Using IPM to Combat Garden Insect Pest

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Integrated Pest Management(IPM)

IPM uses a combination of cultural, physical, biological, and chemical methods to reduce and/or manage pest populations. These strategies are used to minimize environmental risks, costs, and health hazards.

Regular Monitoring for Pests

"Don't wait for trouble"

- Check weekly for early stages
- Look on undersides of leaves and in buds
- Take notes, record keeping
- Look for plants doing poorly

Identify the Problem

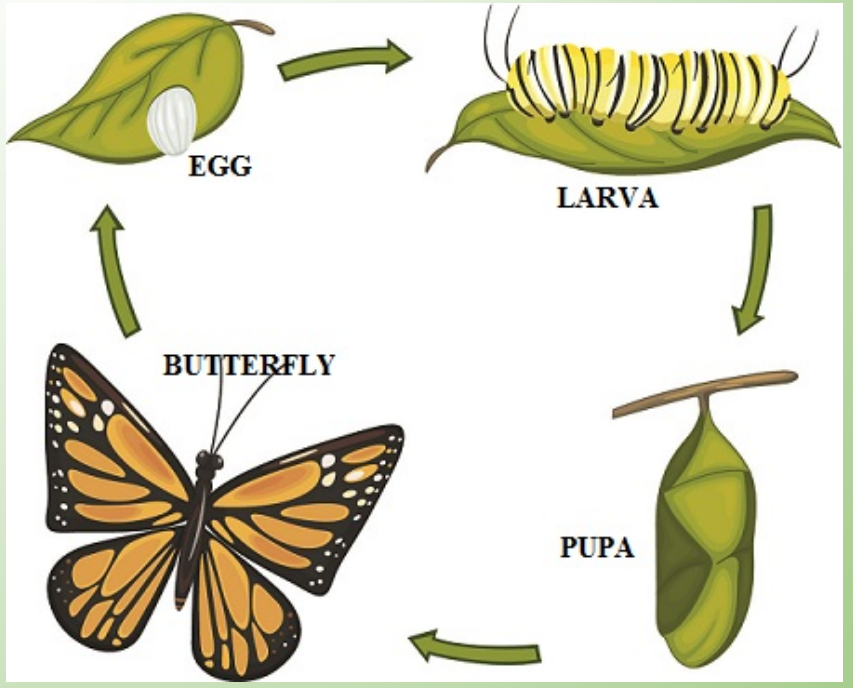
- Most problems are due to non-biological issues (water, temperature, soil, nutrients)
- Find the pest or signs associated with it
- Correctly ID the pest
- Learn about its life cycle
  - When can it be controlled?

Spined Soldier Bug

Brown Marmorated Stink Bug

Life Cycles

- Complete Metamorphosis
- Gradual Metamorphosis



Egg

Nymph

Adult

Mouth parts

- Piercing-sucking
- Chewing

Hornworm

Harlequin Bug

Squash Bug

Cucumber Beetle

Why are they so successful??

- Short life cycles
- Wings
- Small-few resources
- High reproductive rate
- Metamorphosis- Selective eaters

Brown Marmorated Stink Bug Nymphs

When does a pest become a problem?

- Know your tolerance level
  - Time, energy, and money you can spend?
- Know the tolerance level of plants
  - Defoliation vs. tunneling
  - Age of the plant


Cabbage aphids


Cabbage aphids

Develop a Integrated Pest Management Plan

- Cultural controls
  - Preventative
- Physical Controls
- Biological Controls
- Chemical Controls

Lady beetle and spine soldier bug

Cultural Methods

- Proper plant selection for the site
- See if there are *resistant* or *tolerant* plants
  - Resistant, pests don’t do well on these
  - Tolerant, damage doesn’t hurt appearance or yield
- Start with healthy transplants
- Keep plants healthy
  - Fertilizing
  - Water

Cultural Methods

Sanitation

- Remove crop residues after harvest
- Remove galls and other hiding places for pests
- Remove dead limbs and wood
- Remove heavily diseased or infested plants
- Keep garden weed free
- Eliminate hiding places
- Clean your tools regularly

Cultural Methods

Rotating Plants

- Switch plant families
- Crop rotation
- Helps with soil-borne diseases
- Insects that overwinter as immatures in the soil

Plant family*	Representative members
Apiaceae	Carrot, celery, fennel, parsley, parsnip
Asteraceae	Chicory, endive, globe artichoke, lettuce
Brassicaceae	Bok choy, broccoli, Brussels sprout, cabbage, cauli-flower, collard, kale, kohlrabi, mustard, radish, rutabaga, turnip
Chenopodiaceae	Beet, spinach, Swiss chard
Cucurbitaceae	Cucumber, melon, pumpkin, squash
Fabaceae	Bean, pea, vetch
Liliaceae (Alliums)	Chive, garlic, leek, onion, shallot
Solanaceae	Eggplant, pepper, potato, tomatillo, tomato

Cultural Methods

Planting Dates

- Very early or late planting can predispose plants to certain problems

Cultural Methods

- Trap crops
- Companion plants

Trap cropping

Physical Methods

Exclusion

- Row covers
- Fruit bagging
- Netting
- Cardboard collars
- Diatomaceous earth
- Sticky Materials

Physical Methods

Hand Removal

- Hand picking
- Weeding
- Knock into soapy water
- Pruning galls, diseased tissue

Physical Methods

Spraying with water

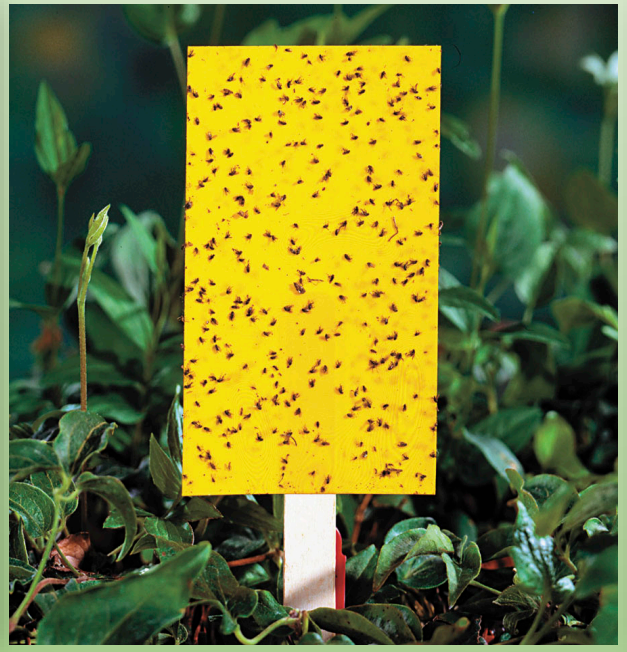
- Helpful with soft bodied insects
- Aphids, mites, lace bugs, spittlebugs

Physical Methods

Trapping

- Used for monitoring

Apple maggot trap



Yellow sticky card trap

Stink bug trap

Japanese beetle trap

Physical Methods

Pheromone Trapping

- Use to monitor pests
- Codling moth, dogwood borer, corn earworm, grape root borer, peach tree borer, etc


Grape root borer - calling


Codling moth trap

Biological Methods

Natural enemies of pests

- Predators – consume many pests
  - Usually generalists
- Parasitoids – live on or in one pest
  - Usually specialized
- Natural enemies slow the development of pest populations

Paper Wasp

Predators

- Usually generalists, don’t specialize
- All stages feed on prey
- Kill or eat many prey
- Effectiveness varies


Green Lacewing

Flower Fly


Wheel Bug

Parasitoids

- Usually specialists - smaller than prey
- Females search and lay eggs on or in
- Kill one prey
- Life stage specific - egg, larva, etc.
- Effectiveness varies

Parasitic Fly

Parasitic Wasp

Releasing Natural Enemies

Convergent lady beetle

Some work … Some don’t

Green lacewing eggs

Eretmocerus eremicus

Praying Mantid eggs

Releasing Natural Enemies

- Wasps
- Parasitic Nematodes
- Lady beetles
- Predaceous mites
- Lacewings
- Big-eyed bug
- Minute pirate bugs

Chemical Methods

Select materials that are…

- Less harmful to the environment
- Least toxic to the applicator
- Specific to the pest
- Least harmful to beneficial organisms

Chemical Methods

Soft Materials

- Insecticidal soap
- Horticultural oils
- Botanical insecticides

Some things to remember….

- Know the insect before you spray!
- Monitor your landscape
  - SCOUT! A certain amount of damage can be done before yields are reduced
- Know your spray before you use it
  - What insects does the spray effect? When is the correct time to use?
- Do not spray preventatively

Some things to remember……

- Spot treat instead spraying everything
- Avoid broad spectrum contact insecticides
  - Will kill not only targeted insect but also surrounding insects
  - Choose insecticides that are selective and not broad spectrum
    - Bt or soaps
- Try spraying in the early morning or evening when bees and other pollinators are less active!

Resources

- Home Vegetable Gardening in Kentucky ID-128
- Kentucky IPM Manuals https://ipm.ca.uky.edu/manuals
- Vendors of Microbial and Botanical Insecticides and Insect Monitoring Devices https://entomology.ca.uky.edu/ef124
- Integrated Pest Management https://entomology.ca.uky.edu/files/ent69.pdf
- Beneficial Insects https://entomology.ca.uky.edu/categories/beneficial-insects

Questions?