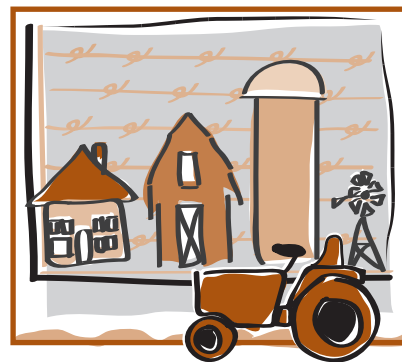


Agricultural Pesticide Personal Protective Equipment

Fact Sheet No. 5.021

Farm and Ranch Series | Safety



by P. Hansen and T. Walker*

Introduction and Risk Management

There is a risk factor whenever someone uses any pesticide product. When dealing with pesticides, the risk is determined by the pesticide toxicity and whether there is an exposure to the pesticide. One way to reduce the risk of exposure is to use the proper personal protective equipment (PPE). PPE plays an important role in keeping applicators safe from pesticide exposures, is generally required by the pesticide label, and reduces the exposure and risk potential of mixing and applying pesticides.

Pesticide Toxicity and Routes of Exposure

Pesticides vary widely in their toxicities. The toxicity, volatility, formulation, and potential type of exposure determine the PPE that is needed. Some pesticides have a low toxicity and it would take a large exposure to harm the user. Other pesticides have high toxicity and a small exposure could seriously harm the user - either immediately or in the long-term.

Pesticides enter the body through three main routes: dermal/ocular (skin/eyes), respiratory/inhalation (breathing), and ingestion (swallowing). PPE is designed to protect the routes of pesticide exposure to humans from a wide variety of pesticide types and toxicities. For example, long-sleeved shirts and gloves prevent dermal exposure to arms and hands; respirators protect lungs and the respiratory system and goggles and protective glasses shield eyes. It is essential for pesticide applicators to

recognize which PPE is needed, as required by the label, and to wear the correct PPE.

Read the Pesticide Label

Each pesticide product label has a PRECAUTIONARY STATEMENTS section, which lists PPE requirements. The pesticide label is a legal document and the user is responsible for reading and following its instructions – including PPE requirements. Following the label instructions is required by law and will ensure pesticides are safely applied and the user is adequately protected. Failure to follow the label instructions can result in misapplications, unnecessary exposure to the user, and potentially a fine or other consequence as determined by the Colorado Department of Agriculture (CDA). Some pesticide labels require the employer and applicator to comply with the Federal Worker Protection Standard, which includes additional PPE requirements if workers must enter a field before the Restricted Entry Interval has expired.

Choose the Right PPE

It is important to wear the right PPE for the job. In general, the more toxic a pesticide is, the more PPE is needed to keep the user safe. Consider the job at hand and what type of application that will be made. Will you apply a fumigant? The proper respirator will offer respiratory protection. Will you apply liquid spray solutions? Long pants, long-sleeved shirt, shoes and socks, gloves, and protective glasses are all good PPE for the job and might be required by the label. Usually the label lists specific PPE required to apply the pesticide, but if a label doesn't list PPE requirements, use your common sense and best judgment. Keep in mind which route(s) of exposure pose risks and adequately protect them – this applies to mixing, loading, and cleaning of application equipment as well.

Quick Facts

- Personal Protective Equipment (PPE) includes clothing and devices that protect the body from contact with chemicals such as pesticides.
- Three factors affect a PPE's chemical resistance: the chemical properties of the pesticide, the exposure time, and the exposure situation.
- Any plastic or rubber material is resistant to dry- and water-based pesticides (those that use water as the only diluent or solvent).
- **Read the pesticide label;** it provides information on the correct PPE to be used for that specific chemical.

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Body Protection

Many pesticide labels require protective clothing such as long-sleeved shirt, pants, socks, and shoes or boots. Clothing should be pesticide-free and made of tightly woven fabric. Other pesticide labels may require the applicator to wear a waterproof or chemical resistant coverall, or use a chemical-resistant apron if duties include mixing and/or loading pesticides. Aprons should cover the front of the body from chest to boots.

Hand and Foot Protection

Most pesticide exposures occur dermally, through the hands, especially during mixing and loading. It is also important to wear gloves when handling or applying pesticides; rinsing or disposing of pesticide containers; repairing contaminated application equipment; or washing contaminated PPE.



Chemical-resistant gloves are required by most pesticide labels, but not all. Even if a label doesn't require wearing gloves, it is still a good idea to wear waterproof or rubber gloves, unless working with a fumigant. A wide variety of gloves is available for different types of applications and different levels of chemical-resistance. Gloves should be unlined, made of the proper material for the pesticide product, and long enough to cover the wrist and lower forearm. Latex and nitrile gloves are readily available in many stores, but keep in mind that latex gloves are not chemical-resistant, and nitrile gloves must be at least 15 mil thick to provide adequate protection. Do not wear leather gloves for any task, and only use fabric gloves if required by the label when using fumigants or some granular pesticides. The pesticide label will tell you which glove type is needed.

Applicators should wear unlined boots when mixing pesticides or walking through a treated areas. They should be made of a chemical-resistant material (e.g. neoprene, nitrile, or polyvinyl chloride) and reach above the ankle. Pant legs should be worn on the outside of the boot to prevent liquid pesticides from running down into the boot and being absorbed through the skin.

Head and Neck Protection

The human head is very absorptive and requires protection from pesticides. Absorption is increased while sweating too, so keeping cool is always preferable. PPE that protects the head includes chemical-resistant hats, face shields, and protective glasses or goggles. Headwear should be waterproof, washable material and not made of leather or fabric or contain sweatbands as pesticides can accumulate there. Baseball caps and straw hats are not chemical-resistant and readily absorb pesticide residues. Headwear should be washed after use along with the other protective clothing used. Wear chemical-resistant safety goggles or a face shield when mixing pesticides, and possibly when spraying pesticides.

Respiratory Protection

Respiratory protection is often required when working with fumigant products or highly volatile pesticides. There are many respiratory devices that can protect you. Air-purifying respirators can protect you from hazardous vapors. Dust masks will protect your lungs from small particles, but not hazardous vapors. The pesticide label will tell you what type of respiratory protection is required for the pesticide application. If you are unsure which type of protective respiratory device to use, check the product label, the safety data sheet (SDS) for the product, or ask the professionals who sell safety equipment for help. Only use respirators that have been approved by the National Institute of Occupational Safety and Health (NIOSH) and make certain you FITTEST it to ensure a proper seal between your face and the face piece before you purchase. A fit test may either be qualitative or

Checklist for Personal Protective Equipment:

- Read and follow the pesticide label directions as to the type of PPE recommended. If the label does not state the type or extent of PPE required, it is better to err on the side of caution and wear PPE.
- Gloves, eye wear, etc. are invaluable PPE for preventing pesticide exposure to various body parts.
- Wear layers of clothing that are loose fitting to provide an air barrier to the body. They should not be so loose that they can be grabbed by moving machinery.
- Clean and maintain or replace PPE as needed.
- Do not remove gloves to open pesticide containers, adjust equipment or wipe any skin areas.
- Be aware of and prepare for possible heat stress.
- For more information on respirators and agricultural air-borne hazards refer to fact sheets 5.019, Agricultural Air-Borne Hazards, and 5.020, Agricultural Respiratory Protective Equipment.
- Sources of PPE are hardware stores, some agricultural chemical dealers, safety supply catalogs, and agricultural products suppliers.

¹One mil = one thousandth of an inch.

quantitative. A qualitative fit test relies on the person's sensation (smell, taste, irritation) to a particular test agent while the quantitative test uses measuring instruments to measure leakage around the face seal. You should also FIT CHECK your equipment before every use by following the manufacturer's instructions. A fit check tests whether the respirator is properly seated to the face before making an application.

After an application, always thoroughly wash the respirator and store the cartridges in an air-tight storage container. It is important to realize that all container or cartridge-type respirators need to have their containers or cartridges replaced after a certain amount of uses or time. Also, the use of respirators by employees in the workplace now requires that a medical evaluation is conducted to assess the worker's ability to use a respirator without adverse health effects.

Cleaning and Disposing of PPE

It is important to clean and discard PPE without causing contamination to yourself, garbage collectors or the environment. Some PPE, like non-disposable gloves and certain respirator parts, can be washed with hot, soapy water and reused. Protective clothing, if not too soiled, can be laundered but should be laundered alone and separate from the family laundry. If laundering, select a heavy duty cycle with prewash and extra rinse, use hot water and heavy-duty detergent. After washing contaminated PPE, run a complete cycle through the empty washer. If a dryer is used, dry on the high heat setting. Clothing should be line-dried to avoid contaminating the dryer, if possible. Clothing that is drenched with a pesticide product should be discarded as household hazardous waste and not cleaned.

Personal protective equipment does not last forever and will eventually degrade. Know the recommended life span for PPE such as gloves, protective clothing, respirators and their filters, etc.

Gloves should be checked for integrity by filling clean gloves with water and checking for leaks. Once PPE has reached the end of its service, ensure that it is disposed of properly. Discarded PPE should be rendered 'unusable' so that no one else will be tempted to reuse it. For example, cut the fingers off gloves before discarding. PPE that is disposable and washable should be cleaned with soap and water to remove pesticide residues. Once it is properly cleaned, it is acceptable to dispose of as regular garbage.

Avoiding Heat Stress When Wearing PPE

There is an increased risk for handlers and applicators to be susceptible to heat stress when wearing PPE for mixing/loading and application tasks. PPE is intended to keep pesticides from entering the body, but it also interferes with the body's natural cooling system--sweat evaporation. Heat stress occurs when the body builds up more heat than it can deal with and doesn't cool as quickly. There are several factors that combine to cause heat stress: heat factors like temperature, humidity, air movement, and sunlight; the workload or effort the task requires; PPE; hydration; and scheduling. If possible, adjust tasks or workplace conditions to minimize those impacts. Wearing PPE can limit the body's ability to cool down. Hydration is key to preventing heat stress. Applicators should drink plenty of water, beginning the night prior to applications, and continuing to rehydrate during and after the task is completed.

Tasks that require a lot of PPE, or a heavy workload, should be scheduled for the coolest part of the day. Breaks should be scheduled frequently to allow the body to cool. Employees should be allowed to adjust to heat and workload gradually by doing 2 hours of light work in the heat for several days in a row. Gradually increase the work period and workload for the next several days. Select a level of PPE appropriate for the task. This is based on the label's minimum PPE requirement and the user's experience to determine if more PPE is needed. Do not over protect if heat stress is a concern. Persons who get dangerously hot should stop work immediately and cool down.

Even a mild form of heat stress makes people feel ill and impairs their ability to do a good job. Workers should be trained to recognize the signs and symptoms of heat stress. They include:

- Fatigue (exhaustion, muscle weakness);
- Headache, nausea, and chills;
- Dizziness and fainting;
- Loss of coordination;
- Severe thirst and dry mouth; and
- Altered behavior (confusion, slurred speech, irrational or quarrelsome behavior).

Many heat stress symptoms are similar to what may occur if a pesticide exposure has occurred. Do not waste time trying to distinguish between the two. Seek medical attention immediately if these symptoms occur.