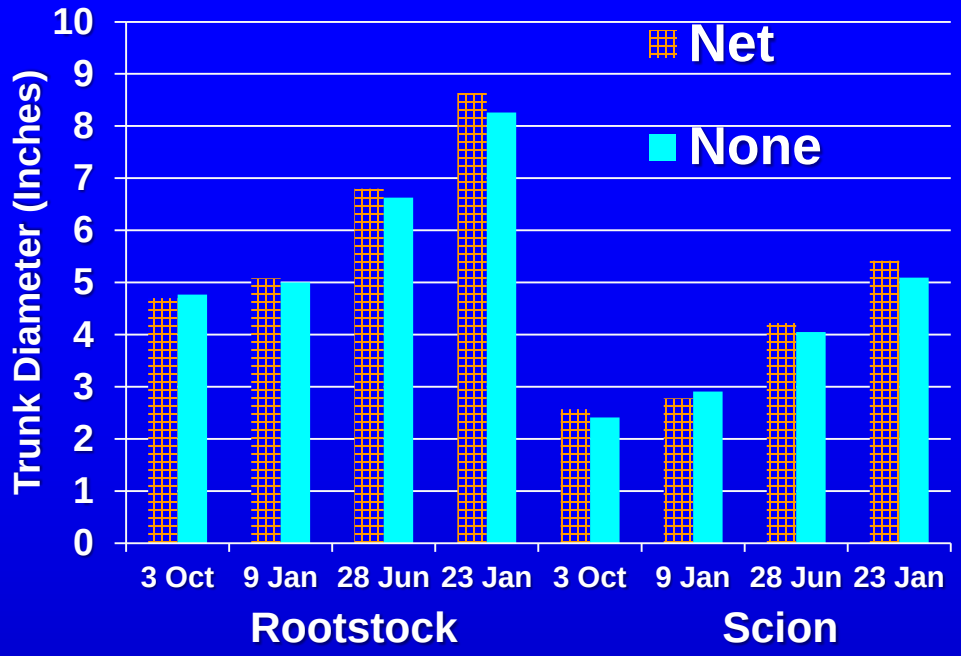
UV Reflective Plastic Mulch

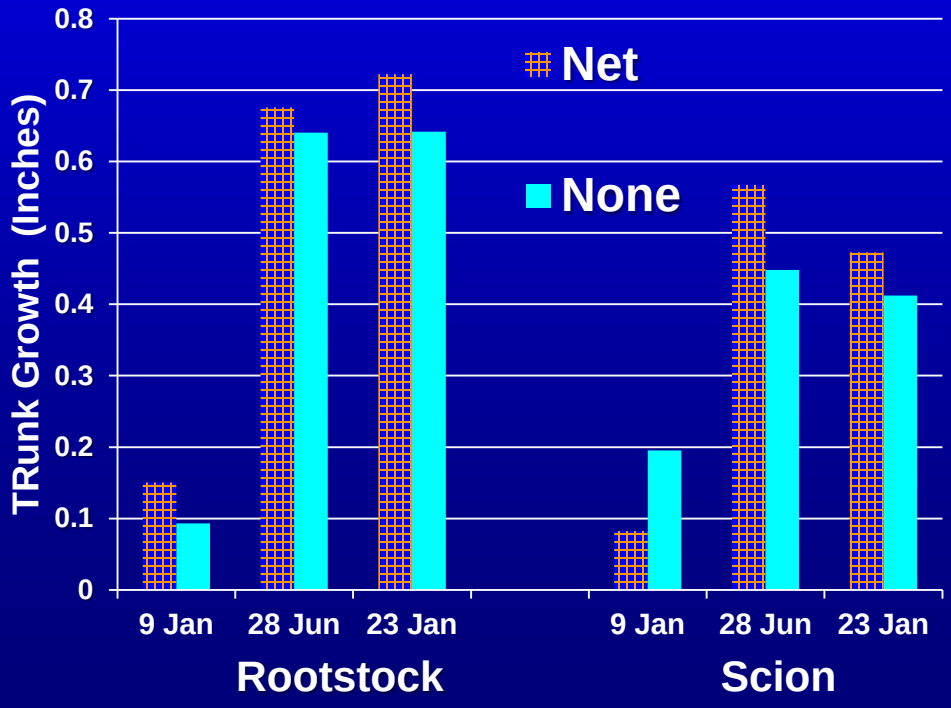
- Deteres ACP and other dayflying insect pests
- Reduces HLB incidence and severity
- Together with drip irrigation provides more efficient use of water, fertilizer and herbicide
- Rapid growth and early yield observed
- Large scale trials in progress
- Work continues to improve bed shape, bedding equipment, irrigation plans, mulch longevity and economic analysis

CUPS Trial to begin soon at SWFREC

- Two 13,000 ft^2 former budwood greenhouses built by SWFREF in 1996
- DPI monthly inspections never found ACP or HLB
- Anitvirus screen walls, one poly top, one screen top
- Further information inquire Fernando Alfarez.


“MiniCUPS”_1:
“Tree Defender”

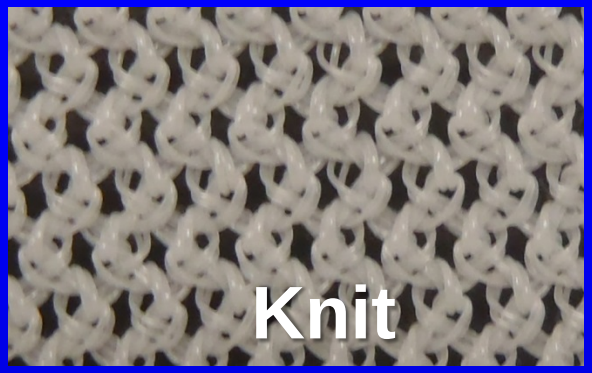


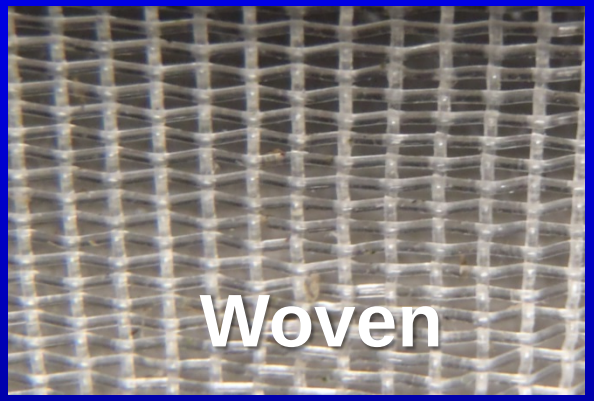


Results:

- More rapid growth with nets
- PCR Ct Net 37.3 ± 1.0 (Neg)
  No Net 26.3 ± 3.6 (Pos)
  - Covering established trees can result in pest problems
  - More susceptible to wind damage than unnetted trees.
  - Fill up quickly

2-Tree Tubes: Can a Psyllid Get Out?





6 ACP/tube
Held 72 hours
6 reps

Mesh type	Hole size (MM)	Escapes (Avg of 6)
Coarse Knit	1.5x0.5	4.17 a
Fine Knit	1.0x0.5	0.83 b
Anit-virus	0.7x0.3	0.33 b

Other practices affecting growth and yield

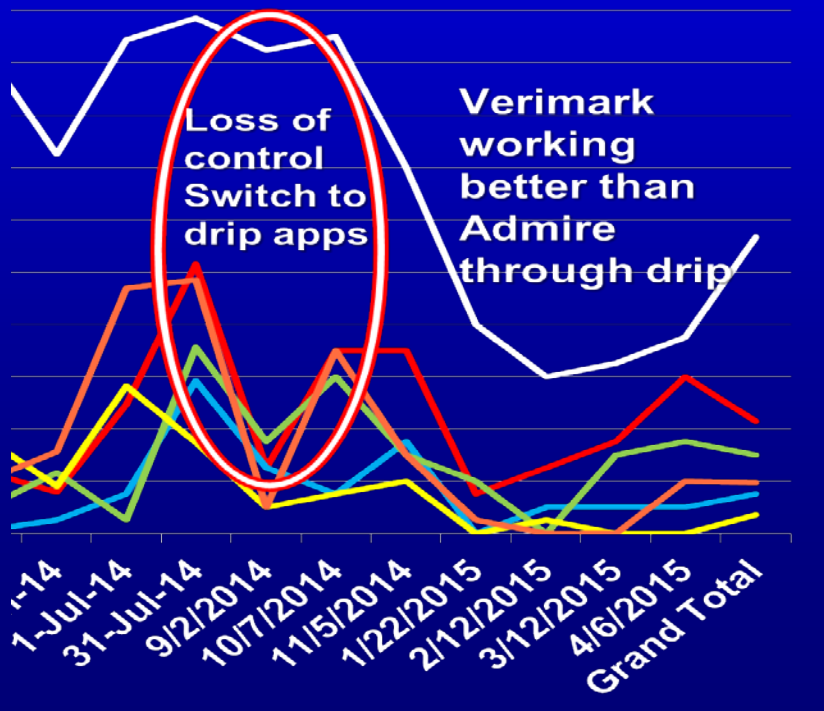
- **Organic amendments**

  Compost increased growth 39% and yield 3X of these grapefruit on Immokalee fine sand. Foliage in compost trees deficient P, K Mn, Fe, and Zn due to rapid growth (M. Ozores Hampton)

- **Irrigation**

  More efficient use of water, fertilizer and systemic pesticides on young trees with drip

  Spoon feed water and nutrients to avoid stress



Summary and Conclusions: Practices to Mitigate HLB in Young Trees

- **Insecticides not enough**
  - Additional protection from ACP needed
  - Reflective mulch, CUPS, Mini-CUPS
- **Good horticulture important**
  - Compost at least at planting
  - Spoon feeding water and nutrients
- **Global ACP Management**
  - Encourage biological control by eliminating unnecessary sprays and using broad-spectrum insecticides for dormant and border sprays only

Acknowledgements

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