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2,4-D: The Most Dangerous Pesticide You've Never Heard Of

This toxic herbicide comes with known health risks, but it's still being used on crops, in parks, and maybe even in your own backyard.

March 15, 2016

[Danielle Sedbrook](#)

One of the cheapest and most common weed killers in the country has a name you've probably never heard: 2,4-D. Developed by Dow Chemical in the 1940s, this herbicide helped usher in the clean, green, pristine lawns of postwar America, ridding backyards everywhere of aesthetic undesirables like

dandelion and white clover. But 2,4-dichlorophenoxyacetic acid, as it's known to chemists, has a less wholesome side. There's a growing body of scientific evidence that the chemical poses a danger to both human health and the environment.



Gavin Baker Photography/Shutterstock

The pesticide, which allows not just grasses but also fruits and vegetables to flourish, can attack both the roots and leaves of weeds by making the unwanted plant's cells grow out of control—sort of like inducing cancer in the plant to kill it or drastically slow its spread. It's used widely in agriculture in soybean, corn, sugarcane, and wheat fields, and it turns up in most "weed and feed" products as well as in many lawn treatments. The problem is, the herbicide that was once considered clean and green may no longer be safe by today's standards.

The evidence is slowly mounting—but not yet conclusive. It's not always easy to determine whether a particular substance is causing harm or just happens to be present when some other agent is to blame. Public health experts can't always draw a firm conclusion from studies whose methodologies are lacking in scientific rigor. Take the link between chronic exposure to 2,4-D and cancer: "The evidence isn't clear enough to draw conclusions with confidence, but it is better to take precautions to prevent possible cancers than to wait for more evidence," says [Jennifer Sass](#), an NRDC senior scientist.

Researchers have observed apparent links between exposure to 2,4-D and non-Hodgkin's lymphoma (a blood cancer) and sarcoma (a soft-tissue cancer). But both of these can be caused by a number of chemicals, including dioxin, which was frequently mixed into formulations of 2,4-D until the mid-1990s. Nevertheless, in 2015, the International Agency for Research on Cancer declared 2,4-D [a possible human carcinogen](#), based on evidence that it damages human cells and, in a number of studies, caused cancer in laboratory animals.

More conclusive is the proof that 2,4-D falls into a class of compounds called endocrine-disrupting chemicals, compounds that mimic or inhibit the

body's hormones. Laboratory studies suggest that 2,4-D can impede the normal action of estrogen, androgen, and most conclusively, thyroid hormones. Dozens of epidemiological, animal, and laboratory studies have shown a link between 2,4-D and thyroid disorders. "That's really important when we're thinking about development," says [Kristi Pullen](#), a staff scientist in NRDC's [Health program](#). "Our thyroid works to ensure the proper timing and development of the brain."

There are reports that 2,4-D can decrease fertility and raise the risk of birth defects. But even though fetuses, infants, and children are at highest risk of these, no studies have looked directly at the effects of 2,4-D on those groups.

Despite concerns about potential health risks, in 2014 the U.S. Environmental Protection Agency approved the combined use of 2,4-D and the popular weed killer Roundup (also known as glyphosate, a whole other—and in many ways more worrying—story when it comes to health and the environment). Enlist Duo, as the combo is called, was already legal in [several states](#). It is used mainly on big farms, where it is sprayed on genetically modified crops called Enlist soy and Enlist corn that have been engineered to be resistant to the poisons.

In other words, farmers can now douse their fields with high concentrations of the weed killer without worrying that it will also destroy their crops.

Originally, plants genetically engineered to resist Roundup were sprayed with that herbicide alone. But when the weeds it was intended to kill also developed resistance, 2,4-D was added to make the mix more effective. As Pullen puts it, "These chemicals by themselves can be problematic, but when we start combining them with other toxic chemicals, we're just creating a new problem in order to solve another problem."

The U.S. Department of Agriculture estimates that by 2020, the use of 2,4-D on America's farms could rise between 100 percent and 600 percent now that it has been approved as part of Enlist Duo. According to Pullen, "When you combine increased use with the potential for increased developmental, cancer, and other health impacts, you could create a perfect storm of hazard and exposure coming together."

Also problematic: 2,4-D sticks around in the environment. Depending on the formulation, it can drift through the air from the fields where it is sprayed or be tracked inside homes by pets or children. By the EPA's own measure, 2,4-D has already been detected in groundwater and surface water, as well as in drinking water. Australian scientists reported in

2012 that it was found in more than 90 percent of samples taken from agricultural catchments bordering the Great Barrier Reef—bad news for many fish, for whom the herbicide can be toxic. It can also poison small mammals, including dogs who can ingest it after eating grass treated with 2,4-D.

The easiest way to avoid 2,4-D is to avoid the products that contain it. You can ask your town whether 2,4-D is used in specific parks. You can also visit the website of the [National Pesticide Information Center](#), which has easy-to-read fact sheets on [2,4-D](#) and most other pesticides. If you think you, your child, or your pet have been in contact with plants recently treated with 2,4-D or any other pesticide, [contact a poison-control center](#).

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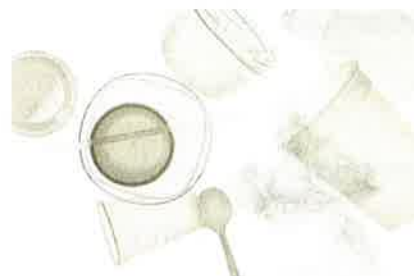
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Weed-Whacking Herbicide Proves Deadly to Human Cells

Used in gardens, farms, and parks around the world, the weed killer Roundup contains an ingredient that can suffocate human cells in a laboratory, researchers say

By Crystal Gammon, Environmental Health News on June 23, 2009

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Used in yards, farms and parks throughout the world, Roundup has long been a top-selling weed killer. But now researchers have found that one of Roundup's inert ingredients can kill human cells, particularly embryonic, placental and umbilical cord cells.

The new findings intensify a debate about so-called "inerts" — the solvents, preservatives, surfactants and other substances that manufacturers add to pesticides. Nearly 4,000 inert ingredients are approved for use by the U.S. Environmental Protection Agency.

Glyphosate, Roundup's active ingredient, is the most widely used herbicide in the United States. About 100 million pounds are applied to U.S. farms and lawns every year, according to the EPA.

Until now, most health studies have focused on the safety of glyphosate, rather than the mixture of ingredients found in Roundup. But in the new study, scientists found that Roundup's inert ingredients amplified the toxic effect on human cells—even at concentrations much more diluted than those used on farms and lawns.

One specific inert ingredient, polyethoxylated tallowamine, or POEA, was more deadly to human embryonic, placental and umbilical cord cells than the herbicide itself — a finding the researchers call "astonishing."

"This clearly confirms that the [inert ingredients] in Roundup formulations are not inert," wrote the study authors from France's University of Caen. "Moreover, the proprietary mixtures available on the market could cause cell damage and even death [at the] residual levels" found on Roundup-treated crops, such as soybeans, alfalfa and

Monsanto scientists argue that cells in Seralini's study were exposed to unnaturally high levels of the chemicals. "It's very unlike anything you'd see in real-world exposure. People's cells are not bathed in these things," said Donna Farmer, another toxicologist at Monsanto.

Seralini's team, however, did study multiple concentrations of Roundup. These ranged from the typical agricultural or lawn dose down to concentrations 100,000 times more dilute than the products sold on shelves. The researchers saw cell damage at all concentrations.

Monsanto scientists also question the French team's use of laboratory cell lines.

"These are just not very good models of a whole organism, like a human being," said Dan Goldstein, a toxicologist with Monsanto.

Goldstein said humans have protective mechanisms that resist substances in the environment, such as skin and the lining of the gastrointestinal tract, which constantly renew themselves. "Those phenomena just don't happen with isolated cells in a Petri dish."

But Cox, who studies pesticides and their inert ingredients at the Oakland environmental group, says lab experiments like these are important in determining whether a chemical is safe.

"We would never consider it ethical to test these products on people, so we're obliged to look at their effects on other species and in other systems," she said. "There's really no way around that."

Seralini said the cells used in the study are widely accepted in toxicology as good models for studying the toxicity of chemicals.

“The fact is that 90 percent of labs studying mechanisms of toxicity or

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Most research has examined glyphosate alone, rather than combined with Roundup’s inert ingredients. Researchers who have studied Roundup formulations have drawn conclusions similar to the Seralini group’s. For example, in 2005, University of Pittsburg ecologists added Roundup at the manufacturer’s recommended dose to ponds filled with frog and toad tadpoles. When they returned two weeks later, they found that 50 to 100 percent of the populations of several species of tadpoles had been killed.

A group of over 250 environmental, health and labor organizations has petitioned the EPA to change requirements for identifying pesticides’ inert ingredients. The agency’s decision is due this fall.

“It would be a big step for the agency to take,” said Cox. “But it’s one they definitely should.”

The groups claim that the laws allowing manufacturers to keep inert ingredients secret from competitors are essentially unnecessary. Companies can determine a competitor’s inert ingredients through routine lab analyses, said Cox.

“The proprietary protection laws really only keep information from the public,” she said.

This article originally ran at [Environmental Health News](#), a news source published by Environmental Health Sciences, a nonprofit

TOXIC HERBICIDES

- from the RIC Good Wood Project

Glyphosate

This stuff is not safe, but unfortunately many forestry agencies, local authorities, private-land tree-planters and bush regenerators now spray, dab, or otherwise apply glyphosate-containing substances to control weed growth prior to planting. In the U.S. in 1993, university studies declared glyphosate the third most commonly reported cause of pesticide illness among agricultural workers, and to be the most commonly reported cause of pesticide illness among landscape maintenance workers [1](#).

Glyphosate is the active killing ingredient in numerous proprietary pesticides, including: ROUNDUP, EAZY WEEDER, SLAM grass and weed killer, ZERO weed spray and wand, COMKILL, SQUADRON, TILLMASTER, TUMBLEWEED, etc.

Virtually all testing for long term health and environmental damage (eg: for cancer, reproductive defects, birth defects, chronic damage) has been done only on the single ingredient, glyphosate, and not on the full formulation containing solvents and surfactants [2](#).

Claims of biodegradability for Roundup (ie, that the herbicide breaks down when it contacts the ground) are therefore next to meaningless. Researchers have found up to 98% of the glyphosate has remained present on sprayed leaves and branches after 90 days. Likewise, if it is not able to be absorbed by a particular soil type, especially those low in organic matter, then it will remain active, often for months.

Glyphosate readily "nitrosates" to form a new compound called **N-nitrosoglyphosate**, which is known to cause tumours. Nitrosation occurs in the human stomach by reaction with the nitrate in normal human saliva. A forest worker spraying Roundup from a backpack, for example, could be in the high risk category for tumour growth by breathing in some of the spray drift.

Nitrosoglyphosate can apparently also form in soils under certain conditions. Research has shown that it is very persistent (ie, not biodegradable), with 7 parts per million remaining in the soil after 140 days. Admittedly, there is diverse and conflicting data put out about glyphosate. On the strength of the above, the Guide advises that you err on the side of caution.

Weed experts now say that weeds such as rye grass are becoming resistant to glyphosate-containing herbicides, which will render conventional chemical farming practices useless.

Glyphosate is illegal to spray in waterways as of June 3rd 1997. Seventy four of seventy five glyphosate-containing substances tested by the National Registration Authority for Agricultural and Veterinary Chemicals contained a surfactant toxic to frogs and other aquatic lifeforms.

The Last Roundup...

The West Australian Environment Protection Agency has evidence that Roundup has killed three species of frogs 3. At first, the reaction from the National Registration Authority was dismissive, but now a snap review of the effects of Roundup in or near aquatic environments is being undertaken. It is suspected by the WA EPA that it is the surfactant in Roundup that kills the frogs.

The manufacturers, Monsanto, have not released the names of the other ingredients in Roundup and they have not been tested in the environment in conjunction with the active ingredient, glyphosphate. Monsanto has reported "severe local effects and testicular effects in rabbits", so watch out!

Roundup is only conditionally registered with the Authority, because nineteen out of twenty eight studies have still not been done. These are studies to ascertain Roundup's movement and accumulation in water, soil, air, fish, irrigated crops, aquatic systems and forests.

In the state of New York, Roundup manufacturers Monsanto are no longer allowed to label their glyphosate products "biodegradable", or "environmentally friendly" in any advertising. (Monsanto is also the manufacturer of genetically-engineered, Roundup-resistant soybeans.)

- Going Organic Magazine, Dec '95, and Pesticide Action Network North America Update Service.

Picloram

Picloram (Tordon), a picolenic acid herbicide, is the type of herbicide a chemical company loves to sell and those concerned only with killing vegetation love to buy: it is persistent and can be used to kill a large variety of woody plants and annual and perennial broadleaved weeds.

A mixture of picloram and 2,4-D, known as Agent White during the Vietnam War, was sprayed by the US military on those plants that survived the initial onslaught of Agent Orange (2,4,5-T and 2,4-D). That mixture is sold in Australia as Tordon.

Picloram/Tordon can be sprayed on foliage, injected into plants, applied to cut surfaces, or placed at the base of the plant where it will leach to the roots. Once absorbed by the foliage, stem, or roots, picloram is transported throughout the plant, where it is quite stable (ie, just sits there, waiting...).

The very characteristics of Picloram that ensure the killing of a wide variety of plants, however, are also the one ones that cause trouble in the wider environment: persistence, leaching, and broad toxicity to plants in small amounts.

Grasslin

Tebuthiuron - Not Recommended

(to be updated)

Atrazine

Atrazine is the world's most widely used herbicide. It is used to control weeds in plantations, on roadsides, in parks, gardens, orchards and pastures, etc lots of places where children play. It is notorious for its tendency to contaminate groundwater, with a consequent deleterious effect on human health as documented by the World Health Organisation. Because it is a systemic poison (organochlorine), its residues penetrate the flesh of fruit and vegetables and cannot be washed off. The Australian Medical Association is opposed to Atrazine spraying.

Research ⁴ has indicated that atrazine is associated with prostate, ovarian and breast cancer and also damages the endocrine system, functioning as a synthetic hormone disruptor. As a 'hormone mimic' it can block, antagonise, compete with, or mimic hormones at cellular level. This may lead to reproductive and endocrinal effects. Atrazine has also demonstrated cardiac toxicity in experimental animals. Exposure may lead to abdominal pain, impaired adrenal function, anaemia, dermatitis, diarrhoea, skin, eye and mucous membrane irritation, nausea and vomiting.

Too often, the community is not even aware of the use of this poison in public areas. It is extremely important to be vigilant when there is the prospect of such chemicals being used in the local community. With the corporatisation of forest agencies, and their hunger for short-term profits and reluctance to date to investigate environmentally-safe weed control, the 'chemical option' remains very attractive to them.

Forestry Tasmania is one such agency which has sprayed Atrazine in water catchment areas after clearfelling areas of forest or plantation. Twenty days after one such instance, Atrazine was found in the town of Derby's tap-water. Manufacturer, Ciba Geigy has tried very hard through the media to claim that Atrazine couldn't harm anyone, yet is unable to explain outbreaks of non-Hodgkins lymphoma in Italy (Europe in general has for years been getting Atrazine fog), or bowel cancer in Kansas in the U.S. (which is subjected to Atrazine rain, has 75% of its water bores contaminated with the stuff and uses identification of Atrazine residues in food imports as a trade barrier). **Info from the manufacturer itself shows that metabolites of Atrazine (ie, what it breaks down into in the ecosystem), are more than twice as toxic as the original compound.**

The Tasmanian foresters declared a moratorium on Atrazine (and Simazine) use until 1997, and have invested \$200,000 in the investigation of alternatives to chemical use in plantations ⁵. Super-heated steam is one option being examined by Councils to control weeds (such as Sydney's Leichhardt Council). However, there are many more chemicals 'out there' which need to be subjected to closer community scrutiny.

1. Lismore's [Big Scrub Environment Centre](#) has published a leaflet called: Glyphosate - How Safe? Call them on [02] 6621 3123 to order a copy or enquire about their other literature. Other info, see [Chemicals, Toxics Groups](#) in the Directory.

2. See also [Know Your Inerts](#) and [Toxic Chemical Combinations](#).

3. Frog extinctions have also been attributed to drought, acid rain, ozone depletion, salination, pesticides, predation, climate-change and viruses from ornamental fish.

4. See the book [Quick Poison, Slow Poison Pesticide Risk in the Lucky Country](#).

5. Forestry Tasmania has published a book on chemical-free weed control - see [Chemicals, Toxics](#) in the **Books** section of the Directory.

Antidepressant Microbes In Soil: How Dirt Makes You Happy

By Bonnie L. Grant

Prozac may not be the only way to get rid of your serious blues. Soil microbes have been found to have similar effects on the brain and are without side effects and chemical dependency potential. Learn how to harness the natural antidepressant in soil and make yourself happier and healthier. Read on to see how dirt makes you happy.

Natural remedies have been around for untold centuries. These natural remedies included cures for almost any physical ailment as well as mental and emotional afflictions. Ancient healers may not have known why something worked but simply that it did. Modern scientists have unraveled the why of many medicinal plants and practices but only recently are they finding remedies that were previously unknown and yet, still a part of the natural life cycle. Soil microbes and human health now have a positive link which has been studied and found to be verifiable.

Soil Microbes and Human Health

Did you know that there's a natural antidepressant in soil? It's true. *Mycobacterium vaccae* is the substance under study and has indeed been found to mirror the effect on neurons that drugs like Prozac provide. The bacterium is found in soil and may stimulate serotonin production, which makes you relaxed and happier. Studies were conducted on cancer patients and they reported a better quality of life and less stress.

Lack of serotonin has been linked to depression, anxiety, obsessive compulsive disorder and bipolar problems. The bacterium appears to be a natural antidepressant in soil and has no adverse health effects. These antidepressant microbes in soil may be as easy to use as just playing in the dirt.

Most avid gardeners will tell you that their landscape is their "happy place" and the actual physical act of gardening is a stress reducer and mood lifter. The fact that there is some science behind it adds additional credibility to these garden addicts' claims. The presence of a soil bacteria antidepressant is not a surprise to many of us who

have experienced the phenomenon ourselves. Backing it up with science is fascinating, but not shocking, to the happy gardener.

Mycobacterium antidepressant microbes in soil are also being investigated for improving cognitive function, Crohn's disease and even rheumatoid arthritis.

How Dirt Makes You Happy

Antidepressant microbes in soil cause cytokine levels to rise, which results in the production of higher levels of serotonin. The bacterium was tested both by injection and ingestion on rats and the results were increased cognitive ability, lower stress and better concentration to tasks than a control group.

Gardeners inhale the bacteria, have topical contact with it and get it into their bloodstreams when there is a cut or other pathway for infection. The natural effects of the soil bacteria antidepressant can be felt for up to 3 weeks if the experiments with rats are any indication. So get out and play in the dirt and improve your mood and your life.

Watch this video about how gardening makes you happy:

Why Gardening Makes You Happy: Gardening Know How's Two...



Resources:

“Identification of an Immune-Responsive Mesolimbocortical Serotonergic System: Potential Role in Regulation of Emotional Behavior,” by Christopher Lowry et al., published online on March 28, 2007 in *Neuroscience*.

http://www.sage.edu/newsevents/news/?story_id=240785 [1]

Lawmakers backing pesticide restrictions poised to shape farm policy

Created on Wednesday, 01 February 2017 | Written by [Mateusz Perkowski/Capital Bureau](#) | 

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Proposed changes to Oregon's 'right to farm' law would remove protections for pesticides.

SALEM — Lawmakers with strong track records of supporting pesticide restrictions are chairing two Senate committees that are positioned to affect Oregon agricultural policies in 2017.

Senate Bill 499 — a proposal to strip pesticide protections from Oregon's "right to farm" law — was introduced at the behest of the Senate Judiciary Committee, whose chair is Floyd Prozanski, D-Eugene.

Oregon's "Right to Farm and Forest" law prohibits local ordinances restricting common farm practices as well as nuisance and trespass lawsuits against such farm practices.

People who lose such lawsuits are required to pay the opposing party's attorney fees, which has discouraged such cases against farm practices from being filed in Oregon.

Under SB 499, however, complaints alleging nuisance or trespass from pesticides are exempted from the "right to farm" law.

The bill's introduction at the request of the Senate Judiciary Committee bodes well for its chances for a vote before the full Senate, particularly since Prozanski has supported a harder line against pesticide usage.

In 2015, for example, Prozanski sponsored bills that would ban neonicotinoid insecticides and increase notification and reporting requirements for spraying pesticides.

All of those bills died in the Senate Committee on Environment and Natural Resources, which was then chaired by Sen. Chris Edwards, D-Eugene.

Edwards left the Legislature last year to take a job at the University of Oregon, so Sen. Michael Dembrow, D-Portland, will replace him as chair of that committee.

Dembrow was a chief sponsor of legislation in 2015 — Senate Bill 613 — that would have increased notification requirements for aerial pesticide spraying of forestland, which died in committee.

The Oregon League of Conservation Voters gives Dembrow a 94 percent "lifetime score" based on his support of environmental legislation.

Scott Dahlman, policy director of the Oregonians for Food and Shelter agribusiness group, said his organization hasn't always seen "eye to eye" with Dembrow.

Even so, Dembrow is known for having an "open door" policy and will hopefully keep an open mind on issues affecting agriculture, Dahlman said.

Beyond Toxics, an environmental non-profit, believes Dembrow is the right choice to chair the Senate Committee on the Environment and Natural Resources, though it's too early to say how he might influence legislation, said Lisa Arkin, the group's executive director.

Arkin said Oregon's approach to pesticides in farming and forestry is "outdated and unscientific" and the state's pesticide laws are overdue for reform.

In the Oregon House, the elimination of the Committee on Rural Communities, Land Use and Water has created some uncertainty for legislation that affects agriculture, said Dahlman.

Bills that would have previously been steered to this committee will now likely wind up before the House Agriculture and Natural Resources Committee and the House Energy and Environment Committee, he said.

The House Agriculture Committee is chaired by Rep. Brian Clem, D-Salem, who is a part-owner of a farm and is familiar



EO MEDIA GROUP - Oregon legislators who back more restrictions on pesticide use have taken over as chairmen of key committees that could change the state's "right to farm" laws.

with agricultural issues, Dahlman said.

Rep. Ken Helm, D-Beaverton, isn't as familiar with natural resource issues but there's no reason to think he won't be receptive to industry concerns, he said.

Rumors Have Been Confirmed, Jolie Comes Clean

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Jan Steinman · 3 hours ago

Don't throw the baby out with the bath water!

Strong "right to farm" legislation is extremely important in these days, when the urban-rural boundary is increasingly blurred.

While I agree that pesticide and herbicide drift should be an exception, farmers need protection from neighbours who move into the neighbourhood from the city or suburbs, and immediately take exception to the noise of roosters in the morning, or the dust from farm machinery, or the odour of livestock manure.

We all eat for a living. Those who move into a farming community need to live with the consequences.

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Two Americas → Jan Steinman · 3 hours ago

...farmers need protection from neighbours who move into the neighbourhood from the city or suburbs, and immediately take exception to the noise of roosters in the morning, or the dust from farm machinery, or the odour of livestock manure.

Amen. During cherry harvest we have to move a lot of equipment around on the country roads, and run trucks to the packing houses. We have an increasing number of suburban transplants in the area now causing all sorts of problems: suing farmers