Reducing Pesticide Waste

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Introduction

Pesticide use in the United States increased from 200,000 pounds per year in the 1950s to more than 1 billion pounds per year by 1987. The dramatic increase in pesticide use creates difficulties in safe and proper disposal of pesticide-related wastes. Pesticides are largely responsible for the abundant and high-quality food supply in the United States. However, if handled or applied improperly they may harm the environment or lead to contamination of surface and ground water resources.

Recent studies indicate that improper handling and disposal of pesticide waste are responsible for most contamination cases. Pesticide waste results from unused pesticide products, excess spray mixture, unrinsed containers, and rinse water from containers and equipment. The best strategy for dealing with waste is to eliminate the source of the waste. However, any reduction in pesticide waste will help protect water resources from pesticide contamination. Substantial reductions in pesticide waste can be accomplished legally, responsibly, and economically.

Listed below are recommendations for reducing pesticide waste, including information on the most common causes of excessive waste.

1. Follow IPM Practices

The first step in reducing pesticide waste is to determine how much pest damage can be allowed before pesticide use is warranted. Examine alternative control practices before purchasing pesticides. The need for pesticides, and, consequently, the risk of surface and ground water contamination, can be reduced through Integrated Pest Management (IPM) practices such as scouting, crop rotation, fallowing, planting resistant cultivars, alternating pest control products, and considering economic thresholds. Many row-crop growers are reexamining the costs and benefits of mechanical cultivation for controlling weeds. Studies indicate that a combination of mechanical cultivation and banding herbicides provides adequate weed control while greatly reducing pesticide use.

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2. Purchase Only What You Need

Avoid problems with unused products (undiluted pesticide concentrate) by checking your storage area each year before purchasing chemicals. Buy only the amount of pesticide you will use in one growing season. Store unused pesticides properly for use the following season.

3. Improve Application Accuracy

Check the accuracy of your sprayer periodically to make sure you are applying the amount recommended on the pesticide label. Guidelines established by the U.S Department of Agriculture and the Environmental Protection Agency indicate that the difference between a sprayers actual application rate and intended application rate should not exceed 5 percent of the intended rate. However, surveys conducted in various locations in the USA indicate that only one out of four sprayers are applying chemicals with application errors less than 5 percent.

4. Eliminate Leftover Spray Mixture

Avoid leftover diluted pesticide in your spray tank following a pesticide application. A few simple calculations can be used to determine the amount of spray mixture needed to spray a field of a known size. Follow these steps to determine the amount of water and pesticide concentrate you need to add to the tank:

1. Determine the area to be sprayed (hectares, square meter etc.)
2. Multiply this area by the application rate of the sprayer to find the amount of spray mixture needed in gallons.
3. Multiply the area to be treated by the pesticide rate to determine the amount of pesticide you must add to the tank.

Example

A sprayer has been calibrated to apply 60 liters of spray mixture per hectare. The pesticide label recommends 2 liters of commercial product per hectare for broadcast application. Determine how much water and pesticide must be added to cover 10 hectares.

Spray Mixture Needed = Spray Output (Liter/Ha) x Hectares to be Sprayed

= 60 L/ha x 10 hectares = 600 liters of spray mixture needed

Amount of Pesticide Needed = 10 hectares x 2 L/ha = 20 Liters

So, if the total solution should be 600 liters, the final mixture should contain 580 liters water and 20 liters of pesticide formulation.

5. Rinse Containers Immediately

Concentrated pesticide residues leaking from unrinsed, discarded containers can cause significant environmental contamination. Up to 0.1 liter of pesticide may be left inside a 20 liter container after normal emptying. Depending on product cost, proper container rinsing could save significant money in pesticide cost alone. Containers should be rinsed immediately after they are emptied because dried residue is difficult to remove.

Triple rinsing is the most common procedure for rinsing containers. It involves filling each container at least one-quarter full with water, replacing the lid, shaking the container, and then emptying the liquid from the container into the spray tank. This is done three times with each container. A new approach, pressure rinsing, allows containers to be rinsed while pesticides are emptied into the spray tank. Special nozzles attached to a garden hose are used to puncture plastic and metal containers. When turned on, the nozzle produces a forceful spray inside the empty container. By holding the container over the opening of the spray tank or holding tank while rinsing, the rinse water can be captured as it drains from the container spout. It takes a few minutes to properly triple rinse a container, but less than a minute to pressure rinse. The amount of rinsate generated is also reduced with the pressure-rinsing method.

6. Reduce Rinsate

Spray equipment requires periodic cleaning and rinsing to keep vital components in good working condition and when changing from one pesticide to another. Improper management of rinsate has great potential for contaminating surface and ground water. The best way to eliminate this problem is to perform all interior and exterior rinsing in the field immediately following the application. Equipment may also be rinsed at a modern pesticide mixing and loading facility equipped with a concrete rinse pad and rinsate-collection pit. However, disposal of the rinsate collected in the pit could become a major problem. This is why it is important to reduce the amount of rinsate to a minimum.

If possible, reuse the rinsate when preparing the next batch of tank mixture. Make sure all the dirt and debris in the rinsate are filtered out before adding the rinsate to the spray tank. The small amount of solids left in the collection pit should be dried and taken to a hazardous waste disposal site or spread evenly over a large part of the field.

7. Modify Spraying Equipment

Take advantage of technological advancements in pesticide application equipment design, and modify your equipment to improve application efficiency while reducing pesticide waste.

Recent developments in pesticide application equipment allow for safer operation and less risk to the applicator and the environment. For example, sprayers with in-line pesticide-injection systems eliminate leftover tank mixtures. With these systems, the

pesticide and water are kept in separate tanks. A separate metering pump feeds the pesticide into the spray line. Any excess water is left in the water tank, and excess pesticide remains in the pesticide tank.

Many new sprayers are equipped with a small tank that holds clean water to rinse out the sprayer tank in the field. Immediately following the application, clean water can be pumped into the large spray tank, and the rinse water can be sprayed over the target field, provided registered rates are not exceeded and application is consistent with label directions.

Research is under way to develop new equipment and methods that will further improve application efficiency. For example, researchers are developing systems that automatically adjust pesticide rates according to the amount of organic matter in the soil. This system operates on the principle that lighter soils, which are low in organic matter, require less pesticide than darker soils.

Some studies indicate that ultra-low volume (ULV) pesticide applications using electrostatic nozzles provide satisfactory insect control at half the rate recommended for conventional spraying. Such techniques mean greater pesticide efficiency and less pesticide consumption, which results in reduced pesticide waste.

8. Choose Pesticides Packaged In Returnable/Refillable Containers

Many agricultural chemical companies have developed new pesticide packaging to protect users from exposure and reduce pesticide waste. For example, minibulk containers, ranging in volume from about 40 to 600 gallons, have become increasingly popular over the last few years. Minibulk containers reduce the number of small containers, which are major sources of pollution. Minibulk tanks usually are returned to the dealer for refilling or for deposit. Nearly every major company offers a minibulk for one or more of its products.

While some companies are promoting small-volume returnable containers, others are trying to eliminate the container altogether. One company has pressed dry pesticide into an effervescent tablet that can be broken into small parts for reduced applications or used whole at full strength for normal applications. Another company is packaging pesticides in small water-soluble pouches that improve safety in normal handling and eliminate problems with container rinsing and disposal.

Some equipment manufacturers and agricultural chemical companies are joining forces to reduce pesticide waste and improve applicator safety. Returnable chemical containers are being designed to fit directly into a valve on the lid of a planter's pesticide hopper. This reduces the risk of the applicator inhaling pesticide dust, which is a recurrent problem with conventional dry granular pesticide packaging.

Summary

Pesticides are likely to remain the primary means for controlling pests for many years. They play an important role in producing the abundant high-quality food we all enjoy. However, improper handling, application, or disposal of pesticides poses substantial danger to human health and the environment. There is no practical and cost-effective way to dispose of pesticides. Although pesticides are considered hazardous wastes and should be disposed of at hazardous waste disposal sites, this type of disposal is not a long-term solution. The best strategy for dealing with any waste is elimination. Hence, any reduction in pesticide waste is a positive step toward protecting the environment from contamination. This publication presents several practices that will help reduce or eliminate pesticide waste.