

UNIFIED PARKINSON'S ADVOCACY COUNCIL

July 24, 2017

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Power for Parkinson's
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Marianne Mannix, Chemical Review Manager
Pesticide Re-Evaluation Division
Office of Pesticide Program Docket
Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20406

Re: Docket EPA-HQ-OPP-2011-0855 (Paraquat Dichloride Registration Review)

Dear Ms. Mannix:

On behalf of the Unified Parkinson's Advocacy Council, we write to express our concern with paraquat dichloride ("paraquat"), which is shown to increase risk of Parkinson's disease (PD). We ask the Environmental Protection Agency (EPA) to deny the reregistration of this herbicide based on strong evidence of paraquat's harm to human health.

The Unified Parkinson's Advocacy Council (UPAC) is led by The Michael J. Fox Foundation for Parkinson's Research (MJFF) and comprises representatives from the leading national, regional and state Parkinson's organizations. We gather field-wide input on public policy issues impacting the Parkinson's community and work to shape policies that support patients, caregivers and researchers. PD is a chronic and progressive neurodegenerative brain disorder that is caused by a loss of neurons and the dopamine neurotransmitter they produce.¹ There is currently no therapy to slow, stop or reverse the progression of PD, nor is there a cure. The disease affects an estimated 750,000 to 1 million Americans.

Science shows paraquat is extremely dangerous. According to the EPA, "one small sip can be fatal and there is no antidote."² We believe it should be eliminated from the American agriculture system for many reasons, including acute toxicity and organ failure by inhalation, oral intake and dermal absorption; chronic toxicity affecting the eyes, lungs, liver, kidneys and endocrine system; and a higher incidence of various cancers after exposure.³ In addition, research indicates low-level chronic exposure significantly increases the risk of Parkinson's disease, which is the focus of this letter.

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Paraquat's Links to Parkinson's Disease

Paraquat is a widely used and potent oxidative stress-inducing herbicide.⁴ Introduced in the 1960s, it kills most green plant tissue on contact and has become one of the most popular commercial herbicides in the United States.⁵ It is used as an alternative for weeds resistant to glyphosate, an herbicide commonly known as "Roundup." Global sales of paraquat totaled \$640 million in 2011.⁶ Usage is expected to grow due to increased glyphosate-resistant weeds in the food system and high profile glyphosate-related lawsuits.⁷

The exact cause of Parkinson's disease is unknown, although research points to a combination of genetic and environmental factors. Certain chemicals, such as nicotine and caffeine, have been found to protect dopaminergic neurons, and others, such as paraquat, increase production of certain oxygen derivatives that may harm cellular structures and cause the disease.⁸ Recent research links paraquat and several other herbicides to the development of Parkinson's pathology and symptoms. The most recent scientific studies indicate:

- Paraquat increases the likelihood of an exposed person developing Parkinson's disease;
- The effect is dose dependent;⁹ and
- When combined with other factors, such as genetic disposition, exposure to the fungicide maneb or the insecticide rotenone, the risk is even greater.¹⁰

Two studies of California's Central Valley found years of exposure to a combination of paraquat and maneb increased the risk of Parkinson's later in life. People exposed at a younger age — in their teen or young adult years — had an increased risk of 200 to 600 percent, depending on the overall number of years of exposure.¹¹ Another study found that Central Valley residents under age 60 who lived near fields where the pesticides paraquat and maneb were used between 1974 and 1999 had a Parkinson's rate many times higher than other residents in the region. It also found that PD was diagnosed at a younger age among those who had used paraquat and similar chemicals.¹²

A study using participants of the large Agricultural Health Study also found a 200 percent increased risk in farmers that mixed or applied paraquat, and if they had a defect in a certain gene, the risk went up even more.¹³ "Our findings, considered together with earlier results, suggest that paraquat use plays a role in human PD," the study concluded. "Because paraquat remains one of the most widely used herbicides worldwide, this finding potentially has great public health significance."¹⁴

More recently, a 2017 study looking at people with Parkinson's found an association between paraquat and PD, especially in those with certain genetic characteristics. This study concluded that paraquat exposure damaged DNA and impaired mitochondrial respiration, further indicating the way by which paraquat could cause PD.¹⁵ In addition, animal studies show that paraquat causes a dose-dependent depletion of dopamine in mice injected with the chemical, and the effect is long lasting and irreversible.¹⁶ In fact, paraquat exposure mimics Parkinson's so well in mice that it is used to create an animal model for the disease.¹⁷

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The EPA Recognizes the Toxicity of Paraquat

The EPA recently introduced policies to protect people who work with paraquat from exposure to the herbicide, including restricting its use to certified individuals and requiring them to participate in additional training.¹⁸ While we support these mitigations, several epidemiologic studies have associated Parkinson's disease with rural living, well water exposure and farming. Studies also indicate that exposure to paraquat, either directly or through air or clothing-borne herbicide drift, markedly increases risk of developing Parkinson's.¹⁹ Restricting the use of the chemical to those with a license is therefore insufficient to protect all people.

Conclusion

Thirty-two countries, including South Korea, China, Serbia, Zimbabwe and members of the European Union (where the chemical is manufactured and exported), have weighed the benefits and the potential harms posed by paraquat and banned the herbicide.²⁰ The UPAC strongly urges the EPA to do the same.

Those who advocate for the continued use of paraquat in agricultural applications cite costs and additional burden to justify their position.²¹ We understand the financial constraints of small family farmers and sympathize with the conflict between a producer's immediate bottom line and future health. However, it is possible to utilize alternative means of pest-control while still obtaining an adequate yield. Sustainable practices such as crop rotation,²² integrated pest management²³ or biopesticides²⁴ can play a significant role in reducing the use of harsh chemicals in the food system.

The economic and emotional costs of living with Parkinson's are too high to continue allowing the use of an herbicide so strongly linked to the disease. A person with PD spends an estimated \$26,400 per year on their care, and Parkinson's results in an annual economic burden of \$19.8 to \$26.4 billion in the United States.²⁵ Many of those costs affect the government because of the significant number of Parkinson's patients who rely on programs like Medicare, Medicaid and Social Security Disability Insurance.²⁶

To protect human health, chemicals like paraquat should be strongly scrutinized and restricted. Please consider the evidence surrounding paraquat and deny the herbicide's reregistration.

Thank you for the opportunity to submit remarks.



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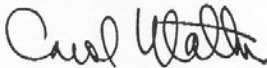
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¹"NIHSeniorHealth: Parkinson's Disease - What Causes Parkinson's Disease?" *Nihseniorhealth.gov*. 2017. Web. 19 July 2017.

²"Paraquat Dichloride." Environmental Protection Agency. 15 Dec. 2016.

³Watts, Meriel. *Paraquat*. Pesticide Action Network Asia & the Pacific, 2011. Web. 19 July 2017.; "Facts About Paraquat." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 02 Apr. 2013. Web. 17 July 2017.

⁴Lascano, Ramiro et al. "Paraquat: An Oxidative Stress Inducer." *Herbicides - Properties, Synthesis and Control of Weeds* (2012) Dr. Mohammed Nagib Hasaneen (Ed.), InTech.

⁵"Paraquat Dichloride." EPA. Environmental Protection Agency, 15 Dec. 2016. Web. 17 July 2017.

⁶Prada, Paulo. "Paraquat: A controversial chemical's second act." Reuters. 16 Apr. 2015. Web. 18 July 2017

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⁷CBS News. "Popular weed killer faces lawsuit over cancer claims." CBS Interactive, 29 June 2016. Web. 18 July 2017.

⁸"Parkinson's Disease and Environmental Factors." National Institutes of Health (Feb. 2014): Web. https://www.niehs.nih.gov/health/materials/parkinsons_disease_and_environmental_factors_508.pdf

⁹Tanner, Caroline M. et al. "Rotenone, Paraquat, And Parkinson's Disease." *Environmental Health Perspectives* 119.6 (2011): 866-872.

¹⁰Costello, S. et al. "Parkinson's Disease And Residential Exposure To Maneb And Paraquat From Agricultural Applications In The Central Valley Of California." *American Journal of Epidemiology* 169.8 (2009): 919-926. ; Ritz, Beate R. et al. "Dopamine Transporter Genetic Variants and Pesticides in Parkinson's Disease." *Environmental Health Perspectives* 117.6 (2009): 964-969. Web. 19 July 2017.

¹¹Gatto, Nicole M. et al. "Well-Water Consumption and Parkinson's Disease In Rural California." *Environmental Health Perspectives* 117.12 (2009): 1912-1918. Web. 19 July 2017.

¹²Ritz, Beate R. et al. (2009).

¹³Tanner, Caroline M. et al. (2011).

¹⁴Tanner, Caroline M. et al. (2011).

¹⁵Sanders, Laurie H. et al. "Editor's Highlight: Base Excision Repair Variants And Pesticide Exposure Increase Parkinson's Disease Risk." *Toxicological Sciences* 158.1 (2017): 188-198.

¹⁶Brooks, A.I et al. "Paraquat Elicited Neurobehavioral Syndrome Caused By Dopaminergic Neuron Loss." *Brain Research* 823.1-2 (1999): 1-10.

¹⁷Tieu, K. "A Guide To Neurotoxic Animal Models Of Parkinson's Disease." *Cold Spring Harbor Perspectives in Medicine* 1.1 (2011). Web.

¹⁸"Paraquat Dichloride Human Health Mitigation Decision; Notice of Availability" *Federal Register*, vol. 82, 3 Jan 2017, p. 118.

¹⁹Ritz, Beate R. et al. (2009).

²⁰Adverse Health Effects Caused By Paraquat- A Bibliography Of Documented Evidence. PAN Asia Pacific, Pesticide Action Network, Public Eye, 2017. Web. 19 July 2017. Report.

²¹"Paraquat Dichloride; Proposed Interim Mitigation Decision; Notice of Availability" *Federal Register*, vol. 81, 9 Mar 2016, pp. 12489-12490. See public comments submitted to docket.

²²"Sustainable Crop Production." Grace Communications Foundation. 2017. Web. 19 July 2017.

²³"Integrated Pest Management (IPM) Principles" US EPA. 2017.

²⁴Marrone, Pam. "Natural Pesticides? Large-Scale Farmers Turn To Safer Products to Keep Their Plants Healthy." On Earth Community Blog. 2011. Web. 19 July 2017.

²⁵Kowal, Stacey L. et al. "The Current And Projected Economic Burden Of Parkinson's Disease In The United States." *Movement Disorders* 28.3 (2013): 311-318. (adjusted for inflation)

²⁶The American Elder Care Research Organization. "Paying For Parkinson's Care: Financial Help For Care, Devices & Technology." *Payingforseniorcare.com*. 2016. Web. 19 July 2017.