

Toxicity of Common Indoor Household Insecticides Registered in Florida¹

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Background

Insecticides are designed to kill insect pests, but, if used incorrectly, they may damage desirable plants and animals, including humans. Some pesticides are so highly toxic that very small quantities can cause illness or eye damage, burn the skin, or even cause death. Because common pesticides, such as those intended for household use, can irritate the skin, eyes, nose, or mouth, it is a good idea to understand the toxicity of household insecticides so you can follow practices designed to reduce exposure to people, pets, and other nontarget organisms. This document addresses the acute toxicity of common indoor household insecticide active ingredients registered in Florida and provides a table with mammalian toxicity values for each of these insecticides.

Acute Toxicity

The acute toxicity of a chemical refers to its ability to do systemic damage as a result of a one-time exposure to relatively large amounts of the chemical. A pesticide with a high acute toxicity may be deadly if even a very small amount is absorbed or ingested. The Environmental Protection Agency (EPA) designates signal words on a pesticide label to inform users of the toxicity level. The signal words on the label (Table 1) are based on the acute toxicity of the pesticide and are divided into four categories based on the amount that causes damage. Acute toxicity may be

measured as acute oral (through the mouth), acute dermal (through the skin), and acute inhalation (through the lungs or respiratory system). For more information about signal words and pesticide labeling, please refer to <https://edis.ifas.ufl.edu/pi137>.

Acute Toxicity Measures

The commonly used term to describe acute toxicity is LD₅₀. LD means *lethal dose* (deadly amount) and the subscript 50 means that the dose was acutely lethal to 50% of the animals to whom the chemical was administered under controlled laboratory conditions. The test animals, most commonly rats, mice, and/or rabbits, are given specific amounts of the chemical in either one oral dose, by a single injection, or dermally, and they are then observed for a specified time.

The lower the LD₅₀ value, the more acutely toxic the pesticide—it takes less of it to cause harm. Therefore, a pesticide with an oral LD₅₀ of 500 mg/kg would be much less toxic than a pesticide with an LD₅₀ of 5 mg/kg. LD₅₀ values are expressed as milligrams per kilogram (mg/kg), which means milligrams of chemical per kilogram of body weight of the animal. *Milligram* (mg) and *kilogram* (kg) are metric units of weight. Milligrams per kilogram is the same measure as parts per million. To put these units into

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Use insecticides safely. Read and follow directions on the manufacturer's label.

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perspective, 1 ppm is analogous to 1 inch in 16 miles or 1 minute in 2 years.

For example, if the oral LD₅₀ of the insecticide parathion is 4 mg/kg, a dose of 4 parts of parathion for every million parts of body weight would be lethal to at least half of the test animals. As an example, the LD₅₀ of caffeine is 150–200 mg/kg, and the LD₅₀ of table salt is about 3,000 mg/kg.

LD₅₀ values are generally expressed based on active ingredient. If a commercial product is formulated to contain 50 percent active ingredient, it would take two parts of the material to make one part of the active ingredient. In some cases, other chemicals mixed with the active ingredient for formulating the pesticide product may cause the toxicity to differ from that of the active ingredient alone. Each pesticide product label lists its common name under the active ingredient statement to identify what is in the product. Then, knowing the active ingredient(s), you may use Table 2 to determine the LD₅₀ value of the product.

Another designation is LC₅₀, which measures acute inhalation toxicity. LC means *lethal concentration*. Concentration is used instead of dose because the amount of pesticide inhaled in the air is being measured. LC₅₀ values are measured in milligrams per liter. Liters are metric units of volume that are similar to a quart. The lower the LC₅₀ value, the more toxic the pesticide.

Additional Information

National Pesticide Information Center (1-800-858-7378 or <http://npic.orst.edu/>).

Nesheim, O. N., F. M. Fishel, and M. A. Mossler. 2005. *Toxicity of Pesticides*. PI-13. Gainesville: University of Florida Institute of Food and Agricultural Sciences. <http://edis.ifas.ufl.edu/pi008>

Table 1. Acute toxicity measures and warnings.

Categories	Signal word	Categories of acute toxicity			Oral lethal dose ¹
		LD ₅₀		LC ₅₀	
		Oral mg/kg	Dermal mg/kg	Inhalation mg/l	
I Highly toxic	DANGER, POISON (skull and crossbones)	0 to 50	0 to 200	0 to 0.2	A few drops to a teaspoon
II Moderately toxic	WARNING	50 to 500	200 to 2,000	0.2 to 2.0	Over a teaspoon to one ounce
III Slightly toxic	CAUTION	500 to 5,000	2,000 to 20,000	2.0 to 20	Over one ounce to one pint
IV Relatively nontoxic	CAUTION (or no signal word)	5,000+	20,000+	20+	Over one pint to one pound

¹ Probable for a 150-pound person.

Table 2. Acute toxicity values for commonly used indoor household insecticides.

Common name	Oral LD ₅₀ (mg/kg) ¹	Dermal LD ₅₀ (mg/kg) ¹	Inhalation LD ₅₀ (mg/l) ¹
Abamectin	221	330	2.2
Acetamiprid	>2,000	>2,000	>3.5
Allethrin, d-cis,trans allethrin	685	>11,000	>3.8
Bifenthrin	632	>2,000	1.0
Bioallethrin (see d-cis,trans allethrin)			
Boric acid	>5,000	>5,050	---
Cyfluthrin	960	>2,000	4.0
Cyhalothrin—gamma	>5,000	>5,000	0.3 – 0.4
Cyhalothrin—lambda	>5,000	>2,000	0.06
Cypermethrin	294	>2,000	>2.02
Deltamethrin	2,613	>5,000	>1.02
Dichlorobenzene—para	500	>2,000	>6.0
Dichlorvos	25	59	15.0
Dinotefuran	>2,000	>2,000	>2.07
d-limonene	>5,000	>5,000	---
Esfenvalerate	1,470	>2,000	2.93
Fipronil	>5,000	>5,000	5.16
Hydramethylnon	>5,000	>2,000	2.9
Imidacloprid	>4,820	>2,000	2.25
Imiprothrin	1,800	2,000	>5.1
Mineral oil	>2,000	>2,000	>5
Napthalene	13,900	N/A	>340
Permethrin	1,030	>2,000	25.7
Phenothrin	>5,000	>5,000	10.4
Prallethrin	640	>2,000	0.66–0.86
Propoxur	50	>5,000	>2.11
Pyrethrins	>2,000	>2,000	>2.11
Pyriproxyfen	>5,000	>2,000	>7.60
Sumithrin (d-phenothrin)	>10,000	>10,000	>2.10
Tetramethrin	>5,000	>5,000	5.63

¹ Oral toxicity based on male rat testing. Dermal toxicity based on rabbit or rat testing. Inhalation toxicity most often based on rat testing.