



COLORADO ENVIRONMENTAL PESTICIDE EDUCATION PROGRAM

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PESTICIDE RESIDUES IN PERSPECTIVE

E.J. Buffington
S.K. McDonald

This fact sheet covers pesticide residues in terms of LD₅₀S, conversion factors, and application rates.

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Pesticide Residues in Perspective

Pesticide residues are substances which remain in or on soil, air, water, or a feed or food commodity following the use of a pesticide. Pesticide residues in food and water are expressed as parts per million (ppm), parts per billion (ppb), and parts per trillion (ppt). The following comparisons may help put these quantities into perspective.

1 ppm = 1 gram (g) of residue in 1,000,000 g of food
= 1 inch in 16 miles
= 1 square inch in the infield of a baseball diamond
= 1 second in 11 days
= 1 minute in 2 years
= 1 cent in \$10,000
= 1 pancake in a stack 4 miles high
= 1 ounce of sand in 31¼ tons of cement
= 1 ounce of dye in 7,530 gallons of water
= 1 ounce of salt in 62,500 pounds of sugar



1 ppb = 1 gram (g) of residue in 1,000,000,000 g of food
= 1 inch in 16,000 miles
= 1 square foot in 36 square miles
= 1 second in 32 years
= 1 cent in \$10 million



1 ppt = 1 gram (g) of residue in 1,000,000,000,000 g of food
= 1 inch in 16 million miles (33 trips to the moon and back)
= 1 square foot of floor tile on a floor the size of the state of Indiana
= 1 second in 32,000 years
= 1 pinch of salt in 10,000 tons of potato chips
(approximately 1,000 18-wheelers loaded with potato chips)



Toxicity is the natural capacity of a substance to produce injury. The toxicity of a pesticide is determined by laboratory testing on animals such as rats, mice, and rabbits. The measuring method, **LD₅₀** (lethal dose, 50%) describes the dose of a pesticide that will kill ½ of a group of test animals from a single dose. A pesticide with a lower LD₅₀ is more toxic than a pesticide with a higher number because it takes less of the pesticide to kill half of the test animals.

The LD₅₀ corresponds with the signal word of a pesticide label and the dosage that will affect you. Always remember, "the dose determines the poison."

Signal Word	Toxicity	LD ₅₀ mg/kg	
		Oral	Dermal
Danger-Poison	Highly Toxic	0-50	0-200
Warning	Moderately Toxic	50-500	200-2000
Caution	Low Toxicity	>500	>2000

Sample LD ₅₀ Values		
	Oral mg/kg*	Dermal mg/kg*
Synthetic Pesticides		
2,4-D	699	800-1500
Captan	9000	—
Diazinon	300-400	3600
Malathion	1000-2800	4100
Roundup	4300	7940
Sevin	246-283	4000
Tordon	8200	>4000
Naturally Occurring Pesticides		
Boric acid	2660-5190	—
Caffeine	192 ^a	—
Nicotine	50-60 ^b	—
Pyrethrins	1500	>1800
Rotenone	132-1500	—
Ryania	1200	—
Strychnine	30-60	—
Others		
Aspirin	750 ^c	—
Gasoline	50-100	—
Salt	3320-4180	—
* mg/kg of body weight		
^a 192 mg/kg is approximately equal to ingesting a fatal dose of 100 cups of coffee		
^b 50-60 mg/kg is approximately equal to ingesting a fatal dose of two cigarettes		
^c 760 mg/kg is approximately equal to ingesting a fatal dose of 15 to 45 tablets		

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.

References and Resources

Grodner, M. 1996. *A Proper Perspective on Pesticide Toxicity*, Louisiana Cooperative Extension Service, Baton Rouge, LA.

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