



Personal Protection From Pesticides

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Imagine battling a fire without a flame-resistant coat, scaling a cliff without climbing ropes, or playing pro football without a helmet.

In our daily lives, at work and at home, we put ourselves at risk—often unnecessarily. Equipment that could help protect us, we complain, is too hot, heavy, cumbersome, silly-looking or just plain uncomfortable. In agriculture, with the use of increasingly concentrated pesticides, personal protective equipment is becoming even more important. While claims that farm pesticides cause higher cancer rates remain controversial, there is growing concern about the effects of long-term exposure. Nevertheless, according to one survey only 44% of farmers always wear gloves when working with pesticides, 22% always wear eye protection, 8% always wear respiratory protection, and 4% always wear coveralls.

The First Step: Read the Label

The first step to ensuring your safety when working with pesticides is determining what personal protective equipment to wear. By law, that information must appear on every pesticide label. Pesticide labels are legal documents, and information on them is the result of years of research and lots of money spent by the manufacturer. Take the label seriously!

Other information you'll find on the label include: the brand name, directions for mixing and applying the pesticide, poisoning symptoms, first-aid and antidote instructions, and hazards to humans, domestic animals, and the environment.

Every label also displays one of three signal words: CAUTION for slightly toxic chemicals, WARNING for moderately toxic chemicals, and DANGER—POISON in bright red lettering for highly toxic chemicals. DANGER is usually, but not always, accompanied by a skull and crossbones. These words tell you at a glance what kind of substance you're dealing with. To protect yourself, wear the proper safety equipment.

Personal Protective Equipment

As many pesticides are sold in concentrated form it's crucial that you wear the proper protective equipment when mixing or loading them. Protection is just as important out in the field, where pesticide particles are suspended in the air, making skin contact likely. Unless a tractor cab is equipped with special filters approved for respiratory protection against pesticides, the cab *will not* block out dangerous vapors and dusts or mists and wearing complete personal protective equipment is necessary.

Gloves. While the ear canal, forehead, crotch, and abdomen absorb pesticides faster than any other body part, hands are the most likely to be exposed. Gloves, which can reduce exposure by up to 99%, may be the most important piece of personal protective equipment.

There are many types of chemical-resistant gloves available. The best ones are synthetic, such as nitrile and neoprene. Nitrile, perhaps the most commonly used glove, offers excellent chemical protection, durability, and dexterity.



They're about \$2-2.50 per pair. Neoprene gloves, a little higher-priced than nitrile at \$7-8 per pair, provide excellent chemical protection and moderate

dexterity. PVC, latex, and natural rubber gloves also work well, although PVC lacks dexterity, natural rubber gloves are expensive, and latex gloves will only protect you from diluted chemicals. Some gloves, such as the 4H® glove and Silvershield® gloves, are made especially for use with chemicals. Generally, they don't resist punctures and tears well, so it's recommended that they be worn under another pair of more durable gloves. Paper, leather or fabric gloves can absorb and retain liquids and should not be worn for chemical protection. All gloves should be unlined because linings can absorb chemicals as well.

Glove manufacturers are beginning to test their products for degradation and permeation. The degradation rate is determined by immersing gloves in a chemical for certain periods of time and measuring any effects the chemical has on the glove material, such as changes in weight or texture. Gloves are tested for permeation by immersing them and recording how long it takes for the chemical to pass through the glove material; this time is referred to as the breakthrough time (BTT) and is measured in minutes. A good glove has a BTT greater than 240 minutes. Manufacturers have only recently begun testing their products against pesticides, so you might not be able to find test data for all farm chemicals.

Periodically test your gloves for leaks by filling them with water and squeezing. Tuck shirt sleeves inside gloves and fold the glove ends over to form a cup that will catch any liquid running down your arm. But, when working with hands and arms overhead, sleeves should be tucked into the gloves with the cuff of the gloves turned up to catch any material that might run down the gloves. Wash off chemicals with soap and water, before removing the gloves, to avoid contaminating your hands while removing the gloves.

Respirators. Pesticides can enter the body via inhalation, skin absorption, and swallowing. Inhalation is the quickest and most direct route to the circulatory system. Respirators protect your lungs from dust, mists, fogs, and vapors. They *will not* protect you in places that may be considered immediately dangerous to life and health (IDLH), such as manure pits or silos. They don't offer protection from fumigants, either. Fumigants are highly penetrating and can penetrate the rubber and plastic on respirators. In addition, some are colorless and odorless and give no warning of exposure.

Before using a respirator, make sure you're fit enough to wear one. People with heart conditions or respiratory impairments should not wear respirators. If you're not sure if you should wear one, check with your doctor. Also make sure that the respirator you've chosen is approved by the Mine Safety and Health Administration (MSHA), or National Institute for Occupational Safety and Health (NIOSH). If the respirator is stamped with a number preceded by the prefix "TC," you can be sure that it's approved.

Perhaps the most common type of respirator used on the farm is the mechanical respirator, which has filtering devices to purify inhaled air. One type of mechanical respirator, the chemical cartridge or canister respirator, uses special screw-on cartridges containing absorbents that filter out specific gases and vapors. The pesticide label will tell you what kind of cartridge you need for the chemical(s) you're using.

If you'll be exposed to dusts or mists, chemical cartridges alone will not protect you. You'll need a chemical cartridge respirator with an added dust/mist particulate prefilter approved for pesticides. The common dust masks found in hardware stores are not approved dust/mist respirators; they are used only as nuisance dust masks. Some dust/mist masks have been approved by MSHA/NIOSH as respirators because they have two elastic straps in back for a better seal, but they do not offer suitable protection from pesticides,

Half-mask mechanical respirators start at about \$20; full-face ones are between \$100 and \$160. If you'll be exposed to dusts or mists *and* vapors, you can buy replaceable cartridge/particulate filter combination for about \$5.00. If you buy them in quantities, they're even less.

Chemical cartridges should be replaced if you begin to smell or taste the chemical; experience eye, nose or throat irritation; or if breathing becomes noticeably harder. Every time you replace a cartridge, if you're using a filter, replace it also. If you're only using a particulate filter, replace it when breathing becomes noticeably harder. If you ever experience nausea, dizziness or respiratory distress, get fresh air immediately.

To ensure that you have a well-fitting respirator, perform a fit *check* by blocking the two filter inlets with your palms and inhale. The mask should collapse onto your face. Then block the exhale hole (located in the chin area) and exhale. The mask should pop off of your face. **DO THIS EVERY TIME YOU PUT THE RESPIRATOR ON!** Annually and before using a new respirator for the first time, have a professional give you a fit *test*. During the test, you'll be asked to move your head around and recite something (the alphabet, for example) while an irritating smoke or strong, odorous substance is waved around your head. If you can't detect the substance, your respirator is sealed tightly. You should also have a fit test done if you gain or lose more than 15 pounds or if you receive an injury or have surgery to your face. For information on where to get a fit test, contact the respirator manufacturer.

Facial hair (even stubble), bushy sideburns, tobacco or gum chewing, or glasses may prevent your respirator from sealing properly. If you must wear prescription glasses, special wire adaptors are available for securing lenses safely inside a full-face respirator.

After each use, clean your respirator in warm, soapy water. (Be sure to remove cartridges and filters first!) Rinse it thoroughly, then allow it to air-dry in a clean, well-ventilated area. After it is perfectly dry, store your respirator and cartridges in a clean, dry plastic bag tied shut with a twist tie. For more detailed information on respirators for pesticides, see Agrichemical Fact Sheet #1, *Respiratory Protective Devices for Pesticides*.



Chemical-protective clothing. When working around low toxicity pesticides, jeans and a long-sleeved cotton shirt are recommended for minimum protection. Apply a layer of starch spray to jeans for another barrier. Cotton coveralls reduce exposure even more. Better yet, as pesticides can penetrate clothing, wear a chemical-resistant suit. Make sure the suit is large enough so that it won't rip when you stretch or bend. Disposable chemical-resistant suits cost about \$5; non-disposables are between \$8 and \$16. Add a chemical resistant apron during periods of high exposure, such as during mixing and loading. Aprons range in price from \$3 to \$12. New materials such as Comfort-Gard II™ breathe as well as cotton for comfort in warm weather, but can still keep liquids out. The suits are washable, but at about \$50 per suit they're considerably more expensive, and none are good for protection against vapors. If you're worried about aesthetics, many suits are now available in a non-conspicuous denim blue.



When wearing a suit, if the neck opening is loose, drift and dust can settle on your shoulders, back or chest and contaminate the clothing you're wearing underneath. Don't leave contaminated clothing lying around the house—you could expose your family. Shake and hang the clothing outdoors to air, and check pockets and cuffs for dust before bringing the clothing inside.

With the exception of TYVEK® and other disposable chemical suits, launder protective clothing and clothing worn under it after every time you work with pesticides. Wash it three times, separate from your family's clothing, in a heavy-duty detergent and hot water at the full water level. Residues can remain in washers, so flush them out by running an empty cycle with detergent. Hang the clothing to dry rather than put it in the dryer, where rubber parts can absorb and retain residue. Replace all protective clothing annually.

Eye protection. To protect your eyes from splashes and drifting dust, wear protective glasses with side and brow guards or, preferably, chemical splash goggles. If you wear protective glasses, a good fit is crucial. Both glasses and goggles should be anti-fog so they don't interfere with your vision, but they don't have to be impact-resistant. If you wear prescription glasses, wear a face shield or prescription protective glasses instead of goggles.



Never wear contact lenses where potential for eye contamination exists. In case you do splash something in your eyes, keep a jug of potable water on hand so you can flush them immediately. Flush for at least 15 minutes and seek medical attention.

Like most other protective equipment, eye protection isn't expensive; goggles and glasses range from \$5 to \$10 and shields cost anywhere from \$10 to \$20.

Protective boots. Don't wear leather or canvas shoes around pesticides as they can soak up chemicals and retain them for long periods of time. They are virtually impossible to decontaminate. A good pair of rubber protective boots should only cost you approximately \$10. Wear pant legs over the boots.



In Case of Accident: Be Prepared!

By wearing personal protective equipment when working around pesticides, you're significantly reducing your chances of being poisoned. Protective equipment won't prevent accidents, however, so you should know what to do before you, a family member or a co-worker needs help. Consult the pesticide container label—it'll give you valuable first-aid and antidote information specific to the chemical you're using.

Generally, signs of pesticide poisoning include: headache, sweating, weakness, dizziness, blurred vision, vomiting or nausea, diarrhea, darting eyes or pinpoint pupils, loss of muscle control, and chest pains. When poisoning is severe, the victim may convulse, fall into a coma or ultimately die.

If you or anyone working around you experiences one or more of these symptoms, call a doctor immediately. (Poisoning symptoms may take up to 4 to 12 hours to appear.) When you go to a doctor, hospital or call for help, **take the pesticide label** with you so you can give the doctor the information that is needed. To save time, always keep a card with numbers of a doctor, hospital, fire/rescue/EMS, poison control and police near the phone.

If your clothes are contaminated with a concentrated, highly toxic chemical, remove them immediately, put them in a plastic bag, and dispose with used pesticide containers. Don't try and wash off the spill—a uniform with spilled parathion concentrate on it may still contain enough residue to make someone seriously ill after being washed 5 or 6 times.

For more detailed information see Agrichemical Fact Sheet #7, Toxicity and Potential Health Effects, available from the Pesticide Education Office (814)863-0263.

Revised Standard Protects Agricultural Workers

The U.S. Environmental Protection Agency has published a worker protection standard for agricultural workers who are exposed to pesticides. Some portions of the regulations take effect April 21, 1993 with the remaining provisions becoming effective on April 15, 1994. Employers will have to abide by a more strict standard that has been expanded to include both workers who handle pesticides directly and workers who may be exposed to pesticides on farms, nurseries, greenhouses and forests. General requirements of the standard include:

1. **PPE.** Pesticide handlers must wear the personal protective equipment (PPE) specified on the pesticide container label. Employers' responsibilities include:
 - Providing PPE to each worker.
 - Cleaning and maintaining PPE.
 - Ensuring that each worker wears and uses PPE correctly.
 - Preventing heat stress if the work and PPE could cause it.
2. **Restricted-Entry Intervals (REIs).** Employers must ensure that all employees abide by these intervals, which are found on the product label. Re-entry intervals range from 12 to 48 hours.
3. **Notification.** To prevent inadvertent exposure, employers are required to warn workers about pesticide-treated areas. Notification can be oral or via signs; if highly toxic chemicals are used, notification must be both oral and via signs.
4. **Decontamination.** Employees must be provided with water for washing off splashed or spilled pesticides or for general washing when they're done working.
5. **Medical Emergencies.** In emergencies, employers are responsible for providing the following:
 - The name and location of the nearest medical facility.
 - Transportation to a medical facility.
 - Information about the pesticide(s) involved in the accident.
6. **Training.** Employers must:
 - Provide pesticide safety training, including training on the use of PPE.
 - Post a pesticide safety poster at a central location.
 - At a central location, provide access to label information and information about what pesticides have been used on the establishment.

All safety warnings, information, and training must be given in "a manner the worker can understand." That is, if some workers speak Spanish, safety literature and training must be in Spanish as well as English. For more information on the EPA Workers Protection Standards (WPS), contact the Pesticide Education Office, 114 Buckhout Laboratory, University Park, PA 16802; 814-863-0263.

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For a copy of our Fact Sheet Listing contact:
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