

Glyphosate's Impact on Human Health and Safety



Glyphosate-based herbicides are among the most widely-used crop protection products in modern agriculture, so it's understandable that people have questions about their safety, the impact they have on our food supply and our health.

All crop protection products, including glyphosate, are subject to rigorous testing and oversight by regulatory agencies. Glyphosate, given its effectiveness and wide adaptation, is one of the most studied herbicides in the world.

Human Health Research

There is an extensive body of research on glyphosate and Bayer's glyphosate-based herbicides, including more than 800 rigorous studies submitted to the EPA, and European and other worldwide regulators in connection with the registration process, that confirms that glyphosate-based herbicides can be used safely and that glyphosate is not carcinogenic. Over 160 countries approve the use of glyphosate-based products.

What the Experts Say

"The draft human health risk assessment concludes that glyphosate is not likely to be carcinogenic to humans. The Agency's assessment found no other meaningful risks to human health when the product is used according to the pesticide label. The Agency's scientific findings are consistent with the conclusions of science reviews by a number of other countries as well as the 2017 National Institutes of Health Agricultural Health Study."

— U.S. EPA, *Draft Risk Assessment for Glyphosate*¹

"Glyphosate use was not associated with overall cancer risk."

— National Institute of Health, *2018 Agricultural Health Study*²

"EFSA — in line with the scientific opinion of 27 out of 28 Member State experts — concluded that glyphosate is unlikely to be carcinogenic to humans."

— European Food Safety Authority, *Statement on Glyphosate*³

"EPA continues to find that there are no risks to public health when glyphosate is used in accordance with its current label and that glyphosate is not a carcinogen. The agency's scientific findings on human health risk are consistent with the conclusions of science reviews by many other countries and federal agencies."

— U.S. Environmental Protection Agency News Release, April 30, 2019⁴

"Glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet."

— Joint FAO/WHO Meeting on Pesticide Residues (JMPR)⁵

Data also indicates that glyphosate does not put people at risk of cancer via food. In May 2016, the Joint FAO/WHO Meeting on Pesticide Residues (JMPR)⁵ concluded that "glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet."

The largest and most recent epidemiologic study — the independent 2018 National Cancer Institute-supported Agricultural Health Study that followed over 50,000 licensed pesticide applicators for more than 20 years and was published after the IARC monograph — found no association between glyphosate-based herbicides and cancer.⁶

Glyphosate's Classification by IARC

One non-regulatory organization presented a classification of glyphosate that was inconsistent with experts and regulatory authorities around the world — this organization was the International Agency for Research on Cancer (IARC), a sub-agency of the World Health Organization (WHO). In March 2015, IARC gave glyphosate a classification of "Category 2A: probably carcinogenic" despite evidence to the contrary. IARC is one of four programs within the WHO that has reviewed glyphosate, and the only one to have made such a finding.

IARC is not a regulatory authority and conducted no independent studies. IARC is the same organization that determined beer, meat, cell phones and hot beverages cause cancer or are likely to cause cancer.

IARC's opinion is inconsistent with the overwhelming consensus of regulatory authorities and other experts around the world, who have assessed all the studies examined by IARC — and many more — and found that glyphosate presents no carcinogenic risk. Since IARC classified glyphosate in March 2015, regulatory authorities in the United States, Europe, Canada, Korea, Japan, New Zealand and Australia have publicly reaffirmed that glyphosate-based herbicides can be used safely and that glyphosate does not pose a carcinogenic risk.

Safety Research on Herbicide Residues

Before crop protection products like glyphosate can be approved for use, scientific evaluations are conducted to determine potential risk of residues. If the risk is too high, the product never makes it to market. For products that pass scientific evaluation, the next step is to submit the studies to government regulators who review them and establish their own safe levels of residues, and then constantly monitor harvests to ensure those levels are not exceeded.

Understanding Residues

All crops will contain trace amounts of elements that are used or present in the environment in which they are grown. Thanks to incredible advances in technology, experts are now able to detect certain substances in units as small as one billionth of a gram. For context, one billionth of a gram would be the equivalent of one drop of water in an Olympic-size swimming pool. These advances give scientists great confidence in their ability to ensure that food is safe.

When it comes to pesticide residues, regulatory authorities have strict rules. In fact, the EPA and the EFSA set daily exposure limits at least 100 times below levels shown to have no negative effect in safety studies.^{7,8}

The levels sometimes found in food are incredibly small and nowhere near any level of concern. Furthermore, on Oct. 2, 2018, the Food and Drug Administration (FDA) published results of its annual residue testing program and concluded that the “levels of pesticide residues in the U.S. food supply are well below established safety standards.” The FDA was clear that the glyphosate levels “were below the tolerance levels set by the U.S. Environmental Protection Agency (EPA).”

The Basics

Acceptable Daily Intake (ADI) and Maximum Residue Limit (MRL) are established thresholds to help assess any potential risks that could arise from consuming food with residues from certain substances.

// The **Acceptable Daily Intake (ADI)** value represents the amount of residue that, if ingested daily over a person's lifetime, is considered to be without significant health risk.

// The **Maximum Residue Limit (MRL)** value reflects the enforceable maximum level of pesticide residues that are permitted in food or feed based on recommended use.

Safety Research on Toxicity

Any real danger from a potentially toxic substance depends on the dose or the levels at which the substance is present in our environment. While some chemicals, like botulin, are poisonous in small doses; others, like caffeine, are only dangerous at higher doses. Just because a chemical is present does not mean that it is harmful. For example, apple seeds, pears, potatoes and courgettes/zucchini all contain natural chemicals that are potentially toxic to humans. In each of these cases, however, they are usually present in amounts that are far below harmful toxicity levels.

Given the sophisticated technology available, glyphosate has been detected in incredibly small amounts in some foods — at levels approximately 100 times below the safety thresholds set by the U.S. EPA and EFSA. Based on the miniscule amounts in which glyphosate is sometimes found in food, a person would have to consume an incredible amount to get anywhere close to a potentially hazardous level.

You could eat 450 boxes of cereal every 24 hours for the rest of your life and still be at a level of glyphosate exposure considered safe by the European Food Safety Agency.⁹

Impact on Farmer Health

For farmers working regularly with glyphosate in the field, it's important to know exactly what impact — if any — this will have on their health.

25-Year Study Follows 50,000 Pesticide Applicators

For more than 20 years, the Agricultural Health Study (AHS)⁹ has continuously monitored over 50,000 pesticide applicators. The study on glyphosate was conducted by independent researchers in academia and/or the U.S. government, and was publicly funded by the National Cancer Institute, the National Institute of Environmental Health Sciences and the National Institute for Occupational Safety and Health, among others — all governmental bodies in the U.S.

This particular study was commissioned by the U.S. government in order to determine the impact of agricultural practices, lifestyle and genetic factors on the health of farmers and their families. In the long-term study, researchers found no association between glyphosate use and cancer.²

Some Additional Facts about Glyphosate Safety Testing

// Glyphosate and glyphosate-based herbicides, which have been on the market around the world for more than 40 years, are among the most rigorously studied products of their kind.

// In addition to the rigorous registration that it has gone through in the U.S. and the EU, glyphosate is approved for use in more than 160 countries.

“We want to explain the benefits that science and innovation can deliver in agriculture while championing what's important to people: safe, healthy and affordable food that is produced in an environmentally sustainable manner. Improving access to the science behind our products is a key part of our Transparency Initiative.”

– Liam Condon, President of the Bayer Crop Science Division

¹ <https://www.epa.gov/pesticides/epa-releases-draft-risk-assessments-glyphosate> [Retrieved February 12, 2019]

² <https://academic.oup.com/jnci/article/110/5/509/4590280> [Retrieved February 12, 2019]

³ <https://www.efsa.europa.eu/sites/default/files/170523-efsa-statement-glyphosate.pdf> [Retrieved February 12, 2019]

⁴ <https://www.epa.gov/newsreleases/epa-takes-next-step-review-process-herbicide-glyphosate-reaffirms-no-risk-public-health> [Retrieved June 10, 2019]

⁵ <https://www.who.int/foodsafety/jmprsummary2016.pdf?ua=1> [Retrieved February 12, 2019]

⁶ <https://www.ncbi.nlm.nih.gov/pubmed/29136183> [Retrieved February 12, 2019]

⁷ <https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments> [Retrieved February 12, 2019]

⁸ <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=activesubstance.detail&language=EN&selectedID=1438> [Retrieved February 12, 2019]

⁹ <https://aghealth.nih.gov/> [Retrieved February 12, 2019]

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