Managing Pests in the Vegetable Garden

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What you will learn:

• The definition of IPM
• How to scout for pests
• How to identify harmful insects, signs of diseases, and some common weeds
• How to spot beneficial organisms
• Some environmentally-friendly methods of control
Integrated Pest Management

- Providing proper cultural practices
- Choosing plants resistant to pests
- Scouting/Identifying/Monitoring
- Asking the right questions
- Choosing a method of control
- Protecting beneficial organisms and the environment
Scouting

• Observe vegetable plants regularly
  – Look at both tops and undersides of leaves and at soil line
  – You may need a hand lens
  – Do you see insects, signs of insects or disease?
Scouting

• Look for damage to plant:
  – Distorted new growth
  – Yellow stippling on leaves
  – Webs around leaves
  – Notched or chewed leaves
  – Black sooty mold
  – Rotting roots
Identifying

• Is damage due to insect pest, disease, or cultural practices?
• If you see insects, are they harmful, helpful, or harmless?
• If the insects are harmful, do you see evidence of beneficial insects also?
Monitoring

• Check to see if population is getting larger or problem getting worse
• Check for beneficial organism activity
• Have a pest tolerance level
  – Only act when level of infestation reached
  – Only treat affected areas or plants
  – Monitor results
  – Re-treat as needed
Insects with Piercing, Sucking Mouthparts

- Aphids
- Whiteflies
- True bugs
- Spider mites
Aphids

- Found on new plant growth and/or flowers
- Damage: leaf curling or puckering, deformed flowers
- Other signs: sooty mold & ants

To control a heavy population:
- Sharp spray from hose
- Beneficial insects
- Insecticidal Soaps
- Horticultural oil
Whiteflies

- Vector for many diseases
- Found on undersides of leaves
  - Adults look like white gnats
  - Larvae stationary on leaves
- Leaves look pale or spotted
- Sooty mold present

Control:
- Beneficial Insects
- Yellow sticky cards
- Horticultural oil
- Insecticidal soap
True Bugs

Leaf-footed bug, Squash bug, Stink Bug
- Hide under leaves near base
- Suck juices from leaves & fruit

Control:
- Insecticidal soap
- Neem oil
- Pyrethrum
- Spinosad
Spider mites

- Relatives of spiders – eight legs
- Found on lower leaf surfaces and fruits
- Webs sometimes present
- Feeding causes stippling on leaf surface

Control:
- Sharp spray from hose
- Beneficial insects
- Horticultural oil
- Insecticidal soap
- Chemical miticides
Thrips

- Tiny - smaller than 2mm
- Found on petals, other flower structures, fruit
- Feeding causes silvering on leaf surface, leaf distortion

Control:
- Beneficial insects
- Neem oil
- Spinosad

A pepper fruit with ‘flecking’ caused by feeding of thrips.

Adult chili thrips
Insects that Chew

- Caterpillars
- Weevils
- Beetles
- Leaf miners
Control of Chewers

Controlled best if very young

- Bt (Bacillus thuringiensis)
- Spinosad
- Beneficial insects
- Mechanical removal

*Remember – butterfly larvae are caterpillars. If you want butterflies, be careful where you use pesticides, including Bt.
Root Knot Nematodes

- Decline and thinning
- Roots may be brown, stunted and galled

Management

- Provide adequate water and fertilizer
- Crop rotation
- Soil solarization in Summer
Diseases

Requirements for disease to occur:

Abiotic Disorders – Not Disease

- Cold or heat stress
- Nutritional, usually deficiencies
- Air pollution
- Mechanical damage
- Excessive rainfall or irrigation
- Drought
Biotic Disorders (Pathogens)

- Fungi
- Bacteria
- Phytoplasmas
- Viruses

85% of all plant diseases are caused by fungi

Bacterial decay

Bad odor
Fungi

Spread:
- Air movement, water splash and insects
- Infected seed and plants
- Contaminated soil and tools
- Man

Bacteria

Spread:
- Splashing water
- Insects
- Contaminated tools
- Man
Diseases of Vegetables

- Damping off Fungus
- Powdery mildew
- Early Blight
- Rust
- Blossom End Rot
- Tomato Yellow Leaf Curl Virus
- Late Blight
Points to Remember:

• Fungi cause more diseases than bacteria.
• Bacterial diseases are more difficult to control.
• Most fungal and bacterial diseases are promoted by high humidity.
• Viral diseases cannot be cured.
Weeds — plants with a people problem

- Common garden weeds:
  - Grass like weeds:
    - Common bermudagrass
    - Sedges – nutsedge
    - Crabgrass
Weeds

- Common garden weeds:
  - Broadleaved weeds:
    - Asiatic Hawksbeard
    - Chamberbitter
    - Carolina geranium
    - Yellow woodsorrel
    - Bittercress
Weeds

• Control strategies
  – Mulch
  – Weed barriers – layers of newspapers
  – Hand pulling is best in veggie gardens
Beneficial Organisms:

**Predators**
- Kill and eat harmful pests

**Parasites**
- Live in or on pests eventually causing death

**Beneficial diseases**
- Viruses, fungi and bacteria that naturally infect and kill insects.
Learn to Recognize the Helpers:

- Damselfly
- Brown lacewing
- Green lacewing
- Green lacewing eggs
- Assassin bug nymph
- Assassin bug adult
- Predaceous mite
Learn to Recognize the Helpers:

- Earwig
- Parasitic wasp pupa
- Lacewing larva
- Minute pirate bug
- Paper wasp
- Dragonfly
- Syrphid fly
- Syrphid fly larva
More of the Good Guys

Lady beetle

Lady beetle larva

Lady beetle larva

Sevenspotted lady beetle

Twice stabbed lady beetle

Lady beetle pupa

Lady beetle with eggs
Conserve Beneficial Insects

• Learn the difference between pests and beneficials
• Grow a diverse garden!
• Grow flowering plants that provide nectar
• Let a few plants with aphids survive, be tolerant of small pest populations
• Consider “neglecting” a small corner of the garden to provide some pests for beneficials
• Minimize Chemical Sprays - use least toxic methods like soaps and oils and target or spot treat applications if necessary
Invite Beneficial Insects

• How? Grow plants that provide protein (pollen) and carbohydrates (nectar) (called insectary plants)

• Beneficials feed on insectary plants when pest insects are in short supply

• Some adult beneficials feed on only nectar and pollen and their larvae feed on pests
What do Beneficials Want?

- Most beneficials are small with short mouthparts
- Shallow flowers with nice landing platform, and exposed nectaries
- Flat-topped umbrella-shaped flowers: dill, fennel, parsley, coriander
- Daisylke flowers in composite family
Flowers That Attract Beneficial Insects

- Anise hyssop (*Agastche foeniculum*)
- Coriander (*Coriandrum sativum*)
- Coreopsis (annuals and perennials)
- Cosmos (annuals and perennials)
- Fennel, Dill (*Foeniculum vulgare*)
- Golden marguerite (*Anthemis tinctoria*)*
- Lavender
- Sweet alyssum
- Yarrow (*Achillea millefolium*)

*Attracted all beneficial insect groups*
Help Maintain Beneficials by Tolerating a Few Plants That Harbor Aphids

Grow a crape myrtle tree. Crape myrtle aphids serve as food for 20-30 beneficial insects. The trees provide nectar and pollen to countless bees and other beneficials during drought periods.
Remember, in order to have beneficial insects ("good guys" like ladybugs), there must be some "bad guys" as food.
“When we kill off the natural enemies of a pest, we inherit their work”

-Carl Huffaker
Change Your Attitude About Bugs

• Next time you see a leaf that’s been munched, take pride in the fact that you are providing habitat for another creature.

• Stop- don’t spray, start studying!

• Get a hand lens that will help introduce you to life in your landscape
Summary

• Many insects inhabit gardens
• Scouting helps catch pests early
• Proper conditions must exist for disease development
• Fungal and Bacterial diseases are favored by high humidity
• Weeds can be a problem
• Protecting beneficial insects is important or we inherit their job
Resources...

Pinellas County Extension
http://pinellascounty.org/extension
- Horticulture Help Desk
  Mon. – Fri. from 8a.m. – 5p.m.
- Horticulture Help Phone Line – call 582-2110
  Mon., Tue. & Thur. From 9a.m.- 12N. & 1 – 4 p.m.

University of Florida
- UF/IFAS Publications http://edis.ifas.ufl.edu
- Featured Creatures http://creatures.ifas.ufl.edu
QUESTIONS?
Credits

- Brown, P. *Managing Pests in Your Florida Vegetable Garden*. UF/IFAS Pinellas County Extension
- Buss, Lyle. Pictures, UF/IFAS
- Harris, V. *Only the Young Die Good*. UF/IFAS Pasco County Extension
- Park-Brown, S. and Buss, E. *Helpful, Harmful, or Harmless ID card Deck*. UF/IFAS
- Santana, F., PhD. *Beneficial Insects: The Importance of Conserving and Promoting Their Biodiversity*. UF/IFAS Sarasota County Extension
- Stephens, J. and Park-Brown, S. *Vegetable Gardening*. UF/IFAS
- Weissling, Thomas J. *Good Bug / Bad Bug*. UF/IFAS.