Pesticides

Pesticides - General

On this page

What are pesticides?

The word "pesticide" is a general term used to describe a substance (or mixture) that kills a pest, or it prevents or reduces the damage a pest may cause. Pests can be insects, mice or other animals, unwanted plants (weeds), fungi, bacteria or viruses.

Pesticides can also include any substance that is used to modify a plant's growth (regulator), drop a plant's leaves prematurely (defoliant), or act as a drying agent (desiccant). Pesticides are usually chemicals, but they can also be made from natural materials such as animals, plants, bacteria, etc.

NOTE: The term "pesticide" describes a very large and diverse group of chemicals or products. It is very important to always get specific information about the exact product you are using.

For more information, other OSH Answers documents in this series include:

- Pesticides - First Aid
- Pesticides - Health Effects
- Pesticides - Labels
- Pesticides - Re-Entry Time
- Pesticides - Working Safely

What are examples of pesticides?

Pesticides include a wide range of products - many of which you may use every day. The table below lists some common categories, their purpose, and what products they are normally found in. There are many, many more types of pesticides than what is listed here.

Common Types of Pesticides		
Category	**Purpose**	**Examples**
Insecticides	Kills or repel insects, ticks and mites	• bug sprays • insect repellents • ant and roach baits • garden dusts or sprays • commercial farm/orchard sprays • flea shampoos, flea and tick collars • moth balls
Herbicides	Kills weeds or unwanted plants.	• weed killers • weed and feed lawn care products • tree cut/stump treatments
Fungicides	Kills mould, mildew and other fungi.	• rose and flower sprays • commercial farm/orchard sprays • treated seeds • paint additives
Rodenticides	Kills rodents such as mice and rats.	• mouse and rat bait stations
Disinfectants	Kills bacteria, mould and mildew.	• bleach • ammonia • kitchen and bathroom cleaners • pool and spa cleaners
Wood preservatives	Protects wood from insects and fungi.	• pressure-treated wood

How do pesticides "work"?

Pesticides are often grouped into "families" because they share similar chemical properties, or they act on the pest in the same way. A pesticide product may have active ingredients from more than one chemical family.

Some common families include:

Organophosphates

Characteristics

There are several types of pesticides in this family, depending on the exact chemicals used.

- Usually made from phosphoric acid.
- Most organophosphates are insecticides. They control pests by acting on the nervous system (for example, the pesticide interferes with nerve-impulse transmissions by disrupting the enzyme (cholinesterase) that regulates acetylcholine (a neurotransmitter)).
- With a few exceptions, most are highly toxic.
- Organophosphates are used because they are less persistent (breakdown faster) in soil, food or feed for animals than other families, such as organochlorine pesticides. However, many are being phased out or used only in critical applications.

Examples

- chlorpyrifos
- dimethoate
- fenthion
- malathion
- naled
- temephos
- trichlorfon

Organochlorines (Chlorinated Hydrocarbons)

Characteristics

- Controls pests by disrupting nerve-impulse transmission (disrupts ion flow at the axon/synapse level).

- Generally persistent in soil, food, and in human and animal bodies (does not break down quickly).
- They can accumulate in fatty tissues.
- Traditionally used for insect and mite control, but many are no longer used due to their ability to remain in the environment for a long time.

Examples

- aldrin
- chlordane
- dieldrin
- endrin

Carbamates and Thiocarbamates

Characteristics

- Made from carbamic acid.
- Control pests by acting on the nervous system (interfere with nerve-impulse transmission by disrupting the enzyme (cholinesterase) that regulates acetylcholine (a neurotransmitter).
- In general, are less persistent in the environment than the organochlorine family.
- Includes insecticides, herbicides and fungicides.
- The health hazard to humans and animals is mild with herbicides and fungicides, while greater with insecticides.

Examples

- Insecticides
    - carbaryl (Banned in European countries, only certain uses will be cancelled in Canada due to concerns of health risks)
    - propoxur (some uses of this insecticide, such as control of mosquitoes, black flies, all indoor use except bait trays, are to be phased out in Canada)
    - methomyl (in Canada some uses are proposed to be cancelled)
    - carbofuran (limited use in Canada)
    - thiodicarb

- Herbicides
  - barban
  - s-Ethyl dipropylthiocarbamate (EPTC)
  - propham
  - triallate
- Fungicides
  - nabam

Pyrethroids (synthetic)

Characteristics

- Disrupts nerve-impulse transmission, (increases sodium ion flow into axon), which stimulate nerve cells and eventually causes paralysis.
- Stable in sunlight (do not degrade quickly).

Examples

- cyhalothrin
- cypermethrin
- deltamethrin

What are different forms of pesticides?

Pesticides are formulated (prepared) in liquid, solid and gaseous forms.

- Liquid formulations include suspensions (flowables), solutions, emulsifiable concentrates, microencapsulated suspensions, and aerosols.
- Solid formulations include dusts, particulates, granulars, pellets, soluble granules, soluble powders, baits, tablets, dry flowables and wettable powders.
- Gaseous pesticides are typically fumigants (can be sold as liquids or gases).

Abbreviations are often used with the trade name on the pesticide label to indicate the type of formulation. Some examples of words and abbreviations used for pesticide label formulation statements are:

A - Aerosol
D or **DU**- Dust of Powder
DF - Dry Flowable
E or **EC** - Emulsifiable Concentrate
F - Flowable
G or **GR** - Granular
P - Pellet
S - Solution
SC - Sprayable Concentrate
SP - Soluble Powder
ULC - Ultra low volume concentrate
WDG - Water Dispersible Granules
W or **WP** - Wettable Powder
WS - Water Soluble Concentrate

It is important to know what form the pesticide is in because the form can have an impact on how hazardous the chemical may be. For example, your skin absorbs liquids more easily than powders. In some cases, formulations such as emulsifiable concentrates may be more easily absorbed than water solutions. In addition, adjuvants (a chemical added to a pesticide to increase its effect) may be added to a spray solution. Some adjuvants may increase the amount of pesticide that spreads onto or sticks to your skin, and the amount that is absorbed through your skin.

What is an inert ingredient?

A formulation will consist of one or more active ingredients plus "inert ingredients" (materials with no pesticide action). Inert ingredients are used for many reasons, including making the pesticide more convenient to use, or enhancing its effectiveness. Even though these inert ingredients will usually be the largest ingredients (for example, by percentage), they are often not listed on the label.

NOTE! The word "inert" does NOT mean that the ingredient is harmless. An "inert" ingredient can be more hazardous to workers than the active (pesticide) ingredient itself. Information on hazardous ingredients in a pesticide formulation can be found in the Safety Data Sheet (SDS) for the product.

Can pesticides be harmful to humans?

Yes, they can be. Because pesticides are designed to "kill", they can also affect humans or animals (such as family pets). Please see the OSH Answers document Pesticides - Health Effects for more information.

You must work with and store pesticides properly. The importance of reading the label and following instructions carefully cannot be overemphasized. Please see the OSH Answers document Pesticides - Working Safely for more information.

How do pesticide laws work?

Canadian pesticide use is regulated through a system shared by federal, provincial and municipal governments. Together, these three levels of government oversee various acts, regulations, guidelines, directives and bylaws. At all levels, however, regulators are working together towards the common goal of helping to protect Canadians from any risks posed by pesticides and ensuring that pest control products do what is claimed on the label.

The **federal government** evaluates and registers pesticides through the Pest Control Products Act (PCPA) and Regulations, which is enforced by the Pest Management Regulatory Agency (PMRA). All pesticides must be registered to be imported into, or sold or used in Canada. For more information, refer to the Pest Management Regulatory Agency. The registration is systematically re-evaluated (every 15 years) on the basis of new available data regarding environmental and human health risks. Based on the assessment, the pesticide can be phased-out or removed from the Canadian market; its use may be restricted for certain applications or other measures may be taken to increase the level of protection (e.g. modification of maximum residue limits and the label information). Health Canada publishes these "decisions and updates".

Provincial and Territorial governments are responsible for the sale, use, storage, transportation and disposal of registered pesticides, as well as training, certification and licensing of applicators, vendors and growers within their province/territory. Provincial and territorial governments are also responsible for issuing permits, responding to spills and incidents and the classification of pesticides for sale and use within their province/territory. Note that in most provinces or territories, anyone who sells or applies pesticides **must** be trained and certified - consult your local Ministry of Agriculture or Ministry of Environment for certification details.

Municipal and Local governments set bylaws for municipal (and often includes private and residential) lands regarding the use of pesticides. For example, many municipalities have banned the "cosmetic use" of pesticides (lawn, turf and garden pesticides used primarily to make a lawn or garden look more attractive). Before you apply any pesticide to your private property, check your local by-laws to see what products, if any, are allowed.

Where can I get more information?

Additional information about pesticides is available at the following websites*:

Health Canada - Pest Management Regulatory Agency (PMRA):

> Pesticide Label Search
> List of Federal, Provincial, and Territorial Agriculture and Environment Links

Pesticides in Agriculture, Government of British Columbia

Pesticide Application and Safety, Ontario Ministry of Agriculture, Food and Rural Affairs

Healthy Lawns, Health Canada

(*We have mentioned these organizations as a means of providing a potentially useful referral. You should contact the organization(s) directly for more information about their information and/or services. Please note that mention of these organizations does not represent a recommendation or endorsement by CCOHS of these organizations over others of which you may be aware.)

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