CITRUS BLACK SPOT MANAGEMENT

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Black spot: A Fungal Disease

- **Causal agent:** *Guignardia citricarpa*
  - Asexual name: *Phyllosticta citricarpa*
- **Hosts:** Citrus species and hybrids
  - Symptomatic: Sweet oranges, mandarins and tangerines, lemons
- **Rind spots cause the economic damage**
  - Internal quality unaffected
- **Causes premature fruit drop reducing yield**
  - Especially on late harvested cultivars like Valencia
Symptoms Occur on Maturing Fruit

• Unusual to see hard spot more than 2 months before maturity
• Exposure to sunlight increases lesion number
  – Warm temps also increase disease
• Symptoms generally occur on the ‘sunny side of trees’
• Symptoms that can occur on green fruit
  – Cracked spot
  – False melanose
Symptoms Observed This Season
New Geographical Location

- South Polk County
- Observed symptoms: few lesions on 1 fruit
- Likely further undetected infected trees
Black Spot Disease Cycle Caused by *Guignardia citricarpa*
Disease Cycle Highlights

- Major source of inoculum: decomposing infected leaves on orchard floor (ascospores)
- Additional source of inoculum: lesions on infected fruits, leaves and branches (conidia)
- Means of spread: Wind (ascospores); Water splash (ascospores and conidia)
- Survival of the fungus: leaves, leaf litter branches, fruits and peduncles
Leaves Are Nearly Symptomless

• On oranges, if chemical control used, symptoms extremely rare
• Does not mean leaves are not infected
  – Certain proportion will harbor the organism
• When symptomatic trees removed, not likely removing disease from grove
• Need to balance between cost of lost trees, likely replant success with HLB, and cost of living with black spot
Plant Debris Movement

• Needs to be minimized to reduce spread
  – Tarping is necessary
  – Have seen tarping machine prototypes built

• All vehicles and equipment
  – Canker decontamination materials (quat) will work

• Fruit loads if possible as well
  – Dr. Reza Ehsani can commercialize machine developed for mechanical harvesting
  – Noticing greater twig breakage during harvest recently
Tree Health

• Declining trees are more symptomatic
  – More susceptible to disease
• Declining trees should be removed
  – Cause of decline unimportant
• Anything that can maintain tree health good practice
  – Nutritional
  – Pest and disease control
Cultural Controls

- Leaf litter management
- 5% urea best treatment in small plots
- Hope for large trials this spring
  - Cooperator last year was not able to participate
Cultural Controls

- Mulching in Brazil shown to reduce disease
  - Can we grow enough mulch in alleys to get nearly 8-12 inches deep?
- Dead wood removal
  - Dead twigs source of inoculum like melanose
  - Man power too expensive?
- Regular irrigation in dry periods
  - To keep leaves on trees
  - Try to reduce wetting of leaf litter
Harvest Early

• Since disease promotes fruit drop
• Prioritize highly symptomatic blocks
• Symptomatic fruit falls early but still suitable for juice
• Symptoms near top of fruit more likely to promote drop
Black Spot Chemical Control

- Fruit is susceptible for 5-6 months post-petal fall
- Control products
  - Copper - All formulations
  - Strobilurin fungicides (Abound, Gem, Headline)
    - Reserved for hot weather
Black Spot Application Timing

Fruit is susceptible for at least 5-6 months post-petal fall
Ascospores present from March to September

Late Spring
(April/May)
Continue applications at 1 month intervals

Timing is critical!
A 7-14 day delay can ruin your season
Spray Intervals

• Reports from Brazil that if using strobilurins can treat every 5-6 weeks
  – Not found publication to support
  – Be cautious

• Copper needs shorter interval
  – 3-4 weeks
  – Can evaluate residue levels with Copper model
Citrus Copper Application Scheduler (Agroclimate.org)

- Improve copper spray timing over 21-day schedule
- Reduce environmental impact of copper sprays
- Avoid unnecessary copper applications
- Reduce costs
- Warn when residue levels are unexpectedly low
# Optimized Schedule for Early Season

- For copper applications
- Traditional 21-day application schedule with early, average and late peak bloom scenarios

<table>
<thead>
<tr>
<th>Event</th>
<th>Early bloom</th>
<th>Ave. bloom</th>
<th>Late bloom</th>
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<tbody>
<tr>
<td>Bloom</td>
<td>10-Mar</td>
<td>20-Mar</td>
<td>30-Mar</td>
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<td>1st spray</td>
<td>31-Mar</td>
<td>10-Apr</td>
<td>20-Apr</td>
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<tr>
<td>2nd spray</td>
<td>21-Apr</td>
<td>1-May</td>
<td>11-May</td>
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<td>12-May</td>
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<td>5th spray</td>
<td>23-Jun</td>
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<td>13-Jul</td>
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<tr>
<td>6th spray</td>
<td>14-Jul</td>
<td>24-Jul</td>
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</tbody>
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For All Diseases Control By Copper

• Longer season is needed for black spot but double disease control
  – Canker
  – Melanose
  – Greasy Spot

• Strobilurin applications also control
  – Melanose
  – Greasy Spot
What Blocks to Treat

- Recommendations from Australia, Brazil and South Africa
  - Treat all blocks with the disease!
  - With no treatment, disease will become more severe

- Leaves not symptomatic but reported susceptible for 10 months post formation
  - More leaf infections, more inoculum next year
Greater Management Efforts

- No easy fixes or solutions
- Will require an integrated approach
  - Leaf litter management
  - Fungicide applications
  - Use tools to aid application timing
  - Removal of declining trees

- Will not be able to rely on one management method
Questions?