Pest Management: Yard & Garden Insects Driving You Buggy?

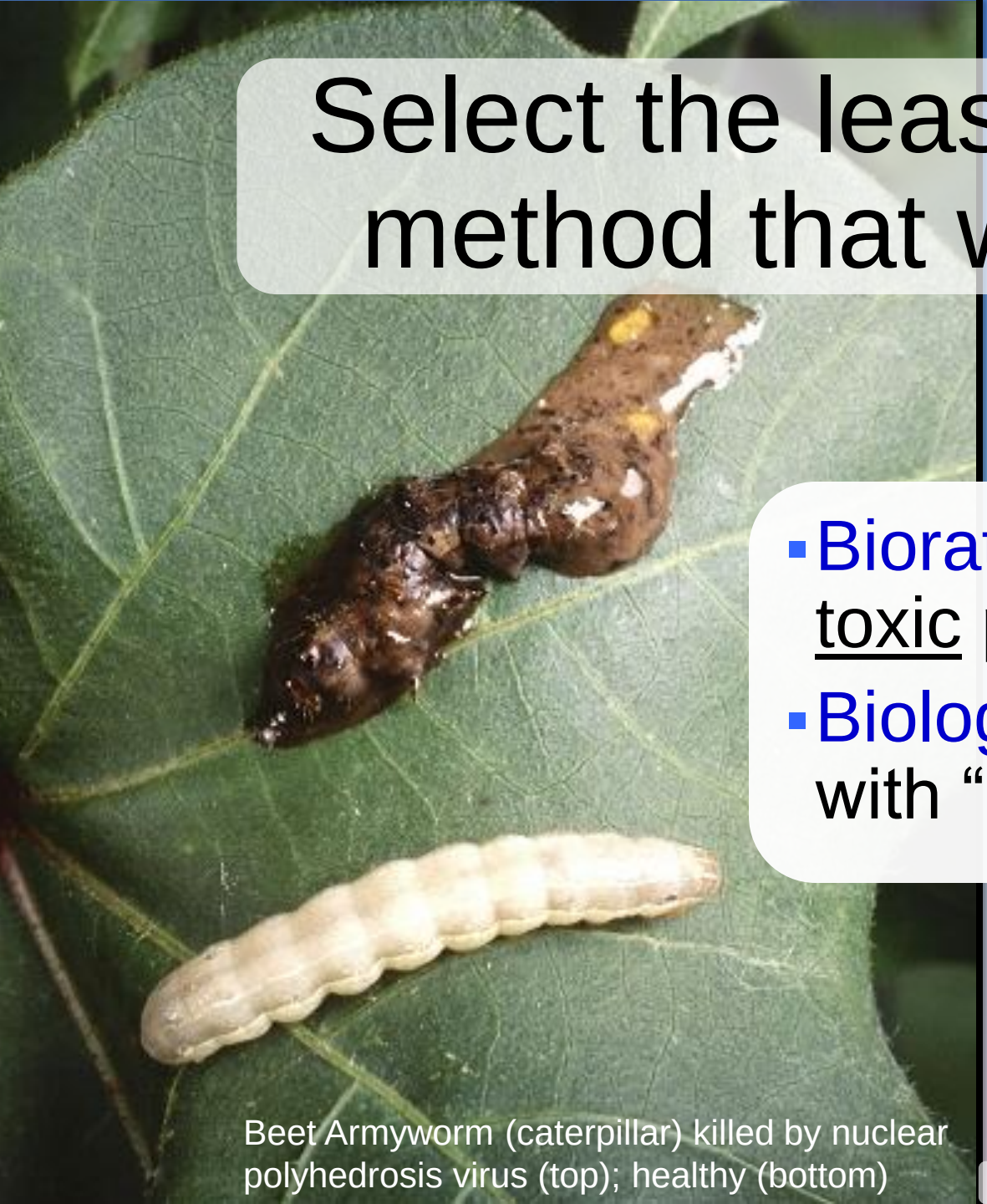
Photo: UF Schall

Bill Schall
Commercial Horticulture
Extension Agent

Palm Beach County
Extension

UF IFAS Extension
UNIVERSITY of FLORIDA

Select the least toxic method that works



- Biorationals: least toxic pesticides
- Biologicals: control with “living” organisms

Beet Armyworm (caterpillar) killed by nuclear polyhedrosis virus (top); healthy (bottom)

Photo: David Nance, USDA Agricultural Research Service, Bugwood.org

Biological Examples

Encarsia spp. wasp attacking scale insects

- Predators predatory mites, bugs, beetles, wasps, spiders, etc.
- Parasites & Parasitoids parasitic wasps and flies
- Micro-organisms beneficial nematodes, fungi, bacteria (Bt) and viruses

Biorational Examples

- Insecticidal Soap
- Insecticidal Oil
- Milk + Water (DM & PM)
- Baking Soda (PM)
- Neem Oil
- Vinegar (herbicide)
- Diatomaceous Earth
- Sulfur (mites & fungi)
- Permethrin
- Rotenone
- IGRs
- Beer
- Pepper
- Cinnamon

Biological Examples

Photo: David Cappaert, Michigan State University, Bugwood.org

Braconid wasp pupae attached to Sphinx moth caterpillar

Next: Hornworm Meets Aliens!

Scouting (Monitoring)

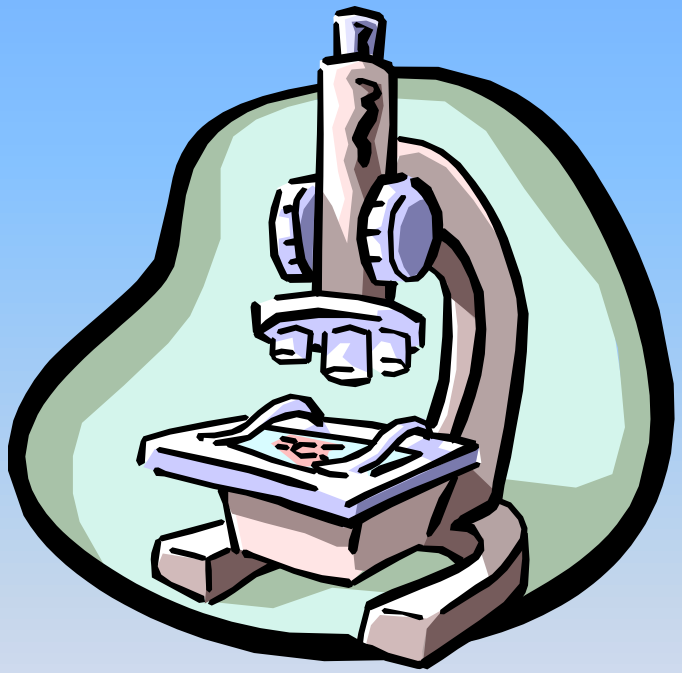
Early detection

- Minimizes the spread of the pest
- Reduces the amount of pesticides needed & therefore cost
- May allow for the use of less harmful control measures
- Weekly best
- Get to know “hot spots”

Photos: UF Schall

Plastic painter’s palette or bucket lid for small insects

Identify



- Extension Agents –
  Master Gardener Hotline
  561.233.1750 or
  mgardenfwd@pbcgov.org
- IFAS or commercial labs
- Featured Creatures Website
- EDIS.IFAS.UFL.EDU

Management “Leave It Or Go After It!”

Photo: Nick Dimmock, University of Northampton, Bugwood.org

- Cultural Control
- Mechanical Control
- Biological Control
- Chemical Control
- Do Nothing

Photo: Scott Bauer, USDA Agricultural Research Service, Bugwood.org

Photo: David Cappaert, Michigan State University, Bugwood.org

Two Common Insect Feeding Types

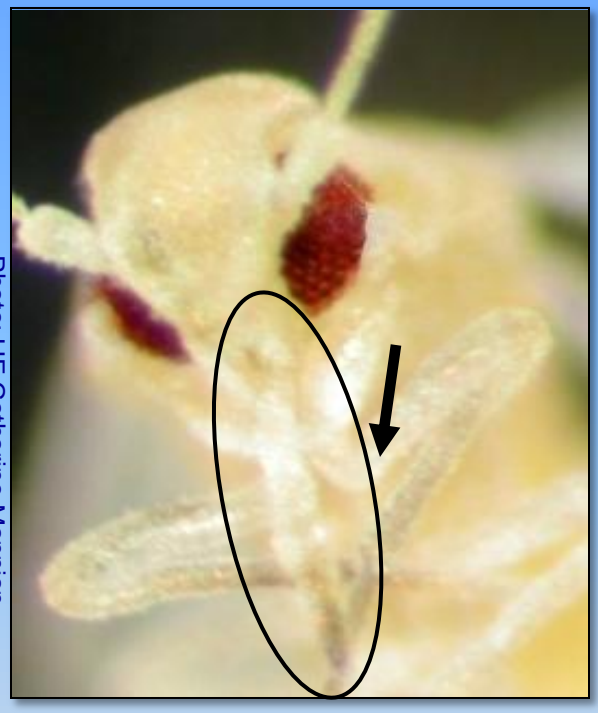


Photo: UF Catharine Mannion

Piercing-Sucking or Rasping

Inserts beak into plant tissue

- sucks out plant juices
- sometimes transmits diseases

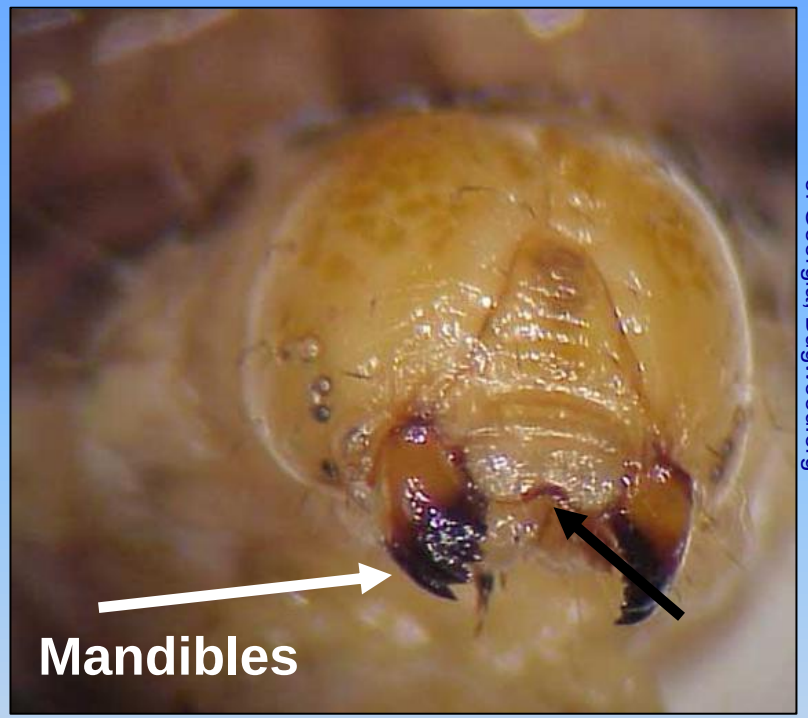


Photo: Philip Roberts, University of Georgia, Bugwood.org

Chewing

Chew on or in plants

Two Common Insect Feeding Types

Photo: UF Mannion

Piercing Sucking & Rasping

- Yellow or brown discoloration & dead spots
- Defoliation (ficus)
- Curled, malformed leaves and petals
- Shiny, sticky “honeydew” or black-colored coating of sooty mold
  – often tended by ants

Two Common Insect Feeding Types

Piercing Sucking & Rasping Ant Tending

Crazy Ants & Mealybug

Photo: Alton N. Sparks, Jr., University of Georgia, Bugwood.org

Tapinoma Ants & Scale

Photo: Susan Ellis, Bugwood.org

Two Common Insect Feeding Types

Sooty Mold

Photo: UF Osborne

Photo: Don Ferrin, Louisiana State University Agricultural Center, Bugwood.org

Two Common Insect Feeding Types

Chewing

- Holes or notched edges on leaves and sometimes stems
- Discolored areas on the leaf surface or “skeletonizing”
- Severed stems, leaves or buds or stem wilting
- Plant wilting (root damage)
- Semicircular holes in leaf edges

Photo: UC Statewide IPM Program

Photo: UF Schall

Two Common Insect Feeding Types

Piercing Sucking Insects First

Piercing/Sucking Insect Groups

What are They?

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Piercing/Sucking Insect Groups

Aphids – specifically green peach

Photo: Scott Bauer, USDA Agricultural Research Service, Bugwood.org

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Piercing/Sucking Insect Groups

Palm Aphids

Photo: UF L. Buss

Aphids

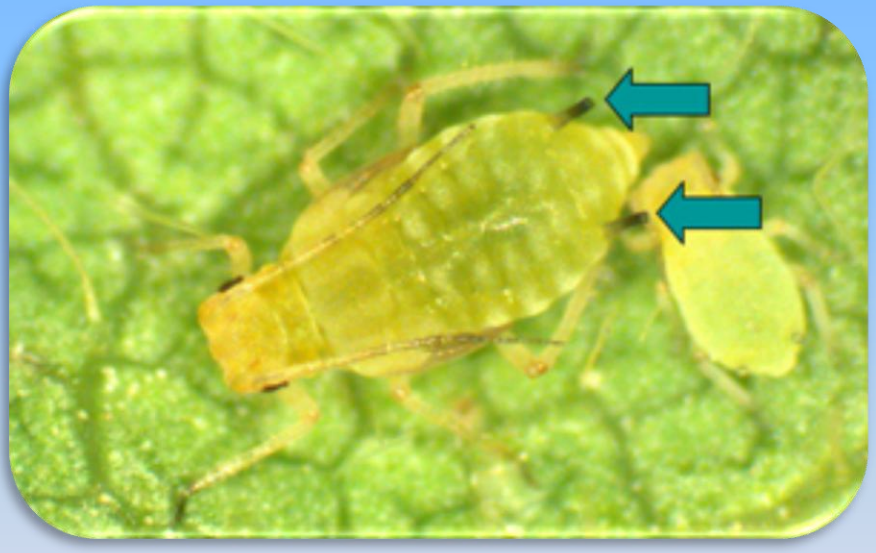


Photo: Jay Obermeyer, Purdue University

- Soft & pear-shaped with cornicles
- May be black, green, yellow to pinkish
- Feeding causes plant stunting & leaf deformities
- Occur early in the spring – whenever new growth

Aphids

- Most wingless, but winged forms (alates) when colonies become overcrowded
- Populations grow quickly
- In Florida, most produce live young (parthenogenesis) – just like their “mom”
- Large amounts of honeydew
- Some transmit plant viruses

Photo: UF J. Castner

Most Common Aphid Species on Woody Plants in Florida

Black citrus

Crape myrtle

Cotton

Green peach

Oleander

Podocarpus

Rose

Yellow rose

Spirea

Aphids

- Mostly cause distorted new growth and honeydew

Photo: Anne W. Gideon, Bugwood.org


Photo: UF Schall
Photo: David Cappaert, Michigan State University, Bugwood.org
Braconid wasp, *Aphidius spp.*
Photo: Nick Dimmock, University of Northampton, Bugwood.org

Piercing/Sucking Insect Groups

Aphid Management

- Wash off with hose (2X in one week)
- Natural parasitoids eventually get them under control - but often leaf distortion & sooty mold left behind
- Soap & oil help dry out & loosen the sooty mold over about 2 weeks

Piercing/Sucking Insect Groups

Aphid Management

Photo: Anne W. Gideon, Bugwood.org

- Ignore them
- Hose (2X in a week)
- Insecticidal Soap (or make your own)
- Insecticidal Oils (lots out there)
- Natural Guard Spinosad; green Light Lawn & Garden Spray; Naturalyte (spinosad)
- Garden Safe Houseplant & Garden Insect Killer; Ferti-Loam Quick-Kill; Bonide Eight Insect Control (bifenthrin)
- Orthene (Acephate)
- Ortho Max Flower, Fruit & Vegetable Insect Killer (Acetamiprid)
- Ferti-Loam and Ortho Max Tree and Shrub Insect Killer (Imidacloprid)
- Malathion
- Sevin

Piercing/Sucking Insect Groups

What are They?

Photo: UF Schall

Piercing/Sucking Insect Groups

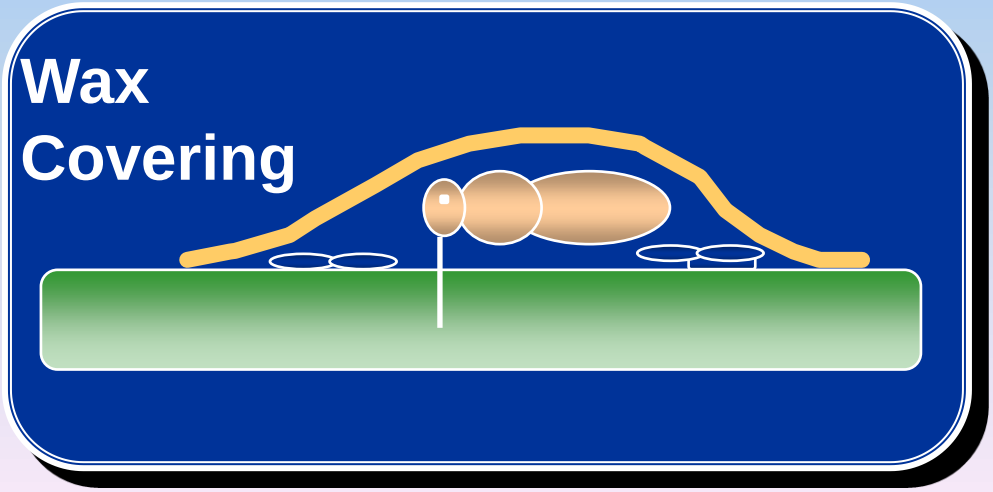
Croton Scale

Photo: UF Schall

Scales

Armored Scale

Soft Scale



Photos & Illustrations: UF Catharine Mannion

Croton Scale

Phalacrococcus howertoni

Arrived 2008

- **Mainly croton, copper leaf & gumbo limbo**
- **Cause decline of plants**
- **<u>Heavy</u> honeydew**

Photos: UF Holly Glenn


Croton Scale
Heavy on stems and leaves
Photo: UF Schall

More Common Scale Insects

False Oleander Scale

Green Scale

Photo: USDA Agricultural Research Service, Bugwood.org

Green Shield Scale

Photo: USDA Agricultural Research Service, Bugwood.org

Lobate Lac Scale

Photos: Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org

Photo: F.W. Howard, University of Florida, Bugwood.org

Cycad Aulacaspis Scale

Photo: F.W. Howard, UF, Bugwood.org

- Leaf, stem, trunk & root
- Prefers King and Queen Sagos
- Can kill Sago
- Looks similar to common False Oleander Scale
- An “armored” scale

Red Date Scale

Phoenicoccus marlatti

Photo: UF Schall

Red Date Scale

Photo:: UF Schall

- Usually restricted to *Phoenix spp.* (date) palms

Just Scurf

Photo: UF Schall

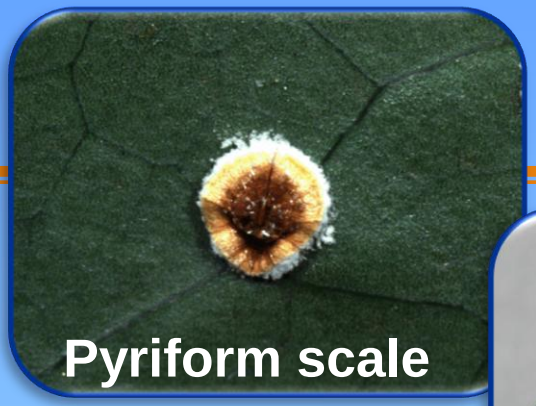
With Scale

Photo: UF Schall

Red Date Scale

- Typically four overlapping generations per year occur in Florida
- Life cycle from 60-158 days (temperature dependent)
- When crawler starts to feed, it starts producing wax

Other Common Scales


Pyriform scale

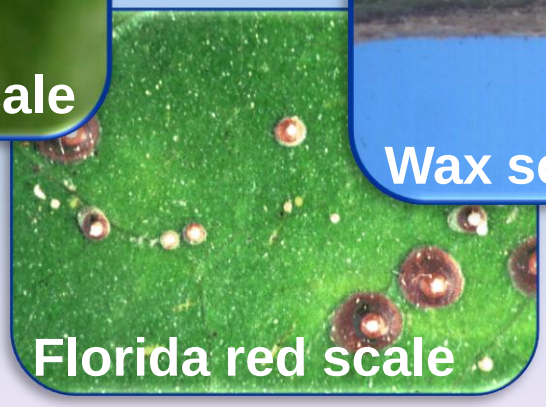

Philephedra

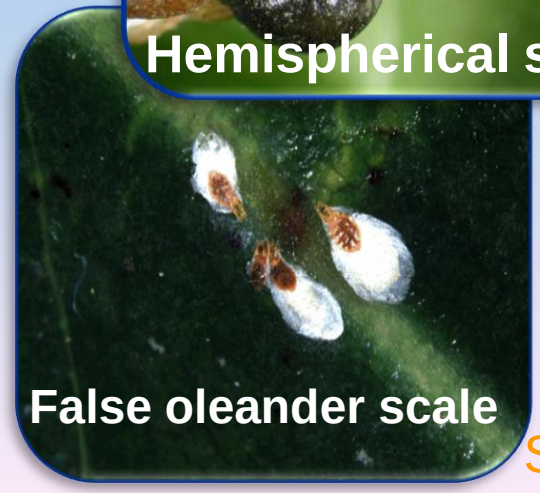

Black thread scale


Nigra scale


Hemispherical scale


Wax scale


Florida red scale


False oleander scale

Tea scale

Still More: brown soft, fern, latania, palm, lesser snow

Scale Management

Light infestations

- Horticultural insecticidal oil or soap

Heavy infestations

- Insecticides recommended for scale control (see next slide)

Scale Pesticide Options

Neonicotinoids (all systemic)

- **Acetamiprid:** Ortho Max Flower, Fruit and Vegetable Insect Killer, Ortho Rose Pride Insect Killer
- **Dinotefuran:** Green Light Tree and Shrub Insect Control with Safari
- **Imidacloprid:** Bayer Advanced Tree and Shrub Insect Killer, Bayer Advanced Rose and Flower Insect Killer (plus a pyrethroid), Bayer Advanced Tree & Shrub Protect & Feed, Bayer Advances Complete Insect Killer, Bonide Systematic Insect Control , Ferti-Lome Tree and Shrub systematic insect drench, Ortho Max Tree & Shrub Insect Control

Pyrethroids

- **Bifenthrin:** several
- **Pyrethrin:** several
- **Tetramethrin:** Cutter Backyard Bug Control

Other

- **Acephate** (systemic): Orthene, Ortho Rose Pride (aerosol), Amvac Orthene
- **Malathion**
- **Oils:** several
- **Soaps:** several

Piercing/Sucking Insect Groups

What are They?

Photo: Florida Division of Plant Industry Archive, Florida Department of Agriculture and Consumer Services, Bugwood.org

Piercing/Sucking Insect Groups

Mealybug

Photo: Florida Division of Plant Industry Archive, Florida Department of Agriculture and Consumer Services, Bugwood.org

Pink Hibiscus Mealybug Plant Damage

Photos: UF Osborne

Common Mealybugs


Root


Longtailed


Pineapple


Citrus

Additional Common Mealybugs

striped

solenopsis

papaya

bamboo

Piercing/Sucking Insect Groups

Stinkbugs

Photo: Russ Ottens, University of Georgia, Bugwood.org

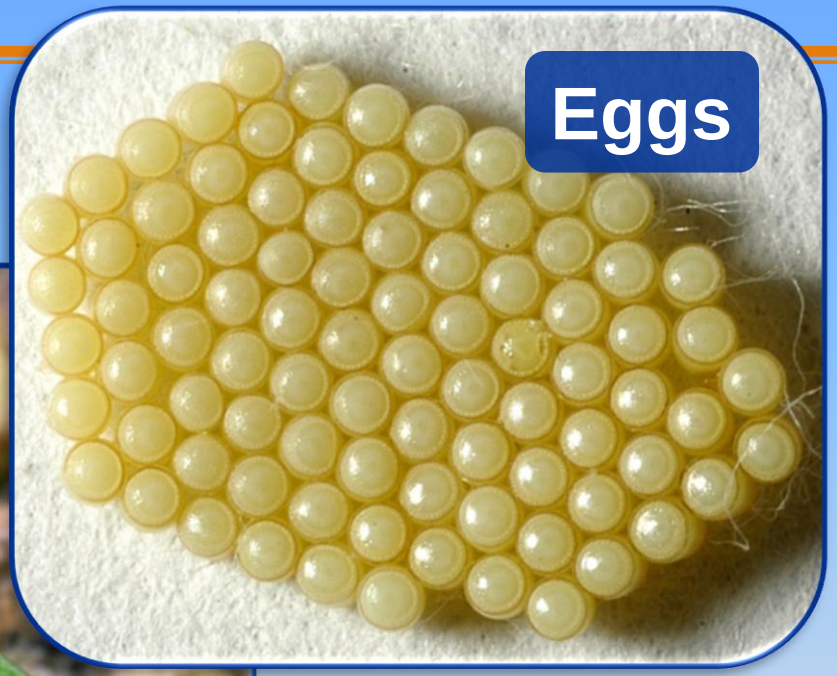


Photo: Herb Pilcher, USDA Agricultural Research Service, Bugwood.org

Whiteflies

The Three Main Pest Ones

Bondar's Nesting **Ficus** **Rugose Spiraling**

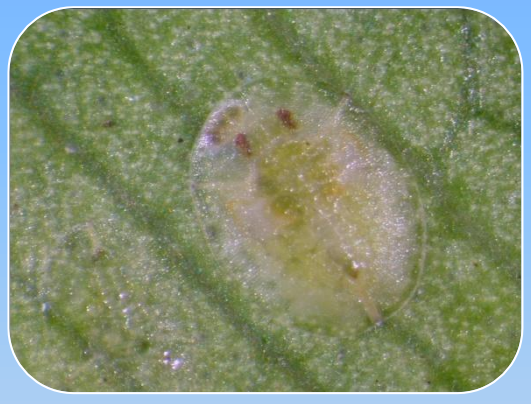





Image credits: Bondar's nesting whitefly: nymph – Ian Stocks, Florida Department of Agriculture and Consumer Services, Division of Plant Industry; adult - Lyle Buss, Department of Entomology and Nematology, University of Florida
Ficus whitefly: nymph – Catharine Mannion, UF/IFAS, UF/IFAS, Tropical Research and Education Center; adult – Jeff Lotz, Florida Department of Agriculture and Consumer Services, Division of Plant Industry
Rugose spiraling whitefly: nymph - Lyle Buss, Department of Entomology and Nematology, University of Florida; adult - H. Glenn, UF/IFAS, Tropical Research and Education Center

Other Common Whiteflies

Giant Whitefly Adults

UF Mannion & DPI Photos

Banded Whitefly

Circular waxy deposits

Waxy fluff up to 6 inches

Silverleaf Whitefly on Hibiscus

Whitefly Management

- Soil Applied
  - Liquid
  - Granular
- Foliar
- Basal Bark (trunk)
- Injection
- Beneficials

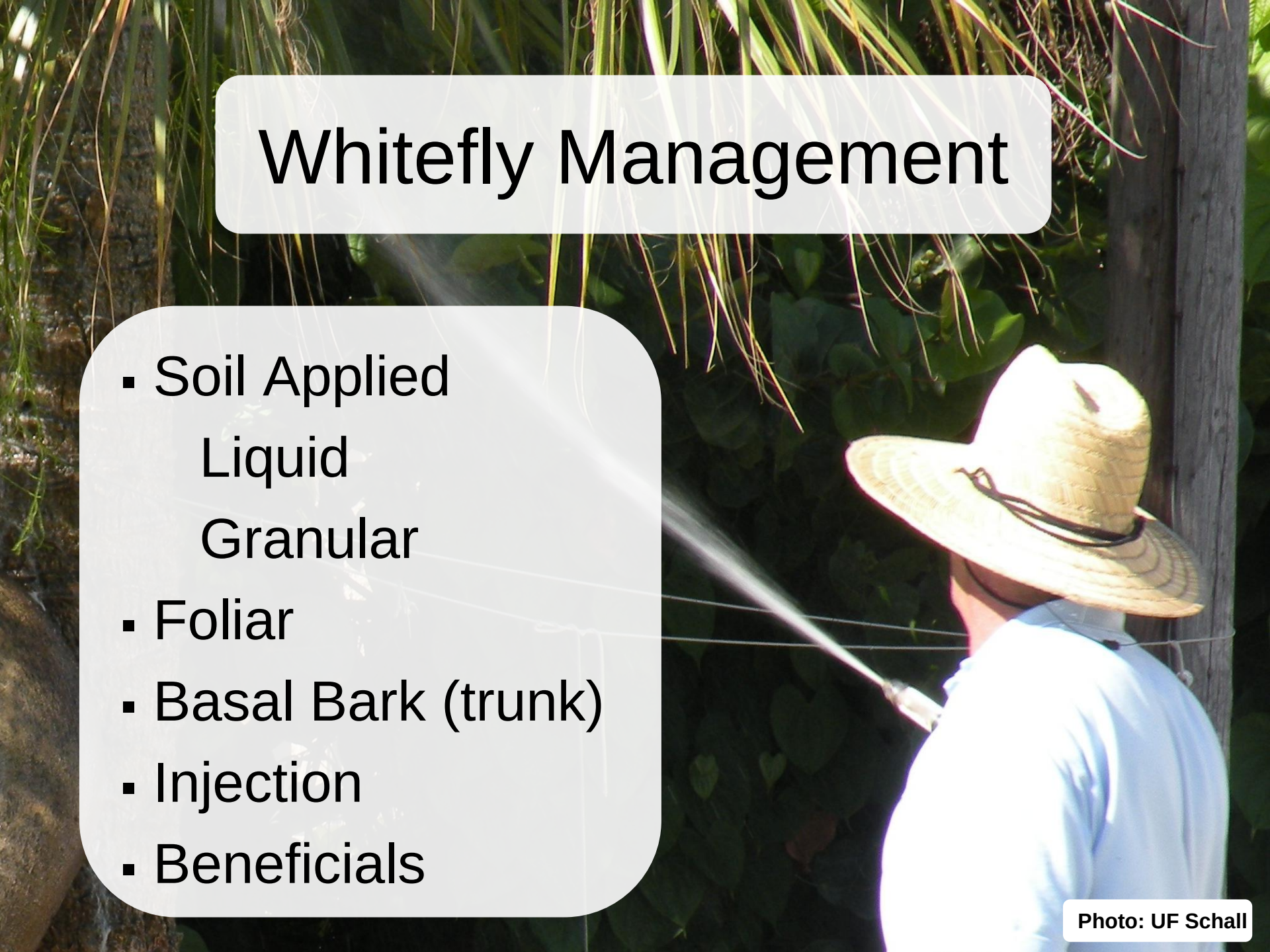
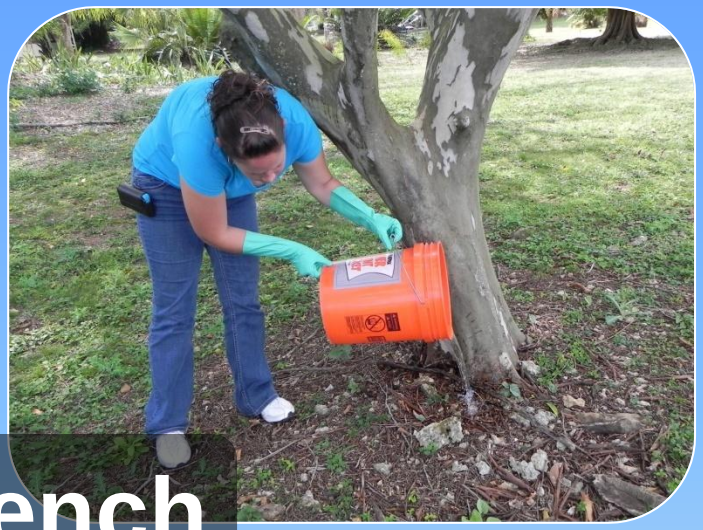
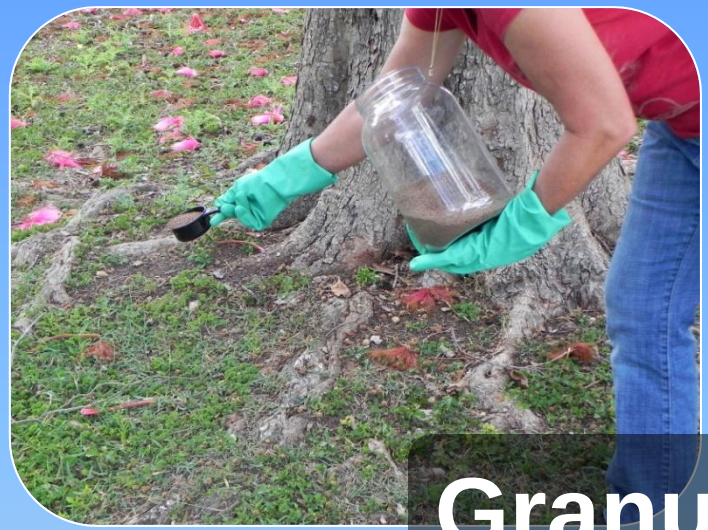


Photo: UF Schall

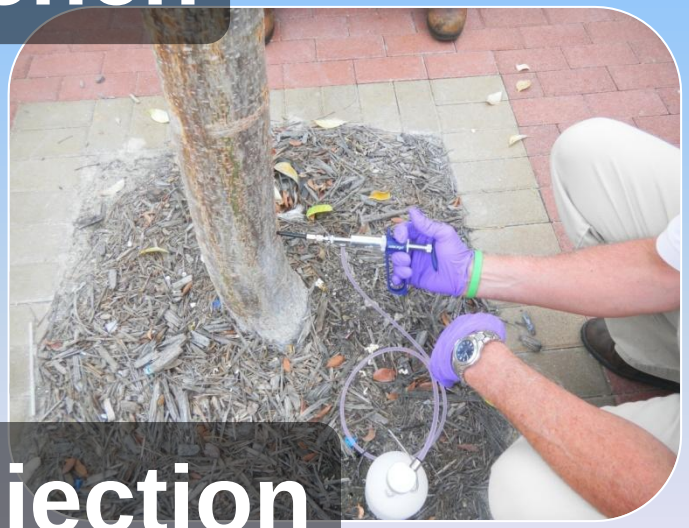
Systemic insecticides – soil and trunk methods



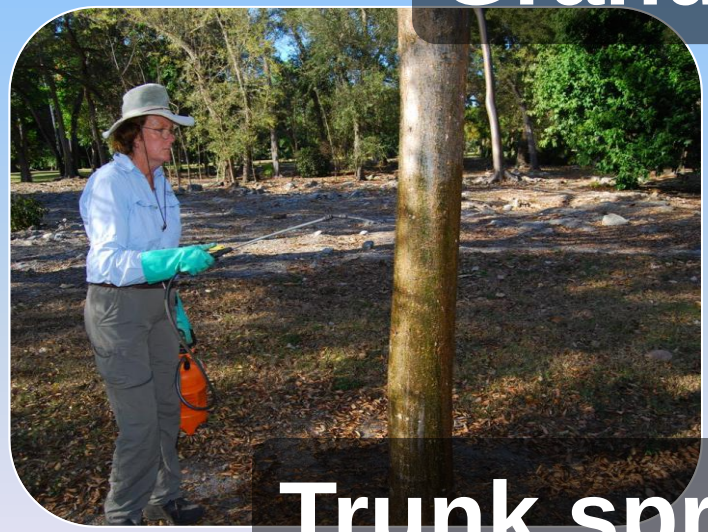
Drench



Granular



Injection



Trunk spray

Photos:
Top – H. Glenn, UF/IFAS Tropical Research and Education Center
Bottom left – C. Mannion, UF/IFAS Tropical Research and Education Center
Bottom right - J. Chamberlin, Valent, Inc.

Soil Applied

- Soil Applied
  Liquid or Granular

Photo: www.millstreehealth.com

Soil Applied – Liquid or Granular

- Apply liquids with plenty of water or after with granular products
- Keeps plant watered well for at least a couple weeks after
- If not watered well, soil binding & loss of material
- Use proper rates for soil treatment – several months control for Ficus whitefly

Photo: Steve Dewey, Utah State University, Bugwood.org

Photo: UF Schall

Foliar

- Many materials available
- Probably cheapest way to go for the customer - short term
- Often harder on beneficial insects

Basal Bark (trunk) Spray

- Lower application rate than soil, but higher than foliar
- Probably comparable control period to soil treatment (several months)
- Can also use on coconuts and palms with woody trunks

Photo: J. Chamberlin, Valent, Inc.

Trunk Injection

- License required for most products
- Arborjet, ArborSystems, Tree Saver, Mauget
- All wound trunks – dicots – palms
- A little faster acting compared to soil treatments
- Can be expensive compared to other treatment methods

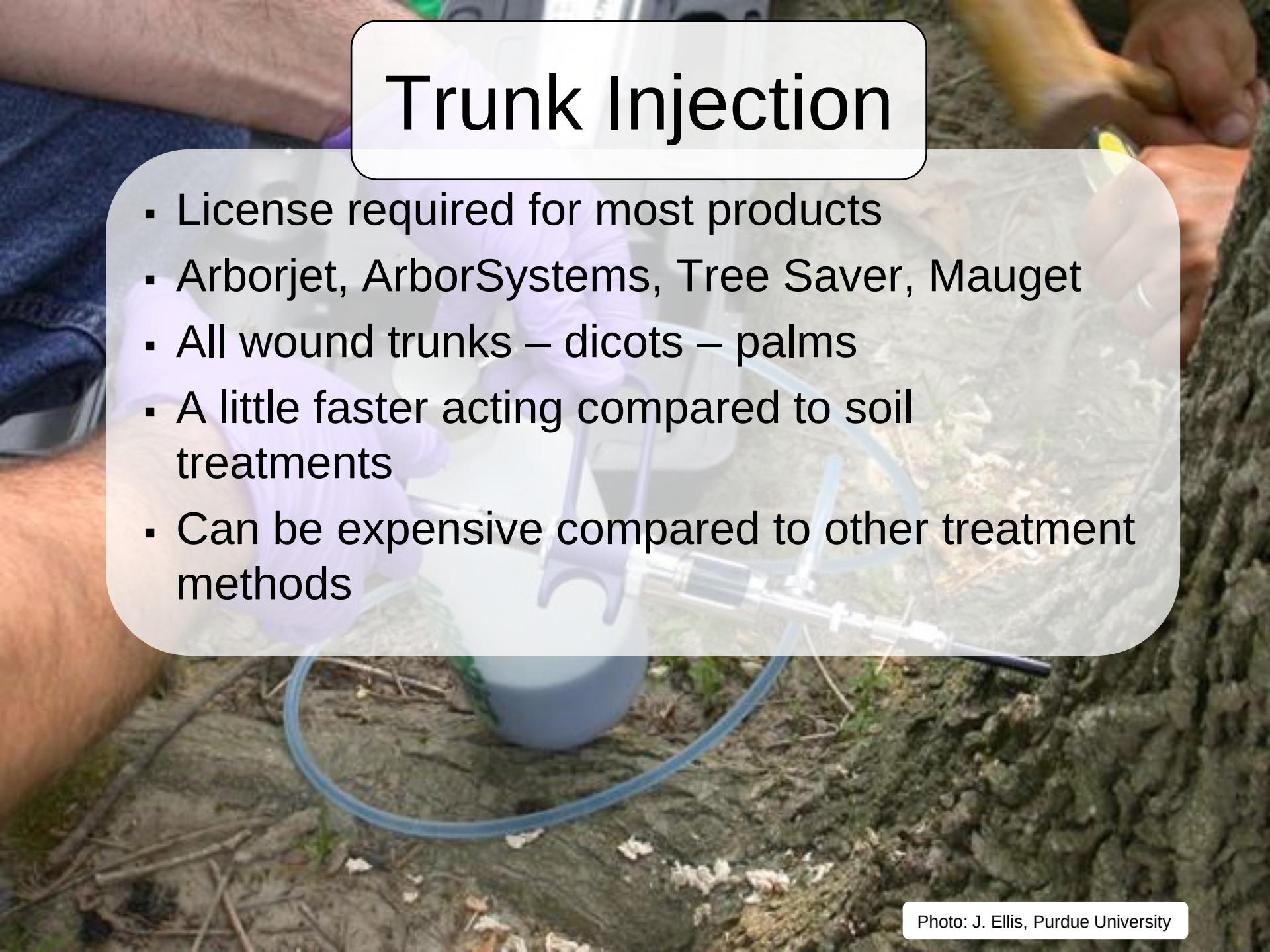


Photo: J. Ellis, Purdue University

What Causes Defoliation & Plant Death?

- Ficus, Rugose Spiraling & Bondar's Nesting Whitefly alone do not kill plants
- Shearing causes stress
- Poor fertilization causes stress
- Too little or much water causes stress
- Prevailing winds on coast
- Are pathogens or toxins involved? – research
- **Resistance likely not an issue yet**

Managing Ficus, Rugose Spiraling, & Bondar's Nesting & Other Whiteflies in the Landscape

Cultural control

- Alternative plant choices (difficult for Rugose Spiraling Whitefly)

Washing plants off with water – used by in pool locations like hotels before insecticide treatment

Neonicotinoid Insecticides

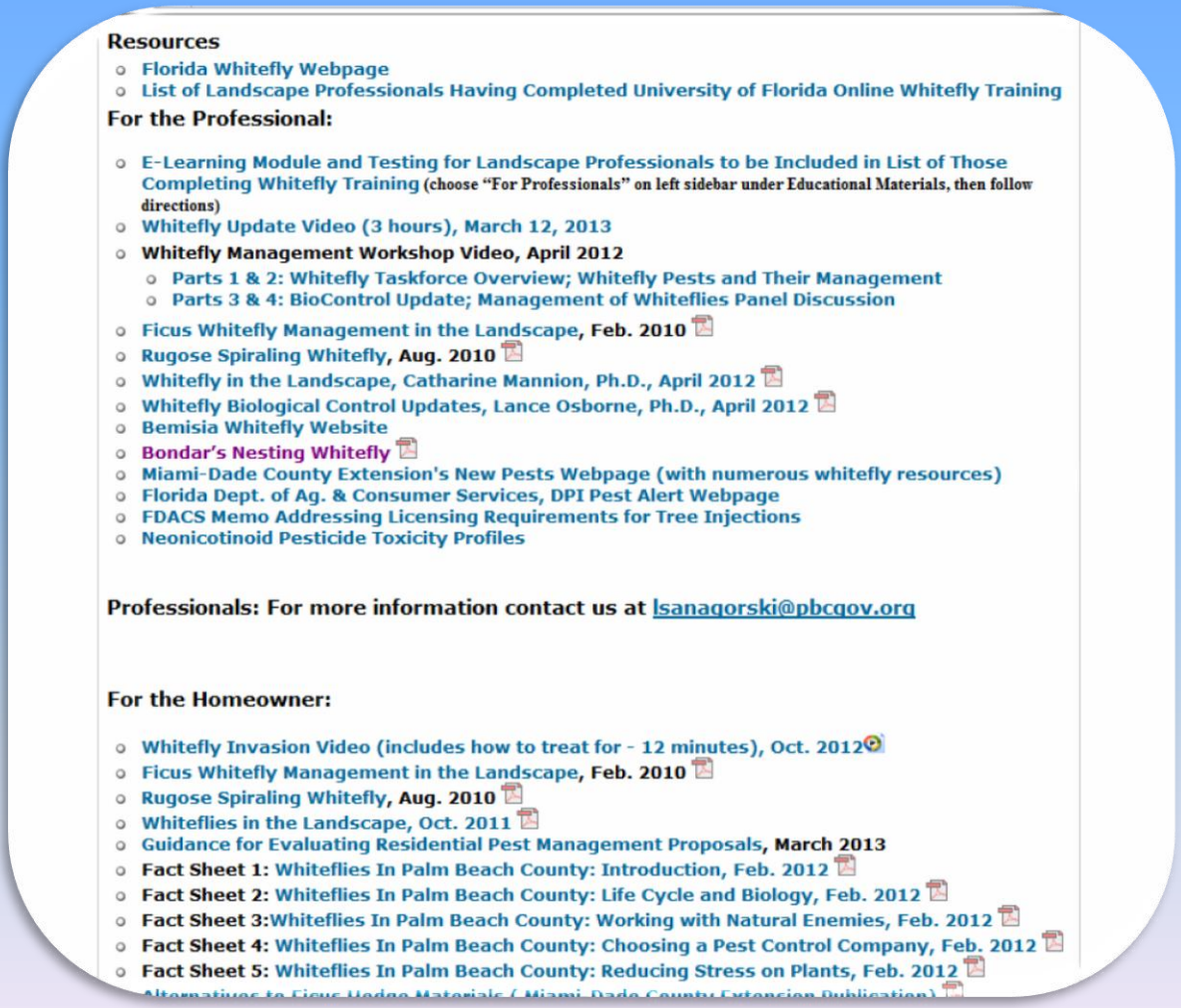
Active Ingredient	Trade Names Professional Use	Trade Names Over-the-Counter
Acetamiprid	TriStar (foliar and basal trunk only)	Ortho Max Flower, Fruit and Vegetable Insect Killer, Ortho Rose Pride Insect Killer
Clothianadin	Arena	
Dinotefuran	Safari, Zylam (also basal trunk)	Green Light Tree and Shrub Insect Control with Safari
Imidacloprid	Merit, Marathon, Coretect, Discus*, Allectus*, several generic labels	Bayer Advanced Tree and Shrub Insect Killer, Bayer Advanced Rose and Flower Insect Killer (plus a pyrethroid), Bayer Advanced Tree & Shrub Protect & Feed, Bayer Advances Complete Insect Killer, Bonide Systematic Insect Control , Ferti-Lome Tree and Shrub systematic insect drench, Ortho Max Tree & Shrub Insect Control
Thiamethoxam	Flagship, Meridian	

*** Contains Neonicotinoid & pyrethroid**

Foliar Insecticides for Homeowner Use

Trade Name(s)	Active Ingredient
Flower, Fruit & Vegetable Insect Killer (Ortho)	Acetamiprid
Bug-B-Gon Max Lawn & Garden Insect Killer (Ortho)	Bifenthrin
Rose & Flower Insect Killer (Bayer Advanced); Lawn & Garden Insect Killer (Schultz)	Cyfluthrin
Triazicide Once & Done Insect Killer (Spectracide)	Lambda-cyhalothrin
Indoor/Outdoor Broad Use Insecticide (Hi-Yield)	Permethrin
Yard & Garden Insect Killer (Bonide); Rose & Flower Insect Spray (Spectracide)	Pyrethrin

Palm Beach Extension Whitefly Website



Resources

- Florida Whitefly Webpage
- List of Landscape Professionals Having Completed University of Florida Online Whitefly Training

For the Professional:

- E-Learning Module and Testing for Landscape Professionals to be Included in List of Those Completing Whitefly Training (choose "For Professionals" on left sidebar under Educational Materials, then follow directions)
- Whitefly Update Video (3 hours), March 12, 2013
- **Whitefly Management Workshop Video, April 2012**
  - Parts 1 & 2: Whitefly Taskforce Overview; Whitefly Pests and Their Management
  - Parts 3 & 4: BioControl Update; Management of Whiteflies Panel Discussion
- Ficus Whitefly Management in the Landscape, **Feb. 2010**
- Rugose Spiraling Whitefly, **Aug. 2010**
- Whitefly in the Landscape, Catharine Mannion, Ph.D., April 2012
- Whitefly Biological Control Updates, Lance Osborne, Ph.D., April 2012
- Bemisia Whitefly Website
- Bondar's Nesting Whitefly
- Miami-Dade County Extension's New Pests Webpage (with numerous whitefly resources)
- Florida Dept. of Ag. & Consumer Services, DPI Pest Alert Webpage
- FDACS Memo Addressing Licensing Requirements for Tree Injections
- Neonicotinoid Pesticide Toxicity Profiles

Professionals: For more information contact us at lsanagorski@pbcgov.org

For the Homeowner:

- Whitefly Invasion Video (includes how to treat for - 12 minutes), Oct. 2012
- Ficus Whitefly Management in the Landscape, **Feb. 2010**
- Rugose Spiraling Whitefly, **Aug. 2010**
- Whiteflies in the Landscape, Oct. 2011
- Guidance for Evaluating Residential Pest Management Proposals, **March 2013**
- **Fact Sheet 1:** Whiteflies In Palm Beach County: Introduction, Feb. 2012
- **Fact Sheet 2:** Whiteflies In Palm Beach County: Life Cycle and Biology, Feb. 2012
- **Fact Sheet 3:**Whiteflies In Palm Beach County: Working with Natural Enemies, Feb. 2012
- **Fact Sheet 4:** Whiteflies In Palm Beach County: Choosing a Pest Control Company, Feb. 2012
- **Fact Sheet 5:** Whiteflies In Palm Beach County: Reducing Stress on Plants, Feb. 2012
- Alternatives to Ficus Hedge Materials (Miami-Dade County Extension Publication)

http://pbcgov.com/coextension/horticulture/whitefly

Beneficial Insects

Nephaspis oculata

Encarsia noyesi

Photo: University of California

Encarsia noyesi Size

Photo: UF H. Glenn

Photo: UF Schall

What about Neonicotinoid Effect on Bees?

Piercing/Sucking Insect Groups

What are They?

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Photo: Kevin Ong, Texas AgriLife Extension Service, Bugwood.org

Photo: Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org

Piercing/Sucking Insect Groups

Thrips

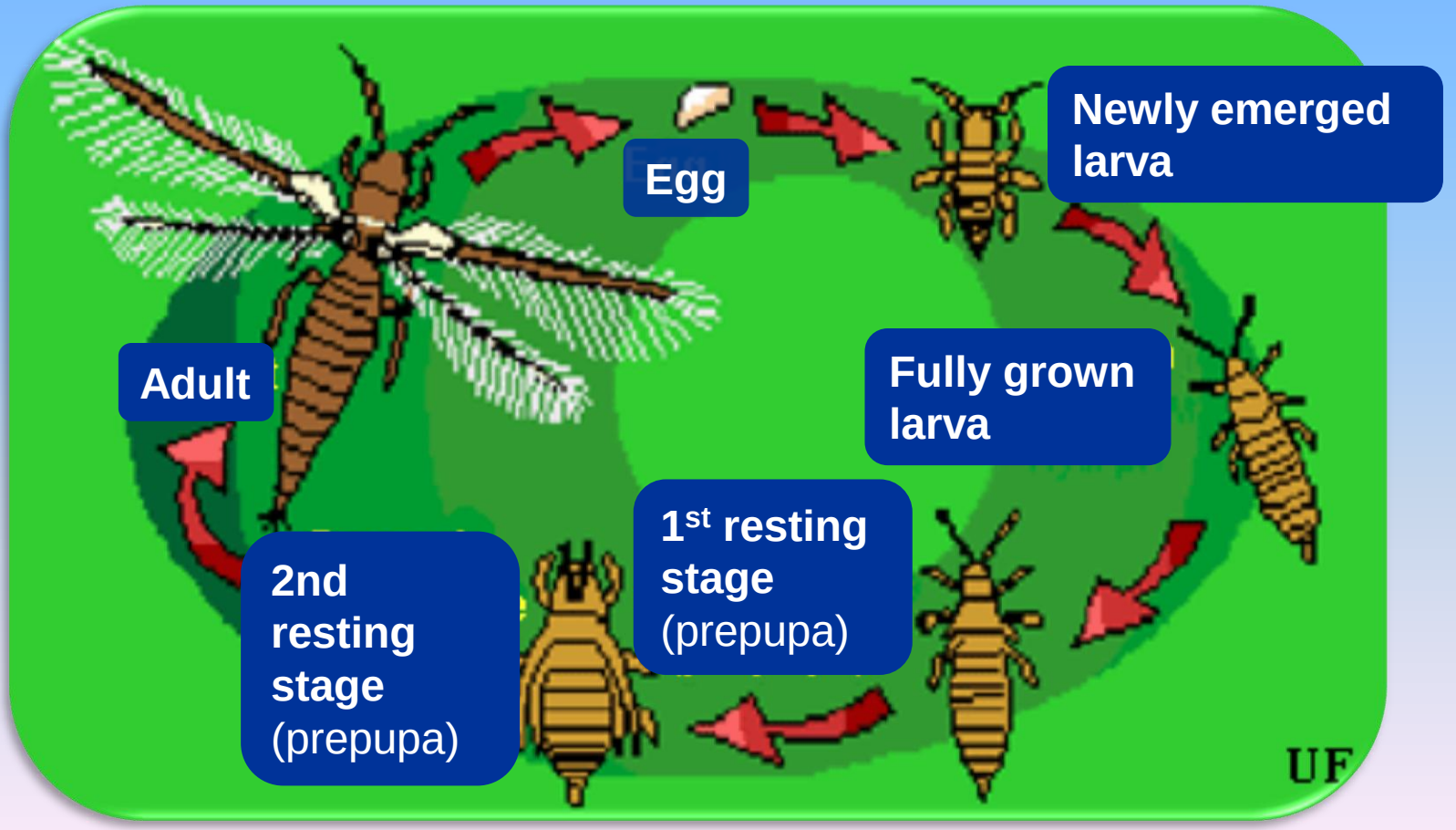
Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Photo: Kevin Ong, Texas AgriLife Extension Service, Bugwood.org

Photo: Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org

Piercing/Sucking Insect Groups

Thrips Life Cycle



Common Thrips in S. Florida

Western flower thrips - *Frankliniella oxidentalis*

Photos: Jack T. Reed, Mississippi State University, Bugwood.org

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Photo: UF Vivek Kumar

Florida flower thrips
Frankliniella spp.

Photo: UF L. Osborne

Chilli thrips adult

More Common Thrips in S. Florida

Ficus Thrips

Redbanded Thrips

Greenhouse Thrips

Cuban Laurel Thrips

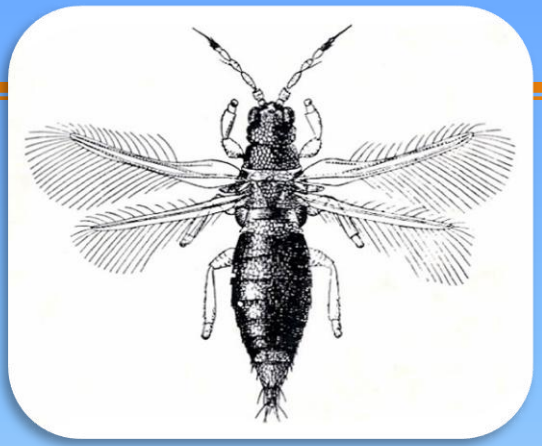
Holopothrips

Photo: Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org

Melon Thrips

Photo: U Hawaii

Piercing/Sucking Insect Groups



Thrips

- 1/16 to 3/8 inch
- Most adults have “fringed” wings with hairs (cilia) so poor flyers
- Feed by “rasping” the plant cells & sucking up juices
- Some spread viral & sometimes bacterial & fungal diseases
- Some are beneficial predators

Thrips

Photo: Clemson University

Thrips

Photo: University of Florida

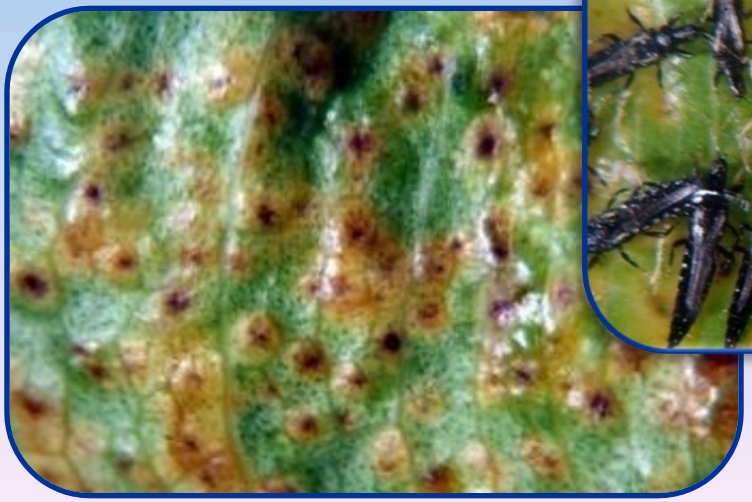
Leaf Damage: lots of varnish-like excrement & sometimes honeydew

Piercing/Sucking Insect Groups

Ficus Thrips

Gynaikothrips uzeli

- Feeding causes sunken, reddish spots on leaves which curl and fold inward



Photos: UF/IFAS MREC

Chilli Thrips

Scirtothrips dorsalis

Adult

Newly Emerged Adult

1st instar larva

2nd instar Larva

Photos: UF L Osborne

Chilli Thrips Damage

- First found late 2005 in Palm Beach on roses
- May transmit some vegetable viruses

Damaged vs. Healthy New Rose Growth

Indian Hawthorne

Photos: UF L Osborne

Chilli Thrips Damage

Schefflera arboricola

Viburnum odoratissimum

Photos: UF L Osborne

Tabebuia Thrips - *Holopothrips*

Photo: UF Schall

Photo: GB Edwards, Florida Department of Agriculture and Consumer Services, Bugwood.org

- Attack new Tabebuia leaves
- Adults up to 1/16 inch long

Piercing/Sucking Insect Groups

Thrips Management

Illustration: :Whitney Cranshaw, Colorado State University, Bugwood.org

Piercing/Sucking Insect Groups

Ficus & Other Thrips Management

Photo: H. Glenn, UF/IFAS

- Monitor new foliage which is what they prefer; shear folded leaves – for ficus thrips
- Neonicotinoids do not do a great job on thrips – but probably using neos for whiteflies
- See next slide

Piercing/Sucking Insect Groups

Thrips Management

- Insecticidal Soap (or make your own)
- Insecticidal Oils (lots out there)
- Orthene (Acephate)
- Natural Guard Spinosad; green Light Lawn & Garden Spray; Naturalyte (spinosad)
- Garden Safe Houseplant & Garden Insect Killer; Ferti-Loam Quick-Kill; Bonide Eight Insect Control (bifenthrin)
- Malathion
- Sevin

Piercing/Sucking Insect Groups

What Are They?

Photos: UF Schall

Piercing/Sucking Insect Groups

Spider Mites

Photos: UF Schall

Piercing/Sucking Group

Spider Mites

Photo: UC Statewide IPM Project

Photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Red Palm Mite

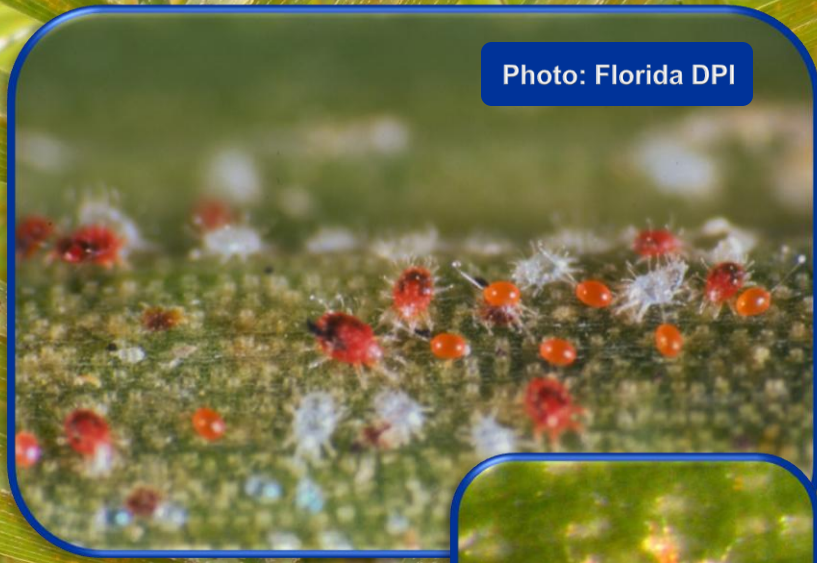


Photo: UF Schall

Two Spotted Spider Mite

Photo: Whitney Cranshaw, Colorado State University, Bugwood.org

Photo: U Calif. IPM

Spider Mites

Two Spotted Spider Mite

Photo: David Cappaert, Michigan State University, Bugwood.org

- Egg to adult in 5-20 days at 80 degrees F
- Egg, larvae, nymph and adult
- 1/50th inch long
- Like hot, dry summer and fall but can develop anytime

Spider Mites

Two Spotted Spider Mite – Palm Damage

Photo: UF L. Osborne

Microscopic Mites – Broad Mite

Under 100x microscope

Photo: Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org

On New Guinea Impatiens

Photo: Leanne Pundt, University of Connecticut

Spider Mite

Monitoring

Photo: UF Schall

Piercing/Sucking Group

Spider Mite Management

Photo: U Calif. IPM

- Insecticidal Oil
- Insecticidal Soaps (several)
- Bayer Advanced Natria Disease & Mite Control; Ortho Elements 3 in 1 Rose & Flower Care (sulfur and pyrethrin)
- Ortho Rose Pride (orthene, resmethrin, Triforine)
- Avid (abamectin)
- Sevin – for microscopic mites

What is it?

Photo: UF Schall

Edema

Photo: UF Schall

What is It?

Photos: UF Schall

Josephiella Gall Wasp

Photos: UF Schall

Josephiella Gall Wasp

Photos: UF Schall

Josephiella Gall Wasp & Ficus Whitefly Interaction?

Photos: UF Schall

Josephiella Gall Wasp Management

Active Ingredient	Trade Names Professional Use	Trade Names Over-the-Counter
Acetamiprid	TriStar (foliar and basal trunk only)	Ortho Max Flower, Fruit and Vegetable Insect Killer, Ortho Rose Pride Insect Killer
Clothianadin	Arena	
Dinotefuran	Safari, Zylam (also basal trunk)	Green Light Tree and Shrub Insect Control with Safari
Imidacloprid	Merit, Marathon, Coretect, Discus*, Allectus*, several generic labels	Bayer Advanced Tree and Shrub Insect Killer, Bayer Advanced Rose and Flower Insect Killer (plus a pyrethroid), Bayer Advanced Tree & Shrub Protect & Feed, Bayer Advances Complete Insect Killer, Bonide Systematic Insect Control , Ferti-Lome Tree and Shrub systematic insect drench, Ortho Max Tree & Shrub Insect Control
Thiamethoxam	Flagship, Meridian	

*** Contains Neonicotinoid & pyrethroid**

Chewing Insect Groups

Photo: Cornell University http://foodpsychology.cornell.edu/OP/bite_vs_chew

Chewing Insect Groups

Beetles & Weevils

Photos: UF Schall

Chewing Insect Groups

What is it?

Photos: UF Schall

Chewing Insect Groups

Sri Lanka Weevil *Myllocerus undatus*

Photos: UF Schall

Sri Lanka Weevil

Photos: UF Schall

Photo: UF Catharine Mannion, PhD

- **Very BROAD host range**
- **HUGE leaf appetite**
- **A BIG problem**

In Soil

Photos: UF Holly Glenn

Chewing Insect Groups

Geiger Beetle

Photos: University of Florida A Hunsberger, H. Glenn & L Buss

Chewing Insect Groups

Management

- Orthene (acephate)
- Ortho Max Flower, Fruit & Vegetable Insect Killer (acetamiprid)
- Ortho Bug B Gone; Ortho Max Lawn and Garden Insect Killer; Hi-Yield Bug Blaster; (bifenthrin)
- Sevin (carbaryl)
- Bayer Advanced Complete Insect Killer (cyfluthrin)
- Bayer Advanced Rose & Flower Insect Killer (bifenthrin & imidacloprid)
- Hi-Yield Kill A Bug (deltamethrin)
- Ferti-Loam Tree & Shrub Insect Killer (imidacloprid)
- Malathion
- Protect Sniper Yard & Garden; Hi-Yield Indoor/Outdoor Broad Use Insecticide; Bonide: Garden & Home (permethrin)
- Safer Brand Ant 7 Crawling Insect Control (diatomaceous earth)
- Naturalyte (spinosad)

Chewing Mollusk

Snails & Slugs

Photo: Roberta Zimmerman, USDA APHIS, Bugwood.org

Chewing Mollusk

Florida Leatherleaf Slug – not flattened & flattened

Photo: UF L. Buss

Biggest S. Florida Snail Problem: Cuban Brown Snail

***Zachrysia spp*.**

Photo: UF L. Buss

Chewing Mollusk

Snail & Slug Management

Baits Containing:

- Iron Phosphate
- Metaldehyde
- Metaldehyde & Carbaryl

Photo: UF L. Buss

Piercing/Sucking Insect Groups

Turf Pests

Piercing/Sucking Insect Groups

What is it?

Photo: UF E. Buss

Piercing/Sucking Insect Groups

How About Now?

Photo: Samuel Abbott, Utah State University

Photo: UF E. Buss

Piercing/Sucking Insect Groups

Chinch Bug

Blissus insularis

Photo: Samuel Abbott, Utah State University

Piercing/Sucking Insect Groups

Chinch Bug

- **7-10 overlapping generations per year in southern Florida**
- **Biggest problem on St. Augustine grass, but can also attack other turf grasses**
- **Feed by piercing-sucking**
- **One generation can take 6-8 weeks in warmer weather**

Chinch Bug Vacuuming for Samples

Photos: University of Florida

Photo: UF E. Buss

Chinch Bug

- **Adults about 1/8 – 1/10 inch long**
- **Can start in full sun areas or near reflected light areas (ex. next to driveway) and elsewhere in lawn**

Piercing/Sucking Insect Groups

Chinch Bug

Photo: UF J. Castner

Photo: Charles Olsen, USDA APHIS PPQ, Bugwood.org

Piercing/Sucking Insect Groups

Chinch Bug Nymphs

Photo: UF J. Castner

Chinch Bug

Blissus insularis

- **To find part grass and check in lower leaf sheath bases or soil surface. Warm, sunny middle afternoon best time to find them**
- **Beating on a white surface can help dislodge them**
- **Can also vacuum with dust-buster and empty what you collect**

Chinch Bug

Blissus insularis

Efforts to Manage

- **High solubility N fertilizer can result in more eggs and faster insect development. Slow release fertilizer can help**
- **Overwatering or fertilizing also causes more thatch, thus reducing the amount of insecticide that reaches the chinch bugs**

Chinch Bug

Blissus insularis

Efforts to Manage

- **Several insects attack chinch bugs including:**
  - **big-eyed bugs**
  - **predatory earwigs**
  - **spiders**
  - **a small wasp, *Eumicrosoma benefica*, parasitizes chinch bug eggs**

Chinch Bug

Blissus insularis

Efforts to Manage

- **Use pyrethroids to “suppress” and systemic neonicotinoids during heavy population times. Should get at least a few months of control with the neos.**

Insecticide Products

- Bayer Advanced Complete Insect Killer for Soil & Turf (bifenthrin & imidacloprid) – for heavy populations
- Sunniland Chinch Bug**s**; Cutter Backyard Bug Control (lambda-cyhalothrin)
- Sunniland Chinch Bug; Protech Sniper Yard & Garden (permethrin)

Chewing Insect Groups

Turf Pests - Caterpillars

Photo: Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Chewing Insect Groups

Turf Pests – Caterpillars Tropical Sod Webworm Damage

Photos: UF Steven Arthurs

Chewing Insect Groups

Turf Pests – Caterpillars Tropical Sod Webworm Damage

- Usually higher numbers spring, followed by fall

Photos: UF Steven Arthurs

Chewing Insect Groups

Turf Pests – Caterpillar Management

- Treat at the first sign of damage
- Reduced-risk products like B.t., halofenozide, and spinosad are more effective against younger caterpillars.
- Caterpillars tend to become problem in newly established turf, or in early fall, especially if the turf was fertilized heavily in late summer.
- Most feed at night.
- Turf can usually recover from caterpillar damage.

Chewing Insect Groups

Turf Pests – Caterpillar Management

- Bonide Eight Insect Control (pyrethrin)
- Sluggo Plus Organic Gardening (spinosad & iron phosphate)
- Green Light Organic Lawn & Garden Insect Control (spinosad)
- Sunniland Chinch Bugs; Cutter Backyard Bug Control (lambda-cyhalothrin)
- Protech Sniper Yard & Garden (permethrin)
- Bayer Advanced Complete Insect Killer for Soil & Turf (bifenthrin & imidacloprid)

Chewing Insect Groups

Turf Pests – Grubs – beetle and weevil

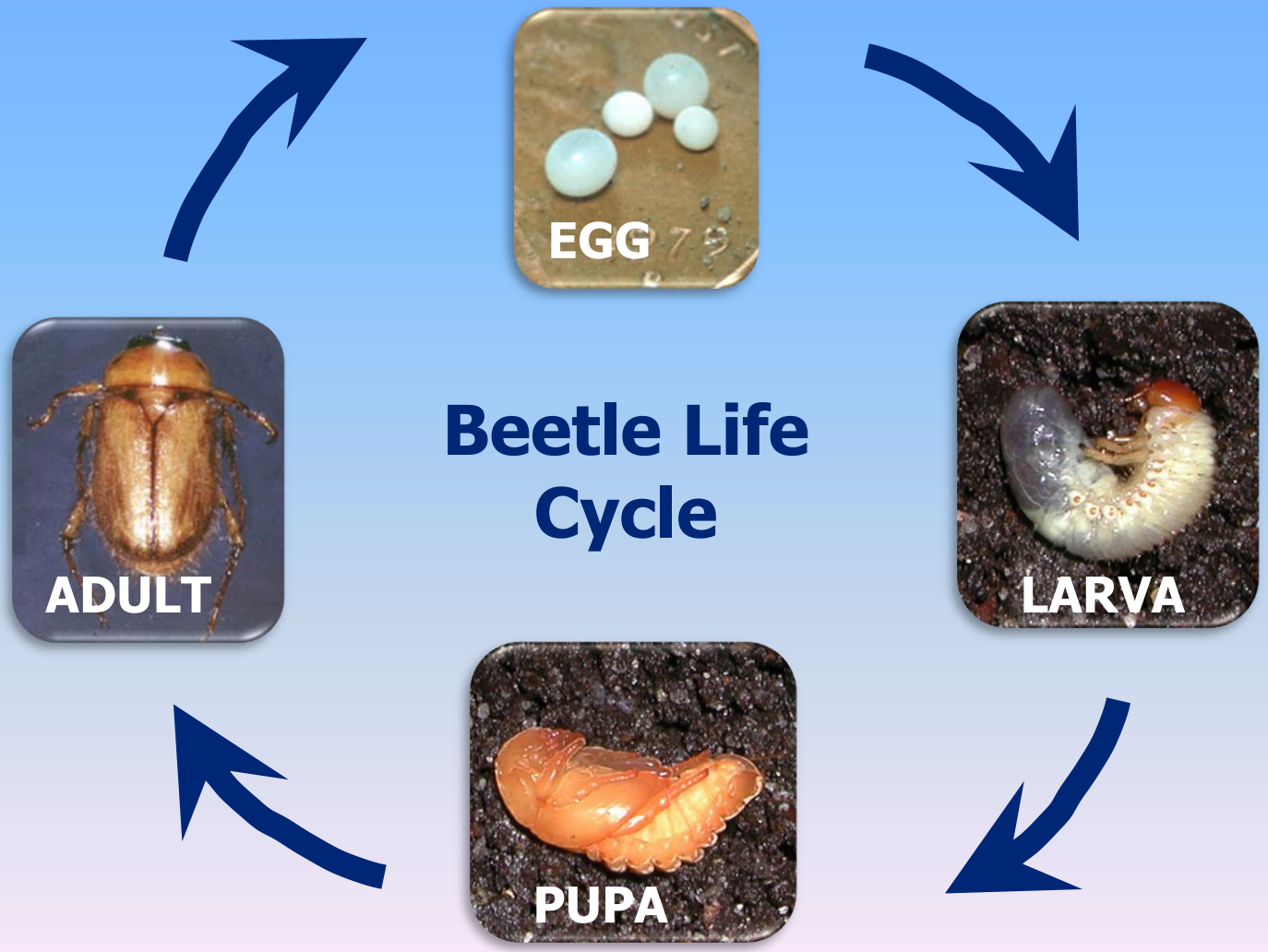


Photo: University of Florida

Chewing Insect Groups

Turf Pests – Grubs – beetle and weevil

Photo: UF E. Buss

Chewing Insect Groups

Grub Homeowner Products

Same as caterpillars without spinosad

Miscellaneous

Millipedes

Photo: University of Florida

Miscellaneous

Photo: University of Florida

Millipedes

- For lawn, same as caterpillars without spinosad

Vegetable Pests

Tomato & Eggplant

Armyworms – Southern Worst

- Five types here
  - Fall
  - Beet
  - Southern
  - Yellow striped
  - True

Photo: Ronald Smith, Auburn University, Bugwood.org

Tomato & Eggplant

Armyworms

- Southern typically the worst
- A major pest on tomato
- Heaviest spring & fall, but can be year round
- Depending on species – 75 to 350 eggs per moth deposited

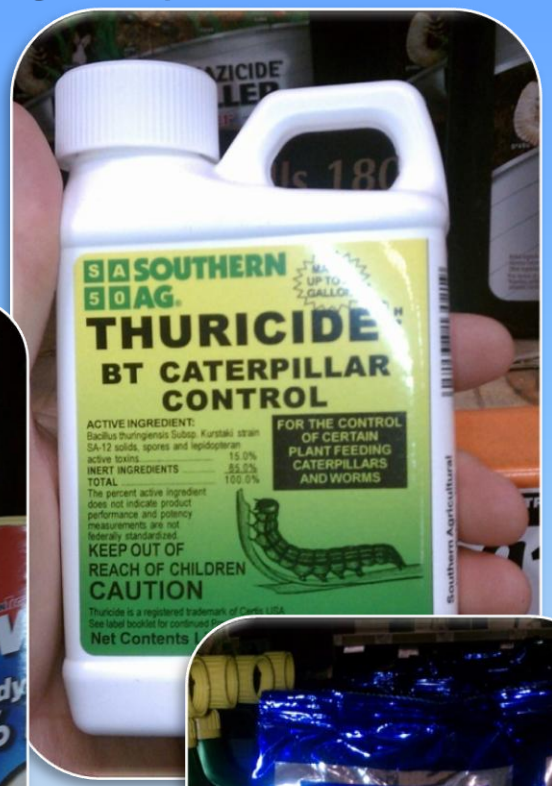
Tomato & Eggplant
Armyworms

- Can attack fruit
- Hide during day, so check lower leaves
- Beet armyworm often on lettuce & celery also
- Southern easiest to control, fall moderate and beet hardest

Tomato & Eggplant

Armyworms

- Some resistant to Sevin
- Bt works well (Dipel, Thuricide)
- Pyrethroids work well
- Ortho Max Lawn & Garden Insect Killer



Tomato & Eggplant

Tomato Hornworm

- Big, green, strong “monster feeders”
- Produce green “spit” (regurgitate stomach contents)
- Spring & summer problem
- Hand remove
- Same as armyworms

Just Tomato

Tomato Fruitworm

- Same insect as corn earworm and cotton bollworm
- They ruin the fruit
- Same control as armyworm

Just Tomato
Tomato Pinworm

- A fly & maggot
- Adult flies in
- Attacks calyx and then outer fruit flesh
- Mostly a problem after the end of December south of Interstate 4
- Neem oil, Bayer Advanced Complete Insect Dust, Bayer Vegetable and Garden Insect Spray

Just Tomato

Leaf Miners

- Mostly flies (citrus leafminers is a caterpillar)
- Predators and parasitoids attack inside leaves & control pretty well
- Usually early spring problem, but can break out anytime here
- Same as tomato pinworm

Just Tomato
Whiteflies

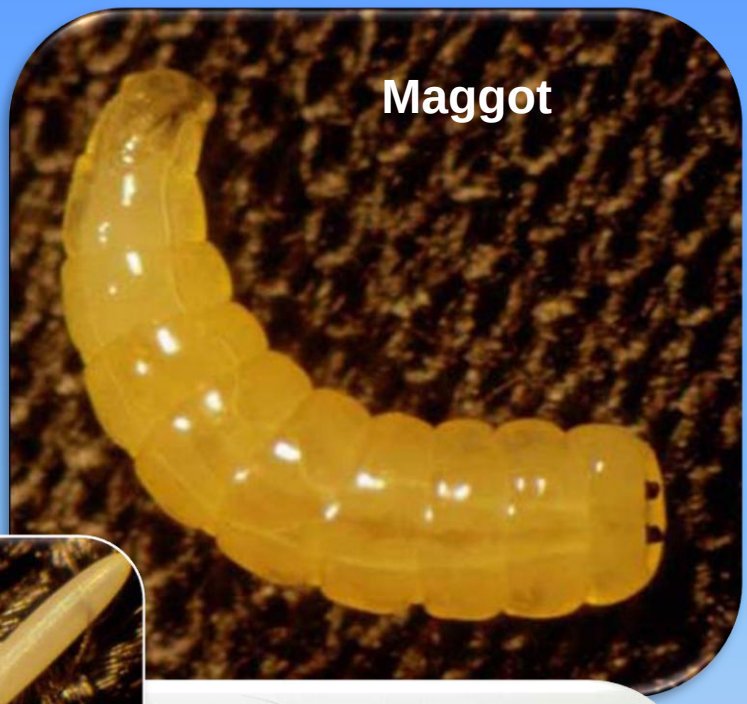
- Transmit the very common tomato yellow leaf curl virus
- A new virus in the county “ground nut virus” is transmitted by thrips
- Bayer Advanced Complete Insect Dust, Bayer Vegetable and Garden Insect Spray, soaps, oils

Photo: USDA: http://www.plantmanagementnetwork.org/pub/php/brief/2010/grsv

Sweet Corn

Corn Silkfly

- Bt does not touch them – they are fly maggots
- Weeds provide refuge from sprays
- Higher concentrations of pyrethroids now needed - Bayer Advanced Complete Insect Dust, Bayer Vegetable and Garden Insect Spray



Sweet Corn

Corn Silkfly

- 4 species here
- Deposit eggs on corn silk, the chew their way out and work way down into ear

Sweet Corn
Aphids

- Populations usually skyrocket within 3 weeks of really cold weather
- Because new growth killed off and a flush of replacement growth after a freeze
- Soaps or oils or water jet to control

Sweet Corn
Aphids

- 2-9 live young (nymphs) deposited daily per female
  - More common than eggs in Florida, because they avoid the exposed egg stage

Sweet Corn

Aphids

- Corn leaf and bird cherry-oat the most common ones on corn

Sweet Corn

Armyworms – Fall Armyworm Usually Worst

- Spoke about on tomatoes and eggplant
- Strong flyers
- Concentrate on remaining plants after a freeze
- Weeds an alt. host
- Also like pepper & lettuce

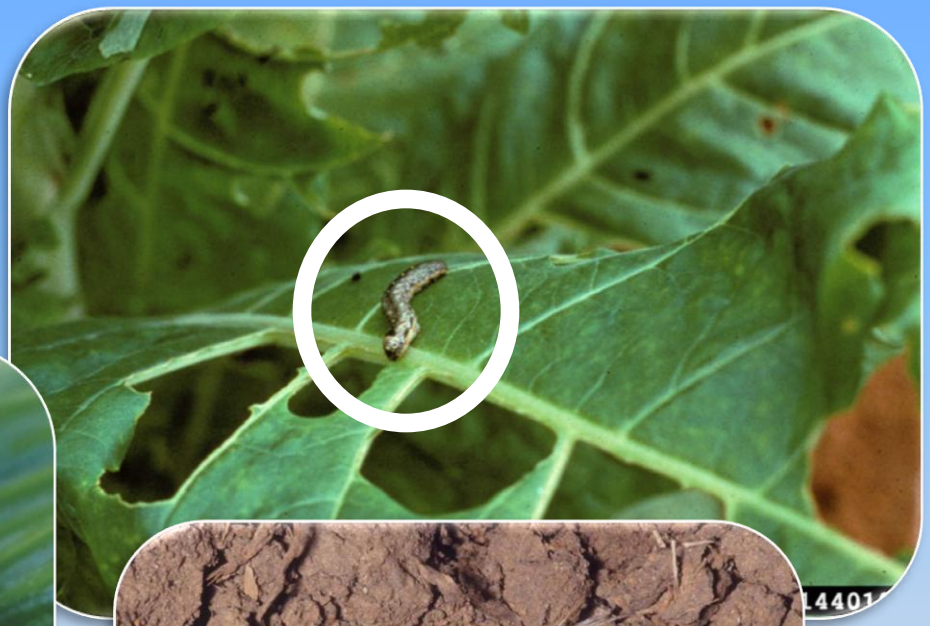
Sweet Corn

Corn Earworm

- Spoke about on tomato (tomato fruitworm)
- In corn, just attack ear

Sweet Corn
Cutworms

- Another nocturnal caterpillar



Black cutworm moth and caterpillar

Sweet Corn

Raccoons

- Can do severe damage

Squash & Cucumber

Melon Leafworm

- A major, & the most common pest
- Mostly on leaves between veins & occasionally in fruit
- Older ones Skeletonizers leaving veins
- Younger ones just lower epidermis, & leaving veins

Squash & Cucumber

Melon Leafworm

- Roll leaves around self
- Can be devastating, with many per planting
- Moth beautiful
- Bt very effective
- Sevin can be used

Squash & Cucumber

Pickleworm

- Some feel a bigger problem than melon leafworm
- Hard to tell apart
- On fruit, but sometimes mine vines
- Can get out of control & must stop before they get into fruit
- Same products as melon leafworm

Squash & Cucumber

Melon Thrips

- Leaf & flower feeders
- Sulfur – use care, soap oil

A Chilli Thrips

Damage on Eggplant

Squash & Cucumber

Raccoons

- Big problem on squash

Peppers
Pepper Weevils

- #1 problem on peppers
- Chew hole in fruit, deposit egg & “cement” in
- Larva a white grub with dark head
- Attack young fruit

Peppers

Pepper Weevils

- Cause leaf drop, so pick up & dispose of (bury, sealed trash bag, or burn)
- Also remove blemished fruit
- Look for on tops of plants in morning
- Bayer Advanced Complete Insect Dust, Bayer Vegetable and Garden Insect Spray

Peppers
Melon Thrips

- Destroy flower ovary chambers, so sometimes fruit with less than 4 chambers
- Also western flower thrips
- Sulfur great below 80^{o} F, and no oils
- Soaps, oils

Miniature bell pepper ripening from purple to ripened (orange)

Peppers
Cutworms

- Not a big problem on peppers

Peppers

Aphids

- Green peach aphid the biggest problem

Lettuce, Cabbage & Leafy Vegetables

Armyworms – southern & others like tomatoes, & especially lettuce

Lettuce, Cabbage & Leafy Vegetables

Cabbage Looper

- Also corn earworm

Lettuce, Cabbage & Leafy Vegetables

Cutworms

- May crawl into leaf cupping areas

Lettuce, Cabbage & Leafy Vegetables

Cabbage webworm on leafy cole crops

- Bore into fleshy broccoli portions or fleshy stem on Chinese cabbage
- Create webbing

Lettuce, Cabbage & Leafy Vegetables

Aphids

- Turnip aphid most common on cabbage & other cole crops
- Green peach aphid can be major
- And several others can attack
- Spirea aphid common on fruiting vegetables & celery

Lettuce, Cabbage & Leafy Vegetables

Spider Mites

- Spring or fall with warm dry days
- Sulfur excellent – but avoid above 80^{o} F & oil

Lettuce, Cabbage & Leafy Vegetables

Diamondback Moth

- Very bad on cabbage
- Really bad last season
- Bt weekly?

Snapbeans
Western Flower Thrips

- On leaves & flowers
- Attack new fruit just as flowers falling off causing “zippers” & bean distortion
- Later feeding causing fruit bronzing
- Avoid pyrethroids, they kill *Orius* – a major predator keeping them in check
- Sulfur, soaps, oils – not together!

Snapbeans
Bean Leafroller

- A caterpillar
- Eat leaf edges & roll up
- Worst early fall or late spring

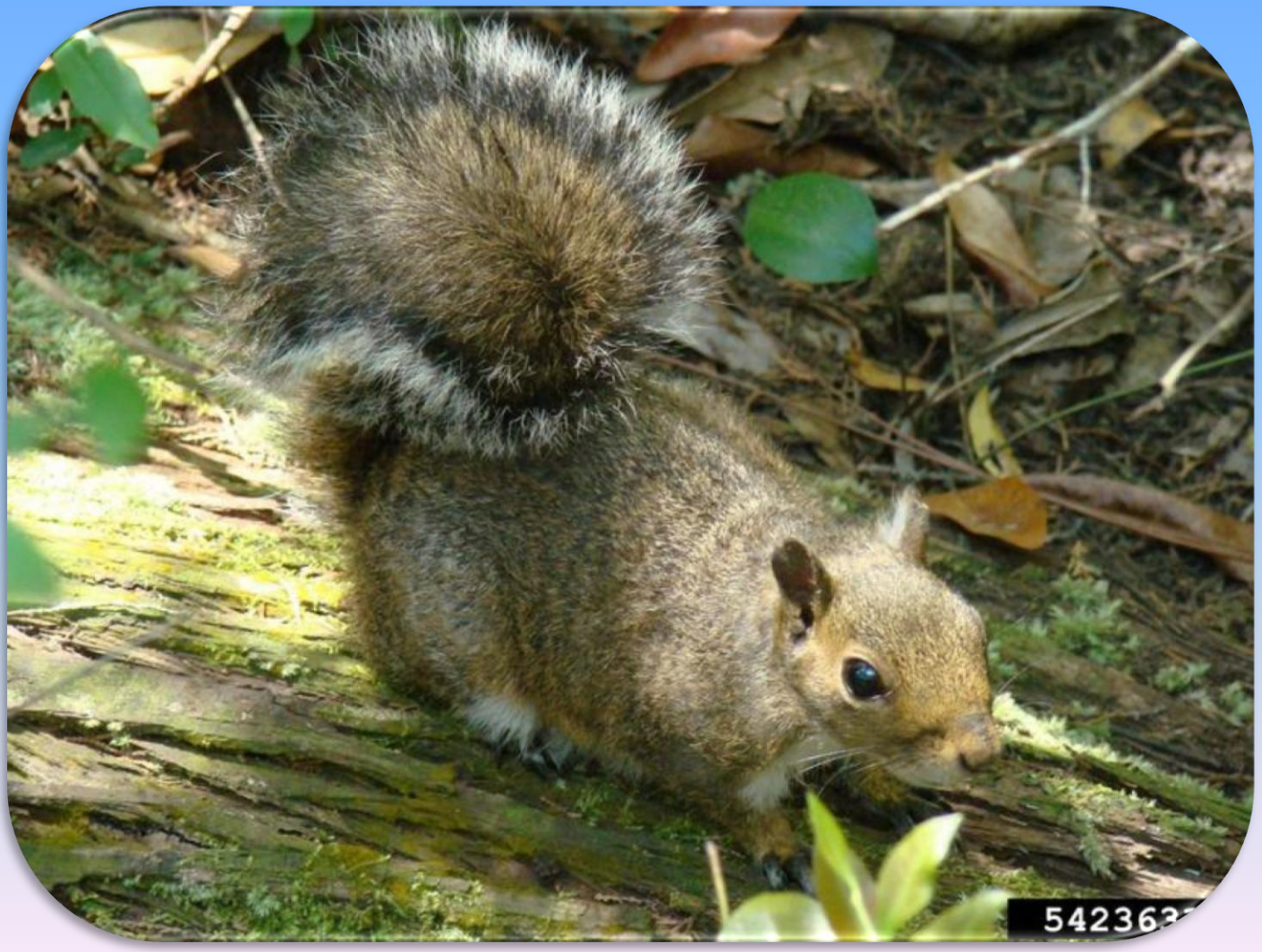
Vertebrates

Birds – especially Blackbirds

- Not always just after insects – often fruit – like tomatoes

Vertebrates

Squirrels



Vertebrates

Rats & Feral House Mice

- Chewing & gnawing damage

Rat feeding on Tropical Fruit
Photo: U of Hawaii

Vertebrates

Raccoons – especially on watermelon

- Especially squash, corn & watermelons

Beneficial Insects & Mites

Orius feeding on Egg

Biological Control

Photo: Sonya Broughton, Department of Agriculture & Food Western Australia, Bugwood.org

Photo: Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org

Photo: Nick Dimmock, University of Northampton, Bugwood.org

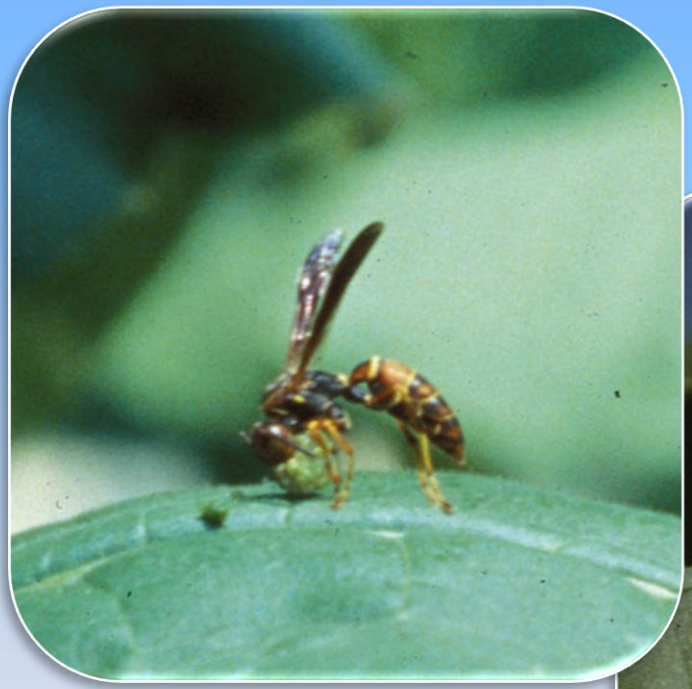
- Predatory insects
  - Ladybeetles
  - Assassin bugs
  - Big-eyed bugs
  - Mealybug destroyer
  - Spined soldier bug
  - Predatory mites
- Parasitoids
  - Parasitoid wasps
  - Parasitoid flies
- Nematodes
- Wildlife

Beneficial Insects & Mites

Lady Beetles & Mealybug Destroyers

Beneficial Insects & Mites

Hornworm attacked by Braconid wasps



Paper wasp attacking hornworm

Beneficial Insects & Mites

Green Lacewing attacking whitefly puparia

Beneficial Insects & Mites

Predatory Stink Bugs

Beneficial Insects & Mites

Syrphid Fly Larva

Beneficial Insects & Mites

Assassin Bug

Veggie Garden Products Found at Lowes & Home Depot

Brand Name	Active Ingredient
Bayer Fruit, Citrus and Vegetable	Imidacloprid
Bayer Vegetable and Garden Insect Spray	Cyfluthrin
Bayer Advanced Complete Insect Dust	Permethrin
Bayer Natria	Sulfur
Bonide Garden Dust	Sulfur
Insecticidal Soap	Insecticidal Soap
Malathion	Malathion

Veggie Garden Products Found at Lowes & Home Depot

Brand Name	Active Ingredient
Ortho Max Flower Fruit and Vegetable Insect Killer	Acetamiprid
Ortho Max Lawn and Garden Insect Killer	Bifenthrin
Sevin Dust	Carbaryl
Southern Ag Malathion Oil	Malathion & Insecticidal oil
Southern Ag Neem Oil	Neem
Southern Ag Thuricide	Bt
Volck Oil Spray	Petroleum oil


Sevin
Concentrate
Bug Killer
Kills Over 100 Listed Insects


ORGANICIDE
Insecticide • Fungicide
Organic Use
OMRI
ORGANIC LABORATORIES, INC.
The World's Leading Producer Of
EnviroCare Pesticides & Fertilizers


Kills Garden Insects
Spectracide
MALATHION
INSECT SPRAY CONCENTRATE
Protects Flowers, Fruits & Vegetables!
Makes up to 48 Gallons of Spray
Multi-Purpose Insecticide
Use in gardens & other listed areas


Sevin-5
Ready-To-Use
5% Dust
Kills Over 65 Insects


ORTHO
elementals
INSECTICIDAL SOAP


BAYER
NATRIA
DISEASE CONTROL
For use on Lawns, Roses, Vegetables, Fruits, Trees, & Shrubs
Controls Brown Patch, Dollar Spot, & other listed diseases
Promotes Healthy, Disease-Free Lawns


Won't Harm Plants or Blooms
ORTHO
MAX
Flower, Fruit & Vegetable INSECT KILLER
KILLS 100 PLUS
CATERPILLAR
JAPANESE BEETLE
APHID
KEEP OUT OF REACH OF CHILDREN
CAUTION
PRECAUCION
NET CONTENTS/
CONTENIDO NETO 32 FL OZ (946 mL)


ORTHO
VOLCK OIL SPRAY
DORMANT SEASON
INSECT KILLER
INSECTICIDA PARA LA TEMPORADA INACTIVA
Kills over-wintering insects and their eggs
CAUTION
PRECAUCION


Attach to HOSE & SPRAY
BAYER ADVANCED
Vegetable & Garden
Insect Spray
KILLS INSECTS* ON CONTACT
• Kills Aphids, Japanese Beetles*, Cutworms, Tomato Hornworms, & other listed pests
• Rainproof in 1 Hour
Also for use on Lawns!

Chewing Insect Groups

Turf Pests – What is It?

Photo: Johnny N. Dell, Bugwood.org

Chewing Insect Groups

Turf Pests – Mole Cricket

Photo: Johnny N. Dell, Bugwood.org

Chewing Insect Groups

Turf Pests – Mole Crickets

- Get insecticides **into** the soil.
- Mole crickets are deeper in the soil during the day and closer to the soil surface at night. Apply insecticides as late in the day as possible.
- Use soap flushes
- Baits for professionals
- Beneficial nematodes for professionals. They attack large nymphs and adults. They are compatible with most insecticides to provide long-term mole cricket suppression

Chewing Insect Groups

Turf Pests – Mole Crickets

- Same as caterpillar, but without spinosad

Chewing Insect Groups - Borer

Giant Palm Weevil

Photo: Doug Caldwell, Univ. Florida, Bugwood.org

Chewing Insect Groups - Borer

Giant Palm Weevil

Photos: UF L. Buss

Chewing Insect Groups - Borer

Giant Palm Weevil

- Mostly a problem at transplant or wounding on Cabbage or *Washingtonia* palms
- Attracted in less than two hours to wounded or dug palms
- Attach *Phoenix canarienses* and Bismarck palms even without wounds
- Huge grubs attack bud area, causing crown collapse

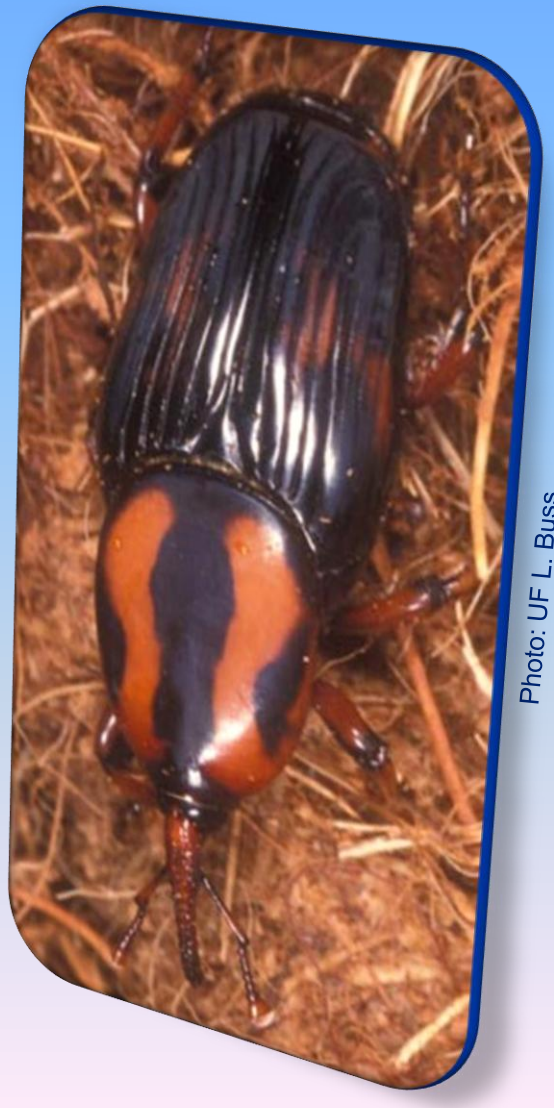


Photo: UF L. Buss

Chewing Insect Groups - Borer

Giant Palm Weevil Management

- Bud treatment at transplant?
- Imidacloprid bud & soil drench for surrounding susceptible palms (especially Bismarck and *Phoenix canarienses*)

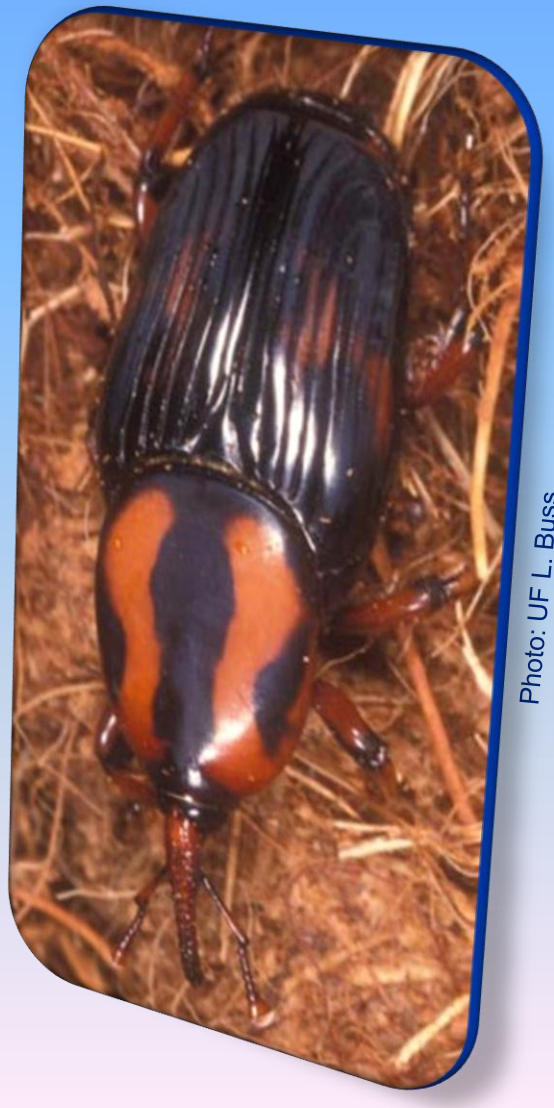


Photo: UF L. Buss

~~Chewing Insect Groups - Borer~~

Ambrosia Beetles on Palms

Photo: UF Schall

Photo: UF Schall

Photo: University of Florida

Ambrosia Beetles on Palms

Photo: UF Schall

Photo: UF Schall

Photo: University of Florida

Chewing Insect Groups - Borer

Management

- imidacloprid
- bifenthrin (Onyx)(professional)
- IGRs?
- Nematodes?

Photo: UF Schall

Chewing Insect Groups

What are They?

Photo: DPI

Photo: Lance S. Risley, William Paterson University, Bugwood.org

Chewing Insect Groups

Leafminers

Photo: DPI

Photo: Lance S. Risley, William Paterson University, Bugwood.org

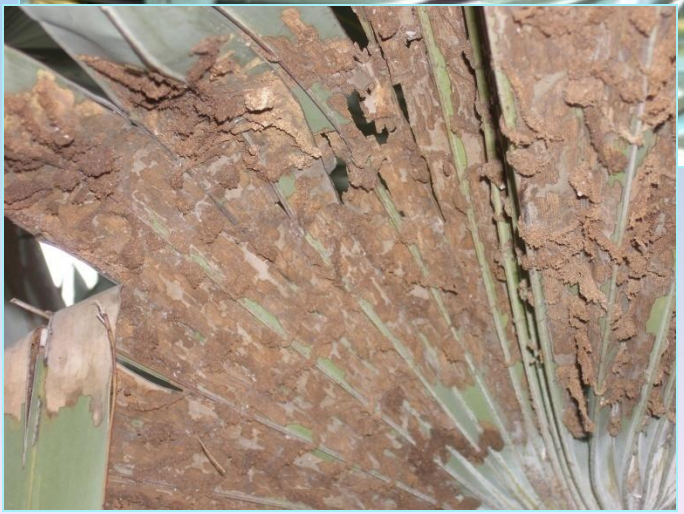
Chewing Insect Groups

Leafminer Management

- Difficult to control in landscape
- Except - Citrus leafminer – oil
- Insecticides: neonicotinoids, orthene, avid, bifenthrin

Photo: DPI

Palm Skeletonizer



- Caterpillars pupate in leaves
- Mostly summer and fall, but damage stays on fronds year around
- Moth lays eggs on unfolding fronds
- Several generations a year

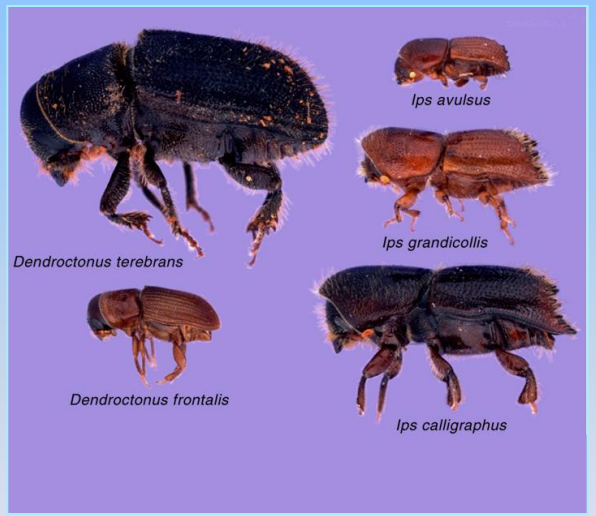
Palm Leaf Skeletonizer
Homaledra sabalella

Pine Borers

Turpenes Attract Beetles to Live Looking Trees

<u>Upper Trunk & Branches</u>
Ips avulsus

<u>Upper Trunk</u>
Five spined Ips
Ips grandicollis



<u>Main Trunk</u>
Six spined Ips
Ips calligraphus

<u>Lower Trunk</u>
Black turpentine beetle
(Dendroctonus terebrans)

Turpenes

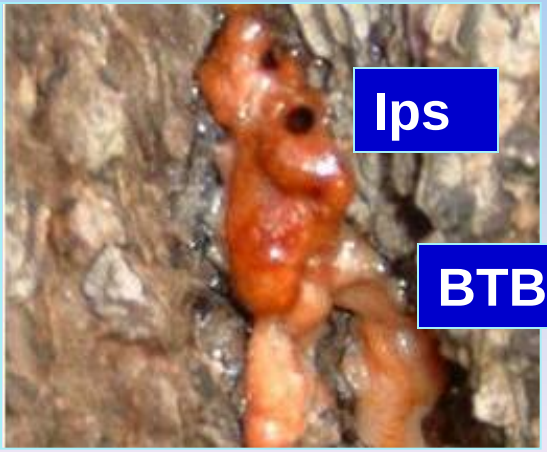
- Produced by tree to protect itself when under stress
- Turpenes attract bark beetles, especially the Ips and black turpentine beetles
- A dead tree does not have the ability to produce protective measures
- Conclusion, healthy “looking” trees, if stressed, can produce insect attracting turpenes – generally before you even can spot a problem
- This creates the ILLUSION that healthy trees are being attacked by beetles
- SPB also confuses the issue

IPS & Black Turpentine Beetles

Ips tree – vigor (rust sap)

Ips - less vigorous tree rust sawdust

Black turpentine beetle (white sap)



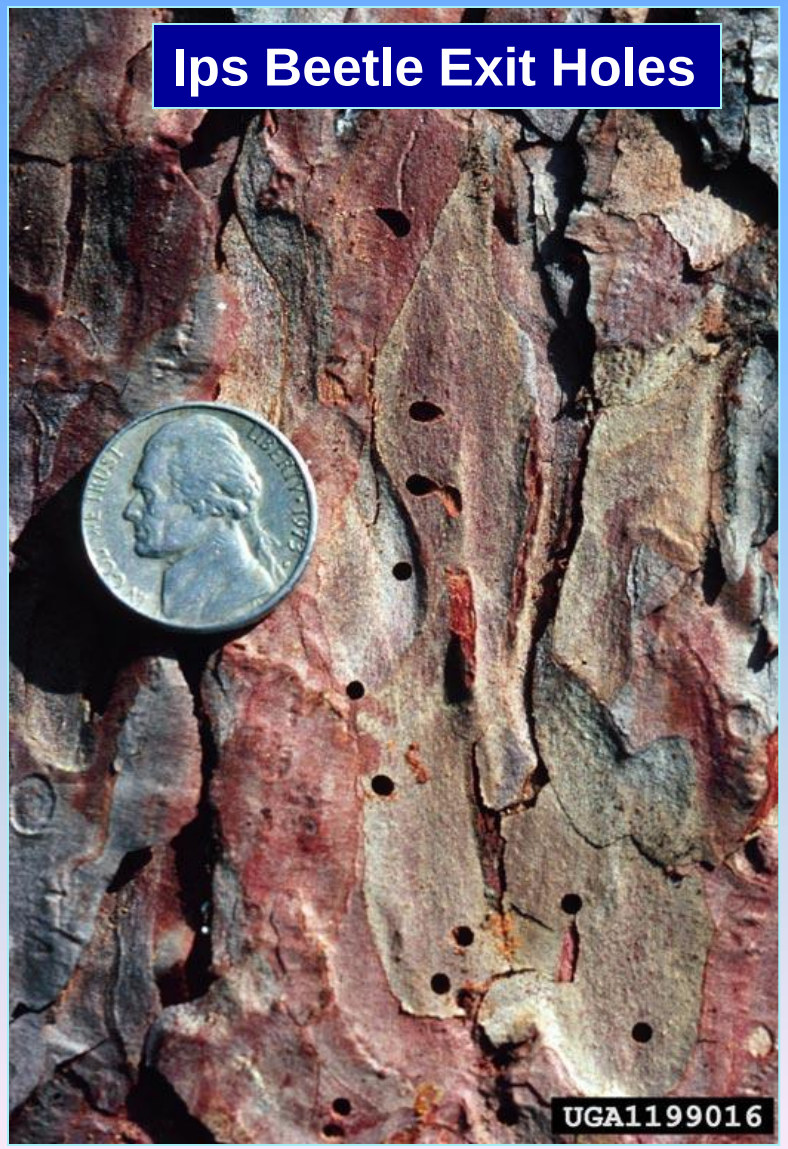
Ips

BTB

Both Ips & BTB

Exit Holes & Natural Bark Holes

Natural Bark Hole



- How would you tell them apart?

Management?

- Tree removal (especially if safety an issue) probably not all that helpful for mgt.
- Onyx is the only insecticide (a formulation of bifenthrin) that research has shown to last long enough, if:
  - Only black turpentine beetle
  - **Visible holes at less than 1 per caliper inch of trunk**
  - Not effective for IPS or Monochamus spp.
- Imidacloprid also labeled

Photo: A. Steven Munson, USDA Forest Service, Bugwood.org

Male Yellow-bellied sapsucker

- Punch holes & feed on sap & insects attracted to sap
- Sapsucker saliva keeps sap flowing, so other animals hang around

Photo: James Solomon, USDA Forest Service, Bugwood.org

Photo: UF Schall

Gall Formers

- Wasps
- Midges
- Aphids
- Others

Africanized Bees


They Nest
Everywhere!
JUL 31 2002
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‘Bee-proofing’ facilities & homes

- Remove all potential nesting sites (garbage, tires, and other debris)
- From March-July (swarming season), inspect property weekly for the presence of unusual bee activity
- Inspect outside walls and eves of your structures
- Seal openings greater than 1/8-inch in walls, around chimneys, plumbing, and other openings by installing screens (1/8-inch hardware cloth) over such openings (rain spouts, vents, cavities of trees and fence posts, water meter/utility boxes, etc.)

During a stinging emergency

- Do not stay in place and swat at bees (this always leads to more stings)
- Do not hide in water or thick underbrush (it may take bees 30+ minutes to calm down or leave an area – remember their colony is likely close)
- Do not attempt to remove swarm yourself
- Seek shelter (building, vehicle, etc.)
- Call 911
- Do not attempt a rescue

Swarms that need removal

Bee Comb Must Also Be Removed

Beehive inside a wall
Photo by Robert Doupe

- Unattended beeswax, honey, brood, and pollen will attract other insects and animals
- Wax moths will enter to consume the wax
- Cockroaches and ants will find the brood and honey.
- Decaying brood and fermenting honey will cause undesirable odors
- Melting wax and honey soaks into walls making them impossible to paint or wallpaper
- Walls will also remain moist to the touch for a considerable period of time

All wild colonies should be destroyed by a professional pest control operator trained in handling Africanized bees

What About Bee Colony Collapse?

UF | IFAS Extension
UNIVERSITY of FLORIDA

Pest Management:
Yard & Garden Insects Driving You Buggy?

Bill Schall
Commercial Horticulture
Extension Agent
561.233.1725

Palm Beach County

COOP. E X T E N S I O N SERVICE