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Glyphosate

Related Information

- [Read EPA's press release on glyphosate and California Proposition 65](#)
- [Letter to glyphosate registrants on California Proposition 65](#)
- [EPA Releases Draft Risk Assessments for Glyphosate](#)
- [Draft Human Health and Ecological Risk Assessments for Glyphosate](#)
- [Registration of Enlist Duo](#)

Glyphosate is a widely used herbicide that controls broadleaf weeds and grasses. It has been registered as a pesticide in the U.S. since 1974. Since glyphosate's first registration, EPA has reviewed and reassessed its safety and uses, including undergoing [registration review](#), a program that re-evaluates each registered pesticide on a 15-year cycle.

In January 2020, after receiving and considering public comments on the glyphosate proposed interim decision, EPA released the interim decision for registration review. As part of this action, EPA continues to find that there are no risks of concern to human health when glyphosate is used in accordance with its current label. EPA also found that glyphosate is unlikely to be a human carcinogen. EPA is requiring management measures to help farmers target pesticide sprays to intended pests, protect pollinators, and reduce the problem of weeds becoming resistant to glyphosate.

- [Read the glyphosate interim decision.](#)

Learn more about glyphosate:

- [Basic information on uses](#)
- [Human health](#)
- [Food safety](#)
- [Ecological health](#)
- [EPA actions and regulatory history](#)
- [Additional information](#)

Basic Information on Uses

Glyphosate targets a broad range of weeds and is important in the production of fruits, vegetables, nuts, and glyphosate-resistant field crops such as corn and soybean. It is effective at managing invasive and noxious weeds. In addition, glyphosate breaks down in the environment, can be used for no-till and low-till farming which can reduce soil erosion, and is useful for integrated pest management.

Products containing glyphosate are sold in various formulations, including as liquid concentrate, solid, and ready-to-use liquid. Glyphosate is used in products such as Roundup® to control weeds in both agricultural and non-agricultural settings. Glyphosate can be applied in agricultural, residential and commercial settings using a wide range of application methods, including aerial sprays, ground broadcast sprayers of various types, shielded and hooded sprayers, wiper applicators, sponge bars, injection systems, and controlled droplet applicators.

Agricultural uses include corn, cotton, canola, soybean, sugar beet, alfalfa, berry crops, brassica vegetables, bulb vegetables, fruiting vegetables, leafy vegetables, legume vegetables, cucurbit vegetables, root tuber vegetables, cereal grains, grain sorghum, citrus crops, fallow, herbs and spices, orchards, tropical and subtropical fruits, stone fruits, pome fruits, nuts, vine crops, oilseed crops, and sugarcane.

Nonagricultural uses include conservation land, pastures, rangeland, aquatic areas, forests, turf grass, residential areas, non-food tree crops (e.g., pine, poplar, christmas trees), rights of way, commercial areas, paved areas, spot treatments, ornamentals, parks, and wildlife management areas.

Human Health

EPA scientists performed an independent evaluation of available data for glyphosate and found:

- **No risks of concern to human health from current uses of glyphosate.** Glyphosate products used according to label directions do not result in risks to children or adults.
- **No indication that children are more sensitive to glyphosate.** After evaluating numerous studies from a variety of sources, the Agency found no indication that children are more sensitive to glyphosate from *in utero* or post-natal exposure. As part of the human health risk assessment, the Agency evaluated all populations, including infants, children and women of child-bearing age, and found no risks of concern from ingesting food with glyphosate residues. EPA also found no risks of concern for children entering or playing on residential areas treated with glyphosate.
- **No evidence that glyphosate causes cancer in humans.** The Agency concluded that glyphosate is not likely to be carcinogenic to humans. EPA considered a significantly more extensive and relevant dataset than the International Agency on the Research for Cancer (IARC). EPA's database includes studies submitted to support registration of glyphosate and studies EPA identified in the open literature.

EPA considered a significantly more extensive and relevant dataset than the International Agency on the Research for Cancer (IARC). EPA's database includes studies submitted to support registration of glyphosate and studies EPA identified in the open literature. For instance, IARC only considered eight animal carcinogenicity studies while EPA used 15 acceptable carcinogenicity studies. EPA does not agree with IARC's conclusion that glyphosate is "probably carcinogenic to humans."

EPA's cancer classification is consistent with other international expert panels and regulatory authorities, including the Canadian Pest Management Regulatory Agency, Australian Pesticide and Veterinary Medicines Authority, European Food Safety Authority, European Chemicals Agency, German Federal Institute for Occupational Safety and Health, New Zealand Environmental Protection Authority, and the Food Safety Commission of Japan and the Joint Food and Agriculture Organization/World Health Organization (FAO/WHO) Meeting on Pesticide Residues (JMPR).

For more information, read the [Revised Glyphosate Issue Paper: Evaluation of Carcinogenic Potential](#).

- **No indication that glyphosate is an endocrine disruptor.** Glyphosate has undergone [Tier I screening](#) under EPA's [Endocrine Disruptor Screening Program](#). Based on all available information, EPA concluded, using a weight-of-evidence approach, that the existing data do not indicate that glyphosate has the potential to interact with the estrogen, androgen or thyroid signaling pathways. The screening program did not indicate the need for additional testing for glyphosate.

Food Safety

Residues of glyphosate on any food or feed item are safe for consumers if they comply with the established tolerances. Before allowing the use of a pesticide on food crops, EPA sets a tolerance or limit on how much pesticide residue can legally remain on food and feed products, or commodities. The complete listing of tolerances for glyphosate can be found in [40 CFR § 180.364](#). If residues are found above the established tolerance level, the commodity will be subject to seizure by the government. The presence of a detectible pesticide residue does not mean the residue is at an unsafe level.

Due to its widespread use, trace amounts of glyphosate residues may be found in various fresh fruits, vegetables, cereals, and other food and beverage commodities. However, these trace amounts are not of concern for the consumer.

EPA conducted a highly conservative dietary risk assessment for glyphosate that evaluated all populations, including infants, children, and women of child-bearing age. EPA assumed that 100 percent of all registered crops were treated with glyphosate, that residues were at the tolerance level for each crop, and that residues in drinking water were from direct application of glyphosate to water. These assumptions would lead to much higher estimated levels of exposure than would be expected to occur with actual use. The resulting conservative estimates of dietary exposure were not of concern.

Ecological Health

The ecological risks identified in EPA's ecological risk assessment included potential risk to terrestrial and aquatic plants and birds, and low toxicity to honeybees. To address these risks, EPA required spray drift management labeling to reduce off-target spray drift and protect non-target plants and wildlife. Learn more about these restrictions in the [glyphosate interim decision](#).

EPA is committed to protecting pollinators, including the monarch butterfly, from pesticide exposure. As with all other herbicides, EPA is requiring registrants to update the label language for these pesticides to raise awareness of their potential effects to pollinator habitat and direct users to instructions on minimizing spray drift. EPA's strategy to protect the monarch butterfly also includes collaborating with federal, state, and other stakeholders on conservation efforts and promoting best management and integrated pest management practices to reduce spray drift and help preserve pollinator habitat. [Read more about what EPA is doing to protect the monarch butterfly](#).

EPA Actions and Regulatory History

Glyphosate was first registered in 1974.

EPA initiated registration review for glyphosate in 2009. In 2010, the Agency required the pesticide registrants to conduct additional studies to

support updated human health and ecological risk assessments. EPA collaborated with Canada's Pest Management Regulatory Agency to share information for risk assessment.

EPA required a substantial amount of data to be collected and submitted for pesticide registration and registration review, including studies that address product chemistry, product performance, hazard to humans and domestic animals, hazard to non-target plants and wildlife, post-application exposure, applicator exposure, pesticide spray drifts, environmental fate, and residue chemistry. The studies submitted by pesticide producers were required to follow [rigorous guidelines](#). EPA also reviewed numerous glyphosate studies published in the open literature.

In 2015, EPA reexamined the carcinogenic potential of glyphosate. The Agency performed an in-depth review of the glyphosate cancer database, including data from epidemiological, animal carcinogenicity, and genotoxicity studies. In December 2016, as part of registration review, EPA consulted the [Federal Insecticide, Fungicide and Rodenticide Act \(FIFRA\) Scientific Advisory Panel \(SAP\)](#).

- [Meeting Materials and Final Report of the 2016 Glyphosate FIFRA SAP](#)
- [EPA's Response to the Final Report of FIFRA SAP](#)
- [Revised Glyphosate Issue Paper: Evaluation of Carcinogenic Potential](#)

In December 2017, EPA published the glyphosate human health and ecological risk assessments for public comment.

- [Glyphosate Human Health Risk Assessment](#)
- [Glyphosate Ecological Risk Assessment](#)
- [Systematic review of the Open Literature, Drinking Water Assessment, Dietary Exposure Analysis and other supporting documents](#)

In April 2019, EPA released the glyphosate proposed interim decision. After reviewing public comments on the proposed interim decision, EPA released the glyphosate interim decision in January 2020. The interim decision required management measures on glyphosate release height, wind speed and droplet size to address pesticide spray drift. It also required measures to prevent or reduce weed-resistance, which includes giving farmers better information on mode of action, the need for scouting, and how to report potential weed resistance issues, to maintain glyphosate as a tool for growers.

- [Glyphosate interim decision](#)
- [Glyphosate proposed interim decision](#)
- [Glyphosate response to proposed interim decision public comments](#)

EPA anticipates completing a draft biological evaluation for glyphosate by Fall 2020 for public comment. Final endangered species determinations are anticipated in 2021.

Additional Information

- [Chemical Search](#) (EPA risk assessments, decisions, and other documents)
- [Glyphosate General NPIC Fact Sheet](#) **EXIT**
- [Glyphosate Registration Review Docket # EPA-HQ-OPP-2009-0361](#)

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