CITIZEN'S GUIDE TO PESTICIDES AND TOXIC SUBSTANCES

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"Someone's Been Poisoned, Help"

Knowing Your Options

THEY'RE THERE. Whether you see them or not, you know they're there--in your home, your vegetable garden, your lawn, your fruit and shade trees, your flowers, and on your pets. They are pests--insects, weeds, fungi, rodents, and others.

American households and their surrounding grounds are frequent hosts to common structural pests (termites, cockroaches, fleas, rodents), as well as a wide array of pests that are usually associated with agriculture. Because pests are all around--sometimes creating a nuisance but sometimes causing severe financial loss--consumers have turned increasingly to pesticides to control them. Just as "pests" can be anything from cockroaches in your kitchen to algae in your swimming pool, pesticides include insecticides, herbicides, fungicides, rodenticides, disinfectants, and plant growth regulators--anything that kills or otherwise controls a pest of any kind.

The first and most important step in pest control is to identify the pest. Some pests, or signs of them, are unmistakable. Others are not. For example, some plant "diseases" are really indications of insufficient soil nutrients.

Three information sources are particularly helpful in identifying pests and appropriate pest control methods: reference books (such as insect field guides or gardening books), the County Extension Service, and pesticide dealers.

The next step is to decide what level of treatment you want. Is anyone in the family or neighborhood particularly sensitive to chemical pesticides? Does your lawn really need to be totally weed-free? Do you need every fruit, vegetable, or flower you grow, or could you replace certain pest-prone species or varieties with hardier substitutes? Will you accept some blemished produce? In other words, do you need to eliminate all weeds and insects, or can you tolerate some pests?

Remember that total pest elimination is virtually impossible, and trying to eradicate pests from your premises will lead you to more extensive, repeated chemical treatments than are required for pest

control. Remember, too, that to manage any pest effectively, you must use each method (or combination of methods) correctly. Finally, you must also abide by all pertinent local, state, and federal regulations.

Federal Registration of Pesticides

The Environmental Protection Agency (EPA) "registers" (licenses) thousands of pesticide products for use in and around homes. No pesticide may legally be sold or used in the United States unless its label bears an EPA registration number. The Federal Insecticide, Fungicide, and Rodenticide Act (FIRA), which governs the registration of pesticides, prohibits the use of any pesticide product in a manner that is inconsistent with the product labeling.

Prevention

There is another important question to ask in making pest control decisions: is there something on your premises that needlessly invites pest infestations? The answer to this question may lead you to take some common-sense steps to modify pest habitat.

Remove water sources. All pests, vertebrate or invertebrate, need water for survival. Fix leaky plumbing and do not let water accumulate anywhere in your home. This means no water in trays under your houseplants overnight if you have a cockroach infestation.

Remove food sources (if the pest's food is anything other than the plant or animal you are trying to protect). For example, this could mean storing your food in sealed glass or plastic containers, avoiding the habit of leaving your pet's food out for extended periods of time, and placing your refuse in tightly covered, heavy-gauge garbage cans.

Remove or destroy pest shelter. Caulk cracks and crevices to control cockroaches; remove piles of wood from under or around your home in order to avoid attracting termites;

Remove and destroy diseased plants, tree prunings, and fallen fruit that might harbor pests.

Remove breeding sites. The presence of pet manure attracts flies, litter encourages rodents, and standing water provides a perfect breeding place for mosquitoes.

Remove sources of preventable stress to plants (flowers, trees, vegetable plants, and turf). Plant at the optimum time of year. Use mulch to reduce weed competition and maintain even soil temperature and moisture. Provide adequate water.

Use preventive cultural practices, such as careful selection of disease-resistant seed or plant varieties, companion planting to exploit the insect-repellent properties of certain plants, strategic use of "trap" crops to lure pests away from crops you wish to protect, crop rotation and diversification, and optimum use of spacing. Make sure you have good drainage and soil aeration.

Non-chemical Controls

If you practice preventive techniques such as those mentioned above, you will reduce your chances, or frequency, of pest infestation. However, if you already have an infestation, are there any pest control alternatives besides chemical pesticides?

The answer is an emphatic "yes." One or a combination of several non-chemical treatment alternatives may be appropriate. Your best strategy depends on the pest and the site where the pest occurs.

Non-chemical alternatives include:

> Biological treatments, including predators such as purple martins, praying mantises, and lady bugs; parasites; and pathogens such as bacteria, viruses (generally not available to homeowners), and other microorganisms like Bacillus thuringiensis and milky spore disease.

There is no way to be certain how long predators will stay in target areas. Contact your County Extension Service for information about how to protect desirable predators.

> Mechanical treatments, including cultivating to control weeds, hand-picking weeds from turf and pests from plants, trapping to control rodents and some insects, and screening living space to limit mosquito and fly access.

Non-chemical pest control methods really work. They do have some disadvantages: the results are not immediate, and it requires some work to make a home or garden less attractive to pests. But the advantages of non-chemical methods are many. Compared to chemical pesticide treatments, such methods are generally effective for longer periods of time. They do not create hardy, pesticide-resistant pest populations. And they can be used without safeguards, because they pose virtually no hazards to human health or the environment.

Chemical Controls

If you decide that chemical treatment can provide the best solution to your pest problem, and you want to control the pests yourself rather than turning the problem over to a professional pest control operator, then you have an important decision to make: which product to choose. Before making that decision, learn as much as you can about a product's active ingredient--its biologically active agent. Is it "broad-spectrum" in its mode of action (effective against a broad range of pests), or is it "selective" (effective against only a few pest species)? How rapidly does the active ingredient break down once it is introduced into the environment? Is it suspected of causing chronic health effects? Is it toxic to non-target wildlife and house pets? Is it known, or suspected, to leach through soil into ground water?

Here again, your County Extension Service, reference books, pesticide dealers, your state pesticide agency, or your regional EPA office may be able to provide assistance. (Lists of State and EPA pesticide contacts are provided at the end of this booklet.)

When you have narrowed your choices of active ingredients, you are ready to select a pesticide product. Choose the least toxic pesticide that can achieve the results you desire. Read the label. It lists active ingredients, the target pests (for example, mites, flies, Japanese beetle grubs, broad-leafed weeds, algae, etc.), and the sites where the product may be used (for example, lawns, specific vegetable crops, roses, swimming pools, etc.). Be sure the site of your pest problem is included among the sites listed on the label.

Pesticide active ingredients are formulated in many ways. Choose the formulation best suited to your site and the pest you are trying to control. The most common types of home-use pesticide formulations include:

Solutions, which contain the active ingredient and one or more additives, and readily mix with water.

Aerosols, which contain one or more active ingredients and a solvent. They are ready for immediate use as is.

Dusts, which contain active ingredients plus a very fine dry inert carrier such as clay, talc, or volcanic ash. Dusts are ready for immediate use and are applied dry.

Granulars, which are similar to dusts, but with larger and heavier particles for broadcast applications.

Baits, which are active ingredients mixed with food or other substances to attract the pest.

Wettable powders, which are dry, finely ground formulations that generally are mixed with water for spray application. Some also may be used as dusts.

Depending on the type of formulation you choose, you may need to dilute or mix the product. Prepare only the amount that you need for each application; don't prepare larger amounts to store for possible future use. (See "Determining Correct Dosage.")

Once you have identified the pest, selected the right pesticide, and determined proper dosage, you are ready to use the product. Application technique and timing are every bit as important as the material used, so read the label for directions. That advice--to read the label--is repeated so often in this guide that it may become tiresome. But in fact, the advice cannot be repeated often enough. Read the label before you buy a product, and again before you mix it, before you apply it, before you store it, and before you throw it away. The directions on a label are there for a very good reason: to help you achieve maximum benefits with minimum risk. But these benefits depend upon proper use of the products.

Chemical pesticides also have their disadvantages. They must be used very carefully to achieve results while protecting users and the environment. The results are generally temporary, and repeated treatments may be required.

Therefore, to achieve best results when you do use chemical pesticides, use preventive and non-chemical treatments along with them. This will reduce the need for repeated applications.

You should always evaluate your pesticide use, comparing pre-treatment and post-treatment conditions. You should weigh the benefits of short-term chemical pesticide control against the benefits of long-term control using a variety of techniques. Knowledge of a range of pest control techniques gives you the ability to pick and choose among them. Pests, unfortunately, will always be around us, and, if you know about all pest control options, you will know what to do the next time THEY'RE THERE.

Tips for Handling Pesticides

Pesticides are not "safe." They are produced specifically because they are toxic to something. By heeding all the following tips, you can reduce your risks when you use pesticides.

All pesticides legally marketed in the United States must bear an EPA-approved label; check the label to make sure it bears an EPA registration number.

Before using a pesticide, read the entire label. Even if you have used the pesticide before, read the label again--don't trust your memory. Use of any pesticide in any way that is not consistent with label directions and precautions is subject to civil and/or criminal penalties.

Do not use a "restricted use" pesticide unless you are a formally trained, certified pesticide applicator. These products are too dangerous to be used without special training.

Follow use directions carefully. Use only the amount directed, at the time and under the conditions specified, and for the purpose listed. Don't think that twice the dosage will do twice the job. It won't. What's worse, you may harm yourself, others, or whatever you are trying to protect.

Look for one of the following signal words on the front of the label. It will tell you how hazardous a pesticide is if swallowed, inhaled, or absorbed through skin.

"DANGER"
means highly poisonous;

"WARNING"
means moderately hazardous;

"CAUTION"
means least hazardous.

Wear the items of protective clothing the label requires: for example, long sleeves and long pants, impervious gloves, rubber (not canvas or leather) footwear, hat, and goggles. Personal protective clothing usually is available at home building supply stores.

If you must mix or dilute the pesticide, do so outdoors or in a well-ventilated area. Mix only the amount you need and use portions listed on the label.

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

If a spill occurs, clean it up promptly. Don't wash it away. Instead, sprinkle with sawdust, vermiculite, or kitty litter; sweep into a plastic garbage bag; and dispose with the rest of your trash.

Remove pets (including birds and fish) and toys from the area to be treated. Remove food, dishes, pots, and pans before treating kitchen cabinets, and don't let pesticides get on these surfaces. Wait until shelves dry before refilling them.

Allow adequate ventilation when applying pesticides indoors. Go away from treated areas for at least the length of time prescribed by the label. When spraying outdoors, close the windows of your home.

Most surface sprays should be applied only to limited areas; don't treat entire floors, walls, or ceilings.

Never place rodent or insect baits where small children or pets can reach them.

When applying spray or dust outdoors, cover fish ponds, and avoid applying pesticides near wells. Always avoid over-application when treating lawn, shrubs, or gardens. Runoff or seepage from excess pesticide usage may contaminate water supplies. Excess spray may leave harmful residues on home-grown produce.

Keep herbicides away from non-target plants. Avoid applying any pesticide to blooming plants, especially if you see honeybees or other pollinating insects around them. Avoid birds' nests when spraying trees.

Never spray or dust outdoors on a windy day.

Never smoke while applying pesticides. You could easily carry traces of the pesticide from hand to mouth. Also, some products are flammable.

Never transfer pesticides to containers not intended for them, such as empty soft drink bottles. Keep pesticides in containers that clearly and prominently identify the contents. Properly refasten all childproof caps.

Shower and shampoo thoroughly after using a pesticide product. Wash the clothing that you wore when applying the product separately from the family laundry. To prevent tracking chemicals inside, also rinse boots and shoes before entering your home.

Before using a pesticide product, know what to do in case of accidental poisoning.

To remove residues, use a bucket to triple rinse tools or equipment, including any containers or utensils used to mix the chemicals. Then pour the rinse water into the pesticide container and reuse the solution by applying it according to the pesticide product label directions.

Evaluate the results of your pesticide use.

Determining Correct Dosage

So much information is packed onto pesticide labels that there is usually no room to include examples of each dilution applicable to the multitude of home-use situations. As a result, label examples may inadvertently encourage preparation of more pesticide than is needed. The excess may contribute to overuse, safety problems related to storage and disposal, or simply wasted costs of unused pesticide.

Determining the correct dosage for different types of pesticides requires some simple calculations. The following information can help you to prepare the minimum quantity of pesticide needed for your immediate use situation.

For example, the product label says, "For the control of aphids on tomatoes, mix 8 fluid ounces of pesticide into 1 gallon water and spray until foliage is wet." Your experience has been that your six tomato plants require only one quart of pesticide to wet all the foliage. Therefore, only 2 fluid ounces of the pesticide should be mixed into 1 quart of water. Why? Because a quart is one-fourth of a gallon, and 2 fluid ounces mixed into 1 quart make the same strength spray recommended by the label, but in a quantity that can be used up all at once.

Consumers can solve problems similar to this one with careful arithmetic, good measurements, and intelligent use of the information provided here.

How to Measure

If you need to determine the size of a square or rectangular area, such as a lawn for herbicide application, measure and multiply the length and width. For example, an area 10 feet long by 8 feet wide contains 80 square feet. Common area measurements may involve square yards (1 square yard = 9 square feet) or square feet (1 square foot = 144 square inches).

If you need to determine the volume of a space such as a room, measure and multiply the room's length, width, and height. For example, a space 10 feet long, 8 feet wide, and 8 feet high contains a volume of 640 cubic feet. You would use this procedure, for instance, for an aerosol release to control cockroaches.

Most residential-use pesticides are measured in terms of volume. Some common equivalents are:

1 gallon (gal.) = 128 fluid ounces (ft. oz.) = 4 quarts (qt.)
= 8 pints (pt.)
= 16 cups

1 qt. = 32 ft. oz.
= 2 pt.
= 4 cups

1 pt. = 16 ft. oz.
= 2 cups

1 cup = 8 ft. oz.

1 tablespoon = 1/2 fl. oz.
= 3 teaspoons

1 teaspoon = 1/8 ft. oz.

In measuring teaspoons or tablespoons of pesticide, use only level spoonfuls, and never use the same measuring devices for food preparation.

The following table provides examples to help you convert label information to your specific use situations. "Amount" can be any measure of pesticide quantity. However, the same unit of measure must be used on both sides of the chart. For example, 8 fluid ounces per gallon of water is equivalent to 2 fluid ounces per quart of water.

Not all dosage rates are included in the examples given here. For rates not included, remember that, for pesticides not diluted with water, proportionally change both the quantity of pesticide and the area, volume, or number of items treated. For example, one-half pound per 1,000 square feet is equivalent to one-quarter pound per 500 square feet. For a pesticide that is diluted with water, proportionally change the quantity of pesticide, the quantity of water, and the area, volume, or number of items treated. For example, one-half pound of pesticide in 1 gallon of water applied to 1,000 square feet is equivalent to 1 pound of pesticide in 2 gallons of water applied to 2,000 square feet.

There is a point at which measurements needed for smaller quantities of pesticides are too minute to

be accurately measured with typical domestic measuring devices. In such cases, the user can either mix the larger volume, realizing that there will be leftover material; obtain a more accurate measuring device, such as a graduated cylinder or a scale which measures small weights; or search for an alternative pesticide or less concentrated formulation of the same pesticide.

Correct Storage and Disposal

The following tips on home storage and disposal can help you handle pesticides correctly.

Storage

Buy only enough product to carry you through the use season, to reduce storage problems.

Store pesticides away from children and pets. A locked cabinet in a well-ventilated utility area or garden shed is best.

Store flammable liquids outside living quarters and away from an ignition source.

Never put pesticides in cabinets with, or near, food, medical supplies, or cleaning materials. Always store pesticides in their original containers, complete with labels that list ingredients, directions for use, and antidotes in case of accidental poisoning. Never transfer pesticides to soft drink bottles or other containers that children may associate with something to eat or drink. Always properly refasten child-proof closures or lids.

Avoid storing pesticides in places where flooding is possible, or in open places where they might spill or leak into the environment. If you have any doubt about the content of a container, dispose of it with your trash.

Disposal

The best way to dispose of a small, excess amount of pesticide is to use it--apply it--according to directions on the product label. If you cannot use it, ask your neighbor whether he/she can use it. If all the pesticide cannot be used, first check with your local health department or solid waste management agency to determine whether your community has a household hazardous waste collection program or any other program for handling disposal of pesticides.

If no community programs exist, follow label directions regarding container disposal. To dispose of less than a full container of a liquid pesticide, leave it in the original container, with the cap securely in place to prevent spills or leaks. Wrap the container in several layers of newspapers and tie securely. Then place the package in a covered trash can for routine collection with municipal refuse. If you do not have a regular trash collection service, take the package to a permitted landfill (unless your municipality has other requirements).

Note: No more than one gallon of liquid pesticide should be disposed of in this manner.

Wrap individual packages of dry pesticide formulations in several layers of newspaper, or place the package in a tight carton or bag, and tape or tie it closed. As with liquid formulations, place the package in a covered trash can for routine collection.

Note: No more than 5 pounds of pesticide at a time should be disposed of in this manner.

Do not pour leftover pesticides down the sink or into the toilet. Chemicals in pesticides could interfere with the operation of wastewater treatment systems or could pollute waterways, because many municipal systems cannot remove all pesticide residues.

An empty pesticide container can be as hazardous as a full one because of residues remaining inside. Never reuse such a container. When empty, a pesticide container should be carefully rinsed and thoroughly drained. Liquids used to rinse the container should be added to the sprayer or to the container previously used to mix the pesticide and used according to label directions.

Empty product containers made of plastic or metal should be punctured to prevent reuse. (Do not puncture or burn a pressurized product container--it could explode.) Glass containers should be rinsed and drained, as described above, and the cap or closure replaced securely. After rinsing, an empty mixing container or sprayer may also be wrapped and placed in the trash.

If you have any doubts about proper pesticide disposal, contact your state or local health department, your solid waste management agency, or the regional EPA office.

How to Choose a Pest Control Company

Termites are chomping away at your house. Roaches are taking over your kitchen. Mouse droppings dot your dresser drawer. You've got a pest control problem, and you've decided that it's too serious for you to solve on your own. You've decided you need a professional exterminator.

If you find yourself in a situation like this, what can you do to be sure that the pest control company you hire will do a good job? Here are some questions you can ask:

1. Does the company have a good track record?

Don't rely on the company salesman to answer this question; research the answer yourself. Ask around among neighbors and friends; have any of them dealt with the company before? Were they satisfied with the service they received? Call the Better Business Bureau or local consumer office; have they received any complaints about the company?

2. Does the company have insurance? What kind of insurance? Can the salesman show some documentation to prove that the company is insured?

Contractor's general liability insurance, including insurance for sudden and accidental pollution, gives you as a homeowner a certain degree of protection should an accident occur while pesticides are being applied in your home. Contractor's workmen's compensation insurance can also help protect you should an employee of the contractor be injured while working in your home.

In most states, pest control companies are not required to buy insurance, but you should think twice before dealing with a company that is uninsured.

3. Is the company licensed?

Regulatory agencies in some states issue state pest control licenses. Although the qualifications for a license vary from state to state, at a minimum the license requires that each company have a certified pesticide applicator present in the office on a daily basis to supervise the work of exterminators using

restricted-use pesticides. (Certified applicators are formally trained and "certified" as qualified to use or supervise the use of pesticides that are classified for restricted use.) If restricted-use pesticides are to be applied on your premises, make sure the pest control operator's license is current. Also ask if the company's employees are bonded.

You may want to contact your state lead pesticide agency to ask about its pesticide certification and training programs and to inquire if periodic recertification is required for pest control operators.

In addition to the licenses required in some states, some cities also issue pest control licenses. Again, qualifications vary, but possession of a city license--where they are available--is one more assurance that the company you are dealing with is reputable and responsible.

4. Is the company affiliated with a professional pest control association?

Professional associations--whether national, state, or local--keep members informed of new developments in pest control methods, safety, training, research, and regulation. They also have codes of ethics that members agree to abide by. The fact that a company, small or large, chooses to affiliate itself with a professional association signals its concern for the quality of its work.

5. Does the company stand behind its work? What assurances does the company make?

You should think twice about dealing with a company unwilling to stand behind its work. 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, a guarantee may be invalidated if structural alterations are made without prior notice to the pest control company.

6. 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. The company should inspect your premises and outline a recommended control program, including what pests are to be controlled; the extent of the infestation; what pesticide formulation will be used in your home and why; what techniques will be used in application; what alternatives to the formulation and techniques could be used instead; what special instructions you should follow to reduce your exposure to the pesticide (such as vacating the house, emptying the cupboards, removing pets, etc.); and what you can do to minimize your pest problems in the future.

Contracts should be jointly developed. Any safety concerns should be noted and reflected in the choice of pesticides to be used. These concerns could include allergies, age of occupants (infants or elderly), or pets. You may want to get two to three, bids from different companies--by value, not price. What appears to be a bargain may merit a second look.

Even after you have hired a company, you should continue your vigilance. Evaluate results. If you have reason to believe that something has gone wrong with the pesticide application, contact the company and/or your state lead pesticide agency. Don't let your guard down, and don't stop asking questions.

How to Reduce Your Exposure to Pesticides

Because chemical pesticides are so widely used in our society, and because of the properties of many of the chemicals, low levels of pesticide residues are found throughout the environment.

Pesticides reach us in a variety of ways--through food, water, and air.

In regulating pesticides, EPA strives to ensure that lawful use of these products will not result in harmful exposures. Proper use of registered products should yield residue levels that are well within established safety standards. Therefore, the average American's exposure to low-level residues, though fairly constant, should not cause alarm.

Still, many people want to learn what choices they can make to further reduce their exposure to any potential risks associated with pesticides. By limiting your exposure to these products, you can keep your risks to a minimum.

Below you will find descriptions of the main pathways of human exposure to pesticides, as well as suggestions on ways to reduce overall exposure and attendant risks. If, however, you suspect that you suffer from serious chemical sensitivities, consult an expert to develop a more personally tailored approach to managing this problem.

Exposure Through Food

Commercial Food

Throughout life--beginning even before birth--we are all exposed to pesticides. A major source of exposure is through our diets. We constantly consume small amounts of pesticides. Fruits and vegetables, as well as meat, poultry, eggs, and milk, are all likely to contain measurable pesticide residues.

EPA sets standards, called tolerances, to limit the amount of pesticide residues that legally may remain in or on food or animal feed marketed in U.S. commerce. 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 tolerances. Further, since pesticide residues generally tend to degrade over time and through processing, residue concentrations in or on most foods are well below legal tolerance levels by the time the foods are purchased.

Although EPA does limit dietary pesticide exposure through tolerances, you may wish to take extra precautions. You can take several steps to reduce your exposure to residues in purchased food.

> Rinse fruit and vegetables thoroughly with water; scrub them with a brush and peel them, if possible. Although this surface cleaning will not remove "systemic" pesticide residues taken up into the growing fruit or vegetable, it will remove most of the existing surface residues, not to mention any dirt.
>
> Cook or bake foods to reduce residues of some (but not all) pesticides.
>
> Trim the fat from meat and poultry. Discard the fats and oils in broths and pan drippings, since residues of some pesticides concentrate in fat.

Home-grown Food

Growing some of your own food can be both a pleasurable activity and a way to reduce your exposure to pesticide residues in food. But, even here, there are some things you may want to do to assure that exposure is limited.

Before converting land in an urban or suburban area to gardening, find out how the land was used previously. Choose a site that had limited (or no) chemical applications and where drift or runoff from your neighbor's activities will not result in unintended pesticide residues on your produce. Choose a garden site strategically to avoid these potential routes of entry, if possible.

If you are taking over an existing garden plot, be aware that the soil may contain pesticide residues from previous gardening activities. These residues may remain in the soil for several years, depending on the persistence of the pesticides that were used. Rather than waiting for the residues to decline naturally over time, you may speed the process.

Plant an interim, non-food, crop like annual rye grass, clover, or alfalfa. Such crops, with their dense, fibrous root systems, will take up some of the lingering pesticide residues. Then discard the crops--don't work them back into the soil--and continue to alternate food crops with cover crops in the off season.

During sunny periods, turn over the soil as often as every two to three days for a week or two. The sunlight will help to break down, or photodegrade, some of the pesticide residues.

Once you do begin gardening, develop strategies that will reduce your need for pesticides while maintaining good crop yields.

Concentrate on building your garden's soil, since healthy soil grows healthy plants. Feed the soil with compost, manure, etc., to increase its capacity to support strong crops.

Select seeds and seedlings from hardy, disease-resistant varieties. The resulting plants are less likely to need pesticides in order to flourish.

Avoid monoculture gardening techniques. Instead, alternate rows of different kinds of plants to prevent significant pest problems from developing.

Don't plant the same crop in the same spot year after year if you want to reduce plant susceptibility to over-wintered pests.

Become familiar with integrated pest management (IPM) techniques, so that you can manage any pest outbreaks that do occur without relying solely on pesticides.

Mulch your garden with leaves, hay, grass clippings, shredded/chipped bark, or seaweed. Avoid using newspapers to keep down weeds, and sewage sludge to fertilize plants. Newsprint may contain heavy metals; sludge may contain heavy metals and pesticides, both of which can leach into your soil.

Food from the Wild

While it might seem that hunting your own game, catching your own fish, or gathering wild plant foods would reduce your overall exposure to pesticides, this isn't necessarily so. Wild foods hunted, caught, or gathered in areas where pesticides are frequently used outdoors may contain pesticide residues. Migratory species also may contain pesticide residues if these chemicals are used anywhere in their flyways.

Tolerances generally are not established or enforced for pesticides found in wild game, fowl, fish, or

plants. Thus, if you consume food from the wild, you may want to take the following steps to reduce your exposure to pesticide residues.

Because wild game is very lean, there is less fat in which pesticides can accumulate. However, avoid hunting in areas where pesticide usage is very high.

Avoid fishing in water bodies where water contamination is known to have occurred. Pay attention to posted signs warning of contamination.

You may want to consult with fish and game officials where you plan to hunt or fish to determine whether there are any pesticide problems associated with that area.

When picking wild plant foods, avoid gathering right next to a road, utility right-of-way, or hedgerow between farm fields which probably have been treated (directly or indirectly) with pesticides. Instead, seek out fields that have not been used to produce crops, deep woods, or other areas where pesticide use is unlikely.

When preparing wild foods, trim fat from meat, and discard skin of fish to remove as many fat-soluble pesticide residues as possible. For wild plant foods, follow the tips provided for commercial food.

Exposure Through Water

Whether it comes from surface or ground water sources, the water flowing from your tap may contain low levels of pesticides.

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

EPA's Water Program sets standards and provides advisory levels for pesticides and other chemicals that may be found in drinking water. Public municipal water systems test their water periodically and provide treatment or alternate supply sources if residue problems arise. Private wells generally are not tested unless the well owner requests such analysis.

If you get your drinking water from a private well, you can reduce the chance of contaminating your water supply by following these guidelines:

Be cautious about using pesticides and other chemicals on your property, especially if the well is shallow or is not tightly constructed. Check with your EPA regional office or County Extension Service before using a pesticide outdoors, to determine whether it is known or suspected to leach to ground water. Never use or mix a pesticide near your well head.

To avoid pesticide contamination problems, be sure your well extends downward to aquifers that are below, and isolated from, surface aquifers, and be sure the well shaft is tightly sealed. If you have questions about pesticide or other chemical residues in your well water, contact your state or county health department.

If your well water is analyzed and found to contain pesticide residue levels above established or recommended health standards, you may wish to use an alternate water source such as

bottled water for drinking and cooking. The best choice is distilled spring water in glass bottles. Ask your local bottler for the results of a recent pesticide analysis.

Exposure Through Air

Outdoors, air currents may carry pesticides that were applied on adjacent property or miles away. But there are steps you can take to reduce your exposure to airborne pesticide residue, or drift, outdoors. To reduce your exposure to airborne pesticides:

Avoid applying pesticides in windy weather (when winds exceed 10 miles per hour).

Use coarse droplet nozzles to reduce misting.

Apply the spray as close to the target as possible.

Keep the wind to your side so that sprays and dusts do not blow into your face.

If someone else is applying pesticides outdoors near your home, stay indoors with your pets and children, keeping doors and windows closed. If it is very windy during the pesticide application, stay inside for an hour or two.

If pesticides are applied frequently near your home (if you live next to fields receiving regular pesticide treatment), consider planting a buffer zone of thick-branched trees and shrubs upwind to help serve as a buffer zone and windbreak.

Many local governments require public notification in advance of area-wide or broad-scale pesticide spray activities and programs--through announcements in newspapers, letters to area residents, or posting of signs in areas to be treated. Some communities have also enacted "right to know" ordinances which require public notification, usually through posting, of lawn treatments and other small-scale outdoor pesticide uses. If your local government does not require notifications, either for large- or small-scale applications, you may want to work with local officials to develop such requirements.

Indoors, the air you breathe may bear pesticide residues long after a pesticide has been applied to objects in your home or office, or to indoor surfaces and crawl spaces. Pesticides dissipate more slowly indoors than outdoors. In addition, energy efficiency features built into many homes reduce air exchange, aggravating the problem. To limit your exposure to indoor pesticide residues:

Use pesticides indoors only when absolutely necessary, and then use only limited amounts. Provide adequate ventilation during and after application. If you hire a pest control company, oversee its activities carefully.

If pesticides are used inside your home, air out the house often, since outdoor air generally is fresher and purer than indoor air. Open doors and windows, and run overhead or whole-house fans to exchange indoor air for outside air rapidly and completely.

If pesticides have been used extensively and an indoor air contamination problem has developed, clean--scrub--all surfaces where pesticides may have settled, including cracks and crevices. Consult a knowledgeable professional for advice on appropriate cleaning materials if soap and water are insufficient.

Exposure Through Home Usage

Over a lifetime, diet is the most significant source of pesticide exposure for the general public. However, on a short-term basis, the most significant exposure source is personal pesticide use.

An array of pesticide products, ranging widely in toxicity and potential effects, is available "off the shelf" to the private user. No special training is required to purchase or use these products, and no one is looking over the users' shoulder, monitoring their vigilance in reading and following label instructions. Yet many of these products are hazardous, especially if they are stored, handled, or applied improperly.

To minimize the hazards and maximize the benefits that pesticides bring, exercise caution and respect when using any pesticide product.

Consider pesticide labeling to be what it is intended to be: your best guide to using pesticides safely and effectively.

Pretend that the pesticide product you are using is more toxic than you think it is. Take special precautions to ensure an extra margin of protection for yourself, your family, and pets.

Don't use more pesticide than the label says. You may not achieve a higher degree of pest control, and you will certainly experience a higher degree of risk.

If you hire a pest control firm to do the job, ask the company to use the least toxic or any chemical-free pest control means available that will do the job. For example, some home pest control companies offer an electro-gun technique to control termite and similar infestations by penetrating infested areas and "frying" the problem pests without using any chemicals.

And remember: sometimes a non-pesticidal approach is as convenient and effective as its chemical alternatives. Consider using such non-pesticidal approaches whenever possible.

"Someone's Been Poisoned. Help!"

What To Do in a Pesticide Emergency

The potential for a pesticide to cause injury depends upon several factors:

Toxicity of the active ingredient. Toxicity is a measure of the inherent ability of a chemical to produce injury. Some pesticides, such as pyrethrins, have low human toxicity while others, such as sodium fluoroacetate, are extremely toxic.

Dose. The greater the dose of a specific pesticide, i.e. the amount absorbed, the greater the risk of injury. Dose is dependent upon the absolute amount of the pesticide absorbed relative to the weight of the person. Therefore, small amounts of a pesticide might produce illness in a small child while the same dose of the same pesticide in an adult might be relatively harmless.

Route of absorption. Swallowing a pesticide usually creates the most serious problem. In practice, however, the most common route of absorption of pesticides is through the skin and the most toxic pesticides have resulted in death through this route of exposure.

Duration of exposure. The longer a person is exposed to pesticides, the higher the level in the

body. There is a point at which an equilibrium will develop between the intake and the output. Then, the level will no longer continue to increase. However, this point may be either above or below the known toxic level.

Physical and chemical properties. The distribution and the rates of breakdown of pesticides in the environment significantly alter the likelihood that injury might occur.

Population at risk. Persons who run the greatest danger of poisoning are those whose exposure is highest, such as workers who mix, load, or apply pesticides. However, the general public also faces the possibility of exposure.

Recognizing Pesticide Poisoning

Like other chemicals, pesticides may produce injury externally or internally.

External irritants may cause contact-associated skin disease primarily of an irritant nature--producing redness, itching, or pimples--or an allergic skin reaction, producing redness, swelling, or blistering. The mucous membranes of the eyes, nose, mouth, and throat are also quite sensitive to chemicals. Stinging and swelling can occur.

Internal injuries from any chemical may occur depending upon where a chemical is transported in the body. Thus, symptoms are dependent upon the organ involved. Shortness of breath, clear saliva, or rapid breathing may occur as the result of lung injury. Nausea, vomiting, abdominal cramps, or diarrhea may result from direct injury to the gastrointestinal tract. Excessive fatigue, sleepiness, headache, muscle twitching, and loss of sensation may result from injury to the nervous system. In general, different classes of pesticides produce different sets of symptoms.

For example, organophosphate pesticides may produce symptoms of pesticide poisoning affecting several different organs, and may progress rapidly from very mild to severe. Symptoms may progress in a matter of minutes from slight difficulty with vision to paralysis of the diaphragm muscle, causing inability to breathe.

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

It is always important to avoid problems by minimizing your exposure when mixing and applying pesticides by wearing gloves and other protective clothing.

The appropriate first aid treatment depends upon which pesticide was used. Here are some tips for first aid that may precede, but should not substitute for, medical treatment:

Poison on skin. Drench skin with water and remove contaminated clothing. Wash skin and hair thoroughly with soap and water. Dry victim and wrap in blanket. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.

Chemical burn on skin. Drench skin with water and remove contaminated clothing. Cover burned area immediately with loose, clean, soft cloth. Do not apply ointments, greases, powders, or other drugs. Later, discard or thoroughly wash contaminated clothing separately from other laundry.

Poison in eye. Eye membranes absorb pesticides faster than any other external part of the body; eye damage can occur in a few minutes with some types of pesticides. Hold eyelid open and wash eye quickly and gently with clean running water from the tap or a hose for 15 minutes or more. Do not use eye drops or chemicals or drugs in the wash water.

Inhaled poison. Carry or drag victim to fresh air immediately. (If proper protection is unavailable to you, call for emergency equipment from the Fire Department.) Loosen victim's tight clothing. If the victim's skin is blue or the victim has stopped breathing, give artificial respiration and call rescue service for help. Open doors and windows so no one else will be poisoned by fumes.

Swallowed poison. A conscious victim should rinse his mouth with plenty of water and then drink up to one quart of milk or water to dilute the pesticide. Induce vomiting only if instructions to do so are on the label. If there is no label available to guide you, do not induce vomiting. Never induce vomiting if the victim is unconscious or is having convulsions.

In dealing with any poisoning, act fast; speed is crucial.

First Aid for Pesticide Poisoning

First aid is the first step in treating a pesticide poisoning. Study the "Statement of Treatment" on the product label before you use a pesticide. When you realize a pesticide poisoning is occurring, be sure the victim is not being further exposed to the poison before calling for emergency help. An unconscious victim will have to be dragged into fresh air. Caution: do not become poisoned yourself while trying to help. You may have to put on breathing equipment or protective clothing to avoid becoming the second victim.

After giving initial first aid, get medical help immediately. This advice cannot be repeated too often. Bring the product container with its label to the doctor's office or emergency room where the victim will be treated; keep the container out of the passenger space of your vehicle. The doctor needs to know what chemical is in the pesticide before prescribing treatment (information that is also on the label). Sometimes the label even includes a telephone number to call for additional treatment information.

A good resource in a pesticide emergency is NPTN, the National Pesticide Telecommunications Network, a toll-free telephone service. Operators are on call 24 hours a day, 365 days a year, to provide information on pesticides and on recognizing and responding to pesticide poisonings. If necessary they can transfer inquiries directly to affiliated poison control centers.

National Pesticide Telecommunications Network Call Toll-Free 1-800-858-7378

NPTN operators answer questions about animal as well as human poisonings. To keep your pets from being poisoned, follow label directions on flea and tick products carefully, and keep pets off lawns that have been newly treated with weed killers and insecticides.

EPA is interested in receiving information on any adverse effects associated with pesticide exposure. If you have such information, contact Frank Davido, Pesticide Incident Response Officer, Field Operations Division (H-7506C), Office of Pesticide Programs, EPA, 401 M Street, SW., Washington, D C 20460. You should provide as complete information as possible, including any official investigation report of the incident and medical records concerning adverse health effects.

Medical records will be held in confidence.

EPA Regional Offices and States Covered

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United States Environmental Protection Agency Regional Organization

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