



Cover up with coveralls and aprons¹

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Are you among the 63 percent of certified private pesticide applicators in Iowa who rarely or never wear cotton coveralls? Or the 53 percent who rarely or never wear disposable ones? If so, it's time to reconsider. Pesticide labels under the federal Worker Protection Standard (WPS) may require coveralls for people working with pesticides or near areas treated with them.

One- or two-piece coveralls provide an extra layer of protection and can reduce skin exposure to pesticides. Although a variety of protective coveralls are available in local stores or by mail, few companies provide information about resistance of their materials to agricultural chemicals. Remember that coveralls cannot offer complete protection and that no one material is effective in all situations. Wearing coveralls over regular work clothes and underwear can reduce the amount of pesticides that get onto clothing worn next to your skin, and thus, your overall exposure to pesticides.

FINDING A FIT

Look around for coveralls that fit comfortably. Sizes may be limited to S-M-L-XL, but can include XXL, and XXXL. Coveralls must be big enough to fit over work clothes so you easily can take them on and off, yet not so big that they interfere with work. Raglan sleeves provide greater freedom of movement than other styles. If you are tall or heavy, check extra-tall catalogs for coveralls with adequate torso length. If you are short, standard sizes may be too long. For safety reasons, cut off excess length rather than roll up sleeves or pantlegs. Disposable nonwovens don't ravel.

Look for seams that are lapped or sealed to keep out dusts and liquids. Lapped zippers or closures give better protection than snaps or buttons, which can gap open. Close-fitting necks help prevent pesticides from filtering down the back.

REUSABLE COVERALL MATERIALS

- **Cotton.** Cotton or cotton/polyester blend twill coveralls that are as heavy as work jeans are reusable unless contaminated with a full-strength liquid concentrate spill. In the technical sense, these materials are not chemically resistant, but they can reduce the amount of pesticide that gets on your skin if you wear regular work clothes and underwear underneath them. Cotton or cotton blend coveralls usually are comfortable to wear because materials "breathe" or let air through. Cotton and cotton/polyester fabrics are

IOWA STATE UNIVERSITY

University Extension

1. This document is Fact Sheet Pm-1563a, a series of the Safe Farm Program, Iowa State University Extension, Ames, Iowa. Safe Farm promotes health and safety in agriculture. It is funded by the National Institute for Occupational Safety & Health, Iowa State University and a network of groups that serve Iowa farm workers and their families. Publication date: March 1994.
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No endorsement of products mentioned is intended nor is criticism implied of products not mentioned. Trade names are given for educational purposes only.

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very strong. Annual replacement is recommended because residues remain in the fabric after laundering. These fabrics absorb moisture quickly so they are helpful primarily for protection against granular or dry formulations of pesticides (before they are mixed with water).

- **Nitrile and PVC-coated fabrics.** These coating materials (common for two-piece coveralls) resist water-based chemicals but may be permeated by some solvents. To add strength and stability, the coatings are applied over nylon scrim or other fabrics. Jackets should not be tucked in at the waist. Little research has been done on cleanup methods for these suits.
- **Gore-Tex®.** This familiar fabric is widely used in rain gear and sportswear. Oklahoma research showed that malathion became trapped in the center layer of this laminate and was not removed by laundering.

SINGLE-USE COVERALL MATERIALS

- **Tyvek®.** This spun-bonded polyolefin nonwoven fabric is used in industrial "clean rooms," for asbestos removal, and for hazardous waste cleanup. Tyvek® coveralls are disposable, inexpensive, and come in colors, however, the fabric melts and burns easily and might not rip off the body if tangled in machinery because of its strength and tear resistance. Depending on your situation, three types might be used:
 - *Regular Tyvek®* offers about the same protection from dusts and fine spray mists as regular cotton, but does a better job if liquid sprays are involved.
 - *Polyethylene-coated Tyvek®* repels water and has better chemical resistance.
 - *Saranex-23P®* coated Tyvek has most chemical resistance for use when exposure is longer or pesticides have higher toxicity.
- **Comfort Gard™.** A microporous membrane of polytetrafluoroethylene (PTFE) in the center of these fabrics keeps out liquids while allowing body heat to escape. Florida researchers found these fabrics offer greater comfort in warm conditions than polyolefin-based materials, but their barrier effectiveness for long-term use has not been determined.
- **Kleenguard®.** A matrix of microfibers in the core layer of this polypropylene laminate filters out liquids and particles. Kleenguard® LP is promoted for use in animal production but not pesticide handling.

- **Barricade®, Chemrel™, and Responder®.** These fabrics are designed for hazardous chemical exposure, such as emergency response, or for highly toxic exposures of longer duration.

PROTECTIVE APRONS

Aprons offer protection from spills of concentrate during mixing and loading. Aprons are always worn over regular work clothes and, perhaps, coveralls. Bib aprons cover the chest to knees and may have attached sleeves or separate sleeve covers for arm protection. Other apron styles cover below the waist and may be split to tie around the legs. Disposable apron materials can be similar to coveralls or to barrier laminate gloves, such as Silver Shield® or 4H®. Most Iowa applicators believe aprons are not necessary for the pesticides they use; but all pesticide spills are chance events. An apron reduces your risk of contamination.

PLAN AHEAD FOR SAFETY

As you plan your pesticide work, think about the kind of protection you need and the toxicity of the chemicals you handle and apply. Under the Worker Protection Standard, pesticide labels must list requirements for personal protective equipment (PPE). Remember that field tests support the conclusion that wearing any type of clean coveralls over regular work clothing is better than none because layers help prevent pesticides from getting through to the skin.

HELPFUL TIPS FOR PROTECTIVE CLOTHING

- Be aware of temperature as you work; coveralls can contribute to heat stress in hot and humid conditions.
- Remove pesticide-soiled coveralls or aprons before entering a house, closed tractor cab, truck, or other less-contaminated work space shared with others.
- Wash reusable coveralls in hot water with a strong detergent, separately from family clothes after every wearing.
- Starch cotton coveralls after laundering to help remove pesticide residues in the next wash.
- Line dry cotton coveralls in the sun, but keep rubber-like materials out of the sun after laundering to avoid fabric damage.
- Do not try to wash disposable coveralls. The inside will become contaminated and the item may fall apart in your washer.

- Do not put nitrile or PVC-coated suits in washers; they will wrinkle and the coating can be damaged. Rinse with a hose, both inside and outside, or dip in tub of hot water with detergent. Avoid prolonged soaking. These materials will melt in a dryer.
- For safe disposal, slash single-use coveralls with a knife or cut in half to prevent reuse by people who can't see or don't know the items are contaminated. Then put them in a garbage bag, close the bag, and treat as you would empty pesticide bags and containers.

PESTICIDE CLOTHING SAFETY

How Much Do You Know?

1. Regular Tyvek® coveralls offer about the same level of protection as cotton ones. True or false?
2. Comfort Gard™ fabrics have been shown to be comfortable in hot conditions, but their use for pesticide protection needs more study. True or false?
3. Cotton coveralls:
 - a. must be washed after each use.
 - b. can be starched before wearing to help pesticide removal in washing.
 - c. should be replaced every year.
 - d. all of the above.

4. For your protection, it's a good idea to:
 - a. remove pesticide-soiled garments before entering a truck or house.
 - b. wash protective clothing after each use with hot water and strong detergent.
 - c. dispose of single-use items promptly.
 - d. all of the above.

See answers at the end of the next section.

FOR YOUR INFORMATION

Good places to learn more about pesticide safety include the Private Pesticide Applicator Study Guide, PAT-1, and the Worker Protection Standard for Agricultural Pesticides How to Comply manual, EPA 735-B-93-001. For a list of product catalogs, see Sources of Protective Apparel and Gear, PAT-13, and for cleaning tips, see Learn About Pesticides and Clothes, Pm-1265f. Ask for these publications at your local extension office.

Research reports used in preparation include:

- Stone, J.F. et al. Pesticide Residues in Clothing: Case Study of Clothing Worn Under Protective Cotton Coveralls. *Journal of Environmental Health*, 55:1, 10-13. July 1992.
- Schwope, A.D. et al, Guidance Manual for Selecting Protective Clothing for Agricultural Pesticides Operations, 68-C9-0037#0-20, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, 1990.

Answers to quiz:

1-True; 2-True; 3-d; 4-d