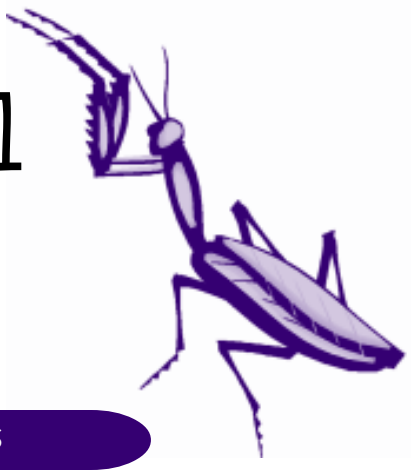
#11 Classroom Activity Grades 4-6

Biological Control



Overview

Biological control is a method of managing pests by using natural enemies. In this lesson students learn about three groups of natural enemies of pests and how they can be used in an IPM program.

Objectives

Students will:

- learn about biological control and how it is used in IPM.
- see how food chains apply to biological control.
- recognize three groups of biological control agents.

Materials

video: *Biological Control: Learning to Live with the Natural Order* (see the next page for information on ordering your free copy), TV and VCR, slide show or pictures at http://www.pested.msu.edu), worksheet

Duration

1 hour

Subjects

science

Background

Biological control is an important control method that can be used in an IPM program. Biological control is a method of managing pests by using natural enemies. This lesson focusses on natural enemies of insect pests. Natural enemies can also be used for controlling weeds and other pests. (For excellent classroom lessons on biological control of purple loosestrife, a serious weed in wetlands, see the classroom resource list on page 6.)

In IPM we can introduce natural enemies to a situation, or we can take steps to preserve the natural enemies that are already there. For example, as part of a cockroach IPM program, we may order tiny wasps that find cockroaches and inject their eggs into the cockroach eggs. As the wasps inside the eggs grow and eat, they will kill the cockroach eggs. For the second situation, one reason that we only use pesticides if they are absolutely necessary is that pesticides often kill the natural enemies that are already there. This is especially important in agriculture and landscapes. When we kill the natural enemies, we can make a pest situation much worse becausepest insects often reproduce and recover faster than the natural enemies.

Doing the Activity

Step 1: *Discussion.* Review the steps in IPM. Review the choices for control methods (refer to "What is IPM" student handout from lesson #3 or bulletin board). Biological control is using natural enemies to manage or control pests. Ask: *What are some ways that pests can be controlled by their natural enemies?*

a) they can be eaten-*predators*
b) they can have other insects living inside or on them- *parasites*

c) they can get a disease - *pathogens*

Step 2: *Taking Notes.* Complete the worksheet with the class. Ask the students for examples. You may wish to transfer the worksheet to transparency film, and complete the worksheet together using the overhead projector.

Step 3: *Show the Video*. The video (see end of this lesson for ordering information) sequentially describes the phases of a classical biological control program against a serious agricultural pest, the Russian wheat aphid. The video includes wonderful close-up footage of natural enemies in action provided by Walt Disney World Co.

Closure/Assessment: Test students' knowledge with a slide show (available in PowerPoint on our website: http://www.pested.msu.edu). Read the slide and have students record what they think each picture represents (predator, parasite, pathogen). Go over the answer before you move to the next slide. If you do not have the means to show the slideshow, read the descriptions to the class, show the pictures on page 66, or print out pictures from the above website.

Enrichment

Guest Speaker or Field Trip: Check to see if your county or city has a mosquito, gypsy moth, or purple loosestrife control program. These programs often have employees who visit classrooms. Biological control is a major part of many of these programs, and a guest speaker or field trip can provide real-world experience on these concepts to the students.

Biological Control pictures from the University of Nebraska, Department of Entomology
http://entomology.unl.edu/images/beneficials/beneficials.htm

Resources

USDA's National Biological Control Institute (NBCI)

Suggested free resources for students available from NBCI:

- *Biological Control: Learning to Live With the Natural Order* is a 25 minute videotape geared towards elementary, middle, and high school students.
- *Natural Enemies are Your Allies*- a color poster with great pictures of natural enemies of insects. University of California, Davis. 1990.

Web order form: http://www.aphis.usda.gov/ppq/nbci/nbcistor.html *or call* NBCI at (301)436-4329.

Other Resources

Weeden, C.R., Shelton, A.M., & Hoffman, M.P., *Biological Control: A Guide to Natural Enemies in North America*, Cornell University
http://www.nysaes.cornell.edu/ent/biocontrol/
-Great background information (geared to adults).

Jeffords, M.R. & Hodgins, A.S. 1995. *Pests Have Enemies Too: Teaching Young Scientists About Biological Control.* Illinois Natural History Survey, Champaign, IL, special publication 18.
-Excellent resource guide and lesson plans for middle school students on biological control. (for fee only) *To order:* call (217) 333-6880.

Supplemental Worksheets

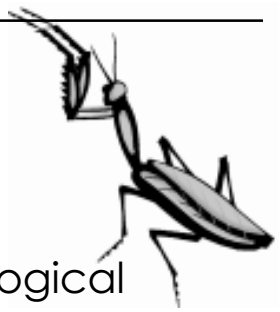
From Minnesota Department of Agriculture IPM Program, *Join Our Pest Patrol-A Backyard Activity Book for Kids- An Adventure in IPM*
http://www.mda.state.mn.us/IPM/IPMPubs.html

3. Fighting Pests with the Three Ps
   http://www.mda.state.mn.us/IPM/PestPatrol/FightingPestswith3Ps.pdf
14. Pests Have Enemies Too: Aphids and Ladybugs
   http://www.mda.state.mn.us/IPM/PestPatrol/PestshaveEnemies.pdf

Answers: http://www.mda.state.mn.us/IPM/PestPatrol/Answers.pdf

Name: _____ **Date:** _____

Biological Control



Biological control is the use of _____ _____ to manage or control pests. Biological control is one choice in the _____ step of IPM. Three types of biological control agents we use are _____ , _____ , and _____ .

Predators _____

List some predators and their prey.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Parasites _____

_____

List some examples of parasites.

_____ _____

_____ _____

Pathogens _____ . _____

List some types of pathogens (things that cause disease).

_____ _____

_____ _____

Name: _____ **Date:** _____

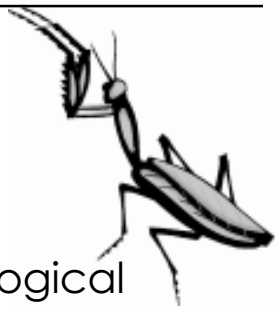
Predator, Parasite or Pathogen?

Watch the slide show and circle the type of natural enemy you think matches the slide.

1.	predator	parasite	pathogen
2.	predator	parasite	pathogen
3.	predator	parasite	pathogen
4.	predator	parasite	pathogen
5.	predator	parasite	pathogen
6.	predator	parasite	pathogen
7.	predator	parasite	pathogen
8.	predator	parasite	pathogen
9.	predator	parasite	pathogen
10.	predator	parasite	pathogen
11.	predator	parasite	pathogen
12.	predator	parasite	pathogen

Name: KEY **Date:** _____

Biological Control



Biological control is the use of natural enemies to manage or control pests. Biological control is one choice in the choosing control methods step of IPM. Three types of biological control agents we use are predators, parasites, and pathogens.

Predators hunt and kill other animals for food.

List some predators and their prey.

owl/mice	fox/rabbits
cat/mice	eagle/mice
ladybug/aphids	dragonfly/insects
frog/flies	snake/mice
bat/mosquitoes	praying mantis/insects
spider/insects	lion/antelope

Parasites live on or inside other animals and may kill them as they grow.

List some examples of parasites.

a wasp lays eggs in a larva	a fly lays eggs in a bug adult
a wasp lays eggs in a cockroach	a wasp lays eggs in eggs

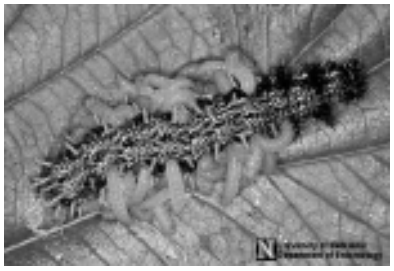
Pathogens cause diseases inside animals.

List some types of pathogens (things that cause disease).

bacteria	virus
fungus	nematodes (tiny worms)

Predator, Parasite or Pathogen?

1. Wasp larvae coming out of a caterpillar



2. Long-legged fly with a captured leafhopper

3. Wasps coming out of aphid bodies

4. Wasp pupae on a caterpillar

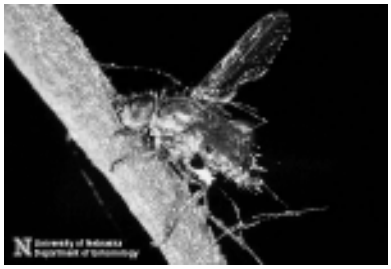
5. Rove beetles eating a maggot

6. The bottom caterpillar is infected with a virus.

7. Caterpillars infected with a fungus

8. A wasp injects eggs into a plant bug nymph.

9. A fly infected with a fungus



10. Scorpion eating a cricket

11. The grub on the right is infected with a bacteria.

12. A spider eating a captured insect

1. parasite, 2. predator, 3. parasite, 4. parasite, 5. predator, 6. pathogen, 7. pathogen, 8. parasite, 9. pathogen, 10. predator, 11. pathogen, 12. predator