#UNIDOS contra o GREENING
Situation and mitigation of HLB in Florida

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Emeritus Professor
UF-CREC

May 22, 2018
II International Symposium on the Management of Citrus Greening Disease
Fundecitrus
Araraquara, SP
Topics for discussion

• Current status of production with HLB since 2005
• Unique nutritional challenges of HLB trees
• Strategies to reduce psyllid transmission in new plantings
  - Metalized Reflective Mulch
  - The Tree Defender
What happened to production after HLB?

~140-150 mil boxes

HLB Decline

Years: 1997/98 to 2017/18

- Valencia
- E/M

45 mil boxes
What happened to root systems to cause such yield loss?

Healthy roots

30-50% root loss

70-80% root loss
Impact of HLB root damage: decline in foliar Ca and Mg over 4 yr period when HLB incidence increased (Data Bill Barber – Lykes Citrus)
What happened with nutrition?

- In 2008 FL growers began “enhanced foliar nutritional programs” as an alternative to removal of HLB trees
- Visual response to increased fertilizer applications but no control of HLB damage or yield loss
- End result: inoculum in the form of infected trees and psyllids spread the disease rapidly
- By 2012, 100% of groves infected
- Tree and psyllid infection approaching 100%
In 2012 we discovered that HLB decline and fruit drop was greater under high soil pH and/or bicarbonate in irrigation water.

- Low liming history - Soil pH 6.4
  - Fruit drop minimal

- High liming history – Soil pH 7.2
  - Fruit drop resulted in early harvest
Management of soil/water quality stresses

• Balanced, lower and more frequent application of water and nutrients to compensate for the lower density root system
• Reduce soil pH/bicarbonate stress to sustain root function in nutrient uptake and root longevity
• **Water conditioning:** Inject sulfuric acid (40%) or urea-sulfuric (N-phuric) acid (15%) to reduce irrigation water bicarbonates
• **Soil conditioning:** broadcast sulfur in wetted zone to reduce soil pH
Metalized Reflective Mulch: More Fruit with Less Psyllids

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2018 Florida Citrus Show
January 25, 2018
110 days post planting
07/05/2014

212 days post planting
10/15/2014

452 days post planting
06/12/2015

604 days post planting
11/11/2015
Average no. of ACP per tree (±S.E.) based on weekly scouting for 2016 and 2017

Note reduction in nymphs & eggs
Relative HLB Incidence Based on PCR Analysis*

% HLB Positive Trees Based on Real-Time PCR Analysis* (n=20)

<table>
<thead>
<tr>
<th>Sample Date</th>
<th>02/14/2017</th>
<th>01/10/2018</th>
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<tbody>
<tr>
<td>Bare Ground</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>Compost</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>MRM</td>
<td>10%</td>
<td>85%</td>
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*Data: Courtesy of Dr. Ozgur Batuman SWFREC
Growth Increase by Canopy Volume

- **Oct. 2015** (19 months)
- **July. 2016** (28 months)

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<tbody>
<tr>
<td>Bare Ground</td>
<td>1.63</td>
<td>3.71</td>
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<tr>
<td>Compost</td>
<td>3.37</td>
<td>6.37</td>
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<tr>
<td>MRM</td>
<td>4.99</td>
<td>8.78</td>
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Tree Size at 2½ Years

Bare Ground

MRM

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1\textsuperscript{st} and 2\textsuperscript{nd} Crop Yields

Yield in Boxes/Tree

<table>
<thead>
<tr>
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<th>1st Crop 2.5 yr.</th>
<th>2nd Crop 3.5 yr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare Ground</td>
<td>0.62</td>
<td>0.52</td>
</tr>
<tr>
<td>Compost</td>
<td>0.83</td>
<td>0.54</td>
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<tr>
<td>MRM</td>
<td>1.18</td>
<td>1.40</td>
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(80 reps/treatment)
The Tree Defender delays the infection risk enabling the tree to produce fruit during the early years as opposed to getting infected before they reach full production stage. The Tree Defender is durable and can be used for multiple years and for multiple plantings.
Yield benefit results from infection delay

- **Infection**
  - % Infection
  - Years
  - Current
  - Proposed

- **Boxes/Ac**
  - Years
  - Current
  - Proposed
Economic advantage of The Tree Defender (TTD)

• A model was run with adjustments for various parameters such as variety, fruit quality, fruit value, cost of TTD, and years of protection to study different outcomes

• The model calculates that Valencia trees planted at 250 per acre protected with TTD for the first 2 seasons returns a profit of over $3,000 per acre and an Internal Rate of Return (IRR) of 60.7%