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Safe Use of Pesticides Around the Home

Controlling pests in and around the home and garden is seemingly a never-ending problem. Insects invade homes, contaminate stored food products, carry certain organisms that cause serious human and animal diseases, infest pets, and threaten fruit trees, ornamental plants, and vegetables. Molds can attack food, plants, ornamentals, and grasses, and can cause serious food contamination and health problems. Mildew fungi are very destructive to clothing, rugs, and other fiber products. Weeds are always competing with ornamentals, vegetables, and grasses for space, nutrients, and water.

To help the homeowner, a wide array of pesticides has been developed to control pests in and around the home and garden. But just how safe are pesticides? This is a very important question, particularly for the applicator and for those who may come in contact with the pesticides before, during, or immediately after the application.

Generally, home pesticide products are safe if handled properly and according to the instructions on the product label. In most instances, the problems associated with the use of pesticides in and around the home environment are the result of individuals failing to educate themselves about the use of these products. When handled in a careless manner, pesticides

may endanger the health of the user as well as the welfare of other persons, pets, and the environment. The most important thing you can do to minimize problems is *always read the label before using any pesticide product!*

What is a Pesticide?

A pesticide is any substance or mixture of substances used to prevent development of, repel, destroy, or kill a pest. And what is a pest? Pests are living organisms that bother, injure, or cause damage to buildings, plants, humans, and animals, including pets. Pests can be animals such as rats, mice, birds, and deer; or insects such as ticks, mites, snails, slugs, and nematodes. Many animal and insect pests carry a variety of disease organisms that are injurious to adults, children, and pets. Pests can also be plants such as weeds; or fungi such as mildews, blights, molds, and rusts. Finally, pests can be microorganisms such as bacteria and viruses.

The term pesticide refers to insecticides, herbicides, fungicides, and various other substances used to control pests. Some pesticides are classified as *Restricted Use* pesticides if there is reason to believe they could harm humans, livestock, wildlife, or the environment, even when used according to label directions. To apply these

types of pesticides in Pennsylvania, a person is required to have a pesticide applicator certification or be under the direct supervision of a certified applicator. All other pesticides are classified as *Unclassified/General Use* pesticides, and anyone can apply them according to label directions. Many household products are pesticides, including the following common products:

- Cockroach sprays and baits
- Insect repellents to repel mosquitoes and other biting insects
- Rat and other rodent poisons
- Flea and tick sprays, powders, and pet collars
- Kitchen, laundry, and bath disinfectants and sanitizers
- Products that kill mold and mildew
- Some lawn and garden products such as weed killers
- Some swimming pool chemicals

Pesticides are made up of one or more active ingredients (AI), and inert ingredients. The active ingredient(s) is the material that controls the pest. The inert ingredients are used to dilute the active ingredient and/or are substances to help the active ingredient target the pest.

What is IPM?

Integrated Pest Management (IPM) is a holistic approach to pest management that uses a full range of pest control methods in a safe, cost-efficient, and environmentally sound manner. The goal of an IPM strategy is to prevent pests from reaching economically damaging levels. Informed decisions regarding pest control can be made with an IPM program based on identifying the pest, measuring the pest population, assessing the damage levels, and identifying available pest management methods.

The IPM practitioner has a “toolbox” of pest management methods available to use. The key is to coordinate the use of multiple methods into a single integrated system. Pesticides or chemicals are just one tool for controlling pests. Nonchemical methods may provide longer and more permanent control of a pest than do pesticide applications, and should be considered when developing a pest management strategy. Here is a list of available pest management methods.

Mechanical controls

Using devices that prevent the spread of or reduce the infestation of pests. Examples include traps, screens, nets, and fences.

Physical controls

Using methods that kill pests, disrupt their life cycle, or make the environment unfavorable for their survival. Examples include manipulation of water, humidity, temperature, electricity, light, or sound waves.

Cultural controls

Using routine management practices that disrupt the normal association between a pest and its host, making the pest’s environment less favorable for survival, growth, or reproduction. Examples include rotating crops, tilling the soil, varying planting times, destroying crop residues, managing manure, and pruning, thinning, and fertilizing plants.

Genetic controls

Using plants and animals that are resistant to attack by pests, or manipulating the genetics of a pest population. Examples include planting genetically modified seed such as *Bt* corn or releasing sterile male insects into the pest population.

Biological controls

The introduction, encouragement, or artificial increase of plants and animals that are parasites or predators of a pest species.

Legal controls

Limiting the development of pest populations by restricting human activities with state and federal laws that establish a framework of inspections and quarantines to prevent the introduction of new pests into the country or the spread of pests within the country.

Chemical controls

Using naturally derived or synthesized chemicals called pesticides to kill, inhibit, attract, repel, or otherwise control the growth of pest plants, animals, and microorganisms.

In IPM, conventional pesticides are one component, rather than the backbone, of defense against pests. IPM promotes calculated and targeted applications of pesticides that are more specific to the pest species.

After you have identified a pest management strategy, the next step in an IPM program is to develop reliable monitoring techniques for measuring pest populations and resulting damages or losses. Next, use a pest control method only if it will prevent more damage than is reasonable to accept (or cost less than the value saved). Finally, evaluate and record the results of your pest control methods.

Types of Pesticides

Many types of pesticides are available to control pests (Table 1). Some, such as fumigants (gases) are nonspecific, in that they control a wide variety of pests such as insects, weeds, nematodes, and fungi in the application area. For example, an aerosol bomb will kill all insects in the room in which it is applied. Other pesticides are very selective, in that they may eliminate a pest only at a certain stage of its development or control only specific types of pests. For example, ovicides kill only the eggs of insects and will not harm the adult insect pests.

Antimicrobial products (bactericides, biocides, disinfectants, and sanitizers) are another type of pesticide. These products are used to destroy or suppress the growth of harmful microorganisms such as bacteria, viruses, or fungi on inanimate objects and surfaces. Ordinary household cleaning agents and sanitizers such as bleach and ammonia are regulated as pesticides if information on their product labels indicates they can be used as disinfectants or germicides.

Table 1. Types of pesticides

Type of Pesticide	Activity
Algaecides	Control algae in bodies of water, including swimming pools.
Antimicrobials	Kill microorganisms that produce disease.
Attractants	Attract specific pests using natural insect chemicals called pheromones that confuse the mating behavior of insects.
Avicides	Control pest birds.
Biopesticides	Naturally occurring substances with pesticidal properties.
Defoliant	Cause foliage to drop from a plant, typically to aid in the harvesting process.
Desiccants	Aid in the drying process of plants or insects, usually for laboratory purposes.
Fumigants	Produce vapors or gases to control air- or soilborne insects and diseases.
Fungicides	Destroy fungi that infect plants, animals, or people.
Herbicides	Control noxious weeds and other vegetation that are growing or competing with a desired species.
Insect Growth Regulators (IGRs)	Accelerate or retard the rate of growth of insects.
Insecticides	Control or eliminate insects that affect plants, animals, or people.
Miticides (Acaricides)	Kill mites that live on plants, livestock, and people.
Molluscicides	Kill snails and slugs.
Nematicides	Kill nematodes, which are microscopic wormlike organisms that live in the soil and cause damage to food crops.
Ovicides	Control insect eggs through the application of low-sulfur petroleum oils to plants and animals.
Piscicides	Control pest fish.
Plant Growth Regulators (PGRs)	Accelerate or retard the rate of growth of a plant.
Predacides	Control vertebrate pests.
Repellents	Repel pests such as mosquitoes, flies, ticks, and fleas.
Rodenticides	Control mice, rats, and other rodents.

Pesticide Formulations

Pesticides are available in a wide variety of formulations. Home and garden products are formulated as aerosols, baits, dry flowables, dry granules, dusts, emulsifiable concentrates, flowables, solutions, and wettable powders. Although most home and garden products are of very low toxicity to humans and pets and do not present environmental problems, you should always exercise care when handling, applying, transporting, and storing these products.

Aerosols

These pesticide formulations are liquids that contain the active ingredient in solution and are packaged in a pressurized container. Pesticide aerosols contain a small amount of active ingredient mixed with a propellant that forces the contents from the can as a mist.

Aerosols are ready to use as purchased without further measuring or mixing of ingredients. Caution is necessary when handling aerosols, however, because the pressurized containers may explode if punctured or burned.

Baits

Poisonous baits are composed of an edible substance or some other attractant material mixed with a small amount of active ingredient. The bait either attracts the pest or is placed in a location where the targeted pest will find and consume it. Baits are used to control insects, snails, slugs, rodents, vermin, and pest birds. They are often used in kitchens, gardens, food-storage and processing areas and facilities, and refuse disposal areas. Since baits can be used in specific locations on an as-needed basis, they can be removed easily when the target pest is controlled or eliminated. There are several disadvantages to bait usage. Children and pets can be easily attracted to the bait if it is not contained in a bait station or properly placed. In addition, the intended pest may not be controlled if the bait itself is not the most attractive food source available.

Therefore, it is important that other, more attractive food sources be eliminated.

Dry flowables (DF)

These products are similar to flowables but are in a dry form. They are mixed with water prior to application and need only minimum agitation to keep the product in suspension or solution. Dry flowables, although much finer in particle size, are nearly identical to wettable powders (WP).

Dusts

Dusts contain an active ingredient and a finely ground inert substance such as talc, clay, nut shells, or volcanic ash. These dry formulations are ready to use as purchased, without additional mixing. The major advantage of dust formulations is the ease of handling with inexpensive application equipment; however, dusts may cause more eye and nose irritation to the applicator than materials that are applied as a spray. Dusts are relatively expensive for the amount of active ingredient in the total formulation. Furthermore, only limited amounts of the active ingredient in the dust may actually reach the intended target site, and it can be removed easily by wind and rain.

Emulsifiable concentrate (EC)

These materials are liquid formulations with the active ingredient dissolved in one or more petroleum solvents. An emulsifier is added so the material will mix readily with water. Emulsifiable concentrate formulations are ideal for the home gardener because they are easy to measure and use, require only slight agitation to keep the material in suspension or solution, are not abrasive to the application equipment, and will not plug the screens and nozzles. However, they have several disadvantages. Phytotoxicity (toxicity to plant tissue) by these materials may occasionally cause browning of the plant parts during periods of high temperatures or slow drying conditions. The high concentration of active ingredient(s) in EC formulations may be a hazard to the applicator and other persons and pets if the product is accidentally spilled on the skin

or consumed. Some formulations are detrimental to painted surfaces.

Proper storage of emulsifiable concentrates is very important. They should never be stored where the liquid is exposed to freezing temperatures or in areas with excessively high temperatures. Certain EC formulations can cause rubber hoses, gaskets, and pump parts to deteriorate, especially if the product is stored in the application equipment.

Flowables (F)

These formulations consist of finely ground solid particles suspended in a liquid carrier. The solid in a flowable is similar to the active ingredient in a wettable powder, except it is formulated to stay suspended in liquid.

Flowables are readily mixed with water and usually do not clog nozzles. They need only moderate agitation to remain in suspension. The principal disadvantage of flowables is the hazard associated with handling and storing undiluted materials. The same precautions should be observed with flowables as with emulsifiable concentrates.

Granules (G)

Granular formulations, also referred to as dry granules (DG), are ready-to-use dry materials. Most are prepared by applying the active ingredient to a coarse, porous, solid material such as clay or ground corncobs. Since the particles are relatively heavy, granules do not normally present a drift hazard and, thus, are safer to apply than most other formulations. They can be applied with relatively inexpensive seeders and fertilizer spreaders, either directly to the soil or over the plants.

When compared to many other formulations, granules are more expensive relative to the amount of active ingredient actually purchased. However, the ease of application more than offsets the added cost. Granular formulations, with few exceptions, cannot be used for treating foliage because they will not stick to plant surfaces.

Solutions (S)

Many of these liquid formulations do not require further dilution, or they are mixed with water to form true solutions. Because the product often contains a high concentration of active ingredient, care must be taken when handling these formulations.

Wettable powders (WP)

These dry, powdered formulations are mixed with water to produce suspensions. As a rule, wettable powders are safer to use on foliage and usually do not absorb through the human skin as quickly as do the liquid formulations. They are generally easy to handle, mix, transport, and store, and are reasonable in cost.

Since wettable powders are dustlike in consistency, they may be hazardous if the applicator inhales the concentrated dust during the mixing process. Very hard or alkaline water may cause some difficulty in mixing wettable powders. After mixing, the wettable powder suspension requires constant agitation to avoid particle settling. Other disadvantages of wettable powders include clogging of sprayer screens and nozzles, and abrasive wear of sprayer nozzles and pumps.

Choose the Proper Pesticide

Choosing the correct pesticide to control the pest(s) in your home, lawn, or garden requires a certain amount of planning. As mentioned above, many types of pesticides exist to treat a specific pest, and a variety of pesticide formulations are available to the consumer. To help choose the correct pesticide for the targeted pest(s), please consider the following.

1. Properly identify the insect, weed, disease, rodent, or other pest that you are attempting to control. Personnel in your county extension office may be able to help you identify the problem pest and select the appropriate control strategy.
2. Determine if you will treat the problem yourself or have a professional licensed pesticide applicator treat the problem pest.

3. Consider using alternative nonchemical control procedures if appropriate.
4. If you choose to treat the problem yourself with a pesticide, purchase the least toxic pesticide product that will eliminate or control the pest. Purchase a quantity of pesticide for immediate use only. Do not stockpile pesticide products.
5. Familiarize yourself with the product by *reading the label* before purchasing and using the pesticide product.
6. Follow all label directions and safety precautions while using the product.
7. Although some homeowners and urban dwellers are not required to keep records of pesticide applications in and around their home and garden, keeping a personal written record of pesticide applications may be invaluable in the event of an alleged poisoning or property damage. Records should include the date, time, pesticide brand name, formulation, rate applied, temperature and wind conditions, and location of the application.

Pesticide Labels

Two important steps you should take before purchasing a pesticide product are to read and understand the product label. The label provides information about the active ingredient, how to mix and apply the product, when and where to apply the product, how to store and dispose of the product, as well as safety and environmental precautions and first aid instructions. The pesticide label is a legal document, and misusing a pesticide product is a violation of the law. Table 2 lists some of the various statements found on a pesticide label.

Table 2. Pesticide label information

Trade, brand, or product names

The trade name is each company's unique market name for the product.

Ingredient statement

This statement identifies every active ingredient, the percentage by weight for each active ingredient, and the percentage by weight for all the inert ingredients.

Use classification statement

The EPA classifies every pesticide product as either *Restricted Use* or *Unclassified/General Use*. The restricted use pesticides must include a special statement. Under law, only those persons who have been certified and receive specialized training can use these types of pesticides. Generally, most pesticide products used in and around the home setting are *Unclassified/General Use* pesticides.

Name and address of manufacturer

Emergency telephone number

Registration number

The EPA registration number indicates that the pesticide product has been registered and that its label has been approved by the EPA.

Signal words and symbols

These words and symbols provide the user with an indication of the relative acute toxicity of the product to humans and animals. The statement "keep out of reach of children" also must appear on the front panel of the label.

- **Caution**—these products are slightly toxic either orally, dermally, or through inhalation, or cause slight eye and skin irritation.
- **Warning**—these products are moderately toxic either orally, dermally, or through inhalation, or cause moderate eye and skin irritation.
- **Danger**—these products can cause severe eye damage or skin irritation.
- **Danger—poison and the skull and crossbones symbol**—these products are highly toxic by any route of entry.

Precautionary statements

Statements to help applicators decide what precautions to take to protect other persons or animals who may be exposed.

Statement of practical treatment

First aid treatments recommended in case of a poisoning. In addition, instructions for physicians and medical personnel may be included.

Environmental hazards

Usually only for restricted-use pesticides. Statements can indicate that a product is especially hazardous to wildlife and include common sense procedures to avoid contaminating the environment.

Physical or chemical hazards

Describes any special fire, explosion, or chemical hazards the product may pose.

Restricted entry interval (REI)

Provides information on how much time must pass between the last application of a pesticide and when people can reenter a treated area.

Storage and disposal

General instructions for the appropriate storage and disposal of the pesticide and its container.

Directions for use

Provides instructions concerning how to use the product, which pests can be treated, the application sites, and any application equipment to use.

Protective Clothing and Safety Equipment

When using pesticides, wearing proper clothing and using safety equipment provides a layer of protection between you and the pesticide during handling, mixing, application, storage, and disposal. The type of protective clothing and equipment needed depends on the job being done and the pesticide being used. Carefully read the pesticide label and follow all directions concerning necessary protective clothing and equipment, usually referred to on the label as personal protection equipment or PPE. Keep protective equipment clean and in good condition.

At a minimum, you should have the following protective items available when handling pesticides:

Clean clothing

Long-sleeved shirt, long trousers, or coveralls made of a tightly woven fabric or a water-repellent material. Cotton t-shirts or tank tops, shorts, and sandals do not provide adequate protection when applying pesticides.

Rubber gloves

Unlined and without a fabric wristband. In most instances, shirtsleeves should be worn over gloves, not tucked inside, to prevent spills from running down the inside of the glove.

Waterproof boots

Pant legs should be worn over boots, not tucked inside.

Waterproof hat

If needed.

Eye protection

Safety goggles, if needed.

Dust mask or cartridge respirator

If needed.

Mix Pesticides Safely

When mixing pesticides, always wear rubber gloves of the type outlined previously. Fill the spray tank about half full of water before adding the chemical. Then, accurately measure the recommended amount of chemical according to label instructions. Finish filling the spray tank with the correct amount of water, being careful not to spill or splash the mixture. To prevent contamination of the garden hose, take appropriate measures to ensure that it does not come into contact with the spray solution.

All measuring utensils (spoons, cups, etc.), containers, and application equipment should be specifically marked and kept where pesticides are stored. Thoroughly wash utensils after each use and never use them for any other purpose.

Although the cost of “premixed” materials is greater than those that you mix at home, the added margin of safety may offset the initial cost of the premixed product. If the mixing area at your home would create an unsafe situation, it would be more prudent to purchase a premixed material.

Apply Pesticides Safely

Here are some common sense suggestions to help you use pesticides safely.

Do not permit irresponsible or careless persons to handle, mix, or apply any pesticide. They may cause harm to themselves or others.

Use chemicals only on the plants for which they are recommended on the label. Applying the wrong pesticide can destroy an entire garden or lawn.

Keep your application equipment in good condition and operating properly to avoid injury to yourself and possible damage to plants.

Cover all bird feeders and baths before applying any pesticide product in or around your home.

Guard against drifts of pesticide sprays or dusts by making the application when there is no wind. Some chemicals can drift considerable distances if the right conditions exist.

Keep children and pets away from treated surfaces or plants until the spray has dried or the dust has settled, or as indicated on the product label.

Never eat, drink, or smoke when applying pesticides; in fact, don't even carry food or smoking items with you. Wash your hands before using the restroom facilities.

Immediately following application and cleaning of equipment, the applicator should bathe thoroughly, using a soap or detergent product. After bathing, change into clean clothing.

The clothing worn by the applicator should be washed separately from other clothing items. Disposable clothing (TYVEC) should be placed in a plastic bag and placed with trash.

Practice good personal hygiene.

Care and Laundering of Personal Protection Equipment

Your personal protection clothing and equipment (PPE) is an important barrier between you and the pesticide products you will be handling. Therefore, properly caring for and laundering these materials is of utmost importance.

Keep pesticide-contaminated PPE separate from other clothing, and wash it separately. If the PPE is to be reused, clean it immediately after each use according to the manufacturer's instructions, unless the pesticide labeling specifies other requirements. If no instructions or requirements are provided, use the following laundering guidelines.

1. Rinse items in a washing machine or by hand.
2. Wash in a washing machine using heavy-duty detergent and hot water for the wash cycle.
3. Wash only a few items at a time to allow plenty of agitation and water for dilution. Use the highest water-level setting.
4. Rinse twice using two rinse cycles and warm water.
5. Use two entire machine cycles to wash items that are moderately to heavily contaminated.
6. Run the washer at least one more entire cycle without any clothing, using detergent and hot water to clean the machine.

Some plastic or rubber items such as gloves, footwear, and coveralls must be washed twice, once to clean the outside and a second time after turning the item inside out. Some items such as heavy-duty boots and rigid hats or helmets should be washed by hand using hot water and heavy-duty detergent.

Hang the items to dry, if possible. Let them hang for at least 24 hours in an area with plenty of fresh air—preferably outdoors. Do not hang items in enclosed living areas. You may use a clothes dryer for fabric items if it is not possible to hang them to dry. Store the clean PPE in a well-ventilated place, separate from personal clothing and away from pesticide-contaminated areas.

Store Pesticides Safely

The storage of *any* pesticidal product in any container other than the original pesticide container is a violation of federal law. In addition, always store pesticides with their label attached and the container lid tightly closed. Storing any chemical in soda-pop containers, food containers, or other types of nonpesticide containers can have serious consequences. Adults or children who mistakenly eat or drink a pesticide may be seriously poisoned or killed. Small children, in particular,

associate the shape of the container with its contents.

Keep all chemicals out of the reach of children, pets, and irresponsible people. Do not store them in your home near food or in the barn near livestock feeds or pet food products. This will help reduce the exposure hazard and also prevent possible contamination of food. Lock all chemicals in a building or cabinet. Also, be sure to identify the storage facility with a sign that clearly indicates that pesticides are stored inside.

Check containers frequently for cracks and leaks. Chemicals, especially those contained in glass bottles or plastic containers, should not be stored near heat sources. The glass bottles can break or explode, spreading the chemical over a large area, while the plastic containers can melt. Materials in glass, metal, or plastic containers should be stored in dry, cool areas. It is also necessary to protect chemicals from freezing; check the label carefully for proper storage information.

To ensure that the label remains on the container and in readable condition, protect it with transparent tape or lacquer if the chemical must be stored for a long period. *Remember that the label is the most important safety factor in the use of pesticides.* Do not let the label become damaged or destroyed.

Dispose of Pesticides Safely

Improperly discarded pesticides and pesticide containers can be very hazardous. Pesticide that leaks from an open or broken container can injure sanitation workers and lead to environmental pollution. An empty container can entice curious children and animals.

Mix only as much pesticide as you will need for a particular treatment. Excess dilute pesticide mixtures can be used only for the crops or sites listed on the label. Never attempt to store dilute pesticides in a sprayer. Do not dump pesticides into

toilets or other drainage systems. Such disposal methods will contaminate water supplies, streams, and sewage disposal systems. Avoid disposal problems with excess pesticides by purchasing only the amount of material needed for one growing season. Do not stockpile!

If a leak or spill occurs, clean it up immediately. Scatter sawdust, pet litter, or some other absorbent material over the spilled pesticide. Then, sweep up the absorbent material into a garbage bag. Wash the area thoroughly with industrial-strength detergent and water. Properly dispose of the contaminated absorbent material and wash water according to the product label.

The Pennsylvania Department of Agriculture (PDA) sponsors two programs to provide applicator businesses as well as homeowners with an environmentally acceptable method for disposing of empty pesticide containers and unwanted pesticides. The first program is called the Plastic Pesticide Container Recycling Program. Clean, plastic crop protection product containers are granulated into chips and recycled into fence posts, pallets, speed bumps, marine pilings, and field drain tiles. Only #2 HDPE plastic containers from EPA-registered agricultural, structural, turf, forestry, and specialty pest control products, as well as containers from adjuvants, crop oil, surfactants, and fertilizers will be accepted.

Caps for the containers are usually made of a different type of plastic and cannot be recycled. They can be cleaned at the same time as the container, but should not be placed back on the container. Instead, dispose of them as normal solid waste. In addition, be sure to remove all labels, booklets, container sleeves, and easily removable paper, as these can interfere with the recycling process.

The second program administered by the PDA is the CHEMSWEEP Program, a free pesticide disposal program. Each year, the CHEMSWEEP Program targets between 10 and 15 counties (which

change every year) where pesticides will be picked up from predetermined locations. (If large quantities are discarded, pickups may be made at the participant's farm or business.) Homeowners also are encouraged to participate. In some cases, participants living outside the selected counties have been included. This program does require an application to be submitted to the PA Department of Agriculture. If you have questions about either program, please call the PDA at 717-772-5231, the nearest PDA regional office, or your local Penn State Cooperative Extension Office.

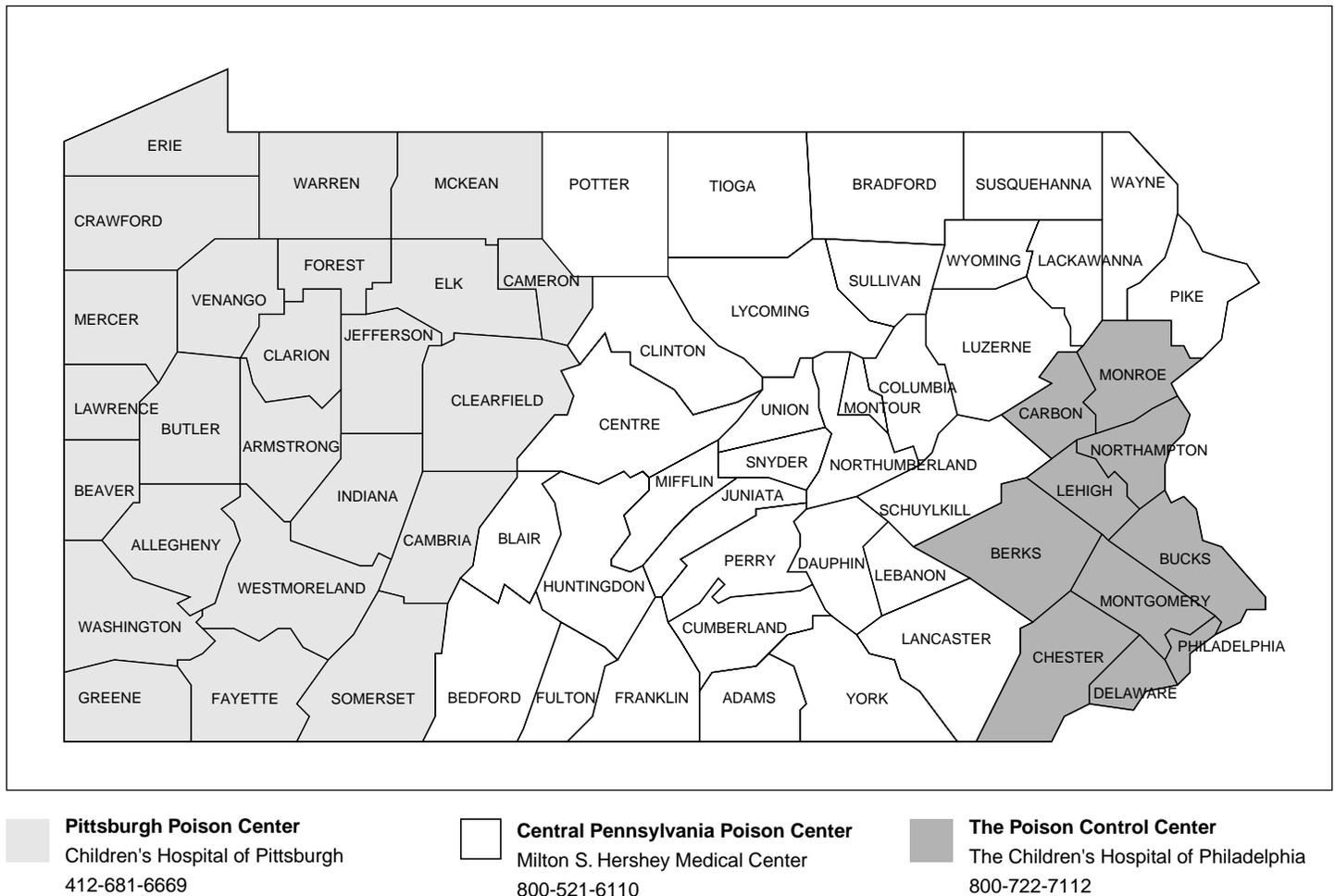
Pesticide Poisoning Symptoms and First Aid

By using common sense and by carefully following the information on a product label, you usually can avoid pesticide-related accidents. Unfortunately, no matter how carefully you handle pesticides, accidents can happen. You should, therefore, be aware of some of the symptoms of pesticide poisoning as well as a few fundamental first aid techniques.

The symptoms of pesticide poisoning may appear immediately after exposure or may take several hours or even days to develop. The most commonly reported health problem associated with pesticide exposure is dermatitis, or inflammation of the skin. The symptoms of dermatitis range from reddening of the skin to blisters or rashes.

Nearly 80 percent of the pesticide poisonings in our children are the result of the inhalation and/or ingestion of bleach and ammonia products. This situation could be avoided simply by properly storing these antimicrobial pesticide products!

Figure 1. Poison Centers in Pennsylvania Regions



Some people may cough, wheeze, or sneeze when exposed to pesticide sprays, dusts, pollens, animal dander, cockroaches, and other airborne materials. Pesticide exposures also can cause allergic reactions. A small percentage of the population is very sensitive to any pesticide exposure, even in minute quantities.

If you use pesticides or live near areas where pesticides are used, you should have the name and number of the nearest Poison Center readily available. The centers are staffed on a 24-hour basis. Figure 1 indicates the counties served by the three Poison Centers in Pennsylvania.

If you become ill after exposure to pesticides, call the Poison Center emergency number in your area. When speaking with the Poison Center personnel, indicate your physical situation and that you have been applying pesticides. Try to have the pesticide product label available so you can answer questions they will have about the pesticide product. Remember, the label contains important medical information such as active ingredients and antidotes.

After speaking to the Poison Center, call your local 911 and inform them that you have spoken to the Poison Center. The Poison Center personnel will then discuss your situation with the local 911 response team. Take the pesticide label or the container to the hospital with you if at all possible. Again, the pesticide label contains important medical information, which will be helpful for the doctor and medical team.

Some symptoms of pesticide poisoning can be mistaken for symptoms of other illnesses such as the flu or common cold. When pesticide handlers become ill from working with pesticides during warm weather or in hot environments, it is sometimes difficult to determine whether they are suffering from heat exhaustion or pesticide poisoning. Table 3 indicates the similar symptoms and the different symptoms of these two illnesses.

In addition, some of the symptoms of pesticide poisoning listed in Table 3 easily could be mistaken for asthma, respiratory or intestinal infection, or other illnesses. Therefore, for proper diagnosis and treatment to occur, it is essential to explain to the Poison Center the activities you were actually performing prior to and when you became ill.

Immediate action may be necessary to prevent serious and often permanent injury to a victim of pesticide poisoning. Indeed, some instances may be life-and-death situations requiring someone to administer first aid to the victim.

Table 3. Symptoms of heat exhaustion and organophosphate/carbamate poisoning

Heat exhaustion	Organophosphate/carbamate poisoning
Similar symptoms include:	
Sweating, headache, fatigue, confusion, central nervous system depression, and loss of coordination	
Different symptoms include:	
Dry membranes	Moist membranes
No tears	Tears
No saliva present	Saliva present in mouth
Fast pulse (slow if person has fainted)	Slow pulse
Nausea	Nausea and diarrhea
Dilated pupils	Possible small pupils
Fainting (prompt recovery)	Coma (can not waken)

If the pesticide has been spilled on the skin or clothing.

Immediately strip off all clothing and thoroughly wash the skin with soap and water. Some pesticides are absorbed through the skin very rapidly. Wash contaminated clothing separately from the family wash to prevent contamination of other clothes. It may be best to dispose of heavily contaminated clothing.

If the pesticide has been inhaled.

First, get the victim to fresh air. Have the victim lie down and loosen all clothing. Keep the victim warm, and administer first aid if needed. Contact a physician or the nearest Poison Center as soon as possible.

If the pesticide has been swallowed.

The most important choice to be made when aiding a person who has swallowed a pesticide is whether or not to induce vomiting. This decision must be made quickly and accurately; the victim's life may depend on it. Determine what poison

the person has ingested. Usually, it is best to void the swallowed poison fast, but *never* induce vomiting if the victim is unconscious or is having convulsions. The victim could choke to death on the vomitus.

Never induce vomiting if the victim has swallowed petroleum products (kerosene, gasoline, oil, lighter fluid), unless directed by the label or by a physician. Many pesticides formulated as emulsifiable concentrates are dissolved in petroleum products. The words “emulsifiable concentrate” on the pesticide label are signals *not* to induce vomiting without first checking with your physician or Poison Center. Petroleum products drawn into the lungs can cause serious respiratory disorders. However, if a dilute preparation was swallowed, the victim should be forced to vomit immediately.

Never induce vomiting if the victim has swallowed a corrosive poison, a strong acid or alkali (base). The victim may experience severe pain and have extensive mouth and throat burns. A corrosive poison will burn the throat and mouth as severely coming up as it did going down.

How to neutralize acids.

If you are sure the poison is an acid, give the victim milk of magnesia (1 tablespoon to 1 cup of water) or baking soda in water.

How to neutralize alkali.

If you are sure the poison is an alkali, give the victim lemon juice or vinegar.

How to induce vomiting.

Do not waste a lot of time inducing vomiting. Use only as first aid until you can get the victim to a hospital. First, dilute the poison. Give the patient at least 1 to 2 glassfuls of water. Do not use carbonated beverages. Second, make sure the victim is lying face down or kneeling forward while retching or vomiting. Finally, collect the vomitus for the doctor, since chemical tests may be needed.

When to use activated charcoal.

After vomiting has occurred, give the patient 2 to 4 tablespoons of activated charcoal in water. Activated charcoal adsorbs many poisons at a high rate and is available from most drug stores.

Only first aid measures have been discussed here. Get the victim to a doctor or hospital as soon as possible and take the pesticide label with you.

Pesticide Regulation

Pesticides are regulated by the environmental protection agency (EPA) under two major federal statutes—the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). Under FIFRA, the EPA registers pesticides for use in the United States and sets labeling and other regulatory requirements to prevent unreasonable adverse effects on human health and the environment.

Under FFDCA, the EPA establishes tolerances for pesticide residues in food to ensure the safety of the U.S. food supply. A tolerance is the amount of pesticide residue that can legally remain in or on each treated food commodity. In establishing tolerances, the EPA considers the toxicity of each pesticide, how much of the pesticide is applied, the frequency of application, and the amount of pesticide residue that remains in or on food. Regulators use a wide margin of safety to ensure that residues remaining in or on foods are many times lower than amounts that could actually cause adverse human health effects. Food producers and the EPA are committed to a safe food supply.

The Food Quality Protection Act (FQPA) of 1996 amended both the FIFRA and the FFDCA to establish a more consistent and protective regulatory scheme based on the best science available. In defining standards and tolerances, the FQPA uses “a reasonable certainty of no harm” as the single health-based standard, eliminating

the problem posed by multiple standards for pesticides in raw and processed foods. Further, the FQPA requires the EPA to add an additional tenfold safety factor for children unless data indicate that a reduced or no additional safety factor is needed.

The FQPA requires all existing pesticide tolerances to be reviewed within 10 years to make sure they meet the requirements of the new health-based safety standard. The EPA has given priority to reviewing the tolerances or exemptions that appear to pose the greatest risk to public health: organophosphates, carbamates, and probable human carcinogens.

Summary

Controlling pests in and around the home and garden is seemingly a never-ending problem. A wide array of pesticides has been developed for the homeowner; however, choosing to use them is a personal decision. If homeowners decide to use pesticides, they should follow an integrated pest management strategy. This program includes a full range of pest control methods, of which pesticides are just one component, rather than the principal defense against pests.

Generally, home pesticide products are safe if handled properly and according to the instructions on the product label. The best way to avoid the hazards of pesticides is to educate yourself about the product you are using and how to use it safely. The only way you can do this is to *read the label*. The pesticide label is a legal document, and misusing a pesticide product is a violation of the law. The attitude of the pesticide user is an important aspect in pesticide use safety.

Use common sense when using pesticides. Choose the correct pesticide and formulation. Take the proper precautions when mixing, applying, storing, and disposing of pesticides. Wear proper clothing and use safety equipment according to label instructions. If the Pennsylvania Depart-

ment of Agriculture's Plastic Pesticide Container Recycling Program and the CHEMSWEEP Program are available in your area, please consider participating in them.

Be aware of the symptoms of pesticide poisoning as well as fundamental first aid techniques. Have the telephone number of the nearest Poison Center posted near the telephone in case of a pesticide emergency. Remember to have the pesticide label available when calling for help or going to the hospital, as it contains important medical information.

For Additional Information

Agrichemical Fact Sheet #13: The Food Quality Protection Act

Sharon I. Gripp, William J. Hoffman, Winand K. Hock, and Lyn Garling (1998)
This fact sheet discusses highlights of the act, setting pesticide tolerances before and after the act, the "risk cup" concept, what pesticides will be targeted first, the role of integrated management, and what readers can do to become involved in the regulatory process.

Order information:

<http://pubs.cas.psu.edu/FreePubs/uo206.html> or call (877) 345-0691

Pest Control in the School Environment: Adopting Integrated Pest Management

Office of Pesticide Programs, Environmental Protection Agency (August 1993)
This booklet is designed to encourage and assist school officials in examining and improving their pest management practices. It identifies ways to reduce the use of pesticides in school buildings and landscapes, as well as alternative methods of managing pests commonly found in schools.

Order information: <http://www.epa.gov/ncepihom/ordering.htm> or call (800) 490-9198

Pesticide Education Manual: A Guide to Safe Use and Handling

Edited by Dr. Winand K. Hock (1996, 3rd Edition)

The pesticide education manual was developed by Penn State to help you understand how to use pesticides safely and properly. This manual is intended for anyone who wishes to know more about pesticides and their safe use.

Order information:

<http://pubs.cas.psu.edu/Pubs/agrs80.html> or call (877) 345-0691

Web sites

Exttoxnet: Extension Toxicology Network: <http://ace.orst.edu/info/exttoxnet/>

A source of objective, science-based information about pesticides written for the nonexpert.

National Antimicrobial Information

Network: <http://ace.orst.edu/info/nain/>
A toll-free telephone service (1-800-447-6349) that provides objective, science-based information about a wide variety of antimicrobial-related subjects including antimicrobial products; sanitizers, disinfectants, and sterilants; toxicology; environmental chemistry; regulations; and registration.

National Pest Management Association: <http://www.pestworld.org/>

This site allows you to post a question about pest problems and receive a reply from a NPMA staff member or a professional pest control operator. Also, if you need professional pest control help, they suggest guidelines and list NPCA-member pest control firms in your area.

National Pesticide Telecommunications Network: <http://ace.orst.edu/info/nptn/>

A toll-free telephone service (1-800-858-7378) that provides objective, science-based information about a wide variety of pesticide-related subjects including pesticide products, recognition and management of pesticide poisoning, toxicology, and environmental chemistry.

Pennsylvania Department of Agriculture Regional Offices: <http://www.pested.psu.edu/paregmap.html>

This page provides a PA map indicating the seven regions with their corresponding regional office addresses and telephone numbers.

Penn State Cooperative Extension Offices: <http://www.extension.psu.edu/extmap.html>

This page provides a PA map with links to all the county extension Web sites, which include their addresses, telephone numbers, and e-mail addresses.

Pennsylvania Integrated Pest Management Program: <http://paipm.cas.psu.edu/>

This page contains information about IPM's history, principles, and importance; IPM software; other IPM-related web sites; and IPM funding opportunities.

Pennsylvania Pesticide Urban Initiative: <http://urbanpested.cas.psu.edu/>

This Penn State and PA Department of Agriculture cooperative outreach education effort is designed to establish safer pesticide use and storage practices in urban communities. Consumer concerns regarding pesticides will be addressed, and scientifically based information will be provided. An extensive list of pesticide-related Web sites is provided, including documentos en Español.

Pesticide Education Program:

<http://www.pested.psu.edu/>
The goal of the Penn State Pesticide Education Program is to promote the safe, proper, and legal use of pesticide products in the Commonwealth and to provide information that allows pesticide users to make responsible decisions when using these products. This Web site includes fact sheets, newsletters, articles, regulatory updates, pesticide-related Web sites, and much more.

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