

# Glyphosate

Terrible Toxin or Terrific Tool?



Jeff Miller



## Our discussion today

1. What is glyphosate?
2. Is it a terrible toxin? Does it cause cancer?
3. Is it in my food?
4. Is it a terrific tool?

## Glyphosate

- Most commonly used herbicide in the world.
  - First used in the 1970s
  - Kills broadleaf and grasses
  - Interferes with shikimic acid pathway (plants and microorganisms)
  - Used as a growth regulator and ripening agent.
  - NOAEL = 175 mg/kg/day for maternal toxicity
- Over 750 products in the US.
  - Since 1996, use has increased 15X
  - 2/3 of total use in last 10 years (40 year history)

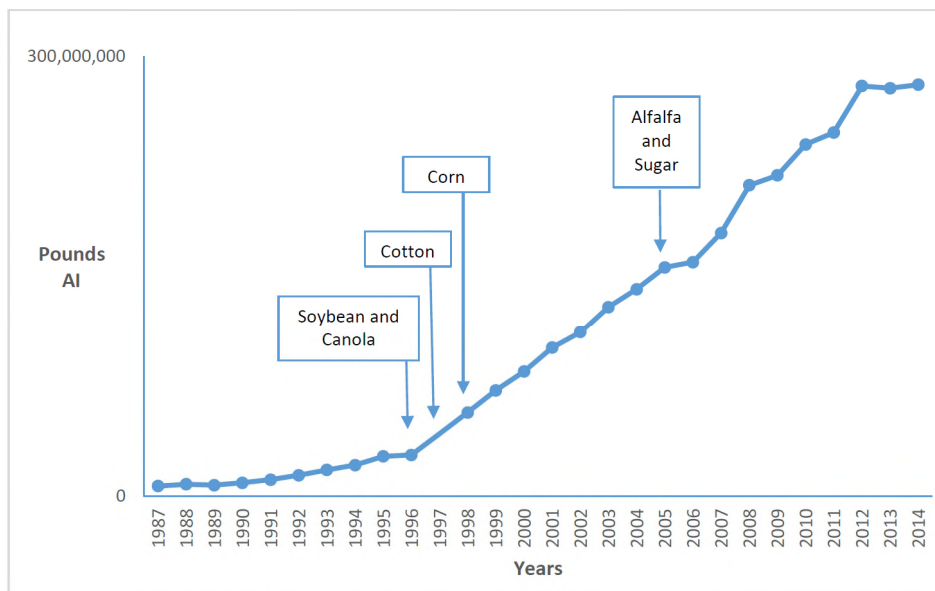


Figure 1.2. Glyphosate agricultural usage (pounds applied annually) from 1987- 2014. Boxes indicate years when glyphosate-resistant crops were introduced. Source: Proprietary Market Research Data (1987 – 2014).

Adapted from Glyphosate Issue Paper: Evaluation of Carcinogenic Potential (EPA)

## Toxicity Values of Common Products

Pesticide	LD50 (ppm)	Product	LD50 (ppm)
Aldicarb	0.8	Capsaicin	47
Diazinon	300	Caffeine	200
Copper sulfate	300	Ethylene glycol	460
Ridomil Gold SL	550	Benadryl	500
2,4-D	660	Flonase	1000
Malathion	1000	Acetylsalicylic acid	1000
Atrazine	1780	Vitamin A	2000
		Amoxicillin	2870
		Sodium chloride	3320
Glyphosate	4320	Accutane	4000
Phosphorous acid	>5000		

## Monsanto ordered to pay \$289m as jury rules weedkiller caused man's cancer

Court finds in favor of Dewayne Johnson, first person to take Roundup maker to trial



▲ Dewayne Johnson listens during the Monsanto trial in San Francisco last month. Photograph: Reuters

\$39 million – compensatory damages  
\$250 million – punitive damages

Screenshot from The Guardian  
<https://www.theguardian.com/business/2018/aug/10/monsanto-trial-cancer-dewayne-johnson-ruling>

Is glyphosate a “terrible toxin”?

Will glyphosate cause cancer?

## IARC – International Agency for Research on Cancer

- Formed in 1965
- Part of the World Health Organization
- Classification of substances – evidence for carcinogenicity
  - Not the relative risk due to exposure
- March 2015 – Glyphosate classified as “probably carcinogenic to humans”
  - Evidence in experimental animals was sufficient
  - Evidence in humans was limited
  - No evidence for harm from exposure through food

[International Agency for Research on Cancer](http://www.iarc.fr)



Copied from [www.iarc.fr](http://www.iarc.fr)

## IARC Cancer Classifications

Group	Description	# of Agents
1	Carcinogenic to humans	120
2A	Probably carcinogenic to humans	82
2B	Possibly carcinogenic to humans	311
3	Not classifiable as to its carcinogenicity to humans	499
4	Probably not carcinogenic to humans	1

<https://monographs.iarc.fr/agents-classified-by-the-iarc/>

## Group 1 Substances Examples – Carcinogenic

- Alcoholic beverages (acetaldehyde, ethanol)
- Asbestos
- Diesel engine exhaust
- Estrogen therapy
- Hepatitis virus (B and C)
- Leather dust
- Mineral oils
- Outdoor air pollution
- Painter (occupational exposure)
- Processed meat
- Salted fish (Chinese style)
- Solar radiation
- Tamoxifen (can also reduce breast cancer)
- Tobacco smoking
- UV radiation
- Wood dust

## Group 2A Substances Examples – Probably Carcinogenic

- Acrylamide
- Diazinon
- **Glyphosate**
- Lead compounds
- Malaria
- Emissions from high temp frying
- Indoor wood burning
- Red meat
- Very hot beverages (over 150°F)
- Being a hairdresser or barber
- Shift work (circadian disruption)

## Group 2B Substances Examples – Possibly Carcinogenic

- Chlorothalonil
- Coconut oil diethanolamine
- DDT
- Diesel fuel
- Gasoline engine exhaust
- *Fusarium moniliforme* toxins
- Parathion
- Bracken ferns
- Ginkgo biloba extract
- Aloe vera
- Carpentry and firefighting
- Printing processes
- Magnetic and radio fields
- Welding fumes
- Talc-based body powders

## IARC – International Agency for Research on Cancer

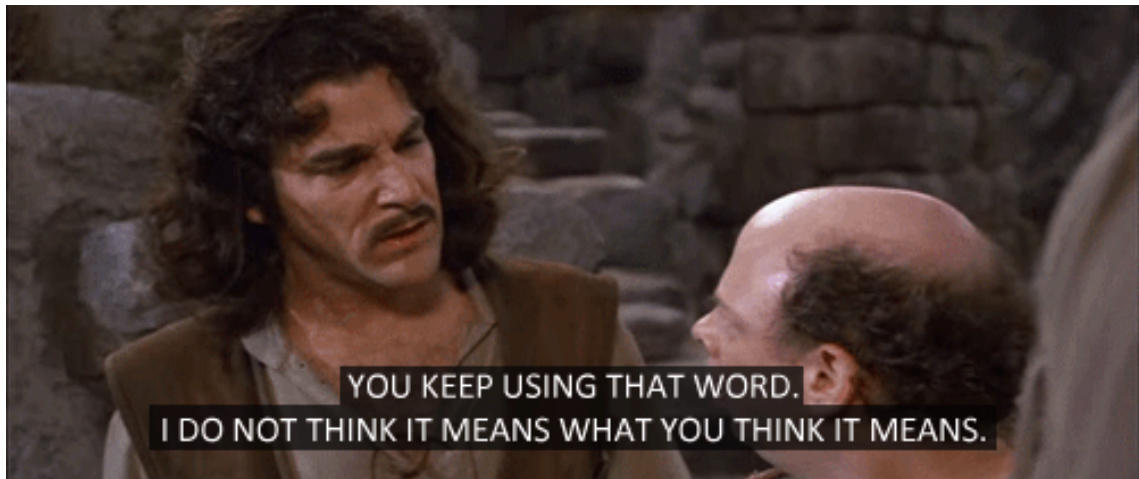
“The IARC Monographs evaluation is a **hazard** classification. It indicates the strength of evidence that glyphosate can cause cancer. The probability of developing cancer will depend on factors such as the type and extent of exposure and the strength of the effect of the agent.”

(<https://www.iarc.fr/featured-news/media-centre-iarc-news-glyphosate/>)

## Problems with the IARC Glyphosate classification

1. Does not take exposure into account
2. Did not use all available data
  - Some data were withheld (Aaron Blair)
3. Potential conflict of interest
4. Data from original research not always interpreted properly?
  - 10 significant changes
  - Negative conclusions about glyphosate and tumors deleted or changed
5. Secretive – lack of transparency

# Hazard



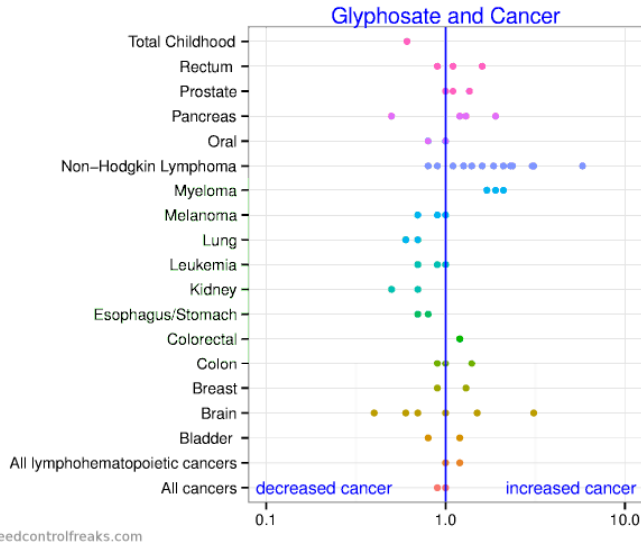
What is the difference between hazard and risk?



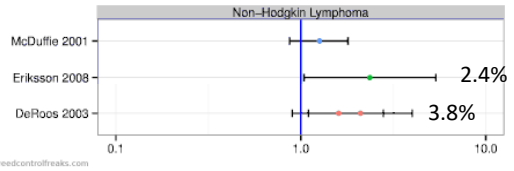
From the Campaign for Accuracy in Public Health Research



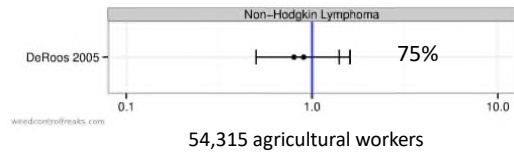
# What do the data actually say?



### Case control studies:

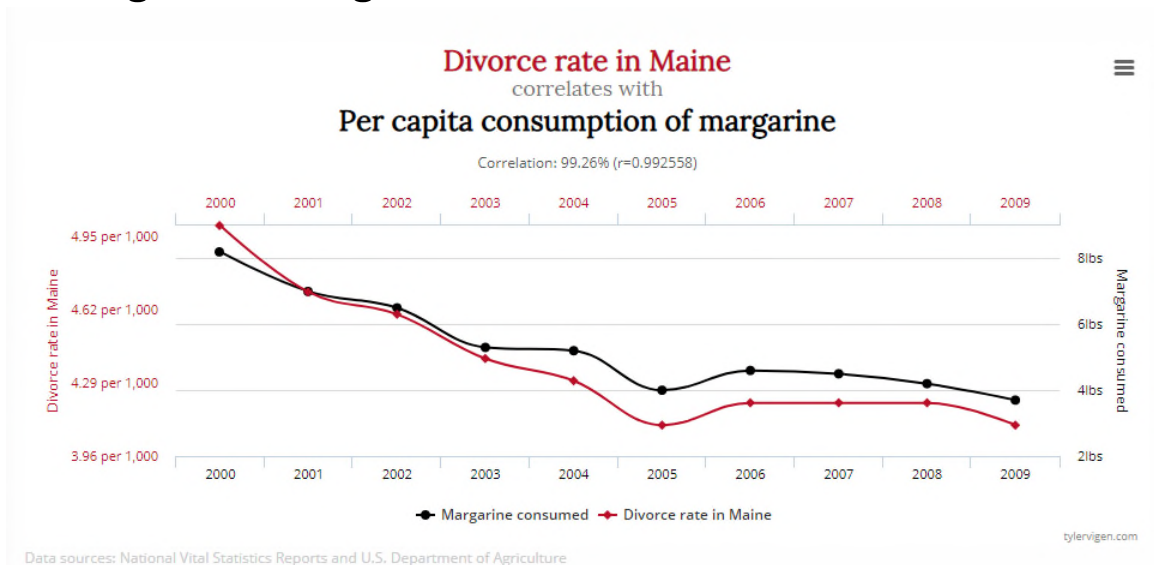


### Cohort study:

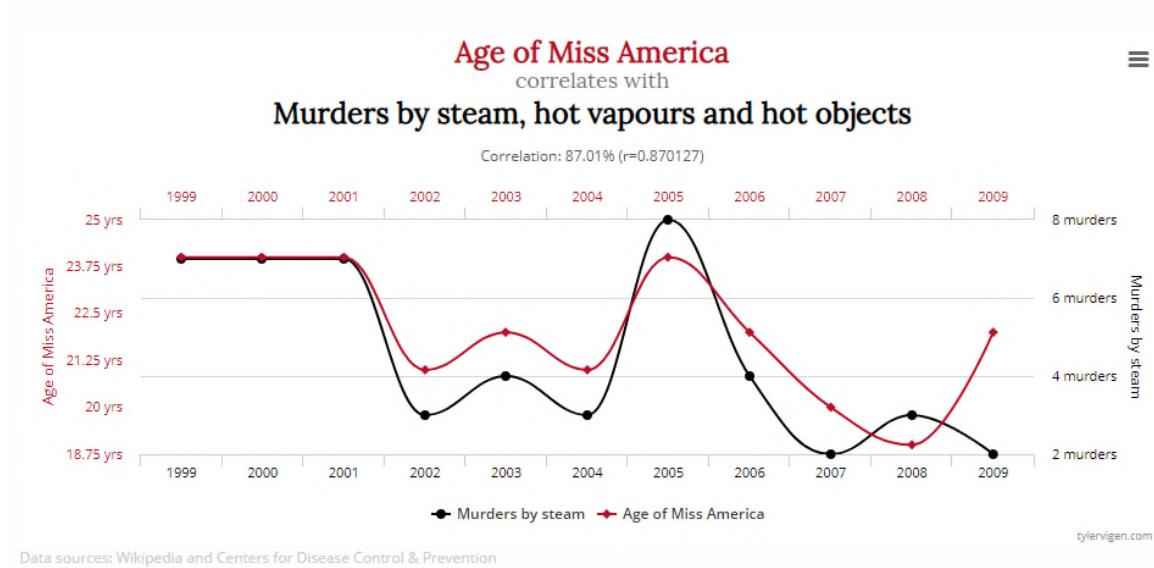


Adapted from Andrew Kniss, Glyphosate and Cancer: What does the data say?

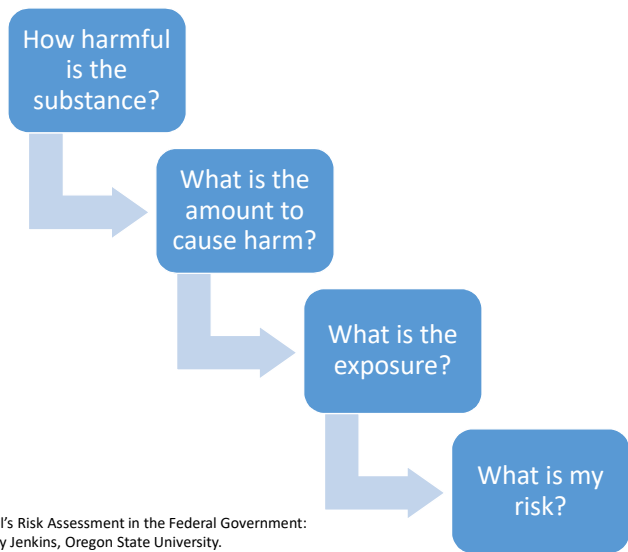
# Danger of using correlations...



## Danger of using correlations...



## How does the US EPA assess risk?



Adapted from the National Research Council's Risk Assessment in the Federal Government: Managing the Process, 1983. Cited by Jeffrey Jenkins, Oregon State University.

## Agricultural Health Study – Glyphosate and Cancer

- Andreotti et al., 2018, J Natl Cancer Inst. 110(5):509-519
- Extended previous cohort study by 12 years, 4x the cancer cases
- Iowa and North Carolina
- Controlled for exposure to other pesticides
- 54,251 participants, 44,932 reported exposure to glyphosate
- **Pesticide applicators: no evidence of positive association**
  - Some evidence of acute myeloid leukemia in highest exposure quartile (not statistically significant)
- Some limitations

THE TIMES

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### Weedkiller scientist was paid £120,000 by cancer lawyers

Ben Webster, Environment Editor

October 18 2017, 12:01am,  
The Times



Christopher Portier advised the International Agency for Research on Cancer, part of the World Health Organisation, which declared that glyphosate was a probable human carcinogen

A scientist who advised a United Nations agency to classify the world's most widely used weedkiller as carcinogenic received \$160,000 (£121,500) from law firms bringing claims by cancer victims against the manufacturer.

Christopher Portier advised the International Agency for Research on Cancer (IARC), part of the World Health Organisation, which concluded in March 2015 that glyphosate was a "probable human carcinogen".

London Times

## Conflict of Interest? – Dr. Christopher J. Portier

- Activist for the Environmental Defense Fund ([www.edf.org](http://www.edf.org))
- Elected Chair of IARC Glyphosate Monograph Advisory Group
- Signed a contract with two law firms suing Monsanto
  - 10 days after attending the IARC glyphosate monograph panel
  - \$160,000
  - Contract did not allow for transparency
- Claimed that “no one had paid him a cent” and that he “had no conflict of interest whatsoever.”

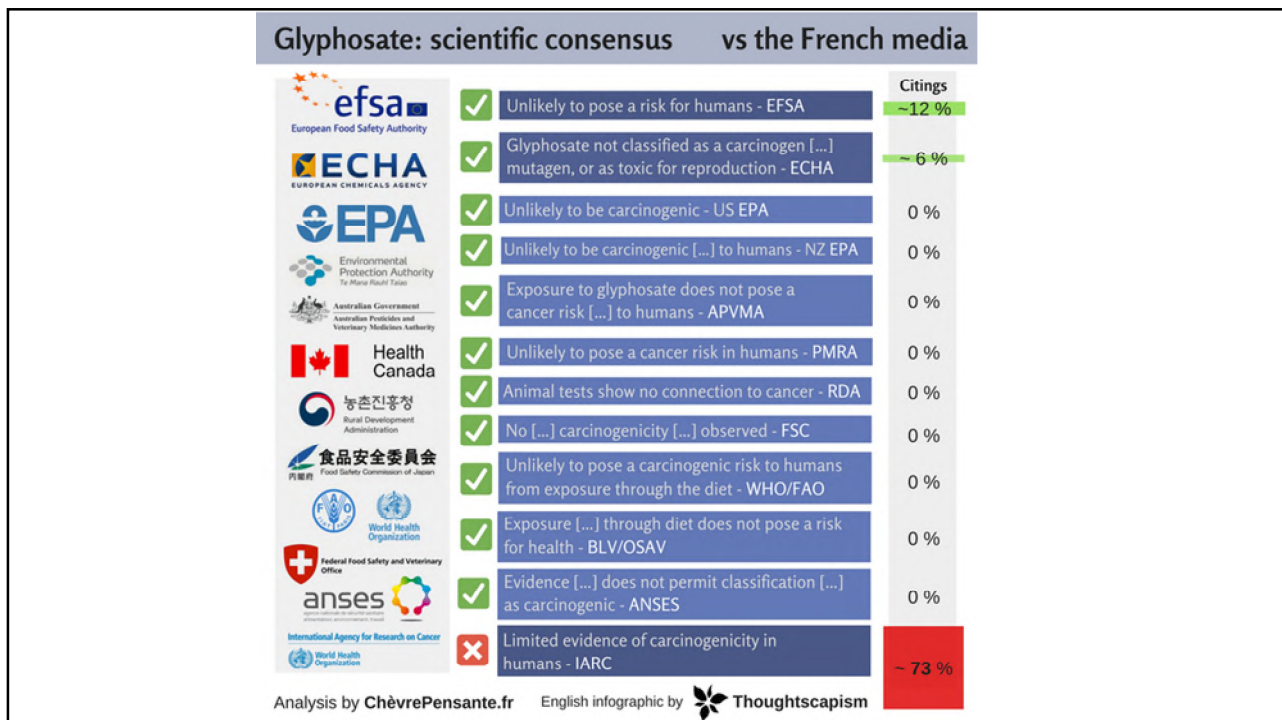
Adapted from the Risk Monger, “Greed, Lies, and Glyphosate: The Portier Papers

## What do other agencies say?

- No evidence of carcinogenic activity
  - US National Institute of Health, National Toxicology Program (NTP)
- Not likely to be carcinogenic to humans
  - US Environmental Protection Agency (EPA)
- No evidence of carcinogenicity
  - European Union, Canada, Australia, Japan
- Glyphosate unlikely to pose a significant risk to humans from exposure through diet
  - Joint FAO/WHO Meeting on Pesticide Residues (JMPR)



Adapted Jeffrey Jenkins, Oregon State University.



## IARC did not interpret all data properly

- Examples of original statements:

- “The authors concluded that glyphosate was not carcinogenic on Sprague Dawley rats”
- “The authors concluded that glyphosate technical acid was not carcinogenic in Wistar rats”
- “The authors concluded that glyphosate was not carcinogenic in CD-1 mice in this study.”

- IARC revision:

- “The Working Group was unable to evaluate this study because of the limited experimental data provided in the review article and supplemental information.”

[www.reuters.com/investigates/special-report/who-iarc-glyphosate](http://www.reuters.com/investigates/special-report/who-iarc-glyphosate)

**healthy** 55+

**ROUNDUP LAWSUIT**

Have you had prolonged exposure to Monsanto's Roundup?  
**ACT NOW: More than 800 lawsuits have been filed.**

*Glyphosate, the main ingredient in Roundup, is "probably carcinogenic to humans."*  
World Health Organization IARC

---

If you were exposed to Roundup and diagnosed with non-Hodgkin's lymphoma, compensation may be available.  
**DEADLINE:** Talk to an advocate to learn more about compensation entitlement.

Roundup side effects?  
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▼

Were you (or a loved one) diagnosed with Non-Hodgkin's Lymphoma after using the weed killer Roundup?



yes  
 no

Do you consider yourself to be a farmer / agricultural worker or were you exposed at a manufacturing plant?

yes  
 no  
 don't know

Was Roundup used at home, work, or both locations?




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If you or a loved one was diagnosed with non-Hodgkin Lymphoma and have a history of using Roundup weed killer products, **contact a lawyer now** and find out if you have a case.

**Free Case Evaluation**

**You may be entitled to compensation related to medical bills, pain & suffering, and more.**

## Mutation Research (Zhang et al., 2019)

<https://doi.org/10.1016/j.mrrev.2019.02.001>

- Meta-analysis
- Claim: Glyphosate exposure = 41% higher likelihood of NHL
  - ~20 cases /100,000 people
  - 41% increase = 8 new cases
- 5 case studies
  - Recall bias
- 1 cohort study
  - More robust
- "... the numerical risk estimates should be interpreted with caution."
- Three authors served in EPA board which evaluated glyphosate (2016).





## Book of Mormon – Alma 11:20

Now, it was for the sole purpose to get gain, because they received their wages according to their employ, therefore, they did stir up the people to riotings, and all manner of disturbances and wickedness, that they might have more employ, that they might get money according to the suits which were brought before them;

To answer question 2:

Glyphosate most likely does not cause cancer.  
It is not a terrible toxin.

## Judge Suzanne R. Bolanos

- Tentative ruling: “Given the state of medical and scientific knowledge there is no clear and convincing evidence that Monsanto acted with malice or oppression in manufacturing and selling its GBH (Roundup) products.”
- October 22, 2018 – Jury verdict upheld.
  - Punitive damages reduced to \$39 million (matching compensatory damages)

Is glyphosate in my food?

If it is, should I be worried?



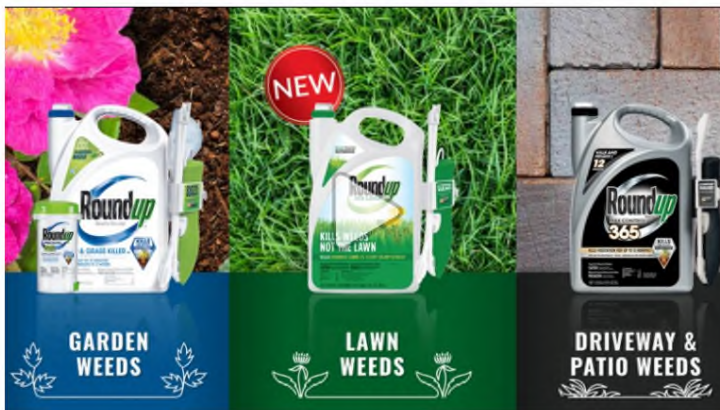
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# Unsafe levels of a weed killer chemical in oat products, report says

By Susan Scutti, CNN

Updated 4:46 AM ET, Wed August 15, 2018



### More from CNN



Authorities find bodies believed to be Colorado man's missing...



Shanann Watts was to have a 'gender reveal' party Saturday

sleep number

**BIGGEST SALE OF THE YEAR  
ALL BEDS ON SALE**

The New York Times

## Report Finds Traces of a Controversial Herbicide in Cheerios and Quaker Oats



New York Times  
Aug. 15, 2018

By Mihir Zaveri

Aug. 15, 2018



An environmental research and advocacy group has found traces of a controversial herbicide in Cheerios, Quaker Oats and other breakfast foods that it says could increase cancer risk for children.

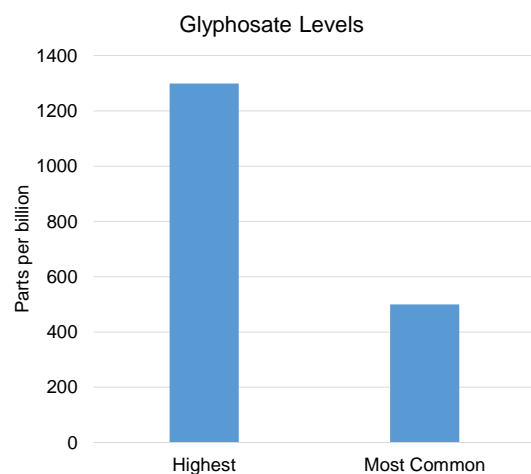
The report comes amid longstanding debate about the safety of the chemical glyphosate, which federal regulators maintain is not likely to cause cancer.

In its report, released Wednesday, the Environmental Working Group said that it tested 45 samples of breakfast foods made from oats grown in fields sprayed with herbicides. Then, using a strict standard the group developed, it found elevated levels of glyphosate in 31 of them.

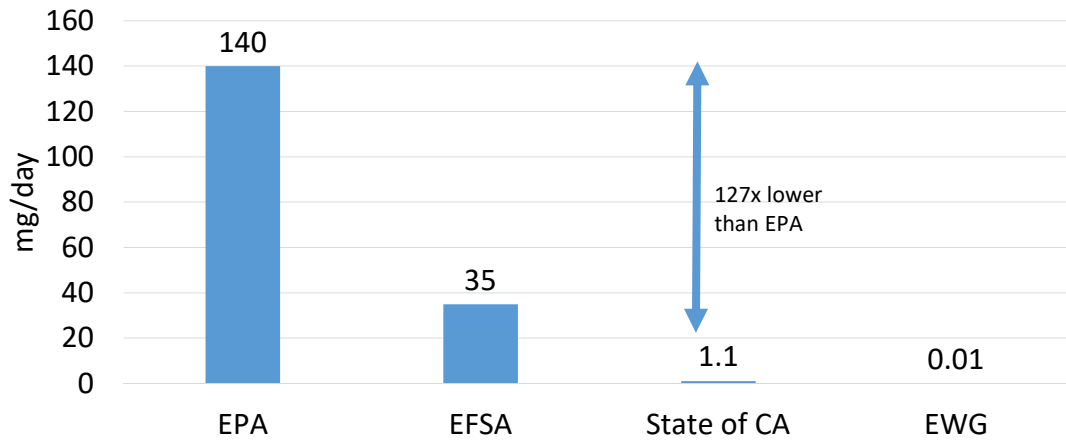
“There are levels above what we could consider safe in very popular breakfast foods,” said Alexis Temkin, the group’s toxicologist who helped with the analysis in the report.

## Environmental Working Group (EWG) Report

- Glyphosate was detected:
  - 43 of 45 conventional cereals
  - 5 of 16 organic cereals
- Levels of detection
  - Highest = 1.3 ppm (1,300 ppb)
  - Most below 0.5 ppm (500 ppb)
  - EPA regulatory limit = 30 ppm



### Safe Level of Glyphosate? – Depends on who you ask.



### Environmental Working Group (EWG)



## Environmental Working Group (EWG)

### GET GLYPHOSATE OUT OF OUR FOOD!

New EWG analysis has found that popular children's foods like cereal, granola bars, and instant oatmeal come with a hefty dose of glyphosate, the cancer-causing ingredient in Monsanto's Roundup.

That's unacceptable.

Monsanto was recently ordered to pay \$289 million in damages after a jury found the pesticide giant liable for causing a school groundskeeper's cancer. **Glyphosate is dangerous, especially for kids.** The EPA calculated that 1-to-2-year-old children are likely to have the highest exposure to glyphosate.

Glyphosate is showing up in food made with oats because oats and wheat are sprayed with glyphosate to kill the crop right before harvesting. It is a practice that is not necessary and should be stopped. **Companies need to step up and make sure their products are free of glyphosate before they hit store shelves.**

We can't wait for the EPA to take action on glyphosate. Parents shouldn't have to worry about carcinogenic pesticides in their food at the grocery store.

**Use the form below to stand with EWG and tell food companies like General Mills, Quaker and Kellogg's to get glyphosate out of our food!**

*Get glyphosate out of our food!*

*As a concerned consumer, I urge you to make sure your oat and wheat products are free of glyphosate.*

*Glyphosate is the key ingredient in Monsanto's signature herbicide Roundup. The World Health Organization and California state scientists have linked glyphosate to cancer.*

*This dangerous chemical shouldn't be anywhere near my food, but recent EWG analysis has found glyphosate in at least one of your products.*

*This is unacceptable.*

*Consumers expect better of you. I urge you to ensure your products are free of cancer-causing glyphosate!*





## What's in my Cheerios?

- EWG says 497 ppb glyphosate. (0.000497 mg/g)
- 28 g of Cheerios = 1 serving
- $0.000497 \text{ mg/g glyphosate} \times 28 \text{ g/serving} = 0.013 \text{ mg glyphosate/serving}$
- CA standards,  $1.1 \text{ mg/day} \div 0.013 \text{ mg glyphosate/serving} = 79 \text{ servings}$
- EFSA standards = 2,518 servings
- EPA standards = 10,072 servings
- EWG standards = 1 serving



Credit: Nick Saik, "Roundup for Breakfast?!", Know Ideas Media

## Who funds the EWG?

- More than 20 companies, including:
  - Stonyfield Farms
  - Earthbound Farms
  - Organic Valley
  - Nature's Path
  - Annie's
  - Applegate
  - Klean Kanteen

## EWG - Anresco Laboratories

### Suspicious deepen on food labs

By **Stephen J. Hedges, Washington Bureau**  
CHICAGO TRIBUNE

MAY 27, 2008 | WASHINGTON

In an interview, Eisenberg said that a check of his company's records revealed that it withheld samples from the FDA at a company's request an average of three times a month. He said the labs break no laws by withholding such information.


"We are employed by the imported-food manufacturer," Eisenberg said. "We are not employed by the FDA, and the FDA has no authority over private labs that are generating imported-food test results, so we have to follow the advice of our customer."

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## KELLOGG LATEST TO BE TARGETED IN GLYPHOSATE RESIDUE LAWSUIT, BUT COURTS NOT PROVING VERY RECEPTIVE, SAY ATTORNEYS

Dec 18, 2018 | [Certification News - Glyphosate Residue Free, Featured, Reports](#)



**Opinion**  
Cancer

### The weedkiller in our food is killing us

*Erin Brockovich*



Thu 6 Dec 2018 05:30 EST

38,199 281

Growing research show that glyphosate, one of the most widely used herbicides in the US, causes cancer

- The best of 2018: we're resurfacing some of our top stories of the past year



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*Water Testing shows 70% of American household's drinking water positive for above detectable levels*

**Glyphosate weedkiller in baby food!**

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edkiller Found in  
Urine  
Sign o  
Toxin Free Town  
Fin

Where is MAA finding glyphosate?

- Breast milk
- Wine
- Honey
- Vaccines
- Drinking water

PUBLIC RELEASE: 23-JUL-2015

## WSU researchers find US breast milk is glyphosate free

*Study is first independently verified look for the presence of Roundup ingredient in human milk*

WASHINGTON STATE UNIVERSITY

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[Regul Toxicol Pharmacol](#). 2015 Dec;73(3):758-64. doi: 10.1016/j.yrtph.2015.10.022. Epub 2015 Oct 28.

**Analysis of Moms Across America report suggesting bioaccumulation of glyphosate in U.S. mother's breast milk: Implausibility based on inconsistency with available body of glyphosate animal toxicokinetic, human biomonitoring, and physico-chemical data.**

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[J Agric Food Chem](#). 2015 Dec 9;63(48):10562-8. doi: 10.1021/acs.jafc.5b04453. Epub 2015 Nov 23.

**Analysis of Glyphosate and Aminomethylphosphonic Acid in Nutritional Ingredients and Milk by Derivatization with Fluorenylmethyloxycarbonyl Chloride and Liquid Chromatography-Mass Spectrometry.**

[Ehling S<sup>1</sup>](#), [Reddy TM<sup>1</sup>](#).

F Fear

U Uncertainty

D Doubt

## USDA-ARS Pesticide Data Program

- Started in 1991
  - Focus on infants and children
  - ~600 sites
  - Test for 450 pesticides, breakdown products
  - ~10,000 samples collected/year
- **2016 Samples**
    - Fresh and processed fruits and vegetables (20)
    - Eggs
    - Milk
    - Environmental contaminants

## Summary of Pesticide Data Program

	2012	2013	2014	2015	2016
Samples	11,893	10,104	10,619	10,187	10,365
% No Detections	47.4	40.5	--*	15	23
% Below Tolerance	>99	>99	>99	>99	>99
% Above Tolerance	0.53	0.23	0.36	0.53	0.46
% W/O Tolerance	4.3	3.0	--*	3.9	2.6

\*Could not access data.

## Herbicide Analysis – Glyphosate SRM

Commodity	# Samples	% No Residue	% Violative	% Glyphosate	% Glufosinate
Corn	274	36.9	0	63.1	1.4
Soybeans	267	33.0	0	67.0	1.1
Milk	113	100	0	0	0
Eggs	106	100	0	0	0
<b>Total</b>	<b>760</b>	<b>53.7</b>	<b>0</b>	<b>46.2</b>	<b>0.9</b>



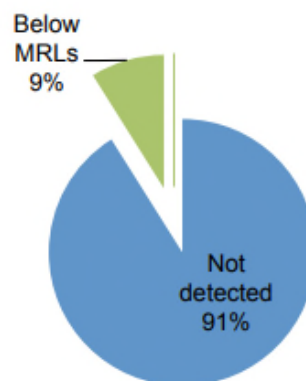
## Canadian Food Inspection Agency

Program	Food Type	# Samples	% with Glyphosate	% > MRL
National Chemical Residue Monitoring Program	Fresh fruits and vegetables	317	7.3	0
	Processed fruits and vegetable	165	12.1	0
Targeted Surveys	Grain products	869	36.6	3.9
	Juice and other beverages	496	16.3	0.2
	Bean/pea/lentil products	869	47.4	0.6
	Soy products	263	11.0	0
Children's Food Project	Infant cereal	82	31.7	0
	Infant food	127	30.7	0
	<b>Total</b>	<b>3,188</b>	<b>29.7</b>	<b>1.3</b>

Safeguarding with Science: Glyphosate Testing in 2015-2016

## Canadian Food Inspection Agency

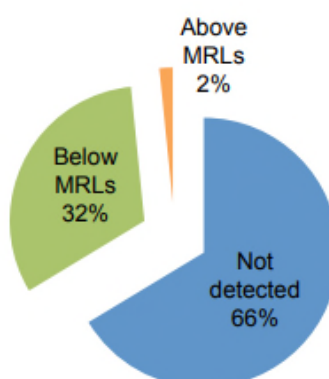
### National Chemical Residue Monitoring Program



Safeguarding with Science: Glyphosate Testing in 2015-2016

## Canadian Food Inspection Agency

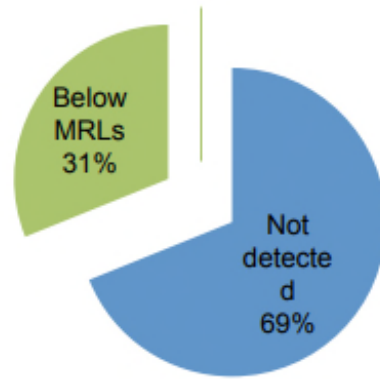
### Targeted Surveys



Safeguarding with Science: Glyphosate Testing in 2015-2016

# Canadian Food Inspection Agency

## Children's Food Project



Safeguarding with Science: Glyphosate Testing in 2015-2016

“All substances are poisons; there is none which is not a poison. The right dose differentiates poison from remedy.”

- Paracelsus



Taken from Casarett & Doull's Toxicology: The Basic Science of Poisons.



Conrad Irwin via Wikimedia Commons

FOOD & DRINK

A pesticide's active ingredient might be in your kids' breakfast. Don't worry about it.

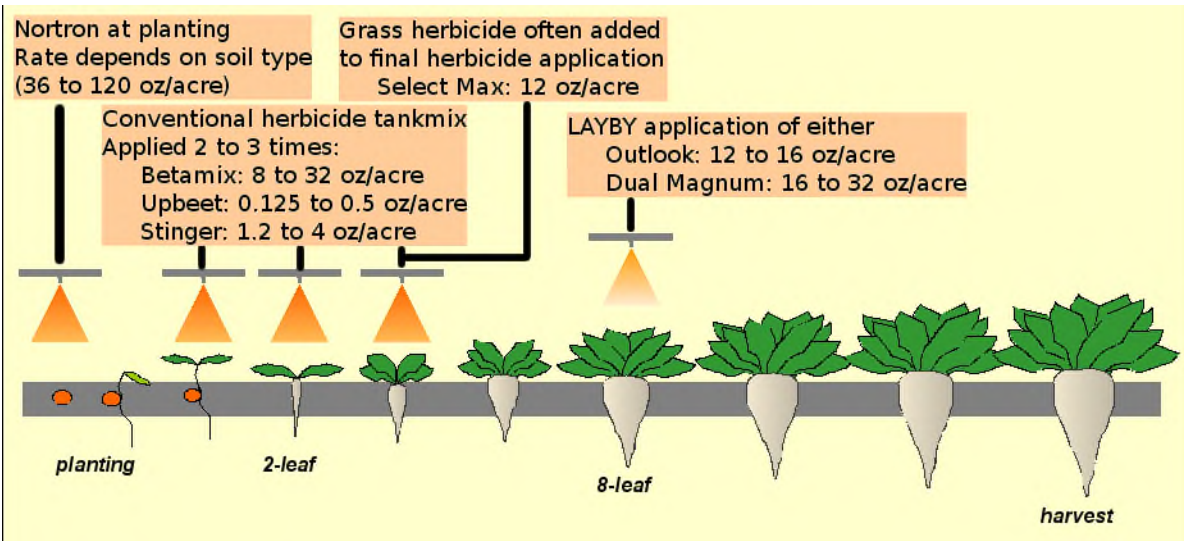
To answer question 3:

Glyphosate may be in some food products.  
But you shouldn't be worried.



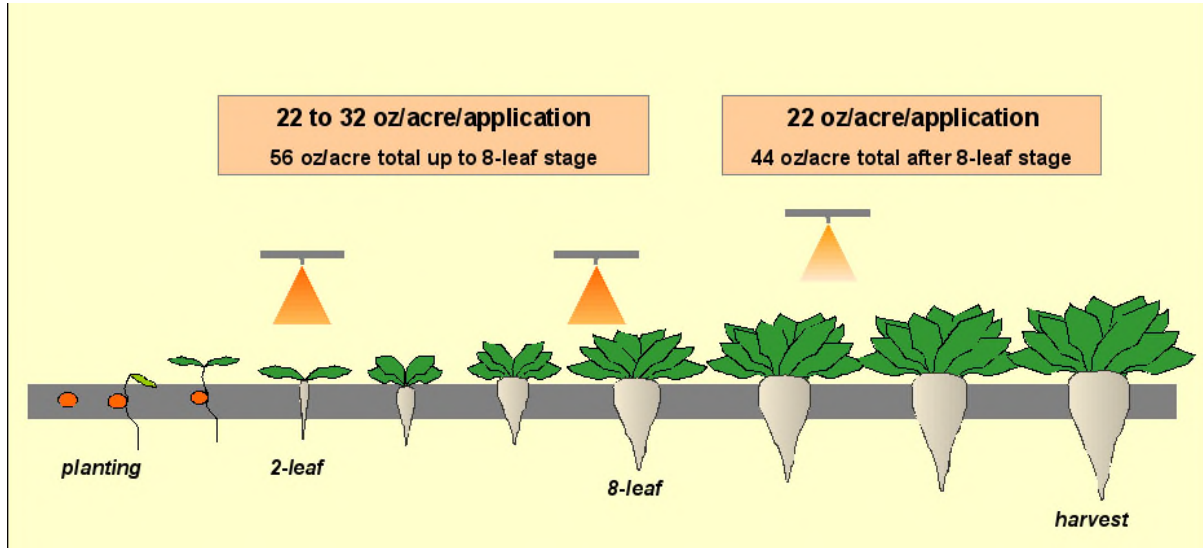
Is glyphosate a terrific tool?

### Typical herbicide regiment for conventional beets

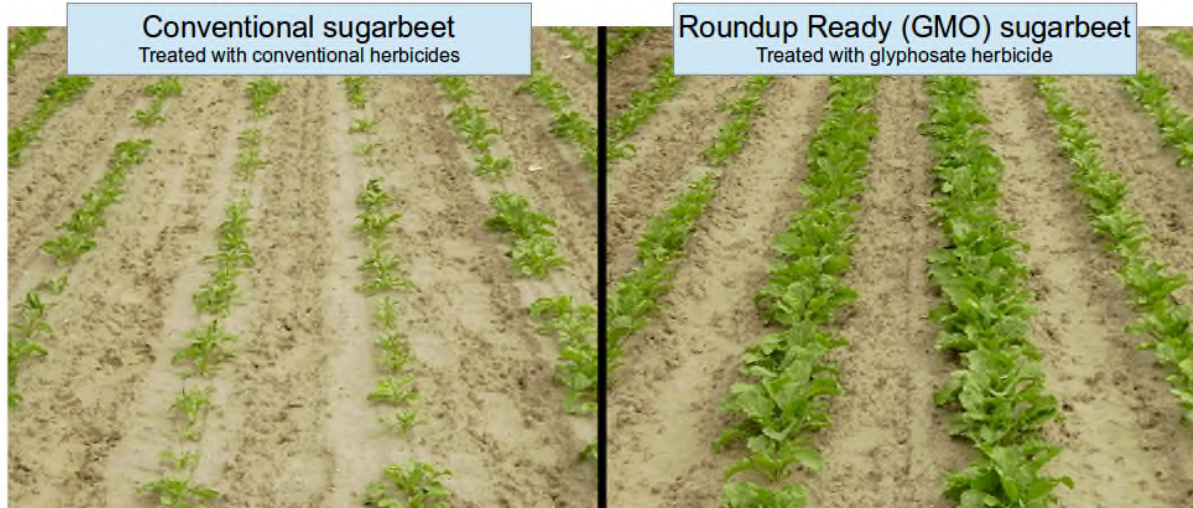


From Andrew Kniss, A Plant Out of Place, May 12, 2016

## Typical herbicide regiment for GE beets



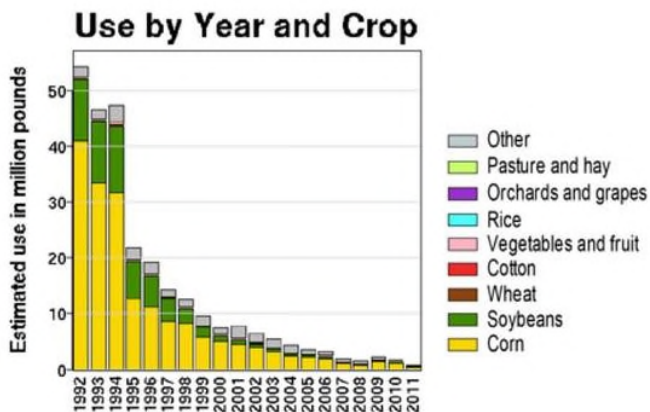
From Andrew Kniss, A Plant Out of Place, May 12, 2016



<http://www.weedcontrolfreaks.com/>

From Andrew Kniss, A Plant Out of Place, May 12, 2016

Glyphosate has helped reduce use of more toxic herbicides

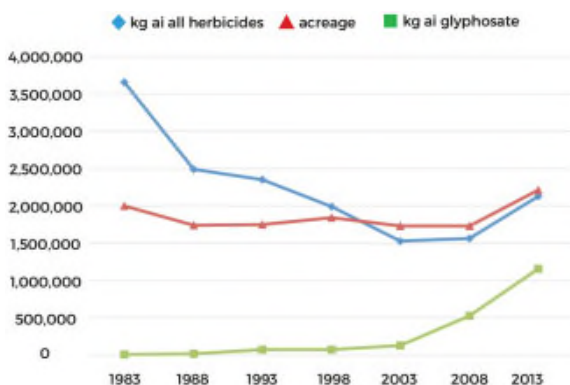


LD<sub>50</sub> = 1350 (rats), 1910 (mice)

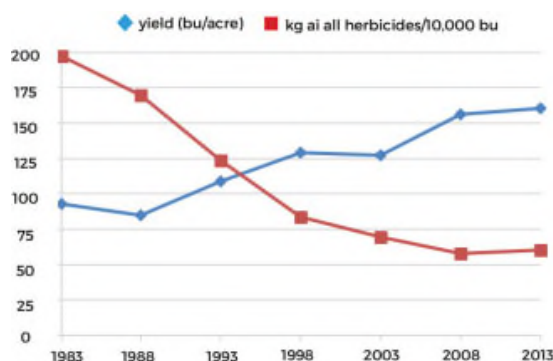
*Alachlor use 1992 - 2011*

USGS National Water-Quality Assessment Project – Pesticide National Synthesis Project  
<https://water.usgs.gov>

### Effect of Glyphosate on Ontario (CA) Corn



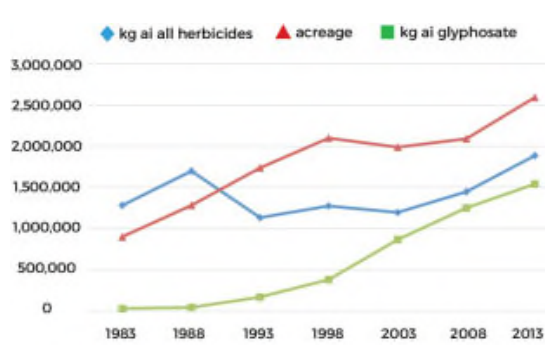
**Figure 1.** Amount of herbicide applied to field corn and acreage grown in Ontario from 1983 to 2013. Drawn from OMAFRA data (1) by Dufault & Saik.



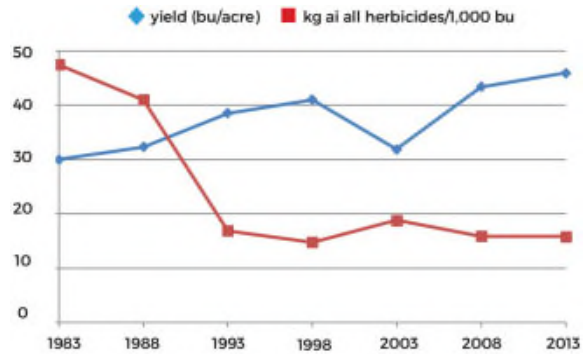
**Figure 2.** Yield of field corn and amount of herbicide applied per 10,000 bushels in Ontario from 1983 to 2013. Drawn from OMAFRA data (1) by Dufault & Saik.

Dufault and Saik, Some Good News about Glyphosate  
<https://rsaik.wordpress.com/2018/08/29/some-good-news-about-glyphosate/>

## Effect of Glyphosate on Ontario (CA) Soybeans



**Figure 3.** Amount of herbicide applied to soybeans and acreage grown in Ontario from 1983 to 2013. Drawn from OMAFRA data (1) by Dufault & Saik.



**Figure 4.** Yield of soybean and amount of herbicide applied per 1,000 bushels in Ontario from 1983 to 2013. Drawn from OMAFRA data (1) by Dufault & Saik.

Dufault and Saik, Some Good News about Glyphosate  
<https://rsaik.wordpress.com/2018/08/29/some-good-news-about-glyphosate/>

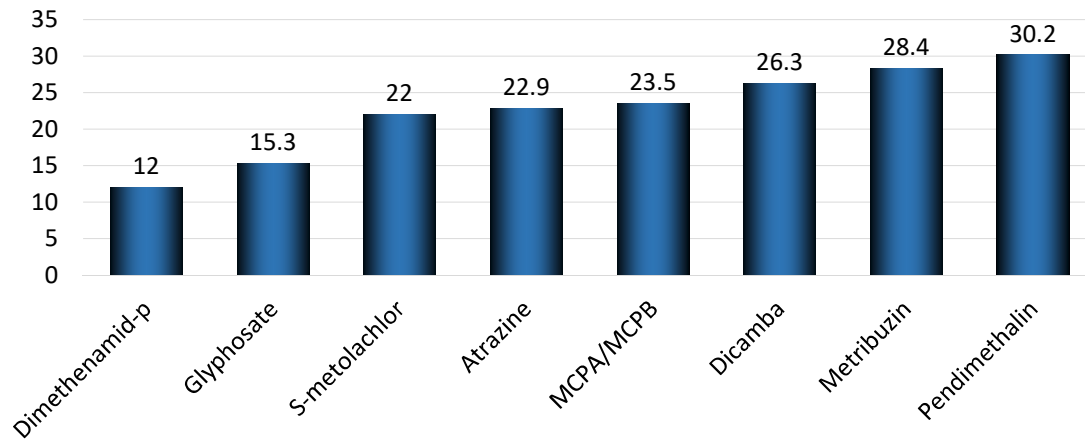
## Environmental Impact Quotient (EIQ)

- Chronic toxicity
- Dermal toxicity
- Plant surface half-life (weeks)
- Soil half-life (days)
- Systemicity
- Leaching potential
- Fish toxicity
- Runoff potential
- Bird toxicity
- Bee toxicity
- Beneficial arthropod toxicity

Higher the EIQ, the higher the pesticide hazard

Environmental Risk of Pesticide Use in Ontario: 2013/2014 Pesticide Use Survey  
 Laura L. Van Eerd, University of Guelph, 5 October 2016

## Environmental Impact Quotient (EIQ)



Environmental Risk of Pesticide Use in Ontario: 2013/2014 Pesticide Use Survey  
 Laura L. Van Eerd, University of Guelph, 5 October 2016

## Results of GM insect resistant and herbicide tolerant crops

- Reduction in 553,000,000 kg of pesticides
- Reduction in fuel use and tillage
  - Reduction in greenhouse emissions
  - Equivalent to removing 12.4 million cars from the road

Brookes and Barfoot, 2015. Environmental impacts of genetically modified (GM) crop use 1996-2013: Impacts on pesticide use and carbon emissions. *GM Crops and Foods* 6:103-133.

## Reasons to use glyphosate

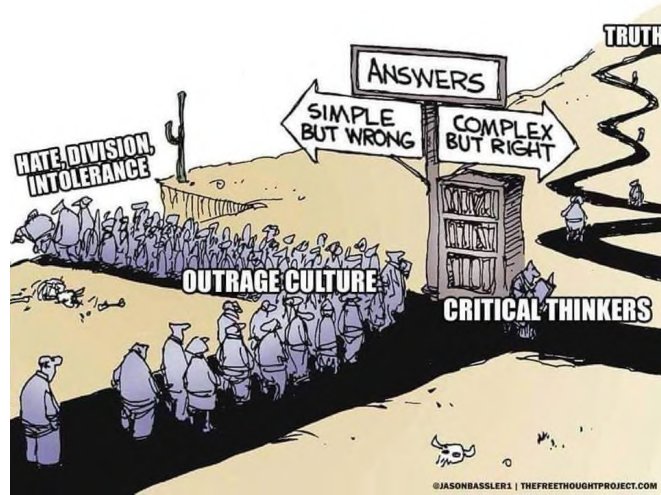
1. Effective and efficient weed control.
2. Fundamental part of no- and low-tillage farming.
3. Scientific agreement that it is safe for human use.
4. Valuable pre-harvest tool for drying crops.
5. No longer patented. No single company profits.

Adapted from NFU Scotland  
[www.nfus.org.uk](http://www.nfus.org.uk)

To answer question 4:

Glyphosate is a terrific tool.  
But like any tool, it needs to be used properly.

# AMERICA 2019



Thefreethoughtproject.com  
Via CFACT



## For further information – selected references

- IARC Monographs Vol. 112, “Some Organophosphate Insecticides and Herbicides”
- US EPA Draft Human Health and Ecological Risk Assessments for Glyphosate
  - <https://www.epa.gov/ingredients-used-pesticide-products/draft-human-health-and-ecological-risk-assessments-glyphosate>
- Thoughtscapism: 17 Questions About Glyphosate
  - <https://thoughtscapism.com/2016/09/07/17-questions-about-glyphosate/>
- Hazard vs. Risk: [https://www.youtube.com/watch?v= GwVTdsnN1E](https://www.youtube.com/watch?v=GwVTdsnN1E)
- Glyphosate and Cancer: What does the data say? (Andrew Kniss)
  - <https://plantoutofplace.com/2015/03/glyphosate-and-cancer-what-does-the-data-say/>
- Know Ideas Media (YouTube), “Roundup for Breakfast?!”
- National Cancer Institute
  - <https://seer.cancer.gov/statfacts/html/nhl.html>