VERMONT
AGENCY OF AGRICULTURE, FOOD & MARKETS

March 18, 2025

Behind the Spray: Personal Risks and Pesticide Toxicity for Applicators

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Today we will cover:

- The risk equation
- Pesticide registration –stay up to date
- How EPA determines the proper PPE
- Trends in applicator pesticide related injures on the job

What is risk?
What are some really dangerous activities?

STAIRS

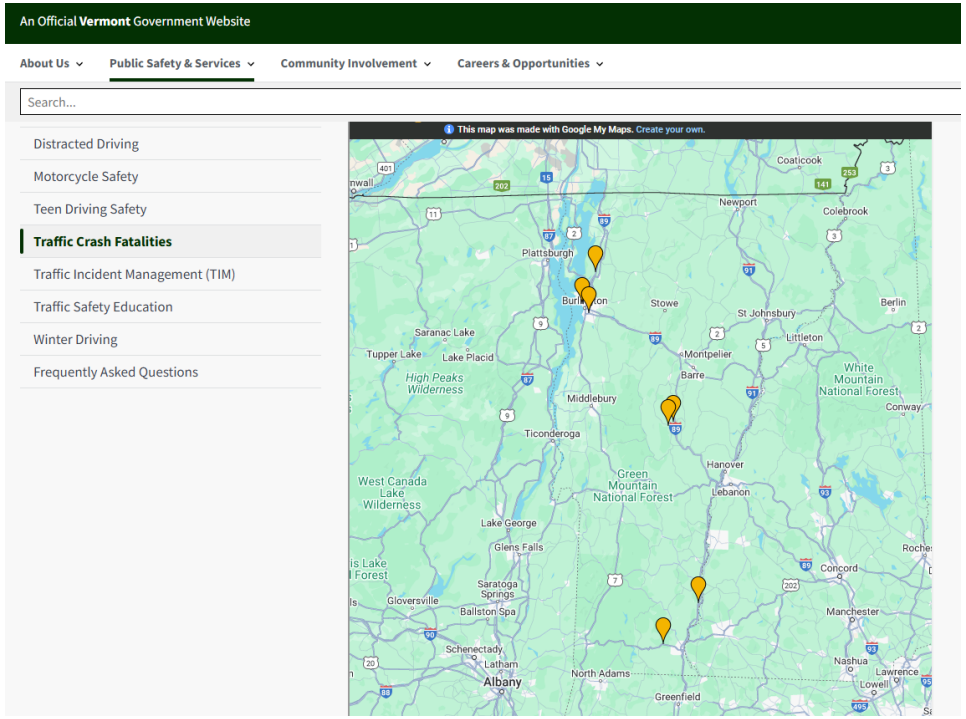
- 12,000 people die from falling down stairs each year in US

CANDLES

- 25 candle-caused house fires each day in US

DRIVING

- Vehicle deaths in Vermont in 2025: 7 people by Feb 2nd

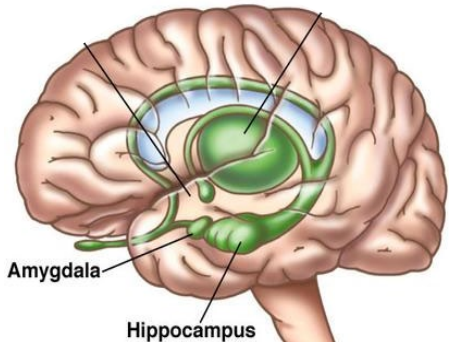


But we shrug those risks off

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

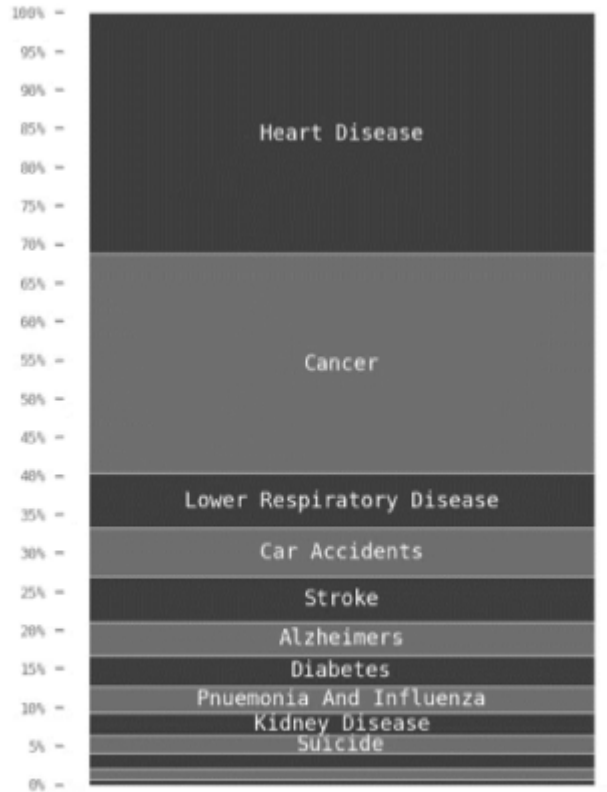
Humans fear:

- 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
Code: www.github.com\aaronpenne
Twitter: @aaronpenne

Based on in-depth analysis by H. Al-Jamaly, M. Siemers, O. Shen, and N. Stone at owenshen24.github.io/charting-death

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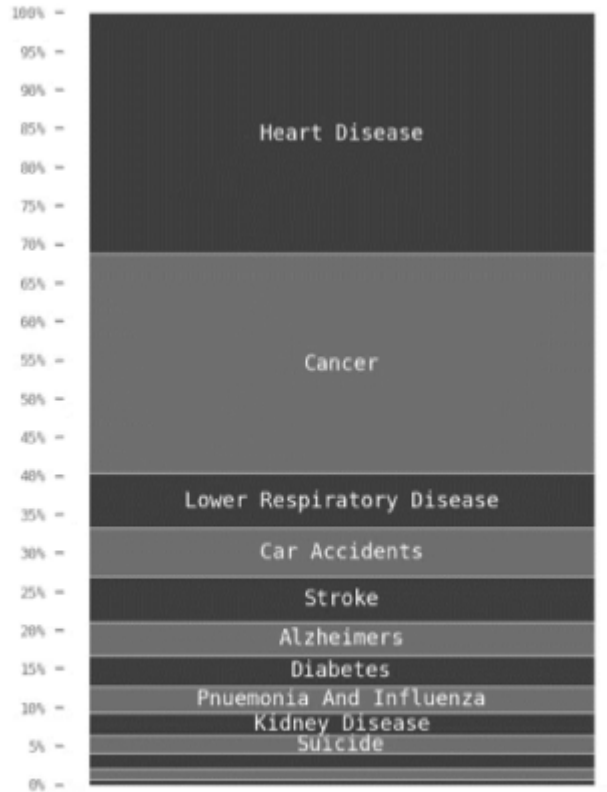

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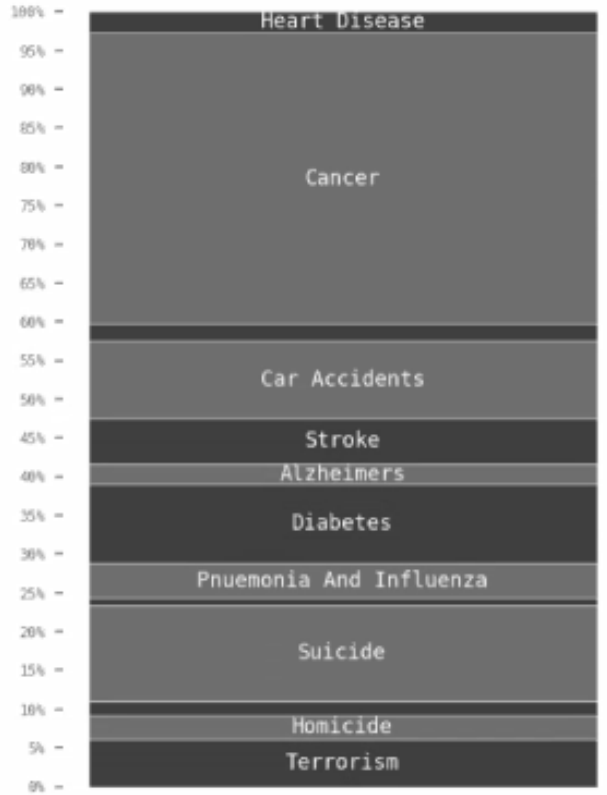
Google Search Trends

"Which causes do we worry about?"



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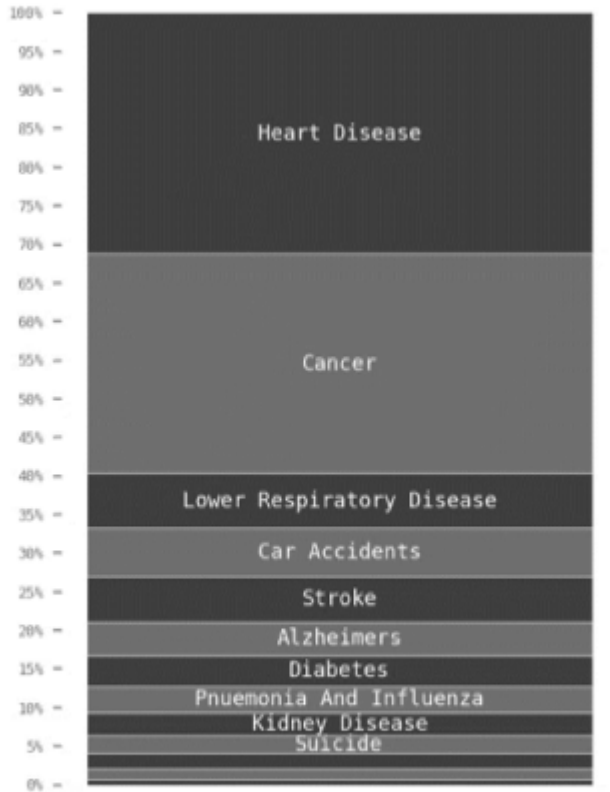

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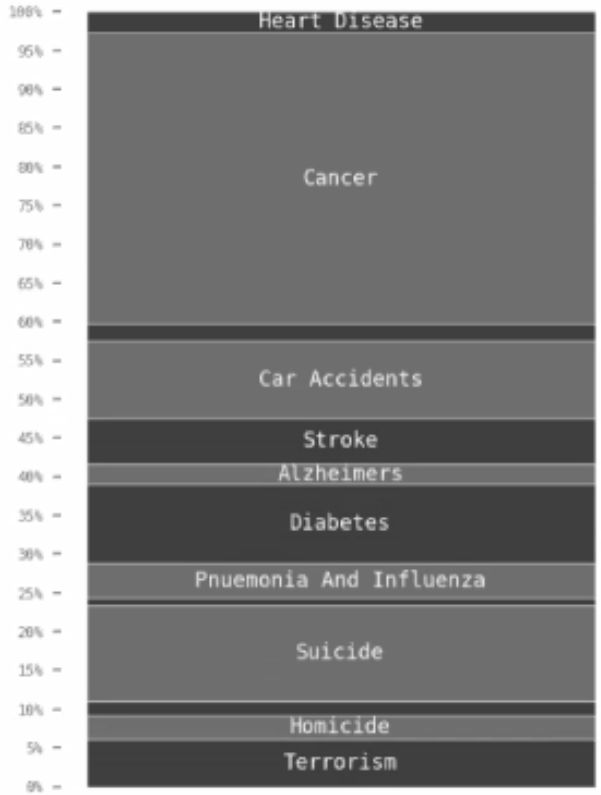

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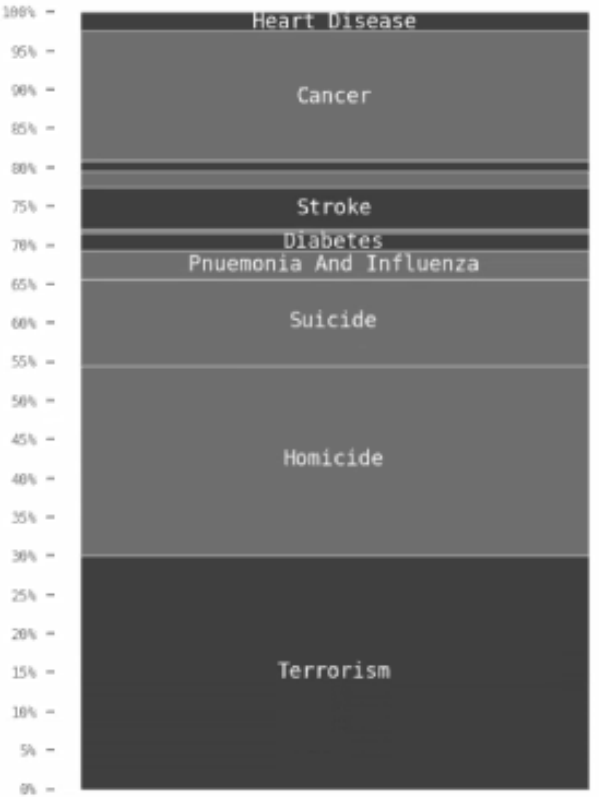
NYT & Guardian Headlines

"Which causes are in the media?"



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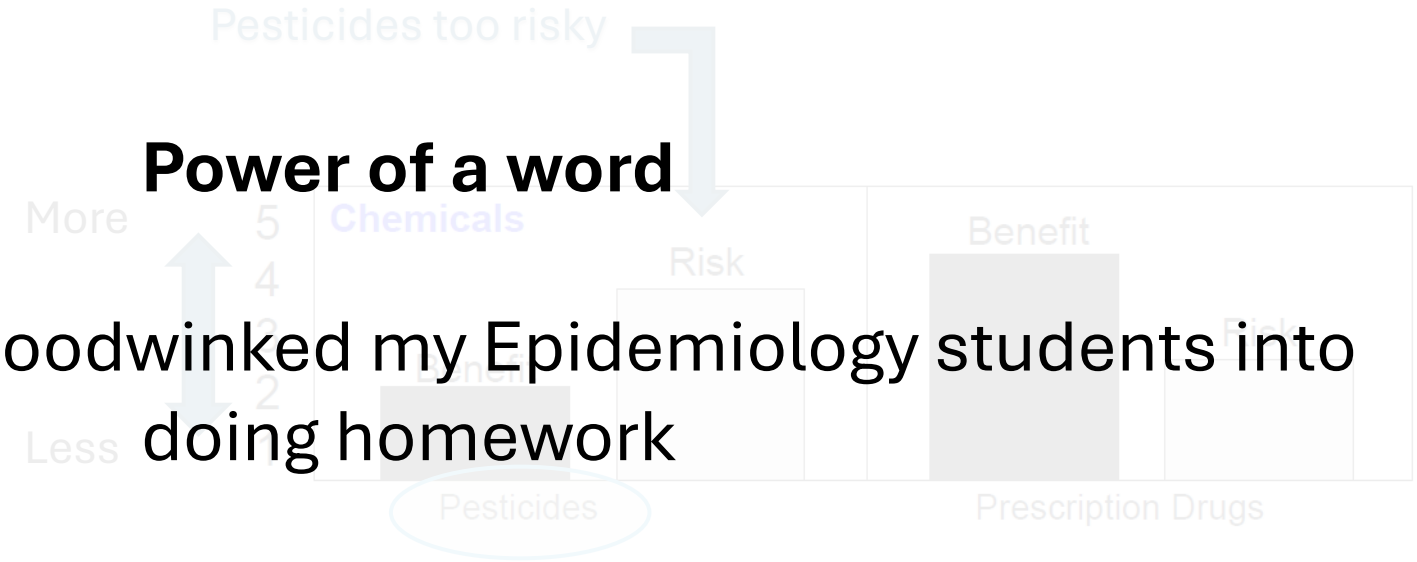
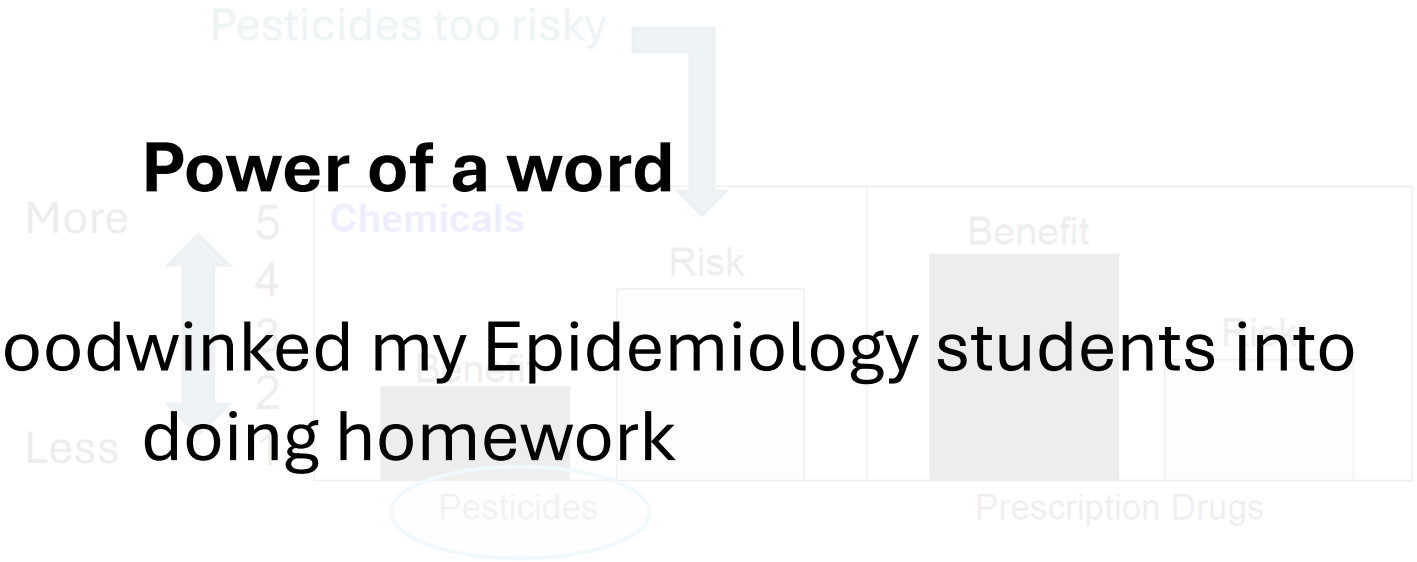


Power of a word

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



Power of a word

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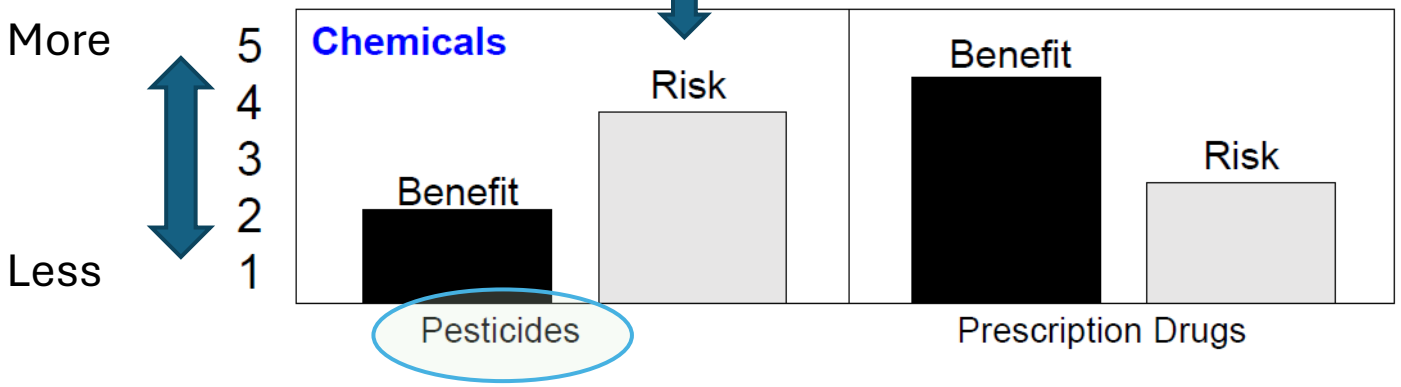
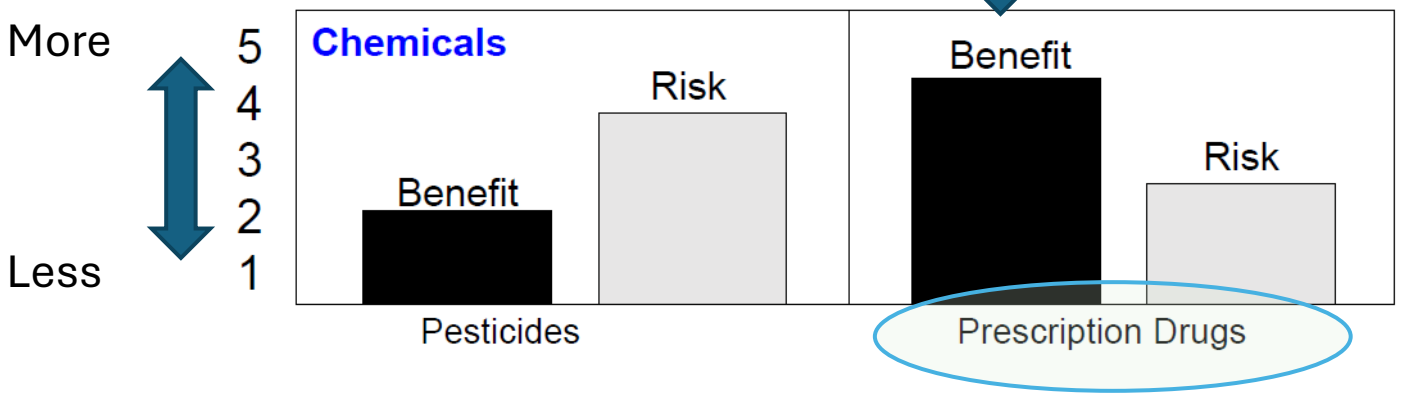
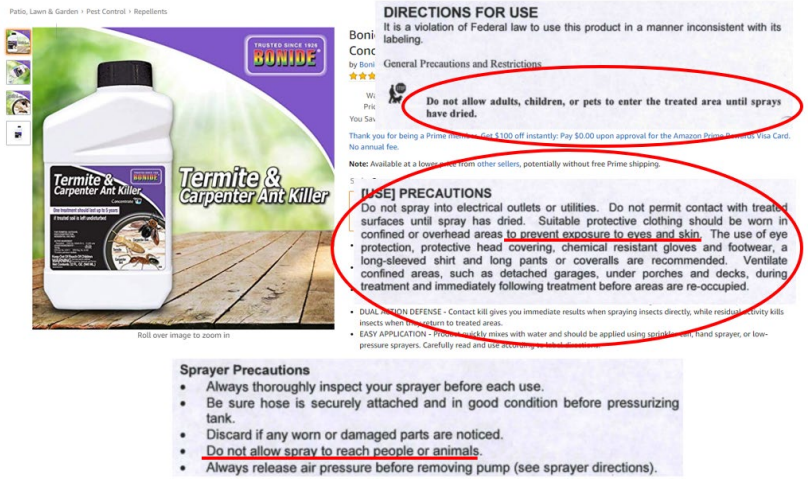
…by calling it a “Take Home Exam”

Pesticides have risk



Medicines have benefit





Same active ingredient

Same concentration

Manufacturer: PERRIGO CO. NDC 45802026937

Permethrin 5% Cream (Generic Elimite)

GENERIC

$65.25 / 60 Grams Tube | Free 1-5 Day Shipping

Qty: - 1 + In Stock

Total Price: $65.25 Add to Cart

Administration

Dosage

Admir

For the t
thorough

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).

DO NOT TAKE MEDICAL ADVICE FROM ME

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

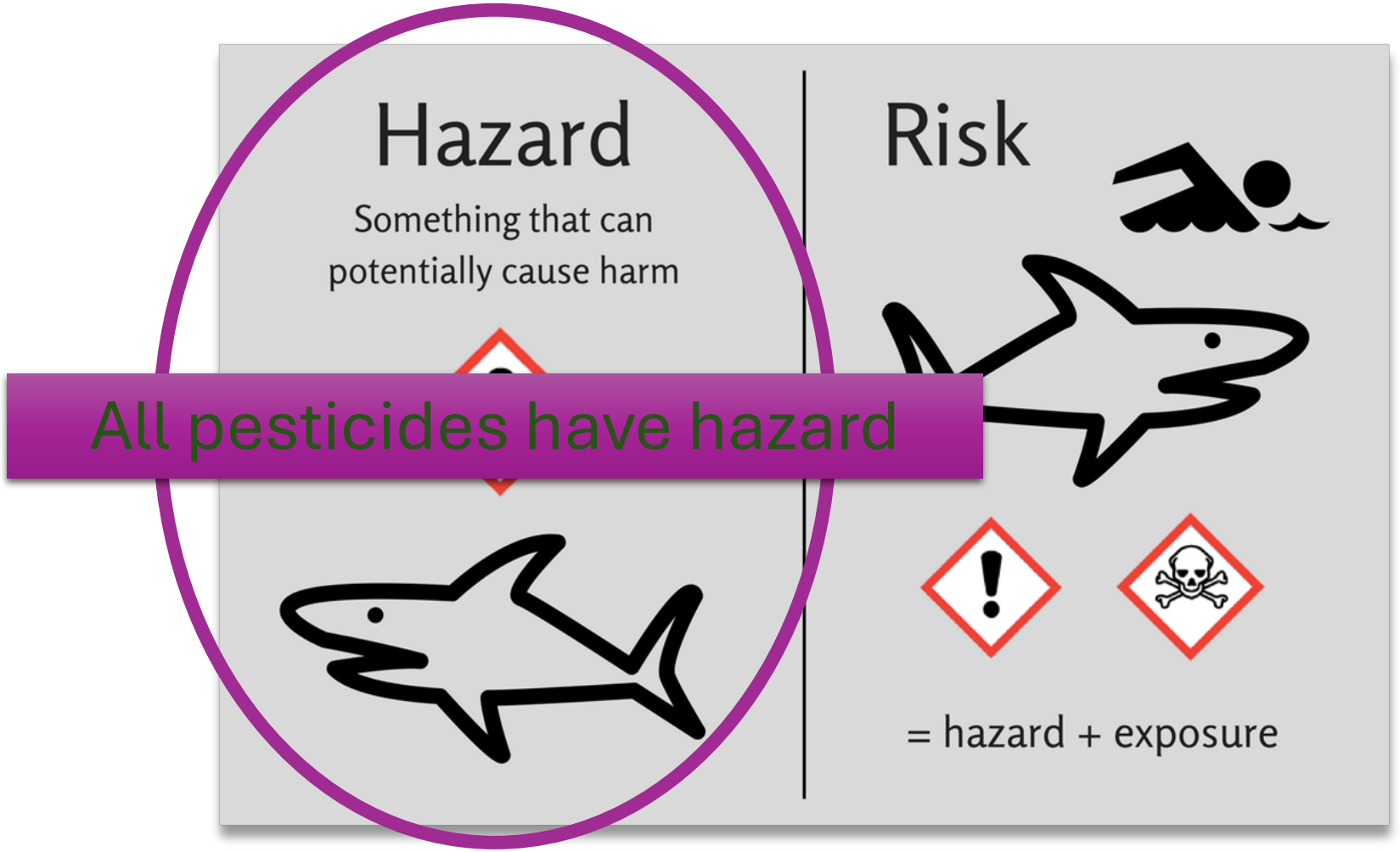
Major Group	Minor Group	Substance Generic Name	5-Yr Tot
Cleaning substances (household)	Bleaches	Bleach: Hypochlorite (Liquid & Dry)	22
Cleaning substances (household)	Disinfectants	Disinfectant: Hypochlorite, Non-Bleach Product	7
Cleaning substances (household)	Disinfectants	Disinfectant: Other/Unknown	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

What do we know about chemical risk?

Risk = Exposure x Hazard

Risk = Exposure x Hazard

Risk = Exposure x Hazard

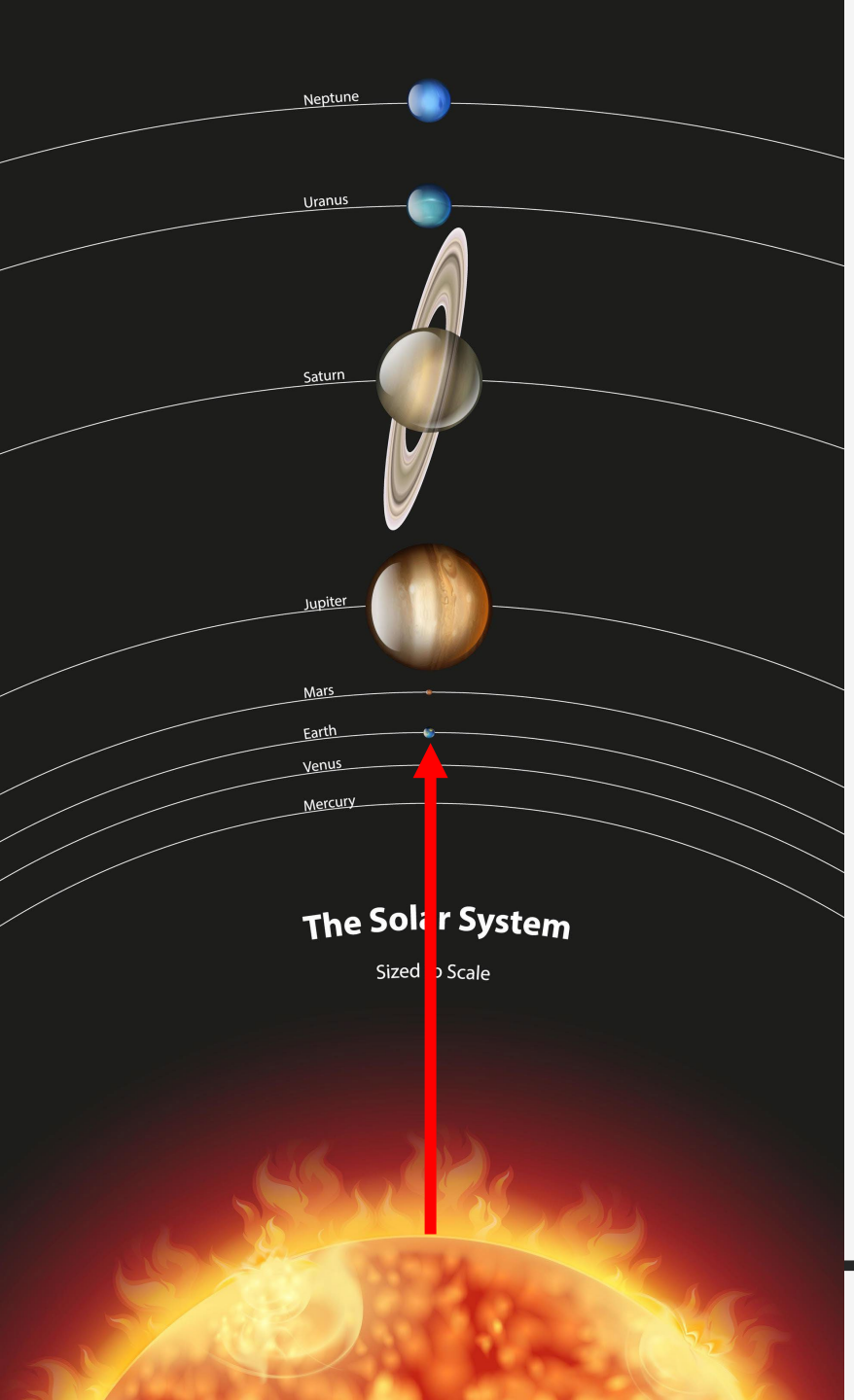


Hazard

One of the world's least toxic substances:

WATER

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



Hazard

World's most toxic substance:

- Botulinum toxin LD_{50} 1 ng/kg (part per trillion)

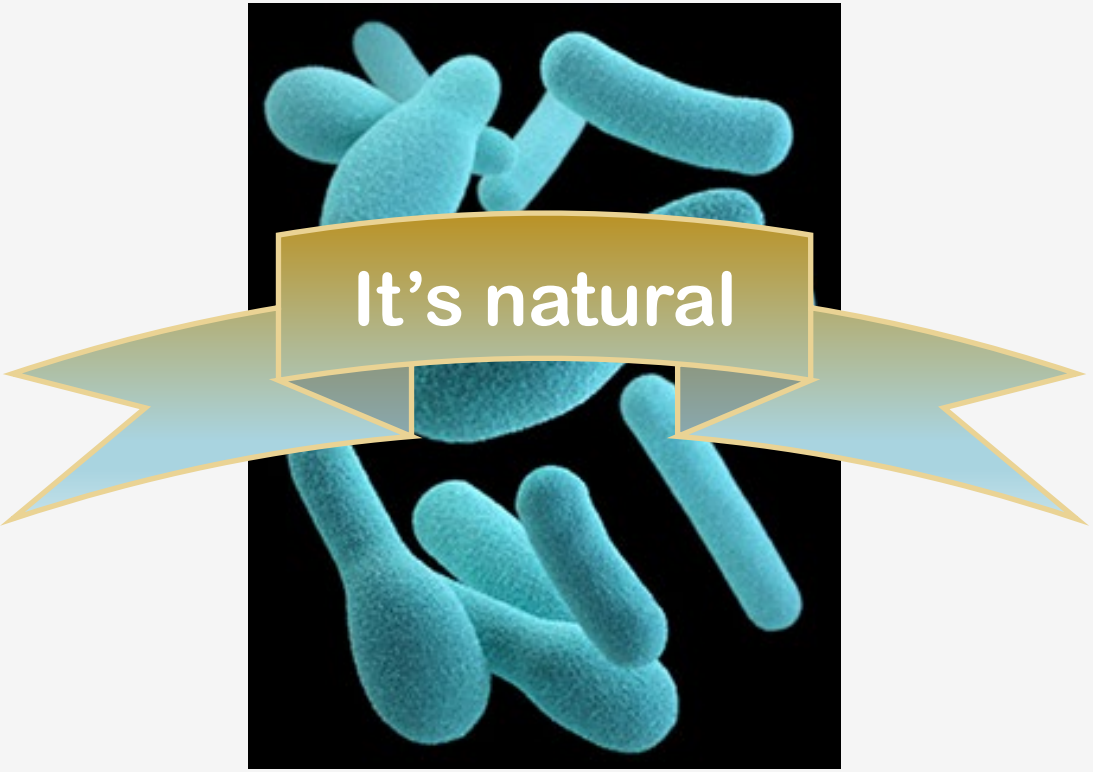
  ~6 inches out of 93 million miles

- 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

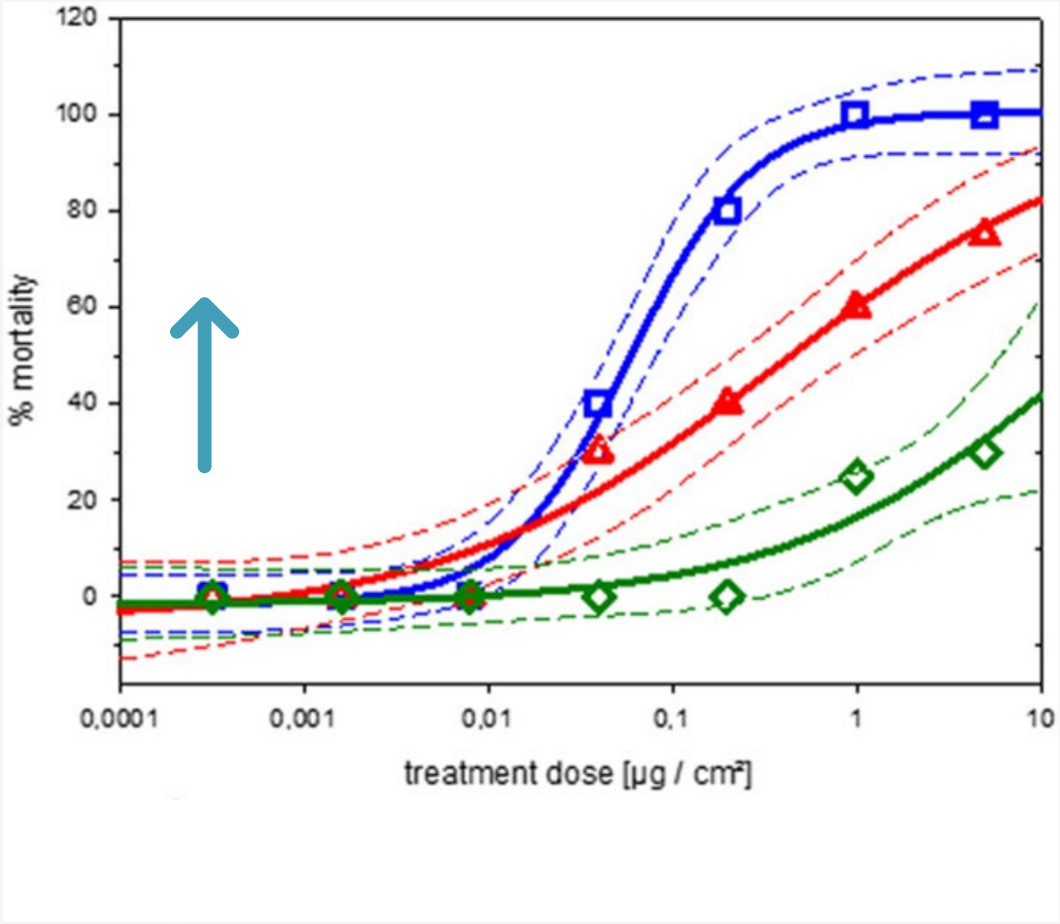
Chemical fate is tightly controlled

This is Botox.

Risk = Exposure x Hazard

Dose-response assessment

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



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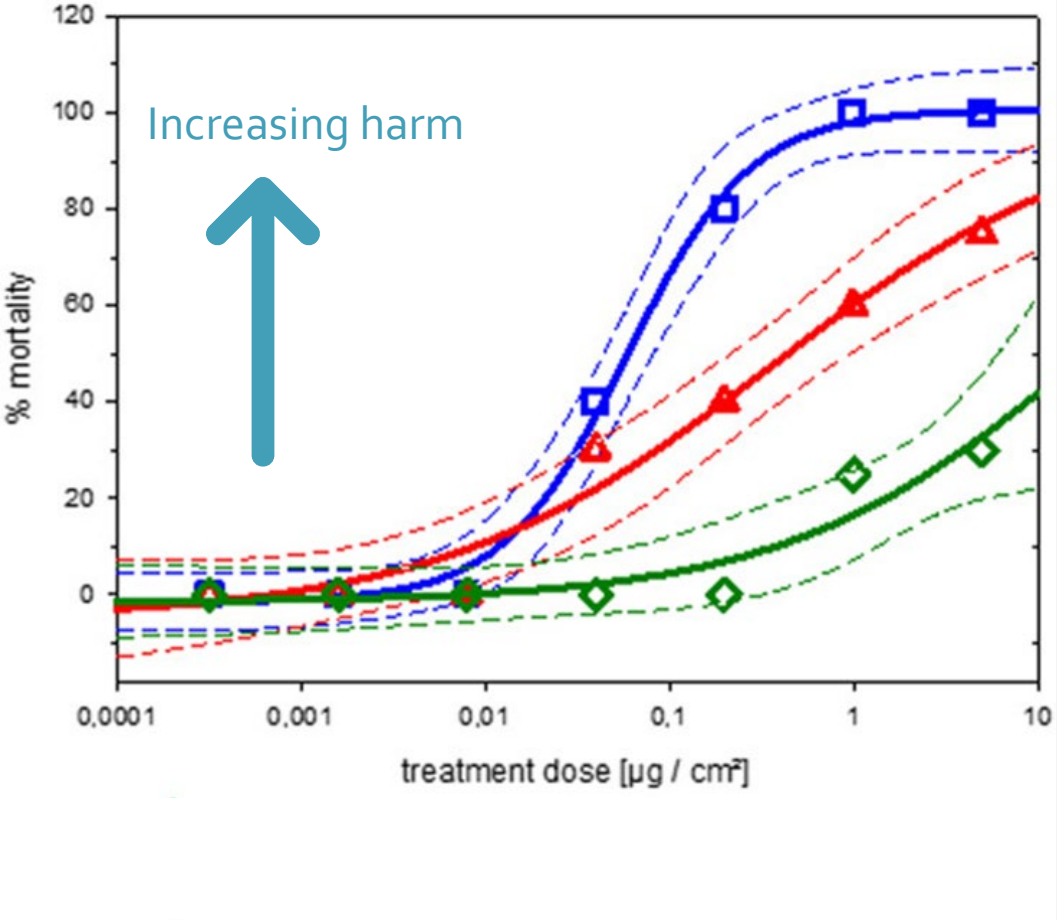

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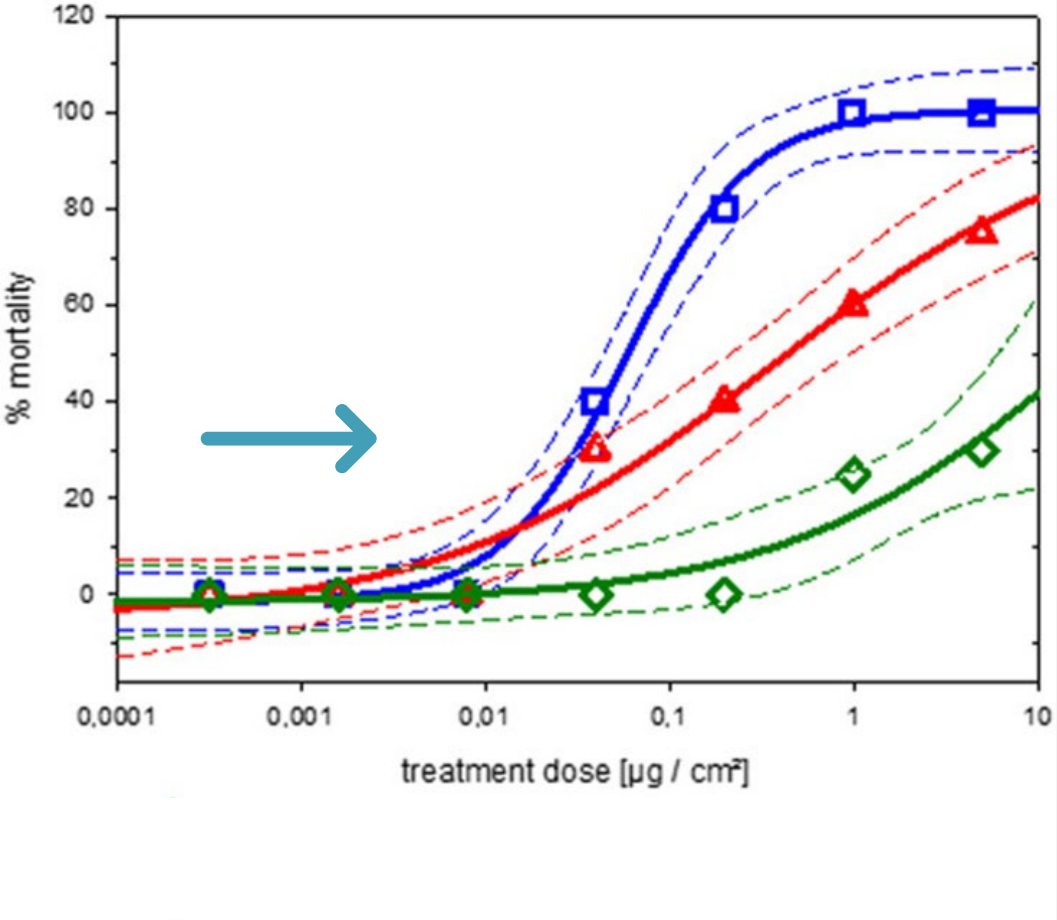

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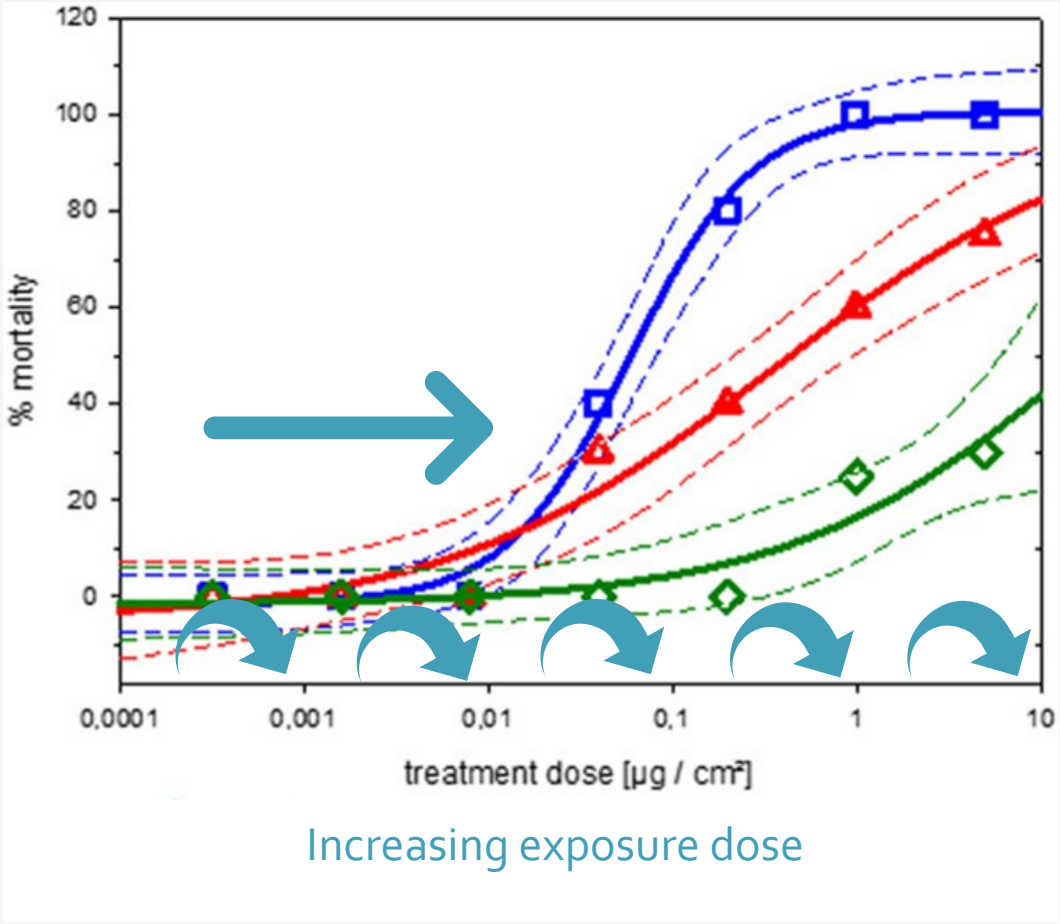

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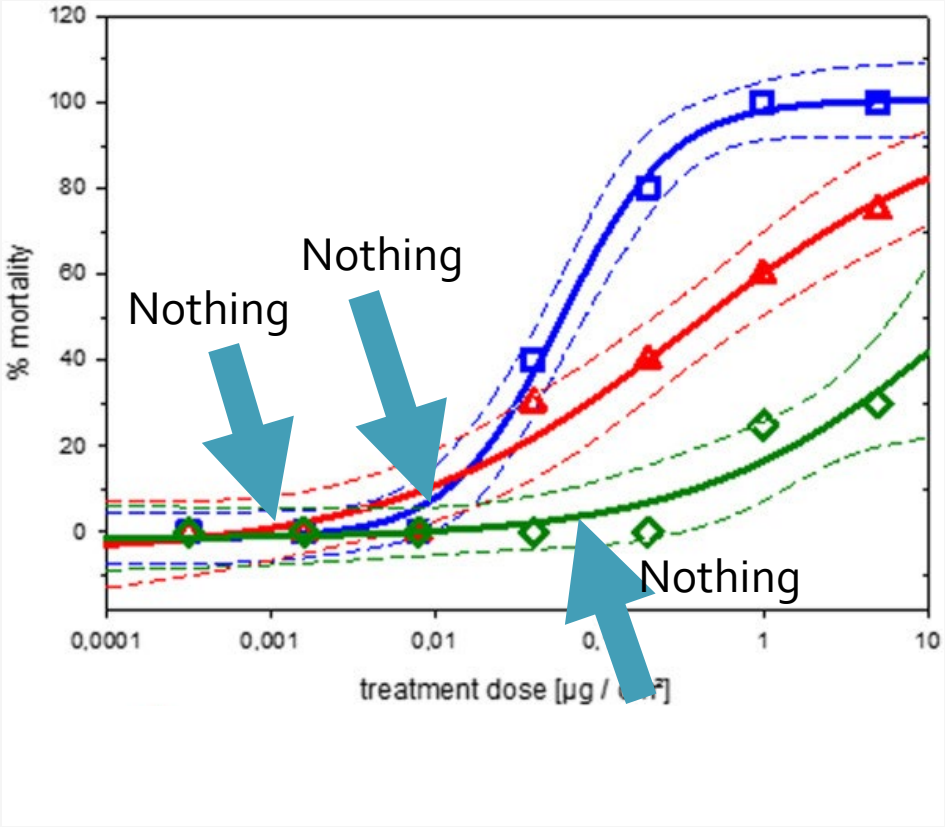

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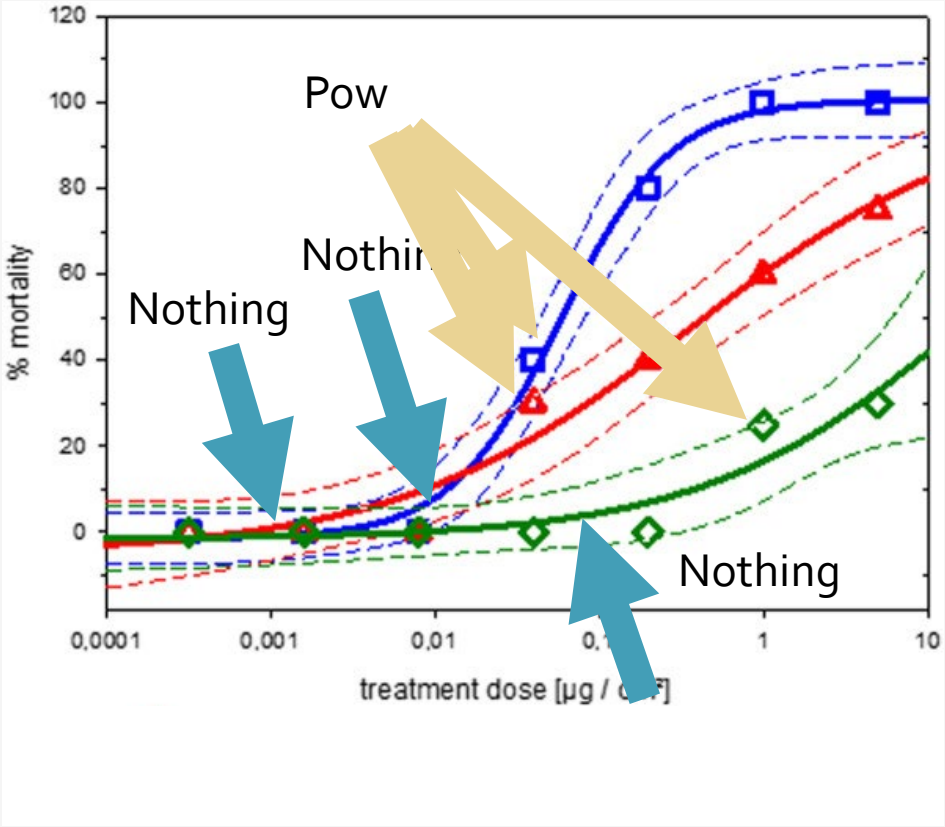

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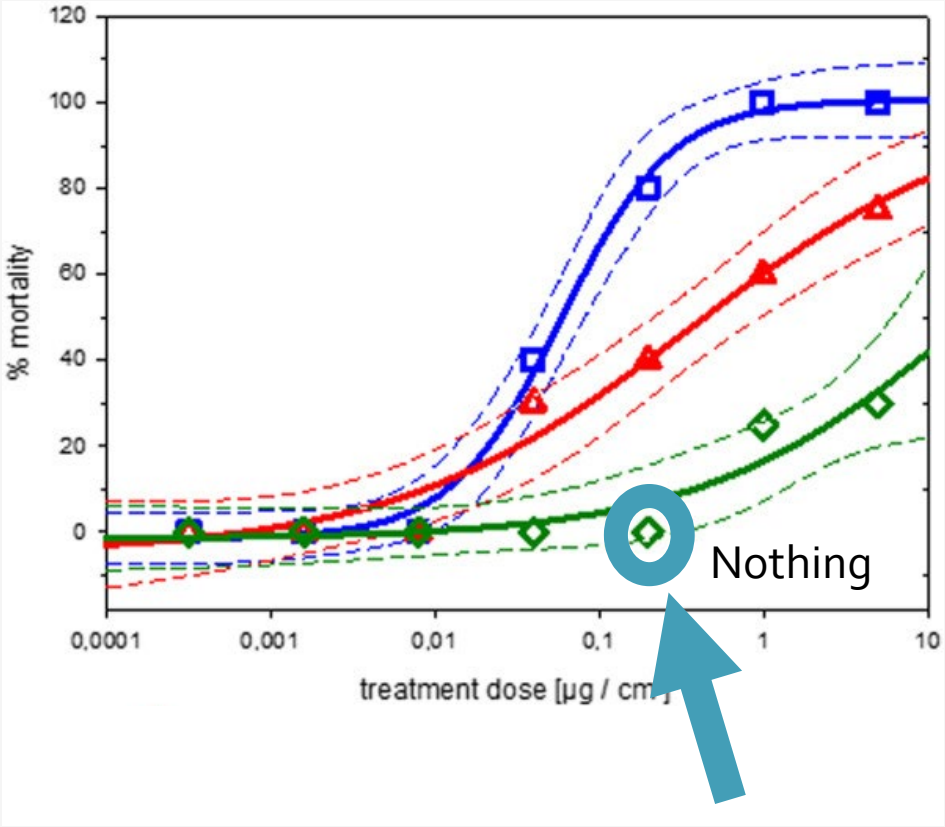

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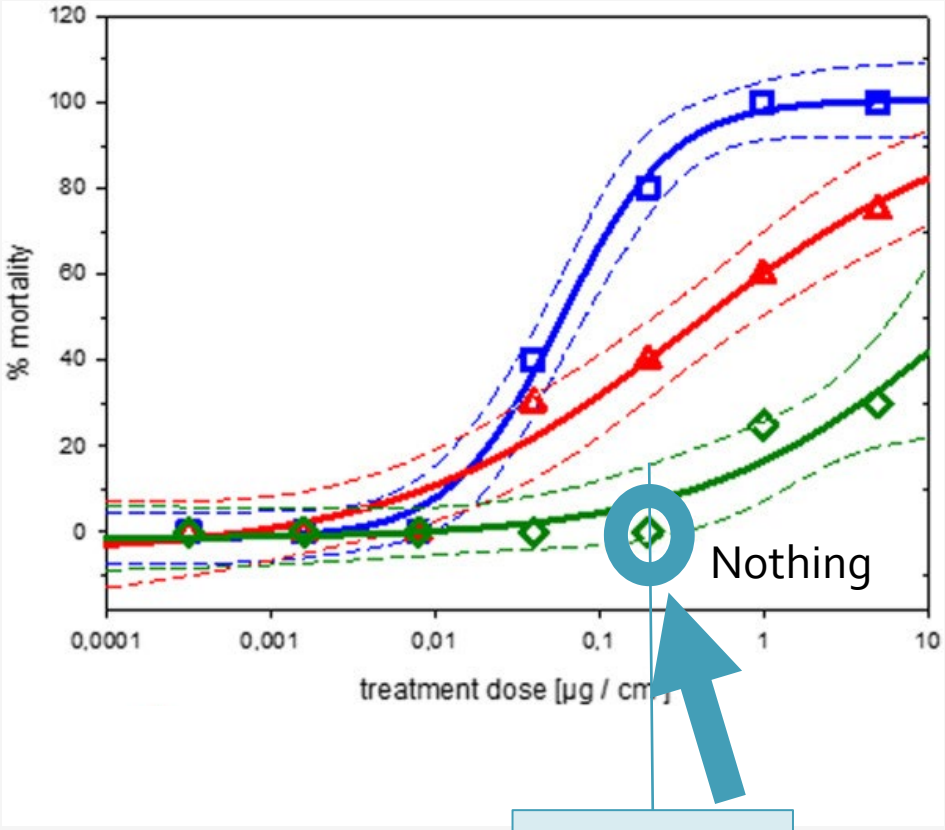
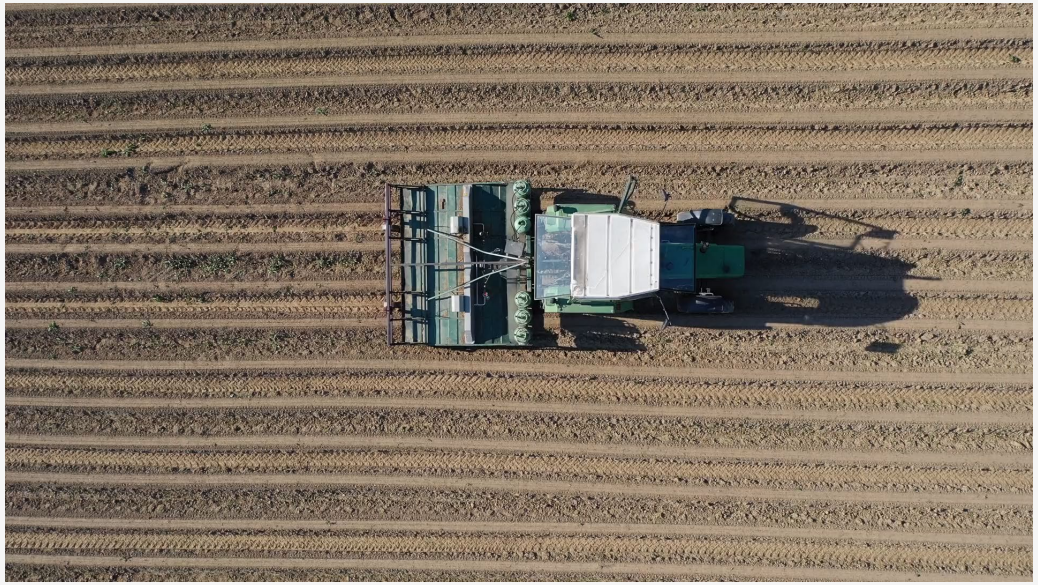
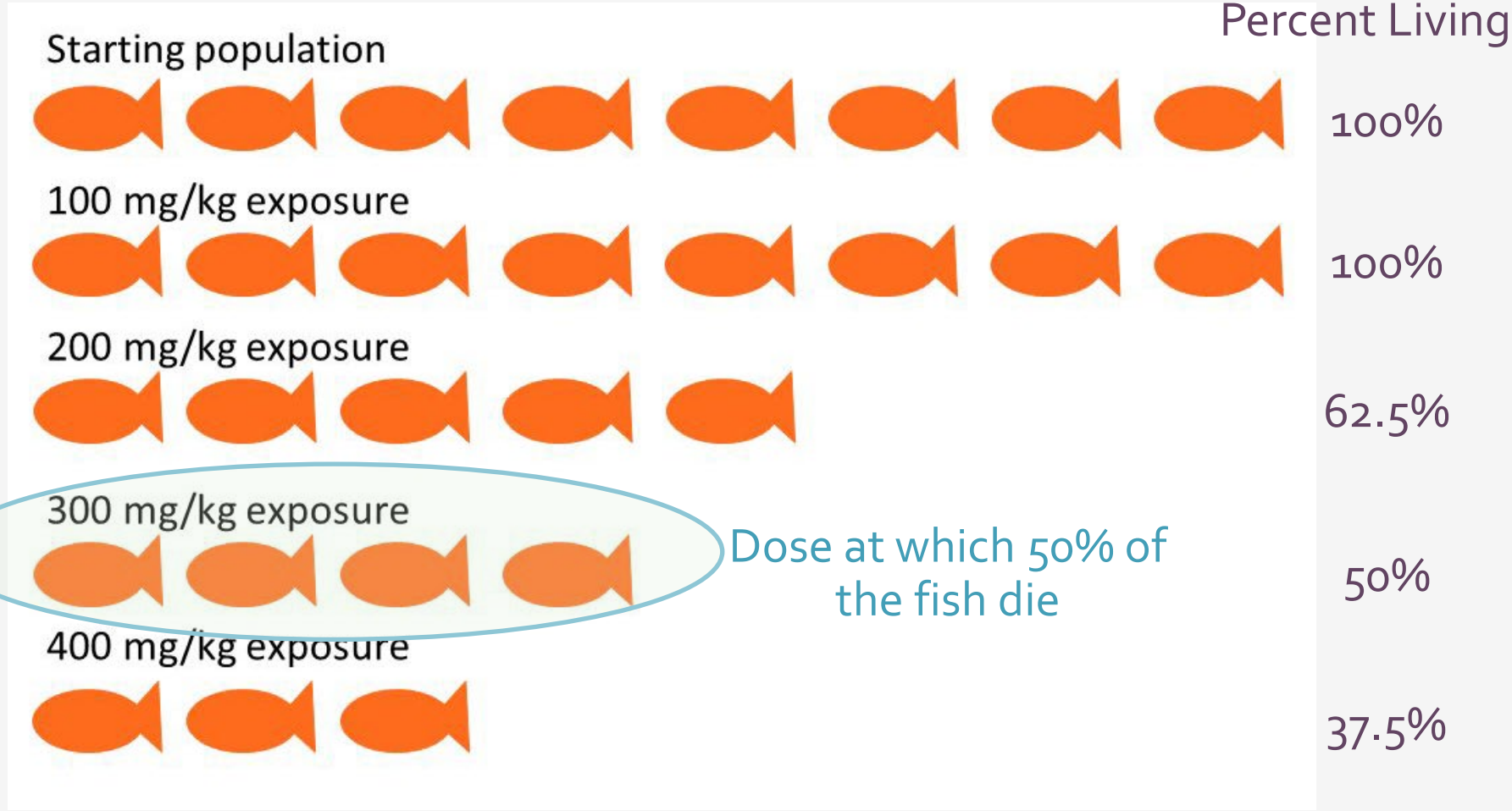


What information do we have about the hazards from pesticides?



Acute testing

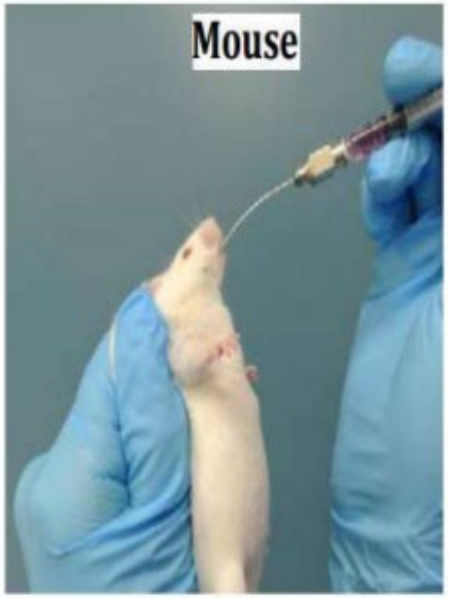
- LD50
  - Oral
  - Dermal
  - Inhalation



Acute testing

- LD50
  - Oral
  - Dermal
  - Inhalation

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.



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

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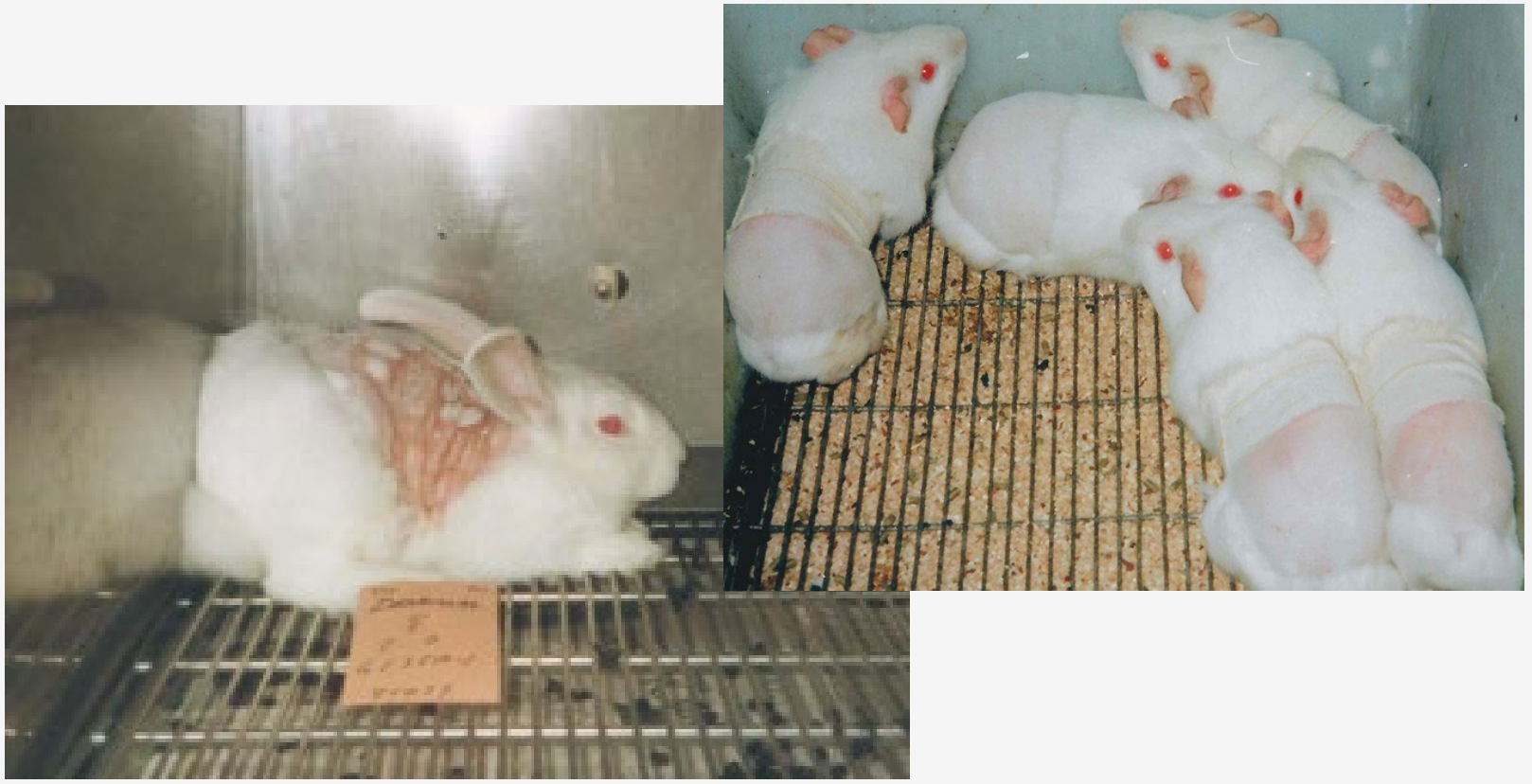

Acute testing

- LD50
  - 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[1]
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[2]
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

[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] 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.

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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
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870.1200	Acute Dermal Toxicity	yes	yes
870.1300	Acute Inhalation Toxicity		
870.2400	Primary Eye Irritation		
870.2500	Primary Dermal Irritation		
870.2600	Dermal Sensitization		
870.3100	Oral Subchronic (rodent)		
870.3150	Oral Subchronic (nonrodent)		
870.3200	21-Day Dermal		
870.3465	90-Day Inhalation		
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

[1] The requirement for an acute inhalation LC_{50} study was waived.
[2] This is not considered a data gap because there is a chronic dog study in the database.

Exposures in-between acute and chronic time periods

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[1]
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[2]
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)		
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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

[1] The requirement for an acute inhalation LC_{50} study was waived.
[2] This is not considered a data gap because there is a chronic dog study in the database.

How well babies grow

Growth Rodent & Non-rodent

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[1]
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[2]
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	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

[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] This is not considered a data gap because there is a chronic dog study in the database.

Pregnancy outcomes

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[1]
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[2]
870.3200	21-Day Dermal	yes	yes
870.3465	90-Day Inhalation	yes	yes
870.3700a	Developmental Toxicity (rodent)		
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870.3800	Reproduction		
870.4100a	Chronic Toxicity (rodent)		
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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

[1] The requirement for an acute inhalation LC_{50} study was waived.
[2] This is not considered a data gap because there is a chronic dog study in the database.

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

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[1]
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[2]
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		
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

[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] This is not considered a data gap because there is a chronic dog study in the database.

Cancer

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[1]
870.2400	Primary Eye Irritation	yes	yes
870.2500	Primary Dermal Irritation	yes	yes
870.2600	Dermal Sensitization	yes	yes
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870.3150	Oral Subchronic (nonrodent)	yes	no[2]
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
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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

[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] 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
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870.7485	General Metabolism		
870.7600	Dermal Penetration		
870.7800	Immunotoxicity		

[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] 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?

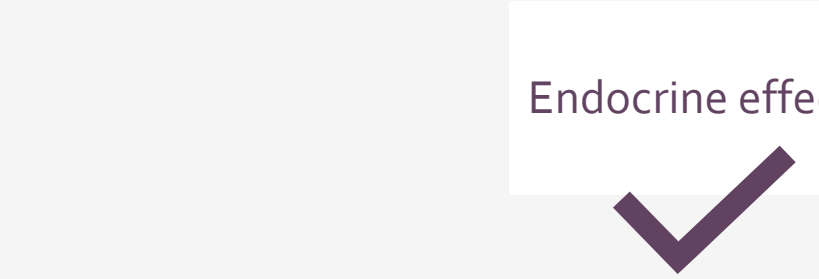

Table B.1. Toxicological Data Requirements for Glyphosate.

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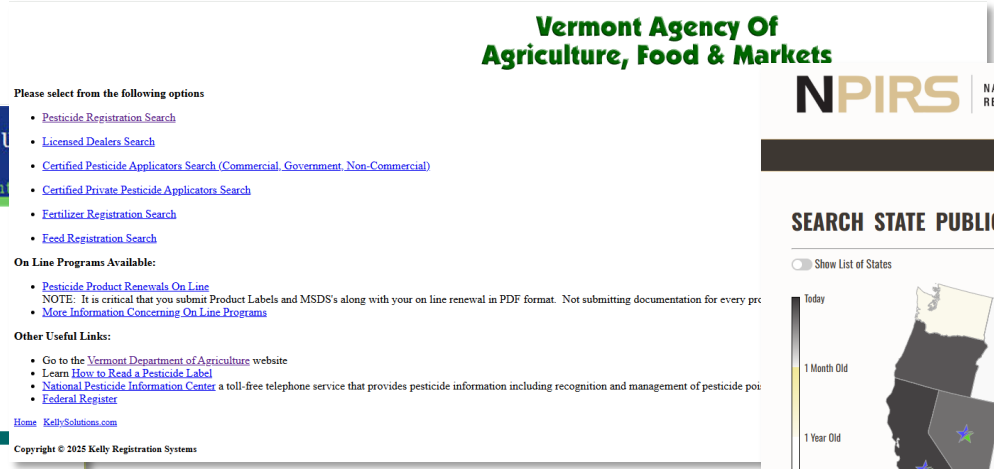
870.7600	Dermal Penetration	no	no
870.7800	Immunotoxicity	yes	yes

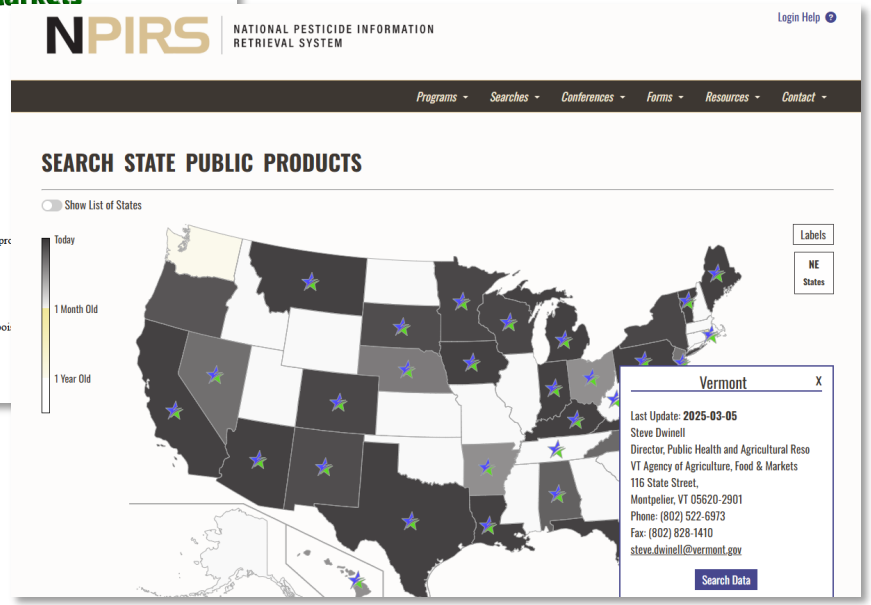
[1] The requirement for an acute inhalation LC_{50} study was waived.

[2] 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.





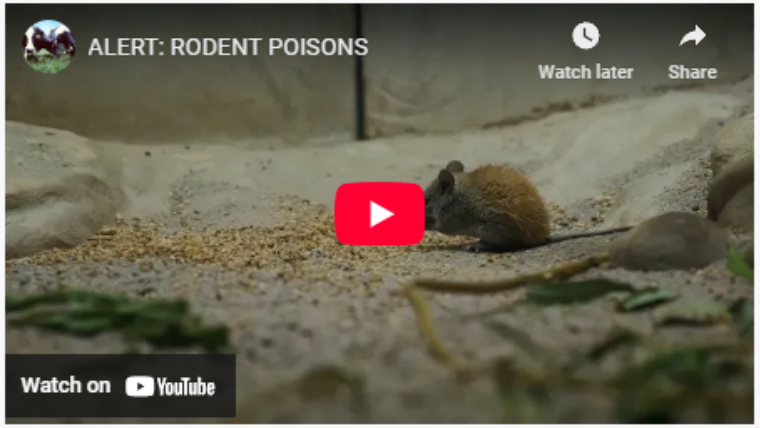
Pesticide Programs

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.

List of Pesticides Registered in Vermont

List of Neonicotinoid Pesticides Registered in Vermont

Home
Contact Us
Administration
Animal Health
Agricultural Development
Dairy Business Innovation Center
Farm First
Food Safety Programs
Inclusion, Diversity, Equity & Accountability
Land Use & Renewable Energy
License and Registrations
Milk Commission
Public Health & Agricultural Resource Management
Apiary Program
Plant Health and Pest Management
Pesticide Programs
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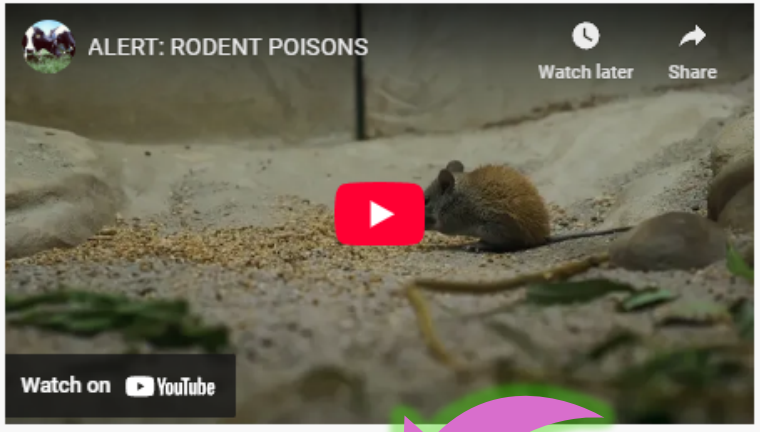

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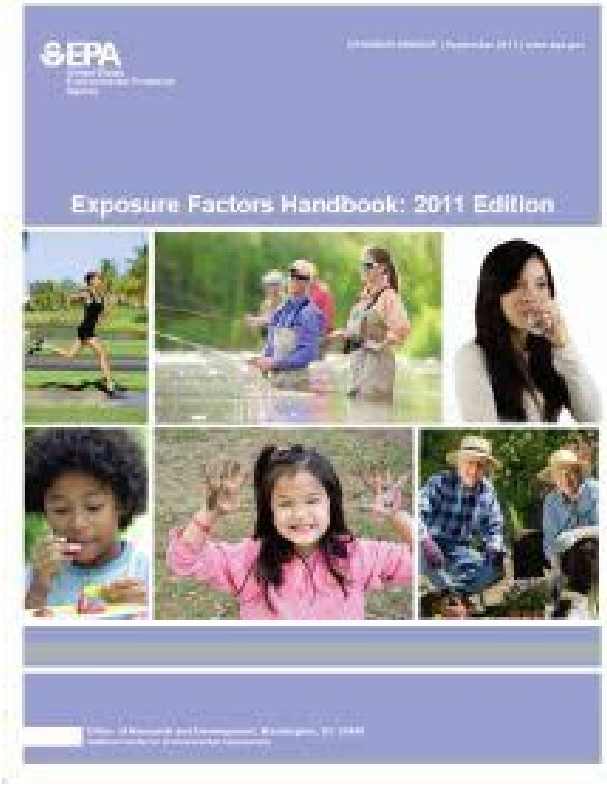
List of Pesticides Registered in Vermont

List of Neonicotinoid Pesticides Registered in Vermont

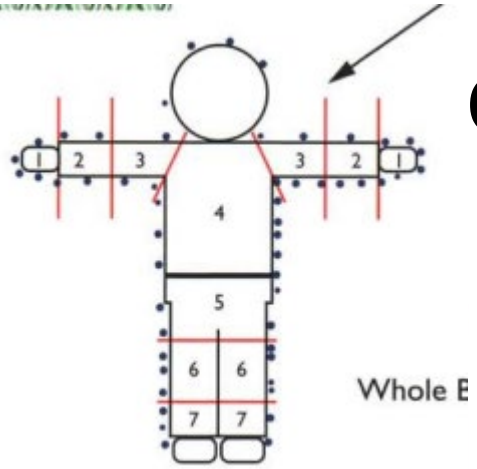
Where do the PPE recommendations come from?

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.

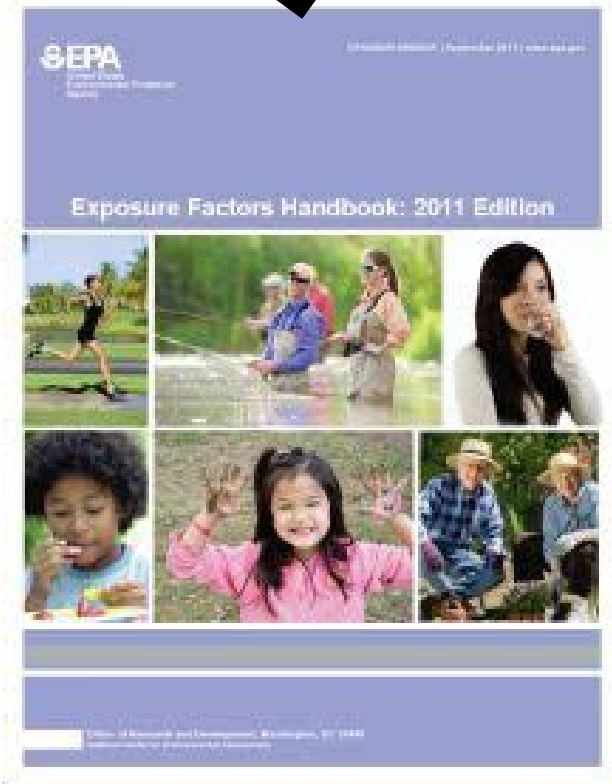


EP length out how much
pe expose



Whole E

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 = $\frac{\text{NOAEL = dose harm starts}}{\text{EED = how much contact}}$

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

$\frac{75}{50}$ = **MOE 1.5**

Is it ok to wear shorts and no gloves?

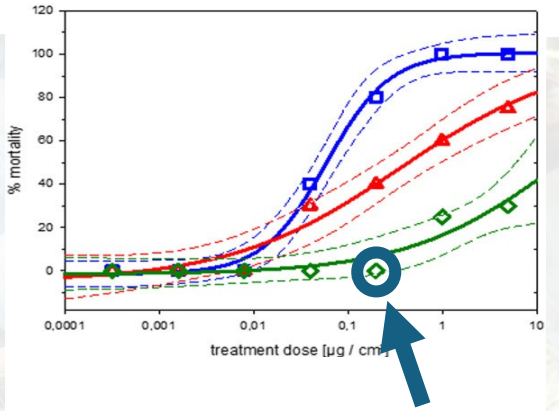
MOE = NOAEL/Estimated Exposure Dose = NOAEL = dose harm starts / EED = how much contact

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:

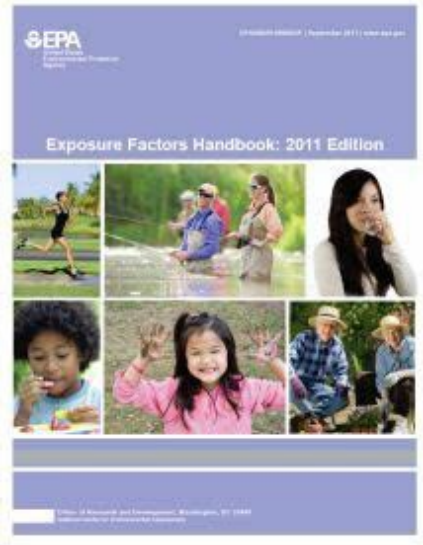
NOAEL = 75 ppm

Shorts + no gloves leads to 50 ppm exposure

EED = 50 ppm

75 / 50

ok to wear
ts and no
es?



MOE = NOAEL/Estimated Exposure Dose = $\frac{\text{NOAEL = dose harm starts}}{\text{EED = how much contact}}$

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

$\frac{75}{50}$ = **MOE 1.5**

Is it ok to wear shorts and no gloves?

MOE = NOAEL/Estimated Exposure Dose = $\frac{\text{NOAEL = dose harm starts}}{\text{EED = how much contact}}$

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

50 ppm

Let's assume:

NOAEL = 75 ppm

Shorts + no gloves leads to 50 ppm exposure

EED = 50 ppm

$\frac{75}{50}$ = **MOE 1.5**

Is it ok to wear shorts and no gloves

MOE = NOAEL/Estimated Exposure Dose = $\frac{\text{NOAEL = dose harm starts}}{\text{EED = how much contact}}$

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

50 ppm

5 ppm

Let's assume:

NOAEL = 75 ppm

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

$\frac{75}{0.5}$ = **MOE 150**

Is it ok to wear coveralls and gloves ?

MOE = NOAEL/Estimated Exposure Dose = $\frac{\text{NOAEL = dose harm starts}}{\text{EED = how much contact}}$

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

50 ppm

5 ppm

0.5 ppm

Let's assume:

NOAEL = 75 ppm

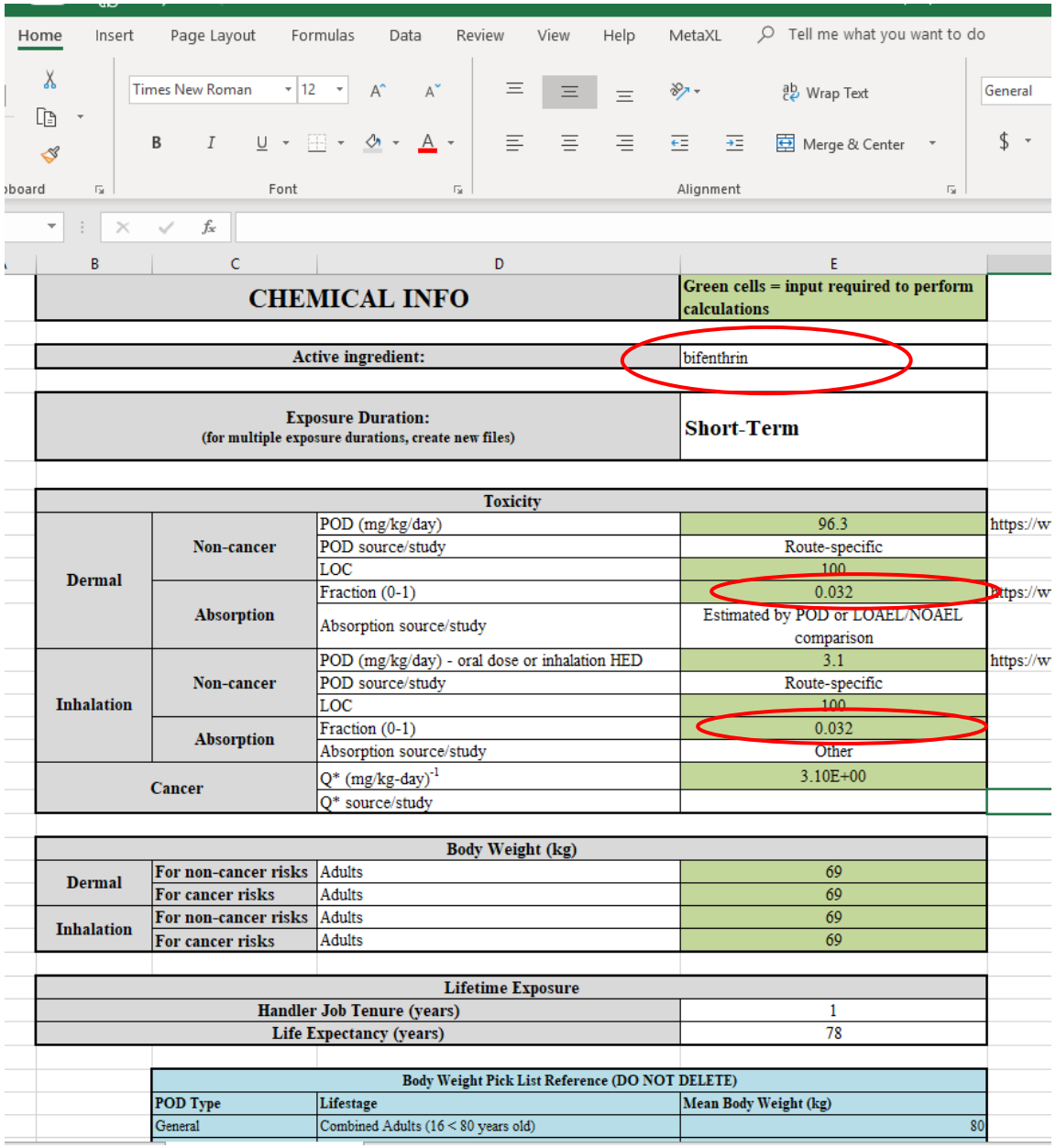
Coveralls + gloves leads to 5 ppm exposure
EED = 0.5 ppm

$\frac{75}{0.5}$ = **MOE 150**

Is it ok to wear coveralls and gloves

That’s the concept now for the math

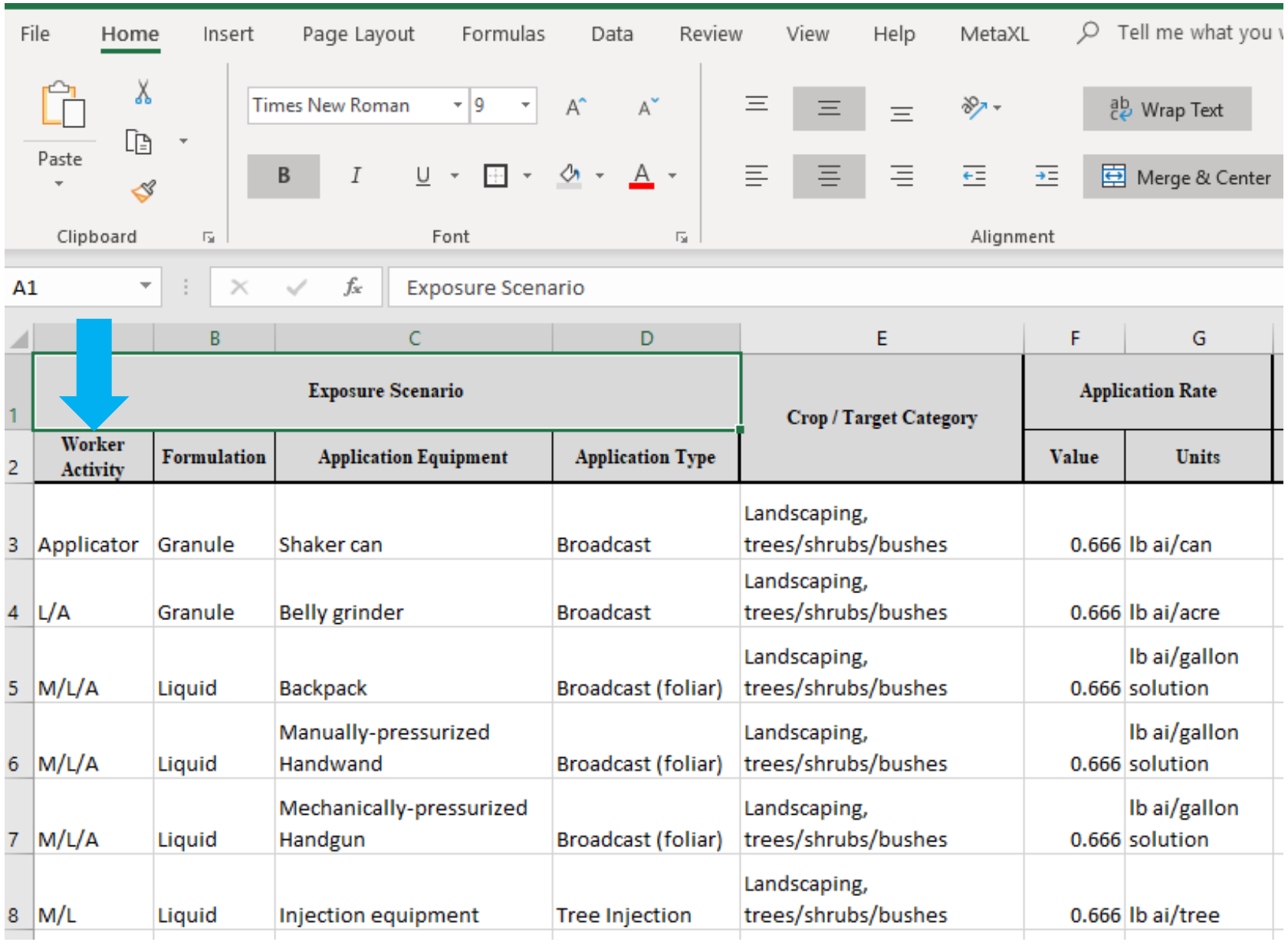
EPA's spreadsheets for determining PPE



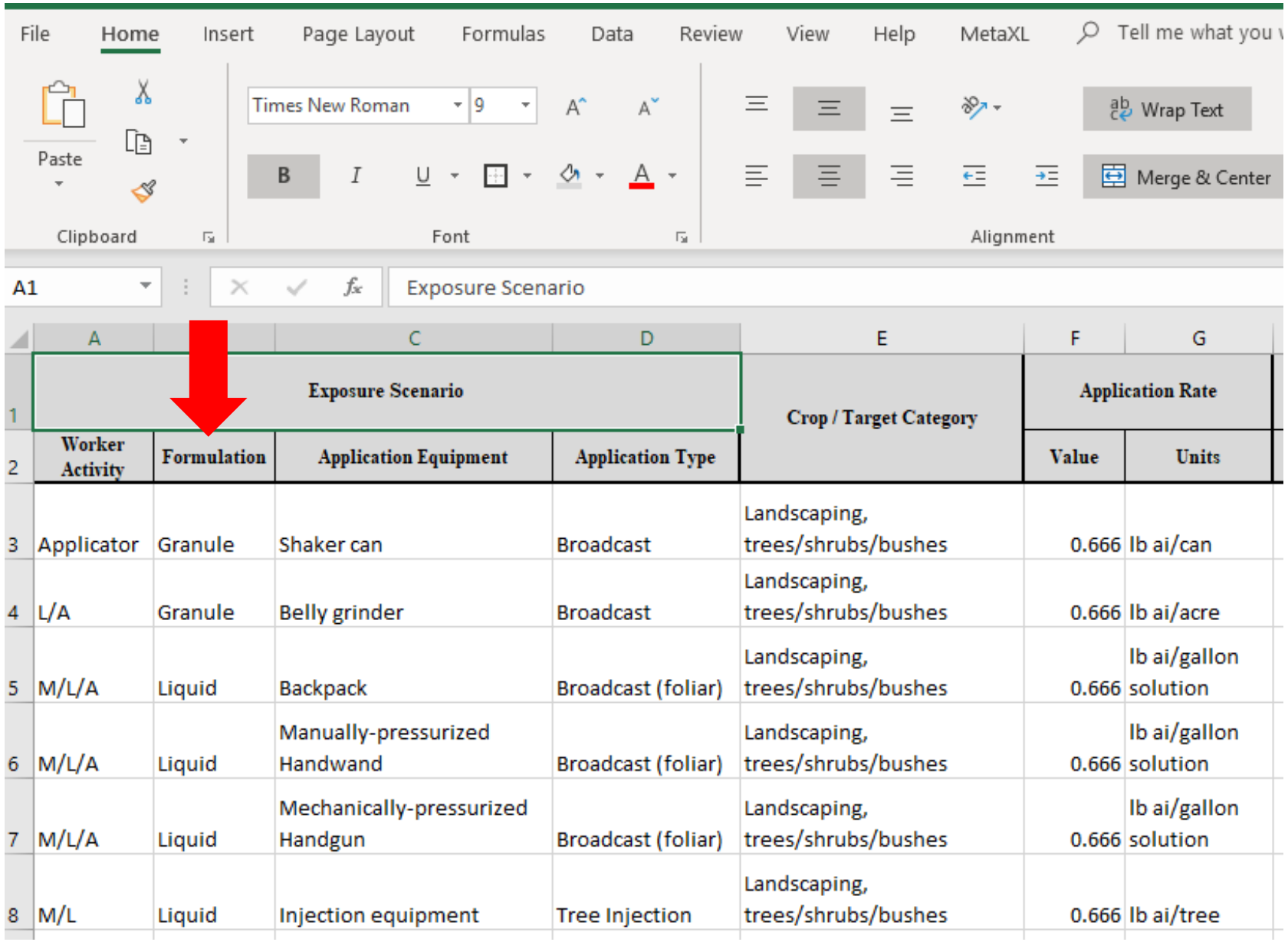
CHEMICAL INFO			Green cells = input required to perform calculations	
Active ingredient:			bifenthrin	
Exposure Duration: (for multiple exposure durations, create new files)			Short-Term	
Toxicity				
Dermal	Non-cancer	POD (mg/kg/day)	96.3	https://w
		POD source/study	Route-specific	
		LOC	100	
	Absorption	Fraction (0-1)	0.032	https://w
		Absorption source/study	Estimated by POD or LOAEL/NOAEL comparison	
Inhalation	Non-cancer	POD (mg/kg/day) - oral dose or inhalation HED	3.1	https://w
		POD source/study	Route-specific	
		LOC	100	
	Absorption	Fraction (0-1)	0.032	
		Absorption source/study	Other	
Cancer		Q* (mg/kg-day)$^{-1}$	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)



	B	C	D	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



	A	C	D	E	F	G
1	Exposure Scenario			Crop / Target Category	Application Rate	
2	Worker Activity	Formulation	Application Equipment	Application Type	Value	Units
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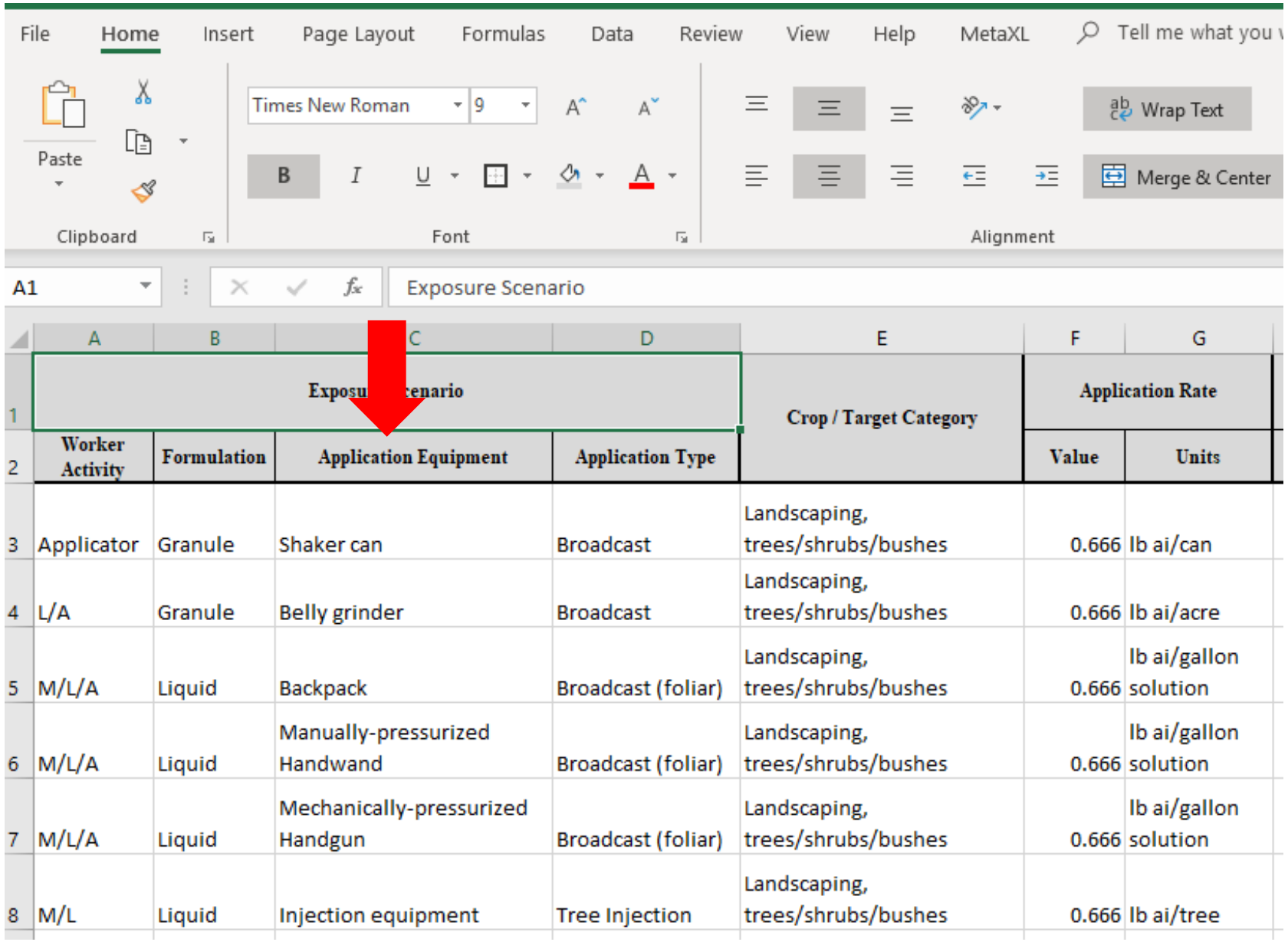
5	M/L/A	Liquid	Backpack	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
6	M/L/A	Liquid	Manually-pressurized Handwand	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
7	M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, 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



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1	Exposure Scenario				Crop / Target Category	Application Rate	
2	Worker Activity	Formulation	Application Equipment	Application Type		Value	Units
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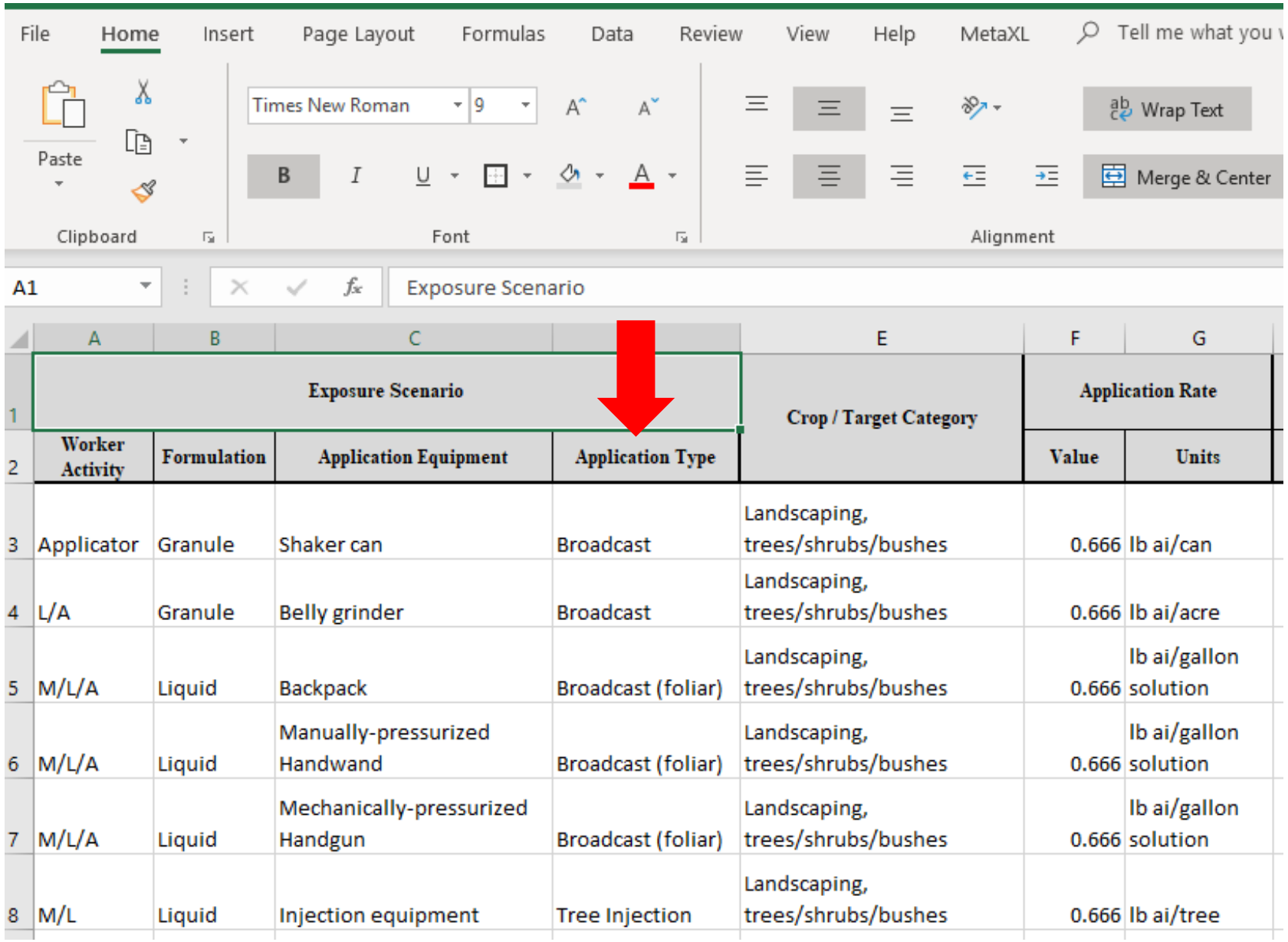
7	M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
8	M/L	Liquid	Injection equipment	Tree Injection	Landscaping, trees/shrubs/bushes	0.666	lb ai/tree



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1	**Exposure Scenario**				**Crop / Target Category**	**Application Rate**	
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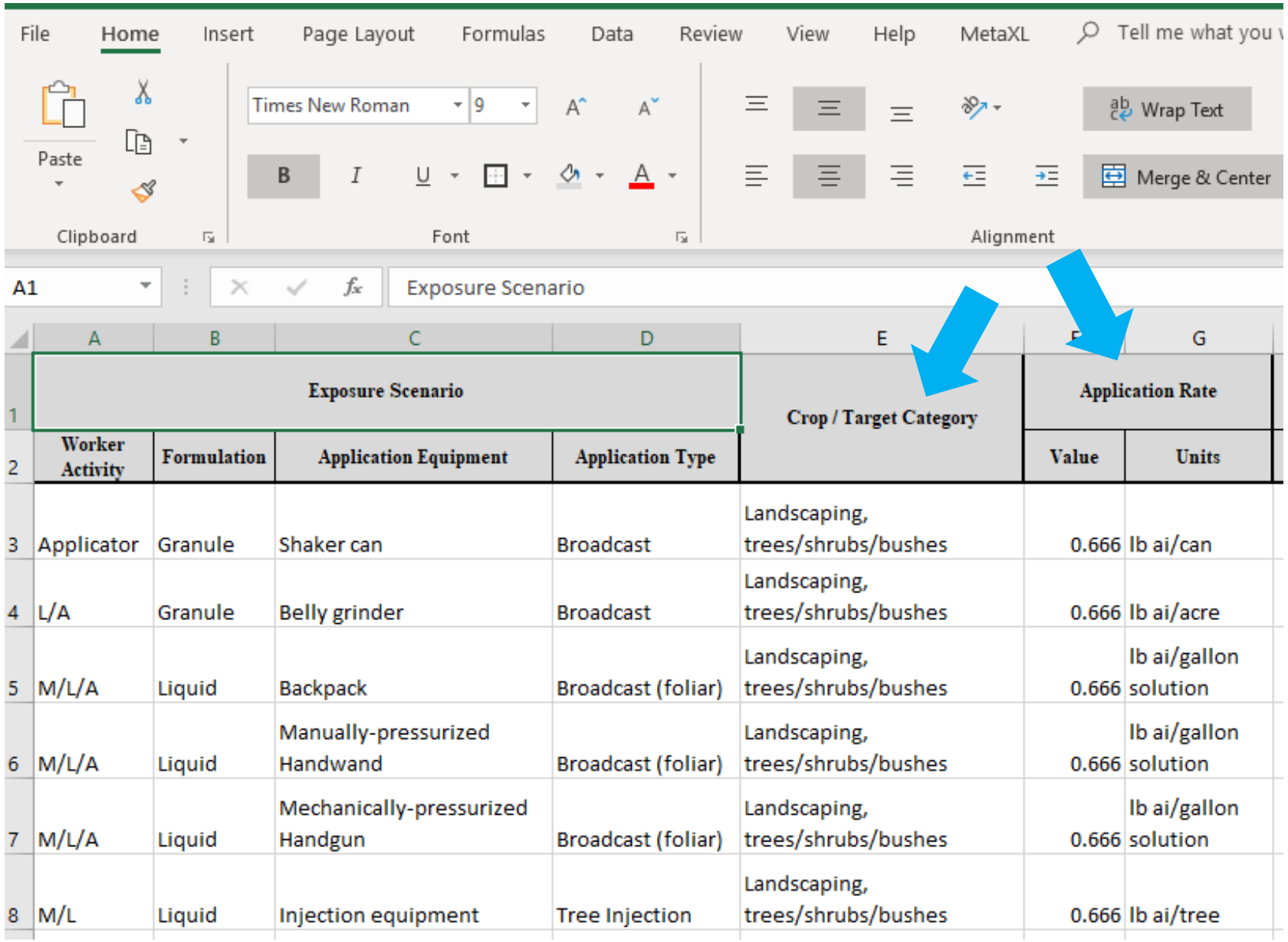
7	M/L/A	Liquid	Mechanically-pressurized Handgun	Broadcast (foliar)	Landscaping, trees/shrubs/bushes	0.666	lb ai/gallon solution
8	M/L	Liquid	Injection equipment	Tree Injection	Landscaping, trees/shrubs/bushes	0.666	lb ai/tree



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1	**Exposure Scenario**				**Crop / Target Category**	**Application Rate**	
2	**Worker Activity**	**Formulation**	**Application Equipment**	**Application Type**		**Value**	**Units**
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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

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	[illegible]0	61,000	18,000	150,000	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	[illegible]0	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	[illegible]0	61,000	18,000	[illegible]0	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	[illegible]0	31,000	28,000	[illegible]	34,000	41,000	53,000	55,000
Liquid	Backpack	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	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		
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face
Granule	Shaker can	15,000	[illegible]0	61,000	18,000	[illegible]0	380,000	18,000	[illegible]0	380,000
Granule	Belly grinder	26,000	[illegible]0	31,000	28,000	[illegible]0	34,000	41,000	[illegible]0	55,000
Liquid	Backpack	130	[illegible]	130	240	[illegible]	260	410	[illegible]	460
Liquid	Manually-pressurized Handwand	77	[illegible]	78	5,700	[illegible]	17,000	6,000	[illegible]0	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 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
		No respirator	Half-face	Full-face	No respirator	Half-face	Full-face	No respirator	Half-face	Full-face

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	[illegible]0	61,000	18,000	[illegible]0	380,000	18,000	150,000	380,000
Granule	Belly grinder	26,000	[illegible]0	31,000	28,000	[illegible]0	34,000	41,000	53,000	55,000
Liquid	Backpack	130	[illegible]30	130	240	[illegible]0	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 0	380,000
Granule	Belly grinder	26,000	0	31,000	28,000	0	34,000	41,000		55,000
Liquid	Backpack	130	30	130	240		260	410		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	Ba[illegible]ack	130	130	130	240	260	260	410	450	460
Liquid	Ma[illegible]ized H[illegible]nd	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	M[illegible]ally-pressu[illegible]andgun	49	51	51	130	150	150	190	230	230
Liquid	Inject[illegible]ipment	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	Ba[illegible]ack	130	130	130	240	260	260	410	450	460
Liquid	Ma[illegible]ized H[illegible]nd	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	M[illegible]ally-pressu[illegible]andgun	49	51	51	130	150	150	190	230	230
Liquid	Inject[illegible]ipment	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	Ba[illegible]ack	130	130	130	240	260	260	410	450	460
Liquid	Ma[illegible]ized H[illegible]nd	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	M[illegible]ally-pressu[illegible]andgun	49	51	51	130	150	150	190	230	230
Liquid	Inject[illegible]ipment	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	Ba…ack	130	130	130	240	260	260	410	450	460
Liquid	Ma… …ized H… …nd	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	M… …ally-pressu… …andgun	49	51	51	130	150	150	190	230	230
Liquid	Inject… …ipment	38,000	39,000	39,000	200,000	230,000	230,000	240,000	290,000	300,000
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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		
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Granule	Belly grinder	26,000	30,000	31,000	28,000	33,000	34,000	41,000	53,000	55,000
Liquid	Ba[illegible]ack	130	130	130	240	260	260	410	450	460
Liquid	Ma[illegible]ized H[illegible]nd	77	78	78	5,700	15,000	17,000	6,000	17,000	20,000
Liquid	M[illegible]ally-pressu[illegible]andgun	49	51	51	130	150	150	190	230	230
Liquid	Inject[illegible]ipment	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 Equipr	Single Layer | No gloves			Single Layer | Gloves			Double Layer | Gloves		
Granule	Shaker							150,000	380,000	
Granule	Belly gr							53,000	55,000	
Liquid	Ba							450	460	
Liquid	Ma H							17,000	20,000	
Liquid	M pressu andgun	49	51	51	150	150	150	190	230	230
Liquid	Inject ipment	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

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

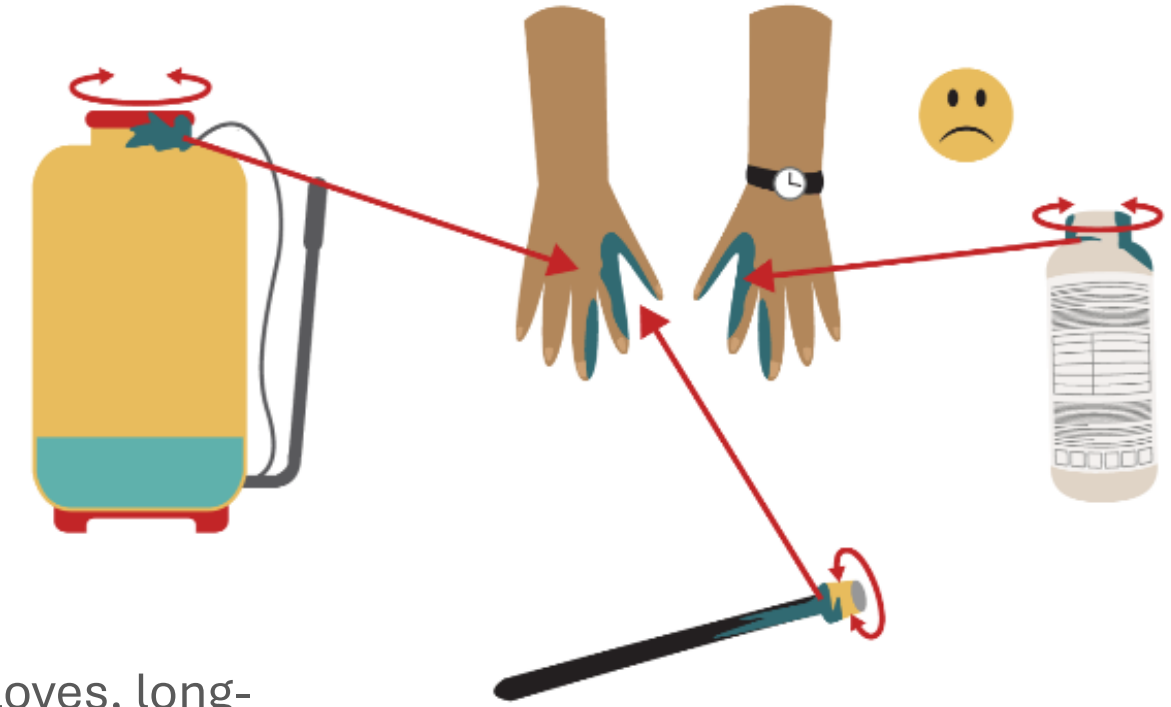
Here are modelled data from EPA

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								53,000	55,000
Liquid	Backpack								450	460
Liquid	Manually-pressu Handwand								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

The language on labels is not just a bunch of made-up directions by the manufacturer or their attorneys.

PPE requirements and usage details are highly dictated by EPA.

Wear PPE



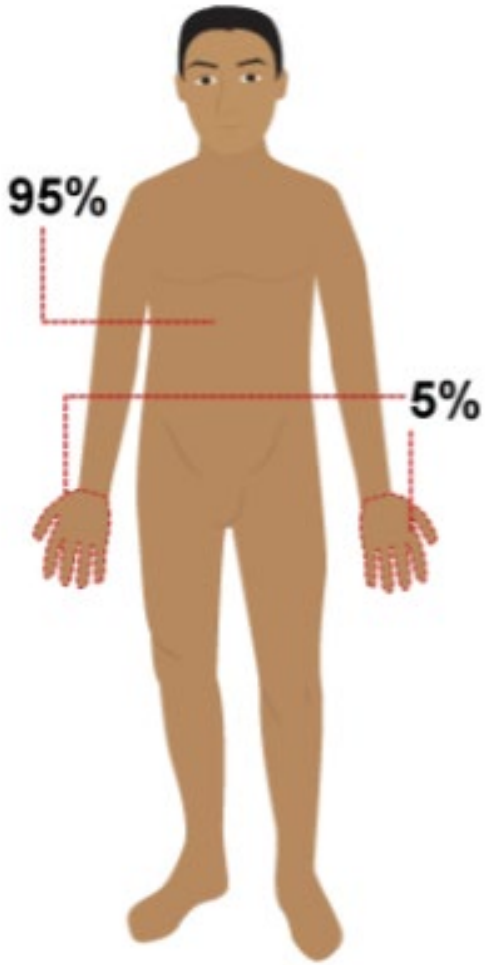
- Read the label
- Daily exposures can add up over time
- Consider a basic minimum PPE kit of gloves, long-sleeves, pants, close-toed shoes, & eye protection.

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.

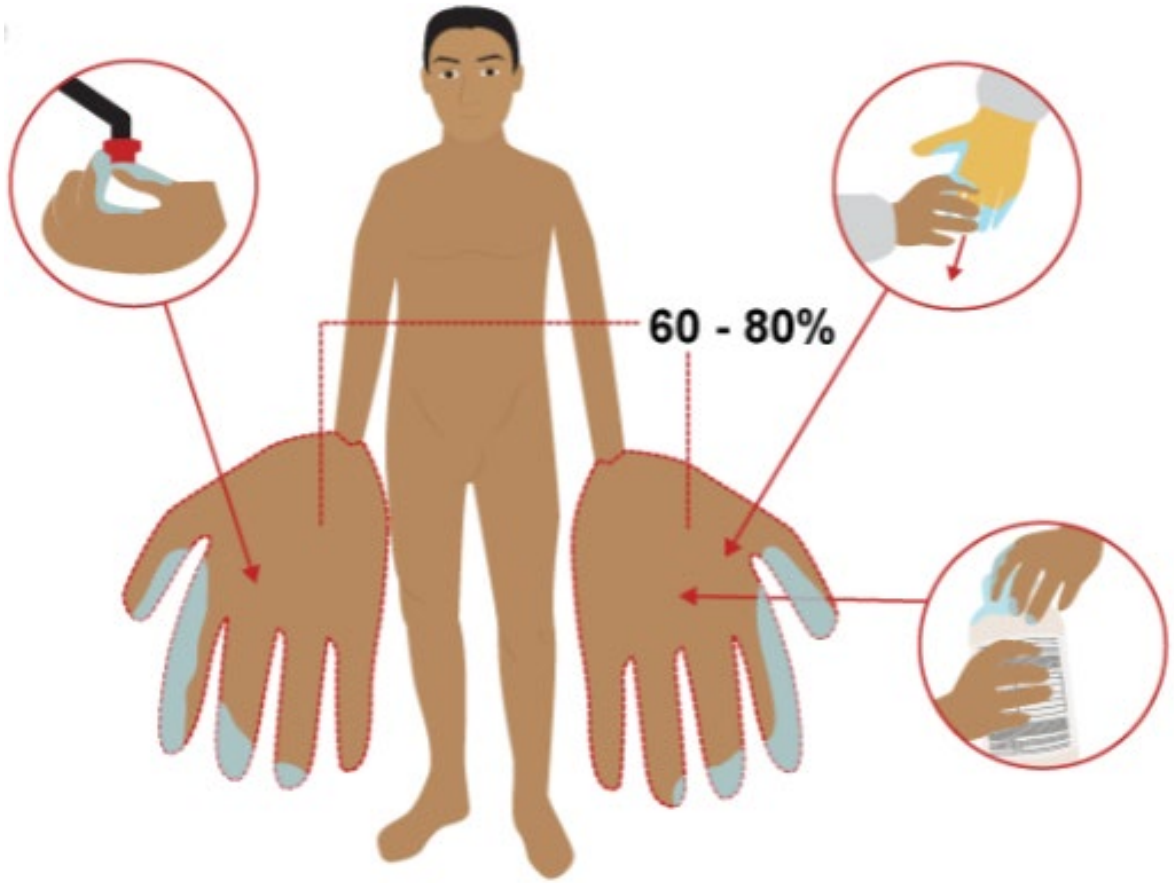
Consider this

Your hands are only 5% of your body’s surface area…



Consider this

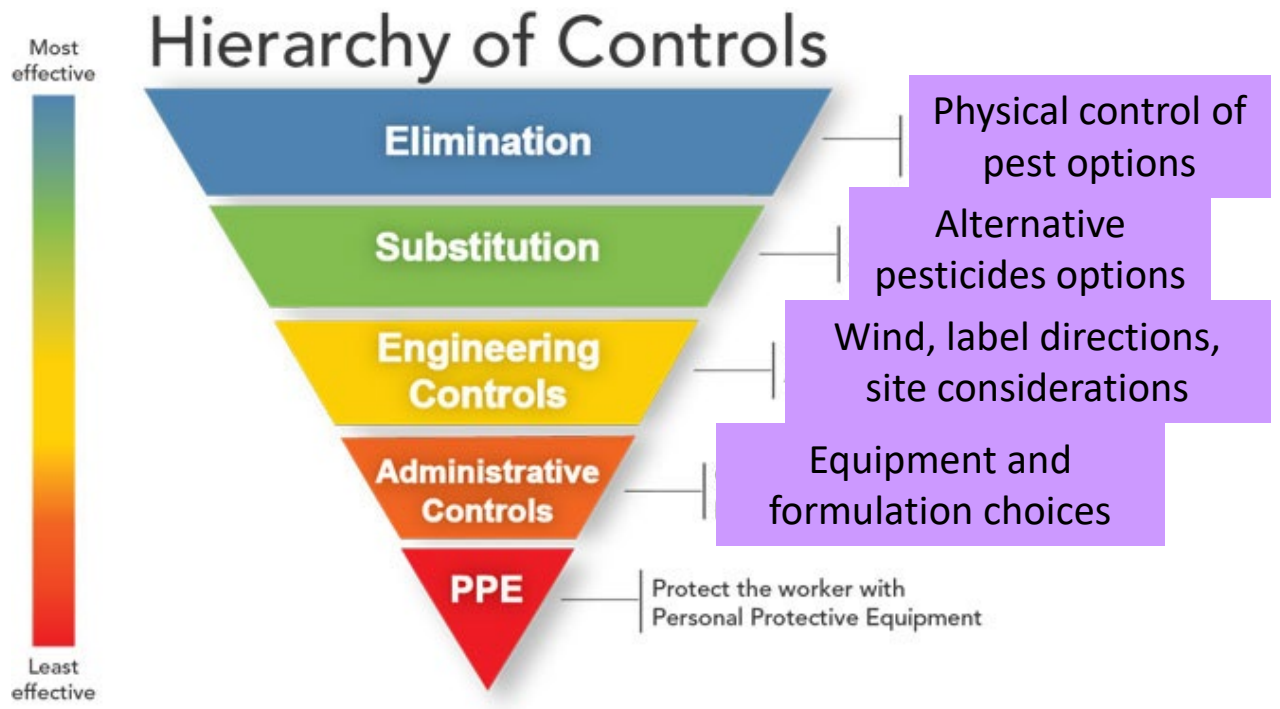
...but they perform most of the contact your body will do in a day.



Most pesticide exposures do not happen during the application

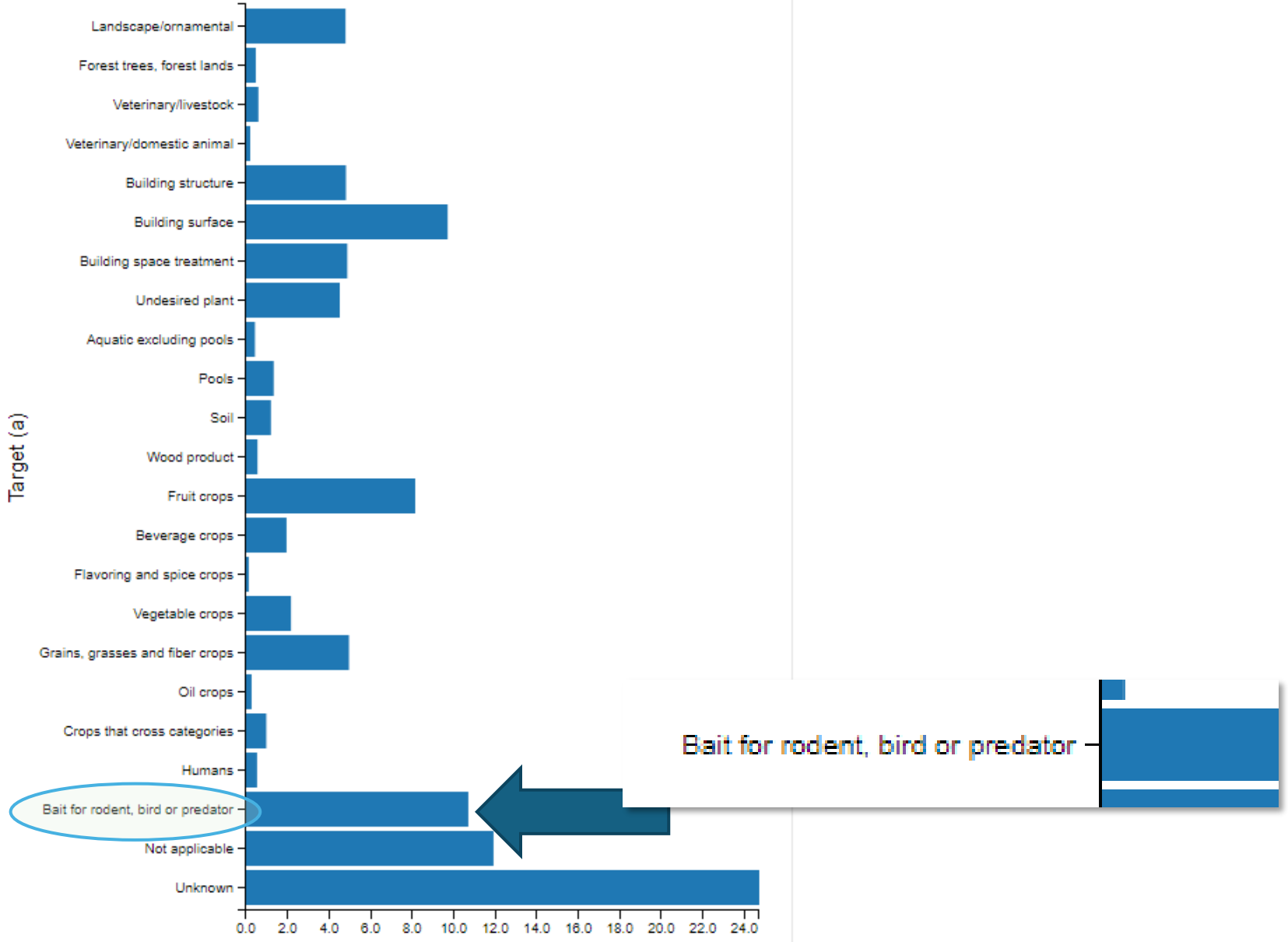
- In 2000, an 18-month-old boy ingested an unknown amount of paraquat solution from a bottle found in his father's landscaping truck. He received multiple-dose activated charcoal treatment two hours after the ingestion. He suffered from lack of oxygen during the first 24 hours followed by progressive 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.

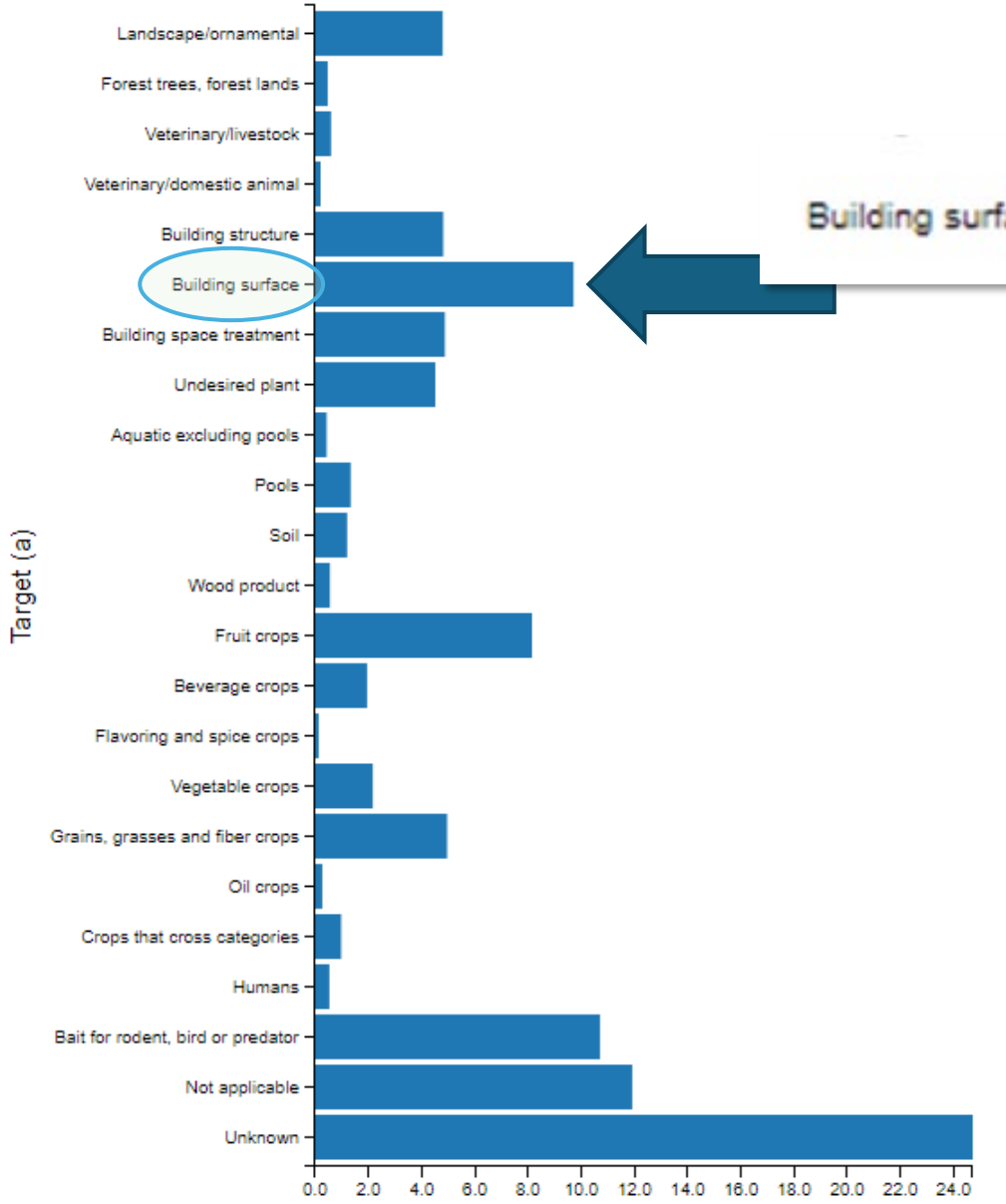


For those in positions to make decisions about job site management, ask yourself, “What other options are there?”

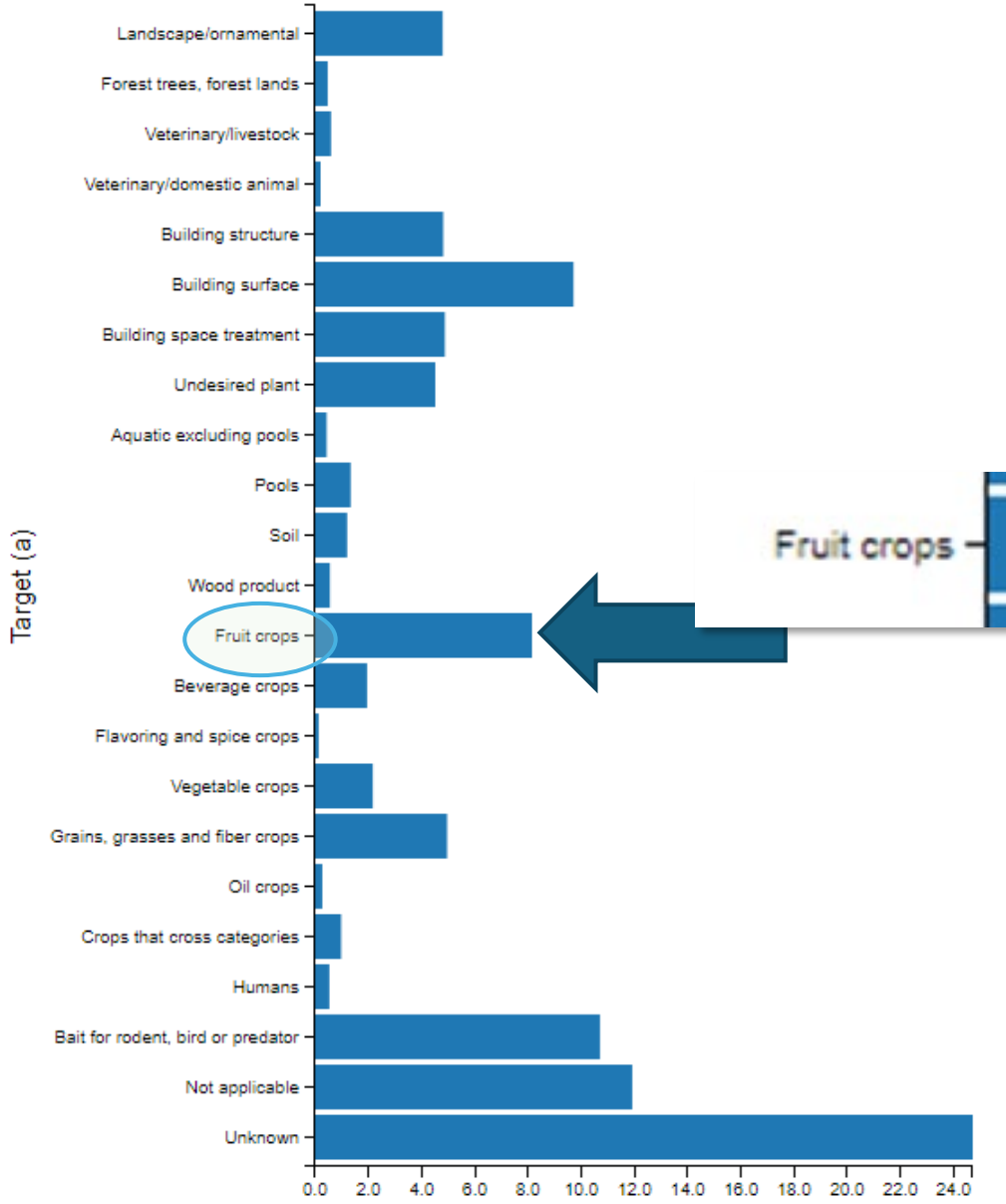
Distribution (%) of Acute Pesticide-Related Illnesses by Target, All Participating States, 1998 - 2011



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



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



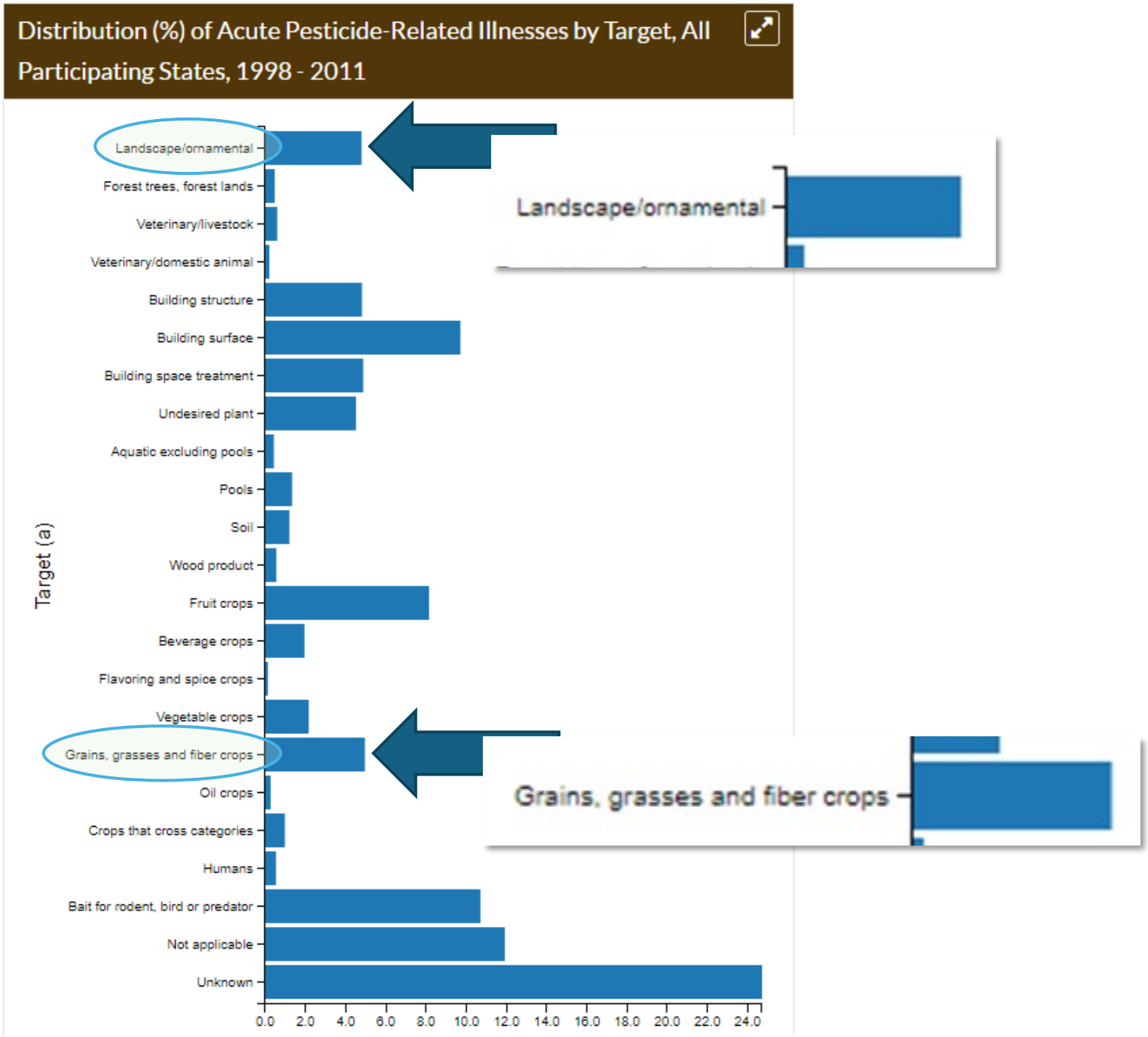
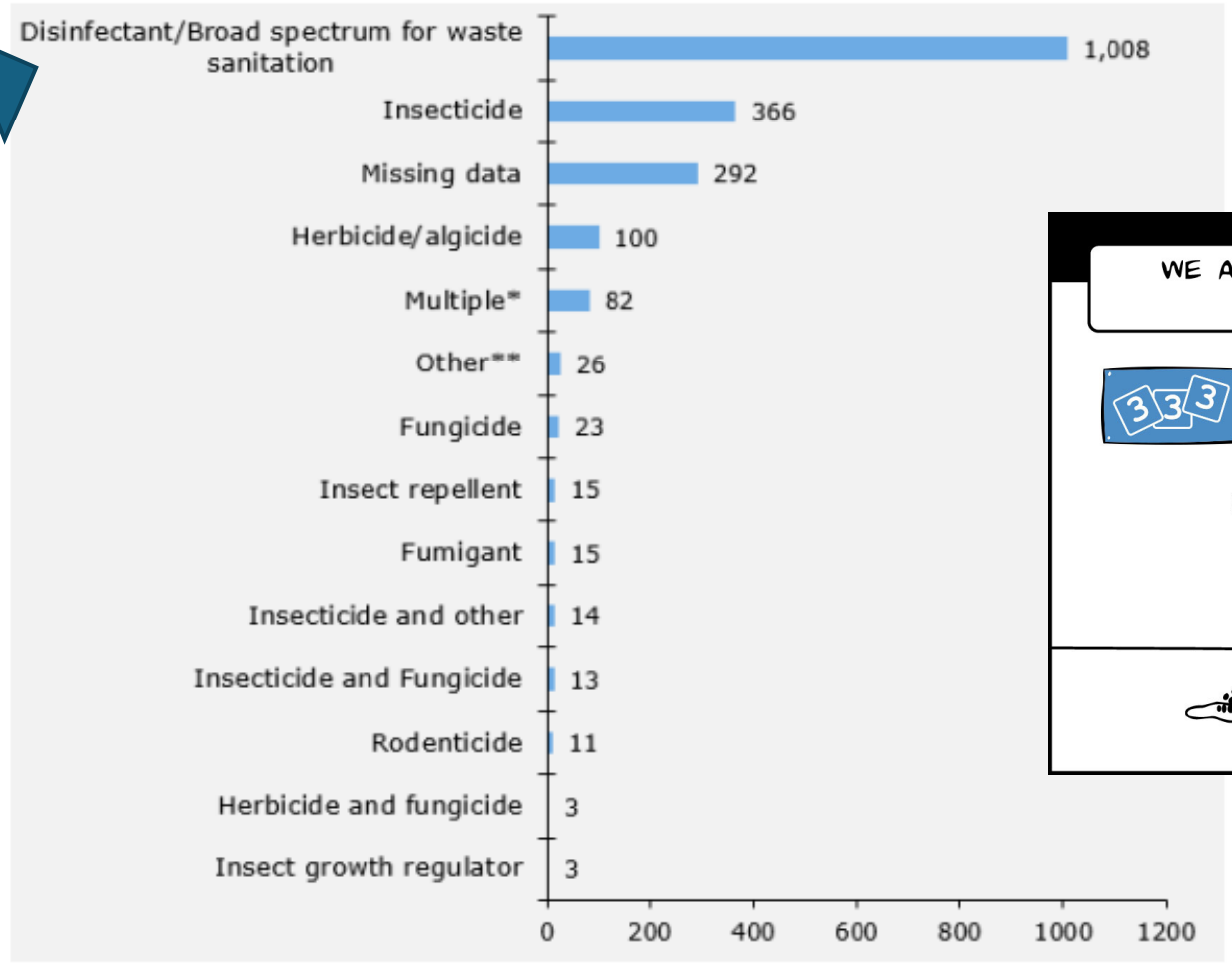

Distribution (%) of Acute Pesticide-Related Illnesses by Target, All Participating States, 1998 - 2011
Target (a)
Landscape/ornamental
Forest trees, forest lands
Veterinary/livestock
Veterinary/domestic animal
Building structure
Building surface
Building space treatment
Undesired plant
Aquatic excluding pools
Pools
Soil
Wood product
Fruit crops
Beverage crops
Flavoring and spice crops
Vegetable crops
Grains, grasses and fiber crops
Oil crops
Crops that cross categories
Humans
Bait for rodent, bird or predator
Not applicable
Unknown
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
Landscape/ornamental
Grains, grasses and fiber crops

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



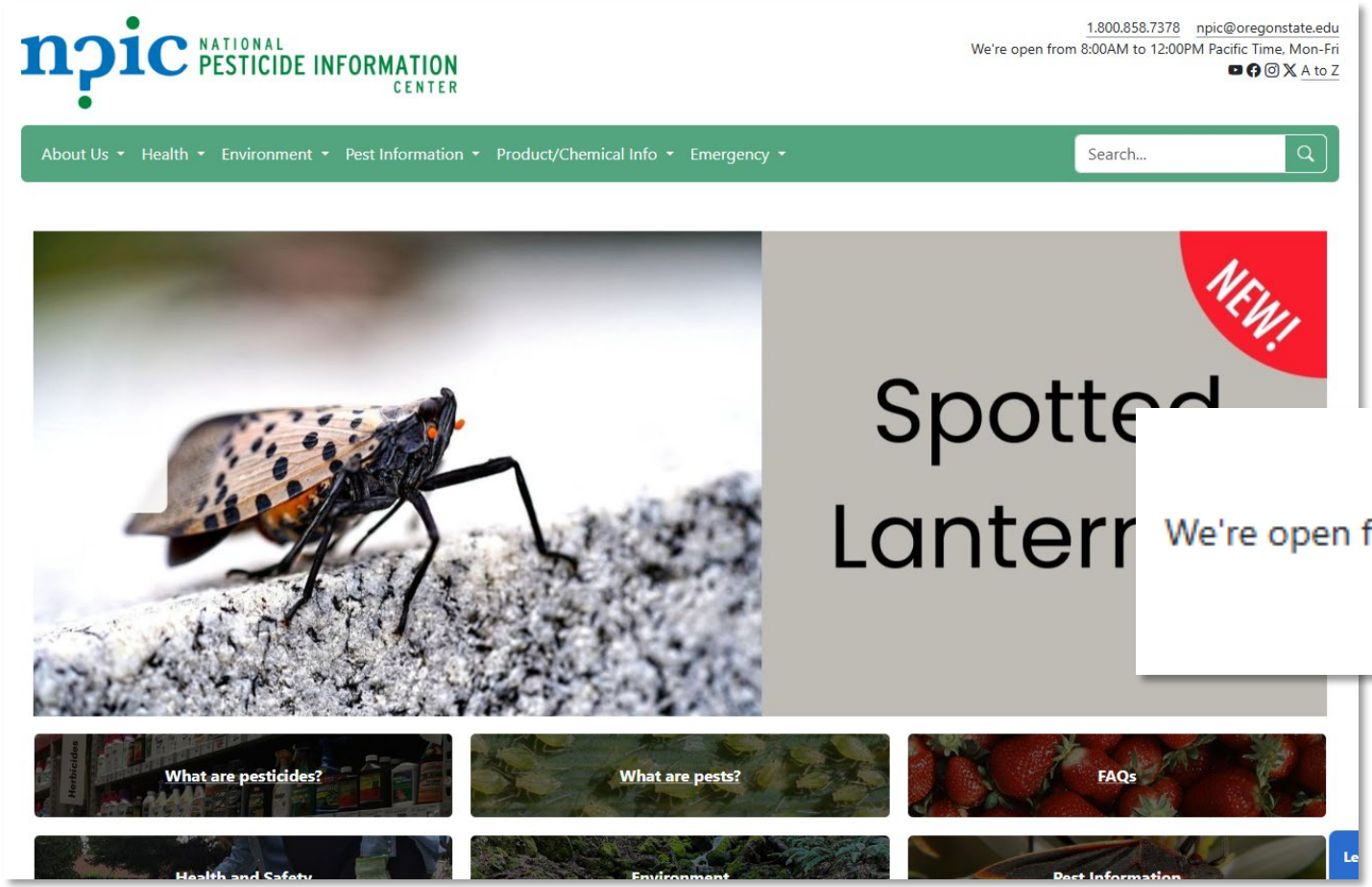
*Multiple includes products that fit in more than one product type category.
**Other includes biological controls or biopesticides (pesticides obtained from natural materials such as animals, plants, bacteria and certain minerals), plant growth regulators, antibiotics, etc.

TEXAS Health and Human Services

Free anonymous help (most all languages)

1-800-222-1222

Free anonymous help (most any language)



1.800.858.7378 npic@oregonstate.edu
We're open from 8:00AM to 12:00PM Pacific Time, Mon-Fri
A to Z

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

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AGENCY OF AGRICULTURE, FOOD & MARKETS

Thank you!

Pam Bryer
pam.bryer@vermont.gov

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.aspx

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/