

Description

Pesticides, herbicides, fertilizers, fuel and other landscape maintenance chemicals must be properly applied, stored, handled and disposed of to prevent contamination of surface water and groundwater. Misuse of pesticides and herbicides can result in adverse impacts to aquatic life, even at low concentrations. Misuse of fertilizer can result in increased algae growth in waterbodies due to excessive phosphorus and nitrogen loading.



Photograph PHF-1. Pesticide, fertilizer, and herbicide applications should be applied in the minimum quantities necessary to achieve specific landscaping objectives, while keeping chemicals out of storm drain systems. Photo courtesy of WWE.

Appropriate Uses

This BMP applies to both commercial and municipal landscaping operations, as well as to homeowners and homeowner associations. For commercial operations, the scale of chemical usage and handling is greater; therefore, additional measures are often required under federal and state law.

Practice Guidelines¹

Public education regarding appropriate landscape chemical application and handling is an important action that local governments can take to reduce the likelihood that landscape chemicals are washed into storm drains and receiving waters through runoff. Local governments can make landscape care information available on websites, in utility mailers, lawn care centers, and other locations. A variety of professional organizations for lawn care professionals already exist and can be contacted for additional information or partnered with for both public education and landscape professional educational efforts and certification programs (See www.ext.colostate.edu and www.greenco.org).

General Guidelines for Pesticide, Herbicide, and Fertilizer Application

- Apply fertilizers, pesticides, and other chemicals according to manufacturer's directions. The label is the law for pesticide usage. Apply pesticides and herbicides only when needed and use in a manner to minimize off-target effects. See the Landscape Management Fact Sheet for fertilizer application guidelines.
- Accurately diagnose the pest. Disease and insect symptoms can mimic each other in many plants. A fungicide will not control an insect, and an insecticide will not control a disease.
- Be aware that commercial chemical applicators must receive thorough training, licensure and proper certification prior to chemical use. Consult Colorado Department of Agriculture (CDA) Regulations for specific requirements.

¹ These practice guidelines have been adapted from the *GreenCO Best Management Practices for the Conservation and Protection of Water Quality in Colorado: Moving Toward Sustainability* (GreenCO and WWE 2008). See that manual for additional detail and references.

S-8 Use of Pesticides, Herbicides and Fertilizers

- Know characteristics of the application site, including soil type and depth to groundwater to avoid migration of chemicals into groundwater.
- Select pesticides and herbicides best suited to the characteristics of the target site and the particular pest or weed. Half-life, solubility, and adsorption should be compared to site characteristics to determine the safest chemical. Choose least toxic and less persistent sprays whenever possible based on comparison of labels and associated material safety data sheets.
- Employ application techniques that increase efficiency and allow the lowest effective application rate. Carefully calibrate application equipment and follow all label instructions.
- Recognize that it is not realistic for a landscape to be completely pest-free or weed-free. Consider using Integrated Pest Management (IPM) strategies to minimize chemical usage.
- Keep pesticide and fertilizer equipment properly calibrated according to the manufacturer's instructions and in good repair. Recalibrate equipment periodically to compensate for wear in pumps, nozzles and metering systems. Calibrate sprayers when new nozzles are installed.
- All mixing and loading operations must occur on an impervious surface.

Integrated Pest Management (IPM)

Integrated pest management (IPM) (also known as Plant Health Care) is the practice of using targeted biological, chemical, cultural, and physical measures to manage pests while minimizing or eliminating the use of chemical pesticides. IPM measures benefit the landscape and help reduce the likelihood that lawn chemicals will be washed into storm drainage systems in stormwater runoff. The pros and cons of various tools should be weighed and used in an integrated manner to achieve pest control objectives in a safe, effective, and cost-effective manner. Basic IPM practices that can be adopted include:

- Consider spot treatments of pests rather than treating the entire area.
- Consider pest occurrence and history when developing pest management strategies.
- Time pesticide application to minimize host plant damage and maximize pest control.
- Rotate annual garden plants to reduce the buildup of soil-borne pests. Clean up plant litter and remove weeds before they go to seed. Remove infested plant residue from the garden in the fall so that pests do not over-winter there.
- Implement cultural controls such as proper plant selection, planting time, and planting method to reduce susceptibility to insects, pests, and diseases, thereby reducing pesticide usage.
- Implement mechanical and physical controls where practical as an alternative to chemical application. Examples include a wide variety of practices such as "collars" around seedlings, mulching, solar heating, syringing, handpicking, mowing, hoeing, and traps.
- Use biological controls where appropriate to reduce pesticide usage. For example, introduce natural enemies of pests such as lady beetles and green lacewings. (Note: pesticides may kill these natural enemies.)
- Consider applying environmentally friendly chemical alternatives such as insecticidal soaps, horticultural oils, and other such measures when practical and effective and when mechanical approaches are impractical.

Application Practices

- Keep records of pesticide application and provide signage as required by law.
- Do not apply pesticides or herbicides during high temperatures, windy conditions or immediately prior to heavy rainfall or irrigation.
- Treat for and control noxious weeds prior to installing the landscape using an herbicide targeted to the weeds that are present and applied in accordance with the product label.
- Be aware that some pesticide formulations are not compatible with other pesticides and combining them may result in increased potency and phytotoxicity.

Managing Mosquitoes in Stormwater Facilities

(Adapted from: Peairs and Cranshaw 2007)

The key to mosquito control is larval management. Larvae occur in specific areas and can be controlled by modifying the habitat through drainage or insecticides applied to larval breeding sites. Weekly mosquito inspections at stormwater facilities with targeted treatments are frequently less costly and more effective than regular widespread application of insecticides. These inspections can be performed by a mosquito control source and typically start in mid-May and extend to mid-September. Mosquito control measures must be cost effective and environmentally sound. Consider alternatives before application of conventional chemical insecticides.

- **Habitat Modification:** Eliminating breeding sites, or habitat modification, is an effective and long-term solution. Proper maintenance of stormwater BMPs to avoid shallow standing water is important.
- **Natural Predators:** Fish, dragonfly nymphs, and diving beetles are natural predators of mosquito larvae; dragonflies, birds, and bats feed on adults. Consult the Colorado Division of Wildlife for recommendations, restrictions and regulations regarding mosquito-eating fish.
- **Insecticides:** Microbial insecticides such as the bacteria "Bti" (*Bacillus thuringiensis israeliensis*) can be as effective as chemical insecticides. Bti is toxic only to mosquito and midge larvae. It is not hazardous to non-target organisms but can reduce midge populations that serve as fish food.

"Soft" chemical insecticides, such as the insect growth regulator methoprene, are toxic only to insects and other arthropods. They are similar to certain insect hormones and create imbalances in the levels of hormones needed for proper mosquito growth and development. They do not directly harm fish or other wildlife but can reduce the amount of available food.

Mosquito larvae also can be controlled by the application of larvicidal oils or chemical insecticides to the water where they occur or are suspected to occur. Remember, several alternatives to conventional chemical larvicides have been developed because of concerns about applying chemicals to water that might be used for drinking or that contains fish and other aquatic life.

If larval control fails, adult mosquito control may be necessary. Adult control generally is done with insecticide applications using ground equipment or aircraft. For more information visit:

www.ext.colostate.edu/westnile/mosquito_mgt.html or www.ext.colostate.edu/westnile/faq.html.

S-8 Use of Pesticides, Herbicides and Fertilizers

- Maintain a buffer zone around wells or surface water where pesticides are not applied. Consult local regulations and landscape ordinances, as well as the product label, for distances, which may vary depending on the type of chemical and the sensitivity of the waterbody. The purpose of this practice is to keep pesticides and herbicides out of surface waterbodies.

Storage Practices

- Storage areas should be secure and covered, preventing exposure to rain and unauthorized access. Commercial and municipal facilities should provide basic safety equipment such as fire extinguishers, warning signs (e.g., "no smoking"), adequate light and ventilation, and spill clean-up materials should be present. Floors and shelves should be non-porous (e.g., metal, concrete) to prevent sorption of chemicals. If possible, temperature control should be provided to avoid excessive heat or cold. Storage areas should be kept clear of combustible material and debris.
- Commercial operations handling large quantities of pesticides and fertilizers should consult the Colorado Department of Agriculture for storage and handling requirements. Commercial greenhouses and nurseries that are storing recycled water laden with fertilizer may need to provide secondary containment to contain the water in the event of a tank rupture or leak.
- Store chemicals in their original containers, tightly closed, with labels intact. Also inspect them regularly for leaks. Store nitrate-based and other oxidizing fertilizers separately from solvents, fuels, and pesticides to reduce fire risk. Follow the general principle of storing like chemicals together. Dry chemicals should be stored above liquids and on pallets to ensure that they do not get wet.
- Locate chemical storage and maintenance areas, as well as vehicle refueling and maintenance areas, away from wells and surface waterbodies in accordance with local regulations, typically at least 50 to 100 feet away.

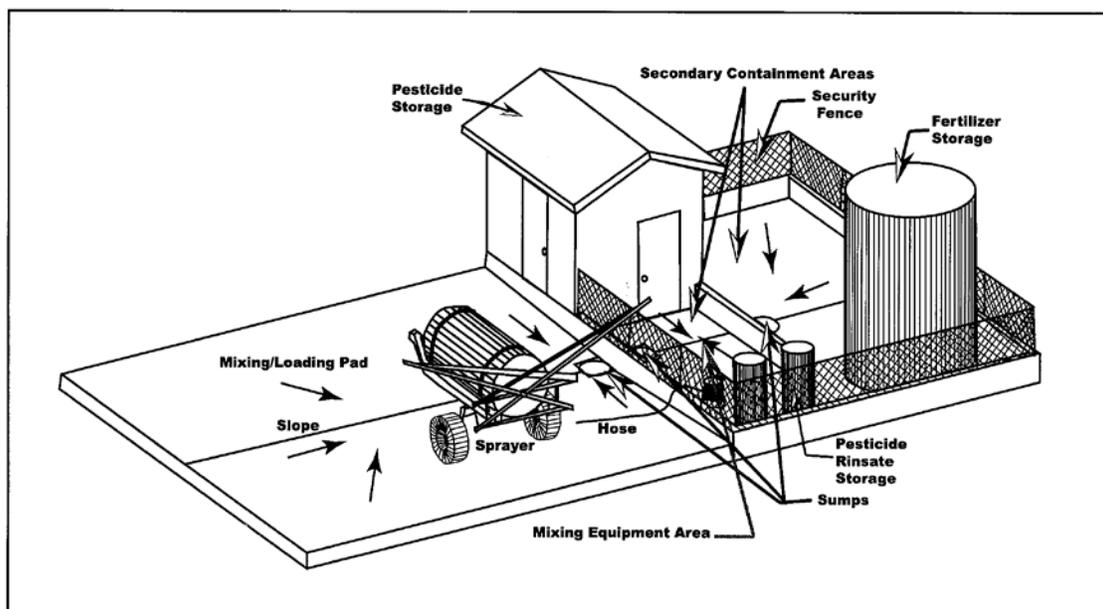


Figure PHF-1. Example Combined Pesticide and Fertilizer Storage and Mixing Area. Figure courtesy of *Designing Facilities for Pesticides and Fertilizer Containment*, Midwest Planning Service, Agricultural Engineering, Iowa State University 1991.

- Make available all Material Safety Data Sheets (MSDSs) in a readily accessible area. A list of all hazardous chemicals in the work place must be completed to ensure that all MSDSs are readily available.
- Do not store large quantities of pesticides for long periods of time. Adopt the "first in, first out" principle, using the oldest products first to ensure that the shelf life does not expire. Buy smaller quantities of pesticides and fertilizers, thereby reducing storage issues.

Spills and Disposal

- Never pour lawn and garden chemicals or rinse water down storm drains (or sanitary drains) and keep chemicals off impervious surfaces (e.g., streets, gutters) during application.
- Follow label directions for disposal. This typically involves triple-rinsing empty containers, puncturing and crushing. All visible chemicals should be cleaned from the container prior to disposal. Use local recycling or hazardous waste collection centers to dispose of unused chemicals.
- Properly manage chemical spills by cleaning them up as soon as possible, controlling actively spilling or leaking materials, containing the spilled material (e.g., with absorbents, sand), collecting the spilled material, storing or disposing of the spilled material, and following relevant spill reporting requirements. "Washing down" a spill with water is not an appropriate cleanup approach.
- Commercial operations should be aware of and comply with basic spill reporting requirements required by law, and keep chemical spill cleanup equipment, personal protective equipment and emergency phone numbers available when handling chemicals and their containers.

For More Information on Legal Requirements

Many federal and state regulations address pesticide, herbicide, and other chemical usage. These sources should be consulted for the most current legal requirements related to chemical handling, storage, application, disposal, and reporting of chemical spills. Examples include the federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the Superfund Amendments and Reauthorization Act (SARA), the Emergency Planning and Community-Right-to-Know Act (EPCRA), and Occupational Safety and Health Administration (OSHA) requirements, particularly the Hazard Communication Standard. Colorado-related regulations include the Colorado Pesticide Applicator's Act, and the Colorado Water Quality Control Act (25-8-601 and 25-8-606), Senate Bill 90-126, and The Agricultural Chemicals and Groundwater Protection Act, which identifies special requirements for facilities handling more than 3,000 pounds (or 500 gallons) of bulk-formulated pesticides.