

UF/IFAS Extension Hendry County

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First Aid for Pesticide Poisoning

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Pesticides are chemical compounds or biological agents that control pests. Pests include insects, mites, worms, fish, birds, animals, weeds, fungi, bacteria and viruses. Pests feed on crops and parasitize on livestock.

Pesticides are used widely in agriculture to control pests. It is estimated that on a worldwide basis, pests destroy up to a half of food supplies. Without pesticides the food losses could be even more significant. Pesticides increase work productivity, profits, and export incomes. Without world hunger would increase as would the price of food.

Pesticides are classified by target pests, chemical structure, physical state and application methods. They include insecticides, fungicides, herbicides, rodenticides, and antimicrobials. Pesticides control pests physically, chemically or biologically interfering with pest metabolism and behavior.

The word pesticide contains the element “-cide” that was borrowed from Latin and means “killer” or “killing”. Although modern agriculture would not be possible without the use of pesticides, many pesticides are toxic and may be dangerous to human health if used improperly. Because pesticides are toxic, they are potentially hazardous to humans, animals, other organisms, and the environment. Therefore, people who use pesticides or regularly come in contact with them must understand the relative toxicity, potential health effects, and preventative measures to reduce exposure to the products they use.

At the end of this module, the reader should:

- Be able to determine whether or not a person has been poisoned by a pesticide.
- Learn to recognize kinds of poisoning and their symptoms.
- Become familiar with chemical families and their toxicity.
- Recognize the signs of pesticide poisoning and know the first aid treatment for it.
- Know the importance of a pesticide first aid kit and what it should contain.
- Understand the importance of poison control centers and how to get immediate information on types of poisonings and their treatment.

Pesticide applicators should learn the signs of pesticide poisoning and have an understanding of first aid treatment.

Symptoms of Pesticide Poisoning

Pesticide applicators and handlers should be aware of the early signs and symptoms of poisoning.

The symptoms of pesticide poisoning are similar to those of other types of poisoning and of other diseases. Heat exhaustion, food poisoning, asthma, and other illnesses are sometimes confused with pesticide poisoning. Just because a person becomes ill after using or being around pesticides is not proof that he is poisoned.

The symptoms of poisoning described here may occur in a person who has been suddenly exposed to large quantities of a toxic material. They may also occur in a person who has been continuously exposed to smaller quantities of toxic material over longer periods of time. If the symptoms appear, call your doctor and tell him what pesticide was involved.

Acute poisoning is the severe poisoning which occurs after exposure to a single dose of pesticide. The appearance of symptoms may be sudden and dramatic or they may be delayed.

Chronic poisoning is the poisoning which occurs as a result of repeated, small, non-lethal doses over a long period of time. Many symptoms may appear, such as nervousness, slowed reflexes, irritability, or a general decline in health. Some test animals are unable to reproduce normally after repeated exposure to pesticides.

If you suspect you are suffering from pesticide exposure, you should seek medical assistance. In such cases, it is wise to warn the physician ahead of time, as many medical doctors may not be well informed as to the symptoms and treatment of pesticide poisoning. This is due to the few cases which they treat.

Pesticide poisoning symptoms may be similar to those of other illnesses and poisonings. You, the pesticide applicator, should tell your doctor which chemicals you use. Then he will know the symptoms and treatment, and can have the antidotes on hand.

Unfortunately, all pesticide poisoning symptoms are not the same. Each chemical family (i.e., organophosphates, carbamates, chlorinated hydrocarbons) can attack the human body in a different way. However, you should be aware of the general symptoms of pesticide poisoning.

The symptoms of pesticide poisoning can range from a mild skin irritation to coma or even death.

Mild poisoning or early symptoms of acute poisoning or includes headache, fatigue, weakness, dizziness, restlessness, nervousness, perspiration, nausea, diarrhea, loss of appetite, loss of weight, thirst, moodiness, soreness in joints, skin irritation, eye irritation, irritation of the nose and throat.

Moderate poisoning or early symptoms of acute poisoning may cause additional symptoms such as nausea, diarrhea, excessive saliva, stomach cramps, excessive perspiration, trembling, no muscle coordination, muscle twitches, extreme weakness, mental confusion, blurred vision, difficulty in breathing, cough, rapid pulse, flushed or yellow skin, weeping.

Severe or acute poisoning symptoms may induce fever, intense thirst, increased rate of breathing, vomiting, uncontrollable muscle twitches, pinpoint pupils, convulsions, inability to breathe, unconsciousness.

Chemical Families

Pesticides which are chemically similar to one another are often grouped together into “families.” Each pesticide in a family attacks a pest in a similar way. Treatment and antidotes for poisoning are also the same within each family. It is important that the doctor know which chemical family is involved. The following chart identifies the symptoms of pesticide poisoning in the major chemical families.

Different classes or families of chemicals cause different types of symptoms. Individuals also vary in their sensitivity to different levels of these chemicals. Some people may show no reaction to an exposure that may cause severe illness in others. Because of potential health concerns, pesticide users and handlers must recognize the common signs and symptoms of pesticide poisoning.

The effects, or symptoms, of pesticide poisoning can be broadly defined as either topical or systemic. Topical effects generally develop at the site of pesticide contact and are a result of either the pesticide’s irritant properties (either the active and/or inert ingredient) or an allergic response by the victim. Dermatitis, or inflammation of the skin, is accepted as the most commonly reported topical effect associated with pesticide exposure. Symptoms of dermatitis range from reddening of the skin to rashes and/or blisters.

Some individuals tend to cough, wheeze, or sneeze when exposed to pesticide sprays. Some individuals react to the

strong odor and irritating effects of petroleum distillates used as carriers in pesticide products. One symptom is that the eyes, mucous membranes of the nose, and even the sensitive linings of the mouth and back of the throat feel raw and scratchy. This symptom usually subsides within a few minutes after a person is removed from the exposure to the irritant. However, a reaction to a pesticide product that causes someone not only to sneeze and cough but also to develop severe acute respiratory symptoms is more likely to be a true hypersensitivity or allergic reaction. Symptoms of a true allergic reaction range from reddening and itching of the eyes and skin to respiratory discomfort often resembling an asthmatic condition.

Systemic effects are quite different from topical effects. They often occur away from the original point of contact as a result of the pesticide being absorbed into and distributed throughout the body. Systemic effects often include nausea, vomiting, fatigue, headache, and intestinal disorders. In advanced poisoning cases, the individual may experience changes in heart rate, difficulty breathing, convulsions, and coma, which could lead to death.

Harmful Effects of Some Pesticide Families

Fungicides

The acute toxicity of fungicides to humans is generally considered to be low, but fungicides can be irritating to the skin and eyes. Inhalation of spray mist or dust from these pesticides may cause throat irritation, sneezing, and coughing. Chronic exposures to lower concentrations of fungicides can cause adverse health effects. Most cases of human fungicide poisonings have been from consumption of seed grain. To prevent these types of poisonings, fungicide treatment now includes a brightly colored dye to clearly indicate that the seed has been treated.

Herbicides

In general, herbicides have a low acute toxicity to humans because the physiology of plants is so different than that of humans. However, there are exceptions; many can be dermal irritants since they are often strong acids, amines, esters, and phenols. Inhalation of spray mist may cause coughing and a burning sensation in the nasal passages and chest. Prolonged inhalation sometimes causes dizziness. Ingestion will usually cause vomiting, a burning sensation in the stomach, diarrhea, and muscle twitching.

Insecticides

Insecticides cause the greatest number of pesticide poisonings in the United States. The most serious pesticide poisonings usually result from acute exposure to organophosphate and carbamate insecticides. Organophosphate insecticides include chlorpyrifos,

diazinon, dimethoate, disulfoton, malathion, methyl parathion, and ethyl parathion. The carbamate compounds include carbaryl, carbofuran, methomyl, and oxamyl. Organophosphates and carbamates inhibit the enzyme cholinesterase, causing a disruption of the nervous system. All life forms with cholinesterase in their nervous system, such as insects, fish, birds, humans, and other mammals, can be poisoned by these chemicals.

To understand how the organophosphate and carbamate insecticides affect the nervous system, one needs to understand how the nervous system actually works. The nervous system, which includes the brain, is the most complex system in the body consisting of millions of cells that make up a communications system within the organism. Messages or electrical impulses (stimuli) travel along this complex network of cells. Nerve cells or neurons do not physically touch each other; rather there is a gap or synapse between cells. The impulses must cross or “bridge” the synapse between nerve cells in order to keep the message moving along the entire network.

When an impulse reaches the synapse, the chemical acetylcholine is released to carry the message on to the next cell. Acetylcholine is the primary chemical responsible for the transmission of nerve impulses across the synapse of two neurons. After the impulse is transmitted across the synapse, the acetylcholine is broken down by the enzyme cholinesterase. Once this occurs, the synapse is “cleared” and ready to receive a new transmission.

Organophosphate and carbamate insecticides inhibit the activity of cholinesterase, resulting in a buildup of acetylcholine in the body. An increase in acetylcholine results in the uncontrolled flow of nerve transmissions between nerve cells. The nervous system becomes “poisoned”; the accumulation of acetylcholine causes the continual transmission of impulses across the synapses.

The effects of organophosphate or carbamate poisoning can result in both systemic and topical symptoms. Direct exposure of the eye, for example, can cause topical symptoms such as constriction of the pupils, blurry vision, an eyebrow headache, and severe irritation and reddening of the eyes. Symptoms and signs of systemic poisonings are almost entirely due to the accumulation of acetylcholine at the nerve endings.

The onset of symptoms depends on the route of entry and the severity of the poisoning. Gastric symptoms such as stomach cramps, nausea, vomiting, and diarrhea appear early if the material has been ingested. Similarly, salivation, headache, dizziness, and excessive secretions that cause breathing difficulties are initial symptoms if the material has been inhaled. Involvement of the respiratory muscles can result in respiratory failure. Stomach, intestinal, and

respiratory symptoms usually appear at the same time if the pesticide is absorbed through the skin. In children, the first symptom of poisoning may be a convulsion.

In advanced poisonings, the victim is pale, sweating, and frothing at the mouth. The pupils are constricted and unresponsive to light. Other symptoms include changes in heart rate, muscle weakness, mental confusion, convulsions, and/or coma. The victim may die if not treated

Seeking Medical Attention

Be alert for the early signs and symptoms of pesticide poisoning in yourself and others. These often occur immediately after exposure, but they could be delayed for up to 24 hours. If you are having symptoms but are unsure if they are pesticide related, at least notify someone in case your symptoms become worse. But when symptoms appear after contact with pesticides, you should seek medical attention immediately. Call the National Poison Center at 1-800-222-1222 for guidance on the proper response to your symptoms. This number will direct your call to the nearest poison center, which is staffed on a 24-hour basis.

If safe to do so, take the pesticide container to the telephone. (However, if the pesticide container is contaminated, write down the product name, active ingredient(s) and percentage, and the EPA registration number.) The product label provides medical personnel information such as active ingredients, an antidote, and an emergency contact number for the manufacturer. If the Safety Data Sheet is available, take this also because it contains additional information for medical personnel.

If you must go to the hospital or doctor’s office, bring a copy of the label and safety data sheet of the chemical you were exposed to. To expedite this, it is a good idea to have clean copies of labels and safety data sheets of pesticides that you use regularly on hand in case of emergency. If necessary, take the entire pesticide container, including the label, with you. In order to avoid inhaling fumes or spilling the contents, make sure the container is tightly sealed and placed into a plastic bag if possible. The pesticide container should never be placed in the enclosed passenger section of your vehicle.

First aid is the initial effort to help a victim while medical help is on the way. Step one in any poisoning emergency is to call an ambulance or doctor. The only exception is when you are all alone with the victim. Then you must see that they are breathing and that he is not further exposed before leaving him to make your phone call. Always save the pesticide and label for the doctor.

Poison on the Skin

More than 95 percent of all pesticide exposures are dermal. Dermal absorption may occur as the result of a splash,

spill, or drift or when cleaning or repairing equipment. Wear unlined, chemical-resistant gloves to eliminate most dermal exposures. Minimum dermal protection for most pesticides consists of a long-sleeved shirt, long trousers, gloves, and proper footwear. For extra precaution, consider wearing coveralls, a waterproof hat, and unlined rubber boots. Additionally, wearing a liquid-proof apron or rain suit is recommended when mixing and pouring concentrates or when using highly toxic products.

It is important to remove the person from the source of exposure quickly. Remove contaminated clothing and wash off any chemical which has soaked through.

- The faster the poison is washed off the patient, the less injury that will result.
- Drench skin and clothing with water (shower, hose, faucet, pond).
- Remove clothing.
- Cleanse skin and hair thoroughly with soap and water. Detergents and commercial cleansers are better than soap.
- Dry and wrap in a blanket or clean coverall.

WARNING: Do not allow any pesticide to get on you while you are helping the victim.

Chemical Burns of the Skin

- Wash with large quantities of slow running water.
- Remove contaminated clothing.
- Immediately cover loosely with a clean, soft cloth.
- Avoid use of ointments, greases, powders, and other drugs in first aid treatment of burns.
- Recognize the signs of pesticide poisoning and know first aid treatment for it.
- Know the importance of a pesticide first aid kit and what it should contain.
- Understand the importance of poison control centers and how to get immediate information on types of poisonings and their treatment.

Chemical in the Eye

Eyes are very sensitive to many pesticides and, considering their size, are able to absorb large amounts of chemical. Serious eye exposure can result from a splash, spill, or drift or by rubbing the eyes with contaminated hands or clothing. Tight-fitting chemical splash goggles or a full-face shield should be worn if there is any chance of getting pesticides in the eyes, especially when pouring or mixing concentrates and handling dusts. When pouring from a container, keep the container below eye level to avoid splashing or spilling chemicals on your face or protective clothing.

- It is most important to wash the eye out quickly but as gently as possible.

- Hold eyelids open and wash eye with a gentle stream of clean running water.
- Continue washing for fifteen minutes or more. It is important to use a large volume of water. If possible, at least five gallons should be used to flush the eye properly.
- Do not use chemicals or drugs in wash water. They may increase the extent of the injury.
- Cover the eye with a clean piece of cloth and seek medical attention immediately.
- New WPS regulations mandate that pesticides handlers have access to a system capable of delivering 0.4 gallons/minute for 15 minutes, or 6 gallons of water able to flow gently for about 15 minutes at a mix/load site if the handlers use products whose label requires eye protection.

Inhaled Poisons

For many toxic chemicals, the respiratory system is the quickest and most direct route of entry into the circulatory system. Respiratory protection is especially important when pesticide powders, dusts, gases, vapors, or small spray droplets can be inhaled.

Use the respirator as designed for its intended use, and always follow the manufacturer's instructions. Select only equipment approved by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). The Worker Protection Standard mandates medical certification and fit testing if the pesticide label requires a respirator.

- If victim is in an enclosed space, do not try to assist unless you are wearing an air-supplied respirator.
- Carry patient (do not let them walk) to fresh air immediately.
- Open all doors and windows.
- Loosen all tight clothing.
- Apply artificial respiration if breathing has stopped or is irregular.
- Keep victim as quiet as possible.
- If victim is convulsing, watch their breathing and protect him from falling and striking their head. Keep his chin up so the air passage will remain free for breathing.
- Prevent chilling (wrap patient in blankets but don't overheat).
- Do not give the victim alcohol in any form.

Swallowed Poisons

Accidental oral exposure most frequently occurs when pesticides have been taken from the original container and put into an unlabeled bottle or food container. Unfortunately, children are the most common victims in these situations. Store pesticides only in their original containers, and keep the original label attached to the

container. Store pesticides only in their original containers and keep the original label attached to the container. Store in a locked cabinet and/or on a high shelf to keep out of the reach of children.

Never use your mouth to clear a spray line or to siphon a pesticide from a tank or container.

After handling or working with pesticides, wash your hands and face thoroughly with soap and water before eating, drinking, or smoking.

The decision whether or not to make a victim vomit must be made quickly and accurately, by a doctor or health care professional because the victim's life may depend on it. Although it is usually best to get rid of the swallowed poison fast, a medical professional must make this determination.

But you should know this:

- 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 a corrosive poison. Find out what poison the person has ingested. A corrosive poison is strong acid or alkali. The victim will complain of severe pain and will show signs of severe mouth and throat burns. A corrosive poison will burn the throat and mouth as severely coming up as it did going down. Dilute the poison as quickly as possible. For acids or alkalis, use milk or water. For patients one to five years old, use one to two cups; for patients five years and older, use up to one quart. For acids, milk of magnesia may also be used (two tablespoons in one cup of water).
- Never induce vomiting if the person has swallowed petroleum products such as kerosene, gasoline, oil, or lighter fluid. Most pesticides which come in liquid formulations are dissolved in petroleum products. The words "emulsifiable concentrate" or "solution" on the pesticide label are signals NOT to induce vomiting in the poison victim if he has swallowed the concentrates. Concentrated petroleum products (like corrosive poisons) cause severe burns. They will burn as severely when vomited up.

If the Poison Control Center advises to induce vomiting. Do not waste a lot of time inducing vomiting. Use it only as first aid until you can get the victim to a hospital. Make sure the victim is lying face down or kneeling forward while retching or vomiting. Do not let the victim lie on their back, because vomitus could enter the lungs and do more damage.

- First give the patient large doses of milk or water. One to two cups for victims up to five years old; up to a quart for victims five years and older.

- If victim is alert and respiration is not depressed, give syrup of ipecac followed by one to two glasses of water to induce vomiting. Adults (twelve years and over): 30 ml (two tablespoons); children under twelve years: 15 ml (one tablespoon). Activity hastens the effect of the syrup of ipecac.
- Collect some of the vomitus for the doctor, it may be needed for chemical tests.

It is very important that the victim get to the hospital without delay. Many communities have rescue units with ambulances manned by Emergency Medical Technicians who can communicate with the hospital and can begin treatment on route.

If a rescue unit is not available in your area, you will have to transport the patient. Call the hospital emergency room or poison control center for instructions so that they can prepare for the victim's arrival. If the poison control center advises use activated charcoal as a "sponge" to absorb excess poisons after the instructions for corrosive or noncorrosive poisons are followed.

Activated charcoal it absorbs many poisons at a high rate. Mix it with water into a thick syrup for the victim to drink. Activated charcoal is available from a drug store.

Sometimes poisoning victims go into shock. If untreated or ignored, the victim can die from shock even if the poisoning injuries would not be fatal.

Symptoms of shock

- The skin will be pale, moist, cold and clammy. The eyes are vacant and lackluster with dilated pupils. The breathing will be shallow and irregular. The pulse is very weak, rapid and irregular. The victim may be unconscious or in a faint.
- Unless vomiting, keep the victim flat on their back with his legs up 1-1 1/2 feet above the level of the head.
- Keep the victim warm enough to prevent shivering. Do not overheat.
- Keep the victim quiet and reassure them often.

WARNING: Never try to give anything orally to an unconscious victim.

Poison Control Centers

Poison control centers have been established to give pertinent information on all types of poisonings, including pesticide poisoning. The applicator should have posted near his phone the telephone number of the nearest poison control center, and his doctor should also have the number available.

In any poisoning emergency, think first of water. Your first aim is to dilute the pesticide no matter where it is. Then get the victim to a doctor fast.

First Aid Kit for Field and On-the-Job Use

A well-equipped first aid kit which is always readily available can be important in a pesticide emergency. You can make up your own pesticide first aid kit from a lunch pail, tool box, or a sturdy wooden box. It should have a tight fitting cover with a latch, so that it won't come open or allow pesticides to leak inside. Label it clearly with paint or a water proof marker.

Contents

1. A small plastic bottle of a common Detergent. It is used to wash pesticides quickly off the skin.
2. A small package or bag of Activated Charcoal. Mixed with water and swallowed, activated charcoal acts as an absorber of all pesticides.
3. A Shaped Plastic Airway for mouth-to-mouth resuscitation.
4. A thermos or large plastic bottle (at least one quart) of Clean Water. If there is no clean water in an emergency, use any pond or stream water that is available.
5. Simple Band Aids, Bandages and Tape. All cuts and scrapes should be covered to prevent pesticides from easily entering the body.
6. A Blanket is very useful. It should be kept in a place where it will not be contaminated by pesticides.
7. Cell phone for an emergency phone call.
8. A small, plastic Empty Jar with a tight fitting lid is useful as a drinking glass for the victim, in order to induce vomiting or feed activated charcoal. It can also be used for collecting vomitus to take to the doctor.

A Checklist for Preventing Pesticide Accidents

Everyone can improve their methods for safe handling of pesticides. Experienced pesticide applicators, unfortunately, may become so familiar with the equipment and materials used that they become careless or take shortcuts. An accident is waiting to happen.

The following checklist of questions is drawn from data showing the common causes of pesticide accidents. Check it against your pesticide handling practices and see how many accidents are waiting to happen to you. Just one "No" may be the one that gets you in trouble!

Practice good hygiene

- Wash hands, face and exposed skin frequently during the day and especially before eating, drinking, using the restroom or using tobacco products.
- Shower thoroughly as soon as possible after you are through applying pesticides.

- Change into clean clothing and start each day with clean clothing to reduce the possibility of exposure.
- Launder clothing worn when applying pesticides separately from family laundry using plenty of soap and hot water and air dry or use the hottest drier setting.

Store Your Pesticides Safely

- Maintain a separate space to store pesticides and keep it locked.
- Store all your pesticides in this secure storage rather than areas where they may be accessible to non-authorized persons.
- Store herbicides separately from other pesticides.
- Place signs on pesticide storage so firemen and other first responders are warned.
- Check periodically for leaking containers.

Use the Recommended Clothing and Protective Equipment

- Read the label to see what protective clothing you should wear.
- Start each spraying day with clean spray clothing.
- Check the signal words and precautions for use on the label to see what protective equipment is necessary.
- Always wear the protective equipment recommended on the label.
- Clean and maintain your protective equipment regularly and often.
- Throw away rubber gloves, coveralls and other personal protective equipment if torn or damaged even if they only have tiny holes in them.

Keep the Original Container So the Label Is There!

- Always keep pesticides in the original container instead of old "coke" bottles, milk cartons or other food containers.
- Refuse to provide agricultural pesticides to anyone for use around the home or apply to any crop or site not listed on the label.
- Never store pesticides in an unlabeled container.
- Check the label for safety precautions, antidotes and directions for use.
- Safely dispose of unwanted pesticides through official programs such as Operation Clean Sweep.

Spills and Splashes of Concentrates can be Very Hazardous!

- Know what to do if you should spill a pesticide on yourself while mixing.
- Wear adequate footwear with your pant cuffs on the outside, so pesticides won't run into your footwear.
- Have sawdust, vermiculite, kitty litter or some other absorbent on hand to soak up spills.

- Always watch your sprayer tank when filling so it won't run over and spill on the ground.
- Have a check valve or other device on your equipment to prevent back-siphoning into the water supply – these are required by Florida Pesticide law.
- Maintain application equipment so it doesn't leak and leave toxic puddles or piles of pesticide on the ground.
- Avoid draining leftover spray mix on the ground.
- Discard old high pressure hose instead of patching it and hoping no one will be nearby when it bursts.
- Always clean nozzles with a brush, by rinsing, etc., instead of blowing them out with your mouth.

Poor Container Disposal May Cause Accidents.

- Triple rinse empty pesticide container at least three times and dispose of the rinse water into by applying to a labeled crop or site
- Collect every used container for disposal before leaving a job, instead of leaving them in the field or at your mix load station.
- Puncture, break or crush non-burnable containers so that they can't be reused.
- Return 30 and 55-gallon pesticide drums to the manufacturer, rather than giving them away for floats, trash barrels, etc.

Attractive Nuisances Can Result in Lawsuits.

- Keep your sprayer equipment where children cannot play on it.
- Keep your spray equipment clean so that those touching it will not be contaminated.
- Always release pressure on your equipment when not in use so spray won't be accidentally discharged?

Care in Application Prevents Accidents

- Always check the wind direction and the area downwind before applying pesticides?
- Consider substituting a safer chemical if you are spraying near a sensitive area?
- Check weather forecasts for the possibility of showers and damaging runoff before applying pesticides?
- Plan your pesticide application so it will have little or no effect on bees, birds, fish or other wildlife?
- Do you make sure that people and livestock are out of the area and stay out until the spray dries or REI has expired?

All pesticides have the potential to be harmful to humans, animals, other living organisms, and the environment if used incorrectly. The key to reducing health hazards when using pesticides is to always limit your exposure by wearing PPE and use a low-toxicity pesticide when available. Reading the label and practicing safe work habits will minimize hazards from the use of pesticides.

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