IPM
Fun with Insects, Weeds and the Environment

Lesson #2
Insect IPM

The New York State
Integrated Pest Management Program

Learn how you can use the 6 steps of integrated pest management to help protect the environment.

www.nysipm.cornell.edu
What makes an insect an insect?

6 jointed legs, and 3 major body regions

Is this true in all parts of the life cycle? no
What about a caterpillar?

Yes, a caterpillar is an insect. You may have trouble seeing its six jointed legs, but they are there!

Insects have three or four stages in their life cycle. Metamorphosis means changes. Some insects have a complete metamorphosis and some have an incomplete metamorphosis.

**Complete** - four stages: egg, larva, pupa and adult

**Incomplete** - three stages: egg, nymph and adult

Review the body parts of an insect by studying this illustration of a grasshopper.

Examples of metamorphosis-
Complete (4 stages): beetles, butterflies, flies, ants, lacewings
Incomplete (3 stages): dragonflies, earwigs, grasshoppers, ‘true’ bugs, aphids
Is it an insect or not?
Practice identifying insects by completing this chart. We’ve done two for you.

<table>
<thead>
<tr>
<th></th>
<th>Six jointed legs?</th>
<th>Three main body regions?</th>
<th>So, is it an insect?</th>
</tr>
</thead>
<tbody>
<tr>
<td>butterfly</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>ant</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>spider</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>tick</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>millipede</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>grasshopper</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>centipede</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>
Now, you can use your experience with a simple key to see how an insect key helps identify an unknown insect.

First, examine the insect:

**Does it have wings?**
___ No -- Use Wingless Insect Key
___ Yes -- go to the Winged Insect Key

To see the features of an insect’s anatomy, you will generally need magnification.

**If the insect is winged, does it have one or two sets of wings?**

Continue using the key, making a choice at each ‘step’.

![Diagram of insect key]

- **Wingless Insects**
- **Mouth Parts for Sucking**
  - Live on birds or mammals
    - Body vertically thin
    - Siphonaptera
      - Fleas
    - Body horizontally flat
    - Anoplura
      - Lice
    - Small to minute insects. Body oval or round
  - Live on plants
    - Waxy or shell-like cover over body
    - Homoptera
      - Scales
    - Soft body; longs legs and antennae
    - Homoptera
      - Aphids
- **Mouth Parts for Chewing**
  - Live on birds or mammals
    - Mallophaga
      - Lice
  - Live on plants or free living
    - Have appendages on abdomen
      - Thysanura
        - Silverfish
    - No appendages on abdomen
      - Collembola
        - Springtails
  - 2–3 thread-like tails
  - Forked tail folded beneath abdomen—used for jumping. Minute insect
Winged insects have one or two pair of wings. The scientific name for the order of flies is diptera. (pronounced DIP ter ra). All insects with only one pair of wings are flies.

di - means two
ptera - means winged.

If a dragonfly actually has four wings, is it really a fly?  no
Here are some magnified photos of a common insect with a complete metamorphosis (four staged life cycle).

**What are the four stages of a beetle life cycle?**

Adult Japanese beetles are a common pest of many ornamental and crop plants in the United States. Females lay their eggs in the soil. Later, eggs hatch into larvae called grubs. Grubs feed on the roots of plants, especially grass and can cause damage in lawns and sports turf.

- **Eggs** (left) and **newly hatched grubs** (right)
- **Larva** (commonly called a grub)
- **Pupa**
- **Adult beetle**

Egg --> larva --> pupa --> adult
Step #3 Sample the environment -

*IPM suggestion: Don’t treat for grubs unless you are sure they are causing damage!*

You can reduce lawn damage by locating high grub populations before they cause damage if you examine samples of lawn soil. This sampling is referred to as **SCOUTING**.

When to sample: Seek out grubs in early August. Sampling early in a grub's life cycle means that you'll catch grubs while they are small and less capable of seriously damaging your lawn.

Where to sample: Begin by sketching a simple map of your property. Mark some areas with X's. These will be your sampling sites. Grab a hose or container of water, a piece of cardboard, and a shovel. Go to one of the sampling sites marked on your map and start **SAMPLING**.

To determine how many grubs you have in your lawn you can use a flat spade to cut back a sample of turf. Peel the turf back like a piece of carpet. Examine the contents on the cardboard. Count the grubs in the top 3 inches of soil. Replace the turf, firm it down and water well.

**Don’t worry, this activity will not injure the turf unless it is extremely dry or you do not water it well after. Slice under the soil at a sharp angle with a shovel. You may also be able to borrow a ‘cup-cutter’ from a golf course. Better yet, ask for a professional volunteer from that golf course!**
The THRESHOLD for treatment of grubs is usually given as a number of grubs found per square foot. If you take a 6” X 6” sample (1/4 of a square foot), you would have to multiply that by four to get the average number of grubs in a square foot. Take multiple samples throughout the lawn area to determine which areas may need treatment.

If you find 1 grub in a 6” by 6” area, how many, would you estimate, are in a square foot? ____________________

Thresholds for common grubs in New York are 8-12 grubs per square foot.

If you find 2-3 grubs in a 6” x 6” area, is the grub population “over threshold”? Yes (this estimates there would be 8 - 12 grubs in a square foot. Before any action is taken, it is best to sample multiple areas in the lawn.

* When pest numbers are below threshold, they are not likely to cause damage. When they are over threshold, they could cause damage. Each pest situation may have a different threshold.
Are ants pests?

Ants perform an important function in our soils. They help break down organic matter which in turn improves the soil. (Organic means something is living or once was living). So, ants are a beneficial insect.

On the other hand, we can tolerate a few ants at a picnic, but no one likes it when they enter our homes, schools or offices.

Ants are closely related to wasps and bees. They all live in colonies with a queen, female workers and a few males.

Workers are the ants you are most likely to see because one of their jobs is to find food for the queen and her larvae.
IPM step #5 is “Choose Tactics.” Tactics are the actions we take to accomplish something. One of the tactics is sanitation.

**From the drawings on this page, what do you think sanitation means?**

_________________________________________________________________________

Pests that enter our homes are often looking for shelter, water or food.

When an ant worker finds a source of food and returns to the nest, other ants will follow a scent trail and soon you will have an ‘ant problem’. To reduce the numbers, clean up all sources of food, even crumbs, and keep floors, counters and other areas clean. Washing counters helps remove the ‘scent trail’ ants follow.

Another tactic of IPM is the use of pesticides. In the case of ants in the house, it is sometimes necessary to use an insecticide bait made to attract ants and the ants carry the insecticide back to the colony.

You can usually reduce or eliminate an ant problem this way. But if sanitation is not kept up, ants may return again. **How does sanitation help to reduce the number of ants coming into your home or school?**

_________________________________________________________________________

_________________________________________________________________________

The number one AND LEAST TOXIC way to prevent or reduce ants in your classroom is to leave no food crumbs, scraps or spills. Good Sanitation is the key!
Ants have an important role in healthy soil but may become pests when they enter buildings. Worker ants leave the colony to find food for the queen’s young. Once a source is found, a scent trail is established for other ants to follow. If you see ants indoors, make a map of where they are moving to and from. If you can locate where they are entering the building, have an adult seal the opening. Cleaning up all food particles and debris from an area is the best way to prevent an ant problem, as well as a good way to end it. Wash all surfaces with soapy water to remove scent trails. Do not leave any food in the classroom that is not sealed in air tight containers. Empty wastebaskets, wash off counters and desks to remove food debris. If necessary, adults may consider using ant baits to stop the ant problem. Ants respond to different types of baits, so be patient. Practicing good sanitation is a very important pest management tactic.

Ant IPM Word Search

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