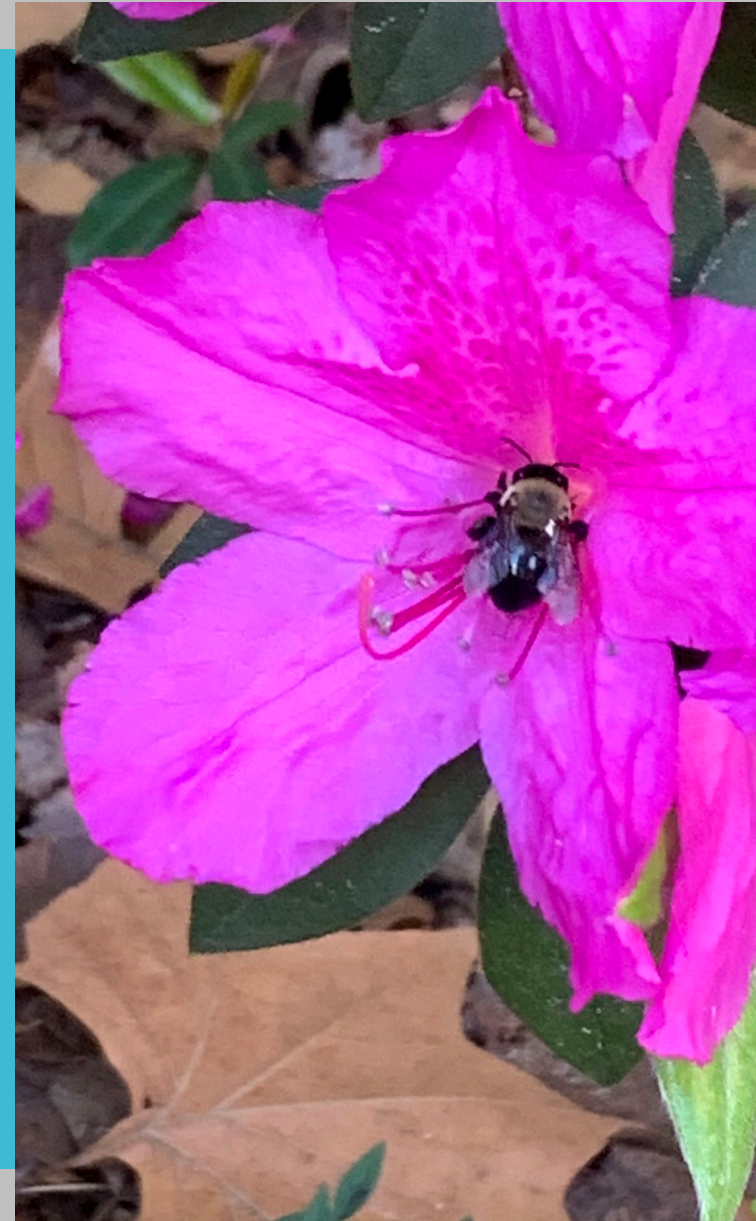


Insect Garden Pests

Advanced Identification

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Hi! I'm Eleanor



- From Nashville, TN
- University of San Diego, undergrad majors Environmental Studies & Spanish
- Lipscomb University master's in sustainable food systems
- UF master's in Entomology & Nematology
- Current Doctor of Plant Medicine Student



Presentation Outline

- Review of Basics
- Major Pest Groups
- Lawn, Garden, & Veggie Pest Groups
- Signs & Symptoms
- Guess the Pest
- Look at Samples

What Makes an Insect an Insect?

1. Three-segmented body
 - (head, thorax, abdomen)
2. Six legs
3. One pair of antennae
4. Exoskeleton made of chitin
5. Jointed appendages
6. Wings (usually)

A note on
Taxonomy
the scientific
naming
system

**General
Taxonomic
Naming System**

Kingdom

Phylum

Class

Order

Family

Genus

species

Example

Animalia (animal kingdom)

Arthropoda (arthropod)

Insecta (insects)

Coleoptera (beetles)

Coccinellidae (lady beetles)

Adalia

bipunctata (two-spotted lady beetle)



Order, Family, Genus, Species Groupings

Life Cycle

Metamorphosis
Complete
or
Incomplete?



Mouthparts

Feeding method
Chewing or
piercing-sucking
damage?



Life Stage

Immature Stage
Often, not
always, the
stage when most
feeding occurs

Life Cycles

3 categories

Ametabolous

- No metamorphosis
- Immatures appear as smaller versions of adults
- Both immatures and adults are wingless
- Groups: Silverfish, Bristletails

Bold = plant pests

Hemimetabolous

- Incomplete metamorphosis
- After eggs hatch, immature stages called instars go through several molts, can appear similar to adults
- Adults are winged
- Groups: Dragonflies, **Grasshoppers**, Crickets, **Stink bugs**, **Aphids**, **White flies**, **Scale insects**, Praying Mantids, Cockroaches, Lice, Stick bugs, Earwigs

Holometabolous

- Complete metamorphosis
- Insects have four life stages: egg, larva, pupa, and adult
- Groups: Green lacewings, **Beetles**, **Ants**, Bees, Wasps, Caddisflies, **Moths**, **Butterflies**, Scorpionflies, Hangingflies, Fleas, **Flies**

Beneficial insects: identifying Predators

Forelegs

- Look for front legs (forelegs) that are 'raptorial' or 'grabbing' (think a praying mantis), & are larger than hind legs

Assassin bug



Photo: J. Castner, UF/IFAS



Photo: Lyle Buss, UF/IFAS



Photo: Lyle Buss, UF/IFAS

Grizzled mantid

Dragonflies



Photo: Seth Bybee, UF/IFAS

Mantisflies



Photo: Lyle Buss, UF/IFAS

Robberflies



Photo: Lyle Buss, UF/IFAS

Beneficial
insects:
Predators

Green lacewings



Adult

Photo: James Castner, UF/IFAS



Eggs

Photo: Paul Choate, UF/IFAS



Larva

Photo: James Castner, UF/IFAS



Larva

Photo: James Castner, UF/IFAS

Lady beetles



Larva

Photo: James Castner, UF/IFAS

Beneficial
insects:
Parasitoids
-lay eggs into
other insects

Hymenoptera (wasps)

- Close to 99% of wasps are parasitoids!

Chalcidae wasp on a moth pupa



Exit holes in citrus blackfly
from parasitism

Diptera (flies)

- Most are in the family Phoridae

Red imported fire ant and
its phorid fly parasitoid





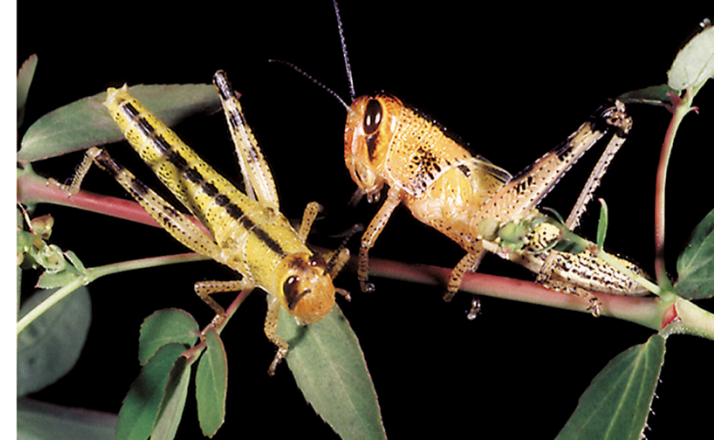
Orthoptera: Grasshoppers, Crickets

- Mandibles = chewing damage
- Same mouthparts in immature and mature stages
- Damage = bites on outer edges of leaves, occasional complete defoliation. Some mole crickets are grass pests

Life Cycle + Damage

American grasshopper

nymph (immature)



adult (mature)



Immature & Mature Mouthparts **Same** - Hemimetabolous Plant Pests



Nymph feeding damage

Mole crickets



Lyle Buss, UF/IFAS

Photos: J. Capinera, UF/IFAS



Hemiptera: Aphids

- **Long stylet** = piercing-sucking damage
- Same mouthparts in immature and mature stages
- Can vector viruses
- Damage = sooty mold, yellowing (chlorosis)

Life Cycle + Damage

Melon aphid

Wingless light form



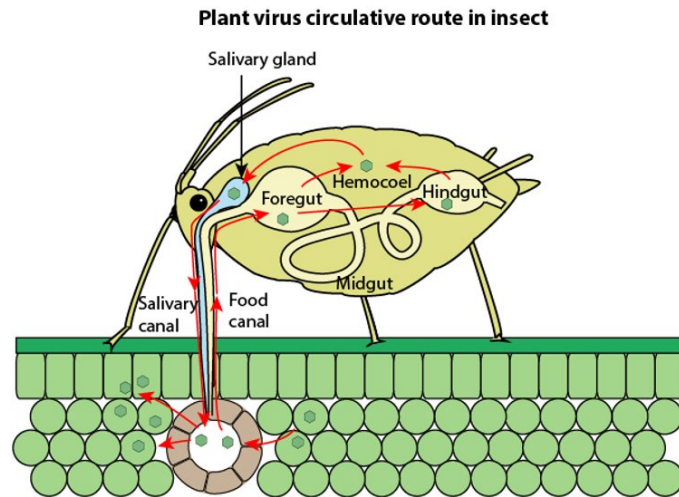
Winged dark form



Immature & Mature Mouthparts Same - Hemimetabolous Plant Pests



Sooty mold



Plant virus transmission



Scale Insects



Whiteflies



Mealybugs

Other Hemiptera "True Bug" Plant Pests



Lac scales



Miridae plant bugs



Stink bugs



Lace bugs



Shield bugs



Leaf-footed bugs

Immature &
Mature
Mouthparts
Same -
Hemimetabolous
Plant Pests

Thrips

- Specialized stylet = rasping-sucking damage
- Same mouthparts in immature and mature stages
- Can tap flowers onto white paper and see thrips
- Can vector viruses
- Symptoms = leaf curling, stippling, flower drop, scarring on fruit



Florida flower thrips

Photo: Lyle Buss, UF/IFAS

Predatory, and plant pests

Thrips can be lots of different colors!



Larvae

Beetles

- Mandibles = chewing damage
- Same mouthparts in immature and mature stages, hardened outer wings as adults
- Damage = foliar and root feeding, occasional complete defoliation. Some mole crickets are grass pests

Life Cycle + Damage

Yellowmargined leaf beetle

1. Egg



2. Larva (grub)



3. Pupa



4. Adult



Immature & Mature Mouthparts Same - Holometabolous Plant Pests



Damage on lettuce

Leaf beetles



White grubs



Wood borers



Other beetle examples

Click beetles



Bess beetles

Straight nose weevils



Ambrosia beetles



Weevils



Immature & Mature Mouthparts Different - Holometabolous Plant Pests

Moths, Butterflies

- Mandibles = chewing damage
- Same mouthparts in immature and mature stages
- Damage = bites on outer edges of leaves, occasional complete defoliation. Some mole crickets are grass pests



Damage on tomato

Life Cycle + Damage

Tobacco hornworm

1. Egg + first instar larva



2. Larvae (caterpillar)



3. Pupa



4. Adult

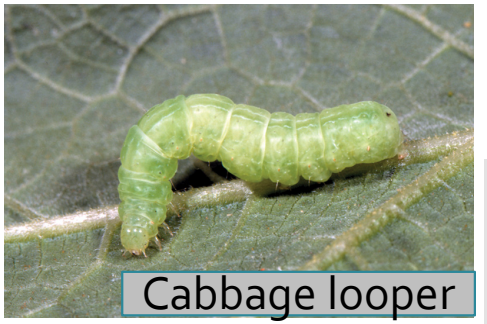




Leaf bean roller



Black cutworm



Cabbage looper

Common caterpillar plant pests



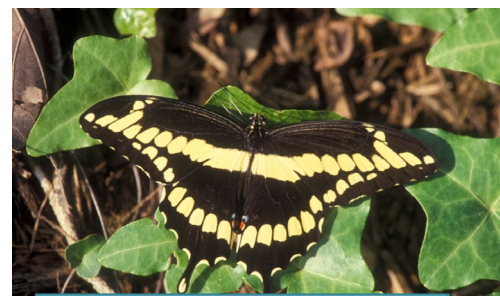
Cross-striped cabbageworm



Diamondback moth



Yellowstriped armyworm



Giant swallowtail / Orange dog



Black swallowtail / Parsleyworm



Fall armyworm

Life Cycle + Damage

Leafminer

1. Pupa



Photo: Lyle Buss, UF/IFAS

2. Adult



Photo: Lyle Buss, UF/IFAS

Notice: two wings, two halteres

Flies

- Mouth hooks in larvae (maggots)
- Different mouthparts in adults – sponging-sucking
- Damage = mining in leaves, sometimes feeding on roots, female fruit flies can damage fruits by laying eggs into fruit



Damage on tomato

Immature &
Mature
Mouthparts
Different -
Holometabolous
Plant Pests

Common
look-alikes:
Larvae

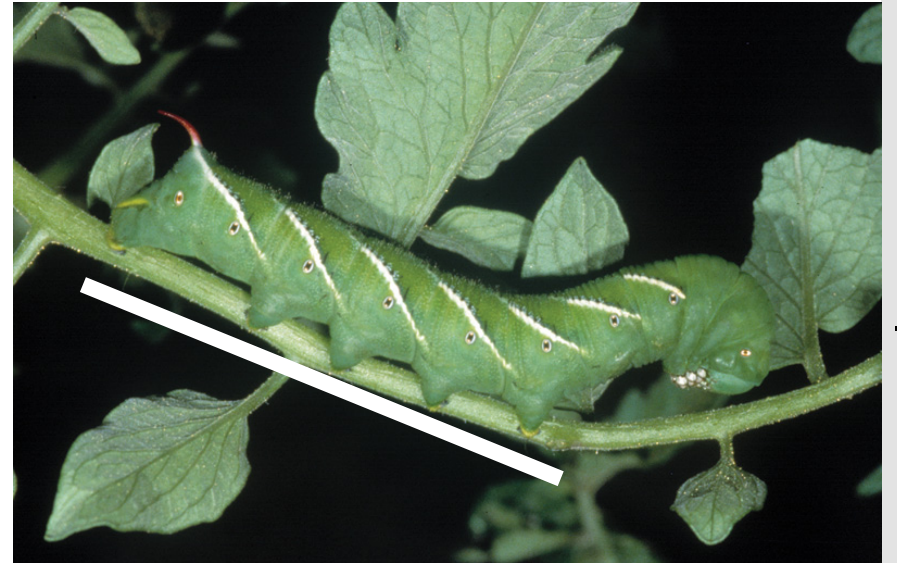
Beetles

- Damaging as larva (grub) AND adult (beetle)
- No prolegs – ONLY three pairs of forelegs



Moths/Butterflies

- ONLY damaging as larvae (caterpillar)
- Prolegs on mid to back end of caterpillar



Similarities: hardened heads

Common
look-alikes:
Larvae

Flies

- Typically only feed as larvae (maggots)
- No legs
- No hardened head area
- Mouth hooks



Cornsilk fly maggot



**Larvae —
beetle,
moth, or
fly?**



J. Capinera, UF/IFAS

**Larvae —
beetle,
moth, or
fly?**



J. Capinera, UF/IFAS

Hymenoptera
Wasps, bees,
ants
Mostly
beneficial,
except ants
which can tend
scale insects

Ants



Red imported fire ant

- Ants
 - Petiole
 - Elbowed antennae
 - Chewing mouthparts

Scale – type of Hemiptera

- Small insects are mobile when in immature stages, females are immobile
- Mobile immatures 'farmed' by ants, who eat their sugary frass



Camponotus spp. tending black scale insects

Management of insects

Damage done as immatures

- Target the immature stage
- Body not as sclerotized, or hardened
 - Usually softer-bodied
 - Not as good or incapable of flying
- Feed more, or feed only as immatures

Damage done as adults

- Damage is **usually** still most problematic when the insect is immature, so still target immature insect
- Exception: ants. Need to select a bait that ant will take back to the hive and feed to the colony

Management of insects

Cultural methods

- If insect pest comes back repeatedly, try switching up the families of plants you're planting
 - i.e. Peas are in the plant family Fabaceae (the bean family)
 - Many insects that like feeding on your peas will also feed on other Fabaceae veggies, such as beans, and planting them will likely not lower the numbers of pests you have
 - Also important to remove Fabaceous weeds from the area that harbor the insects
- Use cloth covers to exclude tinier insects after flowering and pollination
- Remove any diseased plant material if insect pests are spreading pathogens
- Use mulches to prevent pupation in the soil and create a barrier for alternative host weeds from emerging in the garden bed

Management of insects

Cultural methods

- Scout! Look for eggs, larvae, and adults –if you catch them before they hatch or mate, you may be in the clear
 - Underside of leaves, stems for eggs
 - Look for ants going to forage from groups of scale insects
- Plant more than one kind of plant
 - Flowers provide shelter for beneficial insects
- Grow healthy plants!
 - Make sure plants are getting the recommended amounts of light, water, and nutrients

Biological methods

- Release of predators and parasitoids
 - Need to be host-specific and pest must be present to be effective
- Some nematodes are available that function as insecticides, but they are expensive
- Pheromones can disrupt some moths, can be expensive
- Some organic pesticides containing a bacterium *Bacillus thuringiensis* (*Bt*)
 - Mainly effective for caterpillars
 - Degrades quickly in sun
 - Insect-specific gene is incorporated into some commodity crops now to reduce insecticide use

Chemical methods

- Last resort!
 - We want as few chemicals added to the environment as possible using other techniques first
- Targeting larvae/immatures with horticultural oils and soaps in early instars can be effective
 - Important that you use horticultural oil and soap— not dish soap!
- The label is the law!

Management of insects

Chemical methods

- Piercing-sucking damage - systemic
 - Chemicals that the plant takes up via roots
 - Active ingredient is translocated throughout the vascular system of plant which insect feeds on
- Chewing damage – contact
 - Applied directly to foliage or pest
 - May not provide control for a long time
 - Most contact chemistries are most effective when directly applied to larvae
- **Always** ask an Extension agent before making a decision!
 - Laws can differ on pesticide use from county to city to even neighborhood association levels
 - Many insecticides require a license to purchase and use
 - When selecting a chemical method, correct ID of pest is critical!

If you are unsure of your insect pest, you can submit insect samples!

- Local Extension office
- UF Gainesville Insect ID Lab (<http://entnemdept.ufl.edu/insectid/index.html>)
- Physical submissions or photo submissions



TO VIEW an insect slide show, pick a category

- Beneficials or Natural Enemies
- Biting and Stinging Pests
- "Bug Babies"
- Common Florida Insects
- Exotic or Introduced Species
- Food and Fabric Pests
- Fruit Pests: Citrus
- Noninsects that Have More Than Six Legs
- Snails, Slugs and "Worms"
- Occasional Invaders

Welcome to the Insect ID Lab at the University of Florida

Lyle Buss
Insect ID Lab Manager

Need to name that bug?

A host of experts is available to help Floridians identify any insect or related arthropod. If your mystery creature has six or more legs, the UF Insect ID Lab is the place to send it.

In most cases when you send a specimen to the Insect ID Lab, manager Lyle Buss will review it, identify it and respond with the result. If it is an unusual specimen, Mr. Buss forwards it to a commodity or taxonomic specialist within the UF/IFAS Extension System or the Florida Department of Agriculture, Division of Plant Industry. Mr. Buss will send you the final identification results. [Read instructions and complete the form to begin the process.](#)

About the Insect ID Lab and its partners

Submitting photos for identification



Which of these
is an ant?



César Favacho

Questions?

- My email: eleanorphillips@ufl.edu
- Articles on common garden pests:
 - UF Featured Creatures website
 - <http://entnemdept.ufl.edu/creatures/>



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