

UN cancer agency issues warning about five pesticides

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Aerial spraying of pesticides is banned in the EU. [\[tpmartins/Flickr\]](#)

The UN's International Agency for Research on Cancer (IARC) said Friday (20 March) that three pesticides were "probably" carcinogenic and two others, which have already been outlawed or restricted, were "possibly" so.

IARC classified the herbicide glyphosate – the active ingredient in Roundup – and the insecticides malathion and diazinon as "probably carcinogenic" on the basis of "limited evidence" of cancer among humans.

The insecticides tetrachlorvinphos and parathion were classified as "possibly carcinogenic" in the light of "convincing evidence" from lab animals, the IARC said in a [statement](#).

The classification, made by an expert panel, is not binding, said the IARC, an agency based in Lyon, that comes under the aegis of the World Health Organization (WHO).

"It remains the responsibility of individual governments and other international organisations to recommend regulations, legislation or public health intervention," it said.

Glyphosate – introduced in the 1970s under the brand Roundup but now manufactured generically – is the most-produced weed killer in the world, the IARC said.

Agricultural use of it has surged since the introduction of crops genetically modified to be resistant to the chemical, enabling farmers to douse a field in one go, to kill weeds.

"The general population is exposed (to glyphosate) primarily through residence near sprayed areas, home use and diet, and the level that has been observed is generally low," the IARC statement said.

The evaluation of glyphosate saw "limited evidence" of a type of cancer called non-Hodgkin lymphoma, as seen in studies in the United States, Sweden and Canada conducted among farm workers since 2001.

In 1985, the US Environmental Protection Agency (EPA) classified glyphosate as "possibly carcinogenic for humans" on the basis of experiments on lab mice.

In 1991, though, it took another look at those experiments and changed the classification to "evidence of non-carcinogenicity" in humans.

Monsanto rejects classification

The US agribusiness giant Monsanto, which manufactures Roundup, strongly contested the IARC classification.

"Each of the studies considered by IARC have been previously reviewed and considered by regulatory agencies - most recently by the German government on behalf of the European Union," it said in a [press release](#).

"Relevant, scientific data was excluded from review," it charged.

"(The) IARC received and purposefully disregarded dozens of scientific studies – specifically genetic toxicity studies – that support the conclusion glyphosate is not a human health risk."

Malathion is used in substantial volumes throughout the world, with agricultural workers being the most exposed to it, the IARC said.

Diazinon production has been low and decreased further after 2006, following restrictions being placed on it in the United States and the European Union.

Tetrachlorvinphos is banned in the EU, but in the United States, it continues to be used on livestock and pets, including in flea collars.

"Parathion use has been severely restricted since the 1980s. All authorised uses were cancelled in the European Union and the USA by 2003," IARC said.

Definitions

The IARC has four categories: "carcinogenic" (group 1), "probably carcinogenic" (group 2A), "possibly carcinogenic" (group 2B), "not classifiable" (group 3) and "probably not carcinogenic to humans" (group 4).

The term "limited evidence" means its experts, in a review of research, found an association between exposure to the chemical and cancer.

However, chance or confounding factors cannot be ruled out, according to this definition.

A [summary](#) of the assessment was published online in the journal *The Lancet Oncology*.

Independent experts contacted by Britain's Science Media Centre (SMC) said they did not see a clear case of cancer risk for glyphosate, and some queried the IARC's methodology.

"There are over 60 genotoxicity studies on glyphosate with none showing results that should cause alarm relating to any likely human exposure," said Colin Berry, emeritus professor of pathology at Queen Mary University of London.

"The IARC report does not raise immediate alarms," said David Coggon, a professor of environmental medicine at Britain's University of Southampton.

"However, I would expect regulatory authorities around the world to take note of this new evaluation, and to consider whether it indicates a need to review their risk assessments for any of the pesticides that they currently approve."

IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides Lyon, France, 20 March 2015 –

The International Agency for Research on Cancer (IARC), the specialized cancer agency of the World Health Organization, has assessed the carcinogenicity of five organophosphate pesticides.

A summary of the final evaluations together with a short rationale have now been published online in *The Lancet Oncology*, and the detailed assessments will be published as Volume 112 of the IARC Monographs.

What were the results of the IARC evaluations? The herbicide glyphosate and the insecticides malathion and diazinon were classified as probably carcinogenic to humans (Group 2A).

The insecticides tetrachlorvinphos and parathion were classified as possibly carcinogenic to humans (Group 2B).

What was the scientific basis of the IARC evaluations?

The pesticides tetrachlorvinphos and parathion were classified as possibly carcinogenic to humans (Group 2B) based on convincing evidence that these agents cause cancer in laboratory animals.

For the insecticide malathion, there is limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma and prostate cancer.

The evidence in humans is from studies of exposures, mostly agricultural, in the USA, Canada, and Sweden published since 2001.

Malathion also caused tumours in rodent studies. Malathion caused DNA and chromosomal damage and also disrupted hormone pathways.

For the insecticide diazinon, there was limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma and lung cancer.

The evidence in humans is from studies of agricultural exposures in the USA and Canada published since 2001.

The classification of diazinon in Group 2A was also based on strong evidence that diazinon induced DNA or chromosomal damage.

For the herbicide glyphosate, there was limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma.

The evidence in humans is from studies of exposures, mostly agricultural, in the USA, Canada, and Sweden published since 2001.

In addition, there is convincing evidence that glyphosate also can cause cancer in laboratory animals.

On the basis of tumours in mice, the United States Environmental Protection Agency (US EPA) originally classified glyphosate as possibly carcinogenic to humans (Group C) in 1985.

After a re-evaluation of that mouse study, the US EPA changed its classification to evidence of non-carcinogenicity in humans (Group E) in 1991.

The US EPA Scientific Advisory Panel noted that the re-evaluated glyphosate results were still significant using two statistical tests recommended in the IARC Preamble.

The IARC Working Group that conducted the evaluation considered the significant findings from the US EPA report and several more recent positive

results in concluding that there is sufficient evidence of carcinogenicity in experimental animals.

Glyphosate also caused DNA and chromosomal damage in human cells, although it gave negative results in tests using bacteria.

One study in community residents reported increases in blood markers of chromosomal damage (micronuclei) after glyphosate formulations were sprayed nearby.

How are people exposed to these pesticides?

Tetrachlorvinphos is banned in the European Union. In the USA, it continues to be used on livestock and companion animals, including in pet flea collars.

No information was available on use in other countries.

Parathion use has been severely restricted since the 1980s.

All authorized uses were cancelled in the European Union and the USA by 2003.

Malathion is currently used in agriculture, public health, and residential insect control.

It continues to be produced in substantial volumes throughout the world.

Workers may be exposed during the use and production of malathion.

Exposure to the general population is low and occurs primarily through residence near sprayed areas, home use, and diet.

Diazinon has been applied in agriculture and for control of home and garden insects.

Production volumes have been relatively low and decreased further after 2006 due to restrictions in the USA and the European Union.

Only limited information was available on the use of these pesticides in other countries.

Glyphosate currently has the highest global production volume of all herbicides.

The largest use worldwide is in agriculture.

The agricultural use of glyphosate has increased sharply since the development of crops that have been genetically modified to make them resistant to glyphosate.

Glyphosate is also used in forestry, urban, and home applications.

Glyphosate has been detected in the air during spraying, in water, and in food.

The general population is exposed primarily through residence near sprayed areas, home use, and diet, and the level that has been observed is generally low.

What do Groups 2A and 2B mean?

Group 2A means that the agent is probably carcinogenic to humans.

This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.

Limited evidence means that a positive association has been observed between exposure to the agent and cancer but that other explanations for the observations (called chance, bias, or confounding) could not be ruled out.

This category is also used when there is limited evidence of carcinogenicity in humans and strong data on how the agent causes cancer.

Group 2B means that the agent is possibly carcinogenic to humans.

A categorization in Group 2B often means that there is convincing evidence that the agent causes cancer in experimental animals but little or no information about whether it causes cancer in humans.

Why did IARC evaluate these pesticides?

The IARC Monographs Programme has evaluated numerous pesticides, some as recently as 2012 (anthraquinone, arsenic and arsenic compounds).

However, substantial new data are available on many pesticides that have widespread exposures.

In 2014, an international Advisory Group of senior scientists and government officials recommended dozens of pesticides for evaluation.

Consistent with the advice of the Advisory Group, the recent IARC meeting provided new or updated evaluations on five organophosphate pesticides. How were the evaluations conducted?

The established procedure for Monographs evaluations is described in the Programme's Preamble.

Evaluations are performed by panels of international experts, selected on the basis of their expertise and the absence of real or apparent conflicts of interest.

For Volume 112, a Working Group of 17 experts from 11 countries met at IARC on 3–10 March 2015 to assess the carcinogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate.

The in-person meeting followed nearly a year of review and preparation by the IARC secretariat and the Working Group, including a comprehensive review of the latest available scientific evidence.

According to published procedures, the Working Group considered "reports that have been published or accepted for publication in the openly available scientific literature" as well as "data from governmental reports that are publicly available".

The Working Group did not consider summary tables in online supplements to published articles, which did not provide enough detail for independent assessment.

What are the implications of the IARC evaluations?

The Monographs Programme provides scientific evaluations based on a comprehensive review of the scientific literature, but it remains the responsibility of individual governments and other international organizations to recommend regulations, legislation, or public health intervention.

Media inquiries: please write to com@iarc.fr. Thank you.

MONSANTO



Monsanto Disagrees with IARC Classification for Glyphosate

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[Email](#)[PDF](#)[Print](#)[RSS](#)

As consumers ourselves, safety is a priority for every person who works at Monsanto. And, we want to be clear: All labeled uses of glyphosate are safe for human health and supported by one of the most extensive worldwide human health databases ever compiled on an agricultural product. In fact, every glyphosate-based herbicide on the market meets the rigorous standards set by regulatory and health authorities to protect human health.

We join fellow members of both the EU and U.S. glyphosate taskforces in our disagreement with IARC's classification for several reasons:

- There is no new research or data here. Each of the studies considered by IARC have been previously reviewed and considered by regulatory agencies – most recently by the German government on behalf of the European Union.
- Relevant, scientific data was excluded from review. IARC received and purposefully disregarded dozens of scientific studies – specifically genetic toxicity studies – that support the conclusion glyphosate is not a human health risk.
- The conclusion is not supported by scientific data. IARC's classification is inconsistent with the numerous multi-year, comprehensive assessments conducted by hundreds of scientists from countries worldwide who are responsible for ensuring public safety.
- IARC's classification does not establish a link between glyphosate and an increase in cancer. It's important to put IARC's classifications into perspective. IARC has classified numerous everyday items in Category 2 including coffee, cell phones, aloe vera extract and pickled vegetables, as well as professions such as a barber and fry cook.

We take great pride in the science behind, and safety of, our products. We are committed to developing products that contribute to safe and nutritious food choices for all consumers. And, we are reaching out to the World Health Organization (WHO) to

understand how, despite the wealth of existing science on glyphosate, the IARC panel could make a classification that disagrees with scientific and regulatory reviews.

We believe conclusions about a matter as important as human safety MUST BE non-biased, thorough and based on quality science that adheres to internationally recognized standards. We join others in viewing IARC's process and its assessment with strong skepticism. [IARC has previously come under criticism](#) for both its process and demonstrated bias.

We urge anyone who wants to know more about glyphosate to look at [the conclusions reached by regulatory authorities in developed countries](#) that rigorously consider all available data, published and unpublished, in a comprehensive evaluation. You can also learn more at www.monsanto.com/iarc-roundup.

Statement from Dr. Philip Miller, Vice President Global Regulatory Affairs, Monsanto

"As consumers ourselves, the safety of our products is paramount to each of us who work at Monsanto, and our company is built on a foundation of science. All labeled uses of glyphosate are safe for human health and supported by one of the most extensive worldwide human health databases ever compiled on an agricultural product.

As recently as January, the German government completed a rigorous, four-year evaluation of glyphosate for the European Union. They reviewed all the data IARC considered, plus significantly more, and concluded "glyphosate was unlikely to pose a carcinogenic risk in humans."

We join fellow members of both the EU and U.S. glyphosate taskforces in our disagreement with this classification for several reasons: there is no new research or data that was used; the most relevant, scientific data was excluded from review; the conclusion is not supported by scientific data; and there is no link between glyphosate and an increase in cancer when the full data set is included in a rigorous review.

We don't know how IARC could reach a conclusion that is such a dramatic departure from the conclusion reached by all regulatory agencies around the globe. We have issued an urgent request for appropriate personnel of the WHO to sit down with the global glyphosate taskforces and other regulatory agencies to account for the scientific studies used in their analysis and, equally as important, to account for those scientific studies that were disregarded.

It is imperative for society that conclusions about a matter as important as human safety be non-biased, thorough and based on science that adheres to internationally recognized standards. The one thing about true science is that it is not selective. Unfortunately, this review does not meet the standards used by respected agencies around the world."

