Mite Pests of Florida Citrus
Phil Stansly, Barry Kostyk and Xavier Martini
Mite Pests of Citrus

- **Rust mites**
  - Citrus rust mite *Phyllocoptruta oleivora*
  - Pink rust mite *Aculops pelekassi*

- **Spider mites**
  - Citrus red mite *Panonychus citri*
  - Texas spidermite *Eutetranychus banksi*

- **False Spider Mites**
  - *Brevipalpus* spp

- **Broad mites**
  - *Polyphagotarsonemus latus*
RUST mites: Eriophyid mites

Eriophyid mites:

- 4 legged individuals
- Less than 200 μm in length
- Majority of these mites are host specific
- Half of the Eriophyid mites described cause galling
- Worm like mites
- Live in plant tissues
- Only mites to transmit viruses

Aculops leavitaga galls on willow
Rust Mites

- Primarily problems in fresh fruit
- Flared by copper and broad spectrum insecticides, especially pyrethroids
Citrus Rust Mite: *Phyllocoptruta oleivora*
Pink Citrus Rust Mite: *Aculops pelekaissi*

- Primary Damage is "russetting and/or bronzing" of fruit causing a reduction of grade
- High populations may cause reduced fruit size, increased water loss and greater amount of fruit drop.
Early damage: Sharkskin

Late damage: Bronzing
CRM and PCR

- The citrus rust mite (CRM) and the pink citrus rust mite (PCRM) are found on all citrus varieties throughout Florida.
- Four developmental stages: egg, 1st (larva), 2nd (3rd) instar (nymph), and adult.
- Both species can co-exist on the same leaf or fruit.
- The CRM is usually prevalent.
- PCRM may develop damaging populations early (April–May).
- On some specialty varieties (such as Sunburst tangerine), damage may be particularly severe on stems and foliage, causing leaf injury and possible abscission.
- Fruit damage is the main concern for fresh fruit!
Chemical Control of Rust Mites
(from IFAS – 2016 Florida Citrus Pest Management Guide)

• Need to spray dictated by biological attributes and marketing objectives: 1) rapid reproduction, 2) small size, difficult to monitor until visible injury has occurred on the fruit, and (3) fresh or process destination for fruit.

• Cosmetic appearance is a priority for fruit grown for the fresh market. Fruit growth and abscission are not affected until 50% to 75% of the surface has been injured.

• Fresh market groves may receive three or four miticides per year, typically during April, June, August, and October. In contrast fruit designated for processing receive zero to two treatments per year.
When to Treat?

Three approaches to monitoring in widespread use:

1) determining the percentage of fruit and/or leaves infested with rust mites;
2) qualitative rating scales;
3) individual adult mite counts taken from fruit on randomly selected trees.

These sampling approaches are similar in that they are designed to avoid bias by randomly selecting different representative areas within a grove for sampling, avoiding border rows, and random selection of fruit and/or leaves within a tree.
Variables in Scouting for Rust Mites

- Frequency of sampling
- Stops/acre
- Path through the grove
- Number of fruit/stop
- Number of lens fields per fruit
- The Lens Field
  1. Size
  2. Magnification
  3. Position
Standarize the Lensfield

Lensfield size depends on:

• Magnification
• Distance between eye and eyepiece
Field Trials a SWFREC

- A 14X Bausch & Lomb Coddington hand lens is used to view an area of approximately 1.0 cm², referred to as the “lens field”, on two partially shaded areas on 4 fruit per tree and the total number of mites recorded.
What the Heck is the H-B Rating System?

- Developed by Horsfall & Barratt (1945) to measure disease incidence.
- Based on density recognition rather than individual counts.
Florida Pest Management Guide*:

- Process: Every 2-3 Weeks
- Fresh: every 10-14 days
- 80 Lensfields /block (10-40 acres)
  - Stops/ per block = 10
  - Trees per stop = 4
  - Fruit/tree = 2
  - Lens fields per fruit = 1
    Sun-shade transition
  - Location of Fruit: all 4 quadrants, midway in canopy
- Record Mites/lens field
- Provides < 25% variation if CRM > 10/cm²
- Thresholds process: 6 CRM/ LF - Caution
  10 CRM/LF - Spray
- Threshold fresh: 2 CRM/LF - Spray

*2011 Florida Citrus Pest Management Guide, Publication SP-43, UF Gainesville
http://edis.ifas.ufl.edu/cg002
<table>
<thead>
<tr>
<th>Pesticide</th>
<th>IRAC MOA</th>
<th>Comments</th>
<th>Pests Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abamectin + Petroleum spray Oil</td>
<td>6</td>
<td>Do not apply any abamectin containing product within 30 days of last treatment or exceed 0.05 lb ai abamectin or more 3 applications in any growing season.</td>
<td>Rust mites Broad mites Leafminer</td>
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<tr>
<td>Comite</td>
<td>12C</td>
<td>Leaf distortion and/or fruit spotting may occur when used in the spring or if tank mixed with oil or applied within 2 weeks prior to or following an oil application. Do not use in spray solution above pH 10.</td>
<td>Rust mites Spider mites</td>
</tr>
<tr>
<td>Envidor</td>
<td>23</td>
<td>Only one application per season. Tank mixing with oil results in reduced residual activity.</td>
<td>Rust mites Spider mites</td>
</tr>
<tr>
<td>Micromite</td>
<td>15</td>
<td>See restriction on the label.</td>
<td>Rust mites Root weevils Leafminers</td>
</tr>
<tr>
<td>Movento MPC + Petroleum spray Oil</td>
<td>23</td>
<td>Limit of 32 fl oz of product (0.32 lb ai) per acre per season. Do not make back-to-back applications with Envidor.</td>
<td>Psyllid nymphs Some scale insects</td>
</tr>
</tbody>
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<tr>
<td>Nexter</td>
<td>21</td>
<td>Tank mixing with oil or copper results in reduced residual activity.</td>
<td>Spider mites False spider mites Rust mites</td>
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<tr>
<td>Petroleum Oil 97+% (FC 435-66, FC 455-88)</td>
<td>NR³</td>
<td>Do not apply when temperatures exceed 94°F.</td>
<td>Rust mites Scales Whiteflies Spider mites Greasy spot Sooty mold</td>
</tr>
<tr>
<td>Micronized Sulfur</td>
<td>NR³</td>
<td>Do not combine with oil or apply within 3 weeks of oil to avoid fruit burn. May cause eye irritation to applicators and fruit harvesters.</td>
<td>Rust mites Broad mites</td>
</tr>
<tr>
<td>Vendex</td>
<td>12B</td>
<td>Reduced residual activity if tank mixed with oil or copper. Do not apply to fruit less than one inch in diameter within 10 days of oil spray.</td>
<td>Rust mites Spider mites</td>
</tr>
</tbody>
</table>
Spider Mites:
- Dry weather
- Upper surfaces of young hardened leaves
- Stippling, Firing

Texas citrus mite

Citrus red mite

Firing
Scouting for Spider Mites

- Follow CRM sample pattern
- 4 leaves per tree
- Threshold 5-10/leaf, depending on:
  - Population trends
  - Predominantly males
  - Nymphs and females
- Weather
- Tree Condition
False spider mite *Brevipalpus* spp: Vector of Leprosis (not yet in US)
Broad mite
*Polyphagotarsonemus latus*

Mostly a pest of lemons and limes
Key Florida Citrus Pests and some of their Biological Control Agents

- **Mites**: Rust mites, spider mites
  - *Hirsutella*, mites, ladybeetles
- **Thrips**
  - Minute pirate bugs, mites
- **Leafminer**
  - Ants, Spiders, *Ageniaspis*
- **Root weevils**
  - Nematodes, egg parasitoids
- **Scales**: armored, soft
- **Asian Citrus Psyllid**
  - Ladybeetles, *Tamarixia*
Important natural enemies in citrus:

**Euseius tularensis**
**Euseius stipulatus**

**Amblyseius swirskii**
**Iphiseius degenerans**
**Typhlodromus athiasae**
**Euseius scutalis**

**Panonychus citri**

**Phyllocoptruta oleivora**

Predators of small insects or immature stages:
- Whiteflies
- Armored scales
- Asian citrus psyllid
Predaceous mites: Phytoseiids

Cumulative numbers of phytoseiid mites by insecticide treatment schedule

(1) calendar applications
(2) no insecticide
(3) 0.2 thld
(4) 0.7 thld
Citrus Rust Mite
*Phyllocoptruta oleivora*

- Biological control by mites, ladybeetles and *Hirsutella*
- Disrupted by insecticides and copper.
Questions?