

<b>Course</b>	Agricultural Science II
<b>Unit</b>	Entomology
<b>Lesson</b>	Safe Use of Insecticides
<b>Estimated Time</b>	Two 50-minute blocks
<b>Student Outcome</b>	

Identify safety guidelines for insecticide use.

### Learning Objectives

1. Describe what information is located on an insecticide label.
2. Distinguish how insecticide toxicity is measured.
3. Describe what certifications are required for pesticide applicators.
4. Identify what the safety guidelines are for using insecticides.
5. Identify the safe ways to dispose of insecticides and insecticide containers.
6. Describe symptoms of insecticide poisoning.
7. Identify the correct first aid procedures for insecticide poisoning.
8. Identify what supplies should be included in a first aid kit.
9. Identify where the nearest Poison Control Center is.

### Grade Level Expectations

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/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. Activity Sheet
  -  AS 1 – Reading an Insecticide Label
2. *Entomology* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1991.
3. *Entomology Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

#### Supplies & Equipment

- ☐ Labels from several different types of insecticides
- ☐ Various types of protective clothing and equipment

#### Supplemental Information

1. Internet Sites
  - ☐ Poison Center. SSM Cardinal Glennon Children's Medical Center. Accessed January 28, 2008, from <http://www.cardinalglennon.com/internet/home/glennon30.nsf/documents/Poison+Center?OpenDocument>.


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- ❑ Using Insecticides. Michigan State University Extension. Accessed January 28, 2008, from <http://web1.msue.msu.edu/imp/mod02/01500536.html>.
2. Print
- ❑ *Applying Pesticides Correctly: A Guide for Commercial Applicators* (Guide MX328). Columbia: University of Missouri Extension in cooperation with the Environmental Protection Agency, reviewed 2007. Accessed June 10, 2008, from <http://extension.missouri.edu/xplor/miscpubs/mx0328.htm>.
  - ❑ Baker, D.E. *Pesticide Application Safety* (Guide G1916). Columbia: University of Missouri Extension, revised 1997. Accessed June 10, 2008, from <http://extension.missouri.edu/xplor/agguides/agengin/g01916.htm>.
  - ❑ Fishel, F. *Personal Protective Equipment for Working With Pesticides* (Guide G1917). Columbia: University of Missouri Extension, reviewed 2001. Accessed June 10, 2008, from <http://extension.missouri.edu/xplor/agguides/agengin/g01917.htm>.
  - ❑ Fishel, F., and Paul A. *Pesticide Poisoning Symptoms and First Aid* (Guide G1915). Columbia: University of Missouri Extension, reviewed 2002. Accessed June 10, 2008, from <http://extension.missouri.edu/xplor/agguides/agengin/g01915.htm>.
  - ❑ Kroening, M. *Using Pesticides Safely Around the Home* (Guide G1918). Columbia: University of Missouri Extension, revised 2007. Accessed June 10, 2008, from <http://extension.missouri.edu/xplor/agguides/agengin/g01918.htm>.
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### Interest Approach

1. Have students compare the labels of several different types of insecticides. AS 1 can be used to help stimulate questions.
2. Demonstrate the various types of protective clothing and equipment.
3. Ask the class to identify how insecticides affect our everyday lives, both positively and negatively. Topics could include environmental activities, safety precautions for insecticide use, and insecticides required to produce and preserve food and fiber for society.

### Communicate the Learning Objectives

1. Describe what information is located on an insecticide label.
2. Distinguish how insecticide toxicity is measured.
3. Describe what certifications are required for pesticide applicators.
4. Identify what the safety guidelines are for using insecticides.
5. Identify the safe ways to dispose of insecticides and insecticide containers.
6. Describe symptoms of insecticide poisoning.
7. Identify the correct first aid procedures for insecticide poisoning.
8. Identify what supplies should be included in a first aid kit.
9. Identify where the nearest Poison Control Center is.


Instructor Directions	Content Outline
<b>Objective 1</b>  <i>Discuss with students the information found on an insecticide label. The instructor may want to point out the information on several different insecticide labels. Have students complete AS 1.</i>   AS 1 – Reading an Insecticide Label	<b>Describe what information is located on an insecticide label.</b>  <ol style="list-style-type: none"><li>1. Type of insecticide</li><li>2. Target insects</li><li>3. Application techniques</li><li>4. How the product affects different plants and animals</li><li>5. Toxicity level</li><li>6. Signal words</li><li>7. Safety guidelines</li><li>8. Disposal methods</li><li>9. First aid procedures</li></ol>
<b>Objective 2</b>  <i>Discuss with students how insecticide toxicity is measured. Also discuss why it is important to measure the toxicity level.</i>	<b>Distinguish how insecticide toxicity is measured.</b>  <ol style="list-style-type: none"><li>1. LD<sub>50</sub> is a standard measure of toxicity.<ol style="list-style-type: none"><li>a. “LD” stands for the “lethal dose” of the insecticide. This is expressed in milligrams of insecticide per kilogram of body weight necessary to kill half of a test population (such as mice, guinea pigs, rabbits).</li><li>b. The lower the LD number, the greater the insecticide toxicity and the less it takes to kill.</li></ol></li></ol>

Instructor Directions	Content Outline
	<ol style="list-style-type: none"> <li>2. Signal words are used to indicate the level of toxicity and precautions for the product. They are located directly below the statement "Keep Out of Reach of Children."               <ol style="list-style-type: none"> <li>a. Class I: "Danger or Danger-Poison" with an accompanying drawing of a skull and crossbones                   <ul style="list-style-type: none"> <li>- Letters printed in red</li> <li>- Highly toxic category</li> <li>- Oral LD<sub>50</sub> rating of 0-50</li> </ul> </li> <li>b. Class II: "Warning"                   <ul style="list-style-type: none"> <li>- Moderately toxic category</li> <li>- Oral LD<sub>50</sub> rating of 50-500</li> </ul> </li> <li>c. Class III: "Caution"                   <ul style="list-style-type: none"> <li>- Slightly toxic category</li> <li>- Oral LD<sub>50</sub> rating of 500-5,000</li> </ul> </li> </ol> </li> </ol>
<p><b>Objective 3</b></p> <p><i>Discuss with students what certifications are required for pesticide applicators. Give information about the place where students can obtain the certification.</i></p>	<p><b>Describe what certifications are required for pesticide applicators.</b></p> <ol style="list-style-type: none"> <li>1. There are two classifications of pesticides. Some pesticides may be a combination of the two. The classification is listed on the product label.               <ol style="list-style-type: none"> <li>a. "General use" pesticides are not likely to harm people, wildlife, and/or the environment when used according to label directions.                   <ul style="list-style-type: none"> <li>- Examples are Malathion, Sevin, and Pyronone.</li> <li>- Certification is not required.</li> </ul> </li> <li>b. "Restricted use" pesticides could cause serious injury to people, wildlife, or the environment unless applied by a well-trained and competent pesticide applicator, or under the direct supervision of such an applicator.                   <ul style="list-style-type: none"> <li>- Examples are Lannate, Nicotine and Thiodan.</li> <li>- Certification is required.</li> </ul> </li> </ol> </li> <li>2. There are two types of licenses for certified pesticide applicators.               <ol style="list-style-type: none"> <li>a. Private applicator                   <ul style="list-style-type: none"> <li>- Administer restricted use pesticides onto their own land, onto land they rent, or onto property of a person with whom they trade services</li> <li>- Receive training in pesticide application</li> <li>- Common type of license for most producers</li> </ul> </li> </ol> </li> </ol>

Instructor Directions	Content Outline
	<ul style="list-style-type: none"> <li>- License valid for 5 years and then must be renewed</li> <li>b. Commercial applicator               <ul style="list-style-type: none"> <li>- Apply restricted use pesticides on the property of others</li> <li>- Receive training in pesticide application as well as specialized training</li> <li>- License valid for 3 years and then must be renewed</li> </ul> </li> </ul>
<p><b>Objective 4</b></p> <p><i>Discuss with students safety guidelines for using insecticides. Emphasize how important it is to read and follow all insecticide label directions.</i></p>	<p><b>Identify what the safety guidelines are for using insecticides.</b></p> <ol style="list-style-type: none"> <li>1. Always read and follow label directions <b>exactly</b>.</li> <li>2. Remove all people, pets, and foodstuffs prior to insecticide application.</li> <li>3. When spraying in an enclosed environment, close all doors, vents, and openings before applying insecticides in order to avoid insecticide drift.</li> <li>4. Never smoke, eat, or drink while applying insecticides.</li> <li>5. Always wear protective clothing and use protective equipment to prevent exposure to external irritant insecticides.               <ol style="list-style-type: none"> <li>a. Wear clean long trousers and a long-sleeved shirt, or coveralls made of closely woven cloth.</li> <li>b. Wear unlined rubber gloves and rubber boots made of neoprene.</li> <li>c. Wear shirt sleeves outside of the gloves and wear pant legs outside of the boots to prevent pesticides from entering.</li> <li>d. Wear close-fitting eye goggles or a face shield.</li> <li>e. Wear a wide-brimmed waterproof hat, one that is easy to clean or is disposable.</li> <li>f. Wear a respiratory device that prevents internal poisoning whenever applying an insecticide.</li> <li>g. Clean clothing and equipment as directed by the insecticide label or by the Poison Control Center recommendations.</li> </ol> </li> <li>6. Always wear a respiratory device approved by an appropriate agency (NIOSH and MSHA) to prevent internal poisoning.               <ol style="list-style-type: none"> <li>a. Cartridge respirator – used for occasional exposure to most insecticides.</li> </ol> </li> </ol>

Instructor Directions	Content Outline
	<ul style="list-style-type: none"> <li>b. Gas mask or canister respirator – used when the applicator is exposed to an insecticide for a relatively long period of time or is exposed to high concentrations of insecticides for a short period of time, and working in a confined or closed area.</li> <li>c. Self-contained breathing apparatus – used if the oxygen supply is low or the insecticide vapor concentration is high</li> </ul> <ol style="list-style-type: none"> <li>7. Always take precautions to avoid insecticide drift.</li> <li>8. Shower and shampoo after applying insecticides.</li> <li>9. Wash clothing exposed to insecticide separately from other clothing or if disposable, dispose of properly.</li> <li>10. Maintain a health watch program with a physician if applying insecticides on a regular basis. <ul style="list-style-type: none"> <li>a. Inform the doctor of the exact insecticides used so he or she can review chemical formulations and stock a supply of antidotes.</li> <li>b. Follow special instructions for persons applying carbamate or organophosphate insecticides. <ul style="list-style-type: none"> <li>– Establish a regular cholinesterase testing program with a doctor.</li> <li>– Have a “baseline” test taken in January.</li> <li>– Have periodic follow-up tests for cholinesterase level. If cholinesterase level falls too low, the doctor will limit or stop applicator’s contact with these two insecticides until level returns to normal range.</li> </ul> </li> </ul> </li> </ol>
<p><b>Objective 5</b></p> <p><i>Discuss with students the safe ways to dispose of insecticides and insecticide containers. For help with safe disposal of insecticides and/or insecticide containers, contact the Missouri Department of Natural Resources.</i></p>	<p><b>Identify the safe ways to dispose of insecticides and insecticide containers.</b></p> <ol style="list-style-type: none"> <li>1. Read and follow insecticide container label instructions and/or precautions for disposal.</li> <li>2. Apply any surplus insecticide to other areas with the same pest problem.</li> <li>3. Never flush insecticides down the drain, into sewers, or into waterways.</li> <li>4. Take unwanted insecticides and/or insecticide containers to a toxic waste disposal landfill.</li> </ol>

Instructor Directions	Content Outline
<p><b>Objective 6</b></p> <p><i>Discuss with students the symptoms of insecticide poisoning. Point out that there are no standard symptoms.</i></p>	<p><b>Describe symptoms of insecticide poisoning.</b></p> <ol style="list-style-type: none"> <li>1. There are no standard symptoms of insecticide poisoning. Symptoms vary depending on several factors.               <ol style="list-style-type: none"> <li>a. Kind and amount of insecticide</li> <li>b. Length of exposure</li> <li>c. Time interval between exposures</li> <li>d. General health of the victim</li> </ol> </li> <li>2. There are two categories of insecticide poisoning. Many insecticides fit in both categories.               <ol style="list-style-type: none"> <li>a. External irritants – those which sting the nose, eyes, ears, throat, and mouth due to insecticide splashing on external tissues.</li> <li>b. Internal poisons – those which injure body organs due to insecticide being taken into the body through the mouth or skin.</li> </ol> </li> </ol>
<p><b>Objective 7</b></p> <p><i>Discuss with students the correct first aid procedures for insecticide poisoning.</i></p> <p><i>Note: If an insecticide accident occurs at school, the instructor should notify the school nurse as soon as possible.</i></p>	<p><b>Identify the correct first aid procedures for insecticide poisoning.</b></p> <ol style="list-style-type: none"> <li>1. Act as quickly as possible.</li> <li>2. Without endangering yourself, remove the victim from the contaminated area.</li> <li>3. Remove contaminated clothing from the victim.</li> <li>4. Generously flood the affected skin area or eye with water.</li> <li>5. Contact the Poison Control Center or a doctor.</li> <li>6. Administer first aid as indicated by Poison Control Center personnel or a doctor.</li> </ol>
<p><b>Objective 8</b></p> <p><i>Discuss with students the importance of having a first aid kit available.</i></p> <p><i>Note: It is crucial that the school shop have a complete first aid kit available. Poison Control Center personnel or a doctor will indicate first aid procedures that need to be followed.</i></p>	<p><b>Identify what supplies should be included in a first aid kit.</b></p> <ol style="list-style-type: none"> <li>1. Adhesive tape</li> <li>2. Assorted bandages</li> <li>3. Blanket</li> <li>4. Merthiolate</li> <li>5. Syrup of ipecac</li> <li>6. Teaspoon</li> <li>7. Two quarters (for phone calls)</li> </ol>

Instructor Directions	Content Outline
<p><b>Objective 9</b></p> <p><i>Discuss with students information about the nearest Poison Control Center. The instructor should post the toll-free number by the telephone so it is handy in the event of insecticide poisoning.</i></p>	<p><b>Identify where the nearest Poison Control Center is.</b></p> <ol style="list-style-type: none"> <li>Missouri's center is staffed 24 hours by medical professionals. Missouri Regional Poison Control Center Cardinal Glennon Memorial Hospital 1465 South Grand Avenue St. Louis, MO 63104 Phone: 1-800-222-1222</li> <li>It is important to have the insecticide label with you when talking with the Poison Control Center.</li> </ol>
<p><b>Application</b></p> <p> AS 1 – Reading an Insecticide Label</p>	<p>Answers to AS 1: The instructor will need to determine if answers are appropriate.</p> <p>Other activities:</p> <ol style="list-style-type: none"> <li>Visit a local farm or garden supply store to see their insecticide application equipment, including respirators and protective clothing. Require students to take notes on their observations. Students may be asked to prepare a written report on the field trip.</li> <li>Invite an extension agent or other specialist to talk about insecticide safety.</li> </ol>
<p><b>Closure/Summary</b></p>	<p>Insecticide applicators must know and practice the principles of safe insecticide use in order to protect themselves, animals, and/or the environment from the effects of toxic insecticides. Always read and follow all insecticide label directions.</p>
<p><b>Evaluation: Quiz</b></p>	<p>Answers</p> <ol style="list-style-type: none"> <li>b</li> <li>a</li> <li>c</li> <li>d</li> <li>d</li> <li>b</li> <li>a</li> <li>b</li> <li>c</li> </ol>

Instructor Directions	Content Outline
	<p>10. External irritants – such as stinging of nose, eyes, ears, throat, and mouth due to insecticide splashing on external tissues</p> <p>Internal poisons – such as injury to body organs due to insecticide being taken into the body through the mouth or skin</p>