







IPM: Basics of Integrated Pest Management

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Learning Objectives

- Pests & concept of IPM
- Scouting for pest problems
- Georgia Pest Control Handbook
- Pesticide formulations
- Pesticide label & Signal words
- Pesticide failure
- Safely storing pesticides
- Natural controls, their benefits and limitations

Components of IPM

- Pest Identification
- Monitoring
- Control Guidelines
- Methods of Prevention and Control

A Pest...

- **Competes** with humans, domestic animals, or desirable plants **for food or water**
- **Injures** humans, animals, desirable plants, structures, or possessions
- **Spreads disease** to humans, domestic animals wildlife, or desirable plants
- **Annoys** humans or domestic animals

Types of Pests

- Insects
- Insect-like organisms
- Microbial organisms
- Weeds,
- Mollusks
- Vertebrates

Categories of pests

- Continuous pests
- Sporadic, migratory, or cyclical pests
- Potential pests

Things to know about pests

- Physical features
- Damage caused
- Development & biology
- Continuous, sporadic, or potential pests
- Control goal

Do you need to control the pest?

Causing or expected to harm?
-more than acceptable level?



Aphids on Chrysanthemum

Pest Control Goals

1. **Prevention** — keeping a pest from becoming a problem
2. **Suppression** — reducing pest numbers or damage to an acceptable level
3. **Eradication** — destroying an entire pest population

Regular Observation



Scouting - Pest Monitoring

- What kinds of pests?
- How many?
- When is the right time to control?
- Have controls reduced numbers of pests?

Monitoring a Landscape

- Know your plants
- Frequent inspection
- Observe general appearance
- Slowly scan plant
- Identify what you find
- Decide what's acceptable
- Select management method
- Evaluate
- Keep record

Tools for pest monitoring

- Notebook
- Sticky traps
- Hand lens 10x or better
- White paper on clipboard
- Tweezers
- Sample jar
- Reference books

Steps in Pest Monitoring

- Identify the pest.
- Identify the current stage in life cycle.
- Note the location
- Determine the number of insects, weeds or disease infected plants
- Inventory the environment surrounding the pest
- Identify Key Hosts
- Identify existing damage from the pest.
- Keep accurate records of findings and controls

Solving pest problems

- Identify the pest or pests and determine whether control is warranted for each
- Determine pest control goal
- Know what control tactics are available
- Evaluate the benefits and risks
- Choose most effective and least harmful strategy
- Use each tactic in the strategy correctly
- Observe local, state, and federal regulations
- Keep a record

Natural controls

- Climate
- Natural enemies
- Geographic barriers
- Food & water
- Shelter

Applied Controls:

1. Host resistance
2. Cultural control
3. Mechanical control
4. Sanitation
5. Chemical control
6. Biological control

1. Host Resistance

- Host prevents pest from completing life cycle
- Host is more vigorous or tolerant
- Host is more difficult to attack

2. Cultural Control

Prevent or suppress an infestation by:

- Altering the environment
- Altering the condition of the host plant
- Altering the behavior of the pest

Cultural practices

- Crop rotation
- Cultivating soil
- Varying time of planting or harvesting
- Planting trap crops
- Adjusting row width
- Pruning, thinning, & fertilizing plants

3. Mechanical (physical) control

- Traps, screens, barriers, fences, nets
- Lights, heat, refrigeration

4. Sanitation

- Remove crop residues
- Use mulches
- Clean seeds & transplants
- Decontaminate equipment

5. Chemical control

Pesticides are **chemicals** used to destroy pests, control their activity, or prevent them from causing damage.

6. Biological control

- Parasites
- Predators
- Pathogens



Green lacewing

UGA1222004

Eddie McGriff, The University of Georgia,
www.insectimages.org

Pest Control Failures

Pest Resistance

Pesticide rarely kills 100% of the target pests

- Most susceptible killed
- Survivors avoid or adapt- may pass along traits to offspring
- Over time, resistance may increase

Other Reasons for Failure

- Incorrect dose
- Incorrect application
- Pest not correctly identified
- Wrong time
- Infestation may have developed later

The University of Georgia
Cooperative Extension Service
College of Agricultural and Environmental Sciences

2005 Georgia
Pest Management
Handbook

Homeowner
Edition

Copies are available at \$15.00 each. Please make check or money order payable to the UNIVERSITY OF GEORGIA and send to:
Agricultural Business Office
Room 215 - Center Hall
The University of Georgia
Athens, GA 30602

Name: _____
Address: _____
(Send a street address - UPS will not deliver to Post Office Box)
City: _____ State: _____ Zip: _____

Georgia Pest Management Handbook

INTRODUCTION TO PESTICIDES

Grouping Pesticides Based on the Source

- Inorganic
- Organic-natural
- Organic- synthetic
- Microbial

Grouping Pesticides Based on Activity

- Protectants
- Contact poisons
- Stomach poisons
- Systemic
- Translocated
- Selective
- Nonselective
- Fumigants

Grouping Pesticides Based on Timing

- Preplant
- Preemergence
- Postemergence

When and Where to Apply Pesticides

- Follow label directions
- Don't exceed label rate
- Use at correct stage
- Treat only intended target
- Treat correct area
- Don't treat in adverse weather

Factors that Affect Pesticide Activity

- Problem correctly identified?
- Appropriate pesticide used?
- Applied properly?
- Right place?
- Right time?
- Conditions right?

Ingredients

- Active ingredients
- Inert ingredients

Liquid Formulations

- EC Emulsifiable concentrate
 - Mixes well
 - Less safe
- RTU Ready to Use
 - No mixing or measuring
 - More expensive

Dry Formulations

- D** Dusts
- G** Granular
- WP** Wettable Powder
- B** Baits

The image shows a pesticide label for 'DEADBUG Garden Insect Killer Spray'. The label includes the following text: 'DEADBUG Garden Insect Killer Spray', 'KILLS: Aphids, Beetles, Caterpillars on Flowers & Ornamentals', 'ACTIVE INGREDIENTS *ALYUITIUYN.....1 0%', 'INERT INGREDIENTS N267Becfmog Dionate90%', 'EPA Registration Number XXX-XXX', 'D-Binc NET CONTENTS 16 fl oz.', 'Keep out of reach of children', and 'Caution See back panel for additional precautionary statements'. Callout letters A, B, C, and D point to the product name, active ingredients, inert ingredients, and the caution statement, respectively.

(D) Signal words

- DANGER-POISON (can kill)
- DANGER (eye & skin damage)
- WARNING (may cause severe injury)
- CAUTION (low toxicity. Exposure is much less likely to cause injury)

E Garden Insect Killer Spray

F PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS- CAUTION Harmful if swallowed. Might cause allergic reactions...

G STATEMENT OF PRACTICAL TREATMENT -If swallowed: drink promptly a large quantity of water...

ENVIRONMENTAL HAZARDS - This product is harmful to fish and waterfowl...


PHYSICAL OR CHEMICAL HAZARDS - Do not use or store near open flame...

DIRECTIONS FOR USE -It is a violation of Federal Law to use this producer in a manner inconsistent with its labeling.

H FOR OUTDOOR USE ONLY - Shake Well before each use. Apply to leaf surfaces. Spray until surfaces are wet.

FOR USE ON -Roses, flowers, ornamentals...Do not use on garden vegetables or other food crops.

KILLS - Aphids, beetles, caterpillars...

STORAGE AND DISPOSAL
 STORAGE-Keep product in its original container
 EPA Registration Number XXX-XXX  Distributed by Dead-Bug, Inc.

(H) Pesticide Directions for Use

- Where it may be used
- How much may be used
- How often it may be applied
- Other restrictions
- Pests that it will control
- Storage and disposal

Application Equipment

Sprayers



Dusters



Granular Applicators



Pesticide Toxicity

- Acute toxicity - single or short term
- Chronic toxicity - repeated or long term



Pesticides are most dangerous as concentrates. Be especially careful when measuring and mixing pesticides.

USING PESTICIDES SAFELY

Routes of Exposure

- **Skin**
- **Swallowing**
- **Inhaling**
- **Eye injury**



NEVER store any pesticide in a food or drink container

First Aid for Pesticide Exposure

- **Skin** - Rinse the exposed area with clean water.
- **Swallowed** - Consult the pesticide label and call Poison Control **1-800-222-1222** immediately.
- **Inhaled** - Move the victim to fresh air.
- **In eyes** - Rinse with clean water for at least 15 minutes

Protecting the Body from Pesticides

- Wear Protective Clothing
 - **Gloves**
 - **Boots**
 - **Other** -prescribed by label
- Shower
- Launder clothing separately

Pesticide Spills

- Dry Spills
 - Scoop up
- Liquid Spills
 - **DO NOT HOSE DOWN**
 - Absorbent material (kitty litter)-
dispose
 - Remove contaminated soil-dispose



Pesticide Disposal

- Buy only needed amount
- Mix only what you need
- Share excess
- Fill leak proof container with kitty litter and dispose
 - Rinse empty bottles
 - Discard clean bottles in household trash
- Collection days

Beneficial Insects



Parasites, Parasitoids
and Predators



Parasites & Parasitoids

Parasite - organism that lives in or on the body of the host during some part of the parasite's life cycle.

Parasitoid - a special kind of parasite that may consume all or part of the host's tissues, eventually resulting in the host's death.

Predator

- Insect, mite or spider that attacks and feeds on its prey
- Usually larger than prey
- kills and consumes several prey during its lifetime

Key Beneficial Insects

- | | |
|--------------------------|-------------------------|
| • Lady beetles | • Minute pirate bugs |
| • Ground beetles | • Predaceous plant bugs |
| • Tiger beetles | • Assassin bugs |
| • Rove beetles | • Big-eyed bugs |
| • Syrphid flies | • Green lacewings |
| • Long-legged flies | • Brown lacewings |
| • Robber flies | • Parasitic wasps |
| • Spined soldier bugs | • Parasitic flies |
| • Predaceous damsel bugs | |

Predatory beetles



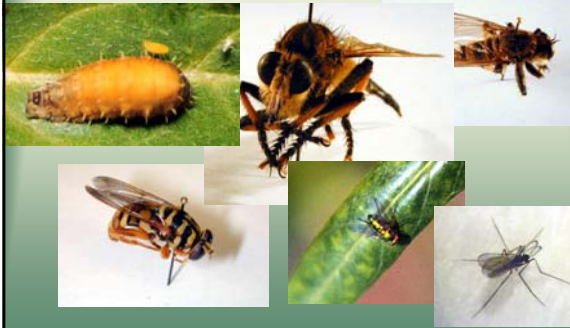
Predators in the "True Bug" group



Earwigs



Predatory flies



Spiders and mites



Thrips



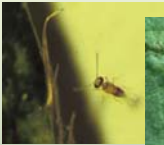
Lacewings



Praying mantids



Parasitic wasps and flies



Increase Natural Enemy Populations

- Judicious selection and use of pesticides
- Design landscapes to feature a variety of plant material



Managing Naturally Occurring Parasites and Predators

- Choose selective rather than broad-spectrum insecticides
 - **May be slower, but long term control is better achieved by using methods that conserve natural enemies**
- Monitor for beneficial arthropods as you would for pest insects
 - **If ratio of pests to natural enemies is low, then spraying can be delayed**

Questions
