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Citizen's Guide to Pest Control and Pesticide Safety

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Foreword

The Environmental Protection Agency (EPA) is charged with ensuring that pesticides do not pose unreasonable risks to the public and to the environment. EPA regulates the use of pesticides under the authority of two laws—the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA). Most pesticides may legally be sold in the United States if they have been "registered" by EPA and if they bear an EPA registration number. Federal pesticide registration, however, is only the first step in preventing pesticide risks. Just as important are the steps that consumers take to control pests and use pesticides safely. EPA hopes that this booklet will help you do just that.

Introduction

SOONER OR LATER, we're all pestered by pests. Whether it's ants in the kitchen or weeds in the vegetable garden, pests can be annoying and bothersome. At the same time, many of us are concerned that the pesticides we use to control pests can cause problems too. How can pests be controlled safely? When and how should pesticides be used?

This booklet is intended to help answer these questions. The questions have no single right answer, but *Citizen's Guide to Pest Control and Pesticide Safety* gives the information you need to make informed decisions. You should be able to control pests without risking your family's health and without harming the environment.

The major goals of this booklet are to help you understand—

- What steps to take to control pests in and around your home.
- What alternatives to chemical pesticides are available, including pest prevention and non-chemical pest controls.
- How to choose pesticides and how to use, store, and dispose of them safely.
- How to reduce your exposure when others use pesticides.
- How to choose a pest control company.
- What to do if someone is poisoned by a pesticide.

Did you know that these common household products are pesticides?

- Cockroach sprays and baits.
- Insect sprays and wasp repellents for indoor use.
- Insect repellents for personal use.
- Termite control products.
- Rat and other rodent poisons.
- Flea and tick sprays, powders, and pet collars.
- Kitchen, laundry, and bath disinfectants and sanitizers, including bleach.
- Products to kill mold and mildew.
- Lawn and garden products such as weed killers.
- Swimming pool chemicals, including those that kill algae.
- Repellents that keep deer, raccoons, or rabbits away from your garden.

Pests, Pest Control, and Pesticides

PLANTS, insects, mold, mildew, rodents, bacteria, and other organisms are a natural part of the environment. They can benefit people in many ways. But they can also be pests. Apartments and houses are often hosts to common pests such as cockroaches, fleas, termites, ants, mice, rats, mold, or mildew. Weeds, hornworms, aphids, and grubs can be a nuisance outdoors when they get into your lawn, flowers, yard, vegetable garden, or fruit and shade trees. Pests can also be a health hazard to you, your family, and your pets. It's easy to understand why you may need and want to control them.

Nowadays, you can choose from many different methods as you plan your strategy for controlling pests. **Sometimes a non-chemical method of control is as effective and convenient as a chemical alternative**. For many pests, total elimination is almost impossible, but it is possible to control them. Knowing your options is the key to pest control. Methods available to you include pest prevention, non-chemical pest controls, and chemical pesticides. Each of these methods will be described in more detail in the next three sections of this booklet (starting on pages 6, 11, and 13).

Pest Management

The most effective strategy for controlling pests may be to combine methods in an approach known as integrated pest management (IPM) that emphasizes preventing pest damage. In IPM, information about pests and available pest control methods is used to manage pest damage by the most economical means and with the least possible hazard to people, property, and the environment. An example of using the IPM approach for lawn care is presented in the next section of this booklet titled "Preventing Pests."

Some signs of pest infestation are unmistakable.

Knowing a range of pest control methods gives you the ability to choose among them for an effective treatment. Knowing the options also gives you the choice of limiting your exposure to potentially harmful chemicals. No matter what option you choose, you should follow these steps to control your pest problem:

First Steps in Pest Management

1 **Identify the pest problem.** This is the first and most important step in pest control—figuring out exactly what you're up against. Some pests (or signs of them) are unmistakable—most people recognize a cockroach or a mouse. Other signs that make you think "pest" can be misleading. For example, what may look like a plant "disease" may be, in fact, a sign of poor soil or lack of water.

Use free sources to help identify your pest and to learn the most effective methods to control it. These sources include library reference books (such as insect field guides or gardening books) and pest specialists at your County Cooperative Extension Service or local plant nurseries. These resources are usually listed in the telephone book. Also, state university Web sites have residential pest control information.

2 **Decide how much pest control is necessary**. Pest **control** is not the same as pest elimination. Insisting on getting rid of all pests inside and outside your home will lead you to make more extensive, repeated, and possibly hazardous chemical treatments than are necessary. Be reasonable. Ask yourself these questions:

- Does your lawn really need to be totally weed free?
- Recognizing that some insects are beneficial to your lawn, do you need to get rid of all of them?
- Do you need every type of fruit, vegetable, or flower you grow, or could you replace ones that are sensitive to pests with hardier substitutes?
- Can you tolerate some blemished fruits and vegetables from your garden?
- Is anyone in your home known to be particularly sensitive to chemicals?

3 **Choose an effective option.** Use the information gathered in Step 1, your answers to the questions in Step 2, and guidance in the sections titled "Preventing Pests," "Using Non-Chemical Pest Controls," and "Using Chemical Pest Controls" to determine which option you want to choose. If you're still uncertain, get further advice from the free sources listed in Step 1.

4 **Evaluate the results**. Once a pest control method has been chosen and implemented, always allow time for it to work and then evaluate its effectiveness by taking the following steps:

- Compare pre-treatment and post-treatment conditions. Is there evidence of a clear reduction in the number of pests?
- Weigh the benefits of short-term chemical pesticide control against the benefits of long-term control using a variety of other treatments, including non-chemical methods.

It's easier to prevent pests than to control them. You may not need to worry about the four pest control steps just mentioned **IF** you make the effort to prevent pests in the first place.

The first step in pest control is to identify the pest.

Preventing Pests

PESTS SEEK PLACES TO LIVE that satisfy basic needs for air, moisture, food, and shelter. The best way to control pests is to try to prevent them from entering your home or garden in the first place. You can do this by removing the elements that they need to survive. Take the following preventive actions:

Indoor Prevention

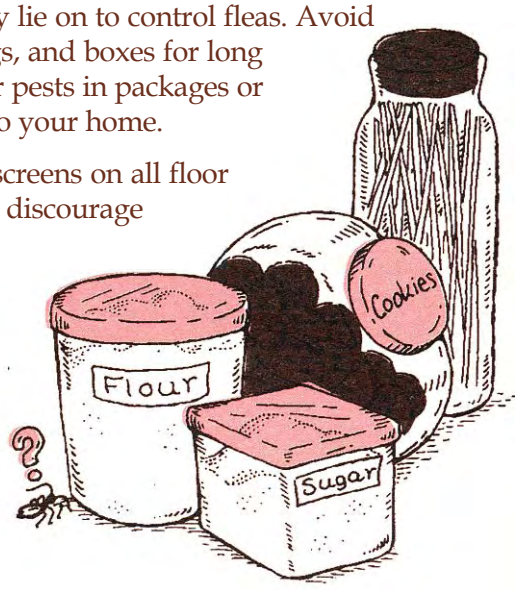
Pests need water to survive. Fix leaky pipes.

- **Remove water**. All living things, including pests, need water for survival. Fix leaky plumbing, and do not let water accumulate anywhere in or around your home. For example, do not leave any water in trays under your houseplants, under your refrigerator, or in buckets overnight. Remove or dry out water-damaged and wet materials. Even dampness or high humidity can attract pests.

- **Remove food**. Store your food in sealed glass or plastic containers, and keep your kitchen clean and free from cooking grease and oil. Do not leave food in pet bowls on the counter or floor for long periods of time. Put food scraps or refuse in tightly covered, animal-proof garbage cans, and empty your garbage frequently.

- **Remove or block off indoor pest hiding places**. Caulk cracks and crevices to control pest access. Bathe pets regularly and wash any mats or surfaces they lie on to control fleas. Avoid storing newspapers, paper bags, and boxes for long periods of time. Also, check for pests in packages or boxes before carrying them into your home.

- **Block pest entryways**. Install screens on all floor drains, windows, and doors to discourage crawling and flying pests from entering your home. Make sure any passageways through the floor are blocked. Place weatherstripping on doors and windows. Caulk and seal openings in walls. Keep doors shut when not in use.



Store food in sealed containers.

Outdoor Prevention

- **Remove or destroy outdoor pest hiding places**. Remove piles of wood from under or around your home to avoid attracting termites and carpenter ants. Destroy diseased plants, tree prunings, and fallen fruit that may harbor pests. Rake fallen leaves. Keep vegetation, shrubs, and wood mulch at least 18 inches away from your house.
- **Remove breeding sites**. Clean up pet droppings from your yard; they attract flies that can spread bacteria. Do not accumulate litter or garbage; it draws mice, rats, and other rodents. Drain off or sweep away standing puddles of water; water is a breeding place for mosquitos and other pests. Make sure drain pipes and other water sources drain away from your house.

Remove breeding sites.
Clean up litter or garbage.

- **Take proper care of all outdoor plants**. These include flowers, fruit and shade trees, vegetable and other plants, and your lawn. Good plant health care reduces pest control needs—healthy plants resist pests better than do weak plants. Plant at the best time of year to promote healthy growth. Use mulch to reduce weeds and maintain even soil temperature and moisture. Water adequately. Native flowers, shrubs, and trees often are good choices because they adapt well to local conditions and require minimal care.

Gardening

- Select healthy seeds and seedlings that are known to resist diseases and are suited to the climate where you live. Strong seeds are likely to produce mature plants with little need for pesticides.
- If your garden is large, alternate rows of different kinds of plants. Pests that prefer one type of vegetable (carrots, for example) may not spread to every one of your carrot plants if other vegetables (not on the pests' diet) are planted in the neighboring rows.
- Don't plant the same crop in the same spot year after year. That way your plants are not as vulnerable to pests that survive the winter.
- Make sure your garden plot has good drainage. Raised beds will improve drainage, especially of clay soils. If a heavy clay soil becomes compacted, it does not allow air and water to get to the roots easily, and plants struggle to grow. To loosen

Before planting, add organic matter to enrich the soil mixture in your garden plot.

compacted soil and create air spaces so that water and nutrients can reach the roots, buy or rent a tiller that breaks up the dirt and turns it over. Before planting, add sand and organic matter to enrich the soil mixture in your garden plot. Also, have the soil tested periodically to see whether you need to add more organic matter or adjust the pH (acidity/alkalinity) balance by adding lime or sulfur. Your County Cooperative Extension Service, listed in the telephone book, or local nursery should be able to tell you how to do this.

- Mulch your garden with leaves, hay, grass clippings, shredded/chipped bark, or seaweed.

Lawn Care

Tending a garden may not be your hobby; but if you rent or own a home, you might need to care for the lawn. You don't have to be an expert to grow a healthy lawn. The key is to work with nature. You need to create the right conditions for your grass to grow strong and stay healthy. A healthy lawn can resist damage from weeds, disease, and insect pests. **Set realistic** weed and pest control **goals** for your lawn.

Think of lawn care as a preventive health care program, like one you would follow to stay healthy yourself. The goal is to prevent problems from ever occurring.

Pesticides can be effective but should not be relied on as the quick-fix solution to any lawn problem. Serious, ongoing pest problems are often a sign that your lawn is not getting what it needs to stay healthy. Pests may be a symptom of an underlying problem. You need to correct the underlying problem to reduce the chances of pests reappearing.

Make these six steps part of a preventive health care program for your lawn:

1 **Develop healthy soil that has the right pH balance, key nutrients, and good texture**. You can buy easy-to-use soil analysis kits at hardware stores or contact your local County Cooperative Extension Service for a soil analysis.

2 **Choose a type of grass that grows well in your climate**. For instance, if your area gets very little rain, don't plant a type of grass that needs a lot of water. Your local County Cooperative Extension Service can advise you on which grasses grow best in your area.

3 **Mow high, mow often, and make sure the lawn mower blades are sharp**. Grass that is slightly long makes a strong, healthy lawn with few pest problems. Weeds have a hard time taking root and growing when grass is fairly long (around 2½ to 3½ inches for most types of grass). A foot-high meadow isn't necessary; just adding an inch to the length of your grass will give most lawns a real boost.

4 **Water deeply but not too often**. The best rule is to water only when the lawn begins to wilt from dryness—when the color dulls and footprints stay in the grass for more than a few seconds. Avoid watering during the hottest part of the day because the water will evaporate too quickly.

5 **Correct thatch buildup.** Thatch is a layer of dead plant material between the grass blades and the soil. When thatch gets too thick (deeper than ¾ of an inch), it prevents water and nutrients from getting into the soil and reaching the roots of the grass. Overusing synthetic fertilizer can create a heavy layer of thatch, and some kinds of grass are prone to thatch buildup.

Get rid of excess thatch by raking the lawn or using a dethatching rake.

In a healthy lawn, earthworms, spiders, millipedes, and a variety of microorganisms help keep the thatch layer in balance by breaking it up and using it for food, which releases nutrients into the soil. You can get rid of excess thatch by raking the lawn using a dethatching rake or by using a machine that pulls plugs out of the grass and thatch layer to break it up. Sprinkle a thin layer of topsoil or compost over the lawn after dethatching or aerating it to speed up the process of decomposition.

6 **Set realistic weed and pest control goals**. It is almost impossible to get rid of all weeds and pests. However, even a lawn that is 15 percent weeds can look almost weed-free to the casual observer. A healthy lawn will probably always have some weeds and some insect pests. But a healthy lawn will also have beneficial insects and other organisms like earthworms that keep pests under control. Improper use of pesticides can kill these beneficial organisms.

By following this preventive health care program for your lawn, you should be able to rely **very little, if at all**, on chemical pesticides for weed and insect pest control. For additional information, refer to EPA's booklet *Healthy Lawn, Healthy Environment*. (See page 42 in the Reference Section.)

If you use the preventive techniques just described, you reduce the chance of pests ever getting into your home or garden in the first place.

Using Non-Chemical Pest Controls

YOU'VE GOT PESTS, and you want to control them with a dependable pest control method that does not contain chemical pesticides. Non-chemical pest control methods really work, and they have many advantages. Compared to chemical treatments, non-chemical methods are generally effective for longer periods of time. They are less likely to create hardy pest populations that develop the ability to resist pesticides. And many non-chemical pest controls can be used with fewer safeguards, because they are generally thought to pose virtually no hazards to human health or the environment. Two examples of non-chemical pest control methods are biological and manual treatments.

Biological Controls

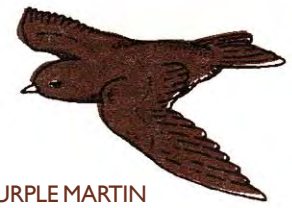
Did you know that pests themselves may be eaten or otherwise controlled by birds, insects, or other living organisms? You can use a pest's natural enemies (predators) to your advantage. These "biological controls," as they are called, take many forms:

- **Beneficial predators** such as purple martins and other birds eat insects; bats can eat thousands of insects in one night; lady beetles (ladybugs) and their larvae eat aphids, mealybugs, whiteflies, and mites. Other beneficial bugs include spiders, centipedes, ground beetles, lacewings, dragonflies, big-eyed bugs, and ants. You can install a purple martin house in your yard. You can also buy and release predatory insects. They are available from sources such as gardening catalogs and magazines.

  Contact your County Cooperative Extension Service, a nursery, or a garden association for information on how to attract and protect beneficial predators.

- **Parasitoids** such as miniature wasps lay their eggs inside the eggs or bodies of insect pests such as tomato hornworms. Once the eggs hatch, the offspring kill their insect hosts, making parasitoids highly effective pest controllers.

Beneficial Predators



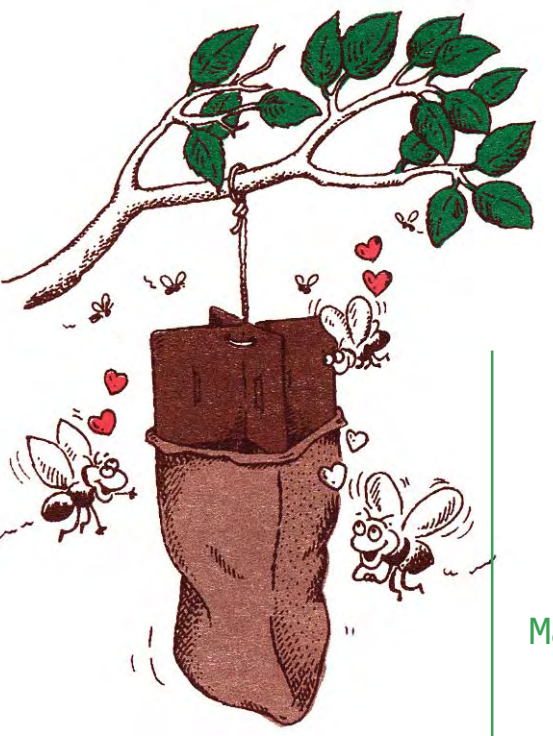
PURPLE MARTIN

SPIDER

LADYBUG

CENTIPEDE

MINI-WASP



Pheromone traps lure pests.

- **Microscopic pathogens** such as fungi, bacteria, and viruses control pests. An example is milky spore disease, which attacks Japanese beetles. A number of these biological pesticides are available commercially at hardware and garden stores. (See page 43 in the Reference Section for more information.)
- **Biochemical pesticides** include pheromones and juvenile insect hormones. Pheromones are chemical substances released by various organisms (including insects) as means of communicating with others of the same species, usually as an aid to mating. Pheromones lure pests inside a trap. Juvenile insect hormones interfere with an insect's normal growth and reproductive functions by mimicking the effects of compounds that occur naturally in the pest.

Manual Methods

- Spading and hoeing to cut up weeds.
- Hand-picking weeds from your lawn and pests from your plants, indoors or out.
- Using a flyswatter.
- Setting traps to control rats, mice, and some insects.
- Mulching to reduce weed growth.

One or a combination of several non-chemical treatments may be just what you need for your pest problem. You must be patient because results may not be immediate. And you must work to prevent pests from entering your home or garden in the first place.

Using Chemical Pest Controls

IF YOU DECIDE that the best solution to your pest problem is chemical—by itself or, preferably, combined with non-chemical treatments—be aware that one of the greatest causes of pesticide exposure to humans is the use of pesticides in and around the home.

Anyone can buy a wide variety of "off the shelf" pesticide products to control weeds, unwanted insects, and other pests. No special training is required to use these pesticides. Yet, many of the products can be hazardous to people, especially when stored, handled, applied, or disposed of improperly. **The results achieved by using chemical pesticides are generally temporary, and repeated treatments may be required**. Over time, some pests become pesticide resistant, meaning they adapt to the chemical and are no longer harmed by it. This forces you to choose another product or method. If used incorrectly, home-use pesticide products can be poisonous to humans. As a result, it is extremely important for you to take responsibility for making sure that these products are used properly. The basic steps in reducing pesticide risks are—

- Choosing the right pesticide product.
- Reading the product label.
- Determining the right amount to purchase and use.
- Using the product safely and correctly.
- Storing and disposing of pesticides properly.

Each of these steps is described in more detail in the sections that follow.

Choosing the right product is a basic step in reducing pesticide risks.

Choosing the Right Pesticide Product

Once you decide to use chemical pesticides, you must decide whether to do the job yourself or hire a professional pest control service. If you are interested in hiring professionals, see pages 36–38 for advice. If you choose to tackle the job yourself, the next question is the most important. Which pesticide product is the best one for your situation?

Home-use pesticides come in many forms—including solutions, aerosols, dusts, granules, baits, and wettable powders. As the name implies, wettable powders are usually mixed with water and/or other liquids and then applied. Pesticide solutions are often diluted with water. Certain formulations work better for some pests and/or some target areas than others. Many pesticides also come in ready-to-use forms, such as aerosols and spray bottles, which are often more practical and easy to use because they don't require measuring or mixing.

Before you buy a product, read the label! Compare product labels, and learn as much as you can about the pesticide. Contact your County Cooperative Extension Service (listed in the telephone book), local pesticide dealers, the National Pesticide Information Center (NPIC) at 1-800-858-7378, or your state pesticide agency for assistance. (See pages 45–48 in the Reference Section for state contacts.)

Read the label before you buy or use a pesticide product.

When you are ready to buy a pesticide product, follow these recommendations:

- First, be certain that you have identified the problem correctly. Then, choose the least-toxic pesticide that will achieve the results you want **and** be the least toxic to you and the environment.
- When the words "broad-spectrum" appear on the label, this means the product is effective against a broad range of pests. If the label says "selective," the product is effective against one or a few pests.
- Find the signal word—either ***Danger, Warning,*** or ***Caution*** on the pesticide label. The signal word tells you how poisonous the product is to humans. (See page 16.)
- Choose the form of pesticide (aerosol, dust, bait, or other) best suited to your target site and the pest you want to control.

Choose the form of pesticide best suited to your target site and the pest you want to control.

DANGER means poisonous or corrosive.

WARNING means moderately hazardous.

CAUTION means least hazardous.

Reading the Pesticide Label

The pesticide label is your best guide to using pesticides safely and effectively. The directions on the label are there primarily to help you achieve "maximum" benefits—the pest control that you desire—with "minimum" risk. Both depend on following label directions and correctly using the pesticide. ***Read the label***. Read the label ***before buying*** the pesticide. Read the label ***before mixing or using*** the pesticide ***each time***, and read the label before storing or disposing of the pesticide. Do not trust your memory. You may have forgotten part of the label instructions or they may have changed. Use of any pesticide in any way that is not consistent with label directions and precautions is illegal. It may also be ineffective and, even worse, dangerous.

The main sections of a pesticide label are described below:

1 **EPA Registration Number.** This number tells you that EPA has reviewed the product and determined that it can be used with minimal or low risk if you follow the directions on the label properly. The number is not a stamp of approval or guarantee of effectiveness.

2 **Ingredients Statement or Active Ingredients.** Active ingredients are the chemicals in the pesticide that kill or control the target pest(s).

3 **Signal Words.** The signal words—*Caution, Warning, or Danger*—indicate the pesticide's potential for making you sick. The word *CAUTION* appears on pesticides that are the least harmful to you. A pesticide with the word *WARNING* is more poisonous than those with a *Caution* label. Pesticides with the word *DANGER* on the label are very poisonous or irritating. They should be used with extreme care because they can severely burn your skin and eyes.

Main sections on front label.

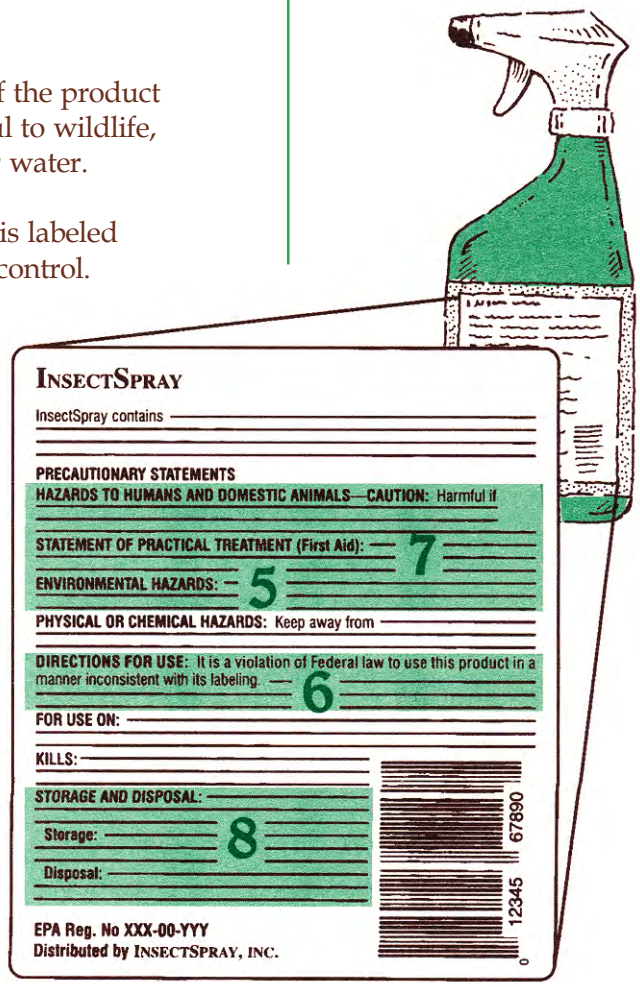
4 **Precautionary Statements**. This part describes the protective clothing, such as gloves or goggles, that you should wear when using the pesticide. The section also tells you how to protect children or pets by keeping them away from areas treated with pesticides.

5 **Environmental Hazards**. This section tells you if the product can cause environmental damage—if it's harmful to wildlife, fish, endangered plants or animals, wetlands, or water.

6 **Directions for Use**. Make sure that the product is labeled for use against the pest(s) that you are trying to control. (For example, products labeled only for termites should not be used to control fleas.) Use only the amounts recommended, and follow the directions exactly.

7 **First Aid Instructions**. The label tells you what to do if someone is accidentally poisoned by the pesticide. Look for this information in the ***Statement of Practical Treatment*** section. The instructions are only **first** aid. **ALWAYS** call a doctor or your local poison center. You may have to take the person to a hospital right away after giving first aid. Remember to take the pesticide label or container with you.

8 **Storage and Disposal**. Read carefully and follow all directions for safe storage and disposal of pesticide products. Always keep products in the original container and out of reach of children, in a locked cabinet or locked garden shed.

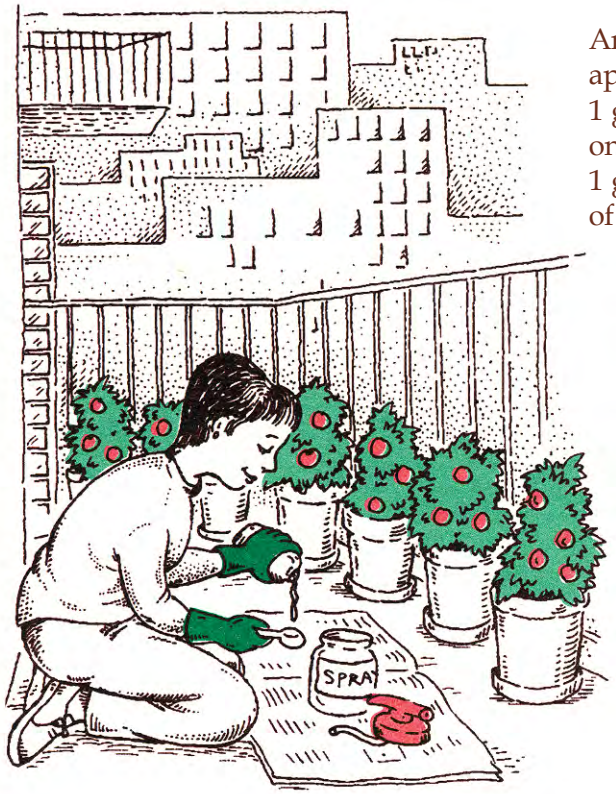


Main sections on back label.

Some pesticides have small foldout booklets containing the label information.

Determining the Correct Amount To Use

Many products can be bought in a convenient ready-to-use form, such as in spray cans or spray bottles, that won't require any mixing. However, if you buy a product that has to be measured out or mixed with water, prepare only the amount of pesticide that you need for the area where you plan to use the pesticide (target area). The label on a pesticide product contains much useful information, but there isn't always room to include examples of different dilutions for every home use. Thus, it is important to know how to measure volume and figure out the exact size of the area where you want to apply the pesticide. Determining the correct amount for your immediate use requires some careful calculations. Use the following example as an illustration of how to prepare only the amount of pesticide needed for your immediate pest control problem.



When using pesticides that must be mixed, determine the correct amount for your immediate use.

An example: The product label says, "For the control of aphids on tomatoes, mix 8 fluid ounces of pesticide into 1 gallon of water and spray until foliage is wet." You have only 6 tomato plants. From experience, you know that 1 gallon is too much, and that you really need only 1 quart of water to wet the leaves on these 6 plants. A quart is only ¼ of a gallon. Because you want to use less water than the label says, you need less pesticide. You need only ¼ of the pesticide amount listed on the label—only 2 fluid ounces. This makes the same strength spray recommended by the label, and is the appropriate amount for the 6 tomato plants.

In short, all you need to do is figure the amount of pesticide you need for the size of your target area, using good measurements and careful arithmetic. For help in making these calculations, see pages 39–41 in the Reference Section.

Caution: When you use cups, teaspoons, or tablespoons to measure pesticides, use only level measures or level spoonfuls. **NEVER** use the same tools that you use for measuring pesticides—spoons, cups, bottles—to prepare food, even if you've washed them.

Using Pesticides Safely and Correctly

Once you have read the pesticide label and are familiar with all precautions, including first aid instructions, follow these recommendations to reduce your risks:

Before Using a Pesticide

- Wear the items of protective clothing the label requires: for example, long-sleeved shirts, long pants, overalls, non-absorbent gloves (not leather or fabric), rubber footwear (not canvas or leather), a hat, goggles, or a dust mist filter. If no specific clothing is listed, gloves, long-sleeved shirts and long pants, and closed shoes are recommended. You can buy protective clothing and equipment at hardware stores or building supply stores.

When Mixing or Applying a Pesticide

- Never smoke or eat while mixing or applying pesticides. You could easily carry traces of the pesticide from your hands to your mouth. Also, some pesticide products are flammable.
- Follow the use directions on the label carefully. Use only for the purpose listed. Use only the amount directed, at the time and under the conditions specified. **Don't change the recommended amount**. Don't think that twice the amount will do twice the job. It won't. You could harm yourself, others, or whatever you are trying to protect.
- If the directions on the label tell you to mix or dilute the pesticide, do so outdoors or in a well-ventilated area. Use the amount listed on the label and measure the pesticide carefully. (Never use the same measuring cups or spoons that you use in the kitchen.) Mix only the amount that you need for each application. Do not prepare larger amounts to store for possible future use. (See "Determining the Correct Amount To Use" on page 18.)

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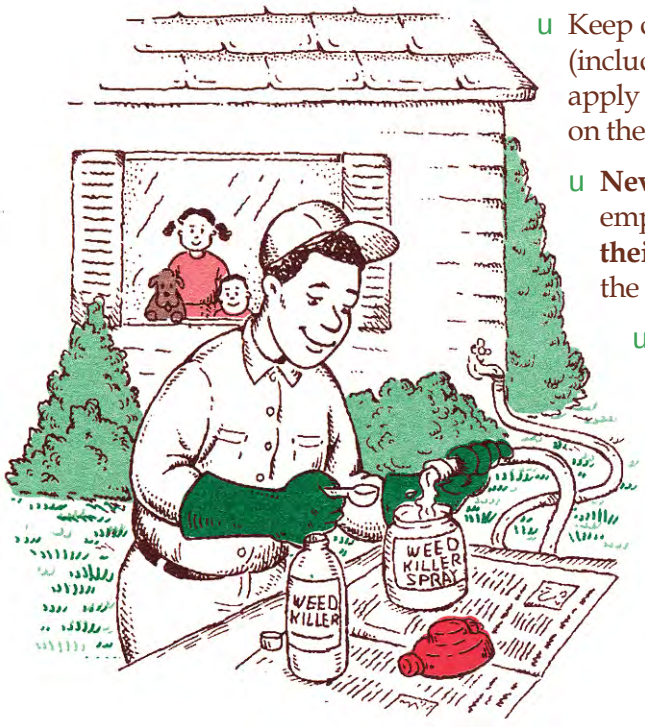
When using a pesticide—

- Read and follow the label directions.
- Wear protective clothing.
- Don't smoke or eat.
- Mix and apply only the amount you need.



Mix pesticides outdoors or in a well-ventilated area.

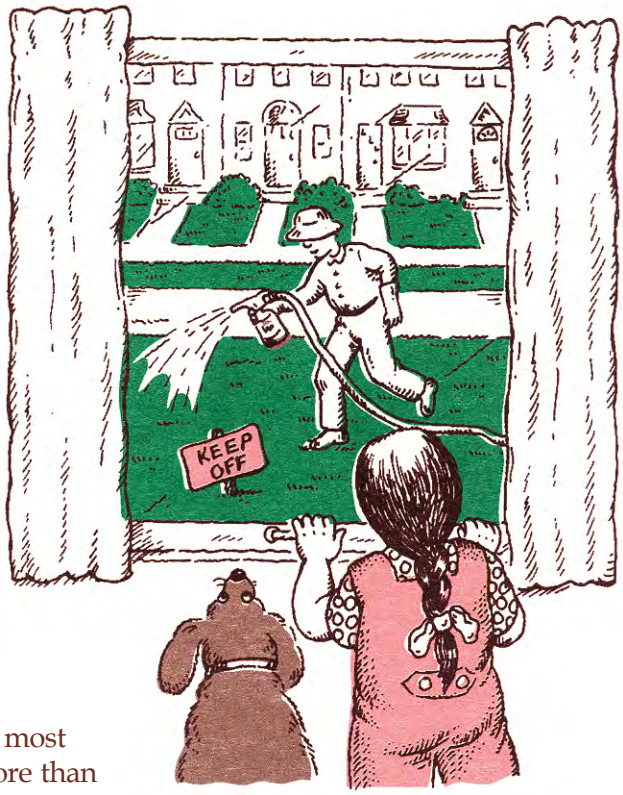
- Keep children, pets (including birds and fish), and toys (including pet toys) away from areas where you mix and apply pesticides for at least the length of time required on the label.
- **Never transfer pesticides to other containers**, such as empty soft drink or milk bottles. **Keep pesticides in their original containers**—ones that clearly identify the contents. Refasten all childproof caps tightly.
- If a spill occurs, clean it up promptly. Don't wash it away. Instead, sprinkle the spill with sawdust, vermiculite, or kitty litter. Sweep it into a plastic garbage bag, and dispose of it as directed on the pesticide product label.
- Indoors or outdoors, never put bait for insects or rats, mice, and other rodents where small children or pets can reach it. When using traps, make sure the animal inside is dead before you touch or open the trap.

Indoor Applications

- Use pesticides indoors only when absolutely necessary, and use only very limited amounts.
- Provide adequate ventilation. If the label directions permit, leave all windows open and fans operating after the application is completed. If the pesticide product is only effective in an unventilated (sealed) room or house, do not stay there. Put all pets outdoors, and take yourself and your family away from treated areas for **at least** the length of time prescribed on the label.
- Apply most surface sprays only to limited areas such as cracks; don't treat entire floors, walls, or ceilings.
- Remove food, pots and pans, and dishes before treating kitchen cabinets. Don't let pesticides get on any surfaces that are used for food preparation. Wait until shelves dry before refilling them. Wash any surfaces that may have pesticide residues before placing food on them.

Outdoor Applications

- Never apply pesticides outdoors on a windy day (winds higher than 10 mph). Position yourself so that a **light** breeze does not blow pesticide spray or dust into your face.
- Before spraying, close the doors and windows of your home.
- Use coarse droplet nozzles on your sprayer to reduce misting, and spray as close to the target as possible.
- Keep pesticides away from plants and wildlife you do not want to treat. Do not apply any pesticide to blooming plants, especially if you see honeybees or other pollinating insects around them. Do not spray bird nests when treating trees.
- Follow label directions carefully to ensure that you don't apply too much pesticide to your lawn, shrubs, or garden. Never water your lawn after applying pesticides. Before using a pesticide outdoors, check the label or contact your EPA Regional Office or County Cooperative Extension Service to find out whether the pesticide is known or suspected to run off or seep into ground water. Ground water is the underground reservoir that supplies water to wells, springs, creeks, and the like. Excessive application of pesticides could cause the pesticide to run off or seep into water supplies and contaminate them. Excess spray may also leave harmful residues on your home-grown fruit and vegetables, and could affect other plants, wildlife, and fish.
- Never mix or apply a pesticide near a wellhead.
- If you have a well, be sure it extends downward to water sources that are below, and isolated from, surface water sources. Be sure the well shaft is tightly sealed. For further information, see EPA's brochure *Pesticides in Drinking Water Wells*. (See page 42 for information on how to order a copy from EPA's National Service Center for Environmental Publications.)
- When using total release foggers to control pests, the most important precautions you can take are to use no more than the amount needed and to keep foggers away from ignition sources (ovens, stoves, air conditioners, space heaters, and water heaters, for example). Foggers should not be used in small, enclosed places such as closets and cabinets or under tables and counters.



Keep children and pets away from areas where you apply pesticides.

After Applying a Pesticide, Indoors or Outdoors

- To remove pesticide residues, use a bucket **to thoroughly rinse** tools or equipment that you used when mixing the pesticide. Then pour the rinse water into the pesticide sprayer and reuse the solution by applying it according to the pesticide product label directions. (See pages 24–25 for safe disposal guidelines.)
- Always wash your hands after applying any pesticide. Wash any other parts of your body that may have come in contact with the pesticide. To prevent tracking pesticides inside, remove or rinse your boots or shoes before entering your home. Wash separately from your regular wash any clothes that have been exposed to pesticide.
- Evaluate the results of your pesticide use. Consider using a different chemical, a non-chemical method, or a combination of non-chemical and chemical methods if the chemical treatment didn't work. Again, **do not assume** that using **more** pesticide than the label recommends **will do a better job**. It won't.
- Watch for negative effects on wildlife (birds, butterflies, and bees) in and near treated areas. If you see any unusual behavior, stop using that pesticide, and contact EPA's Pesticide Incident Response Officer (see page 35).

Wash clothing worn when using pesticides separately from other laundry.

Storing and Disposing of Pesticides Properly

Improper pesticide storage and disposal can be hazardous to human health and the environment. Follow these safety recommendations:

Safe Storage of Pesticides

- Don't stockpile. Reduce storage needs by buying only the amount of pesticide that you will need in the near future or during the current season when the pest is active.
- Follow all storage instructions on the pesticide label.
- Store pesticides high enough so that they are out of reach of children and pets. Keep all pesticides in a locked cabinet in a well-ventilated utility area or garden shed.
- Store flammable liquids outside your living area and far away from an ignition source such as a furnace, a car, an outdoor grill, or a power lawn mower.
- Never store pesticides in cabinets with or near food, animal feed, or medical supplies.
- Always store pesticides in their original containers, complete with labels that list ingredients, directions for use, and first aid steps in case of accidental poisoning.
- Never transfer pesticides to soft drink bottles or other containers. Children or others may mistake them for something to eat or drink.
- Use child-resistant packaging correctly—close the container tightly after using the product. Child resistant does not mean child proof, so you still must be extra careful to store properly—out of children's reach—even those products that are sold in child-resistant packaging.
- Do not store pesticides in places where flooding is possible or in places where they might spill or leak into wells, drains, ground water, or surface water.
- If you can't identify the contents of the container, or if you can't tell how old the contents are, follow the advice on safe disposal in the next section.

Store pesticides in a locked cabinet out of reach of children and pets.

***Never* transfer pesticides to soft drink bottles or other containers that children or others may mistake for something to eat or drink.**

Safe Disposal of Pesticides

- The best way to dispose of small amounts of excess pesticides is to use them—apply them—according to the directions on the label. If you cannot use them, ask your neighbors whether they have a similar pest control problem and can use them.
- If all of the remaining pesticide cannot be properly used, check with your local solid waste agency, environmental agency, or health department to find out whether your community has a household hazardous waste collection program or a similar program for getting rid of unwanted, leftover pesticides. These authorities can also inform you of any local requirements for pesticide waste disposal.
- Earth 911 (1-800-CLEANUP or www.earth911.com) is another source for information about disposal and special waste collection programs in your local area.
- **State and local laws regarding pesticide disposal may be stricter than the federal requirements on the label**. Be sure to check with your state or local solid waste agency before disposing of your pesticide containers.
- If no community program or guidance exists, follow the label directions for disposal. In general, to dispose of less than a full container of a **liquid** pesticide, leave it in the original container with the cap tightly in place to prevent spills or leaks. Put the container in a covered trash can for routine collection with municipal trash. If you do not have a regular trash collection service, take the package to a permitted landfill (unless your town has other requirements).

Do not pour leftover pesticides down the sink, into the toilet, or down a sewer or street drain.

Note: No more than 1 gallon of liquid pesticide at a time should be thrown out with the regular trash in this manner.

- Place individual packages of **dry** pesticides in a tight carton or bag, and tape or tie the package closed. Put the package in a covered trash can for routine collection.

  Note: No more than 5 pounds of dry pesticide at a time should be thrown out with the regular trash in this manner.

- Do **not** pour leftover pesticides down the sink, into the toilet, or down a sewer or street drain. Pesticides may interfere with the operation of wastewater treatment systems or pollute waterways. Many municipal systems are not equipped to remove all pesticide residues. If pesticides reach waterways, they may harm fish, plants, and other living things.

- An empty pesticide container can be as hazardous as a full one because of residues left inside. **Never reuse such a container**. When empty, replace the cap or closure securely and place in trash. Dispose of the container according to label instructions. Do **not** puncture or burn a pressurized or aerosol container—it could explode.
- Many communities have programs to recycle household waste such as empty bottles and cans. Do not recycle any pesticide containers, however, unless the recycling program specifically accepts pesticide containers and you follow the program's instructions for preparing the empty containers for collection.

Follow the label directions for disposal.

Reducing Your Exposure When Others Use Pesticides

EVEN IF YOU NEVER USE PESTICIDES YOURSELF, you can still be exposed to them—at home, school, work, or play—by being in treated areas, as a consumer of commodities that others have **treated** with pesticides, or through food, water, and air that may have been **contaminated** with pesticides.

This section describes sources of exposure other than your own use of pesticides. It also suggests ways to reduce your overall exposure. If you know or suspect that you, or others close to you, are sensitive to chemicals, consult an expert who can help you develop a strategy for handling your potential exposure problems.

Exposure Through Food

Commercial Food

To ensure a safe food supply, EPA regulates the safety of food by setting safety standards to limit the amount of pesticide residues that legally may remain in or on food or animal feed that is sold in the United States. Both domestic and imported foods are monitored by the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) to ensure compliance with these safety standards.

Because most crops are treated with pesticides at least some of the time, foods you buy at the grocery store may contain small traces of pesticide residues. Pesticide levels tend to decline over time because the residues break down and because crops are usually washed and processed before reaching the marketplace. So, while we all consume small amounts of pesticides regularly, levels in our food generally are well below legal limits by the time the food reaches the grocery shelves.

Although EPA sets safety standards for the amount of pesticide residues allowed both in and on foods, you can take extra precautions to reduce the traces of pesticide residues you and your family consume in the food you buy. Follow these suggestions:

- Trim the fat from meat and poultry because residues of some pesticides concentrate in fat. Remove the skin from fish.
- Discard the fats and oils in broths and pan drippings.

- Rinse fruits and vegetables thoroughly with water. Scrub them with a brush and peel them, if possible. Taking these safety steps will remove most of the existing surface residues, along with any remaining dirt. Note that surface cleaning (rinsing and scrubbing) will not remove pesticide residues that are absorbed into the growing fruit or vegetable before harvest.
- Cook or bake foods to reduce residues of some pesticides even further.

Rinse fruits and vegetables with water. Scrub them with a brush and peel them, if possible.

Home-Grown Food

Growing your own food can be an enjoyable activity. It is also a way to reduce your exposure to pesticide residues in food—especially if you decide not to use chemical pesticides on your produce and you choose a garden site where drift or runoff from a neighbor's use of pesticides will not result in unintended residues on your food. If your house or property is regularly treated for pest prevention, don't plant your garden where the treatments are applied.

Food from the Wild

While it may seem that hunting your own game, catching your own fish, or gathering wild plant foods would reduce your overall exposure to pesticides, that isn't necessarily true. If you eat wild animals or plants from areas where pesticides are frequently used, this food may contain pesticide residues. In addition, birds such as ducks and geese may absorb pesticide residues if they have stopped to eat treated crops anywhere along their flight path.

If you eat food from the wild, you may want to take the following steps to reduce your exposure to pesticides:

- Do not fish in water bodies where contamination has occurred. Pay attention to posted signs that warn of contamination.
- Consult with fish and game officials or other appropriate officials where you plan to hunt or fish to determine whether there are any chemical problems associated with the area.
- Do not pick wild plants that are growing right next to a road, utility right-of-way, or hedgerow between farm fields. These areas may have been treated with pesticides.
- When preparing wild foods, trim fat from the meat. Discard the skin from fish.

Exposure Through Water

Do not fish in water bodies where contamination has occurred.

When pesticides are applied to land, a certain amount may run off into streams and rivers. This runoff, together with industrial waste, may result in low-level contamination of surface water. In certain settings—for example, when sandy soil lies over a ground-water source that is near the surface—pesticides can seep down through the soil to the ground water.

To ensure a safe supply of drinking water, EPA's Office of Water sets standards for pesticides and other chemicals that may be found in drinking water. Municipal water systems test their water periodically and provide treatment or alternate supply sources if residue problems occur. Generally, private wells are not tested unless the well owner requests an analysis. If you get your drinking water from a private well—

- Contact your state or local health department if you have any questions about pesticide or other chemical residues in your well water.
- If your well water is analyzed and found to contain pesticide residue levels above established or recommended health standards, use an alternate water source such as bottled water for drinking and cooking. The safest choice is distilled spring water in glass bottles. If you buy water from a local bottler, ask for the results of any recent pesticide analysis of the bottled water.

EPA sets standards for chemicals that may be found in drinking water.

Exposure Through Air

Outdoors

Air currents may carry pesticides that were applied on properties nearby. You can reduce your exposure outdoors to airborne pesticide residues, or drift, by following these recommendations:

- If a close neighbor or someone else is applying pesticides outdoors near your home, you may want to stay indoors with your children and pets. Keep windows and exterior doors closed.
- If you live near fields, parks, or other areas that receive regular pesticide treatment, consider planting a group of hardy, thick-branched trees or shrubs to help serve as a buffer zone and windbreak.

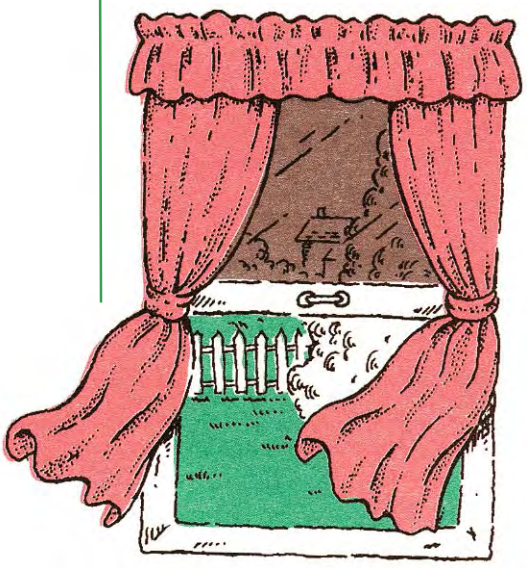
- Careless application can lead to drift or direct spraying of non-target sites. If your property is accidentally sprayed during an aerial pesticide application, you should call your local, state, or regional pesticide office. (See pages 44–48 in the Reference Section for phone numbers.) If you or someone in your family is accidentally sprayed, wash pesticide off immediately and change into clean clothes. Then call your local poison center at 1-800-222-1222.

Some local governments require public notice **before** area-wide or broad-scale pesticide spraying activities take place. Affected residents are notified through newspaper announcements, fliers, letters, or signs posted in areas to be treated. Some communities have also enacted "right-to-know" ordinances that require public notice (usually through posting) of lawn treatments and other small-scale outdoor pesticide uses.

Indoors

The air you breathe may contain low levels of pesticide residues long after a pesticide has been applied to objects inside a building or to indoor surfaces and crawl spaces, or after it has been tracked in from outside. Pesticides break down and disappear more slowly indoors than outdoors. In addition, many homes have built-in energy efficiency features that reduce the exchange of indoor and outdoor air and thus aggravate the problem. To limit your exposure to indoor pesticide residues—

- Air out the building adequately after a pesticide is applied indoors. Open doors and windows, and run overhead, whole-house, or window fans to exchange indoor air for outdoor air rapidly and completely.
- If you suspect that the air in your building is contaminated, consult knowledgeable professionals in your local or state health department or the National Pesticide Information Center at 1-800-858-7378, seven days a week, from 6:30 a.m.–4:30 p.m. Pacific Time (9:30 a.m.–7:30 p.m. Eastern Time) for advice on the appropriate steps to take.



Air out the building adequately after a pesticide is applied indoors.

Poisoned by Pesticides: Don't Let This Happen to Your Child!

A 5-year-old boy drinks from a bottle of bleach that he finds under the bathroom sink.

A 3-year-old girl tries to spray her hair the way mommy does, but sprays an aerosol disinfectant in her eyes instead.

A baby who has just begun to crawl eats green pebbles from behind the sofa. They look like candy, but are really rat poison.

These accidents could happen to your children or to children visiting your home if you don't store pesticides out of their reach or if you don't read the label carefully before using the pesticide product.

The dangers are real. Each year thousands of children are exposed to or poisoned by a household pesticide product that is used or stored incorrectly.

Where do you store your pesticides?

A nationwide study conducted by EPA revealed that almost half (approximately 47 percent) of surveyed households with children under the age of 5 had at least one pesticide stored within their reach.

Whether or not you have young children in your home, take the following precautions to protect all children from unintentional pesticide poisonings or exposures:

- Always store pesticides and other household chemicals up high, out of children's reach, in a **locked** cabinet or garden shed. Installing child-proof safety latches or padlocks on cupboards and cabinets is a good idea. Safety latches are available at your local hardware store or building supply warehouse.
- **Before** applying pesticides—indoors or outdoors—remove children and their toys, along with any pets and their toys, from the area. Keep them away from the area that has been treated until the pesticide has dried and for at least the length of time recommended on the pesticide label.
- If you are interrupted while applying a pesticide—by a phone call, for example—be sure to close the pesticide container properly and put it out of reach of any child who may come into the area while you are gone.

- Never remove labels from containers, and never transfer pesticides to other containers. Children may mistake them for food or drink.
- Never put rodent or insect baits where small children can find them, pick them up, and put them in their mouths.
- Make sure you close any container marked "child resistant" very tightly after you use the product. Check periodically to make sure the product is securely closed. Child resistant does not mean child proof, so you should still be careful with products that are sold in child-resistant packaging.
- Make sure others—especially babysitters, grandparents, and other caregivers—know about the potential hazards of pesticides.
- Teach children that "**pesticides are poisons**"—something they should never touch or eat.
- Keep the **poison center** telephone number (1-800-222-1222) near each phone. Have the pesticide container handy when you call.

Store pesticides out of children's reach.

Handling a Pesticide Emergency

"Help! Someone's Been Poisoned!" What To Do in a Pesticide Emergency

If the person is unconscious, having trouble breathing, or having convulsions, ACT FAST! Speed is crucial.

Give needed first aid immediately.

Call 911 or your local emergency service.

If possible, have someone else call for emergency help while you give first aid.

If the person is awake or conscious, not having trouble breathing, and not having convulsions . . .

Read the label for first aid instructions.

Call your local poison center at 1-800-222-1222, or the National Pesticide Information Center at 1-800-858-7378.

Give first aid.

First Aid for Pesticide Poisoning

When you realize a pesticide poisoning has occurred or is occurring, try to determine what the victim was exposed to and what part of the body was affected before you take action—taking **the right action** is as important as taking **immediate action**. If the person is unconscious, having trouble breathing, or having convulsions, ACT FAST! Speed is crucial. Give needed first aid immediately. Call 911 or your local emergency service. If possible, have someone else call for emergency help while you give first aid. If the person is awake or conscious, not having trouble breathing, and not having convulsions, read the label for first aid instructions. Call your local poison center at 1-800-222-1222 or the National Pesticide Information Center at 1-800-858-7378. Give first aid.

Read the ***Statement of Practical Treatment*** section on the product label. The appropriate first aid treatment depends on the kind of poisoning that has occurred. Follow these general guidelines:

- **Swallowed poison.** A conscious victim should drink a small amount of water to dilute the pesticide. Induce vomiting **only if** a poison center or physician advises you to do so. Call the poison center at 1-800-222-1222.
- **Poison on skin.** Drench skin with water for at least 15 minutes. Remove contaminated clothing. Wash skin and hair thoroughly with soap and water. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.
- **Chemical burn on skin.** Drench skin with water for at least 15 minutes. Remove contaminated clothing. Cover burned area immediately with loose, clean, soft cloth. Do not apply ointments, greases, powders, or other drugs. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.
- **Poison in eye.** Hold eyelid open and wash eye quickly and gently with clean cool running water from the tap or a hose for 15 minutes or more. Use only water; do not use eye drops, chemicals, or drugs in the eye. Eye membranes absorb pesticides faster than any other external part of the body, and eye damage can occur in a few minutes with some types of pesticides.

If a poisoning has occurred, call for help, and be ready to read information from the pesticide label.

- **Inhaled poison.** If the victim is outside, move or carry the victim away from the area where pesticides were recently applied. If the victim is inside, carry or move the victim to fresh air immediately. If you think you need protection like a respirator before helping the victim, call the Fire Department and wait for emergency equipment before entering the area. Loosen the victim's tight clothing. If the victim's skin is blue or the victim has stopped breathing, give artificial respiration (if you know how) and call 911 for help. Open doors and windows so no one else will be poisoned by fumes.

What To Do After First Aid

- First aid may precede but should not replace professional medical treatment. After giving first aid, call the poison center at 1-800-222-1222. Have the pesticide label at hand when you call.

- If emergency treatment is needed in a doctor's office or emergency room, carry the container in your trunk or flatbed away from the passengers in your vehicle. The doctor needs to know what active ingredient is in the pesticide before prescribing treatment. This information is on the label, which sometimes also includes a telephone number to call for additional treatment information.

National Pesticide Information Center (NPIC)

Call Toll Free 1-800-858-7378

Another good resource in a pesticide emergency is NPIC, the National Pesticide Information Center, a toll-free telephone service that operates seven days a week, from 6:30 a.m.–4:30 p.m. Pacific Time (9:30 a.m.–7:30 p.m. Eastern Time). NPIC provides information on pesticides and how to recognize and respond to pesticide poisonings. If necessary, staff at NPIC can transfer your call directly to a local poison center. Call NPIC toll free at 1-800-858-7378.

NPIC staff answer questions about animal poisonings, too. To keep your pets from being poisoned, follow label directions on flea and tick products carefully. If you are concerned about the chemicals used in these products, consult your veterinarian.

How To Recognize Pesticide Poisoning

External irritants that contact skin may cause skin damage such as redness, itching, or pimples. External irritants may also cause an allergic skin reaction that produces redness, swelling, or blistering. The mucous membranes of the eyes, nose, mouth, and throat are also quite sensitive to chemicals. Pesticide exposure may cause stinging and swelling in these membranes.

Internal injuries also may occur if a pesticide is swallowed, inhaled, or absorbed through the skin. Symptoms vary from organ to organ. Lung injury may result in shortness of breath, drooling (heavy salivation), or rapid breathing. Direct injury to the stomach and intestines may produce nausea, vomiting, abdominal cramps, or diarrhea. Injury to the nervous system may cause excessive fatigue, sleepiness, headache, muscle twitching, and numbness. In general, different types of pesticides produce different sets of symptoms.

If someone develops symptoms after working with pesticides, seek medical help immediately to determine if the symptoms are pesticide related. In certain cases, blood or urine should be collected for analysis, or other specific exposure tests can be made. **It is better to be too cautious than too late**.

Avoid potential health problems by minimizing your exposure to pesticides. Follow all the safety recommendations on pages 19–25.

EPA wants to know about any adverse effects associated with pesticide exposure. If you have such information, contact—

Pesticide Incident Response Officer
Office of Pesticide Programs (7506C)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
davido.frank@epa.gov

Choosing a Pest Control Company

IF YOU HAVE a pest control problem that you do not want to handle on your own, you may decide to turn to a professional applicator. How can you be sure that the pest control company you hire will do a good job? Before you choose a company, get answers to these questions:

1 Is the company licensed?

Most state or local agencies issue state pest control licenses. Make sure the pest control operator's licence is **current** if one is required in your state. Also, ask if the company's **employees are bonded**, meaning that the company reimburses you for any loss or damage caused by the employee.

You may want to contact your state pesticide agency to find out about its pesticide certification and training programs and to ask whether periodic recertification is required for pest control operators. (See pages 45–48 for addresses and phone numbers.)

In addition, possession of a city license—where they are issued—is one more assurance that the company you are dealing with is reputable and responsible.

2 Is the company willing and able to discuss the treatment proposed for your home?

Selecting a pest control service is just as important as selecting other professional services. Look for the same high degree of competence you would expect from a doctor or lawyer. Any company, including those advertising themselves as "green," should inspect your premises and outline a recommended control program, including the—

- Pests to be controlled.
- Extent of the problem.
- Active ingredient(s) in the pesticide chosen.
- Potential adverse health effects and typical symptoms of poisoning associated with the active ingredient.
- Form of the pesticide and application techniques.
- Non-chemical alternatives available.

- Special instructions to reduce your exposure to the pesticide (such as vacating the house, emptying the cupboards, and removing pets).
- Steps to take to minimize your pest problems in the future.

3 Does the company have a good track record?
Don't rely on the company salesperson to answer this question. Research the answer yourself. Ask neighbors and friends if they have ever dealt with the company. Were they satisfied with the service they received? Call your state or local pesticide regulatory agency and find out if they have received complaints about the company.

4 Does the company have appropriate insurance? Can the salesperson show proof on paper that the company is insured?
Most contractors carry general liability insurance, including insurance for sudden and accidental pollution. Their insurance gives you a certain degree of protection should an accident occur while pesticides are being applied in your home. Contractors may also carry workmen's compensation insurance, which can help protect you should one of their employees be injured while working in or around your apartment or house. Although most states do not require pest control companies to buy insurance, you should **think twice** before hiring a company that is not insured.

5 Does the company guarantee its work?
You should be skeptical about a company that does not guarantee its work. In addition, be sure to find out what you must do to keep your part of the bargain. For example, in the case of termite control treatments, the company's guarantee may become invalid if you make structural alterations to your home without giving prior notice to the pest control company.

6 Is the company affiliated with a professional pest control association?
Professional associations—national, state, or local—keep members informed of new developments in pest control methods, safety, training, research, and regulations. Members agree to honor a code of ethics. The fact that a company, small or large, chooses to join a professional association signals its concern for quality.

Ask questions before choosing a pesticide company.

You and the company of your choice should develop the contract together. Your safety concerns should be noted and reflected in the choice of pesticides to be used. These concerns may include allergies, sensitivities, age of occupants (infants or elderly), resident pets, and treatment near wildlife and fish. Wise consumers get bids from two or three companies and look at value more than price. What appears to be a bargain may warrant a second look.

If you hire a pest control firm to do the job, ask the company to use the least toxic chemical method available that will do the job. Ask to see the label or Material Safety Data Sheet, which will show precautionary warnings.

Hiring a company to take care of your pest problem does not mean your job is over. You must evaluate the results. If you believe something has gone wrong with the pesticide application, contact the company and/or your state pesticide agency. Be a responsible, wise consumer and keep asking questions until your pests are under control.

Reference Section

Calculating the Correct Amount of Pesticide To Use for Your Target Area

To determine the size of your target area outdoors (usually a square or rectangular part of your lawn or garden), measure each side and multiply the length times the width. For example, if you want to apply a pesticide in an area that is 15 feet long and 15 feet wide, multiply 15 x 15 to get a total of 225 square feet.

When you read the label for pesticides commonly applied outdoors, you will see measurements in square feet or in square yards. A section of lawn that is 1 yard long x 1 yard wide has an area of 1 square yard. Because 1 yard = 3 feet, another way to calculate the same area is this: 3 feet long x 3 feet wide = 9 square feet = 1 square yard.

To know the size of your target area indoors, you may need to determine the volume of a room. You must calculate the volume of a room, for instance, before using a bug bomb (aerosol release) to control cockroaches or fleas. In a case like this, measure and multiply the room's length times width times height. For example, if the kitchen in your apartment is 6 feet long, 5 feet wide, and 8 feet high, its volume is 240 cubic feet (6 x 5 = 30 x 8 = 240).

Tables 1 to 3 (on pages 40–41) give examples for changing measurements you find on the pesticide label to match your specific target area and pest problem.

For most pesticide uses in and around the home, you need to know some common ways to measure volume and some common abbreviations:

1 gallon (gal.)	= 16 cups = 8 pints (pt.) = 4 quarts (qt.) = 128 fluid ounces (fl. oz.)
1 quart (qt.)	= 4 cups = 2 pt. = 32 fl. oz.
1 pint (pt.)	= 2 cups = 16 fl. oz.
1 cup	= 8 fl. oz.
1 tablespoon	= 3 teaspoons = 1/2 fl. oz.
1 teaspoon	= 1/6 fl. oz.
1 sq. yard	= 9 square feet = 3 ft. long x 3 ft. wide

Measurements are based on standard measuring utensils, not on tableware.

Not all amounts are included in the tables. For amounts not included, use the following notes as a guide:

- To figure the amount of a ready-to-use pesticide (**not** to be diluted with water), you must change the quantity of pesticide in the same way that you change the area/volume/number of items treated to keep the correct proportion.

  For example—

  ½ lb. of pesticide per 1,000 sq. ft. = ¼ lb. of pesticide per 500 sq. ft.

- To figure the amount of a pesticide that **is to be** diluted with water, you must change the quantity of pesticide and the quantity of water in the same way that you change the area/volume/number of items treated to keep the correct proportion.

  For example—

  1 lb. of pesticide in 2 gals. of water per 2,000 sq. ft. = ½ lb. of pesticide in 1 gal. of water per 1,000 sq. ft.

TABLE 1 — Diluting Pesticides with Water
Unit stands for any measure of pesticide quantity. Read across.

Pesticide Label Says: Mix "x" Units of Pesticide . . .	*You mix . . .*		
8 units *per* 1 gal. water	2 units *per* 1 qt. water	*or*	1 unit *per* 1 pt. water
16 units *per* 1 gal. water	4 units *per* 1 qt. water	*or*	2 units *per* 1 pt. water
32 units *per* 1 gal. water	8 units *per* 1 qt. water	*or*	4 units *per* 1 pt. water
128 units *per* 1 gal. water	32 units *per* 1 qt. water	*or*	16 units *per* 1 pt. water

TABLE 2 — Measuring Pesticides for a Surface Application
Unit stands for any measure of pesticide quantity. Read across.

Pesticide Label Says: Apply "x" Units of Pesticide . . .		*Your surface measures . . .* 20,000 sq. ft.	10,000 sq. ft.	500 sq. ft.
1 unit *per* 1,000 sq. ft.	***Apply:***	20 units	10 units	½ unit
2 units *per* 1,000 sq. ft.		40 units	20 units	1 unit
5 units *per* 1,000 sq. ft.		100 units	50 units	2½ units
10 units *per* 1,000 sq. ft.		200 units	100 units	5 units

TABLE 3 — Buying Pesticides for a Room Application
Read across.

Pesticide Label Says: Release One Aerosol Can . . .		*Your room measures . . .* 20,000 cu. ft.	10,000 cu. ft.	5,000 cu. ft.
10,000 cu. ft.	***Use:***	2 cans	1 can	don't use
5,000 cu. ft.		4 cans	2 cans	1 can
2,500 cu. ft.		8 cans	4 cans	2 cans

You may need to measure quantities of pesticides that are too small to be measured accurately with common measuring tools available at home. In this case, you should–

- Search for another pesticide product or a less concentrated form of the same pesticide.
- Find a more accurate measuring device, such as a graduated cylinder or a scale that measures small weights.

For More Information

Visit Our Web Site

For more information on pesticides, pesticide safety, and pest control, visit our Web site at www.epa.gov/pesticides. A wide variety of information is available, including:

- Fact sheets
- Frequent questions
- Information sources
- Publications
- Health and safety
- Environmental effects
- Controlling pests
- Regulating pesticides
- Science and policy
- Access to local/regional information
- Materials for kids

Home and Garden Web Resources:

- Controlling Pests (EPA)
  http://www.epa.gov/pesticides/controlling/index.htm
- Controlling Mosquitos
  http://epa.gov/pesticides/factsheets/skeeters.htm
- How to Use Insect Repellents Safely (EPA)
  http://www.epa.gov/pesticides/factsheets/insectrp.htm
- Environmentally Beneficial Landscaping (EPA)
  http://www.epa.gov/greenscapes
- Help Yourself to A Healthy Home
  http://www.uwex.edu/healthyhome/consumers.html
- Cooperative State Research, Education, and Extension Service State Partners (U.S. Department of Agriculture)
  http://www.csrees.usda.gov/qlinks/partners/state_partners.html

Order Publications

You may order pesticide publications two ways:

1. Call the National Service Center for Environmental Publications at 1-800-490-9198 or
2. Order the publications from the Center's Web site at http://www.epa.gov/ncepihom/ordering.htm

Other sources for information about pesticides, pesticide safety, and pest control include:

- National Pesticide Information Center (NPIC)
  Telephone: 1-800-858-7378
  Web site: www.npic.orst.edu
  E-mail: npic@ace.orst.edu

NPIC is an EPA-sponsored toll-free service that provides objective, science-based information on a wide variety of the following pesticide-related subjects to the public:

- Pesticide information
- Information on recognizing and managing pesticide poisonings
- Safety information
- Health and environmental effects
- Referrals for investigation of pesticide incidents and emergency treatment information
- Cleanup and disposal procedures, and much more

- County Cooperative Extension Service offices are usually listed in the telephone directory under county or state government; these offices often have a range of resources on lawn care and landscape maintenance, including plant selection, pest control, and soil testing. (Web site: http://www.csrees.usda.gov/qlinks/partners/state_partners.html)
- State agriculture and environmental agencies may publish information on pests, pest management strategies, and state pesticide regulations. (See state contacts on pages 45–48.)
- Libraries, bookstores, and garden centers usually have a wide selection of books that identify various pests and discuss lawn care. Garden centers may also have telephone hotlines or experts available on the premises to answer gardening questions.

EPA Addresses

EPA Headquarters

U.S. Environmental Protection Agency
Office of Pesticide Programs (7506C)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Telephone: 703-305-5017
Fax: 703-305-5558

EPA Regional Offices

US EPA, Region 1
Pesticide Section
John Kennedy Federal Building
1 Congress Street, Suite 1100
Boston, MA 02114
888-372-7341
www.epa.gov/region01/

US EPA, Region 2
Pesticide Section
2890 Woodbridge Avenue
Edison, NJ 08837
732-321-6769
www.epa.gov/region02/

US EPA, Region 3
Pesticide Section
1650 Arch Street
Philadelphia, PA 19103
215-814-2042
www.epa.gov/region03/

USEPA, Region 4
Pesticide Section
61 Forsyth Street, SW
Atlanta, GA 30303
404-562-8968
www.epa.gov/region04/

US EPA, Region 5
Pesticide Section
77 West Jackson Boulevard
Chicago, IL 60604-3507
312-353-2000
www.epa.gov/region05/

US EPA, Region 6
Pesticide Section
1445 Ross Avenue
Dallas, TX 75202-2733
214-665-6444
www.epa.gov/region06/

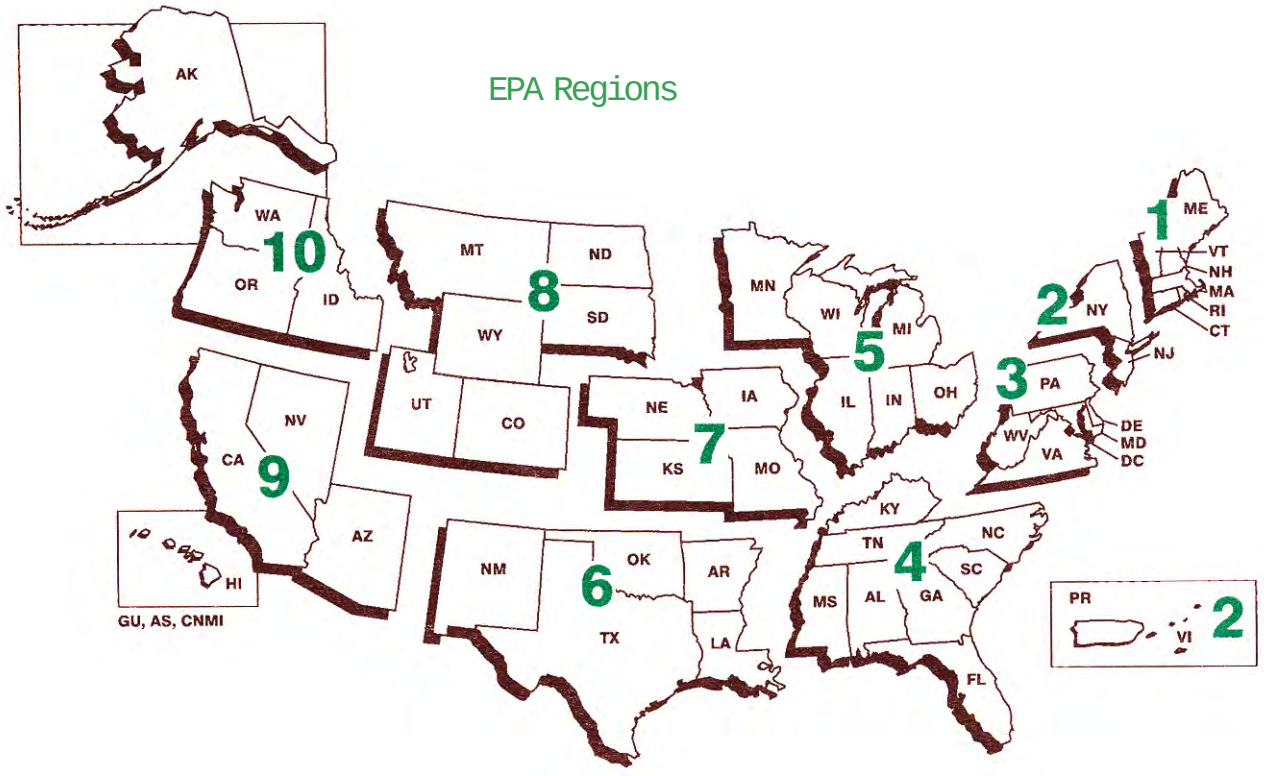
US EPA, Region 7
Pesticide Section
901 N. 5th Street
Kansas City, KS 66101
913-551-7033
www.epa.gov/region07/

US EPA, Region 8
Pesticide Section
999 18th Street
Denver, CO 80202-2466
800-227-8917
www.epa.gov/region08/

US EPA, Region 9
Pesticide Section
75 Hawthorne Street
San Francisco, CA 94105
415-947-8704
www.epa.gov/region09/

US EPA, Region 10
Pesticide Section
1200 Sixth Avenue
Seattle, WA 98101
206-553-1200
www.epa.gov/region10/

EPA Regions



State Lead Agencies for Pesticide Regulation

Alabama
Plant Protection and Pest Management Division
Alabama Department of Agriculture & Industries
P.O. Box 3336
Montgomery, AL 36109-0336
334-240-7237

Alaska
Environmental Health
Dept. of Environmental Conservation
555 Cordova
Juneau, AK 99501
907-745-3236

Arizona
Environmental Services Division
Arizona Department of Agriculture
1688 W. Adams Street
Phoenix, AZ 85007-2617
602-542-3575

Arkansas
Arkansas State Plant Board
P.O. Box 1069
Little Rock, AR 72203-1069
501-225-1598

California
California Department of Pesticide Regulation
1001 I Street
P.O. Box 4015
Sacramento, CA 95812-4015
916-445-4000

Colorado
Division of Plant Industry
Colorado Department of Agriculture
700 Kipling Street, Suite 4000
Lakewood, CO 80215-5894
303-239-4147

Connecticut
Pesticide Management Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127
860-424-3369

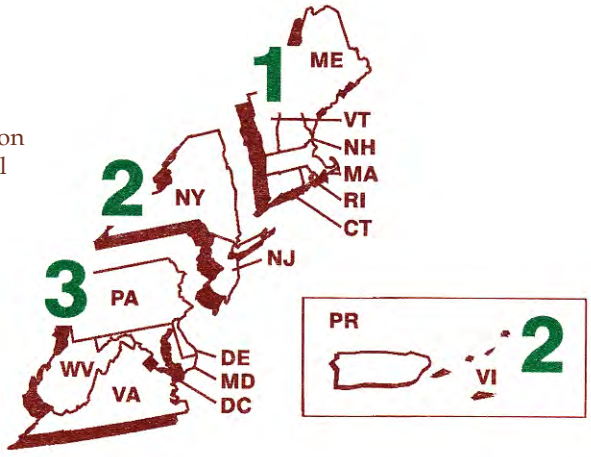
Delaware
Delaware Department of Agriculture
2320 South Dupont Highway
Dover, DE 19901-5515
302-698-4570

District of Columbia
Environmental Health Administration
Bureau of Hazardous Waste and Toxic Substances Division
Department of Health
51 N Street, NE, 3rd Floor, Room 3018
Washington, DC 20002
202-535-2280

Florida
Division of Agricultural Environmental Services
Florida Department of Agriculture and Consumer Services
3125 Conner Blvd., Bldg 6-L29
Tallahassee, FL 32399-1650
850-487-2130

Georgia
Plant Industry Division
Georgia Department of Agriculture
Capitol Square
Atlanta, GA 30334-4201
404-656-4958

Hawaii
Plant Industry Division
Hawaii Department of Agriculture
1428 South King Street
Honolulu, HI 96814-2512
808-973-9415



Idaho
Division of Agricultural Resources
Idaho Department of Agriculture
P.O. Box 790
Boise, ID 83701-0790
208-332-8531

Illinois
Bureau of Environmental Programs
Illinois Department of Agriculture
P.O. Box 19281
Springfield, IL 62794-9281
217-785-2427

Indiana
Office of the Indiana State Chemist
175 S. University Street
Purdue University
West Lafayette, IN 47907-1154
765-494-1587

Iowa
Pesticide Bureau
Iowa Department of Agriculture and Land Stewardship
Wallace Building
Des Moines, IA 50319
515-281-8591

Kansas
Pesticide and Fertilizer Program
Kansas Department of Agriculture
109 SW Ninth Street, 3rd Floor
Topeka, KS 66612-1281
785-296-3786

Kentucky
Division of Pesticide Regulation
Kentucky Department of Agriculture
100 Fairoaks Lane, 5th Floor
Frankfort, KY 40601-1108
502-564-7274

Louisiana
Pesticide and Environmental Programs
Louisiana Department of Agriculture and Forestry
P.O. Box 3596
Baton Rouge, LA 70821-3596
225-925-3763

State Lead Agencies for Pesticide Regulation (cont'd)

Maine
Board of Pesticides Control
Maine Department of Agriculture
State House Station #28
Augusta, ME 04333-0028
207-287-2731

Maryland
Pesticide Regulation Section
Maryland Department of Agriculture
50 Harry S. Truman Parkway
Annapolis, MD 22401-7080
410-841-5710

Massachusetts
Pesticide Bureau
Massachusetts Department of Food and Agriculture
251 Causeway St.—Suite 500
Boston, MA 02114-0009
617-626-1778

Michigan
Pesticide and Plant Management Division
Michigan Department of Agriculture
P.O. Box 30017
Lansing, MI 48909-7517
517-335-6542

Minnesota
Agronomy and Plant Protection Divison
Minnesota Department of Agriculture
90 West Plato Blvd.
St. Paul, MN 55107-2094
651-296-5639

Mississippi
Bureau of Plant Industry
Mississippi Department of Agriculture and Commerce
P.O. Box 5207
Mississippi State, MS 39762-5207
601-325-3390

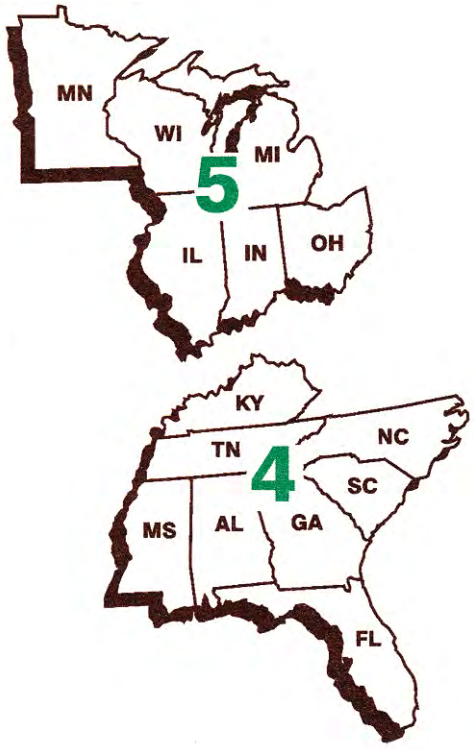
Missouri
Plant Industries Division
Missouri Department of Agriculture
P.O. Box 630
Jefferson City, MO 65102-0630
573-751-2462

Montana
Agricultural Sciences Division
Montana Department of Agriculture
P.O. Box 200201
Helena, MT 59620-0201
406-444-5400

Nebraska
Pesticide Program
Nebraska Department of Agriculture
301 Centennial Mall
P.O. Box 94756
Lincoln, NE 68509-4756
402-471-2394

Nevada
Bureau of Plant Industry
Nevada Department of Agriculture
350 Capitol Hill Avenue
Reno, NV 89502-2923
702-688-1182, ext 239

New Hampshire
Division of Pesticide Control
New Hampshire Department of Agriculture, Markets and Food
P.O. Box 2042
Concord, NH 03302-2042
603-271-3550



New Jersey
Pesticide Control and Land Use Enforcement
New Jersey Department of Environmental Protection
P.O. Box 411
Trenton, NJ 08625-0411
609-984-6647

New Mexico
Division of Agricultural and Environmental Services
New Mexico Department of Agriculture
P.O. Box 30005, Dept. 3AQ
Las Cruces, NM 88003-8005
505-646-3208

New York
Division of Solid and Hazardous Materials
New York State Department of Environmental Conservation
625 Broadway, 9th Floor
Albany, NY 12233-7250
518-402-8768

North Carolina
Food and Drug Protection Division
North Carolina Department of Agriculture and Consumer Services
P.O. Box 27647
Raleigh, NC 27611-0647
919-733-3556

North Dakota
Plant Industries
North Dakota Department of Agriculture
600 E. Blvd., 6th Floor
Bismarck, ND 58505-0020
701-328-4756

Ohio
Division of Plant Industry
Ohio Department of Agriculture
8995 East Main Street
Reynoldsburg, OH 43068-3399
614-728-6377

Oklahoma
Plant Industry & Consumer Services Division
Oklahoma Department of Agriculture
2800 North Lincoln Blvd.
P.O. Box 528804
Oklahoma City, OK 73105-4298
405-522-5879

State Lead Agencies for Pesticide Regulation (cont'd)

Oregon
Pesticides Division
Oregon Department of Agriculture
635 Capitol Street, NE
Salem, OR 97301-2532
503-986-4635

Pennsylvania
Bureau of Plant Industry
Pennsylvania Department of Agriculture
2301 North Cameron Street
Harrisburg, PA 17110-9408
717-772-5217

Puerto Rico
Analysis & Registration of Agricultural Materials
Puerto Rico Department of Agriculture
P.O. Box 10163
Santurce, PR 00908-1163
787-796-1710

Rhode Island
Division of Agriculture & Resource Marketing
Rhode Island Department of Environmental Management
235 Promenade Street
Providence, RI 02908-5767
401-222-2781

South Carolina
Department of Pesticide Regulation
Clemson University
511 Westinghouse Road
Pendleton, SC 29670-8847
864-646-2150

South Dakota
Office of Agronomy Services
Division of Agricultural Services
South Dakota Department of Agriculture
Foss Building, 523 East Capitol
Pierre, SD 57501-3182
605-773-4432

Tennessee
Regulatory Services
Tennessee Department of Agriculture
P.O. Box 40627, Melrose Station
Nashville, TN 37204-0627
615-837-8152

Texas
Texas Department of Agriculture
P.O. Box 12847
Austin, TX 78711
512-463-1093

Utah
Utah Department of Agriculture and Food
350 North Redwood Road
P.O. Box 146500
Salt Lake City, UT 84114-6500
801-538-7180

Vermont
Vermont Department of Agriculture, Food and Markets
116 State Street, Drawer 20
Montpelier, VT 05620-2901
802-828-2431

Virgin Islands
Pesticide Program
Division of Natural Resources
Watergut Homes, Box 118, Christiansted
St. Croix, Virgin Islands 00820
809-773-0565

Virginia
Office of Pesticide Services
Virginia Department of Agriculture & Consumer Service
P.O. Box 1163, Rm. 401-A
Richmond, VA 23218-1163
804-371-6559

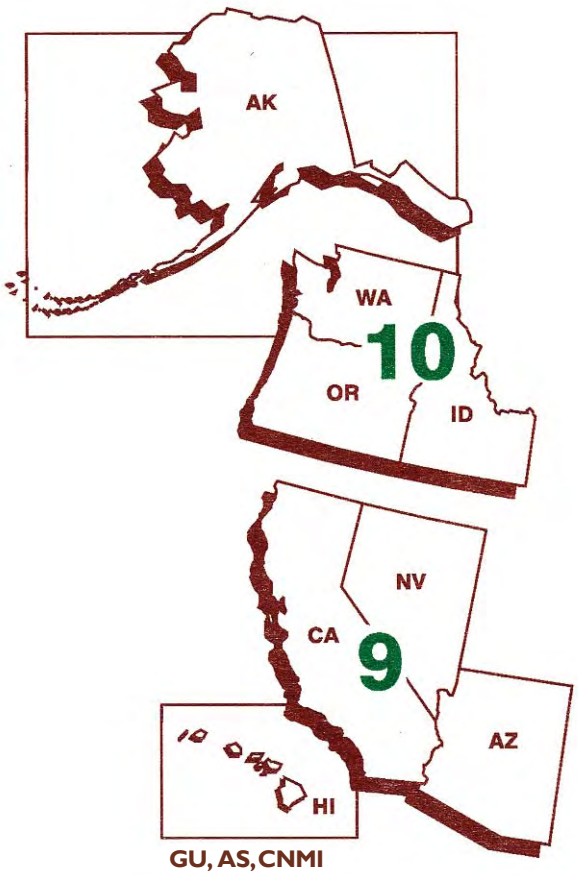
Washington
Registration Services
Pesticide Management Division
Washington Department of Agriculture
P.O. Box 42589
Olympia, WA 98504-2589
360-902-2026

State Lead Agencies for Pesticide Regulation (cont'd)

West Virginia
Plant Industries Division
West Virginia Department of
Agriculture
1900 Kanawha Blvd., East
Charleston, WV 25305-0190
304-558-2209

Wisconsin
Bureau of Agricultural Management
Wisconsin Department of Agriculture,
Trade and Consumer Protection
P.O. Box 8911
Madison, WI 53708-8911
608-224-4550

Wyoming
Technical Services
Wyoming Department of Agriculture
2219 Carey Avenue
Cheyenne, WY 82002-0100
307-777-6590



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"Help! Someone's Been Poisoned!"
What To Do in a Pesticide Emergency

If the person is unconscious, having trouble breathing, or having convulsions . . .
ACT FAST! Speed is crucial.

Give needed first aid immediately.

Call 911 or your local emergency service. If possible, have someone else call for emergency help while you give first aid.

If the person is awake or conscious, not having trouble breathing, and not having convulsions . . .

Read the label for first aid instructions.

Call a doctor, a poison control center, a local emergency service (911), or the National Pesticide Information Center (toll free at 1-800-858-7378).

Give first aid.