Old, New and Expected Landscape Pests in Hawaii

Maui Association of Landscape Professionals
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What will this presentation cover?

*Old- Spiraling Whitefly
  Papaya Mealybug
  scale insects (armored and soft)
  Cotton Lacebug
*New- Little Fire Ant
  Phantasma Scale
  Hala Scale
*Expected- Coconut Rhinoceros Beetle
  Lobate Lac Scale
  Ficus Leaf and Stem Gall Wasp
  Ice Plant Scale
  Red Imported Fire Ant

*Conclusions
Old Favorites
Spiraling Whitefly (SWF) 
*Aleurodicus dispersus*

**Egg to adult:** 34 to 41 days

**Eggs laid in spiral:** 9 to 11 days

**6 to 7 days**

**9 to 11 days**

**4 to 5 days**

**Pupal stage:** 5 to 7 days

**Pupal stage:** 10 to 11 days

**Adult stage:**

**First Instar: eggs and crawlers**

>1549 eggs in 37 days

**2nd Instar: nymphaal stage**

**3rd and 4th Instars:** last nymphaal stage (pupa)

**Nymphaal stage**
Before & After Introducing Natural Enemies of the Spiraling Whitefly

Guava
Honolulu,
HI 1979

1980

Before

After
Classical Biological of the Spiraling Whitefly

* First discovered in Hawaii in 1978.
* Heavy infestations in Hawaii on over 100 plant species, of which guava, banana, plumeria, mango, and sea grape were most preferred.
* Importation of ladybeetles and whitefly parasites from Trinidad brought it under control.
* Heavy infestations are now only observed where these natural enemies are not present due to insecticide or windy, ocean salt conditions.
Stems infested with White Peach Scale

Heavy Spiraling Whitefly Infestation
Mauna Lani
09/2010
Immature Lady Beetle

Adult Lady Beetle

Plumeria at Keahole Ag Park (09/2010)

No natural enemies present
Parasitoid Emergence Hole
Parasitized Whitefly Nymph
Parasitized Whitefly Nymph
Parasitized Whitefly Nymph
Spiraling Whitefly in West Hawaii

Parasitic wasp, very effective against spiraling whitefly in windy, coastal areas in Hawaii. (Kumashiro HDOA)

Eulophid parasitic wasp, *Aleuroctonus vittatus*
Spiraling Whitefly heavily parasitized by parasitic wasps (Note 4\textsuperscript{th} Instar pupae with round exit holes)
Papaya Mealybug

* First discovered in HI in June 2004 Maui.
* Native to Mexico and found on Guam, Florida, Caribbean Islands.
* Mealybug injects a toxin as it feeds and causes chlorosis, stunting, deformation, leaf and fruit drop.
* Heavy infestations observed on papaya, hibiscus, jatropha. Also found on avocado, citrus, tomato, eggplant, peppers, beans, peas, sweet potato, mango, plumeria.
* Lady beetles found feeding on the papaya mealybug on Maui and the Big Island.
* A parasitic wasp, *Anagyrus loecki*, have provided excellent biological control on in HI.
Biological Control:

4 species of ladybeetles.
3 species of tiny parasitic wasps providing excellent in most situations in Hawaii.
Biological Control of Mealybugs

Mealybug destroyer

Immature ladybeetles

http://www.youtube.com/watch?v=l69sltGaZW0
Mealybug Destroyer, Ladybeetles, Parasitic wasps working on Papaya Mealybug on Plumeria

Biological Control:

4 species of ladybeetles.
3 species of tiny parasitic wasps providing excellent in most situations in Hawaii.
Conservation of Natural Enemies

* Recognize the natural enemies and know when the pest is parasitized. Most Important!!

* Avoid plantings in windy or ocean front areas, or extremely hot environments. Modify conditions to encourage natural enemies.

* Avoid use of broad spectrum insecticides:
  - Organophosphates: Dursban, Malathion, Carbamates: Sevin (carbaryl)
  - Pyrethroids: Talstar (bifenthrin)
<table>
<thead>
<tr>
<th>Common name (trade name)</th>
<th>Class</th>
<th>Selectivity (affected groups)</th>
<th>Predator Mites</th>
<th>General Predators</th>
<th>Parasites</th>
<th>Duration of impact to natural enemies</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbaryl (Sevin)</td>
<td>carbamate</td>
<td>Broad (insects, mites)</td>
<td>Moderate/High</td>
<td>High</td>
<td>High</td>
<td>Long</td>
</tr>
<tr>
<td>chlorpyrifos (Dursban)</td>
<td>OP</td>
<td>Broad (insects, Mites)</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>fenpropathrin (Tame)</td>
<td>Pyrethroid</td>
<td>Broad (insects, Mites)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Moderate Long for Talstar</td>
</tr>
<tr>
<td>Imidacloprid (Merit as a Drench)</td>
<td>Neonicotoxinoid</td>
<td>Narrow (sucking, insects)</td>
<td>-</td>
<td>Low</td>
<td>Low</td>
<td>-</td>
</tr>
<tr>
<td>Imidacloprid (Merit as a Foliar)</td>
<td>Neonicotinoid</td>
<td>Narrow (sucking, insects)</td>
<td>-</td>
<td>Moderate</td>
<td>High</td>
<td>Short to moderate</td>
</tr>
<tr>
<td>Insecticidal Soap (M-Pede)</td>
<td>soap</td>
<td>Broad (insects, Mites)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Short to none</td>
</tr>
</tbody>
</table>

http://www.ipm.ucdavis.edu/PMG/r302900111.html
Scale Insects

Armored

Cockerell or Magnolia White Scale

Soft

Green scale
Development of Armored Scales

Armored covering formed by cast skins and waxy secretions

Crawler to adult is about one month

Hibiscus Snow Scale
Armored Scales in the Landscape

Coconut Scale

Ti Scale

Black Thread Scale

Cycad Scale

Female

male

Mining Scale
Soft Scales in the Landscape

Hemispherical Scale

Wax Scales

Green Scale

Barnacle scale

Red Wax Scale

Nigra Scale
Hong Kong orchid
Bauhinia x blakeana

Cotton lacebug
Corythuca gossypii (Tingidae)

Photos by W. Nagamine
cotton lacebug
*Corythuca gossypii* (Tingidae)

lacebug feeding between leaf veins on underside of leaf

yellowing between leaf veins

Neonicotinoids are effective

Yellowed leaves

Photos by W. Nagamine
New Landscape Pests
Little Fire Ant (LFA)

- LFA is in the top 100 of the world’s worst alien species, invading diverse habitats: homes, landscapes, trees (coconut, tropical fruit), shrubs and forests.
- LFA reproduces both asexually and sexually. Sterile workers’ vigor and disease resistance can be genetically selected and reproduced.
- LFA, native to South America, has spread to Mexico, Caribbean and Pacific Islands, Australia, North America (Florida), Africa, Israel (1998), Hawaii (1999) and Guam (2011).
Little Fire Ant (LFA)

Impacts

- LFA disrupt native populations of arthropods by competition, exclusion and predation.

- LFA tend honeydew producing insects.

- Inter-island, interstate and international quarantine pest.

- Aerial colonies in trees are stinging tree trimmers, landcapers, gardeners and tropical fruit pickers as disturbed LFA fall on their necks and in their clothing.
LFA Ant Nest

Photo by W. Nagamine
Most attractive is peanut butter

Photos by W. Nagamine
Will nest almost anywhere, natural or man-made 
Macadamia nut shell
Treatments Commonly Used to Control LFA in Urban, Landscape and Nursery Settings

- **Contacts** – Fipronil (pco only, lateral transfer), bifenthrin (Talstar, pyrethroid)
- **Drenches** – Bifenthrin and hot water (113° F for 5 min).
- **Granules** – Bifenthrin incorporated into media.
- **Granular** – Most of the Red Imported Fire Ant (RIFA) Baits baits (soybean oil on corn grit) are effective:
  - Amdro, Probait, Extinguish Plus (Amdro & methoprene), Siesta, Advion, Distance (IGR), Esteem (IGR, food label)
  - Limiting effectiveness in tropical environment is moisture, leading to moldy baits.
- **IGR Gel** – Methoprene (IGR, Tango) with vegetable or corn Bait oil, peanut butter and xanthan gum.
  (Vanderwoude 2012, http://littlefireants.com/)
New Armored Scale on Palms and Ornamental Plants in Hawaii

**Fiorinia phantasma** (Hemiptera: Diaspididae)

*First discovered in Hawaii in Dec 2004 on Japanese privet on Oahu; previously, only reported from Philippines.*

*Also found on various palms, including coconut palms and traveler’s palm, kamani, *Ficus benjamina*, *Cassia* sp., naio (myoporum), pandanus, heliconia, mock orange, Madagascar olive.*

*Reported as a serious pest on areca palms in the landscape in Wailea/Kihei, Maui (Sept 2011). Scale insect is totally encased in their cast skin “shell” providing protection.*

*Horticultural oils should be effective against crawler stages. Systemic insecticides (e.g. Safari) and insect growth regulators (e.g., Distance) are effective (G. Webb Kona10/12,*).

*Natural enemies identified in Kailua-Kona (ladybeetles & parasitic wasps 02/13).*

Female – yellow w/red stripes

Females

Males

Damage on upper leaf surface of areca

Infestation on lower leaf surface

Janis Matsunaga, HDOA
Arnold Hara, UH-CTAHR
October 2011
**Phantasma Scale, *Fiorinia phantasma***

*Chilocorus nigritus*
‘lady beetle’
Location: Kona (02/13)
Host Plant: Plumeria (leaf)
Host Insect(s): Whiteflies, mealybugs, phantasma scale

*Cybocephalus nipponicus*
‘armored scale predator’ or ‘scale picnic beetle’
Location: Kona (02/13)
Host Plant: Plumeria (leaf)
Host Insect(s): Whiteflies, mealybugs, *Phantasma scale*

Parasitized *Fiorinia phantasma*
Hala Scale, *Thysanococcus pandani*

*Causes yellowing of and serious damage to the leaves of Hala (Pandanus)*

*Adult scale has a dark body with a white fringe around the edge.*

*Hala scale was first observed in Hana, Maui in 1995. East Maui's Hala is infested.*

*The South Pacific island of Rarotonga, in the Cook Islands, apparently lost its Pandanus trees in the 1920's due to this scale.*

Hala scale damage, causing leaf yellowing, in Ha'iku, Maui.

Hala scale on a hala leaf and fruit (inset)

http://www.reportapest.org/pestlist/thypan.htm
Expected Landscape Pests
Coconut rhinoceros beetle (CRB)

Native range: Southeastern Asia
*CRB was introduced throughout the Pacific primarily due to increased sea/air traffic during World War II.
*Most recently, CRB was discovered in Guam in September 2007.
*Primary damage is caused by adults boring from the petioles of fronds into the crown, cutting through developing leaves, and feeding on the exuded sap.
*The beetle breeds in dead, standing coconut palms killed by pest/disease/lightning, and in decaying organic materials, such as compost and sawdust heaps. (Bedford, 1980).
*Eggs hatch in 8-12 days; larvae feed on decaying coconut/palm debris for 82-207 days.
*Prepupal and pupal stage is 25-35 days; adult remains in the pupal cell for 17-22 days.
*Adults live for 4-9 months; each female lays 50-100 eggs.

shorter horn than male
ADULT FEMALE fuzzy, orange posterior
(M. Schmaedick 2005 Am. Samoa)

egg  1st instar
3rd instar
pupa
Primary damage is caused by adults boring from the petioles of fronds into the crown, cutting through developing, unopened fronds, and feeding on the exuded sap.

V-shaped cut on open fronds.

Similar to mechanical pruning damage to unopened fronds

Active adult boring hole in petiole causing “wet look”
Major breeding site among coconut trimming debris - Asan, Guam
Mamala Bay Golf Course
Formerly Hickam Air Force

12/23/13 - A coconut rhinoceros beetle (CRB) was caught in a trap ~1 mile from the infested mulch site discovered at the golf course.
Adults and grubs found at the Mamala Bay (Hickam) Golf Course

Infested mulch pile was covered on January 11, 2014 with bird netting to prevent adult emergence.
* 2/21/14 – Spreading and covering of the double-ground mulch (2000 cu yd) at Mamala Bay Golf Course.
* The site is not considered a breeding site at this time.
* Ground mulch is planned for H-Power incinerating or in-vessel composting reaching 170 F with urea/ammonium nitrate solution.
* Tarp steaming tested but penetration below is minimal.
* Insecticides not effective (recovers from poisoning).
Mamala Bay Golf Course
(Hickam Air Force)

* Coconut trees on golf course with CRB feeding damage.
* Golf course is near the international runway, with military and commercial flights taking-off and landing overhead.
Iceplant scale
*Pulvinariella mesembryanthemi*

* First discovered at Kohala Ranch in 2012 on mini iceplant, *Lamprantus roseus*.
* Related to akuli'kuli, *L. glomeratus*.
* Major pests of iceplant in the landscape in California.
* In California, scale was successfully controlled by parasitoids.
Banyan Stem-Galling Wasp, a New Insect in Hawaii
Hawaii Department of Agriculture (HDOA), Plant Pest Control Branch - August 28, 2012

**Insect species:** Undetermined at this time. Specimens being sent to insect specialists for identification. Belongs to the family Agaonidae (fig wasps).

**Description:** A black wasp, about 1/16th inch or (2mm) in length (Fig. 3).

**First found in Hawaii:** July 13, 2012 (samples of infested stems submitted to HDOA by an arborist from the East-West Center, University of Hawaii).

**Host:** Chinese banyan, Ficus microcarpa, family Moraceae (Fig. 1). Tree is native from Ceylon to India, southern China, Ryukyu Islands, Australia, and New Caledonia.

**Island Distribution:** Oahu (widespread), Hawaii Island (Hilo), and Maui (Kahului, Wailuku).

**Biology:** The female wasp lays its egg in the young stems. The wasp larva hatches and feeds within the tissue (Fig. 4). As the larva develops, the stem becomes swollen and forms a gall. The larva pupates and the wasp adult eventually emerges (Fig. 5), leaving a distinctive exit hole in the woody tissue (Fig. 2).

**Damage:** Some leaf drop and dieback of stems, causing canopy to thin out, although our surveys indicate varying degrees of infestation and damage.

1. Chinese banyan, Ficus microcarpa.

2. Galls in green stem tissue (left side in each picture) and old galls in woody tissue with wasp exit holes (right side).

3. Stem-galling wasp (1/16th inch)

4. Wasp larva in gall (1/16th inch)

5. Adult wasps in dissected stem galls.
Injected with Ace-Jet using Tree I.V. (09/12/12)

Kennedy Theatre

*40 inch diameter breast height.
*Injected with 90 g of AceJet (acephate 97.4%) in 400 ml water.
*3/8 inch drill bit w/ fast drilling
*Bicycle pumped to 50 psi.
*Better uptake during mornings with cooler temperatures.
*Acephate has quicker knock-down compared with imidacloprid.
Injection Systems Evaluated

- **Wedgie Direct-Inject**
  - New! Forestry Pack Option Available
  - Dose Adjustment: Preval to release a 1 ml dose of chemical with each full stroke of the handles. Can be adjusted to deliver 1.0 ml dose where needed.
  - Patented Wedgie™ Tip: Releases chemical where it can be easily absorbed by the tree.
  - Manual Operation: You control the pressure needed to inject the tree.

- **Sidewinder Tree Injector**
  - Delivers highest dose

- **Mauget Tree Injectors**
Lobate lac scale  
*Paratachardina pseudolobata*

*Occurs in Florida, Bahamas and Christmas Island.*  
*Produces honeydew which supports sooty mold.*  
*Host range of over 307 species of woody plants including Fabaceae (Acacia), Malvaceae (Hibiscus) Moraceae (Ficus), Myrtaceae (Eugenia, guava), rose, gardenia, Phoenix palm.*  
*Belongs to the lac scale family from which shellac is produced.*

“The potential for further spread of this scale is especially high for warm areas into which there is a significant movement of living plants e.g., from Florida to Puerto Rico, and other localities of the Caribbean Region, California and HAWAII (Howard et al. 2002).”
*One drench application of Merit 75 WP (imidacloprid) to large Indian Laurel Tree, *Ficus retusa*, eradicated lobate lac scale for over a year (523 days).

*Foliar applications of imidacloprid and bifenthrin (Talstar) were also highly effective against crawler and adult stages of lobate lac scale. (Research in Florida by Howard & Steinberg 2005)
Belongs to the lac scale family from which shellac is made.
Red Imported Fire Ant infestation at Miramar Marine Air Station, San Diego, CA
Will it establish at Kaneohe Marine Air Station?????
THANK YOU!

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