Good Bug, Bad Bug ID
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For more information on Small Farms, visit our website at: http://smallfarms.ifas.ufl.edu or contact your local County Extension Agent.

For inquiries about this topic, please contact: Danielle Treadwell, Educational Program Chair.
Phone: (352)-273-4775
E-mail: ddtreadw@ufl.edu

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Good Bug Bad Bug ID

Speakers:
Dr. Lance Osborne,
Professor of Entomology and Associate Center Director
UF/IFAS Mid-Florida Research and Education Center

Dr. Hugh Smith,
Associate Professor, Vegetable Entomology
UF/IFAS Gulf Coast Research and Education Center

Moderator: Mary Beth Henry,
Extension Agent II, UF/IFAS Polk County Extension
Basics Of Insects

Hugh Smith
Basics Of Scouting

Mary Beth Henry
How observant are you?

- **Scouting**- surveying crops for pests and beneficials
- **Identify**- what you see
  - Good bug or bad bug?
- **Monitor**- populations and stage of crop
  - just a few pests may not warrant treatment
- **Determine if & when to take action**- thresholds
  - Combine info, consider costs and benefits
Where to start?

- Divide up the area & consider:
  - Different crops can have different pests so check them all periodically
  - A rotation of inspection- among crops and then areas within the crop
  - Row ends likely have different conditions than areas deeper in
  - Infestations may occur in pockets vs. even distribution
Where to sample?

- Grid system
  - X
  - Y
  - Z
<table>
<thead>
<tr>
<th>Insects</th>
<th>Grower:</th>
<th>Field:</th>
<th>Date:</th>
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<td>2</td>
<td>3</td>
<td>4</td>
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<table>
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## Thresholds

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<tr>
<th>Insect</th>
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<th>Threshold</th>
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<tr>
<td>Silverleaf whitefly</td>
<td>Season long</td>
<td>5 pupae and/or nymphs/10 leaflets**</td>
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<tr>
<td></td>
<td>0-3 true leaves</td>
<td>10 adults/plant**</td>
</tr>
<tr>
<td></td>
<td>3-7 true leaves</td>
<td>1 adult/leaflet</td>
</tr>
<tr>
<td>Thrips</td>
<td>Post-bloom</td>
<td>&gt;5/flower</td>
</tr>
<tr>
<td>Stinkbugs</td>
<td>Post-bloom</td>
<td>1/6 plants</td>
</tr>
<tr>
<td>Aphids</td>
<td>Season long</td>
<td>&gt;3-4/plant</td>
</tr>
<tr>
<td>Loopers</td>
<td>Season long</td>
<td>1 larva/6 plants</td>
</tr>
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</table>

* When threshold is reached, apply pheromone for mating disruption.

** Tentative threshold; will require more validation. If the source of whiteflies is believed to be tomato, especially if infected with tomato mottle geminivirus (TMoV), the threshold will be lower.
# Appendix 10: Scouting Results Summary

**TO:**

**FROM:**

**FIELD:**

**DATE:**

**SCOUT:**

<table>
<thead>
<tr>
<th>PEST</th>
<th>PRESENT COUNT &amp; LOCATION</th>
<th>LAST COUNT</th>
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</tr>
</tbody>
</table>

**UF. Florida Tomato Scouting Guide**
Where to look?

• Varies by crop, crop development stage and pest
  – Thrips often found in flowers
  – Mites usually found on undersides of leaves
  – Aphids often found on new growth
  – Older whitefly stages will be found on older leaves

• May be easy to overlook
  – Crevices etc.
  – Can sometimes appear to be part of the plant
What to look for?

• Signs
  – Frass (excrement)
  – Webbing
  – Leaf or fruit damage or abnormal growth
    • Missing sections of leaves, holes, etc.
    • Roadmap in the leaf
    • Leaf surface appears stippled
  – Leaf drop
  – Honeydew or sooty mold
What to look for?

• **Insects**
  – Adults
  – Immatures
  – Pupae
  – Eggs

• **Other / not the pest insects**
  – Ants will tend aphids for free food
  – An increase in predators or parasatoids numbers may indicate you have an increase in the insects they feed on/ parasitize.
Insect Leaf Damage Decision Key

Select the best description of the leaf damage.

1. Holes in leaves ... go to Key A
2. Mines in leaves ... go to Key B
3. Leaves silvered or bronzed ... go to Tomato russet mite
4. Black "sooty mold" on leaves ... go to Aphids / Whiteflies
5. Silverish, irregular spots on leaves ... go to Garden fleahopper

Key A

Continue selecting the best description of the leaf damage.

1. Leaves "windowpaned" i.e. lower surface scraped off leaving only upper surface ... go to Armyworms; beet, southern and yellowstriped
2. Tiny "shot" holes ... go to Flea beetles
3. Small, ragged holes of more or less uniform size over entire leaf surface ... go to Cucumber beetle, banded and Cucumber beetle, striped
4. Large, irregular holes ... go to Armyworms; beet, southern and yellowstriped
## Appendix 4: Tomato Growth Stages

This is the code we will use for the growth stage of all our sampling data.

<table>
<thead>
<tr>
<th>Stage of Growth</th>
<th>Code Digit</th>
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<tr>
<td>Cotyledons</td>
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<tr>
<td>First two true leaves</td>
<td>2</td>
</tr>
<tr>
<td>3-8 true leaves</td>
<td>3</td>
</tr>
<tr>
<td>Second bloom</td>
<td>4</td>
</tr>
<tr>
<td>Second bloom</td>
<td>5</td>
</tr>
<tr>
<td>First fruit set</td>
<td>6</td>
</tr>
<tr>
<td>Second fruit set</td>
<td>7</td>
</tr>
<tr>
<td>First harvest</td>
<td>8</td>
</tr>
<tr>
<td>Second harvest</td>
<td>9</td>
</tr>
</tbody>
</table>
Insect Fruit Damage Decision Key

Select the best description of the fruit damage.

1. Large, deep holes anywhere on fruit surface ... go to Armyworms; beet, southern, and yellowstriped; also Tomato fruitworm

2. Small holes, mostly under calyx at stem end ... go to Tomato pinworm

3. Small puncture surrounded by light discolored spot ... go to Stink bug / Leaffooted bug

4. Small dimples, surrounded by whitish area, especially on blossom end ... go to Flower thrips, damage most pronounced from Western flower thrips, especially in North Florida

5. Fruit dimpled and distorted ... go to Leaffooted bug
What to look for?

• **Signs**
  - Excrement
  - Webbing
  - Damage

• **Insects**
  - Adults
  - Immatures
  - Pupae
  - Eggs
When?

• Varies by crop, weather, season and many other factors
  – Field tomatoes- twice a week
  – Note higher temperatures often lead to increased pest populations

• Varies by crop and pest
  – X
  – Y
UF. Florida Tomato Scouting Guide
How can you know for sure?

• Printed publications
  – Extension bookstore

• Online resources
  – Edis publications; featured creatures

• Extension office and RECs
  – often walk-in ID

• UF Insect ID lab
  – Submit a sample by mail

• Distance Diagnostics and Identification System (DDIS)
  – Submit a picture online
Tomato Scouting Guide

http://erec.ifas.ufl.edu/tomato-scouting-guide/index.shtml
common name: Colorado potato beetle  
scientific name: *Leptinotarsa decemlineata* (Say) (Insecta: Coleoptera: Chrysomelidae)

common name: false potato beetle  
scientific name: *Leptinotarsa juncta* (Germain) (Insecta: Coleoptera: Chrysomelidae)

**Introduction**

True "potato beetles" are members of the beetle genus *Leptinotarsa*, with more than 40 species throughout North and South America, including at least 10 species found in Mexico, with two species found in the southwestern U.S. (Arnett 2002). The most notable of these to date is *decemlineata* (Say), which is a serious pest of potatoes and other solanaceous plants.

The Colorado potato beetle was first discovered by Thomas Nuttal in 1811 and described in 1824 by Thomas Say from specimens collected in the Rocky Mountains. The insect's association with the potato plant, *Solanum tuberosum* (L.), was unknown until about 1859 when it began destroying potato crops about 100 miles west of Or
Insect ID Lab

Send sample to: Lyle Buss
Insect ID Lab
Entomology and Nematology Dept., Bldg. 970
University of Florida, P.O. Box 110620
Gainesville, FL 32611-0620

Insect Identification Form

FEE: $8.00 per sample - make check payable to University of Florida

Date collected: ________________ County: ________________
Date sent: ________________

Submitted by:
Name ________________________________
Company ________________________________
Address ________________________________
City/Zip ________________________________

Collection address (if different):

http://fpdn.ifas.ufl.edu/ufmain-insect-lab.shtml
DDIS and Diagnostic Labs

http://ddis.ifas.ufl.edu/

Diagnostic Labs and Clinics at UF/IFAS

- Florida Extension Plant Disease Clinic - Gainesville
- Insect Identification Lab - Gainesville
- Extension Plant Diagnostic Clinic - NFREC, Quincy
- Extension Plant Diagnostic Clinic - Homestead
- Plant Diagnostic Lab - Gulf Coast Research and Education Center
- University of Florida Herbarium (FLAS)
- Florida Medical Entomology Lab - Vero Beach
- Nematode Assay Lab
- Commercial Ornamental Plant Diagnostic Clinic - Mid-Florida Research and Education Center
- Extension Soil Testing Lab
References

  – X
  – Y
  – Z

• Varies by crop and pest
  – X
  – Y
Basics Of Chemical Control
Biological
Control

L.S. Osborne

RESEARCH SUPPORTED BY:

NATIONAL
FOLIAGE
FOUNDATION INC.
Knowing and recognizing
The biology of glasshouse pests and their natural enemies

M.H. Malais - W.J. Ravensberg
Driving Forces for Adopting Alternatives?
100% Reliance on Pesticides = RESISTANCE
Kinds of Natural Enemies
Biological Controls

Parasites
Predators
Pathogens
Natural Enemies-the “Whom”

• **Predator**- consumes more than one prey item during its development
  – Lady beetle

• **Parasitoid**- lives in/on body of one host eventually killing it
  – Parasitic fly or wasp

• **Entomopathogen**- disease causing organism
  – Nematode, bacterium, fungus, protozoan, virus)
Videos

1. Ladybird_beetle.wmv
2. Diomus_larva.wmv
3. Diomus_adult.wmv
4. Syrphid_larva.wmv
5. Aphid_Parasite.wmv
6. Encarsia_sophia.avi
7. Nematodes.avi
8. Nematodes.avi
Accurate Identification of the Target Pest
RELEASES
Augmentative or Seasonal Inoculative biological control
(periodic releases, usually endemic natural enemies)
Natural Enemy Releases

Introduction of pest

Introduce natural enemies

EIL

Time (years)
Seasonal Inoculative

Introduce natural enemies

Begin Cycle

Time (months)

End Cycle

Begin Cycle
Banker Plants

Introduce banker plants

Begin Cycle

Time (months)

End Cycle

Begin Cycle
Integration
Pesticides
Koppert
Side effects

How to use this menu:

**Beneficials** - search side effects via beneficials

On opening this page and/or after clicking "beneficials" in top of the left menu a list is shown with all beneficials on which we have side effect information

Clicking one organism will put this item in the input field and gives a list of all pesticides that have side effects on this item

Clicking a pesticide will give (or expand) a table with side effects info on the chosen combination(s)

**Pesticides** - search active ingredients or tradenames of pesticides

Choose "active ingredients" or "tradenames" in the pop-up menu under "pesticides" in the left menu

Lists of corresponding items will be shown by typing the first character(s) of the searched items in the input field.

Clicking one item in this list will put it in the input field and gives a list of all beneficials that have side effects from it.

Clicking a beneficial will give (or expand) the side effects table with the chosen combination(s).

The table can be expanded to a maximum of 7 active ingredients and 7 beneficials.

Items can be removed from the table by clicking the red minus above the item.

Clicking the green plus above a table item will give a list of all possible related combinations in the left menu.

A simplified version of this side effects menu (without javascript) you can find in our PDA website: [www.koppert.mobi/en/side_effects/](http://www.koppert.mobi/en/side_effects/)
Side effects

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Home > Side effects

Benefits

Abamectin
acephate
acequinocyl
acetamiprid
acrinathrin
aldicarb
alpha cypermethrin
amitraz
azinphos-methyl
azocyclotin
azoxystrobine
Bacillus thuringiensis var. kurstaki
benzoximate
bifenazate
bifenthrin
bixteranol
boscalid + kresoxim-methyl
bromopropylate
bupirimate
buprofezin

Pesticides

Amblyseius californicus

Abamectin

Population
Egg
Larva
Nymph
Adult
Persistence

HVS
TMX

1 - 2

Legend
Explanation
Print
New search
Pesticides
Biobest
## Side-effects manual

### Active ingredient

- abamectin
- acetate
- acequinocyl
- acetamiprid
- acrinathrin
- Adoxophyes orana Granulose Virus
- aclonophor
- aldicarb
- alphachlorpyrifos
- amitraz

### Commercial product

- Ambylyseus californicus

### Beneficial organism:

- **Ambylyseus californicus**
  - nymph/adult
  - persist

### Legend

#### Toxicity on natural enemies

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<td>1</td>
<td>Non-toxic</td>
<td>&lt; 25%</td>
</tr>
<tr>
<td>2</td>
<td>Slightly toxic</td>
<td>25-50%</td>
</tr>
<tr>
<td>3</td>
<td>Mod. toxic</td>
<td>50-75%</td>
</tr>
<tr>
<td>4</td>
<td>Toxic</td>
<td>&gt;75%</td>
</tr>
</tbody>
</table>

#### Toxicity on bumblebees

- **abamectin**
  - s
  - 5 d
Pesticides
Applied Bionomics
## Technical Manual

<table>
<thead>
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<th>#</th>
<th>Description</th>
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"Mr. Osborne, may I be excused? My brain is full."
Thank you!