Insect Pests Impacting Guam's Forests

Forestry Nursery Workshop

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One of the penalties of an ecological education is that one lives alone in a world of wounds. Much of the damage inflicted on the land is quite invisible to laymen.
- Aldo Leopold, "Round River"

Birds Exterminated by Brown Treesnake: Ecosystem Services Lost

- Accidentally introduced by U.S. Military in late 1940s
- Guam's forest birds are gone because of snake predation
- Ecosystem services provided by birds also gone: seed dispersal, pollination, insectivory

Overbrowsing by Ungulates

- Much of Guam's forest is heavily damaged by deer and pigs which preferentially browse on native plants.
- Especially true on forested land occupied by the military, where hunting is prohibited. Andersen Air Force Base has deer population densities as high as anywhere in the world.

Endemic Cycad Attacked by Asian Cycad Scale

- *Cycas micronesica* was listed as the most populous tree-sized plant (DBH>5") in the latest forest survey (Donnegan et al. 2002)
- Asian cycad scale, *Aulacaspis yasumatsui*, detected in 2003 on ornamental plants
- Infestation quickly spread to wild plants. By 2006, *C. micronesica* was placed on the IUCN Red List of Threatened Species.
- To date, 90% of Guam's *C. micronesica* have been killed.

Coconut Palms Attacked by Coconut Rhinoceros Beetle (CRB)

- *Cocos nucifera* was listed as the 2nd most populous tree-sized plant (DBH>5") in the latest forest survey (Donnegan et al. 2002)
- CRB was detected on Guam in 2007; adults kill palms by boring into the crown to feed on sap
- To date, the CRB infestation has spread to most of central and northern Guam
- 50% tree mortality is to be expected if CRB population levels are not kept in check

And Now the Little Fire Ant? ...

Many Invasive Species in Guam's Forests Remain Undetected

- Biological monitoring of Guam's forests is almost non-existent. We don't have a biodiversity inventory.
- Invasive species are almost always discovered accidentally, after establishment.
- Example: After the coffee berry borer (CBB) was discovered in Hawaii, I deployed a single CBB trap during Jan and Feb 2011 at a single site in a forested area on Guam. Trapped bark beetles (Scolytidae) where identified by Dr. Don Bright, Colorado State University.
  This single trap, at a single location, caught 7 species of bark beetles 4 of which were not previously reported from Guam.

Insects and Other Pests in the Nursery

Mark Schmaedick

American Samoa Community College

Preventing Pest Problems

1. Grow a healthy plant
2. Monitor plant conditions
3. Monitor pests and diseases

Grow a healthy plant

Suitable pest- and disease-free container and medium

Grow a healthy plant

- Watering
- Nutrition
- EC, pH

Grow a healthy plant

Keep pests out

Incoming plants

Grow a healthy plant

Keep pests out

Incoming people

Grow a healthy plant

- Old plants
- Sick plants
- Dead plants

Grow a healthy plant

Weeds inside
and outside

Monitor plant conditions

- Watering
- Nutrition
- EC, pH
- Sick plants
- Weeds

Monitor pests

Overview of nursery

Monitor pests

Check each plant species

Monitor pests

Check some individual plants

- Growing point
- Leaves
- Stem
- Roots

Monitor pests

Things to look for – leaf damage

- holes
- spots
- mines

Monitor pests

Things to look for – leaf damage

- distortion
- discoloration

Monitor pests

Things to look for –

- death of growing point
- wilting
- stunting

Monitor pests

Things to look for –

- webbing
- frass
- slime trails

Monitor pests

Things to look for –

sooty mold and ants

Some pests to watch out for

Piercing, sucking pests –

Aphids

Some pests to watch out for

Piercing, sucking pests –

Psyllids

Asian citrus psyllid
(*Diaphorina citri*)

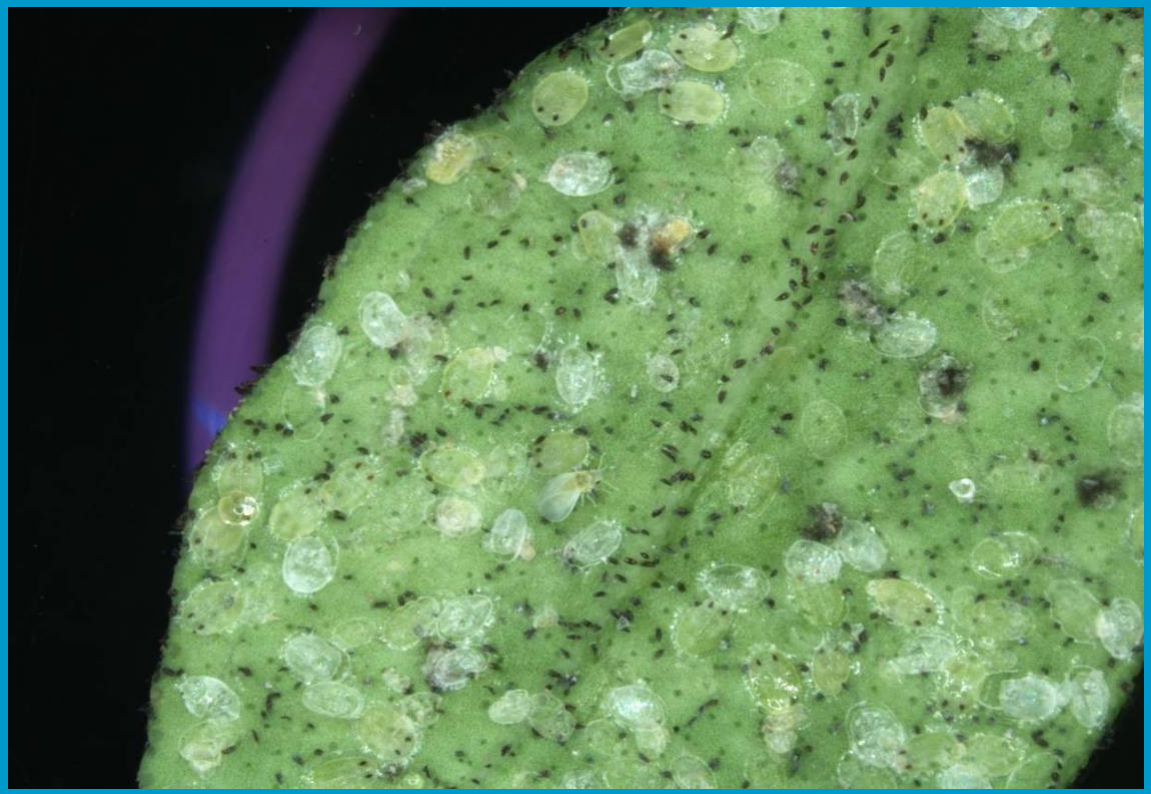
Eugenia psyllid
(*Trioza eugeniae*)

Ifilele psyllid
(*Insnesia glabrascuta*)

Some pests to watch out for

Piercing, sucking pests –

Whiteflies



Bayberry whitefly (*Parabemesia myricae*)

Some pests to watch out for

Piercing, sucking pests –

Scale insects

Oleander pit scale
(*Asterolecanium pustulans*)

Green scale
(*Coccus viridis*)

Trilobed scale
(*Pseudaonidia trilobitiformis*)

Some pests to watch out for

Piercing, sucking pests –

Mealybugs

Solenopsis mealybug (*Phenacoccus solenopsis*)

Some pests to watch out for

Piercing, sucking pests –

Thrips

Red-banded thrips
(*Selenothrips rubrocinctus)*

Gardenia thrips (*Thrips florum)*

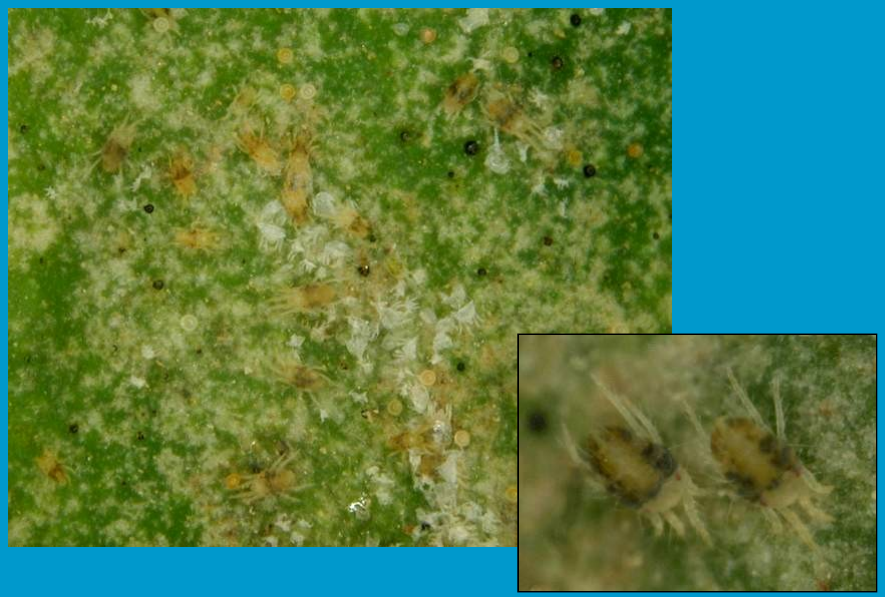
Some pests to watch out for

Piercing, sucking pests –

Mites

Tava erinose mite (*Eriophyes* sp.)

Spider mites (*Tetranychus* spp.)



Broad mite (*Polyphagotarsonemus latus*)

Some pests to watch out for

Chewing pests – Caterpillars

Castor semilooper (*Achaea janata*)

Brown awl (*Badamia exclamationis)*

Citrus leafminer (*Phyllocnistis citrella*)

Geranium plume moth (*Sphenarches anisodactylus*)

Some pests to watch out for

Chewing pests –

Boring beetles

Black twig borer (*Xylosandrus compactus*)

Orchid weevil (*Orchidophilus aterrimus*)

Some pests to watch out for

Chewing pests –

Slugs and snails

Giant African snail
(*Lissachatina fulica*)

Cuban slug
(*Veronicella cubensis*)

Some beneficials to watch out for

Predators

Jumping spider

Long-legged fly

Some beneficials to watch out for

Parasitoids

Controlling pests

- Prevention
- Natural enemies
- Manual (removal, roguing)
- Pesticides

Keeping pests off our islands

- Importing plant material to American Samoa
- Transporting plant material to Manu'a

Keeping pests off our islands

Importing plant material to American Samoa

Risk assessment

Keeping pests off our islands

Transporting plant material to Manu'a

Risk assessment – reduce risk

Keeping pests off our islands

Ants

Tropical fire ant (*Solenopsis geminata*)

- Tutuila ~2002
- Aunu'u ~2010
- Manu'a ~?

Keeping pests off our islands

Ants

Photo by Ronald Heu, Hawai'i DoA

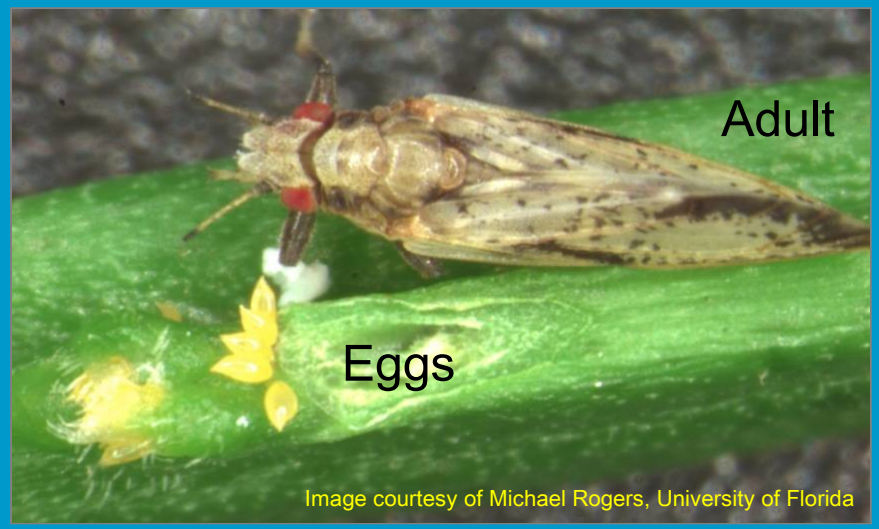
Photo by Walter Nagamine, Hawai'i DoA

Little fire ant (*Wasmannia auropunctata*)

- Hawai'i ~1999
- Guam ~2011
- American Samoa ~?

Keeping pests off our islands

Asian citrus psyllid



Keeping pests off our islands

Pests transferred from Tutuila to Manu'a in recent years

Seychelles scale
Icerya seychellarum

Coconut mealybug
Nipaecoccus nipae

Cotton lace bug
Corythucha gossypii

Phantasma scale
Fiorinia phantasma

Pink hibiscus mealybug
Maconellicoccus hirsutus

Tropical leatherleaf slug, *Laevicaulis alte*

Cuban slug
Veronicella cubensis

Pests in the nursery

- Prevent pest problems
- Grow a healthy plant
- Monitor plant conditions and pests
- Learn to recognize pests and beneficials
- Avoid bringing new pests to the islands

Selected On-line References for Forest Insect Pests on Guam

- Pest Fact Sheets (Tree Pests of the Marianas Series, etc.)
  http://www.guaminsects.net/uogces/kbwiki/index.php?title=Fact_sheets
- Guam Invasive Species Advisory Committe Wiki
  http://www.guaminsects.net/gisac/
- Guam Alien Species Registry
  http://aliens.guaminsects.net/
- Pacific Pest Detector Newsletter
  https://www.wpdn.org/ppd_newsletter_archive
- Traditional Trees of Pacific Islands, Elevitch et al.
  http://agroforestry.net/tti/index.html
- Insects of Micronesia
  http://hbs.bishopmuseum.org/pubs-online/iom.html

Distance Diagnostics

- Pacific Islands Distance Diagnostics and Recommendation System (PIDDRS)
  http://www.dddi.org/pacific/
- PestNet
  http://www.pestnet.org/