



March 18, 2025



# Behind the Spray: Personal Risks and Pesticide Toxicity for Applicators

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Vermont Agency of Agriculture, Food, & Markets

# Today we will cover:

The risk equation

Pesticide registration –stay up to date

How EPA determines the proper PPE

Trends in applicator pesticide related injuries on the job

# What is risk?

# What are some really dangerous activities?

## STAIRS

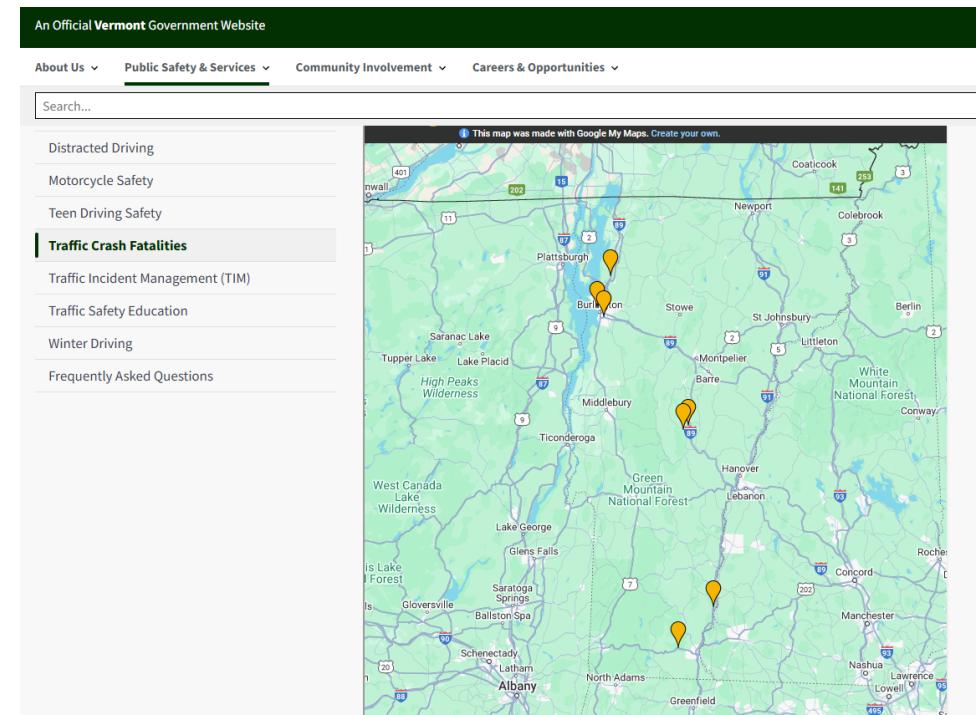
- 12,000 people die from falling down stairs each year in US

## CANDLES

- 25 candle-caused house fires each day in US

## DRIVING

- Vehicle deaths in Vermont in 2025: 7 people by Feb 2<sup>nd</sup>

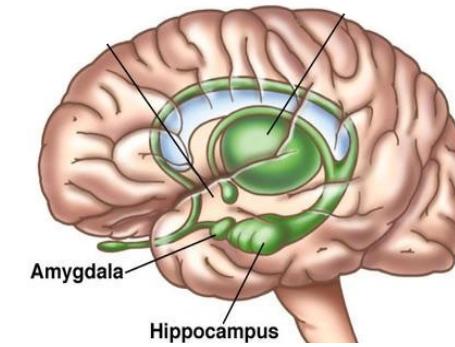


But we shrug those risks off

*-our perception of risk is not in proportion with actual risk*

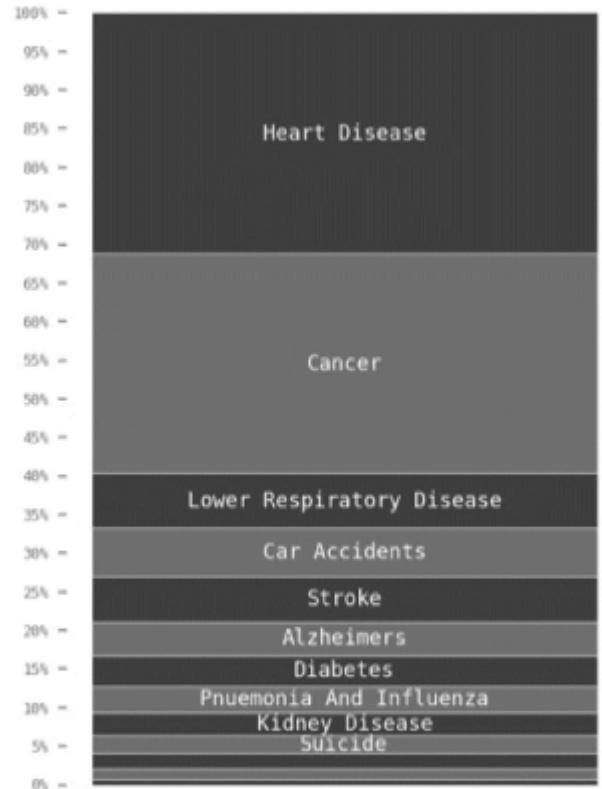
Humans fear:

- New and novel items
- Items we have no control over
- Items we can't see
- When there is no personal benefit



## CDC Cause of Death in USA

"What actually causes death?"



Data: CDC, Google, New York Times, The Guardian

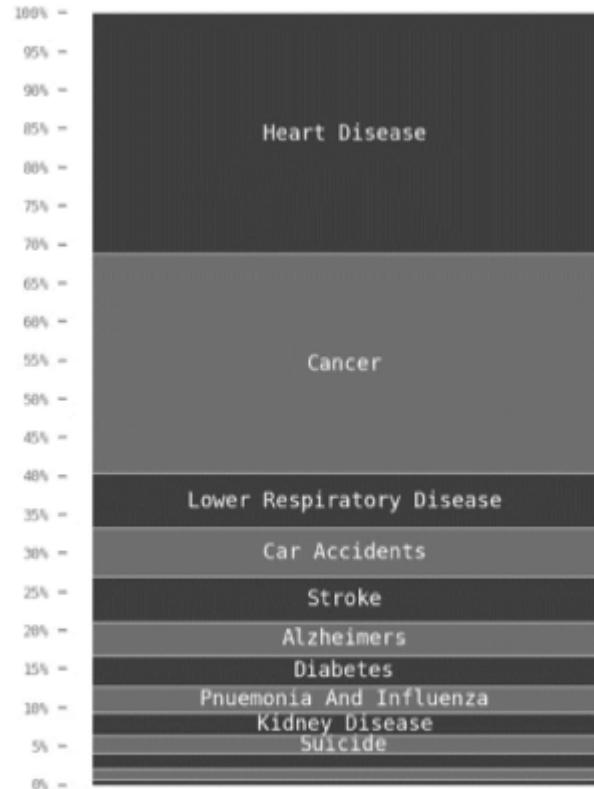
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Twitter: @aaronpenne

Aaron Penne © 2018

Based on in-depth analysis by H. Al-Jamaly, M. Siemers,  
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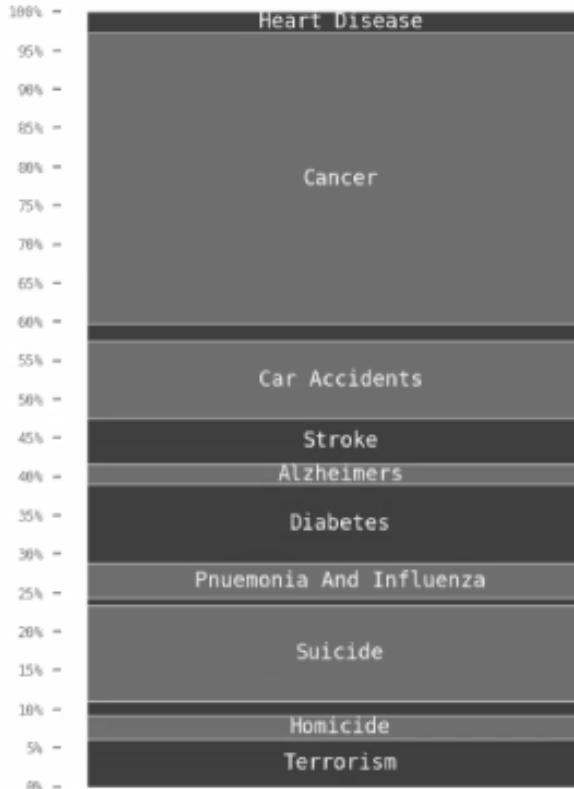
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## Google Search Trends "Which causes do we worry about?"



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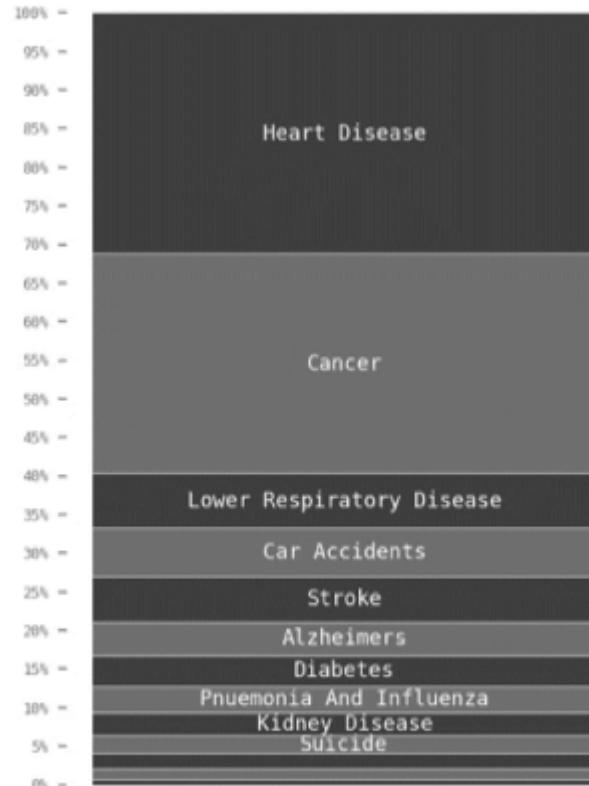
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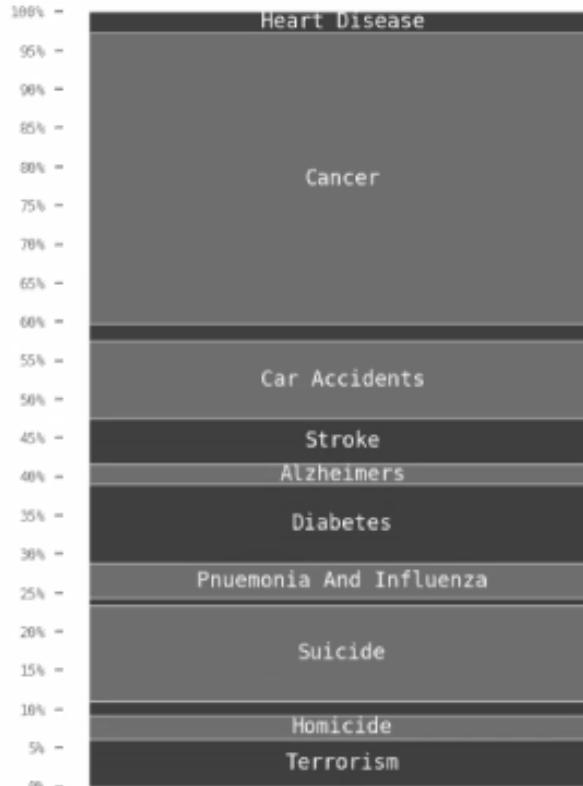
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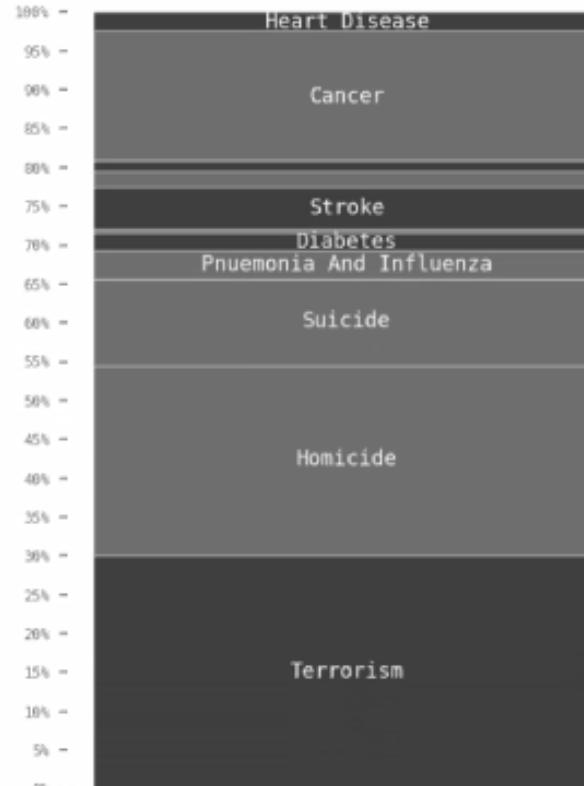
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**NYT & Guardian Headlines**  
"Which causes are in the media?"



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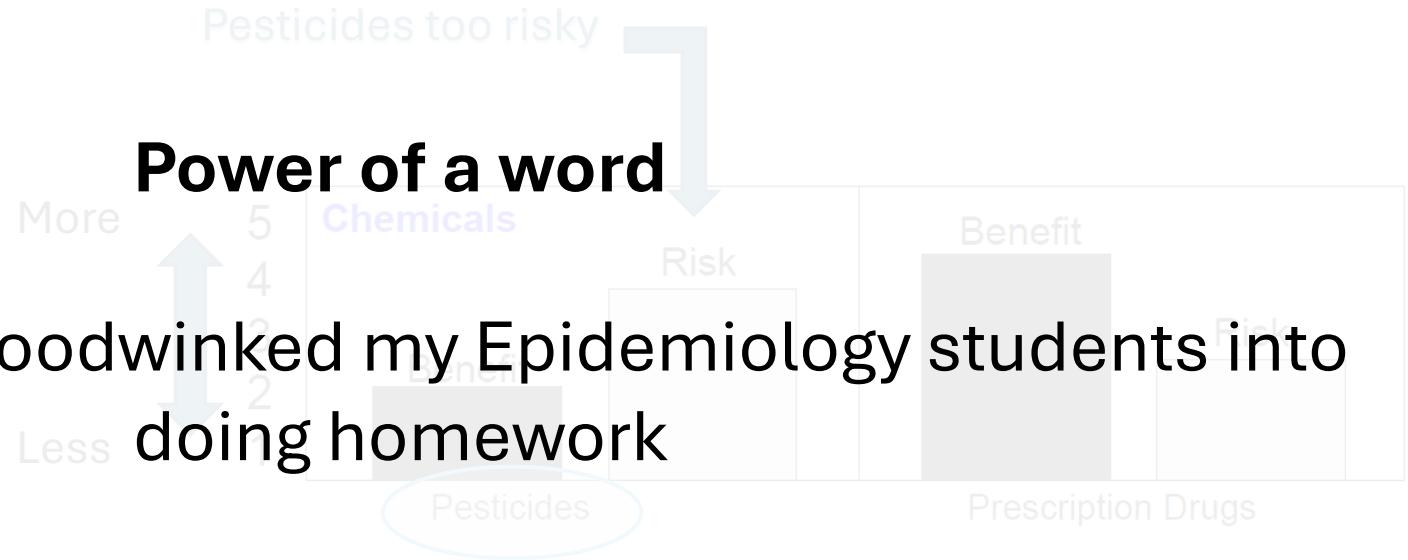
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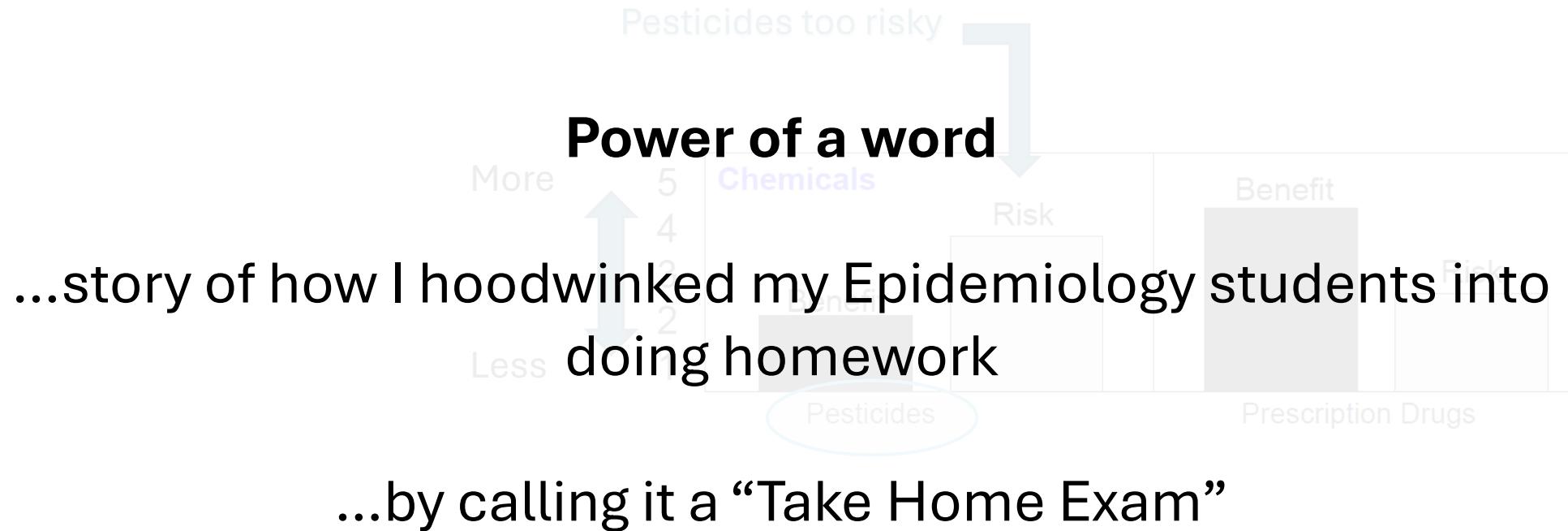
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**Power of a word**

...story of how I hoodwinked my Epidemiology students into  
doing homework





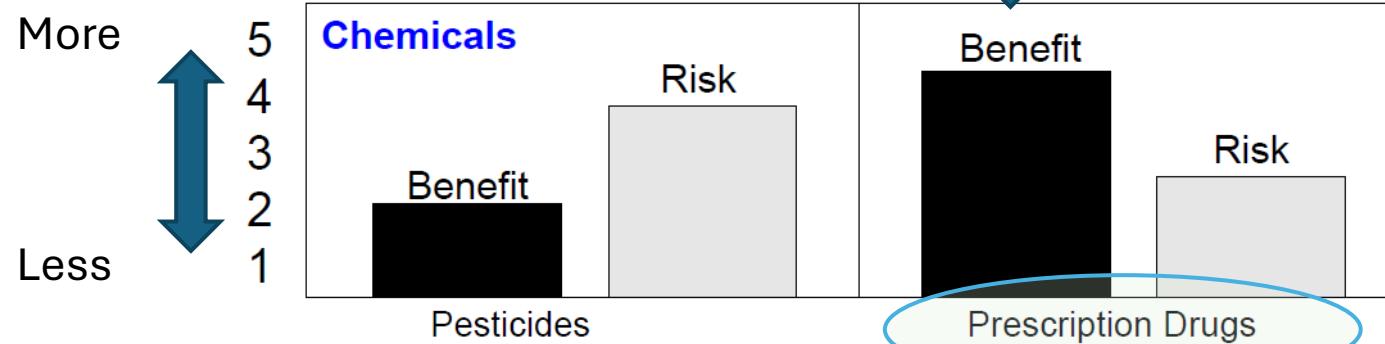


Pesticides have risk





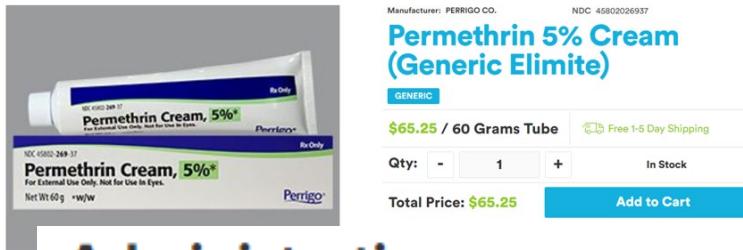
Medicines have benefit





#### Sprayer Precautions

- Always thoroughly inspect your sprayer before each use.
- Be sure hose is securely attached and in good condition before pressurizing tank.
- Discard if any worn or damaged parts are noticed.
- Do not allow spray to reach people or animals.
- Always release air pressure before removing pump (see sprayer directions).



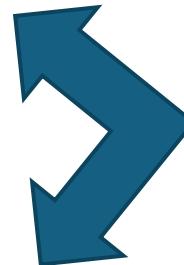
## Administration

### Dosage

### Admir

For the t  
thoroughl

For the treatment of scabies, a thin layer of permethrin 5% cream should be applied uniformly and massaged gently and thoroughly into *all* skin surfaces (entire trunk and extremities) from the neck to the toes (including the soles of the feet).



Same active ingredient

Same concentration

**DO NOT TAKE MEDICAL ADVICE FROM ME**



**WHAT HAS BEEN SEEN...**

*Cannot be un-seen.*

# Pesticide exposures in Vermont –poison control calls

**NNEPC Vermont Human Exposure Cases Involving Pesticides**  
Exposure Reason by Year, 2020-2024

Exposure Reason	2020	2021	2022	2023	2024	5-Yr Tot
Unintentional Misuse	112	94	89	86	80	461
General Unintentional	85	82	70	89	71	397
Environmental	29	22	26	35	22	134
Occupational	9	10	7	15	10	51
Suicide Attempt/Self-Harm	9	9	2	10	6	36
Intentional Misuse	4	4	4	4	6	22
Other Reasons	7	10	10	5	10	42
Total Cases	255	231	208	244	205	1143



There were 42 cases where the patient experienced a medical outcome of “moderate effect” or greater. Moderate effect represents a more serious poisoning that in most cases requires additional health intervention.

# Pesticide exposures in Vermont –poison control calls

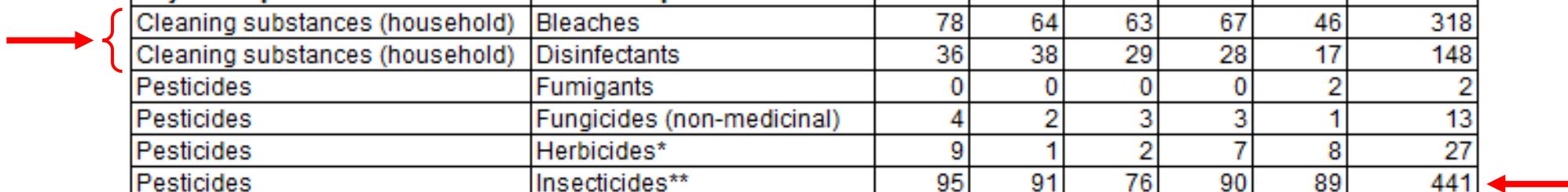
**NNEPC Vermont Human Exposure Cases Involving Pesticides**  
**Patient Age Group by Year, 2020-2024**



Age in Years	2020	2021	2022	2023	2024	5-Yr Tot
0-5	65	71	56	72	62	326
6-12	19	15	13	18	11	76
13-19	7	13	15	8	10	53
20s	18	30	27	32	18	125
30s	35	26	26	27	24	138
40s	25	15	18	25	17	100
50s	13	13	19	13	15	73
60s	24	15	10	9	18	76
70s	17	5	10	7	6	45
80s	5	3	3	4	3	18
Unknown child (<20 yo)	4	3	2	0	0	9
Unknown adult (20+ yo)	17	13	7	22	15	74
Unknown	6	9	2	7	6	30
Total	255	231	208	244	205	1143

# Pesticide exposures in Vermont –poison control calls

**Pesticides Involved in NNEPC Vermont Human Exposure Cases**  
Type of Pesticide or Disinfectant by Year, 2020-2024



Major Group	Minor Group	2020	2021	2022	2023	2024	5-Year Tot
Cleaning substances (household)	Bleaches	78	64	63	67	46	318
Cleaning substances (household)	Disinfectants	36	38	29	28	17	148
Pesticides	Fumigants	0	0	0	0	2	2
Pesticides	Fungicides (non-medicinal)	4	2	3	3	1	13
Pesticides	Herbicides*	9	1	2	7	8	27
Pesticides	Insecticides**	95	91	76	90	89	441
Pesticides	Repellents	27	27	21	32	27	134
Pesticides	Rodenticides	12	12	16	19	16	75

\*Including algaecides, defoliants, desiccants, plant growth regulators

\*\*Including insect growth regulators, molluscicides, nematicides

# Pesticide exposures in Vermont –poison control calls

**Pesticides Involved in NNEPC Vermont Occupational Exposure Cases**  
Substance Generic Name by Minor Group, 2020-2024, Cumulative Totals



Major Group	Minor Group	Substance Generic Name	5-Yr Tot
Cleaning substances (household)	Bleaches	Bleach: Hypochlorite (Liquid & Dry)	22
Cleaning substances (household)	Disinfectants	Disinfectant: Hypochlorite, Non-Bleach Product	7
Cleaning substances (household)	Disinfectants	Disinfectant: Other/Unknown	6
Cleaning substances (household)	Disinfectants	Disinfectant: Phenol (Eg, Lysol)	1
Pesticides	Herbicides	Other Herbicide	3
Pesticides	Herbicides	Paraquat	1
Pesticides	Insecticides	Other Insecticide	7
Pesticides	Insecticides	Pyrethroid	2
Pesticides	Insecticides	Unknown Insecticide	1
Pesticides	Insecticides	Pyrethrin	1
Pesticides	Repellents	Naphthalene Moth Repellent	1
Pesticides	Rodenticides	Rodenticide: Unknown	1

Your chances of getting killed by a cow are low, but never zero

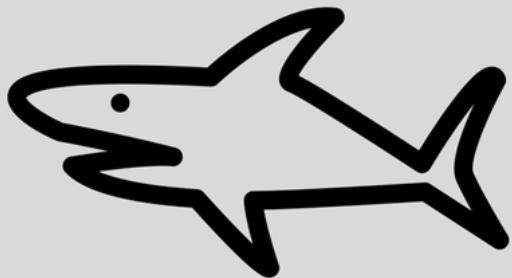


*What do we know about chemical risk?*

$$\text{Risk} = \text{Exposure} \times \text{Hazard}$$

## Hazard

Something that can potentially cause harm



## Risk

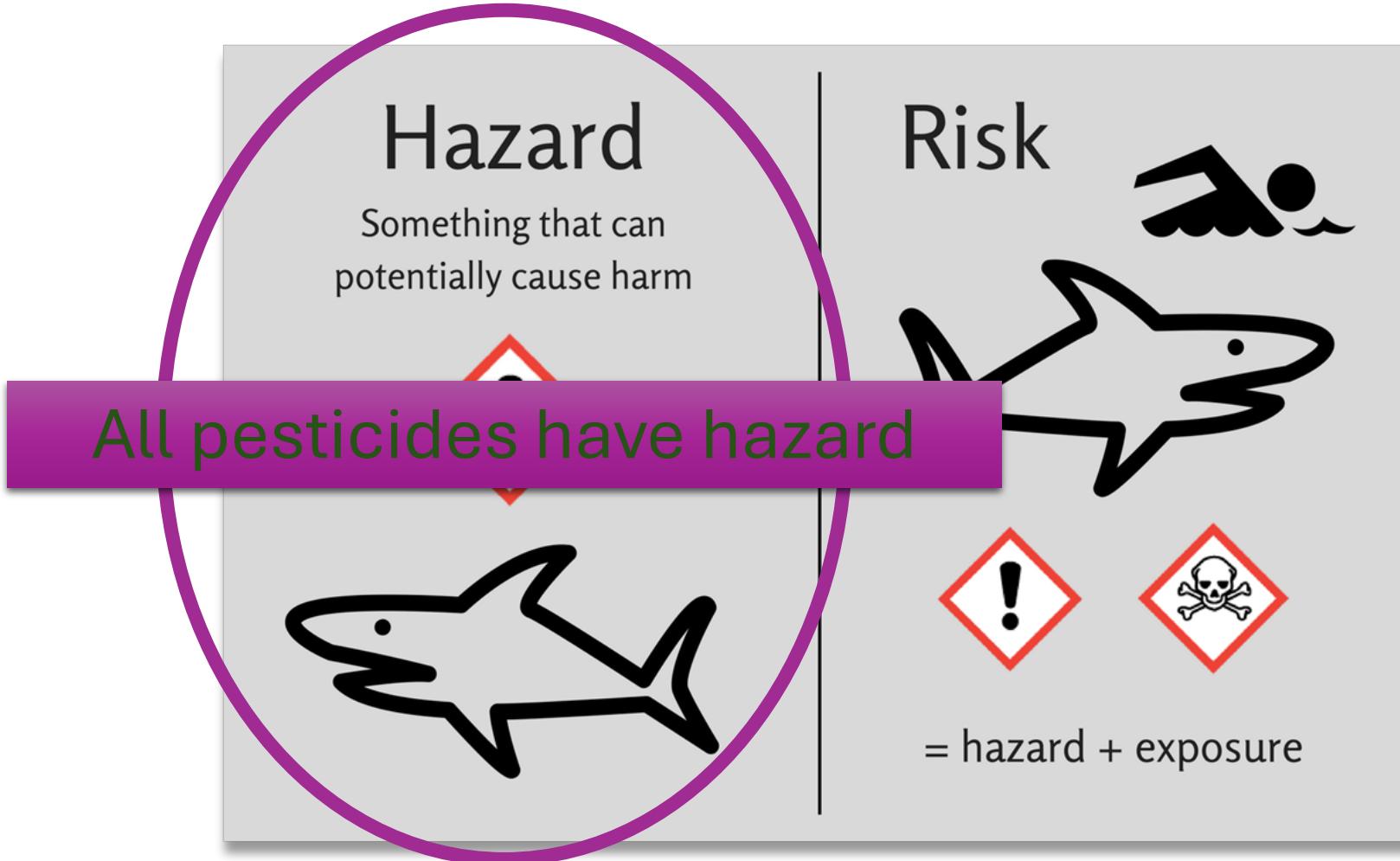


= hazard + exposure

# Risk = Exposure x Hazard



$$\text{Risk} = \text{Exposure} \times \text{Hazard}$$



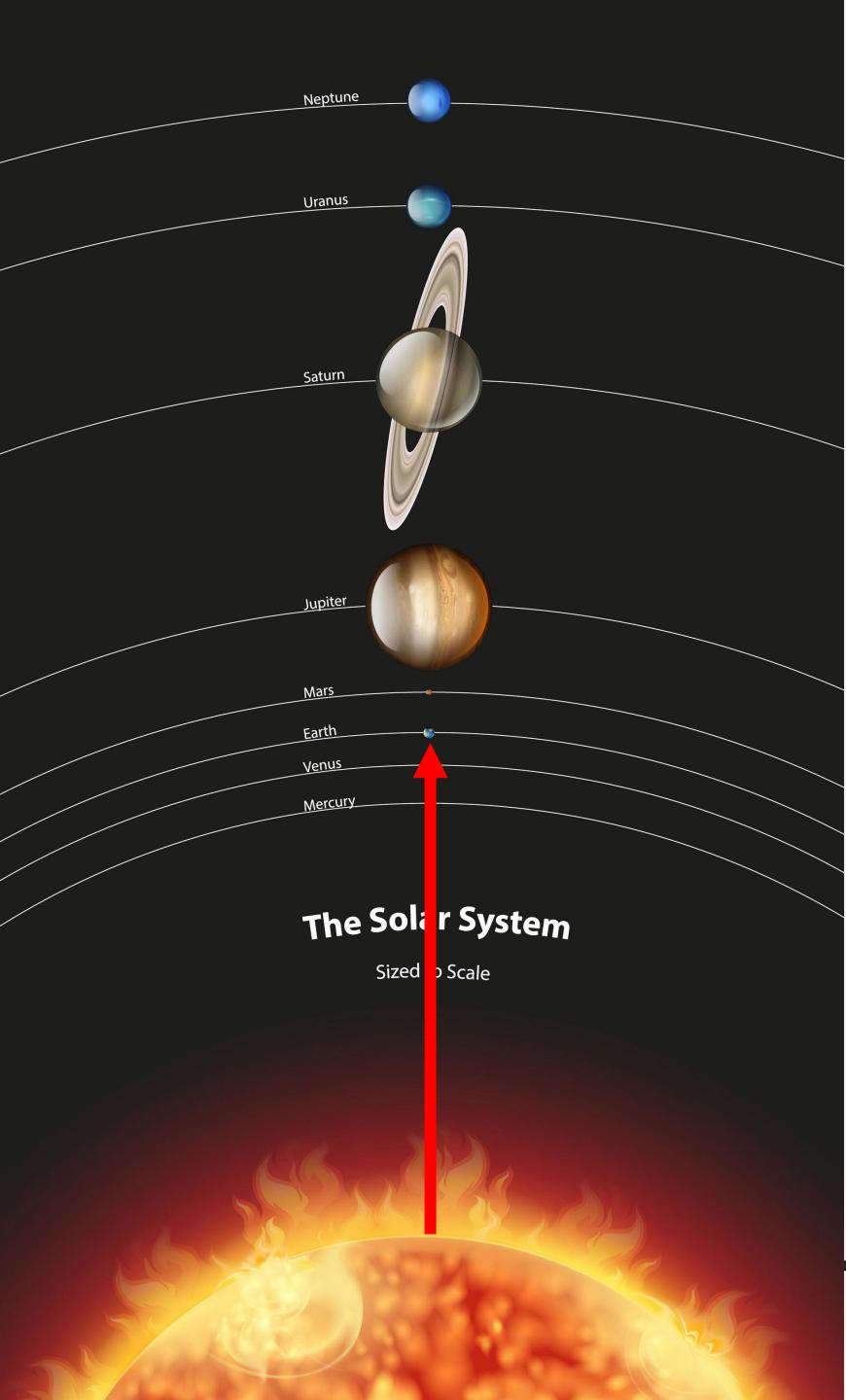
# Hazard

One of the world's least toxic substances:

- Symptoms:
  - Convulsions
  - Gastrointestinal hypermobility
  - Diarrhea
  - Tremor
  - Muscle contraction/spasticity
  - Pupil dilation
  - Nausea
  - Vomiting
  - Death

**WATER**





# Hazard

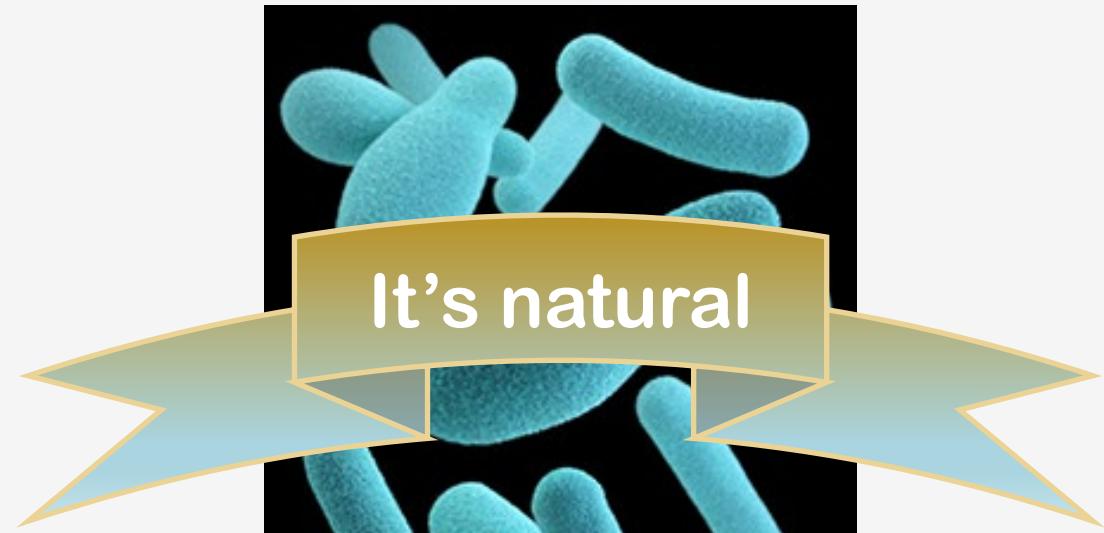
World's most toxic substance:

- Botulinum toxin LD<sub>50</sub> 1 ng/kg (part per trillion)  
~6 inches out of 93 million miles
- Causes muscle paralysis

# Hazard

World's most toxic substance:

- 200 hospitalized annually
- ~5 die annually in US



*Clostridium botulinum*

# Hazard

When is something too dangerous?

**Applied and stays in localized area:**

- doesn't run off to heart/lungs
- doesn't persist or build up

***Chemical fate is tightly controlled***

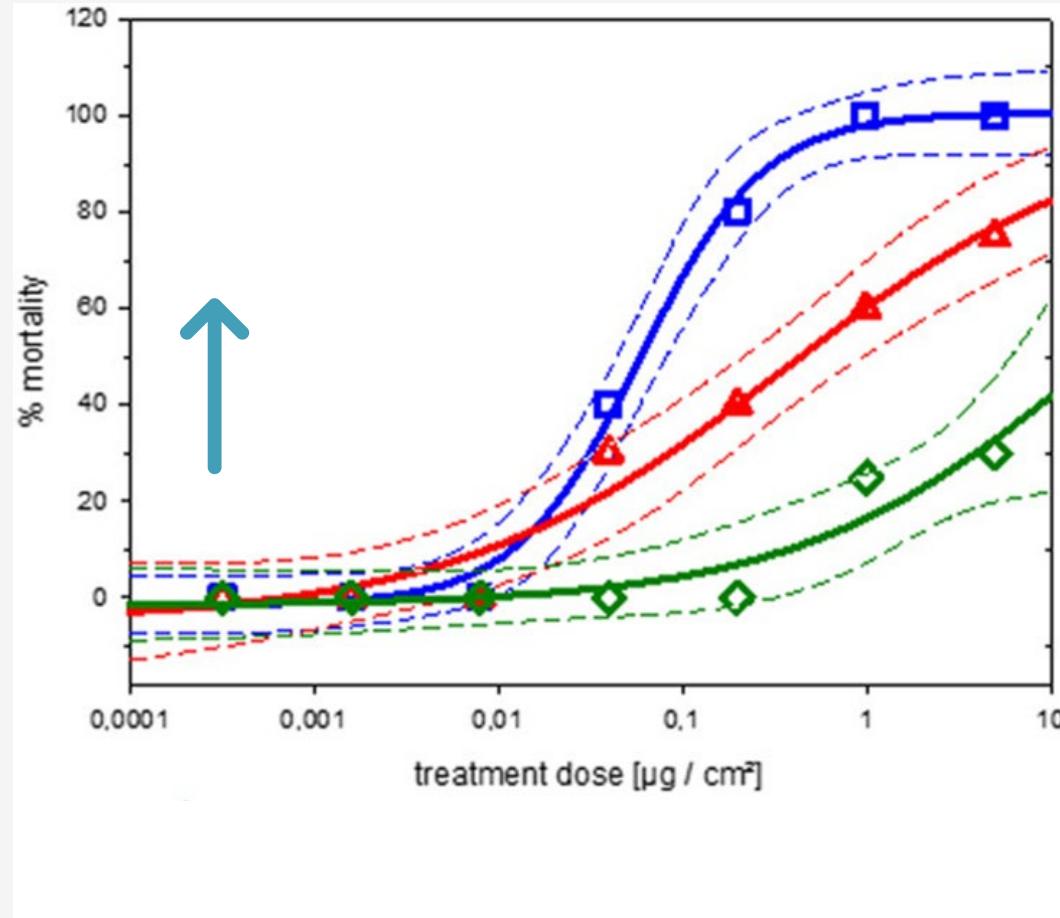


*This is Botox.*

$$Risk = Exposure \times Hazard$$

### Dose-response assessment

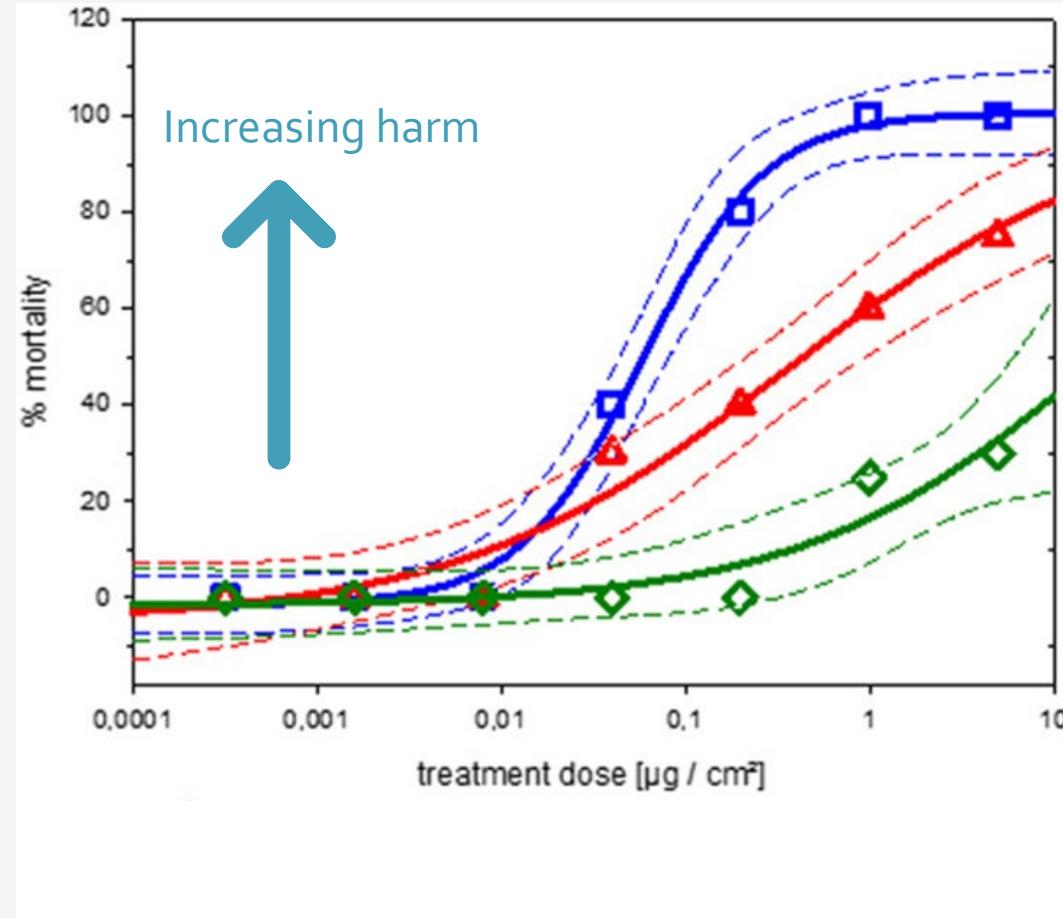
- Role of dose-response assessment is to find the point at which a chemical starts to cause harm



$$Risk = Exposure \times Hazard$$

### Dose-response assessment

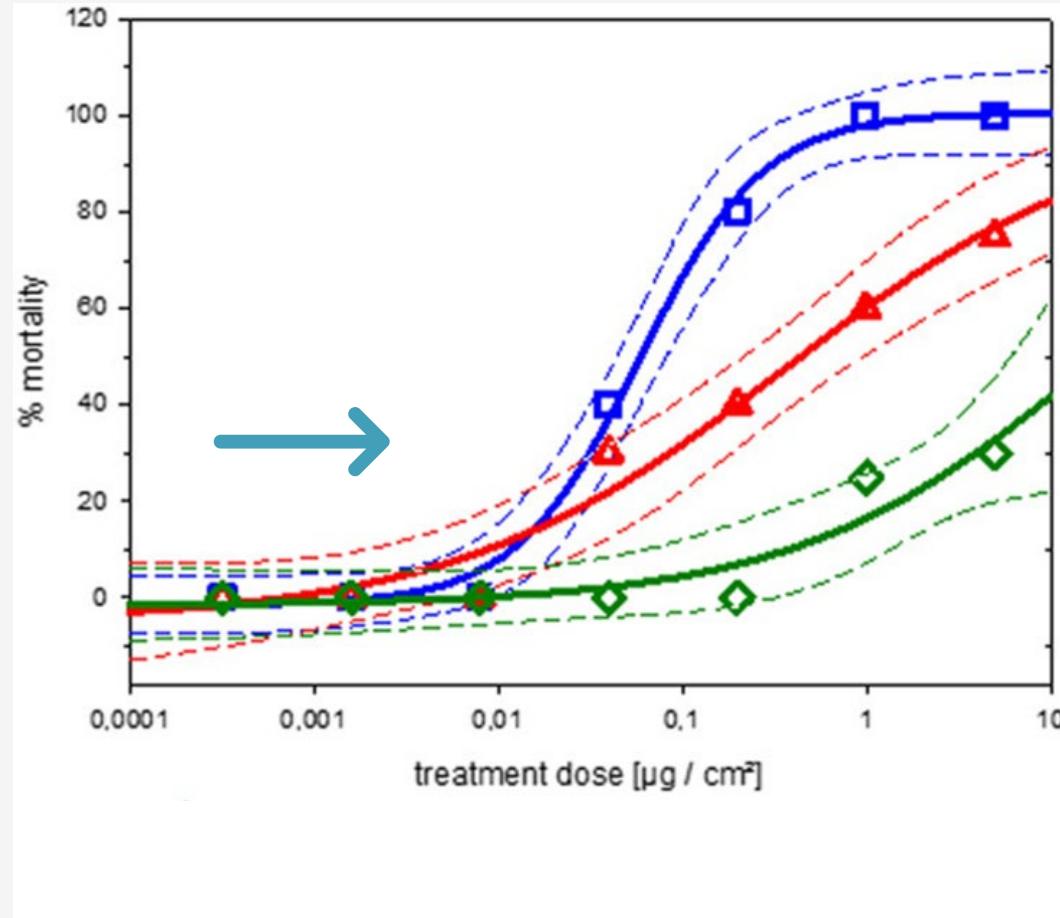
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### Dose-response assessment

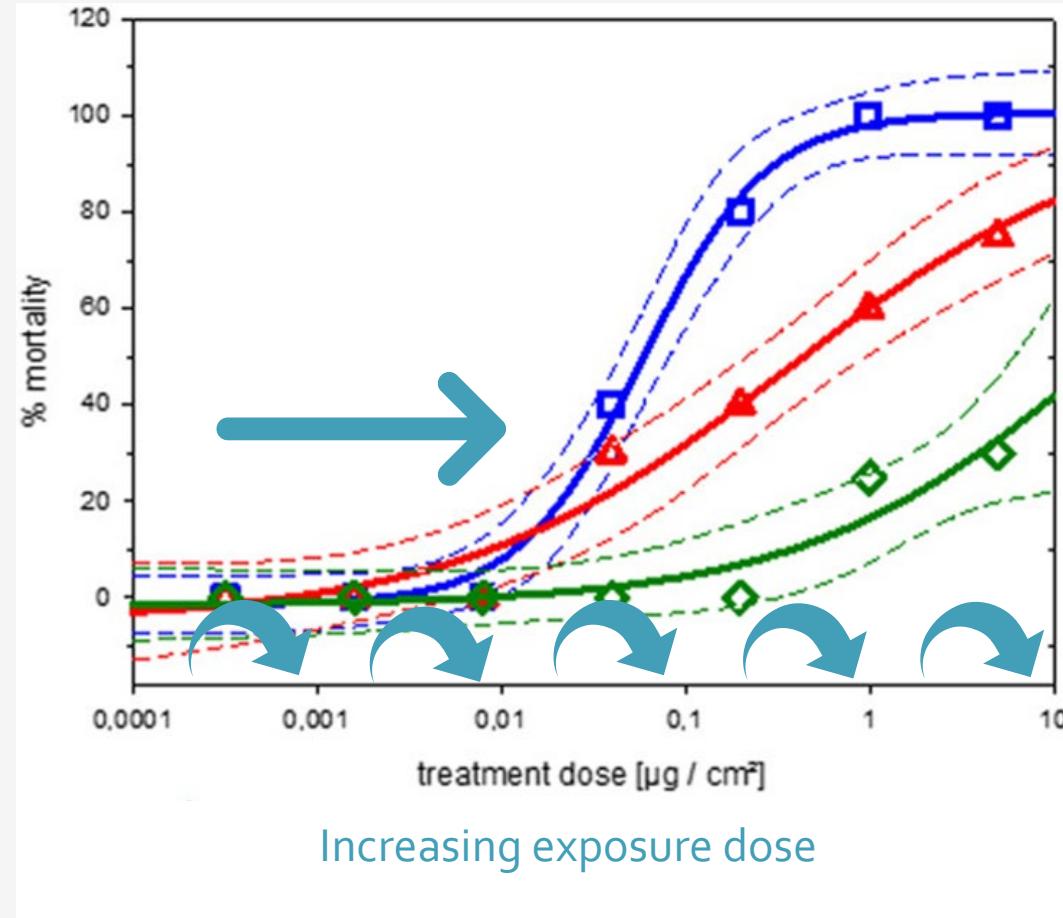
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### Dose-response assessment

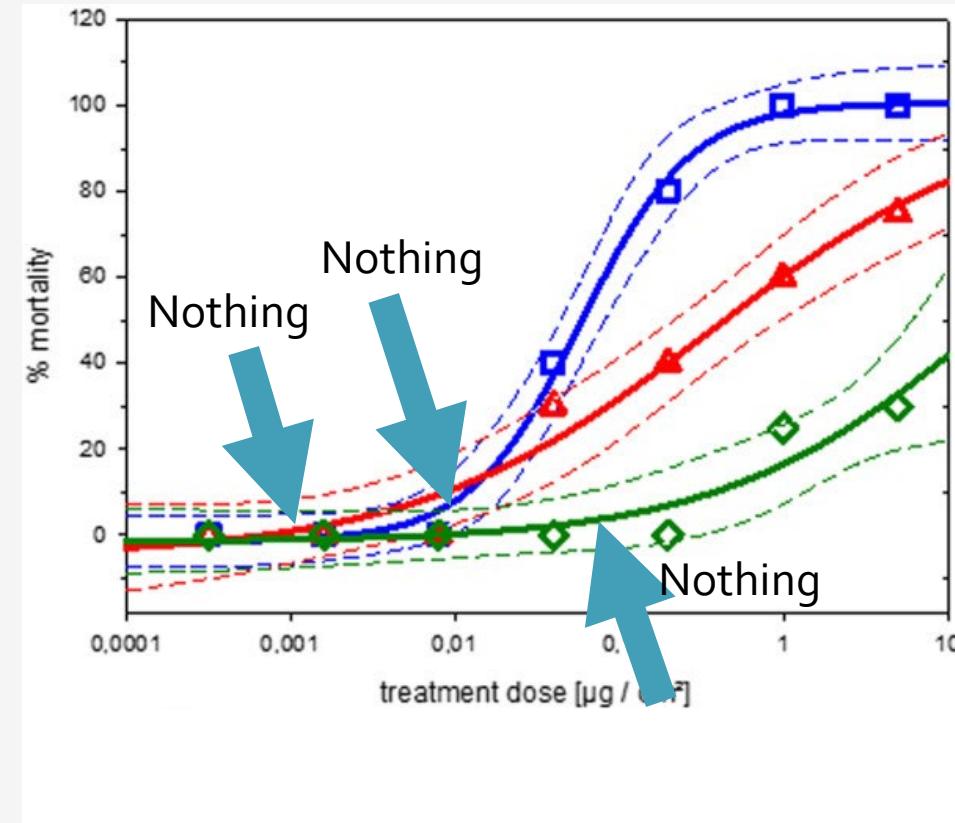
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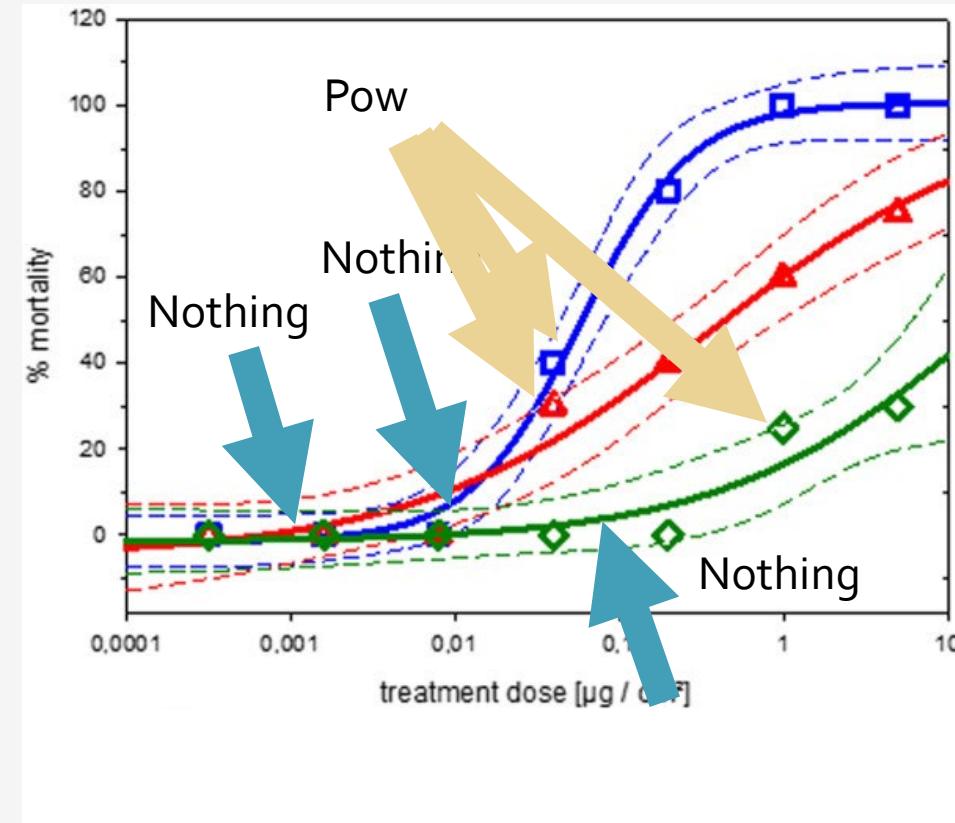
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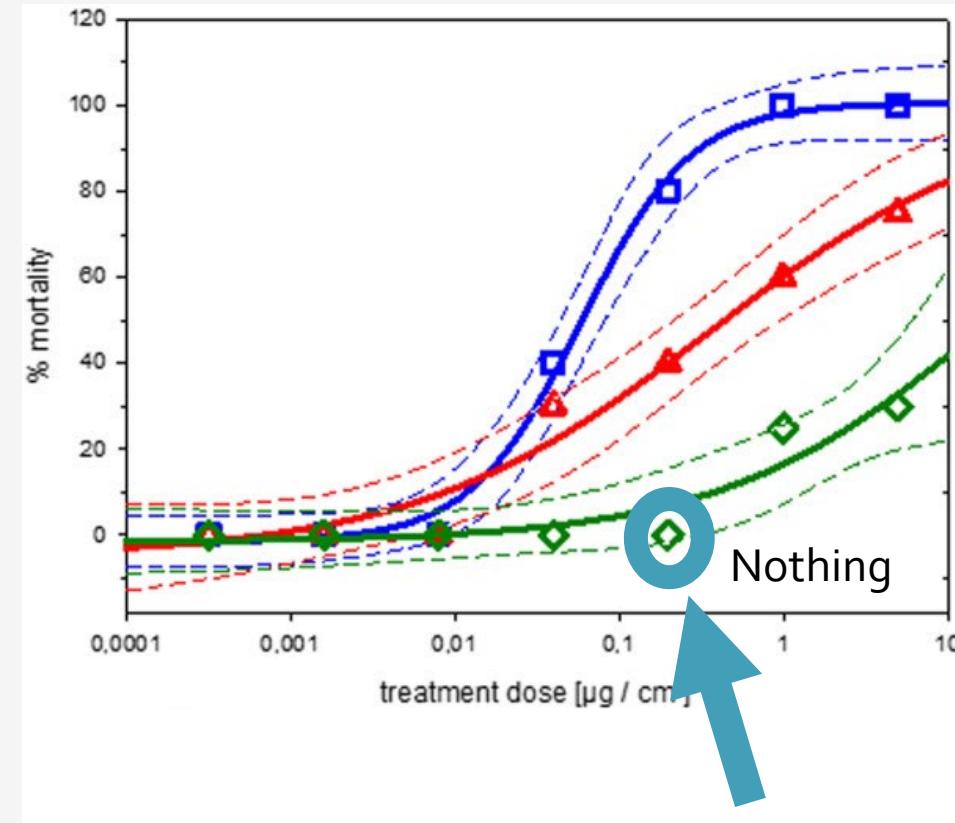
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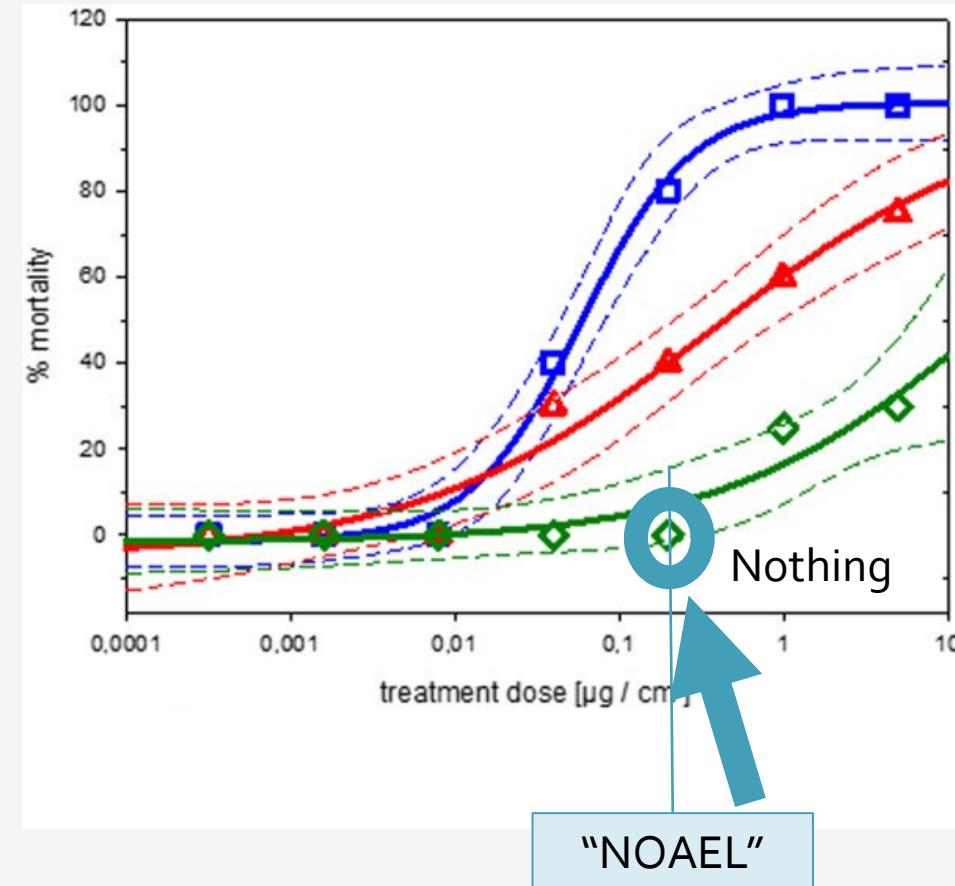
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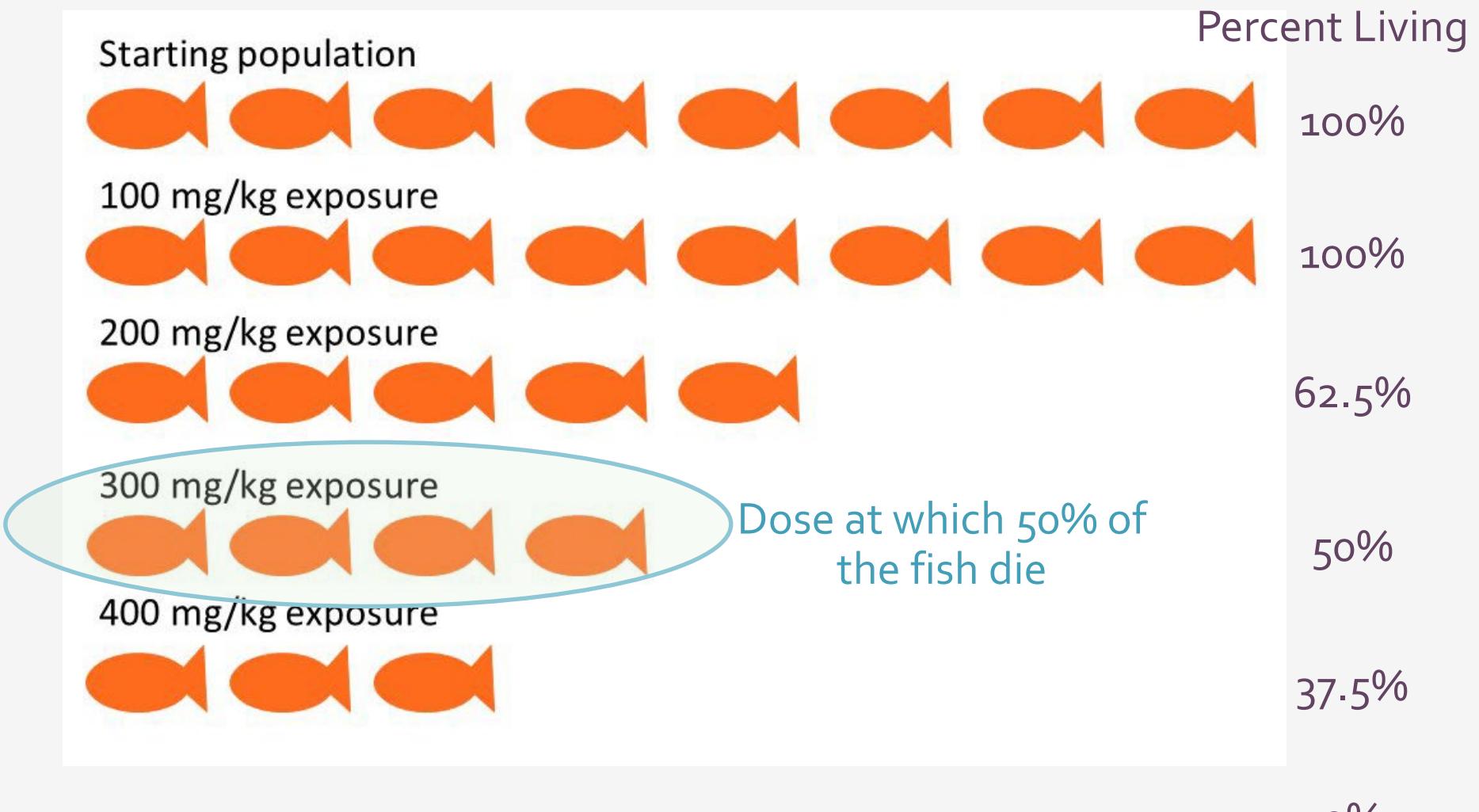
*What  
information  
do we have  
about the  
hazards  
from  
pesticides?*

---



# *Acute testing*

- LD<sub>50</sub>
  - Oral
  - Dermal
  - Inhalation



# *Acute testing*

- LD<sub>50</sub>
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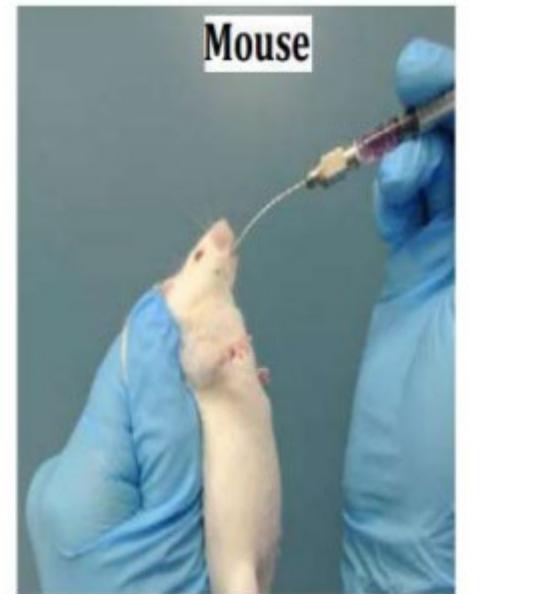


■



Rat

V-Hold restraint of rat for passage of metal gavage needle. Gavage needle is inserted into the left side of the animal's mouth and directed along the hard palate of the mouth to the back of the throat.



Mouse

Gentle scruff of mouse for passage of the metal gavage needle. Gavage needle is inserted into the left side of the animal's mouth and directed along the hard palate of the mouth to the back of the throat.

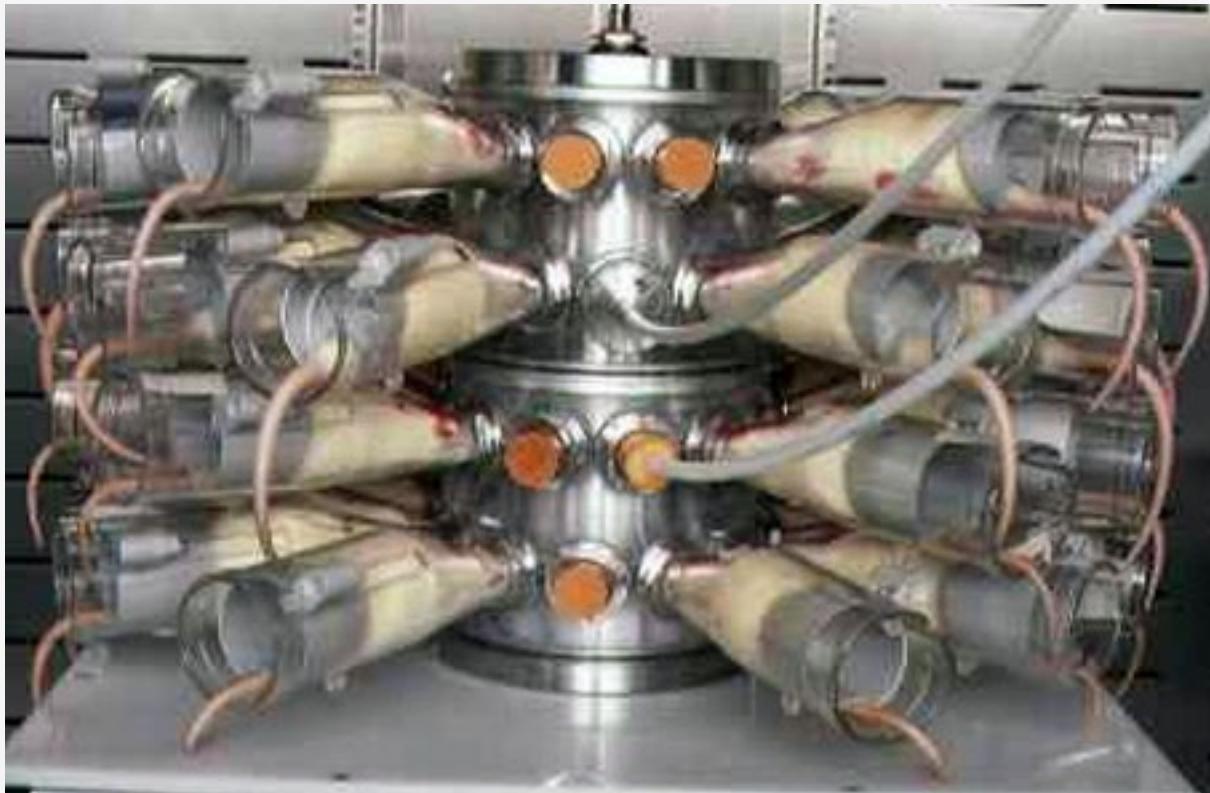
# *Acute testing*

- LD<sub>50</sub>
  - Oral
  - Dermal 
  - Inhalation



# *Acute testing*

- LD<sub>50</sub>
  - Oral
  - Dermal
  - Inhalation



# *Acute testing*

- Eye damage assays



# *Acute testing*

- Hypersensitivity testing



# Acute testing

“Six pack”

Table B.1. Toxicological Data Requirements for Glyphosate.

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity .....	yes	yes
870.1200 Acute Dermal Toxicity .....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation .....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal .....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....	yes	yes
870.3700b Developmental Toxicity (nonrodent).....	yes	yes
870.3800 Reproduction .....	yes	yes
870.4100a Chronic Toxicity (rodent) .....	yes	yes
870.4100b Chronic Toxicity (nonrodent).....	yes	yes
870.4200b Oncogenicity (mouse).....	yes	yes
870.4300 Chronic/Oncogenicity.....	yes	yes
870.5100 Mutagenicity—Gene Mutation - bacterial .....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects .....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen) .....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat).....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Chronic Exposures

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Exposures in-between acute and chronic time periods

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870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....		How well babies grow
870.3700b Developmental Toxicity (nonrodent).....		
870.3800 Reproduction .....		
870.4100a Chronic Toxicity (rodent).....		Growth Rodent & Non-rodent
870.4100b Chronic Toxicity (nonrodent).....		
870.4200b Oncogenicity (mouse).....		
870.4300 Chronic/Oncogenicity.....		
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects.....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen).....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat) .....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Chronic Exposures

**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....		
870.3700b Developmental Toxicity (nonrodent).....		
870.3800 Reproduction		
870.4100a Chronic Toxicity (rodent).....	yes	yes
870.4100b Chronic Toxicity (nonrodent).....		
870.4200b Oncogenicity (mouse).....		
870.4300 Chronic/Oncogenicity.....	yes	yes
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects.....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen).....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat).....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

Pregnancy outcomes

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Chronic Exposures

**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....		
870.3700b Developmental Toxicity (nonrodent).....		
870.3800 Reproduction.....		
870.4100a Chronic Toxicity (rodent).....		
870.4100b Chronic Toxicity (nonrodent).....		
870.4200b Oncogenicity (mouse).....		
870.4300 Chronic/Oncogenicity.....		
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian..		
870.5xxx Mutagenicity—Structural Chromosomal Aber		
870.5xxx Mutagenicity—Other Genotoxic Effects.....		
870.6100a Acute Delayed Neurotoxicity (hen).....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat) .....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration.....	no	no
870.7800 Immunotoxicity .....	yes	yes

Life-long exposures & whole-animal outcomes (organs, blood, tumors, etc)

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Chronic Exposures

**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....	yes	yes
870.3700b Developmental Toxicity (nonrodent).....	yes	yes
870.3800 Reproduction .....		
870.4100a Chronic Toxicity (rodent).....		
870.4100b Chronic Toxicity (nonrodent).....		
870.4200b Oncogenicity (mouse).....		
870.4300 Chronic/Oncogenicity.....		
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects.....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen).....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat) .....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

Cancer

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Chronic Exposures

**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....	yes	yes
870.3700b Developmental Toxicity (nonrodent).....	yes	yes
870.3800 Reproduction .....	yes	yes
870.4100a Chronic Toxicity (rodent).....	yes	yes
870.4100b Chronic Toxicity (nonrodent).....	yes	yes
870.4200b Oncogenicity (mouse).....	yes	yes
870.4300 Chronic/Oncogenicity.....	yes	yes
870.5100 Mutagenicity—Gene Mutation - bacterial.....		
870.5300 Mutagenicity—Gene Mutation - mammalian.....		
870.5xxx Mutagenicity—Structural Chromosomal Aberration:.....		
870.5xxx Mutagenicity—Other Genotoxic Effects.....		
870.6100a Acute Delayed Neurotoxicity (hen).....		
870.6100b 90-Day Neurotoxicity (hen).....		
870.6200a Acute Neurotoxicity Screening Battery (rat).....		
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....		
870.7485 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

Neurotoxicity tests  
2 species

# Chronic Exposures

**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....	yes	yes
870.3700b Developmental Toxicity (nonrodent).....	yes	yes
870.3800 Reproduction .....	yes	yes
870.4100a Chronic Toxicity (rodent).....	yes	yes
870.4100b Chronic Toxicity (nonrodent).....	yes	yes
870.4200b Oncogenicity (mouse).....	yes	yes
870.4300 Chronic/Oncogenicity.....	yes	yes
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects.....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen).....		
870.6100b 90-Day Neurotoxicity (hen).....		
870.6200a Acute Neurotoxicity Screening Battery (rat).....		
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....		
870.7485 General Metabolism .....		
870.7600 Dermal Penetration .....		
870.7800 Immunotoxicity .....		

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

How it gets into/leaves the body  
& immune system effects

# Chronic Exposures

Endocrine effects?



**Table B.1. Toxicological Data Requirements for Glyphosate.**

Study	Technical	
	Required	Satisfied
870.1100 Acute Oral Toxicity.....	yes	yes
870.1200 Acute Dermal Toxicity.....	yes	yes
870.1300 Acute Inhalation Toxicity.....	yes	no <sup>1</sup>
870.2400 Primary Eye Irritation.....	yes	yes
870.2500 Primary Dermal Irritation.....	yes	yes
870.2600 Dermal Sensitization.....	yes	yes
870.3100 Oral Subchronic (rodent).....	yes	yes
870.3150 Oral Subchronic (nonrodent).....	yes	no <sup>2</sup>
870.3200 21-Day Dermal.....	yes	yes
870.3465 90-Day Inhalation.....	yes	yes
870.3700a Developmental Toxicity (rodent).....	yes	yes
870.3700b Developmental Toxicity (nonrodent).....	yes	yes
870.3800 Reproduction .....	yes	yes
870.4100a Chronic Toxicity (rodent).....	yes	yes
870.4100b Chronic Toxicity (nonrodent).....	yes	yes
870.4200b Oncogenicity (mouse).....	yes	yes
870.4300 Chronic/Oncogenicity.....	yes	yes
870.5100 Mutagenicity—Gene Mutation - bacterial.....	yes	yes
870.5300 Mutagenicity—Gene Mutation - mammalian.....	yes	yes
870.5xxx Mutagenicity—Structural Chromosomal Aberrations ...	yes	yes
870.5xxx Mutagenicity—Other Genotoxic Effects.....	yes	yes
870.6100a Acute Delayed Neurotoxicity (hen).....	no	no
870.6100b 90-Day Neurotoxicity (hen).....	no	no
870.6200a Acute Neurotoxicity Screening Battery (rat).....	yes	yes
870.6200b 90-Day Neurotoxicity Screening Battery (rat).....	yes	yes
870.7450 General Metabolism .....	yes	yes
870.7600 Dermal Penetration .....	no	no
870.7800 Immunotoxicity .....	yes	yes

<sup>1</sup> The requirement for an acute inhalation LC<sub>50</sub> study was waived.

<sup>2</sup> This is not considered a data gap because there is a chronic dog study in the database.

# Read the Label

- Pesticide Registrants are required to register EVERY product they intend for use, distribution, & sale in Vermont EVERY year.
- Our database is always available to retrieve the most recent copy of the label.

**Vermont Agency of Agriculture, Food and Markets**

**Brand Search**

**Search Instructions**

For all of the text search fields below, you can search by either:

- exact text,
- or using the \* (asterisk) wildcard to do a partial name match.

Examples:

- Company Name: ABC Company (exact match)
- Company Name: ABC\* (match all entries starting with "ABC")
- Brand Name: \*cide (match all entries ending with "cide")

**Search Criteria**

Program:   
USAPlants ID:   
Company Name:   
Label Company:   
Brand Name:   
Brand ID:   
Brand Line:   
EPA Registration Number:   
Registration Year:

Please select from the following options

- Pesticide Registration Search
- Licensed Dealers Search
- Certified Pesticide Applicators Search (Commercial, Government, Non-Commercial)
- Certified Private Pesticide Applicators Search
- Fertilizer Registration Search
- Feed Registration Search

On Line Programs Available:

- [Pesticide Product Renewals On Line](#)  
NOTE: It is critical that you submit Product Labels and MSDS's along with your on line renewal in PDF format. Not submitting documentation for every product will result in a denial of your renewal.
- [More Information Concerning On Line Programs](#)

Other Useful Links:

- Go to the [Vermont Department of Agriculture](#) website
- Learn [How to Read a Pesticide Label](#)
- National Pesticide Information Center a toll-free telephone service that provides pesticide information including recognition and management of pesticide poisonings.
- [Federal Register](#)

Home [KellySolutions.com](#)

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**Vermont Agency Of Agriculture, Food & Markets**

**NPIRS** NATIONAL PESTICIDE INFORMATION RETRIEVAL SYSTEM

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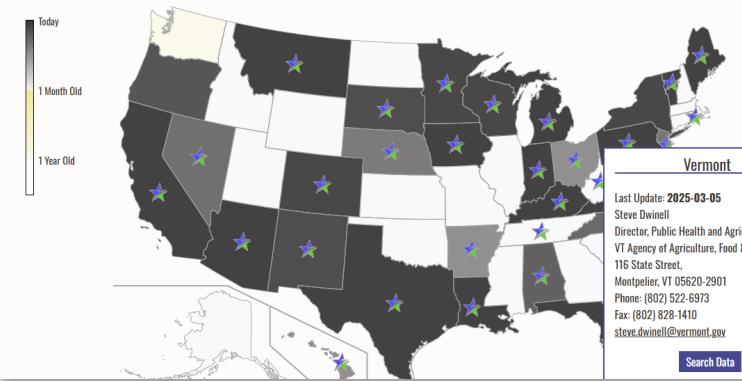
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1 Month Old  
1 Year Old

Labels NE States

Vermont

Last Update: 2025-03-05  
Steve Dwinnell  
Director, Public Health and Agricultural Reso  
VT Agency of Agriculture, Food & Markets  
116 State Street,  
Montpelier, VT 05620-2901  
Phone: (802) 522-6973  
Fax: (802) 828-1410  
steve.dwinnell@vermont.gov

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State of Vermont

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# Pesticide Programs

Professional and homeowner use of pesticides are regulated by this Division under the [Vermont Rule for the Control of Pesticides](#). These regulations cover sales restrictions, proper use, storage, and disposal of pesticides. Product registration, applicator certificates, dealer licenses, and permits may be required for use of certain pesticides, all of which are issued from this Division. Homeowners and professionals are responsible for following the directions on product labels and for properly disposing of all unused pesticides.

Homeowners may dispose of pesticides through their solid waste district or town hazardous waste collections. See [here](#) for a list of sites.

The Agency offers the ability to find Vermont certified applicators, and licensed pesticide companies and dealers. Go [here](#), to get started.

## Rodenticide Alert



**All persons who use pesticides must comply with the provisions of the pesticide label. Always read and follow the label directions.**

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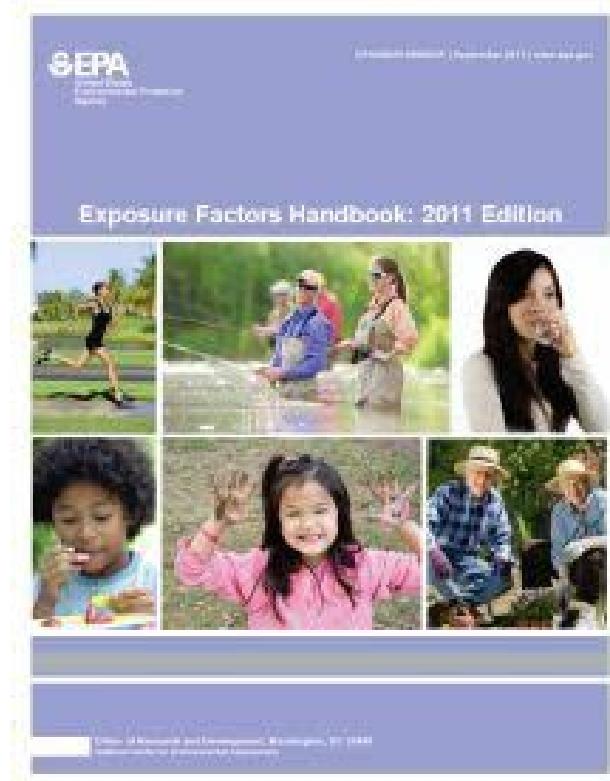
# Where do the PPE recommendations come from?



# EPA goes to lengths to figure out how much people are exposed to



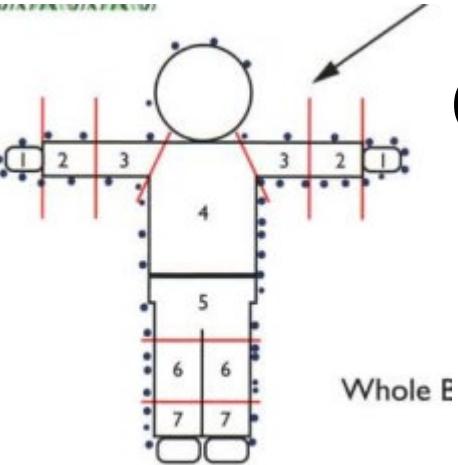
Pesticide exposure was measured by dosimetry and biomonitoring. The dosimetry group (on right) wore full-body cotton suits and personal air samplers. The biomonitoring group (on left) wore matching suits cut to simulate the body coverage of normal golfer attire.



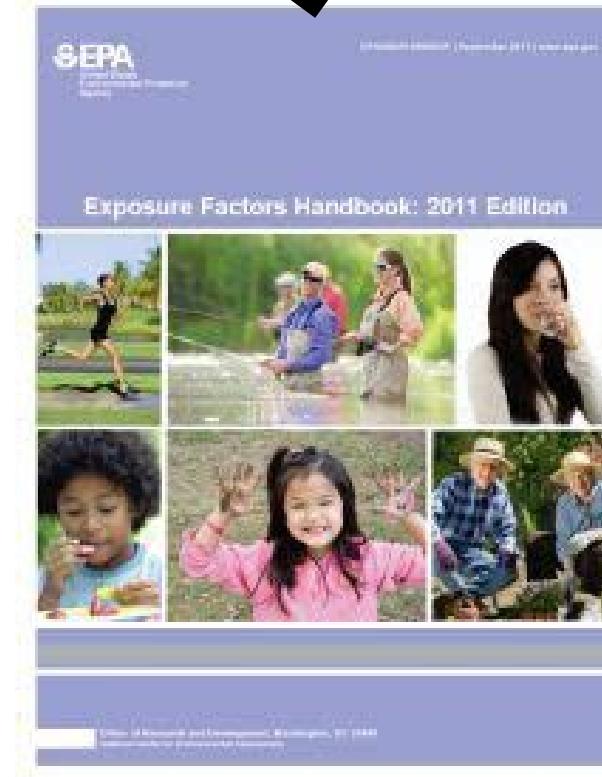
EP  
pe



length  
expose



out how much



Pesticide exposure was measured by dosimetry and biomonitoring. The dosimetry group (on right) wore full-body cotton suits and personal air samplers. The biomonitoring group (on left) wore matching suits cut to simulate the body coverage of normal golfer attire.

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Backpack	130	130	130	240	260	260	410	450	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Backpack	130	130	130	240	260	260	410	450	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230
Liquid	Injection equipment	38,000	39,000					290,000	300,000	
		No respirator	Half-face					or	Half-face	Full-face

These numbers are “MOE”s  
MOE = Margin of Exposure

# **MOE = NOAEL/Estimated Exposure Dose**

NOAEL = dose harm starts  
EED = how much contact

MOE is the ratio of: how bad is it?

MOE over 100 is considered acceptable

if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems



Let's assume:

NOAEL = 75 ppm



Shorts + no gloves leads to 50 ppm exposure  
EED = 50 ppm

$$\frac{75}{50} = \text{MOE}$$

Is it ok to wear shorts and no gloves?

# **MOE = NOAEL/Estimated Exposure Dose**

**NOAEL = dose harm starts**  
**EED = how much contact**

MOE is the ratio of: how bad is it?

MOE over 100 is considered acceptable

if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems

**NOAEL**



## **Estimated Exposure Dose**

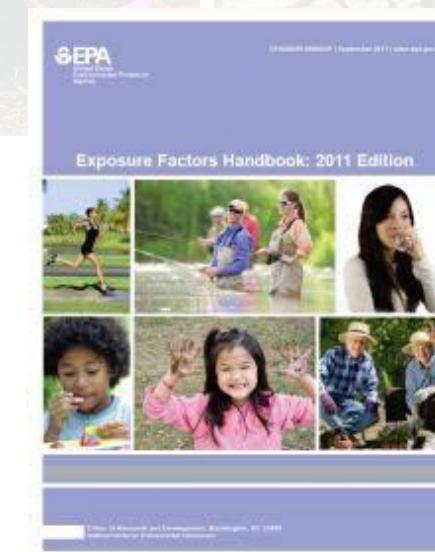
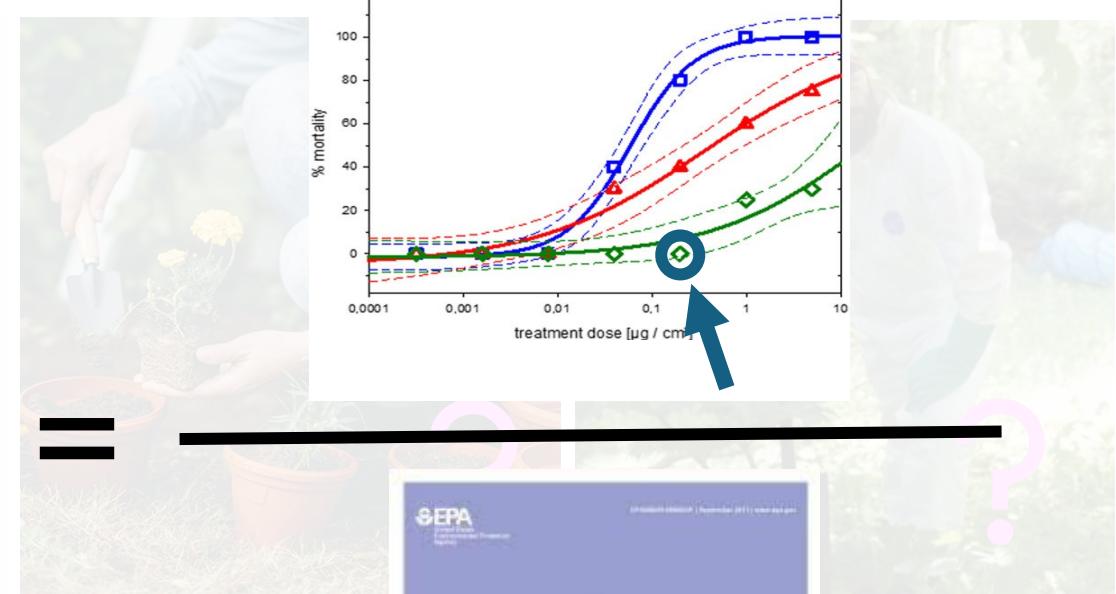
Let's assume:

NOAEL = 75 ppm



Shorts + no gloves leads to 50 ppm exposure  
EED = 50 ppm

$$\frac{75}{50}$$



Look to wear shorts and no gloves?

# **MOE = NOAEL/Estimated Exposure Dose**

NOAEL = dose harm starts  
EED = how much contact

MOE is the ratio of: how bad is it?

MOE over 100 is considered acceptable

if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems



Let's assume:

NOAEL = 75 ppm



Shorts + no gloves leads to 50 ppm exposure  
EED = 50 ppm

$$\frac{75}{50} = \text{MOE}$$

Is it ok to wear shorts and no gloves?

# **MOE = NOAEL/Estimated Exposure Dose**

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if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems



Let's assume:

$$\text{NOAEL} = 75 \text{ ppm}$$



Shorts + no gloves leads to 50 ppm exposure  
EED = 50 ppm

$$\frac{75}{50} = \text{MOE}$$

Is it ok to wear shorts and no gloves?



# **MOE = NOAEL/Estimated Exposure Dose**

NOAEL = dose harm starts  
EED = how much contact

MOE is the ratio of: how bad is it?

MOE over 100 is considered acceptable

if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems



Let's assume:

$$\text{NOAEL} = 75 \text{ ppm}$$



Coveralls + gloves leads to 5 ppm exposure  
EED = 0.5 ppm

$$\frac{75}{0.5} = \text{MOE}$$

Is it ok to wear coveralls and gloves?

# **MOE = NOAEL/Estimated Exposure Dose**

NOAEL = dose harm starts  
EED = how much contact

MOE is the ratio of: how bad is it?

MOE over 100 is considered acceptable

if the MOE is 2 --the expected exposure from this application is only two times higher than the point where we start seeing problems



Let's assume:

$$\text{NOAEL} = 75 \text{ ppm}$$



Coveralls + gloves leads to 5 ppm exposure  
EED = 0.5 ppm

$$\frac{75}{0.5} = \text{MOE}$$

Is it ok to wear coveralls and gloves



That's the concept now for the math

# EPA's spreadsheets for determining PPE

The screenshot shows a Microsoft Excel spreadsheet titled "CHEMICAL INFO". The "Active ingredient:" field contains "bifenthrin", which is circled in red. The "Exposure Duration:" field is set to "Short-Term". The "Toxicity" section includes tables for Dermal and Inhalation routes, with various parameters like POD, LOC, and Fraction values. The "Body Weight (kg)" section shows values for Adults (69 kg). The "Lifetime Exposure" section includes "Handler Job Tenure (years)" and "Life Expectancy (years)". The "Body Weight Pick List Reference (DO NOT DELETE)" section lists "POD Type" as "General" and "Lifestage" as "Combined Adults (16 < 80 years old)", with a mean body weight of 80 kg.

CHEMICAL INFO			
Active ingredient:			bifenthrin
Exposure Duration: (for multiple exposure durations, create new files)			Short-Term
Toxicity			
Dermal	Non-cancer	POD (mg/kg/day)	96.3
		POD source/study	Route-specific
		LOC	100
		Fraction (0-1)	0.032
Inhalation	Non-cancer	POD (mg/kg/day) - oral dose or inhalation HED	3.1
		POD source/study	Route-specific
		LOC	100
		Fraction (0-1)	0.032
Cancer	Absorption source/study	Estimated by POD or LOAEL/NOAEL comparison	
	Q* (mg/kg-day) <sup>-1</sup>		3.10E+00
	Q* source/study		
	Body Weight (kg)		
Dermal	For non-cancer risks	Adults	69
	For cancer risks	Adults	69
Inhalation	For non-cancer risks	Adults	69
	For cancer risks	Adults	69
Lifetime Exposure			
Handler Job Tenure (years)			1
Life Expectancy (years)			78
Body Weight Pick List Reference (DO NOT DELETE)			
POD Type	Lifestage	Mean Body Weight (kg)	
General	Combined Adults (16 < 80 years old)	80	

I entered information for  
bifenthrin (green boxes)





Exposure Scenario							Crop / Target Category	Application Rate	
Worker Activity	Formulation	Application Equipment	Application Type		Value	Units			
Applicator	Granule	Shaker can	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/can			
L/A	Granule	Belly grinder	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/acre			
M/L/A	Liquid	Backpack	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon			
M/L/A	Liquid	Manually-pressurized Handwand	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon			
M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon			
M/L	Liquid	Injection equipment	Tree Injection	Landscaping, trees/shrubs/bushes	0.666	lb ai/tree			

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B I U A Merge & Center

Clipboard Alignment

A1 Exposure Scenario

X ✓ ffx

	A	B	C		E	F	G
1	Exposure Scenario				Crop / Target Category	Application Rate	
2	Worker Activity	Formulation	Application Equipment	Application Type		Value	Units
3	Applicator	Granule	Shaker can	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/can
4	L/A	Granule	Belly grinder	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/acre
5	M/L/A	Liquid	Backpack	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
6	M/L/A	Liquid	Manually-pressurized Handwand	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
7	M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
8	M/L	Liquid	Injection equipment	Tree Injection	Landscaping, trees/shrubs/bushes	0.666	lb ai/tree

The screenshot shows an Excel spreadsheet titled "Exposure Scenario". The table has the following structure:

Exposure Scenario				Crop / Target Category	Application Rate	
Worker Activity	Formulation	Application Equipment	Application Type		Value	Units
Applicator	Granule	Shaker can	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/can
L/A	Granule	Belly grinder	Broadcast	Landscaping, trees/shrubs/bushes	0.666	lb ai/acre
M/L/A	Liquid	Backpack	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon
M/L/A	Liquid	Manually-pressurized Handwand	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon
M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon
M/L	Liquid	Injection equipment	Tree Injection	Landscaping, trees/shrubs/bushes	0.666	lb ai/tree

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better									
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves			
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000	
Granule	Belly grinder	26,000	100	31,000	28,000	33,000	34,000	41,000	53,000	55,000	
Liquid	Backpack	130		130	240	260	260	410	450	460	
Liquid	Manually-pressurized Handwand	77		78	5,700	15,000	17,000	6,000	17,000	20,000	
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230	
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000	
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	

MOE way over 100 = low risk activity

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	18,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	30,000	34,000	41,000	53,000	55,000
Liquid	Backpack	130	130	130	240	260	410	450	460	
Liquid	Manually-pressurized Handwand	77	78	5,700	17,000	6,000	17,000	20,000		
Liquid	Mechanically-pressurized Handgun	49	51	130	150	190	230	230		
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE way over 100 = low risk activity

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	18,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	30,000	34,000	41,000	50,000	55,000
Liquid	Backpack	130	130	130	240	260	410	460	460	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	17,000	6,000	20,000	20,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	190	230	230	230
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE way over 100 = low risk activity

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	0	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	0	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Backpack	130	30	130	240	260	260	410	450	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000

MOE under 100 = risk is too high

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	0	61,000	18,000	0	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	0	31,000	28,000	0	34,000	41,000	53,000	55,000
Liquid	Backpack	130	30	130	240	30	260	410	450	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE goes over 100 = risk is acceptable

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	0	61,000	18,000	0	380,000	18,000	1	380,000
Granule	Belly grinder	26,000	0	31,000	28,000	0	34,000	41,000	1	55,000
Liquid	Backpack	130	30	130	240	30	260	410	1	460
Liquid	Manually-pressurized Handwand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Mechanically-pressurized Handgun	49	51	51	130	150	150	190	230	230
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE doesn't increase much

# Here are modelled data from EPA

MOE over 100 = acceptable risk ---even with no gloves because the formulation changed

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Back pack	130	130	130	240	260	260	410	450	460
Liquid	Manually-activated Hand sand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Manually- pressure sandgun	49	51	51	130	150	150	190	230	230
Liquid	Inject equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Back pack	130	130	130	240	260	260	410	450	460
Liquid	Manually-activated Hand sand	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Manually- pressure sandgun	49	51	51	130	150	150	190	230	230
Liquid	Inject equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE over 100 = acceptable risk --no gloves & no respirator

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Back pack sprayer	130	130	130	240	260	260	410	450	460
Liquid	Manually-activated hand pump	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Manually-pressurized handgun	49	51	51	130	150	150	190	230	230
Liquid	Injecting equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE over 100 = acceptable risk ---but watch when you add respirator

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Back pack	130	130	130	240	260	260	410	450	460
Liquid	Manually-activated Hand held	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Manually- pressure handgun	49	51	51	130	150	150	190	230	230
Liquid	Inject equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE over 100 = acceptable risk ---but watch when you add respirator

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker can	15,000	48,000	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Back pack	130	130	130	240	260	260	410	450	460
Liquid	Manually-activated Hand held	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	Manually- pressure handgun	49	51	51	130	150	150	190	230	230
Liquid	Inject equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

MOE over 100 = acceptable risk ---but watch when you add respirator

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better								
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves		
Granule	Shaker	45	51	51	150	150	150	150	150	150
Granule	Belly gr	53,000	53,000	53,000	55,000	55,000	55,000	450	450	450
Liquid	Barrel	460	460	460	460	460	460	20,000	20,000	20,000
Liquid	Manu	17,000	17,000	17,000	17,000	17,000	17,000	230	230	230
Liquid	Hose	230	230	230	230	230	230	230	230	230
Liquid	Mo	230	230	230	230	230	230	230	230	230
Liquid	pressure sandgun	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
Liquid	Inject equipment	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

Take home messages from this:

- formulation drives PPE
- sometimes more PPE reduces exposure, but not a ton
- depends on the formulation & application methods

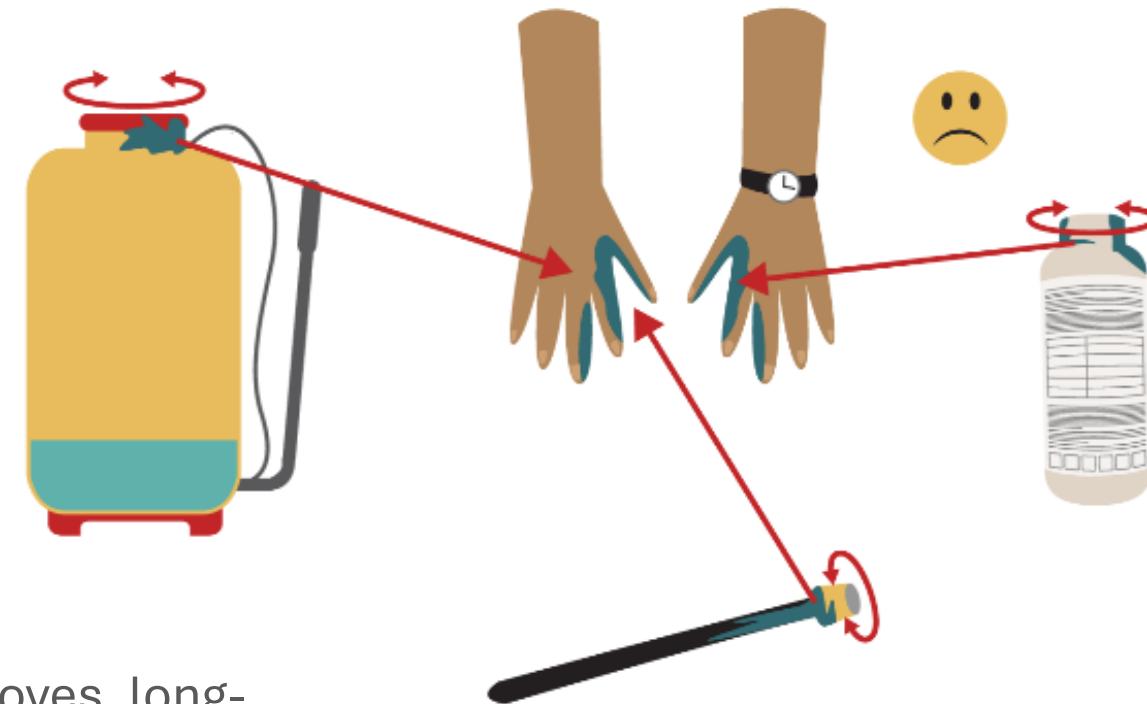
MOE over 100 = acceptable risk ---but watch when you add respirator

# Here are modelled data from EPA

Exposure Scenario		Combined MOE Values MOE > 100 Acceptable   The Larger the Better									
Formulation	Application Equipment	Single Layer   No gloves			Single Layer   Gloves			Double Layer   Gloves			
Granule	Shaker can							150,000	380,000		
Granule	Belly grinder	The language on labels is not just a bunch of made-up directions by the manufacturer or their attorneys.								53,000	55,000
Liquid	Backpack							450	460		
Liquid	Manually-pressurized Handwand	PPE requirements and usage details are highly dictated by EPA.								17,000	20,000
Liquid	Mechanically pressurized Handgun							230	230		
Liquid	Injection equipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000	
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	

**Wear PPE**

- Read the label
- Daily exposures can add up over time
- Consider a basic minimum PPE kit of gloves, long-sleeves, pants, close-toed shoes, & eye protection.



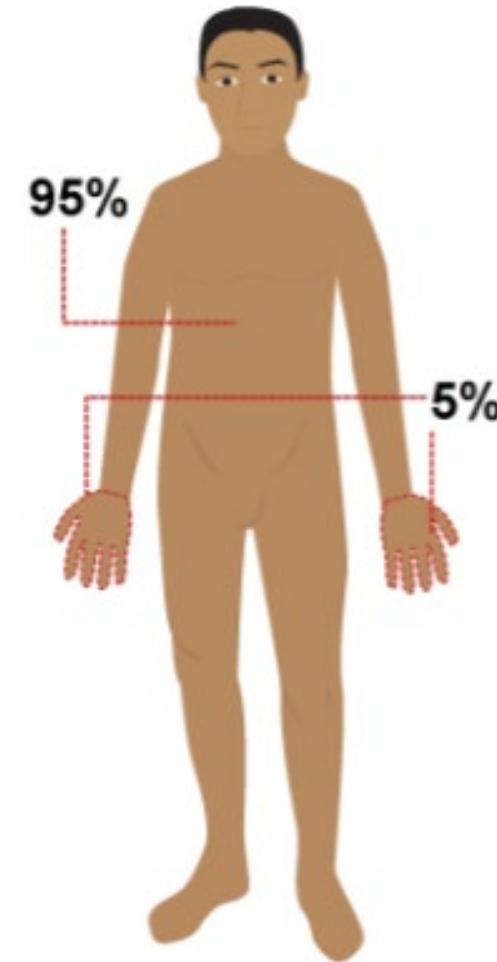
# Wear PPE

- Fit the PPE to the situation
- Many exposures occur during mixing and loading.
- PPE goes on before you start, not just for spraying.



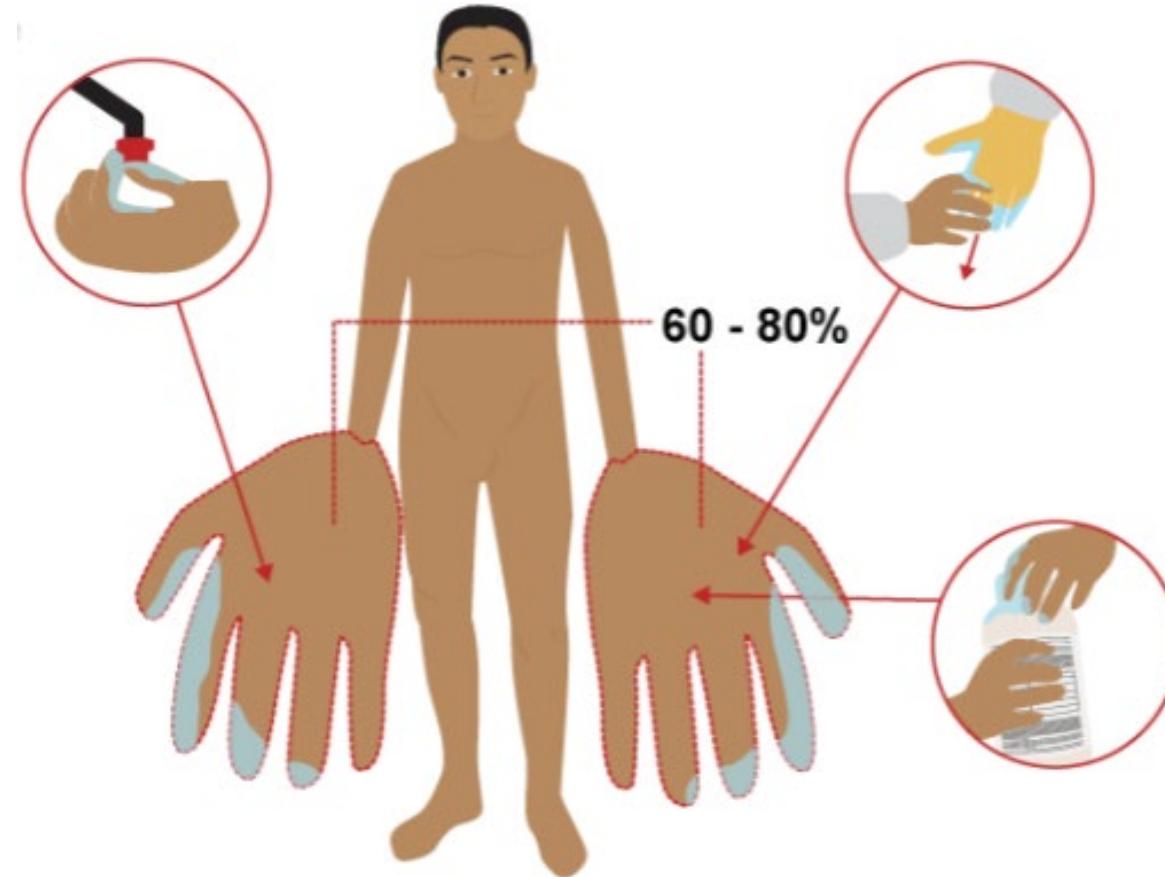
# Consider this

Your hands are only 5% of your body's surface area...



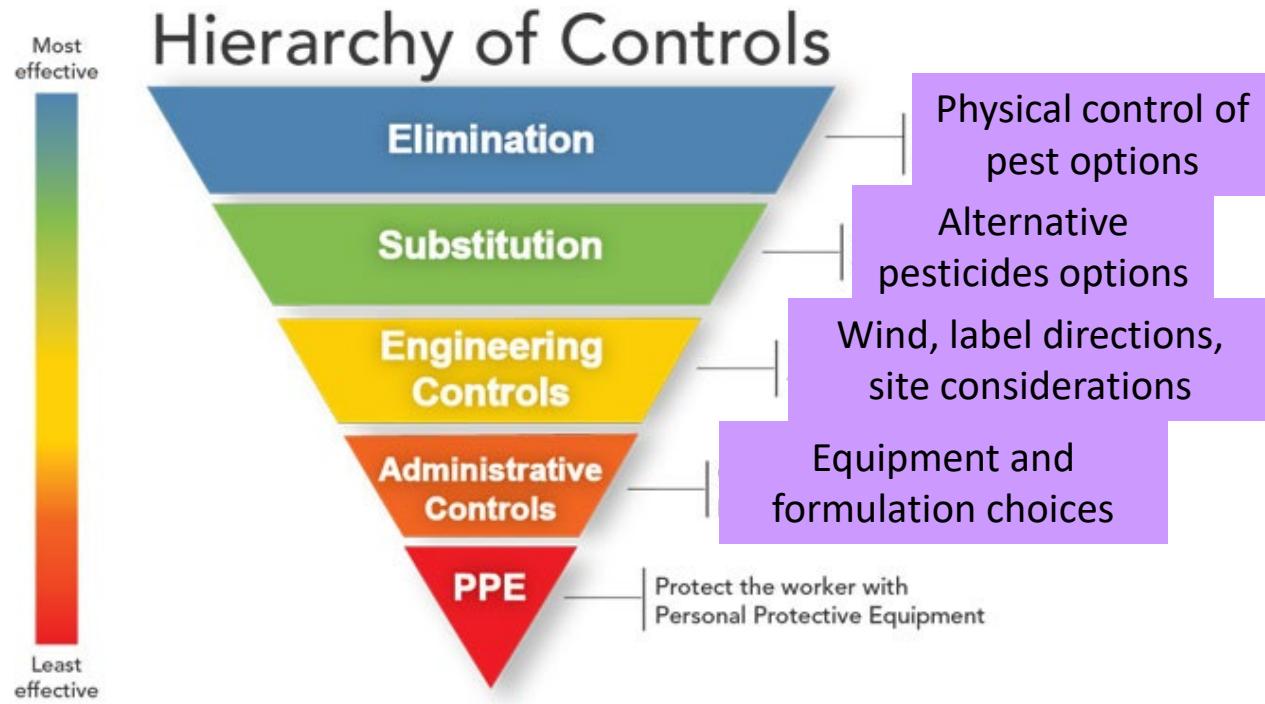
# Consider this

...but they perform most of the contact your body will do in a day.



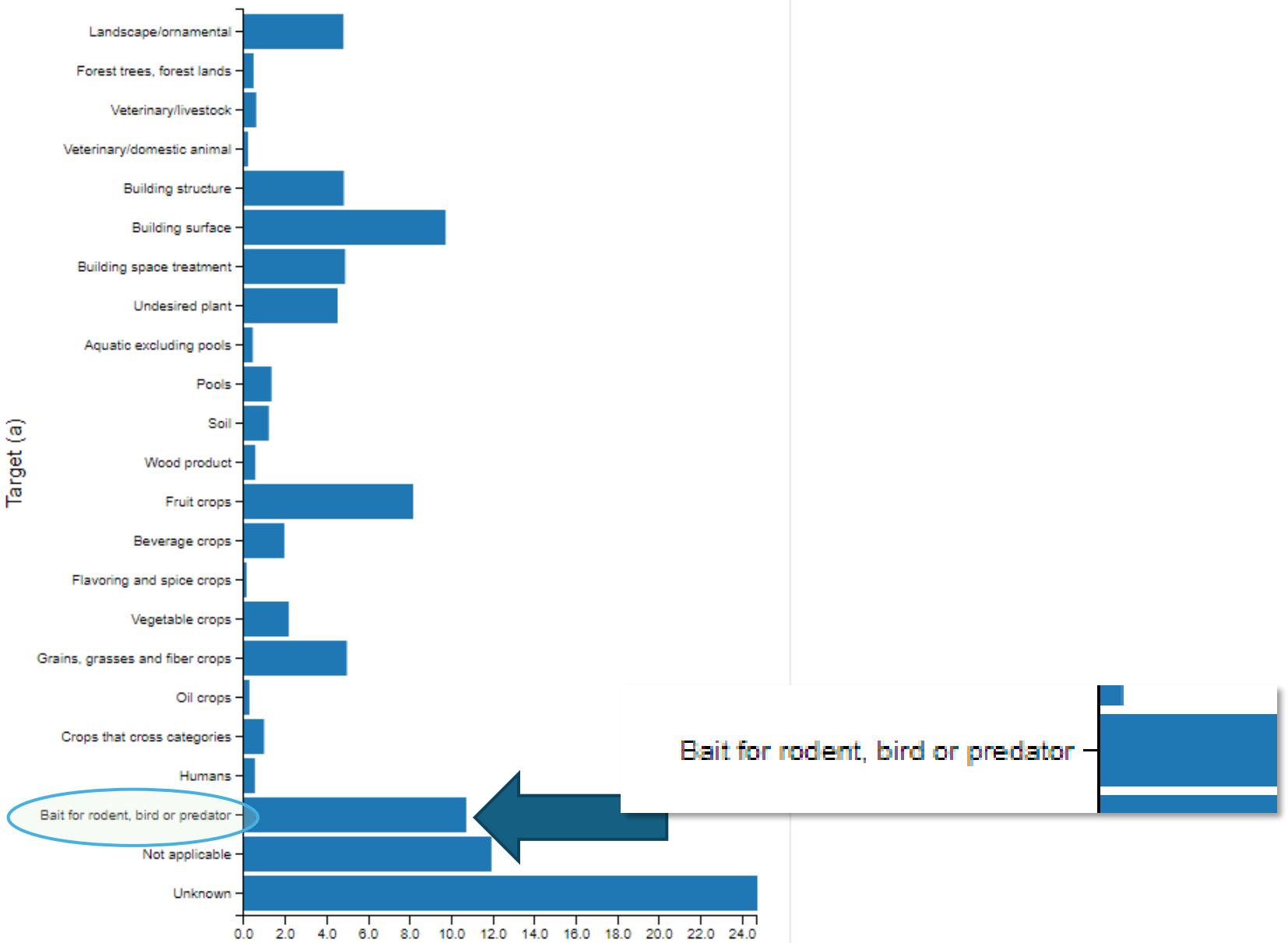
# Most pesticide exposures do not happen during the application

- In 2000, an 18-month-old boy ingested an unknown amount of paraquat solution from a bottle found in his father's landscaping truck. He received multiple-dose activated charcoal treatment two hours after the ingestion. He suffered from lack of oxygen during the first 24 hours followed by progressive liver, kidney, and cardio-pulmonary dysfunction. The boy died 11 days after the ingestion.
- In 2003, a 49-year-old male took a sip from his coffee cup in which he had poured paraquat because the product's bottle was deteriorating. He realized his mistake and went to the Emergency Department. At that time, he was vomiting, cold and sweating profusely. Doses of activated charcoal were administered and his stomach was pumped; morphine was provided for esophageal pain; and he was intubated to support breathing function on the fourth day. Aggressive supportive care continued until he died on the tenth day.

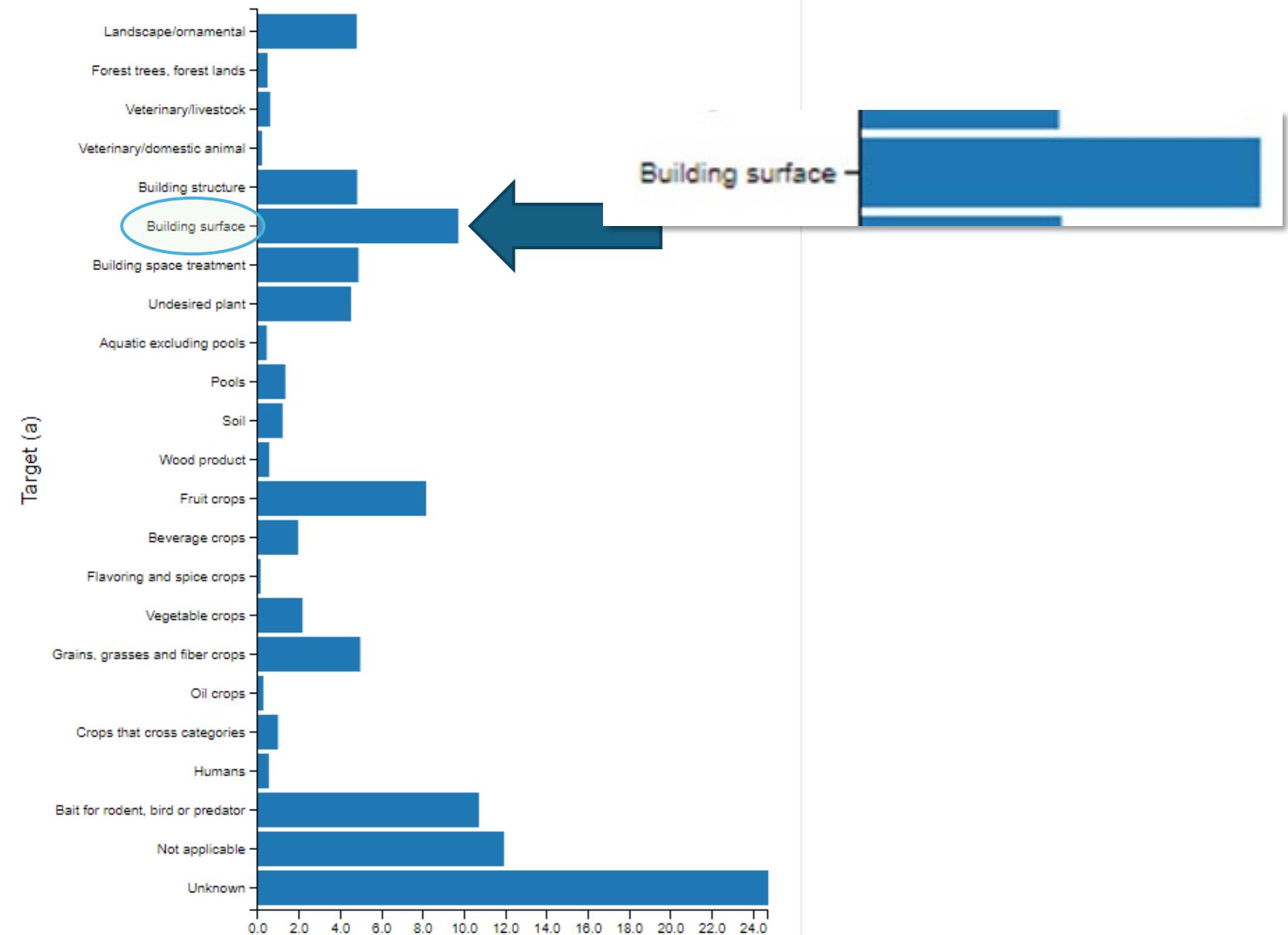


For those in positions to make decisions about job site management, ask yourself, “What other options are there?”

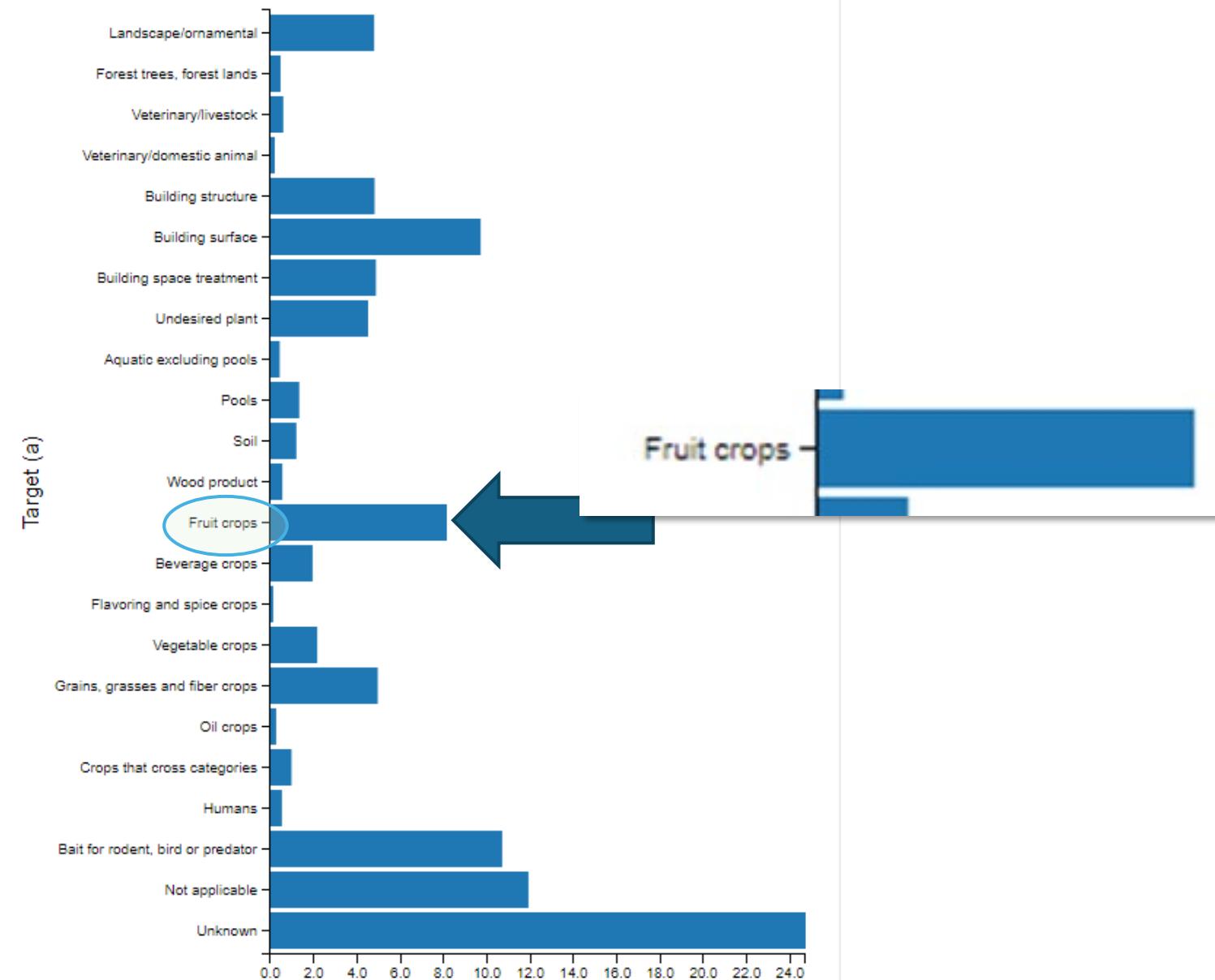
Distribution (%) of Acute Pesticide-Related Illnesses by Target, All  
Participating States, 1998 - 2011



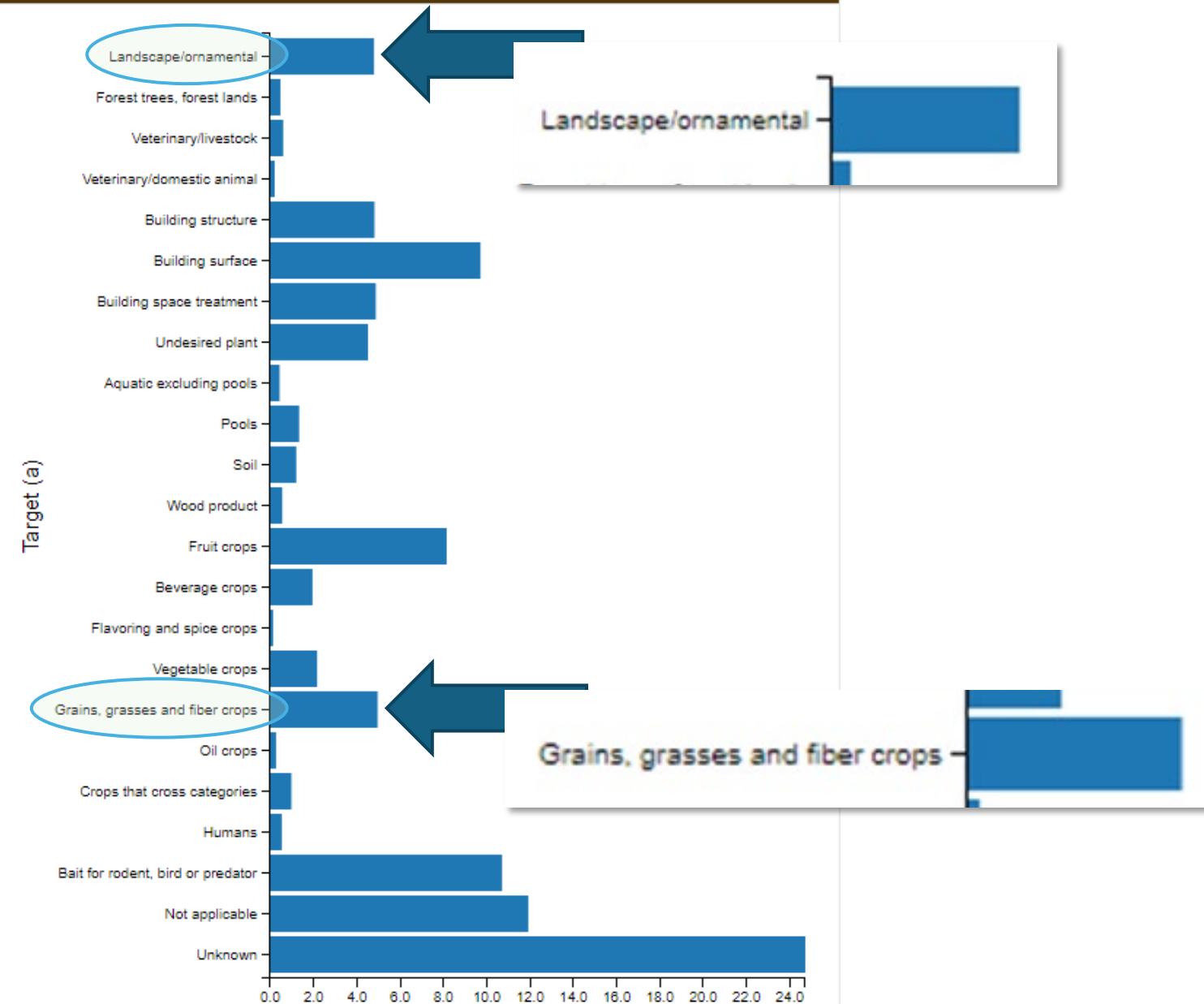
Distribution (%) of Acute Pesticide-Related Illnesses by Target, All  
Participating States, 1998 - 2011



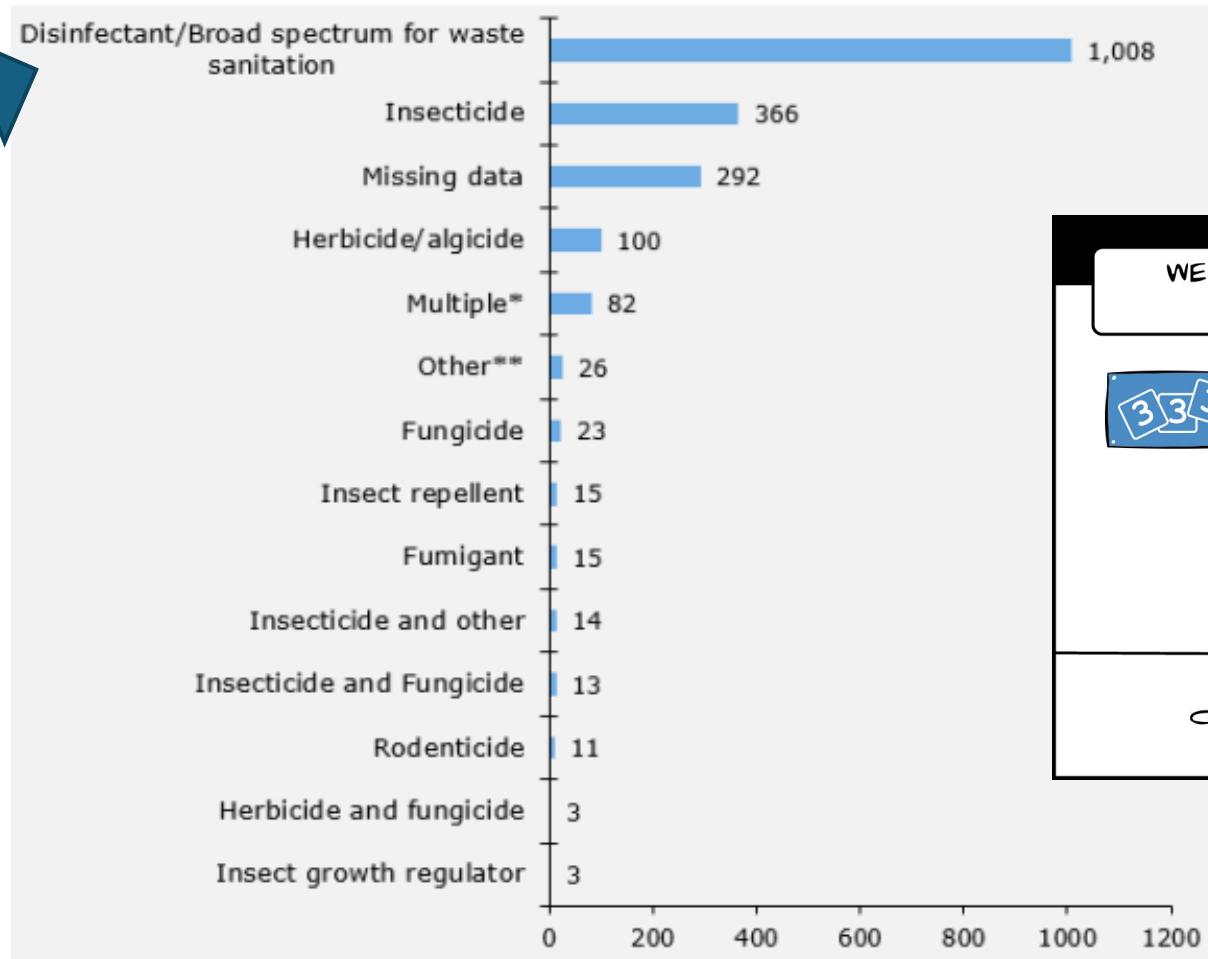
Distribution (%) of Acute Pesticide-Related Illnesses by Target, All  
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Distribution (%) of Acute Pesticide-Related Illnesses by Target, All  
Participating States, 1998 - 2011



**Figure 11: AOPP by product type: Texas, 2006-2015 (n=1,971)**



\*Multiple includes products that fit in more than one product type category.

\*\*Other includes biological controls or biopesticides (pesticides obtained from natural materials such as animals, plants, bacteria and certain minerals), plant growth regulators, antibiotics, etc.



# Free anonymous help (most all languages)

The screenshot shows the homepage of the Northern New England Poison Center. At the top, there is a navigation bar with links to Home, About, Blog, and Contact. Below the navigation is the poison center logo, which consists of four colored squares (red, green, blue, yellow) containing icons related to medicine and science. To the right of the logo, the text "Northern New England Poison Center" is displayed. A red banner at the top features the phone number "1 800 222 1222", a "LIVE CHAT" button, and a "TEXT" button. Below the banner, there are four main menu categories: POISON INFORMATION, EDUCATION, STATISTICS, and FOR PROVIDERS. A search bar is located to the right of these menus. A black banner below the menu bar contains the text "COVID-19: Resources related to poisoning and the COVID-19 pandemic". The main content area features a woman looking at a laptop screen, with the text "Chat Online with Us 24 hours / day" overlaid. At the bottom of this section are three buttons: "Call", "Chat", and "Text". A footer message at the bottom of the page reads: "The Northern New England Poison Center is your source for fast information and expert advice. Whether you've taken too much medicine, spilled a chemical on your skin or just have a question, we are here for you. Call us, chat or visit our [poison index](#)".

1-800-222-1222

# Free anonymous help (most any language)

The screenshot shows the homepage of the National Pesticide Information Center (NPIC) website. At the top left is the NPIC logo with the text "NATIONAL PESTICIDE INFORMATION CENTER". To the right are contact details: "1.800.858.7378 npic@oregonstate.edu" and "We're open from 8:00AM to 12:00PM Pacific Time, Mon-Fri". Below this are social media icons for YouTube, Facebook, Instagram, and Twitter, along with a link to "A to Z". A search bar with the placeholder "Search..." is positioned at the top right.

The main visual is a large image of a Spotted Lanternfly (Lycorma delicatula) on a textured surface. To the right of the insect, the word "Spotted" is written vertically, and "Lanternfly" is written horizontally below it. A red circular badge with the word "NEW!" is placed above the text. Below the main image are several smaller navigation links:

- A row of three cards: "What are pesticides?", "What are pests?", and "FAQs".
- A row of three cards: "Health and Safety", "Environment", and "Pest Information".

At the bottom right of the page, there is a blue button labeled "Learn More".

<https://www.npic.orst.edu/>



Thank you!

Pam Bryer  
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**Links:**

State traffic statistics:

<https://vsp.vermont.gov/trafficsafety/fatalities>

Three electronic portals to search for pesticide products currently registered in Vermont:

<https://usaplants.vermont.gov/usaplants/ProductRegFSA/BrandSearch.asp>

x

<https://www.kellysolutions.com/VT/>

<https://www.npirs.org/state/>

Our program homepage:

<https://agriculture.vermont.gov/public-health-agricultural-resource-management-division>

Poison control:

<https://www.nnepc.org/>

NPIC -National Pesticide Information Center:

<https://www.npic.orst.edu/>