
CHAPTER 6

PESTICIDE HANDLING, STORAGE AND DISPOSAL

LEARNING OBJECTIVES

After you complete your study of this chapter, you should be able to:

- List some safety guidelines for opening pesticide containers and handling pesticides.
- Describe the components of a proper pesticide storage area.
- Describe the cleaning and disposal procedures for empty pesticide containers.
- List safety precautions for transporting pesticides in a vehicle.
- List what you should do in the event of a pesticide fire.

Danger of exposure always exists whenever you are handling pesticides. The greatest risk to the applicator is in handling and applying toxic materials and in using concentrated pesticides. Therefore, the applicator must use safety measures and also be familiar with what action to take in the event of a spill, leak or fire. Study the safety precautions described in this chapter and use them whenever you are handling, applying, transporting or storing pesticides. You will find that most precautions are common sense.

HANDLE PESTICIDES SAFELY

Opening pesticide containers, connecting application equipment or transferring pesticides to another container for application all entail the possibility of exposure. Here are some general safety guidelines for these procedures.

- Review the label before opening the container so that you are familiar with current directions.
- Always wear adequate protective clothing and equipment. Put them on before handling or opening a pesticide container. Remember to wear a respirator or appropriate form of eye protection if any chance of pesticide inhalation or eye exposure exists. Never eat, drink or smoke while handling pesticides.
- Carefully choose the pesticide handling area. It should be away from other people and pets. Pesticides should not be used in areas where a spill or overflow could get into a water supply. Be sure there is adequate ventilation and light. Have a supply of clean water and soap available. Hydrated lime and bleach can be used to neutralize and clean surfaces where spills occur. Clay, cat box filler, activated charcoal or similar material is also helpful to soak up spills or leaks. If possible, do not work alone.
- Do not tear paper containers to open them—use a sharp knife or scissors.
- When pouring from a container, keep the container at or below eye level and avoid splashing or spilling on your face or protective clothing.
- Never use your mouth to siphon a pesticide from a container.
- If an accident occurs, attend to it immediately. Remove any contaminated clothing and wash yourself thoroughly with soap and water. Take care of any spills on the floor or the ground.
- Measure accurately, follow label instructions and use only the amount necessary. Newer measuring devices such as “tip and pours”

are a great help in handling small amounts of concentrated pesticide. Keep all measuring devices (spoons, cups, scales) in the pesticide storage area, and label them to avoid their being used for other purposes. Rinse measuring cups and put the rinse water into the system being treated.

- Triple-rinse pesticide containers (if applicable) as soon as they are emptied—residues can dry and become difficult to remove later. Pour the rinsewater into the application equipment being used to avoid disposal problems and product waste. Replace container caps and close bags. Return them to the pesticide storage area.
- Equipment should be operational and calibrated before filling and using.
- When adding water to a spray mixture, make sure the water hose remains above the level of the mixture, never contacting it. This prevents contamination of the hose and avoids the possibility of back-siphoning the pesticide into the water source.
- Never leave equipment unattended while it is being filled.



If squeeze bottles are used for application equipment, be sure to label the bottle, stating its contents and its use. Triple-rinse the bottle when the application is complete.

- Chemical residues can cause incompatibility problems—always clean application equipment after use.

Keep in mind that water characteristics influence the effectiveness of some pesticides. Alkaline water, for example, leads to chemical breakdown of many pesticides, including organophosphates and carbamates. The recommended water pH for mixing most pesticides is between 5.0 and 7.0. Buffers and acidifying agents can be used to adjust the pH of the water.

STORE PESTICIDES SAFELY

Proper pesticide storage helps prolong chemical shelf life while protecting the health of people, animals and the environment. A number of conditions are essential for safe pesticide storage. Consult the pesticide product label for specific storage information. Other storage guidelines are presented in the following sections.

Storage Area

Keep all pesticides out of the reach of children, pets and careless adults. Store pesticides in a locked, secure place, such as a separate building or storage room. Around the home, the same rule applies—lock them up. A storage area should be located where water damage is unlikely to occur. Soil and land surface characteristics should be considered when constructing a storage facility to prevent contamination of surface or groundwater by drainage, runoff or leaching. In certain situations, dikes may be warranted. For pesticide storage outdoors, erect a fence to prevent unauthorized entry and reduce the chance of theft and vandalism. In addition:

- Post highly visible warning signs on walls, doors and windows to indicate to anyone attempting to enter the facility that pesticides are stored there. Also post “No Smoking” signs.
- Keep storage areas locked.
- Store pesticides away from food, feed, potable water supplies, veterinary supplies, seeds and protective equipment. This prevents contamination from fumes, dusts or spills, and reduces the likelihood of accidental human or animal exposure.
- Ventilate the storage area and keep it relatively free from temperature extremes. Very high or low temperatures can cause pesticide deterioration. Exhaust fans directed to the outside reduce the temperature and dust or

fume concentrations. Fireproof construction with a sealed cement floor is the best.

- Keep pesticides cool, dry and out of direct sunlight.
- Keep plenty of soap and water available in or close to the storage area. A fire extinguisher approved for chemical fires, first aid equipment and emergency telephone numbers should all be readily available.
- Store volatile pesticides separately to avoid possible cross-contamination of other products.

Pesticide Containers

Store pesticides in their original containers only. Do not use soft drink bottles, fruit jars or other types of non-pesticide containers. Serious poisonings could result because small children as well as most adults associate the shape of a container with its contents.



Never store pesticides in food or beverage containers. They may be swallowed accidentally.

If other containers are used as application devices, such as squeeze bottles or empty, clean detergent bottles, measure only the amount needed for that application, and clearly label the container with the product being used. Have complete label information readily available. When the application is complete, triple-rinse the container that was used for the application. These containers should be labeled, "For Pesticide Use Only." One container, one usage. Remember, mix only the amount you will use for the application being performed.

Keep the original label attached to the container. To keep a label legible, protect it with transparent tape or lacquer. Remember, the label is the most important safety factor in the use of pesticides—do not let it become damaged or destroyed.



Containers should be used for only one purpose and labeled to identify their contents.

Never lend a pesticide in an unmarked or unlabeled container. Those who use the pesticide should not rely on verbal directions. Close containers securely when not in use. Dry formulations tend to cake when wet or subjected to high humidity. Opened bags of dry formulations can be placed into sealable plastic bags or other suitable containers. This reduces moisture absorption by the material and prevents spills should a tear or break occur.

If wall units are used to hold and meter bulk product, they must be labeled to identify what they contain. Complete label information must be readily accessible. If these wall units hold more than one product in separate compartments, there should be a separate discharge line for each product. Using one line for all products results in cross-contamination because there is no method for flushing the line between product selection and use.

Store liquid formulations and small containers of dry formulations on metal shelving. Metal shelving does not absorb spilled pesticides and is easier to clean than other surfaces.

Store pesticides in the original containers, under cool conditions, on lower shelves. Too much heat can cause the container to break or explode. Containers should not extend beyond the edge of the shelf where they could be bumped or knocked off.

Check containers regularly for leaks or breaks. If a leak or break occurs, place the container inside another container, or transfer the contents to an empty container that originally held the same material and has the same label attached.

Shelf Life of Pesticides

Keep an inventory of all pesticides in storage and mark each container with the purchase date.

If a product has an effective shelf life recorded on the label, you will know how long the product should remain usable. If doubts or questions about the shelf life of a pesticide, call the dealer or manufacturer. Pesticide deterioration may be apparent during mixing as excessive clumping, poor suspension, layering or abnormal coloration. Sometimes, however, pesticide deterioration from age or poor storage conditions is apparent only after application—poor pest control can occur.

To minimize storage problems, buy only as much as you anticipate needing for the season. Keep records of previous usage to make good estimates of future needs.

Reporting Requirements

Title III of the federal Superfund Amendments and Reauthorization Act of 1986 (SARA) is also called the Emergency Planning and Community Right-to-Know Act. This Act requires, among other things, the reporting of inventories of certain pesticides if the amount stored is greater than a “threshold planning quantity” (see Chapter 1, Pesticide Laws and Regulations.) It is good policy to inform your local fire department if you store chemicals. Chemical fires usually cannot be extinguished by ordinary means, and the smoke from the fire can be extremely hazardous to firefighters. The fire department must be properly prepared in the event of a chemical fire. For more information on these requirements, see Michigan State University Extension bulletin E-2173 or contact the MDNR Title III office at (517) 373-8481.

DISPOSE OF PESTICIDES SAFELY

The pesticide user is responsible for proper disposal of pesticide wastes, such as unused chemicals and empty pesticide containers. In recent years, concern has been growing that improper disposal of pesticide wastes can create serious hazards for both humans and the environment. Empty pesticide containers are a hazard to curious children and animals. Improperly disposed of pesticides and rinse water can result in ground-water contamination and plant damage.

It makes good business sense to deal with pesticide wastes properly and safely. Plan carefully and observe the following guidelines:

- Avoid disposal problems associated with excess pesticide by mixing only the amount needed for one application or one series of applications needed to manage a given pest problem.

- Always read the label for disposal instructions.
- Clothing and protective equipment to be discarded, and contaminated soil or other materials used to clean up spills, should be considered pesticide waste and handled as such.
- Federal and state laws regulate the disposal of containers and other pesticide wastes. Anyone requiring assistance with pesticide disposal should contact the Michigan Department of Natural Resources (MDNR) Waste Management Division at (517) 373-2730.

Cleaning and Disposing of Containers

Triple-rinsing or high-pressure rinsing (power-rinsing) allows glass, metal, plastic and even some heavy paper containers to be considered nonhazardous waste. It also saves money because each rinse captures pesticide residues from the sides and bottom of the container that can be included in the application and not wasted.

Properly rinse pesticide containers at the time they are emptied—residues can dry and become difficult to remove later.

To **triple-rinse**, wear protective clothing and follow these steps:

1. Allow the concentrate to drain from the empty pesticide container for 30 seconds.
2. Fill approximately 10 percent of the container volume with water, replace the lid and rotate the container so all the interior surfaces are rinsed.
3. Put the rinsewater into the spray equipment and use it as part of the application, allowing the container to drain for at least 30 seconds.
4. Repeat the procedure two more times.

Power-rinsing is an effective way to make a pesticide container nonhazardous. Power-rinsing requires the use of a special nozzle that directs high-pressure water into the container. Check with your local chemical dealer for availability. Studies have indicated that power-rinsing may be up to 300 percent more effective than triple rinsing and can take less time.

To **power-rinse**, wear protective clothing, especially gloves and goggles or face shield, and follow these steps:

1. Allow the concentrate to drain from the empty pesticide container for 30 seconds.
2. Push the pointed pressure-rinse nozzle through the bottom of the pesticide container while holding it over the spray tank or water system being treated.

3. Power-rinse the container for 30 seconds, allowing the rinsewater to drain into the spray tank or water system being treated.

4. Triple-rinse the container cap with a slower flow of water, capturing the rinsewater in the spray tank or water treatment system.

Triple- or power-rinsed containers that will be held for disposal at a later time should be marked to indicate triple- or power-rinsing has been done and the date. Pesticide containers that will not be recycled through a recycling facility or the dealer should be rendered unusable by breaking, puncturing or crushing. Never reuse pesticide containers. Keep all containers in the locked storage area until disposal, away from all possible contact with children and animals.

Disposal of triple-rinsed or power-rinsed containers in a sanitary landfill is permissible, but it is a good policy to check with your local solid waste authority before discarding pesticide containers there.

Whenever feasible, recycle triple- or power-rinsed containers. For information on recycling facilities, contact the MDNR Waste Management Division at (517) 373-2730 or the MDA at (517) 373-1087.

Commercial applicators should be aware of the current hazardous waste guidelines established under the federal Resource Conservation and Recovery Act (RCRA) as well as state hazardous waste statutes (Act 64) before disposing of pesticide wastes. Pesticide wastes classified as hazardous require special disposal and recordkeeping practices. The MDNR Waste Management Division, (517) 373-2730, can provide more information on the RCRA and your specific disposal responsibilities under the law.

Follow disposal instructions on the label; seek assistance with disposal problems!

TRANSPORT PESTICIDES SAFELY

Once a pesticide is in your possession, you are responsible for its safe transport. Accidents can occur even when transporting materials a short distance. Do all you can to prevent a transport problem, but be prepared if an emergency should arise.

Transport Vehicle

The safest way to carry pesticides is in the back of a truck. Flatbed trucks should have side and tail racks. Never carry pesticides in the passenger compartment of a vehicle: hazardous fumes may be released and spills may cause injury and be

impossible to remove from seats. If pesticides are transported in a station wagon, windows should be open and no one should be permitted to ride near the pesticides. Never carry pesticides in the same compartment with fertilizers, seed, food or feed—the risk of contamination is too high should a spill occur.

Pesticide Containers

Inspect containers before loading to be sure all caps and plugs are tightly closed and legible labels are attached. Be sure the outside surfaces of the containers are not contaminated with pesticide. Secure containers to safeguard against spills or leaks that may result if the containers roll or slide.

Protect pesticides from temperature extremes during transport. In hot weather, for instance, the temperature inside the trunk of a car is always considerably higher than the temperature outside.

Never leave your vehicle unattended when transporting pesticides in an unlocked trunk compartment or open-bed truck. You are legally responsible if curious children or careless adults are accidentally poisoned by pesticides left unattended and exposed in your vehicle. Whenever possible, transport pesticides in a locked compartment.

Never eat, drink or smoke when handling pesticides, even if containers are intact and tightly sealed. Wash your hands thoroughly when you finish.

PESTICIDE FIRE SAFETY

Pesticide products vary significantly in their flammability and storage hazard. Those requiring extra precautions bear the label statement, “Do not use or store near heat or open flame.”

To reduce fire hazards:

- Locate storage areas as far as possible from where people and animals live.
- Keep storage area locked at all times.
- Store combustible materials away from steam lines and other heating systems.
- Do not store glass containers in sunlight where they can concentrate heat rays and possibly explode or ignite.
- Keep a fire extinguisher approved for chemical fires in all storage areas.
- Notify the servicing fire company of the location and contents of the storage area. It may save firefighters lives and the lives of others if a fire occurs.

In the Event of a Pesticide Fire:

- Clear all persons from the area to a safe distance upwind from the smoke and fumes.
- Call the fire department and inform the firefighters of the nature of the pesticides involved. Material Safety Data Sheets (MSDS), which provide technical and emergency information are available from chemical dealers.
- Firefighting personnel must bring and wear the proper protective clothing and equipment (especially respirators). Assume all

protective gear worn at the fire scene is contaminated and hazardous until it is washed.

- Be aware of the potential for explosion of overheated pesticide containers. Nearby containers should be moved or kept cool.
- The principal objective is to contain the fire and prevent contamination of surrounding areas. Use only as much water as is absolutely necessary. Avoid using heavy hose streams and build necessary dikes to prevent flow of contaminated runoff into lakes, ponds, streams, wells or sewers.

Chapter 6 – Review Questions

Write the answers to the following questions, and then check your answers with those in the back of this manual.

1. A safe way to open a bag containing pesticides is to tear it open. True or False?
2. The recommended water pH for mixing most pesticides is between _____ and _____.
3. List some of the desirable characteristics of a pesticide storage area.
4. Pesticides should be stored in:
 - a. any convenient container.
 - b. their original containers.
 - c. containers too heavy for children to handle.
 - d. any container as long as it is tagged with the name of the contents.
 - e. none of the above.
5. Pesticides should be stored on metal shelving because metal will not absorb spilled pesticides and is easier to clean than other surfaces. True or False?
6. Why should you keep an inventory of pesticides and mark purchase dates on the container?
7. List some of the clues that show a pesticide has deteriorated.
8. What is the best way to get rid of a registered pesticide?
9. How do you triple-rinse a container?
10. Whom do you contact for assistance with disposal problems?
11. If a poisoning incident occurs from a pesticide you are transporting, you will not be liable. True or False?

12. What is the safest way to transport pesticides?
13. You are legally responsible if a curious child or adult is accidentally poisoned from pesticides left unattended. True or False?
14. What types of pesticides are most likely to be flammable and have the following statement on their label: "Do not use or store near heat or open flame?"
15. List three precautions you could take to prevent fire hazards.
16. What should you do first in the event of a pesticide fire?