

# A Proper Perspective on Pesticide Toxicity

There are two types of toxicity: **acute** and **chronic**.

**Acute toxicity** usually results from a single exposure to high levels of a toxicant. This exposure can be either oral, dermal, or through inhalation. This is the type of toxicity that is usually meant when we speak of something or someone having been poisoned.

**Chronic toxicity** results from long-term, low level exposure to a toxicant. This type of toxicity does not result in poisoning in the traditional sense. Chronic toxicity effects are spoken of in terms of long-term effects on the body. The three major areas of concern when chronic effects are discussed are if the toxicant is a mutagen (causes changes in the genetic material DNA), an oncogen (causes the formation of tumors; a carcinogen causes the formation of malignant tumors, cancer), or teratogen (causes birth defects). Chronic toxicity can also include effects on the reproductive system or nervous system as well as liver and kidney effects.

Our bodies have built-in defense mechanisms that allow us to detoxify foreign chemicals taken into the body or chemicals our bodies need if taken in slightly excessive quantities. Our bodies cannot distinguish between the same chemical synthesized by "Mother Nature" or one synthesized in a laboratory. "Mother Nature" is not necessarily benign.

The federal government's Hazardous Substances Labeling Act legally defines a poison as any substance that causes death in 50 percent of laboratory animals exposed to doses of less than 50 milligrams per kilogram (mg/kg) of body weight. However, some materials are exempt from this requirement if they are essential in small doses for life and health. For example, pure

vitamin D can be lethal if taken orally at a dosage of 10 mg/kg, but severe vitamin D deficiency can also cause death.

Always remember, "**the dose determines the poison.**"

## Some Approximate Lethal Doses

The amount of caffeine in 100 cups of strong coffee

The amount of solanine in 100-400 pounds of potatoes

The amount of oxalic acid in 10-12 pounds of spinach or rhubarb

The amount of aspirin in a bottle of 100 aspirin tablets

The amount of hydrogen cyanide in 4 pounds of lima beans

These amounts are only approximate; a person's size will help determine the amount that is poisonous. The smaller the individual, the smaller the amount of a substance required to be lethal; the larger the individual, the larger the amount required. It takes much less of a toxicant to poison a small child than it takes to poison an adult.

Pesticides are usually applied at an application rate of 1 pound per acre or some fraction of a pound per acre.

One teaspoon of sugar spread evenly over 5,000 5-inch cereal bowls is an application rate of 1 pound per acre. Newer pesticides are applied at even lower rates. If the rate is 1/8 pound (2 ounces) per acre, then that teaspoon of sugar is spread over 40,000 bowls of cereal. One ounce per acre equals 1 teaspoon spread over 80,000 bowls of cereal; 1/2 ounce per acre equals 1 teaspoon of sugar spread over 160,000 bowls of cereal.

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Residues of chemicals in our food and water supply are expressed in **parts per million (ppm)** or **parts per billion (ppb)** or sometimes in **parts per trillion (ppt)**. Sometimes these numbers seem to be very large, but in reality they are not. The following comparison will help keep these types of figures in perspective.

**One part per million (ppm) is:**

- 1 ounce of salt in 62,500 pounds of sugar
- 1 square inch in the infield of a baseball diamond
- 1 inch in 16 miles
- 1 second in 11 days

**One part per billion (ppb) is:**

- 1 square foot in 36 square miles
- 1 inch in 16,000 miles
- 1 second in 32 years

**One part per trillion (ppt) is:**

- 1 inch in 16,000,000 miles (33 trips to the moon and back)
- 1 pinch of salt in 10,000 tons of potato chips (approximately 1,000 18-wheelers loaded with potato chips)

## Some Naturally-Occurring Toxicants

Naturally occurring toxic compounds are in the foods we eat and have eaten for centuries. Remember, the chemicals are synthesized by the most accomplished chemist of all - a living plant.

Mushrooms contain hydrazine - a carcinogen.  
Celery contains furocoumarin - a carcinogen.

Alfalfa sprouts contain canavanine, which is associated with effects in the immune system.

Black pepper, nutmeg, and cinnamon contain safrole - a carcinogen.

Chocolate contains theobromine, which can activate several different carcinogens.

Coffee contains chlorogenic acid - a mutagen.  
Vitamin A in very high doses is an animal teratogen.

Rutabagas contain a potent inducer of thyroid cancer.

We survive these naturally occurring toxic compounds in our diet because our intake of them is very small and our built-in defense mechanisms take care of them. **Remember, the dose makes the poison, and use moderation in all things.**

### Source

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