

# The Deadliest Chemical in US Agriculture Goes on Trial

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✓ Fact Checked

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## STORY AT-A-GLANCE

- › Glyphosate – the active ingredient in the broad-spectrum herbicide RoundUp – is commonly used off-label as a desiccant and/or preharvest treatment to speed ripening. This is why even non-GMO foods often contain glyphosate
- › Paraquat and diquat are registered desiccants that have been used in U.S. agriculture since 1962, and as bad as glyphosate is, these “quats” may be even worse
- › More than 3,000 farmers with Parkinson’s disease are suing Syngenta, the lead manufacturer of paraquat, and Chevron, a key distributor, arguing the chemical caused their disease. The first federal trial is set for October 2023. More than 100 lawsuits have also been filed in California state courts, where trials are set to begin in June 2023
- › In 2021, the U.S. Environmental Protection Agency (EPA) reapproved paraquat for another 15 years. Earth Justice sued the EPA claiming the agency has “understated the extent of paraquat’s adverse effects.” The EPA is now re-reviewing its paraquat data and has until December 2023 to draft its reanalysis
- › Research suggests plant lectins are the key link between paraquat and the damage resulting in Parkinson’s disease. Lectins are proteins found in many grains, legumes, and beans – the very crops most-often treated with paraquat. Paraquat can trigger Parkinson’s disease when combined with plant lectins as the lectins transport the toxin straight into the brain

As previously reported in "[Preharvest Use of Glyphosate Poisons Kids' Food](#)," testing has revealed alarmingly high levels of glyphosate in the vast majority (43 out of 45)

breakfast products and snacks made with oats.

Glyphosate – the active ingredient in the broad-spectrum herbicide RoundUp – is commonly used on genetically engineered (GE) crops to kill weeds, but high levels of the chemical is also found in non-GE foods. The reason for this is because it's also used as an off-label desiccant and/or preharvest treatment to speed ripening.<sup>1</sup>

The Monsanto pamphlet "Preharvest Staging Guide"<sup>2</sup> clearly states that Roundup formulation "should not be used as a desiccant," but many farmers use it that way anyway,<sup>3</sup> despite the known risks.

That said, other registered desiccants certainly aren't any safer, and food is not tested for them either. This raises questions about whether desiccants ought to be allowed at all. It's a sticky problem though, for a number of reasons. For example, many farmers today do not own their own harvesting equipment. They hire companies that come in and do it.

It's costly, so to make sure the grain is ready for harvesting on a specific date, they pretreat it with a desiccant to ensure it's sufficiently dry in time for harvesting.

Desiccating also eliminates excess green plant material, which reduces wear and tear on machinery, and improves profits, as farmers are penalized when the grain contains too much moisture. The greater the moisture content of the grain at sale, the lower the price they get.

## **Paraquat and Diquat to Face Trial**

Paraquat and diquat are two herbicides and registered desiccants used in U.S. agriculture since 1962, and as bad as glyphosate is, these "quats" may be even worse. As reported by Civil Eats:<sup>4</sup>

*"... paraquat is still one of the most popular herbicides in the U.S., applied in the greatest quantities to fields of soybeans, cotton, and grapes, according to the U.S. Geological Survey.<sup>5</sup> It's also the deadliest pesticide used in U.S. agriculture,*

capable of killing a human with just a sip, as [the U.S. Environmental Protection Agency \(EPA\) warns](#).<sup>6</sup>

*As far back as 1983, the journalist Andrew Revkin warned that 'the potent weedkiller is killing people,' as he starkly detailed<sup>7</sup> its link to suicides and accidental deaths. A considerable body of evidence<sup>8</sup> links the toxicant to Parkinson's disease, a progressive neurological condition with no cure."*

While 50 countries have banned paraquat due to its adverse effects on health, the chemical remains legal in the U.S., provided farmers receive training on its application. Soon, that may change, however, as more than 3,000 farmers with [Parkinson's disease](#) are now suing Syngenta, the lead manufacturer, and Chevron, a key distributor, arguing paraquat caused their disease.

*"The lawsuits, which were consolidated to pool evidence, have led to a trove of hundreds of documents<sup>9</sup> ... including evidence that the companies knew – as early as the 1960s – about paraquat's potential risks to the brain and feared the potential of lawsuits," Civil Eats reports.*<sup>10</sup>

The first federal trial is set for October 2023. More than 100 lawsuits filed in California state courts have also been consolidated and are set to begin in June 2023.

## **EPA's Paraquat Analysis Is Being Challenged**

In 2021, the U.S. Environmental Protection Agency (EPA) reapproved paraquat for another 15 years. The approval was challenged by Earth Justice, which filed a lawsuit against the EPA claiming the agency "repeatedly understated the extent of paraquat's adverse effects."

In response to that lawsuit, the EPA asked the Ninth Circuit Court of Appeals to allow it to revisit its analysis of paraquat. In December 2022, the court granted its request. The EPA now has until December 2023 to draft its reanalysis. If the EPA does a thorough-enough job, paraquat may end up being restricted or banned. Civil Eats continues:<sup>11</sup>

*"The initial paraquat risk assessment was scientifically and legally baseless," said Jonathan Kalmuss-Katz, a senior attorney at Earthjustice, which in 2021 challenged the EPA's registration on behalf of other petitioners, including the Center for Biological Diversity, Farmworker Justice, and the California Rural Legal Assistance Foundation.*

*'The key question now is whether EPA uses this new opportunity to follow the science and protect the public from this incredibly dangerous pesticide' ...*

*The lawsuit challenged a range of oversights, claiming the EPA considered the economic risk to growers more heavily than the health risk to farmers and farmworkers, in violation of federal pesticides law ...*

*The agency, petitioners claimed, also overlooked the medical evidence relating to Parkinson's disease, citing research<sup>12</sup> by the National Health Institute, the nation's main medical research agency, which 'found that people who applied paraquat were more than twice as likely to develop Parkinson's disease as those who applied other pesticides.'"*

According to Majed Nachawati, the co-lead attorney of the state court litigation in California, the core argument in all these lawsuits is that paraquat exposure – both topical exposure and inhalation – is indeed causally linked to Parkinson's.

## **Paraquat Augments Lectin Toxicity**

Interestingly, research<sup>13</sup> strongly suggests plant lectins are the key link between paraquat and the damage resulting in Parkinson's disease. Lectins are sugar-binding plant proteins found in many grains, legumes and beans. High-lectin foods include peanuts, soy, lentils, rice, potatoes and wheat, just to name a few.

Lectins attach to your cell membranes, and some experts, including Dr. Steven Gundry,<sup>14</sup> author of "The Plant Paradox," argue that **plant lectins are a hidden culprit behind many health problems** as they can cause severe inflammation, damage nerves, kill cells, interfere with gene expression and disrupt endocrine function.

**“ Lectins are proteins found in many grains, legumes and beans — the very crops most-often treated with paraquat. Paraquat can trigger Parkinson's disease when combined with plant lectins as the lectins transport the toxin straight into the brain. ”**

What's worse, researchers have found that paraquat can trigger Parkinson's disease when combined with plant lectins,<sup>15</sup> as the lectins can transport the toxin straight into the brain. The cruel irony here is that paraquat is widely used as an herbicide and desiccant on crops rich in lectins, including wheat, soybeans, potatoes, cereal grains and beans.

In other words, while lectins can cause severe health problems in and of themselves, by spraying paraquat on lectin-rich crops, those crops are made exponentially more hazardous, as the lectins act as transport vehicles for the toxic herbicide. As reported by Medical News Today in 2018:<sup>16</sup>

*"[P]araquat, once in the stomach, causes alpha-synuclein to be misfolded and then helps it travel to the brain. Scientists believe that alpha-synuclein runs along the vagus nerve, which itself runs between the stomach and the brain.*

*In fact, recent studies have shown that the vagus nerve has a direct connection with the substantia nigra, making it a prime suspect in Parkinson's disease. This direct link also helps explain why digestive problems often precede the motor symptoms of Parkinson's by several years.*

*To investigate, the researchers fed rats small doses of paraquat for 7 days. They also fed them lectins ... As expected, they identified Parkinson's-related changes ... As study co-author Prof. Thyagarajan Subramanian explains:*

*'We were able to demonstrate that if you have oral paraquat exposure, even at very low levels, and you also consume lectins [...] then it could potentially trigger the formation of this protein — alpha-synuclein — in the gut. Once it's*

*formed, it can travel up the vagus nerve and to the part of the brain that triggers the onset of Parkinson's disease.'*

*This series of experiments demonstrates how the interplay between two ingested compounds can conspire to create and then transport toxic protein structures from the gut to the brain."*

## **Diquat May Pose Similar Risks**

Diquat, while generally considered less toxic than paraquat, is still thought to have similar health risks. As noted in a 2015 study,<sup>17</sup> diquat causes cell death by producing reactive oxygen species independently of the mitochondria, and appears to be quite hazardous to brain tissue. According to the authors:

*"Evidence indicates that Parkinson's disease (PD), in addition to having a genetic aetiology, has an environmental component that contributes to disease onset and progression ...*

*Given its similarity to paraquat, an agrochemical removed from registration in the EU for its suspected potential to cause PD, we have investigated the in vitro capacity of the related herbicide Diquat to cause PD-like cell death.*

*Diquat showed greater toxicity towards SH-SY5Y neuroblastoma cells and human midbrain neural cells than paraquat and also MPTP, which was independent of dopamine transporter-mediated uptake.*

*Diquat caused cell death independently of caspase activation ... with only a minor contribution from apoptosis, which was accompanied by enhanced reactive oxygen species production in the absence of major inhibition of complex I of the mitochondrial respiratory chain ...*

*Diquat may, therefore, kill neural tissue by programmed necrosis rather than apoptosis, reflecting the pathological changes seen following high-level exposure, although its ability to promote PD is unclear."*

## Take-Home Message

The take-home message from all this is that the hazards of desiccation are not limited to glyphosate. Paraquat has been linked to the development of Parkinson's disease by attaching to lectins in the foods, and diquat may also have similar effects.

These herbicides are considered the "best" drying option for legumes, which are also particularly high in lectins. As a result, many foods that vegetarians and vegans rely on may pose significant health hazards in more ways than one.

You can reduce lectin concentration by pressure cooking, for example, but if you're using an unclean source, you're dealing with extra-toxic kinds of lectins. To avoid or at least minimize these hazards, it's important to buy organic beans, peas, potatoes and other high-lectin foods from a reputable source, ideally a local farmer you can trust.

## Sources and References

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- <sup>1</sup> [JAMA. 2017;318\(16\):1610-1611](#)
- <sup>2</sup> [Roundup.ca, Preharvest Staging Guide](#)
- <sup>3</sup> [Environmental Sciences Europe 2016; 28\(1\): 3](#)
- <sup>4, 10, 11</sup> [Civil Eats March 22, 2023](#)
- <sup>5</sup> [USGS Estimated Annual Pesticide Use](#)
- <sup>6</sup> [EPA Paraquat Risk Message](#)
- <sup>7</sup> [Public Eye, Paraquat](#)
- <sup>8, 12</sup> [NIH February 11, 2011](#)
- <sup>9</sup> [The New Lede Paraquat Papers Library](#)
- <sup>13, 15</sup> [NPJ Parkinson's Disease 2018; 4: 3](#)
- <sup>14</sup> [Drgundry.com Lectin Guide](#)
- <sup>16</sup> [Medical News Today December 10, 2018](#)
- <sup>17</sup> [Archives of Toxicology October 2015; 89\(10\): 1811-1825](#)