



Bayer Environmental Science

Roundup & Glyphosate Facts

2019





Our mission

Bayer:

*Science for a
better life*



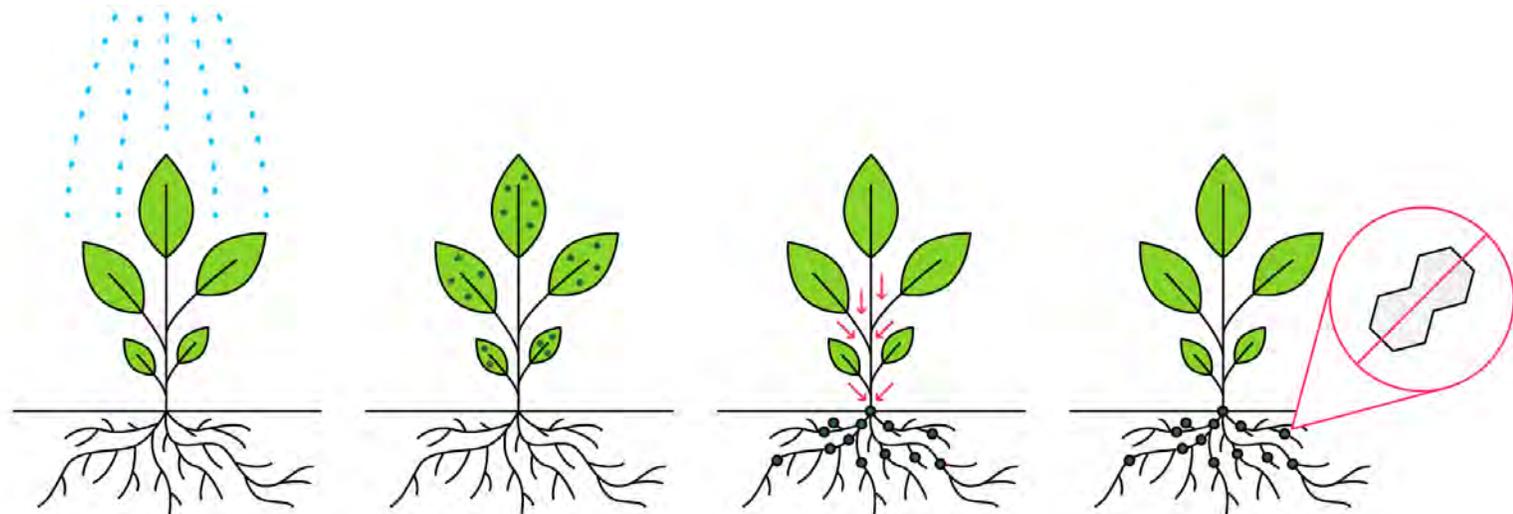


History of Glyphosate

Glyphosate is a versatile herbicide that has been used for **40+ years** by farmers, land managers and gardeners.

HOW IT WORKS:

Glyphosate works by inhibiting an enzyme in a process present in plants.



Glyphosate when applied to a plant, is absorbed and travels to the roots where it blocks this specific plant enzyme. Without that enzyme, the plant can't make the building blocks it needs to grow and the entire plant withers to the ground. |



Benefits of Glyphosate



Widespread adoption is based on three key factors:

1

2

3

- // In past, farmers controlled weeds by hand
- // With mechanization, farmers moved to plowing soil, which contributes to topsoil erosion, and using multiple selective herbicides
- // Using glyphosate-based herbicides, farmers can leave soil intact, supporting soil health and reducing greenhouse gas emissions
- // Overall, more effective, more sustainable and leads to larger harvests



Benefits of Glyphosate



- // Glyphosate helps protect places where we work, live and play
- // Increases sustainability and reduces carbon footprints by providing a highly efficient solution for weed control
- // Helps to manage vegetation to ensure public safety and to protect infrastructure
- // Controls weeds in lawns, landscapes, parks, sports fields, golf courses and other green spaces
- // Reduces public health pests that live in unwanted vegetation
- // Provides a solution to eliminate invasive and noxious weeds

Widespread adoption is based on three key factors:

- 1** Ability to control a broad spectrum of weeds
- 2** Extensive economic and environmental benefits
- 3** Strong safety profile



Current Snapshot:

Where We Stand Today

Regulatory Bodies Around the World Have Found that Glyphosate Does Not Cause Cancer



Health
Canada

Canadian
Pest Management
Regulatory Agency



Australian Government
Australian Pesticides and
Veterinary Medicines Authority



Bundesamt für
Verbraucherschutz und
Lebensmittelsicherheit

The Science Behind Glyphosate is Overwhelming

800+

More than 800 rigorous studies submitted to EPA, European and other regulators that confirms glyphosate-based herbicides are safe when used as directed

50,000+

2018 National Cancer Institute-supported Agricultural Health Study: more than 50,000 licensed pesticide applicators for more than 20 years: found no association between glyphosate-based herbicides and cancer

100+

EPA's 2017 post-IARC cancer risk assessment: Examined more than 100 studies the agency considered relevant: "not likely to be carcinogenic to humans"

The 2015 IARC Opinion is an Outlier



Inconsistent *with the overwhelming consensus* of regulatory authorities and other experts around the world

Based on a *limited and selective consideration of prior scientific research* – as they did no original research

The glyphosate litigation is *based largely on IARC's opinion*. After IARC's opinion was announced in 2015, U.S. trial lawyers started running advertising campaigns to recruit people for lawsuits against Monsanto.

Jury Verdicts Do Not Change the Science

3

To date, # jury verdicts in U.S. trials

1

on appeal

0

cases ongoing

Zero (0)

have reached a final decision

We are **early** in the litigation process.



Timeline

- Glyphosate herbicide registered for use in 1974
- Monsanto releases 'Roundup Ready' technology in 1996
- Classified by EPA as non-carcinogenic
- Glyphosate listed as a class 2A 'probable carcinogen' by the International Agency for Research on Cancer (IARC) in April 2015
- Multiple calls for glyphosate bans in 2015





Current Public Issues: Glyphosate

- Inclusion of glyphosate as a Proposition 65 listed carcinogen in California in 2017
- 2018 EPA releases summary indicating no significant risk
- 2018 California Appellate Court rules glyphosate can be listed as a carcinogen despite EPA's evidence it is not
- August 2018 D. Johnson awarded \$289M in a civil court case for non-Hodgkin's lymphoma attributed to formulated product exposure & inadequate warnings on label of cancer risks posed to consumers
- March 2019 Hardeman v. Monsanto awards plaintiffs \$80M for probable association of glyphosate with NHL
- April 2019 Pilliod vs Monsanto awards plaintiffs \$2B





Breaking News:

EPA Reaffirms Safety of Glyphosate



“Glyphosate is *“not likely to be carcinogenic,”* EPA’s most favorable conclusion. ”

“There is no risk to public health from the application of glyphosate. ”

*Alexandra Dunn, Assistant Administrator, Office of Chemical Safety & Pollution Control,
April 30, 2019*



EPA Reaffirms Safety of Glyphosate



The State of California's much criticized Proposition 65 has led to **misleading** labeling requirements for products, like glyphosate, because it **misinforms** the public about the risks they are facing.

EPA's independent **evaluation** of available scientific data included a **more extensive** and relevant dataset than IARC considered during its evaluation of glyphosate, from which the agency concluded that glyphosate is "**not likely to be carcinogenic to humans.**"

August 8 2019



Testing and Oversight

All crop protection products, including glyphosate, are subject to rigorous testing and oversight by regulatory agencies.

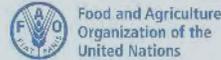
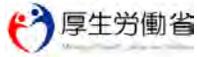
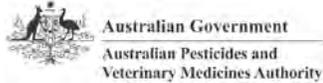
Before a pesticide reaches the market, companies are required to submit more than **100 safety studies** to ensure products pose no unreasonable risk to human health or the environment.

Meeting regulatory and safety requirements takes several years — and according to a 2016 industry study, costs about \$71 million. This investment represents a significant portion of the overall **\$286 million and 11-years** it takes to bring a pesticide product to market.

The studies are carried out according to internationally recognized quality standards called Good Laboratory Practices (GLP). GLP standards are considered among the **highest standard of scientific testing in the world.**



Some of the regulatory authorities and other experts whose conclusions support the safe use of glyphosate and glyphosate-based products



Joint FAO/WHO Meeting on Pesticide Residues (JMPR)



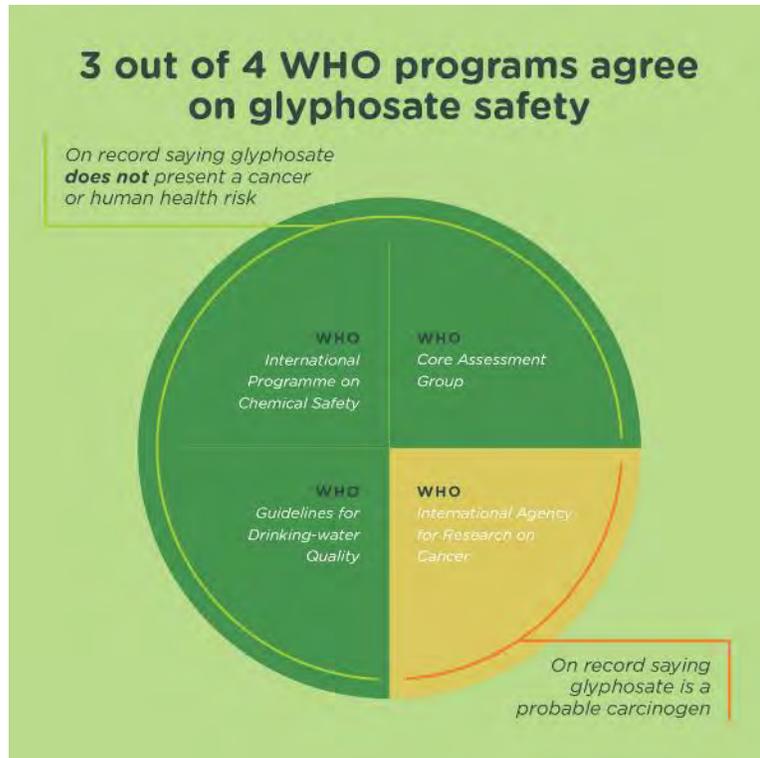
supported by the NIH





What is the International Agency For Research On Cancer (IARC)?

The confusion about glyphosate and cancer stems from one opinion from a group called IARC.



IARC is a program within World Health Organization (WHO) but it is **not a regulatory authority**

One study limitation IARC expressly acknowledges in its 2015 monograph: it “identifies cancer hazards even when risks are very low at current exposure levels,” which means that its **classifications do not reflect real-world exposure.**

In **March 2015**, IARC classified glyphosate as a “probable carcinogen.”

Another limitation is that IARC’s opinion was based on a **limited and selective consideration of prior scientific research** – as they did no original research themselves

IARC’s opinion is **inconsistent with the overwhelming consensus** of regulatory authorities and other experts around the world.

The glyphosate litigation is **based largely on IARC’s opinion.** After IARC’s opinion was announced in 2015, U.S. plaintiff lawyers started using the IARC decision as basis to recruit people to bring lawsuits against Monsanto.



Who is WHO IARC?

The International Agency for Research on Cancer (IARC) is part of the World Health Organization (WHO). One of its major goals is to identify causes of cancer. The most widely used system for classifying carcinogens comes from the IARC. In the past 30 years, the IARC has evaluated the cancer-causing potential of ~1000 likely candidates, placing them into one of the following groups:

- // Group 1: Carcinogenic to humans
- // Group 2A: Probably carcinogenic to humans
- // Group 2B: Possibly carcinogenic to humans
- // Group 3: Unclassifiable as to carcinogenicity in humans
- // Group 4: Probably not carcinogenic to humans

- // IARC identifies cancer hazards, not risk
- // Full List: <https://monographs.iarc.fr/>



What others have to say about glyphosate's vital role

"Our scientists left no stone unturned in conducting this review. No pesticide regulatory authority in the world currently considers glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed."

Health Canada Statement
January 11, 2019

"The Committee recognizes the centrality of glyphosate to the sustainability and productivity of Australian farming."

Parliament of Australia Report
February 1, 2019

"I just want to emphasize that based on our extensive review of all the data, the agency doesn't feel that there's any meaningful risk to human health based on exposure to glyphosate. This is consistent with determinations from other countries and regulatory authorities."

Michael Goodis, Director of the U.S. EPA Registration Division, Office of Pesticides
September 10, 2018 - Politico

"We believe that for the major field crops that feed the world, wise use of herbicides will continue to be part of crop production technology for the foreseeable future. Loss of the once in a hundred year herbicide glyphosate as part of this future would be costly."

"Glyphosate – How it Became a Once in a Hundred year Herbicide and its Future," Outlooks on Pest Management
December 3, 2018

"Near Waverly, Iowa, Mark Mueller said he considers glyphosate essential for sustainably farming his 1,600 acres. For the past decade, Mr. Mueller said, killing off weeds with Roundup has allowed him to stop tilling his corn and soybean fields each fall, a practice that can raise the risk of erosion washing away valuable topsoil."

"Despite Rulings, Farmers Remain Loyal to Bayer's Roundup"
March 21, 2019 - WSJ

> **Regulators are clear on the safety of glyphosate, customers are clear about the need for it to ensure sustainable agriculture.**



Glyphosate Litigation Overview

Recent court rulings do not reflect a scientific judgement

EPA's conclusions, certain studies and data were not allowed into the court

These lawsuits rely heavily on IARC's classification, which is flawed

Timeline for past & ongoing litigation

- // Johnson (San Francisco, CA) August 10 2018*
- // Hardeman (San Francisco, CA) March 27, 2019*
- // Pilliod (Alameda County, California) April 2019*
- // Adams (St. Louis County, Missouri): August 2019
- // Lamb (St. Louis County, Missouri): September 2019
- // Winston (St. Louis City, Missouri): October 2019
- // Cazier (Gallatin County, Montana District Court): October 2019

Bayer will vigorously defend its products based on the body of science that confirms glyphosate does not cause cancer

* **Completed**



Roundup Recap

- // More than 800 scientific studies and reviews by human health & regulatory agencies around the world have determined that glyphosate is safe for use as directed
- // The U.S. National Institutes of Health (NIH) - National Cancer Institute, U.S. Agricultural Health Study followed more than 50,000 farm workers & spouses for >20 years and found no connection between glyphosate and cancer
- // US EPA reviewed >100 studies to conclude that it is not a carcinogen
- // Global regulatory agencies (>150 registrations) do not consider glyphosate a carcinogen
- // The WHO IARC listing of glyphosate contradicts the results of other studies and the conclusions of other regulatory authorities
- // The Johnson, Hardeman & Pilliod cases are not scientific judgements and rely heavily on the IARC conclusion and classification of glyphosate as a probable carcinogen
- // Glyphosate products are EPA-approved & do not pose a public health risk when used according to the federal pesticide label instructions



Glyphosate Resources

// **New Glyphosate Hub** w/ updated technical and outreach information

// <https://www.bayer.com/en/glyphosate-roundup.aspx>

// **Glyphosate Litigation Website:** all things related to the ongoing court cases

// <http://www.glyphosatelitigationfacts.com/main/>

// **GMO Answers :**

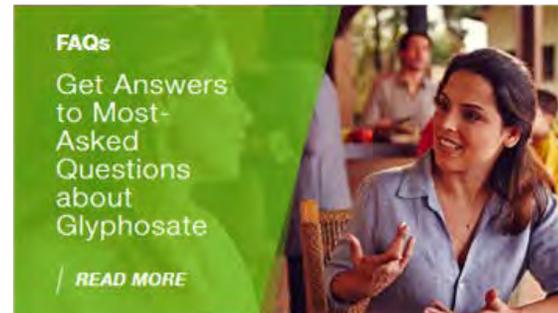
// <https://gmoanswers.com/sites/default/files/Glyphosate-Booklet.pdf>.



Glyphosate Resources

// **Bayer Glyphosate Hub** w/ updated technical and outreach information

// <https://www.bayer.com/en/glyphosate-roundup.aspx>





Glyphosate Resources

// **Glyphosate Litigation Website:** all things related to the ongoing court cases

// <http://www.glyphosatelitigationfacts.com/main/>



Recent News

September 3, 2019 – Four amicus briefs were filed in support of Monsanto in the *Johnson* glyphosate case in the Court of Appeal of the State of California, First Appellate District, Division One. Read these amicus briefs [here](#).

August 15, 2019 – Monsanto filed a Notice of Appeal in the *Hardeman* glyphosate case to the U.S. Court of Appeals for the Ninth Circuit. Read Monsanto's Notice of Appeal [here](#).

August 8, 2019 – The U.S. EPA issued direction to registrants of glyphosate to ensure clarity on labeling, provide accurate risk information to consumers and stop false labeling on products. "EPA will no longer approve product labels claiming glyphosate is known to cause cancer – a false claim that does not meet the labeling requirements of the *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA)." Read EPA's press release [here](#), and what Congress and stakeholders are saying about EPA's action [here](#).

July 25, 2019 – Judge Winifred Smith in the Superior Court of the State of California for the County of Alameda issued a ruling on the post-trial motions in the *Pilliod* glyphosate case, reducing the punitive, non-economic, and future medical damages in the case. The court reduced the total award in the case from \$2.055 billion to \$86.7 million. Read the Court's ruling [here](#) and Bayer's statement [here](#).



Glyphosate Resources

// **GMO Answers :**

// <https://gmoanswers.com/sites/default/files/Glyphosate-Booklet.pdf>.

