



---

# Source Water Protection Practices Bulletin

## Managing Small-Scale Application of Pesticides to Prevent Contamination of Drinking Water

---

Pesticides (including insecticides, herbicides, and fungicides) contain a variety of chemicals used to control pests, insects, and weeds. They are used in many applications to reduce the damage to plants by insects and other pests, and to control overgrowth of undesirable plant species. This fact sheet describes measures to prevent contamination of drinking water sources from small-scale pesticide application (i.e., on lawns, golf courses, cemeteries, parks, and roadways); see also the fact sheet on prevention measures for large-scale pesticide application for agricultural or farm conditions.

### SOURCES OF PESTICIDES

Pesticides are used in a variety of applications in areas with green spaces. They are used by homeowners, in commercial establishments such as golf courses and cemeteries, and along roadways. Homeowners use pesticides in lawn care and gardening activities. Many homeowners plant non-native plant species, which require pesticides, fertilizers, and watering to keep them healthy.



Golf courses and recreational areas such as parks and other open spaces use pesticides for similar purposes. Shorter grasses typical of golf courses are less resistant to insects and require application of pesticides to keep them healthy. Pesticides are also used to maintain lawns in cemeteries and commercial areas. Herbicides are used along roadways and transportation and utility corridors to limit vegetation growth and increase visibility for drivers or access to power lines.

Excess rain can wash pesticides from plants and soil. This can, in turn, run off into streams. Pesticides can leach into the soil if plants are watered or rainfall occurs soon after application. Some pesticides resist degradation by microbes in the soil and will eventually leach into the ground water. Pesticides can reach ground water through drains, sink holes, and other conduits as well.

### WHY IS IT IMPORTANT TO MANAGE SMALL SCALE APPLICATION OF PESTICIDES NEAR THE SOURCES OF YOUR DRINKING WATER?

Pesticides contain a variety of organic and inorganic compounds. By nature, they are poisonous, and while they can be safely used if manufacturers' usage directions are followed, they can, if

mismanaged, seep into surface water and ground water supplies. They can be difficult and expensive to remove, and, if inhaled or consumed, be hazardous to human health. The synthetic organic chemicals in pesticides have been linked to serious health problems, including cancer, liver and kidney damage, reproductive difficulties, and nervous system effects.

Once a water supply becomes contaminated with a pesticide, it can be very difficult and costly to treat. Treating the water supply is a lengthy process and is not always successful. Using an alternative water source may also be costly and impractical. For example, it would be very expensive to connect to another public water system, and drilling new wells does not necessarily guarantee that the new ground water source will not be contaminated.

## **AVAILABLE PREVENTION MEASURES TO ADDRESS SMALL-SCALE PESTICIDE APPLICATION**

Prevention measures are available to protect source water from pesticide contamination. They range from simple, common-sense activities (e.g., reading the label) to more complex activities such as properly storing and disposing pesticides. Most prevention measures for small-scale application of pesticides tend to be easy, low cost activities. The most effective pesticide contamination prevention measures encompass both simple and complex practices to reduce the potential for pesticides to move into source water. Prevention measures can be divided into those that protect surface water from pesticide runoff and those that protect ground water from leaching or percolation.

Please keep in mind that individual prevention measures may or may not be adequate to prevent contamination of source waters. Most likely, individual measures should be combined in an overall prevention approach that considers the nature of the potential source of contamination, the purpose, cost, operational, and maintenance requirements of the measures, the vulnerability of the source waters, the public's acceptance of the measures, and the community's desired degree of risk reduction. The following are the more conventional prevention measures used to avoid contamination from small-scale application.

There are many options available to minimize the need for pesticides. ***Integrated Pest Management (IPM)*** is the use of all means of pest control (chemical and non-chemical) in a compatible fashion to reduce pesticide use. Pesticides are the last line of defense and are used only when pest levels are causing sufficient damage to offset the expense of the application. IPM includes ***regular monitoring*** to check levels of pest populations and their damage to determine management needs, be it pesticide application or other management actions. Monitoring can be accomplished by a trained employee such as a facility manager. IPM also includes ***non-chemical control measures*** such as mechanical, cultural and biological controls, sanitation, and pesticide-resistant plants are highly recommended. Where possible ***alternate plants***, select ***pest-resistant plant varieties***, and mulch the gardens or flower beds to reduce weeds. Maximize the benefits of naturally occurring ***biological controls*** by using pesticides only when necessary. Many insecticides are broad spectrum materials and affect beneficial insects and other arthropods as well as pests. If pesticides must be used, select those that are designed specifically for the pests you wish to control, and are ***low-persistent*** in the environment.



Ladybugs are a natural control for aphids

## Proper Pesticide Application



**Reading the label** on the pesticide container is one of the simplest and most important prevention measures. The label indicates the proper use, rate of application, whether the pesticide is broad spectrum or selective (i.e., kills everything or only a certain type of insect), and proper handling of the pesticide. The label also provides information on proper storage and disposal, and emergency contact numbers, if accidentally ingested. In cases where the pesticide is highly toxic, the label will contain special warnings and use restrictions, such as *setbacks* for mixing and application away from wells or drinking water sources. Reading the label and following the directions will ensure that pesticides are *not over-used* and are used in a way that is *consistent* with the pest problem.

**Proper application** of pesticides reduces the amount of chemicals applied to the ground and saves landowners money by reducing the amount of pesticides purchased. Calibrate application equipment to allow correct application, follow pesticide manufacturers' directions, and select leaching-resistant or "slow release" pesticides. Apply in large droplets to resist carrying away by the wind. Mix and load pesticides only over impervious surfaces, such as cement, that do not contain floor drains or storm water drain inlets; these drains may convey spills to ground water sources. Check the pesticide label for pesticide application procedures; do not over-apply the pesticide.

Pesticides should not be applied immediately before or after rainfall, as this may cause soil runoff at the application site and the need to reapply the pesticide. The soil in the runoff can carry the pesticide to the local storm water drain, and contaminate local source waters.

### Ways to Reduce Pesticide Use

**Select healthy seeds** and seedlings that are known to resist diseases and are suited to the climate. Strong seeds are likely to produce mature plants with little need for pesticides. Planting pest-resistant plant varieties and local plant species will also reduce pesticide needs.

**Alternate your plants** each year; plants will not be vulnerable to the pests that survive the winter. Insects will move to another location where they can find nutrients, and weeds will remain dormant until their nutrient source is replenished.

**Manual activities** such as spading, hoeing, hand-picking weeds and pests, setting traps, and mulching are all good ways to get rid of pests without using pesticides.

Homeowners have a tendency to over-use pesticides, and should take care to use only what they need.

Proper **plant management** can improve plant health, reduce the need for pesticides, and reduce runoff and infiltration. Use mowing and watering techniques that maintain a healthy lawn and minimize the need for chemical treatment. Maintain proper drainage and aeration to encourage the growth of microbes that can degrade pesticides. Reduce watering to control seepage of pesticides to the ground water; this conserves water and reduces runoff.



Use of *biological controls* reduces the need for chemical pesticides. Plants that attract predatory species, such as birds and bats, can enhance landscaping and naturally reduce pests.

### **Proper Pesticide Storage and Handling**

*Proper storage* is important in preventing both surface water and ground water contamination. Store pesticides in intact containers in a shed or covered structure on an impermeable surface such as concrete. You must follow directions for storage on pesticide labels, although the directions are usually general, such as “Do not contaminate water, food, or feed by storage or disposal.” Do not store pesticides in areas prone to flooding. Keep pesticides in their original containers; if the label is unreadable, properly dispose of the product.



*Spill clean up* is another important prevention measure. Promptly sweep up dry spills and reuse the pesticides as intended; dry spills are usually easier to clean. For liquid spills, recover as much of the spill as possible and reuse it as intended. It may be necessary to remove some contaminated soil. Have cat litter or other absorptive materials available to absorb unrecovered liquid from the floor. Be sure to have an emergency contact number to call for help, if necessary. Be sure to check the label for proper handling of the chemicals.

*Disposal of pesticide containers* can lead to ground water contamination if the containers are not stored or cleaned properly. Chemical residues from these containers can leak onto the ground. Homeowners and other users may have smaller quantities of pesticides and empty containers and different disposal options than farmers.

Homeowners usually use nonreturnable containers, and have the option of participating in their local community household hazardous waste collection events. Partially-full and empty containers may be given to household hazardous waste collection. Homeowners should only triple rinse pesticide containers if they are able to use the rinse water immediately, e.g., on plants that require pesticides. Rinse water should never be disposed down a drain or into a sewer system. Recycle plastic and metal containers whenever possible, keeping in mind that non-hazardous container recycling programs may refuse to take pesticide containers. Empty containers may be disposed in regular trash. Shake out bags, bind or wrap them to minimize dust, and put them in regular trash. Do not bury or burn pesticide containers or bags on private property. Homeowners may give unused pesticides to a neighbor rather than throw them away.

Farmers and users of larger quantities of pesticides (e.g., golf course managers) may have larger quantities of pesticides to store and dispose, and are often prohibited from participating in community household hazardous waste collection events. To prevent ground water contamination, use returnable containers as often as possible and take them back to the dealer. For non-returnable containers, pressure-rinse or triple-rinse containers immediately after they are empty, since residue can be difficult to remove after it dries, and apply the rinse water appropriately (i.e., on plants that require pesticides). Most States have collection programs for farmers and other pesticide users with unwanted pesticides, often referred to as Clean Sweep programs. Many States also have pesticide container and recycling programs. Puncture nonreturnable containers and store them in a covered area until they can be disposed according to your State’s guidelines. Shake out bags, bind or wrap them to minimize dust, and take them to a permitted landfill. Do not bury or burn pesticide containers or bags on private property. Contact your State Department of Agriculture or Department of Environmental Quality for information. If containers are full or partially full and the pesticide is in good condition, it may be given to another pesticide user. However, if the pesticide is labeled a restricted use pesticide, it can only be distributed and used by certified applicators.

## FOR ADDITIONAL INFORMATION

These sources contain information on pesticide management measures. All of the documents listed are available for free on the Internet. Contact local government authorities in your area to see if there are ordinances in place to manage pesticides.

AgSafe Coalition. *Safely Handling Pesticides*. Retrieved February 15, 2001, from the World Wide Web: [http://www.agsafe.org/series\\_1/pesticide.html](http://www.agsafe.org/series_1/pesticide.html).

California Environmental Protection Agency, Department of Pesticide Regulation. *Tips for Handling Pesticides Safely*. Retrieved March 12, 2001, from the World Wide Web: <http://www.cdpr.ca.gov/docs/factshts/safeuse.htm>.

EXTOXNET FAQs. *Pesticides: How They Affect You and The Environment*. Retrieved March 8, 2001, from the World Wide Web: <http://ace.orst.edu/info/extoxnet/faqs/>.

Florida Department of Agriculture and Consumer Services and Florida Department of Environmental Protection. Best Management Practices for Agrichemical Handling and Farm Equipment Maintenance. (1998, May) Retrieved May 30, 2001, from the World Wide Web: [http://www.dep.state.fl.us/water/slerp/nonpoint\\_stormwater/documents/pubinfo.htm#Best Management Practices](http://www.dep.state.fl.us/water/slerp/nonpoint_stormwater/documents/pubinfo.htm#Best Management Practices)

Home\*A\*Syst. *National Home\*A\*Syst Program*. Retrieved May 22, 2001, from the World Wide Web: <http://www.uwex.edu/homeasyst/index.html>.

Massachusetts Department of Food and Agriculture, Pesticide Bureau. *A Homeowner's Guide to Environmentally Sound Lawncare*. Retrieved June 4, 2001, from the World Wide Web: <http://www.massdfa.org/pesticides/publications/homeowner.htm>

Massachusetts Department of Food and Agriculture, Pesticide Bureau. Pesticide Storage and Handling Practices in the home. Retrieved June 15, 2001, from the World Wide Web: [http://www.massdfa.org/pesticides/publications/publications\\_storage\\_home.htm](http://www.massdfa.org/pesticides/publications/publications_storage_home.htm)

Massachusetts Department of Food and Agriculture, Pesticide Bureau. *Storage, Mixing and Loading of Pesticides: Guidelines*. Retrieved May 30, 2001, from the World Wide Web: <http://www.massdfa.org/pesticides/waste/index.htm>

National Pesticides Telecommunications Network. *Pesticide Fact Sheets*. Retrieved June 4, 2001, from the World Wide Web: <http://nptn.orst.edu/nptnfact.htm>

Natural Resources Defense Council. *Pesticide Exposure and Toxicity to Infants and Children*. March 1998. <http://www.nrdc.org/health/kids/cdw0398.asp>.

New England Interstate Water Pollution Control Commission. *Source Protection: A Guidance Manual for Small Surface Water Supplies in New England*. March 1996.

Pesticide Watch. *Pesticides and Human Health*. Retrieved March 12, 2001, from the World Wide Web: <http://www.pesticidewatch.org/Html/PestProblem/HumanHealth.htm>.

Schueler, Thomas R. and Heather K. Holland. "Toward a Low-Input Lawn." *The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers and estuaries* 2(1): 254-264.

The Northwest Coalition for Alternatives to Pesticides. *Alternatives Fact Sheets*. Retrieved January 24, 2001, from the World Wide Web: <http://www.pesticide.org/factsheets.html#alternatives>.

Toxic Alert. *Poison In The Grass: The Hazards And Consequences Of Lawn Pesticides*. Retrieved March 12, 2001, from the World Wide Web: <http://www.cqs.com/elawn.htm>.

United States Environmental Protection Agency, Office of Environmental Health Hazard Assessment. *Pesticide Programs*. Retrieved January 23, 2001, from the World Wide Web: <http://www.oehha.ca.gov/pesticides/programs/index.html>.

U.S. EPA, Office of Prevention, Pesticides, and Toxic Substances. *Healthy Lawn, Healthy Environment - Caring for Your Lawn in an Environmentally Friendly Way*. 700-K-92-005. June 1992. Retrieved January 24, 2001, from the World Wide Web: <http://www.epa.gov/oppfead1/Publications/lawncare.pdf>.

U.S. EPA, Office of Prevention, Pesticides, and Toxic Substances. *Citizen's Guide to Pest Control and Pesticide Safety*. Retrieved January 24, 2001, from the World Wide Web: [http://www.epa.gov/OPPTpubs/Cit\\_Guide/citguide.pdf](http://www.epa.gov/OPPTpubs/Cit_Guide/citguide.pdf).

United States Geological Survey, National Water Quality Assessment Pesticide National Synthesis Project. *Pesticides in Ground Water*. Retrieved January 23, 2001, from the World Wide Web: <http://water.wr.usgs.gov/pnsp/gw/index.html>.