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How to Read a Pesticide Label

Pesticide Information Leaflet No. 28

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Background

The pesticide label is a legal document, and it is a violation of the law to use a pesticide in any manner inconsistent with the label. Every pesticide (herbicide, insecticide, fungicide, rodenticide, disinfectants, etc.) is required to bear a label that conforms to standards set by the U.S. Environmental Protection Agency (EPA). This leaflet explains how the pesticide label is derived and arranged, and helps the reader interpret the information presented on the label.

The label provides very important information which should be read before purchase of the pesticide, before use, and before storage or disposal. The Material Safety Data Sheet (MSDS) provides additional technical information for each product. See Pesticide Information Leaflet No. 29, *How to Read a Material safety Data Sheet*, for important information on this topic.

Development of the Pesticide Label

All pesticides are toxic. They provide benefits for pest control, but may pose risks to humans or the environment if not used prudently. If they are not used carefully and according to label directions, they may pose hazards to the health of the applicator and/or to persons exposed to residues such as workers performing cultivation tasks in treated fields or consumers exposed to residues in treated foods. Risk of adverse effects, either in humans or wildlife, is a factor of both the inherent toxicity of a particular pesticide and the level of exposure a human or other animal receives through inhalation, ingestion, and dermal absorption. The product label is the result of toxicological testing on laboratory animals to determine what types of adverse effects (acute, chronic or delayed, and allergic) may be posed by a particular pesticide, combined with an understanding of methods to reduce exposure to the applicator, field worker, and

consumer. Other elements that help determine information contained on the pesticide label include knowledge of the physical and chemical properties of the pesticide, residue testing in food and feed crops, and knowledge of pest life cycles and susceptibility to the product. It is important to remember that testing required by EPA estimates risks based on both acute exposure and exposure over a lifetime. Tests are also required to determine whether offspring of exposed lab animals are likely to have defects or problems due to the pesticide.

No pesticide may be sold in the United States until the EPA has reviewed the manufacturer's application for registration and determined that use of the product will not present an unreasonable risk to humans or the environment. As part of this product registration process, EPA imposes certain labeling information requirements and must approve all language the manufacturer proposes to include on the product labeling. EPA reviews the labeling to make sure that it contains all the information needed for safe and effective use of the pesticide product and that the information is backed by data submitted by the manufacturer.

Pesticide labeling usually is organized under headings to make it easier to find the information. Some information is required by law to appear on a certain part of the labeling or under certain headings. Other information may be placed wherever the manufacturer chooses.

Parts of the Label

Identifying information

Brand name

Each manufacturer has a brand name for each of its products. Different manufacturers may use different brand names for the same active ingredient. Most companies register each brand name as a trademark and do not allow any other company to use that name. The brand or trade name is the one used in advertisements and by company salespeople. The brand name appears plainly on the front panel of the label.

Pesticide handlers should beware of choosing a pesticide product by brand name alone. Many companies use the same basic name with only minor variations to designate entirely different pesticide chemicals. Sometimes several different companies sell the same pesticide product under different brand names. Always read the ingredient statement to determine the active ingredients in a product.

Ingredient statement

Each pesticide label must list what is in the product. The *active ingredients* in a pesticide product are the chemicals that control the pest(s). Most pesticide products also have inert, or inactive, ingredients. *Inert ingredients* are added to make the pesticide safer to handle, to increase its effectiveness, to make it easier to mix, measure, and apply, or to make it more convenient to handle. Both active and inactive ingredients, however, can harm humans or the environment if they are not handled properly. The ingredient statement must list the official chemical name or common (generic) name and amount for each active ingredient. Inert ingredients need not be named, but the label must show what percent of the total contents they make up.

The *chemical name* is a complex name that identifies the chemical components and structure of the pesticide. This name is almost always listed in the ingredient statement on the label. Because pesticides have complex chemical names, many are given

shorter *common names*. Only common names that are officially accepted by the EPA may be used in the ingredient statement on the pesticide label. The official common name may be followed by the chemical name in the list of active ingredients. By purchasing pesticides according to the common or chemical names, consumers will always be sure to get the active ingredient they want. In the case of an accident or emergency, health professionals will need to know the common or chemical name of the ingredients.

Registration and establishment numbers

The *EPA registration number* (for example, EPA Reg. No. 3120280-AA) indicates that the pesticide label has been approved by EPA. If no registration number appears on the pesticide label, the product should not be purchased, because such a product has not been subjected to the testing requirements of EPA. The *establishment number* identifies the facility where the product was made, in case there are questions or concerns about the pesticide product. This number (for example, EPA Est. No. 464-MI-1) appears either on the pesticide label or on the container itself. The registration and establishment numbers are needed in case of poisoning, claims of misuse, or liability claims. The name and address of the manufacturer must also appear on the product label. Often, the manufacturer includes a toll-free number that can be called for general questions about the product or if a physician or other professional needs more specific information about the product.

Type of formulation

The front panel of some pesticide labels will tell what kind of formulation the product is. A single active ingredient is often sold in several different formulations, depending on the end use of the product, whether it is sold ready-to-use or as a concentrate that needs to be diluted, and other factors. A particular formulation may be safe to use on certain plants while a different formulation must be used on other plants. Different formulations also may have different first aid procedures. Some of the more common formulations are listed below.

Emulsifiable concentrates (E or EC) usually contain a liquid active ingredient, one or more petroleum-based solvents, and an agent that allows the formulation to be mixed with water to form an emulsion (colloidal suspension of a liquid in another liquid). When water is added, pesticide emulsions look like milk. Emulsifiable concentrates are easily absorbed through the skin.

Solutions (S) dissolve readily in a liquid solvent such as water or a petroleum-based solvent. When mixed with the solvent, they form a solution that will not readily settle out. Formulations of these pesticides usually contain the active ingredient, the solvent, and one or more other ingredients.

Flowables (F or FL) are liquid formulations consisting of a finely ground active ingredient suspended in a liquid.

Dusts (D) are ready to use and usually contain a low percentage of active ingredient plus a very fine, dry, inert carrier made from talc, clay, chalk, nut hulls, or volcanic ash. Dusts are always used dry, and they easily drift in the air. Dusts are more likely than some other formulations to irritate the eyes, nose, throat, and skin, and they may easily be inhaled by the applicator.

Wettable powders (WP or W) are dry, finely ground formulations that look like dusts. However, they must usually be mixed

with water and are applied as sprays. Wettable powders usually contain 50 percent or more active ingredient. Wettable powder particles do not dissolve in water; unless they are constantly agitated, they settle out quickly. They are less easily absorbed through the skin and eyes than emulsifiable concentrates and other liquids, but they may be inhaled by the applicator while pouring and mixing the concentrated product.

Granular (G) formulations are similar to dust formulations except that granular particles are larger and heavier and thus less likely to drift. The coarse particles are made from an absorptive material such as clay, corn cobs, or walnut shells. The active ingredient either coats the outside or is absorbed into them. The amount of active ingredient is relatively low, ranging from 1 to 15 percent.

Water-dispersable granules (WDG) or *dry flowables (DF)* are like wettable powder formulations, except the active ingredient is prepared as granule-sized particles. Water-dispersable granules must be mixed with water to be applied. Once in water, the granules break apart into a fine powder which must be constantly agitated to remain in suspension. These formulations are less likely to be inhaled by the applicator during pouring and mixing.

Microencapsulated (M) formulations are particles of active ingredient (liquid or dry) surrounded by a plastic coating. The formulated product is mixed with water and applied as a spray. The encapsulation process prolongs the effective life of the pesticide by providing timed release of the active ingredient. Microencapsulated pesticides are not easily absorbed or inhaled.

Aerosols contain one or more active ingredients, usually at a low percentage, and a solvent. Aerosols are easily inhaled, and pressurized aerosols are hazardous if punctured, overheated, or used near an open flame.

Fumigants are pesticides that form poisonous gases when applied. Some active ingredients are liquids when packaged under high pressure but change to gases when released. Other active ingredients are volatile liquids when enclosed in an ordinary container, so are not formulated under pressure. Still others are solids that release gases when applied under conditions of high humidity or in the presence of water vapor. Fumigants are highly toxic to humans and all other organisms and require the use of specialized protective equipment.

Baits are made of active ingredients mixed with food or some other pest-attractive substance. The amount of active ingredient in most bait formulations is quite low, usually less than 5 percent. Baits can be attractive to children and pest, so users must be careful to place them in inaccessible areas.

Classification

Restricted use products

EPA categorizes every use of every pesticide as either general or restricted use. A pesticide is classified for *restricted use* if it could cause harm to humans or to the environment even when used according to label directions. Pesticides classified as restricted use may be purchased only by certified applicators (persons who have received special training on the handling and use of pesticides) or by persons using the pesticide under the supervision of the certified applicator.

If a pesticide is classified as restricted use, the label will state "Restricted Use Pesticide" in a box at the top of the front

panel. Below this heading may be a statement describing the reason for the restricted use classification. A pesticide may be classified restricted use on the basis of concerns about safety of the applicator, safety of the general public exposed to residues, or concerns for the environment. For instance, one product may bear this classification because it has been found to leach into ground water under certain conditions, while another product might be classified for restricted use because the active ingredient has caused tumors when fed to laboratory animals. When all label directions are followed and when the principles learned during the certification process are applied, the product should not pose an undue hazard to humans or the environment.

General use products

General use pesticides have no designation on the product label and may be purchased and applied by anyone. Never-the less, it is still important to follow all label directions.

Hazards to humans and the environment

The signal word

A *signal word* -- DANGER, WARNING, or CAUTION -- must appear in large letters on the front panel of the pest-icide label. It indicates how acutely toxic the product is to humans. The signal word appears immediately below the statement, "Keep out of reach of children," which also must appear on every label. The signal word is based not on the active ingredient alone, but on the contents of the formulated product. It reflects the hazard of any active ingredients, carriers, solvents, or inert ingredients. The signal word indicates the risk of *acute effects* (illnesses or injuries that may appear immediately after exposure to a pesticide). The four routes of exposure to a pesticide product (oral, dermal, inhalation, and eye) have different risks of acute effects; the signal word for a product is based on the route with the greatest risk. The signal word does not indicate the risk of chronic or delayed effects (illnesses or injuries that do not appear immediately) or allergic effects (harmful effects such as skin rash or asthma that some people develop in reaction to pesticides). The signal word is best used to compare acute toxicity between products being considered for use.

DANGER-- This word indicates that the pesticide is highly toxic. The product is very likely to cause acute illness from oral, dermal, or inhalation exposure, or to cause severe eye or skin irritation.

POISON -- All highly toxic pesticides that are very likely to cause acute illness through oral, dermal, or inhalation exposure also will carry the word POISON printed in red, and the skull and crossbones symbol. Products that have the signal word DANGER because of skin and eye irritation only will not carry the word POISON or the skull and crossbones symbol.

WARNING -- This word signifies that the product is moderately likely to cause acute illness from oral, dermal, or inhalation exposure or that the product is likely to cause moderate skin or eye irritation.

CAUTION -- This word signifies that the product is slightly toxic or relatively nontoxic. These products have only slight potential to cause acute illness from oral, dermal, or inhalation exposure. The skin or eye irritation it would cause, if any, is likely to be slight.

Hazards to humans

The labeling will contain statements that indicate which route of entry (mouth skin, eyes, lungs) must particularly be protected and what specific actions should be taken to avoid acute effects from expo-sure to the pesticide. Many pesticides can cause acute effects by more than one route. Understanding this part of the label helps the user know which parts of the body need the most protection during use and application of the product.

If the pesticide can bind to cholinesterase, an enzyme necessary for proper nervous system transmission, the label may identify it as a *cholinesterase inhibitor*. Such identification was not required until recently. See *Pesticide Information Leaflet No 7: Cholinesterase Testing* or *No. 30: Cholinesterase Monitoring: A Guide for the Health Professional* for more information.

If a pesticide product has the potential to cause *allergic effects*, such as skin irritation or asthma, the product label-ing must state that fact. Sometimes the labeling refers to allergic effects as "sensitization."

If the EPA considers a pesticide to have the potential to cause *chronic or delayed effects*, the label must warn of that fact. Such statements tell whether the product has been shown to cause tumors, reproductive problems, or other delayed effects in laboratory animals. Such products often have had certain requirements imposed, such as a reduction in the rate applied, an increase in the type or level of protective gear, or other adjustments that will result in lowered exposure and risk reduction. These adjustments may have been required prior to initial registration of the pesticide. If an unacceptable risk is determined to exist for a product already on the market, EPA can either cancel or suspend the use of the product or change the labelling to result in reduced risk. EPA believes that, if such products are used with care and according to all directions on the label, there should be no unreasonable risk of adverse effects.

Personal protective equipment statements

Immediately following the statements about acute, delayed, and allergic effects, the labeling usually lists *personal protective equipment (PPE)* requirements. These statements identify the minimum PPE that must be worn when using the pesticide. Sometimes the statements will require different PPE for different pesticide handling activities. For example, an apron may be required only during mixing and loading or equipment cleaning. Sometimes the statements will allow reduced PPE when use safety systems, such as closed systems or enclosed cabs, are employed. It is important to follow PPE requirements; they are there to minimize exposure and prevent acute, delayed or chronic, and allergic reactions.

Worker Protection Standard (WPS) requirements

When used on farms, forests, nurseries, or greenhouses, pesticides are subject to certain requirements under the Worker Protection Standard (WPS). For these pesticides, the label will display a special section stating that the pesticide is subject to WPS requirements when used on these sites. The WPS was implemented to provide special protection for pesticide handlers (those who may mix, load, or apply pesticides as part of their jobs) and workers (those who may be exposed to pesticide residues on the job, as in cultivation, harvesting, or equipment maintenance).

These protections may include additional PPE or other measures not required for uses of the pesticide on other sites.

Statement of practical treatment (first aid)

Pesticide products are required to include instructions on how to respond to an emergency exposure. The instructions usually include first aid measures and may include instructions to seek medical help. The directions are based on the formulation (*i.e.*, both active and inert ingredients). Some inert ingredients are corrosive and can cause more damage if a person is made to vomit. First aid instructions should always be followed very carefully.

Environmental hazards

This section of the pesticide labeling will indicate precautions for protecting the environment when using the pesticide. Some general statements appear on the labeling of nearly every pesticide. Most pesticide labeling, for example, will warn the user not to contaminate water when applying the pesticide, cleaning equipment, or disposing of pesticide wastes. The labeling will contain extra precautionary statements if the pesticide poses a specific hazard to the environment. For example, the label may state that the product is highly toxic to bees or other wildlife, or that the pesticide is subject to leaching under certain conditions.

Directions for use

Directly under the heading "Directions for Use" on every pesticide product labeling is the following statement: "It is a violation of Federal law to use this product in a manner inconsistent with its labeling." It is illegal to use a pesticide in any way not permitted by the labeling. A pesticide may be used only on the plants, animals, or sites named in the directions. It may not be used at higher dosages, higher concentrations, or more frequent applications. All directions for use must be followed, including directions concerning safety, mixing, diluting, storage, and disposal. These directions are not advice -- they are requirements.

Mixing, additives, and application instructions

The instructions on how to use the pesticide are an important part of the labeling. This is the best way to find out the right way to handle the product. The use instructions tell

- the pests that the manufacturer claims the product will control;
- the plant, animal, or site the product is intended to protect;
- in what form the product should be applied;
- the correct equipment to use;
- how much pesticide to use;
- mixing directions;
- whether the product can be mixed with other products;
- whether the product is likely to cause unwanted injuries or damage to plants, animals, or surfaces;
- where the material should be applied; and
- when and how often it may be applied.

Re-entry and preharvest intervals

For many products, especially those for use in and around homes, the treated area may be re-entered once the spray has dried or the dust has settled. Pesticides used on other sites such as crops may require a specific amount of time be allowed to pass before persons can re-enter the treated area. In such cases, the label will state the number of hours or days to be waited before reentry. There may be special circumstances under which a treated area may be reentered early.

For instance, workers in agricultural fields may reenter early, providing that they have received special early entry training, that special protective gear is worn, that only certain tasks may be performed, and that a minimum of four hours have passed since application. Often the waiting period, called the *restricted entry interval* or *REI*, will differ for different crops or sites. This may be because tests have shown the crops or sites degrade the pesticide at different rates, or because different rates of the pesticide are applied to the different crops, resulting in quicker degradation on crops receiving lower rates, or because specific data exist for certain crops but not for others. In the absence of specific degradation data on each crop, EPA imposes a default REI that depends on the acute toxicity category of the pesticide. Default REIs are conservative; *i.e.*, they provide extra protection than is likely to be needed, and are thus longer.

Preharvest intervals (PHI), also called days to harvest, identify the number of days that must be waited before a treated crop can be harvested for consumption by humans or animals. Again, different crops bear different PHIs, depending on many factors.

Special requirements

Some directions for use that pesticide users must obey are contained in documents that are only referred to on the product labeling. Such instructions include EPA or other government agency regulations or requirements concerning the safe use of the pesticide product. In such cases, the pesticide user is responsible for determining whether the regulation, bulletin, or other document referred to on the pesticide product labeling applies to the particular situation and the intended use of the pesticide product. If the document is applicable, the user must comply with all the specific directions for use and other requirements that it contains. These documents do not always accompany the pesticide product when it is sold. Additional directions and requirements may have to be obtained from other sources such as pesticide dealers or company representatives, industry or commodity organizations, land grant universities, or Cooperative Extension agents. This reference to other documents is a new practice. It is necessary because there is no longer room on the traditional pesticide label to explain the requirements of all laws and regulations that may apply to the user. For example, EPA has adopted new requirements concerning groundwater protection; endangered species protection; pesticide transportation, storage, and disposal; and worker protection.

Storage and disposal

All pesticide labeling contains instructions for storing the pesticide. These may include both general statements, such as "Keep out of reach of children and pets," and specific directions, such as "Do not store at temperatures below 32 ^{0}F." Pesticide labeling also contains some general information about how to dispose of excess pesticide and the pesticide container in ways that are acceptable under Federal regulations. State and local laws vary, however, so the labeling usually does not give exact disposal instructions.

Reading the Label

The pesticide label should be read before purchase, prior to use, and before disposal. The buyer should be sure the pesticide

- is labeled on the crop or site to be treated;
- will control the pest(s) of concern;
- will not harm wildlife or desirable plants near the treatment site;

- will not contaminate the environment, given the conditions at the treatment site;
- does not require the use of application equipment or PPE not available to the user; and
- will not pose a storage problem.

In the event of an emergency involving overexposure to a pesticide, the label should be referred to for first aid directions. If the victim needs medical follow-up, the label (or, if available, a copy) should be taken along so that the physician or other medical personnel can determine the correct course of treatment for the particular product.