



Plant Science Course

Under Agricultural Science Core **Standard 6**- Students will demonstrate an understanding of agronomy.

New **Objective**: Understand how herbicides, pesticides and fertilizers affect health.

Learning goal: Students will understand the negative respiratory health effects of pesticides and fertilizers.

Student learning objectives:

1. Describe how pesticides enter the body.
2. Explain what variables determine how a person response to pesticide exposure.
3. Explain how to protect yourself from pesticide exposure.

List of resources:

National Ag Safety Database

Utah Department of Health Asthma Program

Integrated Pest Management for Iowa Schools (<http://www.ipm.iastate.edu/ipm/schoolipm/node/61>)

List of equipment, tools, supplies and facilities:

Writing Surface

Overhead Projector

Copies of student lab sheets

Materials for lab

Computer Lab with internet access

Terms:

Pesticide

Trade name

Chemical name

Common name

Interest Approach: : Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here:

Nationally, 20,110 cases of acute pesticide poisoning were tracked in 2001. In the agriculture industry, among the 3,380,000 workers, there are an estimated 10,000-20,000 doctor-diagnosed pesticide poisonings each year.

According to the most recent U.S. Environmental Protection Agency (EPA) Pesticide Industry Sales and Usage Report, 1.23 billion pounds active ingredient of conventional and other pesticide chemicals were

applied in the U.S. in 1997 (Aspelin and Grube, 1999). Furthermore, 77% (or 944 million pounds) of the chemicals were designated specifically for agricultural use (Aspelin and Grube, 1999).

Summary of Content and Teaching Strategies:

Objective 1: Describe how pesticides enter the body.

Anticipated Problem: What is a pesticide?

A pesticide is any chemical used to prevent, destroy, or repel pests. Pests can be insects, weeds, diseases, or mice and other rodents. Pesticides can also be used to destroy or prevent fungus and pathogens.

How can pesticides enter the body?

- Through the skin- Pesticides can be absorbed through the skin just by coming in contact with a them.
- By eating or drinking –If you get a pesticide on your hands and then pick up your food you can ingest the pesticide. Also if you are using a pesticide near where your food or drink is stored it can also be contaminated.
- By inhaling-Pesticides whether in power or spray form can be inhaled if the proper respiratory protection is not taken.

Objective 2: Explain what variables determine how a person responds to pesticide exposure.

Anticipated Problem: What is considered exposure?

Exposure is anytime you or another individual comes in contact with a pesticide.

Pesticides may irritate skin or eyes, may cause cancer, or may affect the nervous, endocrine or hormone systems.

Respiratory, allergic, gastrointestinal or neurological symptoms may be associated with being exposed to high levels of pesticides for a short time. Long-term exposure could result in Alzheimer's, Parkinson's, and other neurologic diseases.

The health effects of pesticides depend on what pesticides are present and the *length* and *frequency* of exposure.

Other variables that play a role in how a person responds to pesticides are:

- Health condition
- Age
- Personal behaviors (like smoking or hygiene)
- Size of the person (body weight)



Objective 3: Explain how to protect yourself from pesticide exposure.

Anticipated Problem: What are the different types of pesticides?

Classification of Pesticides: Pesticides can be grouped according to the pests that they control. Some examples include:

- **Algicides** - Chemicals used to manage algae in areas such as swimming pools.
- **Avicides**- Chemicals used to manage birds.
- **Disinfectants**- Chemicals used to destroy harmful microorganisms.
- **Fungicides**- Chemicals used to manage fungi.
- **Herbicides**- Chemicals used to manage unwanted plants or weeds.
- **Insecticides**- Chemicals used to manage insects and other related creatures, such as ticks, spiders, and centipedes.
- **Microbial Insecticides**- Naturally occurring insect-disease microorganisms that are lethal to a specific group of insects.
- **Molluscicides**- Chemicals used to control snails or slugs.
- **Pheromones**- Chemicals used to attract insects.
- **Repellents**- Chemicals used to repel insects or other pests.
- **Rodenticides**- Chemicals used to manage rats, mice, and other rodents.

To protect yourself, be sure you understand the pesticide label before using a pesticide. A pesticide label must follow guidelines established by the federal government. The following are important components of any pesticide label. The trade name is the name used in advertising. It is printed on the front panel of the label and is the easily identified. The chemical name is a description of the chemical structure of the product. Often times the chemical name is very complicated because it must follow the rules of nomenclature for organic chemistry. As a result, the common name is a simplified version of the chemical name and makes it easier to identify the product.

To protect yourself and others from exposure always follow the directions on the label. Many pesticides require you to have a specific license to apply them.

To protect yourself from pesticide exposure:

- Wear personal protective equipment (PPE) as described on the label
 - Respirator or mask, gloves, shoes, coveralls
- Choose the correct respiratory protection for the job
- Be familiar with the PPE you use and make sure it fits correctly
- Inspect pesticide application equipment often
- Mix pesticides with care
- Regularly clean equipment
- Wash clothes you wore during spraying separately from non-spraying clothes
- Keep out of pesticide-treated areas for as long as stated on the label

Answers to Sample Test:

1. Algicides, Avicides, Disinfectants, Fungicides, Herbicides, Insecticides, Microbial Insecticides, Molluscicides, Pheromones, Repellents, Rodenticides
2. The trade name is easily identified along with the chemical name and the common name.
3. Health condition, Age, Personal behaviors (like smoking or hygiene), Size of the person (body weight), length and frequency of exposure
4. True

Sample Test:

1. List 5 classifications of pesticides
2. What components does the government require on a pesticide label?
3. Name two conditions that affect how a person responds to pesticides.
4. True or False. Pesticides are absorbed through the skin

Let us know how it went. We are always trying to improve this lesson plan. Please send any comments or suggestions to the Utah Asthma Program (asthma@utah.gov).



Lab activity:**Pesticides and Chemicals**

Overview: This module is designed to assist students with understanding the importance of pesticides as chemical tools. The chemistry of a pesticide is important for understanding the composition of the product, the classification of pesticides according to their use and the classification of insecticides according to their chemical makeup. This knowledge of pesticides can assist students with understanding what pesticides are currently being used around their home, neighborhoods, and school.

Purpose: After completion of this module, the student will be able to

- Understand a pesticide label, especially the trade name, common name, and chemical name.
- Identify the general classification of pesticides by understanding what they control.
- Identify the classification of insecticides by understanding the chemical makeup.
- Identify pesticides that are currently being used around the home and understand how to classify these chemicals.

Materials:

- The Pesticide Label” worksheet
- “Pesticides Used Around Your Home” worksheet

Getting Ready: The teacher will review the technical information section on pesticides. In addition, the teacher will need to identify a location for Internet access for student activities. Verify access to Internet sites listed in Activities Section and the Internet Resources Section.

Motivate (Engage): To introduce this activity the teacher should discuss with the students how there are a number of types of chemical products a person can buy when they go to the store. The use of chemicals has helped mankind and the environment in many ways. Have the students guess why chemicals are important (writing these on the board can help in this brainstorming activity). Students may answer preservation of food, medicine, plastics, rubber, clothing, preservation of wood (houses, fences, decks, etc.), and protection of crops, animals and people from pests. Students should think of reasons how chemicals could be harmful. This will lead into a discussion on how chemical use must be guided by safety, understanding of proper uses, and careful planning.

Activity (Explore):

1. Explain what a pesticide is and the importance of chemistry in pesticides.
2. Explain the parts of a pesticide label. Focus on the trade name, common name, chemical name, and chemical formula.
3. Have each student complete “The Pesticide Label” exercise.
4. Explain the classification of pesticides.
5. Explain the classification of insecticides according to their chemical makeup.



Safety Tips: Pesticides are chemicals that could be dangerous to humans. Have the students wash their hands after touching any pesticide containers in the class and after completing the Going Further activity.

Going Further (Extensions): Have the students take home the “Pesticides Used Around Your Home” worksheet. This will help students realize how every home has one or more pesticides stored there. If a student goes to a hardware store or a lawn & garden center, they will experience the great variety and quantity of pesticides available to the general citizen. Have the students bring their findings to class the next day.

An interactive web site that allows students to explore a typical house for pesticides is available at:

<http://www.epa.gov/opptintr/kids/hometour/index.htm>

Closure: Summarize this activity by discussing what pesticides the students discovered in their home or garden center explorations. Ask them about their impressions of the variety of chemicals which are classified as pesticides.

Assessment (Evaluation): This activity could easily lend itself to a formal written evaluation of concepts learned. It is suggested that the teacher obtain Xerox copies of a pesticide label (via the Internet) and ask students questions about the specific label.

Pesticide Label

1. Find the Environmental Protection Agency Website.
 - a. What is the URL for this site:
2. Browse the EPA Topics. Select the **pesticide** topic, select the pesticide legal aspects section, select the labeling section, and then select the read the label first section.
 - a. Review the interactive label exercise. What additional information is included on the label (besides the common name, trade name, and chemical name)?

3. Try to find a pesticide label posted on the Internet.
 - a. What is the URL for this site:
 - b. What is the product name:
 - c. What is the common name:
 - d. What is the chemical name:

Pesticides Used Around The Home

1. Search around your home, neighborhood and school for pesticides. If you cannot find three pesticides, visit the lawn and garden center of your local hardware store.
2. Be Careful!! These products are useful for managing pests, but some of the chemicals may be dangerous to humans. They may irritate your skin, eyes, nose, and throat. They may be POISONOUS.
3. Identify at least 3 pesticides you find.
 - a.
 - b.
 - c.
4. Classify these pesticides according to their general use.
 - a.
 - b.
 - c.
5. Are any of the pesticides classified as insecticides? If so, determine if they are organophosphates, carbamates, or pyrethroids
 - a.
 - b.

- c.
6. Now check your cabinets for chemicals used for cleaning and disinfecting surfaces. Do any of the chemicals have an EPA Registration Number? Identify at least 3 products that you find. These too are pesticides!
- a.
 - b.
 - c.