

Course	Agricultural Science II
Unit	Entomology
Lesson	Methods of Control
Estimated Time	50 minutes
Student Outcome	

Describe methods of pest control.

Learning Objectives

1. Identify the different pest control methods.
2. Identify the advantages and limitations of biological control methods.
3. Identify the advantages and limitations of cultural control methods.
4. Identify the advantages and limitations of physical and mechanical control methods.
5. Identify the advantages and limitations of chemical control methods.

Grade Level Expectations

SC/LO/3/B/09-11/d	SC/LO/3/B/09-11/e	SC/LO/3/D/09-11/b
SC/EC/1/A/09-11/a	SC/EC/1/A/09-11/b	SC/EC/1/B/09-11/a
SC/EC/1/B/09-11/b	SC/EC/1/C/09-11/b	SC/EC/1/D/09-11/b
SC/EC/3/B/09-11/a	SC/EC/3/C/09-11/b	SC/ST/1/B/09-11/a
SC/ST/1/C/09-11/a	SC/ST/3/B/09-11/a	SC/ST/3/B/09-11/b
SC/ST/3/B/09-11/c	SC/ST/3/D/09-11/a	

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. *Entomology* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1991.
2. *Entomology Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplemental Information

1. Internet Sites
 - ☐ Natural Insect Control. Golden Harvest Organics, LLC. Accessed December 7, 2007, from <http://www.ghorganics.com/page9.html>.
 - ☐ Entomology Answers. University of Missouri Extension. Accessed December 7, 2007, from <http://extension.missouri.edu/explore/qa/entomology0006.htm>.

Interest Approach

Demonstrate the effect and efficiency of the different types of pest control. Show why insect control is necessary. Ask the class to identify various ways to control or kill the common housefly. List answers on the board. Possible answers may include: hitting with hand (cultural control), hitting with fly-swatter (mechanical control), hanging a no-pest strip (mechanical control), screen doors and windows (mechanical control, barrier), spiders as predators (biological control), household insecticide spray (chemical control), and outdoor light zappers (mechanical). Identify the form of pest control demonstrated by each answer. Discuss the risks and benefits of each method. Discuss how the various methods can be combined and when one might consider each type of method.

This lesson will enable students to complete question 11, Methods of Control, on their Insect Fact Sheet (AS 1, Lesson 3).

Communicate the Learning Objectives

1. Identify the different pest control methods.
2. Identify the advantages and limitations of biological control methods.
3. Identify the advantages and limitations of cultural control methods.
4. Identify the advantages and limitations of physical and mechanical control methods.
5. Identify the advantages and limitations of chemical control methods.

Instructor Directions	Content Outline
Objective 1 <i>Insects have a great influence on many aspects of our lives. People compete with insects for food, fiber, and health in many areas. The control and management of insects is an important part of one's life as well.</i>	Identify the different pest control methods. <ol style="list-style-type: none">1. There are different ways to control insects.<ol style="list-style-type: none">a. Biological control methodsb. Cultural control methodsc. Physical and mechanical control methodsd. Chemical control methods2. The particular method or methods selected depend on the needs of the individual.
Objective 2 <i>Biological control is the use of naturally occurring organisms to control insects. These include: bacteria, diseases, fungi, viruses, insects, nematodes, birds, fish, toads and frogs, lizards, snakes, rodents, and weeds.</i>	Identify the advantages and limitations of biological control methods. <ol style="list-style-type: none">1. Four general areas of biological control<ol style="list-style-type: none">a. Using the insect's natural enemies – selectivity increasing the population of the insect's natural enemiesb. Resistant plant varieties – using plant varieties, occurring naturally and by genetic research, that are resistant to the insectc. Crop rotations – rotating the type of crop grown in a particular spot so that the same crop is not grown continuously

Instructor Directions	Content Outline
	<ul style="list-style-type: none"> d. Sterilization – using chemicals or radiation to sterilize or to genetically alter insects so they cannot reproduce 2. Advantages <ul style="list-style-type: none"> a. Works with the insect’s natural enemies and environment b. Not necessarily expensive 3. Limitations <ul style="list-style-type: none"> a. Only partially effective b. Requires a lot of time to become effective c. Results are not guaranteed d. Not easy to control insects selectively e. An extensive knowledge of the insect’s life cycle and response to the environment is necessary f. Can be labor intensive g. Can be very expensive h. Not practical for commercial agriculture i. Cannot predict effect on the environment
<p>Objective 3</p> <p><i>Cultural control is the management of insect populations by modifying the environment. Standard production practices are used to make the environment less attractive or agreeable for insects.</i></p>	<p>Identify the advantages and limitations of cultural control methods.</p> <ul style="list-style-type: none"> 1. Five methods in cultural control <ul style="list-style-type: none"> a. Tillage systems b. Crop rotation c. Sanitation d. Timing of harvest and planting e. Water management 2. Advantages <ul style="list-style-type: none"> a. Does not require special machinery or equipment b. Uses standard agricultural or management practices c. Is not expensive d. Most practices do not require intensive labor 3. Limitations <ul style="list-style-type: none"> a. Only partially effective b. Not easy to control insects selectively c. An extensive knowledge of the insect’s life cycle and responses to the environment is necessary d. Can be labor intensive

Instructor Directions	Content Outline
<p>Objective 4</p> <p><i>Ask students how they physically or mechanically destroy insects.</i></p>	<p>Identify the advantages and limitations of physical and mechanical control methods.</p> <ol style="list-style-type: none"> 1. Physical and mechanical control methods <ol style="list-style-type: none"> a. Directly destroying insects b. Modifying the environment to make it unsuitable for insect pests c. Differ from cultural methods because, in addition to normal production practices, special machinery and equipment are used 2. Advantages <ol style="list-style-type: none"> a. Results are immediate and noticeable b. Based on standard agricultural or management practices 3. Limitations <ol style="list-style-type: none"> a. Only partially effective b. Not easy to control insects selectively c. An extensive knowledge of insect's life cycle and responses to the environment is necessary d. Can be labor intensive e. Can be expensive f. Limited application in commercial agriculture
<p>Objective 5</p> <p><i>Ask students about the kinds of insecticides with which they are familiar.</i></p> <p><i>Also discuss how the different methods of insect control may be used together for different situations. Encourage students to think about what is involved with each method and to compare the strengths and weaknesses of each. There are no real "right" or "wrong" answers. A person skilled in insect control needs to be able to use a variety of control methods.</i></p>	<p>Identify the advantages and limitations of chemical control methods.</p> <ol style="list-style-type: none"> 1. Classification of insecticides <ol style="list-style-type: none"> a. Organic insecticides – manufactured materials consisting mainly of carbon, hydrogen, and oxygen <ul style="list-style-type: none"> – Chlorinated Hydrocarbon: also called organic chlorines – Organic Phosphate: contains phosphorus – Carbamate: contains groups of nitrogen and hydrogen b. Inorganic insecticides – are made from minerals, are persistent, and do not break down easily in the environment c. Botanical insecticides – made from plants <ul style="list-style-type: none"> – Nicotine – Potenome – Dried pyrethrum flowers

Instructor Directions	Content Outline
	<p>d. Bacterial insecticides – infect insects with diseases, specifically kills one kind of insect, used on Japanese beetles and caterpillars</p> <p>2. Advantages</p> <ol style="list-style-type: none"> Works quickly and effectively Possible to control a particular insect selectively Only a general knowledge of the insect's life cycle and responses to environment is needed Not labor intensive <p>3. Limitations</p> <ol style="list-style-type: none"> Buildup of insecticide-resistant insects Outbreaks of other harmful insects May have negative effects on the environment if not used properly Extremely dangerous to people <p>From the following questions, provide advantages and limitations of using different control methods together.</p> <ol style="list-style-type: none"> Which methods are most appropriate for commercial agriculture? Which methods are best suited for home and garden care? Which methods should be selected if insect control is needed immediately? Why? Why is the timing of insect control important? Why are labor intensive methods considered a limitation? Why is it necessary to consider the level of knowledge needed for activating a particular control method? How can the different methods be used together? Which methods would not work well together?
Application	<p>Other activities:</p> <p>Bring in different types of common household or garden insecticides. Have the students compare the labels for the amount of time necessary for effective use, types of insects killed, restrictions for use, and any harmful side effects to the environment.</p>
Closure/Summary	<p>There are several different methods for controlling insects. Each has its own advantages and limitations. The particular method or methods chosen depend on the</p>

Instructor Directions	Content Outline
	needs of the individual. Frequently, more than one method is used for the best control of insects.
Evaluation: Quiz	<p>Answers:</p> <ol style="list-style-type: none"> 1. c 2. b 3. a 4. a 5. d 6. d 7. d 8. c 9. b 10. Evaluate the responses based on what was discussed in class.