EPA PESTICIDES REDUCTION

POLLUTION PREVENTION (P2) EDUCATION TOOLBOX
Tools for Helping Teachers Integrate P2 Concepts in the Classroom

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WHAT ARE PESTICIDES?

Rodents, bugs, and mold are natural organisms found in the environment and can benefit people in many ways. However, when we find rodents in the garden, bugs in the kitchen, or mold in the bathroom, we may consider these organisms pests. The best way to resolve pest problems is through prevention, but we are often too busy and bothered and use pesticides to resolve the problem. The chemicals in pesticides are used to control insects, weeds, and rodents thereby protecting crops and food supplies and making our lives pest free. Pesticides are generally divided into four chemical groups: insecticides to control insects, herbicides to control weeds, fungicides to control molds and fungus, and rodenticides to control rodents.

Pesticides use has become common in and around the home. For example, the following pesticides are common household products you may be familiar with:

- ✔ Cockroach sprays and baits
- ✔ Insect and wasp sprays
- ✔ Termite control products
- ✔ Rat and mice poisons
- ✔ Flea, tick, and lice sprays, powders, and pet collars
- ✔ Repellents that keep rabbits, raccoons, or deer away from gardens
- ✔ Kitchen, laundry, and bath cleansers
- ✔ Bleach products to kill mold and mildew
- ✔ Lawn and garden products such as weed killers
- ✔ Swimming pool chemicals, including those that kill algae

These pesticides can cause health problems but do not have to be used if you can first prevent the pest problem from occurring.

WHY IS PESTICIDES REDUCTION IMPORTANT?

Pesticides are not only harmful to pests. If used improperly, pesticides can also create health risks to humans, pets, and the environment.

If pesticides are not applied properly on crops, pesticide residues on unwashed fruit and vegetables can cause human health problems such as immune system problems and birth defects. Because of their smaller size and higher metabolism, children may be particularly susceptible to negative health effects from pesticide exposure through food.

We can also be exposed to pesticides in water. When pesticides are applied to land, residues may run off into streams and rivers, thereby contaminating fish, plants, and animals living in or near the water, and drinking water sources. For example, when people in your neighborhood apply pesticides to their lawns or gardens, storm water can wash the chemicals into storm sewers that often drain into water bodies. Pesticides applied to land can also migrate through soil into groundwater, which can be another drinking water source.

Air in another pathway for pesticides to migrate in the environment. During pesticide application, air currents may carry pesticide vapors to nearby properties. In addition, if pesticides are improperly applied

inside a building and the building is not evacuated for the appropriate amount of time, pesticide residues in the air can be absorbed through the skin and eyes or inhaled.

Pesticides also threaten the health of pets and humans through direct contact. Pets may contact the chemicals when they roll around in the grass or on the floor. As a result, humans can be exposed to pesticides when they handle pets.

HOW CAN POLLUTION PREVENTION HELP YOU?

Safe pest control is very important to prevent health hazards. The best P2 option is to prevent a pest problem from occurring. If you already have a pest problem, the best P2 option is to control pests without using pesticides.

An effective, less- or non-toxic approach to pest management is integrated pest management (IPM). IPM manages pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM guidelines include a combination of the following:

- ✔ Practice good sanitation and proper maintenance of structures and grounds.
- ✔ Use mechanical traps to control pests.
- ✔ Control weeds by mowing, hoeing, and mulching.
- ✔ Use the minimum amount and least toxic pesticides only when necessary.
- ✔ Implementing IPM and incorporating the basic P2 methods discussed below can help you prevent pest problems and reduce or eliminate pesticides use.

Changing What You Use

- ✔ If you have a pest problem, before you use a pesticide, ask yourself is it really necessary? Is there another way of eliminating the pest?

- ✔ Try mechanical means of pest control, such as using fly swatters, mesh netting around gardens, or hand picking weeds. Insects and rodents can also be trapped and then set free or picked up by animal control.

- ✔ Try natural or low-toxicity pesticides such as pesticidal soaps, horticultural oils, and diatomaceous earth (a natural pest control that can be sprinkled around the garden or home), to chase away bugs. These natural or low-toxicity pesticides can be bought at a plant nursery.

- ✔ Try non- or less toxic alternatives to pesticides such as home-made insecticidal soap. To make your own solution, mix four tablespoons of liquid dishwashing soap to each gallon of water and spray it on insects.

Changing What You Do

- ✔ Before you buy any pesticides, determine the extent of the problem and if your lawn and house really need to be completely pest free. Decide if you can tolerate some blemished fruits and vegetables from your garden. Some pests can be helpful. For example, some insects keep soil healthy or carry pollen to fertilize plants. Insects such as bees provide materials like wax and honey.

- ✔ Select plants such as scented geraniums and flowering plants that attract predatory insects such as ladybugs, spiders, centipedes, and praying mantises. These creatures feed on many garden pests.

- ✔ Select garden plants that repel insects, such as mint, garlic, and marigolds.

- ✔ Try natural garden and lawn-care methods. These methods include mowing less frequently with the blades set high to encourage longer and healthier roots, watering deeply but not often, tilling the soil to control weeds, and growing native plants adapted to local soil conditions that do not require chemical upkeep. Native plants are plants that have adapted over a long period of time to local conditions; therefore, they are resistant to many native pests.

- ✔ Buy organic produce grown without any chemical pesticides.

- ✔ Buy organic flea collars at your local pet store.

- ✔ If you have decided to use a chemical pesticide, read the label a minimum of five times from the time you buy it to the time you apply it. Follow directions and take safety precautions to prevent health hazards.

- ✔ Protective equipment such as dust masks and gloves should be worn when applying pesticides. Outdoor pesticides should be applied on low-wind, no-rain days to prevent migration. If you need to dispose of pesticides be sure to do it properly.

Improving Your Housekeeping

- ✔ Keep your house clean and free from food crumbs. Keep food containers sealed.

- ✔ Block or destroy outdoor pest hiding places and entry points.

- ✔ Eliminate sources of free standing water where mosquitoes like to breed.

- ✔ Install door and window screens to keep pests from entering.

- ✔ Keep areas such as the bathroom and kitchen dry. Areas that never dry out are conducive to molds and fungi.

- ✔ Fill cracks in the house so pests cannot enter.

Educating Yourself and Others

- ✔ Learn to understand the value of pests.

- ✔ Share alternative ideas and safety precautions of pesticides use with your family, friends, and neighbors.

- ✔ Read and learn more about other alternatives to using pesticides.

LESSON PLAN

This lesson plan provides guidance and activities that will help you meet the following goals:

✔ Define pesticides and their uses

✔ Explain why pesticides can be harmful to humans, pets, and the environment

✔ Explain how P2 concepts can help reduce or eliminate pesticides use

The preceding pages of the fact sheet contain background information and definitions necessary to implement this lesson plan, which meets the requirements for the following Chicago Academic Standards and Frameworks: 6th grade - state goal 11 CAS C. CFS 2, state goal 12 CAS B. CFS 4; 7th grade -state goal 11 CAS C. CFS 2, state goal 12 CAS B. CFS 4; 8th grade - state goal 11 CAS C. CFS 1 and 2, state goal 12 CAS B. CFS 1.

WHAT ARE PESTICIDES?

Ask students to answer the question "What are pesticides and why are they used?"

✔ Explain that pesticides are chemicals used to control undesirable insects, weeds, and rodents and that they are used in homes and other buildings, on agricultural lands, on lawns and gardens, and on people.

✔ Ask the students to name some of the pesticides that we use daily (examples are shown in the box in the fact sheet).

WHY IS PESTICIDES REDUCTION IMPORTANT?

Based on the information provided, discuss why pesticides reduction is important.

✔ Emphasize that improper use of pesticides can harm people and the environment.

✔ Describe the four exposure paths for pesticides (food, water, air, and direct contact).

Activity No. 1- Pesticides Migration

Objectives: Students should understand the migration of a pesticide through a stream and its effects on wildlife

Time Length: About 10 minutes

Materials Needed: A 1-gallon (4-liter) glass jar or plastic jug, a 1-cup measuring cup, and red food coloring

Activity:

✔ Pour one-half cup of water into the gallon jar and tell the students that this water represents water in a stream.

✔ Add and stir in two drops of food coloring. The food coloring represents a pesticide that has entered the stream from a farm that used the pesticide on its crops, and a storm sewer outlet that is transporting storm runoff containing pesticides that were applied to neighborhood lawns.

- ✔ Add one cup of water at a time to the jar until the red color disappears. This demonstrates that even though an abundant amount of pesticides may enter the stream from a certain area (the storm sewer outlet and farm) as the pesticides flow downstream and mix with more water, the initial amount is diluted. However, dilution does not mean that the pesticides are gone. Just like the red food coloring drops, they are still in the water.

- ✔ Explain that the migration of the pesticide in this stream can contaminate other water bodies that provide our drinking water. Similarly, animal and plant life in the stream may be affected by pesticides many miles from the source.

- ✔ Describe to the students that if plants and animals along the stream are contaminated with the pesticides, the other species that feed on the plants and animals can be contaminated as well.

- ✔ Explain to the students that back in the 1950s and 1960s, DDT was used often on farm fields. Insects in the fields ate the plants covered with DDT, small birds and mammals ate the insects, and birds at the top of the food chain, such as the peregrine falcon and bald eagle, ate the small birds and mammals. DDT caused the peregrine falcon and bald eagle to lay very thin-shelled eggs that did not hatch, and the populations of the two birds began to decline. As a result, these birds were on the brink of extinction. When scientists finally figured out that DDT was the problem, DDT was no longer used, and the peregrine falcon and bald eagle populations began to recover. The bald eagle has now been upgraded from an endangered to a threatened species.

HOW CAN POLLUTION PREVENTION HELP YOU?

Based on the information provided, discuss how the four P2 concepts described earlier can be used to reduce pesticides use and maintain a healthy environment.

- ✔ Emphasize that the best approach to pesticide reduction is to prevent a pest problem from occurring in the first place. If there is a pest problem, controlling pests without the use of chemicals is the best approach. However, when pesticides must be used, following directions and taking safety precautions are important to prevent health hazards.

- ✔ Discuss ways to prevent a pest problem. For example, block pest entrances into homes and living areas. Keep the discussion interactive - ask students for their ideas.

Activity No. 2 - Memory Game

Objectives: Students should learn preventive measures to pest problems and alternatives to the use of chemical pesticides

Time Length: About 30 minutes

Materials Needed: Student journal, scissors, copy of the "Memory Game" attachment, and a pencil for each student

Activity:

- ✔ Ask the students to name the benefits and risks of using a chemical pesticide. Benefits include protection of crops and food supplies from pests and diseases. Risks include the health problems they cause for humans, pets, and the environment.

- ✔ Ask the students to name alternatives to using chemical pesticides.

- ✔ Divide the class into groups of four or less and pass out two copies of the "Memory Game" attachment to each group.

- ✔ Explain that the attachment has 20 boxes; 10 boxes identify "pests" and 10 boxes describe preventive measures and nontoxic alternatives to controlling the pests.

- ✔ Have each group read the descriptions in each box, cut out each box, and place the boxes face down on the floor, desk, or table. Two sets of boxes from two attachments should be cut out.

- ✔ Have one group member mix the boxes so that no one remembers which box was placed where.

- ✔ Have one group member pick up two boxes to see if the pest and alternative match. If they do not match, the boxes should be put back down in their original place. Students should try to remember where the boxes are placed.

- ✔ Have each group member repeat the selection process until a match is made. When a match is made, have the student read the alternative and preventive measure to the group members and have everyone write it down in their journals. The student can then place the two matching boxes into his or her own pile

- ✔ When all boxes have been matched (there will be doubles because two sets of boxes will be used), the student with the most boxes in his or her pile wins the game.

- ✔ After all groups have finished the memory game, ask the students to name other insects, animals, and plants that are pests and why they consider them pests.

- ✔ Have the class think of the benefits of the pests they named, preventive measures and nontoxic ways to control them

Activity No. 3 - Integrated Pest Management in Your Community

Objectives: Students should learn alternative methods to control pests and understand IPM concepts

Time Length: About 25 minutes

Materials Needed: A piece of paper and pencil for each student

Activity:

- ✔ Discuss the advantages and disadvantages of specific means of pest control. For example, cockroach controls include chemical pesticides (Raid™), mechanical devices (traps with sticky bands), nontoxic pesticides (discussed in fact sheet), and no action.

- ✔ Divide the students into pairs and assign each pair a different role in the "community." For example, environmentalist, president of a pesticides company, science teacher, mayor, homemaker with two small children, chemical manufacturer, real-estate agent, and owner of a summer camp for children.

- ✔ Ask students to vote for or against each control option in their new roles and discuss their justification for these decisions.

- ✔ Have the class discuss the different options and opinions. Have the students also evaluate the pest control options based on cost, and potential hazards to people, property, and the environment.

- ✔ Ask the class to choose two options that will work together to use in the "community."
- ✔ Explain that the class has just used IPM concepts to control the community cockroach problem.
- ✔ Explain that IPM is a combination of non- or low-toxicity pest control options, good sanitation, and proper maintenance methods that can be applied to communities, schools, and homes.

METHOD OF EVALUATION/ASSIGNMENT

- ✔ Have students write the following questions in their journals:
- ✔ How are pesticides used in and around your home?
- ✔ Have you tried non-toxic alternatives to pesticides?
- ✔ What P2 methods are you using to help reduce or eliminate pesticide use?

Students should answer these questions with the help of family and friends and write the answers in their journals.

ATTACHMENT

MEMORY GAME

EARWIGS	To **prevent** earwigs, seal up cracks and windows in your house and check newspapers before bringing them inside. To **repel** earwigs, leave old rags outside where earwigs breed, and each morning drop the rags in boiling water
ANTS	To **prevent** ants, clean up crumbs. To **repel** ants, pour a line of cream of tartar or sprinkle red chili pepper, paprika, or dried peppermint leaves at the place where ants enter the house. The ants will not cross over the line.
ROACHES	To **prevent** roaches, keep all food tightly covered in storage and keep crumbs cleaned up. To **repel** roaches, set out a dish containing equal parts of baking soda and powdered sugar. Also, place bay leaves around cracks in the room. Spiders will eat roaches.
FLEAS AND TICKS	To **prevent** fleas and ticks, dust animals with talc. Vacuum rugs, cat and dog beds, and furniture daily. Talk to your veterinarian about adding Brewer's yeast, Vitamin B, or garlic tablets to your pet's diet. To **repel** fleas, hang a small bag containing herbs such as fennel, rue, and rosemary around your pet's neck.
MOSQUITOES	To **prevent** mosquitoes, wear white and pastel yellow clothes that are less appealing to mosquitoes. To **repel** mosquitoes, rub citronella oil or vinegar on exposed body parts. Dragonflies, bats, and purple martin birds eat mosquitoes.

ATTACHMENT

MEMORY GAME

MICE AND RATS	To **prevent** mice, keep your house clean and free of food crumbs. Block and destroy entry points. To **repel mice,** pour a solution of 1 tablespoon of hot pepper to 2 quarts of water down mouse or rat holes. To catch mice or rats, use a live trap with bacon or peanut butter as bait.
FLIES	To **prevent** flies, seal up cracks around doors and windows. To **repel** flies, blend six cloves of crushed garlic, one minced onion, and 1 tablespoon of soap in 4 quarts of water. Let the solution sit for 1 day, strain the solution, and spray it on flies. Spiders, wasps, and hornets will eat flies.
SLUGS AND SNAILS	To **prevent** slugs and snails, scatter sand, wood or coal ashes, or lime around plants. To **repel** slugs and snails, put alcohol or household bleach in shallow pans in areas where slugs and snails are abundant.
TERMITES	To **prevent** termites, block entry ways. To repel termites, dust areas where they enter with red pepper.
GNATS	To **prevent** gnats, store fruit and seal fruit juices in closed containers. To **repel** gnats, dab yourself with a few drops of vanilla.