Managing Rugose Spiraling Whitefly in the Landscape

November 2011
Whiteflies

- Approximately 75 species of whiteflies in Florida.
- Common pests of many ornamental plants
- Narrow and wide host range depending on the species
- Piercing-sucking mouthparts
- Excrete honeydew
- Capable of transmitting viruses
- Adults are small, moth-like, usually with white wings.

Photos: H. Glenn, UF/IFAS
Whitefly Life Cycle

Adult → Eggs → Crawler → Second Instar Nymph → Fourth Instar Nymph → Third Instar Nymph → Adult

Photo: H. Glenn, UF/IFAS

Courtesy University of California: Statewide IPM Program, Agriculture and Natural Resources
Variability in Whitefly Immature Stages

Photo: H. Glenn, UF/IFAS
Damage from Whiteflies

• Direct damage
  – Caused by the piercing and sucking of sap from the foliage; leaf drop
  – Usually not sufficient to kill plants

• Indirect damage
  – Accumulation of honeydew and white, waxy flocculent material
  – Sooty mold growth on honeydew

• Virus transmission
  – Some whiteflies can transmit disease
  – Currently, no known viruses associated with the Rugose spiraling whitefly
Rugose Spiraling Whitefly
*Aleurodicus rugioperculatus*

- First found at USDA office in Miami on *Bursera simaruba* Spring 2009
- Known from Belize, Guatemala and Mexico
- Eggs are in a spiral pattern
- Adult is relatively large and docile
Plants Hosts

- Acalypha wilkesiana (Copperleaf)
- Annona sp. (Sugarapple)
- Araucaria heterophylla (Norfolk island pine)
- Bucida buceras (Black olive)
- Bursera simaruba (Gumbo limbo)
- Calophyllum species
- Catharanthus roseus (Madagascar periwinkle)
- Chrysobalanus icaco (Cocoplum)
- Chrysophyllum oliviforme (Satinleaf)
- Cocos nucifera (Coconut palm)
- Conocarpus erectus (Buttonwood)
- Cordyline fruticosa (Hawaiian ti)
- Dictyosperma album (Hurricane palm)
- Dypsis lutescens (Areca palm)
- Eugenia spp.
- Ficus aurea (Strangler fig)
- Ficus carica (Edible fig)
- Hyophorbe verschaffeltii (Spindle palm)
- Mangifera indica (Mango)
- Manilkara roxburghiana
- Myrica cerifera (Wax myrtle)
- Musa sp. (Banana)
- Parthenocissus quinquefolia (Virginia creeper)
- Persea americana (Avocado)
- Phoenix roebelenii (Pigmy palm)
- Quercus virginiana (Live oak)
- Sabal palmetto (Sabal palm)
- Schinus terebinthifolius (Brazilian pepper)
- Simarouba glauca
- Smilax auriculata
- Spondias sp.
- Spondias purpurea
- Strelitzia nicolai (White bird of paradise)
- Strelitzia reginae (Bird of paradise)
- Tabebuia species
- Terminalia catappa (Tropical almond)
- Veitchia species
- Washingtonia palm
- Zeuxine strateumatica

And, the list continues to grow
Rugose Spiraling Whitefly
Spiraling Eggs

Rugose Spiraling Whitefly
Rugose Spiraling Whitefly

Adult

1st Instar

2nd Instar

3rd Instar

4th Instar

Eggs
Effect of Temperature on the Life Cycle of the Rugose Spiraling Whitefly

![Bar graph showing the effect of temperature on the life cycle of the Rugose Spiraling Whitefly. The graph displays the number of days needed for each temperature level: 68 days at 68°F, 77 days at 77°F, 81 days at 81°F, and 86 days at 86°F.]
Effect of Temperature on Egg Hatch
Population of Rugose Spiraling Whitefly
Natural Enemies

- **Parasitoid:** *Encarsia guadalupae*
- **Beetle predator:** *Nephaspis oculatus*
- **Lacewing Predator:**
Management of the Rugose Spiraling Whitefly in the Landscape

- Need long term management which requires other options other than complete reliance on insecticides
- Importance of scouting/monitoring
  - Spiral eggs
- Awareness of natural enemies
Management of Whitefly in the Landscape

• Cultural control
  – Alternative plant choices (difficult in this situation)

• Washing plants off with water
  – Small infestations or small plants
  – Must remove the immature stages and eggs.
Management of Whitefly in the Landscape

• Soaps and oils
  – Horticultural oil; insecticidal soap; dish soap (don’t use soaps with degreasers i.e. Dawn)
  – Strictly contact so thorough coverage is required
  – Several applications are required 7-10 days
  – Phytotoxicity under high temperatures
Management of Whitefly in the Landscape

• Insecticides
  – Sometimes important in the early management of a pest
  – Appropriate choices of insecticide, formulation, methods of application and frequency of application
  – Effects on natural enemies
Management of Whitefly in the Landscape

• Insecticides
  – Misuse or overuse can cause problems such as insect resistance, secondary pest problems, environmental contamination, and detrimental effects on non-target organisms
  – Follow label instructions - The site and method of application must be on the label (i.e. landscape, nursery, etc.)
Management of Whitefly in the Landscape

• Apply a systemic (neonicotinoid) insecticide to the soil or trunk for longer term protection
  • Soil application (drench, granular, pellets)
  • Trunk application (basal spray, injection)
• Foliar application
Safari Basal Trunk Spray
(12 oz/ gallon)

Spray trunk to chest height

Gumbo Limbo
Tree Injection
<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Trade Names Professional Use</th>
<th>Trade Names Over-the-Counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetamiprid</td>
<td>TriStar (no soil application)</td>
<td></td>
</tr>
<tr>
<td>Clothianadin</td>
<td>Arena, Aloft*</td>
<td></td>
</tr>
<tr>
<td>Dinotefuran</td>
<td>Safari</td>
<td>Green Light Tree &amp; Shrub Insect Control with Safari</td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>Merit, Marathon, Coretect, Discus*, Allectus*, several generic labels</td>
<td>Bayer Advanced Lawn Complete Insect Killer; Bayer Advanced Tree &amp; Shrub Insect Control; Ortho Max</td>
</tr>
<tr>
<td>Thiamethoxam</td>
<td>Flagship, Meridian</td>
<td></td>
</tr>
</tbody>
</table>

* Contains a Neonicotinoid and a pyrethroid
UV Stability of Neonicotinoids

**Slide Credit:** Presentation by C. Sclar, Longwood Gardens
Relative Water Solubility of Neonicotinoids

Clothianidin (Arena) 327
Imidacloprid (Merit) 500
Acetamiprid (TriStar) 2950
Thiamethoxam (Meridian) 4100
Dinotefuran (Safari) 39830

Slide information courtesy C. Sclar. Longwood Gardens
Soil Binding Potential ($K_{oc}$)

Source: Shetlar, Turfgrass Trends, July 2007
Neonicotinoid Uptake
Royal Palm (25-30 ft) – Soil Application

Applied April 11, 2009

Dr. A. D. Ali (Davey Tree), Walter Albeldano (Valent USA Corp).
Safari Uptake into Foliage
Mexican Fan Palm (13” dbh)

Applied: May 7, 2011

- Safari drench 6 gm/indbh - Upper leaves
- Safari drench 6 gm/indbh - Lower leaves
- Safari bark spray 12 oz/ gal - Upper leaves
- Safari bark spray 12 oz/ gal - Lower leaves

14 days after application □ 28 days after application

Buzz Uber (Crop Inspection Service), Walter Albeldano (Valent USA Corp)
Drench Application
Neonicotinoids

Percent Mortality

- control
- Marathon drench
- Safari drench
- Arena drench
- Flagship drench
Foliar Application

Percent Mortality

- control
- TriStar foliar
- Kontos foliar
- Judo foliar
- AzaSol foliar
- Distance foliar
Rugose Spiraling Whitefly

Mean Live Immature Whitefly per Leaf

Control

Injection

1 month
2 month
3 month
4 month
Rugose Spiraling Whitefly

Mean No. Eggs. Per Leaf

Control vs. Injection

- 1 month
- 2 month
- 3 month
- 4 month
Management Options

Foliar Insecticide Application

• Whitefly should be present
• Foliar insecticides may provide quick control, most will not provide long-term control.
• Some foliar insecticides (i.e. pyrethroids) may disrupt the natural enemies and should be used very selectively.
• It is not recommended to use the same insecticide on both the foliage and in the soil
Insecticide Selection
Foliar Application
Professional Use (Landscape and Nursery)

Abamectin (Avid)
Acetamiprid (TriStar)
Azadirachtin (Azatin XL)
Bifenthrin (Talstar)
Buprofezin, (Talus)
Clothianidin (Arena)
Endosulfan (Endosulfan; Thiodan)
Flonicamid (Aria)
Horticultural oil
Imidacloprid (Merit, Marathon, Discus, Allectus)
Pymentrozine (Endeavor)
Pyriproxyfen (Distance)
Spiromesifen (Judo)

Beauveria bassiana (BotaniGard)
<table>
<thead>
<tr>
<th>Trade Name(s)</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower, Fruit &amp; Vegetable Insect Killer (Ortho)</td>
<td>Acetamiprid</td>
</tr>
<tr>
<td>Bug-B-Gon Max Lawn &amp; Garden Insect Killer (Ortho)</td>
<td>Bifenthrin</td>
</tr>
<tr>
<td>Rose &amp; Flower Insect Killer (Bayer Advanced); Lawn &amp; Garden Insect Killer (Schultz)</td>
<td>Cyfluthrin</td>
</tr>
<tr>
<td>Triazicide Once &amp; Done Insect Killer (Spectracide)</td>
<td>Lambda-cyhalothrin</td>
</tr>
<tr>
<td>Indoor/Outdoor Broad Use Insecticide (Hi-Yield)</td>
<td>Permethrin</td>
</tr>
<tr>
<td>Yard &amp; Garden Insect Killer (Bonide); Rose &amp; Flower Insect Spray (Spectracide)</td>
<td>Pyrethrín</td>
</tr>
</tbody>
</table>
Complications in Management

- Insect reproduces quickly; populations can build rapidly
- Large host range
- Excessive wax can impede good coverage/contact of insecticides
- Drought conditions have affected the activity of the systemic insecticides (particularly imidacloprid)
- Local impact is great but national concern is limited which means less resources
Methods of Application for Neonicotinoids

• There are numerous options on how to apply the neonicotinoids;
• Take advantage of the different methods
• Take advantage of the different formulations
• Fit the method of application for the site
• The site and method needs to be on the label
Specific Management Tips

Rugose Spiraling Whitefly

• Scout – spiraling eggs on undersides of leaves; easy to see
Specific Management Tips
Rugose Spiraling Whitefly

• Foliar insecticides – contact may be difficult due to heavy wax production

• Soil or trunk insecticides – use for heavily infested trees; can use for nearby plants or if eggs are present
Specific Management Tips
Rugose Spiraling Whitefly

• Whatever control method you use, there will be impact on natural enemies

• Insecticide use
  – Use appropriate insecticides and methods of application

• DO EVERYTHING POSSIBLE TO CONSERVE NATURAL ENEMIES
  – Necessary for long term control
Remember - the below symptoms do not stop or go away immediately even if you are controlling the pest

Leaf drop

Sooty mold

White, waxy flock

Do not apply additional insecticide unless you are sure it is necessary
Catharine Mannion
Research and Extension Specialist
Ornamental Entomology

University of Florida, IFAS
Tropical Research and Education Center
18905 SW 280th Street
Homestead, FL 33031

305-246-7000
cmannon@ufl.edu
http://trec.ifas.ufl.edu/mannion