Vegetable Diagnostics 101: Insects and Diseases
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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.

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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
  – Edges of field likely have different conditions than areas deeper in
  – Infestations may occur in pockets vs. even distribution
  – Try to design your sampling to be as representative as possible
Where to sample?

• Grid system
  – Split field into even sections
  – Sample randomly within that quadrant
  – Record

  – In tomato fields larger than 20 acres, inspecting one 6ft section per 2.5 acres is representative

smaller fields require more samples
Where to sample?

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  – Sample randomly within that quadrant
  – Record

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  smaller fields require more samples
<table>
<thead>
<tr>
<th>Insects</th>
</tr>
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<tbody>
<tr>
<td>AW</td>
</tr>
<tr>
<td>CR</td>
</tr>
<tr>
<td>CU</td>
</tr>
<tr>
<td>PW</td>
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<tr>
<td>GR</td>
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<tr>
<td>LB</td>
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<tr>
<td>LO</td>
</tr>
<tr>
<td>SWF</td>
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<table>
<thead>
<tr>
<th>Diseases (%)</th>
</tr>
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<tbody>
<tr>
<td>Dam</td>
</tr>
<tr>
<td>Rhi</td>
</tr>
<tr>
<td>RKN</td>
</tr>
<tr>
<td>Sc1</td>
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<table>
<thead>
<tr>
<th>Diseases (H/B Rating)</th>
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<tbody>
<tr>
<td>A/M</td>
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<tr>
<td>Bsp</td>
</tr>
<tr>
<td>EB</td>
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<tr>
<td>LB</td>
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<tr>
<td>PVY</td>
</tr>
<tr>
<td>TMV</td>
</tr>
<tr>
<td>VIR</td>
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<table>
<thead>
<tr>
<th>Specific Count</th>
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<tbody>
<tr>
<td>LM</td>
</tr>
<tr>
<td>Live</td>
</tr>
<tr>
<td>Ap</td>
</tr>
<tr>
<td>PW</td>
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</table>

<table>
<thead>
<tr>
<th>Percent/10 Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bsp</td>
</tr>
<tr>
<td>EB</td>
</tr>
<tr>
<td>LB</td>
</tr>
<tr>
<td>Sci</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grower:</th>
<th>Field:</th>
<th>Date:</th>
<th>SOG:</th>
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<tbody>
<tr>
<td></td>
<td></td>
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</table>

UF. Florida Tomato Scouting Guide
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>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
## Thresholds

<table>
<thead>
<tr>
<th>Pest</th>
<th>Stage</th>
<th>Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silverleaf whitefly</td>
<td>Season long</td>
<td>5 pupae and/or nymphs/10 leaflets**</td>
</tr>
<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>
</tbody>
</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.
Figure: UC Davis http://www-pip.ucdavis.edu/iaps/rost/tomato/leaves/leafanat.html
### 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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<tbody>
<tr>
<td>Cotyledons</td>
<td>1</td>
</tr>
<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>
Where to look?

• Varies by 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 found on older leaves
  – Whitefly will fly and land quickly off of 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
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
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 parasitoids numbers may indicate you have an increase in the insects they feed on/ parasitize.
Helpful techniques?

- **Use a hand lens**
  - 10 X good for many
  - 15 X may be needed

- **Use white painters pallet**
  - Jar flower or stem onto the pallet
  - Fine brush can be used to catch quickly moving insects
Where to look?

- Varies by crop, crop development stage and pest
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- May be easy to overlook
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Other methods of monitoring

• Sticky cards
  – Yellow attracts aphids whitefly
  – Blue attracts thrips
  – Will catch flying insects
  – Will catch debris & non pests

• Attractants like pheromones
  – Trap
  – Other attractants such as fermented

http://edis.ifas.ufl.edu/in080
When?

- Varies by crop, weather, season and many other factors
  - Field tomatoes- twice a week
  - Note higher temperatures often lead to increased pest populations
  - Insects less active in cooler temp

- Best time of day varies
  - Morning probably better than mid-day
  - Some pests are nocturnal
**Southwest Florida**

- Southern armyworm
- Vegetable leafminer
- Silverleaf whitefly
- Tomato pinworm

**North Florida**

- Yellowstriped armyworm
- Tomato pinworm
- Western flower thrips
- Vegetable leafminer
- Silverleaf whitefly

**West Central Florida**

- Southern armyworm
- Vegetable leafminer
- Silverleaf whitefly
- Tomato pinworm

Heavy

Sometimes

Rarely
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
common name: Colorado potato beetle
scientific name: *Leptinotarsa decemlineata* (Say) (Insecta: Coleoptera: Chrysomelidae)

common name: false potato beetle
scientific name: *Leptinotarsa juncta* (Germar) (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 four Mexico are found in the southwestern U.S., two species are found either in the eastern states or throughout most of the U.S. (Arnett 2002). The most notable of these to *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. insect's association with the potato plant, *Solanum tuberosum* (L.), was not known until about 1859 when it began destroying potato crops about 100 miles west of O
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

University of Florida IFAS Extension

Diagnostic Labs and Clinics at UF/IFAS

Diagnostic Services

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

Quick Links

Meet Your Diagnosticians >>
Latest Pest Info >>
DDIS Brochure >>
Web Resources >>
Get GPS code >>

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

