

GLYPHOSATE: FARMING, HEALTH & THE ENVIRONMENT

What is glyphosate?

Glyphosate is a type of pesticide, known as an herbicide. Herbicides damage or kill plants. Glyphosate is a broad-spectrum herbicide, meaning it affects both grasses and broadleaf plants. It was first registered for use in the US in 1974 and is currently the most widely used pesticide in the world.

How is glyphosate used in Vermont?

Glyphosate-containing products, such as Roundup®, are used to control many different types of weeds in many different settings in Vermont, such as:

- Agricultural practices, such as terminating cover crops for water quality practices

- Weed control in ornamental plantings, lawn, turf, invasive plant control, and right-of-way maintenance

The LD50 is the amount of a substance needed to kill 50% of a test population of animals. The substance can be given to the test population in a variety of ways, including oral (ingestion), dermal (contact with the skin (dermal), or by air (inhalation).

Generally, an LD50 is expressed as milligrams of the substance per kilogram of animal body weight. The lower the LD50, the more toxic the substance.

The EPA also looks at risks in the short-term (acute), long-term (chronic), and even those in between (sub-chronic) in this process. The potential carcinogenicity (ability to cause cancer) is another risk evaluated. After all the tests are done, the EPA determines if, and how, it can manage risks to humans and the environment from the pesticide, while balancing the economic and social benefits. A product's label will reflect the entire assessment through the directions for use and ways to reduce exposure, such as personal protective equipment (PPE), limitations, and restrictions on sales and use.

What happens to glyphosate in the environment?

Glyphosate sticks tightly to soil and has a relatively short half-life, making it unlikely to be found in

How is glyphosate evaluated for safety?

In the US, the Environmental Protection Agency (EPA) evaluates and registers pesticides for use. During registration, the EPA uses a scientific process to evaluate risks to human health and the environment. One part of the process is toxicity testing. Toxicity, or how poisonous a chemical is, is measured by the median lethal dose, the "LD50."

Table 1. Ground and surface water samples tested for glyphosate and AMPA by county in Vermont, 2006-2018 (as of 12/1/2018)

County	Number of samples
Addison	26
Caledonia	56
Chittenden	14
Essex	9
Franklin	91
Grand Isle	8
Orange	12
Orleans	12

Is glyphosate safe?

Glyphosate can be used safely if used according to the label. Glyphosate is relatively non-toxic to hu-

mans. Many household products are more toxic than glyphosate; for example, caffeine, table salt, and nicotine are all more toxic than glyphosate (Table 2).

Glyphosate is used on crops, are they safe to eat?

Glyphosate is used on a variety of fruit, grain, and vegetable crops, including certain genetically engineered crops and other non-genetically engineered crops. The use of glyphosate on these crops is also evaluated for risks to human health when they are added to the pesticide label. The EPA determined that if the products are used according to the label, these foods are safe to eat.

What about recent reports that glyphosate was found in food/drink?

As it is widely used, trace amounts of glyphosate may be found in various food and beverage products. This type of potential exposure is

Table 2. ACUTE TOXICITY: Life-threatening one-time doses

Substance	Found In	Lethal Dose (LD50)	Toxicity
Water	Water	90,000	Practically non-toxic (>5,000 mg/kg)
Sucrose	Table sugar	29,700	
Ethanol	Beer, wine, spirits	7,060	
Calcium carbonate	Antacids	6,450	
Glyphosate	Herbicide (Roundup®)	4,900	Slightly (500 - 5,000 mg/kg)
Sodium chloride	Table salt	3,000	
Acetaminophen	Tylenol	1,944	
2,4-D	Herbicide	666	
Codeine	Pain killer, cough suppressant	427	Moderately (50 - 500 mg/kg)
Copper sulfate	Organic fungicide	300	
Caffeine	Coffee, tea, soda	192	
Rotenone	Organic insecticide	60	
Vitamin D3	Supplements	42	Highly (1 - 50 mg/kg)
Nicotine	Cigarettes	9	
Hydrogen cyanide	Fruit pits	4	
Botulinum toxin	Botox	<0.001	

*University of Florida Pesticide Information Office, <http://fafdl.org/gmobb/6-of-17-is-glyphosate-an-especially-dangerous-pesticide/> and the NIH TOXNET Database, <https://toxnet.nlm.nih.gov/> compares the toxicity of herbicides and household items. The lower the LD50 value (the dose at which half of lab animals [rats, oral] die), the more toxic the substance.

