

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

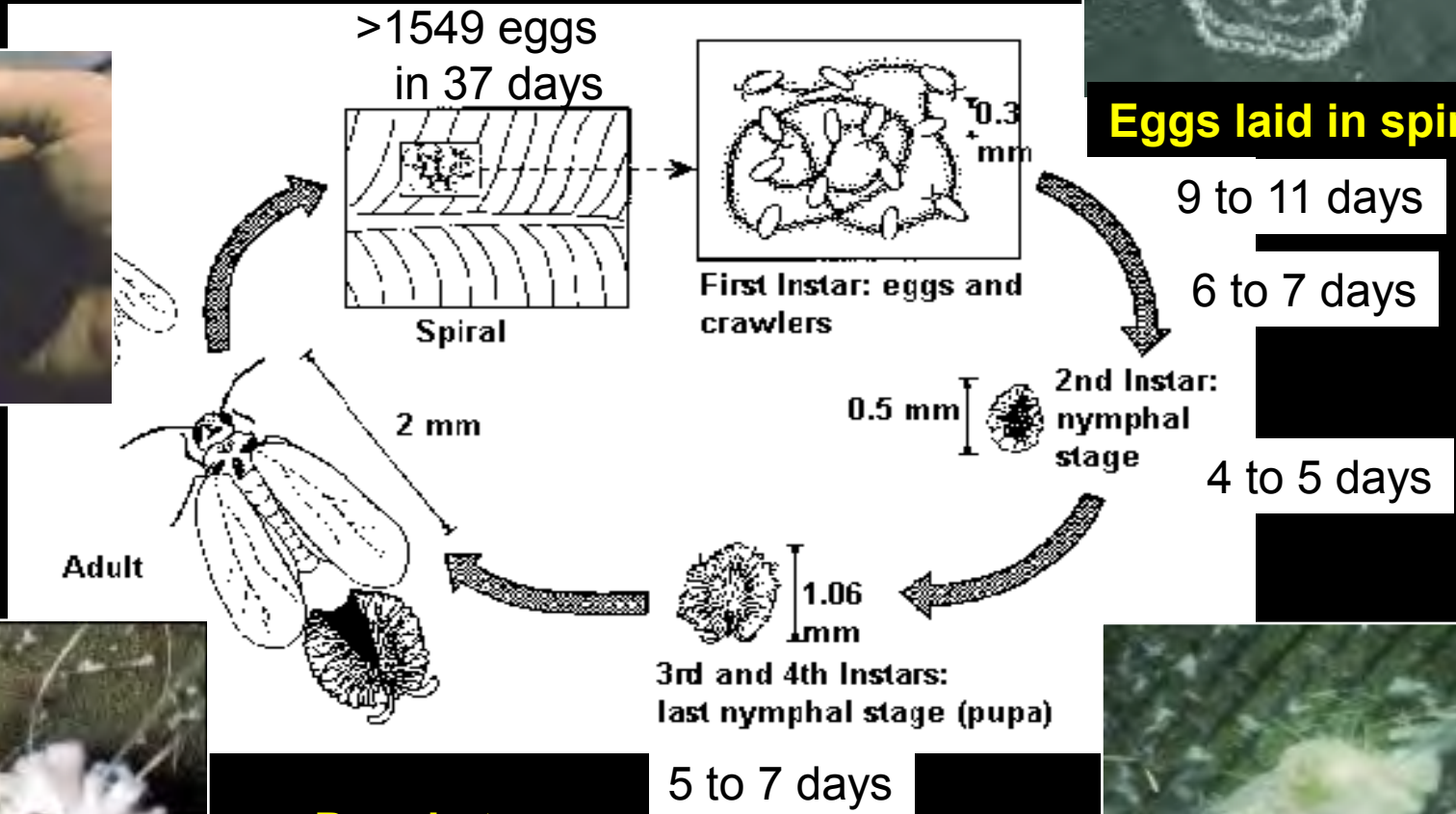
Egg to adult
34 to 41 days



Adult stage



Eggs laid in spiral



Pupal stage
10-to 11 days



Nymphal stage

Before & After Introducing Natural Enemies of the Spiraling Whitefly

Guava
Honolulu,
HI 1979



Before

1980



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.



Nephaspis



Encarsia

Heavy Spiraling
Whitefly Infestation
Mauna Lani
09/2010



Stems infested with
White Peach Scale



2010/09/28

Plumeria at Keahole Ag Park (09/2010)



Immature Lady Beetle



Adult Lady Beetle



No natural enemies present

2010/09/29

Spiraling Whitefly in West Hawaii

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



Parasitized Whitefly Nymph



Parasitoid Emergence Hole



Eulophid parasitic wasp,
Aleuroctonus vittatus

**Spiraling Whitefly heavily parasitized by parasitic wasps
(Note 4th Instar pupae with round exit holes)**



Papaya Mealybug

Paracoccus marginatus

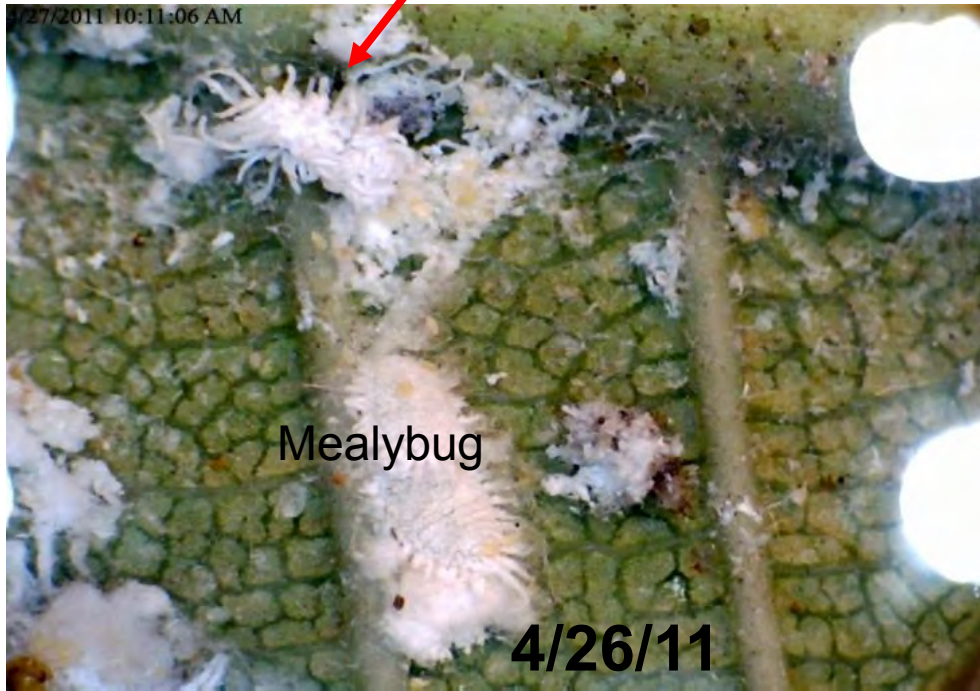
- * First discovered in HI in June 2004 Maui.
- * Native to Mexico and found on Guam, Florida, Carribean Islands.
- * Mealybug injects a toxin as it feeds and causes chlorosis, stunting, deformation, leaf and fruit drop.
- * Heavy infestations observed on papaya, hibiscus, jatropha. Also found on avocado, 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 loeckii*, have provided excellent biological control on in HI.



Papaya Mealybug 2004



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.



Biological Control of Mealybugs

Mealybug destroyer

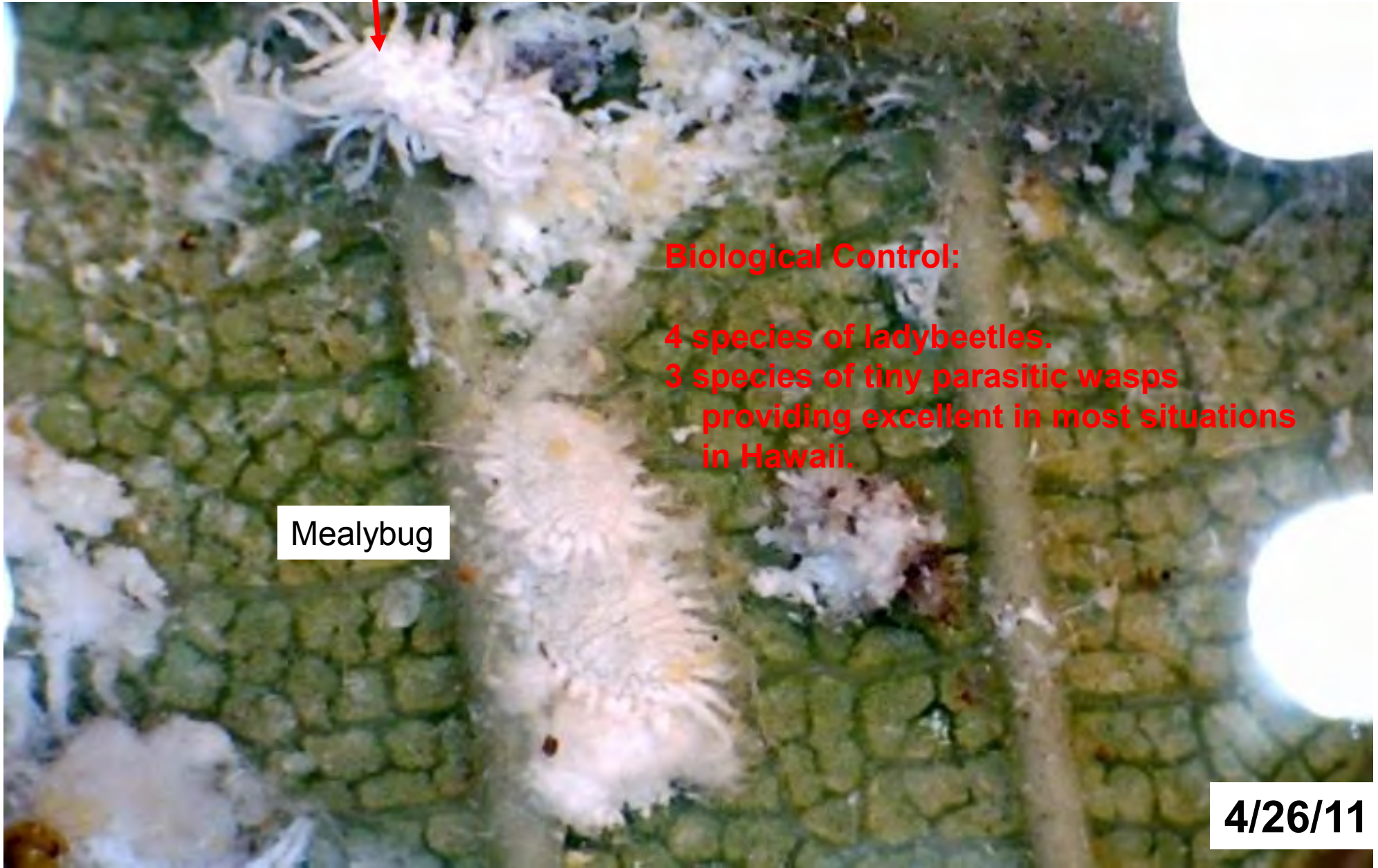


Immature ladybeetles



<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.**

Mealybug

4/26/11

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)

Insecticide Toxicity to Natural Enemies

Common name (trade name)	Class	Selectivity (affected groups)	Predator Mites	General Predators	Parasites	Duration of impact to natural enemies
carbaryl (Sevin)	carbamate	Broad (insects, mites)	Moderate/High	High	High	Long
chlorpyrifos (Dursban)	OP	Broad (insects, Mites)	Moderate	High	High	Moderate
fenpropathrin (Tame) similar To (Talstar)	Pyrethroid	Broad (insects, Mites)	High	High	High	Moderate Long for Talstar
Imidacloprid (Merit as a Drench)	Neonicotinoid	Narrow (sucking, insects)	-	Low	Low	-
Imidacloprid (Merit as a Foliar)	Neonicotinoid	Narrow (sucking, insects)	-	Moderate	High	Short to moderate
Insecticidal Soap (M-Pede)	soap	Broad (insects, Mites)	Moderate	Moderate	Moderate	Short to none

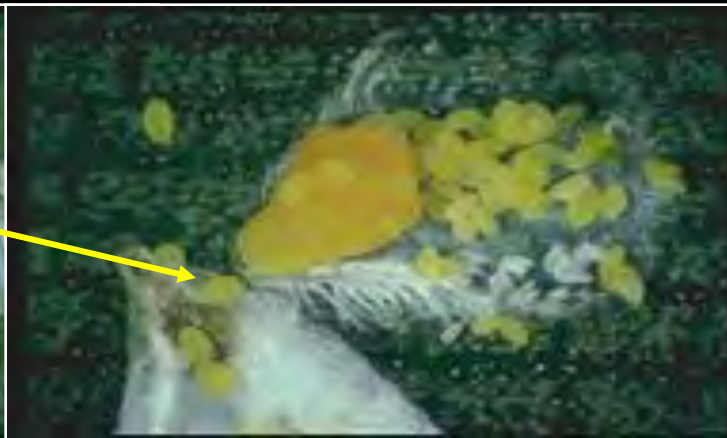
Scale Insects

Armored

Soft



Cockerell
or Magnolia
White Scale



Green scale

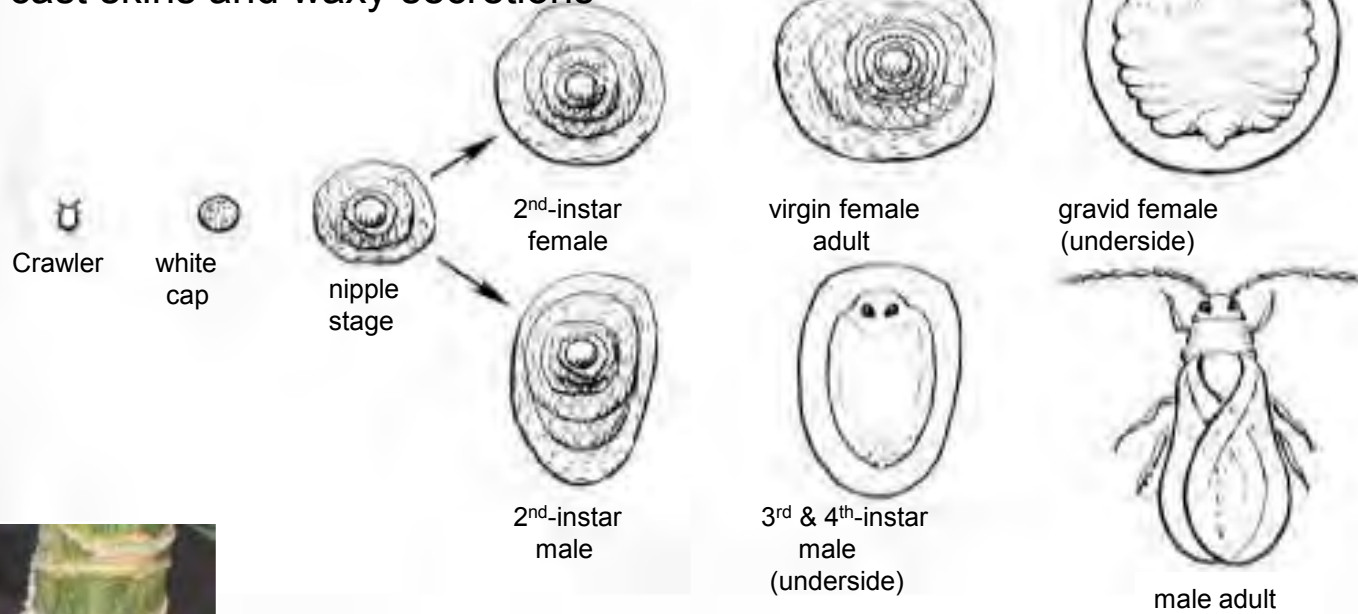


Development of Armored Scales

Crawler to adult is about one month



Armored covering formed by cast skins and waxy secretions



Hibiscus
Snow
Scale



Pre-adult



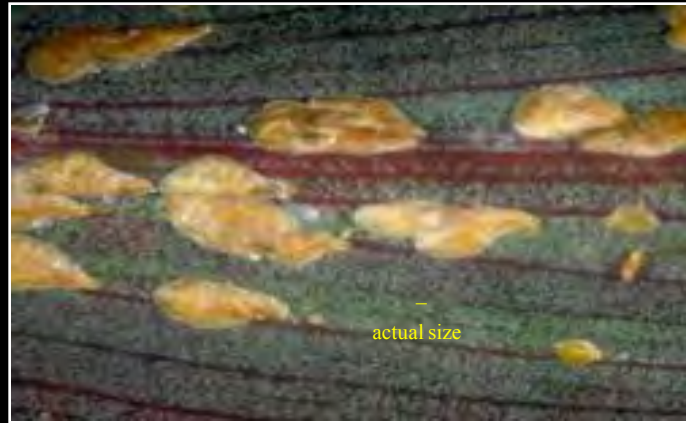
Adult male

Armored Scales in the Landscape

Coconut Scale



Ti Scale



Black Thread Scale



Cycad Scale



Mining Scale



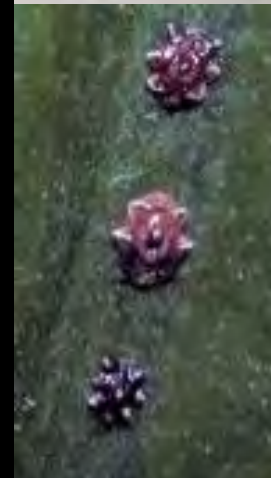
Soft Scales in the Landscape

Hemispherical Scale



Green Scale

Wax Scales



Red Wax Scale

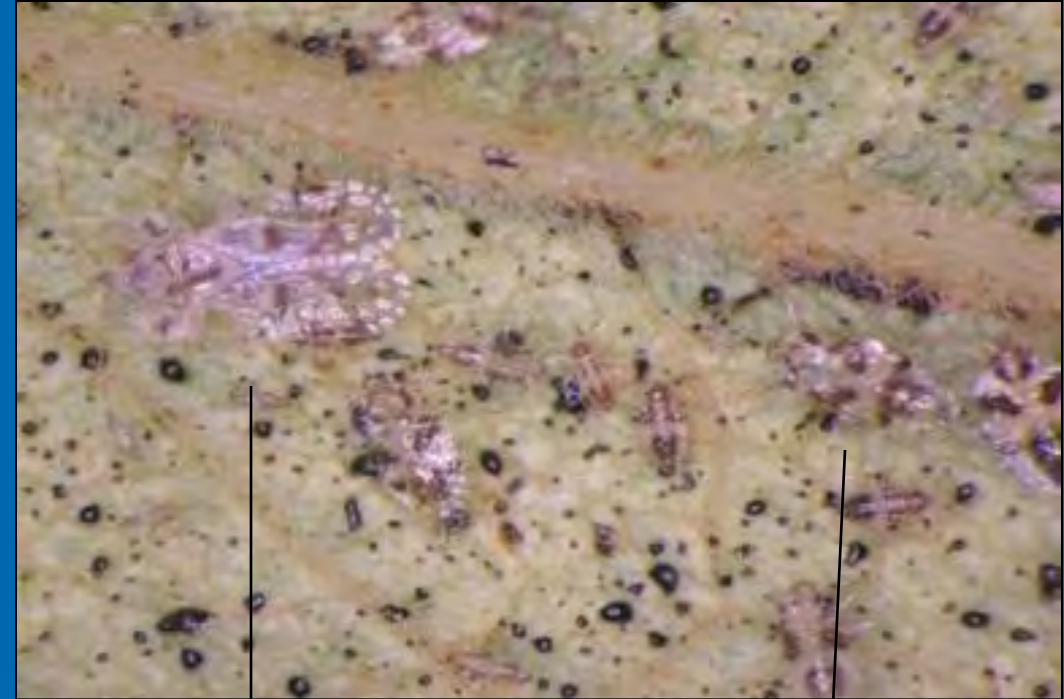
Nigra Scale



Hong Kong orchid
Bauhinia x blakeana



Cotton lacebug
Corythuca gossypii (Tingidae)



lacebug adult



lacebug nymphs

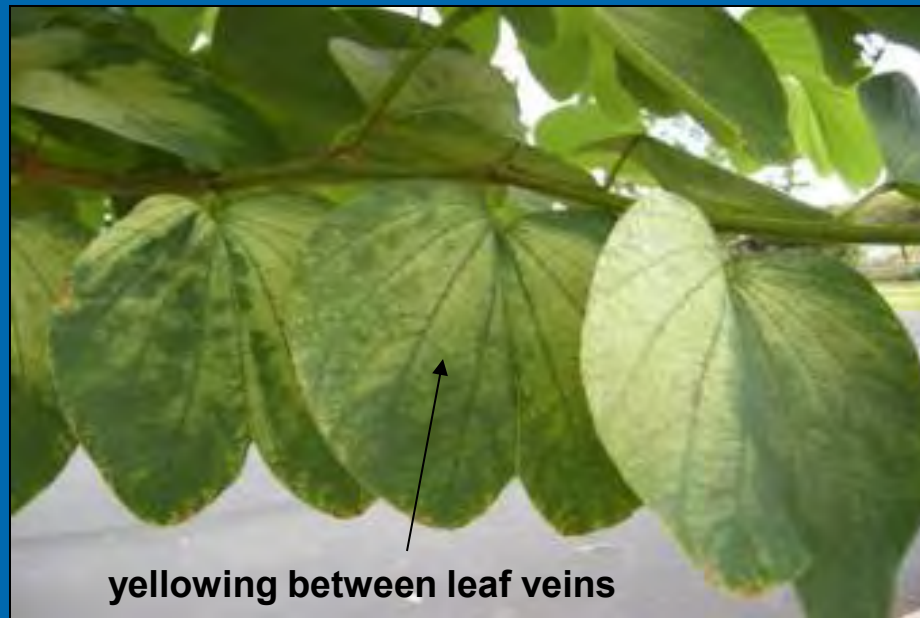
Photos by W. Nagamine

cotton lacebug
Corythuca gossypii (Tingidae)

lacebug feeding between leaf veins on underside of leaf



Neonicotinoids are effective



yellowing between leaf veins



Yellowed leaves

Photos by
W. Nagamine

New Landscape Pests

Little Fire Ant (LFA)



LFA male



LFA female

- ❖ 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.



LFA foraging for nectar on
anthurium spadix



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

LFA Ant Nest



Photo by

Most attractive is peanut butter



Photos by
W. Nagamine

Will nest almost anywhere, natural or man-made
Macadamia nut shell



Photo by W. Nagamine

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 Baits – Most of the Red Imported Fire Ant (RIFA) baits (soybean oil on corn grit) are effective:
 - Amdro, Pro bait, 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 Bait – Methoprene (IGR, Tango) with vegetable 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)

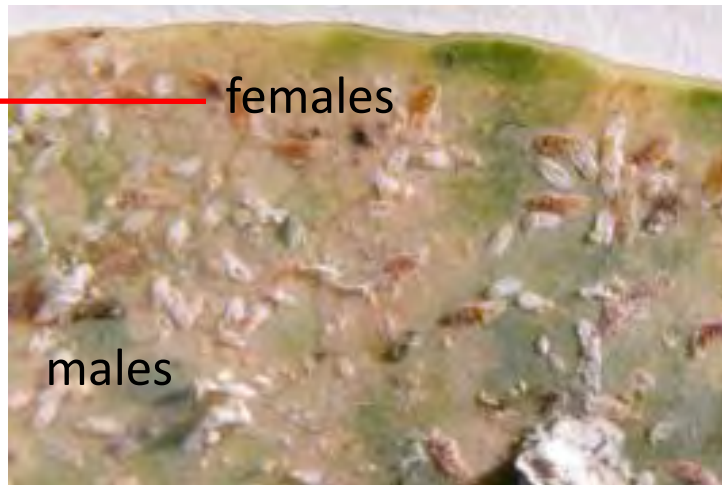
- *First discovered in Hawaii in Dec 2004 on Japanese privet on Oahu; previously, only reported from Philippines.
 - *Also found on various palms, including coconut palms and traveler's palm, kamani, *Ficus benjamina*, *Cassia* sp., naio (myoporum), pandanus, heliconia, mock orange, Madagascar olive.
 - *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 regulars (e.g., Distance) are effective (G. Webb Kona10/12,).
 - *Natural enemies identified in Kailua-Kona (ladybeetles & parasitic wasps 02/13).



Damage on upper leaf surface of areca



Female – yellow w/red stripes



females

males



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*



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

- *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 on a hala leaf and fruit (inset)



Expected Landscape Pests

Coconut rhinoceros beetle (CRB)

Native range: Southeastern Asia

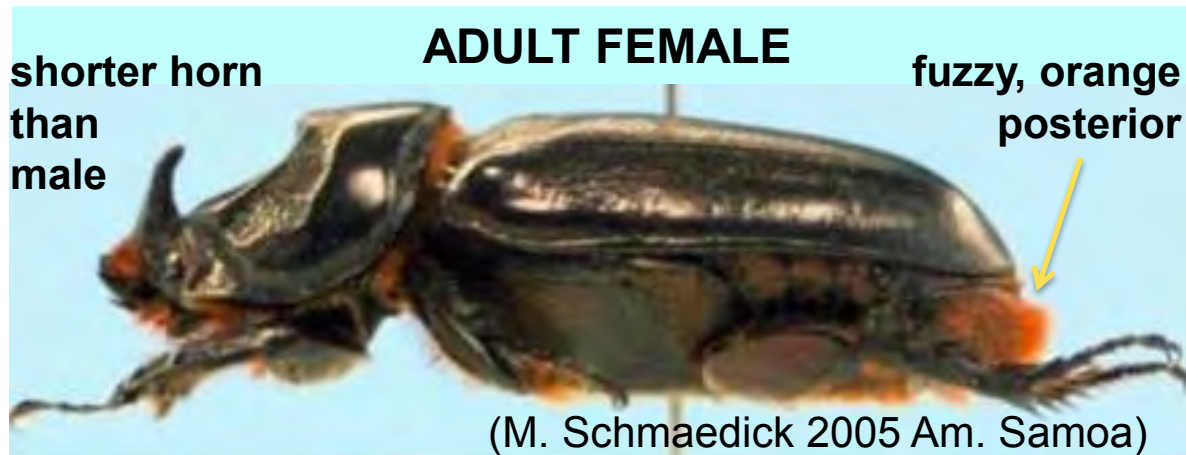
- *CRB was introduced throughout the Pacific primarily due to increased sea/air traffic during World War II.
- *Most recently, CRB was discovered in Guam in September 2007.
- *Primary damage is caused by adults boring from the petioles of fronds into the crown, cutting through developing leaves, and 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.



egg 1st instar



3rd instar



ADULT FEMALE

shorter horn
than
male

fuzzy, orange
posterior

(M. Schmaedick 2005 Am. Samoa)



pupa

Coconut rhinoceros beetle (CRB) - Damage Symptoms

**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"



Active adult boring hole thru petiole



Coconut fibers resulting from adults' boring



Major breeding site among coconut trimming debris - Asan, Guam



Joint Base Pearl Harbor-Hickam military facility



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



194 adults



422 grubs



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 (Fig. 5). 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).



Figure 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



Lobate lac scale

Paratachardina pseudolobata

- *First time in Florida on hibiscus in August 1999.
First in Hawaii Oct 2012 on *Ficus*, Moanalua Park.
- *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).”

Paratachardina pseudolobata lobate lac scale

- Adult females are x-shaped, dark red-brown, and ~ 1/16th inch in length and width and height.

- To the untrained eye, scales can blend in with the bark of the plant and be difficult to spot.

- Immature scales are bright red, flat, oval, and around 1/64th inch long.

- Over 300 recorded hosts in over 50 plant families were recorded in Florida.

- Prefer woody stems. Usually not found on stems more than ¾ inch in diameter.

- On Oahu, it has been found on various ficus and hibiscus species, mango, Tahitian gardenia, and golden rain tree



Adult females on hibiscus branch. Inset: immature scale (magnified).



Infested hibiscus stem showing scales and black sooty mold starting to build up (a good indicator of an infestation)



Badly infested *Ficus benyamina* tree showing dieback of large branches and defoliation

- In the continental U.S., it is only known to occur in Florida. Also found in Puerto Rico, Cuba, The Bahamas, and Christmas Island (Australia).

- First found on Oahu in October 2012 in the Moanalua area. Likely to be found island-wide. Not yet found on other islands.

- These insects produce copious amounts of honeydew, which can lead to thick layers of sooty mold covering branches and foliage.

If you suspect that you have the lobate lac scale, please call.

Maui:
873-3949
Kauai :
274-3072
Big Island
Hilo:
974-4146
Kona:
323-7579
Oahu:
973-9525

*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)

Hawaii Dept. of Agriculture
Plant Pest Control Branch

Walter Nagamine, Darcy Oishi,
Bernarr Kumashiro, Janis Matsunaga



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?????



Red Imported Fire Ant



02/14

THANK YOU!

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