Understanding Vegetable Garden Insects

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There are lots of pests out there...are there?
Integrated Pest Management

• IPM involves using multiple tactics to keep pest populations low enough that damage is tolerable
• Effective IPM depends on knowing your pests and their life histories
• Scouting (regularly examining your plants for insects, feeding damage, and diseases) is essential
Identification

- Find a good identification guide--pictures and drawings can be better than photos
- Get a hand lens (magnifier), 5x or 10x
- Look underneath leaves
- Go out at night with a flashlight to look for nocturnal insects
Identification

- Learn life histories of your pests and beneficial insects
- Keep records, take pictures
- Visit your county extension office

Adult yellow-margin leaf beetle
Larval stage of same beetle
Scouting

• Once or twice a week, walk through the vegetable garden, early in the day, if possible.
• Stop and examine as many plants as you have time for--more for larger gardens.
• Record the type of vegetable, the plant part examined (leaves, fruit, stems) and what you found.
• If you find disease, many pest insects or more damage than you can tolerate, you need to decide what to do about it.
Principal Pests of Tomato in SW Florida

- Silverleaf whitefly/TYLCV
- Southern Armyworm
- Vegetable leafminer
- Tomato Pinworm
Occasional Tomato Pests in SW Florida

Aphids

Tetranychus spp

Stinkbugs: Various
Principal Pests of Pepper in SW Florida

- Pepper weevil
- Melon thrips
- Beet Armyworm
- Broadmite
- Aphids/potyvirus
Principal Pests of Cucurbit Crops in SW Florida

Silverleaf whitefly

Aphids/potyvirus

Twospot

Pickelworm

Melonworm
Principal Pests of Eggplant in SW Florida

- Silverleaf whitefly
- Broadmîte
- Melon thrips

Twospot
Less than 1% of Insects in Your Yard are True Pests

Plant feeding (phytophagous) stink bug

Predaceous stink bug

Spined Soldier Bug
Managing Insects

• Cultural controls
  – Crop rotation
  – Soil preparation
  – Barriers
  – Physical controls
• Biological control
• Chemical control--a last resort
• Tolerate some damage
Cultural Control

- Soil preparation well in advance of planting (several weeks to months)
- Especially important if the garden area was recently in grass
- Turning soil will bring grubs and wireworms to the surface where birds can eat them
Crop Rotation

- Learn which plants are related and don’t plant them in the same location in the garden
- Keep records and plant crops in a different place each year
- Crop rotation will help manage both insects and diseases
Reduce Plant Stress

• Fertilize properly--too much nitrogen makes plants more attractive to aphids and whiteflies
• Water carefully
• Remove overripe fruit and diseased plants
• Manage weeds that can be a source of pests and diseases
Barriers

• Cutworm collars prevent cutworms from cutting off small seedlings
• They can be made from many materials
• Press the “collar” one or two inches deep in soil
Barriers

• Lightweight floating row covers keep insects off plants (remove for pollination)
• Rain and sunlight pass through
• Available from garden supply companies
• Not the same as frost protection covers
Physical Controls

• Use transplants that are free of insects and obvious disease.
• During the growing season, hand-pick larger insects and drown in soapy water.
Biological Control

• Avoiding pesticides will help preserve the good insects
• Plant flowering plants to provide nectar and pollen for parasitoids and predators
• Some can be purchased - lacewing larvae or eggs
• Lady beetles will fly away!
Useful Publications For Identifying Beneficial Insects
Univ. Florida Extension Publications on the Internet

• http://edis.ifas.ufl.edu
  – Database of all current cooperative extension publications that are searchable and free for hard copy printing

• http://ifasbooks.ufl.edu
  – Extension bookstore - online catalog of resource publications covering all areas of extension research (1-800-226-1764)

• http://creatures.ifas.ufl.edu
  – In depth profiles of insects and other organisms
Insects and Spiders that Eat other Insects

Jumping spider

Lacewing adult

Lacewing larva

Lacewing eggs
Predatory Beetles

- Lady beetles

- Ground beetles

Courtesy of Celeste Welty, OSU
Predatory Bugs

- **Stink bugs**
  - Spined soldier bug
  - Twospotted stink bug

- **Flower bugs**
  - Minute pirate bug
  - Insidious flower bug

- **Damsel bugs**

- **Assassin bugs**

Courtesy of Celeste Welty, OSU
Predatory Bugs

Leaf footed bug

Big eyed bug
Spined Soldier Bug *versus* Army Worm
Predatory Flies

- Hover flies (flower flies)
- Aphid midges
- Robber flies

Courtesy of Celeste Welty, OSU
Other Predators

- Wasps:
  - Yellowjackets

- Thrips:
  - Black hunter thrips

- Mites:
  - Phytoseiid mites

Courtesy of Celeste Welty, OSU
Parasitoids

- Some wasps
  - Braconid wasps
    - On hornworm
    - On imported cabbageworm
    - On aphids
  - Ichneumonid wasps
    - On diamondback
  - Other wasps
    - On whiteflies
    - On caterpillar eggs

Courtesy of Celeste Welty, OSU
Beneficial Insects At Work - Mealybug Infestation on Grapefruit

Sweet feeding ants tending citrus mealybugs - Collecting honey-dew and spreading mealybugs around
Honeydew Is An Important Source Of Carbohydrates (Sugar) For Ants
Mealybugs Have Spread Over A Large Surface Area Of The Grapefruit
Tiny Encyrtid Wasps Begin Showing Up Parasitizing The Mealybugs
Mealybug Parasitic Wasp Introduced Into the U.S.

*Leptomastix dactylopii*
Introduced from Brazil

Can search out very small mealybug populations

Wasps can be purchased from biological control suppliers
Mealybug Destroyer Lady Bug
Larvae Show up After the Wasps

Lady bug species that specializes in mealybugs
Adult Mealybug Destroyer
Ladybug Also Feeds On Mealybugs

Introduced into U.S. to prey on mealybugs—eating what wasps missed
In the End, The Grapefruit Survived—Saved by Beneficials

It was not necessary to spray. Spraying would have killed beneficial insects. 100s or more wasps and ladybug beetles have reproduced to search for more mealy-bugs.
Lady Beetle Larvae Have Many Shapes and Forms
Plant Refuge for Natural Enemies

Adult insect predators need pollen; parasitoids need nectar

sweet alyssum

nasturtium

cilantro

dill
Last Resort… Chemical Control

- Try to use the least harmful first
- Products containing Bacillus thuringiensis (Bt) will control caterpillars and will not harm beneficial insects
- Soaps and oils (don’t use if weather is hot) for soft-bodied insects like aphids
- A few drops of mineral oil on new corn silks will kill corn earworm eggs
- Products containing spinosad
- Repellents, neem oil (botanicals)
B.t. products

- Bacillus thuringiensis
  - Bacteria are dead—a toxin in them paralyzes insect gut

- Sprayable or dusts for caterpillars

- Best if:
  - Target young larvae
  - Apply at 3-4 day intervals
  - Get thorough coverage (lot of water)
Smothering Agents

- Petroleum oil
- Soap (potassium salts of fatty acids)
Effect of Soap on Aphids

Clumps and overturns aphids, suffocating them in sticky masses.
By the way... you can start with a water spray (aphids)
Neem:
azadirachtin
& neem seed oil
(Several brands)
Spinosad: for caterpillars, some beetles, thrips

Some brands:
- GreenLight: Lawn & Garden Spray Spinosad Concentrate
- Monterey: Garden Insect Spray
- Gardens Alive: Bulls-Eye Bioinsecticide
Repellents from plants: 

- capsaicin
- garlic
Chemical Controls

- Broad spectrum pesticides will kill good insects as well as pests, so use only if necessary.
- Pyrethrins and pyrethroids act quickly
- Pyrethrins alone not very effective
- Carbaryl
- Malathion
Pyrethrins + PBO*

*PBO= piperonyl butoxide (a synergist)
Iron Phosphate: Slug bait

Courtesy of Celeste Welty, OSU
Use Pesticides Safely

- Read the label completely
- Follow safety requirements
- Use only pesticides labeled for home vegetable gardens--some are for specific vegetables
- Pay attention to pre-harvest intervals--how long to wait after treatment before harvesting
- Keep pets and children away from treated areas
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