Florida Citrus Production, Greening & Horticultural Practices

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Industry Challenges

- Hurricanes of 2004 and the spread of canker
- Canker
- Irrigation water
- Prices
- More People
- Urbanization
- Labor
- Changing land prices
- Other land uses
- Greening
FL Citrus Acreage

Source: Florida Agricultural Statistics Service
# Citrus Acreage, 1990 to 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Oranges</th>
<th>Grapefruit</th>
<th>Specialty</th>
<th>Total</th>
<th>% of 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>564,809</td>
<td>125,300</td>
<td>42,658</td>
<td>732,767</td>
<td>87%</td>
</tr>
<tr>
<td>1998</td>
<td>658,390</td>
<td>132,817</td>
<td>54,053</td>
<td>845,260</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>529,241</td>
<td>63,419</td>
<td>28,713</td>
<td>621,373</td>
<td>74%</td>
</tr>
<tr>
<td>2012</td>
<td>464,918</td>
<td>48,191</td>
<td>18,384</td>
<td>531,493</td>
<td>63%</td>
</tr>
</tbody>
</table>

Loss of 313,767 acres

FL Citrus Production Per Year

Source: Florida Agricultural Statistics Service
Total Production Costs Per Acre - Florida

Source: UF IFAS, Ron Muraro
## Citrus Yield, 2011-12 Season in Boxes, 2012-13 (Red)

<table>
<thead>
<tr>
<th>Type</th>
<th>Production</th>
<th>Fresh</th>
<th>Processed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oranges</td>
<td>146,600,000</td>
<td>4.2%</td>
<td>95.8%</td>
</tr>
<tr>
<td></td>
<td>133,400,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grapefruit</td>
<td>18,850,000</td>
<td>42.1%</td>
<td>57.9%</td>
</tr>
<tr>
<td></td>
<td>18,400,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tangerines</td>
<td>4,290,000</td>
<td>66.2%</td>
<td>33.8%</td>
</tr>
<tr>
<td></td>
<td>3,350,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Tangelos)</td>
<td>1,150,000</td>
<td>38.5%</td>
<td>61.5%</td>
</tr>
<tr>
<td></td>
<td>1,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>170,890,000</td>
<td>10.9%</td>
<td>89.9%</td>
</tr>
<tr>
<td></td>
<td>156,150,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Yield - Boxes/Acre for Bearing Trees All Oranges

Crop Year


Boxes

350
300
250
200
150
100
50
0
Unit of Measurements

• Standard Field Box
  – 1 3/5 bushel field container
  – Legal weight of standard field box is:
    • Oranges, temples, tangelos = 90 lb
    • Grapefruit = 85 lb
    • Tangerines = 95 lb
  – FCOJ yield in gallons per box = ~1.5 to 1.6 gal
  – NFC yield in gallons per box = ~ 6 to 6.6 gal
## Typical Production Program

<table>
<thead>
<tr>
<th>Operation</th>
<th>Cost</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed Control</td>
<td>$234.91</td>
<td>12.9%</td>
</tr>
<tr>
<td>Spray Program</td>
<td>$418.74</td>
<td>23.1%</td>
</tr>
<tr>
<td>Enhanced Foliar Nutrient Spray</td>
<td>$265.98</td>
<td>14.6%</td>
</tr>
<tr>
<td>Fertilizer/Lime</td>
<td>$420.37</td>
<td>23.1%</td>
</tr>
<tr>
<td>Pruning (Hedging/Topping)</td>
<td>$36.38</td>
<td>2.0%</td>
</tr>
<tr>
<td>Tree Replacement</td>
<td>$220.19</td>
<td>12.1%</td>
</tr>
<tr>
<td>Irrigation (Microsprinkler)</td>
<td>$165.15</td>
<td>9.1%</td>
</tr>
<tr>
<td>Regulatory (canker decontamination and scouting)</td>
<td>$55.48</td>
<td>3.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,817.20</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Budgeting Costs and Returns for Central Florida Citrus Production, 2011-12, R. P. Muraro
Greening Costs

• Since 2006 citrus greening has cost the Florida economy $3.6 billion in lost revenues and 6,600 jobs.
  – Spreen and Hodges (2012)
  – Found in FL in 2005
  – Asian citrus psyllid spreads the bacterial disease
  – Reduces production and life of the citrus tree
Citrus Greening
[Greening, Huanglongbing (HLB)]

1. Blotchy mottle with green islands
   Moteado de hojas con islas verdes

2. Blotchy mottle
   Moteado de hojas

3. Psyllid damage (leaf notching)
   Daño del psílidos

4. Blotchy mottle with psyllid notching
   Moteado de hoja con daño del psílidos (flecha)

5. Severe fruit drop
   Caída de fruta

6. Severe leaf drop & adult psyllid
   Caída de hoja y los psílidos adultos

7. Seed abortion with yellow staining at base of fruit button
   Semillas abortadas con color amarillo a la base del tallo de la fruta

8. Reduced fruit size and color inversion
   Tamaño de fruta reducido y inversión de color

Report high suspects to the Florida Division of Plant Industry Canker/Greening Hotline 1-800-282-5153 or call local extension office.
Impact of Greening

- Less productive tree
- Shorter tree life span
- Smaller fruit size of infected fruit
- Off flavor of juice
- Fruit drop
  - Last year 10 to 20% of the crop fell onto the ground in large part due to greening
    - Anomaly?
    - New norm?
Spray Program – Pest Mgt

• 7 to 12 sprays per year
  – 7 sprays = ~$418.75 per ac/yr
  – 12 sprays = ~$496.49 per ac/yr

• Application method & cost per acre
  – Ground ~$30.21
  – Ground (low volume) ~$12.64
  – Aerial (fix wing) ~$5.25

• Typical pests
  – Diseases – canker, greasy spot, black spot (where present), melanose, etc.
  – Insects/Mites – rust mites, spider mites, psyllid
Greening Mgt.

• 3 steps of minimizing disease*
  – Slow spread of the disease
  – Control vector (psyllid)
    • Minimize future spread
    • Slows reinfection
  – Nutritional therapies

• Plant disease free trees and try to keep them disease free as long as possible

* Does not get rid of the disease but minimize adverse impact to tree and yield.
Enhanced Foliar Nutrient Program (Nutritional Therapies)

• Program consists of 5 foliar nutrient applications of which:
  – 3 are included with other spray applications,
  – 2 additional ground applications

• Applied to foliage to improve tree health in bypassing blocked phloem (part of vascular bundle in plant) and declining root health which limit nutrient uptake
Citrus Health Management Areas (CHMA)

• Purpose
  – Control psyllids on a wider geographical area as compared to individual efforts

• Control methods
  – Ground
  – Fix wing airplane
  – Low volume

• Select same AI of chosen pesticide to minimize pest resistance

• Timing
  – Strive for 2 week application period
Citrus Black Spot

M. M. Dewdney and N. A. Peres

Fungal disease: Caused by *Guignardia citricarpa* (sexual stage) / *Phyllosticta citricarpa* (asexual stage)

Major inoculum source: Airborne ascospores (sexual spores) from leaf litter

Minor inoculum source: Conidia (asexual spores) from pycnidia that form on fruit, dead twigs, and leaf litter. The conidia are rain-splash dispersed. Potential problem on cultivars that have young and mature fruit on the tree simultaneously.

Cultivar susceptibility: All commercial cultivars are susceptible, but late maturing cultivars and lemons are most vulnerable.

Leaf symptoms: Rare in well-managed groves; most common on lemons. Older lesions are small, round, and sunken with a gray center, dark brown margin, and yellow halo. Younger lesions are reddish brown with light centers and a diffuse yellow halo.

Fruit symptoms: Variable. Four main types: 1) Hard spot (most common and diagnostic) – Small, round, sunken lesions with gray centers with brick red to black margins. Fungal structures appear as slightly elevated black dots. Appears as fruit begins to color where light exposure is highest; 2) False melanose – Numerous small, slightly raised lesions that can be tan to brown. Occurs on green fruit and does not have pycnidia. May become hard spot later in the season; 3) Cracked spot – Large, flat, dark brown lesions with raised cracks in their surface. Thought to be caused by an interaction with rust mite. Can become hard spot later in the season. Occurs on green and mature fruit; 4) continued other side
Harvesting

• 98% hand harvest
• 2% mechanical harvest
Harvesting Costs

- Florida Hand Harvesting
  - Pick - $0.90 to $1.50 box
  - Roadside - $0.90
  - Transportation $1.00
  - **TOTAL COST = $2.80 to $3.30 per box**

- Cost will vary by block, yield, condition of grove, size of tree and distance to processing plant.

- Fresh fruit harvesting cost is higher than fruit going to processing plants

- Mechanical harvesting offers long term options to reduce cost but declining in use due to HLB, tree conditions and stress
Problems & Opportunities

- Problems
  - Business model - Risk / Reward, ROI
  - Citrus canker
  - Greening
  - Citrus black spot
  - Diseases – CTV, citrus blight, foot rot, etc.
  - Urban pressure
  - High labor cost – FL min. wage $7.79 (2013), Fed $7.25 (2009), Guest worker (H2A) min. wage almost $10.00/hr + housing and transportation
  - Labor supply and issues with documentation
  - Land values

- Opportunities
  - Market (world price vs US price)
  - Price (FCOJ vs NFC)
Is the Sun Rising or Setting on the Citrus Industry?