

# Pesticide Safety

**P**ESTICIDES are chemicals used in production agriculture and horticulture. However, they can be dangerous to the applicator, other people, and animals in the area if safety practices are not followed. In addition, pesticides can pollute the environment and contaminate water and food supplies if not used properly.



## Objective:



Describe pesticide safety.

## Key Terms:



caution

danger

dermal exposure

eye exposure

general-use pesticides

inhalation exposure

keep out of reach of children

LC<sub>50</sub>

LD<sub>50</sub>

lethal concentration

lethal dose

oral exposure

restricted-use pesticides

signal words

toxicity

warning

## Pesticide Safety

The use of pesticides to control pests poses some risks to humans and the environment. Pesticides poison pests. The fact that they are toxic to living organisms means they can also be toxic to humans and non-targeted species.

**Toxicity** refers to the degree of poison in a material. Some pesticides are more toxic than others. The amount of active ingredient in a material as well as the chemical nature of the poison determines toxicity. Pesticides are classified as general-use and restricted-use pesticides.

**General-use pesticides** are less hazardous to the environment and are widely used by following label instructions. In most cases, special training in applying general-use pesticides is not required.

**Restricted-use pesticides** have higher toxicity levels than general-use pesticides. Risk is greater to humans and the environment. Anyone who applies these pesticides must have special training in the safe use and handling of these chemicals.



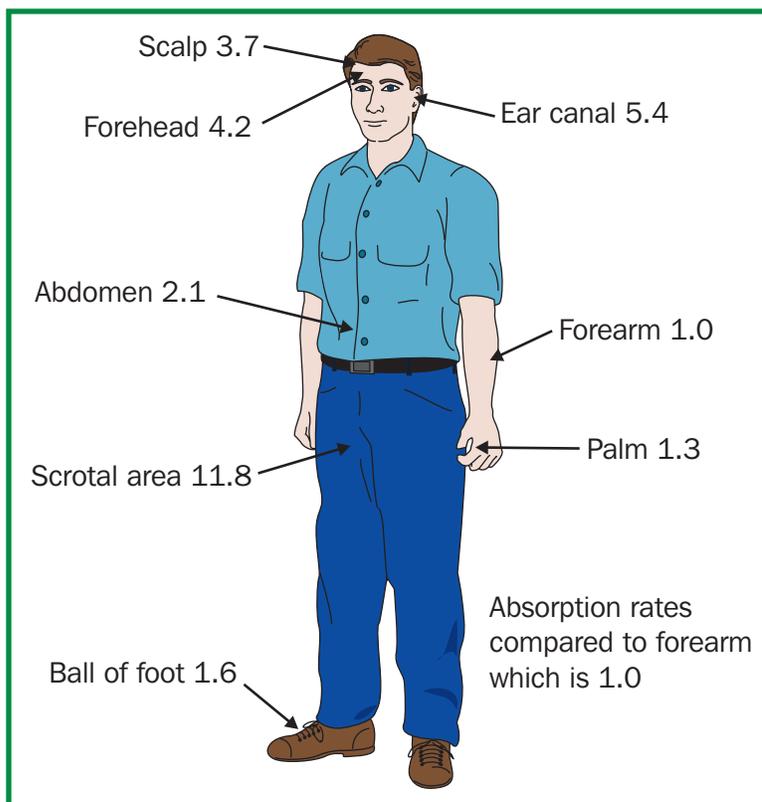
**FIGURE 1.** Proper clothing and training is generally required when handling restricted-use pesticides. (Courtesy, USDA)

## ROUTES OF ENTRY

Before a pesticide can harm anyone, the person must first be exposed to it. There are four main routes by which a pesticide can enter the body. These include oral, dermal, inhalation, and eye.

**Oral exposure** is the entry of the pesticide through the mouth and digestive system. This exposure may occur because of an accident but is more likely to be the result of carelessness. Blowing out a plugged nozzle with your mouth or smoking or eating without washing contaminated hands can result in oral exposure.

**Dermal exposure** is a route of entry through the skin. This type of exposure can occur anytime a pesticide is mixed, applied, or handled. The severity of dermal exposure depends on the dermal toxicity of the material, the rate of absorption through the skin, the size of the skin area contaminated, and the length of time the material is in contact with the skin.



**FIGURE 2.** The rate at which chemicals are absorbed by the skin depends on what areas the chemical comes in contact with.

**Inhalation exposure** is the entry of a pesticide through the nose and respiratory system. This type of exposure results from breathing pesticide vapors, dusts, or spray particles. In some cases, inhalation exposure can be more serious than oral or dermal exposure due to the uptake of blood via the lungs and other membranes.

**Eye exposure** occurs when pesticides enter through the eyes. Eyes are very sensitive to most pesticide materials. Eye protection should be worn when working with any pesticide.

## PESTICIDE TOXICITY

The method used to measure toxicity differs slightly among the different types of exposure.

The method used to measure oral and dermal toxicity is **LD<sub>50</sub>**. The LD stands for lethal dose. **Lethal dose** means the amount of pesticide necessary to cause death. The 50 associated with LD<sub>50</sub> means that 50 percent of the test animals are killed at this dose. The lower the LD<sub>50</sub> number of a pesticide, the more poisonous it is. LD<sub>50</sub> values are given in milligrams of substance per kilogram of test animal body weight. This is equivalent to parts per million.

The method used to measure inhalation toxicity is **LC<sub>50</sub>**. LC stands for **lethal concentration**. LC<sub>50</sub> values are measured in milligrams per liter. The lower the LC<sub>50</sub> number of a pesticide, the more poisonous it is.

### Signal Words

Words required on every label to indicate the degree of toxicity and the potential dangers of using pesticides are called **signal words**. Signal words are based on the LD<sub>50</sub> and LC<sub>50</sub> values of toxicity for the pesticide. The words “**Danger**” or “**Danger—Poison**” with a skull and crossbones (all in red) must appear on the labels of all highly toxic pesticides. “**Warning**” is required on the labels of all moderately toxic pesticides. “**Caution**” must be printed on the labels of all pesticides with a low or very low toxicity. The child hazard warning “**Keep Out of Reach of Children**” must also appear on the label of all pesticides, regardless of the toxicity.

### Summary:



The use of pesticides to control pests poses some risks to humans and the environment. Toxicity refers to the degree of poison in a material. Pesticides are classified as general-use and restricted-use pesticides.



**FIGURE 3.** All pesticide container labels will display at least some kind of signal word, depending on the toxicity level.

There are four main routes through which a pesticide can enter the body. These include oral, dermal, inhalation, and eye. The method used to measure toxicity differs slightly among the types of exposure. The method used to measure oral and dermal toxicity is LD<sub>50</sub>. The method used to measure inhalation toxicity is LC<sub>50</sub>.

Words required on every label to indicate the degree of toxicity and the potential dangers of using pesticides are called signal words. The words “danger,” “warning,” and “caution” signal the level of toxicity. The child hazard warning “keep out of reach of children” must also appear on the label of all pesticides.

### Checking Your Knowledge:

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1. What is toxicity?
2. How do general-use and restricted-use pesticides differ?
3. What are the recognized routes of entry for pesticides?
4. What are LD<sub>50</sub> and LC<sub>50</sub>?
5. What are the signal words used with pesticides?

### Expanding Your Knowledge:

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Identify some common pesticides and conduct research on the Internet. Determine the pesticides' toxicity in terms of LC<sub>50</sub> and LD<sub>50</sub>. Learn of any special precautions that should be taken to avoid oral, dermal, inhalation, and eye exposure.

### Web Links:

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#### Understand Pesticide Toxicity

[http://www.thisland.uiuc.edu/57ways/57ways\\_18.html](http://www.thisland.uiuc.edu/57ways/57ways_18.html)

#### Safe Use of Pesticides in Agriculture

<http://www.ext.vt.edu/pubs/safety/442-036/442-036.html>

#### Agricultural Pesticides

[http://209.85.165.104/search?q=cache:07iOsroxRzYJ:abe.sdstate.edu/hosta/index\\_files/Task%2520Sheets/3.5%2520Agricultural%2520Pesticides.pdf+signal+words+agricultural+pesticides&hl=en&ct=clnk&cd=1&gl=us](http://209.85.165.104/search?q=cache:07iOsroxRzYJ:abe.sdstate.edu/hosta/index_files/Task%2520Sheets/3.5%2520Agricultural%2520Pesticides.pdf+signal+words+agricultural+pesticides&hl=en&ct=clnk&cd=1&gl=us)

#### Pesticide Labeling: Signal Words

<http://edis.ifas.ufl.edu/PI137>