

PSEP Fact Sheet:**Pesticide Residues in Perspective**

Jeff M. Edwards, *Pesticide Applicator Training Coordinator*

Joe Hiller, *Former Assistant Director, Agriculture and Natural Resources*

Mark Ferrell, *Former Extension Pesticide Coordinator*

Andrea M. Lewis, *Former Extension Publication Assistant*

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 cent in \$10,000
 = 1 pancake in a stack 4 miles high
 = 1 ounce of sand in 31¼ tons of concrete
 = 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

1ppt = 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 percent) 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 toxicity of the poison."

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



Department of Plant Sciences
College of Agriculture and Natural Resources

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; ½ 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, Louisiana.

Buffington, E. J. and S. K. McDonald. *Pesticide Residues in Perspective*. Pesticide Fact Sheet #116. Colorado State University, Cooperative Extension. 2000

Pesticide Label Signal Word	Toxicity	LD ₅₀ mg/kg	
		Oral	Dermal
Danger-Poison	High	0-50	0-200
Warning	Moderate	50-500	200-2000
Caution	Low	>500	>2000

Sample LD ₅₀ Values		
	Oral (Ingestion) mg/kg*	Dermal (skin) 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

Issued in furtherance of extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, University of Wyoming Extension, University of Wyoming, Laramie, Wyoming 82071.

The University of Wyoming is an affirmative action/equal opportunity employer and institution and does not discriminate on the basis of race, color, religion, sex, national origin, disability, age, veteran status, sexual orientation, or political belief in any aspect of employment or services. The institution's educational programs, activities, and services offered to students and/or employees are administered on a nondiscriminatory basis subject to the provisions of all civil rights laws and statutes. Evidence of practices that are not consistent with this policy should be reported to the Employment Practices Office at (307) 766-6721.