SAFETY

Agricultural Pesticide Protective Equipment **no. 5.021**

by M. Legault [1]

Quick Facts...

Personal Protective Equipment (PPE) is 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.

All pesticides are toxic. **Toxicity times exposure equals risk.** Some pesticide labels require the use of Personal Protective Equipment (PPE). This protects the handler from poisonings when mixing, loading and applying pesticides. Improperly handling pesticides increases the level of risk because the exposure level increases. Read and follow the directions on the pesticide label to protect the user and derive the most benefit from the pesticide.

Chemical-resistant PPE is material that pesticides cannot penetrate during the time required to complete the pesticide handling task. Use appropriate PPE when mixing and applying pesticides and when cleaning equipment used to apply pesticides. Always wear PPE when entering an area where pesticides are being used.

Materials used in PPE are resistant to a particular pesticide but may not provide a constant level of protection over time. Some materials protect for extended periods and others protect for just a few minutes. Exposure time is the term used to define chemical resistance. For example, neoprene may be resistant to one solvent, used in the formulation of a pesticide, for 30 minutes or less and to another solvent for more than four hours. Disposable plastic gloves, shoe covers and other PPE may provide only enough protection for tasks that can be completed in a few minutes.

Pesticides enter PPE material on contact and continue to move into and through the material until the source is removed. Therefore, rinsing the PPE with clean water after each use extends its protective life. When putting on or removing PPE, use caution: the outer surface may be contaminated with pesticides. When removing any PPE, **do not** allow it to touch skin or lightly covered areas. Do not take a deep breath -- contamination can result from inhalation of pesticides.

PPE constructed of sturdy materials is recommended for tasks that involve walking through rough terrain or handling sharp objects. Punctures or other damage to the PPE material reduces the protective qualities.

No single material can protect against all pesticide products. Chemical resistance depends on whether the pesticide is liquid or dry and what diluents, solvents and concentrations are used in the agricultural chemical. The label may state what materials are resistant to the pesticide. If the label does not state the PPE material required for protection, contact the Toxic Substances Branch of the Environmental Protection Agency, Colorado State University Cooperative Extension, the manufacturer of the pesticide, or the PPE dealer in your area. To check whether a plastic or rubber is resistant to a pesticide, use a sample of the material and expose it to the pesticide for the longest period of time that you would wear the PPE. If the material does any of the following, discard the PPE and choose another:

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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.*

- changes color,
- becomes soft or spongy,
- swells or bubbles,
- dissolves or becomes jelly-like, or
- becomes stiff or brittle.

Never use hats or gloves made or lined with absorbent materials such as cotton, leather or canvas. Hats or gloves are worn snugly and contamination can result easily. Work clothes made of cotton or a cotton blend may be used if worn loosely in layers. They should be made of a tightly woven, sturdy material (denim should weigh 7 to 10 ounces per square yard). If clothes are worn too loosely, they can be entangled in machinery. Some pesticides, such as fumigants, prohibit the use of chemical-resistant PPE. Always read the label. Cotton and canvas are difficult and leather is impossible to clean, as they readily absorb pesticides, even dry formulations.

Body Protection

Wear long-sleeved shirts and long pants. Fasten the collar to protect the lower neck. Wear coveralls over the shirt and pants. The coveralls should fit loosely, to create an air barrier that reduces direct contact with the pesticide. When wearing two-piece coveralls, leave the top outside and extended below the waist. Coveralls should protect everything except the feet, hands, neck and head. If the pesticide is highly or moderately toxic, the coveralls should be chemical-resistant. If the coveralls are not chemical-resistant, wear a chemical-resistant apron.

Chemical-resistant coveralls can be very hot to wear and can lead to heat stress. Use the following precautions to reduce heat stress:

- select the coolest PPE appropriate for the task;
- schedule work at the coolest time of the day;
- increase the amount of water intake to compensate for water lost to perspiration;
- if the air temperature is high, rest frequently to allow the body to cool;
- if at any time perspiration is no longer produced, stop working immediately.

When wearing a chemical-resistant apron, choose one that reaches from the neck to the knees. If working around machinery, do not wear an apron: it can easily become caught in the machinery. Wear chemical-resistant coveralls instead.

Handle clothes worn during pesticide application as if they were contaminated. Handle all contaminated clothing with gloves. Wash the clothing daily and separate from the family wash. Prerinse or presoak the contaminated clothing using **hot** water. Use heavy-duty liquid detergent. Wash only a few items at a time with the highest water level and the longest wash time. Line dry the clothing. After washing, **run the washer through a complete cycle with detergent**.

Hand and Foot Protection

Hands and forearms receive the most pesticide exposure. Eighty-five percent of dermal exposure occurs on the hands and forearms. This can be reduced to 3 percent with the use of unlined, chemical-resistant gloves. Unlined gloves prevent absorption of pesticides to the inside surface of the glove. Wear chemical-resistant gloves when using any kind of pesticide. Refer to pesticide labels for stated requirements of certain types of glove material. Wear gloves that reach at least halfway to the elbow. This will keep pesticides from running down the sleeves and into the gloves. Put sleeves over the gloves and fasten the cuff,

unless working overhead. If applying pesticides overhead, fold the glove to make a cuff.

Leave the gloves on when adjusting equipment or opening pesticide containers. **Do not** wipe your face when gloves are worn. Leave the gloves on until the entire task is complete. Removing the gloves increases the likelihood of contamination. After completing the task, **wash your hands with the gloves on**, remove the gloves and thoroughly wash and dry your hands.

To decrease exposure levels in the leg area, wear pant legs outside the boots or fasten shoe covers tightly to the pant leg. This keeps pesticides from running down the pant leg and collecting in boots or shoes.

Canvas, cloth and leather are difficult or impossible to clean adequately, and should not be worn as foot protection. Spills are often made when handling pesticides. Such spills are likely to land on or near the feet. Wear chemical-resistant footwear for spill protection. This can be shoes, shoe covers or boots. Remember to clean the footwear before removal to reduce the contamination from pesticides.

Gloves or footwear made of polyvinyl chloride (PVC) or rubber (butyl, nitrile, neoprene or natural rubber) must be at least 14 mils[2] thick. If gloves or footwear were previously exposed to agricultural chemicals and irritation of the skin occurs when they are put on, wash the affected area immediately for at least 15 minutes and dry. Replace the footwear or gloves with clean ones. Keep several pairs of gloves and footwear available to change whenever necessary.

Head and Neck Protection

To protect the head and neck from exposure to pesticides, wear a chemical-resistant, wide-brimmed hat or hood. Plastic “safari” hats, with a plastic sweatband, are a good choice and are relatively cool. Some chemical-resistant jackets or coveralls have an attached protective hood. If the hood is not used, tuck it inside the neckline to keep it from collecting pesticides.

Protective Eye Wear

Eyes are very sensitive to pesticides. Use protective eye wear when handling pesticides. The different types of protective eye wear are shielded safety glasses, face shields and goggles. Shielded safety glasses must have brow and side shields. They do not cause fogging or sweating and give eye protection in many situations. Face shields provide protection to the entire face. Face shields that are cupped inward toward the throat give better protection than straight face shields.

Wear goggles when riding in an open cab during an air blast application, flagging under an aerial application, applying mists, fogs or aerosols indoors, or working in similar situations. For these situations, goggles provide better protection than shielded safety glasses or face shields. Goggles should fit tightly against the face. A full-face respirator also protects the applicator in these situations. If worn with a half-mask respirator, select styles that fit comfortably with the respirator.

For additional information, contact your Colorado State University Cooperative Extension county office or the Cooperative Extension safety specialist at (970) 491-6172.

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[2] One mil = one thousandth of an inch.

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