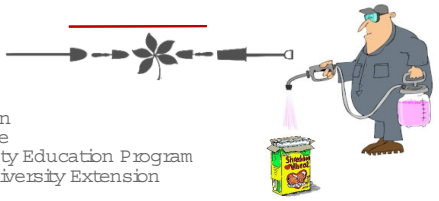


Glyphosate: Facts, Hype and Best Practices

Jennifer Andon
Mary Ann Rose
Pesticide Safety Education Program
Ohio State University Extension



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Ohio

- I was born at OSU, I spent 10 years in college at OSU, I have worked at OSU now for 13 years, I'll probably die at OSU, which is OK!!
- I have never worked for Bayer, which acquired Monsanto (manufacturer of Roundup in 2018)
- I am a licensed commercial pesticide applicator in the state of Ohio (category 8: Turfgrass)



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Why It Should Anger All Of Us That Trump Still "Has Monsanto's Back" On Roundup

The EPA's decision to reauthorize Roundup pesticides means we will be eating, drinking and breathing these poisons for years to come.

EPA Issues Interim Registration Review Decision for Glyphosate
Friday, February 7, 2020
On February 6, 2020, the U.S. Environmental Protection Agency (EPA) issued a **limited registrant notice** announcing the availability of an interim registration review decision for glyphosate. EPA previously issued

Concerns about effect of glyphosate on pollinators essential to agriculture

EWG Applauds Kellogg's for Pledge To End Pre-Harvest Use of Weedkiller Glyphosate

U.S. EPA reaffirms that glyphosate does not cause cancer
Posted on January 28, 2020 by Carey Gillam

A U.S. court blamed Roundup for causing cancer. Then Canada defended the herbicide, emails show

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Let's walk through this together!!!

- It's ok to have questions
- It's ok to have concerns



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The Dose makes the poison

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

Philippus Aureolus Theophrastus Bombastus Von Hohenheim-Paracelsus

- 1 cup of coffee = 😊
- 3 cups of coffee = 😐
- 8 Red Bulls = ☠️



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

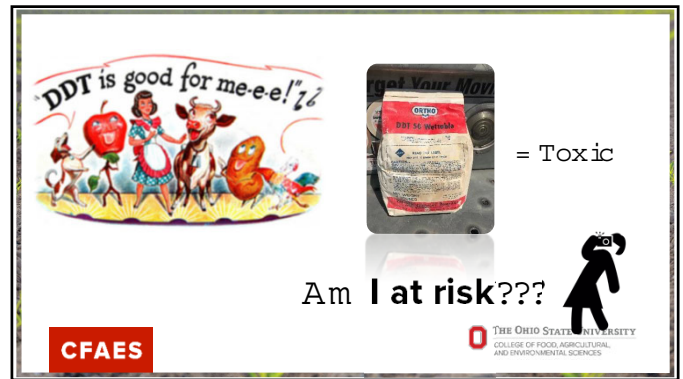
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Glyphosate

- Most widely used herbicide in the world
- Widely used for non-crop, landscape use
- Used on 90% of soy, 70% of corn crop
- A has low mammalian toxicity
- Why? Herbicide targets an enzyme found only in plants
- Signal word: caution - acute toxicity, Cat 3
- LD 50 = 5600 mg/kg (rat, oral)
- 1008 tablets of 500 mg Tylenol for a 200 lb person

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glyphosate \neq Roundup®



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Glyphosate in the News:

- 2012 (Seralini et al) Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize: Retracted, Republished

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Glyphosate in the News:

- March 2015 International Agency for Research on Cancer (IARC / WHO) declares glyphosate a probable human carcinogen (based on hazard)
 - Classified glyphosate as a Group 2a carcinogen
 - ~consuming red meat, drinking very hot beverages, and cell phone use

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Glyphosate in the News:

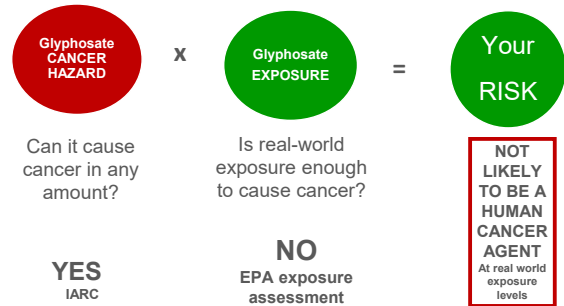
- August 2018 a jury awards \$289M to a school groundskeeper with terminal cancer who used Roundup for 3-4 years (reduced to 78M)

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Glyphosate – Risk for Cancer



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Can we use glyphosate safely ?



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Pesticide Registration Under FIFRA , FQPA , FFDCA

- "Registration is based on evaluation of scientific data and assessment of risks and benefits of a product's use"
- "Set pesticide tolerances for all pesticides used in or on food or in a manner that will result in a residue in or on food or in animal feed"

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Pesticide Registration process

- Extensive scientific, legal and administrative procedure (6-9 years, millions of \$\$)
- Human Health and Environmental Risk Assessment
 - Laboratory Testing / Toxicological Testing
 - Exposure assessments
- Crop/food tolerances established
 - Maximum contaminant levels in food

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Tolerance Levels Established for "defects"

WHY???

The FDA set these action levels because it is economically in practical to grow, harvest, or process raw products that are totally free of non-hazardous, naturally occurring, unavoidable defects.



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Pesticide Tolerances

- EPA has established tolerances for glyphosate on a wide range of crops, including corn, soybean, oilseeds, grains, and some fruits and vegetables, ranging from 0.1 to 310 ppm.
- The EPA Allowable Daily Intake (ADI) for glyphosate is set at 1,750 µg (1.75 mg) per kg of body weight.

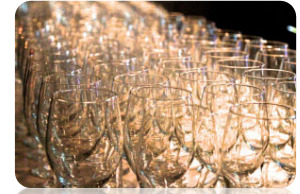
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Glyphosate in my beer and wine???

"An adult would have to drink more than 140 glasses of wine a day containing the highest glyphosate level measured just to reach the level that California's Office of Environmental Health Hazard Assessment (OEHHA) has identified as No Significant Risk Level," wrote a spokesperson for the Wine Institute in a statement to USA TODAY.



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Mitigating Risk from Pesticides during registration process

Too high

acceptable

- Pesticide Label written to ensure pesticide is used as safely as possible
- Pesticides come up for review every 15 years

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These agencies determined glyphosate is unlikely to cause cancer in humans

- December 2017: US EPA
- May 2016: Joint Food and Agricultural Organizations of the UN / World Health Organization
- October 2016: Australian Pesticides and Veterinary Medicines Authority
- April 2017: Canadian Pest Management Regulatory Agency
- March 2017: Committee for Risk Assessment of the European Chemicals Agency

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Agricultural Health Study



JNCI Natl Cancer Inst (2018) 110(5): djk233
doi: 10.1093/jnci/djk233
First published online November 9, 2017
Article

ARTICLE

Glyphosate Use and Cancer Incidence in the Agricultural Health Study

Gabriella Andreotti, Stella Koutros, Jonathan N. Hofmann, Dale P. Sandler, Jay H. Lubin, Charles F. Lynch, Catherine C. Lerro, Anneclaire J. De Roos, Christine G. Parks, Michael C. Alavanja, Debra T. Silverman, Laura E. Beane Freeman

Affiliations of authors: Occupational and Environmental Epidemiology Branch (GA, SK, JNH, CCL, DTS, LEB), Biostatistics Branch (JNL), and formerly of Occupational and Environmental Epidemiology Branch (JNL), Division of Cancer Epidemiology and Prevention, National Cancer Institute, National Institutes of Health, Department of Health and Human Services, Bethesda, MD; Epidemiology Branch, National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services, Research Triangle Park, NC (DPS); Department of Epidemiology, University of Iowa, Iowa City, IA (DTS); Iowa Health Registry of Iowa, Iowa City, IA (DTS); Department of Environmental and Occupational Health, Drexel University Drexel School of Public Health, Philadelphia, PA (JNL); Correspondence to: Laura Beane Freeman, PhD, 9609 Medical Center Drive, Box 602340, MDC 0073, Bethesda, MD 20892 (e-mail: lbeane@nih.gov).

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Agricultural Health Study Cont.

Results: Among 54 251 applicators, 44 932 (82.8%) used glyphosate, including 5779 incident cancer cases (79.3% of all cases). In unlagged analyses, glyphosate was not statistically significantly associated with cancer at any site. However, among applicators in the highest exposure quartile, there was an increased risk of acute myeloid leukemia (AML) compared with never users (RR = 2.44, 95% CI = 0.94 to 6.32, $P_{trend} = .11$), though this association was not statistically significant. Results for AML were similar with a five-year (RR_{5-year} = 2.32, 95% CI = 0.98 to 5.51, $P_{trend} = .07$) and 20-year exposure lag (RR_{20-year} = 2.04, 95% CI = 1.05 to 3.97, $P_{trend} = .04$).

Conclusions: In this large, prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall, including NHL and its subtypes. There was some evidence of increased risk of AML among the highest exposed group that requires confirmation.

<https://aghealth.nih.gov/>

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Does this mean there is no risk to glyphosate or other registered pesticides?

Absolutely not!

YOU **MUST**:

- ✓ Read and follow Label
- ✓ Wear the required PPE

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Safety is about reducing Risk

• RISK is "a situation involving exposure to danger"

- Risk to you
- Risk to others
- Risk to the environment
- Risk to property



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Safety
Tip

Know what you are working with!

Horsepower

SELECTIVE HERBICIDE

KEEP OUT OF REACH OF CHILDREN

DANGER / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en español. (If you do not understand the label, find someone to explain it to you in Spanish.) SEE INSIDE BOTTLE FOR FIRST AID AND ADDITIONAL PRECAUTIONARY STATEMENTS

PRECAUTIONARY

STATEMENTS

HAZARDS TO HUMANS AND

DOMESTIC ANIMALS

DANGER

Corrosive. Causes irreversible eye damage. Harmful if swallowed or absorbed through skin.....

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Ranger v. Rodeo
Two different glyphosate formulations

Ranger – aquatic sites **NOT** on label

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment.....

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Ranger v. Rodeo
Two different glyphosate formulations

Rodeo – aquatic sites on label

For control of annual and perennial weeds and woody plants in natural and production forests for site preparationin and around aquatic sites and wetlands, also for perennial.....

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Safety
Tip

At start of season, be sure you have the necessary PPE on hand

**Do You Use Any of These PESTICIDES?
Then You Need These PPE!**
(In addition to others)

LambdaStar 1 CS
Warrior T
Mustang Maxx
PROPI-STAR EC



Liberty 280 SL
Callisto Xtra
Corvus
Flexstar



Boots are required for some, recommended for all.

Salvo
Lexar
Furadan 4F
Headline



Engenia
Lorsban 4E
Dicofol 4E
Gramoxone SL 2.0



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Safety Tip → **Wear the PPE!**

Horsepower
SELECTIVE HERBICIDE

PERSONAL PROTECTIVE EQUIPMENT (PPE)
All mixers, loaders, applicators, and other handlers must wear:

- Long-sleeved shirt and long pants
- Protective eyewear (goggles or face shield)
- Shoes plus socks
- Chemical resistant gloves made of any waterproof material

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PPE Requirements depend on the task



Mixing & loading

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Personal Protective Equipment (PPE)
- the



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Some items may be worse than nothing at all!

• Hat ok unless you are spraying over your head



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Some glyphosate formulations do not require gloves... ..

Roundup PRO MAX

PERSONAL PROTECTIVE EQUIPMENT (PPE)
All applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks

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Safety Tip → Wear Gloves, even if not required by Label



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Gloves – the first line of defense



Hand without protection shows much more contamination.


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The protective value of gloves


- Farmers who used gloves had 70% less 2,4-D detectable in urine
- Farmers who used gloves had 80% less Captan detectable on hands




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Safety Tip → Inspect PPE and Wear it Correctly



Free of cracks and holes?




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Safety Tip → Store PPE Safely

What's wrong with this picture?



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Safety Tip → Don't do dumb things!





USER SAFETY RECOMMENDATIONS
Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet

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Safety Tip → Be prepared to decontaminate yourself in the field!

- Water
- Soap
- Towels
- Spare clothing
- Eyewash if you use pesticides requiring eye protection

No, hand sanitizer doesn't work!




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Pesticide Spill Response The 3 C's

- Control
- Contain
- Clean-up



- Wear PPE
- Don't rinse into drains
- Dispose of waste properly
- Notify supervisor

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Safety Tip → Keep people out during restricted entry interval (REI)

NON-AGRICULTURAL USE REQUIREMENTS
The Requirements in this box apply to uses that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, and greenhouses. Do not enter treated areas without protective clothing until sprays have dried.

Keep people and pets off treated areas until the sprays have dried.

REI for Ag uses will be LONGER!

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Safety Tip → Don't contaminate yourself when removing PPE

Removing PPE - there is a correct order

- Wash gloves
- Wash PPE, then remove
- Wash and remove gloves



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Safety Tip → Remove work clothes and shower before contact with your family

I sure hope he's not wearing his yucky pesticide clothes!



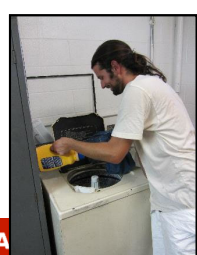
And leave the boots outside the door!

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Safety Tip → Wash Work Clothes Separately from Family Wash

- Pesticides can transfer to other items in wash
- Don't wear clothing again until washed



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IT'S ALL FUN AND GAMES UNTIL THE LAUNDRY HAS TO BE DONE

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Safety Tip → Discard heavily contaminated clothing

- Don't try to wash
- Can leave residues in washer, dryer
- Not fully removed from clothing



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Safety Tip → Know the possible signs of Pesticide Poisoning

- Headache, dizziness
- Nausea, vomiting
- Sweating or chills
- Stomach cramps, diarrhea
- Chest pains
- Breathing difficulty
- Muscle cramps or aches
- Rashes, swelling, or burns

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If you are a first responder:

- Remove victim from source of exposure
- Call for emergency help, have label
- Read and follow "First Aid" on pesticide label

FIRST AID	
IF SWALLOWED	<ul style="list-style-type: none"> Call a physician or Poison Control Center for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a Poison Control Center or physician. Do not give anything by mouth to an unconscious person. Quick treatment is essential to counteract poisoning and should be initiated before signs and symptoms of injury appear.
IF INHALED	<ul style="list-style-type: none"> Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a Poison Control Center or physician for further treatment advice.
IF IN EYES	<ul style="list-style-type: none"> Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a Poison Control Center or physician for treatment advice.

- Have the product container or label with you when calling a poison control center or physician, or going for treatment.
- You may also contact (314) 694-6900, collect day or night, for emergency medical treatment information.
- This product is identified as Roundup QuikPRO™ herbicide, EPA Registration No. 524-535.

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Safety Tip → Always have emergency information handy

- Your nearest emergency medical facility
- National Poison Control 1-800-222-1222
- Chemtrec - 1-800-424-9300
 - technical advice about chemical spills
- Ohio Department of Agriculture Pesticide Regulation 614-728-6987

ALWAYS HAVE THE PESTICIDE CONTAINER OR LABEL AVAILABLE FOR DOCTOR, OR WHEN CALLING EMERGENCY HOTLINES!!

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The OSU Pesticide Safety Education Program 614-292-4070
pestsu.edu



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